

Restoration Strategies Science Plan Progress

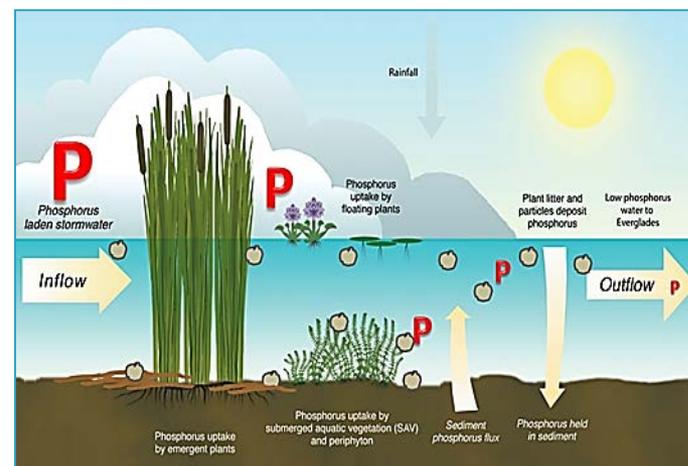
Long-Term Plan
Communications Meeting
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Tracey Piccone, Chief Engineer
Applied Sciences Bureau
SFWMD

Phosphorus Sources, Forms, Flux, & Transformation Processes in the STAs

Study Objectives/Purpose

- Characterize P sources, speciation, cycling, and transport in STAs, and understand mechanisms and factors influencing P reduction in low P environment
- Use results to recommend enhancements or new operational and management strategies to further improve STA performance



Phosphorus Sources, Forms, Flux, & Transformation Processes in the STAs

Progress

- Measurement of STA P flux
 - For stagnant, low flow, and high flow controlled events
 - Completed data collection for one stagnant event [surface water quality, enzyme activity, soil porewater, redox]
- Continuing STA data mining and analysis
- Developed methods for field collection and laboratory enzyme activity measurements
- Performed low altitude remote sensing trial
- Performed initial avian surveys



Use of Soil Amendments/Management to Control P Flux

Study Objective/Purpose

Determine if flux of P from the soil in STAs can be reduced with soil amendments or management techniques such as soil inversion or addition of a limerock cap



Use of Soil Amendments/Management to Control P Flux

Progress

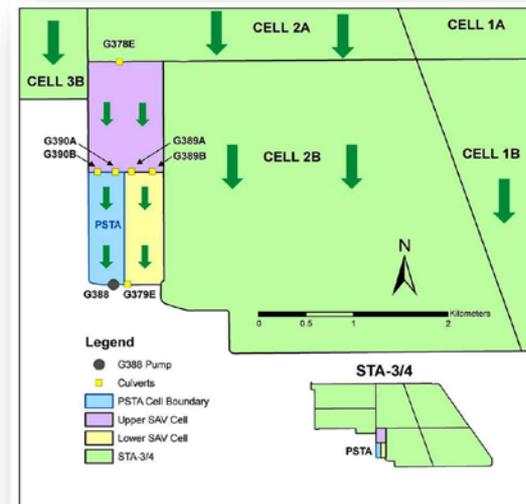
- **Developed Draft Phase I report**
 - Literature review on soil amendments and management techniques
 - Previous findings relevant to controlling P flux in wetlands
 - Preliminary feasibility to implement select amendments/techniques in STAs including in situ experimental and full-scale implementation cost estimates
- **Currently evaluating implementation of next phases of study**



Periphyton-based Stormwater Treatment Area (PSTA): Performance, Design & Operational Factors

Study Objective/Purpose

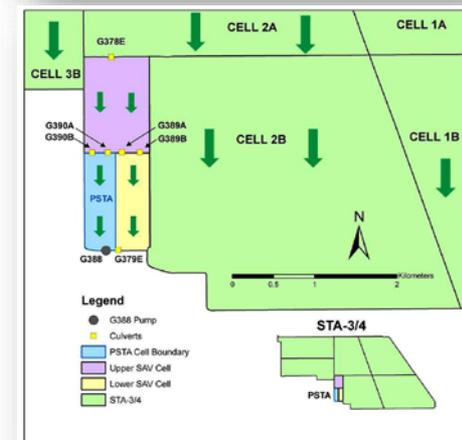
Continue investigation of PSTA cell performance to determine design elements, operational factors, and biogeochemical characteristics that enable the PSTA cell to achieve ultra-low outflow TP levels



