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# Update on Five Shrimp Working Groups

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# (1) Shrimp Fishery Effort Estimation Working Group

## On hold

- Waiting for the final Council/industry decision on a new shrimp effort data collection method (e.g. P-SEA WindPlot and/or another platform)
- Once a new shrimp effort program is established and the data begins transmitting to NMFS, this WG will convene (i.e., we don't want to blindly build/improve a model without all the pieces in place)

## (2) SEAMAP Shrimp Indices Working Group

### Objectives:

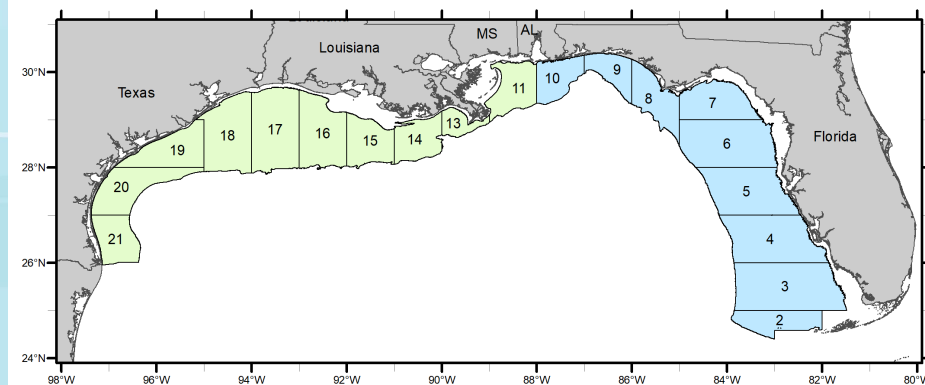
- i. Review the history of the SEAMAP survey, as well as the current shrimp abundance indices, including methodology, data exclusions & survey area utilized
- ii. Verify SEAMAP survey is operating along similar spatial & temporal scales as the fishery
- iii. Explore alternative methods for deriving SEAMAP indices for shrimp
- iv. Determine if SEAMAP is a representative index, and provide best practice & research recommendations

# I. Review the history of the SEAMAP survey

- FIM bottom trawl survey has been conducted annually since 1972 by NMFS, but all surveys were unified under the SEAMAP umbrella in 1987 (see Nichols, 2004 for specifics)
- Since 1987, the SEAMAP survey gear and trawl configurations have remained largely unchanged
- Data from the SEAMAP survey is used to derive FIM indices of abundance for Brown, Pink & White Shrimp (input into stock assessments), for both summer and fall seasons

# I. Review current methodology, data exclusions & survey area

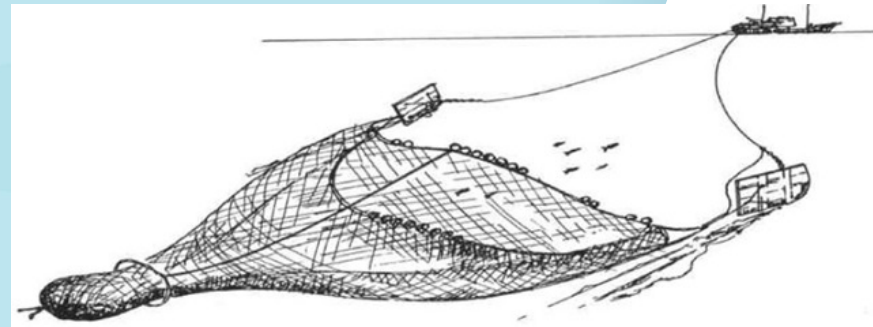
- 1987-2007: spatial coverage of SEAMAP was Brownsville, Texas to Mobile Bay, AL (stat zones 11-21)
- Mods to the survey occurred in 2008+: dropping the time of day stratification; moving to a 30 min tow time (to reduce turtle mortality); & moving to a true stratified random sampling design (by shrimp stat & depth zone)
- In 2008+: new funding allowed for sampling along FL, down to the FL Keys (2008+ stat zones 2-21 are sampled)
- A possible change in catchability was noted in the survey data from 2008+



# I. (Continued) Review current methodology, data exclusions & survey area

The consistent trawl gear and trawl configuration used, includes:

