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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 12 and 14, 2019
Mont-Joli, QC

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Foreword

The purpose of these Proceedings is to document the activities and key discussions of the meeting. The Proceedings may include research recommendations, uncertainties, and the rationale for decisions made during the meeting. Proceedings may also document when data, analyses or interpretations were reviewed and rejected on scientific grounds, including the reason(s) for rejection. As such, interpretations and opinions presented in this report individually may be factually incorrect or misleading, but are included to record as faithfully as possible what was considered at the meeting. No statements are to be taken as reflecting the conclusions of the meeting unless they are clearly identified as such. Moreover, further review may result in a change of conclusions where additional information was identified as relevant to the topics being considered, but not available in the timeframe of the meeting. In the rare case when there are formal dissenting views, these are also archived as Annexes to the Proceedings.

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SUMMARY

This document 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 12 and 14, 2019, 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 12 and 14, 2019.

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 2019 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.

BACKGROUND

This meeting was chaired by Denis Chabot and Kim Émond. Mr. Chabot reviewed the objectives and schedule of the peer review meeting. He reviewed the agenda and terms of reference for the meeting. The participants introduced themselves. Stock assessment biologist Cédric Juillet noted the contributions made by his collaborators. He provided a general overview of landings on the Atlantic coast and by fishing area (16, 17, 12A, 12B, 15, 16A, 12C, 14, 13). In 2018, landings totalled 8,502 t, a decrease of about 2% compared with 2017. Area 16 accounted for the largest share of landings, although Area 17's share increased.

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, outlooks regarding recruits/adolescents and crab left by the fishery, distribution of fishing effort, long-term recruitment (trawl) and size structures.

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, 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. These include three possible scenarios (high, intermediate, low) for setting the 2019 TAC for each area. These are established by taking the value and uncertainty of the stock status's combined index and related indicators (crab carapace size and condition, expected recruitment) into account, 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 2018. A favourable habitat index by area, based on the snow crab's thermal preferences, was briefly presented. In 2018, a reversal of the declining trend in the thermal habitat favourable to snow crab was observed in several key fishing areas (17, 16 and 14) and in the four marginal areas (12A, 12B, 12C and 16A). These interannual variations in the snow crab thermal habitat could have an impact on the productivity or abundance of this resource.

- In connection with this index, the participants suggested that the general trend and the trend over recent years compared with previous years could potentially be examined. A proposal was made to express this index in proportion to the area.
- The participants noted a global trend toward the erosion of habitat favourable to snow crab in several areas, in line with the observed warming of the deep waters of the Gulf of St. Lawrence.

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 setting the 2019 TAC. 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 16

Review of indicators: Area 16

The 2018 TAC was similar to the 2017 TAC of 3,648 t and it was reached. The commercial fishery CPUE has been declining since a high period was observed in 2013–2015 and it was below the historical average in 2018. Landings consisted mostly of recruits. The proportion of recruits increased for the third consecutive year, while that of intermediate-shell crabs decreased. The average size of landed crabs in the commercial fishery decreased between 2017 and 2018 and is just above the average.

With the exception of 2015, the commercial abundance index of the post-season survey has been declining since 2013, when the highest value in the series was observed. The 2018 value was the lowest since 2002. The abundance of adolescents ≥ 78 mm in the post-season survey has increased slightly since 2017 and is at the average level, which does not suggest a significant increase in recruitment for 2019.

The combined index decreased by 13% compared with 2017, which suggests that less biomass will be available to the fishery in 2019 than in 2018.

Monitoring of the snow crab population in Baie Sainte-Marguerite suggests that recruitment in terms of legal crab numbers associated with the 2007 recruitment wave will decrease from 2018 for about three years, before the positive effect of the 2015–2016 wave is felt. Good recruitment of legal males is anticipated from 2022–2023.

