

Stop-gap approach for estimating Gray Triggerfish shrimp trawl bycatch

Cheston Peterson¹, Steve Smith¹

Assistant Scientist

¹CIMAS, University of Miami
ctp2849@miami.edu



UNIVERSITY OF MIAMI
COOPERATIVE INSTITUTE
for MARINE & ATMOSPHERIC
STUDIES



Problem statement

- Some species are not quantified in the observer program (e.g. Gray Triggerfish) meaning the improved shrimp bycatch method developed for Red Snapper is not a suitable approach.
- SEAMAP data is a poor substitute for bycatch estimation due to differences in gear, tow times, and habitats sampled.
- The forthcoming assessment of Gray Triggerfish this year requires an alternative approach to estimate bycatch from the shrimp fleet.
- As a stop-gap measure, prior to field calibration experiments, we suggest estimating bycatch using proxy species in the observer data, determined through co-occurrence analysis of SEAMAP trawl data limited to samples with gear and habitat matching commercial shrimp operations.

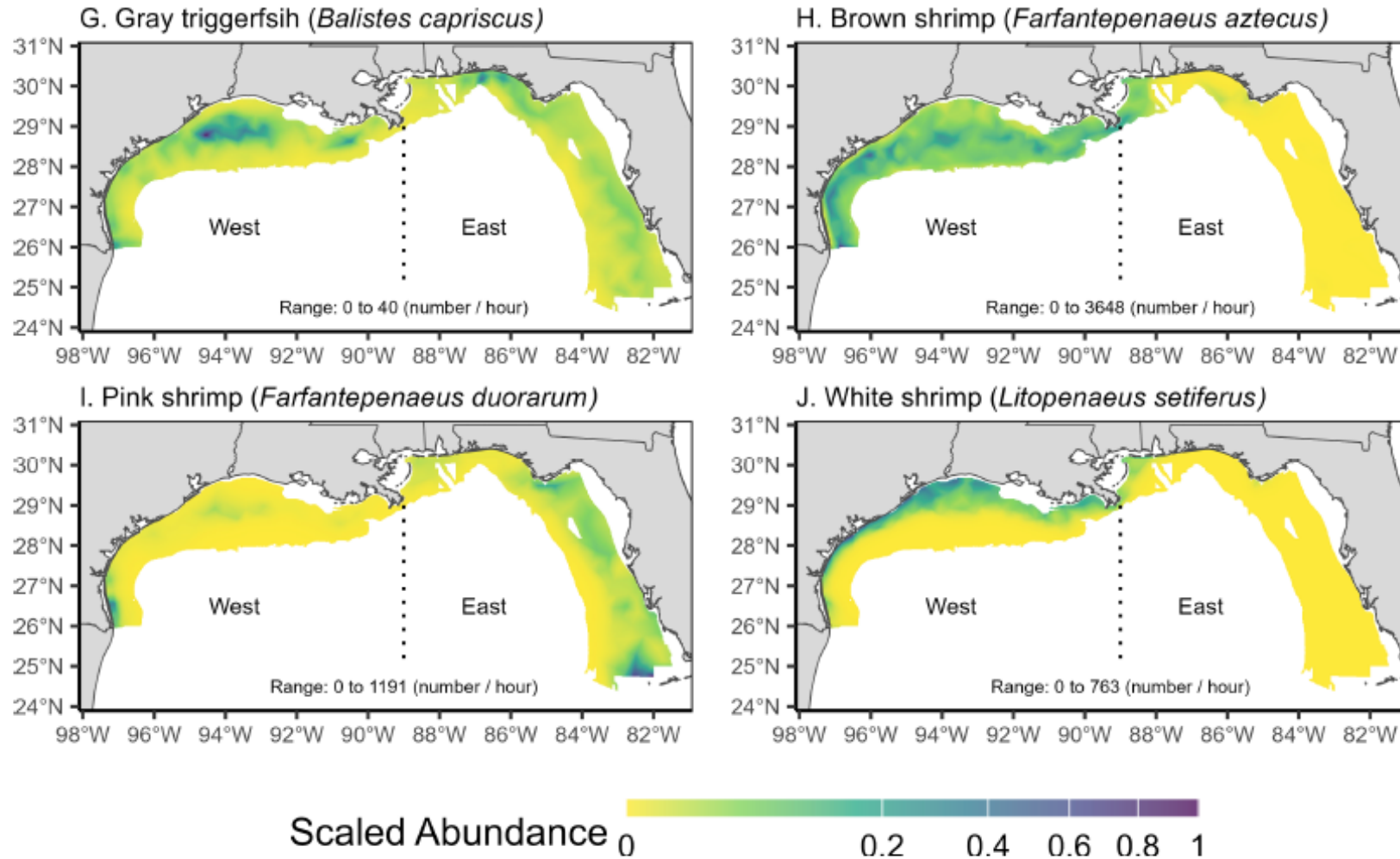


FIGURE 8

(A-J) Scaled abundance (0 to 1 with respect to the maximum catch rates in number per hour) of selected species captured during Southeast Area Monitoring and Assessment Program (SEAMAP) Summer and Fall Shrimp/Groundfish Surveys from 2010 – 2022. The range of catch rates are listed for each species in their respective panel.

Task 1

- **Prepare SEAMAP Analysis-Ready Dataset:**

- Filter SEAMAP data to only include tows fishing in habitat representative of where the shrimp fleet operates. This involves using existing habitat maps and fisheries sampling data to delineate SEAMAP tows on soft-bottom or reef/hard-bottom habitat.

- Existing data sets for use in Task 1:

- SEAMAP catch data - catch indicators of habitat (e.g. octocorals for reef/hard-bottom, shrimp catch rates for soft-bottom).
