Peer Review Report for
Marine Recreational Information Program (MRIP)
Fishing Effort Survey (FES) Calibration Model

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Executive Summary

In order to improve the survey methodology for estimating catch for recreational fishing in the coastal US, the Marine Recreation Information Program (MRIP) has implemented a new program for estimating fishing effort based on a mail-based survey, the Fishing Effort Survey (FES), to replace a historical telephone survey, the Coastal Household Telephone Survey (CHTS). This report provides a technical review of a calibration model for adjusting the historic CHTS estimates using the FES results during the overlapping period. The calibration model was developed and tested using data from side-by-side implementation of the two methods during 2015 and 2016.

The proposed modeling framework has strong theoretical underpinnings and the proposed estimators have desirable properties. The proposed model is equipped with the components to address different sources of variation in the survey data as well as accounting for method-specific effects. The design variance as well as the effort estimates are modeled using predictor information. There are a limited number of potential explanatory variables that are readily available through both surveys. This limits the explanatory and predictive ability of the statistical calibration modeling strategies. Critically, the current model does not provide insight into the underlying mechanisms resulting in differences in estimated effort.

It is recommended that the investigators provide a comprehensive discussion of alternative methods and present a narrative on the reasoning behind selection of the proposed model over the competing alternatives. Although the investigators did not discuss alternative approaches in their report, they informed the Review Panel of the alternative options that they had considered and explored. This list included a reasonable number of options. They provided sufficient discussion on the advantages and disadvantages of some of these approaches and convincingly articulated the reasoning which had led them to choose the proposed method. In particular, the investigators reported on consideration of several popular approaches including time series approaches, and hierarchical Bayesian methods.

It is recommended that the MRIP and the investigators consider efforts to improve several aspects of the current model as well as the presentation and communication of the methodology and results. In particular, efforts should be made to obtain additional potential predictor information to better understand the underlying mechanisms that may explain the differences observed in the effort estimates during the side-by-side experiments. Additional potential predictor information may include state-level or county-level population values (potentially broken down by age groups) and socio-economic factors. Also, comparisons of similarities and dissimilarities among estimates of different states may shed light on area-specific and local drivers of these mechanisms. Additionally, a more comprehensive simulation study of the model to assess the effectiveness and predictive ability of the model is lacking and should be implemented.

1   Introduction

1.1   Background

The Review Panel for the MRIP-FES Calibration Model Review met from June 27 to June 29 in Silver Spring, Maryland to review a statistical model developed by a team of investigators from Colorado State University (F. Jay Breidt, Teng Liu and Jean D. Opsomer). The review committee was composed of six members. Three scientists were appointed by the Center for Independent Experts (CIE): Robert Hicks, The College of William and Mary; Cynthia Jones, Old Dominion University; and Ali Arab, Georgetown University. The other three members on the review panel consisted of representatives from the New England (Patrick Sullivan) and South Atlantic (Fredric Serchuk) Scientific and Statistical Committees, and the Atlantic States Marine Fisheries Commission (Jason McNamee). The meeting was chaired by Paul Rago as a member of the Mid-Atlantic Fishery Management Council Scientific and Statistical Committee.

1.2   Review Activities

The pre-review documents were provided by the NTVI staff on June 19, 2017, about a week before the Panel Review.

Day 1 (Tuesday June 27, 2017): The Panel Review meeting started with welcoming remarks and introductions, followed by presentations on the transition from the telephone survey (CHTS) to the mail survey (FES), the importance of calibration of the CHTS efforts, and the ramifications of the calibrated catch efforts for stock assessment, and fisheries management. The presentations in the afternoon, included presentations by the Colorado State University investigators, Jean Opsomer and Jay Breidt. Opsomer provided an overview of the challenges of calibrating historical time series in general, and the specific challenges for the calibration of the CHTS effort estimates. Breidt presented the proposed calibration model.

The presentations were followed by questions and comments from the Panel, and the audience (present in the room as well as online through the webinar platform).

The Panel met in closed session at the end of Day 1 and discussed the presentations.

