# Center for Independent Experts (CIE) Independent Peer Review Report

# SEDAR 42 Gulf of Mexico red grouper

**Prepared for the Centre for Independent Experts**

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# Table of Contents

# Executive Summary

- This document is the individual CIE Reviewer Report of the SEDAR 42 Gulf of Mexico red grouper (*Epinephelus morio*) stock assessment review. The review was conducted during July and August 2015, and solely represents the views of the independent reviewer (Geoff Tingley).

- The assessments for the red grouper stock were clearly presented and well documented, including detailed descriptions of the input data and an appropriate level of coverage of the uncertainties. The assessment team fully engaged with the review in a highly professional and constructive manner.

- All of the model runs presented or developed during the review had difficulty in fitting the level of estimated discards from the different fleet components of the fishery. The level of fishing mortality due to discarding probably represents the greatest uncertainty in the assessment of Gulf of Mexico red grouper.

- The assessments presented all included time-series of data described as indices of abundance. Some of these 'indices' are highly variable to the point that their usability as indices of abundance is likely to be compromised, suggesting that the Data Workshop component of this assessment probably needed to take a more critical approach to the selection of abundance indices to be retained for use in the assessment.

- Re-examining aspects of the data inputs, especially the approach to developing and retaining abundance indices for use in the assessment and the estimation of discard data, are likely to yield further improvements in model fits in future.

- During the review, the Review Panel recognized some potential shortcomings in the assessment and worked with the assessment team to develop alternative model runs that addressed the more important of these.

- Specific recommendations aimed at improving the stock assessment approach for this stock are made by the reviewer under Term of Reference 8 (Appendix 2).

- The information content and quality of the assessment are sufficient to form the basis for advising managers on aspects of the Gulf of Mexico red grouper stock and fishery.

- The three-days of the Review Workshop did not provide sufficient time to review and improve the assessment presented.

# Background

This review of the 2014 Stock Assessment Report for Gulf of Mexico red grouper (*Epinephelus morio*) was conducted as part of an independent review of the overall assessment process for the Center for Independent Experts (CIE).

Key assessment documents from the Data Workshop, the Assessment Workshop and this Review Workshop, were clearly presented with few omissions or typographical errors. The support provided by the SEDAR staff was of a high standard.

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

The fisheries for red grouper in the Gulf of Mexico are complex, encompassing a number of different fishing methods including both commercial and recreational fleet components, most of which are difficult to monitor consistently or effectively. For clarity, in this report the reviewer considers the red grouper fishery as a single fishery composed of multiple fleets.

Improvements in input data have been made since the previous assessment for red grouper was conducted in 2009. This specifically includes the discard data. Further improvements in input data are both are desirable and achievable prior to the next assessment for this stock.

# Description of Review Activities

This review was undertaken by Geoff Tingley between the 25th July and 23rd August 2015 as part of the SEDAR 42 review of the 2014 Stock Assessment Report for Red Grouper in the Gulf of Mexico. The Review Workshop (RW) timing proceeded as scheduled, but the final submission of this review report was delayed, with the agreement of the CIE, to enable some final alternative assessment outputs to be incorporated. Technical issues affecting the reviewer coupled with the initial delay and scheduled travel for other work further delayed delivery of the report. This report was finally submitted to the CIE on 23rd August 2015.

The supporting documentation for the review of the assessment was provided to the reviewer in electronic format adequately in advance of the RW. These documents included material pertaining to the Data Workshop (DW), the Assessment Workshop (AW) and the RW, some additional background documents were also provided as well as copies of the various presentations. All documents provided are listed in the Bibliography (Appendix 1).

The assessment was reviewed against the specific Terms of Reference (ToR) provided by the CIE (Annex 2 of Appendix 2).

The background information relevant to this review is presented in appendices to this review report, as required by the ToR. These are, Appendix 1: Bibliography of documents; and Appendix 2: CIE Statement of Work (which includes background information and Annexes describing the (i) Format and Contents of the CIE Peer Review Report, (ii) Tentative Terms of Reference for the Peer Review SEDAR 42 Gulf of Mexico Red Grouper Assessment; and (iii) Tentative Agenda for the Review Workshop.

Final outputs from the most important additional model runs developed during the three day workshop were not completed by the end of the workshop due to inadequate time to do so.

These outputs were provided later, by email, with the last information being provided on the 30th July 2015.

## Summary of Findings

The Gulf of Mexico red grouper Assessment Team should be commended for their thorough and professional approach to processing the basic data and developing and applying the models for a complex, multi-fleet fishery to enable the development of advice to managers. Two areas of exception would be the approach to selecting the various time-series of data retained as informative indices of abundance, and how the quantities of fleet specific discard data were estimated. These two areas are discussed in some detail and appropriate recommendations made.

The task of developing this assessment was made more complex and demanding by the decision to change the assessment software from ASAP (Age Structured Assessment Program) to Stock Synthesis v3.24P (SS3). While this change was made for good reason, it did make comparison of this assessment with the previous one completed in 2009 problematic. A second result of changing the assessment framework was that the time required to complete the switch from ASAP to SS3 left less time to develop the model, and thus some desirable elements were not fully covered or omitted.

Two additional model runs were developed during the RW. These model runs (RW1 and RW2) showed improved fits to the data and should be considered as a preferred basis for providing assessment advice over the model and sensitivities presented on day one of the RW. As a result, this reviewer finds that this assessment of Gulf of Mexico red grouper constitutes the best scientific information available from which to provide advice to fishery managers.

The largest area of uncertainty in this assessment is that associated with the incorporation of the discard data from the various fleets that make up the fishery. All model runs experienced difficulty in fitting the available data, with most runs fitting the data unacceptably poorly. Runs RW1 and RW2 did show improved fits to these data but fits were still poor. Given the types of fishing operation and derivation of the discard data (scaled up observer recorded discards), this is not that surprising. This issue does, however, have a large impact on the assessment, the level of associated uncertainty, and the assessment's utility as the basis for providing advice and should clearly be a focus of improvement before the next assessment for this stock.

The types, amount and quality of data available to assess Gulf of Mexico red grouper are sufficient to enable a high quality assessment to be developed. It is worth noting, however, that the red grouper fishery is complex and largely small scale, making it difficult to get consistent and representative spatial and temporal monitoring data of catch and discard quantities, of discard mortalities and various biological measurements (length frequencies, age frequencies, sex, etc.). This means that any stock assessment developed for red grouper will tend to have a relatively high level of uncertainty associated with the model fit and outputs. Provided that this uncertainty is recognized and appropriate sensitivity runs are conducted and reported, this does not affect the utility of the assessment for providing management advice.

