

Species Specific Shrimp Effort Estimation

Presentation to: Gulf Shrimp Bycatch Workgroup

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Rationale/Assumptions

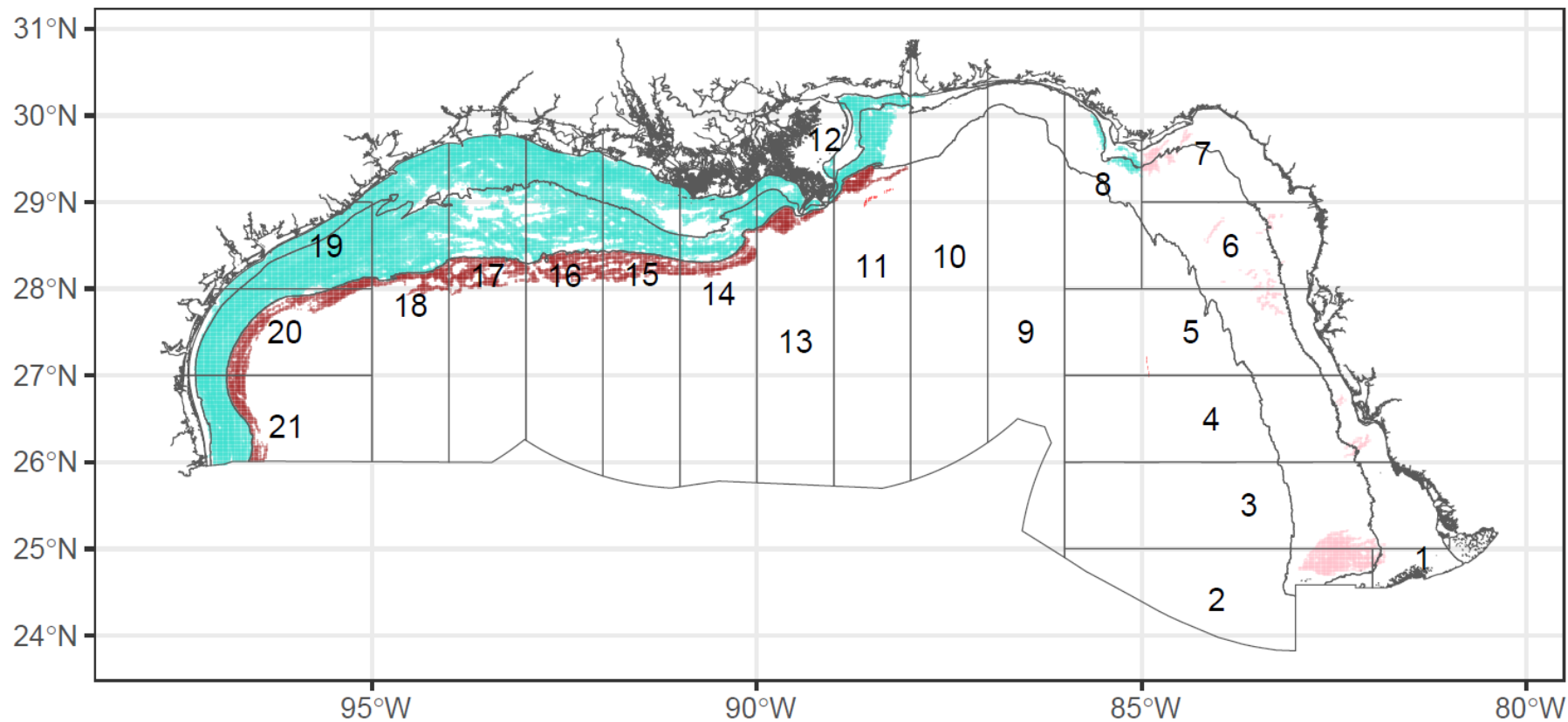
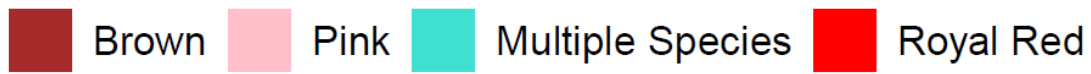
- Use fishery independent SEAMAP data to determine species distributions in space and time at finest possible scale
- Pair with fishery dependent ELB data to statistically apportion targeted effort
- Species specific effort sums to the total effort (NOT comparable with previous estimates where effort does not sum to the total)

Assumptions:

- There have been no systematic shifts in relative habitat use patterns among the Penaeid species across the duration of the SEAMAP survey (generally supported by the data; allows aggregation over years to better estimate sparse cells)
- Only three Penaeids (brown, pink, white) and royal reds are being explicitly targeted

