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Canadian Science Advisory Secretariat (CSAS)

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National Capital Region

Proceedings of the National Peer-Review for guidance on the identification of Critical Habitat in the riparian zone for freshwater species at risk

Meeting Dates: March 3–4, 2020
Location: Ottawa, Ontario

Co-chairs: Eva Enders & Justine Mannion
Editors: Karine Robert & Travis Durhack

Fisheries and Oceans Canada
200 Kent Street
Ottawa, Ontario K1A 0E6

March 2021

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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MPO. 2021. Compte rendu de la réunion nationale d'examen par les pairs concernant les Directives sur la désignation de l'habitat essentiel dans la zone riveraine pour les espèces d'eau douce en péril, 3 et 4 mars, 2020. Secr. can. de consult. sci. du MPO. Compte rendu 2021/005

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SUMMARY

The Government of Canada aims to ensure adequate protection of Critical Habitat for at risk freshwater fishes and mussels. One important component of the habitat that may need to be included as Critical Habitat are the riparian areas along the edges of waters where these at risk species are found. Riparian vegetation provides a number of significant benefits when naturally intact along the water's edge, including maintaining natural levels of erosion, filtration of harmful substances and excessive nutrients from overland water, and more. In order to better identify the riparian zone that should be delineated as Critical Habitat in future species at risk Recovery Potential Assessments and Recovery Strategies, a guidance on the identification of riparian zones as Critical Habitat is required. As part of the peer-review process for this guidance, a meeting was held March 3–4, 2020 in Ottawa, Ontario. The focus of the meeting was to provide Science Advice on the guidance provided in a Research Document entitled "Review of information to guide the identification of Critical Habitat in the riparian zone for listed freshwater fishes and mussels". The discussion was guided by a presentation by the lead author of the Research Document and discussion lead by the co-chairs. This Proceedings is the record of meeting discussions, recommendations, and conclusions. A Science Advisory Report (SAR) and Research Document were produced following the conclusion of the meeting.

INTRODUCTION

An important component of Critical Habitat that requires consideration for protection are the riparian areas along the edges of waterbodies where at risk species are found. Riparian vegetation provides a number of significant benefits when naturally intact along the water's edge, including maintaining natural levels of erosion, filtration of harmful substances and excessive nutrients from overland water, infiltration of surface water into soils, energy and food subsidizations for the aquatic ecosystem, wood and coarse sediment supply for habitat structure, isolation of sensitive ecosystems from anthropogenic disturbances, meandering of stream and rivers, and shading to provide cover and temperature regulation. The Department's goal is to ensure sufficient protection of Critical Habitat for at risk freshwater fishes and mussels. In order to properly protect the riparian zone as Critical Habitat for species at risk in future Recovery Potential Assessments and Recovery Strategies, a guidance document for the identification of riparian zones as Critical Habitat was required. The focus of the meeting was to provide Science Advice on the guidance provided in the Research Document (Caskenette et al. 2020). The discussion was guided by a presentation by the lead author of the document and discussion lead by the co-chairs. This Proceedings is the record of meeting discussions, recommendations, and conclusions.

The peer-review of the "Guidance on the identification of Critical Habitat in the riparian zone for freshwater species at risk" was held in Ottawa, Ontario from March 3–4, 2020, and provided Science Advice on Critical Habitat identification in riparian zone for at risk freshwater fishes and mussels. The meeting commenced with co-chair welcoming the participants and providing an overview of the Canadian Science Advisory Secretariat (CSAS) peer-review process, guidelines, and policies, and the agenda for the first day. The co-chair also reviewed the Terms of Reference (Appendix 1), wherein the purpose of the meeting was to provide Science Advice on how to determine when riparian features constitute Critical Habitat and determine if the proposed guidance is appropriate for a wide-range of at risk freshwater fishes and mussels species, by assessing the Research Document and drafting a Science Advisory Report. Meeting participants included experts from Fisheries and Oceans Canada (DFO) including the Science, Species at Risk and Fish and Fish Habitat Protection sectors, B.C. Ministry of Environment, and Alberta Riparian Habitat Management Society (Cows and Fish) (Appendix 2). Although the meeting followed the agenda (Appendix 3), only two of the three days originally planned for the meeting were needed to cover all the items. Additional publications from this process will be posted on the DFO Canadian Science Advisory Secretariat website as they become available. It was agreed by participants that discussion would be ongoing during presentation to allow for timely discussions of topics, instead of leaving discussions until the end of the day. Although discussion was ongoing throughout the presentation and meeting, for clarity, the Proceedings have been split up into two sections. The first section covers the presentation, in chronological order, followed by the discussions and conclusions.

