

# Telemetry Estimates of Site Fidelity and Residency for Gray Triggerfish, *Balistes capriscus*, Around Artificial Reefs in The Northern Gulf Of Mexico

## Estimaciones de la Telemetría de Fidelidad de Sitio y Residencia para Gray Triggerfish, *Balistes capriscus*, Alrededor de Arrecifes Artificiales en el Norte del Golfo de México

## Estimations de Télémétrie de Fidélité au Site et Résidence pour Gris Balistes, *Balistes capriscus*, Autour des Récifs Artificiels dans le Nord du Golfe du Mexique

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### EXTENDED ABSTRACT

Gray triggerfish, *Balistes capriscus*, are an ecologically and economically valuable species in the northern Gulf of Mexico. Regional populations support both commercial and recreational fisheries that have grown in importance in recent decades. Gray triggerfish are presently considered overfished (SEDAR 2015). Despite their increasing value and newly implemented management strategies, many life history parameters remain unclear. For example, little is known of their movement patterns, habitat use or residency to structured reef habitats (Herbig and Szedlmayer, In press).

In the present study, the Vemco VR2W Positioning System (VPS) was used to characterize fine-scale horizontal movement patterns of gray triggerfish from Oct 2012 to July 2015. Three VPS receiver arrays were deployed on steel cage artificial reefs (2.5 x 1.3 x 2.4 m) at 20-30 m depths, 25-30 km south of Alabama, USA, in the northern Gulf of Mexico. Each VPS array consisted of a single VR2W acoustic receiver and sync tag (Vemco V16-6x, 540-720 sec ping interval, 69 kHz) placed next to the artificial reef (center site) with four additional receivers and sync tags placed 300 m north, south, east and west of the center receiver (Piraino and Szedlmayer 2014). These VPS receiver arrays provided frequent (10 min interval) fish positions at meter scale accuracy. Surrounding these VPS arrays were 22 additional VR2W receivers, located 1.5 km apart at similar steel cage artificial reefs. The complete receiver array (VPS and surrounding receivers) covered a 64 km<sup>2</sup> area (Figure 1).

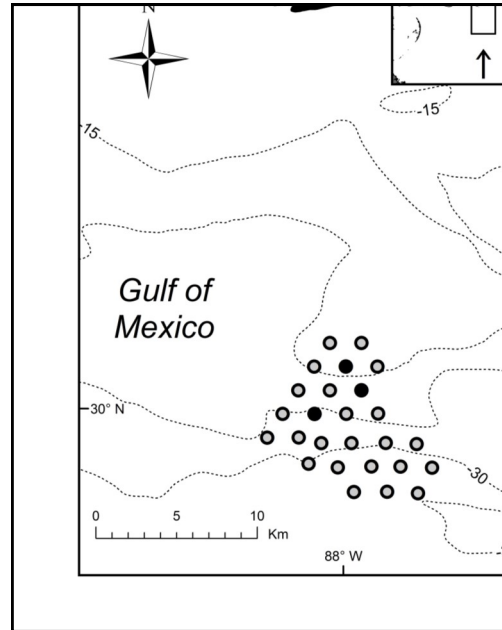
A total of 27 gray triggerfish (> 25 cm FL) were caught with hook and line at the three VPS sites. Vemco acoustic transmitters (V13-1L, 40-80 sec ping interval, 88 week battery life, 69 kHz) were surgically implanted into the peritoneal cavity and fish were released at their site of capture. Tagged individuals (N = 22) were successfully tracked for 8 to 563 days. Derived latitude and longitude positional data were used to estimate core activity space (50 % kernel density estimate, KDE) and home range areas (95 % KDE). Home ranges were compared over diel and seasonal time periods. Kaplan-Meier survival analysis was used to estimate site fidelity and residency (Schroepfer and Szedlmayer 2006).

Two of the 27 fish were not released due to poor recovery from capture and transmitter insertion. Three fish were not detected (lost) 24 h after release at any of the VPS arrays or surrounding receivers and two additional fish showed no movement after release. These lost and stationary fish (N = 5) were removed from further analyses. The fate of one fish was unable to be determined eight days post release. Four fish were caught by fishers after being successfully tracked for extended periods at their release site (21, 116, 159, 164 days). Two fish showed tracking patterns that indicated natural mortalities, most likely from predation. Six fish emigrated from their VPS site after extended residencies (41 to 399 days), and most (83 %) of these emigrations were detected at the surrounding receivers. Four of the emigrated fish, returned to their original VPS release site after a 2 to 157 day absence, then left again and returned one to seven times. Six fish remained active at their VPS site and were monitored for 284 to 563 days at which time transmitter batteries expired. One fish remained at its VPS site and was still being tracked at the end of the study period (9 July 2015; Figure 2).

