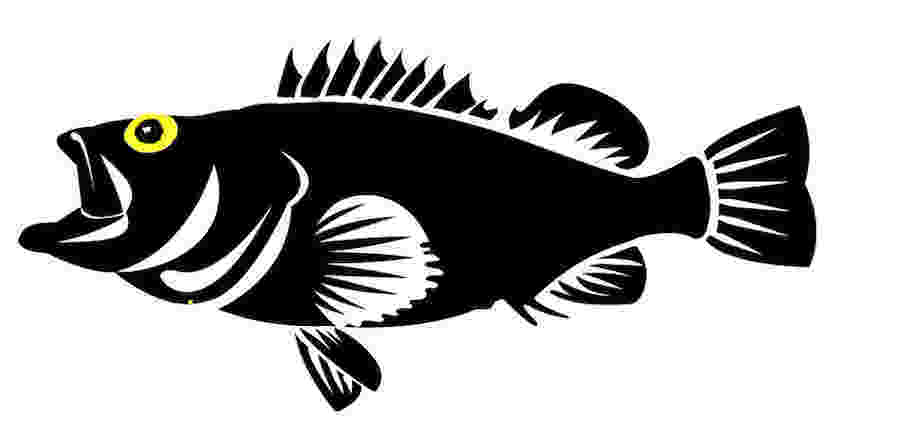
Independent Peer Review Report of Gulf of Alaska Demersal Shelf Rockfish Assessment

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Prepared for

Center for Independent Experts

Independent System for Peer Review

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## Executive summary

1. A review of the Gulf of Alaska Demersal Shelf Rockfish Assessment was conducted during a virtual meeting from the 12-13th September 2023 involving three CIE reviewers. Staff from Alaska Fishery Science Center, Alaska Department of Fish and Game (ADF&G), and the International Pacific Halibut Commission (IPHC) participated in the meeting.
2. The main focus of the review was a new Surplus Production Model (SPM) applied to yelloweye rockfish. The model shows promise and potential advantages over the current random effects (REMA) approach through the ability to estimate FMSY directly from the data.
3. At present the model is still in a state of development and requires further testing before replacing the existing M-REMA model method that is applied under Tier 5. Areas for improvement include fitting the model in one stage to avoid duplicate use of the data, and reviewing the choice of parameter priors. Focusing on the data from 1980 onwards would help simplify the model without compromising estimates of quantities of interest.
4. Priority should be to show that the SPM configured as closely as possible to the REMA model has advantages in terms of performance and the estimation of FMSY. This could be done *inter alia* using retrospective analysis. A simple operating model, either age structured or biomass dynamic could also be used to test performance. If the SPM does outperform the REMA method then the stock could be moved to Tier 4 using the estimate of FMSY from the model.
5. Methods for estimating yelloweye bycatch and discards from the IPHC survey appear appropriate. There is scope to make the estimation internal to the SPM model rather than entering the bycatch ratio as data. This might avoid using the IPHC survey data twice.
6. The non-yelloweye species included in the DSR complex comprise a very small fraction of the total catch. The existing approach of using the maximum catch for the period 2010-2014 to calculate OFL and ABCs in Tier 6 for these species seems appropriate.
7. While comparing the SPM model to an age structured model through simulation testing is of interest, the absence of a well-informed age structured operating model poses significant challenges in devising a meaningful analysis. In the first instance priority needs to be given showing that the SPM offers benefits over the REMA approach before more in depth comparisons are made.

## Background

External scientific peer reviews have been and continue to be an essential part of strengthening scientific quality assurance for fishery conservation and management actions of NMFS.

This review deals with the stock assessment of Demersal Shelf Rockfish Complex in the Southeast Outside Subdistrict of the Gulf of Alaska (GOA). It provides the scientific basis for the management advice considered and implemented by the North Pacific Fishery Management Council (NPFMC). The stock assessment is conducted by the State of Alaska in partnership with the Alaska Fisheries Science Center (AFSC) and provides management advice in the federally regulated Gulf of Alaska Fishery Management Plan.

