



Independent Peer Report

BSAI Pacific Ocean Perch Assessment Review

Prepared for the Center for Independent Experts

By

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Executive Summary

- This document is the individual CIE Reviewer Report of the review of the stock assessment of the Bering Sea and Aleutian Islands (BSAI) stock of Pacific Ocean perch (*Sebastes alutus*). The review was conducted during May 2022, with the review meeting held from 10.00 (PDT) daily from 11th to 13th May using a virtual platform (Webex). The meeting timing was a day earlier for this reviewer due to the difference in time zone and started at 05.00 NZST on the 12th May. This report represents the sole views of the independent CIE reviewer Geoff Tingley.
- The current and recent historical assessment documents for the stock, voiced presentations, a video, as well as other relevant background documents, were provided in advance of the meeting in a downloadable format posted on a dedicated Webex webpage. Additional supporting documents and analyses were made available during the meeting. All documents are listed in [Appendix 1](#).
- The assessment for the stock was clearly presented and supported by additional documentation, including detailed descriptions of the input data and especially that from the research survey series, and included appropriate coverage of the main uncertainties. The presenting assessment analyst and other participants fully engaged with the review in a highly professional and constructive manner. The assessment presentations were supported by clear and informative presentations on the BSAI Bottom Trawl Surveys for the Eastern Bering Sea (EBS) slope and for the Aleutian Islands, MACE Program Gulf of Alaska Acoustic-Trawl Surveys, the North Pacific Observer Program, Alaska Fisheries Science Center (AFSC) Age and Growth Program, and the Gulf of Alaska Age and Growth Program, all of which were key to the full understanding of the assessment being reviewed.
- The assessment model was age-structured and the design and implementation appropriate for the biology of Pacific Ocean perch in this region, the type, scale and extent of the fishery, and the available catch, abundance, and composition data. A particular strength of the assessment is the availability of a consistent timeseries of biomass estimates from the two (EBS and AI) Bottom Trawl Survey timeseries, plus the high-quality age data from both the surveys and fishery.
- The assessment appropriately considered and sought to address the main uncertainties in the data and the assumptions necessary to develop and implement the model.
- During the review process, the CIE reviewers identified some issues within the assessment. While none of these identified issues were considered a major concern by this reviewer, one was of more than minor and warrants thorough investigation prior to the next assessment. There was open discussion about identified issues and, where possible, additional model outputs were produced and reviewed during the meeting.
- This stock assessment for BSAI Pacific Ocean perch represents the best available science and meets the acceptability threshold for scientific and technical quality to be used for informing management. Given the assessment, the current management approach and the scale and intensity of the fishery, there are no current sustainability concerns for the stock of BSAI Pacific Ocean perch. The stock is not experiencing overfishing, is not overfished, and projections indicate that, at assumed catch levels delivering recent fishing

mortality, this will likely remain the case for the short- to medium-term, although the spawning stock biomass will likely continue to decline towards the management target.

- Specific recommendations aimed at improving both aspects of the input data and the stock assessment for BSAI Pacific Ocean perch, as well as some general processes, are made by the reviewer as required by the reviewer Terms of Reference provided by the CIE. Some more strategic recommendations are also made.

Background

This review of the 2020 Stock Assessment Report for the Bering Sea and Aleutian Islands (BSAI) Pacific Ocean perch stock was conducted as part of an independent review for the Center for Independent Experts (CIE).

All views expressed in this report are solely those of the named, independent CIE reviewer.

The key assessment reports, for assessments in 2016, 2018 and 2020, together with supporting background documents and reports, were comprehensive, well written and clearly presented. The support provided by the local NMFS staff, particularly that provided by Pete Hulson (meeting Chair), Paul Spencer (stock assessment analyst) and Jim Ianelli (assessment co-author), was exceptional and much appreciated by the reviewer. The reviewer appreciated the high quality and informative presentations by the various NMFS staff. The provision of pre-recorded videos and voice-over PowerPoints for review prior to the meeting worked really well, allowing better understanding of the fishery and monitoring programs. Provision of these resources should be continued even if these review meetings return to an in-person basis.

The fishery for BSAI Pacific Ocean perch has experienced a managed, long-term recovery since the early 1980s, as the stock has increased and catch limits have been adjusted. There has been a reduction in spawning stock biomass over the last decade, accelerating in more recent years. The recent four-year catch average has been about 35,500 t (2017-2020).

The meeting Chair, Pete Hulson, ran the meeting, facilitated discussions within the group, and ensured appropriate support was provided, as required. The various presenters provided clear and informative background on their individual areas of expertise and responsibility for the review team, including fish biology, sampling, spatio-temporal data analyzes, ageing, and assessment. All presenters responded fully to questions raised by members of the review panel. This CIE reviewer considered all of the documents and presentations provided. All CIE reviewers asked questions of clarification and engaged to offer alternative approaches where they considered such approaches would lead to insights on or improvements in the assessment.

Description of Review Activities

This review was undertaken by Geoff Tingley (Gingerfish Ltd) between mid-April and 31st May 2022. The review meeting was conducted using the Webex software platform, with CIE reviewers joining remotely from east coast Canada, east coast USA and New Zealand. The timing of the virtual review meeting proceeded as scheduled from 10.00 PDT am 11th May, concluding on 13th May 2022. The agreed [agenda](#), was broadly followed, with the meeting finishing a little early on some days when business was concluded at a natural breakpoint.

The supporting documents for the review of the assessment were provided to the reviewers in electronic format adequately in advance of the review meeting. These documents included the current and two historic stock assessments for BSAI Pacific Ocean perch, previous CIE review reports and recorded video and voice-over PowerPoint presentations on the various

monitoring programs. Additional relevant documents detailing aspects of the stocks, sampling and other related science matters necessary for a full understanding of the stock, the fishery and the assessment were also made available electronically before and during the meeting as and when it became clear that these may be of use in the review. Electronic copies of the various presentations and additional work conducted during the review meeting were also provided. The reviewer also accessed additional, publicly available reports relevant for understanding the assessment and supporting the review. All documents provided and used are listed in the Bibliography ([Appendix 1](#)).

All documents provided in advance of the meeting were reviewed prior to the start of the meeting and the assessment was reviewed against the specific, Terms of Reference (ToR) provided by the CIE in the Performance Work Statement ([Appendix 2](#)).

Information relevant to this review is presented in three appendices to this review report, as required by the ToR provided by the CIE. These are, [Appendix 1](#): Bibliography of documents; [Appendix 2](#): CIE Performance Work Statement (which includes its own annexes describing (1) the Peer review report requirements, (2) the ToR for the peer review, and (3) the draft agenda for the review meeting; and [Appendix 3](#): Panel membership and other relevant information and decisions, including the agenda (as agreed at the start of the meeting).