Participants made a few comments:

- Given a low observer coverage rate, participants expressed reservations about the carapace size data. It was mentioned that this issue has been forwarded to the relevant authorities and that measures would be put forward to address it.
- With regard to the distribution of fishing effort, the aim is to improve access to vessel monitoring system (VMS) data, whose database is in Newfoundland.
- It was noted that more males have reached legal size since the early 2000s, which may be related to warming. Participants mentioned the possibility that the legal size of 95 mm no longer protects the resource as well.
- A concern was raised about the mating success and fertility of primiparous females, which will need to be monitored as of 2020, given a smaller reserve of males below legal size.
- It was noted that the results of the trawl survey in Baie Sainte-Marguerite can be generalized to Area 16, based on what has been observed in the past and since several indices coincide.

Summary and outlook: Area 16

Participants discussed the summary and scenarios presented:

- In the summary of all areas, it was agreed to use management TAC data.
- For Area 16, it was agreed to include a highlight on recruitment outlooks in relation to the trawl survey.
- It is important to specify where we are in the snow crab recruitment cycle.
- It was agreed that only the delta value would be presented for the combined index.
- The participants quickly agreed on the wording of the scenarios.

Therefore, the scenarios that were proposed and agreed upon by the participants are as follows:

The 13% decrease in the combined index, in a context where fishing recruitment is expected to decline until 2021, suggests that the TAC should be reduced in 2019.

1. *High scenario:* A 10% decrease in the TAC compared with 2018.
2. *Intermediate scenario:* A 20% decrease in the TAC compared with 2018.
3. *Low scenario:* A more than 20% decrease in the TAC compared with 2018.

AREA 17

Review of indicators: Area 17

The TAC increased by 25% to 2,623 t from 2017 to 2018, and it was reached. The commercial fishery CPUE decreased from 2017 to 2018 after three years of consecutive increases. It remains above the historical average of the time series. Landings were mostly made up of recruits, with the proportion of intermediate-shell crabs declining for a fourth consecutive year. The average size of crabs caught in the commercial fishery in 2017 and 2018 was comparable and is just below the historical average.

The commercial abundance index of the 2018 post-season survey was down sharply after four years of increases and below the average. The extent of the decline observed for the north

shore was much more marked than for the south shore. The abundance of adolescents ≥ 78 mm in the post-season survey decreased between 2017 and 2018 and is below the average. However, trends differ between the two shores, with adolescents falling sharply in the survey on the north shore, with the 2018 value being the lowest observed to date, while they are up on the south shore compared with 2017, at a value just below the average.

The last scientific trawl survey in 2017 on the north and south shores predicted good recruitment until 2018 and then a subsequent decline in recruitment by 2020.

The marked and unexpected decrease in the NPUE of all crab size categories in the post-season survey on the north shore, and only for this sub-area, is a significant source of uncertainty as to the reality of the decreases observed on the north shore in this survey between 2017 and 2018.

The combined index is down 25% from the 2017 value, which suggests that the fishable biomass will be lower in 2019 than in 2018.

Participants made a few comments:

- The main comment relates to the sharp decrease in the NPUE of the post-season survey on the north shore. Many participants agree that this decrease is overestimated. Some participants associate it with the high presence of capelin, resulting in a low attraction to the traps, although it remains difficult to estimate the real impact of the phenomenon. However, it was decided to keep this indicator in the calculation of the combined index, taking this source of uncertainty into account in the wording of the proposed scenarios.
- There is some consistency between the trawl survey data in Area 17 and the data from the Baie Sainte-Marguerite survey (Area 16 west), with some lag nonetheless.

Summary and outlook: Area 17

Participants discussed the summary and scenarios presented:

- In the post-season highlight, it is important to clearly point out the problem encountered on the north shore in order to put the associated uncertainty into context. It is understood that the factors that may be involved (e.g. capelin) will be described in the text of the science advisory report.
- With respect to recruitment, participants discussed the relevance of including a highlight indicating that it could decrease in 2019.
- The participants quickly agreed on the wording of the scenarios.

Therefore, the participants recommended the following scenarios:

The sharp decline in the combined index (CI) suggests that harvest should be reduced in 2019. However, given the uncertainty in the results of the post-season survey on the north shore and that stock status is likely to be better than the CI indicates, the decrease in the CI between 2017 and 2018 is used as a low scenario.