Detailed findings and recommendations are presented below within each section of the ToR as set out in Annex 2 of Appendix 2.

**Overall findings**

The approach to modeling was thorough and sound and appropriately addressed uncertainty to the principle assumptions through the range of sensitivities explored. The input data were clearly described. However, the lack of critical quality selection criteria in the selection of some of the input data, especially for time-series presented as indices of abundance, is considered a weakness in this assessment, but one that can be addressed before the next assessment for this stock.

The red grouper fishery has greater than usual data quality issues that tend to increase uncertainty associated with any stock assessment. While many of these uncertainties have been fully addressed, others remain unaddressed and some intractable. Further work to address the most important of these is recommended in advance of the next assessment for Gulf of Mexico red grouper.

Despite some critical comments about some data input choices, as well as concerns about the fundamental quality of the discard estimates (an expected outcome from a review process), the assessment runs developed before and during the RW represent the best scientific information available for the development of management advice for this fishery.

In a fishery with multiple data deficiencies, one of the objects of modelling the fishery is to identify those datasets that, by their inadequacy, associated uncertainties or absence, have a disproportionate impact on the outcomes of the assessment. This can assist in developing a rational approach to prioritizing future research effort specifically aimed at most effectively supporting and improving the assessment and fisheries management. This has proved successful in this assessment, with the clear identification of the estimation of the discard data as the major source of uncertainty, with additional work and recommendations to address the issue flowing from the assessment.

**Summary**

- The assessment of Gulf of Mexico red grouper reviewed at SEDAR 42 represents the best scientific information available from the development of management advice for this fishery.

- The majority of uncertainties in the input data, parameter assumptions and model structure were appropriately explored in the treatment of the input data and in sensitivity runs to the base case model by the Assessment Team. The Review Workshop developed additional model runs that improved model fits and how some uncertainties were addressed.

- Two areas where uncertainty could have been better addressed and for which recommendations are made in this report are: (i) in the basic quality and quantity of the data pertaining to discards and how these data were analyzed and prepared as input data; and (ii) in how times series of data were selected as indices of abundance to include in the assessment.

- A program of improved data collection related to discards is recommended, as is a thorough review of the approach to analyzing the discard data from the fishery for use

in any future assessment. This somewhat extends recommendations made in the AW and AW reports.

- Development of an approach and subsequent application to quality-test the various time-series of data as possible indices of abundance prior to their inclusion in these assessments is recommended, i.e., a higher quality threshold is needed for screening abundance indices. This should yield improved model fits to the retained indices of abundance as well as other key input data sets with associated increases in the robustness of and confidence in the assessment results.

- The duration of the Review Workshop was too short to enable the Review Panel to both adequately review the presented material and to engage in addressing key issues with the Assessment Team.

- The approach and attitude of the Assessment Team at the RW was highly commendable.

# Comments addressing the Individual Terms of Reference

1. *Evaluate the data used in the assessment, including discussion of the strengths and weaknesses of data sources and decisions, and consider the following:*

    *a) Are data decisions made by the DW and AW sound and robust?*

    *b) Are data uncertainties acknowledged, reported, and within normal or expected levels?*

    *c) Are data applied properly within the assessment model?*

    *d) Are input data series reliable and sufficient to support the assessment approach and findings?*

a) The data decisions made by the DW and AW were largely sound. Two areas should be subject to specific development: (i) the retention of abundance indices (too many of indifferent quality were retained), and (ii) the approach to the estimation of the discard data, which was discussed at length during the RW and is the subject of AW and DW recommendations as well as those of the CIE reviewers and the Review Panel as a whole.

b) Given the caveats above, the data uncertainties were clearly acknowledged and reported and were within the normal range for a fishery of this type. i.e., relatively high due to difficulties sampling from recreational and small boat fleets within the fishery. The issues of uncertainty have generally been addressed in a sound, appropriate and robust manner by the Assessment Team. Where issues could or should have been addressed differently, these are highlighted elsewhere in the report.

c) Data have been applied correctly within the model. Further exploration of the weighting of the different data components would be advisable in future. A review of data weighting should specifically consider the relative weightings of, for example, the composition data, which appear to be over-weighted compared to the index data. This issue is likely to affect the goodness of fit, and thus uncertainty in results, but would not be expected to affect stock status in a major way (although if close to a management threshold even a relatively small shift in stock status could have management implications).

Appropriate biological data for red grouper were considered, analyzed, reported on, and used in the assessment.

Information on some catches (e.g. early and Cuban catches). i.e., landings and discards, is fairly uncertain, but this has been appropriately highlighted and dealt with so far. Length frequency and age data are patchily available in time and space and in low numbers from some fleets. Looking again at the early catch data might enable a future assessment to have somewhat earlier start date.

d) The majority of input data series are sufficiently reliable to support the assessment approach and findings of this assessment. Further development work needs to be directed at (i) the estimation of discards, and (ii) the retention of abundance indices, for which recommendations have been made.

Having options to develop multiple time-series that could be used as indices of abundance can be really useful in assessments of otherwise data poor fisheries. However, acceptance

that a time-series of CPUE or a fisheries-independent survey as an index of abundance can introduce substantive problems in an assessment if it is not actually indexing abundance or if the quality of the index is poor. Including such 'indices' tends to downgrade the model fit to some or all of the other data sets, including other, genuine indices of abundance.

Note that the SS modeling package is designed to permit use of multiple input data sets such as abundance indices. However, getting an acceptable outcome relies on the ability of SS to 'balance' the input data. Where there are good data (quality and quantity) this may work, as those datasets that match will work together to override those that may be weak or erroneous. However, where much of the data in the assessment are less good (e.g., lower quality, poor spatial/temporal coverage), it becomes considerably less likely that the model will be able to find a solution that approximates to the 'correct', i.e., real world, situation and uncertainty will increase.

This reviewer believes that the retention of so many indices increases the risk of including unacceptably poor indices, and also increasing the number of parameters for the model to handle to no benefit. Thus, a more parsimonious approach is recommended: retain fewer indices and only the better quality ones. If other indices are believed to be important, their relevance can be evaluated using specific sensitivity runs.

