

Simulating Water & Phosphorus Balances of the Everglades Stormwater Treatment Areas & Water Conservation Areas

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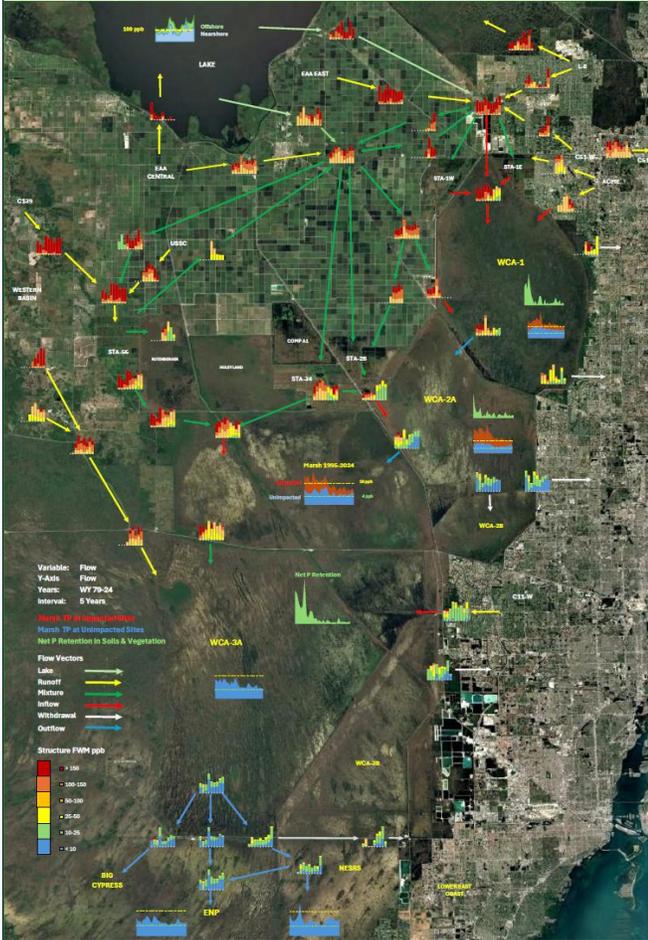
- Panel A Map of Historical Structure Flows and Flow-Weighted-Mean Concentration at Structures in the Water Conservation Areas and Watersheds, 1979-2024
- Panel B Map of Historical Structure Flows and Flow-Weighted-Mean Concentration at Structures in Everglades National Park, 1979 - 2024
- Panel C Phosphorus Retention & Marsh TP Concentrations in WCAs, 1979-2024
- Panel D Simulations of Water Conservation Area Outflows, Loads, Concentrations, & Depths using the Dynamic Water for Stormwater Treatment Areas, 1979 - 2024
- Panel E Simulations of Stormwater Treatment Area Outflows, Loads, Concentrations & Depths using the Dynamic Water for Stormwater Treatment Areas, 2012-2024

An extensive database has been compiled to evaluate long-term responses of the Everglades to water quality and hydrologic restoration efforts implemented over the 1979-2024 period. Water quality restoration efforts include implementation of Best Management Practices in the EAA in 1993 and construction of Stormwater Treatment Areas starting in 1999. All supporting data have been downloaded from SFWMD's DBHYDRO website.

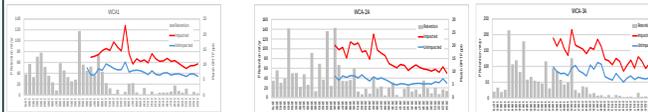
Flow & concentration data are displayed in Panel A (WCAs) and Panel B (ENP). Bar charts display flows averaged at 5-year intervals. Some charts represent structure flows. Others represent sums of flow from upstream structures. As indicated in map legends, color codes represent distributions of FWM concentrations associated with the flows. By representing both flow trends and concentration intervals, the charts express responses to both hydrologic and water-quality restoration efforts. Hydrologic restoration efforts include changes in WCA-3A operation designed to increase in WCA-3A outflows to Shark River Slough in the past five years. Taylor Slough & Coastal Basin inflow P levels decreased, particularly in the southern C-111 canal.