In 2022, the stock assessment authors introduced new methodologies for assessing a major component species of the DSR Complex, Yelloweye Rockfish. This review is focused on these new methods and their application to the NPFMC harvest control rules. The review meeting took place on the 12-13 September by Google Meet.

## Description of the individual reviewers’ roles in the review activities

Approximately two weeks prior to the meeting, reports and supporting documents for the assessments were available. These are listed in Appendix 1 and were reviewed before the main meeting commenced on the 12th September. A preliminary virtual meeting was held on the 30th August with NMFS, AFSC and ADF&G staff to discuss meeting arrangements and any issues of concern. During the main review meeting the reviewer participated fully and contributed to discussions. The reviewer made a number of suggestions for further development of the SPM and these are further discussed below.

The statement of work is given in Appendix 2.

## Summary of Findings for each TOR

*1. Evaluate the use of the proposed Bayesian state-space surplus production models, and model methods for use in management of the yelloweye rockfish portion of the GOA Demersal shelf rockfish complex. Specifically, determine if results suggest that the NPFMC Tier 5 approach is appropriate. Should biomass estimates from such a model be used in place of the survey average method currently used for most Tier 5 stocks managed by the NPFMC?*

My overall conclusion in relation to the new SPM was that it is still in a state of development and was not yet ready for application within the Tier system. However, the model shows promise and, if successful, offers advantages over the REMA based approach currently in use. In particular, the SPM can potentially estimate FMSY directly and would avoid the need to use M as a proxy. The current method is vulnerable to *ad hoc* revisions in the estimate of M which may result in undesirable changes to management advice. With the present M-REMA approach there is a risk that the value of M is not consistent with the data used in the REMA model (the ROV biomass estimate and IPHC survey). With an SPM both the biomass and FMSY are estimated from the same data sources and are likely to be internally consistent making the SPM approach worth pursuing.

In its present state the SPM is fairly complex and seeks to include as much catch and abundance data as possible while accounting for unrecorded bycatch and discards. In doing so a three stage frame work has been devised to try to overcome differences in data spatial resolution and problems with unreported catch. The principal criticism of such an approach is that it makes use of the same data in the model more than once. The data in one stage are used to derive priors for parameters in the next stage which also uses some of the same data. In general, this is not good practice and will lead to underestimation of uncertainty and potential bias**.** I could see no reason why the model could not be framed in a way that used all the data in one step without having to resort to multiple stages.

One of the motivations for the three-stage approach was to facilitate the inclusion of catch data with lower spatial resolution than recent data that go back to 1880 when the fishery began and the stock would have been close to unexploited biomass. Hence, there may be information to inform the estimate of carrying capacity, K. While it should be possible to include the older data without the three-stage approach, some thought needs to be given to whether carrying capacity in the 19th century is still relevant today and therefore whether these old data are worth including, particularly as there is no contemporary abundance information for that era. If there has been a trend in K over this long period, older data may adversely influence the estimate of K for the current environment. My recommendation would be to focus on data from 1980 onwards in the first instance and optimise the model for data in that period. Here the data are the most informative and will have the greatest relevance to current conditions. Once this has been done there may be a case for exploring older data to reconstruct biomass trends, but it is probably not a priority at present.

The SPM presented is a Bayesian state-space model. All model parameters require priors to be specified and this does require care, especially to avoid using the data to derive a prior. It is important to specify priors that genuinely incorporate knowledge before the data are used. Posterior distributions from one stage that are used as priors in the next stage where the same data are used should be avoided.

For three of the most important parameters r, K and ϕ, the choice of prior is both important and challenging. For r, it may be more useful to parameterize the model in terms of FMSY since there is a direct relationship between r and FMSY (equation 32 et seq in Joy et al 2022). Here a prior on FMSY could be derived from inspection of similar species, or if the relationship FMSY≈M is regarded as sound, then using C’s method for M (Hamel, 2015) may serve as a suitable prior for FMSY.

