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Central and Arctic Region

Proceedings of the Regional Peer Review on the Stock status and sustainable harvest levels for Arctic Char in Ikaluit Lake (Robert Peel Inlet), Cumberland Sound Area, Nunavut

Meeting dates: June 24–25, 2014
Location: Iqaluit, Nunavut

Co-chairs: Ross Tallman and Yamin Janjua
Editor: Yamin Janjua

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August 2023

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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SUMMARY

A Regional Science Advisory Process (RAP) to assess the Arctic Char stock from Ikaluit Lake (Robert Peel Inlet, Cumberland Sound) was held in Iqaluit on June 24-25, 2014. The objectives of the meeting were to assess and report on the current stock status of Ikaluit Lake Arctic Char, including a review of all the information. The objectives of the meeting were also to:

1. Attempt to provide an abundance estimate for the population;
2. Attempt to provide an estimate of sustainable harvest for the population;
3. Highlight sources of uncertainty in the assessment; and
4. Develop a monitoring plan to assess the long-term sustainability of the fishery.

The participants reviewed the available science information on the Arctic Char stock and discussed patterns in biological characteristics of the population. Participants reached a general consensus that the Ikaluit Lake Arctic Char stock looked stable during the last few years, however it was difficult to study the long trend because of different types of data. Participants emphasized the need for additional information and refining of the available information in the research and Scientific Advisory Report (SAR) documents. Community participants provided additional knowledge of the Ikaluit Arctic Char stock. Community participants stressed a need for an increase in the quota based on economic reasons. The information on the Ikaluit Lake Arctic Char stock indicates that the stock is harvested for both subsistence and fishery purposes with exploitation rates from 5 to 20%. However, participants agreed that the stock is stable and able to withstand the current harvest.

INTRODUCTION

A Regional Science Advisory Process (RAP) to review and assess the Ikaluit Lake Arctic Char stock was held at Fisheries and Oceans Canada (DFO) Qamutik Building in Iqaluit on June 24-25, 2014. The objectives of the meeting, as described in the Terms of Reference (Appendix 1), were to;

1. Attempt to provide an abundance estimate for the population;
2. Attempt to provide an estimate of sustainable harvest for the population;
3. Highlight sources of uncertainty in the assessment and;
4. Develop a monitoring plan to assess the long-term sustainability of the fishery.

The meeting participants included fishers from Pangnirtung Hunters and Trappers Organization (HTO) (via conference call), the Government of Nunavut Fisheries and Sealing, Fisheries and Oceans Canada Science and Fisheries Management (Central and Arctic Region), Brian Dempson (research scientist) Newfoundland and Labrador region, Nunavut Wildlife Management Board, and external experts. A complete list of meeting participants is available in Appendix 2. The RAP was open to all participants to provide a critical view on the status of the stock. Participants discussed a draft research document as a working paper prepared by DFO which provided scientific information. This research document had been distributed for review to invited participants prior to the meeting. From that working paper, a Science Advisory Report (SAR) for the stock will be produced. These proceedings report the main points covered in the presentations and discussions during the review meeting. The proceedings also focus on recommendations made by the meeting participants. The meeting agenda is provided in Appendix 3.

WELCOME AND OPENING REMARKS

Meeting participants were welcomed by the Chair and Co-chair, and participants were invited to introduce themselves. The Chair reviewed the main objectives of the meeting. He explained that this Regional Advisory Process (RAP) will provide an update on the Arctic Char stock status of Ikaluit Lake (Robert Peel Inlet) and will provide an estimate of abundance and a sustainable harvest level as well as recommendations for a long-term plan for this fishery. The chair informed the participants that it is a part of DFO's mandate to provide technical knowledge and advice to management and regulatory agencies on the conservation requirements for these aquatic resources. Participants were informed that discussion and debate is an important component of the review process with the hope that participants would reach consensus on the main points.

REVIEW OF THE AVAILABLE SCIENCE INFORMATION

Zoya Martin, Lead biologist of this RAP and lead author of the research document, presented the working paper to all meeting participants.

