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Review of 2005 SEDAR Panel for Red Snapper

for

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Executive Summary

The SEDAR review panel examined the 2004 assessment of red snapper (*Lutjanus campechanus*). The review was held April 4th to 7th 2005 at the Country Inn and Suites hotel in New Orleans, Louisiana. The assessment data, model structure and results were presented to the Panel, and issues evaluated through open discussion. A decision was reached on the data set and assessment model to be used as a basis for management of the fishery. Recommendations for future red snapper data and assessment workshops were made.

The quantity and quality of work performed during the data and assessment workshops, and by the assessment team during the review workshop was highly impressive, and represents a considerable increase in knowledge since the last assessment. As a result, the data used within the assessment represent the best scientific information available, and the assessment approach, despite uncertainties, is adequate for the current stock assessment.

1. Adequacy and appropriateness of data

For the 2004 assessment, the time-series of catch data was extended back to the dawn of the fishery in 1872, using information available from various literature sources. This catch was divided between eastern and western regions of the Gulf. The review workshop (RW) considered that these data represented the best possible information available. The division of historical catch between areas, rather than absolute annual catch level, was considered a greater source of uncertainty. Sensitivity analyses examining the effect of different divisions of catch between east and west areas are recommended. Use of this extended time-series also required the strong assumption that biological processes remained constant over this time. Sensitivity analyses on the potential impact of temporal changes in biological parameters on the assessment are recommended.

Offshore longline catches exhibited a much older age composition than those of commercial and recreational fisheries operating inshore. This raises questions about stock spatial distribution and larval settlement, and whether the offshore component is the source of recent high recruitments despite inshore depletion. The implications of potential distributions of larvae and adults on the assessment (through the stock recruitment relationship) should be investigated. Suggestions for areas of study are made in the conclusions and recommendations section of this report.

Serial depletion of areas, as seen historically, may erroneously bolster CPUE levels, maintaining abundance level indices. This has been seen in commercial data from snapper fisheries in the Pacific, where serial depletion of sea-mounts has occurred. Available information on catch location should be examined for localized depletion.

Discard (release) mortality rates were related to depth. Fish caught in deeper waters experienced greater mortality on release. A single release mortality value was used, although a range may be more appropriate to incorporate potential stochasticity. Discard mortality will also interact with natural mortality at younger ages. An examination of the sensitivity of assessment results to different values of release mortality rate, and interaction between natural mortality and release mortality values at younger ages is recommended.

2. Adequacy, appropriateness and application of assessment methods

CATCHEM_AD, an age-structured model constructed in AD Model Builder, was used in the 2004 assessment; the ASAP model used in the 1999 assessment failed to converge when applied to the extended time-series of data. CATCHEM has the advantage of being more flexible than ASAP, allowing further factors to be incorporated (e.g. inclusion of eastern and western Gulf stocks, multiple fleets, etc.) and has better mathematical rigour owing to internalization of the catch-at-age fitting. The general perception of estimated stock status was comparable between the two models, when the short time-series of data were used. Estimated fishing mortality levels may be quite different between the two models, however. Fishing mortality estimates for the short time period run should be examined to identify differences in this metric.

CATCHEM consistently indicated that the stock was in a depleted state, but abundance indices were relatively constant, or increased slightly. Comparison of estimated unexploited age structures with current age structures did suggest that the inshore stock was depleted, supported by the high western Gulf effort level. The general perception of stock status was also unchanged between short and long time-series CATCHEM runs. The long time-series was selected as the base case, as it represents the best scientific information available. It is recommended that limited projections be performed using the short time period run to identify any differences in expected recovery period (with due consideration to management benchmarks).

While CATCHEM allows the eastern and western Gulf units to be modelled, it does not include migration rates between areas. Inclusion of migration should be considered and its potential impact examined.

The RW recommended that the base-case model include age 0 fish, as this age class is caught in an active fishery (the shrimp trawl fishery), and management may wish to explore options to control this bycatch. This reviewer fully supports the recommendation. The related issue of density dependence warrants further examination, however, since SEDAR7-RW 06 notes that its inclusion may result in considerably different perceptions of stock status and recovery trajectories.

The stock recruitment relationship remains an area of considerable uncertainty, with model fits indicating very high steepness. Examination of available data on the dynamics of the offshore, less exploited ‘stock’ (see above) might help explain this. Confidence limits on recruit estimates should be presented in model outputs.

High recruitment estimates in recent years may result from the model’s assumption of constant *q*, which may have increased over time. The RW recommended that attempts to estimate effort directly be made.

A number of model diagnostics were requested by the RW, including standardized residuals. Further diagnostic approaches are recommended and suggested in the conclusions and recommendations section of this report.

3. Adequacy, appropriateness and application of population benchmark estimation methods

Management benchmarks were driven by gear selectivity patterns and the stock recruitment relationship, and hence were strongly influenced by management decisions. Identification of benchmarks more robust to these factors through management strategy simulation is recommended. Consideration should also be given to inclusion of all related fisheries in assessments, and area-based management policies.

4. Adequacy, appropriateness and application of projection methods

Deterministic projections based upon the Beverton and Holt stock recruit relationship were presented. The RW recommended that the mean of recent high recruitments also be used during projections. Stochastic projections with suitable diagnostics for recovery are recommended where possible.

5. Assessment results are clearly and accurately presented in the Stock Assessment Report

The assessment report was well written, and generally clear in detailing the decisions made and rationale for those decisions. The production of a document detailing the proceedings of the assessment workshops was particularly helpful. A number of minor comments are noted in this report.

6. Performance of data and assessment workshops against respective Terms of Reference

The majority of the Terms of Reference for the data and assessment workshops were completed fully. Areas where further work could be performed to fully complete the terms of reference are noted in this report.

7. Recommendations

Recommendations have been noted throughout this report, and are clearly detailed in the Conclusions and Recommendations section.

Background

South East Data, Assessment, and Review (SEDAR) is a joint process for stock assessment and review of the South Atlantic, Gulf of Mexico, and Caribbean Fishery Management Councils; NOAA Fisheries, SEFSC and SERO; and the Atlantic and Gulf States Marine Fisheries Commissions. SEDAR is organized around three workshops: data, assessment, and review. Input data are compiled during the data workshop, population models are developed during the assessment workshop, and an independent peer review of the data and assessment models is provided by the review workshop. The assessment review panel is composed of stock assessment experts, other scientists, and representatives of councils, fishing industries, and non-governmental conservation organizations. Final SEDAR documents include a data report produced by the data workshop, a stock assessment report produced by the assessment workshops, a review consensus report evaluating the assessment and drafted during the assessment review panel workshop, and the collected stock assessment documents considered in the SEDAR process.