Geometric mean concentrations at near-shore and offshore monitoring sites in Lake Okeechobee, which increased steadily over the 1979-2004 period are displayed at the top of Panel A. Maps also show yearly time series of geometric-mean concentrations measured at impacted (red) and unimpacted marsh sites (blue) over the 1995-2024 period in each region relative to 10 ppb (P criterion) and 4 ppb (marsh background concentration). Green charts show net retention of phosphorus in each WCA computed from mass balances (Total Inflows - Outflow - Withdrawal Loads) over the 1979-2024 period. Panel C compares marsh concentrations relative to the 10-ppb phosphorus criterion with net retention values, which reflect the accumulation of phosphorus in soils & vegetation. These are the two primary drivers of ecological impact related to phosphorus. Significant reductions in each metric occurred over the period.

Panel A Map of Historical Structure Flows and FWM Concentrations at WCA Structures and Watersheds, 1979-2024



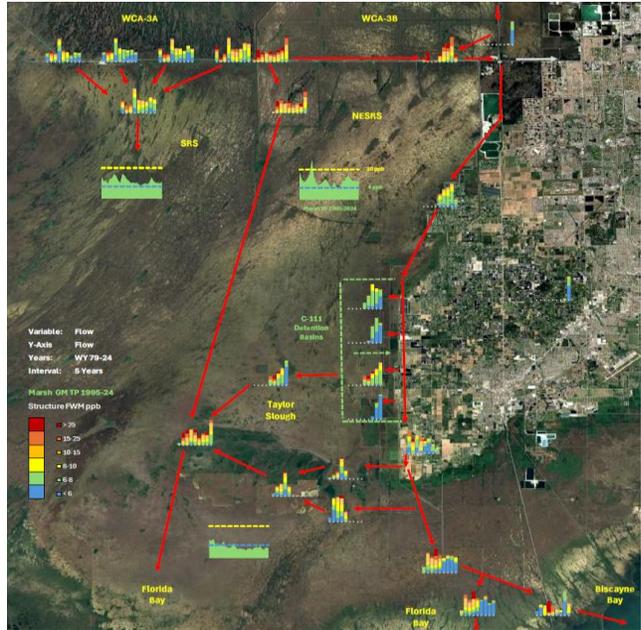
Panel C - Phosphorus Retention & Marsh TP Concentrations in WCAs



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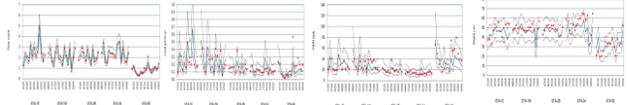
Panel B Map of Historical Structure Flows and FWM Concentrations at Structures in Everglades National Park, 1979 - 2024



Panel D- DMSTA Simulations of WCA Outflow Volumes, Loads, FWM Concentrations, & Water Depths



Panel E- DMSTA Simulations of STA Outflow Volumes, Loads, FWM Concentrations, & Water Depths



WCA simulations were calibrated to 2012-2024 data and tested against 1979-2011 data. STA simulations were based on original calibrations developed based on pre-2005 data and used in the design of the Restoration Strategies Plan.

DMSTA is based upon the fundamental concept of mass balance (i.e. reducing inflow loads will reduce downstream P levels and improve marsh ecology). This concept was the basis for implementing BMPs and STAs to reduce marsh P levels, P accumulation in WCA soils driving excessive growth of rooted vegetation, and P levels in WCA outflows. While WCA-1 and WCA-2A outflow FWMs, decreased significantly over the 1979-2024 period, WCA-3A outflow FWMs responded less because of changes in WCA-3A operation that increased flow delivery to Northeast SRS at low stage (when P concentrations are higher) and shifted more outflow to S333 & S333N, which have higher P levels than S12 structures.

[DBHYDRO. South Florida Management District. 2024.](https://www.sfwmd.com/DBHYDRO_South_Florida_Management_District_2024)

[Walker & Kadlec, Dynamic Model for Stormwater Treatment Areas, prepared for U.S. Department of the Interior, 2005.](https://www.sfwmd.com/Walker_Kadlec_Dynamic_Model_for_Stormwater_Treatment_Areas_prepared_for_US_Department_of_the_Interior_2005)