SEDAR 68 Index Working Group—Gulf of Mexico Plenary 3

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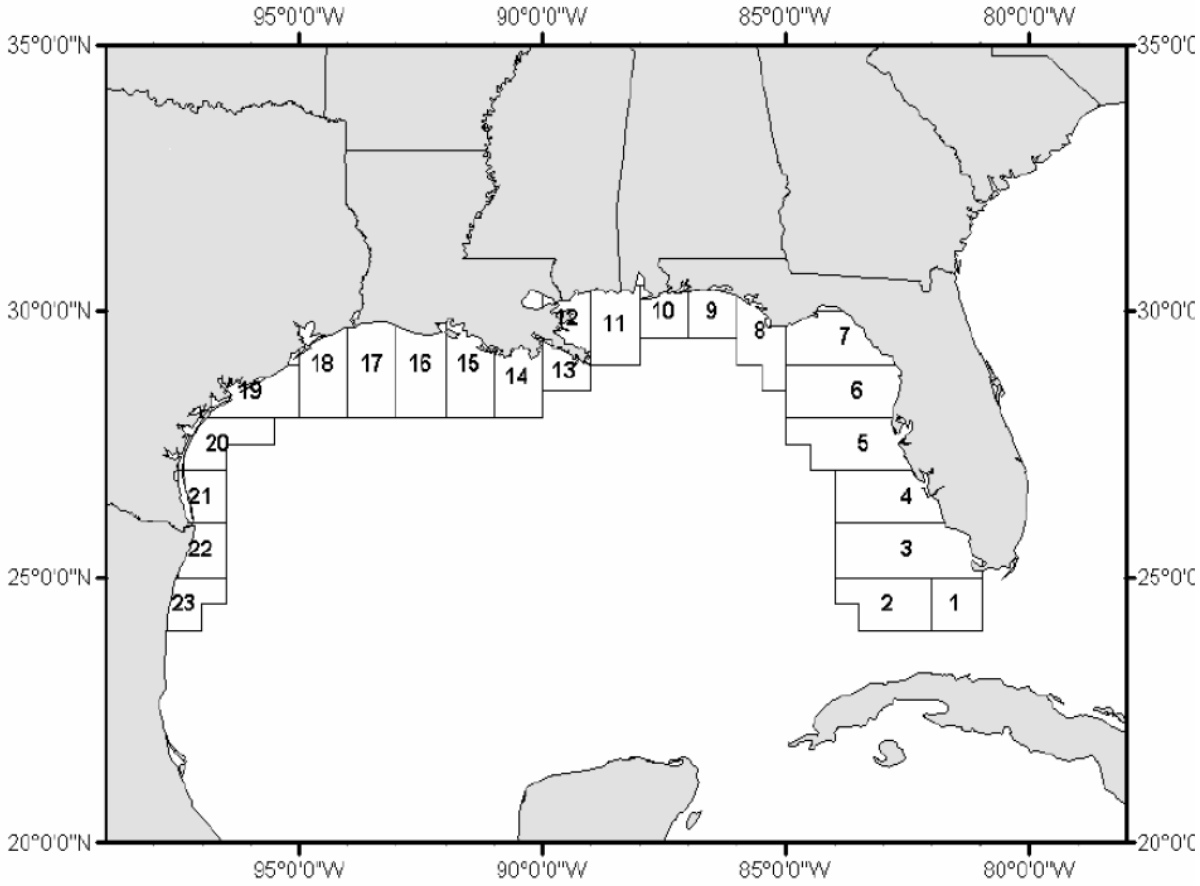
Indices Reviewed-Fishery Dependent

- 4 Logbook indices
  - Vertical Line
    - Pre-IFQ
    - Post-IFQ
  - Longline
    - Pre-IFQ
    - Post-IFQ
- Observer program index
  - First use of data and method