This report reviews the results of the data and stock assessment panels held under the SEDAR process for Gulf of Mexico red snapper (*Lutjanus campechanus*), at the request of the Center for Independent Experts (see Appendix 1). This stock is within the jurisdiction of the Gulf of Mexico Fishery Management Council and respective southeastern states. The author was provided with data review and stock assessment panel review documents, files and reports (see bibliography), and participated in the SEDAR review panel process.

Description of review activities

The review was undertaken by Dr Graham Pilling at CEFAS (Lowestoft, UK) and during the SEDAR panel review held in New Orleans, Louisiana, at the Country Inn and Suites hotel. The SEDAR panel was convened during April 4th to 7th 2005. The panel membership is listed in Appendix 2.

The documentation (see bibliography) was reviewed at CEFAS. Dr Pilling actively participated in the SEDAR panel meeting in New Orleans and assisted with the development of the SEDAR review panel meeting report. This separate report to CIE was completed on return to CEFAS.

Observers, including members of the fishing industry, attended the SEDAR panel meeting. The draft assessment was presented to the panel and other attendees, and the issues evaluated through open discussion. A decision was then reached on the data set and assessment model to be used as a basis for management of the fishery. Recommendations for future red snapper data and assessment workshops were made.

Summary of findings

The meeting of the SEDAR review panel for the 2004 red snapper assessment represented the culmination of over a year of scientific analysis, and data and assessment meetings. The resulting assessment, while presenting a similar picture to that of the 1999 assessment, is quite different in its specifics. These differences include both the model itself, and the data to which the model was applied. Overall, the data workshop (DW) and assessment workshops (AW) should be commended in developing an assessment based upon the best scientific information available.

The CIE reviewer's views on uncertainties in the data and modelling approach, and recommendations for future work, were fully incorporated in the SEDAR review panel consensus report. The strengths, weaknesses and uncertainties inherent in the approach are described below within relevant sections, addressing points 1-7 under the SEDAR assessment review panel tasks. Numbered recommendations (in bold) refer to the conclusions and recommendations section of the current report.

1. Adequacy and appropriateness of data

Many sources of useful data were available. While the data collection programmes were effective in recent years, the resulting time period of data was short. Long-term systematic sampling needs to continue so that the value of these data sets can be fully realized.

Commercial landings and recreational catch data have been documented through systematic data collection since 1962 and 1984, respectively. For the 2004 assessment, a catch history beginning in 1872 (the presumed start of the fishery) was constructed using information available from various literature sources. Recreational catches prior to 1981 were inferred, under the assumption that catches were proportional to human population census data from 1900. In the assessment model, however, recreational catches were assumed to start in 1946. Total annual catch was divided between eastern and western regions of the Gulf, since both genetic and otolith microchemistry studies indicated a division into these stock units. The RW considered that, despite the uncertainties, these data represented the best possible information available for the fishery. A number of assumptions were required to divide the catches between east and west regions, and it was indicated during the RW that the division of catch between areas, rather than the absolute catch level in the historical period, was the greater source of uncertainty. **See recommendation 1**. It was hoped that this extended time-series would provide a better contrast in the data, and that unexploited biomass indices could be better estimated as a result. Unfortunately, extending the time-series did not achieve this.

When using extended time-series within models, the strong assumption is made that biological processes have remained constant over this time. This is particularly relevant when considering the difference in recruitments estimated by the model in recent times compared with historical recruitments (see below). It is unlikely that additional biological information for earlier in the time-series (particularly in the 'ultra-historic' period) will become available, however. **See recommendation 2**.

Limited age composition data were available, although large numbers of samples had been collected during the period 1998-2002. There is a need to continue this

sampling, ensuring appropriate statistical coverage of the population over space and time. Offshore longline catches exhibited a much older age composition than those obtained in commercial and recreational fisheries operating inshore. This raises an issue over spatial distribution and settlement: is settlement of larvae purely inshore followed by ontogenetic migration offshore, or is settlement more uniform across depth ranges in the Gulf? These two different settlement patterns have very different consequences. In the former, young fish are subject to fishing mortality from an early age from the commercial and recreational gears, which they must survive before moving offshore. In the latter, a source of relatively unexploited fish exists further offshore which are unaffected by commercial gears until older, and might contribute to inshore recruitment. Given indications that the Campeche Bank stock was quite heavily exploited, this offshore component might represent the source of high recruitments in recent years despite localized inshore depletion. **See recommendation 3**.

Historically, the fishery has exhibited serial depletion. If sufficient areas with potential for high catch rates still remain, movement of vessels between areas following serial depletion could bolster the CPUE level and mask continued depletion of the stock. **See recommendation 4**.

Many different values for natural mortality were estimated through a range of scientific studies. Despite the availability of such information, the value of M remains a source of considerable uncertainty. Its value was increased markedly in the current assessment (the rate doubled at age 0 and 1 years compared to the 1999 assessment). The change from 0.3 to 0.6 on age 1 had little qualitative influence on the results of the assessment. There may be interactions between the natural mortality rate set for younger individuals and the impact of the shrimp trawl fishery, however. The value set for adult natural mortality and the resulting implications of the lack of a plus group in the model was commented upon during the meeting by the CIE chair.

Commercial logbook and recreational fishery interviews were used to gather information on discards. Despite efforts, discard estimates were developed from sparse data based upon assumptions that are difficult to verify. Discards need to be taken into account in the assessment, however, and these data represent the best information available. Experimental studies indicated that discard mortality rates were related to depth. Individuals caught in deeper waters experienced a greater mortality on release. Using the relationship with depth, an overall discard mortality rate was set for the east and west areas of the Gulf, based upon average fishing depth. The value used was a point estimate, although use of a range may be more appropriate to incorporate the potential stochasticity. The discard mortality rate will also interact with the value of natural mortality at younger ages. **See recommendation 5**.

Estimates of fecundity at age (expressed as relative *per capita* production) were higher in the current assessment than those of Shirripa and Legault (1999). There was little difference between the rates up to ~4 years, but they diverged notably after this age, converging again in fish older than 25 years. As a result, the rate of recovery may be faster when based upon the current assessment settings than when based on those used in 1999.