It is more difficult to specify priors for K and ϕ. As they will be correlated, informative priors on both may prove problematic. Suitable bounds for a uniform prior on ϕ might be identified by inspection of similar species for which more comprehensive assessments are available. In my own experience I found a log uniform prior on K can lead to negative bias but that a square root uniform performed reasonably well (Cook et al, 2021). I felt that the priors chosen for error distribution variances were potentially too informative and suggest that as a default uniform priors on the standard deviation may be more appropriate (Gelman, 2006).Priors on the error distribution can potentially alter the relative weight given to the different data and therefore need to be chosen carefully, perhaps with some experimentation to explore sensitivity.

Data from the IPHC FISS survey are used in the model as a CPUE index of abundance and are also used to derive estimates of unrecorded bycatch and discards. Thus the same raw data on yelloweye rockfish in the survey are to some extent used twice. There is a danger that measurement errors in the two derived data sets are correlated and may be interpreted as real biomass signal rather than noise. Consideration should be given to using the IPHC data once in the model and reconstructing the discards and bycatch internally from the fitted index rather than externally.Equation 22 in Joy et al (2022), for example, gives the observation equation for the survey index and here the fitted index could be transformed into the bycatch ratio allowing the bycatch and discards to be calculated. This would avoid using the derived bycatch ratio from the IPHC survey as observations as they would no longer appear in the likelihood.

As currently formulated the SPM model treats catch as a model parameter to be estimated. An alternative would be to parameterize catch as C=FB, where F is a harvest ratio. Here C is a derived value and F is a parameter to be estimated. Typically, this would require one F value to be estimated for each year in the time series. The effective number of parameters to be estimated could be reduced by assuming the harvest rate follows a random walk where

Ft+1 ~Lognormal(log(Ft), sd).

The model has been fitted using the Bayesian modelling package “JAGS” and takes a substantial run time (ca 12 hours) which inhibits the rate of development and sensitivity testing. It may be worth re-coding the model in Stan and use the rstan package (Stan Development Team 2016). As stan models are fully compiled they may execute much more rapidly. The rstan package also offers powerful diagnostics.

One of the key differences between the REMA approach and the SPM is the parametric modelling of the biomass dynamics. A parametric model has the potential to offer more useful projections and to understand productivity better. Perhaps, therefore, as a first step it would be useful to show that a SPM, configured as closely as possible to the accepted REMA model in terms of data input and spatial resolution, performs well. This might be done, for example, through comparison of retrospective analysis of both the REMA and SPM models. It is also important to show that the model code can recover the correct parameter values through testing on simulated data. Results shown during the meeting suggested problems with the current model both in terms of convergence on some parameters and bias in critical quantities such as r.

If improved performance can be demonstrated, then incremental elaboration of the model by adding in the catch data and including greater spatial complexity in parameters such as r could follow. Such an approach might help understand what can be achieved and where limitations on model complexity lie.

I was impressed by the amount of sensitivity testing that had been done to quantify uncertainty. This included different levels of process error and addition measurement error for the ROV survey. These are important and useful steps that will need to be applied in a re-configured model. I also note the work done to show that the IPHC survey index is relatively insensitive to the selection of stations in the derivation of the index. While further investigation of the way the index is calculated is always welcome, (e.g. limiting the index to stations of yelloweye habitat), I did not feel this was a high priority in the development of the model.

At present biomass estimates from the REMA approach are used in conjunction with M in Tier 5 to provide catch advice. The Tier is based on the assumption that both biomass and M are “reliable” estimates. There are reasons to believe the biomass estimates are reliable since two measure of abundance (ROV and IPHC index) appear to show consistency. The assumption that M=0.02 is reliable seems a very strong one. It is conditioned on life history theory and is subject to revision. Until the SPM can be demonstrated to be an improvement, however, the REMA approach in Tier 5 is the best available. In the event that the SPM is shown to be reliable it should provide appropriate estimates of both biomass and FMSY and at face value would allow the stock to be moved to Tier 4.

There appears to be some scepticism that SPMs can produce reliable estimates of FMSY and that only age structured models can serve this purpose, thus placing a barrier to the application of Tier 4. I would have thought that the principal issues are whether the chosen model fits the data, produces plausible estimates of the quantities of interest and can be shown to deliver management goals in a management strategy evaluation, rather than whether or not the dynamics are age or biomass structured. Clearly there is a potential scaling issue with FMSY in so far as the SPM estimates this as a harvest rate as opposed to a true mortality rate. Given that FMSY and F are numerically very small for this stock estimation on either scale is likely to be similar and should not be a major problem.