Commercial Logbook indices

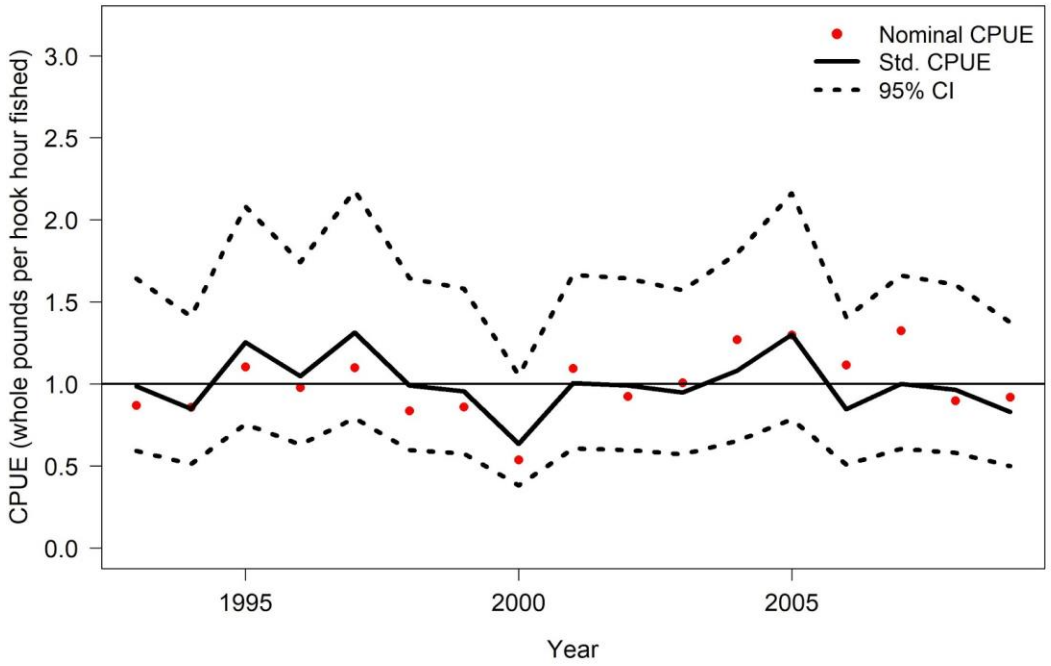
- Provides complete census from 1993
- Standard to include indices in the assessment
  - Continuous time series where independent data lacking
- Follows familiar/standard methods
  - Stephens and MacCall
  - Lognormal or Delta-Lognormal GLM with variable selection evaluated by AIC
  - Model diagnostics



Logbook review and recommendations

- Longline: Pre-IFQ
  - Low catch/poor model diagnostics
  - Not recommended for assessment
- Vertical Line: Pre-IFQ
  - High proportion positive: ~55%-75% of selected trips
    - Good model diagnostics
  - Fills in critical data gaps
  - Not heavily selected species so likely representative
  - Recommended for assessment

Pre-IFQ Commercial Vertical Line Index - standardized



Final Models:
Proportion Positive = YEAR + AWAY + HOOKHRS
ln(CPUE) = YEAR + AREA + AWAY + CREW + AREA*YEAR