2. Adequacy, appropriateness and application of assessment methods

The model used in the 1999 assessment of Gulf of Mexico red snapper – ASAP – was not used in the current assessment. When the extended data series was applied to ASAP, the model failed to converge. This was in contrast to ASAP's general behaviour when applied to the shorter time-series of data. The reason for the failure in convergence was not identified, but it does suggest a problem with the model. As a result of this, CATCHEM_AD, an age-structured model constructed in AD Model Builder, was developed. While the application of a new model for assessment purposes is not generally desirable, it was necessary in this case owing to the extraordinary circumstances. The model was also tested as far as possible prior to the assessment. CATCHEM has the advantage of being more flexible than ASAP, allowing further factors to be incorporated (e.g. the inclusion of stock structure by splitting stocks between the eastern and western Gulf, plus multiple fleets) and has better mathematical rigour owing to internalization of the catch-at-age fitting.

Although the model consistently indicated that the stock was in a depleted state, it was initially difficult to identify the information driving that result. Abundance indices were relatively constant. The exception was the larval indices, which showed marked increases from the mid-1990s, and the recreational fishery in the east, which also indicated an increase during this period. Constant abundance indices suggest that the stock could be consistently over- or underexploited, and its size is not changing rapidly. Comparison of estimated unexploited age structures with current age structures did suggested a depleted state for the stock exploited by the inshore fishery. This is supported by the high effort in the western Gulf.

It was gratifying to note that in the continuity runs requested by the RW, the general perception of estimated stock status was comparable between ASAP and CATCHEM (when the short time-series of data were used). In both cases, the stock was heavily exploited. The resulting fishing mortality levels might be quite different between the two models, however, despite the similarity in the level of 'spawning stock' as a percentage of unexploited levels. **See recommendation 6**.

The general perception of stock status was also unchanged between short and long time-series runs from CATCHEM. Although the review panel selected the long time-series run in CATCHEM as being the base model (because it represents the best scientific information available), the short time-series has the advantage of being based upon observed data only. **See recommendation 7**.

As noted, CATCHEM allows the red snapper stock to be assessed as eastern and western Gulf units. Currently, the model does not allow migration rates to be included between areas. **See recommendation 8**.

In the base-case model selected by the AW, age 0 fish were excluded. Given that this age class is caught in an active fishery (the shrimp trawl fishery), and that management may wish to explore options to control this bycatch, the key assumption of the AW-recommended base case (all processes were compensated for under natural mortality at age 0) is very strong. The RW panel opted for the inclusion of age 0 fish as the base-case model setting, which this reviewer fully supports. While inclusion of age 0 fish did not make a large difference to the perception of current stock status, it was noted that its inclusion in the model made it much easier to explain to interested

parties, particularly given the perceived importance of the shrimp bycatch fishery. The issue of density dependence must be considered further, however, since SEDAR7-RW 06 noted that its inclusion could significantly affect the perception of stock status and recovery. **See recommendation 9**.

An area of considerable uncertainty remains the stock-recruitment relationship for red snapper, and in particular the steepness value. In CATCHEM, separate Beverton and Holt stock recruitment relationships are used for the east and west stocks. The results of model fits suggest that in the recent time period, recruitments are relatively high (greater than the estimated virgin recruitment, R_0), but the model estimates of 'spawning potential' are at their lowest. This results in a very high steepness estimate (near 1). If correct, and not a product of the model formulation, potential hypotheses for the cause are a regime shift in recent years (as compared with the ultra-historic period), or the recruitment of young from other areas (e.g. the 'Campeche Bank connection', or recruitment from the offshore spawning stock). **See recommendations 3 and 10**. Investigations undertaken during the RW raised some questions as to the source of the information driving this variable but high recruitment in recent years. Age composition information indicated few startlingly strong age classes, although variability in this information may be damped by dome-shaped selectivity patterns. There remains the possibility that the information is actually coming from fluctuations in the abundance time-series. This issue needs careful examination.

High recruitments estimated by the model in recent years may result from the assumption of constant *q*. Realistically, *q* may have increased in recent years, as a consequence of technological creep, e.g. the fitting of GPS, the advent of fish finders. During the RW, a model run was performed with increased CVs on *q*. The results suggested that *q* in the commercial fleet was increasing over time, but that recreational *q* levels were decreasing, and that recent recruitment levels were relatively high. Effort is being estimated from CPUE data within the model, however, which may confound changes in *q*. The RW recommended that attempts be made to estimate effort directly.

Despite the use of Bayesian priors in the model, the current assessment provided only point estimates for parameters from the posterior distribution. This was mostly because of the complexity of the model, and the resulting time needed to perform a single assessment. Sensitivity analyses were requested during the review to examine changes in data time-series, inclusion/exclusion of age 0, and *q*. A number of diagnostics were requested to judge model outputs better and to check the internal assumptions of the model. Standardized residuals (and quantile-quantile plots) were requested, and produced during the RW. The results suggested that the catch-at-age structure violated the assumption of a multinomial distribution. The larval index also did not comply with the assumption of normality. **See recommendation 11**.

3. Adequacy, appropriateness and application of population benchmark estimation methods

Management benchmarks were noted to be 'an emergent property of the harvest strategy', being driven by the selectivity pattern of gears in the fishery and the stock recruitment relationship. Benchmark values are therefore strongly influenced by the management decisions made. As a result, specific MSY and SPR proxy benchmarks

were given for three separate scenarios of management action – linked (all fisheries catching red snapper are increased or decreased by the same percentage), no shrimp (shrimp bycatch is eliminated in the shrimp fishery) or current shrimp (shrimp bycatch and closed season bycatch remain the same, regardless of changes made to effort in the other fisheries). The interaction between management and stock status meant that further communication was needed between the management and stock assessment fora before final status and recovery scenarios could be estimated. **See recommendations 12 to 14**.

4. Adequacy, appropriateness and application of projection methods

Deterministic projections were presented, indicating likely recovery rates for the stock relative to management benchmarks. The methods used were scientifically sound and appropriate given their deterministic nature. Future recruitment levels were based upon the Beverton and Holt stock recruit relationship, and hence assumed that the recent time-series of very high recruitments would not continue. This assumption on future recruitments represents a significant source of uncertainty. The RW recommended that the mean of recent high recruitments also be used during projections. **See recommendation 15**. The RW also considered that the actual stock recruit dynamics were not well understood. As a result, the panel indicated that only short-term projections should be considered, with the different R_0 settings providing a suitable bound on recruitment uncertainty.

5. Assessment results are clearly and accurately presented in the Stock Assessment report

The assessment report was well written, and generally clear in detailing the decisions made and the rationale for those decisions. This was greatly helped by the production of a document detailing the proceedings of the assessment workshops.