Here, I provide specific examples that suggest some inherent issues in index retention: (i) the combined video index is a composite of two separate time-series, one series runs for the whole time period considered, the second runs for about half of the time period, thus the combined dataset is unlikely to be a single index as the two halves are composed of fundamentally different data; (ii) the headboat index shows significant variation between adjacent years that are incompatible with an index of good quality showing real change in abundance (e.g., a 2.2 fold difference between 1989 and 1990); (iii) the red tide in 2005 showed as the headboat index dropping by a factor of 2.7, while the other indices dropped by factors between 1.1 and 1.8.

2. *Evaluate and discuss the strengths and weaknesses of the methods used to assess the stock, taking into account the available data, and considering the following:*

   *a) Are methods scientifically sound and robust?*

   *b) Are assessment models configured properly and used consistent with standard practices?*

   *c) Are the methods appropriate for the available data?*

a) The methods used to develop the stock assessments for this stock are scientifically sound and robust.

b) The assessment model appears to be properly configured within the SS3 framework and is consistent with the standard practices of implementing assessments in SS3.

c) The approach and methods are appropriate for the available data. While better quality (e.g., spatial and temporal coverage of observer data) should yield improved model fitting, this would not lead to any structural changes in the model, whereas new information on stock structure indicating one or more sub-stocks would require a re-assessment of the model specification.

For example, SS3 assumes that landings are precisely known, whereas for this stock there is somewhat higher than average uncertainty about landings for most of the fleets. These uncertainties have, however, been appropriately addressed, especially through the use of sensitivity model runs.

3. *Evaluate the assessment findings and consider the following:*

   a) *Are abundance, exploitation, and biomass estimates reliable, consistent with input data and population biological characteristics, and useful to support status inferences?*

   b) *Is the stock overfished? What information helps you reach this conclusion?*

   c) *Is the stock undergoing overfishing? What information helps you reach this conclusion?*

   d) *Is there an informative stock recruitment relationship? Is the stock recruitment curve reliable and useful for evaluation of productivity and future stock conditions?*

   e) *Are the quantitative estimates of the status determination criteria for this stock reliable? If not, are there other indicators that may be used to inform managers about stock trends and conditions?*

a) The key assessment findings are reasonably reliable and consistent with the input data and population biology. These outputs are useful to support status inferences and support management decisions, but need to be treated carefully due to relatively high levels of uncertainty arising from the input data issues of discards and retained indices, and also the limited level of collective scrutiny of the model runs developed at the RW. The Review Panel was not able to collectively consider and discuss all outputs from the RW developed runs in the time available.

b) The available evidence from the stock assessment is that it is unlikely that the stock is overfished. This is evidenced by the stock status estimates from the various model and sensitivity runs, and also basic fisheries data on length- and age-frequency.

c) The stock does not appear to be experiencing overfishing. As above, the assessment outputs (e.g., phase plots) suggest that overfishing is not occurring, but the relatively high uncertainty in the model estimates and in the reference points, leaves a relatively high level of uncertainty associated with this observation.

d) There is no information on the form of the stock-recruit relationship for Gulf of Mexico red grouper (AW Report, Figure 3.2.58). Very little can be deduced about productivity or future stock trend from the S-R information available.

e) Noting the relatively high uncertainty described above, the quantitative estimates of stock status, supported by the other stock information, are sufficiently reliable to inform management of the fishery.

4. *Evaluate the stock projections, including discussing strengths and weaknesses, and consider the following:*

   a) *Are the methods consistent with accepted practices and available data?*

*b) Are the methods appropriate for the assessment model and outputs?*

*c) Are the results informative and robust, and useful to support inferences of probable future conditions?*

*d) Are key uncertainties acknowledged, discussed, and reflected in the projection results?*

Given the concerns that the Review Panel had about the lack of fit of all model runs and sensitivities to the discard data, the Panel decided not to use their limited time in reviewing projections as planned. Time did not permit projections to be developed for the model runs developed during the RW (RW1 and RW2) for review at the workshop.

Reviewing the documents and outputs provided, however, permits the following to be deduced about the approach to projections, noting that the steepness used (0.8), was probably too low and would have led to the underestimation of productivity.

a)  The approaches used to develop projections look to be appropriate for the stock, available data and consistent with accepted practice.

b)  The methods are appropriate to the assessment presented and would also be appropriate for the RW-developed model runs.

c)  Due to the concerns about the underlying models, the results presented are unlikely to be robust or to support inferences about future conditions. However, the approach, if repeated on an accepted base model, would be expected to be both robust and to provide a basis for inferring probable future conditions for the stock.

d)  Some of the key uncertainties are acknowledged (discards, steepness), but others are not recognized (index retention). Discussion of uncertainties within the projection sections of the AW Report was overly brief. Inclusion of projection sensitivities to some key variables would be recommended for this fishery, specifically, related to steepness and recruitment. For long-term projections, the assumed pattern of recruitment may be important, assuming average recruitment (all years) or recent average recruitment (e.g., last ten years) may generate considerable stock differences over the relatively long projection periods applied.

5. *Consider how uncertainties in the assessment, and their potential consequences, are addressed.*

    a) *Comment on the degree to which methods used to evaluate uncertainty reflect and capture the significant sources of uncertainty in the population, data sources, and assessment methods*

    b) *Ensure that the implications of uncertainty in technical conclusions are clearly stated.*

The majority of the key uncertainties of all types were generally recognized and appropriately addressed. The issue of the models failing to fit the discard data was recognized as the greatest source of uncertainty in the assessment, but no adequate solution was found in the assessment presented to the RW on day one. The additional model runs developed during the RW did produce improved fits to the discard data and should enable better model development in future. However, it is most probable that the

underlying issue was the quality of the estimated discard data, due to both the estimation procedures selected, but also due to sampling inadequacies in the raw data. This will not be a simple issue to correct but substantive progress should possible prior to the next assessment for this stock. Both the DW and AW provided recommendations aimed at correcting parts of this issue, however, given the importance of this issue, future research and monitoring should be part of a well-considered and comprehensive program aimed at improving future data collection and the estimation of both future and historic discard data.

The majority of other uncertainties associated with input data, model structure, and parameter assumptions were clearly expressed and addressed through the use of sensitivity runs.

More effort to address some of the uncertainties of moderate importance would also be advised. Specifically, this should include uncertainties associated with defining or understanding the importance of steepness ($h$) to estimating quantities of importance to fisheries managers, model start year and how the composition data (length– and age–frequencies) are weighted compared to the indices. The approach to fixing steepness in the assessment probably resulted in steepness being set too low, especially when the recent work on steepness in West Coast and Canadian rockfish is considered. With no way to adequately estimate $h$, the RW eventually set $h$ too high (0.99) in models RW1 and RW2, a decision that should be reconsidered in future assessments.

