

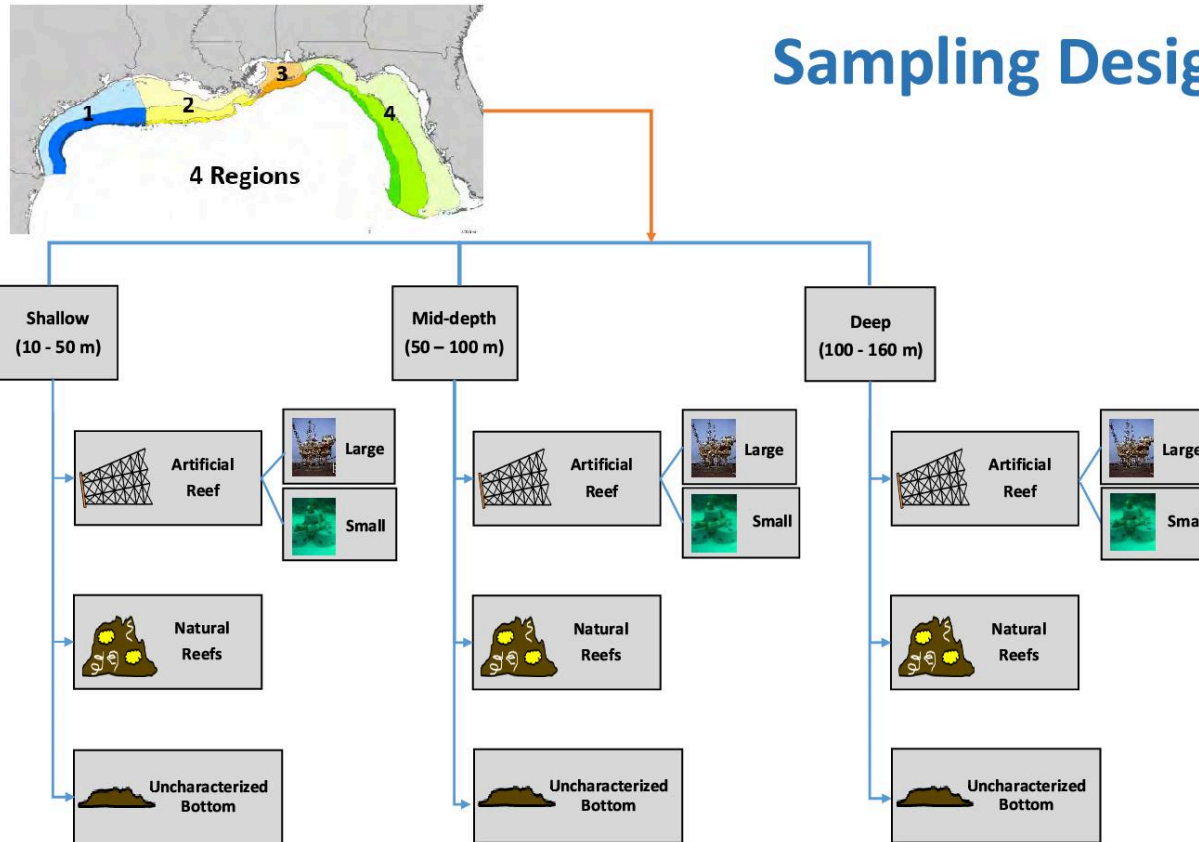
# Review of 'The Great Red Snapper Count' (GRSC)

A close-up photograph of a Red Snapper's head, focusing on its large, dark eye. The fish's scales are a reddish-brown color with a visible texture. The eye is prominent, with a dark pupil and a lighter, fleshy iris. The background is dark and out of focus.

# ***"The Great Red Snapper Count"***

**Estimating the absolute abundance of Red Snapper  
in the U.S. Gulf of Mexico.**

## Sampling Design:





NOAA 2018 Stock Assessment (SEDAR 52): 36 M

# Request and setting

- Review was requested by the SSC in its January 2021 meeting
- TOR set by Council and NOAA Fisheries
- Process modeled on SEDAR with SSC members and independent experts Drs. Steve Cadrin (SC), Mary Christman (MC) and Dave Eggleston (DE)
- SSC members who are Co-PIs of the GRSC were asked to abstain from voting on motions
- Outputs include the reports by independent experts (directly addressing the TORs) and the summary report of the review meeting
- This presentation provides an overview of independent experts' comments and the motion passed by the review meeting

# TOR Summary

The primary objective of the review is to determine whether the absolute abundance estimate and its variance is reliable and consistent with input data and population biological characteristics. The review (...) specifically does not address the tagging components of the GRSC.

