Terms of Reference

Pacific Herring Fishery Management Plan Scientific Peer Review Process

2018

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Contents

1. Introduction

1.1.CDFW Management Context

Pacific herring populations support important commercial and recreational fisheries in California state waters. Herring are a schooling species found throughout California nearshore ecosystems during spring and summer and migrate to bays and estuaries to spawn from November through April. They play an important role in the California marine ecosystem as a forage species for a wide suite of predators, including marine birds and mammals and are among the top forage species in terms of their proportion in predator diets, making them an essential food source for predators on the West Coast. The San Francisco Bay herring population supports a valuable fishery for herring roe (kazunoko), and a smaller herring-eggs-on-kelp (komochi or kazunoko kombu) fishery. San Francisco Bay also supports a limited commercial fresh fish and recreational fishery.

A primary goal of fishery management under the Marine Life Management Act (MLMA) is to ensure that fishing levels are sustainable and do not result in an overfished stock. While the commercial herring fishery is considered well managed, even with a very precautionary management approach, concerns about changing ocean conditions, sea-level rise, loss of spawning habitat, stakeholder interest, and a need to better understand spawning and stock fluctuations and their role as a forage fish have prompted the development of a fishery management plan (FMP). FMPs assemble information, analyses, and management options to guide the management of the fishery by the California Department of Fish and Wildlife (CDFW) and Fish and Game Commission (Commission). The FMP becomes effective upon adoption by the Commission, following their public process for review and revision. Thus, it is important for the scientific underpinnings of the draft FMP to have undergone independent review prior to submission to the Commission. External, independent peer review of the scientific underpinnings of the FMP is one way to provide the Commission and stakeholders assurances that the FMPs are based upon the best readily available scientific information, as set forth under the MLMA. The Ocean Protection Council (OPC) has provided funding to complete the peer review process for the Pacific herring FMP.

1.2. Review Process Goals and Objectives

Ensuring the best use of best available information in fisheries management is an important tenet of the MLMA. The MLMA identifies external scientific review as a key tool to ensure management decisions are based on the best available scientific information. CDFW is committed to incorporating the best available scientific information into fisheries management through a peer review process.

Scientific and technical peer review (review) is widely applied across numerous technical disciplines to assure products are of high quality, reflect solid scholarship, and that the information contained is accurate and based on rigorous, sound scientific methods (OST 2016). In any review, Ocean Science Trust's (OST) intent is to provide an assessment of the work product that is balanced, fairly represents all reviewer evaluations, and provides feedback that is actionable. When building a review process, OST seeks to balance and adhere to six core review principles: scientific rigor,

transparency, legitimacy, credibility, salience, and efficiency. These principles ground the review and shape the products that we develop.

As such, the goals and objectives of the FMP review process are to:

1. ensure that the science underpinning the FMP represents the best available scientific information and is appropriately used to inform a harvest control rule;
2. follow a detailed calendar and fulfill explicit responsibilities for all participants to produce required reports and outcomes;
3. provide an independent external scientific and technical review of the agreed upon sections of the herring FMP;
4. use review resources effectively and efficiently.

1.3. Review Coordinating Body: Ocean Science Trust

Ocean Science Trust is an independent non-profit organization working across traditional boundaries to bring together governments, scientists, and citizens to build trust and understanding in ocean and coastal science. We empower participation in the decisions that are shaping the future of our oceans. We were established by the California Ocean Resources Stewardship Act (CORSA) to support managers and policymakers with sound science.

For more information, visit our website at www.oceansciencetrust.org.

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2. FMP Peer Review Scope and Process

2.1. Review Request

CDFW's purpose in asking for this review is to ensure the scientific and technical elements presented within the FMP provide a rigorous underpinning for management decisions and regulatory action. Ocean Science Trust is serving as the review coordinating body, and worked with CDFW to develop a scope of review that focuses on key scientific and technical components of the FMP where independent scientific assessment would add value (this document). The review is not intended to be a comprehensive assessment of the entire FMP or the proposed approach to management contained therein, but rather focuses on key components identified below. Components subject to review were determined using criteria from OST 2017 (here).

2.2. Scope of review

CDFW is seeking an independent assessment of the science underpinning the proposed management framework that will guide fishery management decisions for the San Francisco Bay Pacific herring stock. The framework uses a predictive model for determining herring spawning stock biomass mass and data collected by CDFW and others in the California Current Ecosystem. The review will focus on whether the available data and predictive model that underpin the proposed FMP management strategy are applied in a manner that is scientifically sound, reasonable, and appropriate.

