Restoration Strategies Science Plan Progress

Long-Term Plan
Communications Meeting
September 4, 2015

Tracey Piccone, Chief Engineer
Applied Sciences Bureau
SFWMD

sfwmd.gov
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
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.
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
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
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
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
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/