- 12.8 meter, semi-balloon shrimp trawl with a 12.8 meter headrope and wooden doors
- Trawling speeds of 2.5-3 knots
- No TED or BRD being used





# I. (Continued) Review methodology, data exclusions & survey area

- ❖ A delta-lognormal model (DLN) is used to derive relative abundance indices for Brown, White and Pink Shrimp. The data included in each species-specific model:

- ❖ Brown Shrimp:

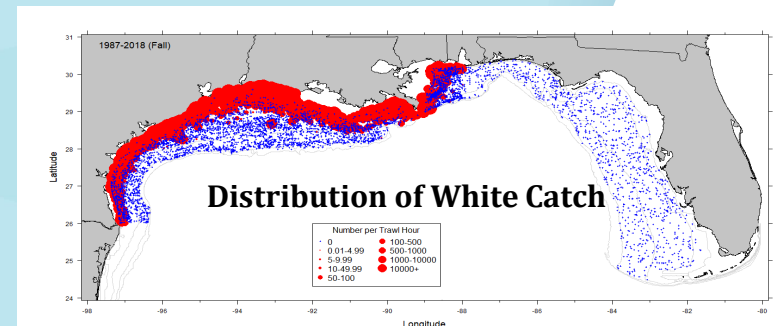
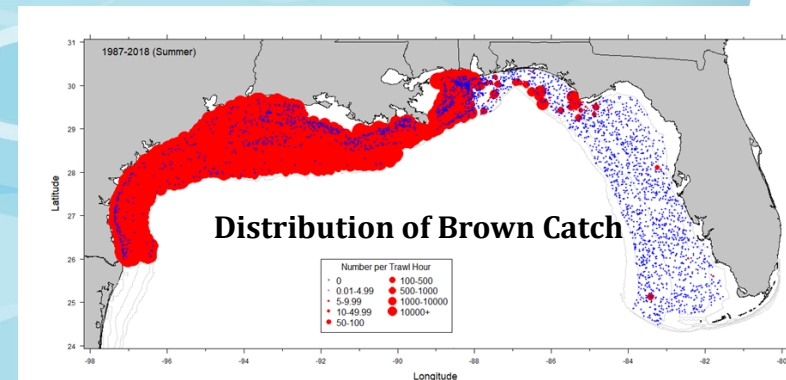
- 1987-2008: stat zones 11-21
- 2009+: 8-21
- Depth range: 9-110 meters

- ❖ White Shrimp:

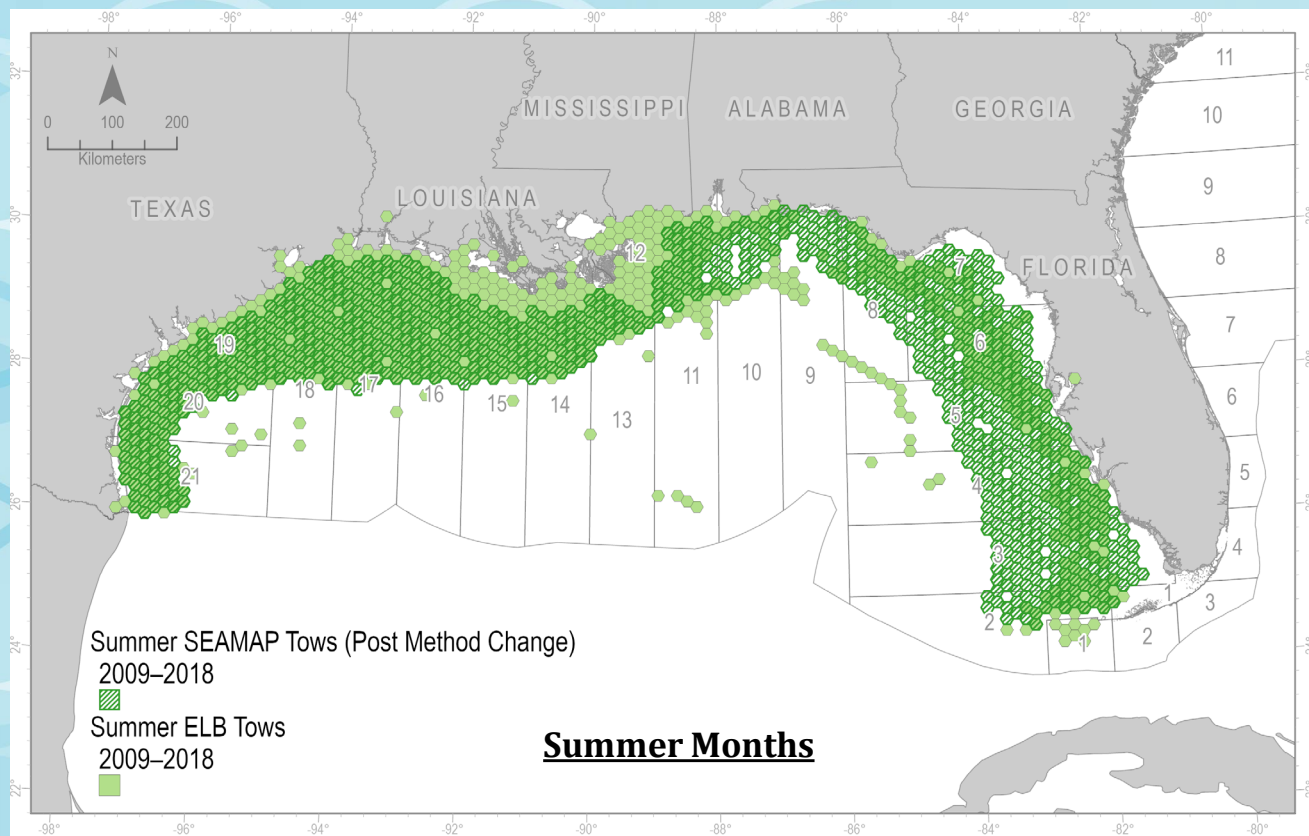
- 1987+: stat zones 11-21
- Limited to depths <25 fathoms (little to no white shrimp beyond 25 fathoms, as shown ➡)

- ❖ Pink Shrimp:

- 2010+: stat zones 2-11 (WFS)