- Vertical line observer program - sets are associated with 500 m² grid cells can be cross-matched with SEAMAP tow tracks for indicators of habitat
- Shrimp fleet VMS effort data (2007-2023)

Task 2

- **Co-occurrence Analysis:**

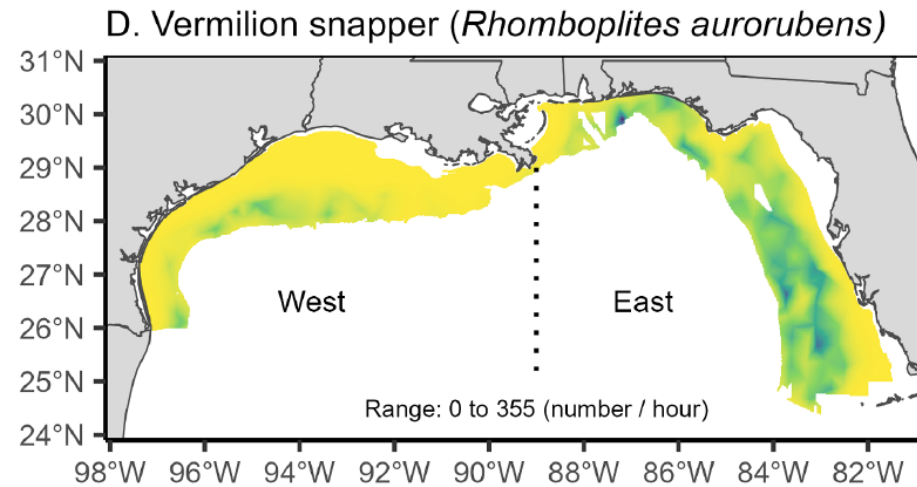
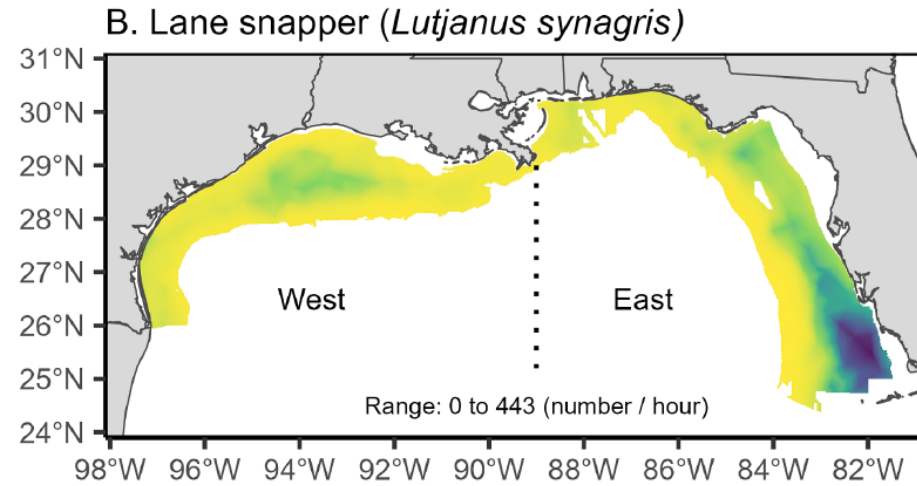
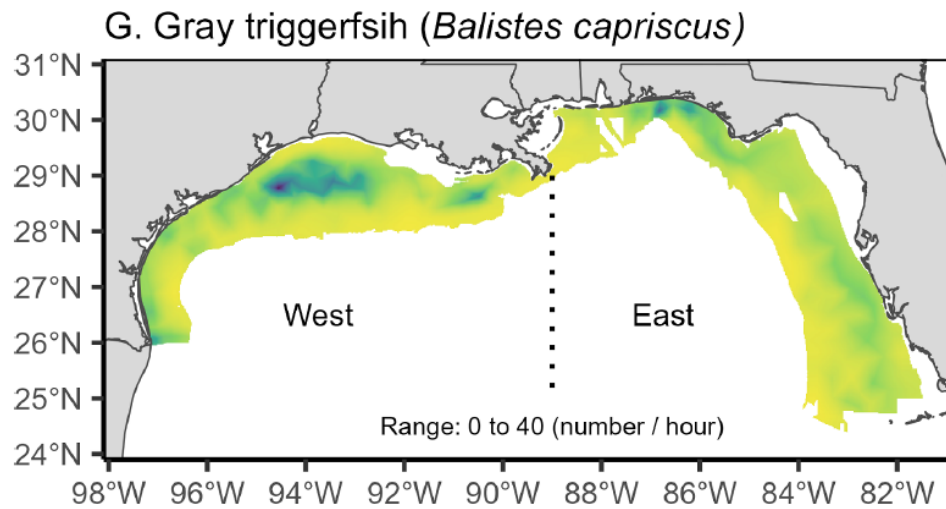
- Use filtered SEAMAP data to determine associations between Gray Triggerfish and co-occurring species to identify proxy species for bycatch estimation.
 - A suitable proxy would be positively associated and consistently co-occur with Gray Triggerfish and be among those quantified on observer trips.
 - Co-occurrence analysis allows for blocking (e.g. location/region, depth, season) to examine spatial/temporal co-occurrence. Stratum-level bycatch estimation allows for use of multiple proxies if associations are spatio-temporally variable.
 - Potential proxy species consistently collected by observers include Lane Snapper and Vermillion Snapper

