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Ecosystems and  
Oceans Science

Sciences des écosystèmes  
et des océans

## **Canadian Science Advisory Secretariat (CSAS)**

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**Proceedings Series 2023/025**

**National Capital Region**

### **Proceedings of the National Advisory Meeting on Science advice for assessing cumulative effects in support of policy development and regulatory decision-making**

**Meeting dates: March 8-12, 2021**

**Location: Virtual via MS Teams**

**Chairperson: Keith Clarke**

**Editor: James Kristmanson**

Fisheries and Oceans Canada  
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Ottawa, ON K1A 0E6

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## Foreword

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

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### ***Aussi disponible en français :***

*MPO. 2023. Compte rendu de la réunion sur les avis scientifique nationale pour l'évaluation des effets cumulatifs à l'appui de l'élaboration des politiques et de la prise de décisions réglementaires; du 8 au 12 mars 2021. Secr. can. des avis sci. du MPO. Compte rendu 2023/025.*

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## SUMMARY

This Proceedings results from the virtual Science Advisory meeting of March 8-12, 2021 of the National Peer Review of Science Advice for Assessing Cumulative Effects in Support of Policy Development and Regulatory Decision-making.

Through the Canadian Science Advice Secretariat (CSAS), the Fish and Fish Habitat Protection Program (FFHPP) requested that DFO Science conduct a peer review on assessing cumulative effects in support of policy development and regulatory decision-making.

FFHPP has been interested in science advice related to cumulative effects previously but the requirement for science advice on cumulative effects became more pressing due to: (1) revisions to the Fisheries Act which include the consideration of cumulative effects under paragraph 34.1(1)(d); and, (2) the recent program revitalization and creation of an “Integrated Planning” branch within FFHPP. Thus, science advice is necessary to support: regulatory decisions under the revised Fisheries Act, Species at Risk Act, and Aquatic Invasive Species Regulations; to support ongoing policy development that will determine how cumulative effects will be considered in FFHPP; and, to support a greater understanding of cumulative effects on the broader landscape scale for planning purposes.

The meeting reviewed two working papers prepared by researchers in DFO’s Ecosystems and Ocean Science Sector (EOSS). One of these working papers addressed the broader scale context for considering cumulative effects in integrated planning, and the other addressed the needs within program decision-making. The two working papers were closely connected and coordinated.

This Proceedings summarizes the discussions following presentations and formal reviews of the working papers in relation to the Objectives of the meeting and the crafting of the Summary Bullets for the Science Advisory Report. Discussions were wide-ranging, collegial and constructive. The author teams expressed their appreciation for the suggestions put forward and how these helped improve the clarity of the working papers. Consensus on the Summary Bullets was achieved without issue. Many participants were topical experts, but had relatively little CSAS peer review meeting experience and were favourably impressed by the process.

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## **OVERVIEW OF THE FFHPP PROGRAM AND THE NEED FOR SCIENCE ADVICE ON ASSESSING CUMULATIVE EFFECTS IN SUPPORT OF POLICY DEVELOPMENT AND REGULATORY DECISION-MAKING**

An introductory presentation was made about the need for considering cumulative effects of works, undertakings and activities in FFHPP decision making. Guidance is being sought from Science on what information is needed and how it can be collected in a consistent and feasible manner.

### **DISCUSSION**

Questions were posed concerning when cumulative effects are considered by the Program and how considerations are related to the Impact Assessment Act. Another item of clarification was how cumulative effects were determined – whether they were multiple effects from a single project or effects from multiple projects. There was a comment that the focus should be on predicting effects rather than monitoring for effects. There were also comments on how to consider science vs personal knowledge, how duty to consult is triggered and how to consider the many small projects that may fly under the regulatory radar. A need was identified to understand the ‘death by 1000 cuts’ to ecosystems, and how to consider these when making decisions.

The concept of baseline state was raised and how it could be defined – is it a pristine state? This led to a discussion on the desired state, what that is, and how to achieve it.