An on-line (Webex) draft agenda was provided in advance of the meeting. At the start of the meeting the agenda was discussed and agreed with no changes. The meeting was conducted in an open, friendly and constructive manner throughout. Presentations were made with questions of clarification asked by all members of the panel. All discussions were professional and good natured, being focused on clarification and clarity around the assessment under review. Most attendees were ASFC staff, with one academic and two industry attendees also, a list of attendees is given in [Appendix 3](#).

Additional output from model runs requested during the meeting, as well as responses to panel questions, were made available to the reviewers as soon as completed. This material was either posted to the Webex site or distributed by email. All reviewer requests were responded to before the end of the meeting or by email shortly afterwards. The assessment team are to be congratulated on the quantity of additional work they delivered over the three days of the review.

None of the three CIE reviewers reported having any major concerns about the assessment during the three days of the meeting.

Summary of Findings

The 2020 assessment report was well written and together with the supporting documentation included virtually all the information necessary to support the review.

Focusing on a single assessment, as was done for this review, enabled a more comprehensive review than is possible when multiple assessments on different stocks or species are conducted, especially given the rather more challenging remote working environment.

Areas of the assessment where one or more reviewer considered there was opportunity to improve on the assessment approach were explored during the meeting. These are discussed in some detail below, and where appropriate, recommendations have been made.

Additional model runs for the assessment were developed during the review meeting. This testing of the assessment enabled individual reviewer and collective review panel concerns to be explored and clarification of whether those concerns were justified or not. Some areas where improvements could be made in future assessments were identified and are reported below. This approach clearly demonstrated that the assessment was robust and of a high quality, representing the best available science and fully appropriate to use as a basis for providing management advice.

The types, amount and quality of data available to assess the status of Pacific Ocean perch in the Bering Sea and Aleutian Islands are more than sufficient to enable an assessment of very high quality to be developed. There remains one significant area where improvement should be made, relating to a mismatch between the composition data, survey abundance indices and/or the model structure.

The Aleutian Islands Bottom Trawl Survey was found to be a high-quality data source, providing fishery-independent abundance (biomass) information. This has been developed with considerable care, with tow distribution planned to account for key fish species density distribution, depth, main habitat types, trawlable/untrawlable ground, and differences in gear and survey vessels within the timeseries. The earliest survey points have already been dropped from the bottom trawl survey abundance index based on concerns that the survey methodology for those timepoints was sufficiently different from that used in later years and that these early points would not represent part of the same timeseries as the later points. The reviewer concurs with this decision.

The Eastern Bering Sea Slope Bottom Trawl Survey was also of a high quality in design and execution but the utility and influence of the survey within the assessment was somewhat lower due to the shortness of the survey timeseries and the termination of the timeseries in 2016.

Recommendations for research and development work for future assessments for this stock were considered and discussed. Some of the recommendations made with regard to the assessment of Pacific Ocean perch are also relevant for assessments for other BSAI stocks.

By the end of the review meeting, the approach to modeling the BSAI stock of Pacific Ocean perch had been thoroughly explored, was considered thorough and sound, and appropriately addressed uncertainty to the principal assumptions through the range of models and sensitivities explored. The ranges of input data available and used were clearly described.

The overall outcome of this assessment, as reviewed, is that it meets the description of best available science and meets the acceptability quality threshold to be used to inform management.

Addressing the Terms of Reference for the Peer Review

Detailed findings and recommendations are presented below, as required by the ToR for the review.

BSAI Pacific Ocean perch

1. Evaluation of the data used in the assessments, specifically trawl survey estimates of abundance, and recommendations for processing data before use as assessment inputs

The data used in the BSAI Pacific Ocean perch assessment were generally all of a high standard.

Trawl Surveys

The quality statement above is particularly true of the data collected by Aleutian Islands Bottom Trawl Survey series, excepting the early years, which are dealt with appropriately with data prior to 1993 excluded from the assessment. The Eastern Bering Sea survey series is rather shorter and terminated in 2016. These surveys are well designed and well documented and the development of the abundance indices for Pacific Ocean perch from the survey data is also of a high standard.

There will no doubt be future options to more fully explore the application of spatio-temporal analyses to develop alternative indices from the survey data, and these should be taken up at the appropriate time.

Catch History

The Pacific Ocean perch fishery is reported to have started in the early 1960s when it was dominated by foreign flagged vessels, with very large catches reported in the mid-1960s, peaking in 1965. Catches declined from the late 1960s through the 1970s. Domestic interest was established during 1986 and a fully domestic fishery began in 1990. This assessment used catch data from 1960 to 2019, with total catch for 2020 projected.

There is, clearly, some uncertainty about the reliability of the early years catch data and any concerns about the influence that this uncertainty may have on the assessment outcomes could be evaluated by running model sensitivities to plausible alternative catch histories.

It would be appropriate to run sensitivities to plausible alternative catch histories, particularly with regard to the catches made in the early years of the fishery. Such sensitivities would best be run when there are substantive changes to the assessment model structure or assumptions in the future.

Composition Data

There are substantive amounts of composition data available, from both of the survey timeseries and also from the commercial fishery. Observer coverage of the early foreign fishery was poor and while noting some impact due to COVID-19, there has been full observer coverage of this fishery for the last two decades and thus the composition data from this period are expected to be representative of the fishery.

Substantial length frequency data from the fishery are available from 1964, showing periodic improvement in sampling approach. Thus, for example, there was an increased emphasis on sampling from multiple hauls starting in 1991, which was increased again from 2018.

The current assessment uses age-frequencies from the fishery from 1981 (though not for every year) derived using an age-length key. Composition data from the Aleutian Islands fishery has typically been about three times the quantity from the Eastern Bering Sea fishery. With some reported increase in Pacific Ocean perch in areas of the Eastern Bering Sea, some consideration of the sampling ratio of the composition data from the two fisheries may be advisable.

Considerable efforts have been applied in this assessment to ensure that the composition data have been appropriately weighted. This was reflected in the content of assessment, as well as through the engagement from previous reviewers and the SSC. While the fits to these data, as evidenced by the various plots of age- and length-frequency fits and residual plots, are acceptable, it is clear that this is one area of the assessment that could be improved. This is best seen in the poor fits to the model to the survey biomass indices, especially in recent years ([Figures 1 and 2](#)).

