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

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**Pacific Region**

### **Proceedings of the Pacific Regional Peer Review Meeting on the Framework for Reviewing and Approving Revisions to Wild Salmon Policy Conservation Units**

**October 25-26, 2018  
Nanaimo, British Columbia**

**Chairperson: Nicholas Komick  
Editors: Erika Anderson & Nicholas Komick**

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Science Branch  
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## Foreword

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

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## SUMMARY

These proceedings summarize the relevant discussions and conclusions that resulted from a Fisheries and Oceans Canada (DFO), Canadian Science Advisory Secretariat (CSAS) Regional Peer Review meeting on October 25-26, 2018 at the Pacific Biological Station in Nanaimo, B.C. A working paper on the criteria and procedure for managing changes to, and process for updating, conservation unit characterizations for the five Pacific salmon species was presented for peer review.

The major topics discussed were the types of changes (administrative or substantive), development of the framework (external involvement, conservation unit (CU) data management categories, treatment of enhanced salmon in CUs, CU naming conventions, CU profiles), and related data storage within the New Salmon Escapement Database System (NuSEDS).

In-person and web-based participation included Fisheries and Oceans Canada (DFO) Science, Salmon Enhancement Program, and Policy staff, First Nations, and non-governmental organizations.

The Research Document and Proceedings will be made publicly available on the [Canadian Science Advisory Secretariat \(CSAS\) website](#).

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## INTRODUCTION

A regional peer review meeting was held on October 25-26, 2018 at the Pacific Biological Station in Nanaimo to evaluate the criteria and procedure for managing changes to, and process for updating, conservation unit (CU) characterizations for the five Pacific salmon species.

The terms of reference for the science review (Appendix A) were developed in response to a request for science advice from the Fishery and Assessment Data Section of Fisheries and Oceans Canada. Notifications of the science review and conditions for participation were sent to representatives with relevant expertise from Fisheries and Oceans Canada, First Nations, and non-governmental organizations.

The following working paper was prepared and made available to meeting participants prior to the meeting:

Wade, J., Hamilton, S., Baxter, B., Brown, G., Grant, S., Holt, C., Thiess, M. and Withler, R. 2018. Framework for reviewing and approving revisions to Wild Salmon Policy conservation units. CSAP Working Paper. 2016SAL01.

Participants also received copies of the terms of reference, agenda (Appendix B), and written reviews (Appendices C and D) prior to the meeting.

Nicholas Komick, the meeting chair, welcomed participants and reviewed the role of CSAS in the provision of peer-reviewed advice. The Chair discussed the role of participants and the definition and process around achieving consensus decisions and advice. In total, 37 people participated in the regional peer review (Appendix E). The rapporteur for the meeting was Erika Anderson.

## PRESENTATION OF THE WORKING PAPER

All authors were present including: J. Wade, S. Hamilton, B. Baxter, G. Brown, S. Grant, C. Holt, M. Thiess, and R. Withler. An oral presentation was given by Shelee Hamilton to summarize the working paper described in the following abstract.

## ABSTRACT OF THE RESEARCH DOCUMENT

In 1998, Fisheries and Oceans Canada (DFO) announced its new direction stating that conservation of Pacific salmon stocks was its primary objective. The first published list of Conservation Units (CUs) was for Fraser River Chinook Salmon (*Oncorhynchus tshawytscha*) (Candy et al. 2002). With the adoption of the Wild Salmon Policy (WSP) for the Pacific Region of Canada in 2005, methods for identifying CUs were subsequently developed and a list of CUs was developed for five of the Pacific salmon species (Holtby and Ciruna 2007). This list was the result of much research and consultation. Since the 2007 list was developed, adjustments have occurred as new information has become available, as CU-specific biological expertise and aboriginal expertise has been sought, and as historic information has been examined in greater detail.

There has been recognition of a need for a formalized process for reviewing and updating CUs which could guide the review process in a standardized and consistent manner. Such a process could also resolve various issues such as establishing a repository for all information related to and used to define CUs and establish a process for communicating change. The need for such a process has also been precipitated by the retirement of Dr. Holtby, a DFO scientist and original architect of the CU list, who had maintained the information and data used to define

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CUs. This work aligns with a key element of the WSP Implementation Plan (DFO 2018) through the establishment of a process to review and approve revisions to CUs (Activity 1.1).

This paper proposes a framework to review and approve changes to CUs. It also proposes guidelines for data management, governance of the authoritative list of CUs and their attributes, and communication both within DFO and to the public.

