HOW CAN THE LAKE OKEECHOBEE SYSTEM BE OPERATED TO MITIGATE THE HARMFUL ALGAL BLOOMS PROBLEM?

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Lake Okeechobee has faced serious environmental problems for decades, including Harmful Algal Blooms (HABs) and biodiversity deterioration. Previous environmental research in Okeechobee has highlighted two main issues: First, hydrologic alterations have led to excessive water discharges to the St. Lucie and Caloosahatchee Rivers, thus reducing water going to the Everglades. Second, legacy nutrient loadings primarily from agriculture have caused serious eutrophication in the lake and adjacent waterways. This study aims at evaluating drivers of HABs in the Okeechobee system through analyzing flows, rainfall, nutrients, and Chlorophyll-a (as an indicator of HABs) at the main inlets and outlets of the Lake. First, the study evaluates temporal trends in flows, rainfall, Total Phosphorous (TP), Total Nitrogen (TN), and Chlorophyll-a around Lake Okeechobee using the non-parametric Mann-Kendall test. Second, the study quantifies the relationships among these parameters in water entering the Lake, as well as their effect on parameters of discharges out of the Lake into the estuaries and Everglades. Ultimately, flow-HABs relationships will be quantified at key locations of the Lake. Preliminary results demonstrate that despite increasing trends in water discharges from the lake into St. Lucie and Caloosahatchee, there hasn't been significant positive trends in TP concentration loadings into the Lake since 1973. Increasing trends in TP concentrations have indeed occur in the Lake itself and in discharges into St. Lucie, Caloosahatchee, and Miami Canal. Although there have not been significant trends in Chlorophyll-a concentrations in the Lake since 1980, there has been an increasing trend in concentrations discharged into the St. Lucie. Ultimately, identifying the relations between flow, nutrients, and HABs in the Okeechobee system can better inform water managers about how modifications to the system infrastructure operations could improve the well-being of South Florida ecosystems and the millions of Floridians that are influenced by the Lake.

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