Center for Independent Experts (CIE) Independent Peer Review of SEDAR 87 Gulf White, Pink, and Brown Shrimp, June 23-27, 2025

Peer Review Report

Larry D. Jacobson, CIE Reviewer

Executive Summary and Summary of Findings

- The data and stock assessments for brown and white shrimp are suitable for determining the condition of both stocks and for monitoring both fisheries (neither fishery is actively managed). As pointed out by the Assessment Team (AT), the stock assessment for pink shrimp was not suitable for either purpose due to short uninformative data trends.
- My comments apply to brown and/or white shrimp only, unless pink shrimp are mentioned.
- The AT used data through 2022 because data for 2023-2024 were not available. Thus, the most recent information in the assessment is for 2022.
- The brown and white shrimp stocks were healthy and at high biomass in 2022 relative to previous conditions. This finding is based on survey trends and model estimates of B/B_{msy}. Fishing mortality was low relative to historical conditions based on catch, catch/survey data trends and model estimates of F/F_{msy}.
- The lack of data for 2023-2024 is an important shortcoming but not the fault of the AT. However, catch and Texas survey data provided to me informally at the Review Panel (RP) meeting show that stock biomass for brown shrimp was high and exploitation for both stocks was low during 2023-2024 (see below). These preliminary figures should be verified when better information is available.
- For the first time, the VAST model was used to preprocess shrimp survey data for modeling. VAST removes variability in survey data due to unsampled area, missing observations, different types of sampling gear and environmental variability. It is often used in fisheries stock assessments and seemed reasonable for Gulf shrimp.
- Survey trends were less variable after VAST processing but similar in trend to the original data. Thus, conclusions do not depend on VAST.
- The AT used two stock assessment modeling approaches that were both new in Gulf shrimp assessments. JABBA (Just Another Bayesian Biomass Assessment Model) is a familiar and widely used surplus production approach. Gaussian Process Empirical Dynamic Models (EDM) are relatively new and were unfamiliar to reviewers. However, information distributed before the RP meeting, detailed explanations during the meeting, and long experience with other models and fisheries made it possible for reviewers to provide useful comments.
- EDM is increasing in popularity because of its flexibility, incorporation of explicit and implicit environmental effects, apparent utility based on assessments for other species, simulation test results and issues with other approaches (e.g., retrospective patterns and difficulties incorporating environmental effects).

- The AT chose EDM as the preferred modeling approach because they considered EDM biomass estimates more credible and because of interest in using economic "environmental" data that might affect the fishery and stock. Such data were used successfully in preliminary, but not final EDM runs.
- The RP agreed with the decision to use VAST, try two assessment models and the ultimate selection of EDM as the primary approach. However, there are uncertainties about EDM outlined below and in the committee report.
- In my opinion, the most important uncertainties concern accuracy of scale estimates (stock size and biomass reference points in absolute terms, e.g., pounds of tails). Scale is difficult to pin down in many assessments while trends are relatively east to estimate.
- Fortunately, uncertainties about models for shrimp do not affect conclusions about recent stock condition because the data and all models show that brown and white shrimp stock size increased to high levels as catches declined to low levels because of economic factors. Exploitation declined as biomass increased and catch declined.
- The idea that fishing has little effect on Gulf shrimp came up repeatedly at the review. However, in the opinion of this reviewer, fishing effects were clear in the data and assessment results for brown and white shrimp (Figure 1). Stock size increased dramatically in both stocks starting in the 1990's for brown and by the mid-2000's for white shrimp, as catch and fishing mortality declined. The declines in catch and fishing mortality were reportedly due to imports of inexpensive farmed shrimp, low exvessel prices and high diesel fuel costs. These results from this unintended economic experiment suggest that brown and white shrimp react to fishing in a predictable and expected way and that the effects of consistently high or low fishing pressure are long lasting.