## **PRESENTATION OF WRITTEN REVIEWS**

### **John Candy**

Please refer to Appendix C for full written review. The main comments are listed below:

- All genetic analysis tools should be included in the framework, not just dendrograms.
- Hatchery exclusions and enhanced salmon should be discussed in the working paper. For example, hatchery salmon are not part of CUs according to the Wild Salmon Policy, but they are included in the Chinook Salmon 9000 series.
- CU types in Table 2 are mixture of status and type, and need further consideration.

### **Authors Response to John Candy**

Hamilton agreed that the word dendrogram, would be replaced with “genetic analysis” to allow other genetic tools to be applied. Currently, hatchery exclusion is inconsistently applied so Hamilton requested ideas on how to handle enhanced salmon in the paper. The authors also discussed why the current CU types exist for data management and agreed to revise Table 2 of the working paper after further discussion.

### **Michael Folkes**

Please refer to Appendix D for full written review. The main comments are listed below:

- Folkes requested more detail in section 6.1.1 and 6.1.2 of the working paper. Examples given were: use of traditional ecological knowledge (TEK) and specific time without spawning activity for extirpated CUs or census sites.
- The information in Holtby’s unpublished document, “All Things CU”<sup>1</sup>, should be published.
- Would this framework produce the same CUs as the Fraser River Sockeye Salmon (Grant et al. 2011) and Chinook Salmon (DFO 2013) CU determinations?
- The next step is testing this framework on future CU development. If the process is modified after testing, how will the changes be disseminated?
- The inclusion of a glossary was requested (i.e. PNI, characterization).
- CU types given in the working paper are sufficient for data management, but should be renamed as they are not all CUs.

### **Authors Response to Michael Folkes**

The authors had written sections 6.1.1 and 6.1.2 to allow for the process to be applied to multiple species and used by different groups. Nevertheless, they agreed to modify the

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<sup>1</sup> Unpublished document written by Holtby, L.B. called All Things CU. Last Updated 2017.

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procedures with more details and for clarity. The authors agreed that portions of “All Things CU” should be published. The authors believed the framework would produce the same CU results as in the Fraser River Sockeye Salmon and southern Chinook Salmon reviews, because the framework was based on those processes. It was agreed that a glossary would be added. Finally, the authors would like a discussion of CU types with participants to determine changes.

## **GENERAL DISCUSSION**

### **Types of Changes**

Field staff wanted to ensure there was a timely process to add census sites or CUs for their data reporting. External parties were concerned that quick changes would not allow full transparency and external participation. In addition, census sites, population IDs and CUs have not been used consistently between areas and species, therefore, regional science staff wanted CU creation to be reviewed and consistently applied over the region. Furthermore, CUs based on Holtby and Ciruna 2007 methodology (region-wide standardization) that have undergone a subsequent in-depth review (for local-scale consistency) should change infrequently going forward. To date, not all CUs defined by Holtby and Ciruna 2007 have undergone an in-depth, local-scale review. Everyone agreed that CU assessment often has associated deadlines, and the framework should not cause inefficiencies but remain rigorous and transparent.

After a lengthy discussion, it was agreed that at least two types of processes should be defined: an abbreviated version for administrative changes and a CSAS process for substantive changes. In the working paper, administrative changes were called minor changes and substantive changes were called major changes. Participants agreed that these terms should be changed to administrative and substantive. A substantive change was later divided into local substantive and global substantive categories. Examples of Type 1 (administrative) changes included: a clerical error, name change to align with a naming convention, or new census sites within existing CUs using existing methods. Examples of Type 2 (substantive) changes included: moving, deprecating, or deleting existing census sites with supporting life history, ecotypological, or genetic information, changing census site names due to new or updated information (i.e. run timing) or large-scale CU or census site reviews based on existing methods. Examples of Type 3 (substantive) changes included: changes to CU or census assignment, and CU or census review based on new methods.

### **Framework Development**

There were several discussions regarding the specific text and details of sections 6.1.1 and 6.1.2 of the working paper. Additional situations were suggested, details added, and the “weighting” of life history removed. These modifications were incorporated into a new document by one of the authors during the meeting. M. Thiess created a form to articulate the modified framework. Anyone, either external or internal to Fisheries and Oceans, may submit the form for a review of changes to CUs or census sites. An adjudication group, including the proponent, will review the suggested changes and classify the type of change. Depending on the change type, the process will follow one of three paths. If approved, a Type 1 change will be documented with the form and NuSEDS updated directly, a Type 2 change will undergo the same review as a Type 1 change but will be posted online on the Federal Government’s Open Data portal for public comment before any NuSEDS updates occur; a Type 3 change will require a peer-reviewed CSAS process that must be initiated by a request for science advice. The outcome of a request for a review, regardless of type, will be posted on the DFO website. Participants contributed to and revised a preliminary flow chart presented in the meeting. The CU review

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request form and framework flow chart will be included in the research document and replace Figure 1 of the working paper and sections 6.1.1 and 6.1.2.