Example results of co-occurrence analysis from previous research (Reef vertical line, 'Target' species - Scamp)

Family/Group	Species	East GOM			West GOM		
		20-55 m	55-100 m	100-150 m	20-55 m	55-100 m	100-150 m
Groupers	Gag	Green					
	Yellowedge Grouper			Green			Green
	Red Grouper	Green					
	Graysby	Green					
	Speckled Hind			Green			
	Spanish Flag		Green				
	Snowy Grouper			Yellow			
	Snappers	Red Snapper	Yellow	Green			Yellow
Vermilion Snapper		Green	Yellow			Green	Green
Blackfin Snapper						Green	
Gray Snapper		Green	Yellow			Yellow	
Lane Snapper		Yellow			Green	Yellow	
Grunts	White Grunt	Green					
	Tomtate	Yellow				Yellow	
Porgies	Red Porgy	Green				Green	
	Knobbed Porgy	Green					
	Jolthead Porgy	Green	Yellow				
	Saucereye Porgy	Green					
	Littlehead Porgy	Green					

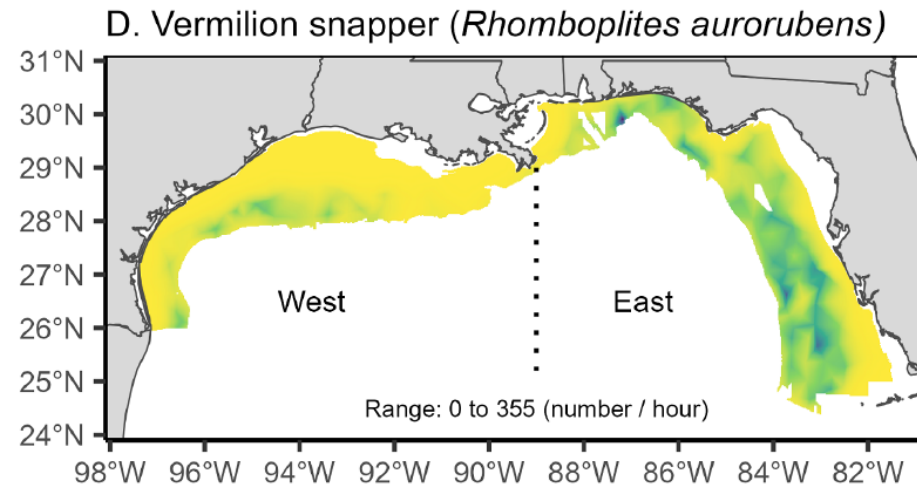
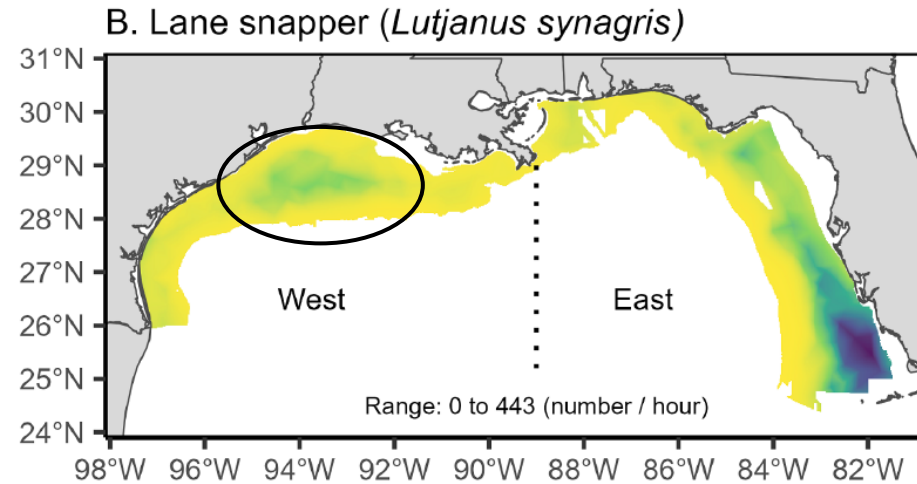
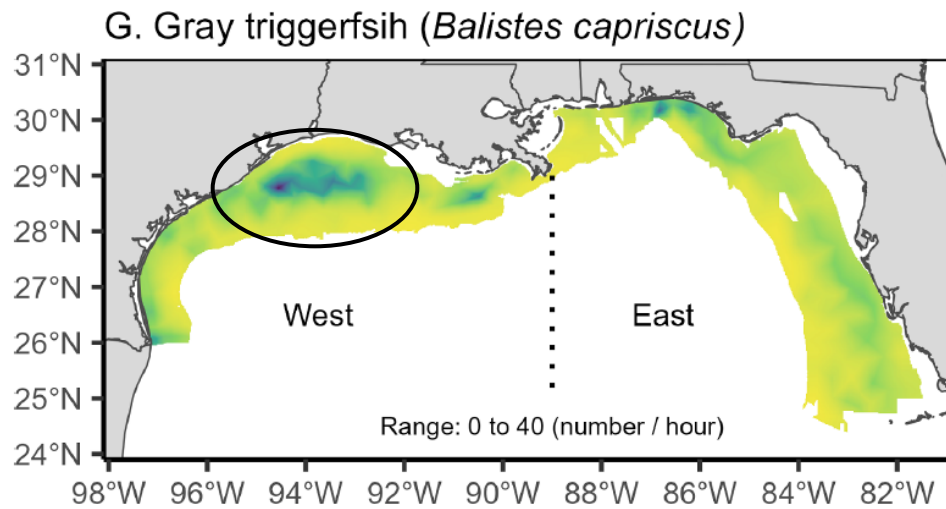
Task 2