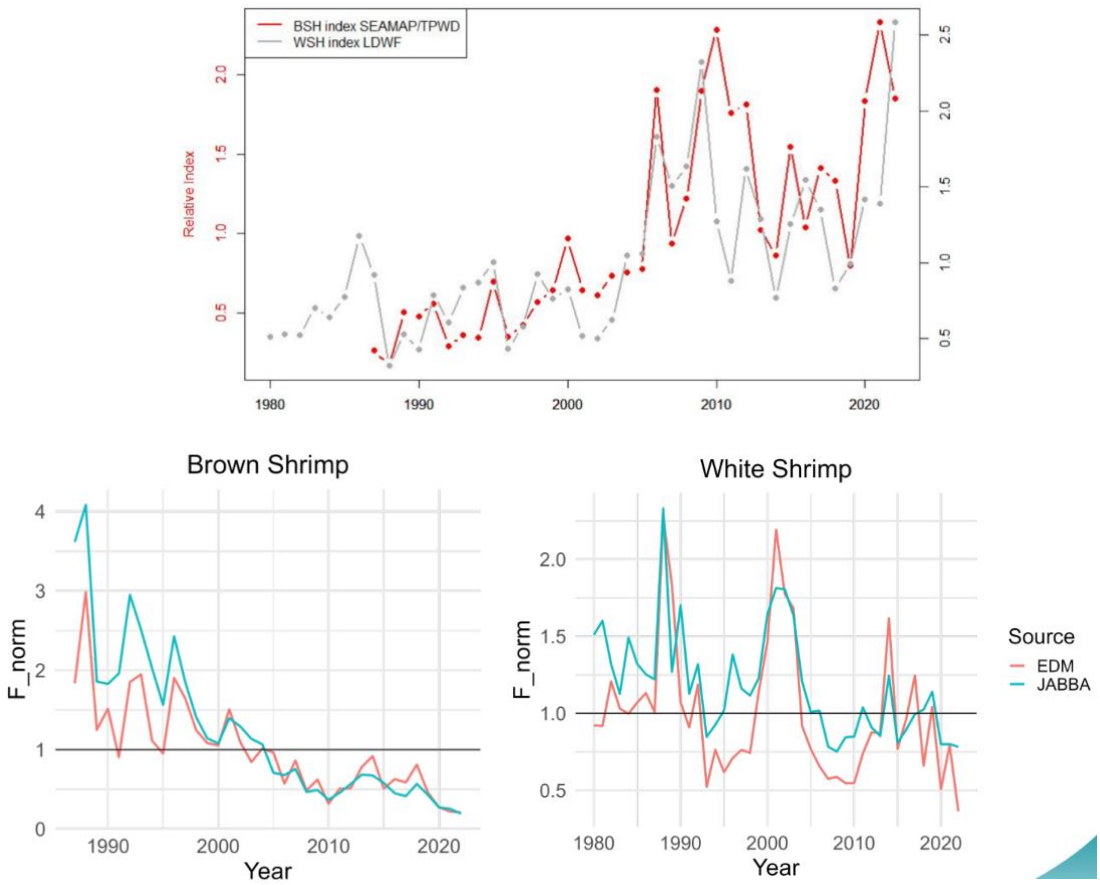


Figure 1. Top: SEAMAP survey data for brown shrimp (BSH, dark line) and Louisiana Department of Wildlife and Fisheries (LDWF) survey data for white shrimp (WSH, light line). Bottom: Rescaled trends in fishing mortality from JABBA and the preferred EDM model. Trends in data and model results were similar for both species.

Summary of Role

- The Center for Independent Experts (CIE) contracted me to help review the SEDAR-87 Gulf White, Pink, and Brown Shrimp Stock Assessments (Appendix 1). The review was conducted at a meeting held 23-27 June 2025, at the Gulf Council's office in Tampa, Florida.

Background

- The AT consisted of co-leads Lisa Ailloud and Molly Stevens who prepared and presented the assessment report with support from Katie Siegfried (all from NMFS SEFSC). The RP and meeting participants are listed in Appendix 2. Proceedings were broadcast, taped and are presumably available from SEDAR staff.

- The meeting was collegial, efficient, and focused on technical questions and science. Jim Tolan, the chair, did a good job running the meeting and prepared the consensus RP report. The stock assessment team was helpful, well prepared, competent and provided clear explanations.
- Complete draft stock assessment reports for each stock were circulated before the RP meeting. The draft reports were updated at the meeting based on discussion.
- A Data Workshop (DW) report that summarized extensive discussions and recommendations from data workshops was also made available before the meeting and mentioned in discussions (Appendix 3). Links to working papers from the DW were provided but little used.
- A draft consensus summary report was compiled at the meeting and finished afterwards by the chair. CIE reviewers are required to prepare individual independent reports, such as this one, to supplement the RP's summary. The independent reports should describe any differences of opinion and highlight any topics in the consensus summary that need elaboration. However, the RP reached consensus on all the important topics concerning stock status and modeling choices. Areas of disagreement seemed minor.
- This consensus summary report should be read prior to reading reviewer's reports.

Findings, Conclusions and Recommendations by Term of Reference (ToR)

ToR 1. Evaluate the degree to which the terms of reference from the Data and Assessment processes were addressed.

- The DW was comprehensive, well documented and seemed to address the ToR with one exception. Results were sufficient to support the assessment work.
- The exception was DW ToR3 (*Create a conceptual model based on feedback from a variety of industry representatives in the Data Workshop to capture their institutional knowledge*). However, economic conditions and effects on the fishery were mentioned repeatedly. In addition, one of the modeling approaches (EDM) can incorporate additional data from industry (e.g., prices and possibly CPUE, see below). I do not see the omission of DW ToR3 as a shortcoming because it is process oriented rather than scientific and did not affect results of this assessment.

- The Assessment Process (AP) thoroughly addressed the ToR with a single exception. The exception was AP ToR2 (*Develop a management advice framework. Consider data availability (e.g., landings and CPUE) and management needs (e.g., harvest controls, stock status), and particular needs of the fishery and the biology of the resource*). I don't see the omission as a shortcoming because it does not affect assessment conclusions and would require input from managers, constituents and Council committees.

ToR 2. Evaluate the data used in the assessment including discussion of the strengths and weaknesses of data sources and decisions.

- Data decisions by the AT were justified and seemed to generally follow DW recommendations. Departures were minor but explained and justified. Data uncertainties were acknowledged and within normal or expected levels.
- Data were sufficient to run JABBA and EDM models for brown and white shrimp but the time series of survey and catch data for pink shrimp were too short and uninformative.
- It is impossible to infer 2023-2024 stock and fishery conditions because the data were not presented in the assessment. Such data delays are potentially a serious problem for short-lived, actively managed stocks that may change substantially over two years.
- Unofficial catch data for all three species and survey data for brown shrimp made available at the RP meeting by SEFSC indicate that no drastic changes in catch occurred during 2023-2024. The unofficial catch data show a 20% increase in brown shrimp catch during 2023 to a level that is still relatively low, a 24% decrease in pink shrimp catch and a 12% decrease in white shrimp catch. Landings were probably still low in 2024 because cheaper imports were not constrained by US tariffs, diesel fuel prices were high, and markets were reportedly limited.