The Salmon Data Unit agreed to administer and manage the submitted CU review request forms. A DFO Science lead will oversee the adjudication of CU review request forms into Type 1, 2, or 3. There is a place on the CU review request form for the proponent to indicate an ideal date for review completion and to explain any urgency. It was agreed that the form should be reviewed soon after submission to allow the proponent to correct any errors or omissions.

M. Thiess agreed to test the framework by submitting a request for review of 2017 Decoder Ring file updates (majority were for Chinook Salmon CUs) in order to reconcile the difference between the NuSEDS database (based on the 2013 Decoder Ring file) and this latest update. Once these inconsistencies are resolved, the decoder ring file will be retired and the data housed exclusively in NuSEDS.

## **External Involvement**

External participants found the working paper unclear about how they could initiate CU change. As the form evolved from this framework, it was agreed that the proponent, whether external or internal to Fisheries and Oceans, should be part of the working group to adjudicate any changes. Nevertheless, Fisheries and Oceans staff is responsible for and provide the consistency over time for the review of CUs and maintenance of the official list of CUs.

There was discussion regarding the incorporation of traditional ecological knowledge (TEK) and local ecological knowledge (LEK) into CUs reviews. The authors of the southern BC Chinook Salmon and Fraser River Sockeye Salmon reviews discussed how the technical team had included this knowledge. This ecological knowledge may be helpful and should be included if it is available. Other external groups, such as the Pacific Salmon Foundation, have online resources with information on CUs in BC. Collaborations will reduce duplication of effort and improve the information maintained by Fisheries and Oceans.

## **CU Types**

Definitions of CU types from Table 2 of the working paper were discussed repeatedly. It was recognized that the table represents the current state within the database that had evolved for data management purposes. Nevertheless, the table had a combination of status (current, extirpated), type (CU, BIN), and administrative (deprecated, deleted) categories. Not all categories within the table are CUs. BINs are used for census sites, enhanced salmon, or non-spawning populations, but they may also contain CUs that need to be assigned to a current CU. Participants requested more clarity in the table caption and name (i.e. data management categories). The authors agreed to remove all the subcategories of VREQ from Table 2. This simplified table will be included in the research document, along with examples of each category. Participants recommended that a working group evaluate the categories used in NuSEDS to determine if any database changes are necessary.

Participants expressed concern about how many CUs were in the VREQ categories in the summary of CU types in Table 1 of the working paper. Participants asked how they could move CUs from VREQ to current. Other users routinely use VREQ (BIN) to complete data reporting of their field data. There was disagreement on whether BINs should be removed from Table 1 or not. Suggestions were made to improve the name, caption and organization of the table to make it clear that all BINs are not CUs. There was a discussion about the definition of extirpation. How many salmon returning (<10?), over how many years (3-5 years?) observed before the status is changed? This definition was added to the list of tasks for the working group to review. The extirpated category exists to prevent users from incorrectly assigning a census



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site to an extirpated CU. Some participants preferred that this be a field associated with a CU, instead of a CU category.

## **Enhanced Salmon**

It was recognized that CUs should only refer to wild salmon as defined by the Wild Salmon Policy; however, many current CUs contain some level of enhanced salmon. There is inconsistent treatment of enhanced salmon depending on the species and area, resulting in hatchery exclusions or CUs with enhanced salmon. To further complicate the issue, self-sustaining, transplanted populations that are over two generations old are considered wild enough to be a CU. Participants believed that determining a threshold of enhancement to exclude salmon from a CU is beyond the scope of this meeting. Nevertheless, it was recognized that treatment of enhanced salmon within CUs must be addressed and applied consistently across the region. It was recommended that the working paper include a paragraph describing the issue of enhanced salmon in CUs and recommend further work be done. The Salmon Enhancement Program (SEP) is developing guidelines and management tools to use with existing populations (e.g. the Proportional Natural Influence (PNI) metric); therefore, further work should involve collaboration between Science and SEP.