*2. Evaluate the management of the GOA demersal shelf rockfish complex as a whole including examination of the use of available data for species other than yelloweye rockfish and determination of Tier level designations*.

Yelloweye rockfish comprise around 95% of the DSR catch. Catch advice on the remaining minor species is currently considered under Tier 6 and is based on the maximum the catch between 2010-2014. These would be expected represent catches during a period when biomass was low. The ABCs for these species are added to that for yelloweye. This is a pragmatic approach and in principle should have the effect of discouraging any expansion of the fishery. A potential weakness could arise if the aggregate DSR ABC permits the yelloweye component to be used to increase of the catch of minor species. It is beyond the scope of this review to evaluate if this is a problem. As a general point, however, I could see no reason why ABCs should not be summed simply because they arise from a different Tier from the yelloweye advice.

*3. Review the methods used for estimating yelloweye bycatch in the directed Pacific halibut fishery and for estimating total yelloweye catch removals.*

Yelloweye bycatch is estimated from the IPHCM FISS survey and halibut landings. The method calculates the ratio of yelloweye catch to halibut catch at each station, obtains a mean ratio for each subarea and then uses the recorded landings of halibut to raise the ratio to a total bycatch of yelloweye from the halibut fishery. Applying the method gave very similar estimates for the period when the bycatch was fully documented. This provides some reassurance that historical estimates, when bycatch and discard data were incomplete, are adequate. There is an implicit assumption that the survey catches are representative of the halibut fishery. There may be differences, however. The commercial fishery, for example, may not use the same hook size at the survey. IPHC staff were of the opinion that the assumption of similarity is reasonable, and given the similarity of bycatch estimates during the period of full catch documentation, the method appears appropriate.

Unlike the IPHC abundance index, the bycatch ratio is calculated without applying a hook saturation correction to the raw survey catches, presumably because the effect cancels out in the ratio estimator. Nevertheless, the same yelloweye survey catch data are used in both the abundance index and bycatch ratio calculation. To some extent the data are being used twice in the model which may be a problem if errors are correlated, as discussed above.

*4. Provide advice and recommendations on a framework for simulation testing the surplus production model to evaluate similarities between this application of surplus production models and age-structured methods typically used in the North Pacific Fishery Management Council Tier management system.*

Fish populations are age structured and models that reflect that structure would be expected to be more realistic. Total biomass is an emergent property of age structured population dynamics. SPMs model the latter and hence consider a highly summarised version of underlying population behaviour that ignores the fundamental age structure. It is therefore of considerable interest to understand how SPMs will perform compared to more realistic models that explicitly consider age structure. In principle this could be done by constructing an age structured operating model and then using an age structured assessment model or a SPM to estimate management quantities of interest such as FMSY and BMSY. Such a comparison pre-supposes that a well-informed operating model can be constructed that will objectively test competing models. In the case of yelloweye rockfish much of the biology that underpins an age structure population is little known and includes important processes such as stock and recruitment, growth, maturity and natural mortality. These are often density dependent. Including these processes in an operating model will require a number of strong assumptions in the face of considerable uncertainty, and will make the interpretation of assessment model performance much more difficult since the operating model itself may be flawed. Poor performance by a SPM may simply be due to misspecification of density dependent processes.

In the context of the yelloweye assessment, it would seem that the primary question is whether the SPM performs better that the REMA approach, rather than a comparison to an age structured model. This is because the REMA approach is the currently accepted one and age structured assessments have not been successful so far. I would suggest, therefore, that the initial focus should be on comparing the REMA model to the SPM using an appropriate operating model. The latter could be either age structured, or biomass dynamic based on a SPM. Here the performance of the assessment models could be judged by their ability to accurately estimate the ABC using the M-REMA biomass formula or FMSY-SPM biomass. There needs to be a particular emphasis on the sensitivity to M in the case of the REMA model and the prior on FMSY for the SPM.