PRESENTATION OF THE RESEARCH DOCUMENT: REVIEW OF INFORMATION TO GUIDE THE IDENTIFICATION OF CRITICAL HABITAT IN THE RIPARIAN ZONE FOR FRESHWATER FISHES AND MUSSELS AT RISK

Presented by: Amanda Caskenette

SYNOPSIS OF PRESENTATION

DFO Science presented the Research Document, which included literature reviews to gather information about how to identify Critical Habitat in the riparian zone for at risk freshwater fishes and mussels. Important considerations for identifying Critical Habitat in the riparian zone for at risk freshwater species were identified in the following themes 1) Overview of Species at Risk legal framework, 2) When riparian habitat is Critical Habitat, 3) Riparian features that affect aquatic habitat features and water quality attributes, 4) Riparian features that support freshwater fishes and mussels, 5) Delineating protected area in the riparian zone, and 6) Case studies and discussed in the following section.

1) Overview of Species at Risk legal framework

The lead author first mentioned that the order of objectives 1 and 2 were switched in the Research Document from the Terms of Reference (TOR) to aid the flow of the Research Document. They then gave an overview of the Species at Risk listing process. It was explained that when an aquatic species is listed on Schedule 1 of *Species at Risk Act* (SARA) as threatened, endangered or extirpated, DFO is required to identify and protect its Critical Habitat.

2) When riparian habitat is Critical Habitat

An overview of how the description of Critical Habitat in the riparian zone may vary among Recovery Potential Assessments (RPA) and Recovery Strategies was then presented. It was noted that although the description of Critical Habitat in the riparian zone varies significantly between different RPAs and Recovery Strategies, that most documents reviewed included the destruction of the riparian zone as a threat to the respective species. An overview of the terminology and definitions related to Critical Habitat was also presented. Critical Habitat is defined in terms of functions, features, and attributes; it's the features that are protected as Critical Habitat.

The lead author then explained the links between riparian and aquatic features and how they both need to be protected to support Critical Habitat. It was noted that the important habitat of host species was initially included as Critical Habitat in the Research Document; however, as the current SARA guidelines on determining Critical Habitat do not include host species habitat as Critical Habitat, it was discussed whether host species habitat should be removed from the Research Document. Participants agreed that the "host species" and its habitat should be kept as a feature and that a paragraph explaining this decision should be added in the Research Document.

3) Riparian features that affect aquatic habitat features and water quality attributes

The lead author started by mentioning that the list of aquatic features that was used for the literature review was developed based on a standardized list of features taken from an internal draft document on Critical Habitat standardized terminology[1]. They further explained that

[1] DFO. 2020 (Unpublished). Standardized terminology to be used in the identification of critical habitat for aquatic species at risk. Fisheries and Oceans Canada.

features and attributes may indirectly support the functions necessary for survival of the species and may thus sometimes be located outside of the aquatic system (i.e., in the riparian zone). It was described that regardless of how far the feature is from the aquatic habitat, if it has an impact on an aquatic feature it should be considered as Critical Habitat.

An overview was presented of the results of the literature review that was undertaken to identify current scientific evidence on the effect of riparian features on aquatic habitat features. It was explained that riparian features affect aquatic features through eight main processes (i.e., erosion control, filtration, infiltration, shading, isolation, meandering, subsidization, and wood recruitment). An overview of those processes was then presented. A similar approach was then used to identify riparian features that affect water quality attributes.

The literature review included a review of current provincial regulations and recommendations regarding riparian zone widths, separated into three categories based on land use: agriculture, forestry, and development. The lead author mentioned that two tables were included in the Research Document, a shortened summary table of minimum to maximum widths for each province in the text and a full table broken down into categories of land use and water body types in the supplementary data.