## **Naming Conventions**

Holtby and Ciruna (2007) developed a naming convention for CUs. The recent review of southern BC Chinook Salmon (DFO 2013) revised this naming convention, however, Holtby rejected some of these revisions before retirement. Participants suggested that the naming conventions should be standardized by a working group. There was agreement that naming conventions should be standard within species, but not necessarily between species. Some users did not like the concatenation that is currently used in NuSEDS for names. There was agreement that an authoritative list should be maintained by the Salmon Data Unit. It was suggested that the components of the name (species, area, run timing) be solicited on the form, but the name not be assigned until analysis of the evidence.

## **CU Profiles**

Appendix II of the working paper, contains a description of CU profile headings and descriptions from “All Things CU”<sup>1</sup>. Participants agreed that having a central data source of CU profiles would benefit their work. In addition, the Fraser River Sockeye Salmon and southern BC Chinook Salmon reviews compiled CU profiles and would like them to be available. NuSEDS does not currently contain CU profiles, but a link could be added with the metadata or a table developed. There was discussion about the specific fields to include in the CU profile. The Pacific Salmon Foundation has CU profiles available [online](#), therefore, collaborative opportunities exist. It was recommended that CU profiles not be implemented until the format has been reviewed by a working group and that it aligns with the final implementation of the framework defined by the research document. The Salmon Data Unit could maintain the final approved CU profiles, such as on the Wild Salmon Policy website and/or within NuSEDS.

## **NuSEDS**

The Salmon Data Unit maintains NuSEDS, which includes CU data. Salmon escapement data and Conservation Unit exports are publicly available through the Government of Canada’s [Open Data portal](#). Conservation Unit data is also publicly available through the Government of Canada’s [Open Maps website](#). Participants recognized that the database requires some updates to meet the needs of current users, such as the incorporation of CU profiles.

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Suggestions to improve this database should be considered by a working group on data standards and CU methods.

There was disagreement on whether this database should include DFO data only or additional external data sources. Some participants wanted all the data together; whereas others believed the data would not be consistent across the region, if external data was included. This issue should be addressed by a working group. The external organization representatives indicated a desire to participate in those discussions.

### **All Things CU**

Reviewers and participants recommended that the relevant information in Holtby's unpublished document, "All Things CU"<sup>1</sup>, should be published. Relevant portions of this document were incorporated into the research document. It was suggested that Holtby be contacted to seek agreement for publication of the remaining pertinent information as a Canadian Technical Report of Fisheries and Aquatic Sciences.

### **Genetic Analysis**

Dendrograms are used in current CU assignments; however, new genetic tools are emerging. An emerging tool to determine run timing of Chinook Salmon by genetic analysis was discussed as an example. In addition, genetic tools that may indicate either adaptive or neutral changes were discussed. Previously, life history was used exclusively for adaptive change and genetic tools used for neutral changes. It was recommended and agreed that the term dendrogram be replaced by genetic analysis to allow emerging technologies to be incorporated into the CU framework.

### **Miscellaneous**

Overall, participants supported Folkes' suggestions of a glossary in the research document.

A participant requested an expanded literature review on the development of CUs be incorporated in to the research document. The authors agreed to add additional background information within the introduction on the development of CUs with the help of a participant who offered their expertise on this subject.

It was requested that a CU be more clearly defined as a group of fish in a freshwater spawning area, not a geographic boundary.

A participant suggested that DFO employees and managers link their CU work planning to the Wild Salmon Policy implementation plan to encourage support.

A participant expressed concern over the terms of reference and why these objectives were different in the working paper. It was clarified that the objectives, as stated in the working paper, were a further refinement of the more general Terms of Reference objectives. The participant wondered if Objective 1 in Terms of Reference was met by the working paper, because the framework did not include examples. It was clarified that the testing of the framework using examples was outside the scope of this working paper, but would be subsequent to this process.

## **CONCLUSIONS AND UNCERTAINTIES**

The working paper was accepted with revisions. A framework for changes to CUs was developed, including a CU review request form and process detailed in a flow chart. This process may be initiated by Fisheries and Oceans staff or an external proponent. This

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framework requires testing with all three types of changes to CUs, and may be revised after implementation. Modifications to NuSEDS may be necessary to incorporate CU profiles. It is recommended that a working group address the outstanding issues: CU types and definitions, CU naming conventions, and CU profile headings.