INTRODUCTION

Participants questioned the rationale behind the initial setting of the commercial quota for Ikaluit Lake. It was explained that a test fishery was conducted at that time for two to three years by the Government of the Northwest Territories (GNWT) Renewable Resource Officers with the help of fishers to gather base line data including biological samples to assess the fish stock at the onset of fishing. DFO did not actively conduct research in Cumberland Sound at that time.

These quotas were set at what was thought to be a conservative level. Participants were told that the initial quotas were determined on the basis of the best scientific information available and community input.

MATERIALS AND METHODS

Participants were provided with additional information on the study area including the catchment area, river length, and the lake size. Participants discussed and further elaborated on the data source. Participants questioned the source of the “Excel Spreadsheet” data in the research document. Participants were told that it is data provided by DFO Resource Management. Participants asked about any difference in winter and summer fisheries data. It was explained that there was no significant difference in fish size and weight among seasons because a resident Arctic Char population in Ikaluit Lake does not exist. Participants highlighted and discussed the importance of subsistence fisheries data. Participants from the Pangnirtung community explained that no exact information was available on subsistence fisheries. A participant reported that at least two families from Pangnirtung visit Ikaluit Lake every year. Participants explained that the Pangnirtung community usually doesn’t target Ikaluit Lake, especially for subsistence harvest because the area is hard to access during the winter. They fish Ikaluit lake when they visit the area for hunting purposes only, and this activity is decreasing because there are no more caribou in that area. Participants agreed that with some annual variations, subsistence fishing of Ikaluit Lake Arctic Char by people from the community of Iqaluit is probably quite significant.

It was identified that there was more uncertainty about the subsistence catches on Ikaluit Lake, because two different communities harvested this stock. Pangnirtung participants clarified that subsistence fishing pressure on the lake is greater from the Iqaluit community. However, no representative from Iqaluit HTO community attended the meeting and this statement was not confirmed. Participants suggested that an effort should be made after this meeting to collect more information on subsistence fisheries from both communities - Pangnirtung and Iqaluit. Community participants also described an annual variability in subsistence harvest depending on ice and snow conditions. Participants recommended further analysis of harvest data and that the harvest should be presented graphically.

Participants also questioned the accuracy and consistency of fish age estimation across the years. Participants were informed that the three components necessary to ensure a high-quality procedure for consistency in age measurements were accuracy, intra-reader precision, and inter-reader precision. Standard aging methods were used. There was consistency across the years and despite some “noise”, data was accurate enough to detect changes in fishing mortality. However, it was not possible to validate the aging which means there is a chance that the reader is over- or under-aging the fish.

DATA ANALYSIS

Participants reviewed the results and discussion sections of the research document together.

Catch Per Unit Effort (CPUE)

Participants recommended further elaboration and standardization of catch per unit effort (CPUE). Participants suggested that a set of equations used for standardization of CPUE be added to the research document. Participants pointed out that there is a declining trend in CPUE. Even in summer samples, a declining trend was noted. However, confidence intervals were very large and there was much uncertainty in the strength of the trend. This uncertainty was probably because of sampling errors. CPUE data from 2011 to 2013 looked to be stable.

It was noted that CPUE data suggests seasonal variability. Participants suggested that CPUE data from different seasons and gear were not comparable and therefore should be presented by using different symbols on the same graph. Participants suggested that CPUE points should not be joined by the trend line. Participants also suggested a change in the statement that there was no trend in CPUE.

Participants also discussed an increase in subsistence fisheries as one of the possible reasons for the decrease in fisheries independent CPUE during recent years. Use of snowmobiles as a mode of transportation has made distant areas more accessible. Participants also inquired about any relationship between CPUE and tide height. It was recommended that DFO acquire past tidal data from Canadian Coast Guard and if available, that it be used to look for a correlation with the CPUE data.

Length Weight Relationship & Condition Factor

Participants questioned the usefulness or relevance of fish Condition Factor. Condition Factor assumes that fish growth is isometric. However, it has been shown that fish often grow allometrically. A gradual rise in condition with increasing length usually indicates allometry. Therefore, discrepancies in Condition Factor may occur merely due to differences in mean fish length between different samples. Participants suggested that the Condition Factor may not represent the actual status of the population. They suggested that the Condition Factor also may be density dependent; therefore, lower condition may be present in a dense population. Participants suggested that the effect of allometry can be reduced or eliminated from the fish condition, by using “b”, a constant determined from the length-weight relationship, showing how weight varies with length. Participants agreed that the condition of fish or how weight varies with length can be shown better by a log converted plot of weight-length.

