
Terms of Reference

California Halibut Stock Assessment Scientific Peer Review Process

2020



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1. Introduction

1.1. CDFW Management Context

California halibut (*Paralichthys californicus*) is a large, predatory flatfish that lives in nearshore, soft bottom ocean habitat. They range from Baja California Sur (MX) to the Quillayute River in Washington, and are most abundant from central California to Baja California (MX). Large adults inhabit deeper water, outer banks, and islands, except during the peak spawning season (winter-spring), but are most often caught in 10 to 90 ft of water. In southern California halibut move inshore to spawn during April through May. California halibut populations have been fished actively from before the beginning of California landings records in 1916 and continue to support important commercial and recreational fisheries off California.

Recreational catch is taken by shore, private/rental boats, and party/charter boats and collectively makes up a significant proportion of the total catch. The commercial fisheries have caught California halibut using trawl, hook-and-line, and set nets. Set nets, both gill and trammel nets were historically important statewide, but their use has been reduced to certain areas outside of state waters in southern California due to regulations banning these fishing methods in some areas and at certain depths.

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. To determine where a fishery is relative to this goal, managers develop stock assessments that establish the current and historical status of the fishery resource. Stock assessments make use of all available data, which most commonly includes catch, abundance indices, and biological data specific to the species. They are highly informative management tools used to monitor the abundance of fish populations, determine the level at which a resource may be sustainably exploited, and sometimes to predict the potential consequences of policy decisions. California halibut previously underwent a stock assessment and associated peer review process in 2011. As part of the MLMA implementation process, CDFW is currently identifying priority fisheries for development of Fishery Management Plans (FMP) and it is likely that California halibut will rank high in the prioritization process and require the development of an FMP.

It is essential that the stock assessment undergo an expert peer review prior to serving as the basis for any subsequent management decisions. External, independent peer review of the scientific underpinnings of the stock assessment is one way to provide the CDFW and stakeholders assurances that it is based upon the best readily available scientific information. Resources Legacy Fund has provided funding to complete the peer review process for the 2019 California halibut stock assessment.

1.2. Review Process Goals and Objectives

The MLMA identifies external scientific review as a key tool to ensure fisheries 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 this review process are to:

1. ensure that the science underpinning the stock assessment represents the best available scientific information and is appropriately used, thereby, meeting the mandates of the MLMA;
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 halibut stock assessment; and
4. use review resources effectively and efficiently.

1.3. Review Coordinating Body: Ocean Science Trust

Ocean Science Trust is an independent non-profit organization that convenes science expertise to accelerate progress towards healthy oceans in California. Believing that durable solutions require broad input and shared objectives, we serve as a nexus between managers, scientists and stakeholders to bring together the diversity of perspectives. OST was established by the California Ocean Resources Stewardship Act (CORSA) in 2000 to support state priorities around oceans and coasts with sound science.

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

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2. Stock Assessment 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 stock assessment 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 stock assessment where independent scientific assessment would add value (this document). The review is intended to be a comprehensive review of the stock assessment, but with a focus 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 developed stock assessment that will guide fishery management decisions for the northern and southern California halibut stocks, with a break at Point Conception. The two regional stock assessments use a sex-structured statistical catch-at-age model, implemented in Stock Sythesis (Methot and Wetzl 2013), to estimate the status of the stock separately for the northern and southern regions. There are five separate fisheries in the model. This review will focus on whether the available data and models that underpin the two regional stock assessments are applied in a manner that is scientifically sound, reasonable, and appropriate. The review will address the stock assessments similarly to a "full assessment" review for the Pacific Fisheries Management Council (PFMC, 2019).

The central question of this review is:

Given all available data related to the species, are the technical components, models, analysis techniques and the applications of the analyses in the stock assessments scientifically sound, reasonable and appropriate?