### **REVISIONS FOR WORKING PAPER**

- Change the terms “minor” and “major” changes to administrative and substantive changes, respectively.
- Reduce use of CSAS processes to substantive changes only.
- Include the CU review request form presented to at the meeting in the research document and, revise the framework description to include the text edits recorded during the meeting.
- Replace Figure 1 with the flow chart developed during meeting.
- Revise Table 1: Summary of CUs to remove totals, indicate Bins differently than CUs.
- Revise Table 2: CU Types to include examples, remove all subtypes for VREQ and rename table.
- Add paragraph discussing how to evaluate enhanced salmon and hatchery exclusion during CU reviews.
- Include recommendation that standardized naming conventions be adopted and that the Salmon Data Unit maintains the authoritative list.
- Include recommendation that a Data Technical working group address outstanding issues with CUs and NuSEDS: CU type categories and associated definitions, method to move “populations” from Bin and VREQ to other data management categories, CU naming convention, CU profile fields, maintenance of this framework.
- Include recommendation to publish condensed version of “All Things CU<sup>1</sup>” as a DFO technical report.
- Replace the word “dendrogram” with “genetic tools”.
- Provide a glossary of terms used in the document.
- Provide a short introductory section summarizing the historic development of CUs.

### **RECOMMENDATIONS**

- It is recommended that the following CU tasks be considered during work planning in order to minimize issues in data management and review of CUs.
  - Review and formally approve data management categories and associated definitions.
  - Formally review and update NuSEDS with approved 2017 revisions to the Decoder Ring file.
- Establish a Salmon Data Management Working Group to review and approve:
  - CU data management categories and associated definitions, including methods to utilize Bin and VREQ categories;
  - CU naming convention;
  - CU profile fields (see Appendix III of the working paper for example).

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- Based on the SDMVG-approved CU profile fields, produce profiles for all existing CUs. Profiles would increase the efficiency of future reviews, provide metadata and document the history of changes to CUs.
  - Extract and publish relevant portions of the unpublished document entitled “All Things CU”<sup>1</sup> as a technical report (ideally, with B. Holtby’s consent).
  - Consider advice provided by Withler et al. (2018) on the inclusion/exclusion of hatchery-supplemented populations when reviewing sites and populations within CUs.

### **ACKNOWLEDGEMENTS**

We appreciate the time contributed to the RPR process by all participants. In particular, we thank the reviewers, John Candy and Michael Folkes, for their time and expertise.

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## APPENDIX A: TERMS OF REFERENCE

### Framework for reviewing and approving revisions to Wild Salmon Policy Conservation Units

#### Regional Peer Review Process – Pacific Region

October 25-26, 2018

Nanaimo, British Columbia

Chairperson: Nicholas Komick

#### Context

The Wild Salmon Policy (WSP) (2005) defines a Conservation Unit (CU) as a group of wild salmon sufficiently isolated from other groups that, if lost, is very unlikely to recolonize naturally within an acceptable timeframe such as a human lifetime or a specified number of salmon generations. After the Wild Salmon Policy (WSP) was adopted in 2005, methods for identifying CUs were developed and a first list of Pacific CUs for each of the five salmon species was produced (Holtby and Ciruna 2007).

Since this initial list was developed, adjustments to the list have occurred as new information has become available or historical information has been examined in greater detail than was possible by Holtby and Ciruna (2007). CU modifications were first introduced for Fraser River sockeye salmon CUs (Grant et al. 2011). CU modifications were later introduced for some of the CUs of Chinook salmon in southern British Columbia and the approach was documented in a Science Response report (DFO 2013). This work resulted in various types of major modifications such as the combining of existing CUs. Both cases resulted in modifications to CUs, revealing that the rationale to identify and modify CUs was not understood broadly within DFO Science and that a need existed for a standard and consistent approach. For these reasons and also given new approaches to identifying CUs that include advances in genetics, a new well described approach for CU updates is required. This will ensure that CUs are defined consistently and regularly.

CUs provide the basic unit for biological status assessment under the Wild Salmon Policy. One of the Activities (1.1.b) of the draft WSP Implementation Plan (DFO 2017) is to establish a framework for reviewing and approving revisions to CUs. The current target date for completion of a framework is March 2022, but Science has requested this date be moved up so that the framework can be used as soon as possible. This project will focus on developing a framework for reviewing and approving revisions to CUs; since the project is about the procedure, existing CUs will not be reviewed and updated at this stage.

The overall objective of this Regional Peer Review process is to establish a procedure and process for reviewing Conservation Unit definitions and for managing CUs.

#### Objectives

The following working paper will be reviewed and provide the basis for discussion and advice on the specific objectives outlined below.