A number of minor comments on additional requirements for the stock assessment report were noted by the RW, which this reviewer endorses:

- more detailed discussion related to the use of SPR rather than biomass-based benchmarks;
- more information on why age-0 red snapper by-catch was not explicitly included in the model. Furthermore, more information is required on the potential impacts of these decisions on projected stock status;
- a statement of recommended ABC;
- an explanation of the methods used to compute effective spawning stock biomass.

6. Performance of data and assessment workshops against respective Terms of Reference

The majority of the Terms of Reference for the data and assessment workshops were completed fully, to the best of the ability of the workshops. Noted below are the few areas where further effort was needed to complete their terms of reference:

Data workshop:

- ToR 3. The fishery-independent measures of abundance appeared to take into account only sample variability, ignoring other sources of variation.
- ToR 4. Changes in catchability were not assessed. This is a potentially important factor in the model.

Assessment workshop:

- ToR 3. A number of approaches to assess model performance, reliability and goodness of fit were not examined by the AW. Approaches were recommended by the RW and where possible, implemented during the review panel. Further recommendations are made in the RW report, and in this report.
- ToR 5. Interval estimates were not provided for parameters. See recommendations in this report.
- ToR 6. Sensitivity runs to identify which indices and data had the strongest influence on model results were recommended by the RW.

7. Recommendations

Recommendations were noted in the RW report. That report also reviewed those made by the DW and AW. Specific recommendations from this reviewer are noted in the following section.

Conclusions and recommendations

The quantity and quality of work performed during the data workshop, assessment workshops, and by the assessment team during the review workshop was impressive and highlight the considerable increase in knowledge since the last assessment. As a result, the data used within the assessment represent the best scientific information available, and the assessment approach, despite uncertainties, is adequate for the current stock assessment.

A number of areas for future work in the data and assessment processes are highlighted in the section above, and the specific recommendations are presented here. In many cases, sensitivity analyses are suggested. These, and other simulation testing, will help to identify areas in which specific research effort needs to be concentrated to improve estimates of key parameters in the model.

Adequacy and appropriateness of data
The data inputs for the assessment model cover a wide range of biological processes, at different spatial and temporal scales. A particular area of uncertainty was the assumptions that accompanied the use of the extended time-series of catches. Recommendations are:

Recommendation 1: Perform sensitivity analyses to examine the effect of different historical catch divisions between east and west areas of the Gulf on the assessment.

Recommendation 2: Perform sensitivity analyses to examine the impact of potential changes in biological parameters over time on the assessment.

Recommendation 3: Examine the implications of the different potential distributions of larvae and adults for the assessment. Are there areas offshore suitable for juvenile settlement? Is the offshore age structure consistent with recruitment directly to deeper waters, or ontogenetic migration? Does oceanographic information suggest that larval movements of this type are realistic? Consider tagging programmes to examine the movement of juveniles and adults offshore/onshore and between east and west regions of the Gulf (see also recommendation 8).

Recommendation 4: Consider the examination of available information on fishing position through logbooks (if sufficiently accurate) or observer programmes (if available) for serial depletion. Recommendations by the RW to examine the feasibility of VMS may need to be initiated before this can be investigated further.

Recommendation 5: Examine the sensitivity of assessment results to different values of release mortality rate (within the bounds indicated by the existing research). Investigate the interaction between natural mortality values and release mortality rates at younger ages.

Adequacy, appropriateness and application of assessment methods
The model represents a change from that applied during the 1999 assessment. Recommendations arise as result of this change, settings within the assessment, and particular assessment results:

Recommendation 6: Examine the fishing mortality levels output from ASAP and CATCHEM for the short time period run to identify any differences and trends in this metric.

Recommendation 7: Perform projections based upon the CATCHEM outputs from the short time period run to identify whether there are quantitative differences in expected recovery period. This will also require consideration of the management benchmarks resulting from changes in the estimated stock recruitment relationship, which may result in more significant differences.

Recommendation 8: Consider the inclusion of migration between east and west areas of the Gulf in the model. Parameterization might be based upon available information (if sufficient) or through new tagging studies (if feasible).

Recommendation 9: Examine the issue of density dependence and its effect on stock status and recovery further. Consider results in terms of risk to the population.

Recommendation 10: Present confidence limits on the recent recruitment levels estimated by the model, so that statistical differences between recruitments in the recent past and the ultra-historical period can be identified.

Recommendation 11: Develop further diagnostic approaches to assess the performance of the model. Present interval estimates for output parameters, or examine posterior distributions, as many of the estimates may be against their bounds (a count of the number of parameters against their bounds could be another diagnostic). Examine the shape of the response surface to assess whether local maxima are being identified. Perform retrospective analyses to assess model stability.

Adequacy, appropriateness and application of population benchmark estimation methods

Management benchmarks for these projections were highly sensitive to management decisions and biological assumptions. Recommendations are:

Recommendation 12: Identify benchmarks that are more robust to changes in management levels and the stock-recruitment relationship, through management strategy evaluation simulations.

Recommendation 13: Consider whether there is a need specifically to examine the red grouper/vermillion snapper fisheries (closed-season bycatch) along with the shrimp bycatch fishery and the targeted fisheries in assessments and management. Evaluate multispecies benchmarks.

Recommendation 14: While the RW was not tasked to look at management issues, the division of the stock between east and west areas of the Gulf within the assessment allows separate management to be applied within these areas, rather than the current strategy of producing Gulf-wide management (TACs). Indeed, given that the eastern stock appears to be less productive than the western stock, Gulf-wide management has the potential to reduce the eastern stock to very low levels. This needs to be presented to managers for consideration.

Adequacy, appropriateness and application of projection methods
The methods used to project population status were appropriate. The projections from the model were deterministic, however.

Recommendation 15: Consider performing stochastic projections and providing management with suitable diagnostics for recovery (e.g. the likelihood of recovery within particular time periods).

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SEDAR7- DW-33add Addendum to Document 33.

SEDAR7-DW-34 Precision of age estimation in red snapper (*Lutjanus campechanus*). NOAA, NMFS, Panama City Laboratory Contribution Series: 04-04. Allman, R.J., G.R. Fitzhugh, K.J. Starzinger and R.A. Farsky

SEDAR7-DW-35 Characterization of red snapper (*Lutjanus campechanus*) reproduction: for the 2004 Gulf of Mexico SEDAR. NOAA, NMFS, Panama City Laboratory. Contribution Series: 04-01. Fitzhugh, G.R., M.S. Duncan, L.A. Collins, W. T. Walling Jr., D.W. Oliver.

SEDAR7- DW-35add Addendum to Document 35.

