Estuary Science Exchange November 10th, 2023!

11:00 – 12:00 November 10th, 2023, Virtual: Microsoft Teams

The Texas Water Development Board is pleased to announce that our next Estuary Science Exchange will feature Ryan Bare on November 10th, 2023 from 11:00 – 12:00 CDT.

Dr. Ryan Bare

The Assimilative Capacity of Lake Livingston: Nutrients, Sediments, and High Flow Events.

Abstract: Lake Livingston was created as a water supply reservoir when a dam was constructed in 1969, which impounded the Trinity River, bisecting it into two distinct stretches: the Trinity River North and South. The Trinity River has an ecologically significant role as the primary source of freshwater, nutrients, and sediment inflows to Galveston Bay, the largest Texas estuary. Therefore, it is critical to understand the assimilative capacity of the Lake Livingston reservoir and the related impacts on freshwater inflows to Galveston Bay.

The goal of this study was to enhance the understanding of how the hydrologic flow regime, biogeochemical cycling, and physical characteristics of the Lake Livingston reservoir influence the regulation of nutrient and sediment delivery from the upper to lower reaches of the Trinity. It addressed data gaps from a Phase I Lake Livingston study completed in 2019 by the Houston Advanced Research Center (HARC) and the United States Geological Survey (USGS) by increasing the number and temporal resolution of water quality samples, performing targeted sample collection during high flow events, and conducting sediment quality sampling to monitor the potential sequestration of nutrients within the reservoir bed. The influence of the Trinity River's flow regimes on physiochemical water quality upstream, within, and downstream of the Lake Livingston Reservoir was also assessed using historically collected water quality data. All field sampling was performed by personnel from the USGS Gulf Coast Branch of the Oklahoma-Texas Water Science Center.

Lower nutrient and sediment concentrations were recorded at the Trinity Goodrich station downstream of the Lake Livingston Dam compared to the Trinity Riverside station above the reservoir. These results suggest that Lake Livingston is a nutrient and sediment sink. Higher nutrient concentrations were also measured in the bed sediment samples collected from the reservoir during high flow events. This indicates that the nutrients are immobilized in the bed sediment of Lake Livingston and may be less likely to be transported downstream of the dam during periods of elevated flow. The retention of sediment and nutrients within the reservoir has important ecological implications because the Trinity River regulates the delivery of these constituents to the Galveston Bay system.

This presentation will detail the project's methodology and sample design for water and sediment quality sampling, the collection of targeted high-flow event samples, and the assessment of historical water quality data to understand the influence of the Trinity River's flow regimes on water quality upstream, within, and downstream of Lake Livingston. A summary of the data will be presented including findings about water quality within the reservoir and below the dam and sediment quality within the reservoir.

Dr. Ryan Bare is a Research Scientist specializing in Watershed Ecology under the Hydrology and Watersheds Program. He received a Doctorate in Water Management and Hydrological Science from Texas A&M University. At HARC, he focuses on studying interactions between hydrological and ecological systems across coastal and inland watersheds. Dr. Bare's research interests include water quality impacts of developing communities, water borne pathogen risk and public health, nature based & green infrastructure, and the application of data science to investigate natural and built environments.

The presentations will be held virtually through Microsoft Teams and be followed by the opportunity for questions and discussion. Please email us at melissa.lupher@twdb.texas.gov to receive the Microsoft Teams meeting invite for this event.