Length and Age Frequency Distribution

No overall trend was found in the length frequency distributions. However, a few participants highlighted a decline in modal ages, which was probably due to sampling biases and comparison of two different types of data. Figure 7 in the research document provided more details of age frequency for different mesh sizes, however the sample number was very small. Age frequency distribution for 5.5” mesh size showed an increase in age mode, however sample size was very small. It was suggested that age frequency may be redistributed for each mesh size, and age sample size may be increased using an age at length model.

Trend Analysis

Participants suggested that the trend lines in the figures should be removed, and different symbols be used for different types of data. Participants further suggested that a trend line be added on the same graphs for 5.5” mesh size for the last three years (experimental multi mesh). Some participants suggested use of ANOVA test for trend analysis, but it was also mentioned that it would be hard to pick up any difference with ANOVA because of large variance, therefore use of a distribution test or Chi Square test could be a better option. Participants agreed that it is not justified to conclude no trends were visible, since there were some trends but with high uncertainty. Participants agreed to replace the word “trend” with “observation” in the conclusions.

Length-at-age data

Participants suggested that fish growth may be modeled using the von Bertalanffy growth function (VBGF). Participants recommended the use of some statistics to compare length-at-age data among years.

Sex and Maturity

Participants highlighted the importance of sex and maturity characteristics data for proper stock assessment. Participants emphasized the need for more data on fish sex, age at maturity, and resting stages. Participants discussed that the timing of migration may be different for different sexes and maturity stages, therefore timing of sampling matters, especially during summer. In some fish populations, 1st time spawners migrate first, followed by 2nd year spawners. Maturing fish may also migrate earlier compared to other individuals. Community participants said that traditional knowledge is not available on this topic. Participants stressed that additional information may be required for fish maturity, fidelity, and stock mixing. Participants also suggested including the calculation of length (or age) at 50% maturity (L50 or A50) in the analysis.

Catch Curve Analysis

Participants discussed the annual total instantaneous mortality rate (Z). The annual total mortality "Z" fluctuated from 0.25 to 0.51 with a mean value of 0.37. Considering a mean instantaneous natural mortality rate (M) of 0.15 ± 0.5 for Arctic Char stocks, participants noted that Z was much higher than M for a few years (2001, 2005, and 2008). Participants noted that these high mortalities were either due to a comparatively large commercial harvest in prior years or due to a higher subsistence harvest. For the last few years, fishing mortality (F = Z - M) was almost equal to the natural mortality.

Abundance Modeling

Participants agreed to shift the discussion on fish stock abundance to the second day and review it along with SAR document.

OTHER RECOMMENDATION

Participants also highlighted the importance of studying stock mixing and natal fidelity for Ikaluit Lake stocks. Participants mentioned stock mixing as one of the possible reasons for the large CPUE during summer months in the past years. According to elders and fishers, fish move between lakes and some do not go back to the natal location. They suggested that some Arctic Char may even stay in marine waters and overwinter there. Participants also discussed that recent genetic studies had shown very little stock mixing on the western side of Cumberland Sound. They also discussed that the genetic discreetness does not always mean that there is no straying during non-spawning years. Participants discussed that 5-20% straying is common among other species. Participants agreed that there is likely some mixing of stocks and further research on stock mixing and over-wintering in marine water was recommended. Participants asked about the mean weight of fish caught with different mesh size especially 3.5" to 4.5" mesh sizes (subsistence mesh size). They were provided with additional data on mean weight of fish caught by different mesh sizes in the Ikaluit Lake fisheries.

REVIEW OF THE SCIENCE ADVISORY REPORT – Day 2

The chair reviewed the agenda and objectives. The objectives of day two were to estimate stock abundance and to review different sections of the Science Advisory Report (SAR).

CONTEXT AND SUMMARY

Meeting participants agreed on the content of the context and summary sections. Participants agreed that the SAR document will be updated considering the discussion of the research document on the first day.