Day 2 (Wednesday June 28, 2017): The Panel Review meeting resumed in the morning with a summary discussion of the Panel based on initial reactions and findings. The main focus of the presentations and discussions was on the proposed calibration model. Breidt

presented additional material including model results for a limited number of cases and clarified several points raised and requests made by the Panel during Day 1. In particular, Breidt and colleagues provided information on the list of modeling options they had considered and informed the panel of the process which had led them to the proposed model. They also provided additional information and sample results of the calibrated CHTS effort with prediction intervals.

The Panel met in closed session at the end of Day 2 and discussed the presentations.

Day 3 (Thursday June 29, 2017): The Panel met in closed session to discuss the Terms of Reference and draft a summary report. The meeting concluded about mid-day.

2 Review of MRIP FES Calibration Model

The modeling approach is based on well-established classical methodology, and I commend the investigators on their work, especially for making the connection between their initial modeling framework with a well-known model in small area estimation, the Fay-Herriot model (See e.g., Fay and Herriot, 1979; Rao, 2015). The proposed method results in valid analytical forms for the model estimators based on well-established theory.

The main area of improvement in the current modeling framework is to better account for uncertainty of some of the model estimates. In particular, the uncertainty in the design variances is not accounted for in the model. Although I consider this as the main shortcoming of the proposed modeling framework, it is not an unusual consequence of the methodology choice (and in fact, it is a rather common consequence of most classical methods). This may be improved by adapting a Bayesian approach for estimating the model parameters. However, Bayesian approaches have disadvantages too; mainly, the estimation procedures do not rely on analytical results and are based on advanced computational methods.

Below, I list several recommendations to possibly improve the model and its implementation for calibrating the CHTS data.

2.1 Recommendations:

- It is highly recommended that the investigators conduct realistic simulation studies and test the performance of the proposed model (in comparison to other alternative methods). The current simulations, as described by the investigators, are limited to sensitivity analysis for specific assumptions and choices (e.g., sensitivity of the normality assumption for sampling error).

- The model is based on only two years of calibration data (in fact, 11 waves), and although the proposed model structure is based on well-established methodology, it is highly recommended that the calibration is periodically updated based on future data. It is my understanding that the overlapping period between CHTS and FES is scheduled to be three years (two of which data is available for). I highly recommend extending the overlapping period between the two surveys to obtain additional data for the purpose of calibration.

- Given that the model results indicate the wireless effect as the only significant covariate (aside from log of population) with a minor effect size in explaining the differences between the two surveys, I recommend limiting the application of the calibration model to the CHTS data for the period where the wireless phones became relatively prevalent (early 2000's and onwards).

- Also, I recommend considering other potential candidates beyond what has already been considered to serve as predictor information for the model to possibly better explain the differences between the data obtained using the two survey methods. In particular, additional information related to demographics (possibly broken down by age groups) and socio-economic within states may serve as predictor variables.

- Another aspect that does not seem to have been explored is the potential similarities or dissimilarities in trends of CHTS and/or FES data among certain states. This may help better understand the mechanisms underlying these data. To clarify, this recommendation does not necessarily indicate using spatial dependence structure to model the response data, rather the goal is to identify potential common predictor factors specific to certain states through by focusing on similarities (or dissimilarities) between the patterns of survey data in these states.

- Finally, the current description of the proposed model requires familiarity with statistical methodology at a relatively high level. Given that the audience of this product are not statisticians, the methodology should be communicated in a more effective way than the current document prepared by the investigators.

3   Evaluation of Terms of Reference

3.1   Term of Reference 1

1. Evaluate the suitability of the proposed model for converting historical estimates of private boat and shore fishing effort produced by the CHTS design to estimates that best represent what would have been produced had the new FES design been used prior to 2017.

TOR 1 and its subcomponents (a-e) were met.

a) Does the proposed model adequately account for differences observed in the estimates produced by the CHTS and FES designs when conducted side-by-side in

The general model structure is capable of accounting for the observed differences between the CHTS and FES results during the overlapping period (2015-2016). The model parameterization accounts for different patterns and sources of variability including trend, seasonality (between waves), and unexplained sources (called the 'irregular' effect). Also, the proposed model accounts for the sampling method effect being different between the mail and telephone surveys. Moreover, the design variances are modeled using predictor information. The described parameterization allows for adequately accounting for the differences between the observation from the two survey methods. However, in practice, there are two shortcomings: 1) the period of overlap between the two surveys is short, currently resulting in 11 observations, and thus, the process of learning from data in order to calibrate historic CHTS values is based on limited number of observations; 2) the current model results only identify a few number of predictors as important factors in describing the differences between the two survey results, and these results hardly explain the mechanism underlying these differences.

