



# 2014 BMP Research Update: Floating Aquatic Vegetation Impact on Farm Phosphorus Load

Samira Daroub  
BMP Training

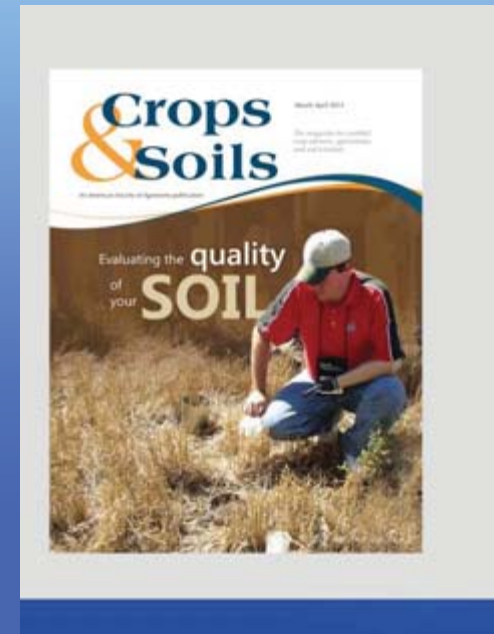
September 25, 2014

# Presentation Outline

- Introduction
- Project Update: Floating Aquatic Vegetation (FAV)  
Impact on Farm P Load
  - FAV Biomass
  - Farm Treatment and Control Selection
  - Farm Drainage Water
  - Ambient Farm Canal Water
  - Farm Canal Sediments
- 2014/15 Preview

# National attention to the EAA and BMP program

- Upcoming featured article in National magazine *Crops & Soils* and about success of the BMP program in the EAA
- *"The cooperative, science-based approach to the BMP program is at the core of its success, says Rick Roth. In fact, it's made him a better farmer."*



# Extension publications: <http://edis.ifas.ufl.edu/>

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SL231/SS450: Best Management Practices in the Everglades ...  
... Best Management Practices in the Everglades Agricultural Area: Fertilizer Spill Prevention 1. OA Diaz, SH Daroub, RW Rice, TA Lang, and M. Chen 2. Introduction. ...  
author: O.A. Diaz, S.H. Daroub, R.W. Rice, T. A. Lang, and M. Chen  
department: Soil and Water Science  
[edis.ifas.ufl.edu/ss450](http://edis.ifas.ufl.edu/ss450) - 18k - 2008-09-15

SL231-SP/SS471: Mejores Prácticas de Manejo en el Area Agrícola ...  
... Everglades: Prevención de el Derramamiento de Fertilizantes 1. OA Diaz, SH Daroub, RW Rice, TA Lang, VM Nadal, and M. Chen 2. Introducción. ...  
author: O.A. Diaz, S.H. Daroub, R.W. Rice, T.A. Lang, V.M. Nadal, and M. Chen  
department: Soil and Water Science  
[edis.ifas.ufl.edu/ss471](http://edis.ifas.ufl.edu/ss471) - 18k - 2010-07-08

SL-232/SS451: Best Management Practices in the Everglades ...  
... Best Management Practices in the Everglades Agricultural Area: Fertilizer Application Control 1. TA Lang, SH Daroub, OA Diaz, and M. Chen 2. Introduction. ...  
author: T.A. Lang, S.H. Daroub, O.A. Diaz, and M. Chen  
department: Soil and Water Science  
[edis.ifas.ufl.edu/ss451](http://edis.ifas.ufl.edu/ss451) - 22k - 1998-10-30


SL-225/SS445: Best Management Practices in the Everglades ...  
... SH Daroub, OA Diaz, TA Lang and M. Chen 2. Introduction. ... 44 pp. Sievers, P., D. Pescatore, S. Daroub, JD Stuck, J. Vega, P. McGinnes, and S. Van Horn. 2003. ...  
author: S.H. Daroub, O.A. Diaz, T.A. Lang and M. Chen  
department: Soil and Water Science  
[edis.ifas.ufl.edu/ss445](http://edis.ifas.ufl.edu/ss445) - 25k - 2006-03-24

SL232-SP/SS470: Mejores Prácticas de Manejo en el Area Agrícola ...

