

WATERSHED MODIFICATION EFFECTS ON COASTAL ECOSYSTEMS: A SYNTHESIS FROM KEY GULF OF MEXICO ESTUARIES

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Estuaries of the Gulf of Mexico contain valuable wetlands that provide numerous ecosystem services and functions, including supporting diverse ecosystems, providing productive fisheries, and buffering wave energy from storm events. Freshwater from terrestrial runoff combine with coastal marine waters to drive estuarine environmental conditions, subsequently determining ecological processes within coastal systems. However, land-use to meet the needs of a growing human population and climate-induced changes throughout watersheds also alter water availability and quality, affecting estuary-derived natural resources. We summarized five case studies from major watersheds that feed northern Gulf of Mexico estuaries (Galveston Bay, TX; Mississippi River Delta, LA; Big Bend of Florida; South Florida) to examine effects of watershed modification on coastal ecosystems. Studies were selected to provide comprehensive descriptions of watershed modifications on estuaries of the Gulf of Mexico. Based on these examples, we developed a conceptual model describing effect pathways of changes in freshwater inflow on coastal ecosystems. Our synthesis indicated that anthropogenic modification of watersheds affects estuarine food webs by affecting seasonal processes through timing and quantity of fluvial resources, altering species interactions through changes in community structure, and impacting foundation species on which ecosystems services depend (e.g., oysters, seagrasses). These effects will most likely be exacerbated by climate change. Watershed management presents a unique opportunity to mitigate threats to coastal natural resources, but these efforts often require cooperation across multiple levels of government and stakeholders to balance conflicts of inland and coastal interests.

PRESENTER BIO: Scott is a Fisheries and Aquatic Sciences PhD candidate at UF advised by Dr. Charles Martin. His dissertation research focuses on freshwater inflow effects on estuarine community and trophic structure. He is also involved on projects focusing on estuarine habitat assessments, nonnative and expanding species, and oil spills.