In response, the factors taken into consideration during the FFHPP decision making process were highlighted: whether or not a project causes death of fish or a Harmful Alteration Disruption or Destruction (HADD) of Fish Habitat, how well impacts can be mitigated, the state of fish and fish habitat; all these factors are considered throughout the process. Of note, FFHPP decision-making also considers SARA and AIS issues. The question of baseline and desired states resulted in a discussion of Integrated Planning and the ranking of habitat quality, i.e. in what state should the a watershed be. Integrated Planning can also include consideration for Species at Risk (SARA), Aquatic Invasive Species (AIS) and other Works, Undertakings and Activities (WUAs) being a proactive approach, could possibly lead to different outcomes depending on the focus. There was a caution that best intentions may differ from actual outcomes as mitigations and offsetting activities may not be as effective as anticipated.

## **UNDERSTANDING CUMULATIVE EFFECTS IN INTEGRATED PLANNING (OBJECTIVES 1 & 2)**

### **PRESENTATION: CUMULATIVE EFFECTS LANDSCAPE CONSIDERATIONS FOR INTEGRATED PLANNING IN DFO**

#### **Clarification questions**

There was commentary about adaptive management and using management decisions as part of the process of evaluating effectiveness – use of management actions as an active experimentation approach along with monitoring.

### **PRESENTATION: FORMAL REVIEW OF CUMULATIVE EFFECTS LANDSCAPE CONSIDERATIONS FOR INTEGRATED PLANNING IN DFO**

#### **Clarification questions**

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There was a question on how integrated planning would incorporate Indigenous Science and noted that it seemed to be missing from, or not explicitly stated in, the integrated planning approach. This was followed with comments on what cumulative effect timeline was being considered. Could the timeframe include changes since the arrival of Europeans and could Traditional Knowledge be incorporated to address this longer term baseline. This may depend on whether the approach is to rehabilitate the watershed or maintain status quo.

It was noted that the approach depends on what is known and what can be improved. How to consider productivity and how to get to a preferred habitat state may be addressed. Planning involves consultation and science, and other knowledge systems, can inform what can be done.

It was noted that First Nations use a seven-generation model for decision making. A Cree example (e.g. Keeyask hydro project) was brought up to highlight how it depends on knowledge and community preferences and the general approach was to consider the goal of achieving a pre-hydro state.

Good Environmental Status was put forward as a European framework that could be useful to decision makers. There was much discussion on Integrated Planning, baseline states and desired outcomes, state of the environment as a factor in authorizing projects and the range of fluctuations in the past (i.e. natural variability and cycles). It was pointed out that this presentation was attempting to describe Integrated Planning without telling management how to do it, and that the discussion may be getting away from providing science advice, but that knowledge and evidence can inform all parts of the decision making process, including planning.

## **OBJECTIVES 1 & 2 DISCUSSION**

There was a comment that the working paper doesn't seem to deal with areas out of DFO jurisdiction and asked what could be done to influence practices not under DFO's purview. There was some support for including wording that considered a landscape approach to impacts. It was mentioned that the Indigenous community would be very interested in the landscape approach but not just the science portion, solely.

There was more discussion of management tools. Integrated Planning and improving Federal/Provincial communication to include common goals. There was some support to broaden scope beyond in-stream/in-water to include landscape influences. There was also more discussion on adaptive management, current states vs. desired states and how management approaches could achieve them. It was noted that Good Environmental Status approach was based on achieving a goal rather than avoiding impacts. Habitat CPR was mentioned – Conservation, Protection and Restoration, as well as varying degrees of habitat actions to deal with impacts in general. Non-threshold based approaches were raised and questions came up on how this would work – replies stated standardization of monitoring would be needed and use of risk tolerances rather than thresholds to determine impact level / thresholds.

There was a call to FFHPP to weigh in on the approach so far. The perspective of the Program was that there have been good discussions but had diverged into policy and urged participants to focus on science advice only.

## **SUMMARY OF OBJECTIVES 1 & 2 DISCUSSION AND REVIEW OF DRAFT SUMMARY BULLETS**

There was a short introduction to products to be generated from the meeting for first time participants, specifically the structure of the advisory report.

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Comments on bullets to be included in the SAR focused on citing of the Fisheries Act and not SARA or AIS. Following discussion it was agreed to move to more general language. There was discussion of whether to use decision making or regulatory review in the bullets, and decision making was decided upon because it was consistent with the Terms of Reference and was more general. It was noted to the participants that the bullets are high level concepts and the nuances are to be found in the SAR text.