1. *High scenario:* A 5% decrease in the TAC compared with 2018.
2. *Intermediate scenario:* A 15% decrease in the TAC compared with 2018.
3. *Low scenario:* A more than 25% decrease in the TAC compared with 2018.

AREA 12A

Review of indicators: Area 12A

The TAC was increased by 7% to 105.5 t from 2017 to 2018, and it was reached. The commercial fishery CPUE remained similar in 2018 to that of 2017 and is among the lowest values observed. Landings consisted primarily of intermediate-shell crab. The average size of crabs caught in the commercial fishery increased between 2017 and 2018 and is above the average.

All abundance indices from the 2018 post-season survey are declining or fairly stable and are among the lowest values observed in the historical series.

The combined index decreased by 7% compared with the 2017 value. The biomass available to the fishery in 2019 could be lower than in 2018.

Participants made a few comments:

- According to the industry representatives, the lack of resources affects the quality of the post-season survey.
- Reservations were expressed about the carapace size data, given a low observer coverage rate.

Summary and outlook: Area 12A

Participants made comments about the summary and came to an agreement regarding the scenarios:

- For the CPUE and all post-season survey abundance indices, they agreed that the values are among the lowest.
- They agreed that the available biomass in 2019 could be lower than in 2018.

Finally, the participants agreed on the following scenarios:

The slight decrease in the combined index suggests that the TAC should be reduced in 2019 compared with 2018:

1. *High scenario: status quo* of the TAC compared with 2018.
2. *Intermediate scenario:* A 7% decrease in the TAC compared with 2018.
3. *Low scenario:* A more than 10% decrease in the TAC compared with 2018.

AREA 12B

Review of indicators: Area 12B

The 2018 TAC was intended to enable monitoring of snow crab yields for this stock, which is considered to be in poor condition, but whose exact status is uncertain due to the absence of post-season surveys in 2017 and 2018. The TAC decreased by 28.57% between 2017 and 2018 to 125 t. The TAC was not reached, with landings of only 40 t. The area has been neglected by some fishers for various reasons and fishing effort has not been high, which may partly explain why the TAC has not been met. The CPUE increased slightly, but is the second-lowest value in the historical series. Landings consisted primarily of intermediate-shell crabs. The average size of crabs caught in the commercial fishery remained similar to that of 2017 and is among the lowest values observed since the beginning of the historical series.

A significant increase in the favourable thermal habitat available in the area was observed between 2016 and 2018.

Participants made a few comments:

- Participants believe 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.
- Industry representatives pointed out that it is not due to a lack of willingness that the post-season survey could not be conducted.
- The presence of Northern stone crab was also mentioned.

Summary and outlook: Area 12B

The following comment reflects the opinion of the participants:

- Given the high uncertainty associated with socio-economic circumstances and the lack of a post-season survey in 2018, it remains difficult to develop scenarios for this area.

Therefore, participants drew the following conclusions:

The non-attainment of the TAC, low catch rates, small size and low recruitment of snow crab suggest that stock status did not improve in 2018. Given the uncertainty about the exact status of the biomass in this area, it is impossible to make specific recommendations.

It is recommended that harvest be set at the lowest level possible for monitoring of the area, further to a consultation between the fishing industry and Fisheries and Oceans Canada (Ecosystem and Fisheries Management sector).

AREA 15

Review of indicators: Area 15

The TAC remained stable in 2018 at 631.7 t and was reached. The commercial fishery CPUE declined for a third consecutive year and is now below the historical series average. Landings mainly consisted of recruits, whose proportion increased for a second consecutive year, while that of intermediate-shell crabs decreased. The average size of crabs caught in the commercial fishery increased slightly between 2017 and 2018. These at-sea measurement values have been fairly stable for the past 10 years and are among the highest in history.

The commercial abundance index of the post-season survey has decreased over the past three years, with a marked decrease between 2017 and 2018. The abundance of adolescents ≥ 78 mm has been relatively stable in the post-season survey over the past five years.

The combined index is down 29% from the 2017 value. This was the third consecutive decline. This decline in the index suggests that there will be less biomass available to the fishery in 2019 than in 2018.

Participants made a few comments:

- Some clarifications were given about the use of databases that may contain certain errors, which must be reviewed, shared and revalidated.
- With regard to the post-season survey, participants questioned the impact of changing traps (replacing Japanese traps with standard traps) and the approach for standardizing the series. Indeed, work needs to be done on this issue. However, this has no impact on the

comparison of 2019 data with 2018 data. Some participants would prefer to see both NPUE trends presented.

- Participants mentioned the reservation expressed during the last assessment about the NPUE values of crab left by the fishery and of recruits in 2017, while the reliability of identifying carapace conditions was questioned the same year. The same concerns about post-season survey sampling also applied to Areas 16A and 12C. However, the correction could not be made for 2017, although uncertainty was raised. There seems to be no reason to doubt the quality of the identification of carapace conditions in this area and surrounding ones in 2018. As a result, only the NPUE values of crab left by the fishery and of recruits in 2017 would be somewhat unreliable.
- The at-sea observer program is being challenged by the industry. Coverage remains low and the data are considered insufficient and not very rigorous. A lack of transparency was also mentioned.
- Participants questioned the significant presence of white crabs as of the second half of the fishing season. These crabs are very vulnerable to release and, if caught, they will not be available the following year. It is better to spare these crabs, which will have a higher value the following year.
- According to several participants, current observations suggest that the stock is in a trough.
- For trawl survey data, participants would like the 2018 value to be included in the graphs. Participants found this data very useful in illustrating the recruitment waves. However, the stock assessment biologist reminded participants that this information is already available.

Summary and outlook: Area 15

The participants discussed the summary and wording of the scenarios:

- It is important to agree on the correct wording specifying the value at which a change (decrease or increase) is observed. This wording will be applied to each area. Further clarifications about the wording of the highlights were provided.
- With regard to crab size, participants agree that values from 2008 to 2018 are comparable.
- In the highlight regarding the post-season survey, some participants recommended not mentioning recruitment given the uncertainty surrounding this issue.

The participants agreed upon the following scenarios:

A third decline in the combined index in a context where recruitment to the fishery is expected to remain low in the short term suggests that the TAC should be reduced in 2019.

1. *High scenario:* A 25% decrease in the TAC compared with 2018.
2. *Intermediate scenario:* A 30% decrease in the TAC compared with 2018.
3. *Low scenario:* A more than 30% decrease in the TAC compared with 2018.

AREA 16A

Review of indicators: Area 16A

The TAC decreased by 10% to 412.9 t in 2018 and it was not reached (landings of 369 t). The fishery was closed as of July 14, 2018, due to an increase in the proportion of white crab in catches. The commercial fishery CPUE decreased for a fourth year. The 2018 CPUE is the lowest since the series began in 2004. Landings in 2018 consisted of a large majority of recruits.

The average size of crabs caught in the commercial fishery remained stable between 2017 and 2018 and is at the historical average.

The commercial abundance index of the post-season survey has declined significantly over the past four years. The abundance of adolescents ≥ 78 mm remained low and relatively stable in the post-season survey between 2017 and 2018, which does not suggest an increase in recruitment to the fishery in 2019.

The combined index was down for the fourth consecutive year (24% decrease from 2017 to 2018). This decline in the index suggests that there will be less biomass available to the fishery in 2019 than in 2018.

Participants made a few comments:

- For carapace conditions at dockside, some verifications will be done for 2005 and 2006.
- Participants agreed on presenting the two NPUE trends (Japanese and standard) next year.
- Industry representatives would like to see the CPUE for the period before the fishery closed due to the presence of white crabs. This closure must be reported in the summary. CPUEs by week and gear type for 2017 and 2018 were presented at the industry's request.

Summary and outlook: Area 16A

Participants commented on the proposed summary and scenarios:

- In the TAC highlight, participants agreed to integrate information about the closure of the fishery as of July 14 due to the high proportion of white crab in the fishery.
- With regard to average crab size, participants agreed that values are comparable to those between 2017 and 2018.
- It should be noted that the lowest CPUEs have been observed since 2004 and that there has been a significant decrease in the NPUE over the past four years.
- Recruitment to the fishery is expected to be lower in 2019 than in 2018.
- With respect to the proposed scenarios, given the current uncertainty, it is advisable to remain cautious.
- Participants returned to discussing the relevance of recommending harvest versus TACs. In areas where TACs are met, the two terms are equivalent, and no questions arise. However, when the TAC is not met, it gets a little more complicated.