The central question of this review is:
Given CDFW's available data streams and analysis techniques, are the applications of the analyses to the integrated management strategy scientifically sound, reasonable and appropriate?

Specifically, the review will focus on evaluation of the following components of the FMP:

- The accuracy of representation of existing literature on the biology of the stock and in the essential fishery information (Sections 3 and 5.2)
- the proposed spawning stock biomass thresholds and associated harvest rates underpinning the catch quota decision making process and signaling when the fishery may warrant management response; (Section 7.7)
- the decision matrix of ecosystem indicators and the rationale behind the inclusion of these ecosystem indicators in management; (Section 7.7)
- the science underpinning additional conservation and management measures (Section 7.8)
- identify research and methods needed to improve assessments and fishery management in the future (Section 8)

For clarity we note that the following are not included in the scope of the current review:

- the data collection protocol (Section 5.1), as it has been reviewed previously

- the new predictive model for spawning stock biomass (Section 7.6), as this is currently undergoing a separate peer review.

2.3. Process

Review Process Overview

- **Select a review mode.** A review process is selected in consultation with CDFW and the Ocean Protection Council by considering complexity, management risk, uncertainty, socioeconomics, level of previous review, and novelty (OST 2016; OST 2017).
- **Assemble review team.** Ocean Science Trust will convene a 3-4 member review panel composed of Ocean Protection Council Science Advisory Team members and other experts (see "Assembling a Review Team," OST 2016 and "assembling a review team" below for additional details).
- **Conduct review via a series of webinars.** Group webinars will allow CDFW to engage directly with reviewers at the outset to present the inputs, model methods, and application of analyses and provide two-way interaction to provide any additional clarity needed to complete the review. There will also be opportunities for independent deliberation and conversation among reviewers.
- **Develop and share final report.** Reviewers will contribute to the development of a final report, which will be made available on the OST and CDFW webpages.

Review Mode: Remote Panel Review

All meetings will take place via remote online meetings (webinars). At the outset of the review, OST will work with CDFW to develop detailed reviewer instructions that encourage focused scientific feedback throughout the process. Instructions will include directed evaluation questions and may delegate tasks for reviewers based on their individual areas of expertise. This document will be used to guide the development of meeting agendas and track progress throughout the course of the review. For each meeting, advance work will be required of participants (e.g. drafting responses to guiding questions) in order for all parties to come prepared for meaningful discussions. OST will notify CDFW of additional requested materials and data immediately following the first webinar.

Webinar 1: Initiation of Review

Ocean Science Trust will host an initial webinar to provide the review committee and CDFW staff an overview of the scope and process, and clarify the roles and responsibilities of each participant. CDFW will also provide a summary of the relevant management context to ensure reviewers understand the role of the review in the larger FMP development process, and how the outputs will be considered. The bulk of the webinar will then focus on a presentation by CDFW and FMP contractor on the scientific and technical components of the draft FMP. This webinar is an opportunity to develop a shared understanding of the tasks and allow reviewers to ask CDFW any clarifying questions about the review materials before they convene independently to conduct their technical assessment.

Webinar 2-3: Reviewers convene with OST to conduct review

Ocean Science Trust will convene approximately two remote one- to two-hour webinars with the review committee to conduct an in-depth evaluation of the components identified in the Scope of Review (above). In advance of each webinar, reviewers will be asked to prepare responses to guiding evaluation criteria questions specified in the review instructions. During each webinar, reviewers will discuss their findings and develop conclusions and recommendations within the context of these questions. Additional follow-up phone conversations may be scheduled as needed to complete the review. Outputs from each webinar, as well as reviewer responses to the questions, will guide the development of the final report.

Webinar 4: Final summary report feedback

Ocean Science Trust will host a final 1-hour webinar to gather final feedback and input from the review panel on the summary report. The review panel will be asked to review the draft summary report in advance of this meeting. This final meeting will provide a space for reviewers to voice any suggested edits or clarifications, and a chance to have a final discussion about results before sharing the final report with CDFW.

Management Preview and OPC-SAT Endorsement

Ocean Science Trust will share the final summary report with CDFW for a management preview before the review results are published. There will be an opportunity for CDFW to ask clarifying questions of the review committee and for reviewers to make clarifying edits, as appropriate. This may occur via email, conference call or short webinar as time allows.