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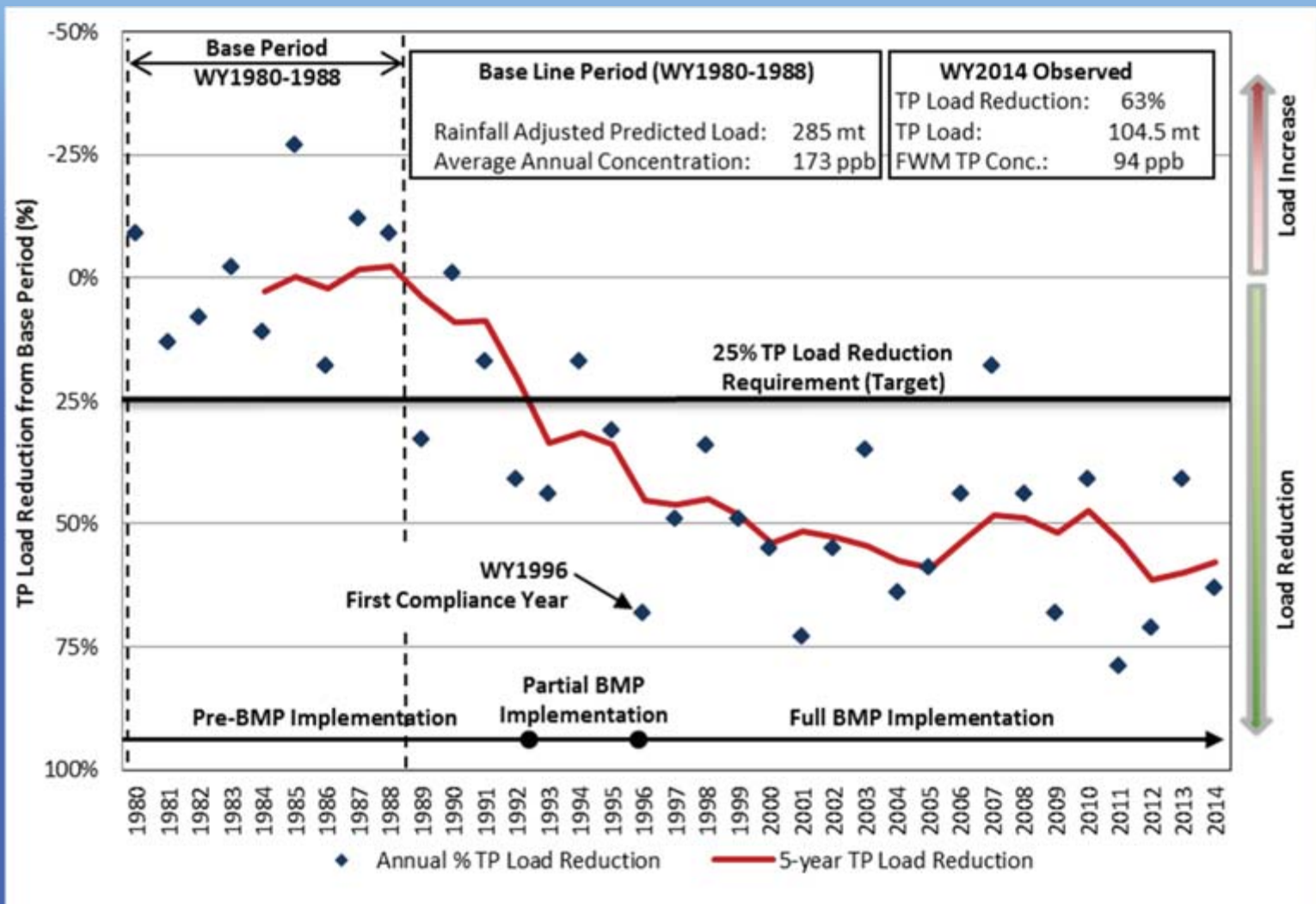
### Research

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#### Soil & Water Resources

- ▶ Best Management Practices & Water Resources
  - *Samira Daroub*
- ▶ Best Management Practices training presentations - April, 2014
  - *Agenda for the EAA BMP Training in Spanish, held in Thursday, April 24, 2014*
  - *Precipitation Detention, by Pepe López (Detención de Precipitación, por Pepe López)*
  - *Rational Use of Pesticides, by César Asuaje (Uso Racional de Plaguicidas en el EAA, por César Asuaje)*
  - *Sediments and Particles Control, by Luis Girado (Control de Sedimentos y Partículas, por Luis Girado)*
  - *Nutrients Control, by Orlando Díaz (Control de Nutrientes, por Orlando Díaz)*
  - *Verification and Documentation of the BMP Program, by Carmela Bedregal (Verificación y Documentación del Programa BMP, por Carmela Bedregal)*
  - *Economy of the BMP Program, by Luis Girado (Economía del Programa BMP por Luis Girado)*
  - *Updating Research for the BMP Program, by Viviana Nadal (Actualización de la Investigación del Programa BMP, por Viviana Nadal)*
- ▶ Best Management Practices training presentations - September 26, 2013
  - BMP Verification and Documentation*
  - EAA Basin and Farm P Loads*
  - Sugarcane, Water Tables, and BMPs*
  - Aquatic Weed Control in the EAA*
  - Wise Use of Pesticides in the EAA*
  - Nutrient Application Practices*
  - Flat Land, Low Level Farm Drainage*
  - Stormwater Treatment Area Research Update*
  - BMP Rule 40E63 and Research Update*
- ▶ Best Management Practices training presentations - April 2013
  - 40E-63 Explanation & Research Update*
  - Herbicide Resistance*
  - BMP Audits and Documentation*

# EAA Basin BMP Performance (courtesy SFWMD)

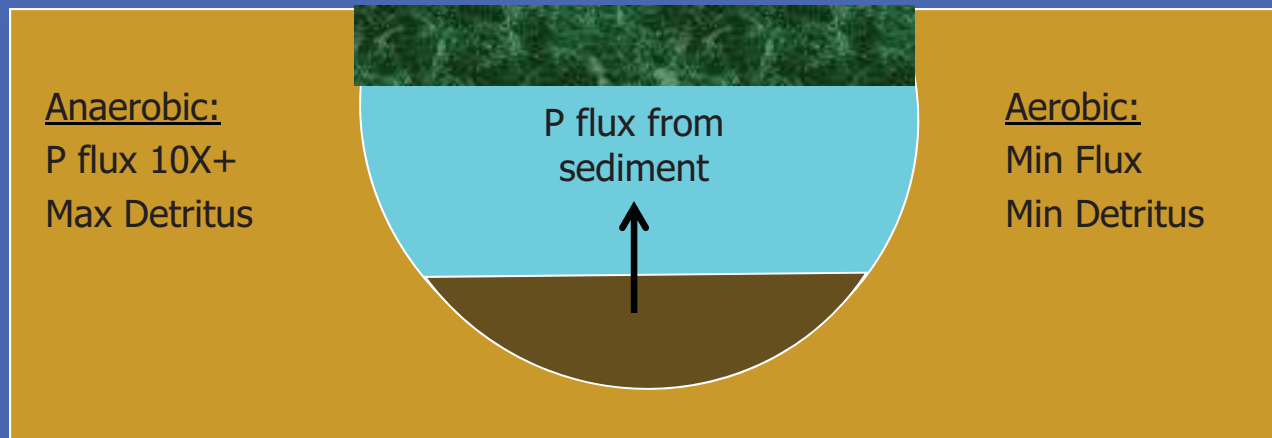
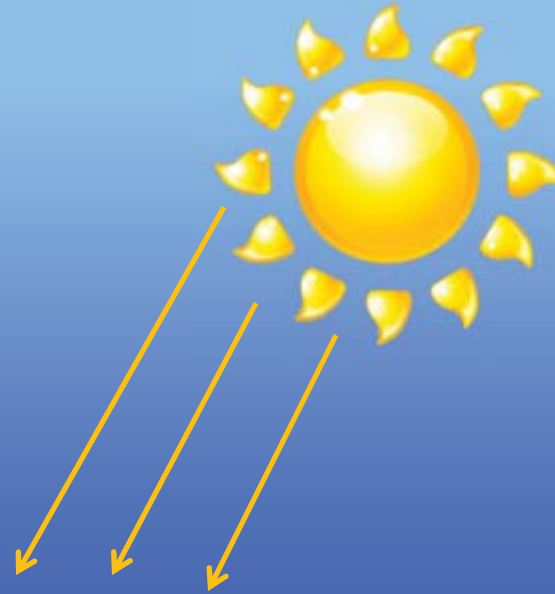