Integrated Planning was brought up for inclusion but it was noted that this is not entirely a science driven process. More discussion was held on Integrated Planning, Adaptive Management and Cumulative Effects and how they were all related. It was agreed that striving to implement adaptive management was a good thing. It was decided that some of these ideas around IP and AM could be captured in the Other Considerations section of the SAR.

## **CONSIDERING CUMULATIVE EFFECTS TO SUPPORT FISH AND FISH HABITAT PROTECTION PROGRAM DECISION-MAKING (OBJECTIVES 3 &4)**

### **PRESENTATION AND FORMAL REVIEW: CONSIDERING CUMULATIVE EFFECTS IN FISH AND FISH HABITAT DECISION-MAKING**

There was much discussion on habitat sensitivity and what is meant by the concept. It was agreed that it may not be as precise as needed and that it was relative and depended on context. An example was given of a new baseline state that is functional habitat even though degraded. There was also discussion on habitat quality and quantity and whether degraded habitat is more sensitive to change. Degraded habitat was characterised as lessened habitat which like reduced habitat could be limiting. Habitat sensitivity is a complex question.

It was noted that habitats and fish distributions change over time and there was concern that a snapshot approach would miss this variability. It was further noted that climate change would affect these factors and relationships as well. Predicting habitat is difficult and reasonable fluctuations are mentioned to be part of the considerations.

Reference conditions, spatial and temporal scale, and cumulative effects being bigger than project scale were discussed. It was noted that there is a lot of variability across the country on how these concepts are addressed. Science could help with streamlining, standardizing, as well as improving the rigour of these approaches and any associated tools. It was suggested that science could come up with recommendations for consideration at the project footprint level and beyond.

### **SUMMARY OF OBJECTIVES 3 & 4 DISCUSSION AND REVIEW OF DRAFT SUMMARY BULLETS**

The participants were asked if the working papers were acceptable and with the noted corrections and edits could be advanced as Research Documents. It was agreed that they were acceptable and the participants approved of keeping the working papers separate but harmonized.

There was a call to modify objective three as the risk assessment approach was not available to critique. It was explained that the objective could not be modified at this stage but that the advisory report will explicitly state any constraints to the analysis/recommendations such as the specific risk assessment method was not available for context, so a generic risk assessment approach was assumed.

Adding a glossary to both working papers was suggested and agreed to.

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There was a discussion over the difference between consideration and assessment of cumulative effects and whether to include this distinction in the glossary. The concept of assessment producing information for consideration was debated. This led to the idea of outlining information needs to enable an assessment of potential cumulative effects.

What are the minimum information requirements for cumulative effects assessment? Information was needed at both project and landscape scale and information exchanges between these levels would improve both decision processes. It was noted that cumulative effects considerations may only involve large projects and miss numerous small projects. An integrated planning approach was cited as considering both small and large projects and their combined effects.

There was a lot of discussion on adaptive management, integrated planning, and monitoring as a cyclical learning mechanism. Also characterizing habitat by state of impairment, and the possible positive, as well as negative, cumulative effects resulting from a project – water treatment plant improvements were cited as an example of a positive effect.

### **SUMMARY BULLET DISCUSSION**

There was much discussion over the context bullets and participants were instructed that the bullets were to capture high level concepts and that nuances would be developed in the text. There was some call for how to operationalise the advice and it was noted that this was not done at a CSAS process. Developing targets for consideration was brought up and noted that this may be important from a First Nations perspective but it was clarified that this was outside this science advice process. Uncertainty in the concepts and their application was mentioned and it was noted that there is a section for uncertainty in the advisory report.

The Glossary was presented and it was noted that it was five pages long at present. It was also noted that some terms were defined through legislation and regulations and need to be consistent. There was a comment that some terms seem to be used interchangeably i.e., pressure and stressor and it was agreed to standardise on the preferred term. Targets were brought up again and it was noted that that is a consultation discussion, which can be informed by ecosystem knowledge.