Riparian features that affect aquatic attributes followed the presentation of the eight processes that occur in the riparian zone and impact the aquatic habitat. Aquatic attributes (i.e., nutrient loading, dissolved oxygen, temperature) are affected by six of these processes, wood recruitment and meandering do not have a large effect on aquatic attributes.

4) Riparian features that support freshwater fishes and mussels

The results of another literature review that aimed at identifying the most current scientific evidence in regards to how riparian features directly affect the life history functions of freshwater fishes and mussels at risk were presented. It was explained that many life history functions (e.g., reproduction, migration, and feeding) may take place in the riparian zone.

5) Delineating the protected area in the riparian zone

The presentation then moved onto delineating the protected area in the riparian zone and riparian areas' width necessary to allow the processes that support the aquatic habitat from the riparian habitat to take place. It was mentioned that although potential Critical Habitat is not usually identified in the RPAs, it is sometimes described. An overview of the suggested widths based on the processes was provided, with the recommendation that the width of the riparian zone be equal to the largest width required for a process. It was followed by a description of the extent of the riparian zone required so each process can take place and that would thus need to be protected.

6) Case studies

The final portion of the presentation was case studies of using the Research Document to determine required riparian features and the width of the riparian zone required to support the required features and the processes they provide for the aquatic habitat. Four case studies were originally planned to be discussed, however, due to discussions about riparian zone width suggestions (see discussion section below) only two case studies were presented before it was decided the format needed to be changed to reflect the suggested changes for the Research Document.

DISCUSSION

Participants discussed the terminology used in the document, ensuring key terms were defined and requested clarification on the differences between upland and riparian areas. The decision

was made to change the term “riparian Critical Habitat” that was used in the draft version of Research Document to “Critical Habitat in the riparian zone”, which should better illustrate to readers that Critical Habitat in the aquatic environment and riparian environment should be considered equally. Extensive discussions were held by the group regarding the clarity of the terms functions, features, and attributes, which often get confused and misused. The term ‘functions’ was changed to “life-history functions” going forward in the Research Document and the SAR for clarity. The inclusion of host species and their habitat as part of Critical Habitat for at risk species was discussed, once brought up by the author. The habitat requirements of host species are not considered Critical Habitat according to current guidance for identifying critical habitat, however, as mentioned in the guidance, habitat of the host species can be considered as a feature of Critical Habitat if the host species or the availability of that species’ habitat is a limiting factor for the recovery or survival of the listed species, participants agreed that it should be mentioned in the Research Document. The term ‘forestry’ was not included as a possible threat to riparian habitat, however, this land use activity falls under ‘biological resource use’ in the International Union for Conservation of Nature (IUCN) threat assessment used in the Research Document. Clarifications were added to the Research Document to indicate that forestry activities were included in the analysis.

Discussion of the eight processes presented by the author led to some changes in the terms used for the processes for clarity, which resulted in a change of the number of processes to seven (erosion, filtration, infiltration, shading, isolation, meandering, subsidization), as subsidization and wood recruitment were combined, as both are a form of subsidization to the aquatic ecosystem. A request was made to provide a rationale for using the processes to determine riparian features in the Research Document. It was also requested to clarify the difference between filtration (removal of contaminants from water either overland or through the ground) and infiltration (water seeping into soil). The process of shading was only considered for direct shade provided to aquatic habitat, however, a participant noted that shading should also include shading for groundwater recharge areas upland of the riparian zone as these areas help contribute cool water to aquatic habitats, but if they do not have adequate shading as well, the temperature of the groundwater and subsequently the river temperature will increase. Increased ice formation with removal of forested areas along streams was also discussed, since the removal of this thermal barrier may increase the formation of frazil and anchor ice.

A participant questioned whether a complete analysis of the guidelines/legislation of Atlantic jurisdictions was undertaken. One of the author mentioned that although pre-work literature review was done on Canadian jurisdictions’ riparian habitat legislation/guidelines, that they would provide additional information that would complete the literature review. Participants were asked to share additional information on jurisdictional legislation/guidelines on riparian habitat with Research Document authors.