As a product of the Ocean Protection Council Science Advisory Team (OPC-SAT), near-final reports must also go through a full OPC-SAT endorsement before public release.

Assembling Reviewers

Transparency

Reviewer names will be published on OST's webpage for the review at the outset of the review; however, specific review comments in the final review report will not be attributed to individual reviewers.

Selection of Reviewers

Ocean Science Trust will implement a reviewer selection process to assemble a review committee composed of 3-4 external scientific experts. Ocean Science Trust will consult with and solicit reviewer recommendations from CDFW, the OPC-SAT, as well as OST's own professional network among the academic and research community. Membership may include experts from academia, research institutions, and government agencies as appropriate to deliver balanced feedback and multiple perspectives. Reviewers will be considered based on three key criteria:

Expertise: The reviewer should have demonstrated knowledge, experience, and skills in one or more of the following areas:

- Fisheries biology, stock assessments and modeling, including spawning stock biomass analyses and application
- Herring and/or forage fish biology and ecology, with an understanding of California's coastal ecosystem and how forage fish stocks and linked populations (e.g. predators) respond to fishing pressure and climate change
- Developing and/or testing harvest control rules for fisheries management, including applying ecosystem based management

Objectivity: The reviewer should be independent from the generation of the product under review, free from institutional or ideological bias regarding the issues under review, and able to provide an objective, open-minded, and thoughtful review in the best interest of the review outcome(s). In addition, the reviewer should be comfortable sharing his or her knowledge and perspectives and openly identifying his or her knowledge gaps.

Conflict of Interest: Reviewers will be asked to disclose any potential conflicts of interest to determine if they stand to financially gain from the outcome of the process (i.e. employment and funding). Conflicts will be considered and may exclude a potential reviewer's participation.

Final selections for the review committee will be made by the OPC-SAT Executive Committee. Ocean Science Trust will select one member of the review committee to serve as chair to provide leadership among reviewers, help ensure that all members act in accordance with review principles and policies, and promote a set of review outputs that adequately fulfill the charge and accurately reflect the views of all members.

Transparency in the Review Process

To ensure transparency, reviewers will serve openly. Reviewer names will be published on Ocean Science Trust's review webpage at the outset of the review. However, to encourage unbiased and candid input, specific review comments will not be attributed to individual reviewers. Upon delivery of the final report to CDFW, the report will also be made public on the OST review webpage.

In addition, OST will host a public webinar briefing in which the review committee, led by the chair, will share the draft findings of the review process. The information sharing will be open to the public, and include a Q&A so the reviewers (and CDFW scientists) can answer questions. This meeting will occur after the completion of the final summary report.

2.4. Review Report (reference appendix template)

Ocean Science Trust will work with reviewers to synthesize reviewer assessments (responses to the review instructions and input during webinars) into a cohesive, concise final written summary report. This review summary will be delivered to CDFW by late July 2018, and made publically available on OST's website. Reviewers may also provide individual in-text comments on the draft FMP which will be provided to CDFW for internal use. We acknowledge that reviewers may provide

scientific recommendations beyond the given reviewer charge; such scientific recommendations will be honored and represented in the final summary.

2.5. Timeline

The review will commence the end of April 2018 with the expected delivery of a final summary report to CDFW by mid August 2018. A timeline of each task is provided below.

	Feb	Mar	April	May	June	July	Aug
Receive Draft FMP			30-Apr				
Terms of Reference Development (Feb - March)							
Develop and Finalize Terms of Reference	X	X					
Assemble Review Team and Develop Guidance for Reviewers (March - April)							
Develop/put up webpage		X					
Solicit, select, and confirm reviewers			X				
Schedule webinars			X				
Develop Review Instructions			X	X			
Develop webinar agendas				X			
Conduct Review (May - Aug)							
Distribute TOR, review materials, and Review Instructions to reviewers			X				
Kickoff webinar				X			
Webinar 2				X			
Webinar 3					X		
Webinar 4					X		
Additional data requests to DFW			X				
Develop outline and draft report, edits from reviewers					X		
Final draft to reviewers					X		
Final edits						X	
Management preview						X	
Final Report to DFW							X
Post final report on OST website							X
Public sharing webinar							X

Follow-up as appropriate							

3. Roles and Responsibilities of Peer Review Participants

3.1. Shared Responsibilities

All participating parties share the responsibility in assuring adequate technical and scientific review of the Pacific Herring FMP in accordance with the MLMA.