6. *Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted.*

    a) *Clearly denote research and monitoring that could improve the reliability of, and information provided by, future assessments with particular emphasis on the Deepwater Horizon oil spill.*

    b) *Provide recommendations on possible ways to improve the SEDAR process.*

No issues associated with the Deepwater Horizon oil spill were identified during the RW in relation to this stock or fishery.

    a) *Research and monitoring recommendations:*

***Recommendations from the Data Workshop***

Many recommendations are made in the DW Report but are unprioritized. It is assumed that the current monitoring and quality control of monitoring data will continue, and those areas flagged as 'business as usual' are not considered as monitoring rather than research *per se* and are not commented on further.

***Stock Structure***: clarity about stock structure is important but probably not a priority at present. Additional research on stock structure only becomes desirable from an assessment perspective where the existing data support sub-regional (i.e., multiple) stock assessments. It is not clear that the existing catch and effort can be sufficiently spatially disaggregated to support sub-regional assessments, neither is it clear that sufficient length or age frequency data exist either.

*Population genetics*: low priority - probably useful if stock structure is an issue (see above), but probably not a priority (just because the technique is available does not mean that it should be applied without a defined assessment or management need).

*Larval transport and connectivity*: low priority - useful but probably not a priority.

*Habitat requirements*: medium priority - this may be important in terms of understanding some of the impacts of overexploitation on reproduction (i.e., the S/R ratio and steepness), and thus informing on appropriate limit reference points. This is an area of uncertainty that is poorly understood and would benefit from some targeted research. If done, this should be part of a coherent, long term plan to understand how the reproductive biology impacts the S-R relationship, especially at low stock size or when fishing impacts one sex more than the other, including linking to reproductive and mating studies (see below).

*Tagging, movements, and migrations*: low priority - informative if stock structure or sub-structure is important or affecting the assessment or management, which does not appear to be the case at present. If catch data from the Cuban fishery were ever to become available, then this type of study might become more important provided the relevant parts of the species range were covered. Large scale tagging programs tend to be expensive, if tagging is ever done, it should be combined with other fleet-based data initiatives such as discard sampling and growth and mortality estimation to maximise value for money.

***Age and Growth*:**

*Sources of age data*: **high priority**.

*Reader age precision*: business as usual - important - do not stop.

*Year class progressions*: business as usual - important - do not stop.

*Age and length data*: **high priority**.

*Modelling growth*: low priority - useful but unlikely to affect the assessment in any major way.

***Mortality*:** elements of this are important and of a high priority.

*Natural mortality*: low priority - useful but unlikely to affect the assessment in any major way, especially where $M$ is fixed in the assessment.

*Total mortality*: business as usual - important - do not stop.

*Discard mortality*: **high priority** - see discussion and recommendations elsewhere in this report.

***Reproduction*:** medium priority - see text regarding habitat requirements above and link to mating systems below.

*Age and size at maturity*: business as usual - important - do not stop.

*Age and size at transition*: business as usual - important - do not stop.

*Mating systems*: medium priority – see text regarding habitat requirements above and link to reproduction above also.

***Meristic & conversion factors*:** business as usual - important - do not stop.


***Recommendations from the Assessment Workshop***

The AW made five recommendations:

1. *Evaluate existing methods for deriving historical discard numbers and discard rates and improve methods as appropriate*: high priority - as noted elsewhere in this individual CIE

review report, discard estimation is probably responsible for the largest single-source of uncertainty in this assessment. Being able to appropriately and reliably estimate historical discards and explore the bounds of that estimation is a very high priority prior to the next assessment. This recommendation should be combined with recommendation #5 below.

2. *Develop/evaluate methods to maintain continuity of fishery-dependent indices in light of management regulations and ITQs*: high priority - the interaction between regulatory change and fishery-dependent indices of abundance is a constant issue in developing appropriate indices to support assessments. As noted, this is a high priority recommendation but should be informed by a CIE review recommendation to have a more critical review of which abundance indices to retain within the assessment. Essentially, there is little point in putting significant effort into fixing this problem for every fishery-dependent time-series if some have little or no prospect of being used with the assessment. This recommendation should therefore be implemented in association with a wider program to address index needs, including developing separate time-series of fishery dependent indices if the impact of management issues on the existing time-series cannot be resolved.

3. *Considering red tide is an unpredictable event, but can be a significant source of mortality, a response protocol should be developed for data collection and incorporation of the information into updates assessments*: medium priority - useful but only required following a major red tide event, which by their nature are periodic and difficult to predict.

4. *The start year for this assessment was 1986. Future assessments should investigate extending the assessment model further back in time*: high priority - as discussed during the RW. This should not be limited to only trying to push back the start date, which would be preferable but also to explore different start dates after 1986 based on the data sets available (time period and quality).

5. *Develop protocol for reliable estimation of fishery discards*: high priority – see discussion under AW recommendation 1 above.

    b) *SEDAR process improvement recommendations:*

The organizational approach, provision of clear ToR, and provision of documents for the SEDAR process is of a very high standard. The recommendations that follow address issues that specifically affected this review.

- The length of the Review Workshop, at three days, was too little time to achieve the required adequate review of presentational assessment material, investigation of the detail of the assessment and exploring possible improvement or alternative model runs by the Review Workshop. If the need for the peer review process to explore alternative models remains, then finding additional time for the analysts to conduct additional model runs and report back to the RW during the RW really is a requirement. All options to address this have cost implications for most parties. Options include, for example, adding a further day mid-review specifically to allow time for the Assessment Team to conduct analyses. If a review does not need this time, a Review Panel would be able to utilize the time to fully discuss issues and work on the review reports so that this time would not be wasted for the Review Panel.

- It would be helpful for those less familiar with the fishery, including the CIE reviewers and the public audience, for the DW and AS Reports to have included a list of acronyms. Basic acronym lists, tailored to NOAA reporting, are available (e.g. http://www.nmfs.noaa.gov/sfa/fisheries_eco/status_of_fisheries/archive/2013/2013_acronyms.pdf).

7. *Consider whether the stock assessment constitutes the best scientific information available using the following criteria as appropriate: relevance, inclusiveness, objectivity, transparency, timeliness, verification, validation, and peer review of fishery management information.*

This Gulf of Mexico red grouper assessment does constitute the best scientific information available from which to formulate management advice for this fishery. The process appeared to be fully transparent with all relevant documents publically available, and public attendees were present at the Review Workshop. The Data and Assessment Workshops appeared to have addressed their terms of reference and used the relevant information. The DW and AW provided outputs in appropriate formats and on appropriate timescales. The peer review process carefully verified key elements of the data inputs and checked the validity of the most important assessment assumptions. Finally, the openness and positive approach of the assessment team during the peer review was a clear statement about the objectivity of those members of the Assessment Team involved in the Review Workshop.

