Core Healing in Orbicella faveolata as an Indicator of Colony Health Across Multiple Gradients

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Anthropogenic (anchors, scuba divers, tissue sampling) and natural disturbances (corallivory, storm damage) can wound living coral tissues, negatively affecting their life processes and impacting their ecosystem function. Wounding can impair coral growth, reproduction, and increase disease susceptibility, yet it can also increase growth rates through microfragmentation, which is the main principle behind asexual coral propagation. Tissue regeneration rates are indicative of a colony's condition, but they vary inter- and intraspecifically depending on intrinsic factors (lipid stores, colony size, symbionts) and extrinsic factors (temperature, light, nutrients). Understanding the relationship between the factors that affect tissue regeneration is needed for it to be a useful indicator. Experimental coring is a common practice when studying coral biology, but its long-term effects and downstream effects remain understudied. This study opportunistically assessed the tissue regeneration rates and impacts of core sample lesions across latitudinal gradients, stages of gametogenesis, and terrestrial nutrient exposure on the reef-building species *Orbicella* in Florida. In 2021-22, eighty-seven colonies across SE Florida and the two reefs in the Keys were sampled over three periods corresponding to different environmental conditions and stages of gametogenesis (1,717 cores). Image analysis was used to calculate the daily regeneration rates and assess the long-term effect of core sampling. Results found that 24% of all tissue biopsied healed, of which 20.69% of cores healed completely, 24.14% of cores were predated, and 3.45% were diseased as a result of coring. Regeneration rates decreased with latitude, and both Keys' locations had significantly lower regeneration rates than SE Florida colonies. Patterns in the regeneration rate were similar to spatial gradients in protein expression, lipid levels, and fecundity scores taken on the same colonies. There were no significant differences between genotypes, disease resistance categories (classified by previous stony coral tissue loss disease lesions), or live tissue area.