# EFFECTS OF LAKE OKEECHOBEE OPERATION SCHEMES ON PHOSPHOROUS EXPORTS

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Lake Okeechobee is the largest reservoir by surface area in the United States and a crucial water source in South Florida, supplying water for human consumption, irrigation, and surrounding wetland ecosystems. Though of natural origin, the lake is now bounded by the Herbert Hoover Dike, and it is strictly operated for flood control, water supply, and environmental flows. Lake Okeechobee, however, is a major source of nutrients to surrounding distributaries and estuaries, with lake operations being a key driver of contemporary trends in water quality. This study aims at evaluating impacts of Lake Okeechobee operations on phosphorous loadings into the main distributaries and in the lake proper. Thus, a comprehensive modeling tool for Lake Okeechobee hydrology and water quality was developed that simulates different historical and even proposed operation schedules of Lake Okeechobee. The model determines the regulated discharges into the main distributaries of the lake given the Lake's net inflows. The model also simulates the phosphorus mass balance as a function of hydrology, operations, and incorporating internal loadings from the surficial layer of bottom sediments. The model was calibrated and validated for both hydrological and phosphorous conditions for the period (1991-2018) simulating three different Lake Okeechobee operation schedules. The model's outputs incorporate regulated water discharges and phosphorous loadings into the main distributaries, water levels and associated water volumes in the lake, and phosphorous concentrations in the lake water body. Various operation scenarios were simulated and their impacts on phosphorous loadings in the lake and the distributaries were evaluated where it was found that phosphorous in Lake Okeechobee were mainly driven with flow patterns. In the near future, this model will be used to design Okeechobee discharges that minimize phosphorous loadings into the distributaries and estuaries.

**PRESENTER BIO**: Osama is a Ph.D. candidate in USF with Master's degree on water resources engineering. His doctoral dissertation aims at mitigating Lake Okeechobee's phosphorous loadings into the surrounding water bodies while benefiting associated human communities. His research interests include ecohydrology, water resources, designer flows, and hydrological modeling.