LAKE OKEECHOBEE NUTRIENT MASS BALANCE AND TRENDS: A 45-YEAR ANALYSIS

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Long-term data analysis and assessment are critical for a successful adaptive management of any ecosystem restoration. Lake Okeechobee (LO) is the liquid heart of the greater Everglades through its direct and indirect connections with the entire South Florida. LO has suffered from substantial environmental impairment over the last seven decades. While water quality restoration efforts began over 30 years, no substantial improvement is evident as of now. The aim of this study is to perform flow and nutrient (Total Phosphorus – TP and Total Nitrogen – TN) mass balances for LO and to assess temporal trends in nutrient loadings and concentrations of surface inflows and outflows as well as in-lake water, while compiling a 45-year database (1973-2018).

The trend analysis results indicated that surface water inflows and outflows remained unchanged for the last 45 years (at $\alpha = 5\%$) along with inflow nutrient loadings. The outflow TP load and TP Flow Weighted Mean Concentration (FWMC) showed an increasing trend while inflow TN FWMC showed a decreasing trend. The in-lake TP concentrations increased statistically while the in-lake TN concentrations showed the opposite trend, resulting in a decreased TN:TP ratio from well over 30 in 1973 to below 10 in 2018. Results also indicated that LO has been a hypereutrophic lake (Trophic State Index > 60) over the last 45 years. LO TP sedimentation rate (indicator of sediments assimilation capacity) showed a decreasing trend further indicating that the lake may become a continuous source of TP by 2035. TP accumulation in LO sediments was estimated to be 37,750 mtons with 82% and 17% contributions attributed to the northern and southern regions, respectively. TP contribution from the southern region to the total TP accumulated in the sediments was 1.6 times greater than the contribution from the northern region on a unit per area basis.

PRESENTER BIO: Dr. Khare received his PhD from the University of Florida (2014) focusing on hydrologic and water quality modeling and uncertainty & sensitivity analysis. For the last 5 years and in his current role as a water quality scientist at the Everglades Foundation, he is engaged in Everglades water quality research and restoration planning.