Periphyton-based Stormwater Treatment Area (PSTA): Performance, Design & Operational Factors

Progress

- Evaluated high flow pulse flow events in PSTA Cell
 - preliminary results suggest pulses had no apparent adverse effect on performance
- Evaluated PSTA Cell inflow and outflow P data collected every 3 hours (Remote P Analyzers) to understand potential factors influencing performance such as flow, stage, inflow concentration, season, time of day (James, 2015)
- Developed improved POR annual water and P budgets (Zhao, 2015)
- Preparing interim report on PSTA Cell results to date



Evaluate the Use of Alternative Vegetation Occurring in Low P Environments to Achieve Low P STA Discharge

Study Objective/Purpose

Evaluate nutrient removal efficacy of vegetation that occurs under very low P conditions in STAs and examine major processes and mechanisms underlying P cycling at very low P conditions in STAs



Evaluate the Use of Alternative Vegetation Occurring in Low P Environments to Achieve Low P STA Discharge

Progress

- Defining preliminary path forward for study
- New focus for next phase of study:

Evaluate the P Reduction Performance of Rooted Floating Aquatic Vegetation (FAV) mixed with Submerged Aquatic Vegetation (SAV)



Impacts of Deep Water Inundation Pulses on Cattail Sustainability

Study Objectives/Purpose

- Evaluate the influence of deep water pulsing on cattails
- Provide recommendations for STA and FEB operations



Impacts of Deep Water Inundation Pulses on Cattail Sustainability

Progress

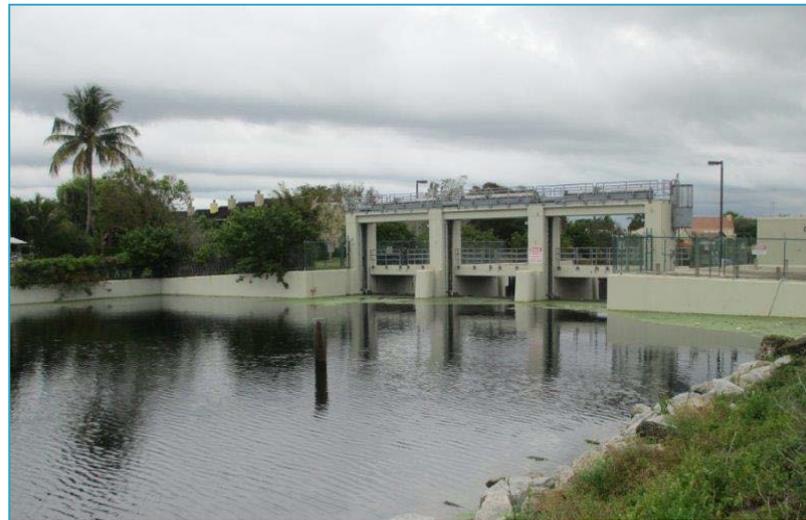
- In Situ Component
 - Developed SOPs for in situ data collection
 - Initiated collection of biomass, floc and soil baseline data in STA-1W (Cell 2A) and STA-3/4 (Cell 2A)
- Test Cell Component
 - Performing POR hydrologic data analysis for each cell
 - Evaluating results from wave test in STA-1W Cell 2A
 - Refurbishment completed and cattail grow-in underway



Development of Operational Guidance for FEB and STA Regional Operational Plans

Study Objective/Purpose

Develop modeling tools and operational protocols for FEBs/STAs to manage storage and flows and minimize STA outflow P concentrations



Development of Operational Guidance for FEB and STA Regional Operational Plans

Progress

- Developing draft reports for field tests conducted in STA-2 Cell 3, STA-3/4 Cell 2A, and STA-3/4 Cell 3A
- Continued refinement of iModel optimization tool for Optimization Framework
- Improved functionality of “WaveOp” tool to assist in real-time operation support