INTRODUCTION

Species Biology

Participants agreed that the SAR document will be updated considering the discussion of the research document. Participants proposed to add some information on the effect of tidal cycles on Arctic Char movement and their impact on the fisheries.

Habitat

Participants agreed that further information should be added on lake and river habitat considering the discussion on the first day.

FISHERIES

Data Source and Harvest Information

Detailed discussion on subsistence harvest levels continued on day two. Participants from the Pangnirtung community joined the meeting via conference call. They said that the subsistence fisheries in Ikaluit Lake are mostly done while hunting for other animals such as caribou and polar bear, although in recent years, changing ice conditions and decline in caribou population number has reduced the subsistence fisheries significantly. However, other participants believed that recently more subsistence fishing in Ikaluit Lake has been occurring by people from Iqaluit. Community participants explained that it is very difficult to estimate the number of fish people take per trip because it differs every time.

Stock trends

Meeting participants agreed on the content of the stock trend section, provided that all changes identified and suggestions agreed upon during the review of the research document are included.

Abundance Modeling

Participants estimated and discussed the Arctic Char stock abundance in Ikaluit Lake. In light of the previous discussions and previous estimates of life history parameters, participants used a simple fish stock assessment model to estimate fish abundance using the last three years' mean commercial catch, a range of potential subsistence harvests (1-5 times of the commercial harvest), three years' average total instantaneous mortality (Z), natural mortality (0.15 ± 0.05), and 2.9 kg as the average harvestable fish weight. Harvestable fish stock biomass was estimated as 6,588 kg (4,288 to 9,594 kg in the 10% to 90% percentile, respectively). However, there was high uncertainty with this modeling because of the unknown range of potential subsistence harvest, and large uncertainty with other input data. Participants agreed that it was

still the best possible method to calculate fish stock abundance given this data deficient situation.

SOURCES OF UNCERTAINTY

Participants identified, discussed, and highlighted different sources of uncertainty. Lack of subsistence harvest information was identified as one of the major sources of uncertainty. Fisheries independent data from different seasons, locations, and gear was also identified as a major source of uncertainty. Fishing locations in winter may create bias because it is speculated that big fish tend to stay in the middle of the lake. Participants also identified lack of information on habitat and productivity as a source of uncertainty. Participants identified large uncertainties with CPUE data and trend analysis. Because of the lack of age validation, some uncertainty was also identified with fish aging data. Participants also agreed that high uncertainty was associated with stock abundance and biomass.

OTHER DISCUSSIONS

Pangnirtung community participants also discussed the use of Arctic Char as bait in the turbot fisheries, where it is used at the start of the turbot fishing season. They explained that usually white-fleshed Arctic Char is not considered good for eating, thus why it is used as bait. However, it is unknown exactly how much Arctic Char is used as bait and from which stocks the Arctic Char come from. Community participants said that Arctic Char meat is getting whiter because of an increase in consumption of Capelin. Participants also expressed their concerns regarding an increase in garbage along the lake, which is not good for the ecosystem.

SUSTAINABLE HARVEST LEVEL ADVICE

Participants from Pangnirtung HTO emphasized that there are a lot of fish in Ikaluit Lake. They added that during the winters, Arctic Char remain at the bottom of the lake, making it appear that there are very few fish. They thought that the present commercial quota is not economically feasible. The community participants emphasized that the stock is large enough to increase the harvest quota. The Pangnirtung community believes that this stock can sustain a higher harvest level in the range of 2,500 kg (3,850 lbs). Participants asked the Pangnirtung HTO about the closure requested by Pangnirtung HTO in 2000 when the quota was 1,400 kg. The HTO said that they did not request the closure in 2000, and that it was decided by DFO Resource Management because of a high commercial catch in 1999-2000.

Based on other studies conducted in the Canadian Arctic, participants agreed that a harvest (all fisheries) of 10% of the harvestable stock may pose a high risk, while 5% poses a moderate risk. A 5% exploitation rate based on the abundance modeling estimate, would permit a harvest of 214 kg, 329 kg, or 480 kg, depending on whether the minimum, median, or maximum population estimates (by modelling) are used. Participants also considered fish mortality rates and calculated exploitation rates. Considering a mean total instantaneous mortality rate of 0.29 for three years (2011-2013), and a natural mortality of 0.15, the total fishing mortality (F) (commercial, subsistence, and experimental fisheries) was estimated as F = 0.14. An exploitation rate of 12% during the last three years was determined. Participants agreed that the Ikaluit Arctic Char stock was already exploited at the high-risk level. DFO Science indicated that the present total harvest is almost equal to the natural mortality. Participants agreed that increasing harvest will result in a much higher risk. However, considering community demand and thoughts, it was recommended that if no further fisheries independent study is conducted at Ikaluit Lake for the time being, the DFO experimental fisheries quota (approximately 250 kg) could be added to the commercial fisheries quota. This remains a decision for DFO Resource Management and other stakeholders to decide.

FUTURE MONITORING PLAN

Participants proposed that the monitoring plan formulated during the Arctic Char Harvest workshop in Winnipeg during June 2014 should be followed to assess the long-term sustainability of the Ikaluit Lake fishery, including an experimental approach to examine the effects of different exploitation rates. Participants agreed that subsistence fisheries at Ikaluit Lake must be estimated in collaboration with the Pangnirtung HTO and Iqaluit Hunters and Trappers Association. Further research on stock fidelity and maturity was also recommended by the participants.

RECOMMENDATIONS AND CONCLUSION

Participants reviewed the Research Document and SAR document of the Arctic Char fish stock in Ikaluit Lake and on the basis of data presented and discussed. They then formulated advice, recommendations, and conclusions which were agreed upon by the meeting participants. There was consensus among participants that there are large uncertainties with the available data. Participants recommended proper documentation of subsistence harvest. On the basis of available information, some participants proposed that the Arctic Char stock was being exploited at a high-risk level and the commercial quota should not be increased. This was not agreed upon by all participants, the Pangnirtung HTO and fishers felt that this stock could handle a higher quota. Participants agreed with the science advice to be described in the SAR. At the end of the meeting, the Chair and Co-chair summarized the meeting recommendations. The Chair described the time frame for the Proceedings, SAR, and the Canadian Science Advisory Secretariat (CSAS) Research Document. Lastly, the Chair and Co-chair thanked all participants for their contributions.

APPENDIX 1. TERMS OF REFERENCE

Ikaluit Lake (Robert Peel Inlet) Arctic Char Assessment

Regional Peer Review – Central and Arctic Region

June 24-25 2014
Iqaluit, Nunavut

Chairperson: Ross Tallman and Yamin Janjua

Context

Ikaluit Lake (Robert Peel Inlet) is one of several waterbodies in the Cumberland Sound area that is presently fished for Arctic Char (*Salvelinus alpines*) under a stage II exploratory fishing licence. From 1977– 1985, it was fished under an exploratory licence. In 1990, the lake was licenced as a commercial waterbody with a quota of 1,400 kg and was fished under the commercial licence until 2000. In 2000, the commercial fishery on Ikaluit Lake was closed at the request of the Pangnirtung Hunters and Trappers Association (HTA). The Pangnirtung HTA had concerns about potential negative effects of harvest on the stock and they requested that Ikaluit Lake be closed to commercial fishing for five (5) years. Ikaluit Lake was reopened in 2006 at the request of the Pangnirtung HTA under an exploratory licence with a quota of 1,000 kg. Ikaluit Lake is fished for subsistence by both the communities of Pangnirtung and Iqaluit although there is no record of current subsistence harvest levels for this stock.

The objective of fishing under a stage II exploratory licence is to determine whether a population can sustain a commercially viable operation. An analysis of biological (age, length and weights), and catch and effort data allows Science to assess the status of an Arctic Char population's vulnerability to exploitation at current harvest levels, and advise on sustainability of the harvest. Biological and catch and effort data are requested as a licence condition for exploratory fisheries following the five-year exploratory fishery protocol. For some waterbodies, Fisheries and Oceans Canada (DFO) Science's stock assessment research program also collect similar data through fishery-independent sampling as is the case for the Ikaluit Lake system.