- Potential proxy species



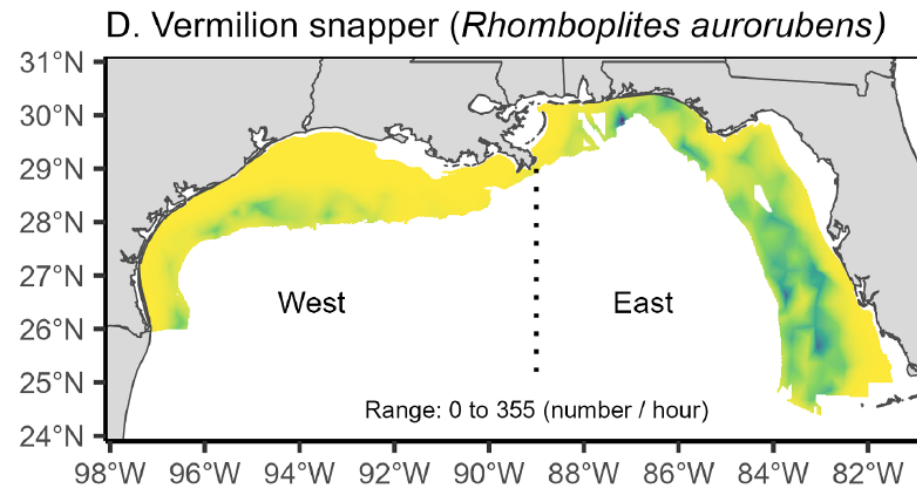
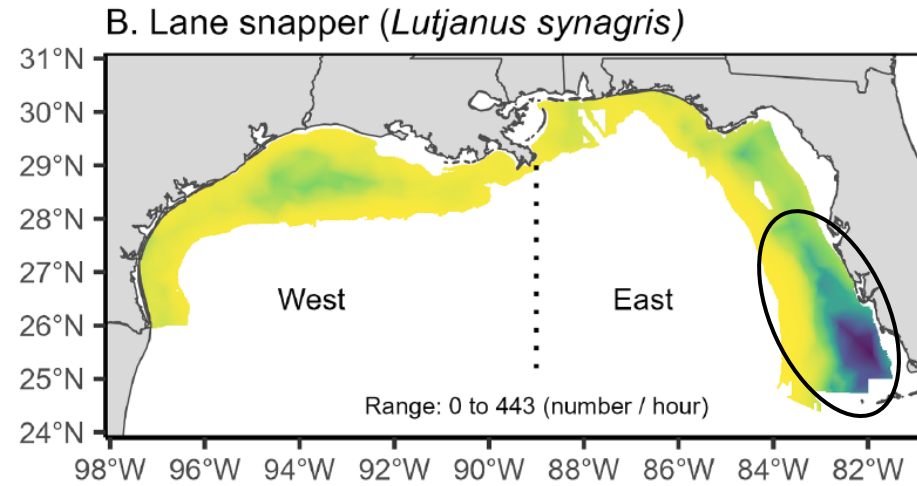
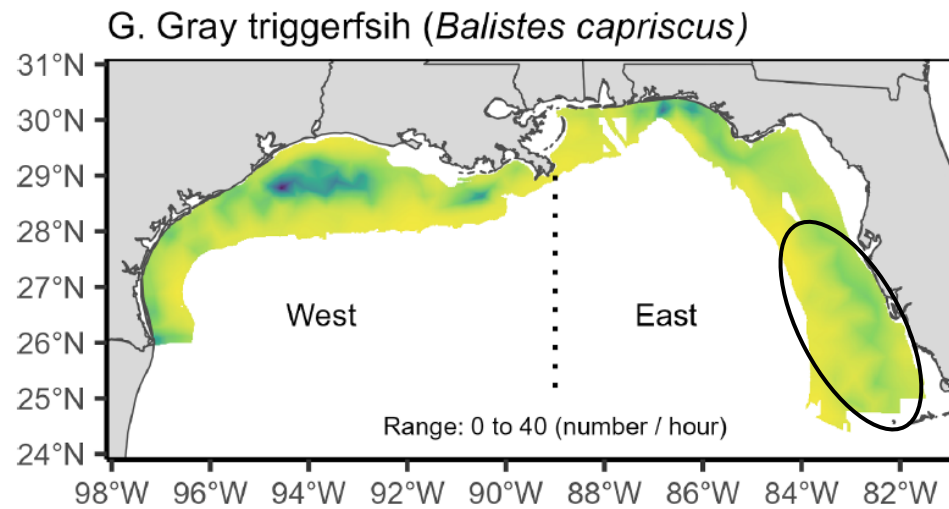
Task 2