Devising an appropriate operating model is a potentially large undertaking involving a detailed review of the biology of yelloweye. Perhaps a simple place to start would be to use the results from earlier age structured assessments of yelloweye and treat these as the “truth” which simulates biology and from which test data could be drawn. Although these assessments did not pass scrutiny for assessment purposes, they may nevertheless be adequate for simulation testing since they are at least conditioned on observations from the stock in question.

In addition to an age structured operating model it may be useful to develop a parallel model based on the SPM presented in Joy et al (2022). This model is already complex and even though it can be improved as an assessment tool, it may nevertheless be adequate for simulation testing. It has the advantage of already being in place and could easily be adapted as an operating model. Such an operating model could be used test new versions of the SPM as well as the REMA approach.

## Conclusions

The proposed SPM is still in a state of development and is not yet ready for application within the Tier system. Until the SPM can be demonstrated to be an improvement, the REMA approach in Tier 5 is the best available.

The SPM model shows promise and offers advantages over the REMA based approach currently in use. It can potentially estimate FMSY directly and would avoid the need to use M as a proxy. The current method is vulnerable to *ad hoc* revisions in the estimate of M which may result in undesirable changes to management advice. In my opinion the SPM approach should be pursued to overcome this vulnerability.

The treatment of minor species in Tier 6 is appropriate in the absence of any data beyond landings.

The method of estimating bycatch and discards appears appropriate but thought needs to be given to avoiding the use of the IPHC survey data twice; once as an abundance index and again as a bycatch ratio.

Simulation testing of the SPM should focus on comparison with the performance of the REMA model before embarking on study of performance relative to age based assessment models.

## Recommendations

1. The SPM should be framed in a way that uses all the data in one step without having to resort to multiple stages that use the data more than once.
2. Focus should be on data from 1980 onwards in the first instance and optimise the model for data in that period
3. It may be more useful to parameterize the model in terms of FMSY rather than r since there is a direct relationship between the two quantities. Here a prior on FMSY could be derived from inspection of similar species, or if the relationship FMSY≈M is regarded as sound, then using Hamel’s method for M may serve as a suitable prior for FMSY.
4. I suggest that, as a default, uniform priors on the standard deviation for error distributions would be more appropriate.
5. Consideration should be given to using the IPHC data once in the model and reconstructing the discards and bycatch internally from the fitted index rather than externally.
6. As a first step it would be useful to show that the SPM performs well, when configured as closely as possible to the accepted REMA model in terms of data input and spatial resolution.
7. I would suggest that the initial focus should be on comparing the REMA model to the SPM using an appropriate operating model rather than evaluating the SPM in comparison to an age structured assessment model.

## Appendix 1: Bibliography

Cook, R., Acheampong, E., Aggrey-Fynn, J, and Heath, M. (2021). A fleet based surplus production model that accounts for increases in fishing power with application to two West African pelagic stocks. Fisheries Research, 243: 1- 12*.*

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## Appendix 2. Statement of Work

**Performance Work Statement**

**National Oceanic and Atmospheric Administration (NOAA)**

**National Marine Fisheries Service (NMFS)**

**Center for Independent Experts (CIE) Program**

**External Independent Peer Review**

**Gulf of Alaska Demersal Shelf Rockfish Assessment**

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 standards[[1]](#footnote-1). Further information on the Center for Independent Experts (CIE) program may be obtained from [www.ciereviews.org](http://www.ciereviews.com).