Trip ticket reported offshore landings, 2016-2024

| COMMON NAME | TAIL WEIGHT (lbs.) | PERCENT |
|-----------------|--------------------|---------|
| BROWN | 279,069,546 | 45.7 |
| WHITE | 259,670,203 | 42.5 |
| PINK | 69,496,744 | 11.4 |
| ROCK | 1,053,366 | 0.2 |
| ROYAL RED | 865,932 | 0.1 |
| PENAEOID | 573,455 | 0.1 |
| ATLANTIC SEABOB | 454,217 | 0.1 |
| ROUGHNECK | Conf. | -- |



Process

1. Penaeid ELB effort isolated from royal red (>100 fm)
2. All Penaeid effort in stat zones 1-7 (W. FL) defined as pink
3. All Penaeid effort in stat zones 8-21 (Northern Gulf) and deeper than 30 fm defined as brown
4. Penaeid effort in stat zones 8-21 and shallower than 30 fm proportioned according to relative weights of brown/pink/white in SEAMAP data (1987-2024) by:
 - Season*
 - Stat zone**
 - Depth zone (0-10 fm, 10-30 fm, 30+ fm)***
 - Time of day (D/N based on sunrise/sunset)

*SEAMAP survey only occurs in summer and fall, therefore summer and fall proportions are averaged within stratum cells and used as winter proportions

**Stat zones 8-10 and 11-12 are combined due to limited data

***SEAMAP survey has 5 fm minimum depth

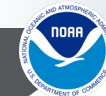
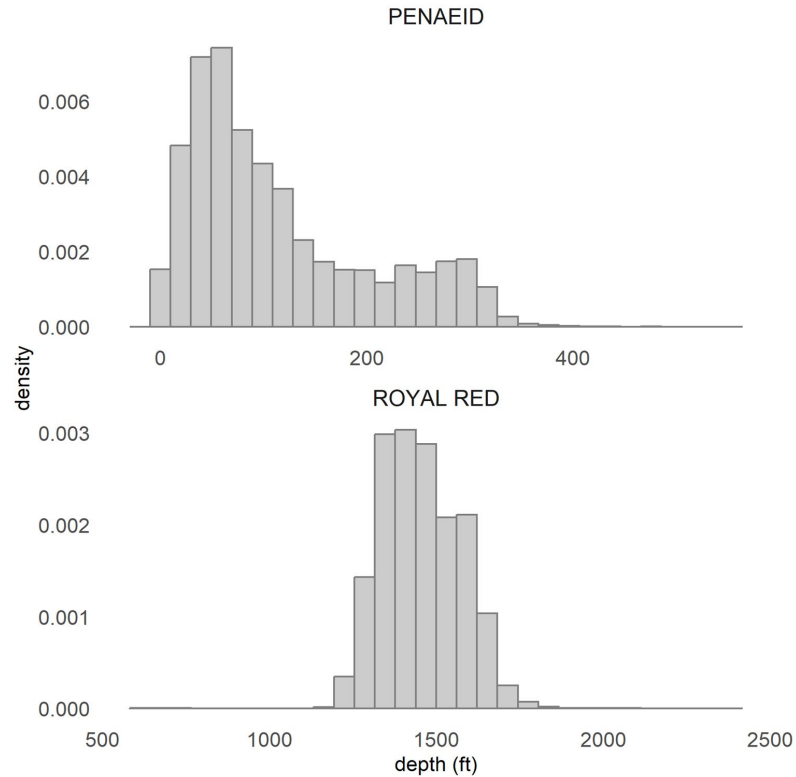


Why SEAMAP over trip ticket?

- Trip tickets are not reported at sufficient spatial and temporal resolution to capture variables that are important to predicting species distribution
 - Single stat zone reported for trips spanning many (e.g., 30+) days and multiple stat zones
 - No depth information
 - No time of day information
- Species not always reported as completely and accurately on trip tickets (e.g., sometimes mixed species trips are reported as single species)
- SEAMAP runs 30 minute tows, allowing relative species abundances to be derived at a much finer scale

