

Interactions Between Invasive Lionfish and a Native Predator, Red Grouper (*Epinephelus morio*)

Las Interacciones entre el Pez León y un Depredador Nativo, Cherna Americana (*Epinephelus morio*)

Interactions Entre L'espèce Invasive Poisson-lion et un Prédateur Indigène, le Mérrou Rouge (*Epinephelus morio*)

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EXTENDED ABSTRACT

Following the introduction of the Indo-Pacific lionfish (*Pterois volitans* and *P. miles*) to the western Atlantic, Caribbean, and Gulf of Mexico, there has been extensive investigation into the life history traits and ecological impacts of this invasive species. Declines in the abundance and biomass of small demersal coral reef fishes have been well documented and attributed to the presence of lionfish on reefs. However, the competitive and behavioral interactions that may occur between native predators and invasive lionfish are less well understood. During the summer of 2013 we experimentally altered the presence of lionfish and Red Grouper (*Epinephelus morio*) in solution-hole hardbottom features in Florida Bay. For six weeks we tracked subsequent changes in juvenile reef fish and motile macroinvertebrate communities to determine how the presence of the native grouper may inhibit or modify the effects of the invasive lionfish.

The effects of the native and invasive predators on the abundance of juvenile reef fishes < 10 cm TL were significantly different after six weeks (Figure 1). Relative to solution holes where both predators were excluded, mean juvenile reef fish abundance declined 83.7% in solution holes with a lionfish but increased 154% in solution holes with a Red Grouper. Juvenile reef fish abundance was essentially the same in holes with both predators and holes where both predators were excluded. We also documented a shift in lionfish stomach contents from mostly teleost fishes when alone to mostly crustaceans when in the presence of the Red Grouper.

The abundance of two species of cleaner shrimp (*Ancylomenes pedersoni* and *Periclimenes yucatanicus*) decreased by 14.7% when lionfish were present but increased by 56.2% at holes where lionfish were excluded. The reduction of cleaner shrimp that provide important ecological services to the fish communities of Florida Bay are a potentially important indirect effect of the lionfish invasion, and one that has not previously been described in detail. Our results indicate that lionfish may alter their behaviors in the presence of the Red Grouper, and highlight the importance of intact native predator communities for ameliorating the negative effects of the lionfish invasion.

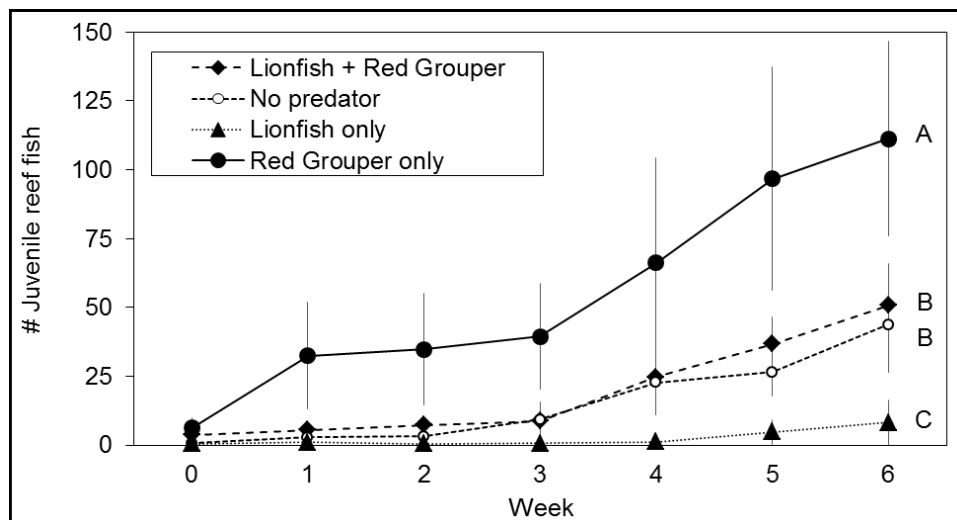


Figure 1. Abundance of juvenile coral reef fishes (< 10 cm TL) over time at solution holes in Florida Bay from four experimental predator treatments in 2013. Values presented are means \pm SE for each group; the sample size for each group was 4. Letters at the far right indicate results of pairwise comparisons performed on recruit abundance among treatments at the final census (matching letters indicate a p -value > 0.05 based on t-tests performed on the best fit linear mixed-effects model).