

Governing Board Meeting  
February 12, 2015

# Overview of the Restoration Strategies Science Plan

## Agenda Item 37

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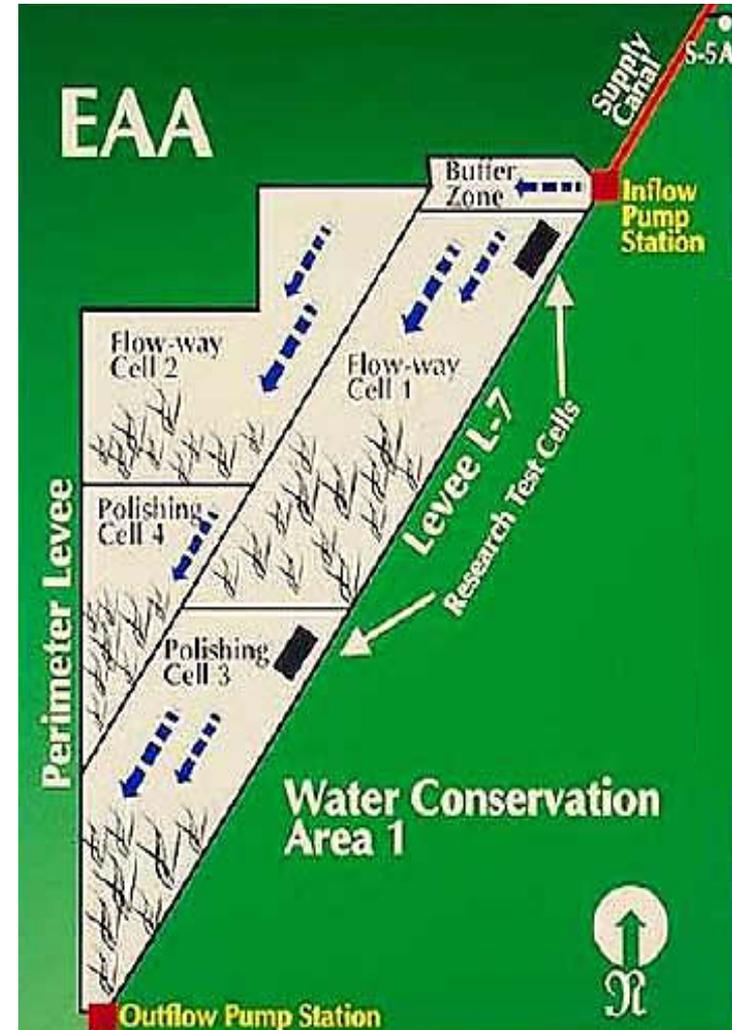
# Background & Mandates

- 1994 Everglades Forever Act
  - Construction of STAs
  - Advanced treatment technologies research
- 2012 Permits & Consent Orders
  - Identify key factors influencing P reduction to meet permit limits
  - Develop Operations Plans for FEBs and STAs to sustain low P outflow concentrations in STAs
- Develop Science Plan in coordination with Technical Representatives identified by USEPA and FDEP

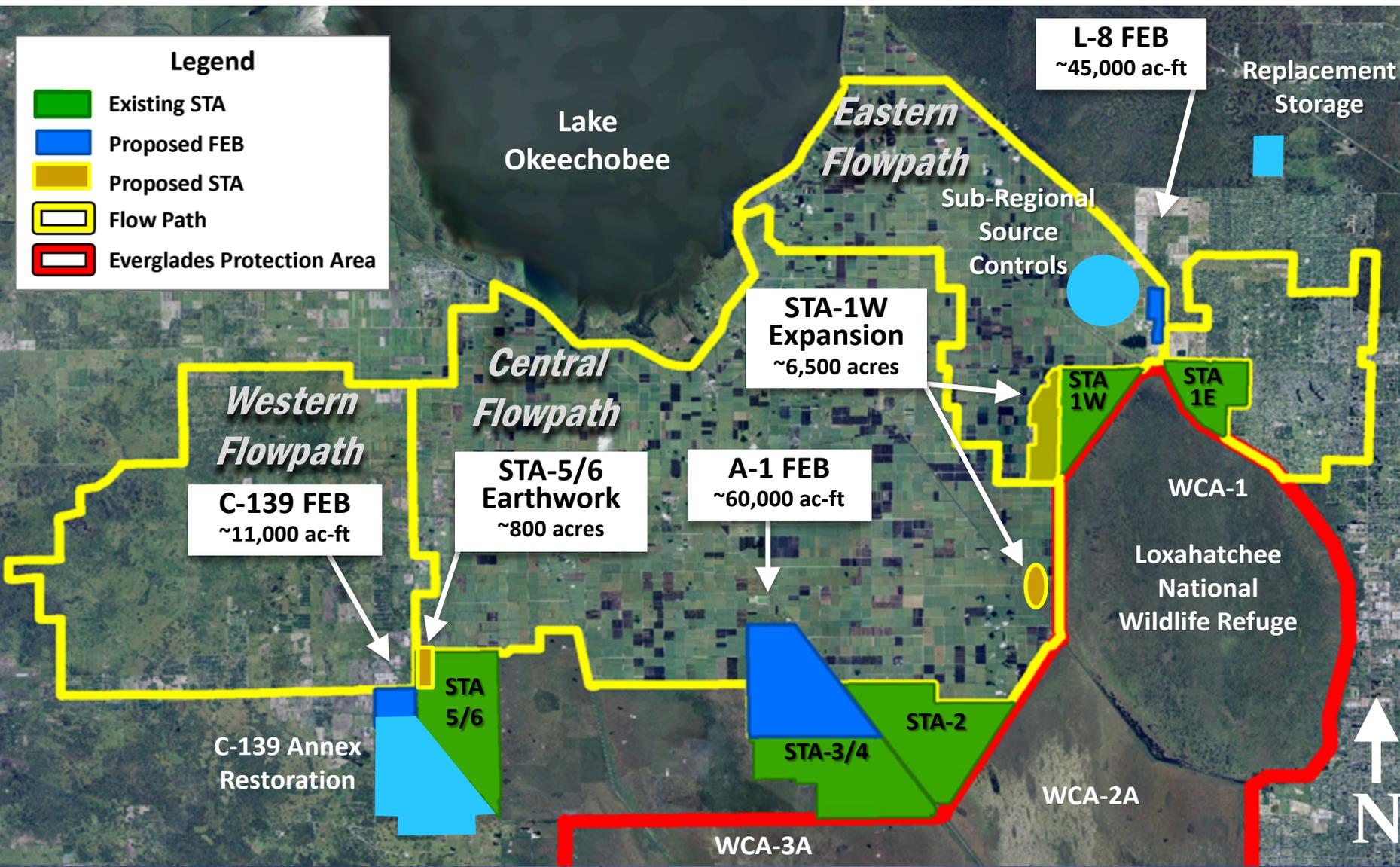


# Everglades Nutrient Removal Project

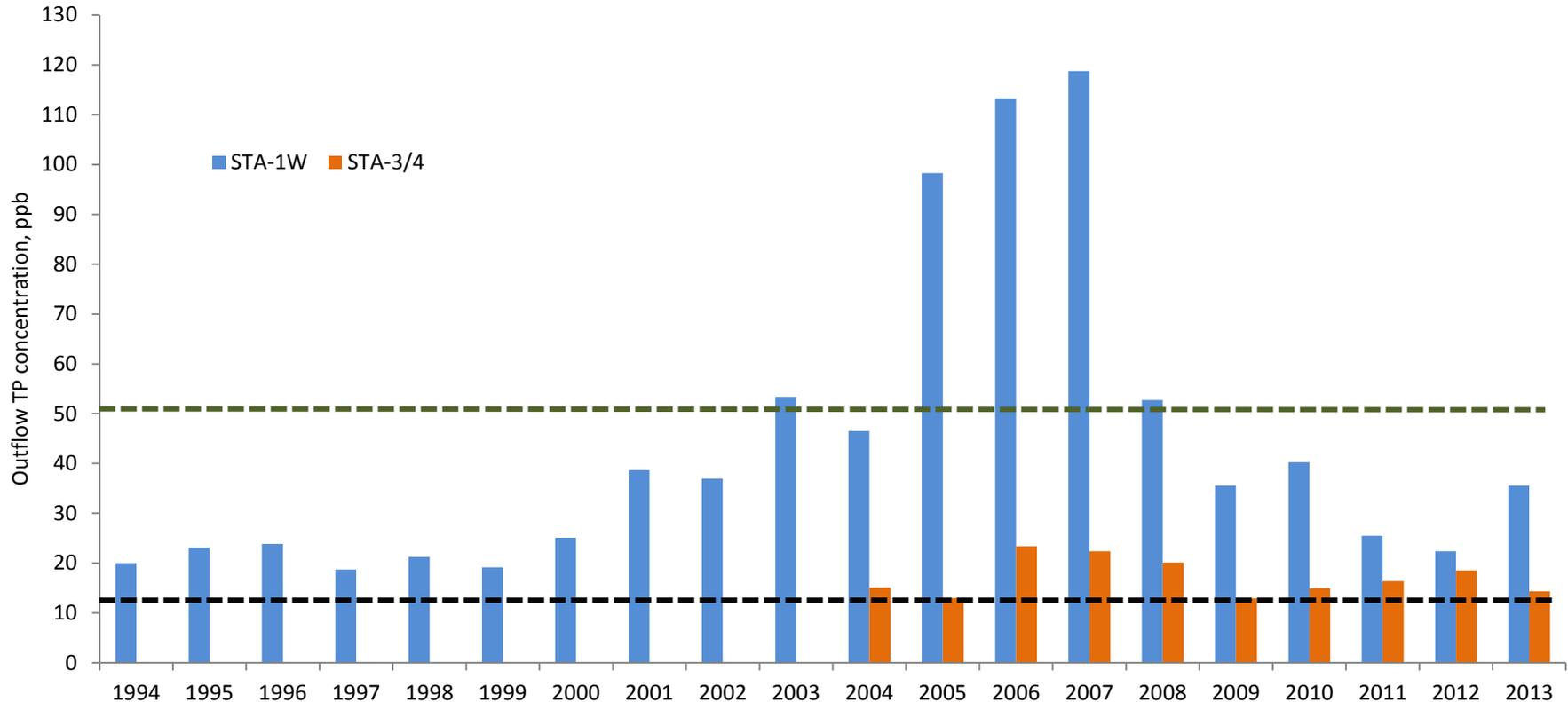
- 1988 Lake Okeechobee Technical Advisory Council (LOTAC) II recommended that the District conduct a long-term, large-scale demonstration of a vegetated flow-way system to remove P from EAA runoff
- Construction legislatively authorized by the 1991 Marjory Stoneman Douglas Everglades Protection Act
- ENR completed in 1993 and began operation in August 1994
- 3,815 acres of formerly farmlands
- Goal: to reduce the phosphorus loads into the Arthur Marshall Loxahatchee National Wildlife Refuge (WCA-1).
- Cost: \$13.9 million
- Today we have 57,000 acres of STAs



# Stormwater Treatment Areas & Flow Equalization Basins



# STA Performance to Date



- STA-1 West and STA-3/4 period of record performance
- Concentrations are annual flow-weighted means

# Background & Mandates

- Specified areas of research to be included in Science Plan per the Consent Orders:
  - Phosphorus & hydraulic loading rates
  - Inflow P concentration
  - Inflow water volumes, timing, pulsing, peak flows and water depths
  - P forms at inflows & outflows
  - Effects of microbial and enzyme activity
  - P resuspension and flux
  - Stability of accreted P
  - P concentrations in soils and floc
  - Influence of other water quality constituents, i.e. calcium
  - Emergent & submerged vegetation species
  - Vegetation density & cover
  - Weather conditions, i.e. drought & hurricanes



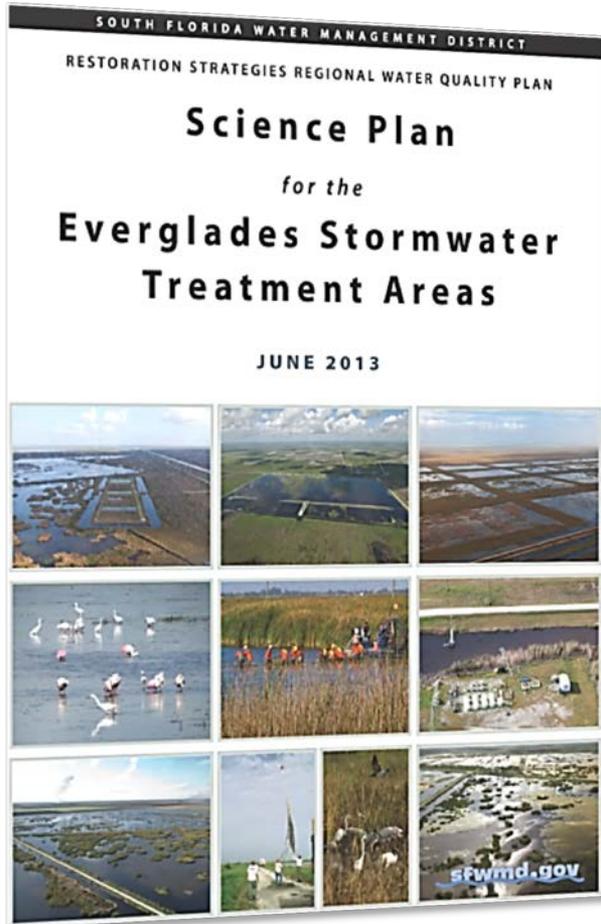
# Science Plan Development

## General Approach:

- Build upon existing knowledge and experience with the STAs
- Identify uncertainties and knowledge gaps:
  - Obtain a better understanding of P reduction in the STAs
  - Determine what measures can be implemented to enhance vegetation-based P treatment
- Focus on meeting permitted STA discharge limits (WQBEL)



# Science Plan: Progress to Date



- Initial Technical Representatives meetings (November 2012 to May 2013)
- Final Science Plan submitted to FDEP (June 2013)
- Detailed Study Plans
  - Developed with input from state and federal Technical Representatives
- Two competitive solicitations for contract support (Consultants, Universities)
- Science Plan implementation (began July 2013)

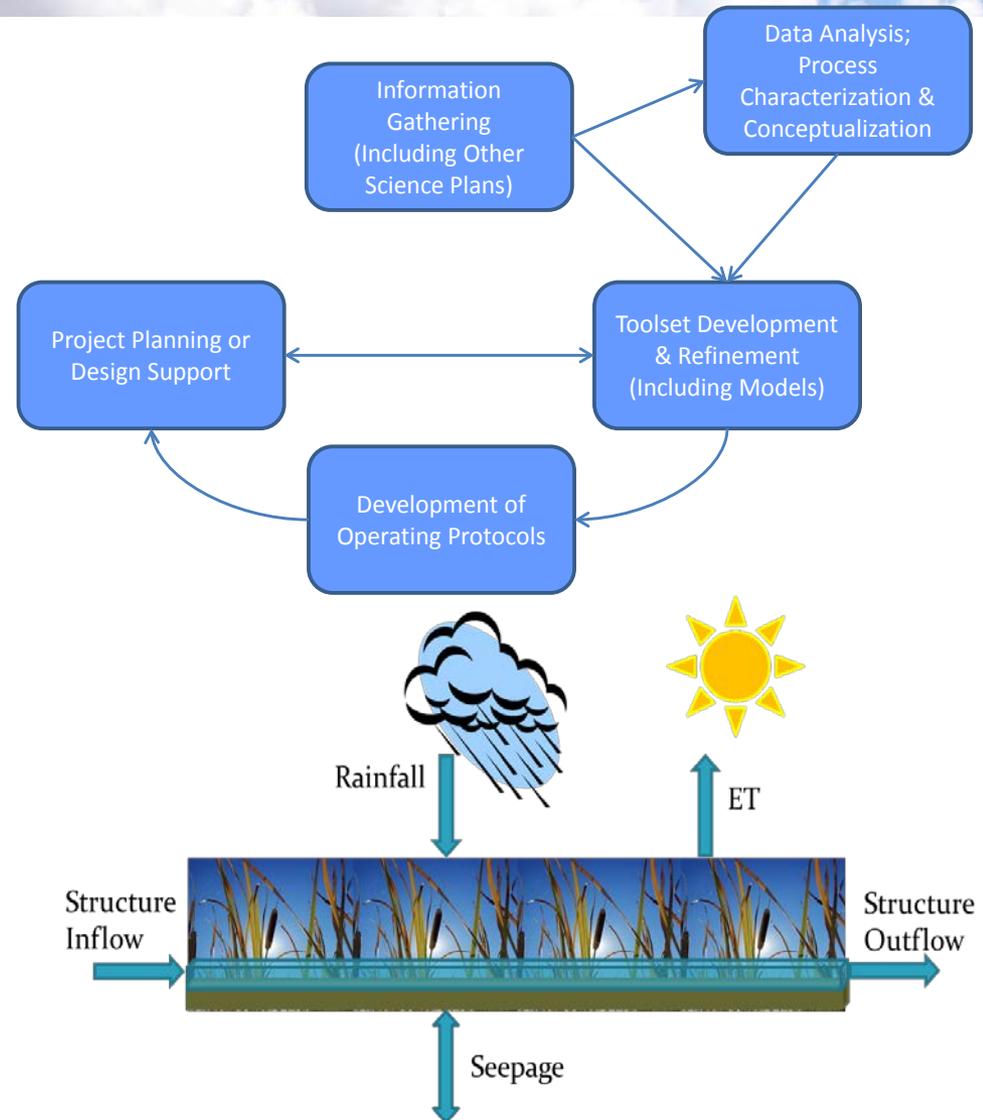
# Initial Studies

## 1. Development of Operational Guidance for FEB and STA Regional Operation Plans

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

## 2. STA Water & Phosphorus Budget Improvements

- Important tool for understanding STA performance
- Determine sources of error and develop methods to reduce the error



# Initial Studies (continued)

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

- Determine whether P concentrations change when conveyed through STA inflow and outflow canals

### 4. Evaluation of Inundation Depth and Duration Threshold for Cattail Sustainability

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



# Initial Studies (continued)

- 5. Investigation of STA-3/4 PSTA Performance, Design, and Operational Factors**
  - Determine design, operations, and biogeochemical characteristics that enable achievement of ultra-low outflow P
  
- 6. Phosphorus Removal Efficacy of Alternative Vegetation in a Low Nutrient Environment**
  - Compared effectiveness of native vegetation species such as water lily and sawgrass



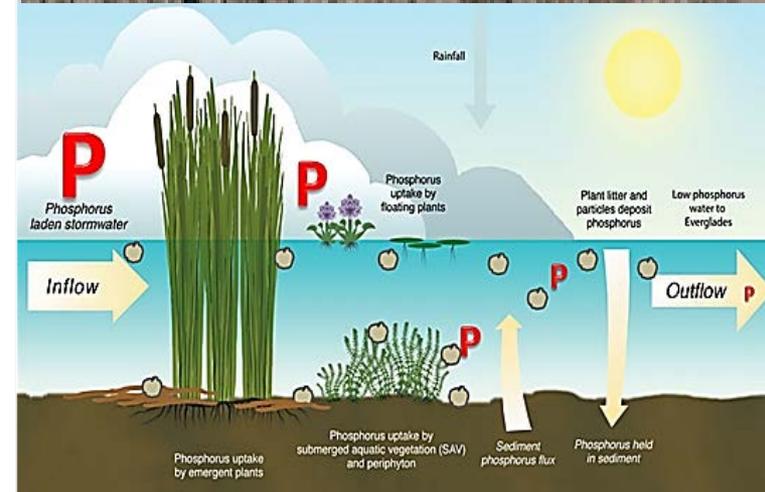
# Initial Studies (continued)

## 7. Use of Soil Amendments/ Management to Control Phosphorus Flux

- Determine if release of P from the soil can be reduced with soil amendments or management techniques

## 8. Phosphorus Sources, Forms, Flux, and Transformation Processes in the STAs

- Understand mechanisms and factors influencing P reduction in low P environment
- Use information to improve operational and management strategies



# Initial Studies (continued)

## 9. Sampling Methods for Total Phosphorus

- Determine the best method for surface water total phosphorus sampling in STAs



# Summary

- **Restoration Strategies Science Plan Developed to optimize STA performance to meet the WQBEL**
- **Nine initial studies in various stages of implementation; includes refurbishment of STA test cells**
- **Studies developed in coordination with Technical Representatives reflecting FDEP, EPA, ENP, USACE, ARM Loxahatchee Wildlife Refuge**
- **Science Plan updates and subsequent results will be presented in quarterly meetings with the Tech Reps, Long Term Plan meetings, and the annual South Florida Environment Report**