Wade, J. et al. Framework for reviewing and approving revisions to Wild Salmon Policy Conservation Units. CSAP Working Paper 2016SAL01

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The specific objective of this review is to develop a framework which:

1. identifies the criteria to define CU characterizations and CU delineation (includes changes such as splitting);
2. proposes a procedure, including roles and responsibilities, methods, and frequency on which to assess, review and update CU characterizations; and
3. provides recommendations regarding governance of the authoritative list of CUs and their associated attributes and data.

### **Expected Publications**

- Proceedings
- Research Document

### **Expected Participation**

- Fisheries and Oceans Canada (DFO) (Ecosystems and Oceans Science sector)
- Fisheries and Oceans Canada (DFO) Policy
- Academia
- First Nations
- Non-governmental organizations
- Commercial and recreational fishing interests

### **References**

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## APPENDIX B: AGENDA

### Canadian Science Advisory Secretariat (CSAS) Regional Peer Review Meeting (RPR) Framework for reviewing and approving revisions to Wild Salmon Policy Conservation Units

October 25 to 26, 2018  
Nanaimo, British Columbia

Chair: Nicholas Komick

#### DAY 1 – Thursday, Oct 25

Time	Subject	Presenter
0900	Introductions Review Agenda & Housekeeping CSAS Overview and Procedures	Chair
0915	Review Terms of Reference	Chair
0930	Presentation of Working Paper	Authors
1030	<b>Break</b>	-
1050	Overview Written Reviews	Chair + Reviewers & Authors
12:00	<b>Lunch Break</b>	-
1300	Identification of Key Issues for Group Discussion	Group
1330	Discussion & Resolution of Technical Issues	RPR Participants
1445	<b>Break</b>	-
1500	Discussion & Resolution of Technical Issues	RPR Participants
1645	Check in on progress and confirmation of topics for discussion on Day 2	RPR Participants
1700	Adjourn for the Day	-

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**DAY 2 – Friday, Oct 26**

<b>Time</b>	<b>Subject</b>	<b>Presenter</b>
0900	Introductions Review Agenda & Housekeeping Review Status of Day 1	Chair
0915	Discussion & Resolution of Technical Issues (Continued from Day 1)	RPR Participants
1030	<b>Break</b>	-
1045	Discussion and Resolution of Working Paper Conclusions	-
1130	Develop Consensus on Paper Acceptability & Agreed-upon Revisions	RPR Participants
1200	<b>Lunch Break</b>	-
1300	<i>Proceedings Development</i> Develop consensus on the following for inclusion: <ul style="list-style-type: none"><li>• Guidelines around process</li><li>• Process Structure Recommendations</li><li>• Additional advice to Management (as warranted)</li></ul>	RPR Participants
1430	<b>Break</b>	-
1445	<i>Proceedings Development (Continued)</i>	RPR Participants
1630	Next Steps – Chair to review <ul style="list-style-type: none"><li>• Review/approval process and timelines</li><li>• Research Document &amp; Proceedings timelines</li><li>• Other follow-up or commitments (<i>as necessary</i>)</li></ul>	Chair
1645	Other Business arising from the review	Chair & Participants
1700	<b>Adjourn meeting</b>	-



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## APPENDIX C: WORKING PAPER REVIEWS

### REVIEWER: JOHN CANDY, FISHERIES AND OCEANS CANADA

The purpose of this paper is clearly stated and the methods support the required objective. This document outlines a framework to update and revise Conservation Units (CUs) for Pacific salmon in BC and the Yukon. It sets out steps for a biologically-based approach for updating CUs. This framework is consistent with the original vision of CU development, that CUs are determined on biological merit alone.

There are three other areas that this reviewer feels need additional consideration by the authors. These are: recognition of new genetic tools, recognition of hatchery exclusions, clearer definitions of CU “types” for CU review and evaluation. Each of these is treated below.

- **Recognition of new genetic tools**

Under the Terms of Reference for this document it is recognized that advances in genetics will provide new tools to describe CUs. Although Holtby and Ciruna 2007 exclusively used dendrograms, there are other methods to visualize genetic distances between CUs and descriptive statistics which could prove useful when evaluating CUs such as genetic diversity measures, estimation of straying rates, and effective population size. In addition, the development of new adaptive SNP markers such as the GREB locus differentiating individuals as either summer or fall run chinook are valuable for quantifying differences between CUs. Parentage-based tagging is useful to determine the hatchery contribution to natural spawners.

To keep flexibility in the use of a range of potential genetic tools available, I would remove specific mention of dendrograms which implies that this is the only measure available. Instead, implementation of a range of genetic tools would require close collaboration with staff in the genetics lab.

