Quantifying Inundation Effects on Marsh Vegetation

Reference SON: *2016 ER-3 Use of Remote Sensing and Field Data Collection to Quantify Inundation Effects on Marsh Vegetation*

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Research Need

Currently, high levels of uncertainty exist regarding the effects of hydrologic alterations and water management actions on wetland resources. Coastal marsh ecosystems are sensitive to a number of vegetation and soil parameters, however there is still considerable uncertainty over effect of these parameters on coastal marsh mortality. Parameters associated with uncertainty are critical inundation depth for marsh mortality, inundation duration required for mortality, lag time between inundation and mortality, and effect of soil structure and function on mortality. This lack of knowledge hinders planning and adaptive management efforts. Therefore, there is an immediate need to evaluate the direct and indirect effects of inundation depth and duration on marshes in coastal wetlands.

Project Objectives & Plan

The purpose of this work unit is to improve understanding of impacts to coastal marsh vegetation resulting from changes in hydrologic regime. The impact of depth/duration of inundation will be evaluated for the following factors: wetland productivity, soil condition and function, vegetation sequencing and seasonal effects, tolerance across vegetation species and spatial integrity. Inundation-based indices and factors will be developed for decision-support tools/models. Mesocosm experiments will be conducted to evaluate the effects of inundation depth/duration in a controlled environment. These efforts will be transitioned to a field setting for additional testing.

Payoff

This project will provide the information needed to produce decision-support tool/models needed by project planners and aquatic habitat managers. Remote sensing methods developed will allow for efficient assessment of coastal marsh health and improve management outcomes.

Products

Journal Article (JAs)

Suir, G.M. and Sasser, C.E. (2019). Use of NDVI and Landscape Metrics to Assess Effects of Riverine Inputs on Wetland Productivity and Stability. Wetlands 39: 815-830.

Suir, G.M., Sasser, C.E. and Harris, J.M. (2020). Use of remote sensing and field data to quantify the performance and resilience of restored Louisiana wetlands. Wetlands, 40(6), pp.2643-2658.

Wu, W., Grimes, E. and Suir, G. (2023). Impact of freshwater diversions on vegetation in coastal wetlands based on remote sensing derived vegetation index. Frontiers in Marine Science, 10. https://doi.org/10.3389/fmars.2023.1202300

Lambiotte, A.N., Berkowitz, J.F., Suir, G.M. and Willis, J.M. (2023). Aboveground wetland vegetation growth responses to simulated sediment diversion inundation scenarios. Ecological Engineering, 190, p.106943.

Grimes, E.S., Wu, W. and Suir, G. (2025). Evaluating the response of *Sagittaria lancifolia* to combined inundation and nitrogen addition using a marsh organ. Environmental Monitoring and Assessment, 197(4), pp.1-15.

Technical Reports (TRs)

Suir, G.M. and Berkowitz, J.F. (2021). Inundation depth and duration impacts on wetland soils and vegetation: State of knowledge (ERDC/EL SR-21-5), Technical Report, U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi.