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Canadian Science Advisory Secretariat (CSAS)

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Arctic Region and Ontario and Prairie Region

Proceedings of the Regional Peer Review on the Stock Assessment of Northern Shrimp (*Pandalus borealis*) and Striped Shrimp (*P. montagui*) in the Eastern Assessment Zone and Western Assessment Zone for the 2023-24 Fishing Season

Meeting dates: February 15–16, 2023
Location: Winnipeg, MB and Virtual

Chairperson: Joclyn Paulic
Editor: Kayla Gagliardi

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February 2024

Canada

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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Aussi disponible en français :

*MPO. 2024. Compte rendu de l'examen régional par les pairs de l'évaluation de la crevette nordique (*Pandalus borealis*) et de la crevette ésope (*P. montagui*) dans la zone d'évaluation Est et la zone d'évaluation Ouest pour la saison de pêche 2023-24; du 15 au 16 février 2023. Secr. can. des avis sci. du MPO. Compte rendu 2024/010.*

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SUMMARY

A Canadian Science Advisory Secretariat (CSAS) Regional Peer Review Process on the Stock Assessment of Northern Shrimp (*Pandalus borealis*) and Striped Shrimp (*P. montagui*) in the Eastern Assessment Zone (EAZ) and Western Assessment Zone (WAZ) for the 2023–24 fishing season was held February 15–16, 2023 as a hybrid in-person/virtual meeting. Fisheries and Oceans Canada (DFO) Resource Management requested a biennial stock assessment for Northern Shrimp and Striped Shrimp in the EAZ and WAZ. While monitoring occurs every year, DFO Science conducts a full stock assessment, which examines available fishery data to evaluate the state of the stock (stock status indicators) and other environmental factors that could affect the stocks (i.e., climate, oceanographic conditions, predator-prey relationships) every two years. In the interim years, DFO Science provides an update on the status of the stocks, which generally serves as a mechanism to consider stock status indicators (i.e., biomass and exploitation rate indices) within the context of the Precautionary Framework. This science advice will be used by Fisheries Management for future consultations with the Nunavut Wildlife Management Board, Nunavik Marine Region Wildlife Management Board and the Northern Shrimp Advisory Committee (NSAC) to inform the co-management decision-making process on annual harvest levels for the fisheries.

The objectives of this peer review meeting were to 1) review and update the stock status indicators (biomass indices, exploitation rate indices) and catches for Northern Shrimp and Striped Shrimp in the EAZ and WAZ within the context of the Precautionary Framework (Limit Reference Points and proposed Upper Stock Reference Points); and, 2) review available and relevant summaries of oceanographic conditions, biological community structure and trends, and pertinent knowledge of ecological interactions (e.g., predator/prey interactions) and other stressors (e.g., anthropogenic impacts).

This Proceedings report summarizes the relevant discussions and presents key conclusions reached during the meeting. Additional publications from this process will be posted on the DFO Canadian Science Advisory Secretariat website as they become available.

PRESENTATIONS

OPENING WELCOME/OVERVIEW OF THE CANADIAN SCIENCE ADVISORY SECRETARIAT (CSAS) PEER REVIEW PROCESS

Presenter: J. Paulic (Chair)

The Chair provided an overview of Canadian Science Advisory Secretariat (CSAS) and the peer review process as well as the role of participants, guidelines for the meeting, and the expected meeting products. The Terms of Reference (Appendix 1) were reviewed and the meeting agenda (Appendix 2) was presented. Participants from the meeting included affiliates from Fisheries and Oceans Canada (DFO), Science and Fisheries Management sectors (Ontario and Prairie, Newfoundland and Labrador, Arctic, and National Capital regions), Nunavik Marine Region Wildlife Board (NMRWB), fishing industry, academia, and other invited experts (Appendix 3).

CONTEXT FOR THE REQUEST

Presenter: C. D'Aoust

Summary

Context for the request from the client sector was presented. Information from this meeting will be used by DFO Fisheries Management to inform the co-management decision-making process for the Eastern Assessment Zone (EAZ) and Western Assessment Zone (WAZ) on annual harvest levels for the fisheries.

Discussion

It was brought to the attention of meeting participants that there were concerns with the limited participation from industry members for this CSAS meeting and noted that this year was challenging due to the fragmented approach (e.g., Shrimp Fishing Area [SFA] 4 was being assessed later and not with EAZ/WAZ). Although this is not ideal, the northern co-management boards need the advice earlier. The Chair noted that the goal of the meeting was to have a balance of expertise and the Steering Committee attempted to ensure that balance was met. It was suggested to consider including key offshore captains as participants for future meetings as they could help with providing information and interpretation of data.

WORKING PAPER OVERVIEW

Stock Status of Northern Shrimp, *Pandalus borealis*, and Striped Shrimp, *Pandalus montagui*, in the Eastern and Western Assessment Zones

Presenter: S. Fulton

Summary

The status of the Northern Shrimp (*Pandalus borealis*) and Striped Shrimp *(P. montagui*) resources in the EAZ and the WAZ were assessed based on the results of fishery-independent surveys jointly conducted by DFO, the Northern Shrimp Research Foundation (NSRF) and commercial catch information. Data for the EAZ spans the years 2009–2022 while the current WAZ time series spans 2014–2022. Results from individual survey areas within the EAZ are

also provided. Based on the data, the presenter provided a summary of findings for each assessment area and species.

Discussion

More clarification on the equations for biomass and bump factors (i.e., how does sub-sample weight change to full trawl) was requested in written reviews from participants and will be clarified in the working paper. It was suggested to add the verbal context that was presented on the methods used for this assessment into a shareable presentation and think about making it available for industry members as a standalone piece (e.g., video, Board meeting presentation). The working paper author also suggested adding a worked example as an appendix in the Research Document. The Upper Stock Reference (USR) proposed by DFO Science is currently 80% for all four stocks. It was recommended to keep the USR in the Female Spawning Stock Biomass graphs like it was originally presented, but emphasize that it is a proposed line for now. It was clarified that if the USR were to be set as 70%, instead of 80%, the stocks would still remain in their current zones, but it would affect how much of the confidence interval would fall into its neighboring zone within the Precautionary Approach (PA) Framework. There were questions around if it would be beneficial to also show a USR of 70% on the graphs since it has been brought up at the Northern Precautionary Approach Working Group. Since 70% has only been discussed so far and not approved, including it would not be justified at this point; however, managers could look at it and extrapolate. It was suggested to consider using individual graphs in the documents instead of groups of four for better readability or increasing the quality/size of images.

It was asked if there is any indication as to why catches have been low this year for *P. borealis* in the WAZ compared to others and if it may be due to business decisions or resources. Participants explained that it seems as though there is not a directed fishery for *P. borealis* in the WAZ and it is mostly bycatch. There also appears to have been more fishing in the EAZ this year compared to others and the catches of *P. borealis* in that area were not sizable. More generally for the fishery it was also a record year for *P. montagui* in the WAZ and the catch rates were good as the area was fishable until December which is exceptional for accessibility. It was noted that fishing information from captains could be helpful for answering this question.

It was suggested to monitor shrimp sizes every year as some vessels have said it was the best sizes in a decade, particularly for *P. borealis* in the EAZ. Data was not available in time to include in the working paper or to share at this meeting, but once it is received it can be shown at the next meeting. Science will follow up with industry members to let them know if there is value in adding shrimp size to the observer data reports, and if there is a potential index to use. It may also be possible to collaborate with at-sea observers to get captains involved with this discussion.

Oceanography: Ocean Climate Variability in the Northwest Atlantic Ocean

Presenter: F. Cyr

Summary

The Northwest Atlantic Ocean is a highly variable environment that naturally undergoes decadal-scale variations of its ocean circulation driven by Sea-Level Pressure (SLP) patterns. The Newfoundland (NL) climate index is from 1950–2022 and “normal” is defined as the 1991–2020 average. The 1960s was the warmest decade and the mid-1980’s/early 1990’s was the coldest period (1991 being the coldest year). Since 2020, the NL climate index is in a warm phase (2021 was a record), characterized by a cold winter in the north and a warm summer in the south. For the first time since 2017, the bottom temperature was colder than average in the

EAZ. Bottom temperature in the WAZ was still warmer than average after the record high established in 2021. Bottom salinity was slightly fresher than average in the EAZ and normal in the WAZ.

Discussion

It was recommended to add more clarification/context on how the reference period changes every 10 years and why the term “normal” is used for the average. A future consideration could be to expand the analysis to look at sea ice in the Arctic as current reporting is only for the NL region. It was asked if melting of the polar ice cap influences ocean temperatures and suggested to possibly do an analysis of correlation with temperature shifts over time to see if relationships between temperature and fish could be predicted instead of just using observations.

It was noted that there are no clear linkages to climate change at this point. There may be more bias to warm anomalies in future years that would be influenced by climate change, but it is currently hard to draw a trend.

A participant asked how volume is considered as a factor for bottom temperature and it was clarified that only sea floor temperature has been looked at so far. Volume has not been deciphered yet as the properties and ratio of the source current can change. Bottom temperature is usually quite stable between weeks but if it is possible to get moorings from the previous year this could provide more insight into weekly/monthly changes and provide more environmental data for the next assessment.

Redfish: Juvenile Redfish Resurgence in the EAZ – Potential Impact on Shrimp Stock Biomass

Presenter: W. Walkusz

Summary

Redfish are present in the EAZ and WAZ historically and at present; however, few are found in the WAZ. A resurgence of juvenile redfish was observed in the EAZ in the NSRF survey results with large bycatches. The same method used to calculate shrimp biomass is now being used to calculate redfish biomass with NSRF data, which resulted in a notable juvenile redfish biomass increase from 2019–2022. The diet/stomach contents of approximately 400 redfish from three cohorts were analysed. The youngest fishes fed primarily on energetically rich species like copepods, which are also fed on by Arctic Cod (*Boreogadus saida*). Larger redfish ate more amphipods and the largest redfish ate more shrimp and *Calanus hyperboreus*. As redfish grow their diet changed from small and energetically dense species to less energetically dense but bigger species. The next step for this work would be to look at energetic differences. In summary, juvenile redfish are generally planktonic feeders and although there are diet changes between cohorts they generally still feed on planktonic species.

Potential implications from a resurgence of redfish in the ecosystem may include: 1) competition for food with other pelagic species (e.g., Arctic Cod, another pelago-benthic species in the area); 2) an increased source of food for predators (e.g., Greenland Halibut [*Reinhardtius hippoglossoides*]); and, 3) other unknown potential that could alter the ecosystem through heavy pelagic feeding. Additionally there could be potential for a new fishery (if redfish stay in the same location and grow to be fishable). From the shrimp perspective, implications of resurgence of redfish from the ecosystem include active feeding of redfish on shrimp (once large enough; approximately 19–20 cm), strong competition with shrimp over available food resources (estimation that in some locations entire food base may be cleared, on a large scale 10–20 % of

zooplankton removed), and potential for a mass removal of larval shrimp during the advection phase (with currents) and during the settlement (considering redfish eating larger zooplankters).

Discussion

It was noted that there is a caveat for using the same methodology for calculating shrimp biomass for redfish since redfish schools are mobile and the same school could be counted twice. However, the method is still a good measure of the relative boom compared to previous years and provides a solid relative index with the caveat that it does not reflect definitive numbers and that there is not 100% certainty. Even if the method is flawed, as long as the same method is used consistently, then booms can still be seen over the years (the same method was used for Arctic Cod). The authors will make it clearer that this is an index/exploratory work and that biomass indexes should be taken with caution.

It was asked if there has been any plans as of recent to start doing a more constructive system for targeting redfish/examining changes. It was also asked if the potential large removal of shrimp is for the larval stage and if this has been talked about in other regions or if there are plans to build on this research. The presenter explained that it is unknown exactly when the planktonic stage happens as redfish spawning events are very unpredictable but there is work happening now to determine diet and distribution. Redfish are being collected on an annual basis with the NSRF and there is genetic work being done; however, there is a need for more research and methods to predict what is going to happen with the population. There is currently no pelagic survey happening for Arctic Cod in the area so this cannot be used to help with redfish questions. There is indication of two large cohorts, but no numbers to characterize how big they are.

It was noted that the *Calanus* found in redfish stomachs were primarily females that were just descended to diapause. A participant asked if seasonal variability may be occurring and if stomachs from other times of the year could be looked at to see if contents are changing over time. It was explained that redfish will eat what they can find based on availability and it may become more specific at different times of the year; however, the samples so far are only from late summer. Samples collected at the same time of year give comparability between years but not season to season.

It was noted that the 2010 and 2021 pulses look like they might correspond to the two warm phases that occurred in the past and asked if there is any historical record of redfish in the area from the 60s (even if just quantitative) that could support this. There may be historical data available from past papers to look into this and also to support if the increases in redfish should truly be classified as a resurgence as opposed to just another surge.

Predator-Prey: Pandalid Shrimp as Prey Items in the Diets of Six Demersal Fish Taxa

Presenter: S. Atchison

Summary

An exploratory overview was done to collect biological information on predators of Pandalid shrimps and examine Pandalid shrimps as a prey items in the EAZ, WAZ, and SFA4 from 2018–2021. All predator groups came from the NSRF survey at pre-designated stations and six groups were included in the study of Pandalid shrimp as a prey item: Atlantic Cod (*Gadus morhua*), Greenland Halibut, Grenadier (*Macrourus sp*.) American Plaice (*Hippoglossoides platessoide*), redfish (*Sebastes sp., S. mentella, S. norvegicus,* and *S. fasciatus*), Skates (Rajidae family, *Raja sp., Amblyraja radiata,* and *A. hyperborea*). Greenland Halibut made up the majority of predators examined.

The stomachs of 2,701 predators were examined and prey items from 11 phyla and 15 classes were found, with Grenadier and Greenland Halibut having the highest diversity and redfish and Atlantic Cod having the lowest. For the presence/absence of Pandalids relative to stomachs with non-pandalid prey items and empty stomachs the relative proportion of Pandalid prey items within predator groups remained consistent across years. Pandalids were present in all length classes of Atlantic Cod (small sample size). In other predator groups pandalids were present in distinct length classes. For Greenland Halibut stomachs containing Pandalids, *P. borealis* was the proportionally highest item in the EAZ and SFA4 except in the largest length category (60–80 cm) in the EAZ, where *P. montagui* surpassed *P. borealis*. As predator size increased the proportion of *P. montagui* increased and *P. montagui* was the dominant pandalid prey item for > 20 cm length categories in the WAZ. For the average number of individual *P. borealis* and *P. montagui* per stomach per 5 cm length category, Atlantic Cod had both the largest mean number of *P. borealis* and largest standard deviation, up to 12 shrimp in a single stomach. *P. borealis* and *P. montagui* were found in Greenland Halibut of almost all length classes. Overall, there was a higher total number of *P. borealis* observed across more predator/length categories then *P. montagui*.

Plans for next steps for this research include continuing sampling using this data to focus on specific questions (i.e., looking at more Atlantic Cod), building a shrimp predation model (postdoc/Atlantic Fisheries Fund/MUN), and turning presence/absence into biomass of Pandalid prey items using length/weight data from survey.

Discussion

It was asked if it is fair to predict that if redfish populations continue to grow and become a significant predator, then the consequences may be more of a risk to *Pandalus borealis* than *P. montagui* due to temperature preferences. This is a fair hypothesis; however, even though where they overlap/the probability of co-occurrence is known, this cannot be a definitive statement at this point as there is not any information for directed feeding. A spatial analysis could be done separately or built into a model that has already been proposed which a postdoc is working on now.

It was explained that the sample size of Atlantic Cod was lower than for other species due to the pre-selected sites; however, the sampling protocol could be changed in the future to obtain more samples. It was recommended to expand on text in the working paper to note that a good portion of the redfish that were caught had everted stomachs, making it difficult to conclude what they were eating. The authors will explicitly note in the working paper that all of the work in this section was an exploratory analysis of what has been done so far using limited data/small sample sizes. It was agreed to not include preliminary statistics at this point but include a paragraph outlining next steps and how more can be done once more data is collected.

DRAFTING AND DISCUSSION OF SCIENCE ADVISORY BULLETS

The original draft Science Advisory Report (SAR) only presented information/data associated with stock status and not the other sections of information that were included in the working paper (e.g., oceanography, impacts of increased redfish, predator-prey interactions). It was agreed to add an ‘ancillary ecosystem information’ section to the SAR to include more details but note that there is still limited data (oceanographic/ecosystem data) compared to other areas.

After discussion participants agreed on:

- broadly acknowledging SFA4 in a summary bullet since there is potential for transport even though there is no data for it in the report;

- adding to the general summary bullet that connectivity between management zones is currently poorly understood;
- adding a piece about fluctuations to the general summary bullets and how linkages need to be considered to interpret fluctuations in biomass within and among assessment areas, even within the same year since fluctuations in areas can be relative to each other;
- emphasizing that the emergence of juvenile redfish in the EAZ was a large biomass; however, the magnitude/duration of potential direct and indirect impacts is unknown;
- not including a bullet for the prey items since this is consistent information and will be mentioned in the general summary bullet and discussed more in the rest of the documents;
- using geometric means throughout the documents, which is used in the PA framework;
- changing confidence intervals to probability as it is easier to understand and adding a statement to the working paper on how probability is calculated; and,
- adding that both the reported and potential exploitation rates were the highest in the time series for *Pandalus borealis* in the EAZ.

