

Ecological Resistance of Multiply Stressed Populations: *The response of tidal marsh birds and plants to Hurricane Sandy*

All animal and plant populations can weather change. The amount of environmental change a population can absorb, however, depends on where, when, and in what kind of population the change occurs. To predict how extreme storms challenge the long-term viability of wild populations thus requires an understanding of how local context matters. The proposed work uses Hurricane Sandy as a natural experiment to test the vulnerability of wild populations to extreme storms within tidal marshes. By comparing the abundances of tidal-marsh plants and animals within the storm's path to their abundances prior to the storm, this project will determine which species are most vulnerable, which types of locale are most vulnerable, and which biological communities are best able to weather major storms. Specifically, the work will test whether vulnerability increases in marshes surrounded by development, invaded by foreign plants, or challenged by high rates of sea-level rise, and further it will test whether explicitly protecting areas helps reduce vulnerability. By addressing these questions using current theories of ecosystem disturbance, the research will provide broad insights of general relevance to ecosystem disruption elsewhere.

This research also will provide a specific assessment of Sandy's impact on tidal marshes and focus the prioritization of specific tidal marshes for conservation and restoration. This will greatly improve the way in which many millions of dollars of federal restoration funds are spent (H.R. 152: Disaster Relief Appropriations Act). Further, the work will inform future coastal management planning by identifying characteristics of marshes that are likely to withstand future disturbances, thereby informing decisions about where and how protection efforts should be prioritized. The results of this project will be disseminated to local, state, and federal partners through the Saltmarsh Habitat and Avian Research Program, a cooperative consortium of universities, NGO's, and state and federal agency partners working together to conserve tidal marsh habitats and the species they support (www.tidalmarshbirds.org).