SEDAR7-DW-36 Red snapper otoliths selected for aging at NMFS Panama City Laboratory and discussion of future sampling targets. NOAA, NMFS, Panama City Laboratory. Contribution Series: 04-02. Fitzhugh, G.R., L.A. Lombardi-Carlson, R.J. Allman and B. K. Barnett.

SEDAR7-DW-37 Analysis of Total Fishing Mortality for Gulf of Mexico Red Snapper Contributed by Shrimp Trawl Bycatch and Commercial and Recreational Fisheries (Including Discards). McAllister, M. K.

SEDAR7-DW-38 Status of bycatch reduction device performance and research in Norh-Central and Western Gulf of Mexico. Foster, D. G. and Scott-Denton, E.

SEDAR7-DW-39 Florida Fishery Dependent Monitoring. Brown, S. E.

SEDAR7-DW-40 History of red snapper management in federal waters of the US Gulf of Mexico, 1984-2004. Hood, P. and Steele, P.

SEDAR7-DW-41 Alternative catch rate indices for red snapper (*Lutjanus campechanus*) landed during 1981-2003 by the U.S. recreational fishery in the Gulf of Mexico using MRFSS and Texas Parks and Wildlife Department data sets. Cass-Calay, S. L.

SEDAR7-DW-42 Standardized catch rates of red snapper (*Lutjanus campechanus*) from the United States headboat fishery in the Gulf of Mexico during 1986-2002. Brown, C. A. and S. L. Cass-Calay

SEDAR7-DW-43 Some problems with sampling commercial red snapper fisheries in the Gulf of Mexico. Chih, C-P.

SEDAR7-DW-44 Estimation of species misidentification in the commercial landing data of red snappers in the Gulf of Mexico. Chih, C-P.

SEDAR7-DW-45 Size frequency distribution of red snapper from dockside sampling of commercial landings in the Gulf of Mexico 1984-2003 (TIP size data). Diaz, G.A., S. C. Turner, and C-P Chih.

SEDAR7-DW-46 Size frequency distribution of red snapper from dockside sampling of recreational landings in the Gulf of Mexico 1984-2003 (TXPW, MRFSS, and headboats size data). Diaz, G. A.

SEDAR7-DW-47 Standardized catch rates of red snapper (*Lutjanus campechanus*) from the United States commercial handline fishery in the Gulf of Mexico during 1996-2003. McCarthy, K. J. and S. L. Cass-Calay

SEDAR7-DW-49 A priori estimates of natural mortality rates and stock-recruitment curve steepness for Gulf of Mexico red snapper. Sladek Nowlis, J.

SEDAR7-DW-50 An age-structured assessment model for red snapper that allows for multiple stocks, fleets, and habitats. Porch, C. E.

SEDAR7-DW-51 MSY, Bycatch and Minimization to the "Extent Practicable". Powers, J. E.

SEDAR7-DW-52 Length and weight conversions for Florida's recreationally important finfish species. Sauls, B., R. Beaver, and J. O'Hop

SEDAR7-DW-53 Comparisons of Relative Fishing Powers of Selected SEAMAP Survey Vessels. Pellegrin, G. Jr; N. Sanders Jr; J. Hanifen; R. Waller; M. VanHoose

SEDAR7-DW-54 Update for the Bayesian estimation of shrimp fleet bycatch. Nichols, S.

SEDAR7-DW-55 An evaulation of the first annulus for red snapper off Alabama. Mareska, J.

SEDAR7-DW-56 Some methods of calculating catch at age of the directed fisheries for red snapper in the Gulf of Mexico, 1984-2002. Turner, S. C.

SEDAR7-DW-57 An Update of Shrimp Trawl Bycatch Reduction Efforts in the Gulf of Mexico. Graham, G.

NAJFM 2003 23:581-589 SEDAR7-REF1. Description of a simple electronic logbook designed to measure effort in the Gulf of Mexico shrimp fishery. Gallaway, B. J., J. G. Cole, L. R. Martin, J.M. Nance, and M. Longnecker

NAJFM 2003 23:7987-809 SEDAR7-REF2. An evaluation of an electronic logbook (ELB) as a more accurate method of estimating spatial patterns of trawling effort and bycatch in the Gulf of Mexico shrimp fishery. Gallaway, B. J., J. G. Cole, L. R. Martin, J. M. Nance, and M. Longnecker

GoM Science 1998(1):92-104 SEDAR1-REF3. Movement of red snapper, *Lutjanus campechanus*, in the North central Gulf of Mexico: Potential effects of hurricanes. Watterson, J. C., W. F. Patterson III, R. L. Shipp, and J. H. Cowan

TAFS 2001 130:533-545 SEDAR7-REF4. Movement of tagged red snapper in the Northern Gulf of Mexico. Patterson, W. F. III, J. C. Watterson, R. L. Shipp, and J. H. Cowan

MRAG Americas Inc. 1997 SEDAR7-REF5. Consolidated Report of the Peer Review of Red Snapper (*Lutjanus campechanus*) Research and Management in the Gulf of Mexico anon.

MARFIN Final Report NA87FF0424 SEDAR7-REF6. Stock Structure of red snapper in the Northern Gulf of Mexico: Is there management as a single stock justified based on spatial and temporal patters of genetic variation, otolith microchemistry,and growth rates? Gold, J. R.

AFS Symp. 36. 2003 SEDAR7-REF7. Red snapper discards in Texas coastal waters—a fishery dependent onboard survey of recreational headboat discards and landings. In:Stanley, D.R., Scarborough-Bull, A. (Eds.), Fisheries, reefs, and Offshore development. American Fisheries Society, Symposium 36, Bethesda, Maryland, pp.155-166. Dorf, B.A.

Fish Bull 2001 99:617-621 SEDAR7-REF8. Age and growth of red snapper, *Lutjanus campechanus*, from an artificial reef area off Alabama in northern Gulf of Mexico. Patterson, W. F. III; J. H. Cowan, Jr; C. A. Wilson, R. L. Shipp

53 GFCI SEDAR7-REF9 Indirect estimatio of red snapper (*Lutjanus campechanus*) and gray triggerfish (*Balistes capriscus*) release mortality. Patterson, W. F. III; G. W. Ingram, Jr.; R. L. Shipp, J. H. Cowan, Jr.

AFS Symp. 2003 36:181-193 SEDAR7-REF10 Site fidelity and dispersion of red snapper associated with artificial reefs in the northern Gulf of Mexico. Paterson, W. F. III; and J. H. Cowan

1st and 2nd assesssment workshop documents

SEDAR7-AW 1 Growth models for red snapper in U.S. Gulf of Mexico waters estimated from landings with minimum size limit restrictions. Diaz, Guillermo A., Clay E. Porch, and Mauricio Ortiz

SEDAR7-AW 2 Allometric relationships of Gulf of Mexico red snapper. Diaz, Guillermo A.