- **Hatchery exclusion**

This document should recognize the existence of hatchery exclusion populations which occur in a number of CUs. An example of hatchery excluded population can be found in Appendix B –Table 2 of *DFO 2013 Review and update of southern BC conservation unit assignments*.

Hatchery exclusion occurred where fish were considered “enhanced” if they failed to meet the criteria for a wild salmon under the Wild Salmon Policy (wild fish having spent their entire life cycle in the wild and originating from parents that were also produced by natural spawning and had continuously lived in the wild). These populations are listed as 9000 series.

- **CU evaluation -definitions of CU “types” (Table 2)**

I find the definitions associated the CU “types” confusing in Table 2. This table seems to be mixture of both the demographic status and CU updating requirements. I recognize these categories already exist in NSEDS and in the Decoder Ring File.

I find it useful to review what Holtby and Ciruna 2007 set out defining CUs. Some of these criteria are:

1. CU is a group spawning sites/populations that “describe real and presumably adaptive diversity” and each CU is “significant element of biodiversity” for that species.

2. If individual spawning sites/populations are extirpated within a CU, it can be recolonized by adjacent sites within the CU within an acceptable timeframe.
3. The WSP defines a CU as “a group of wild salmon sufficiently isolated from other groups that, if all the populations are extirpated within a CU, is very unlikely to recolonize naturally within an acceptable timeframe.”
4. Loss of a CU means the loss of a species biodiversity on an evolutionary time scale.

Here is a simplified version of Table 2 that I think covers most possibilities.

- Current – existing CU (CU meets criteria 2)
- Vrequired – verification required where new data available with following possible outcomes
  - Confirmation of current CU (meets criteria 2)
  - Split CU (as per criteria 1)
  - Merge CU where all pops in both CUs (meets criteria 2)
  - Move one or more populations between CUs (as per criteria 2)
  - Excluded populations (hatchery exclusions, migratory dropouts, transplants) (as per WSP definition of wild salmon)
- Deleted – assessment indicates no persistent populations ever occurred in this CU – removed.

Extirpated CU is a demographic status rather than a “type” of CU. Suspected extirpated CUs may require assessment to ensure no returning fish but this should affect the properties of this CU. Extirpated CUs are not deleted but remain as a record of lost biodiversity under criteria 1. Single population left in one CU added to another CU (Depreciated) violates CU definition under criteria 3. The single remaining population from the collapsed CU cannot be rescued from the other populations in the new combined CU.

It might be helpful to include specific examples for as many of these cases as possible from DFO et al. 2013 or Grant et al. 2011 to clarify these categories.

Table 2 from manuscript

Type	Definition
Current	CU is extant and is either accepted or has been proposed.
VREQ (Current)	VREQ: Indicates that there is some doubt about the nature of the CU and verification is required. Current: CU is extant and is either accepted or has been proposed.
VREQ (Bin)	VREQ: Indicates that there is some doubt about the nature of the CU and verification is required. Bin: Not a CU but is a category to hold sites that for some reason are not assigned to a CU.
VREQ (Extirpated)	VREQ: Indicates that there is some doubt about the nature of the CU and verification is required. Extirpated: There are no known sites with fish spawning successfully in the wild and there are no known hatchery sites.
Extirpated	There are no known sites with fish spawning successfully in the wild and there are no known hatchery sites.

Type	Definition
Bin	Not a CU but is a category to hold sites that for some reason are not assigned to a CU.
Deprecated	An extant CU was merged with another CU or CUs. The CU should no longer be used. A deprecated CU is neither deleted nor extirpated because at least one of its populations persists or is believed to, and has been assigned to another CU.
Deprecated (Bin)	An extant CU was merged with another CU or CUs. The CU should no longer be used. A deprecated CU is neither deleted nor extirpated because at least one of its populations persists or is believed to, and has been assigned to another CU. Bin: Not a CU but a category to hold sites that for some reason are not assigned to a CU.
Deleted	The CU was deleted after confirmation that no persistent populations were ever present within recorded history within the area of the CU.

**Reviewer: Michael Folkes, Fisheries and Oceans Canada**

This paper is a methodical outline of the process required for consistent, objective, and well documented revisions to CU definitions. I cannot perceive any glaring errors in the approach proposed, which makes sense based on the number of authors contributing to the work. I imagine there was extensive refinement of the process between authors! My congratulations to the authors for preparing this paper.