There was discussion on whether to use the long term (moving) mean (from 2009–2021) or reference period mean (from 2009–2019 for the EAZ and 2014–2019 for the WAZ; the timeframe used for LRP calculation) for the biomass indexes. There were votes for using the reference period mean with the rationale that the time period reflects a relatively stable productive period which is justified to use as a point of comparison. There were also votes for using the long term non-stationary mean since the stock is variable and the long term mean would capture change if the time series were to vary/fluctuate, whereas the reference period mean could dilute year-to-year departures from it. It was agreed to include both means throughout the documents.

It was suggested to consider tracking the relationship between the two means. If they are similar it would support the assumption that there is not a trend (stock is varying without trend over time) until a point where the two means are different enough in the future. It may be helpful to present a figure that shows the long term mean reported relative to the reference mean to plot any departure over upcoming years. Since the current values overlap this would not be useful yet; however, it may beneficial to look at in the future. It was recommended to not just assume that there is no trend (without verifying), but rather monitor this assumption over time to ensure it remains valid (by monitoring both means).

The reduced number of stations sampled in the WAZ was noted in the sources of uncertainty and how it influenced the confidence intervals. A lower number of stations corresponds to higher confidence intervals but there was still the required minimum number needed to complete biomass estimates. It was clarified that since only a few stations were missed in the EAZ, the impact to the confidence intervals was minimal.

CONCLUSION

It was noted that the draft working paper reviewed by participants ahead of the meeting still required a conclusion section to integrate all of the information from the above presentations together. This will be added to the final working paper and noted in the SAR. The group agreed to accept the working paper as a research document with the addition of the verbal and written comments provided before and during the meeting.

APPENDIX 1. TERMS OF REFERENCE

Stock Assessment of Northern Shrimp (*Pandalus borealis*) and Striped Shrimp (*P. montagui*) in the Eastern Assessment Zone and Western Assessment Zone for the 2023-24 fishing season

Regional Peer Review - Ontario and Prairie Region

February 15-16, 2023
Virtual Meeting

Chairperson: Joclyn Paulic

Context

Fisheries and Oceans Canada (DFO) Fisheries Resource Management requests a biennial stock assessment for Northern Shrimp (*Pandalus borealis*) and Striped Shrimp (*Pandalus montagui*) in the Eastern and Western Assessment zones (EAZ/WAZ). While monitoring occurs every year, DFO Science conducts a full stock assessment, which examines available fishery data to evaluate the state of the stock (stock status indicators) and other environmental factors that could affect the stocks (i.e., climate, oceanographic conditions, predator-prey relationships) every 2 years. In the interim-years, DFO Science provides an update on the status of the stocks, which generally serves as a mechanism to consider stock status indicators (i.e., biomass and exploitation rate indices) within the context of the Precautionary Framework. The full stock assessment and the stock status updates are used by DFO Fisheries Management to inform the co-management decision-making process on annual harvest levels for the fisheries.

The last stock status update was held in January 2022, and all stocks were determined to be in the Healthy Zone based on preliminary (not yet finalized) Upper Stock Reference points (DFO 2022). DFO Fisheries Management has requested a full stock assessment to inform decision-making for the upcoming 2023/24 fishing season. This stock assessment will report on the catches to the end of the 2022 fishing season and biomass indices from the 2022 survey using the limit reference indicators developed in 2020 (DFO 2020). This science advice will be used by Fisheries Management for future consultations with the Nunavut Wildlife Management Board, Nunavik Marine Region Wildlife Management Board and the Northern Shrimp Advisory Committee (NSAC).

Objectives

The objective of this peer-review meeting is to:

- review and update the stock status indicators (biomass indices, exploitation rate indices) and catches for Northern Shrimp and Striped Shrimp in the EAZ and WAZ within the context of the Precautionary Framework (Limit Reference Points and proposed Upper Stock Reference Points); and,
- review available and relevant summaries of oceanographic conditions, biological community structure and trends, and pertinent knowledge of ecological interactions (e.g., predator/prey interactions) and other stressors (e.g., anthropogenic impacts).