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

- 1) the rationale given for the proposed stock structure
- 2) the rationale given for including and excluding specific datasets in stock assessment development
- 3) the comprehensiveness, interpretation and application of data on life history characteristics such as growth, natural mortality, maturity and fecundity and ecosystem considerations, including underlying models used to determine biological parameters
- 4) the treatment and application of relevant input data to each of the stock assessment models
- 5) the scientific merits for the modeling approach used, how this assessment builds upon the 2011 stock assessment, and how feedback from the associated peer review was addressed or incorporated

- 6) the model structure, selection, and evaluation, including the treatment of underlying assumptions and uncertainty
- 7) the development of base-case model results
- 8) the critical evaluation of model outputs relative to CDFW's sustainability and ecosystem health mandates within the Marine Life Management Act
- 9) identify priority research methods and monitoring needed to improve assessments and fishery management in the future

For clarity we note that the evaluation of management decisions is not included in the scope of the current review.

2.3. Process

2.3.1 Review Process Overview

To establish a review process, OST will:

- **Select a review mode.** A review process is selected in consultation with CDFW 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 experts with relevant expertise (see "Assembling a Review Team," OST 2016 and "assembling a review team" below for additional details).

OST will then, with the review panel:

- **Conduct review via an in-person and remote meetings, as needed.** Meetings 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. During the review process, the panel will work with CDFW to ensure that the assessment is sufficiently reviewed. This will likely include requests to CDFW for additional analyses.
- **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: Series of Remote and In-person Meetings

The review will mainly be conducted during a multi-day remote workshop (in accordance with COVID-19 Shelter in Place procedures) and/or a series of closely scheduled remote meetings, preceded and followed by remote meetings, as needed, to set the groundwork for the review and address any issues that were not able to be addressed or resolved during the main workshop. At the outset of the review, OST will work with CDFW and the reviewer chair 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. In advance of meetings, work may be required of participants (e.g. drafting responses to guiding questions, identifying additional information needs or analysis requests from CDFW) in order for all parties to come prepared for meaningful discussions. OST will notify CDFW of any additional requested materials and data in advance of the in-person workshop.

Initial meeting: Initiation of review

Ocean Science Trust will host an initial remote meeting that will provide the review panel and CDFW with 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 management process, and how the outputs will be considered.

The meeting will then focus on a presentation by CDFW on the scientific and technical components of the stock assessment and 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.

Multi-day workshop: Reviewers convene remotely with OST to conduct review

The workshop will allow the reviewers to conduct an in-depth evaluation of the components identified in the Scope of Review (above). In accordance with COVID-19 Shelter in Place procedures, the workshop will be held remotely via webinar/video conferencing. In consideration of differences between video and in-person formats, the original intended multi-day workshop will instead be conducted via several separate remote meetings, depending on recommendations and input from the review panel. In advance of this workshop, reviewers will be asked to prepare responses to guiding evaluation questions specified in the review instructions and make requests for additional information, if needed. During the workshop, reviewers will evaluate the technical merits of the stock assessment, discuss their findings, and develop conclusions and recommendations within the context of these questions.

In advance of and during the workshop, the panel may request additional analyses based on alternative approaches. This may include additional requests of CDFW staff to conduct sensitivity or other analyses and report back to the review panel. It is expected that CDFW will make a good faith effort to complete these analyses. Recommendations and requests to CDFW for additional or revised analyses must be clear, explicit and in writing. If possible, these analyses should be completed by or during the panel meeting. However, if follow-up work by CDFW is required after the review meeting, then it is the panel's responsibility to track this progress and incorporate any additional findings into the final summary report.

Outputs from the workshop, as well as reviewer responses to the questions, will guide the development of the final report, which will be led by the review panel chair. Additional follow-

up remote conversations may be scheduled with individual reviewers or the panel as a whole as needed to complete the review.

Follow up meeting: Addressing unresolved topics and final summary report feedback

Ocean Science Trust will host a final 1-2 hour meeting, as needed, 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

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 panel and for reviewers to make clarifying edits, as appropriate. This may occur via email, conference call or short webinar as time allows.