1. Is the purpose of the working paper clearly stated?
  - Yes, the authors outline the five objectives in section 2.
2. Are the data and methods adequate to support the conclusions?
  - I feel the traditional sense of a data category is not applicable to this paper. The section describing the background of the process, and the respective issues, does give it context (a variation on the concept of 'data').
  - The methods section (Framework) is general in its description, which for the most part is fine. I describe below my one concern regarding a potential need for more detail.
3. Are the data and methods explained in sufficient detail to properly evaluate the conclusions?
4. See previous question If the document presents advice to decision-makers, are the recommendations provided in a useable form?
  - Mostly yes. Recommendations 1, 2, and 5 are in essence recommendations to approve the paper. I interpret recommendation 3 to imply a future formal (presumably CSAP) review of the CU Type definitions, and not a review within this immediate process.
5. If the document presents advice to decision-makers does the advice reflect the uncertainty in the data, analysis or process?
  - The document gives guidance to science on the 'best practice' to implement CU revisions. In this context I'll define science as the decision-making group. The document does outline steps when reviewing the two categories of CU revision. Perhaps the authors' intent was to maintain sufficient generality in the guidance that it would not impede the review process. However I feel there could be more detail in

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the “Framework” section. I imagine a new staff member being brought in to aid with a CU review. Is this document adequately detailed to guide somebody without 20 years of salmon stock assessment experience?

6. Can you suggest additional areas of research that are needed to improve our assessment abilities?
  - o I have no suggestions.

### **Logistics**

It is recommended that documentation (CSAS aside), data handling, and mapping of CU information be managed by the Salmon Data Unit. This approach does place additional work load on that group. Judging by the affiliation of some co-authors with the SDU, I trust this planned approach has the support of the SDU.

### **Methods**

I seem to recall CSAS does not permit citation of unpublished documents (they can be treated as footnotes). That’s a small matter. However, there are sections of this paper that rely on methodology outlined in Blair Holtby’s unpublished 2013 paper. As it’s uncertain that paper will attain a permanence in the published media, may I suggest that references to methods/process in Holtby’s 2013 paper be given greater detail so that readers of this working paper are not reliant on the unpublished work?

Regarding methods, a key section in this paper is 6.1.1 (changes to entire CUs). These methods were refined from Holtby’s unpublished paper. This may be among the most important guiding sections of the paper. I found several of the steps to be vague due to lack of detail. Perhaps this it is not the objective of this working paper, but I feel they need to be formalized in detail somewhere and this may be the best opportunity. An example from these steps is consideration of TEK. This is an challenging subject to apply to quantitative assessment and that may be part of the reason integration of TEK into scientific assessments is rare. I appreciate that defining the role of TEK may be a paper in its own right.

I feel the latter two sub-sections of section 6 (Framework) were clearly described with sufficient detail that there’s unlikely to be any controversy or confusion regarding their application!

### **Testing**

I assume that lessons learned during the southern chinook CU review guided much of the content of this paper. Section 6 opens with the sentence that it is intended this process be tested on current CUs. Is it expected that a revisit of the chinook process lead to the same outcome? The same question could be asked of the Fraser sockeye review.

## APPENDIX D: PARTICIPANT LIST

<b>Last Name</b>	<b>First Name</b>	<b>Affiliation</b>
Anderson	Erika	DFO Science, Core Salmon Assessment
Bailey	Richard	DFO Science, Fraser BC Interior Area
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Davis	Brooke	DFO Science
Fisher	Aidan	Fraser River Aboriginal Fisheries Secretariat (FRAFS)
Folkes	Michael	DFO Science
Foos	Aaron	DFO Science, Yukon Transboundary Rivers Area
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Hertz	Eric	Pacific Salmon Foundation
Harding	Joel	DFO Science, Yukon Transboundary Rivers Area
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Hyatt	Kim	DFO Science
Irvine	Jim	DFO Science
Komick	Nicholas	DFO Science, Core Salmon Assessment
Luedke	Wilf	DFO, South Coast Area
Lynch	Cheryl	DFO Salmon Enhancement Program
MacDougall	Lesley	DFO, Centre for Science Advice Pacific
MacKenzie	Julia	DFO Policy
McGreer	Madeleine	Central Coast Indigenous Resource Alliance
Ogden	Athena	DFO Science
Olsen	Andy	Salmon Coordinating Committee (SCC) Wild Salmon Policy Small Working Group
Patten	Bruce	DFO Science
Staley	Michael	IAS Ltd.
Tadey	Joe	DFO Science
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Van Will	Pieter	DFO Science, South Coast Area
Wade	Joy	Fundy Aqua Services Inc.
Withler	Ruth	DFO, Science
Wong	Janson	First Nations Fisheries Council