Expected Publications

- Science Advisory Report
- Research Document

- Proceedings

Expected Participation

- Fisheries and Oceans Canada (DFO), Science and Fisheries Management sectors (Ontario and Prairie Region, Newfoundland and Labrador Region, Arctic Region, and National Capital Region)
- Nunavut Wildlife Management Board (NWMB)
- Nunavik Marine Region Wildlife Board (NMRWB)
- Fishing Industry
- Academics
- Other invited experts

References

DFO. 2020. Science Advice on Limit Reference Points for Northern Shrimp (*Pandalus borealis*) and Striped Shrimp (*Pandalus montagui*) in the Eastern and Western Assessment Zones. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2020/053.

DFO. 2022. Update of stock status indicators for Northern Shrimp, *Pandalus borealis*, and Striped Shrimp, *Pandalus montagui*, in the Western and Eastern Assessment Zones, January 2022. DFO Can. Sci. Advis. Sec. Sci. Resp. 2022/013. (Erratum: February 2022)

APPENDIX 2. LIST OF MEETING PARTICIPANTS

Name	Organization/Affiliation
Joclyn Paulic (Chair)	DFO Science, Ontario and Prairie Region
Kayla Gagliardi (Rapporteur)	DFO Science, Ontario and Prairie Region
Sheila Atchison	DFO Science, Ontario and Prairie Region
Samantha Fulton (Science Lead)	DFO Science, Ontario and Prairie Region
Wojciech Walkusz	DFO Science, Ontario and Prairie Region
Krista Baker	DFO Science, Newfoundland and Labrador Region
William Coffey	DFO Science, Newfoundland and Labrador Region
Fredrick Cyr	DFO Science, Newfoundland and Labrador Region
Nicolas Le Corre	DFO Science, Newfoundland and Labrador Region
Nicholas Duprey	DFO Science, National Capital Region
Mary Thiess	DFO Science, National Capital Region
Courtney D'Aoust	DFO Resource Management, National Capital Region
Christi Friesen	DFO Fisheries Management, Arctic Region
Tomas Schmidt (Written Review Only)	Marine Institute Memorial University of Newfoundland
Emma Corbett	Government of Newfoundland and Labrador
Alastair O'Reilly	Northern Coalition
Derek Butler	Nunavut Fisheries Association
Bruce Chapman	Canadian Association of Prawn Producers
Frankie Jean-Gagnon	Nunavik Marine Region Wildlife Board

APPENDIX 3. MEETING AGENDA

STOCK ASSESSMENT FOR NORTHERN SHRIMP (PANDALUS BOREALIS) AND STRIPED SHRIMP (PANDALUS MONTAGUI) IN THE EASTERN ASSESSMENT ZONE AND WESTERN ASSESSMENT ZONE, FEBRAURY 2023

Regional Peer Review: Ontario and Prairie Region and Arctic Region

February 15–16, 2023

Hybrid Meeting
Freshwater Institute, Winnipeg, MB and via MS Teams
Time in Central (CST)

DAY 1 – Wednesday, February 15, 2023

9:00 a.m. Opening Welcome and Meeting Introduction (Chair)

Participant Introduction (Please be prepared with a few sentences about your background, knowledge and expertise for this meeting)

9:15 a.m. Overview of the CSAS Peer Review Process (J. Paulic)

Terms of Reference (Chair)

Review Meeting Agenda (Chair)

9:30 a.m. Context for the Request (Client Sector)

10:00 a.m. Working Paper Presentation: Stock Status (S. Fulton)

10:30 a.m. Health Break

10:45 p.m. Discussion and Questions Stock Status Presentation (Chair)

12:00 p.m. Lunch (not provided)

12:30 p.m. Working Paper Presentation: Oceanography (F. Cyr)

1:00 p.m. Discussion and Questions Stock Status Presentation (Chair)

2:30 p.m. End of Day 1

DAY 2 – Thursday, February 16, 2023

9:00 a.m. Summary of Day 1

9:05 a.m. Working Paper Presentation: Redfish (W. Walkusz)

9:45 a.m. Working Paper Presentation: Predator-Prey (S. Atchison)

10:30 a.m. Health Break

10:45 a.m. Summarize Changes and Outcomes for the Working Papers; Determine if Working Papers adopted as Research Documents

11:00 a.m. Review Summary Bullets and Conclusions

12:30 p.m. Lunch (not provided)

1:00 p.m. Review other sections in the SAR (Sources of Uncertainty)

2:00 p.m. Summarize Meeting Participant expectations and CSAS Publication Timelines

2:05 p.m. Meeting Complete – THANK YOU!