# Floating Aquatic Vegetation Impact on Farm Phosphorus Load



# FAV Project Update

## Experiment Rationale





# FAV Project Update

## Objectives

1. Evaluate FAV management practices in the EAA farm canals for impact on
  - a) farm drainage water phosphorus (P) load
  - b) P speciation of farm drainage water
  - c) canal sediment properties
2. Use research results to develop a BMP for managing FAV in farm canals that further lowers farm P loads.

*The goal is to provide growers an additional tool in their efforts to reduce off-farm P loading in the Everglades Agricultural Area.*

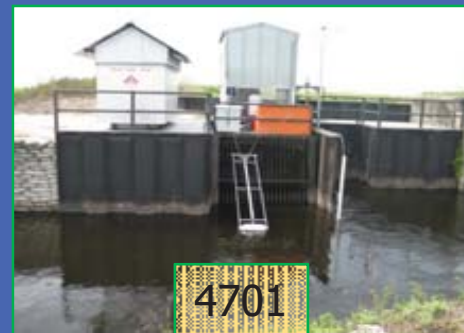


# FAV Project Update

## Methods

### Paired farms study (4 pairs)

- Two pairs each in S-5A and S-6 sub basins
- 2-yr calibration and 3-yr treatment periods
- Calculate changes after initiation of practices
- Improved vs. typical FAV control practices