SEDAR7-AW 3 Estimated conversion factors for calibrating MRFSS charterboat landings and effort estimates for the Gulf of Mexico in 1981-1997 with For Hire Survey estimates with application to red snapper landings. Diaz, Guillermo A and Patty Phares

SEDAR7-AW 4 Revised catch rate indices for red snapper (*Lutjanus campechanus*) landed during 1981-2003 by the U.S. Gulf of Mexico recreational fishery – REVISED. Cass-Calay, Shannon L.

SEDAR7-AW 5 Batch-fecundity and maturity estimates for the 2004 assessment of red snapper in the Gulf of Mexico. Porch, Clay E.

SEDAR7-AW 6 An age-structured assessment model for red snapper that allows for multiple stocks, fleets and habitats. Porch, Clay E.

SEDAR7-AW6a Calculation of relative length frequencies. Brooks, E.N.

SEDAR7-AW 7 Preliminary Trials Estimating M1 from Fall and Summer Trawl Surveys. Brooks, Elizabeth N. and Clay E. Porch

SEDAR7-AW 8 Red Snapper Compensation in the Stock-Recruitment Function and Bycatch Mortality. Powers, J.E. and E.N. Brooks

SEDAR7-AW 9 Standardized catch rates of red snapper (*Lutjanus campechanus*) from the United States commercial handline fishery in the Gulf of Mexico during 1996- 2003: additional indices. McCarthy, Kevin J. and Shannon L. Cass-Calay

SEDAR7-AW 11 A population dynamics model for Gulf of Mexico red snapper that uses a historically extended catch time series and alternative methods to calculate MSY. McAllister, Murdoch K.

SEDAR7-AW 12 Impact on Yield from Density Dependence of red Snapper Juvenile Life Stages. Gazey, W.J.

SEDAR7-AW 13 Brief Review of Red Snapper Data Workshop Report. McAllister, Murdoch K.

SEDAR7-AW 14 Identifying some approaches to formulating prior probability distributions for natural mortality rates in age zero and age one Gulf of Mexico red snapper. McAllister, Murdoch K.

SEDAR7-AW 15 Estimation of Juvenile M for Red Snapper Based on SEAMAP Survey Data. Nichols, Scott, Gilmore Pellegrin Jr. and G. Walter Ingram

SEDAR7-AW 16 Estimates of Historical Red Snapper Recreational Catch Levels Using US Census Data and Recreational Survey Information. Scott, Gerald P.

SEDAR7-AW 17 Documentation on the Preparation of the Database for the Red Snapper Stock Assessment SEDAR. Poffenberger, John and Stephen C. Turner

SEDAR7-AW 18 revised. Modeled age composition of Gulf of Mexico Red Snapper 1984-2003. Turner, Stephen C., Elizabeth Brooks, Gerald P. Scott and Guillermo Diaz

SEDAR7-AW 19 Gulf of Mexico Red Snapper Observed Catch at Age. Sladek Nowlis, Josh

SEDAR7-AW 20 Estimating Catch at Age for Red Snapper in the Shrimp Fleet Bycatch. Nichols, Scott

SEDAR7-AW 21 A Summary of the August Assessment Workshop for Red Snapper. Anonymous

SEDAR7-AW 22 The commercial landings of red snapper in the Gulf of Mexico from 1872 to 1962. Porch, Clay E., Stephen C. Turner, and Michael J. Schirripa

SEDAR7-AW 23 Reconstructed time series of shrimp trawl effort in the Gulf of Mexico and the associated bycatch of red snapper from 1948 to 1972. Porch, Clay E. and Steve Turner

SEDAR7-AW 24 Additional information on modeled age composition of red snapper from the Gulf of Mexico 1984-2003. Turner, Stephen C., Elizabeth Brooks, and Guillermo Diaz

SEDAR7-AW 25 Alternative indices of abundance of juvenile red snapper from the Gulf of Mexico from SEAMAP surveys 1972-2003. Turner, Stephen C., and Clay E. Porch

SEDAR7-AW 26 An age-structured stock reduction analysis (SRA) model for the Gulf of Mexico red snapper that accounts for uncertainty in the age of density dependent natural mortality. McAllister, Murdoch K.

SEDAR7-AW 27 An alternative assessment of the red snapper (*Lutjanus campechanus*) fishery in the U.S. Gulf of Mexico using a spatially-explicit age-structured assessment model: Preliminary results. Porch, Clay E.

SEDAR7-AW 28 Benchmarks and Estimated Status from a 1-fleet VPA projection for Red snapper (*Lutjanus campechanus*). Brooks, Elizabeth N. and Steve Turner

SEDAR7-AW 29 VPA Evaluation of Projected SPR resulting from TAC and Bycatch Reduction for Red snapper (*Lutjanus campechanus*) in the Gulf of Mexico. Brooks, Elizabeth N. and Steve Turner

SEDAR7-AW 30 Assessments of Gulf of Mexico red snapper during 1984-2003 using a Gulfwide implementation of ASAP, including continuity cases. Cass-Calay, Shannon L. and Guillermo A. Diaz

SEDAR7-AW 31 Assessments of Gulf of Mexico red snapper during 1962-2003 using a Gulfwide implementation of an age-structured-assessment-program (ASAP). Cass-Calay, Shannon L., Guillermo A. Diaz, and Joshua Sladek Nowlis

SEDAR7-AW 32 Draft: Bootstrapping a Gulfwide implementation of an age-structured-assessment-procedure (ASAP) for red snapper (*Lutjanus campechanus*) from 1962 to 2003. Sladek Nowlis, Joshua and Shannon L. Cass- Calay

SEDAR7-AW 33 Summary of all model runs and control rule plots. Brooks, Elizabeth N.

SEDAR7-AW 34 Assessments of red snapper stocks in the eastern and western Gulf of Mexico using an age-structured assessment-procedure (ASAP). Cass-Calay, Shannon L. and Mauricio Ortiz

Revised assessment documents

SEDAR7-RW 1 Application of the age-structured assessment model CATCHEM to the U.S. Gulf of Mexico red snapper fishery since 1962. Porch, Clay E.

