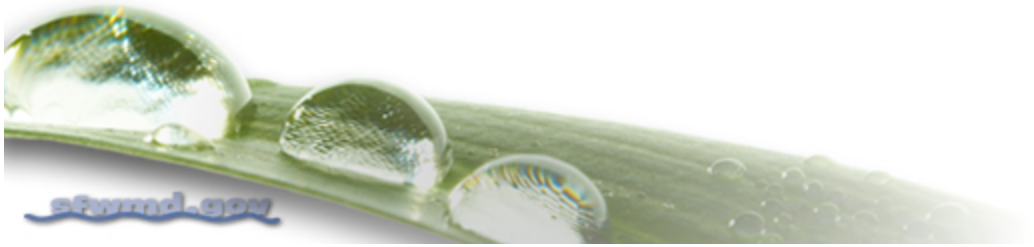
SOUTH FLORIDA WATER MANAGEMENT DISTRICT

South Dade Investigation Kickoff

South Florida Water Management District
October 15, 2015

RECAP:
THE SOUTH DADE INVESTIGATION



Why are we here?

- Provide a forum to integrate all perspectives
- Create common understanding
- Consider the big picture and how individual system elements interact and complement each other
- Identify options that can be considered in upcoming projects and plans
- Expedite implementation of potential outcomes by providing foundational analysis of feasibility

Intentionally Broad Scope

- All objectives are on the table
- Structural and operational options – no restrictions on the ideas to be considered
- Range of options could include small to big projects and traditional to non-traditional ideas
- Provide high-level evaluation of concepts
  - Effectiveness of proposed features
  - System view with the Regional Simulation Model (RSMGL)
  - Use of other tools as needed (e.g. detailed evaluation of local effects)

South Dade Water Resource Management: A Unique Challenge

So Many Objectives…

So Small an Operating Range…

What's Happening Today

Today's Goal:

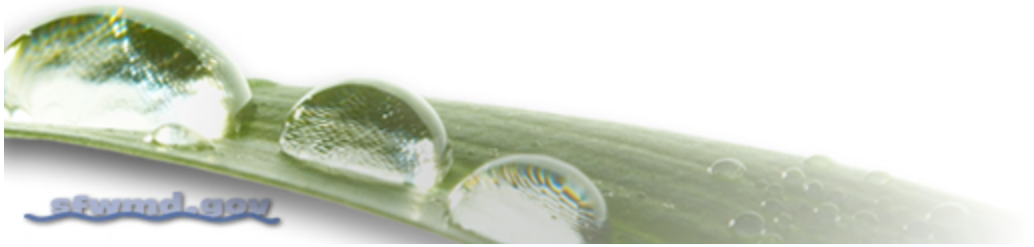
Getting on the same page…

Through information sharing and discussion at today's meeting,

create a common understanding of the hydrology and

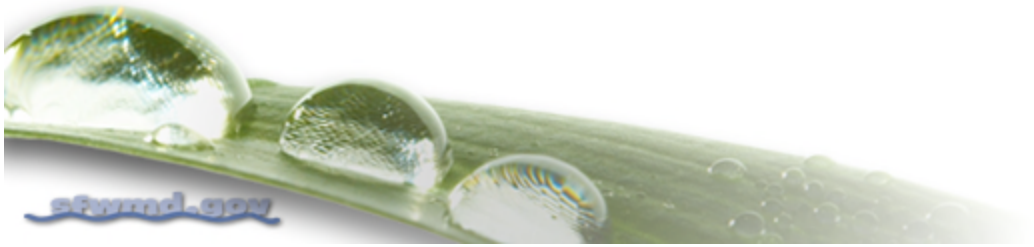
identify a range of options to investigate further.

With this feedback, we will perform analysis and provide preliminary results at the next South Dade Investigations workshop in November.