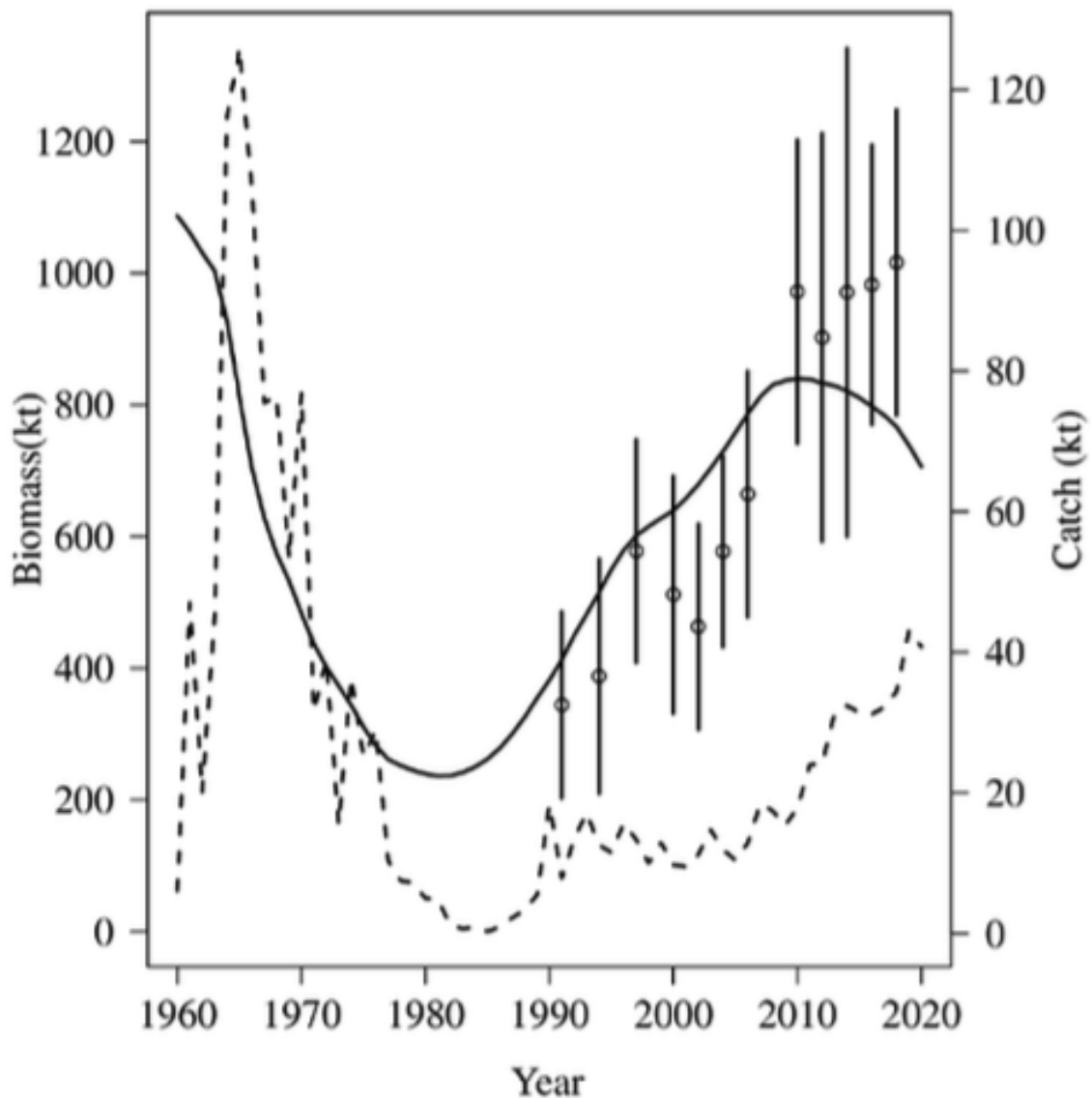


Figure 1: Observed Aleutian Islands survey biomass (data points, +/- 2 standard deviations), estimated survey biomass (solid line), and BSAI harvest (dashed line). Assessment Figure 12.13.