SEDAR7-RW 2 Revised Assessments of Gulf of Mexico red snapper during 1984-2003 using a Gulfwide implementation of ASAP. Cass-Calay, Shannon L. and Guillermo A. Diaz

SEDAR7-RW 3 Revised Assessments of Gulf of Mexico red snapper during 1962-2003 using a Gulfwide implementation of an age-structured-assessment-program (ASAP). Cass-Calay, Shannon L., Guillermo A. Diaz, and Joshua Sladek Nowlis

SEDAR7-RW 4 Assessments of red snapper stocks in the eastern and western Gulf of Mexico using an age-structured assessment-procedure (ASAP). Revised and updated analysis of results presented in SEDAR7-AW-32. Ortiz, Mauricio and Shannon L. Cass-Calay

SEDAR7-RW 5 Revised bootstrapping a Gulfwide implementation of an age-structured-assessment-procedure (ASAP) for red snapper (*Lutjanus campechanus*) from 1962 to 2003. Sladek Nowlis, Joshua and Shannon L. Cass-Calay

SEDAR7-RW 6 An age-structured stock reduction analysis (SRA) model for Gulf of Mexico red snapper that accounts for uncertainty over the ages of density-dependent natural mortality. McAllister, Murdoch K.

SEDAR7-RW 7 Alternative fishery independent larval indices of abundance for red snapper. Hanisko, D., J. Lyczkowski-Shultz, and W. Ingram.

Documents received at the meeting

SEDAR 7-RW8. Alternative estimates of the yield of red snapper from the Gulf of Mexico recreational fishery. Stephen C. Turner.

Appendix 1. Statement of work

Statement of Work

Consulting Agreement between the University of Miami and CEFAS
Dr. Graham Pilling

March 7th, 2005

General

South East Data, Assessment, and Review (SEDAR) is a joint process for stock assessment and review of the South Atlantic, Gulf of Mexico, and Caribbean Fishery Management Councils; NOAA Fisheries, SEFSC and SERO; and the Atlantic and Gulf States Marine Fisheries Commissions. SEDAR is organized around three workshops: data, assessment, and review. Input data are compiled during the data workshop, population models are developed during the assessment workshop, and an independent peer review of the data and assessment models is provided by the review workshop. The assessment review panel is composed of stock assessment experts, other scientists, and representatives of councils, fishing industries, and non-governmental conservation organizations. Final SEDAR documents include a data report produced by the data workshop, a stock assessment report produced by the assessment workshops, a review consensus report evaluating the assessment and drafted during the assessment review panel workshop, and the collected stock assessment documents considered in the SEDAR process.

NMFS-SEFSC requests the assistance of two assessment scientists from the Center for Independent Experts (CIE): one to serve as Chair and one to serve as a technical reviewer for the SEDAR 7 Assessment Review Panel that will consider the assessment for Gulf of Mexico red snapper. This stock is within the jurisdiction of the Gulf of Mexico Fishery Management Council and respective southeastern states. No consensus opinion between the two CIE panelists is sought.

The review workshop for SEDAR 7, Gulf Red Snapper, will take place at the Country Inn and Suites in New Orleans, Louisiana, from 8:30 am on Monday, April 4, 2005 through 6:00 pm on Thursday, April 7, 2005. Meeting materials will be forwarded electronically and in hard copy approximately 3 weeks prior to the meeting. Please contact John Carmichael (SEDAR Coordinator; 843-571-4366 or John.Carmichael@safmc.net) for additional details.

SEDAR Assessment Review Panel Tasks

The SEDAR Review Workshop Panel will evaluate the Gulf of Mexico red snapper stock assessment, input data, assessment methods, and model results as put forward in stock assessment reports. (The following list indicates the expected Terms of Reference for the Review Workshop. However, the Terms of Reference may be modified as necessary by the Council and the SEDAR Steering Committee to address particular needs following conclusion of the Assessment Workshop.) The Assessment Review Panel will complete the following tasks.

1.Evaluate the adequacy and appropriateness of all data used in the assessment, and state whether or not the data are scientifically sound.

2.Evaluate the adequacy, appropriateness, and application of the methods used to estimate population parameters such as abundance, biomass, and exploitation; state whether or not the methods are scientifically sound.

3.Evaluate the adequacy, appropriateness, and application of the methods used to estimate population benchmarks (MSY, Fmsy, Bmsy, MSST, MFMT, etc.). State whether or not the methods are scientifically sound.

4.Evaluate the adequacy, appropriateness, and application of the methods used to project future population status and, if appropriate, evaluate stock rebuilding. State whether or not the methods are scientifically sound.

5.Ensure that all available required assessment results (as listed in the SEDAR Stock Assessment Report Outline) are clearly and accurately presented in the Stock Assessment Report and that such results are consistent with the Panel's decisions regarding adequacy, appropriateness, and application of the data and methods.

6.Evaluate the performance of the Data and Assessment Workshops with regard to their respective Terms of Reference, and state whether or not the Terms of Reference for those previous workshops are adequately addressed in the Data and Assessment Sections of the SEDAR Stock Assessment Report.

7.Develop recommendations for future research for improving data collection and the assessment.

8.Review the Draft Advisory Report, which will summarize the stock assessment results and will have been initially drafted during the Assessment Workshop.

9.Prepare a Consensus Summary Report summarizing the peer review panel's evaluation of the Gulf red snapper and addressing the Terms of Reference. (Drafted during the Assessment Review Panel workshop, with a final report due three weeks after the workshop ends: April 29, 2005.)

The Assessment Review Panel's primary duty is to review the assessments presented. In the course of this review, the Chair may request a reasonable number of sensitivity runs, additional details of the existing assessments, or similar items from technical staff. However, the Review Panel is not authorized to conduct an alternative assessment or to request an alternative assessment from the technical staff present. If the Review Panel finds that an assessment does not meet the standards outlined in Items 1 through 6, above, the Panel shall outline in its report the remedial measures that the Panel proposes to rectify those shortcomings.

The Review Panel Report is a product of the overall Review Panel, and is NOT a CIE product. The CIE will not review or comment on the Panel's report, but shall be provided a courtesy copy, as described below under "Specific Tasks." The CIE products to be generated are the Chair's and Reviewer's reports, also discussed under Specific Tasks.

The review workshop for SEDAR 7, Gulf of Mexico Red Snapper, will take place at the Country Inn and Suites in New Orleans, Louisiana, from 8:30 am on Monday, April 4, 2005 through 6:00 pm on Thursday, April 7, 2005. Meeting materials will be

forwarded electronically and in hard copy. Please contact John Carmichael (SEDAR Coordinator; 843-571-4366 or John.Carmichael@safmc.net) for additional details.

