Restoration Strategies Science Plan Progress

## Long Term Plan Communications Meeting
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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
- Compare results with Water Conservation Areas (WCAs)
- Develop STA operational and management strategies to meet discharge limits
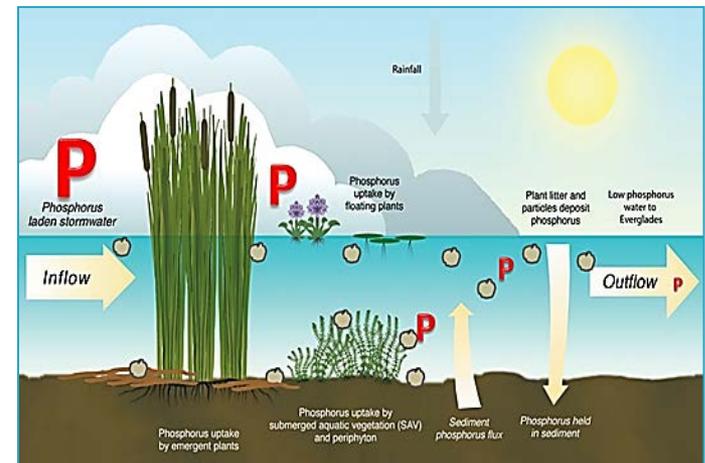
Phosphorus Sources, Forms, Flux, & Transformation Processes in the STAs

Progress

- Initiated setup for STA P flux and vegetation measurements

- Baseline STA SAV surveys completed

- Continued literature review on P processes

- Organic P characterization work underway

- Data mining and analysis of historical DB STA data underway

- Low altitude remote sensing trial data analysis performed

- Avian video surveys ongoing

- Finalizing contract for STA internal water quality, litter, floc, and soil measurements
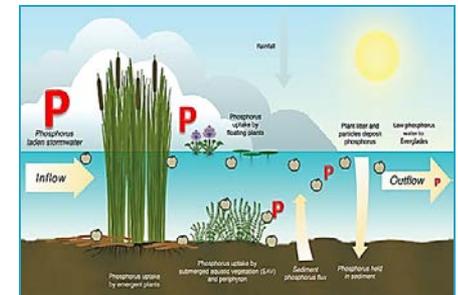
Use of Soil Amendments/Management to Control P Flux

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 adding a limerock cap

Use of Soil Amendments/Management to Control P Flux

Progress

Developed Draft Phase I report

- Completed literature review regarding soil amendments and management techniques

- Summarized previous findings relevant to controlling P flux in wetlands for these approaches

- Evaluating issues in order to determine if next phase in the STAs should be implemented GO/STOP

- Soil inversion in STA-1W expansion site under consideration

- Further development of experimental phase and full-scale implementation cost estimates

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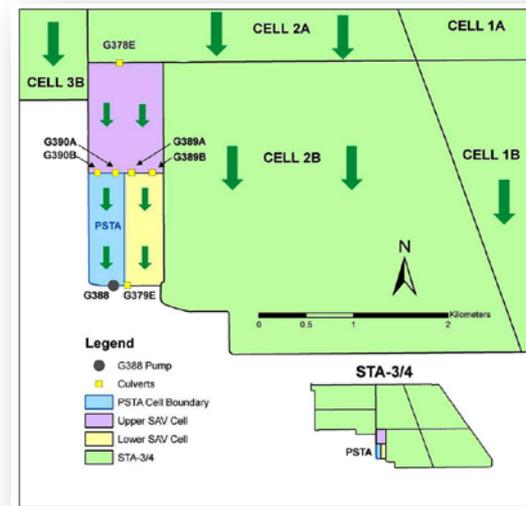
Periphyton-based Stormwater Treatment Area (PSTA): Performance, Design & Operational Factors

Progress

- Continued routine monitoring and analysis
- Completed preliminary analysis on PSTA Cell water budget
- Completed preliminary analysis of PSTA Cell RPA data
- Finalizing additional groundwater/seepage data in support of PSTA Cell water budget
- Analyzing monitoring results from three pulse tests
- Preparing interim report on PSTA Cell results to date to determine path forward for feasibility evaluation
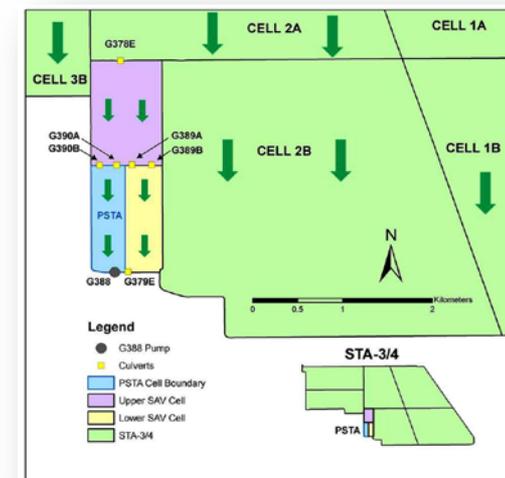
Evaluate the Use of Alternative Vegetation Occurring in Low P Environments to Achieve Low P STA Discharge

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
- Mesocosm results presented in 2015 SFER
- Compiling additional literature on vegetation in low P environments
- Establish preliminary path forward for study:

Evaluate the Role that Rooted Floating Aquatic Vegetation (FAV) mixed with Submerged Aquatic Vegetation (SAV) have in Meeting STA TP Discharge Limits