- Texas trawl survey data (Jim Tolan, Texas Parks and Wildlife Department) were variable but suggest brown shrimp abundance was relatively high during 2021-2024 (Figure 2). The data peaked during 1989-1990, varied around a lower mean during 1991-2021 then increased to an intermediate level during 2021-2024.

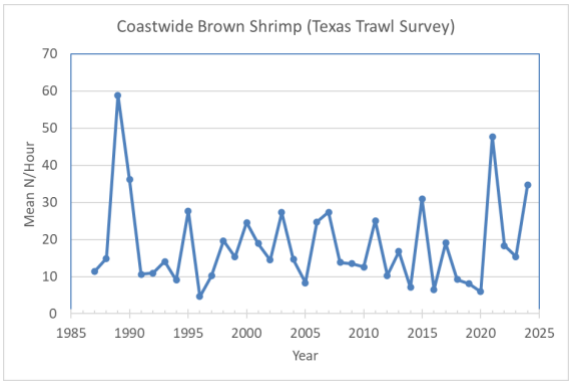


Figure 2. Texas trawl survey data for brown shrimp (Jim Tolan, Texas Parks and Wildlife Department).

ToR3. Evaluate and discuss the strengths and weaknesses of methods used to assess the stock.

- Surplus production models like JABBA are a reasonable and traditional modeling approach for species like shrimp because data requirements are modest and there is little or no age structure in either the stock or the model. However, potentially important environmental effects cannot be modeled in JABBA except indirectly as process errors (alternative models of the same type that use environmental data are available or could be constructed). JABBA models were configured properly and in a reasonable manner.
- EDM models were configured based on careful consideration, trial model runs and advice from scientists outside the AT that were familiar with the approach as it was applied to other species.
- EDM models are potentially appropriate and well suited for shrimp stock assessments because of difficulties with traditional approaches and because environmental effects are probably important. EDM models for shrimp predict survey data and biomass in the current time step based on historical survey, catch data and environmental (if available) data from previous time steps when environmental conditions and population dynamics may have been similar.
- A remarkable mathematical result (Taken's theorem) suggests that environmental effects can be captured or included in EDM, even without direct environmental data and even if the environmental process and shape of the relationship is unknown, because they are implicit in the survey and other data in the model. In theory, the selected historical survey and catch data were affected by environmental

conditions like current conditions and therefore embody information useful for making predictions.

- "Environmental" data in EDM can be any factor (e.g., exvessel prices for shrimp) that might directly or indirectly affect the fishery and condition of the stock.
- EDM seems promising but some skepticism about the merits of the approach is prudent till the limits of the method in fish stock assessment are better understood (see below).

ToR4. Consider how uncertainties in the assessment, and their potential consequences, are addressed.

- Environmental effects are ignored in JABBA although they are thought to be important for shrimp. Environmental effects were modeled explicitly based on data in preliminary but not in final EDM models because reference points were calculated in final runs by long term simulation and future environmental conditions can't be predicted (see below).
- Hierarchical models with independent or correlated "populations" within the stock can be set up in EDM to accommodate temporal-spatial patterns (same or different patterns in populations within the stock over time).
- Retrospective and hindcasting were used to evaluate performance of both models. Hindcasting tests a model's predictive capability. Retrospective runs test model stability.
- JABBA models were evaluated based on statistical measures of model convergence, model fit, model consistency, process error, prediction skill, and DIC. Goodness of fit statistics were compared to a predetermined range of acceptable values to help identify model configurations that performed well.
- No single JABBA model passed all the comparative statistical tests, but most were "well behaved", and it was possible to select potentially useful candidate configurations for further evaluation.
- Data for EDM models were stratified to accommodate 1-2 areas, 1-3 size groups and 1-3 seasons. Many combinations of the stratification variables were tested in the EDM runs. Within the stock, populations are defined by the stratification and assumed to be either independent or correlated.
- Sequential cross validation was used to evaluate the EDM models. This test involves omitting all data after a year and then comparing test predictions to the omitted data and predictions based on all of the data. Sequential cross validation was preferred by the AT because the accuracy of extended future simulations with no

data was an important topic for reference point calculations. Another procedure omitted individual survey observations at random, but it was not as informative about long term predictive capability.

- Three R^2 and RMSE statistics were used to describe goodness of fit to in-sample (used to fit the model) and out-of-sample (omitted from model fitting) data during cross-validation.
- Fifty-four models were selected based on out-of-sample goodness of fit and used in simulations for MSY reference point calculations. Models with unreasonably high MSY, high F_{msy} or poor retrospective or hindcasting patterns were dropped. Two models remained after these criteria were applied. Of these, one was selected because it was relatively simple.
- The EDM model selection process was rigorous, but it surprised me that results were so different among stratification approaches. It appears that the EDM model results were sensitive to stratification decisions, possibly because of spatial heterogeneity in the stock and because the Gulf is so large.

ToR5. Provide, or comment on, recommendations to improve the assessment

- All of the recommendations below are long-term and best considered Research Recommendations.
- There are at least three main questions about EDM that are important and were touched on at the RP meeting. Under what conditions can EDM: 1) estimate trends in stock size and exploitation, 2) estimate scale (overall stock size), and 3) utilize implicit historical environmental information for predictive purposes. The most important question is whether it can estimate scale based on the data available.
- It doesn't seem surprising that EDM captured the trends in shrimp survey and catch data given the relatively large number of model parameters (e.g., 29 for brown shrimp based on the trace of the smoother matrix), simplicity and consistency of the input data for shrimp as well as the exhaustive trial and error approach to stratifying the input data. In contrast to shrimp, many assessments confront conflicting survey and catch data trends that are harder to model.
- It is important to understand whether, how well and under what conditions Taken's theorem applies to complex and noisy fisheries data. Simulations and work with other species suggest that the idea is promising but it is too early to reach conclusions about capturing implicit effects of unspecified environmental variables in fisheries models. What happens, for example, when multiple effects conflict (e.g.,

the environment supports high catches, but economic factors do not)? What if the data do not incorporate full environmental cycles?