8. *Provide guidance on key improvements in data or modeling approaches which should be considered when scheduling the next assessment.*

Principal Recommendations

i)  A substantive need is to improve the basic data relating to the discarding practices in the different fleets of the fishery. For each fleet, more data of higher quality are needed to enable future models to better handle the discard data. The areas needing to be addressed for each first include: (a) the quantities of catch discarded including spatial and temporal patterns; (b) the survival/mortality of discarded fish including averages, variability, and seasonal and spatial patterns. While this is essentially a data collection exercise that will focus on the observer and other fleet sampling programs, it would be advantageous to include key members of the Assessment Team in the development of this work program. This will help ensure that the highest quality and most usable data are collected that will address the specific needs of the assessment process, specifically including the quantities of data and the length of time over which the data are collected.

ii)  In addition to improving the collection of additional data regarding discarding practices, there is a need to further investigate how to handle the existing data. Even with better quality data in future, the existing data are likely to form an important component of future stock assessments, and need to be processed so as to provide input data to the assessment that make biological sense, are clearly related to the different fleet activities, improve the understanding of the fishery and enable assessment models to fit the discard data much better without compromising the fit to other key data sets (e.g., indices and composition data).

iii)  Recommendations (i) and (ii) should be addressed as part of a single, comprehensive program to improve the historic, current and future understanding of discarding in this fishery, including changes in discarding practice and on-going monitoring.

iv)  In developing input data, the Data and Assessment Teams should explicitly consider the quality of the time-series being considered as abundance indices. This consideration should take account of evidence and logical argument, which supports or opposes the likelihood of the time-series indexing the stock in question. Where time-series are found to be unlikely or highly unlikely to index abundance or they are unacceptably noisy, they should be omitted from the assessment. The object of this recommendation is to improve the quality of the abundance indices retained for

14

use in the assessment. Where opposing indices or where otherwise interesting time-series exist, their impacts upon the model fit to data and outcomes of the assessment can be explored using sensitivity runs. It is recommended that the DW should take a more critical approach to selecting from the available time-series of data that are or may be indices of abundance in order to produce better model fits with fewer confounding variables. One possible approach would be to select fewer key indices (base case indices) and then have a secondary list of indices to contribute to exploratory and sensitivity runs. The selection should be based on the understanding of the inherent quality of the time-series data. Overall, there should probably be less indices included in the next assessment.

v) The DW should provide the AW with explicit information about the quality of the recommended datasets, to assist the AW to choose which datasets to include or exclude, to appropriately weight the different datasets, and how to select the most informative sensitivities.

Secondary recommendations

vi) Review the use of indices using weight rather than numbers for line fisheries. Numbers are likely to provide a better measure of abundance. Review the appropriateness of using multiple indices where some use weight and some use numbers as their base, as these may well measure different trends.

vii) Consider explicitly including recruitment variability in all long-term projections, especially as recent recruitment appears to have been below average and assuming average recruitment will likely give overly optimistic projections of stock status.

viii) Should low stock abundance occur in future, the implications for the S-R relationship in this stock are unclear due to the protogyny and harem breeding biology exhibited by this species. An exploration of how both protogyny and harem breeding would affect stock status and reproductive potential under conditions of (i) low population density, and (ii) disproportionate sex ratios, would be informative in assisting the assessment of such population properties as recovery times and would assist managers to understand changing uncertainties at low stock densities and/or unusual sex ratios. This should also be linked to the implications of different levels of sedentariness by sex, age and size.

ix) For incorporating red tide events, consider a band or range of effective impacts rather than a simple threshold.

x) Review the data available for, and the implications of, both spatial and temporal change in the length-weight relationship.

xi) This final recommendation relates to the management of the fishery rather than to improving the assessment. Given the importance of discarding and discard mortality in the fishery and within the assessment, there is a strong case for researching ways of decreasing commercial discard mortality. This could, for example, be through the application of different hook types, seeking approaches to reducing deep fishing as a way of reducing mortality through barometric trauma, development or application of fishery-specific unhooking equipment, and though appropriate education and co-operation programs to embed good practices into the fishery. The argument for this is simple, a relatively small change in the need to discard, in discarding practice and in discard mortality would result in a measurable number of additional fish in the water.

It is recognized that some elements of the recommendations under this ToR are currently being developed or implemented in full or in part.

9. *CIE Reviewer may contribute to a Peer Review Summary summarizing the Panel's evaluation of the stock assessment and addressing each Term of Reference.*

The peer reviewer fully contributed to the development of the Panel's report.