It should be noted that the described issues are not shortcomings of the proposed model and rather are based on limited availability of data and predictor information.

b) Is the proposed model robust enough to account for potential differences that would have been observed if the two designs had been conducted side-by-side in years prior to 2015 with regards to time trending biases?

The model parametrization, as described previously, contains the required components to account for the differences between the two survey methods. The main shortcoming in this area is due to data availability and inconsistency in collection of auxiliary data (e.g., demographic information about the anglers being surveyed) through the CHTS.

Another important issue is that the investigators were not able to identify the mechanism underlying the differences between the two surveys. The Panel members discussed this issue at length, but were unable to identify an easy solution for this problem. I agree that this is not a simple problem to address but without insight into the underlying mechanisms that explain the differences between the two survey methods, it would be difficult to confidently respond to this ToR. Presumably, if we knew more about the underlying mechanism and had access to additional useful predictor data, the model structure would allow to conduct robust inference.

c) How does the approach used in developing the proposed FES/CHTS calibration model compare in terms of strengths or weaknesses with other potential approaches?

Strengths: The proposed model is developed based on well-established classical methodology and nicely fits into a well-known small area estimation method framework (the Fay-Herriot model). The estimators have desirable properties (e.g., unbiasedness, etc.) and model implementation is straightforward and may be done using available software.

Weaknesses: I consider the disconnect between the uncertainty in estimated design variance and the estimation of effort as the main weakness of the proposed model. In the proposed model, the point estimates for the design variances are used in the model for estimating effort, without accounting for uncertainty in the estimation of design variances. Alternatively, a hierarchical Bayesian approach may be considered to fully account for uncertainty in the design variance estimation.

The investigators described that they had considered and explored additional modeling approaches including a hierarchical Bayesian approach and although they recognized the advantages of some of these methods over their proposed method, they provided convincing arguments in defense of their choice. In particular, the advantages of the proposed method based on the Fay-Herriot model including the nice theoretical properties of the estimators, the availability of analytical forms for the estimators (as oppose to stochastic ones determined using numerical approximations in Bayesian methods), and availability of off-the-shelf software tools outweigh the competing modeling options. In summary, I have no concerns about the scientific credibility and theoretical underpinnings of the proposed method.

d) Does the proposed calibration model help to explain how different factors would have contributed to changes in differences between CHTS and FES results over time?

As previously mentioned, the current model results do not provide a clear understanding of the underlying mechanisms that may describe the differences between the CHTS and FES outcomes. Although the investigators have considered several predictor variables, other than population size (included in the model as the log of population) and a minimal effect of wireless phones, none of these predictor variables showed any statistical significance in explaining the differences between the two surveys. Potentially, availability of auxiliary information about the anglers surveyed through the CHTS (similar to what is available through the FES) would have been helpful to better understand the differences. However, given that these data are lacking for the historical CHTS surveys (pre-2015), it is not clear if much can be done to improve the issue.

Further possibilities that may deem helpful include using population and demographic information at finer scales (e.g., Census tract or county level data). Also, it may be instructive to look at similarities and dissimilarities of data among different geographical locations (e.g., among states) to potentially identify spatially differentiated effects that may help better understand the underlying mechanism of the differences in survey results.

e) Is it reasonable to conclude that revised 1981-2016 private boat and shore fishing effort estimates based on the application of the proposed FES/CHTS calibration model would be more accurate than the estimates that are currently available? Does evidence provided for this determination include an assessment of model uncertainty?