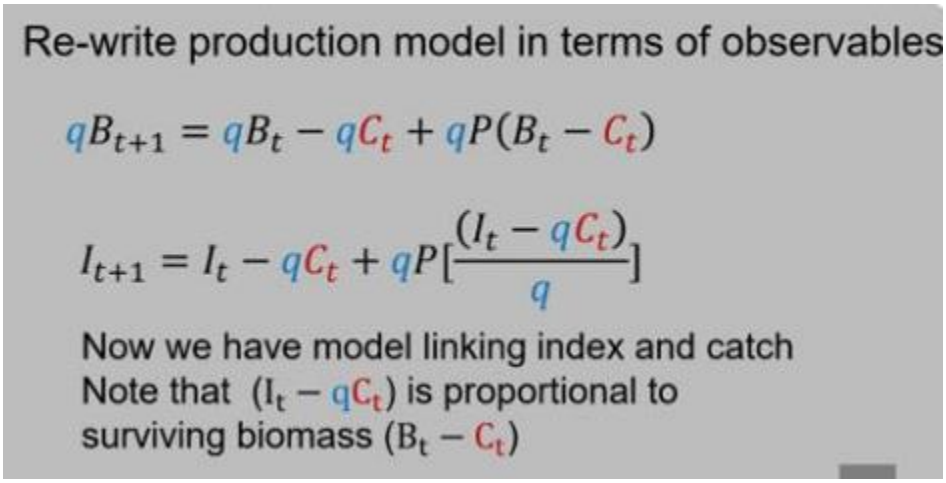
- Environmental data were included in preliminary EDM runs but not in final runs because MSY reference points were calculated by simulating the stock over long future periods at various levels of catch. No direct information about the future was available, making it necessary to omit such data from simulations and the final models for shrimp. Thus, the reference points estimated using EDM are based on average implicit historical environmental conditions and, strictly speaking, may apply only to the historical fishery and environment. Is EDM useful for simulations with climate change ?
- Uncertainty about the future and difficulties in calculating environmentally dependent reference points are likely to persist with EDM. Would it be better to avoid long term predictions in favor of shorter tactical projections used, for example, to suggest possible stock conditions 1-3 years ahead? Environmental data for short term predictions might be easier to predict by simple means or terminal year data could be reused. It might be better to base reference points on an educated guess about the future informed by historical estimates and recent conditions than to attempt a statistical estimate with high uncertainty and variance.
- Given concerns about ongoing climate change, it is important to understand how and how fast EDM responds to non-stationary processes like changes in water temperature, seasonal patterns, freshwater runoff, etc. This is a way of reiterating the previous point.
- It seems likely that other types of routine fishery calculations will be difficult in EDM because processes like size selectivity and growth are not modeled explicitly. For example, it is not clear how reference points might be calculated under a potential new regulation that shifted size selectivity towards larger or smaller shrimp or if growth changes. It may be necessary to make EDM models more complicated to handle these questions or to use EDM in tandem with conventional models with clearly defined internal processes.
- If EDM can handle environmental data that has an unspecified and probably nonlinear relationship with stock size, it seems possible that it might handle fishery CPUE as well. Fishery CPUE is meaningful to constituents but hard to handle in assessment models because it has a nonlinear relationship with biomass. It usually changes more slowly than biomass when stock size is high and more slowly than stock size when biomass is low. Moreover, CPUE is affected by changes in fishing technology, regulations and vessel operations.
- One advantage of CPUE is that it can be standardized in models like VAST to account for differences among vessels, locations, etc. in the same way as survey

data (although nonlinearity is not removed). CPUE data are usually less variable than survey data and may therefore show the direction, if not the magnitude, of changes in stock size clearly. The possibility of using CPUE in EDM should be investigated.

- There are statistical issues that crop up in many types of statistical modeling that need to be explored for EDM. The issues include errors in predictors (particularly bias and changes in bias over time) and effects of outliers (widely inaccurate survey, catch or environmental observations). What about correlation among predictor variables (multicollinearity)? For example, how would EDM performance change if survey biomass, salinity and temperature were correlated but used in the same model? Could the model parse the effects of multiple causes? Would it be better to use uncorrelated principal components in such a case?
- How well can EDM estimate conditions that did not occur while survey data were being collected? Can it estimate B_{msy} or K if all of the data were collected while the stock was at low biomass? Can it estimate F_{msy} from data obtained while a stock was at high biomass? How does it perform with one-way trip data compared to other models?
- I think that certain tools would facilitate use of EDM. It would be useful to automatically perform retrospective analysis and hindcasting while terminal or initial years are selectively removed from the estimation process. How many data points are sufficient to obtain stable estimates? Are the available number of data points sufficient? Performance should fall off at some point as the input data are shortened.
- The data in EDM models can be visualized by plotting the manifold that they theoretically define. A tool for doing so might improve understanding of the shrimp stock assessments using EDM. For example, in a model with two lags, survey data for year *t* can be plotted against survey and other data for years *t-1* and *t-2* to understand the density and position of the lagged data used to fit the model. The plots can be two or three dimensional although two dimensions are easier to visualize and might suffice. The presentation of the last few data points could be animated using a graduated color scale to illustrate recent trends and current stock conditions.
- Such manifold plots might be useful in understanding which portions of the manifold have data and which do not, whether the available data covers one or more cycles for the stock (emphasized in theoretical presentations about Gaussian Process Models) and whether recent conditions differ from past.
- The *q* parameter is important in EDM models because it is used to account for the effects of fishing based on catch data and to convert observed and estimated