3.2. Reviewer Responsibilities

The role of the review committee is to conduct a detailed evaluation of the scientific underpinnings of aspects of the Pacific Herring FMP where external review will be valuable. The specific responsibilities of the review committee are included in the Review Instructions. The review committee may request additional information, data, and analyses as appropriate to support a comprehensive and useful review.

The review committee chair has, in addition, the responsibility to: 1) provide leadership among reviewers; 2) ensure that review committee participants follow the terms of reference and review instructions and guidelines; and 3) promote review outputs that adequately fulfill the charge and accurately reflect the views of all members.

The review committee is required to make an honest and legitimate attempt to resolve any areas of disagreement during the review process. Occasionally, fundamental differences of opinions may remain between reviewers that cannot be resolved. In such cases, the review committee will document the areas of disagreement in the final summary report.

Selected reviewers should not have financial or personal conflicts of interest with the scientific information, subject matter, or work product under review within the previous year (at minimum), or anticipated. Reviewers should not have contributed or participated in the development of the product or scientific information under review. Review committee members who are federal employees should comply with all applicable federal ethics requirements. Reviewers who are not federal employees will be screened for conflicts of interest.

3.3. CDFW FMP and Management Team Responsibilities

The Mission of the California Department of Fish and Wildlife is to manage California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public. CDFW and the management team, including contractors, will participate in the review process as follows:

1. *Provide all relevant project documents, data, and supporting materials.* CDFW will identify and provide all project documents, data, and other information necessary for reviewers to conduct a constructive assessment. CDFW will work to ensure all related materials are clear

and accessible to reviewers in a realistic timeframe and respond to additional requests in a timely manner.

2. *Constructively engage with reviewers and OST staff, and respond to data and other information requests in a timely manner.* CDFW staff and contractors most familiar with the draft FMP will engage in the process and be available to answer questions or present materials to the review committee as necessary. The CDFW Environmental Scientist, Ryan Bartling, and contractor, Sarah Valencia, have agreed to serve as the primary contacts during the review process. In order to adhere to review timelines, CDFW will respond to and provide feedback on requested materials from OST in a reasonable, mutually agreed-upon timeframe.
3. *Consider reviewer comments and recommendations.* CDFW intends to consider and incorporate reviewer feedback and recommendations into the FMP and supporting materials as appropriate.

3.4. Ocean Science Trust Responsibilities

California Department of Fish and Wildlife has requested OST to serve as the independent appointed entity to design and coordinate all aspects of this scientific and technical review. Ocean Science Trust will design and implement all aspects of the review process to meet management needs, including assemble and guide a committee of expert reviewers, conduct a review process that is on task and on time, schedule and host remote meetings as appropriate, work with reviewers to produce a written final summary report, and encourage candor among reviewers, among other activities. Upon completion of the review, the final report will be delivered to CDFW and made publicly available on the OST website. Throughout, OST will serve as an honest broker and facilitate constructive interactions between CDFW and reviewers as needed in order to ensure reviewers provide recommendations that are valuable and actionable, while maintaining the independence of the review process and outputs.

Appendix: Outline of Example Peer Review Report

The following is an example template for a peer review report:

1. Summary of the Peer Review Committee, containing:
    a. Names and affiliations of committee members
    b. Topic(s) being reviewed
    c. List of analyses requested by the Committee, the rationale for each request, and a brief summary the responses to each request
2. Comments on the technical merits and/or deficiencies in the applications of the analyses underpinning the FMP and recommendations for remedies. Comments should address issues such as the following:
    a. What are the data requirements of the analyses underpinning the FMP?
    b. What are the situations/stocks for which the analyses are applicable?
    c. What are the assumptions of the methodology and/or in applying the proposed analyses?
    d. Are the methodology and application of the analyses correct from a technical perspective?
    e. How robust are results to departures from the assumptions of the analyses?
    f. Do the application of the analyses take into account estimates of uncertainty? How comprehensive are those estimates?
    g. Will the new analyses and application of analyses result in improved stock assessments or management advice?
3. Areas of disagreement regarding panel recommendations:
    a. Among panel members
    b. Between the panel and proponents
4. Unresolved problems and major uncertainties (e.g., any issues that could preclude use of the analyses underpinning the FMP)
5. Management, data, or fishery issues raised by the public and other representatives during the panel review
6. Prioritized recommendations for future research and/or data collection