This is a very difficult question to answer as the underlying mechanisms for these surveys are complex and not fully understood. In general, it may be argued that mail surveys are currently more effective than telephone surveys. This is due to a decline in landlines and the rise in prevalence of wireless/mobile phones (which are not used in CHTS) as well as other potential factors. There are other advantages to a mail survey over a telephone survey in this setting including a better recollection of fishing trips, etc. Although some of these arguments hold true for the historic period and thus we may conclude for example that the calibrated historic CHTS values may be more accurate than the observed CHTS values, one may argue that in general, telephone surveys used to be more effective than mail surveys in the past. This is particularly true for the period before wireless phones became popular (and use of landlines started to decline, especially among the younger demographics). In general, there are advantages and disadvantages to both survey methods (For more discussion see e.g., Groves et al. 2001).

The proposed model is capable of accounting for uncertainty in the CHTS calibrated estimates. In particular, prediction intervals may be produced and considered. The investigators did not provide the prediction intervals in the manuscript describing the methodology; however, they provide discussion of the derivation of the estimate variances (i.e., the "MSE"). During the Panel Review meeting, per request from the Panel, the investigators provided sample results which contained prediction intervals. In the future, it would be critical that the produced calibrated CHTS results include prediction intervals, and the importance of accounting for uncertainty in the point estimates should be effectively communicated with the community of users of this product.

3.2 Term of Reference 2

2. Briefly describe the panel review proceedings highlighting pertinent discussions, issues, effectiveness, and recommendations.

On pre-review materials and background documents:
-   Additional background documents would have been useful for the review, for example, MRIP Handbook should have been provided before the review meeting in order to provide the reviewers with more detailed background information about the surveys.

- Discussions during the review included several other reports that seemed to be closely related to this review (e.g., the National Academy reports, etc.). However, none of these reports were provided prior to the Panel Review meeting.

- It would have been extremely helpful to have a clearer presentation of the proposed model that would discuss the components of the model in more details. Also, a summary of candidate modeling approaches, and details on the process that led to the proposed model would have been very useful. The investigators provided this summary per request from the Panel. However, it would have been helpful to have the discussion documented and presented to the Panel prior to the Panel Review meeting.

- It would have been extremely helpful to have more information about the surveys prior to the meeting, including similarities and differences in definitions of effort, questions on the questionnaires, etc.

Review panel and presentations:
- I was hoping and expecting to see:
  - more details presented on the survey methodologies used in both surveys,
  - more specific information and simulation regarding impact of the calibration procedure results on stock assessment, and
  - more details on the proposed model beyond the paper that was provided to the reviewers, and information on exploratory data analyses and the process that led to the proposed model (including details on other potential candidate models), and simulation studies based on the proposed model to validate model performance for simulated data sets.
- The presenters did not address the TORs directly, which made it harder for the Panel to assess the relevance of some of the information presented to these TORs. Consequently, the Panel spent substantial portion of questions/answers period (and discussion time) on obtaining answers to address TORs.
- The Panel members and staff were all very knowledgeable and pleasant to work with. Overall, the review process was efficient except for the issues mentioned above. The Panel members worked effectively together and the Chair of the Panel did an extremely well job in making sure the discussions stayed on track.
- In summary, my main concern about the review process and an area that requires attention and improvement for future reviews is communication. The background documents, and the information essential for the review were either not provided or not provided in the level of details that the Panel members expected. This is extremely important, in particular for outside reviewers who may not be familiar with the history of these surveys and past reviews.

Appendix 1: Bibliography of materials provided for review

Fay III, R. E., & Herriot, R. A. (1979). Estimates of income for small places: an application of James-Stein procedures to census data. *Journal of the American Statistical Association*, *74*(366a), 269-277.

Groves, R. M., Biemer, P. P., Lyberg, L. E., Massey, J. T., Nicholls, W. L., & Waksberg, J. (Eds.). (2001). *Telephone survey methodology* (Vol. 328). John Wiley & Sons.

Rao, J. N. (2015). *Small-Area Estimation*. John Wiley & Sons, Ltd.