survey trends to biomass. The algebra used to derive *q* in EDM is based on a crude surplus production model (see below) that is most accurate when recruitment and the production function are not too variable and when the rates for somatic growth (G) and natural mortality (M) are either too low to matter or equal and cancel each other out. Both G and M are very high in short-lived species like shrimp, stock dynamics are described as "chaotic", and it is not clear that the approximate production model is accurate enough to make the parameter *q* suitable for both purposes. See: *MacCall, A.D. 1978. A note on production modeling of populations with discontinuous reproduction. Calif. Fish Game, 64: 225–227.*

- It might be better to separate *q* parameters for the survey data vs. the catch and production function. One might use a parameter *q* for the survey data and $q_2=e^z q$ for catch and production where *z* has a prior centered at zero. Along the same lines, a different version (e.g., continuous time or centered on the middle of each time step) might be better for highly dynamic and short-lived species.



- EDM works best with relatively long and continuous survey, catch and environmental time series. Shorter or interrupted time series are difficult to use as seen in this assessment for brown shrimp where numerous short survey time series were omitted from modeling. Approaches to using incomplete time series or filling data holes by imputation or other means would be useful.

ToR6. Review of agency process

- As mentioned above, the most recent data in the Gulf shrimp stock assessments reviewed in 2025 were for 2022. The data lag reduced the amount of information

provided by the assessment. Such a lag could be important in future if conditions are changing rapidly, particularly for short lived and dynamic stocks like Gulf shrimp.

- Updated data would have provided the Gulf shrimp community with increased data at the same cost. It might be better to update model runs using preliminary data immediately prior to the RP meeting without changing the underlying model. The results would be more current and still available for review by the RP and SSC prior to potential consideration by managers and stakeholders.
- The SEDAR-87 assessment and RP meeting focused on relatively new modeling techniques that may be useful for many species. All the technical modeling work was useful scientifically for shrimp and possibly other species. However, the biological condition of the stock based on simple trends in the underlying data and simple, practical considerations received much less attention.
- I can imagine, in a hypothetical world, that an assessment could be rejected because of modeling uncertainties even though the basic data clearly shows the condition of the stock. It may be better to scrutinize, report, and summarize the data trends (possibly applying some simple analytical techniques) prior to running the relatively complex assessment model, particularly if the modeling approach is new.
- Consider adding a short "Empirical Assessment" section to the ToR for the assessment that focusses on data trends, very simple methods and the apparent condition of the stock. Constituents may better understand the assessment and appreciate inclusion of such information.

ToR7. Prepare a Review Workshop Summary Report

- A review workshop summary report was prepared, addressing all relevant ToR.

Appendix 1: Bibliography of materials provided for review

Document #	Title	Authors
Documents Prepared for the Data Workshop		
SEDAR87-DW-01	Estimation of Commercial Shrimp Effort in the Gulf of Mexico	Kyle Dettloff
SEDAR87-DW-02	Social Dimensions of the Gulf of Mexico Shrimp Fishery: Overview	David Griffith
SEDAR87-DW-03	Commercial Landings of Gulf of Mexico Shrimp Self-Reported Survey 2005-2020	Rebecca Smith, Alan Lowther, J. Williams
SEDAR87-DW-04	Vessel and Gear Characterizations of Gulf of Mexico Shrimp Self-Reported Survey 2005-2020	Rebecca Smith, Alan Lowther, J. Williams
SEDAR87-DW-05	Gulf of Mexico Brown, Pink, and White Shrimp Weight-Length Regression using SEAMAP Data	Molly H. Stevens
SEDAR87-DW-06	Commercial Shrimp Landings of Gulf of Mexico Final Title: Gulf of Mexico Commercial Brown, Pink and White Shrimp Landings	Jade Chau, Alan Lowther, and Kimberley Johnson Final Document Authors: Sarina Atkinson, Alan Lowther, Kyle Dettloff, and Steven Smith
SEDAR87-DW-07	Economics of the Federal Gulf of Mexico Shrimp Fishery	Christopher Liese
SEDAR87-DW-08	General Economic Measures for Fuel Price Trend, Inflation Adjustment, and Discounting	Christopher Liese
SEDAR87-DW-09	Gulf of Mexico Spatial-Temporal Environmental Data	Holden Harris
SEDAR87-DW-10	Shrimp Import Data	Alan Lowther
SEDAR87-DW-11	Indices of relative abundance for Pink Shrimp, and summary of data availability for Pink, Brown, and White Shrimp, from inshore surveys of Florida's Gulf coast estuaries	Dwayne D. Edwards, Derek M. Tremain, Meagan N. Schrandt, and Theodore S. Switzer
SEDAR87-DW-12	Inshore brown and white shrimp relative abundance in Louisiana	Office of Fisheries, Louisiana Department of Wildlife and Fisheries
SEDAR87-DW-13	Brown, White and Pink Shrimp Abundance Indices from SEAMAP Groundfish Surveys in the Northern Gulf of Mexico	Adam G. Pollack and David S. Hanisko