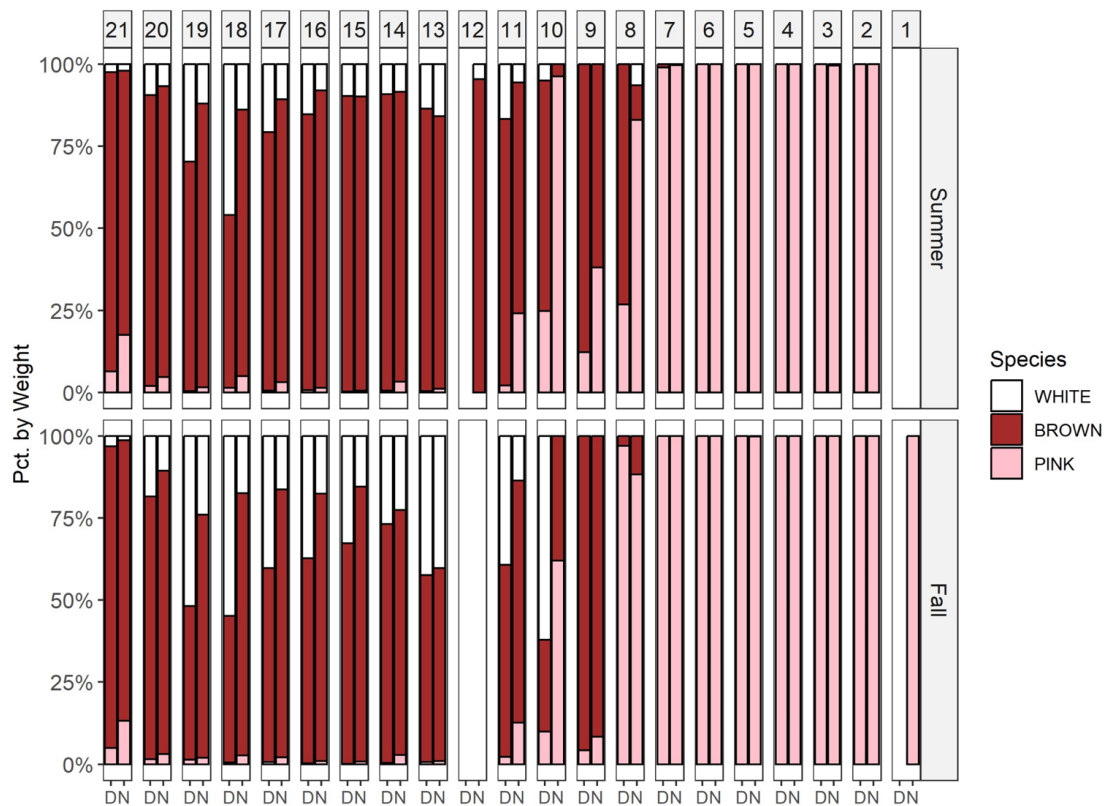


1. Isolation of royal red effort

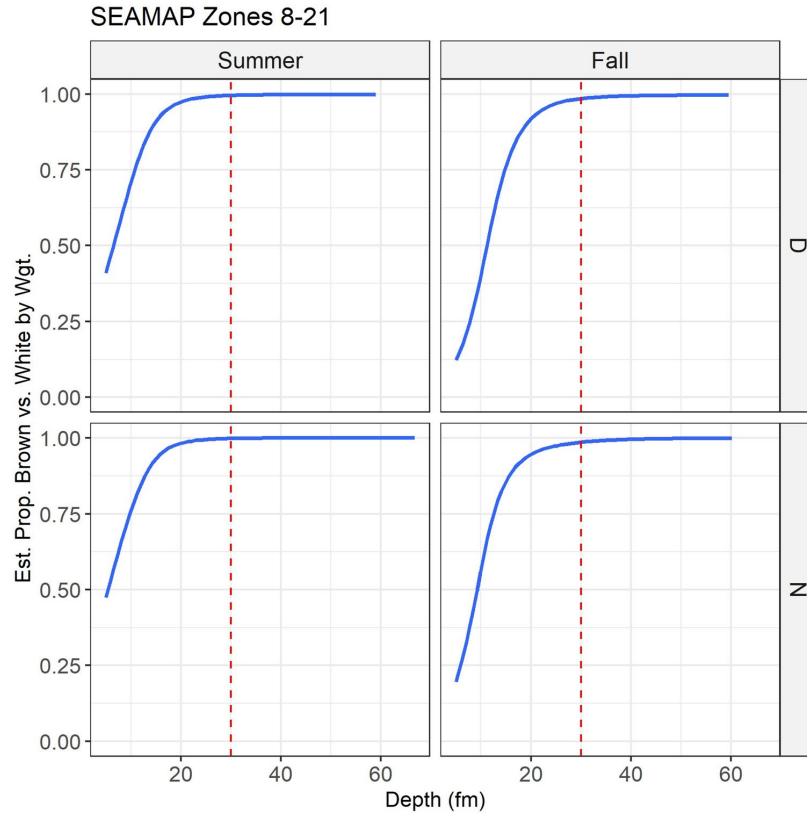


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