Uncertainty and Other Considerations were discussed as well. It was noted that climate change is a considerable source of uncertainty as it may disrupt existing relationships, life histories, etc. How to distinguish climate change from natural variability and project effects? The point was made that pressures can interact in complex ways (synergistic, additive, subtractive, etc.) and this could be another source of uncertainty.

There were a number of considerations brought up that have been the subject of previous CSAS advice and it was noted that these could be consulted and referenced for additional information in the SAR rather than include them specifically.

The concept of thresholds was explored and how to identify useful ones. This led to discussion of targets and 'desired state' of habitat and participants were reminded that we need to focus on science related elements. Ecosystem targets can be informed by science, or other knowledge systems' but the desired state can also be a societal decision which would be outside the scope of this meeting.

There was discussion over whether to use landscape or watershed, concern that landscape includes land which is not a DFO issue. Agreed to use watershed and ecosystem consistently. The term sensitivity was discussed as well. The term was considered to be composed of resilience and resistance ideas. It was noted that sensitivity, resilience and resistance need to



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defined in order to be useful. There were further discussions on how sensitivity is affected by state of habitat, whether degraded or not. Participants ended up with consensus on using resilience and sensitivity as discussed and reflected in the corresponding bullet.

Review of bullets resulted in minor wording changes and discussions on some concepts that were interesting however tangential or not relevant to the science advice process. Participants indicated that consensus had been achieved on the bullet concepts. The author teams as well were happy with the feedback and agreed that the suggestions they received would improve the clarity of the working papers.

### **NEXT STEPS**

Points raised and suggested text for bullets were to be sent to authors for consideration and inclusion as appropriate. Various tools and databases were discussed and how they could assist in improving the approach to cumulative effects. It was suggested that some consideration be given to science communication and dissemination to working groups so that the ideas here get wider exposure. There was also discussion on the need for standardization of approaches, models and tools to avoid falling into too much regional specialization.

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## APPENDIX 1: TERMS OF REFERENCE

### SCIENCE ADVICE FOR ASSESSING CUMULATIVE EFFECTS IN SUPPORT OF POLICY DEVELOPMENT AND REGULATORY DECISION-MAKING

National Advisory Meeting – National Capital Region

March 8-12, 12-4:30pm (EST)

Virtual Meeting

Chairperson: Keith Clarke

#### Context

Through the Canadian Science Advice Secretariat (CSAS), Fisheries and Oceans Canada (DFO)'s Fish and Fish Habitat Protection Program (FFHPP) has requested that DFO Science conduct a peer review on assessing cumulative effects in support of policy development and regulatory decision-making.

FFHPP has been interested in science advice related to cumulative effects at various points in time. The requirement for science advice on cumulative effects became more pressing due to: (1) revisions to the *Fisheries Act* which include the consideration of cumulative effects under paragraph 34.1(1)(d); and, (2) the recent program revitalization and creation of "Integrated Planning" program within the FFHPP. Thus, science advice is necessary to support: regulatory decisions under the revised *Fisheries Act*, *Species at Risk Act*, and *Aquatic Invasive Species Regulations*; to support ongoing policy development that will determine how cumulative effects will be considered in the FFHPP; and, to support a greater understanding of cumulative effects on the broader landscape scale for planning purposes.

While DFO Science has provided some advice on cumulative effects and related topics in the past, previous work has been largely marine-focused and advice specific to freshwater habitat has been limited. Freshwater ecosystems substantially differ from marine environments (e.g., in size, level of connectivity, and proximity to particular anthropogenic activities). Moreover, understanding the cumulative effects from multiple human activities is a complicated endeavor. One of the challenges is the many factors that play a role, for example: characteristics of the landscape (abiotic), characteristics of the species present (biotic), and characteristics of the human activities. This necessitates a focused review on key considerations for including cumulative effects in freshwater ecosystems as it relates to departmental decision-making. This science advisory process will focus on assessing and considering cumulative effects in freshwater ecosystems exclusively.

Working Papers: It is expected that this process will review two working papers prepared by researchers in DFO's Ecosystems and Ocean Science Sector (EOSS). One of these working papers is targeted to address the broader scale context for considering cumulative effects in integrated planning and the other is targeted to address the needs within program decision making. The two working papers are intended to be closely connected and coordinated.