SEDAR87-DW-14	Summary of the Gulf of Mexico Shrimp Effort Data Collection	Alan Lowther
SEDAR87-DW-15	Social Dimensions of Gulf of Mexico Shrimping	David Griffith, Christopher Liese, Mike Travis, Matt Freeman, David Records
SEDAR87-DW-16	SEDAR 87 Commercial Fishery Landings and Effort Figures for White, Pink, and Brown Shrimp in the US Gulf of Mexico, 1960–2021	Jo A. Williams, Kimberley Johnson, and Alan Lowther
Documents Prepared for the Assessment Process		
SEDAR87-AP-01	Development of estuarine environmental indices for SEDAR 87 Gulf of Mexico White, Pink, and brown shrimp stock assessment	Brendan Turley, Lisa Ailloud, and Molly Stevens
SEDAR87-AP-02	Price Indices for Shrimp Imports and Gulf of Mexico Shrimp Landings by Size and Season	Christopher Liese
SEDAR87-AP-03	Developing a fishery-independent index of relative abundance for Gulf of Mexico Brown Shrimp using VAST	Lisa Ailloud, Molly Stevens, Brendan Turley, Adam Pollack, and David Hanisko
SEDAR87-AP-04	Developing a fishery-independent index of relative abundance for Gulf of Mexico Pink Shrimp using VAST	Lisa Ailloud, Molly Stevens, Brendan Turley, Adam Pollack, and David Hanisko

		Pollack, and David Hanisko
SEDAR87-AP-05	Developing a fishery-independent index of relative abundance for Gulf of Mexico White Shrimp using VAST	Lisa Ailloud, Molly Stevens, Brendan Turley, Adam Pollack, and David Hanisko
Documents Prepared for the Review Workshop		
SEDAR87-RW-01	State Management History - Texas	Council & State Staff
SEDAR87-RW-02	State Management History - Louisiana	Council & State Staff
SEDAR87-RW-03	State Management History - Mississippi	Council & State Staff

SEDAR87-RW-04	State Management History - Alabama	Council & State Staff
SEDAR87-RW-05	State Management History - Florida	Council & State Staff
Final Stock Assessment Reports		
SEDAR87-SAR1	Gulf Council White Shrimp	SEFSC
SEDAR87-SAR2	Gulf Council Pink Shrimp	SEFSC
SEDAR87-SAR3	Gulf Council Brown Shrimp	SEFSC
Reference Documents		
SEDAR87-RD01	SEAMAP Trawl Shrimp Data and Index Estimation Work Group Report	
SEDAR87-RD02	The Annual Economic Survey of Federal Gulf Shrimp Permit Holders: Implementation and Descriptive Results for 2008	Christopher Liese and Michael D. Travis
SEDAR87-RD03	Mississippi Department of Marine Resources and University of Southern Mississippi Gulf Coast Research Laboratory Inshore Trawl Monitoring Programs: Sampling and Lab Protocols	
SEDAR87-RD04	Marine Fisheries Crustacean Section - Independent Sampling Activities: Field Manual	Louisiana Wildlife and Fisheries
SEDAR87-RD05	Fisheries Assessment and Monitoring Program (FAMP)	Alabama Marine Resources Division
SEDAR87-RD06	AL FAMP Assessment Sampling - Standard Operating Procedures	Alabama Marine Resources Division
SEDAR87-RD07	TPWD's Gulf Trawl Sample Design	Texas Parks and Wildlife Division
SEDAR87-RD08	Commercial brown, white, and pink shrimp tail size: total size conversions	Susan L. Brunenmeister
SEDAR87-RD09	Final Report: U.S. Gulf of Mexico Commercial Shrimp Conversion Factors Validation 2020	GSMFC
SEDAR87-RD10	Conversion of "whole" and "headless" weights in commercial Gulf of Mexico shrimps	Joseph H. Kutkuhn (1962)
SEDAR87-RD11	Brown, White and Pink Shrimp Life History Summaries	Jen Leo
SEDAR87-RD12	JABBA: Just Another Bayesian Biomass Assessment	Henning Winker, Felipe Carvalho, Maia Kapur

SEDAR87-RD13	Empirical dynamic modeling for sustainable benchmarks of short-lived species	Cheng-Han Tsai, Stephan B. Munch, Michelle D. Masi, and Molly H. Stevens
SEDAR87-RD14	Recent developments in empirical dynamic modelling	Stephan B. Munch, Tanya L. Rogers, George Sugihara
SEDAR87-RD15	Comparing estimates of abundance trends and distribution shifts using single- and multispecies models of fishes and biogenic habitat	James T. Thorson and Lewis A. K. Barnett
SEDAR87-RD16	The Texas Shrimp Fishery	Texas Parks and Wildlife

Appendix 2: Performance Work Statement

Performance Work Statement (PWS)
National Oceanic and Atmospheric Administration (NOAA)
NOAA Fisheries
Center for Independent Experts (CIE) Program
External Independent Peer Review

SEDAR 87 Gulf of Mexico White, Pink, and Brown Shrimp
June 23-27, 2025

Background

The NOAA Fisheries 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). NOAA Fisheries science products, including scientific advice, are often controversial and may require timely scientific peer reviews that are strictly independent of all outside influences. A formal external process for independent expert reviews of the agency's scientific products and programs ensures their credibility. Therefore, external scientific peer reviews have been and continue to be essential to strengthening scientific quality assurance for fishery conservation and management actions.

Scientific peer review is defined as the organized review process where one or more qualified experts review scientific information to ensure quality and credibility. These expert(s) must conduct their peer review impartially, objectively, and without conflicts of interest. Each reviewer must also be independent from the development of the science, without influence from any position that the agency or constituent groups may have. Furthermore, the Office of Management and Budget (OMB), authorized by the Information Quality Act, requires all federal agencies to conduct peer reviews of highly influential and controversial science before dissemination, and that peer reviewers must be deemed qualified based on the OMB Peer Review Bulletin standards[1].