Scope

The stock assessment for Demersal Shelf Rockfish Complex in the Southeast Outside Subdistrict of the Gulf of Alaska provides the scientific basis for the management advice considered and implemented by the North Pacific Fisheries Management Council. This stock assessment is conducted by the State of Alaska in partnership with the Alaska Fisheries Science Center (AFSC) and provides management advice in the federally regulated Gulf of Alaska Fishery Management Plan. An independent review of this stock assessment is requested by the Alaska Fisheries Science Center’s (AFSC) Auke Bay Laboratories Division (ABL) and the Alaska Department of Fish and Game (ADF&G). The goal of this review will be to ensure that the stock assessment represents the best available science to date and that any deficiencies are identified and addressed. In 2022, the stock assessment authors introduced new methodologies for assessing a major component species of the DSR complex, yelloweye rockfish. Review of these new methods and their application to the North Pacific Fishery Management Councils (NPFMC) harvest control rules are requested. The specified format and contents of the individual peer review reports are found in Annex 1. The Terms of Reference (TOR) 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 TOR below. The reviewers shall have a working knowledge and recent experience in the application of complex stock assessment methods and in particular application of Bayesian state-space surplus production models (SSSPM).

Additionally, the CIE reviewers shall have:

* Expertise with measures of model fit and evaluation, uncertainty, forecasting, and biological reference points;
* Expertise in the application of surplus production models in providing management advice;
* Familiarity with Alaska groundfish fisheries and management;
* Familiarity of the assessment and management of stock complexes;
* Working knowledge of the use of fishery and survey data in stock assessment;
* Familiarity with North Pacific Fishery Management Council harvest control rules and determination of reference points used in Alaska fisheries management;
* 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 and ADF&G Project Contacts will make all necessary background information and reports available electronically 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. Attend virtually and participate in the panel review meeting. The meeting will consist of presentations and discussions with the ADF&G stock assessment authors, NMFS staff, and supporting experts of fishery and survey information to facilitate the review.
3. After the review meeting, reviewers shall conduct an independent peer review report in accordance with the requirements specified in this PWS, OMB guidelines, and TOR, in adherence with the required formatting and content guidelines; reviewers are not required to reach a consensus.
4. Each reviewer should assist the Chair of the meeting with contributions to the summary report, if required in the TOR.
5. Deliver their reports to the Government by the specified deadline.

Each CIE reviewer shall complete the following tasks in accordance with the PWS and Schedule of Milestones and Deliverables herein.

Pre-review Background Documents

Review the following background materials and reports prior to the review:

The following document is the most recent Demersal Shelf Rockfish Complex stock assessment (November, 2022).

Joy et al. 2022. 14: ASSESSMENT OF THE DEMERSAL SHELF ROCKFISH STOCK COMPLEX IN THE SOUTHEAST OUTSIDE SUBDISTRICT OF THE GULF OF ALASKA .

<https://apps-afsc.fisheries.noaa.gov/Plan_Team/2022/GOAdsr.pdf>

NPFMC peer-review bodies provided comments and recommendations to the authors regarding the implementation of the Bayesian state-space surplus production models. The links below provide comments from the NPFMC GOA Groundfish Plan Team and the NPFMC Science and Statistical Committee (SSC).

September, 2022 GOA Groundfish Plan Team Minutes (page 3)

<https://meetings.npfmc.org/CommentReview/DownloadFile?p=32eee72a-2fc4-46f6-bd2b-9011ea8e3577.pdf&fileName=C5%20GOA%20Groundfish%20Plan%20Team%20Minutes.pdf>

October, 2022 NPFMC SSC Minutes (page 23)

<https://meetings.npfmc.org/CommentReview/DownloadFile?p=d95d28fe-3540-4e74-baa3-f029ce6a3a7d.pdf&fileName=SSC%20Report%20Oct%202022_Final.pdf>

November, 2022 NPFMC GOA Groundfish Plan Team Minutes (page 6)

<https://meetings.npfmc.org/CommentReview/DownloadFile?p=39d6577b-136c-49e4-b17e-03dd78659c41.pdf&fileName=C5%20GOA%20Groundfish%20Plan%20Team%20Minutes%20November%202022.pdf>

December, 2022 NPFMC SSC Minutes (page 46)

<https://meetings.npfmc.org/CommentReview/DownloadFile?p=d94f4b3e-7e21-4e4f-92fd-e39141acfc4a.pdf&fileName=SSC%20Report%20Dec%202022_DRAFT%20to%20COUNCIL.pdf>

Management advice provided by NPFMC stock assessments conforms to specified harvest control rules. The NPFMC uses an Overfishing Control Rule (OFL) referred to as the “Tier System”. Any model output or management advice must provide reference points applicable to these harvest control rules.