## 1. STUDY DESIGN AND SAMPLING APPROACHES

- Evaluate study design used for developing a composite estimate of absolute abundance by habitat type, depth, region, and age.
- Sampling approaches

## 2. STATISTICS AND DATA ANALYSIS

- Evaluate the statistical methods used to analyze the data, and to construct the absolute abundance estimate and its variance.

## 3. RESULTS

- Is the estimate and its variance reliable, consistent with input data and population biological characteristics, and useful as an estimate of absolute abundance of age 2+ red snapper?
- Do you think the data presented can be combined with age-specific composition information for generating an age-specific estimate of abundance?

# Up front...

The review team (SSC members and independent experts) complimented the GRSC team for an impressive implementation of this large-scale field study and acknowledged

- The scale and complexity of the study
- The use of advanced sampling technologies
- Collaboration with fishermen
- Wealth of new information beyond the absolute abundance estimate
- Impressive educational outreach

# Study design and sampling approaches

- Overall, the design covered a large area of the GoM appropriately (MC, DE)
- Implementation sometimes differed from the design and the reasons and implications for possible bias and variance are not always clear (MC, SC, DE)
- Use of different technologies in different strata was unavoidable, but paucity of intercalibration studies affects intercomparisons and combination of data from different strata (MC, SC). Also differences in sampling design (SC)
- Limited intercomparison off FL indicates that the true observation error is likely much larger than the 11% CV derived from the stratified estimate (SC).
- Lack of data collection in some strata (LA) and consequent need to infer mean densities in those strata (MC)



# Statistics and data analysis

- Overall, the two independent analyses were partially correct, with some issues arising from non-random (cluster) sampling and lack of clarity about post-stratification decisions (MC, SC)
- Estimated variances are low due additional sources of variability not currently included. Some of these can be estimated and included, others can't (MC, SC, DE)
- Some questions about effect of imputations for unsampled strata, gut difficult to judge (MC)
- Arithmetic means are unbiased estimators but observed distributions of observation suggest that other estimators may be better suited (SC)

# Results

- Results if corrected for noted statistical issues can be useful at least in a regional context (MC)
- Not appropriate to combine eastern and western Gulf into a single value of “absolute abundance” due to differences in technology and lack of calibration (MC, SC)
- Eastern Gulf estimate with more credible variance can be included as abundance estimate in assessment, western Gulf estimate as lower bound constraint (SC)
- Confidence in abundance estimate for UCB is lower than for abundance in other habitats due to small sample sizes in UCB (MC, SC, DE)
- Assumptions appear appropriate and not likely to induce bias (except in variance) (MC, DE).
- Stock-wide estimate may be an underestimate, but not entirely clear (SC)

# Motion

**Substitute Motion:** The review team (external consultants and SSC) considers that the great red snapper count provides a representative estimate of abundance for the eastern Gulf and a highly uncertain estimate for the Western Gulf. However, the review team also considers that the true uncertainty in both estimates is substantially larger than implied by the 11% CV stated in the report, and that the estimate for uncharacterized bottom is particularly uncertain.

***Substitute Motion carried 21-1 with 5 abstentions.***

***Abstentions: Sean Powers, Judd Curtis, Robert Leaf, Will Patterson, Steven Scyphers (GRSC Co-PIs)***

# Perspective

- Like the GRSC, our stock assessments are uncertain (some more so than others), and often underestimate the true uncertainty
- Both, the SEDAR 52 assessment and the GRSC estimate of abundance are **estimates** derived from sampling and use of mathematical and/or statistical models
- Integrating data from both should help to reduce uncertainty and possible bias, improve management advice and help identify new options
- In addition to the absolute abundance estimate, the GRSC provides exciting new information on many aspects of red snapper ecology and fisheries