- Potential proxy species



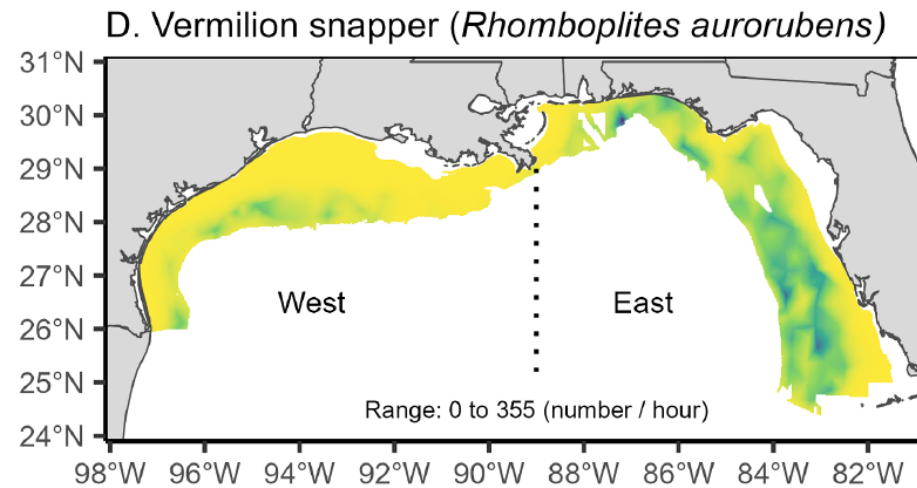
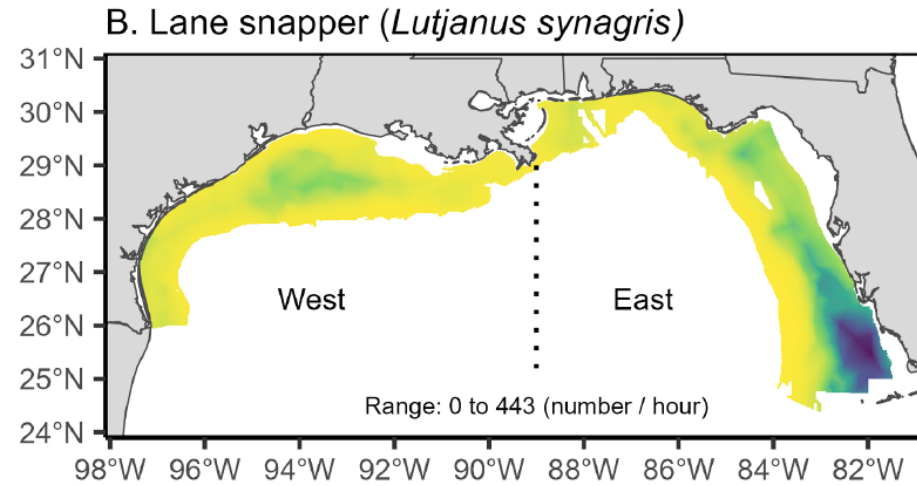
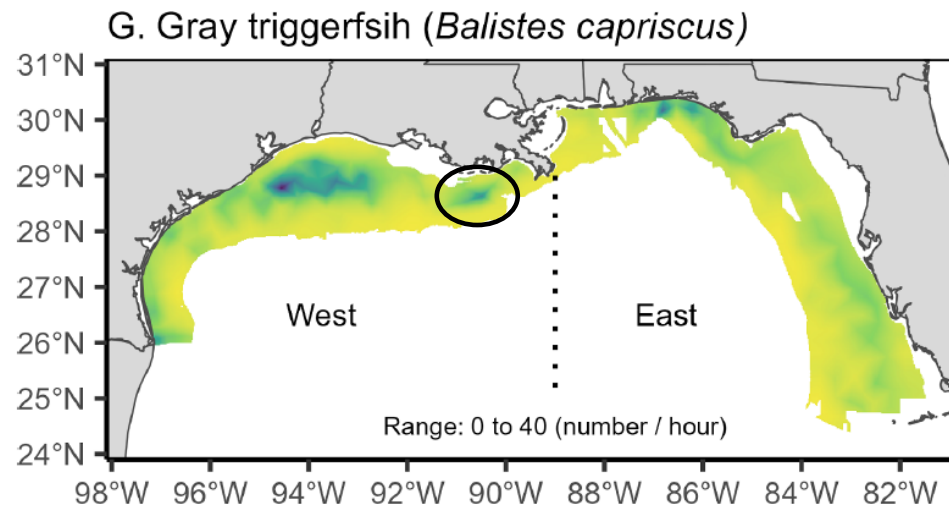
Task 2

- Potential proxy species



Task 2

- Potential proxy species



Task 3

- **Bycatch Estimation of Proxy Species:**

- Conduct bycatch estimation using proxy species for Gray Triggerfish at necessary strata levels.
 - Use shrimp observer data using either the method developed for red snapper or that used for data-limited species.
 - SEAMAP data would be used to calculate a calibration factor to adjust the bycatch estimates of the proxy species to Gray Triggerfish.

Timeline

- The proposed tasks will [hopefully] be completed by the Gray Triggerfish data workshop at the end of August 2025.
- Task 1 is ongoing, expected completion in June.
- Tasks 2 & 3 should take 1-2 months using streamlined and generalized R code, assuming suitable proxy species can be identified.