<https://www.npfmc.org/fisheries-issues/fisheries/goa-groundfish-fisheries/>

Two weeks before the peer review, the NMFS Project Contact will send by electronic mail or Google drive to the CIE reviewer all necessary background information and reports for the peer review. In addition to the documents cited above, the Project Contact will provide pertinent code and model development materials. 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, for example:

1. Virtual Peer Review: The CIE reviewers will attend and participate in a virtual peer review. The meeting will consist of presentations and discussions with the NMFS Project Contact, assessment authors, and other staff to facilitate the review.
2. Independent Review Report: Each CIE reviewer shall conduct the independent peer review in accordance with the PWS and TOR, and shall not serve in any other role unless specified herein. Modifications to the PWS and TOR cannot be made during the peer review, and any PWS or TOR modifications prior to the peer review shall be approved by the Contracting Officer’s Representative (COR) and the CIE contractor.
3. Contract Deliverables - Independent CIE Peer Review Reports: Each CIE reviewer shall complete an independent peer review report in accordance with the PWS. Each CIE reviewer shall complete the independent peer review according to required format and content as described in Annex 1. Each CIE reviewer shall complete the independent peer review addressing each TOR as described in Annex 2.

Place of Performance

Each CIE reviewer shall conduct an independent peer review following a virtual review meeting, therefore no travel is required.

Period of Performance

The period of performance shall be from the time of award through October 15, 2023. The virtual review meeting will be scheduled during the month of September, 2023. Each reviewer’s duties shall not exceed 10 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 |
| Two weeks prior to the review | Contractor provides the pre-review documents to the reviewers. |
| **September 12-13, 2023** | The reviewers will meet with NMFS POC and assessment authors in a virtual meeting for the duration of two days. Each reviewer conducts an independent peer review as part of the virtual independent peer review. |
| Within two weeks after review | Contractor receives draft reports |
| Within two weeks of receiving draft reports | Contractor submits final reports to the Government |

**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 (3) The reports shall be delivered as specified in the schedule of milestones and deliverables.

**Travel**

Since this is a virtual 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.

NMFS Project Contacts:

Chris Lunsford

Supervisory Fish Biologist

NOAA/NMFS/AFSC

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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 or not the science reviewed is the best scientific information available.
2. The main body of the reviewer report shall consist of a Background, Description of the Individual Reviewer’s Role 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 TOR.
3. The reviewer report shall include the following appendices:
   1. Appendix 1: Bibliography of materials provided for review
   2. Appendix 2: A copy of the CIE Performance Work Statement

**Annex 2: Terms of Reference for the Peer Review**

**AFSC approaches to biomass based stock assessments**

CIE reviewers are contracted to complete their independent peer review based on the TOR. Therefore, the CIE-NMFS review and approval process is based on whether the CIE independent reports addressed each TOR. The AFSC requests a virtual review in September 2023 to review the applicability and use of Bayesian state-space surplus production models in the Demersal Shelf Rockfish Complex stock assessment in the North Pacific, specifically related to survey averaging methods. CIE reviewers shall address the following TOR during the peer review and in the CIE reports.

1. Evaluate the use of the proposed Bayesian state-space surplus production models, and model methods for use in management of the yelloweye rockfish portion of the GOA Demersal shelf rockfish complex. Specifically, determine if results suggest that the NPFMC Tier 5 approach is appropriate. Should biomass estimates from such a model be used in place of the survey average method currently used for most Tier 5 stocks managed by the NPFMC?
2. Evaluate the management of the GOA demersal shelf rockfish complex as a whole including examination of the use of available data for species other than yelloweye rockfish and determination of Tier level designations.
3. Review the methods used for estimating yelloweye bycatch in the directed Pacific halibut fishery and for estimating total yelloweye catch removals.
4. Provide advice and recommendations on a framework for simulation testing the surplus production model to evaluate similarities between this application of surplus production models and age-structured methods typically used in the North Pacific Fishery Management Council Tier management system.

1. https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2005/m05-03.pdf [↑](#footnote-ref-1)