Participants had discussions on the features that are located outside of the riparian zone that indirectly support the functions and attributes necessary for survival of the species. It was mentioned that some of the features may not be found in the riparian zone, but still have an impact on Critical Habitat. A participant questioned whether those features that can sometimes be quite far from aquatic habitat, would still be considered as Critical Habitat. The authors explained that although it is case specific, if a given terrestrial feature has an impact on an aquatic feature, it should be considered as Critical Habitat, regardless of how far the terrestrial feature is from the aquatic habitat.

A participant suggested to explain the process concept in the Research Document. The authors agreed to add a paragraph in the Research Document in which the different riparian processes as well as their importance would be explained.

During the discussion of riparian features that affect aquatic attributes, it was discussed whether all appropriate aquatic attributes were included in the Research Document. It was noted that water pH was missing and it was added to the final Research Document. Following the discussions on riparian features that affect water quality attributes, it was agreed to merge the attributes of water quality with the riparian features.

Discussions occurred regarding the width and length of suitable riparian zones to provide required processes to the aquatic habitat. It was also discussed whether providing recommended widths or minimum widths in the Research Document is advisable, as some users could take these as absolute values and use them without doing proper assessment of the true needs of the habitat to be protected. The discussion ended with the decision of removing advice on width from the Research Document. Instead the authors provided recommendations and clarified that habitats have site specific requirements for riparian zone widths and that no general number can be used as a baseline for all sites. A participant suggested to replace the table, which includes suggested widths with a 'dose response curve' figure, which would display how wider riparian zones provide an increasing number of processes to support aquatic features. Occasional extreme events (e.g., spring flooding, avalanches) were also mentioned as something to consider when setting the width of riparian zones and whether these should be taken into account. The group agreed to add some wording around the impact of major events in the Research Document. A participant suggested to reference the Alberta subregional plans, in the Research Document.

The length and connectivity of riparian habitat was also brought up, as this was not discussed in great detail in the Research Document. It was argued that having a connected riparian zone along the length of the species' habitat would be more effective than patches of protected riparian zones. 'Migration and movement corridors' is an aquatic feature that is included in the Research Document, and participants agreed the description of this feature should be changed to add wording and clarity to include connectivity of riparian zones along these corridors as well.

Provincial regulation and recommendations for riparian zone widths as they were presented in the two tables in the Research Document were discussed; it was noted that some regulations were missing from the tables. Participants agreed to forward regulations that were missing to the authors for inclusion in the document. Authors agreed to change the wording describing the tables to ensure readers understand all regulations may not be included in the table and that further research may need to be conducted by users to ensure they are following local regulations for riparian zone widths. It was also decided that the shorter summary table would be removed from the Research Document.

Discussion on the case studies mainly focused around the tables, which presented suggested widths for riparian zones based on the processes required to support the riparian features. Since it was decided that suggested widths would be removed from the document, the tables in the case studies would also need to be removed or changed. It was decided that the suggested widths column would be removed from the table, but the rest of the table, which outlines the aquatic features, aquatic attributes, riparian features and processes required for Critical Habitat would be kept.

The final discussion of the meeting was on the Science Advisory Report (SAR) and bullet points of the Science Advice were drafted.

CONCLUSIONS

All four objectives from the Terms of Reference were discussed in plenary. The group engaged in open, in depth discussions regarding the Research Document and what should qualify as

Critical Habitat, both in the riparian zone and possible areas beyond the riparian zone, including upland areas further from the waterbody. Overall, discussions led to changes to the Research Document, which increased the clarity of wording and terminology used in the Research Document regarding Critical Habitat in the riparian zone. The changes suggested by the group will help the Research Document to be more user friendly and create a document that easily allows users to assess the protection needs for Critical Habitat in riparian zones for at risk freshwater fishes and mussels. Following discussions, the participants agreed on the summary bullets for the SAR based on key pieces of advice related to each of the objectives.