Background Papers

Many papers and documents on the existing and proposed survey methodology may be found at the following website:
http://www.st.nmfs.noaa.gov/recreational-fisheries/MRIP/effort-survey-improvements

Background on the MRIP Calibration Model Peer Review may be found at:
https://www.st.nmfs.noaa.gov/recreational-fisheries/MRIP/FES-Workshop/index.html

The National Academies of Sciences, Engineering, and Medicine. 2016. Review of the Marine Recreational Information Program (MRIP) Washington, DC: The National Academies Press. doi: 10.17226/24640
https://www.st.nmfs.noaa.gov/confluence/display/FESCALIB?preview=/73074985/73728799/NAS_MRIP_review.pdf

National Research Council. 2006. Review of Recreational Fisheries Survey Methods. Committee on the Review of Recreational Fisheries Survey Methods, ISBN: 0-309-66075-0, 202 pages. http://www.nap.edu/catalog/11616.html

Working Papers

Development and Testing of Recreational Fishing Effort Surveys Testing a Mail Survey Design: Final Report. Project Team Members: Rob Andrews, NOAA Fisheries, J. Michael Brick, Westat, Nancy A. Mathiowetz, University of Wisconsin-Milwaukee. July 31, 2014.
https://www.st.nmfs.noaa.gov/recreational-fisheries/MRIP/FES-Workshop/documents/Report_recommending_FES_to_replace_CHTS--Finalize_Design_of_Fishing_Effort_Surveys.pdf

Marine Recreational Information Program Fishing Effort Survey Transition Progress Report. October 28, 2016. https://www.st.nmfs.noaa.gov/recreational-fisheries/MRIP/FES-Workshop/documents/2015_benchmarking_progress_report.pdf

Marine Recreational Information Program Transition Plan for the Fishing Effort Survey
Prepared by the Atlantic and Gulf Subgroup of the Marine Recreational Information Program Transition Team May 5, 2015
https://www.st.nmfs.noaa.gov/recreational-fisheries/MRIP/FES-Workshop/documents/MRIP_FES_Transition-Plan_FINAL.pdf

A Small Area Estimation Approach for Reconciling Mode Differences in Two Surveys
of Recreational Fishing Effort draft: F. Jay Breidt, Teng Liu, Jean D. Opsomer
Colorado State University June 10, 2017
https://www.st.nmfs.noaa.gov/recreational-fisheries/MRIP/FES-Workshop/documents/DRAFT-Report_of_Calibration_Model.pdf

Presentations

Calibration_Scenarios-20161115.pdf

MRIP FES website link

FESCALIBRATIONNOTESDay2.docx

EBLUPS.csv

EBLUPS_Variable_Names.csv

FESCALIBRATIONNOTESDay1.docx

Eblup comparisons.docx

MRFSS Fish Hunt Comps.xlsx

FES Errors.pptx

Model_Fits.txt

Mode_3_logeffort_poly_fixed.pdf

Mode_7_logeffort_poly_fixed.pdf

Webinar Links

All open sections of the meeting were recorded and available for viewing at the following links.

[0 - Intro - Paul Rago](#)

[1 - MRIP Fishing Effort Survey - Rob Andrews](#)

[2- Catch and Assessments - Rick Methot](#)

[3 - Management Implications - Andy Strelcheck](#)

[4 - Calibrating Survey Estimates over Time - Jean Opsomer](#)

[5 - Calibration from CHTS to FES - Jay Breidt](#)

[6 - Initial Calibration Review Discussion - Tuesday Afternoon](#)

[7 - Day Two, AM Discussion](#)

[8 - Day Two, PM Discussion](#)

[9 - Day Two, Initial Findings Summary](#)

Appendix 2: Statement of Work

Statement of Work
National Oceanic and Atmospheric Administration (NOAA)
National Marine Fisheries Service (NMFS)
Center for Independent Experts (CIE) Program
External Independent Peer Review

Calibration Model Accounting for a Recreational Fishery Survey Design Change

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. (http://www.cio.noaa.gov/services_programs/pdfs/OMB_Peer_Review_Bulletin_m05-03.pdf).
Further information on the CIE program may be obtained from www.ciereviews.org.

Scope
The Office of Science and Technology requests an independent peer review of a calibration model proposed for use in revising statistics produced by surveys of marine recreational fishing effort on the Atlantic coast and in the Gulf of Mexico. This calibration model is considered by the Marine Recreational Information Program (MRIP) to be very important to adjust historical time series of recreational effort and catch estimates in order to account for biases in past sampling and estimation methods that have become apparent with the development of a new, more statistically sound

method. The calibration model is intended to account for past biases in private boat and shore fishing effort estimates that have resulted from the continued use of a legacy random-digit-dial telephone survey design that has degraded over time and will be replaced with the implementation of a new mail survey design (the "Fishing Effort Survey", or FES) in 2018.

