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**Habitat drivers of predator prey interactions over rocky reefs revealed by fishery acoustics**

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**Abstract**

Predation activity and predator – prey interactions play a crucial role in structuring and controlling fish communities in many marine ecosystems, including sub-tropical rocky reefs. The general pattern of distribution and behavior of predators and prey in reef areas usually follows diel cycles that are predictable with a peak of predation activity during the twilight hours. Despite this predictability, many factors (e.g. environmental and habitat characteristics) can interact with this process, increasing its variability. A better understanding of the dynamics of these processes would allow us to manage and monitor these productive and vulnerable areas more efficiently. In this study we investigated the diel distribution and density of predators and prey fish in sub-tropical sandstone reefs at Gray’s Reef National Marine Sanctuary (GRNMS), located 20 nautical miles off the coast of Georgia, USA. Fisheries acoustic methods were used in association with visual surveys of fish assemblages and direct observation of predation events. Habitat metrics, derived from multibeam mapping (e.g. rugosity, slope, curvature), and currents from ADCP data, were used as potential predictors of fish distribution in order to analyze the changes in co-location of predators and prey throughout the diel cycle.

The results indicate that predators and prey distribution patterns changed considerably throughout the day with a modification of their habitat selection. The habitat characteristics were the most important drivers of the distribution. High variability in distribution patterns was revealed across sites and ascribed to the differences in the habitat and fish community composition.

**Keywords**: predator-prey interaction; fisheries acoustics; diel pattern; habitat modeling; reef fish; spatial ecology; community

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