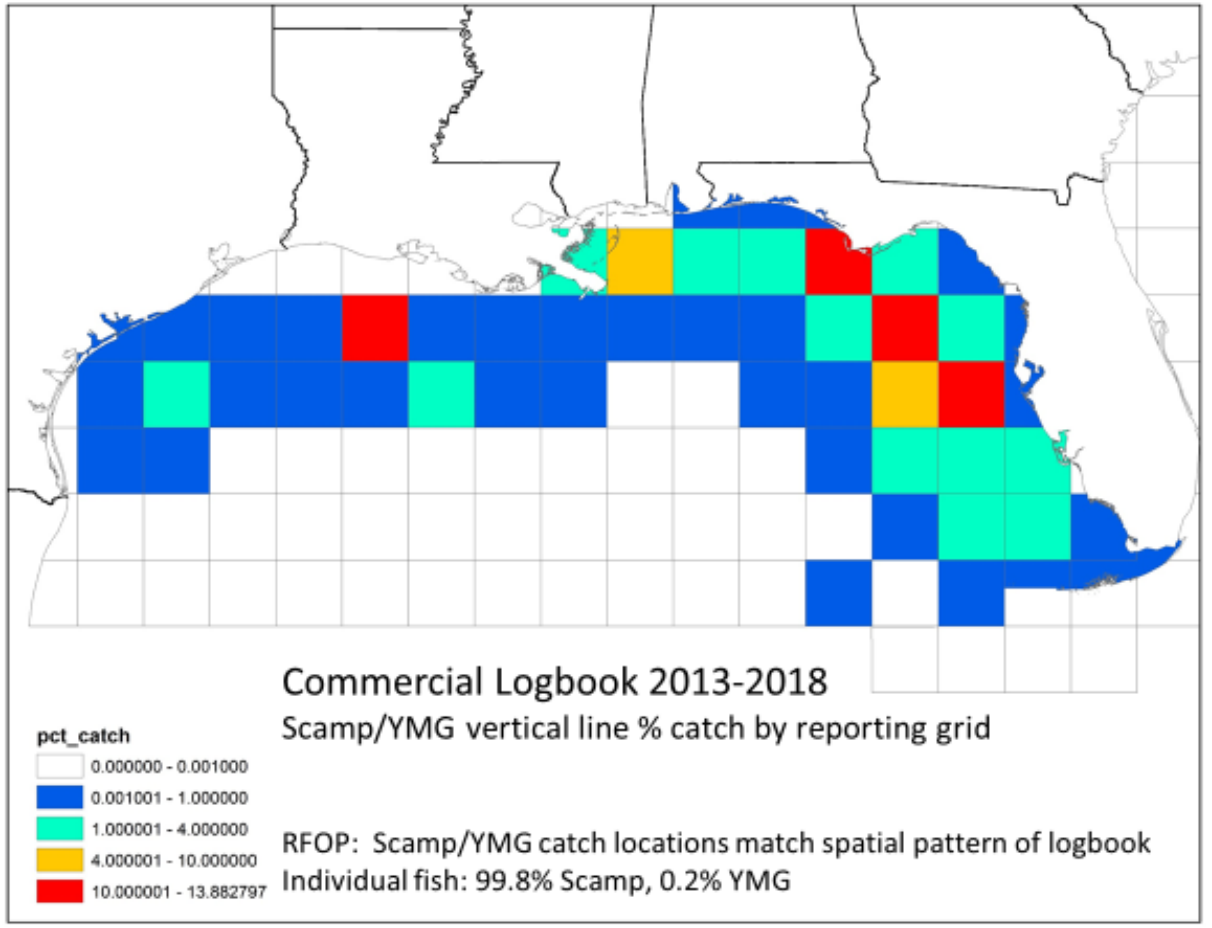
Logbook review and recommendations

- Post-IFQ for both Vertical Line and Longline fisheries
- Significant issues regarding the time series
- Implementation of the IFQ program in 2010 changed the way the fisheries operated by reducing the race to fish
  - Allowed more flexibility in fishing practices (e.g., seasonal targeting or regional targeting depending upon species they have quota for or market prices).
- Changes in catchability may mask true trends in population abundance

- Not recommended for this assessment
- Potential for other datasets to inform post IFQ time period….