Calibration Model for the Fishing Effort Survey

In 2015, MRIP formed a Transition Team to collaboratively plan a transition from a legacy telephone survey design to a new mail survey design for estimating private boat and shore fishing effort by marine recreational anglers. Since 2008, MRIP had conducted six pilot studies to determine the most accurate and efficient survey method for this purpose on the Atlantic and Gulf coasts. The most recent study, conducted in four states in 2012-2013, compared a new mail survey design with the Coastal Household Telephone Survey (CHTS) design that has been used since 1979. MRIP subjected the final report from the pilot project to external peer review in 2014 and certified the new survey design, called the Fishing Effort Survey (FES), in February 2015 as a suitable replacement for the CHTS. The FES is much less susceptible to potential sources of bias than the CHTS because it can reach more anglers, achieve higher response rates, and is less prone to possible recall errors. The pilot project results indicated that FES estimates were substantially higher than CHTS estimates for both private boat fishing and shore fishing.

MRIP recognized the FES should not be implemented immediately as a replacement for the CHTS, and a well thought out transition plan was needed to ensure that the phase-in of the FES is appropriately integrated into ongoing stock assessments and fisheries management actions in a way that minimizes disruptions to these processes, which are based on input from multiple data sources over lengthy time series. The Transition Plan developed by the Transition Team called for side-by-side benchmarking of the FES against the CHTS for three years (2015-2017) with the development and application of a calibration model to enable adjustment of past estimates that account for biases in historical effort and catch statistics after the second year. With this timeline, revised estimates can be incorporated into stock assessments during 2018 using a peer reviewed calibration model, and new Annual Catch Limits (ACLs) can then be set in 2019 for at least some stocks.

Requirements

 NMFS requires three reviewers to conduct an impartial and independent peer review in accordance with the SoW, OMB Guidelines, and the Terms of Reference (ToRs) below. The CIE reviewers shall have working knowledge and recent experience in the design of sampling surveys, the evaluation of non-sampling errors (i.e., undercoverage, nonresponse, and response errors) associated with changes to survey designs over time, and the evaluation of differences between surveys using different modes of contact (e.g., mail *versus* telephone). In addition, they should have experience with complex, multi-stage sampling designs, time series analyses, regression estimators, and small

domain estimation methods. Some recent knowledge and experience in current surveys of marine recreational fishing is desirable but not required.

NMFS will provide a Chair who has experience with U.S. fisheries stock assessments and their application to fisheries management. The Chair would ensure that reviewers understand the importance of maintaining a comparable time series of marine recreational fisheries catch statistics for use in stock assessments and their application to fisheries management. The Chair will not be selected by the contractor and will be responsible for facilitating the meeting, developing and finalizing a summary report and working with the CIE reviewers to make sure that the ToRs are addressed in their independent reviews.

Tasks for Reviewers
Pre-review Background Documents
The following background materials and reports prior to the review meeting include:

Transition Plan for the FES:
https://www.st.nmfs.noaa.gov/Assets/recreational/pdf/MRIP%20FES%20Transition%20Plan%20FINAL.pdf

Report recommending the FES to replace the CHTS: *Finalize Design of Fishing Effort Surveys*
(https://www.st.nmfs.noaa.gov/pims/main/public?method=DOWNLOAD_FR_PDF&record_id=1179)

2015 Benchmarking Progress Report:
https://www.st-test.nmfs.noaa.gov/Assets/recreational/pdf/2015_FES_Progress_Report-20161115.pdf

Report on FES/CHTS Calibration Model:
This report will be provided by the contractor (via electronic mail or make available at an FTP site) to the CIE reviewers.

Panel Review Meeting
Each CIE reviewer shall conduct the independent peer review in accordance with the SoW and ToRs, and shall not serve in any other role unless specified herein. Each CIE reviewer shall actively participate in a professional and respectful manner as a member of the meeting review panel, and their peer review tasks shall be focused on the ToRs as specified herein. The meeting will consist of presentations by NOAA and other scientists to facilitate the review, to provide any additional information required by the reviewers, and to answer any questions from reviewers.