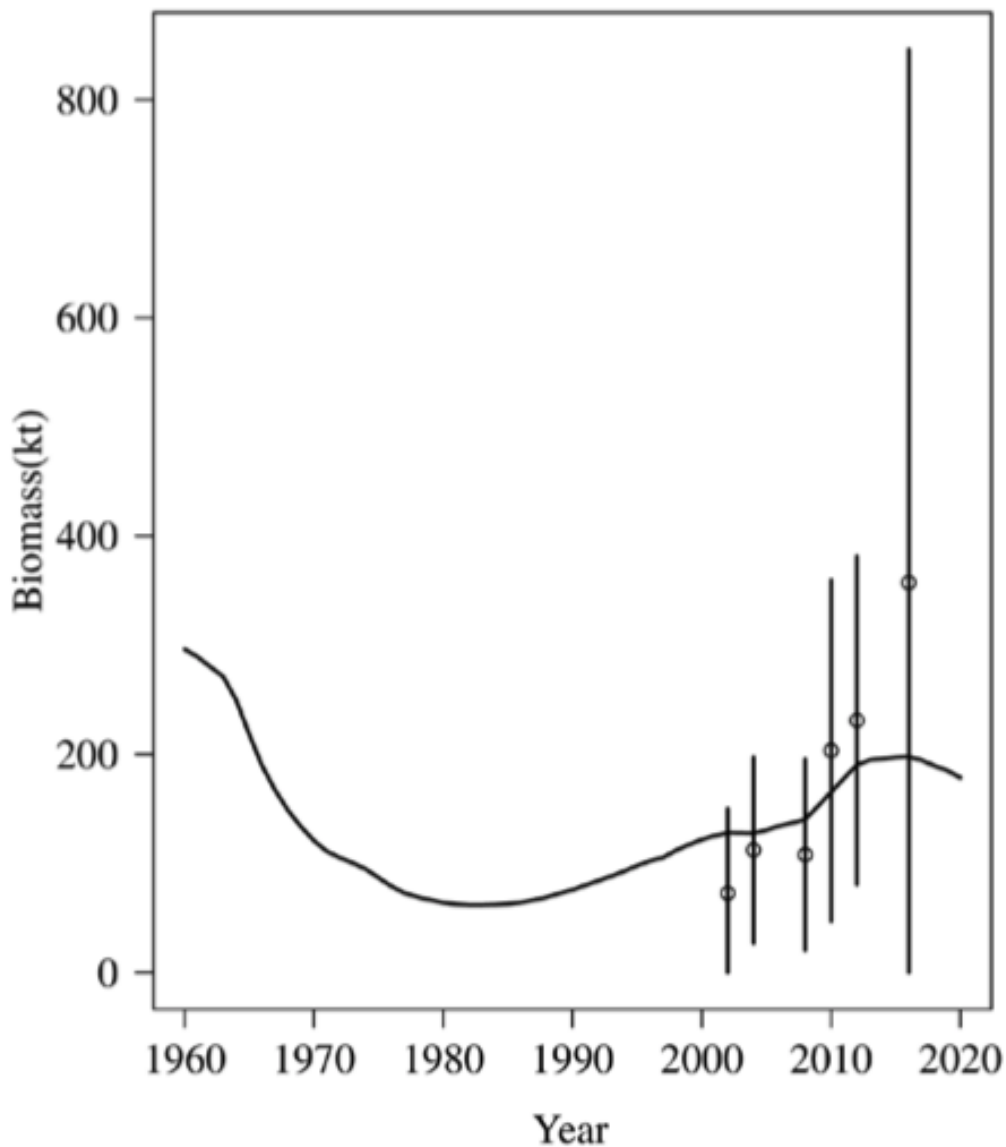


Figure 2: Observed Eastern Bering Sea survey biomass (data points, +/- 2 standard deviations) and estimated survey biomass (solid line). Assessment Figure 12.15.

The appearance is that the composition data are over-weighted in this assessment, and a review requested model run conducted during the review removing all composition data did enable substantially better fits to the abundance indices, including the latter years (although there were other major acceptability issues with this model run).

This indicates that there is mismatch between the composition data and the abundance indices within the assessment framework that needs further investigation. From the various model runs considered before and during the review, it does not appear to be a simple over-weighting issue. This therefore suggests that there is either a conflict between the composition data and the abundance indices and/or a misspecification in the model. This is, therefore, a complex issue to explore as the cause or causes could be with one or more than one of the sampling or development of the composition data, the sampling or development of the survey indices, or in the model structure or assumptions.

It would be appropriate to explore different approaches to address this issue but given the complexity, a well-structured approach would be desirable. In addition to reviewing the model structure and assumptions, Possible components could include, for example, re-developing the abundance indices on a spatio-temporal basis, reviewing, and applying a stricter quality control of the composition data components, as well as using sub-groups of composition data (fishery only, survey only, etc.), focused on addressing the fitting issue.

Plus Group

The 2020 assessment used a plus age group at 40 years-old for a stock with a maximum age estimated at 104 years. The spawning stock biomass has seen a substantial increase since the early 1980s, through managed reduction in fishing mortality, with an expectation of a growth in the number (and proportion) of older fish.

While a plus age group at 40 years may have been appropriate in earlier assessments, the age composition data support a review of this. The over representation of fish in the plus group is very clear in the fishery data over the last decade, as well as in some earlier years, and can be seen in the size of the terminal age bars in Figure 3. As the same pattern is seen in the survey age composition data, this is not just a phenomenon of the fishery (Figure 4) Changing the plus group has been considered previously. The available data suggests that this should be revisited, especially so given the conflict noted in the assessment in relation to composition data.

It is recommended that an exploration of an older plus group should be done in advance of, or as part of, the next assessment for BSAI Pacific Ocean perch.

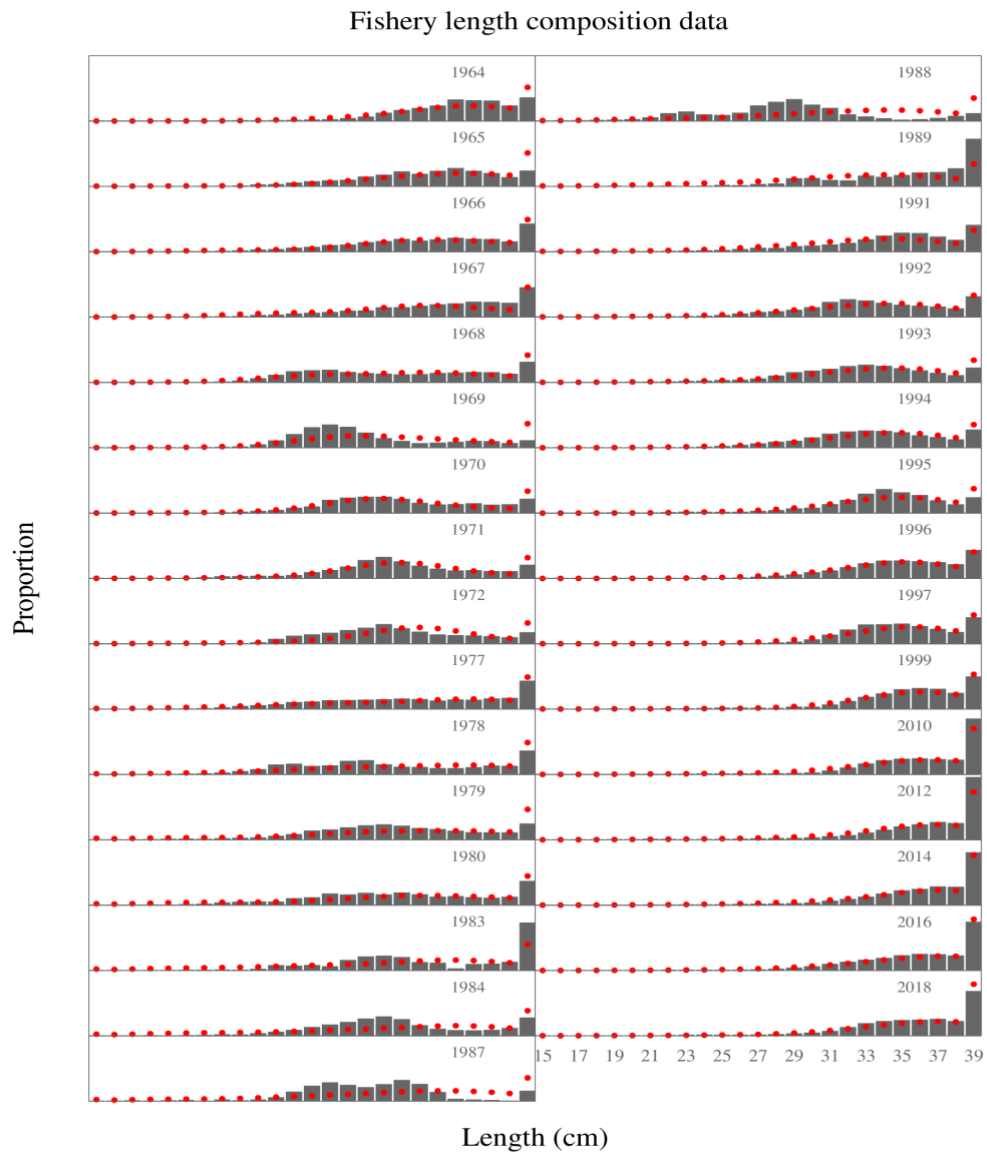


Figure 3: Model fits (dots) to fishery length composition data (columns) for Aleutian Islands Pacific Ocean perch, 1964-2018. Assessment Figure 12.18.