# Appendix 1: Bibliography

# SEDAR 42 Gulf of Mexico red grouper document list

| Data Workshop Papers | |
|---|---|
| S42 DW 01 | Summary of commercial red grouper (*Epinephelus morio*) catch data based on fishery observer coverage of the Gulf of Mexico reef fish fishery. |
| S42 DW 02 | Evaluation of the natural mortality rates of red grouper (*Epinephelus morio*) in the West Florida Shelf ecosystem using the individual-based, multi-species model OSMOSE-WFS. |
| S42 DW 03 | Use of the Connectivity Modeling System to estimate the larval dispersal, settlement patterns and annual recruitment anomalies due to oceanographic factors of red grouper (*Epinephelus morio*) on the West Florida Shelf. |
| S42 DW 04 | Ontogenetic spatial distributions of red grouper (*Epinephelus morio*) within the northeastern Gulf of Mexico and spatio-temporal overlap with red tide events |
| S42 DW 05 | Red Grouper Abundance Indices from SEAMAP Groundfish Surveys in the Northern Gulf of Mexico. |
| S42 DW 06 | Red Grouper Abundance Indices from NMFS Bottom Longline Surveys in the Northern Gulf of Mexico. |
| S42 DW 07 | Maturity, sexual transition, and spawning seasonality in the protogynous red grouper on the West Florida Shelf. |
| S42 DW 08 | Indices of abundance for Red Grouper (*Epinephelus morio*) from the Florida Fish and Wildlife Research Institute (FWRI) video survey on the West Florida Shelf. |
| S42 DW 09 | Indices of abundance for Red Grouper (*Epinephelus morio*) from the Florida Fish and Wildlife Research Institute (FWRI) chevron trap survey on the West Florida Shelf. |
| S42 DW 10 | An age and growth description of Red Grouper (*Epinephelus morio*) from the northeastern Gulf of Mexico: 1978-2013 for SEDAR42. |
| S42 DW 11 | SEAMAP Reef Fish Video Survey: Relative Indices of Abundance of Red Grouper. |
| S42 DW 12 | Variations in length frequency distributions and age length keys for red groupers collected in the Gulf of Mexico. |
| S42 DW 13 | The use of Otolith Reference Collections to Determine Ageing Precision of Red Grouper (*Epinephelus morio*) Between Fisheries Laboratories. |
| S42 DW 14 | Size Distribution of Red Grouper Observed in For-Hire Recreational Fisheries in the Gulf of Mexico. |
| S42 DW 15 | Red Grouper *Epinephelus morio* Findings from the NMFS Panama City Laboratory Trap & Camera Fishery-Independent Survey – 2004-2014 |
| S42 DW 16 | Estimates of Historical Private/Charterboat and Headboat Fishery Red Grouper Angler Catch in the Gulf of Mexico 19xx-1980. |
| S42 DW 17 | Discards of red grouper (*Epinephelus morio*) for the headboat fishery in the US Gulf of Mexico. |
| S42 DW 18 | Length and age frequency distributions for red groupers collected in the Gulf of Mexico from 1984 to 2013. |
| S42 DW 19 | Index Report Cards. |
| | |
| **Data Workshop Supplementary Papers** | |
| S42 RD 01 | A Directed Study of the Recreational Red Snapper Fisheries in the Gulf of Mexico along the West Florida Shelf – Final Project Report. |
| S42 RD 02 | SEDAR 12-DW-11: Quantitative Historical Analysis of the United States and Cuban Gulf of Mexico Red Grouper Commercial Fishery |
| S42 DW Report | Gulf of Mexico Red Grouper Section II: Data Workshop Report |
| | |
| **Assessment Workshop Papers** | |
| S42 AW 01 | Red tide mortality on red grouper (*Epinephelus morio*) between 1980 and 2009 on the West Florida Shelf. |
| S42 AW 02 | Standardized catch rates for red grouper from the Unites States Gulf of Mexico vertical line and longline fisheries. |
| S42 AW 03 | Standardized Catch Rates of Red Grouper (*Epinephelus morio*) from the U.S. Headboat Fishery in the Gulf of Mexico, 1986-2013. |
| S42 AW 04 | Standardized Catch Rates of Red Grouper (*Epinephelus morio*) from the Gulf of Mexico Recreational Charterboat and Private Boat Fisheries (MRFSS) 1986-2013. |
| S42 AW 05 | Estimating age- and size-specific natural mortality rates for Gulf of Mexico red grouper (*Epinephelus morio*) using the ecosystem model OSMOSE-WFS. |

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|---|---|
| **Assessment Workshop Supplementary Papers** | |
| S42 AW Report | Gulf of Mexico Red Grouper SECTION III: Assessment Process Report. |
| | |
| **Review Workshop Papers** | |
| S42 RW 01 | Incorporating ecosystem considerations within the Stock Synthesis integrated assessment model for Gulf of Mexico Red Grouper (*Epinephelus morio*). |
| S42 RW 02 | Assessing the impact of the 2014 red tide event on red grouper (*Epinephelus morio*) in the Northeastern Gulf of Mexico. |
| | |
| **Review Workshop Presentations** | |
| 1 S42 Introduction | US Gulf of Mexico Red grouper assessment Review Workshop Introduction. |
| 2 S42 Data Inputs | US Gulf of Mexico Red grouper assessment Review Workshop Data inputs. |
| 3 S42 Life History | US Gulf of Mexico Red grouper assessment Review Workshop Life history and assessment model configuration. |
| 4 S42 Model Fit | US Gulf of Mexico Red grouper assessment Review Workshop Model fit and diagnostics. |
| 5 S42 Removals & Discards | US Gulf of Mexico Red grouper assessment Review Workshop Breakdown of Total Removals & Discard Fractions. |
| | |
| **Review Workshop Supplementary Papers** | |
| Frusher, S. (2007) Review Report SEDAR 12: Gulf of Mexico Red Grouper, CIE, 25pp. | |
| Lee,H-H., Maunder, M.N., Piner, K.R. & Methot, R.D. (Draft paper, unknown status). Can steepness of the stock-recruitment relationship be estimated in fishery stock assessment models? 24pp. | |
| Mangel, M., MacCall, A.D., Brodziak, J., Dick, E.J., Forrest, R.E., Pourzand, R. and Ralston, S. (2013). A perspective on steepness, reference points, and stock assessment. *Can. J. Fish. Aquat. Sci*. 70: 930–940. | |

# Appendix 2: Statement of Work

**Attachment A**

## Statement of Work

**External Independent Peer Review by the Center for Independent Experts**

**SEDAR 42 Gulf of Mexico Red Grouper Assessment Review Workshop**

**Scope of Work and CIE Process:** The National Marine Fisheries Service's (NMFS) Office of Science and Technology coordinates and manages a contract providing external expertise through the Center for Independent Experts (CIE) to conduct independent peer reviews of NMFS scientific projects. The Statement of Work (SoW) described herein was established by the NMFS Project Contact and Contracting Officer's Technical Representative (COTR), and reviewed by CIE for compliance with their policy for providing independent expertise that can provide impartial and independent peer review without conflicts of interest. CIE reviewers are selected by the CIE Steering Committee and CIE Coordination Team to conduct the independent peer review of NMFS science in compliance the predetermined Terms of Reference (ToRs) of the peer review. Each CIE reviewer is contracted to deliver an independent peer review report to be approved by the CIE Steering Committee and the report is to be formatted with content requirements as specified in **Annex 1**. This SoW describes the work tasks and deliverables of the CIE reviewer for conducting an independent peer review of the following NMFS project. Further information on the CIE process can be obtained from *www.ciereviews.org*.

**Project Description:** SEDAR 42 will be a compilation of data, an assessment of the stock, and CIE assessment review conducted on Gulf of Mexico Red Grouper. The review workshop provides an independent peer review of SEDAR stock assessments. The term review is applied broadly, as the review panel may request additional analyses, error corrections and sensitivity runs of the assessment models provided by the assessment panel. The review panel is ultimately responsible for ensuring that the best possible assessment is provided through the SEDAR process. The Terms of Reference (ToRs) of the peer review are attached in **Annex 2**. The tentative agenda of the panel review meeting is attached in **Annex 3**.

**Requirements for CIE Reviewers:** Three CIE reviewers shall conduct an impartial and independent peer review in accordance with the SoW and ToRs herein. CIE reviewers should have expertise in stock assessment, statistics, fisheries science, and marine biology sufficient to complete the primary task of providing peer-review advice in compliance with the workshop Terms of Reference. Each CIE reviewer's duties shall not exceed a maximum of 14 days to complete all work tasks of the peer review described herein.

**Location of Peer Review:** Each CIE reviewer shall conduct an independent peer review during the panel review meeting scheduled in **Miami, Florida** during **July 14-16, 2015.**

**Statement of Tasks:** Each CIE reviewers shall complete the following tasks in accordance with the SoW and Schedule of Milestones and Deliverables herein.

Prior to the Peer Review: Upon completion of the CIE reviewer selection by the CIE Steering Committee, the CIE shall provide the CIE reviewer information (full name, title, affiliation, country, address, email) to the COTR, who forwards this information to the NMFS Project Contact no later the date specified in the Schedule of Milestones and Deliverables. The CIE is responsible for providing the SoW and ToRs to the CIE reviewers. The NMFS Project Contact is responsible for providing the CIE reviewers with the background documents, reports, foreign

national security clearance, and other information concerning pertinent meeting arrangements. The NMFS Project Contact is also responsible for providing the Chair a copy of the SoW in advance of the panel review meeting. Any changes to the SoW or ToRs must be made through the COTR prior to the commencement of the peer review.

Foreign National Security Clearance: When CIE 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 CIE reviewers who are non-US citizens. For this reason, the CIE 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/

http://deemedexports.noaa.gov/compliance_access_control_procedures/noaa-foreign-national-registration-system.html

Pre-review Background Documents: 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 reviewers the 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 Lead Coordinator on where to send documents. CIE reviewers are responsible only for the pre-review documents that are delivered to the reviewer in accordance to the SoW scheduled deadlines specified herein. The CIE reviewers shall read all documents in preparation for the peer review.

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. **Modifications to the SoW and ToRs cannot be made during the peer review, and any SoW or ToRs modifications prior to the peer review shall be approved by the COTR and CIE Lead Coordinator.** 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 NMFS Project Contact is responsible for any facility arrangements (e.g., conference room for panel review meetings or teleconference arrangements). The NMFS Project Contact is responsible for ensuring that the Chair understands the contractual role of the CIE reviewers as specified herein. The CIE Lead Coordinator can contact the Project Contact to confirm any peer review arrangements, including the meeting facility arrangements.

Contract Deliverables - Independent CIE Peer Review Reports: Each CIE reviewer shall complete an independent peer review report in accordance with the SoW. 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: Each CIE reviewer may assist the Chair of the panel review meeting with contributions to the Summary Report, based on the terms of reference of the review. Each CIE reviewer is not required to reach a consensus, and should provide a brief summary of the reviewer's views on the summary of findings and conclusions reached by the review panel in accordance with the ToRs.

**Specific Tasks for CIE Reviewers:** The following chronological list of tasks shall be completed by each CIE reviewer in a timely manner as specified in the **Schedule of Milestones and Deliverables**.

1) Conduct necessary pre-review preparations, including the review of background material and reports provided by the NMFS Project Contact in advance of the peer review.
2) Participate during the panel review meeting in Miami, Florida during July 14-16, 2015.
3) Conduct an independent peer review, as specified herein, in Miami, Florida during July 14-16, 2015, in accordance with the ToRs (Annex 2).
4) No later than August 3, 2015, each CIE reviewer shall submit an independent peer review report addressed to the "Center for Independent Experts," and sent to Dr. Manoj Shivlani, CIE Lead Coordinator, via email to *MShivlani@ntvifederal.com*, and Dr. David Sampson, CIE Regional Coordinator, via email to *david.sampson@oregonstate.edu*. Each CIE report shall be written using the format and content requirements specified in Annex 1, and address each ToR in **Annex 2**.

**Tentative Schedule of Milestones and Deliverables:** CIE shall complete the tasks and deliverables described in this SoW in accordance with the following schedule.

| | |
|---|---|
| *June 15, 2015* | CIE sends reviewer contact information to the COTR, who then sends this to the NMFS Project Contact |
| *June 29, 2015* | NMFS Project Contact sends the CIE Reviewers the pre-review documents |
| ***July 14-16, 2015*** | Each reviewer participates and conducts an independent peer review during the panel review meeting |
| *July 30, 2015* | CIE reviewers submit draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator |
| *August 10, 2015* | CIE submits CIE independent peer review reports to the COTR |
| *August 17, 2015* | The COTR distributes the final CIE reports to the NMFS Project Contact and regional Center Director |

**Modifications to the Statement of Work:** This 'Time and Materials' task order may require an update or modification due to possible changes to the terms of reference or schedule of milestones resulting from the fishery management decision process of the NOAA Leadership, Fishery Management Council, and Council's SSC advisory committee. A request to modify this SoW must be approved by the Contracting Officer at least 15 working days prior to making any permanent changes. The Contracting Officer will notify the COTR within 10 working days after receipt of all required information of the decision on changes. The COTR can approve changes to the milestone dates, list of pre-review documents, and ToRs within the SoW as long as the role and ability of the CIE reviewers to complete the deliverable in accordance with the SoW is not adversely impacted. The SoW and ToRs shall not be changed once the peer review has begun.

**Acceptance of Deliverables:** Upon review and acceptance of the CIE independent peer review reports by the CIE Lead Coordinator, Regional Coordinator, and Steering Committee, these reports shall be sent to the COTR for final approval as contract deliverables based on compliance with the SoW and ToRs. As specified in the Schedule of Milestones and Deliverables, the CIE shall send via e-mail the contract deliverables (CIE independent peer review reports) to the COTR (Allen Shimada, via Allen.shimada@noaa.gov).

**Applicable Performance Standards:** The contract is successfully completed when the COTR provides final approval of the contract deliverables. The acceptance of the contract deliverables shall be based on three performance standards:

(1) The CIE report shall completed with the format and content in accordance with **Annex 1**,
(2) The CIE report shall address each ToR as specified in **Annex 2**,
(3) The CIE reports shall be delivered in a timely manner as specified in the schedule of milestones and deliverables.

