Hot-Spot Cluster Analysis of Large Parrotfish in the Florida Reef Tract to Inform Restoration

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Herbivory is a primary function on coral reefs as it controls macroalgae cover and facilitates coral recruitment. The Diadema urchin die-off in the 1980's has left parrotfish as the primary herbivores on Caribbean reefs. While assemblages with parrotfish of over 25cm in length have shown to remove exponentially higher amounts of macroalgae than those without large individuals, they also contribute to higher rates of corallivory. High abundance of large corallivorous parrotfish can have adverse effects on coral restoration by direct consumption of outplants. Previous studies have revealed that densities of these larger parrotfish differ in three main ecoregions in the Florida reef tract, with the Dry Tortugas and Florida Keys having substantially higher abundances than Southeast Florida. Despite their protected status, these populations have undergone severe declines due to hurricanes and habitat loss, leaving the Florida reef tract dominated by small individuals. Here, using National Coral Reef Monitoring Program reef fish visual census from the years 2014-2024, we conduct site-level hotspot cluster analysis to analyze spatiotemporal patterns of the large parrotfish population. We aim to find patterns through space and time that can guide restoration strategies by identifying sites that may require precautions to avoid losses due to parrotfish corallivory. We also expand on previous work to further analyze distributions of these large individuals among the three ecoregions with updated survey data and explore potential factors of population declines. Preliminary analysis shows that losses and shifts of large parrotfish hotspots have occurred in all three Florida ecoregions.