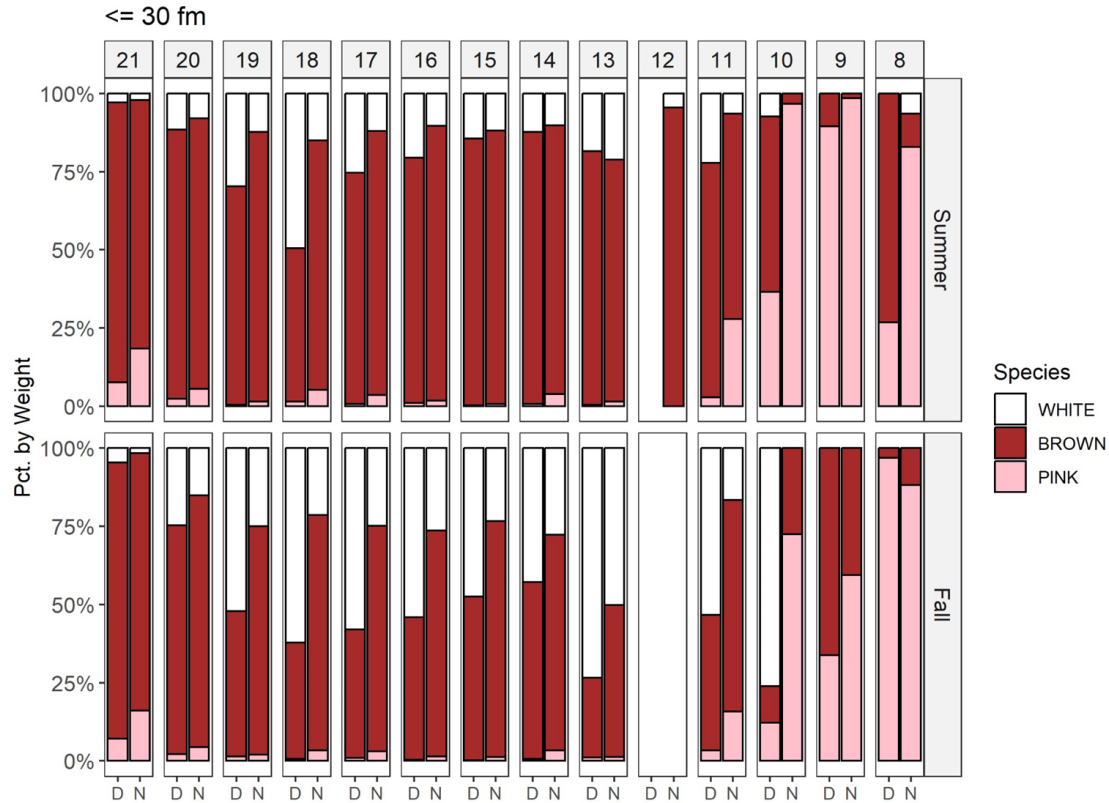
2. Isolation in pink shrimp effort in zones 1-7



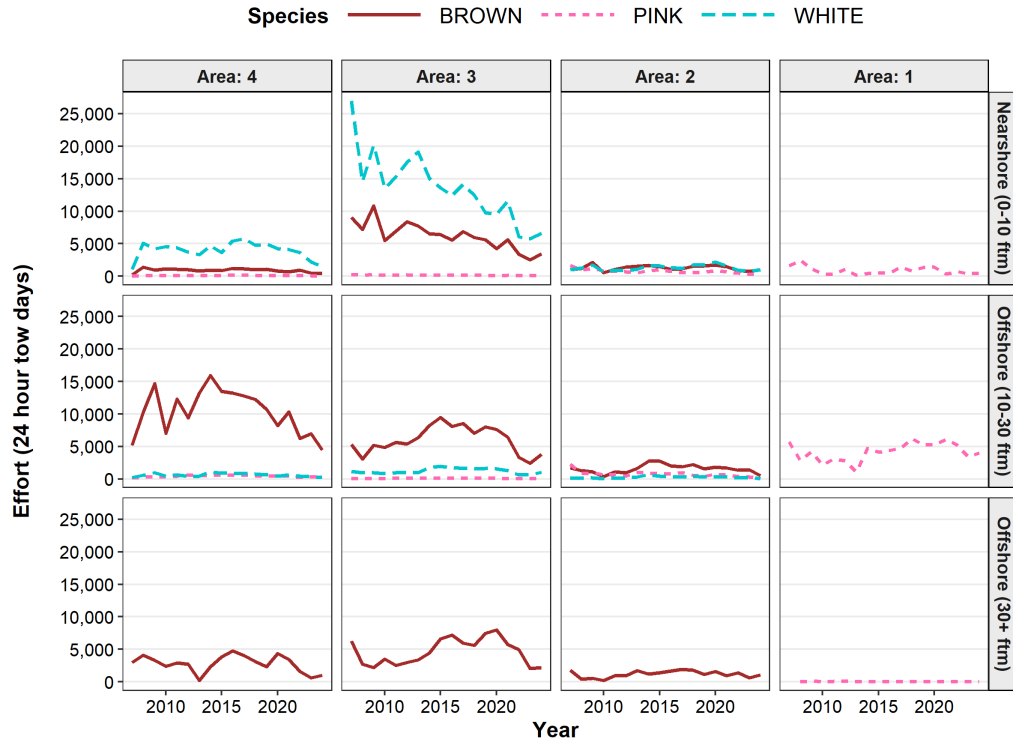
3. Isolation of brown shrimp effort in stat zones 8-21, >30 fm



