HURRICANE IMPACTS TO MANGROVE FORESTS ON THE SOUTHWEST COAST OF FLORIDA

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Abstract

Mangroves may be uniquely impacted by climate change as rising temperatures alter decomposition rates, sea level rise changes conditions for seedling establishment, and frequency or intensity of hurricanes directly affects forest structure. Hurricane Irma subjected much of the coastline in Sarasota, Charlotte, Lee, Collier and Monroe counties to hurricane winds in 2017. We established plots to quantify the impact to forest structure, and to incorporate the complex legacies of previous hurricane disturbances in the last three decades (Andrew, Katrina, Charlie, Wilma, and Irene). In addition, we compared plots that are tidally restricted to those with more natural tidal flushing. In each plot we identified, mapped, and measured the woody vegetation to determine if this hurricane history and human alteration to hydrology has altered the composition of forest communities, influenced impacts of Hurricane Irma, or shifted trajectories of recovery. It is important to understand the potential complex synergy of multiple disturbances to these critical coastal ecosystems.

Historical Hurricane Impact Map

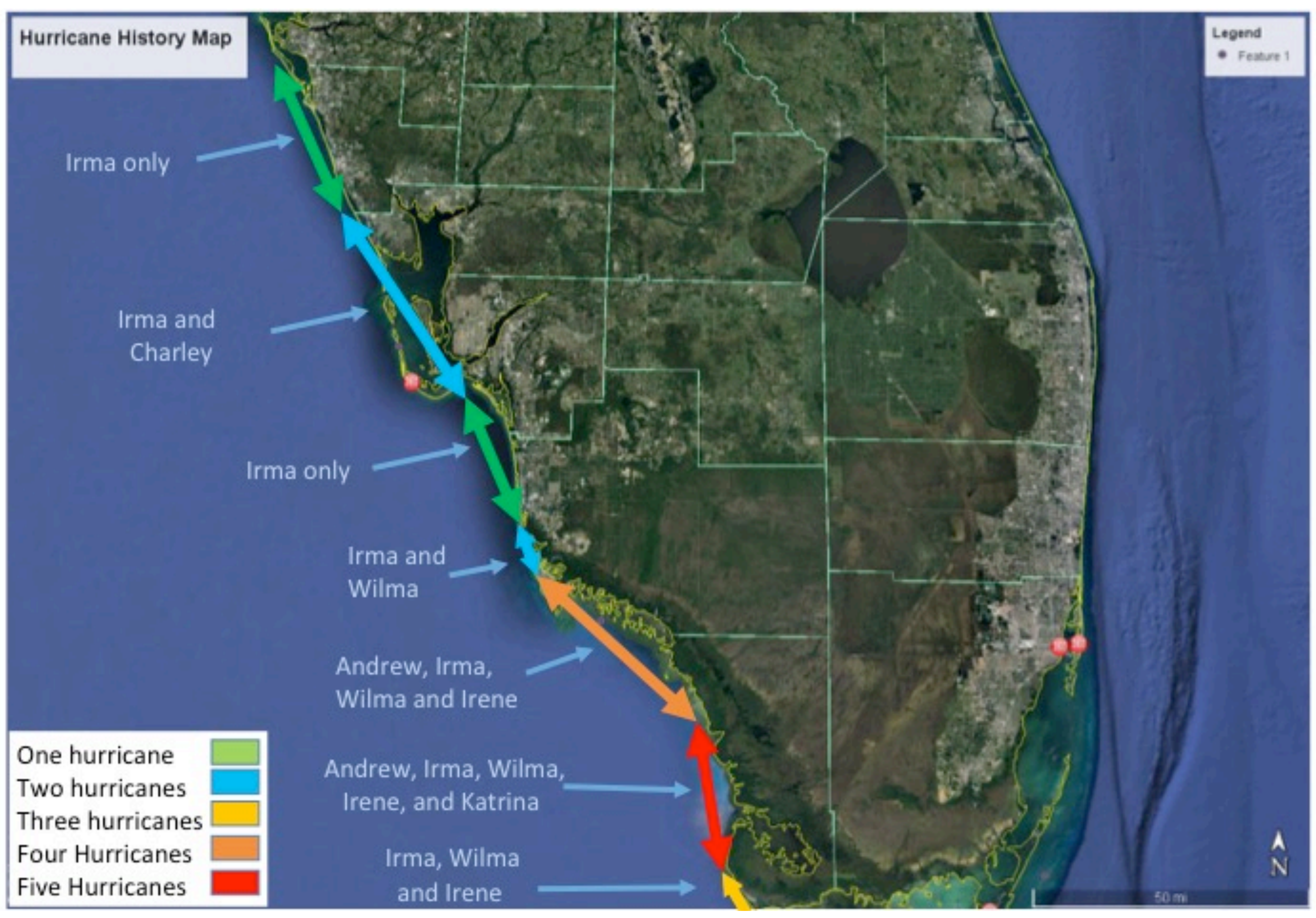

Figure 1 A map showing the historical hurricane impacts to the coast of Southwest Florida, from Hurricane Andrew in 1992 to Hurricane Irma in 2017