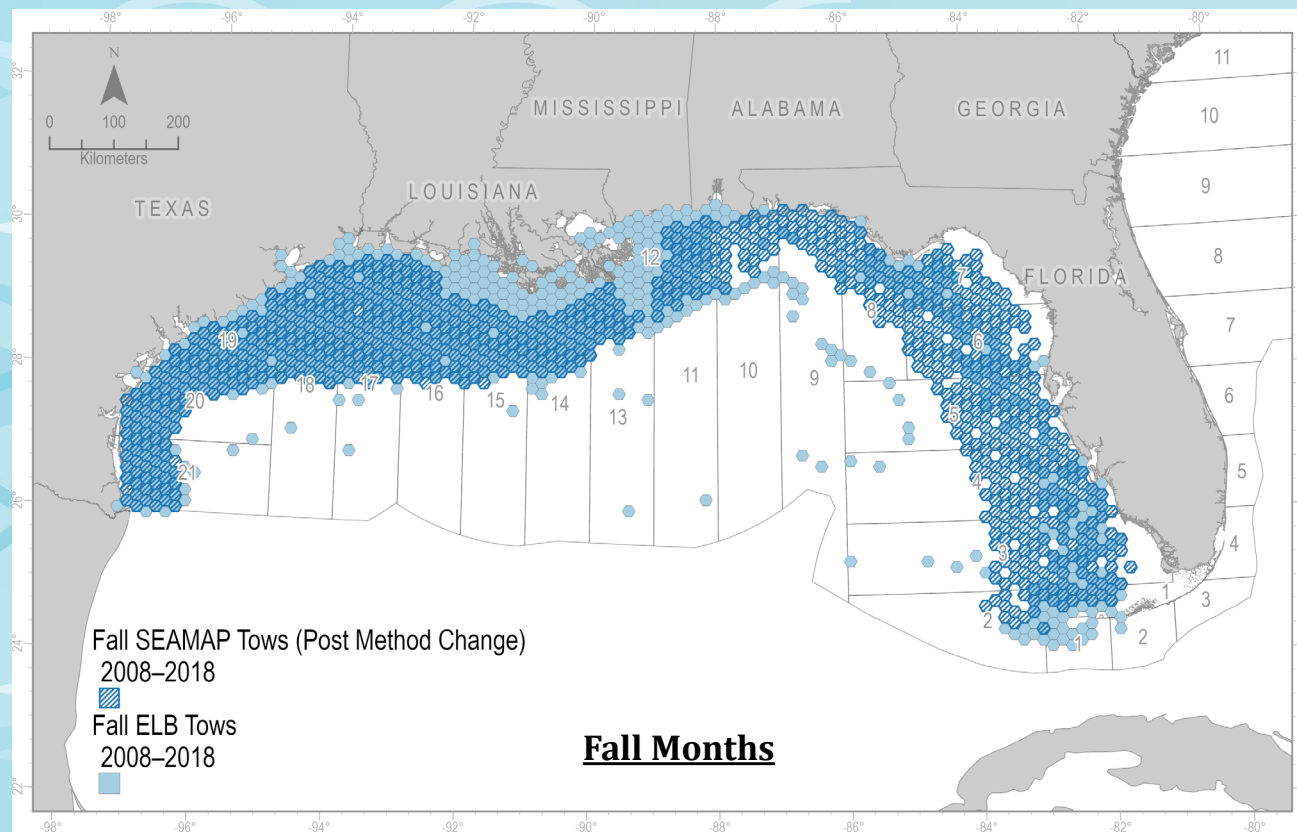


## II. Verify spatial & temporal overlap of survey and fishery





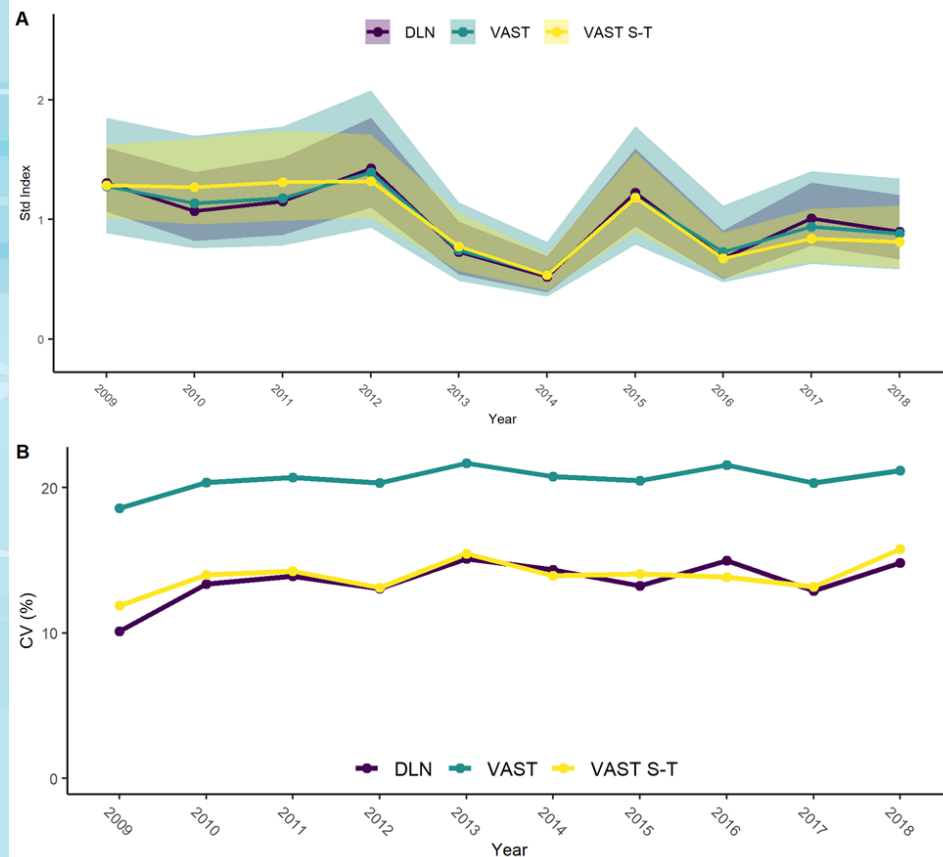
## II. Verify spatial & temporal overlap of survey and fishery



# III. Explore alternative methods: (1) VAST

- ❖ VAST predicts variation in abundance across space, time & categories (species, size) & then predicts total abundance across spatial domain (Thornson, 2019)
- ❖ Advantages: improved prediction for data poor areas, ability to weight abundance by area, estimation of range shifts, etc.
- ❖ No significant deviations from DLN observed among species