Scope

The **Southeast Data, Assessment, and Review (SEDAR)** is the cooperative process by which stock assessment projects are conducted in NOAA Fisheries' Southeast Region. SEDAR was initiated to improve planning and coordination of stock assessment activities and to improve the quality and reliability of assessments.

The SEDAR 87 review workshop will be a CIE assessment review of the Benchmark Assessment of Gulf of Mexico white, pink, and brown shrimp. 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 additional runs of the assessment models provided by the assessment panel. The review panel is ultimately responsible for providing advice to ensure the assessment is appropriate for use by fishery managers.

[1] https://www.whitehouse.gov/wp-content/uploads/legacy_drupal_files/omb/memoranda/2005/m05-03.pdf

The specified format and contents of the individual peer review reports are found in **Annex 1**. The Terms of Reference (ToR) of the peer review are listed in **Annex 2**. The tentative agenda of the panel review meeting is attached in **Annex 3.**

Requirements

NOAA Fisheries requires three reviewers to conduct an impartial and independent peer review in accordance with the Performance Work Statement (PWS), OMB guidelines, and the ToRs below. The reviewers shall have a working knowledge in stock assessment, statistics, and fisheries science sufficient to complete the primary task of providing peer-review advice in compliance with the workshop Terms of Reference fisheries stock assessment. Expertise in the usage of at least two of the three of the following: surplus production models, EDM (Empirical Dynamic Modeling), and VAST (Vector Autoregressive Spatio-Temporal Model) modeling approaches and the associated diagnostics is necessary.

The chair, who is in addition to the three reviewers, will not be provided by the CIE. Although the chair will be participating in this review, the chair's participation (e.g., labor and travel) is not covered by this contract. Each reviewer will write an individual review report in accordance with the PWS, OMB Guidelines, and the ToRs below. Modifications to the PWS and ToRs cannot be made during the peer review, and any PWS or ToRs modifications prior to the peer review shall be approved by the Contracting Officer's Representative (COR) and the CIE contractor. All ToRs must be addressed in each reviewer's report.

Tasks for Reviewers

1) Pre-review Background Documents: Review the following background materials and reports prior to the review:

Completed Data and Assessment reports, along with all working papers and reference documents, will be available on the SEDAR website no later than two weeks prior to the in-person review workshop:

https://sedarweb.org/assessments/sedar-87-gulf-of-mexico-white-pink-and-brown-shrimp/

2) Attend and participate in an in-person review meeting. The meeting will consist of presentations by NOAA and other scientists, stock assessment authors and others to facilitate the review, to answer any questions from the reviewers, and to provide any additional information required by the reviewers.

3) After the review meeting, reviewers shall conduct an independent peer review report in accordance with the requirements specified in this PWS, OMB guidelines, and ToRs, in adherence with the required formatting and content guidelines. Reviewers are not required to reach a consensus.

4) Each reviewer shall assist the Chair of the meeting with contributions to the summary report.

5) Deliver their reports to the Government according to the specified milestones dates.

Foreign National Security Clearance

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 Project Contact for the purpose of their

security clearance, and this information shall be submitted at least 30 days in advance. For additional information, please see the following link: https://www.commerce.gov/osy/programs/foreign-access-management. The contractor is required to use all appropriate methods to safeguard Personally Identifiable Information (PII).

Place of Performance
The place of performance shall be Tampa, Florida

Period of Performance
The period of performance shall be from the time of award through August 15, 2025. 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.

Schedule	**Milestones and Deliverables**
Within 2 weeks of award	Contractor selects and confirms reviewers
Approximately 2 weeks prior to the review	Contractor provides the pre-review documents to the reviewers
June 23-27, 2025	Panel review meeting
Approximately 2 weeks later	Contractor receives draft reports
Within 3 weeks of receiving draft reports	Contractor submits final reports to the Government

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

Applicable Performance Standards
The acceptance of the contract deliverables shall be based on three performance standards:
(1) The reports shall be completed in accordance with the required formatting and content (2) The reports shall address each ToR as specified (3) The reports shall be delivered as specified in the schedule of milestones and deliverables.

Confidentiality and Data Privacy
This contract may require that services contractors have access to Privacy Information. Services contractors are responsible for maintaining the confidentiality of all subjects and materials and may be required to sign and adhere to a Non-disclosure Agreement (NDA).

Travel

All travel expenses shall be reimbursable in accordance with Federal Travel Regulations (Travel resources | GSA), and all contractor travel must be approved by the COR prior to the actual travel. Any travel conducted prior to the receipt of proper written authorization from the COR will be done at the Contractor's own risk and expense. International travel is authorized for this contract. Travel is not to exceed $12,000.00.

Project Contacts

Kate Siegfried – NOAA Fisheries Project Contact
Chief, Gulf Fisheries Branch
Sustainable Fisheries Division
Southeast Fisheries Science Center

Julie Neer - SEDAR Program Manager
Science and Statistics Program
South Atlantic Fishery Management Council
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Annex 1: Peer Review Report Requirements

1. The independent Peer Reviewer report shall be prefaced with an Executive Summary providing a concise summary of whether they accept or reject the work that they reviewed, with an explanation of their decision (strengths, weaknesses of the analyses, etc.).

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 agency review process, including suggestions for improvements of both process and products.