Contract Deliverables - Independent CIE Peer Review Reports
The CIE reviewers shall complete an independent peer review report in accordance with the requirements specified in this SoW and OMB guidelines. 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**.

Other Tasks – Contribution to Summary Report
The CIE reviewers may assist the Chair of the panel review meeting with contributions to the Summary Report, based on the terms of reference of the review. The CIE reviewers are not required to reach a consensus, and should provide a brief summary of each reviewer's views on the summary of findings and conclusions reached by the review panel in accordance with the ToRs.

Foreign National Security Clearance
When reviewers participate during a panel review meeting at a government facility, the NMFS Project Contact is responsible for obtaining the Foreign National Security Clearance approval for reviewers who are non-US citizens. For this reason, the reviewers shall provide requested information (e.g., first and last name, contact information, gender, birth date, passport number, country of passport, travel dates, country of citizenship, country of current residence, and home country) to the NMFS Project Contact for the purpose of their security clearance, and this information shall be submitted at least 30 days before the peer review in accordance with the NOAA Deemed Export Technology Control Program NAO 207-12 regulations available at the Deemed Exports NAO website: http://deemedexports.noaa.gov/ and http://deemedexports.noaa.gov/compliance_access_control_procedures/noaa-foreign-national-registration-system.html. The contractor is required to use all appropriate methods to safeguard Personally Identifiable Information (PII).

Place of Performance
The place of performance shall be at the contractor's facilities, and at the NMFS Headquarters in Silver Spring, Maryland.

Period of Performance
The period of performance shall be from the time of award through July 31, 2017. Each reviewer's 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
Within four weeks of award	Contractor provides the pre-review documents to the reviewers
June, 2017	each reviewer participates and conducts an independent peer review during the panel review meeting
Within two weeks of panel review meeting	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

All travel expenses shall be reimbursable in accordance with Federal Travel Regulations (http://www.gsa.gov/portal/content/104790). International travel is authorized for this contract. Travel is not to exceed $15,000.

Restricted or Limited Use of Data

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

NMFS Project Contact:

Dave Van Voorhees
National Marine Fisheries Service
1315 East West Highway
Silver Spring, MD 20910
dave.van.voorhees@noaa.gov

Annex I: Format and Contents of CIE Independent Peer Review Report

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

Annex 2: Terms of Reference for the Peer Review

Calibration Model Accounting for a Recreational Fishery Survey Design Change

1. Evaluate the suitability of the proposed model for converting historical estimates of private boat and shore fishing effort produced by the CHTS design to estimates that best represent what would have been produced had the new FES design been used prior to 2017.
   a) Does the proposed model adequately account for differences observed in the estimates produced by the CHTS and FES designs when conducted side-by-side in 2015-2016?
   b) Is the proposed model robust enough to account for potential differences that would have been observed if the two designs had been conducted side-by-side in years prior to 2015 with regards to time trending biases?
   c) How does the approach used in developing the proposed FES/CHTS calibration model compare in terms of strengths or weaknesses with other potential approaches?
   d) Does the proposed calibration model help to explain how different factors would have contributed to changes in differences between CHTS and FES results over time?
   e) Is it reasonable to conclude that revised 1981-2016 private boat and shore fishing effort estimates based on the application of the proposed FES/CHTS calibration model would be more accurate than the estimates that are currently available? Does evidence provided for this determination include an assessment of model uncertainty?
2. Briefly describe the panel review proceedings highlighting pertinent discussions, issues, effectiveness, and recommendations.

Tentative Agenda
Calibration Model Accounting for a Recreational Fishery Survey Design Change

TBD

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Appendix 3: Panel membership

The review committee was composed of six members: three scientists appointed by the Center for Independent Experts (CIE): Robert Hicks, The College of William and Mary, Cynthia Jones, Old Dominion University and Ali Arab, Georgetown University, as well as representatives from the New England (Patrick Sullivan) and South Atlantic (Fredric Serchuk) Scientific and Statistical Committees, and the Atlantic States Marine Fisheries Commission (Jason McNamee) served on the review panel. The meeting was chaired by Paul Rago as a member of the Mid-Atlantic Fishery Management Council Scientific and Statistical Committee.