After discussing this issue, participants agreed upon the following scenarios:

The 24% decrease in the combined index, which was the fourth consecutive one, suggests that the TAC should be reduced in 2019, in a context where recruitment is expected to remain stable and/or low.

1. *High scenario:* A 25% decrease compared with the 2018 value.
2. *Intermediate scenario:* A 30% decrease compared with the 2018 value.
3. *Low scenario:* A more than 30% decrease compared with the 2018 value.

AREA 13

Review of indicators: Area 13

The TAC remained unchanged at 406 t and was not reached (landings of 328.8 t). After several years of relatively high values, the commercial fishery CPUE declined sharply from 2017 to 2018, and is below the historical average in 2018. Landings consisted primarily of intermediate-shell crab in 2018. The average size of crabs caught in the commercial fishery decreased over the past two years to below the historical average in 2018. It should be noted that the decrease in the average size of crabs caught in the commercial fishery could be associated with the lack of at-sea sampling on the south side and a northward shift in fishing effort covered by the At-Sea Observer Program.

The commercial abundance index of the post-season survey on the north side of the area declined sharply for a second consecutive year and is at the level of the historical average in 2018. The 2018 value for the south side of the area is up from the previous year, but remains below the historical average and is among the lowest values in the historical series. The abundance of adolescents ≥ 78 mm remained low and stable in the post-season survey, which does not suggest a significant increase in recruitment to the fishery in 2019.

The combined index decreased by 42% from 2017 to 2018. The biomass available to the fishery in 2019 could be lower than in 2018.

Participants made a few comments:

- As suggested in previous assessments, abundance indices are presented by region (north versus south) to get a better idea of what is happening on each side.
- Participants noted the presence of a large number of primiparous females, but a limited number of large males, which could explain the low spermatheca load rates.
- Although the indices are decreasing, a recruitment wave is being detected that could be felt around 2022.
- It was mentioned that various factors (e.g. presence of capelin and herring, difficult weather) could account for the failure to reach the TAC, as well as the decline in the indices. This aspect could be addressed in the text of the science advisory report.
- However, it was noted that the various abundance indices all point in the same direction.
- In the science advisory report, it could be specified that most of the commercial catches were conducted on the north side.

Summary and outlook: Area 13

Participants discussed the summary and scenarios to be recommended:

- With respect to the highlight on the post-season survey, it is important to note that there is a significant decrease in the NPUE on the north side in 2018 in terms of the historical average. On the south side, despite an increase in 2018, it should be noted that this is far from the historical average and the NPUE is among the lowest values.
- Reference to trawl survey data should be included in the recruitment highlight. It is hoped that the medium density series will be included in the text of the science advisory report.
- A discussion took place regarding the percentage to be recommended for the intermediate scenario. For industry members, the value of the combined index (-42%), as proposed by

Science, appears too high. Some participants suggested a 25% reduction. In the end, participants agreed upon an intermediate value, i.e. 35%. The other two scenarios were derived from this one.

The participants agreed on the following scenarios:

The significant decrease (42%) in the combined index (CI), while recruitment is expected to remain low, suggests decreasing the TAC in 2019. In the presence of a stock exploited at a lower intensity than neighbouring fishing areas since its reopening, the area's CI value was used as a reference for the low scenario, which reflects this specific aspect.

1. *High scenario:* A 25% decrease in the TAC compared with 2018.
2. *Intermediate scenario:* A 35% decrease in the TAC compared with 2018.
3. *Low scenario:* A more than 45% decrease in the TAC compared with 2018.

AREA 14

Review of indicators: Area 14

The TAC decreased by 10% in 2018 to 617.3 t. It was almost met. The commercial fishery CPUE declined sharply for the second consecutive year and is below the historical average in 2018. Landings consisted primarily of intermediate-shell crab in 2018. The average size of crabs caught in the commercial fishery shows a strong upward trend between 2012 and 2018, with the last year being among the highest values.