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

3. The report shall include the following appendices:

   Appendix 1: Bibliography of materials provided for review

   Appendix 2: A copy of this Performance Work Statement

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

Annex 2: Terms of Reference for the Peer Review

SEDAR 87 Gulf of Mexico White, Pink, and Brown Shrimp
June 23-27, 2025

Review Workshop Terms of Reference

1. Evaluate the degree to which the terms of reference from the Data and Assessment processes were addressed.

2. Evaluate the data used in the assessment, including discussion of the strengths and weaknesses of data sources and decisions. Consider the following:
   - Are data decisions made by the Data and Assessment processes justified?
   - Are data uncertainties acknowledged, reported, and within normal or expected levels?
   - Is the appropriate model(s) applied properly to the available data?
   - Are input data series sufficient to support the assessment approach?

3. Evaluate and discuss the strengths and weaknesses of the methods used to assess the stock, given the available data. Consider the following:
   - Are methods scientifically sound and robust?
   - Are priority modeling issues clearly stated and addressed?
   - Are the methods appropriate for the available data?
   - Are assessment models configured properly and used in a manner consistent with standard practices?

4. 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.
   - Comment on the likely relationship of this variability with possible ecosystem or climate factors and possible mechanisms for including this into management reference points.

5. Provide, or comment on, recommendations to improve the assessment

- Consider the research recommendations provided by the Data and Assessment processes in the context of overall improvement to the assessment, and make any additional research recommendations warranted.
- If applicable, provide recommendations for improvement or for addressing any inadequacies identified in the data or assessment modeling. These recommendations should be described in sufficient detail for application, and should be practical for short-term implementation (e.g., achievable within ~6 months). Longer-term recommendations should instead be listed as research recommendations above.

6. Provide recommendations on possible ways to improve the Research Track Assessment process.

7. Prepare a Review Workshop Summary Report describing the Panel's evaluation of the Research Track stock assessment and addressing each Term of Reference.

Annex 3: Tentative Agenda

SEDAR 87 Gulf of Mexico White, Pink, and Brown Shrimp Review

June 23 – 25, 2024

Tampa, Florida

Monday

1:00 pm – 6:00 pm	**Introductions and Opening Remarks**	**Coordinator**
	- Agenda Review, TOR, Task Assignments	
	Assessment Presentations	**Analytic Team**
	- *Background*	
	- *Assessment Data & Methods*	

Tuesday

9:00 am – 12:00 pm	**Assessment Presentations (continued)**	**Analytic Team**
	- *Assessment Data & Methods*	
12:00 pm – 1:30 pm	**Lunch Break**	
1:30 pm – 4:30 pm	**Assessment Presentations (continued)**	**Analytic Team**
	- *Assessment Data & Methods*	
	- Identify additional analyses, sensitivities, corrections	
4:30 pm – 5:00 pm	**Wrap Up/Public Comment**	**Chair**
5:00 pm - 6:00 pm	**Panel Work Session**	**Chair**

***Tuesday Goals*:** Initial assessment presentations completed, sensitivities and modifications identified.

Wednesday

8:30 a.m. – 11:30 pm	**Assessment Presentations (continued)**	**Analytic Team**
	- *Assessment Methods*	
	- Identify additional analyses, sensitivities, corrections	
11:30 a.m. – 1:00 pm	**Lunch Break**	
1:00 pm – 5:30 pm	**Panel Discussion**	**Chair**
	- Review additional analyses, sensitivities	
	- Recommendations and comments	
5:30 pm - 6:00 pm	**Public Comment**	**Chair**

Wednesday Goals: Presentations completed, additional sensitivities identified, preferred models selected, projection approaches approved, Summary report drafts begun.

Thursday

8:30 a.m. – 11:30 pm	**Panel Discussion**	**Chair**
	- Review additional analyses, sensitivities	
	- Recommendations and comments	
11:30 a.m. – 1:00 pm	**Lunch Break**	
1:00 pm – 5:30 pm	**Panel Discussion**	**Chair**
	- Final sensitivities reviewed.	
	- Projections reviewed.	
5:30 pm - 6:00 pm	**Public Comment**	**Chair**

Thursday Goals: Review final sensitivities, complete assessment work, and finalize discussions.

Friday

9:00 a.m. – 1:00 pm	**Panel Discussion or Work Session**	**Chair**
	- Review Summary Reports	

Friday Goals: Final results available. Draft Summary Report reviewed.

Appendix 3: Sedar 87 Review Workshop Participants

Review Panel
Jim Tolan (Chair) GMFMC Appointee
Simon DeLestang CIE Reviewer
Larry Jacobson CIE Reviewer
Erik Lang LDWF/GMFMC Appointee
Joe Powers CIE Reviewer
Steven Saul GMFMC SSC

Analytic Team
Lisa Ailloud NMFS SEFSC
Molly Stevens NMFS SEFSC
Katie Siegfried NMFS SEFSC

Appointed Observers
Fernando Martinez-Andrade TXPWD

Staff
Julie A Neer SEDAR
Matt Freeman GMFMC Staff
John Froeschke GMFMC Staff
Ryan Rindone GMFMC Staff
Charlotte Schiaffo GMFMC Staff

Workshop Observers
Leann Bosarge Shrimp Industry
Workshop Observers via Webinar
Jason Adriance LADWF
Jesse Buntin NOAA
Peyton Cagle LADWF
Judd Curtis SAFMC Staff
Tricia Kimball
Dominique Lazarre SERO
Richard Malinowski NOAA
Jessica Marchant AL DCNR
Michelle Masi SERO
Steve Munch SWFSC
Emily Ott SEDAR
Jason Saucier MS DMR
Rebecca Smith NOAA
John Walter SEFSC