2.3.2 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 panel composed of 3-4 external scientific experts. Ocean Science Trust will consult with and solicit reviewer recommendations from CDFW, members of 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 the below key criteria:

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

- Technical stock assessments and modeling, including stock synthesis or other assessment models
- Fisheries biology and population dynamics
- U.S. West coast groundfish biology and ecology, with an understanding of California's coastal ecosystem and how fish stocks and linked populations (e.g. predators) respond to fishing pressure and climate change

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 panel will be made by the OPC-SAT Executive Committee as a scientific support body for state needs. Ocean Science Trust will select one member of the review panel 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.

2.3.3 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.

OST will host a public briefing at the outset of the review in which OST and the review panel, led by the chair, will share the review process and questions under consideration of the panel. The information sharing will be open to the public, and include a Q&A so the reviewers (and CDFW scientists) can answer questions.

In addition, OST will host a public briefing at the conclusion of the review in which the review panel, led by the chair, will share the 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 the review chair and other reviewers to synthesize reviewer assessments (responses to the review instructions and input during meetings) into a cohesive, concise final written summary report. This review summary will be delivered to CDFW by July 31, 2020, and made publically available on OST's website. Reviewers may also provide individual in-text comments on the stock assessment which will be provided to CDFW for internal use. A written summary of discussion on significant technical points and lists of all Panel recommendations and requests to CDFW are appropriate for inclusion in the Panel's report. 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

This review process will commence in December 2019 with the expected delivery of a final summary report to CDFW in August 2020. A timeline is provided below.

Review Activities	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Receive draft stock assessment for review									
Terms of Reference Development									
Assemble Review Team									
Develop Guidance for Reviewers									
Conduct Review									
Stakeholder Engagement									
Final report published									
Follow-up to finalize stock assessment, as appropriate									

3. Roles and Responsibilities of Peer Review Participants

3.1. Shared Responsibilities

All participating parties share the responsibility in ensuring adequate technical and scientific review of the California halibut stock assessment in accordance with the MLMA.

3.2. Reviewer Responsibilities

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

Members of the review panel are also expected to participate in a stakeholder engagement webinar at the closing of the review.

The review panel chair has, in addition, the responsibility to:

- 1) Provide leadership among reviewers, including by working with OST to set appropriate content for review panel meeting agendas.
- 2) Support the development of the review instructions to ensure feasibility of addressing questions within.
- 3) Ensure that review panel participants follow the terms of reference and review instructions and guidelines.
- 4) Promote review outputs that adequately fulfill the charge and accurately reflect the views of all members. This includes leading the development of the final scientific and technical report and reviewing an OST-led executive summary for inclusion in the report.

The review panel 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 panel 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 panel 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 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 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 most familiar with the stock assessment will engage in the process and be available to answer questions or present materials to the review panel as necessary. CDFW Marine Region Environmental Scientist, Kathryn Meyer, and Environmental Program Manager, Kirsten Ramey, 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 stock assessment 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 panel of expert reviewers, conduct a review process that is on task and on time, schedule and host remote and in-person meetings as appropriate, work with reviewers to produce a written final summary report with executive summary, 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 Panel, containing:
 - a. Names and affiliations of panel members
 - b. Topic(s) being reviewed
 - c. High-level summary of review findings
2. List of analyses requested by the Panel, the rationale for each request, and a brief summary of the responses to each request
3. 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 stock assessment?
 - 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?
4. Areas of disagreement regarding panel recommendations:
 - a. Among panel members
 - b. Between the panel and proponents
5. Unresolved problems and major uncertainties (e.g., any issues that could preclude the use of the analyses underpinning the FMP)
6. Management, data, or fishery issues raised by the public and other representatives during the panel review
7. Prioritized recommendations for future research and/or data collection