DFO's Resource Management (RM) program has requested that DFO Science provide an update on the stock status, abundance and sustainable harvest level for multiple Arctic Char stocks in Cumberland Sound, including Ikaluit Lake.

Objectives

The following objectives will be addressed:

- Assess and report on the current stock status of Ikaluit Lake (Robert Peel Inlet) Arctic Char, including a review of all new information.
- Provide an abundance estimate for the population.
- Provide an estimate of sustainable harvest level for the population.
- Highlight sources of uncertainty in the assessment.
- Develop a monitoring plan to assess the long-term sustainability of the fishery (e.g., identify information needs, timeframes, and monitoring protocols).

Expected Publications

- Science Advisory Report

- Proceedings
- Research Document

Participation

- Fisheries and Oceans Canada (DFO) (Science, and Fisheries Management)
- Government of Nunavut, Department of Environment, Fisheries and Sealing
- Pangnirtung Hunters and Trappers Association
- Amarok Hunters and Trappers Association
- Nunavut Tunngavik Incorporated
- University of Manitoba, University of Laval and University of Calgary
- Other invited experts

APPENDIX 2. LIST OF PARTICIPANTS

Name	Organization/Affiliation
Zoya Martin	DFO Stock Assessment, Central and Arctic, Iqaluit
Yamin Janjua	DFO Stock Assessment, Central and Arctic, Winnipeg
Brian Dempson	DFO Newfoundland and Labrador, St. John's
John Post	University of Calgary, Calgary
Enooyaq Sudlovenick	DFO Fisheries Technician Student, Iqaluit (University of Guelph)
Sally Wong	DFO Resource Management, Iqaluit
Andrew Dialla	Interpreter
Ross Tallman	DFO Stock Assessment, Central and Arctic, Winnipeg
Melanie Toyne	DFO Stock Assessment, Central and Arctic, Winnipeg
Simon Wiley	DFO Stock Assessment, Central and Arctic, Winnipeg
Patrick Kilabuk	Pangnirtung Hunters and Trappers Organization
Jackie Maniapik	Pangnirtung Hunters and Trappers Organization
Mathewsie	Pangnirtung Fisher
Jacobie Maniapik	Pangnirtung Hunters and Trappers Organization
Corenna Nuyalia	Government of Nunavut Fisheries and Sealing
Danica Crystal	Nunavut Wildlife Management Board

APPENDIX 3. MEETING AGENDA

Ikaluit Lake Arctic Char Stock Assessment Review

June 24 – 25, 2014

DFO 4th floor of the Qamutik Building, Iqaluit, NU

Day 1:

9:00 am
- Opening Prayers
- Round Table Introduction
- Review Terms of Reference for the meeting
- Review intention and purpose of the working documents
- Review of building safety and general amenities

9:30 am
- Opening remarks from the meeting Chair
- Opening remarks from the lead biologist (Zoya Martin)

10:00 am
- Review Research Document: INTRODUCTION

10:30 am BREAK

10:45 am
- Review Research Document: MATERIALS AND METHODS

11:45 am LUNCH

1:15 pm
- Review Research Document: DATA ANALYSIS & RESULTS

3:15 pm BREAK

3:30 pm
- Review Research Document: DISCUSSION
- Review Research Document: RECOMMENDATIONS

4:30 pm
- Summary of Research Document review – Chair
- Overview for tomorrow

5:00 pm CLOSE FOR THE DAY

Day 2:

9:00 am
- Go over any last thoughts for the Research Document
- Review SAR: CONTEXT & SUMMARY
- Review SAR: INTRODUCTION

10:30 am BREAK

10:45 am
- Review SAR: INTRODUCTION
- Review SAR: ASSESSMENT
- Add comments and information needed in the document

11:45 am LUNCH

1:15 pm
- Review SAR: SOURCES OF UNCERTAINTY
- Review SAR: CONCLUSIONS AND ADVICE

3:15 pm BREAK

3:30 pm
- Review Research Document: OTHER CONSIDERATIONS
- Summary of SAR review

4:30 pm
- What is next - process following the meeting – Chair
- Closing remarks from lead biologist (Zoya Martin)
- Closing remarks from Chair
- Closing Prayer

5:00 pm MEETING CLOSES