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

- Continued comprehensive literature review
- Developed SOPs for in situ data collection
- Initiated collection of baseline data for in situ study in STA-1W (Cell 2A) and STA-3/4 (Cell 2A)
- In support of the experimental design performed POR hydrologic data analysis for each cell and evaluated results from wave test in STA-1W Cell 2A
- Test cell refurbishment completed

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
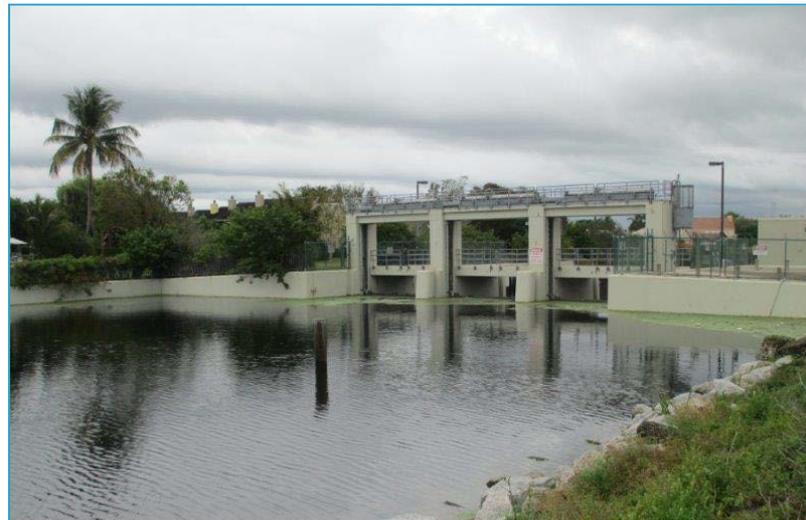
Development of Operational Guidance for FEB and STA Regional Operational Plans

Progress

- Completed hydraulic field testing in STA-1W, STA-2, and STA-3/4 and data analyses and developing vegetative resistance values for STAs

- Completed user guide for hydraulic field testing

- Refining iModel optimization tool to develop Optimization Framework

- Developing preliminary operation plans for A-1 and L-8 FEBs
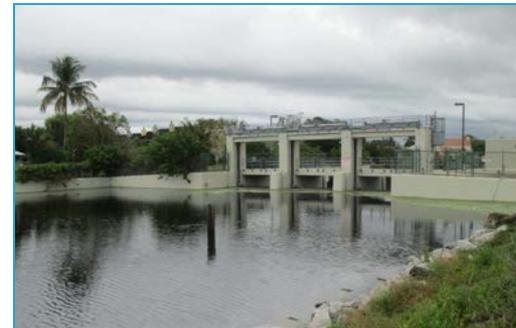
Evaluation of the Influence of Canal Conveyance Features on STA & FEB Inflow & Outflow TP Concentrations

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

- Prepared Support Information for Canal Evaluation- 6 canals (literature review, data query, canal as-builts review, and canal inspection)

- Prepared STA-1 inflow basin canal report

- Performed analyses for STA-1W inflow basin canal and discharge canal
  - ➢ Water quality concentration analysis
  - ➢ Annual wet/dry season and monthly mass balance
  - ➢ Storm-event based mass balance for different parameters
  - ➢ Correlation analysis for several parameters

- Developed SOW for contractual support for additional data analyses

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

- Monitoring completed
  - ➢ G390B - inflow to PSTA at STA-3/4
  - ➢ G310 - discharge from STA-1W
- Preliminary analyses indicate that at G310 during 34 consecutive weeks with flow (4/31-12/15/14)
  - grab samples provided 100% of expected results
  - ADTs provided 99% of expected results
  - RPAs provided 78% of expected results, and
  - ACFs provided 59% of expected results
- Evaluating preliminary results regarding modifications to sampling practices

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

Rainfall ET

Inflow Outflow
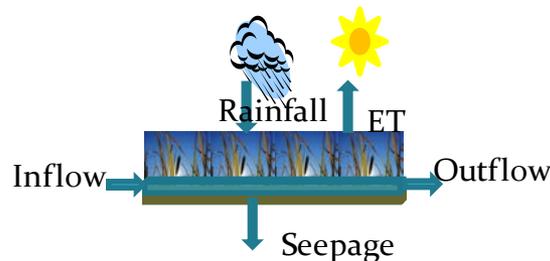
Seepage

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

STA Water & Phosphorus Budget Improvements

Progress

- HDM section completed work on improved flow ratings for POR for STA-1E structures (STA-3/4 & STA-2 structures completed)

- Continued to improve water budget tool, including the ability to incorporate seepage estimates for all cells in STA-2 & STA-3/4

- Preliminary seepage coefficients estimated for STA-2 & STA-3/4

- Finalized Test Case Report (STA-3/4 Cells 3A and 3B)

Rainfall   ET

Inflow   Outflow

Seepage
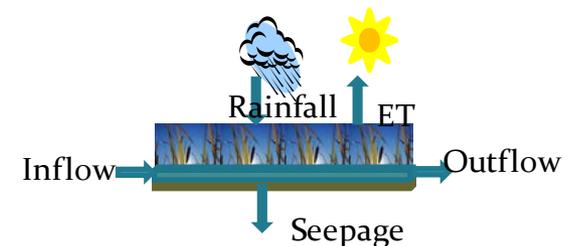
Summary

- **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/