#### Objectives

The specific objectives of the working papers developed for this peer-review are listed below. These objectives are not prioritized but are listed based on representation in the two working papers.

*Understanding cumulative effects in integrated planning:*

- 
1. Outline the state of knowledge on how cumulative effects are currently understood to manifest on the landscape.
  2. Identify approaches currently used to understand and adaptively manage cumulative effects on the landscape.

*Considering cumulative effects to support Fish and Fish Habitat Protection Program decision making:*

3. Evaluate the relevant elements within the current risk approach to determine if sufficient information is gathered to inform the consideration of cumulative effects.
  - a. Identify recommendations for additional elements to be included in the current risk approach to inform the consideration of cumulative effects.
  - b. Identify the fundamental information needed about species and habitats in the region of a project when considering cumulative effects.
4. Provide advice on key characteristics required to determine how habitat sensitivity can be determined in the context of cumulative effects.

It is expected that this process will also have synergy with other current CSAS processes focused on freshwater habitat science advice, namely revisiting Pathways of Effects and estimating impacts and offsets for death of fish.

### **Expected Publications**

- Science Advisory Report
- Proceedings
- Research Document(s)

### **Participation**

- Fisheries and Oceans Canada (DFO)
  - Ecosystems and Oceans Science, Fish and Fish Habitat Protection Program
- Other federal departments
- Provincial government
- Academia
- Invited experts

## APPENDIX 2: LIST OF MEETING PARTICIPANTS

#	Participant	Affiliation
1	Tom Bird	Fisheries and Oceans Canada
2	Roland Cormier	Fisheries and Oceans Canada
3	Susan Doka	Fisheries and Oceans Canada
4	Eva Enders	Fisheries and Oceans Canada
5	Neil Mochancz	Fisheries and Oceans Canada
6	Emma Hodgson	Fisheries and Oceans Canada
7	Caroline Longtin	Fisheries and Oceans Canada
8	<b>Keith Clarke (chair)</b>	Fisheries and Oceans Canada
9	Hilary White (coordinator)	Fisheries and Oceans Canada
10	Guy Robichaud	Fisheries and Oceans Canada
11	Simon Trépanier	Fisheries and Oceans Canada
12	Neil Fisher	Fisheries and Oceans Canada
13	Bev Ross	Fisheries and Oceans Canada
14	Dave Carter	Fisheries and Oceans Canada
15	Alex de Paiva	Fisheries and Oceans Canada
16	Emilie Lagace	Fisheries and Oceans Canada
17	Jim Kristmanson (rapporteur)	Fisheries and Oceans Canada
18	Cindy Chu	Fisheries and Oceans Canada
19	Jeffrey Lemieux	Fisheries and Oceans Canada
20	Cathryn Murray	Fisheries and Oceans Canada
21	Violane Shikon	Fisheries and Oceans Canada
22	Evan Henderson	Fisheries and Oceans Canada
23	Vanessa Stelzenmüller	Thunen Insitut
24	Marc Porter	ESSA Technologies
25	Nick Lapointe	CWF
26	John Richardson	UBC
27	Dak deKerckhove	OMNRF
28	Dan Benoit	INAC and MMF
29	Lucinda Johnson	UMinnesota
30	Jon Clayton	Credit Valley Conservation
31	Rob Wilson	Lake Simcoe Region Conservation Authority
32	Jonathon Moore	SFU
33	David Browne	Director of Conservation at CWF
34	Bereket Isaac (observer)	ECCC
35	Al Daly (facilitator)	Turtle Island Staffing
36	Barb MacLean (facilitator)	Turtle Island Staffing

## APPENDIX 3: MEETING AGENDA

Fisheries and Oceans Canada  
Canadian Science Advisory Secretariat (CSAS)  
National Science Advisory Workshop

### AGENDA

#### Science advice for assessing cumulative effects in support of policy development and regulatory decision-making

MS Teams: March 8-12, 11am-1pm & 2-4pm EST daily.