Evaluation of the Influence of Canal Conveyance Features on STA & FEB Inflow & Outflow TP Concentrations

Study Objectives/Purpose

- Determine whether P concentrations change when conveyed through STA inflow and outflow canals
- Evaluate P concentration in sediments and seepage to and from canals



Evaluation of the Influence of Canal Conveyance Features on STA & FEB Inflow & Outflow TP Concentrations

Progress

- Completed two technical publications:
 - Supporting Information for Canal Evaluation for all six study canals including literature review, as-built drawing review, and data query (Zhao, 2015)
 - STA-1 Inflow Basin Canal Investigation Phase 1 Report (Zhao, 2015)
- Initiated analysis of STA-1W Discharge Canal, STA-2 Inflow/Supply Canal and STA-3/4 Inflow/Supply Canal



Sampling Methods for Total Phosphorus

Study Objective/Purpose

To determine which sampling regime/method provides most accurate representation of TP (as grab samples, and auto-samplers used for compliance sampling, show significant differences)



Sampling Methods for Total Phosphorus

Progress

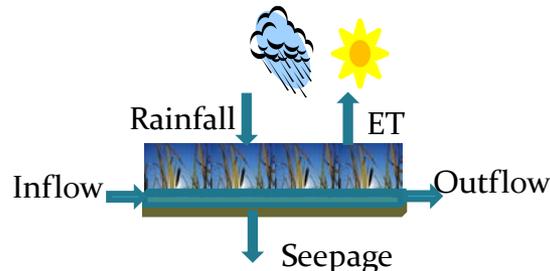
- Installed and evaluated equipment at
 - G-310 - discharge from STA-1W
 - G-390B - inflow to STA-3/4 PSTA Cell
- Conducted monitoring and analysis
- Report preparation underway
 - Methods
 - Observations on wildlife, vegetation, and infrastructure issues impacting sampling results
 - Evaluation of efficacy of sampling methods
 - Use of temporal vs. flow-based measurements



STA Water & Phosphorus Budget Improvements

Study Objectives/Purpose

- Water and P budgets are an important tool for understanding STA performance
- Need to determine sources of error in water budgets & evaluate methods to reduce the error
- Develop improved water budgets for STA cells in a phased approach for a test case (STA-3/4 Cells 3A and 3B) and then at other locations to meet Science Plan needs

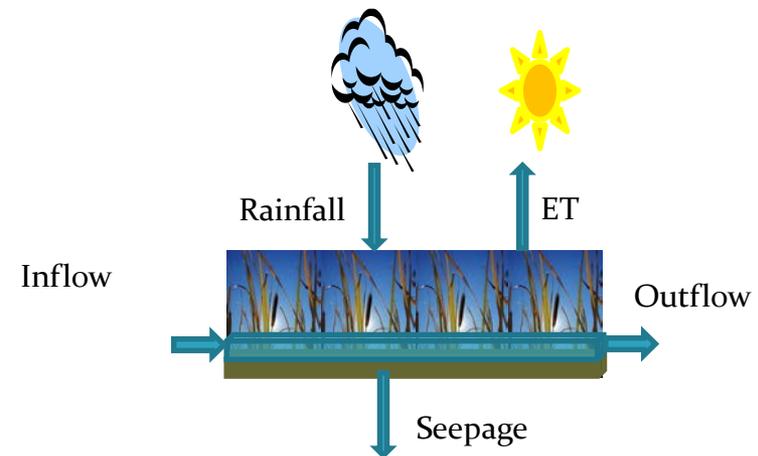


$$\text{Residual} = \text{Outflow} + \text{Seepage} + \text{ET} + \Delta \text{ Storage} - \text{Inflow} - \text{Rainfall}$$

STA Water & Phosphorus Budget Improvements

Progress

- Continuing improvements to Water Budget Tool
- Continuing flow data improvements for STA-1E structures for WY2014 to date



Summary

- **Restoration Strategies Science Plan Developed to optimize STA treatment performance to meet WQBEL**
- **Nine initial studies in various stages of implementation**
- **Science Plan updates and subsequent results presented in the annual SFER**

www.sfwmd.gov/restorationstrategies/