Methods

- Established six 10 m x 10 m plots in each zone, three in a tidally restricted mangrove forest and three in a tidally unrestricted mangrove forest
- Identified, mapped, measured, and assessed hurricane damage for each tree with a DBH ≥ 4 cm
- Identified and counted saplings with a height ≥ 0.5 m and DBH < 4 cm within a 5 m x 5 m subplot
- Identified and counted seedlings with a height < 0.5 m within four 1 m x 1 m subplots

Preliminary Results

The results for this project are still preliminary because all of the data has not yet been collected. Figure 2 shows that the plots within tidally unrestricted mangrove forests appear to contain more seedlings than the plots within tidally restricted mangrove forests. This is most likely due to the transportation of seedlings through the tides. Figure 3 shows that the plots within tidally unrestricted mangrove forests appear to have experienced more damaged from Hurricane Irma (snapped off/branch damage) than the plots within tidally restricted mangrove forests, but this difference does not appear to be significant. Since tidally unrestricted mangrove forests are assumed to be healthier, this isn't the response we were expecting at the beginning of the project. We assumed the tidally restricted mangrove forests would have significantly more hurricane damage than the tidally unrestricted mangrove forests.

Seedling Density

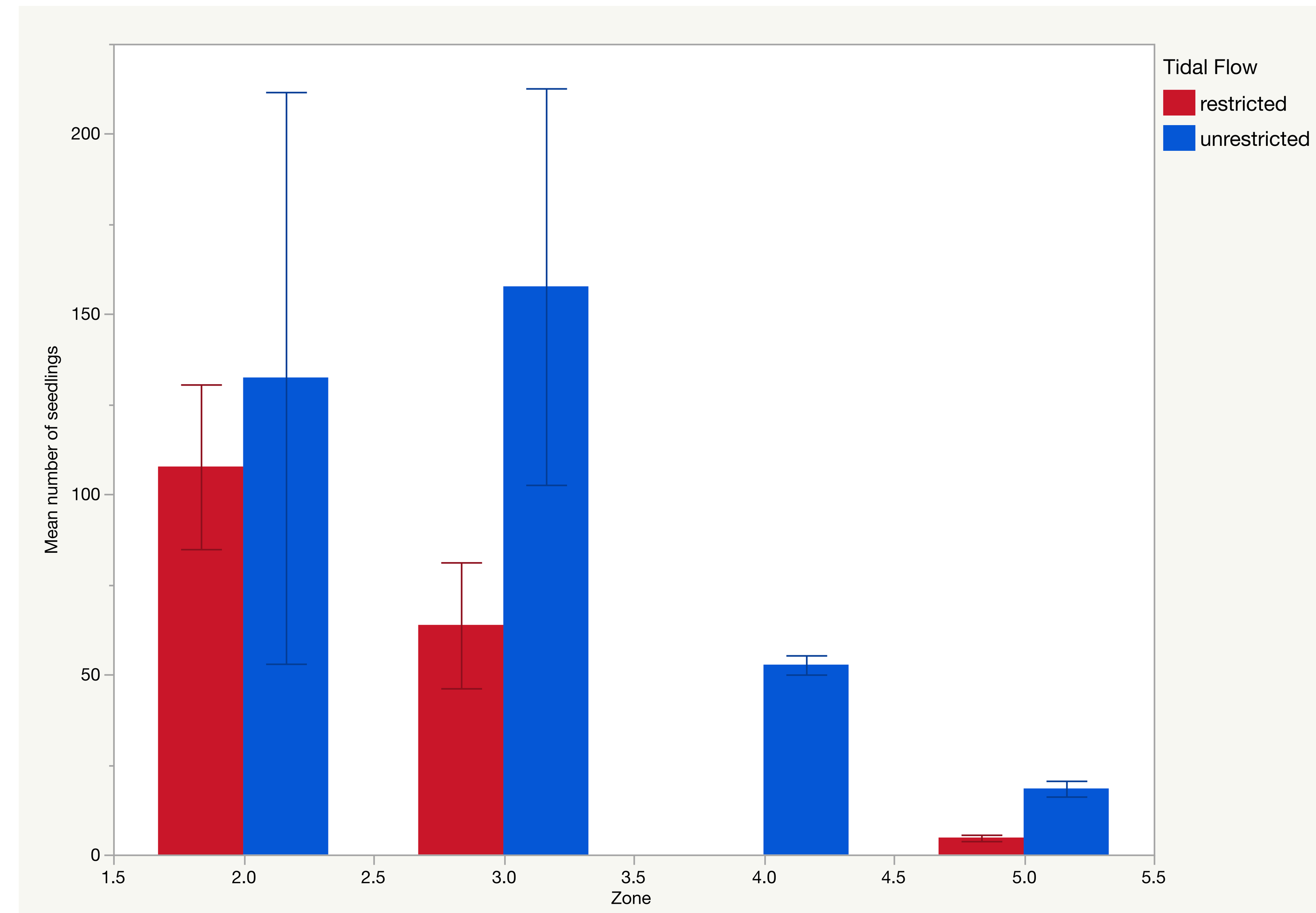

Figure 2 A comparison of the number of seedlings between the tidally restricted and tidally unrestricted plots within all four zones; zone four only includes data for the tidally unrestricted plots because that is the only data that has been collected.

Image 1 A *Laguncularia racemosa* seedling in a tidally restricted plot in zone 3

Image 2 Edwin Everham standing in the hole created from an uprooted *Avicennia germinans* in a tidally restricted plot in zone 5

% Hurricane Damage

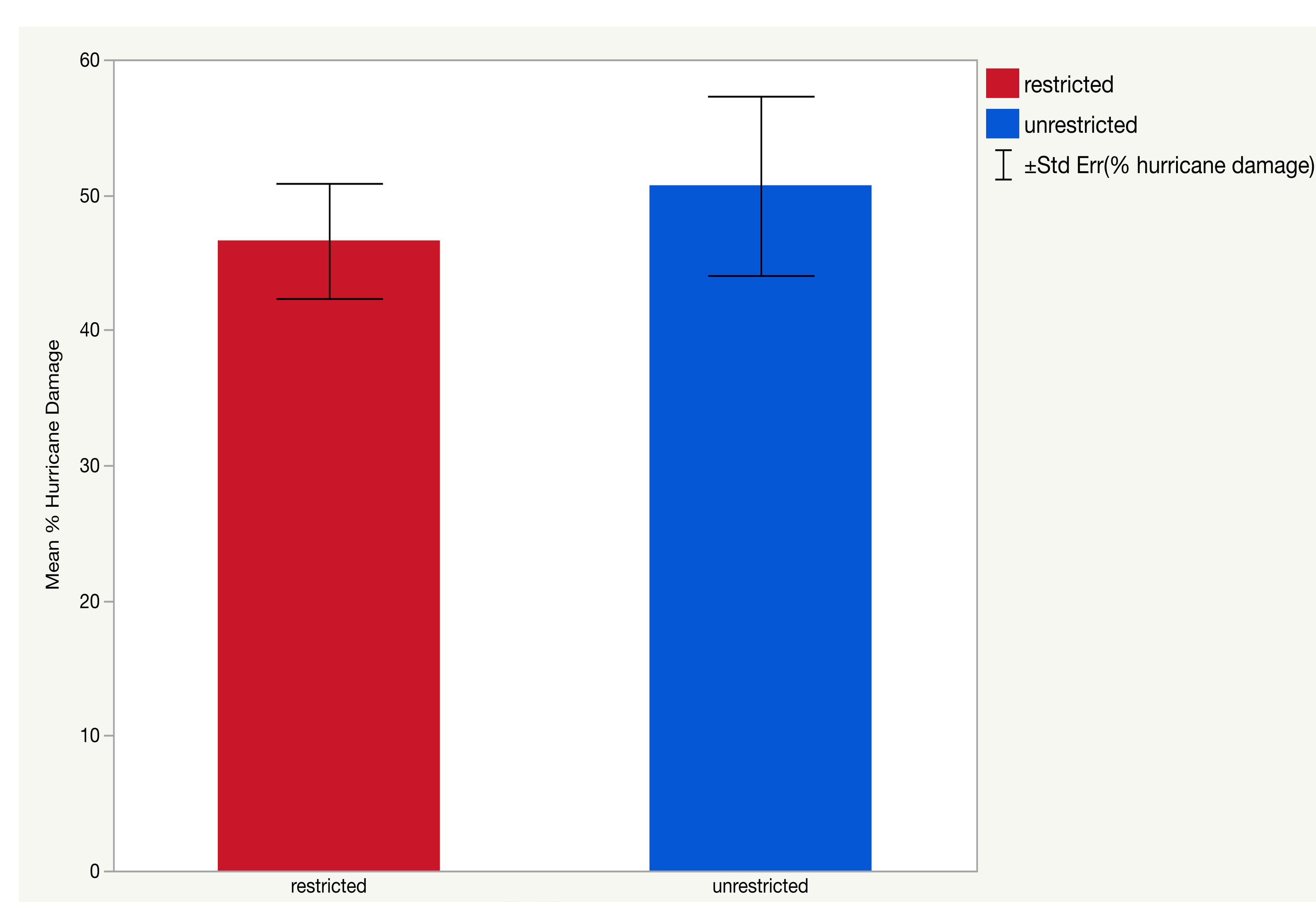

Figure 3 A comparison of the percent of hurricane damage between tidally restricted and tidally unrestricted plots for all four zones; zone four only includes data for the tidally unrestricted plots.

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