Scamp GOM Commercial Abundance Index: Reef Fish Observer Program

- First use of observer data to produce regional index
- Vertical Line Gears
  - 2007-2018
- Analyses show similar patterns to catch as logbooks
- Data include discards as well as landings
- Significant effort to appropriately model CPUE for timeseries



Reef Fish Observer Program: methods summary

Probability Survey Estimation Approach

Main Steps for RFOP Scamp CPUE Index

1. Sample Unit for Vertical Lines
2. Gear Sub-Categories
3. Valid Scamp Sample Units
4. Effort Variable
5. Standardized Effort for Gear Sub-Categories
6. Stratification Variables

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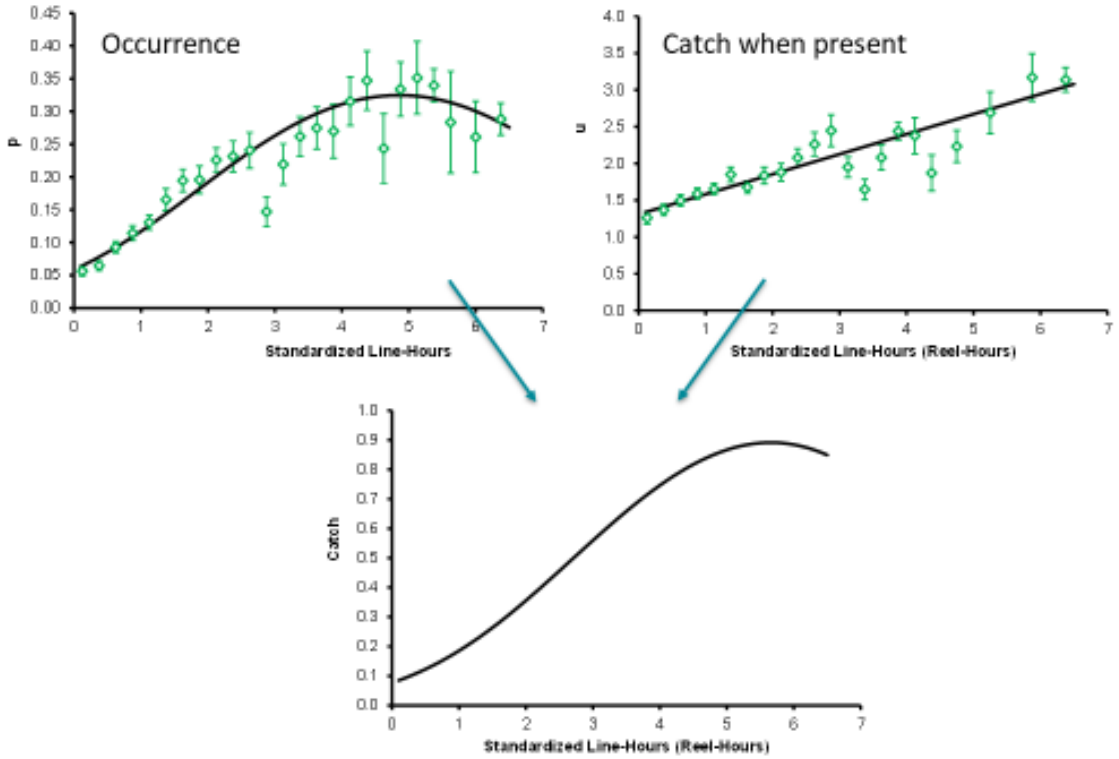
Annual Estimates of Scamp CPUE ± SE