# FAV Project Update

## Farm Descriptions and Locations

### S-5A Sub-basin

Farm 0401: 908 acres- cane w/corn

Farm 2501: 823 acres- cane w/corn

Farm 1813: 594 acres- cane w/corn

Farm 6117: 800 acres- cane

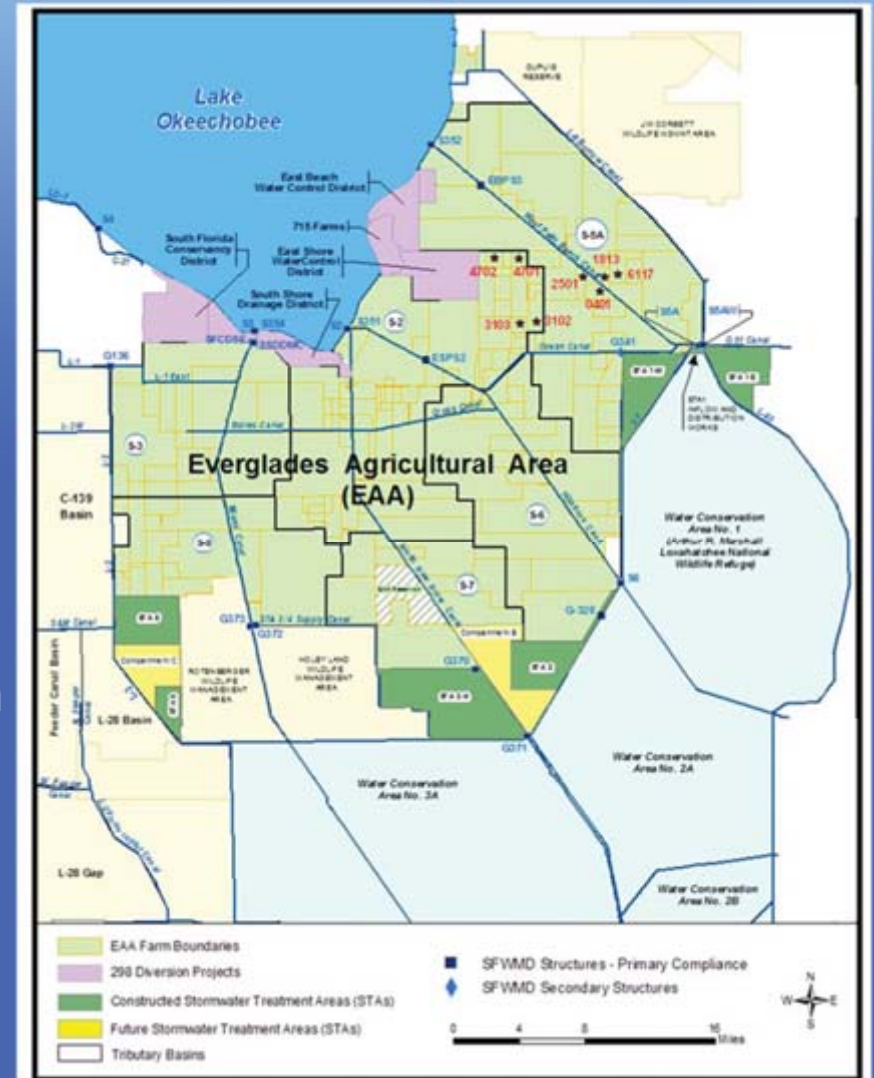
### S-6 Sub-basin

Farm 3102: 1608 acres- cane w/corn

Farm 3103: 602 acres- cane+veg w/corn

Farm 4701: 630 acres- cane

Farm 4702: 640 acres- cane w/rice



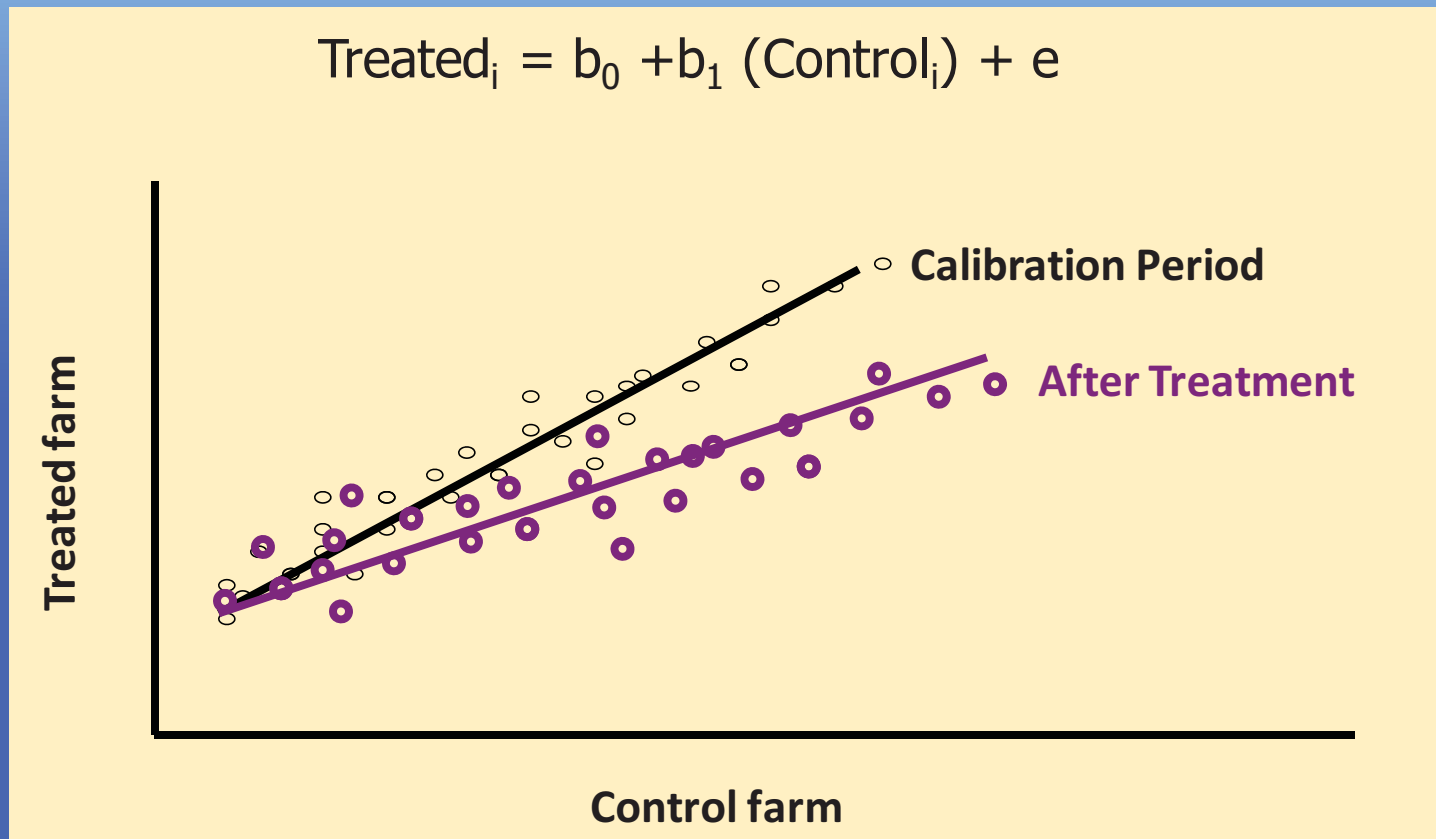
# Example: Farm Pair Aerial View



# FAV Project Update

## Comparative Regression Analysis For P Load

$$\text{Treated}_i = b_0 + b_1 (\text{Control}_i) + e$$



## Calibration Period

- For Farm Pair 4701/4702 three years data:
  - May 1, 2011 – April 30, 2014 (calibration)
  - Started treatment May 1, 2014
- Stepwise multiple linear regression analysis conducted on P loads between 4701/4702 to determine the relationship and its significance

# FAV Project Status

- Treatment Farms: 3103 0401 6117 4702
- Control Farms: 3102 2501 1813 4701
- Treatment Initiation: May 1, 2013 for 3 farm pairs
- Treatment Initiation: May 1, 2014 for farm pair 4 (4701/4702)
- Monitoring of FAV growth
- Biweekly spot spraying if needed, with approved aquatic weed herbicides

# FAV Project Update

## Data Collection

### FAV Biomass:

Species composition, Aerial Coverage, P Content,  
Biomass

### Drainage Water:

Flow volume, velocity

TP/TDP/SRP (PP/DOP), Ca, DOC, pH, TSS

### Ambient Canal Water:

TP/TDP/SRP (PP/DOP), Ca, DOC, pH, TSS

Hydrolab *in situ*: Temp, DO, ORP, SpCond

### Canal Sediments:

TP, Wet Density, Dry Density, OM (LOI), ash content

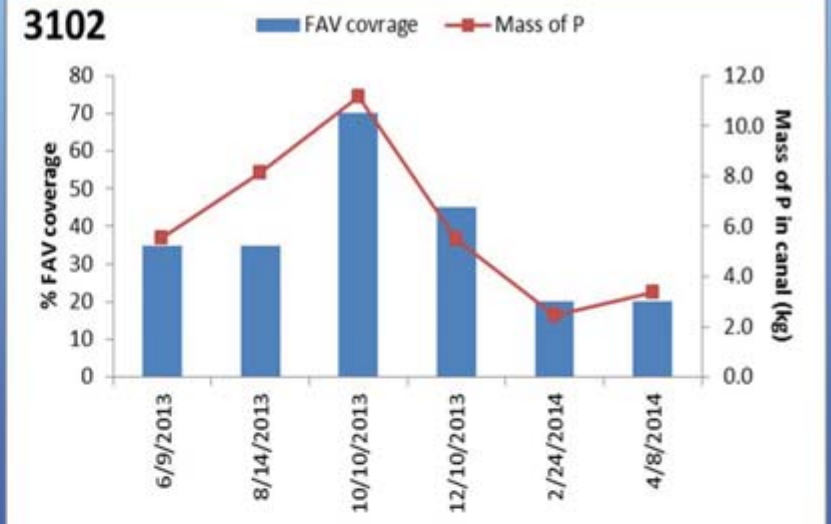
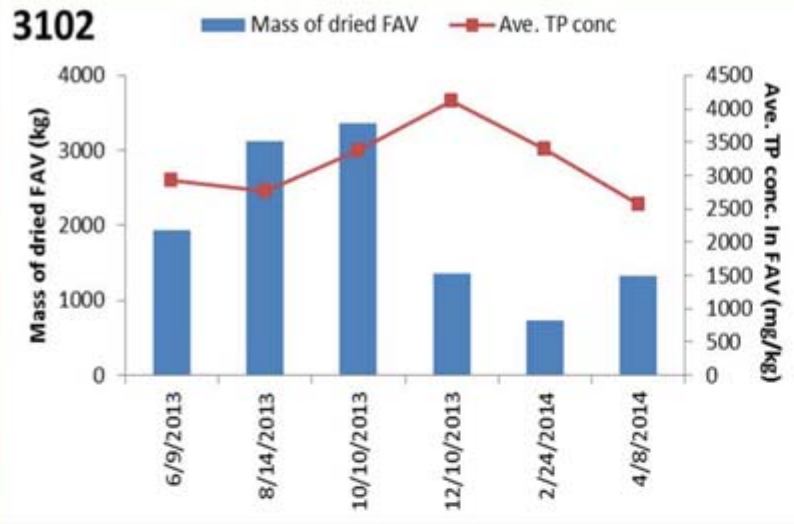
Sediment depth surveys



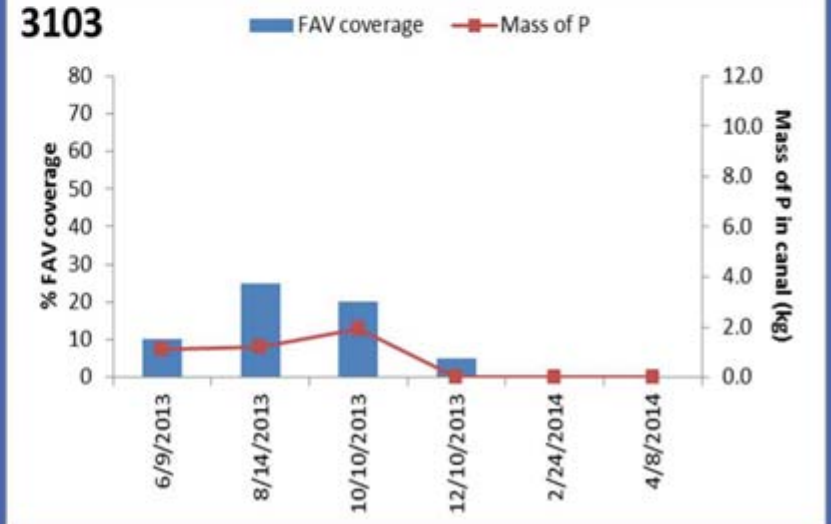
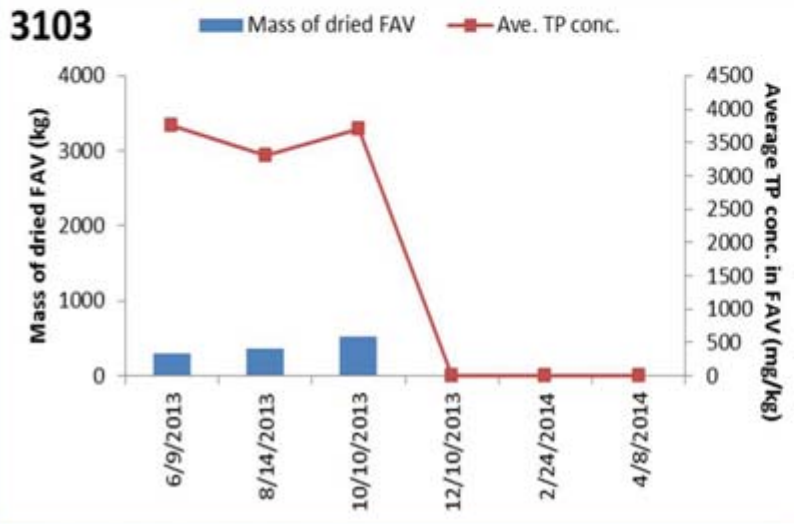
# FAV Project Update

## FAV Coverage and Biomass

Control

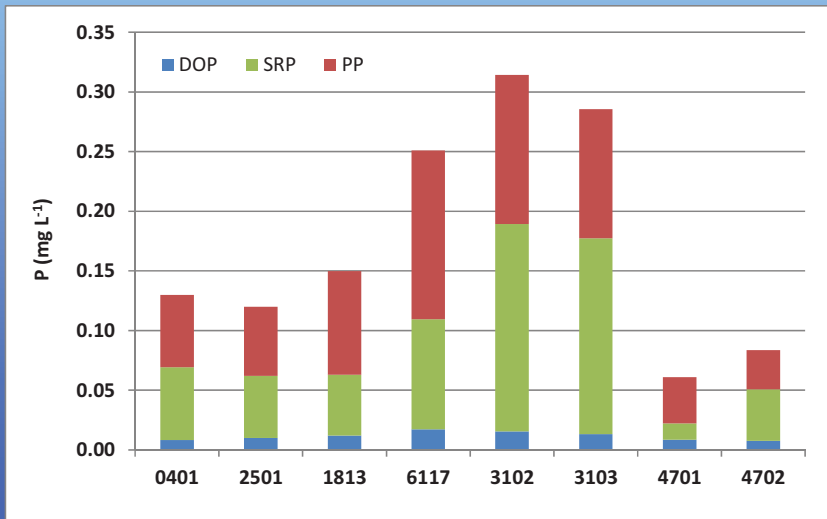


Treatment

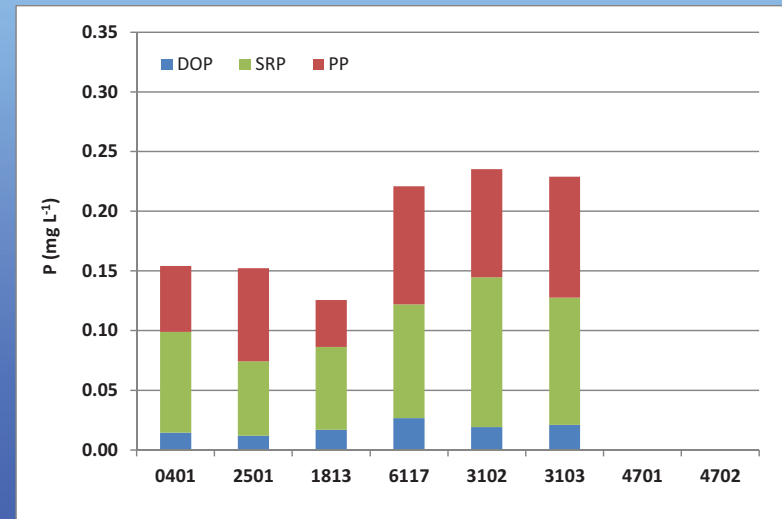


# FAV Research Project

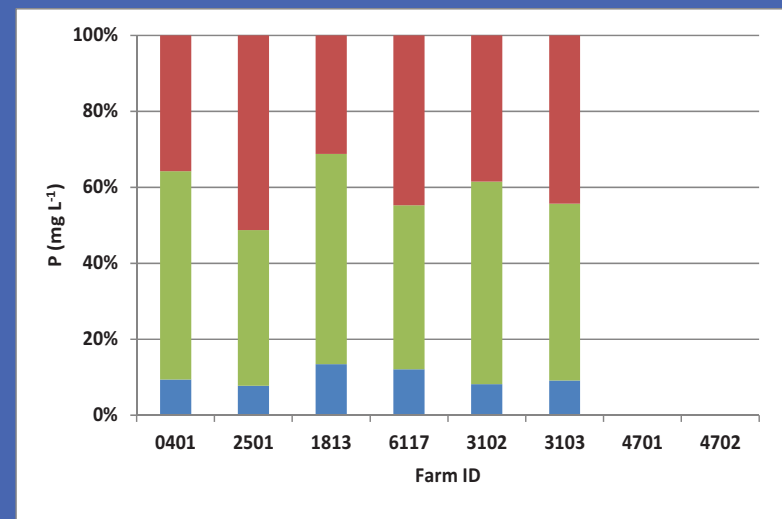
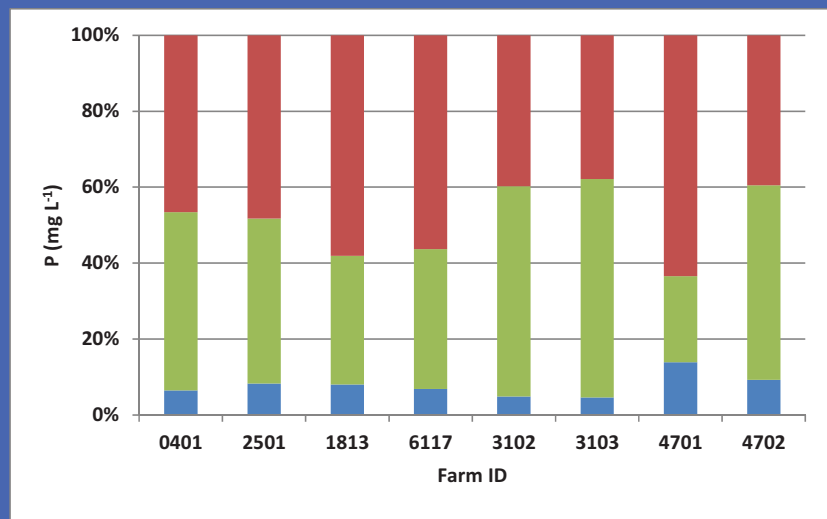
## Farm Drainage Water



Calibration Period

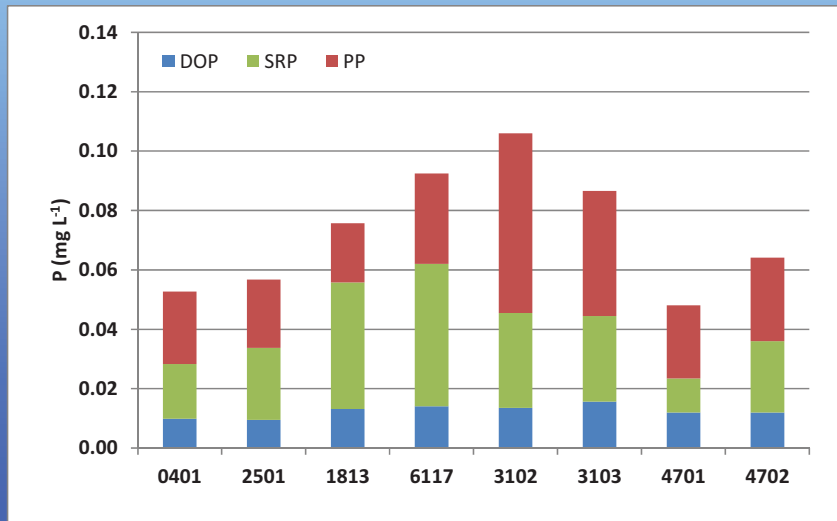


Treatment Period

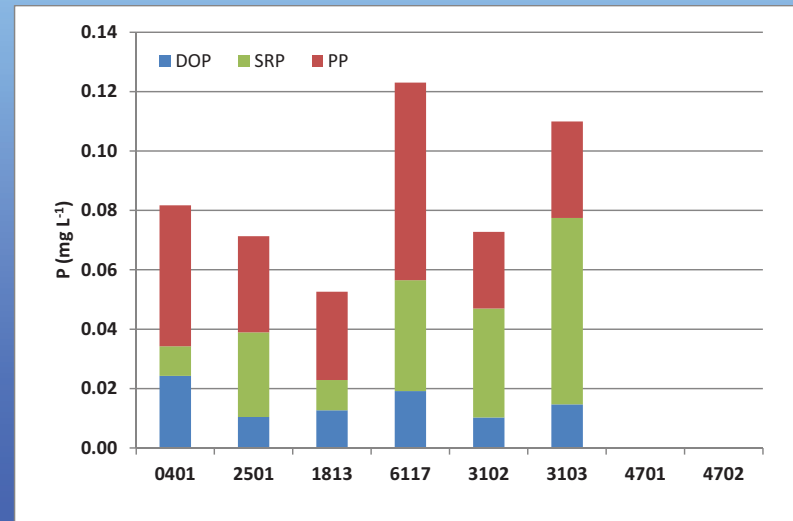


# FAV Research Project

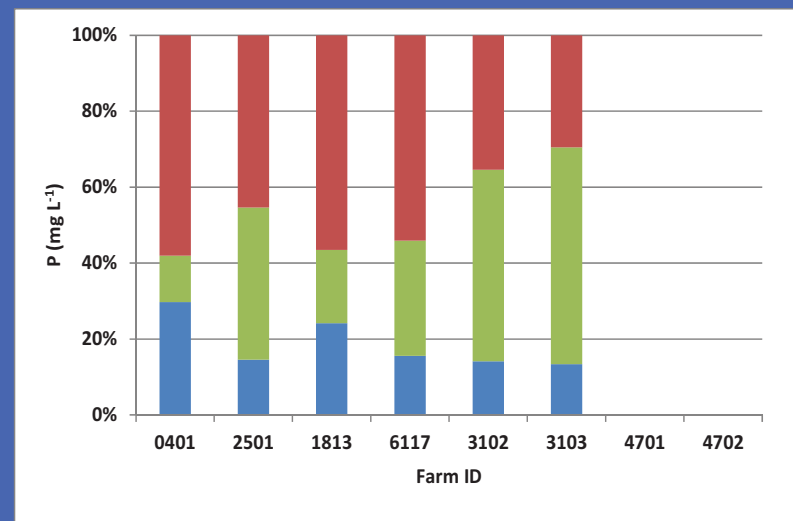
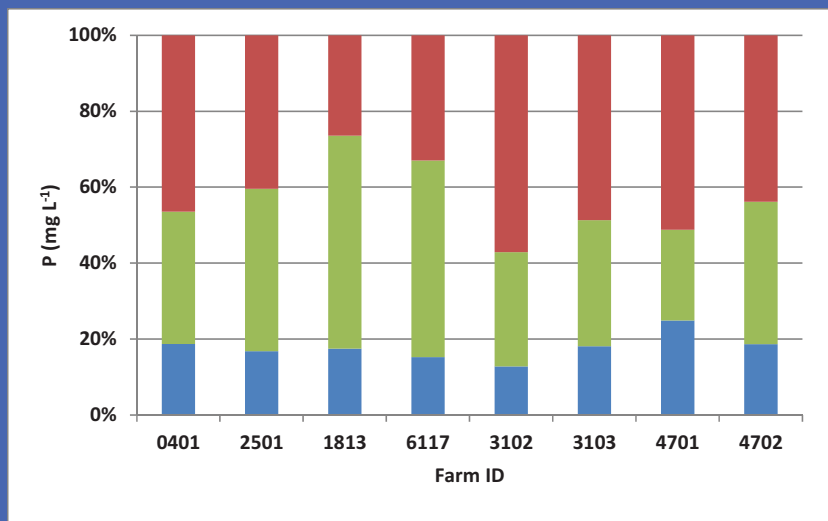
## Ambient Canal Water



Calibration Period



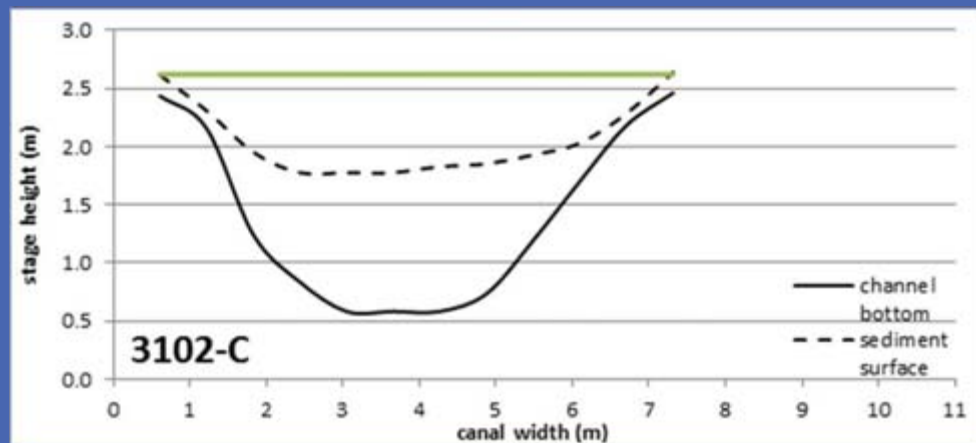
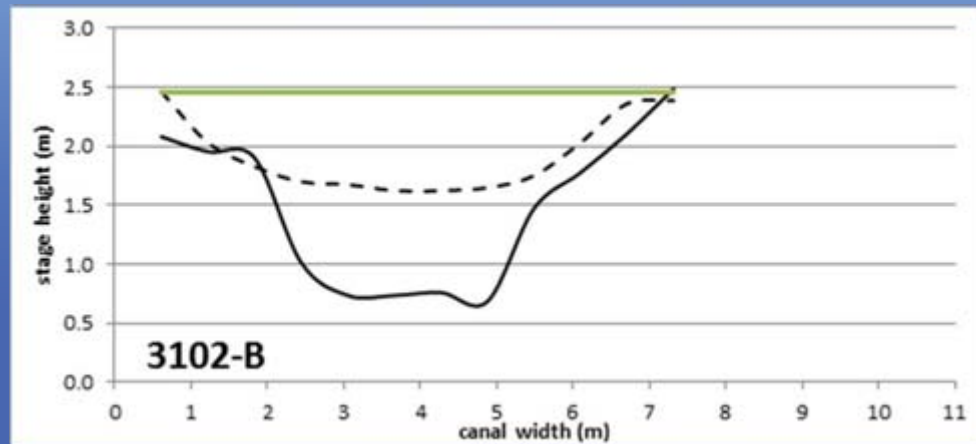
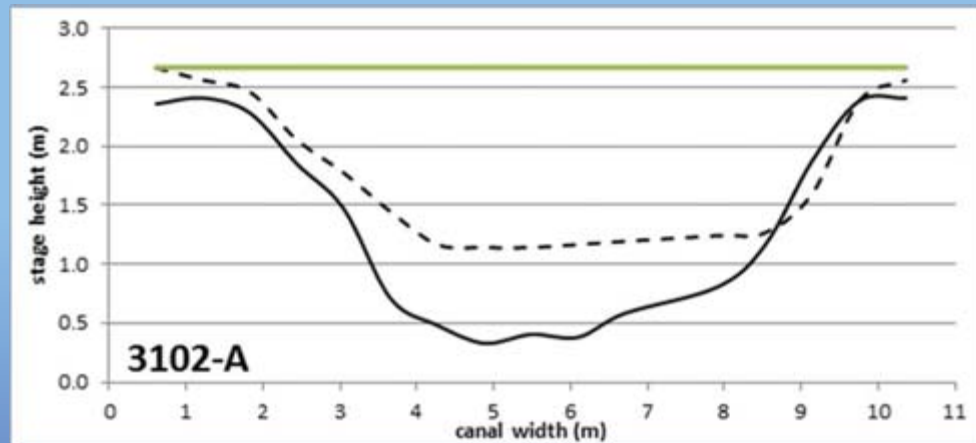
Treatment Period



# FAV Research Project

## Sediment Surveys

Sediment profile of main canal of farm 3102 at three transects, A, B, and C, surveyed in April 2014. Green line corresponds to height of water.



# Sediment properties – April 2014

<b>Farm</b>	<b>Location 0-2.5 cm</b>	<b>Mean Depth (m)</b>	<b>Organic matter (%)</b>	<b>Bulk Density (g cm<sup>-3</sup>)</b>	<b>Total P (mg kg<sup>-1</sup>)</b>
<b>3102</b>	<b>A</b>	<b>0.37</b>	<b>32.6</b>	<b>0.44</b>	<b>830</b>
	<b>B</b>	<b>0.45</b>	<b>42.9</b>	<b>0.26</b>	<b>1906</b>
	<b>C</b>	<b>0.67</b>	<b>38.7</b>	<b>0.24</b>	<b>1581</b>
<b>3103</b>	<b>A</b>	<b>0.44</b>	<b>29.5</b>	<b>0.36</b>	<b>926</b>
	<b>B</b>	<b>0.82</b>	<b>38.5</b>	<b>0.25</b>	<b>1259</b>
	<b>C</b>	<b>0.43</b>	<b>37.4</b>	<b>0.17</b>	<b>1401</b>

# Preview 2014/2015

## Planned Activities

### Continue Sample Collection, Monitoring, and Analyses:

Farm drainage waters: flow volume and WQ

Complete sediment analyses and surveys: fall 2014 and spring 2015

Collect ambient canal waters: biweekly

FAV biomass survey/composition analysis: bimonthly

Survey FAV on TMT/CTRL farms: biweekly

Spot spray FAV on TMT farms: as needed

BMP training workshops: Sep 25<sup>th</sup>, 2014 and Apr 16<sup>th</sup>, 2015

Annual report to SFWMD and EPD: July 2015

Final Project Report – Fall 2016

# Personnel

Samira Daroub, PhD  
Timothy Lang, PhD  
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Miguel Diaz, AA

Principal Investigator  
Project Manager  
Lead Scientist  
Head Chemist  
Chemist  
Grad Student  
Field Technician  
Field Technician



Thank You!

Questions?