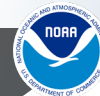
4. Proportioning of effort by stratum in stat zones 8-21, <=30 fm



Time series of estimates, 2007-2024



Areas represent red snapper CPUE strata:
 1 = Stat Zones 1-6, 2 = 7-12, 3 = 13-17, 4 = 18-21



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Not used in bycatch estimation

- Only splits effort that has already been scaled to the fleet level, not part of actual estimation process
- Not relevant to bycatch estimation procedures
 - Season, area, depth, time of day, and number of nets predict bycatch. The actual shrimp species being targeted is secondary to those factors.
- Only port-agent reported species specific *landings* are used in hindcasted estimates of historical (pre-2007) bycatch
- Industry request in 2023 resulting from presentation of new effort methodology



What are these CPUEs and why do they differ by species?

| region | depth zone | species | tow days | lower | upper | landings | CPUE |
|--------|------------|---------|----------|-------|--------|------------|-------|
| East | 0-10 ftm | BROWN | 22 | 0 | 47 | 23,083 | 1,036 |
| East | 10-30 ftm | BROWN | 9 | 2 | 17 | 7,129 | 764 |
| East | 0-10 ftm | PINK | 562 | 384 | 739 | 479,481 | 854 |
| East | 10-30 ftm | PINK | 4,068 | 3,234 | 4,902 | 4,622,814 | 1,136 |
| East | 30-100 ftm | PINK | 5 | 0 | 14 | 5,124 | 969 |
| East | 0-10 ftm | WHITE | 16 | 0 | 32 | 13,936 | 887 |
| East | 100+ ftm | ROYAL | NA | NA | NA | NA | NA |
| | | RED | | | | | |
| West | 0-10 ftm | BROWN | 4,846 | 4,260 | 5,433 | 7,543,675 | 1,557 |
| West | 10-30 ftm | BROWN | 8,745 | 7,740 | 9,750 | 12,098,657 | 1,383 |
| West | 30-100 ftm | BROWN | 4,282 | 3,353 | 5,210 | 6,547,152 | 1,529 |
| West | 0-10 ftm | PINK | 432 | 339 | 526 | 683,017 | 1,581 |
| West | 10-30 ftm | PINK | 398 | 325 | 471 | 543,567 | 1,366 |
| West | 0-10 ftm | WHITE | 9,120 | 8,079 | 10,161 | 13,229,871 | 1,451 |
| West | 10-30 ftm | WHITE | 1,341 | 1,069 | 1,613 | 1,908,416 | 1,423 |
| West | 100+ ftm | ROYAL | 37 | 0 | 88 | 41,796 | 1,142 |
| | | RED | | | | | |

- *Shrimp* CPUE, not to be confused with *bycatch* CPUE
- Trip ticket landings allocated proportionally to species-specific effort within season (1-3) and area (1-5)
- Assumes 1.23 scalar for 4 vs. 2 nets. On average, 4 nets catch 1.23 times more shrimp in same amount of time fished as 2 nets. Not perfect doubling because each net is larger in 2 net configuration
- CPUEs differ by area, season, and because of different ratios of 2 to 4 net vessels by depth zone
- Differences in CPUE by species are solely reflective of these factors, not explicitly *because* of species
- E.g. 2 nets most likely to fish in 0-10 ftm zone, where white shrimp happen to be most abundant

Acknowledgements

- Gulf Shrimp Fishing Industry
- Gulf Fishery Management Council, SSC and Shrimp AP
- Internal SEFSC Shrimp Bycatch and Effort Workgroup