The commercial abundance index of the post-season survey has declined significantly over the past four years, to below the historical average in 2018. The abundance of adolescents ≥ 78 mm has remained low and fairly stable in the post-season survey over the past four years, which suggests that recruitment to the fishery will not increase in 2019.

The combined index decreased by 38% from 2017 to 2018. This is the fourth consecutive decline, which suggests that the biomass available for fishing in 2019 will be lower than in 2018.

The main comments made were as follows:

- For Area 14, a recruitment wave is also expected to occur around 2022.
- Participants noted a problem with sea fleas (amphipods), which would affect trap catchability in the post-season survey, in addition to strong currents.

Summary and outlook: Area 14

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

- With regard to whether or not the TAC was reached, it was mentioned that it was almost reached.
- With regard to the highlight on average size in 2018, it is more accurate to talk about one of the highest values.
- In the post-season survey highlight, it should be noted that the NPUE has decreased significantly over the past four years.
- It was mentioned that this is the fourth consecutive decline in the combined index.
- Recruitment data were considered to have been affected by difficult conditions during the post-season survey.
- Participants briefly discussed the wording of the three scenarios.

They agreed upon the following scenarios:

A significant decrease (38%) in the combined index with no indication of improved recruitment suggests that the TAC should be reduced in 2019.

1. *High scenario:* A 25% decrease in the TAC compared with 2018.
2. *Intermediate scenario:* A 35% decrease in the TAC compared with 2018.
3. *Low scenario:* A more than 35% decrease in the TAC compared with 2018.

AREA 12C

Review of indicators: Area 12C

The TAC decreased by 10% to 256.4 t and was not met (landings of 235 t). The commercial fishery CPUE is down for the second consecutive year. The CPUE in 2018 is among the lowest values observed in 25 years. Landings consisted primarily of intermediate-shell crab, and they declined between 2016 and 2018. The average size of crabs caught in the commercial fishery remained close to the historical averages at sea and dockside in 2018.

The commercial abundance index of the post-season survey decreased significantly over the past four years. The abundance of adolescents ≥ 78 mm remained low and fairly stable in the post-season survey between 2014 and 2018, which does not suggest an increase in recruitment to the fishery in 2019.

The combined index decreased for a fourth consecutive year, with a 26% decrease from 2017 to 2018. This decline in the index suggests that there will be less biomass available to the fishery in 2019 than in 2018.

Participants made the following comments:

- There was agreement that the TAC was “nearly” reached.
- Participants reiterated that a coral and sponge protection area was established in 2018.

Summary and outlook: Area 12C

Participants briefly discussed the proposed summary and scenarios:

- In the average size highlight, participants agreed that it has remained close to the historical average.
- For the post-season survey, it should be noted that the NPUE has decreased significantly over the past four years.
- With regard to the combined index, the highlight must emphasize that the decline is continuing.

The participants quickly agreed on the wording of the scenarios:

The 26% drop in the combined index, during a period of stable and low recruitment, suggests that the TAC should be reduced in 2019.

1. *High scenario:* A 25% decrease in the TAC compared with the 2018 value.
2. *Intermediate scenario:* A 30% decrease in the TAC compared with the 2018 value.
3. *Low scenario:* A more than 30% decrease compared with the 2018 value.

RESEARCH IDENTIFICATION AND PRIORITIZATION

With respect to research priorities, Mr. Juillet mentioned a capture-tag-recapture project in Areas 16 and 14 funded by the Fisheries Science Collaborative Program (FSCP), which will be extended to all of Canada's East Coast if funding is granted in 2019.

APPENDIX 1 – TERMS OF REFERENCE

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

Regional Peer Review – Quebec Region

February 12 and 14, 2019
Mont-Joli, Quebec

Chairpersons: Denis Chabot and Kim Emond

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 2017, landings have totaled 8,350 t, down by 9% from 2016.