**Distribution of Approved Deliverables:** Upon acceptance by the COTR, the CIE Lead Coordinator shall send via e-mail the final CIE reports in \*.PDF format to the COTR. The COTR will distribute the CIE reports to the NMFS Project Contact and Center Director.

**Support Personnel:**
Allen Shimada
NMFS Office of Science and Technology
1315 East West Hwy, SSMC3, F/ST4, Silver Spring, MD 20910
Allen.Shimada@noaa.gov        Phone: 301-427-8174

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**Key Personnel:**

NMFS Project Contact:

Julie A. Neer
SEDAR Coordinator
4055 Faber Place Drive, Suite 201
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(843) 571-4366
julie.neer@safmc.net

**Annex 1: Format and Contents of CIE Independent Peer Review Report**

1. The CIE independent report shall 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 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 ToRs.

   a. Reviewers should describe in their own words the review activities completed during the panel review meeting, including providing 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, and especially where there were divergent views.

   c. Reviewers should elaborate on any points raised in the Summary Report that they feel 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 CIE independent 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 CIE independent report shall be an independent peer review of each ToRs, and shall not simply repeat the contents of the summary report.

3. The reviewer report shall include the following appendices:

   Appendix 1: Bibliography of materials provided for review
   Appendix 2: A copy of the CIE Statement of Work
   Appendix 3: Panel Membership or other pertinent information from the panel review meeting.

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

**SEDAR 42 Gulf of Mexico Red Grouper Assessment Review Workshop**

1. Evaluate the data used in the assessment, including discussion of the strengths and weaknesses of data sources and decisions, and consider the following:

   a) Are data decisions made by the DW and AW sound and robust?

   b) Are data uncertainties acknowledged, reported, and within normal or expected levels?

   c) Are data applied properly within the assessment model?

   d) Are input data series reliable and sufficient to support the assessment approach and findings?

2. Evaluate and discuss the strengths and weaknesses of the methods used to assess the stock, taking into account the available data, and considering the following:

   a) Are methods scientifically sound and robust?

   b) Are assessment models configured properly and used consistent with standard practices?

   c) Are the methods appropriate for the available data?

3. Evaluate the assessment findings and consider the following:

   a) Are abundance, exploitation, and biomass estimates reliable, consistent with input data and population biological characteristics, and useful to support status inferences?

   b) Is the stock overfished? What information helps you reach this conclusion?

   c) Is the stock undergoing overfishing? What information helps you reach this conclusion?

   d) Is there an informative stock recruitment relationship? Is the stock recruitment curve reliable and useful for evaluation of productivity and future stock conditions?

   e) Are the quantitative estimates of the status determination criteria for this stock reliable? If not, are there other indicators that may be used to inform managers about stock trends and conditions?

4. Evaluate the stock projections, including discussing strengths and weaknesses, and consider the following:

   a) Are the methods consistent with accepted practices and available data?

   b) Are the methods appropriate for the assessment model and outputs?

   c) Are the results informative and robust, and useful to support inferences of probable future conditions?

   d) Are key uncertainties acknowledged, discussed, and reflected in the projection results?

5. Consider how uncertainties in the assessment, and their potential consequences, are addressed.

   •Comment on the degree to which methods used to evaluate uncertainty reflect and capture the significant sources of uncertainty in the population, data sources, and assessment methods.

•Ensure that the implications of uncertainty in technical conclusions are clearly stated.

6. Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted.

    •Clearly denote research and monitoring that could improve the reliability of, and information provided by, future assessments with particular emphasis on the Deepwater Horizon oil spill.

    •Provide recommendations on possible ways to improve the SEDAR process.

7. Consider whether the stock assessment constitutes the best scientific information available using the following criteria as appropriate: relevance, inclusiveness, objectivity, transparency, timeliness, verification, validation, and peer review of fishery management information.

8. Provide guidance on key improvements in data or modeling approaches which should be considered when scheduling the next assessment.

9. CIE Reviewer may contribute to a Peer Review Summary summarizing the Panel's evaluation of the stock assessment and addressing each Term of Reference.

# SEDAR 42 Gulf of Mexico Red Grouper Review Workshop
## Miami, Florida

## 14-16 July 2015

### *Tuesday*

| | | |
|---|---|---|
| **9:00 a.m.** | **Introductions and Opening Remarks** | **Coordinator** |
| | *- Agenda Review, TOR, Task Assignments* | |
| **9:30 a.m. – 11:30 a.m.** | **Assessment Presentations** | **Meaghan Bryan** |
| | *- Assessment Data & Methods* | |
| | *- Identify additional analyses, sensitivities, corrections* | |
| **11:30 a.m. – 1:00 p.m.** | **Lunch Break** | |
| **1:00 p.m. – 6:00 p.m.** | **Assessment Presentations (continued)** | **Meaghan Bryan** |
| | *- Assessment Data & Methods* | |
| | *- Identify additional analyses, sensitivities, corrections* | |
| **6:00 p.m. – 6:30 p.m.** | **Public comment** | **Chair** |

*Tuesday Goals***:** Initial presentations completed, sensitivity and base model discussion begun

### *Wednesday*

| | | |
|---|---|---|
| **8:00 a.m. – 11:30 a.m.** | **Panel Discussion      Chair** | |
| | *- Assessment Data & Methods* | |
| | *- Identify additional analyses, sensitivities, corrections* | |
| **11:30 a.m. – 1:00 p.m.** | **Lunch Break** | |
| **1:00 p.m. – 6:00 p.m.** | **Panel Discussion/Panel Work Session** | **Chair** |
| | *- Continue deliberations* | |
| | *- Review additional analyses* | |
| | *- Recommendations and comments* | |
| **6:00 p.m. – 6:30 p.m.** | **Public comment** | **Chair** |

*Wednesday Goals***:** sensitivities and modifications identified, preferred models selected, projection approaches approved, Report drafts begun

### *Thursday*

| | | |
|---|---|---|
| **8:00 a.m. – 11:30 a.m.** | **Panel Discussion** | **Chair** |
| | *- Final sensitivities reviewed.* | |
| | *- Projections reviewed.* **Chair** | |
| **11:30 a.m. – 1:00 p.m.** | **Lunch Break** | |
| **1:00 p.m. – 5:30 p.m.** | **Panel Discussion or Work Session** | **Chair** |
| | *- Review Reports* | |
| **5:30 p.m. – 6:00 p.m.** | **Public comment** | **Chair** |
| **6:00 p.m.** | **ADJOURN** | |

*Thursday Goals:* Complete assessment work and discussions, final results available. Draft Reports reviewed