Restoration Strategies Science Plan Progress

Quarterly Communications Meeting on the
Long-Term Plan for Achieving Water Quality Goals
for Everglades Protection Area Tributary Basins
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Phosphorus Sources, Forms, Flux, & Transformation Processes in the STAs

Study Objective

Characterize P sources, speciation, cycling, & transport in STAs, & understand mechanisms & factors influencing P reduction in low P environment

Progress

- Completed literature review and data mining
- Executed support contracts (UF, FIU, DB Environmental, TetraTech)
- Water quality (transects)
  - Sampling and flux measurements for 2 flow events at STA-2 Cell 1
  - Instrumentation/equipment setup, sampling, and measurements in STA-2 Cell 3
- Vegetation
  - Baseline EAV and SAV biomass harvest in STA-2 Cells 1 and 3
  - Quarterly low altitude vegetation remote sensing
- Soil sampling - Completed for STA-2 Cells 1 & 3 and STA-3/4 Cell 3B
- Fauna
  - Bird surveys continued (year 2)
  - Aquatic fauna contract executed

Use of Soil Amendments/Management to Control P Flux

Study Objective

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

Progress

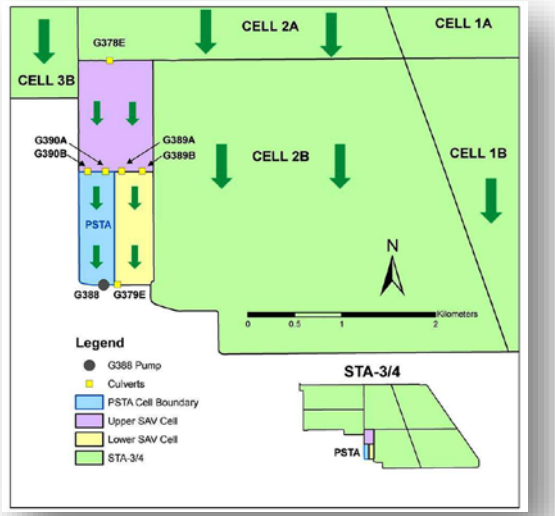
Phase I Summary Report finalized

- Literature review >100 materials sorb P, only a few suitable for use in STAs
- Preliminary feasibility to implement selected amendments & techniques in STAs for experimental and full-scale implementation
- Will implement large-scale soil inversion evaluation in STA-1W Expansion Area
- No additional testing of soil amendments or other soil management techniques will be performed at this time

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

Study Objective

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

- High flow pulse events - increased water depth & time of day did not affect PSTA Cell's performance
- Further evaluating pulse events to determine flow rate for optimal treatment
- Preparing follow-on testing with increased water depth (approximately 2.5' to 3.0')
- Continuing work on PSTA interim summary report

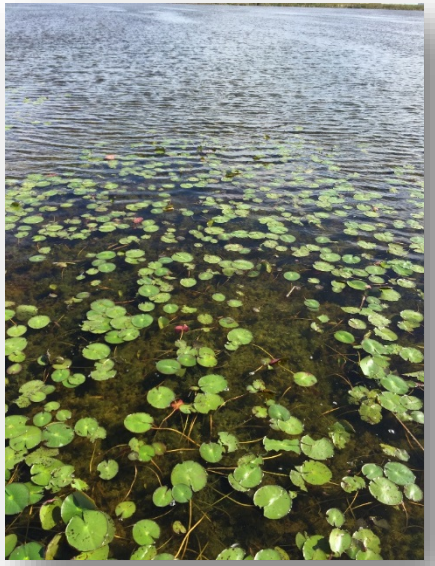
Evaluate the Use of Alternative Vegetation Occurring in Low P Environments to Achieve Low P STA Discharge

Study Objective

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

Progress

Evaluate the Role that Rooted Floating Aquatic Vegetation (FAV) have in lowering STA TP Discharge Concentrations



- Phase 1: Evaluate if TP is lower in the water column with rooted floating aquatic (FAV) vs. areas with SAV
- Phase 2: If warranted, assess uptake and storage of P in rooted FAV areas vs. SAV areas

Rationale for Evaluating the Use of Rooted FAV

Rooted FAV may:

- Reduce P diffusion from soil to the overlying water through uptake and storage in belowground biomass
- Physically provide long term storage of P through:
  - extensive root system
  - high belowground biomass allocation
  - high tissue nutrient uptake and translocation (shoots to roots)
  - slow turnover rates
  - increase resistance to flow and reduce damage to SAV from high wind and high flow events

If rooted FAV show benefits→
Promote establishment
in downstream end of STAs

Impacts of Deep Water Inundation Pulses on Cattail Sustainability

Study Objective

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

Progress

- Cattail monitoring STA-1W Cell 2A & STA-3/4 Cell 2A
  - Completed 2015 wet season monitoring
  - Plant biomass sampling
  - Ongoing data analysis
- STA-1W northern test cells refurbishment
  - 1-2 feet of soil needed in test cells for cattail growth and water level control

Development of Operational Guidance for FEB and STA Regional Operational Plans

Study Objective

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

Progress

- Hydraulic (vegetation resistance) & water quality (TP) field testing
  - **STA-3/4 Cell 3A dense EAV 2014**
  - **STA-2 Cell 3 SAV 2015**
  - **STA-3/4 Cell 2A less dense EAV 2016**

- Developed and updated Hydraulic Field Test User's guide
- Implemented iModel for the STA central path based on historical data
  - iModel prediction for short term (e.g. weekly) TP results indicates better efficiency than previous modeling
  - Continue to develop iModel to improve correlation between model predictions and observed STA outflow TP concentration data

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

Study Objective

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

Progress

- Phase I study: STA-1W Inflow Basin Canal complete
  - Results suggest that canal behaved as TP source for period analyzed
  - L-8 FEB will reduce peak flow discharges so there will be less potential for P export from this canal, therefore postponing Phase II field work for now
- Phase I studies are underway for STA-1W Outflow Canal, STA-2 Inflow/Supply Canal, & STA-3/4 Inflow/Supply Canal
- Phase I study of STA-2 Discharge Canal & Phase II Study of STA-2 Inflow Canal scheduled to start in FY16

Sampling Methods for Total Phosphorus

Study Objective

To determine which sampling regime and method provides most accurate representation of TP:

- GRAB
- ACF (composite flow)
- ADT (discrete time)

Progress

- Grab & ADT methods appear to be most reliable for collecting samples
- ACFs operation can lead to extended periods of failure
- ACFs at structures with low flows and reverse flow may be biased
- Structures, levees and other associated infrastructure serve as habitat for both fauna & flora
- And through biogeochemical processes become both acute & chronic sources of TP & influence outflow concentrations
- Report preparation underway

Sampling Methods for Total Phosphorus

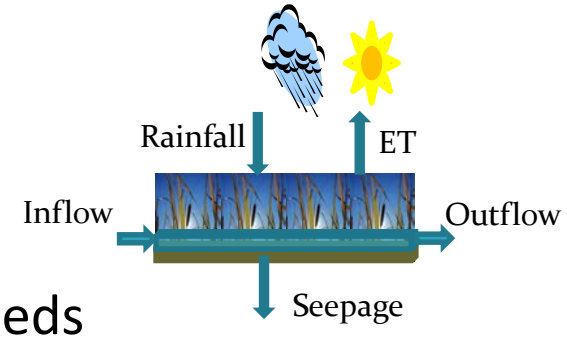
Recommendations for future work include:

- Document autosampler installation process
- Provide routine quality assurance of autosampler operation
- Redesign selected platform and sampling equipment
- Determine impact of autosampler data error
- Evaluate of alternative sampling methods

STA Water & Phosphorus Budget Improvements

Study Objective

- Determine sources of error in water budgets
- Evaluate methods to reduce the error
- Test case STA-3/4 Cells 3A and 3B
- Then at other locations to meet Science Plan needs



Progress

- Phase 2
  - Improving flow ratings & flow estimates for select STA-1W & STA-5/6 structures
  - Ongoing flow data improvements for structures in STA-1E, STA-2, and STA-3/4
  - Improvements to the Water Budget Tool need to be completed to proceed with improved water and TP budgets for STA-2 and STA-3/4

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/