AI Survey age composition data

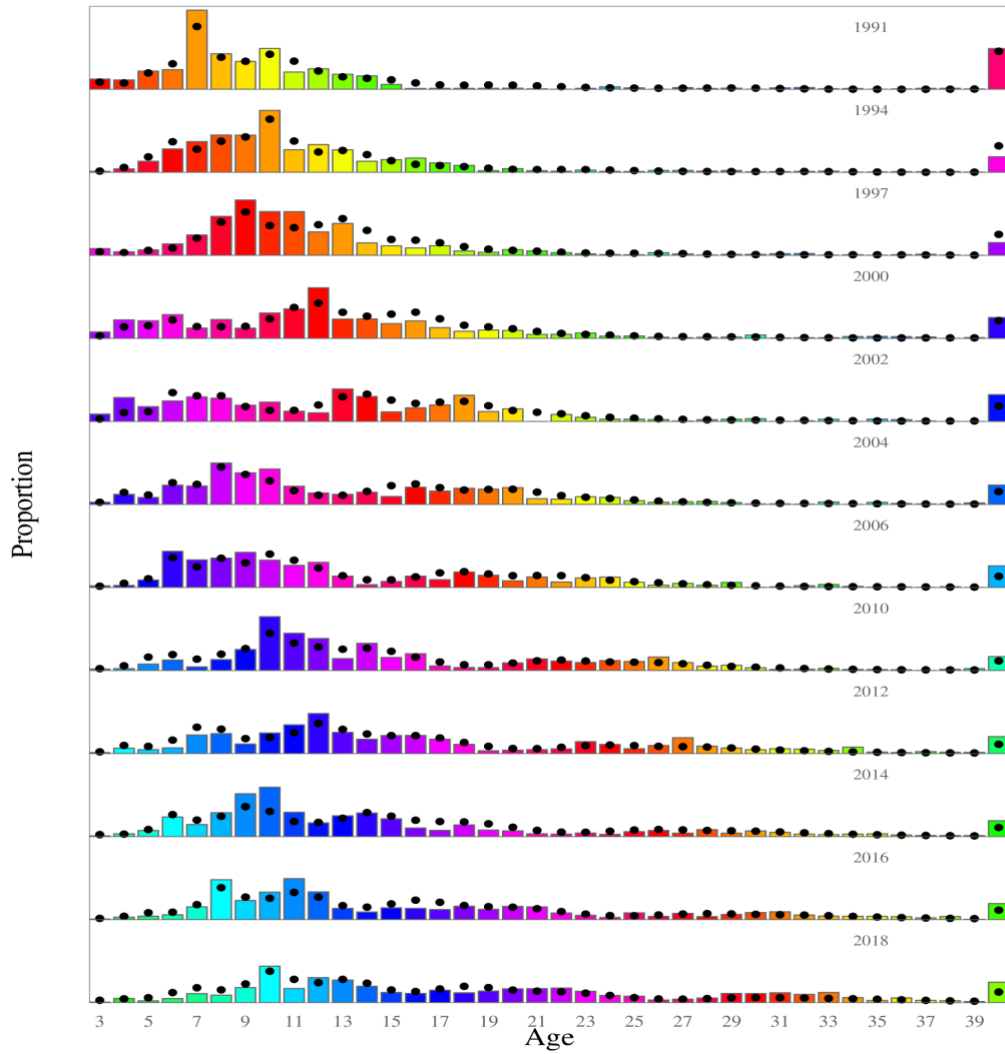


Figure 4: Model fits (dots) to survey age composition data (columns) for Aleutian Islands Pacific Ocean perch, 1991-2018. Colors correspond to cohorts (except for the 40+ group). Assessment Figure 12.19.

2. Evaluation of analytical methods used in assessments, particularly in regard to selectivity, modeling of natural mortality, and data weighting assumptions

The assumptions about stock structure and fishery structure are reasonable and appropriate. These, however, should be kept under periodic review given the increasing environmental change seen in this region.

The estimate of natural mortality, M , used in the 2020 assessment (0.056) was slightly lower than that used in previous years, for example, in the 2016 assessment M was 0.062, and M was 0.058 in 2018. The M used in the BSAI assessments is notably lower than that used in the Gulf of Alaska Pacific Ocean perch assessment.

Considerable thought went into exploring appropriate values of M , as was described during the review and the outcome appears to be appropriate at this time.

Whether M remains constant or varies through time as the environment changes is already under consideration and was discussed during the review.

Error in the estimation of M can be a cause of poor fits to abundance indices (as seen Figures 1 and 2), especially under conditions where abundance may have been changing substantially over time. While this is possible in this stock, the available evidence appears to point to a composition data conflict or model misspecification rather than a problem with the estimation of M .

The weighting of the composition data has been substantially addressed at point 1 above.

Selectivity parameters represent approaching 20% of the total parameters in the model. The choice of selectivity pattern was informed by discussion and advice from the SSC, and various options were explored and reported. Survey selectivity was modelled with logistic functions. Selectivity in the fishery was shown to vary by age and over time. Overall, a range of appropriate selectivity functions were explored and the end result appears reasonable.

There remains a question about the value of the Eastern Bering Sea Slope Bottom Trawl Survey in relation to the Aleutian Islands Bottom Trawl Survey. The EBS survey time series is quite short, with the last survey in 2016, and the 2016 biomass estimate was also highly uncertain ([Figure 2](#)). Without additional data points, the influence of this survey within the assessment is likely to degrade over time. If there are no further Eastern Bering Sea slope surveys, it would be appropriate to begin exploring the impact of dropping the Eastern Bering Sea survey data completely from the assessment, at least as a sensitivity. However, given the recent environmental changes in the BSAI region, and reported increase of occurrence of Pacific Ocean perch in areas of the Eastern Bering Sea where they have not been seen previously in numbers (John Gauvin, pers. comm.), it is possible that the Aleutian Islands survey may not in future index the whole POP stock. It would therefore be appropriate to consider the potential utility and value of restarting the Eastern Bering Sea slope survey to support the management of Pacific Ocean perch, as well as other Eastern Bering Sea fish stocks.