RESEARCH RECOMMENDATIONS

The following research recommendations were identified during the discussion:

- Quantitative meta-analysis to further identify ranges of widths for riparian zones.
- Large scale empirical study in northern systems on the appropriate widths of riparian zone to ensure proper functioning of riparian zone and to assess if the polygons/bounding box approaches are effective.
- Assessment of the effectiveness of riparian protection.
- Development of guidance on upslope identification of Critical Habitat to maintain riparian zone and aquatic habitat features (e.g., groundwater recharge, water temperature)
- Assessment of the species requirements in terms of connectivity of riparian zones along their ranges (i.e., spatial organization of polygons in the aquatic zone to describe Critical Habitat).
- Study on the implementation challenges of Critical Habitat in the riparian zone on private land. This process and future research would provide defensible link and rational to support zones and justification/criteria for protection.

REFERENCES CITED

Caskenette, A.L., Durhack, T.C., and Enders, E.C. 2020. Review of information to guide the identification of Critical Habitat in the riparian zone for listed freshwater fishes and mussels. DFO Can. Sci. Advis. Sec. Res. Doc. 2020/049. vii + 67 p.

APPENDICES

APPENDIX 1:TERMS OF REFERENCE

Terms of Reference

Guidance on the identification of Critical Habitat in the riparian zone for freshwater species at risk

National Peer Review - National Capital Region

Date: March 3–5, 2020 **Location:** Ottawa, Ontario

Chairperson: Eva Enders & Justine Mannion

Context

Fisheries and Oceans Canada (DFO) is responsible for identifying the Critical Habitat for aquatic species at risk listed under the *Species at Risk Act* (SARA). According to SARA, Critical Habitat is defined as "the habitat that is necessary for the survival or recovery of a listed wildlife species". For aquatic species, the Critical Habitat may include areas in the riparian zone that need to be protected under a Critical Habitat Order. In the DFO 2015, "Guidelines for the identification of Critical Habitat for aquatic species at risk", riparian zones are defined as features outside the aquatic ecosystem, which support the establishment and maintenance of deep and shallow pool features, supply food for migrating and juvenile fish of many species, and influence water temperature (e.g., tree shade). However, as the current riparian zone definition is based on the requirements of only a few fish species, it may not represent the features that support most freshwater fishes and mussels' life cycle process taking place in Critical Habitat (i.e., functions). Guidance is required that builds upon and complements the Department's existing approaches to identify riparian critical habitat, in order to make scientifically-defensible decisions about the identification of Critical Habitat in the freshwater riparian zone.

As specified in SARA (s. 41(1)(c) and 49(1)(a)), every Recovery Strategy and Action Plan developed for a species listed in Schedule 1 of the *Act* as Threatened, Endangered or Extirpated[1] must identify that species' Critical Habitat, to the extent possible. Currently, there is no national guidance on the identification of Critical Habitat in riparian zone for aquatic species at risk. Consequently, DFO's Species at Risk Program has requested that DFO Science develop a scientific guide for the identification of riparian Critical Habitat for freshwater species at risk.

[1] Species listed as Extirpated under SARA may not require the identification of Critical Habitat unless a program of re-introduction is proposed.

Objectives

The specific objectives of the working paper developed for this peer-review are to:

1. Identify the suite of features that riparian habitat provides for freshwater fishes and mussels' functions,
2. Provide guidance on how to determine when riparian habitat features constitute Critical Habitat,
3. Provide, where available, Science Advice on the extent of the riparian zone that is important for features that constitute Critical Habitat,
4. Present case studies illustrating the use of the guidance for practitioners.

Expected Publications

- Science Advisory Report
- Proceedings
- Research Document

Expected Participation

- Fisheries and Oceans Canada (DFO) (Ecosystems and Oceans Science, Species at Risk Program, Fish and Fish Habitat Protection Program)
- Provincial Government
- Academia
- Industry
- Non-government Organizations

References

DFO. 2015. *Species at Risk Act* (SARA) Guidelines for the Identification of Critical Habitat for Aquatic Species at Risk. Unpublished Report, January 2015, Ecosystem Management Branch, Ottawa, Canada, 43 p.