DAY 1		
Time	Monday, March 8 <sup>th</sup> , 2021	Lead
11:00-11:55	Welcome	Chair
	Housekeeping notes	Facilitators
	Participant Introductions	Chair and all
	Introduction to CSAS advisory process	Chair
	Overview of the FFHPP program and the need for science advice on assessing cumulative effects in support of policy development and regulatory decision-making	Alex de Paiva (FFHPP)
	Review Terms of Reference including the overview of goals and objectives of meeting	Chair
11:55-12:00	5 minute health break	
12:00-12:15	<b>Presentation:</b> <i>Cumulative effects landscape considerations for integrated planning in DFO</i>	Roland Cormier
12:15-12:30	<b>Presentation:</b> Formal review of <i>Cumulative effects landscape considerations for integrated planning in DFO</i>	Vanessa Stelzenmueller
12:30-1:00	General Discussion	All
1:00-2:00	Break	
2:00-3:00	<i>Cumulative effects landscape considerations for integrated planning in DFO</i> – Objective 1 Discussion	All
3:00-3:05	5 minute health break	
3:05-3:45	<i>Cumulative effects landscape considerations for integrated planning in DFO</i> – Objective 1 Discussion continued	All
3:45-4:00	Draft SAR points from Day 1	All

DAY 2		
Time	Tuesday, March 9 <sup>th</sup> , 2021	Lead
11:00-11:40	Recap of Day 1	Chair
	Review of SAR bullets captured from Day 1	All
11:40-11:45	5 minute health break	
11:45-1:00	<i>Cumulative effects landscape considerations for integrated planning in DFO – Objective 2 Discussion</i>	All
1:00-2:00	Break	
2:00-3:00	<i>Cumulative effects landscape considerations for integrated planning in DFO – Objective 2 Discussion continued</i>	All
3:00-3:05	5 minute health break	
3:05-3:45	<i>Cumulative effects landscape considerations for integrated planning in DFO – Objective 2 Discussion continued</i>	All
3:45-4:00	Draft SAR points from Day 2	All

DAY 3		
Time	Wednesday, March 10 <sup>th</sup> , 2021	Lead
11:00-11:40	Recap of Day 2	Chair
	Review of SAR bullets captured from Day 2	All
11:40-11:45	5 minute health break	
11:45-12:00	<b>Presentation:</b> <i>Considering cumulative effects in fish and fish habitat decision making</i>	Emma Hodgson
12:00-12:15	<b>Presentation:</b> Formal review of <i>Considering cumulative effects in fish and fish habitat decision making</i>	Cathryn Murray
12:15-1:00	General Discussion	All
1:00-2:00	Break	
2:00-3:00	<i>Considering cumulative effects in fish and fish habitat decision making – Objective 3 Discussion</i>	All
3:00-3:05	5 minute health break	
3:05-3:45	<i>Considering cumulative effects in fish and fish habitat decision making – Objective 3 Discussion continued</i>	All
3:45-4:00	Draft SAR points from Day 3	All

<b>DAY 4</b>		
<b>Time</b>	<b>Thursday, March 11<sup>th</sup>, 2021</b>	<b>Lead</b>
11:00-11:40	Recap of Day 3	Chair
	Review of SAR bullets captured from Day 3	All
11:40-11:45	5 minute health break	
11:45-1:00	<i>Considering cumulative effects in fish and fish habitat decision making</i> – Objective 4 Discussion	All
1:00-2:00	Break	
2:00-3:00	<i>Considering cumulative effects in fish and fish habitat decision making</i> – Objective 4 Discussion continued	All
3:00-3:05	5 minute health break	
3:05-3:45	<i>Considering cumulative effects in fish and fish habitat decision making</i> – Objective 4 Discussion continued	All
3:45-4:00	Draft SAR points from Day 4	All

<b>DAY 5</b>		
<b>Time</b>	<b>Friday, March 12<sup>th</sup>, 2021</b>	<b>Lead</b>
11:00-12:00	Recap of Day 4	Chair
	Review of SAR bullets captured from Days 1-4	All
12:00-12:05	5 minute health break	
12:05-1:00	Continue drafting Science Advisory Report	All
	Overflow/continued Discussion	
1:00-2:00	Break	
2:00-4:00	Complete drafting Science Advisory Report Wrap up/Next Steps CE CSAS meeting ends	All