3. Evaluation of the ability of the stock assessment model for BSAI Pacific Ocean perch to provide parameter estimates to assess the current status of the stock

This assessment, through the numerous different runs developed, the consideration of the analysts, SSC, Plan Team, and previous CIE reviews, provides a sound basis for estimation of

the parameters necessary to evaluate the current stock status. The assessment also provides a sound basis for estimating stock status into the near future.

The results of this assessment are fully appropriate for use in informing management of the fishery.

At this point, there are two areas worth further consideration, (i) the retrospective pattern in the assessment results, and (ii) the poor fit to the survey abundance indices, especially in the most recent years (Figures 1 and 2).

With regard to the retrospective patterns in the assessment results, these were explored in the estimation of both recruitment and spawning stock biomass. The patterns for spawning stock biomass are lower than in previous assessments, and in this assessment the results are virtually identical for the most recent years, 2019 and 2020 (Figure 5). This level of retrospective pattern is broadly similar to that seen previously, is better than for some recent assessments of this stock and are not considered unusual or a cause for concern in this assessment.

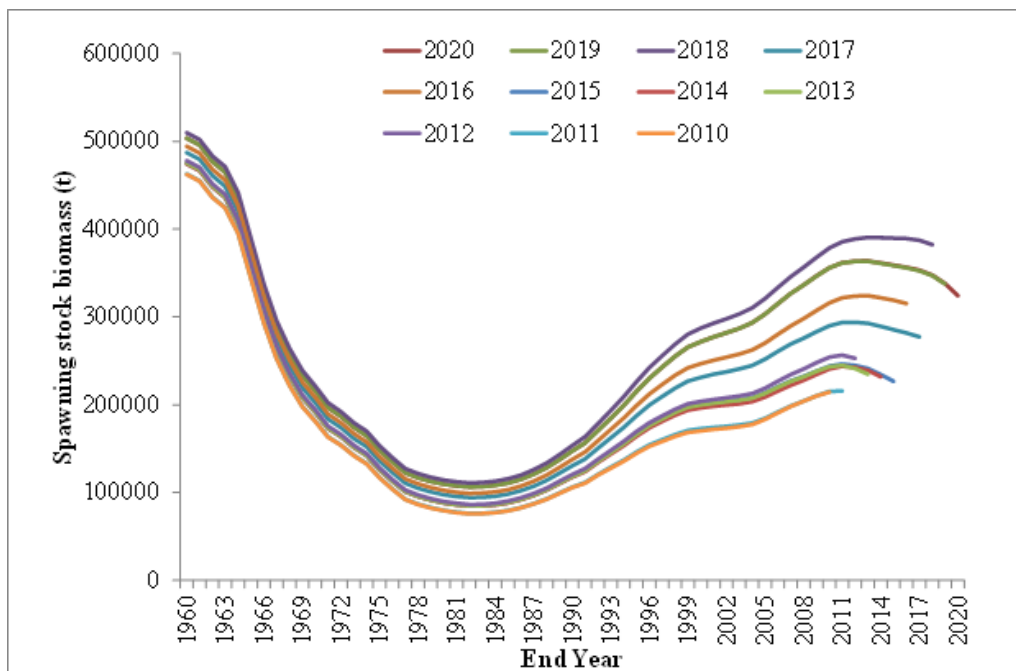


Figure 5: Retrospective estimates of spawning stock biomass for model runs with end years of 2010 to 2020. Assessment Figure 12.10.

There are, however, some unresolved conflicts within the assessment (fully discussed in Section 1 above) that leads to the estimated biomass being lower than would be expected from the estimated abundance indices of both the Aleutian Islands Bottom Trawl Survey and the Eastern Bering Sea Slope Survey, especially in the most recent years of both surveys (Figures 1 and 2) There is, therefore, rather more uncertainty in the results of this assessment than would be expected in an assessment that better fitted the main abundance indices, and this higher uncertainty needs to be reflected in advice to managers. This is appropriately reflected in the advised level 2 risk rating for Assessment considerations in the assessment report.

On balance, this is a very robust stock assessment.

4. Evaluation of the strengths and weaknesses in the stock assessment model for BSAI Pacific Ocean perch

There are a number of key strengths of this assessment. Principle is the sound basis of available data, especially that of the abundance index derived from the Aleutian Islands Bottom Trawl Survey, and to a lesser extent from the Eastern Bering Sea Slope Survey (due to its shortness and age of last point). There are reliable catch data and substantive and largely representative composition data from the fishery. This is supported by the composition data available from both the survey timeseries.

An important strength in the assessment is the scale and reach of the historic and on-going investment in scientific research. This provides background information that enables appropriate and informed consideration on data choices, data handling choices, and supports the rational development of necessary assumptions to underpin the assessment. For example, in the development of a better understanding of natural mortality, M , how it may vary across time and the implications of such variability. There has also been notable progress in the development of statistical approaches to the proper weighting of the composition data within the assessment, and current and on-going development of spatio-temporal approaches to better understand and utilise the fisheries and survey data, where there are inherent spatial and temporal patterns that have previously been ignored in assessments. The value of the long-term study of environmental change in the region is already substantive and appears likely to become progressively more so over time.

The assessment included the presentation of a range of informative diagnostics which enabled easier and quantitative exploration of the nature and quality of the fit of the model to the various datasets. This adds to confidence in the model and also enables easier identification issue with and effective improvements to the model.

A key strength apparent in this assessment is the expertise of the analytical assessment team, ably supported by various subject experts and technicians.

All assessments have some weaknesses. No critical weaknesses were identified in this assessment during this review.

There was one weakness that did stand out, the apparent conflict between the composition data and abundance indices. This was thoroughly explored both prior to and during the review process but without solution. Therefore, this remains the most substantive issue to address for the next assessment, and one for which a structured investigative plan would assist in ensuring all avenues are appropriately explored.

Recommendations to address identified weaknesses are provided in the next section.

5. Recommendations for improvements to the assessment models

The following recommendations for the BSAI Pacific Ocean perch assessment are those of this CIE peer reviewer.