APPENDIX 2: LIST OF MEETING PARTICIPANTS

Name	Organization/Affiliation
Boyko, Amy	DFO SARA – C&A
Bradford, Mike	DFO Science – PAC
Breau, Cindy	DFO Science – Gulf
Caskenette, Amanda	DFO Science – C&A
Clarke, Keith	DFO Science – NFLD
Cormier, Roland	DFO Science – Gulf
Depaiva, Alex	DFO FFHPP – NCR
Drake, Andrew	DFO Science – C&A
Durhack, Travis (Rapporteur)	DFO Science – C&A
Ellefsen, Hans-Frederic	DFO Science – QC
Enders, Eva (Co-Chair)	DFO Science – C&A
Fitch, Lorne	Alberta Riparian Habitat Management Society (Cows and Fish)
Lacho, Christine	DFO SARA – C&A
Makkay, Kristina	DFO SARA – NCR
Mannion, Justine (Co-chair)	DFO Science – NCR
Reader, Jeff	DFO Science – MAR
Robert, Karine (Rapporteur)	DFO Science – NCR
Rosenfeld, Jordan	BC Environment
Winegardner, Amanda	DFO Science – NCR

APPENDIX 3: MEETING AGENDA

Fisheries and Oceans Canada
Canadian Science Advisory Secretariat (CSAS)
National Science Advisory Process – National Capital Region

AGENDA - Science Advice to Support Guidance on the identification of Critical Habitat in the riparian zone for freshwater species at risk

Co-chairs: Eva Enders & Justine Mannion
Location, Alt Hotel (Rose Fuchsia)
Ottawa, Ontario
March 3–5, 2020

Note: All times tentative and subject to change depending on progress of discussions.

Day 1 – Tuesday, March 3, 2020	
Time	**Items**
9:00 am **60 min**	• Welcome and context • Introduction of participants • Overview of CSAS policies • Review Terms of Reference • Meeting process / agenda • Presentation of the Research Document: "Review of information to guide the identification of Critical Habitat in the riparian zone for freshwater fishes and mussels at risk" - *Overview of Species at Risk legal framework (Listing process & Critical Habitat identification)* - *When riparian habitat is Critical Habitat*
10:00am – 10:20am	**Mid-morning Break**
10:20am **100 min**	• Discussion on *When Riparian Habitat is Critical Habitat* • Presentation on - *Riparian features that affect aquatic habitat features* - *Riparian features that affect water quality attributes* - *Riparian features that support freshwater fishes and mussels*
12:00pm – 1:00pm	**Lunch break (Lunch not provided)**

Day 1 – Tuesday, March 3, 2020	
1:00pm **120 min**	• Discussion on - *Riparian features that affect aquatic habitat features* - *Riparian features that affect water quality attributes* - *Riparian features that support freshwater fishes and mussels* • Presentation on - *Delineating protected area in the riparian zone*
3:00pm – 3:20pm	**Mid-afternoon Break**
3:20pm **100 min**	• Discussion on - *Delineating protected area in the riparian zone* • Review of draft summary bullets
5:00pm	**Adjourn (day 1)**

Day 2 – Wednesday, March 4, 2020	
Time	**Items**
9:00 am **60 min**	• Recap of Day 1 • Review of draft summary bullets • Case Studies - Mapleleaf - Redside Dace -
10:00am – 10:20am	**Mid-morning Break**
10:20am **100 min**	• Case Studies - Spring Cisco - Westslope Cutthroat Trout -
12:00pm – 1:00pm	**Lunch break (Lunch not provided)**
1:00pm **120 min**	• Case study - Salish Sucker

Day 2 – Wednesday, March 4, 2020	
3:00pm – 3:20pm	**Mid-afternoon Break**
3:20pm **100 min**	• Discussion of the guidance advice • Review of draft summary bullets
5:00pm	**Adjourn (day 2)**

Day 3 – Thursday, March 5, 2020	
Time	**Items**
9:00 am **60 min**	• Recap of Day 2 • Review of draft summary bullets
10:00am – 10:20am	**Mid-morning Break**
10:20am **100 min**	• Review of Terms of Reference to ensure meeting objectives have been met • Draft the Science Advisory Report
12:00pm – 1:00pm	**Lunch break (Lunch not provided)**
1:00pm **180 min**	• Next steps (after meeting): Review of Science Advisory Report and Proceedings
4:00pm	**Meeting Close**