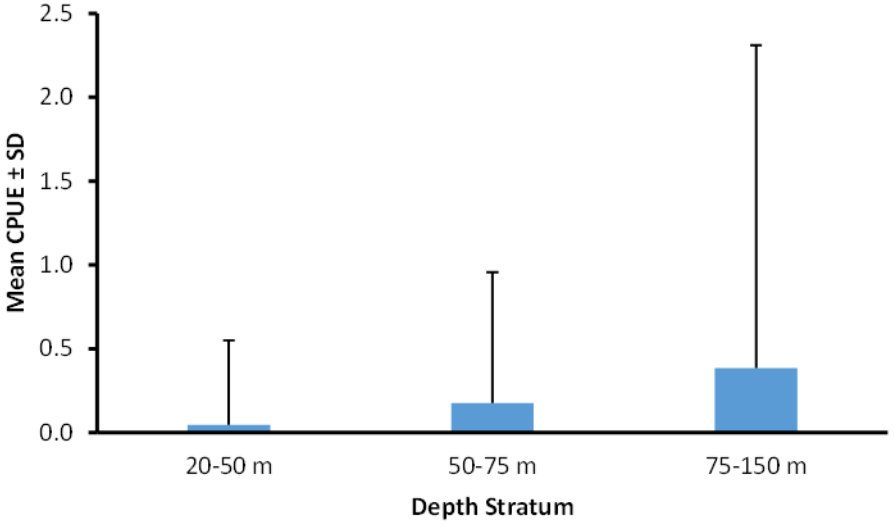
Stratified Random Survey Ratio-of-Means Estimator

Diagnostics #1: Increasing relationship between Y (catch) and X (effort)



Reef Fish Observer Program: methods summary

- Following model stratified by depth
- Design based approach vs. model based



Sampling Assumptions for Regression CPUE Model

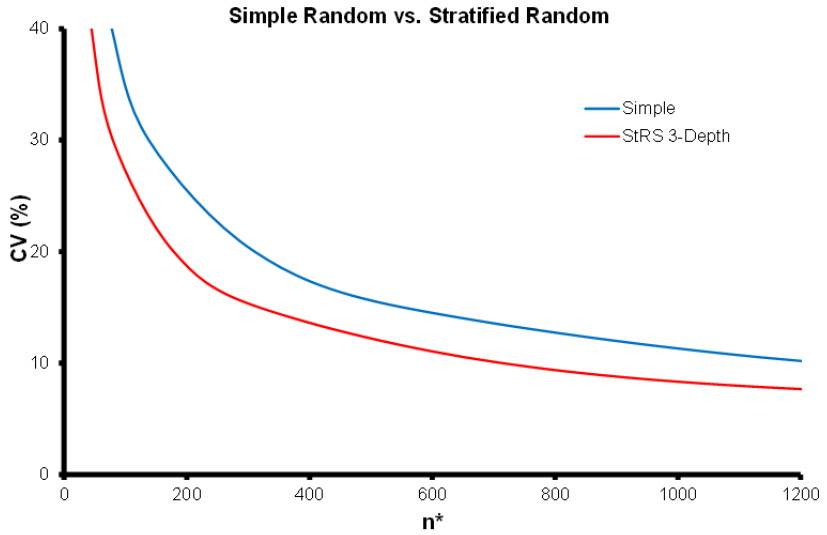
Logistic occurrence and gamma catch when present models:

cont. covariate

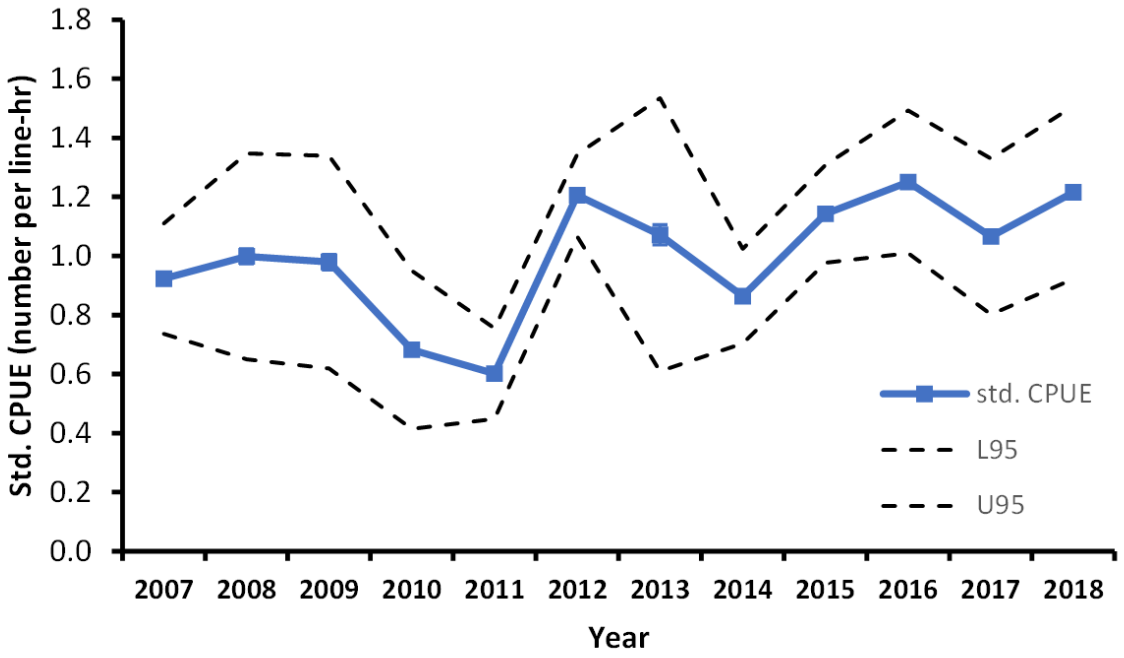
space main effects

Catch = f(effort, year, subregion, depth)

time main effect = annual index



Reef Fish Observer Program: Results



Year	n	Mean Effort	Mean Catch	Nominal CPUE	Relative Index	Lower 95% CI	Upper 95% CI	CV
2007	698	1.9840	0.2638	0.1330	0.923	0.736	1.111	0.103
2008	499	2.3334	0.3354	0.1437	0.998	0.649	1.347	0.178
2009	433	2.0470	0.2887	0.1410	0.979	0.620	1.339	0.187
2010	804	1.7626	0.1732	0.0983	0.682	0.414	0.951	0.200
2011	1431	1.8983	0.1645	0.0866	0.602	0.448	0.756	0.130
2012	3638	1.8437	0.3201	0.1736	1.206	1.066	1.345	0.059
2013	1192	1.6821	0.2596	0.1543	1.072	0.609	1.535	0.220
2014	1167	1.6504	0.2053	0.1244	0.864	0.703	1.024	0.095
2015	2251	1.6900	0.2780	0.1645	1.142	0.976	1.308	0.074
2016	1476	1.7233	0.3104	0.1801	1.251	1.009	1.492	0.098
2017	769	1.7072	0.2620	0.1535	1.066	0.802	1.330	0.126
2018	384	2.0943	0.3663	0.1749	1.215	0.922	1.507	0.123

Reef Fish Observer Program: Discussion

Cons:

- Fishery-Dependent
  --Varying gear characteristics and effort among fishing locations
  --Fisher-selected sampling locations (500x500 m grid cells)

Key Assumption: sample units within a depth stratum can be considered a representative sample of valid scamp habitat grid cells in that depth range.
---In depth discussion regarding habitat selection of Scamp in comparison to independent data

Pros:

- Observer catch obs (kept + discards) are not affected by mgmt. regs.
- Vertical line fishing/observer sampling locations encompass principal geographical and depth range of Scamp in GOM, i.e., stock-wide coverage
- Employed analysis procedures to account for varying gears & effort
- Spatial strata weighting controlled potential bias of stock-wide CPUE due to disproportionate sampling in relation to environmental factors (depth)

Reef Fish Observer Program: Discussion

- Recommended for use in this assessment
  - Consideration of data and methods
  - Coverage, years, accounting for discards
- Significant effort to develop these methods to expand use of observer data and opportunity to illustrate utility in this research track
- Particularly informative given limitations of post-IFQ, fishery-dependent indices
  - Several species and assessments

Final Gulf Indices Comparison