General recommendations

- The provision of pre-recorded videos and voice-over PowerPoints for peer reviewers to consider prior to the actual review meeting worked really well. Provision of these resources should be continued even if these review meetings return to an in-person basis.

i. Evaluation of the data used in the assessments, specifically trawl survey estimates of abundance, and recommendations for processing data before use as assessment inputs

- Continue to explore different approaches define the cause of and solutions to the mismatch between the composition data, abundance indices and/or model structure. A well-structured approach to this investigation would be advisable.
- Given the substantive differences in vessels, gear and scientific practice, continue to exclude the early years Aleutian Islands Bottom Trawl Survey data from the assessment.
- Review the appropriateness of the age at which the plus group is currently set (40 years).
- Sensitivity model runs for plausible alternative catch histories, particularly for the early years of the fishery, should be considered, but probably only when there are substantive changes to the assessment model structure or major assumptions.
- Continue to explore and develop spatio-temporal approaches to analyzing survey and fisheries data, plus the associated diagnostics to enable these methods to be adequately evaluated against current practice. This may specifically contribute to the investigation of the composition data-survey-model conflicts noted above.
- Continue to ensure that sufficient, representative composition data are collected from fisheries in each of the two areas (Aleutian Islands and Eastern Bering Sea), accounting for any environmentally driven changes in the distribution or regional abundance of the Pacific Ocean perch stock.

ii. Evaluation of analytical methods used in assessments, particularly in regard to selectivity, modeling of natural mortality, and data weighting assumptions

- Considering the relative weight of the two surveys within the assessment, and given the scale and rate of environmental change, and reported changes in Pacific Ocean perch distribution, it is recommended that a critical review of the value and utility of restarting the Eastern Bering Sea Slope Bottom Trawl Survey be undertaken. Such a review should cover the future value of the survey to managing all relevant BSAI and

Eastern Bering Sea fisheries, including that for Pacific Ocean perch. Such a review should also consider the appropriate period between surveys.

- Continue to explore different approaches define the cause of and solutions to the mismatch between the composition data, abundance indices and/or model structure. A well-structured approach to this investigation would be advisable.

iii. Evaluation of the ability of the stock assessment model for BSAI Pacific Ocean perch to provide parameter estimates to assess the current status of the stock

- Continue to explore different approaches define the cause of and solutions to the mismatch between the composition data, abundance indices and/or model structure. A well-structured approach to this investigation would be advisable.

iv. Evaluation of the strengths and weaknesses in the stock assessment model for BSAI Pacific Ocean perch

- Continue to explore different approaches define the cause of and solutions to the mismatch between the composition data, abundance indices and/or model structure. A well-structured approach to this investigation would be advisable.

Appendix 1: Bibliography

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Additional Papers Sourced

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Appendix 2: Performance Work Statement

Performance Work Statement (PWS)
National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service
(NMFS)
Center for Independent Experts (CIE) Program

External Independent Peer Review

May 9-13, 2022

Virtual Panel Review

Bering Sea/Aleutian Islands (BSAI) Rockfish – Pacific Ocean Perch (CLIN 0003)

Background

The National Marine Fisheries Service (NMFS) is mandated by the Magnuson-Stevens Fishery Conservation and Management Act, Endangered Species Act, and Marine Mammal Protection Act to conserve, protect, and manage our nation's marine living resources based upon the best scientific information available (BSIA). NMFS science products, including scientific advice, are often controversial and may require timely scientific peer reviews that are strictly independent of all outside influences. A formal external process for independent expert reviews of the agency's scientific products and programs ensures their credibility. Therefore, external scientific peer reviews have been and continue to be essential to strengthening scientific quality assurance for fishery conservation and management actions.

Scientific peer review is defined as the organized review process where one or more qualified experts review scientific information to ensure quality and credibility. These expert(s) must conduct their peer review impartially, objectively, and without conflicts of interest. Each reviewer must also be independent from the development of the science, without influence from any position that the agency or constituent groups may have. Furthermore, the Office of Management and Budget (OMB), authorized by the Information Quality Act, requires all federal agencies to conduct peer reviews of highly influential and controversial science before dissemination, and that peer reviewers must be deemed qualified based on the OMB Peer Review Bulletin standards³. Further information on the Center for Independent Experts (CIE) program may be obtained from www.ciereviews.org.

Scope

The stock assessment for Bering Sea/Aleutian Islands Pacific Ocean perch provide the scientific basis for the management advice considered and implemented by the North Pacific Fisheries Management Council. An independent review of these integrated stock assessments is requested by the Alaska Fisheries Science Center's (AFSC) Resource Ecology and Fisheries Management (REFM) Division. The goal of this review will be to ensure that the stock

³ <https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2005/m05-03.pdf>

assessments represent the best available science to date and that any deficiencies are identified and addressed.

The goal of this review will be to ensure that the stock assessments represent the best available science to date and that any deficiencies are identified and addressed. The specified format and contents of the individual peer review reports are found in **Annex 1**. The Terms of Reference (TORs) of the peer review are listed in **Annex 2**. Lastly, the tentative agenda of the panel review meeting is attached in **Annex 3**.

Requirements

NMFS requires three (3) reviewers to conduct an impartial and independent peer review in accordance with the PWS, OMB guidelines, and the TORs below. The reviewers shall have a working knowledge and recent experience in the application of age-structured stock assessment methods in general and, in particular, application of ADMB in stock assessment. The chair, who is in addition to the three reviewers, will not be provided under this contract. Although the chair will be participating in this review, the chair's participation (i.e., labor and travel) is not covered.

Additionally, the CIE reviewers shall have:

- Expertise with measures of model fit, identification, uncertainty, forecasting, and biological reference points;
- Familiarity with federal fisheries science requirements under the Magnuson-Stevens Fishery Conservation and Management Act;
- Familiarity with groundfish fisheries and management;
- Working knowledge of trawl survey design and estimation of stock biomass
- Excellent oral and written communication skills to facilitate the discussion and communication of results.

Tasks for Reviewers

- 1)** Review the following background materials and reports prior to the review meeting. Two weeks before the peer review, the NMFS Project Contact will send by electronic mail or make available at an FTP site to the CIE reviewer all necessary background information and reports for the peer review. In the case where the documents need to be mailed, the NMFS Project Contact will consult with the CIE on where to send documents. The CIE reviewer shall read all documents in preparation for the peer review.

- 2) Additionally, prior to the peer review, the CIE reviewers will participate in a test to confirm that they have the necessary technical (hardware, software, etc.) capabilities to participate in the virtual panel in advance of the review meeting. This review's Project Contacts will provide the information for the arrangements for this test.
- 3) Virtually attend and participate in the panel review meeting. The meeting will consist of presentations by NOAA scientists, including the stock assessment authors and survey team members to facilitate the review, provide any additional information and answer questions from the reviewers.
- 4) After the review meeting, reviewers shall conduct an independent peer review report in accordance with the requirements specified in this PWS, OMB guidelines, and TORs, in adherence with the required formatting and content guidelines; reviewers are not required to reach a consensus
- 5) Each reviewer should assist the Chair of the meeting with contributions to the summary report, if required in the terms of reference.
- 6) Deliver their reports to the Government according to the specified milestones dates.

Place of Performance

The place of performance shall be online.

Period of Performance

The period of performance shall be from the time of award through July 2022. The CIE reviewers' duties shall not exceed 14 days to complete all required tasks.