Hotel Arrangements

Country Inn and Suites
315 Magazine Street
New Orleans LA 70130
PH: (504) 324 – 5400
Fax: (504) 324 – 5439
Group Rate $143 + $18.59 tax + $1.00 Occ. Fee = $162.59
Cut-off date for group rate: March 3, 2005.

Specific Tasks

It is estimated that the Review Panelist's duties will occupy a maximum of 14 workdays; several days prior to the meeting for document review; five days at the SEDAR meeting, and several days following the meeting to ensure that final review comments on documents are provided to the Chair and to complete a CIE review report.

Roles and responsibilities:

1. Prior to the meeting the CIE Review Panelist shall be provided with the stock assessment reports and associated documents for Gulf red snapper. The Reviewer shall read these documents to gain an in-depth understanding of the stock assessment and the resources and information considered in the assessment.
2. During the Review Panel meeting, the Reviewer shall participate, as a peer, in panel discussions on assessment validity, results, recommendations, and conclusions. The Reviewer also shall participate in the development of the Peer Review Panel Consensus Summary and Stock Advisory Report.
3. Following the Review Panel meeting, the Reviewer shall review and provide comments to the Panel Chair on the Peer Review Panel Consensus Summary and Stock Advisory Report.
4. No later than April 22, 2005, the Review Panelist shall submit a written CIE review report[1] consisting of the findings, analysis, and conclusions to Dr. David Sampson, via email to David.Sampson@oregonstate.edu, and to Mr. Manoj Shivlani, via email to mshivlani@rsmas.miami.edu. The report shall address points 1-7 under the above heading: SEDAR Assessment Review Panel Tasks. See Annex I for details on the contents of the Reviewer Report.

Submission and Acceptance of CIE Reports

The CIE shall provide the final consultants' reports in pdf format for approval by NOAA Fisheries to the COTR, Dr. Stephen K. Brown, no later than May 6, 2005. The COTR shall notify the CIE via e-mail regarding acceptance of the consultants'

[1] The written Reviewer report will undergo an internal CIE review before it is considered final.

reports. Following the COTR's approval, the CIE shall provide the COTR with digital copies of the consultants' reports with digital signed cover letters, both in pdf format.

Draft Agenda
SEDAR 7: Gulf Red Snapper

Monday, April 4, 2005

8:30 a.m.	Convene	
8:30 a.m. – 9:00 a.m.	Introductions and Opening Remarks	John Carmichael
	- Agenda Review, Task Assignments	
9:00 am – 12:00 pm	Data Presentation	SEFSC TBD
	- Overview of input data and modifications from AW	
12:00 p.m – 2:00 p.m.	Lunch	
2:00 p.m – 6:00 p.m.	Red Snapper Assessment Presentations	SEFSC TBD
	-Methods and Results Overview	

Tuesday, April 5, 2005

8:30 a.m. – 12:00 p.m.	Red Snapper Assessment Discussions Chair
	- Focus discussion on preferred model *- Identify corrections and adjustments* *- Identify sensitivity runs* *- Identify projection runs*
	MILESTONE: Identify preferred model configuration
12:00 p.m. – 2:00 p.m.	LUNCH
2:00 p.m. – 6:00 p.m.	Data and Assessment Terms of Reference Chair *- Data Report Review* *- Assessment Methods Review* *- Assessment Report Draft Review*

Wednesday, April 6, 2005

8:30 a.m. – 12:00 p.m.	Continue Assessment Discussions Chair
	- Review sensitivity analyses *- Review Projections*
	MILESTONE: Final Call for Additional modelling requests.
12:00 p.m. – 2:00 p.m.	LUNCH
2:00 p.m. – 6:00 p.m.	Continue Terms of Reference Discussion Chair

	- Projection/benchmark TOR review *- Research Recommendations* *- Review Advisory Report*

Thursday, April 7, 2005

8:00 a.m. – 11:00 a.m.	Continue TOR Discussions if necessary Chair
	Review Final Model Results
	Review additional model runs if necessary
	Work session to draft consensus summary
	- Review Panel: Consensus Summary Draft *- Assessment Team: Appendices, Advisory Report*
11:00 a.m. – 1:00 p.m.	LUNCH
	MILESTONES: First Draft Consensus Summary
	Draft Assessment Report with Final Results
1:00 p.m. – 4:00 p.m.	Work Session
	- Panel: Review and Edit Consensus Summary
	- Assessment Team: Review and Edit Assessment Report
4:00 p.m. – 6:00 p.m.	Final Review of Consensus Summary Chair
6:00 p.m	ADJOURN

Annex I. Contents of SEDAR Reports.

Consensus Summary Contents

I. Terms of Reference

List each Term of Reference, and include a summary of the Panel discussion regarding the particular item. Include a clear statement indicating whether or not the criteria in the Term of Reference are satisfied.

II. Additional Comments

Provide a summary of any additional discussions not captured in the Terms of Reference statements.

III. Stakeholder Comments

Stakeholder representatives on the Panel are encouraged to submit brief statements summarizing their opinions regarding stock status, analytical methods, and input data.

IV. Recommendations for Future Workshops

Panelists are encouraged to provide suggestions to improve the SEDAR process.

Contents of Reviewer Report

1. The report shall be prefaced with an executive summary of findings and/or recommendations.

2. The main body of the report shall consist of a background, description of review activities, summary of findings, conclusions/recommendations, and references.

3. The report shall also include as separate appendices the bibliography of all materials provided and a copy of the statement of work.

Please refer to the following website for additional information on report generation: http://www.rsmas.miami.edu/groups/cie.

Appendix 2. SEDAR panel attendees

Name	Affiliation	Role
Patrick Cordue	Innovative Solutions Ltd.	CIE chair
Graham Pilling	CEFAS	CIE Reviewer
Kenneth Rose	GMFMC FSAP	Panel member
Michael Murphy	GMFMC FSAP	Panel member
Harry Blanchet	GMFMC FSAP	Panel member
Elizabeth Babcock	NGO ED	Panel member
Russell Underwood	GMFMC AP	Panel member
Mike Nugent	GMFMC AP	Panel member
Andrew Kemmerer	GMFMC SSC	Panel member
Michael Sissenwine	NOAA Fisheries	Panel member
Mike Praeger	NOAA Fisheries, SEFSC	Panel member

CEFAS
The Centre for Environment, Fisheries & Aquaculture Science

The Centre for Environment, Fisheries & Aquaculture Science
Lowestoft Laboratory, Pakefield Road,
Lowestoft, Suffolk NR33 0HT UK
Tel: +44 (0) 1502 562244
Fax: +44 (0) 1502 513865
www.cefas.co.uk