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 2019 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 of 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- and sub-legal-size crabs, mean carapace width for males and spermatheca load;
- Analysis of data from trawl surveys conducted annually in certain 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 2019 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
- Proceedings

Participation

- Fisheries and Oceans Canada (DFO) (Science, and Ecosystem and Fisheries Management sectors)
- Fishing industry
- Provincial representatives

- Aboriginal communities / organizations

APPENDIX 2 – LIST OF PARTICIPANTS

Name	Affiliation	Feb. 12	Feb. 14
Bernier, Denis	DFO - Science	x	-
Blais, Rosaire	Co-management Area 16	x	-
Boivin, Brian	DFO - Science	x	-
Boucher, Jean-René	RPPNG-OPCNZ 16	x	-
Boucher, Larry	Co-management Area 16	x	-
Bourassa, Luc	Consultant Biologist	x	x
Bourdages, Hugo	DFO - Science	x	x
Bourdages, Yan	Fisher Area 12B	x	-
Brulotte, Sylvie	DFO - Science	x	-
Bruneau, Benoit	DFO - Science	x	-
Castonguay, Martin	DFO - Science	x	-
Chabot, Denis	DFO - Science	x	x
Chamberland, Jean-Martin	DFO - Science	x	-
Chevalier, Jody (tel)	Fisher Lower North Shore	x	-
Collier, Frank (tel)	LNSFA	-	x
Côté, Francis	Fisher Area 12A	x	-
Côté, Langis	Fisher Area 12A	x	-
Couillard, Catherine	DFO - Science	x	-
Cyr, Charley	DFO - Science	x	x
Desgagnés, Mathieu	DFO - Science	x	x
Doucet, Marc	Fisher Area 17	x	-
Dubé, Sonia	DFO - Science	x	x
Duplisea, Daniel	DFO - Science	-	x
Emond, Kim	DFO - Science	x	-
Faille, Geneviève	DFO - Science	x	-
Fequet, Ross (tél)	Fisher Lower North Shore	-	x
Galbraith, Peter	DFO – Science	x	-
Gauthier, Pierre	DFO – Science	x	-
Gauthier, Sylvain	Co-management Area 16	x	-
Gilbert, Michel	DFO – Science	x	x
Girard, Mathieu	Fisher Area 12B	x	-
Gionet, Paolo	Office des pêcheurs de la CN Area 16	x	-
Gosselin, Claude	Fisher Area 17	x	-
Hurtubise, Sylvain	DFO - Science	x	-
Joncas, Jean-Richard	Fisher Lower North Shore	x	x
Juillet, Cédric	DFO - Science	x	x
Lacasse, Olivia	DFO - Science	x	-
Lambert, Jean	DFO - Science	x	x
Landry, René	Fisher Area 17	x	-
Langelier, Serge	AMIK	x	x
Leclerc, Caroline	DFO – Fisheries management	x	-
Léonard, Pierre	Essipit First Nation	x	-
Monger, Marc	Fisher Area 14	x	x
Morin, Bernard	DFO – Fisheries management	x	x
Morin, Mathieu	DFO – Fisheries management	x	x
Nadeau, Paul (tel)	LNSFA	x	x
Pinette, Majoric	Pessamit First Nation	x	-
Poirier, Serge	Co-management Area 16	x	-
Rock, Anne	Pessamit First Nation	x	-
Rowsell, Austin	Fisher Area 12C	x	x
Roy, Virginie	DFO - Science	x	-

Name	Affiliation	Feb. 12	Feb. 14
Saint-Laurent, Érick	DFO – Fisheries management	x	-
Sainte-Marie, Bernard	DFO - Science	x	x
Sandt-Duguay, Emmanuel	AGHAMM	x	-
Smith, Andrew	DFO - Science	x	-
Stubbert, Curtis	Fisher Area 15	x	x
Talbot, Héléna	DFO - Science	x	-
Tambrari, Hacène	DFO - Science	x	-
Thibeault, Sébastien	Fisher Area 17	x	-
Thomas, Roland (tel)	Fisher Lower North Shore	-	x
Tremblay, Claude	DFO - Science	x	-
Vigneault, Guy	Co-management Area 16	x	-
Weiner, Guy-Pascal	Malecites of Viger	x	-