Brown Shrimp: New Design Statistical Zones 21 to 8 from 5 to 60 fm



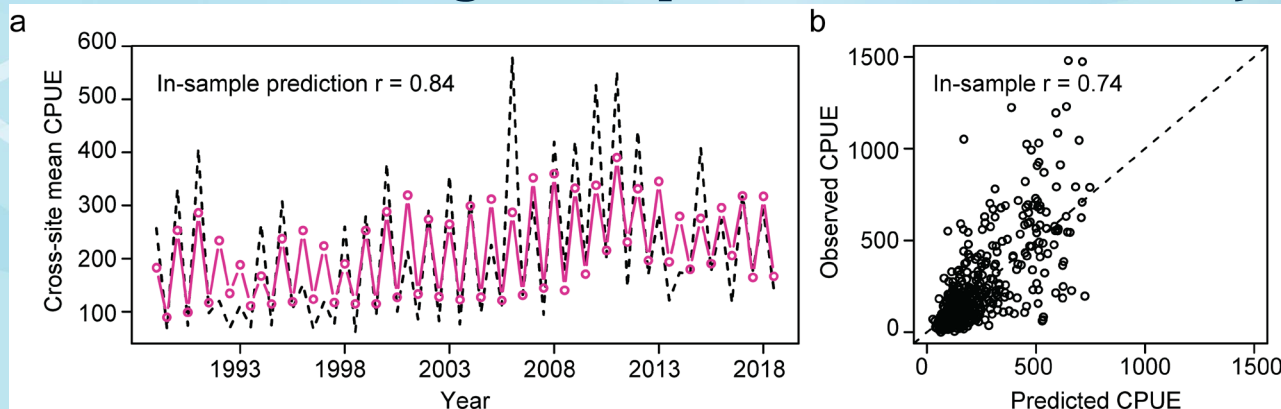
# III. Explore alternative methods:

## (2) Empirical Dynamic Modeling

- ❖ Empirical Dynamic Modeling (EDM) is an 'equation-free' inference tool that allows model predictions to be based on nonlinear dynamics, which are often incompletely observed in reality, but can be extracted from the time series itself

### Advantages:

- Track annual changes in stock dynamics using one data source – SEAMAP (potentially more efficient, given the technical concerns among shrimp assessment models)



# (Continued)

## Advantages of EDM

- EDM can readily incorporate environmental driver(s) (e.g. temperature) ∴ EBFM for shrimp
- Provides the ability to forecast 1 year ahead ∴ allowing NMFS to provide managers and stakeholders with more timely information (recall: currently the assessments provide stock status information at a 2 year lag)
- Forecasts would have associated uncertainty bounds, by incorporating uncertainty around forecasted environmental state variables (i.e., providing forecasts with associated error ranges around point estimates)
- Use EDM predictions (based on SEAMAP sample locations) to explore any spatial/temporal dynamics of the stocks





# IV. Determine if SEAMAP is representative; provide best practice & research recommendations

- ❖ SEAMAP survey determined to be a representative index of abundance by TWG participants for Brown, Pink and White Shrimp ✓
- ❖ Best Practice recommendations: ✓
  - For now, use split index for Brown and White, to account for possible change in catchability 2008+ (1987-2008 & a 2009+ summer & fall index)
  - Limit white shrimp index to < 25 fathoms
  - Just use 2010+ & summer survey for Pink Shrimp
  - Research recommendations: ✓
    - Continue exploring: scaling issue in indices pre & post-2008 changes; EDM & VAST



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# (3) Shrimp Life History & Environmental Data WG

## Objectives:

- i. Collate Gulf state inshore survey data to (attempt to) update life history parameter estimates (e.g. length freq. -> growth & natural mortality)
- ii. Collate in situ and/or literature-based environmental data, for future SA improvements
- iii. Attempt to update stock assessment growth parameters, while simultaneously evaluating the spatial & temporal distributions of the stocks (to better represent any variability in catchability)



# I-II. Collate inshore survey and in-situ environmental data

Received inshore survey & in-situ environmental data from 4 state partners:

- i. Texas ☒
- ii. Mississippi ☒
- iii. Louisiana ☒
- iv. Florida ☒

Thank you 😊



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# III. Attempt to update life history parameters (shrimp assessment model input data)

## Developing length frequencies with state data

### FL Pink Shrimp:

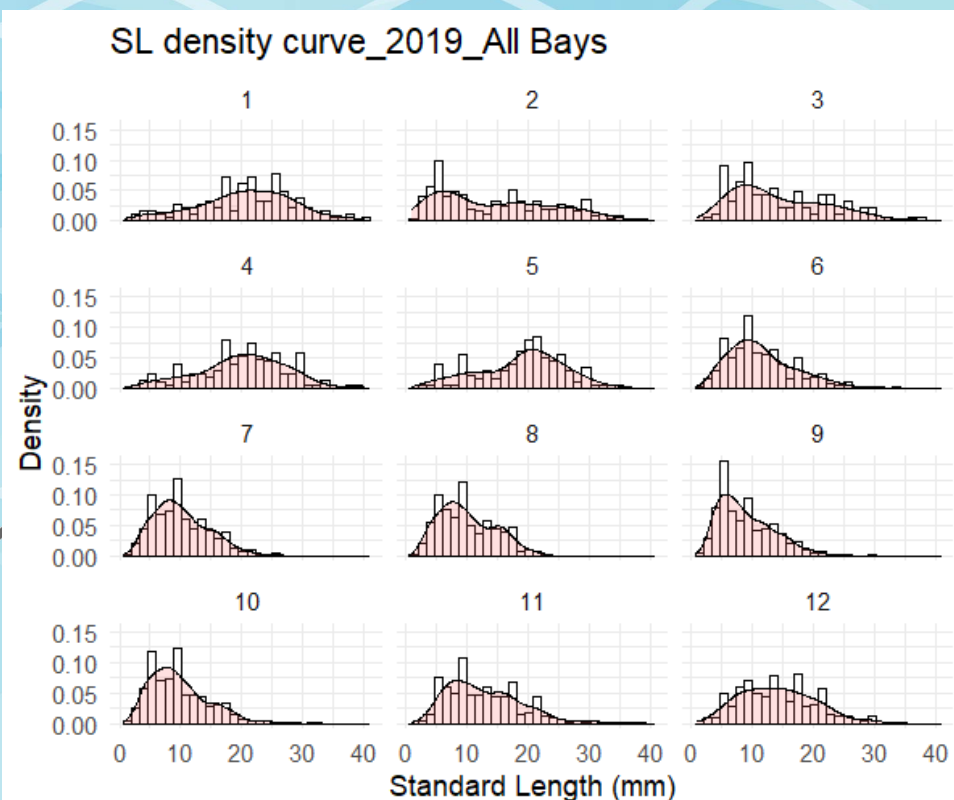
- All Bays Combined
- 2019
- Monthly

i. Florida ☒

ii. Mississippi ☒

iii. Texas

iv. Louisiana



# (4) Shrimp Catch Estimation Working Group (D. Gloeckner)

## Objectives:

- i. Revisit Value Stream Mapping process for shrimp data (i.e., an outline of data processing at SEFSC for trip tickets and Gulf Shrimp data)
- ii. Work with NMFS Office of Science & Technology to alter due data for the Fisheries of the US publication
- iii. Update Commission participants about need for more timely shrimp landings information
- iv. Hold data workshop to assess the best source of landings information for use in management

## I-IV. Catch Estimation WG

All objectives completed (see Catch Estimation WG Report):



- WG met 9/04/20 to discuss shrimp data collection processes
- WG deemed port agent data collection is duplicative to the mandatory state trip ticket data collection
- $\therefore$  Trip tickets are the most complete source of landings data



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# I-IV. Catch Estimation WG

Although trip tickets are the most complete source of landings data, quality & timeliness issues still remain:

- Primary timeliness issue is that data is often received at 3 month lag
- Primary data quality issues are that vessel ID and/or shrimp size fields are not being consistently reported on the state trip tickets
- These issues could be improved by adding Gulf shrimp dealers to the GSAD permit (require weekly reporting)

MARINE FISHERIES TRIP TICKET			
VESSEL ID		SPECIES	AMOUNT OF CATCH
Code	Size	Grade	
			.
			.
			.
			.

TRIP START DATE  
\_\_\_\_/\_\_\_\_/\_\_\_\_

UNLOADING DATE  
\_\_\_\_/\_\_\_\_/\_\_\_\_



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# I-IV. Catch Estimation WG

## Path to Improvements:

- SEFSC presented the timeliness and quality concerns at the GSMFC TCC Data Management meeting on 9/10/20.
- At that time, the Gulf State reps agreed to work with NMFS to reduce the data lag time down to 2 months, and/or to work with NMFS to develop estimation methods for any incomplete data

GOOD



GREAT



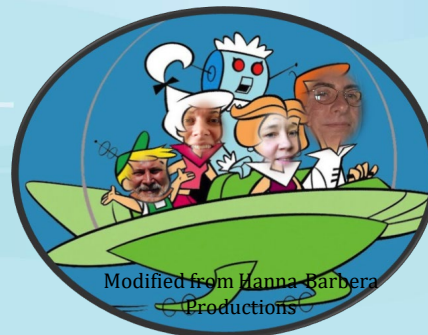
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# I-IV. Catch Estimation WG

## For the future:

- All shrimp assessments and analytical outputs will be based on state trip ticket data (& no longer on port agent data)
- NMFS will continue to work with Gulf States to improve data quality and timeliness issues



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# (5) Shrimp Bycatch Estimation Working Group (X. Zhang)

## Objectives:

- i. Review the draft report from the 2017 Workshop to Evaluate Data Inputs and Methods for Estimating Reef Fish Bycatch in the Gulf of Mexico Shrimp Fishery
- ii. Develop best-practice guidance, documenting & justifying any revisions to the previous working groups' recommendations and conclusions, as needed

# I.

## Review Draft Report

### Progress to date:

- Making use of the variety of expertise, the WG successfully accomplished the first primary objective through a series of 2-hour webinars, where the WG reviewed data inputs and methods currently used for the estimation of shrimp bycatch (from the 2017 Workshop Report)
- The WG participants generally agreed that both the current bycatch models and data inputs need to be fully evaluated
- Thus, to be more effective, two smaller and more focused sub-working groups were formed: Xinsheng, Shannon and several SFD staff are working with Dr. Beth Babcock to evaluate the bycatch model itself, and myself & some SEFSC colleagues are reviewing the data inputs
- Sub-WGs intend to report back to whole WG



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# I. (Continued) Review Draft Report

## Also documenting issues w/ the Bycatch Model:

- So far, noting that the quality of catch data for species like grey triggerfish may not be acceptable for bycatch estimation, because observers are recording these as “finfish” rather than to the species level
- It may be more practical to divide the full time series into 2-3 distinct periods (e.g. historical, voluntary-observer and mandatory-observer), so that these time periods could be treated differently in the model
- SEAMAP data should only be used for the time period where observer coverage is lacking; otherwise it may introduce bias in years adequately covered by the observer program





## **(Continued) documenting issues w/ the Bycatch Model:**

- The bycatch model appears to be sensitive to some priors, which is likely a result of the bycatch model trying to estimate too many parameters for rare and data poor species
- Also, the model sub-WG has determined that the bycatch model needs to go through a more detailed, technical review than is currently possible
- The data sub-WG is reviewing input data, and will then evaluate whether it is appropriate to estimate bycatch using catch information from the observer program with fishery reported effort (coming from ELBs and state trip ticket data)



## II. Develop Best Practice Guidelines

- Progress towards the second primary objective is slow (given to the lack of dedicated staff time), but is certainly moving us in the right direction
- The WG leads have informed Center leadership of the need to have a dedicated bycatch person, whose main job duty is bycatch estimation (shrimp, longline, gillnet, logbooks, etc., to be most effective in meeting these objectives)
- However, until someone is brought on to fill this role, the sub-WGs will continue progressing slowly to document model diagnostics and any data issues, and then updating the whole WG as appropriate





Two large, cooked shrimp are arranged on a dark, textured background to form a heart shape. The shrimp are a vibrant orange-pink color, indicating they are cooked. Their long antennae extend downwards from the heart's base. The text "Thanks to everyone involved!" is overlaid in white, serif font across the center of the heart.

Thanks to  
everyone  
involved!