Schedule of Milestones and Deliverables

The contractor shall complete the tasks and deliverables in accordance with the following schedule.

Within two weeks of award	Contractor selects and confirms reviewers
Approximately 2 weeks later	Contractor provides the pre-review documents to the reviewers
May 9-13, 2022	Virtual Panel Review Meeting
Approximately 3 weeks later	Contractor receives draft reports
Within 2 weeks of receiving draft reports	Contractor submits final reports to the Government

*The Peer Reviewer Summary Report will not be submitted to, reviewed, or approved by the Contractor.

Applicable Performance Standards

The acceptance of the contract deliverables shall be based on three performance standards:

(1) The reports shall be completed in accordance with the required formatting and content; (2) The reports shall address each TOR as specified; and (3) The reports shall be delivered as specified in the schedule of milestones and deliverables.

Travel

Since this is a virtual panel review travel is neither required nor authorized for this contract.

Restricted or Limited Use of Data

The contractors may be required to sign and adhere to a non-disclosure agreement.

Project Contact(s):

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Annex 1: Peer Review Report Requirements

1. The report must be prefaced with an Executive Summary providing a concise summary of the findings and recommendations, and specify whether the science reviewed is the best scientific information available.

2. The report must contain a background section, description of the individual reviewers' roles in the review activities, summary of findings for each TOR in which the weaknesses and strengths are described, and conclusions and recommendations in accordance with the TORs.

a. Reviewers must describe in their own words the review activities completed during the panel review meeting, including a brief summary of findings, of the science, conclusions, and recommendations.

b. Reviewers should discuss their independent views on each TOR even if these were consistent with those of other panelists, but especially where there were divergent views.

c. Reviewers should elaborate on any points raised in the summary report that they believe might require further clarification.

d. Reviewers shall provide a critique of the NMFS review process, including suggestions for improvements of both process and products.

e. The report shall be a stand-alone document for others to understand the weaknesses and strengths of the science reviewed, regardless of whether or not they read the summary report. The report shall represent the peer review of each TOR, and shall not simply repeat the contents of the summary report.

3. The report shall include the following appendices:

Appendix 1: Bibliography of materials provided for review

Appendix 2: A copy of this Performance Work Statement

Appendix 3: Panel membership or other pertinent information from the panel review meeting.

Annex 2: Terms of Reference for the Peer Review

1. Evaluation of the data used in the assessments, specifically trawl survey estimates of abundance, and recommendations for processing data before use as assessment inputs
2. Evaluation of analytical methods used in assessments, particularly in regard to selectivity, modeling of natural mortality, and data weighting assumptions
3. Evaluation of the ability of the stock assessment model for BSAI Pacific ocean perch to provide parameter estimates to assess the current status of the stock
4. Evaluation of the strengths and weaknesses in the stock assessment model for BSAI Pacific ocean perch
5. Recommendations for improvements to the assessment models

**Annex 3: Tentative Agenda
Virtual Panel Review
BSAI rockfish – Pacific Ocean perch**

May 11-13, 2022

NMFS Point of contact: Pete Hulson (pete.hulson@noaa.gov)

As provided in advance of the meeting via the Weblink site.

All times below are Pacific Daylight Time. Daily breaks at 11:30am and 3:45pm, Lunch 1pm-2pm

Wednesday, May 11	
10:00 am – 11:30 am: Introduction/Background	
Introductions and agenda	Pete Hulson
Overview of rockfish biology, fishery, and history of assessment	Pete Hulson
Current management of Alaska rockfish	Paul Spencer
11:45 am - 1:00 pm: Discussions	
2:00 pm – 3:45 pm: Input data	
Survey data	
Abundance, distribution, and age composition	Ned Laman, Paul Spencer
Update on model-based abundance	James Thorson
Fishery data – Catch, observer program, ages, lengths	Raul Rameriz, Paul Spencer
Age determination, lengths, maturity, and growth	Delsa Anderl, Paul Spencer
4:00 pm - 5:00 pm: Discussions	
Thursday, May 12	
Pre-recorded presentations to review: Field-based catchability	
10:00 am – 11:30 am: Assessment model	Paul Spencer
Model structure, likelihoods, data weighting, parameter estimates, data fit, diagnostics	
11:45 am - 1:00 pm: Discussions	
2:00 pm – 3:45 pm: Assessment model	Paul Spencer
Catchabilities, selectivities, model fits, diagnostics	
4:00 pm - 5:00: Discussion	
Friday, May 13	
10:00 am – 11:30 pm: Model Developments	Paul Spencer
P Alternative data weighting	
Alternative specification for natural mortality	
Other miscellaneous model developments	
11:45 am - 1:00 pm: Discussion	
2:00 pm - 3:45 pm: Requested topics/model runs	
4:00 pm - 5:00 pm: Summarize, revisit Terms of Reference	

Appendix 3: Panel membership and other pertinent information from the panel review meeting

Panel Membership

As noted during the meeting by the reviewer, with apologies for any errors or omissions.

Name	Role / Affiliation
Peter John Hulson	Chair ASFC, NMFS
Noel Cadigan	CIE Reviewer (Canada)
Mathew Cieri	CIE Reviewer (USA)
Geoff Tingley	CIE Reviewer (New Zealand)
Paul Spencer	Presenter – Stock Assessment Lead ASFC, NMFS
Jim Ianelli	Stock Assessment Team ASFC, NMFS
Ned Laman,	Presenter ASFC, NMFS
James Thorson	Presenter AFSC, NMFS
Raul Rameriz	Presenter ASFC, NMFS
Delsa Anderl	Presenter ASFC, NMFS
Darin Jones	Presenter – MACE (Acoustic) Survey ASFC, NMFS
Raul Rameirez	Presenter – NP Observer Program ASFC, NMFS
Chris Gburski	Presenter – Age & Growth ASFC, NMFS
Chris Lundsford	ASFC, NMFS
Jane Sullivan	ASFC, NMFS
Dan Goethel	AFSC, NMFS
Kathryn Myer	ASFC, NMFS
Dana Hanselman	AFSC, NMFS
Cara Rodgveller	AFSC, NMFS
Anne Hollowed	AFSC, NMFS

Other attendees

John Gauvin	Industry
Jason Anderson	Industry
Franz Mueter	Academia

Other pertinent information from the panel review meeting

Following brief discussion with the reviewers about the need for a summary (panel) report, as referred to in the CIE reviewer TOR, the Chair stated that no summary (panel) report was necessary, and none would be prepared for this meeting. All relevant matters are covered in this individual Peer Reviewer Report.

The pre-released Agenda (TOR Annex 3) was agreed at the start of the meeting.