Assessing the Consequence of Hurricane-Induced Habitat Conversion on Fish and Decapod Crustacean Assemblages in the Big Sable Creek Complex of Southwest Florida

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Hurricanes routinely cause damage to mangrove forests, generally by breaking and toppling trees. Normally, forests recover through growth of new plants from seedling germination. For reasons that are not completely understood, the passage of two Category 4-5 hurricanes across the Cape Sable peninsula in SW Florida (1935, 1960) resulted in permanent damage to some mangrove forests: in certain locations adult trees were killed and no seedlings rejuvenated. The net result was conversion of mangrove forests to unvegetated mud flats. Mangroves are generally considered to be critical nursery habitat to both small resident forage fishes, and to the juveniles of many species of estuarine transient fishes whose adults spawn offshore and whose young life-history stages use mangrove environments. This project asks the question, "What is the consequence of the conversion of mangrove to mud flat habitat on intertidal assemblages of fish and decapod crustaceans within the creeks in the Big Sable Creek complex?"

The Big Cape Sable Creek complex consists of six tidal creeks that are a mosaic of mangrove forest and mud flats, both inundated at high tide. Rivulets are depressions in the substrate that are up to 1 m deeper than the forest floor or mud flat around them. Rivulets fill earlier on flood tides and retain water later on ebb tides. Rivulets are "hotspots" for the entry and egress of fish and decapod crustaceans (shrimp, crabs) from intertidal habitats and are a convenient location for sampling these animals. We use block nets across intertidal rivulets to compare the fish and decapod fauna leaving replicate forest and mud flat sites.

The statistical design was a repeated-measures ANOVA with creek the unit of replication. The dependent variable was catch-per-unit effort (CPUE); the independent variable was habitat type: catch was quantified as both numbers and biomass. We sampled three replicate creeks, each with a forested and a mud flat site. The rivulet sites were fixed and drained an unknown area that varied both with tidal height and location. We have sampled every 2 months for 18 months.

Preliminary analyses indicate that the species composition of the two habitat types is different. We compare species composition using an ordination technique, multidimensional scaling (MDS), followed by analysis of similarity (ANOSIM) to ascertain statistical significance of ordination groupings. We are in the process of upgrading our measurement of catch by developing stage-discharge curves for each net site. Once completed, these curves will permit expression of results as fish per cubic meter of water discharged through a net on a given tide. Final analysis of abundance differences awaits this standardization process. This study is designed to assist management in predicting long-term fisheries impacts of severe-hurricane landfall in mangrove-dominated environments.