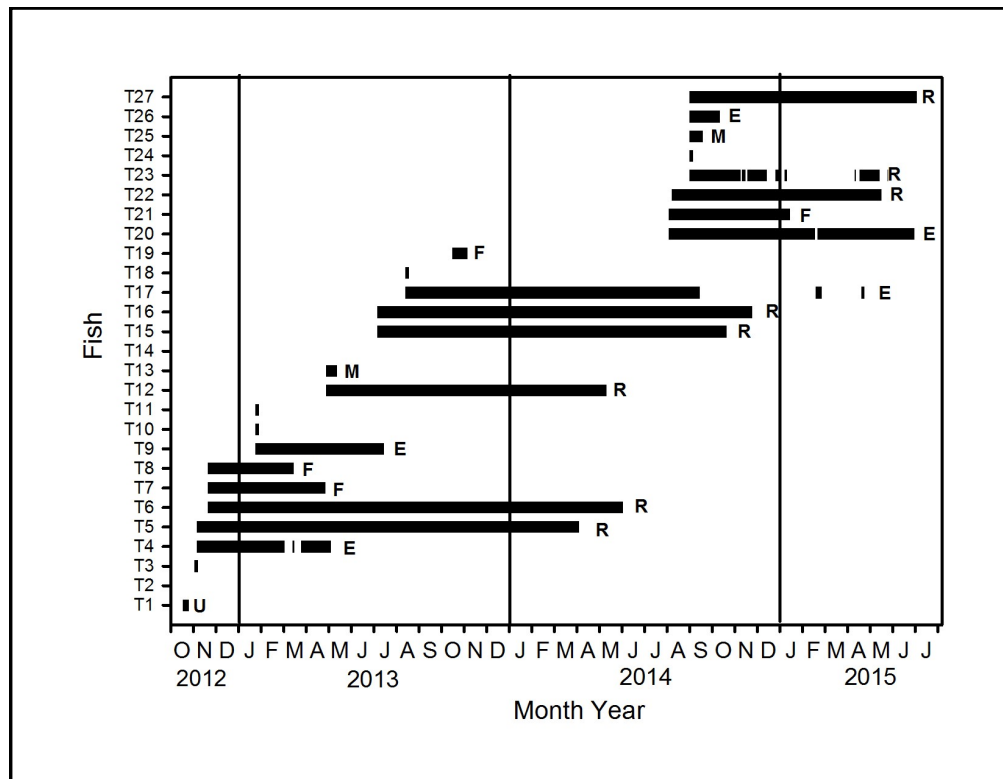
Gray triggerfish showed significant differences in movement patterns over diel and seasonal periods, high site fidelity (site fidelity = total survival<sup>(52/80)</sup> = 0.52<sup>(0.65)</sup> = 65 %) and long-term residency (residency > 80 weeks; i.e., 50% of the tagged fish were still present). When active at their VPS release site, tracked individuals remained close to reef structures (mean distance from reef = 46.3 ± 1.3 m). Mean home range = 3238 ± 3687 m<sup>2</sup> (mean ± SD) and core area = 278 ± 331 m<sup>2</sup>. Home ranges were significantly greater during the day (1825 ± 87 m<sup>2</sup>) than at night (186 ± 57 m<sup>2</sup>), with crepuscular periods (1380 ± 376 m<sup>2</sup>) not significantly different (ANOVA,  $p < 0.001$ ). Gray triggerfish home ranges were significantly greater during the fall (5014 ± 4692 m<sup>2</sup>) than winter (2866 ± 3850 m<sup>2</sup>) and spring (2002 ± 1594 m<sup>2</sup>), while no significant difference was detected for summer (3583 ± 3072 m<sup>2</sup>; ANOVA,  $p = 0.003$ ). Due to high residency and close proximity to reef structures, gray triggerfish may be highly susceptible to fishing mortality (i.e., easy to locate) and should be closely monitored for indications of overfishing. Understanding gray triggerfish behavior and movement patterns can lead to more effective management strategies and protect the long-term sustainability of this species.

**LITERATURE CITED**

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**Figure 1.** Northern Gulf of Mexico study area and total receiver array. Black dots are VPS sites and gray dots are surrounding receiver sites.



**Figure 2.** Tracking periods of acoustically tagged gray triggerfish, *Balistes capriscus*, in the northern Gulf of Mexico. Active periods = black bars. Letters at the end of bars are fish status at the end of tracking period for each fish (R = resident, E = emigration, M = natural mortality, F = fishing mortality, U = unknown). Fish without tracking times and no letters were removed from analyses.