SOUTH FLORIDA WATER MANAGEMENT DISTRICT

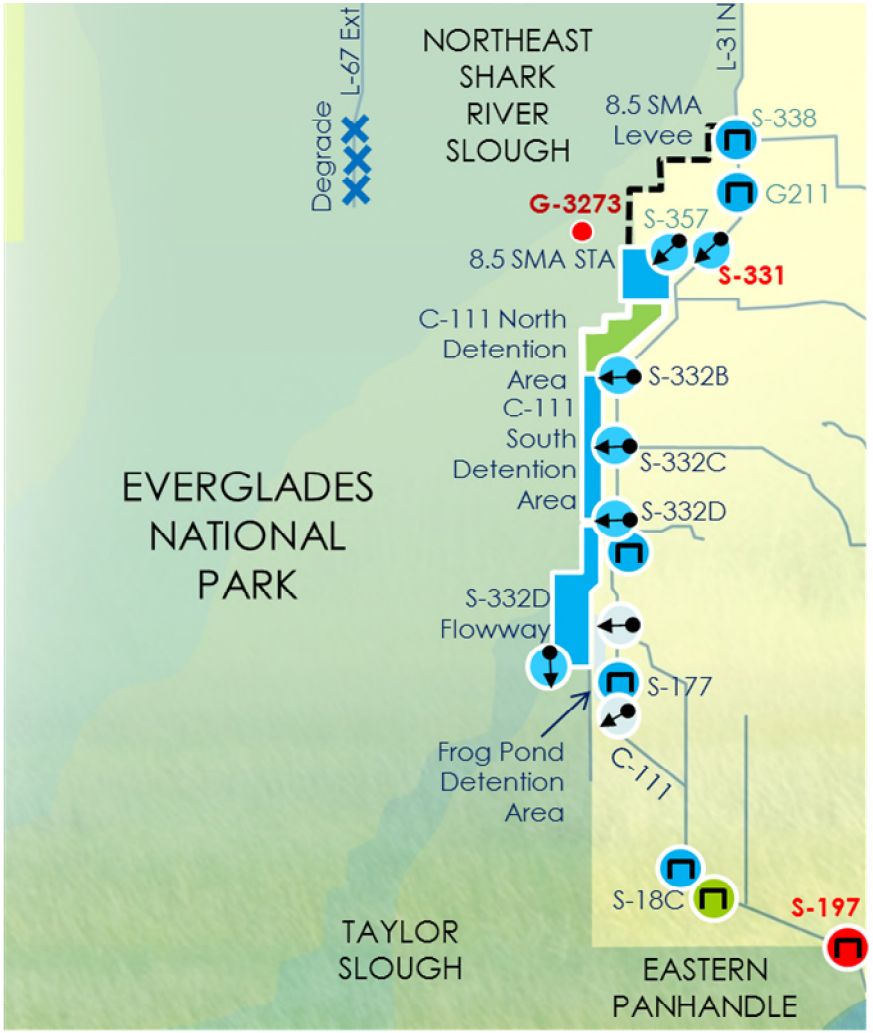
WHAT WE'VE HEARD: GOALS AND OPTIONS




KEEP
CALM
CAUSE
EVERYTHING
IS POSSIBLE

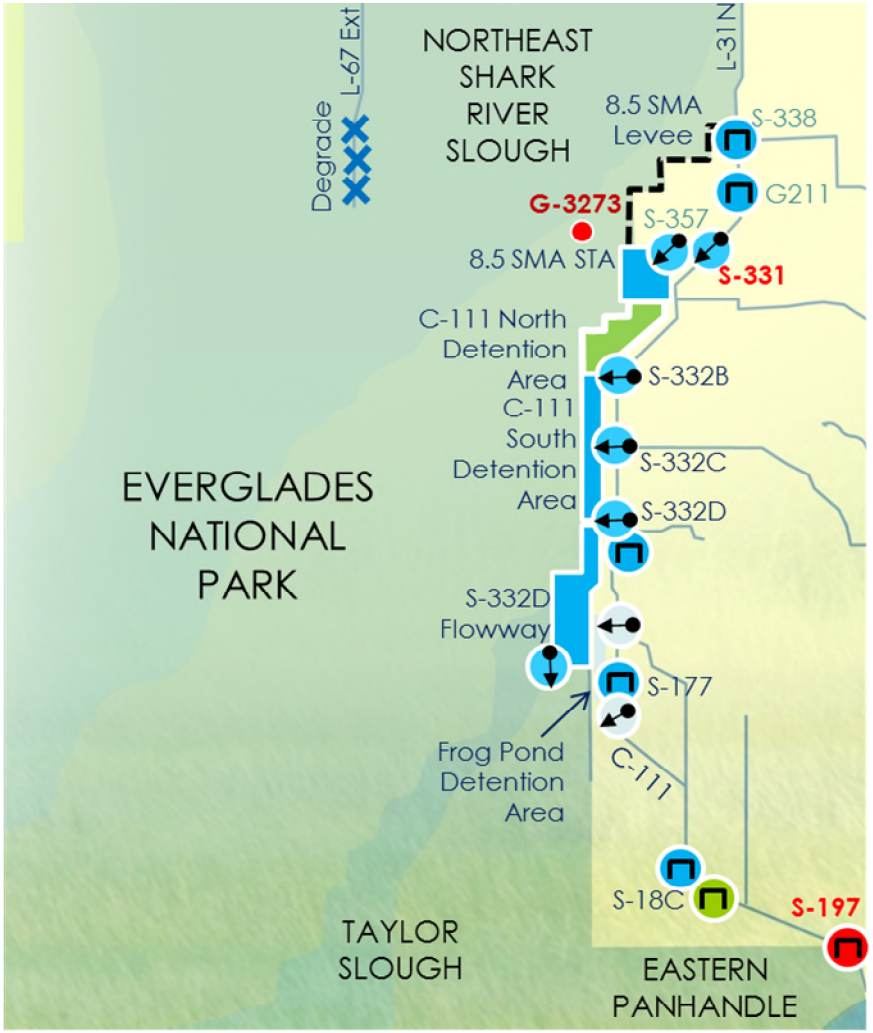
Thank You! We've heard from…

- Sept 3rd Workshop
  - Over 70 participants
- One-on-one meetings with federal, state and local agencies
- Direct contact from interested parties
- SFWMD technical staff
- Communication continues at today's workshop



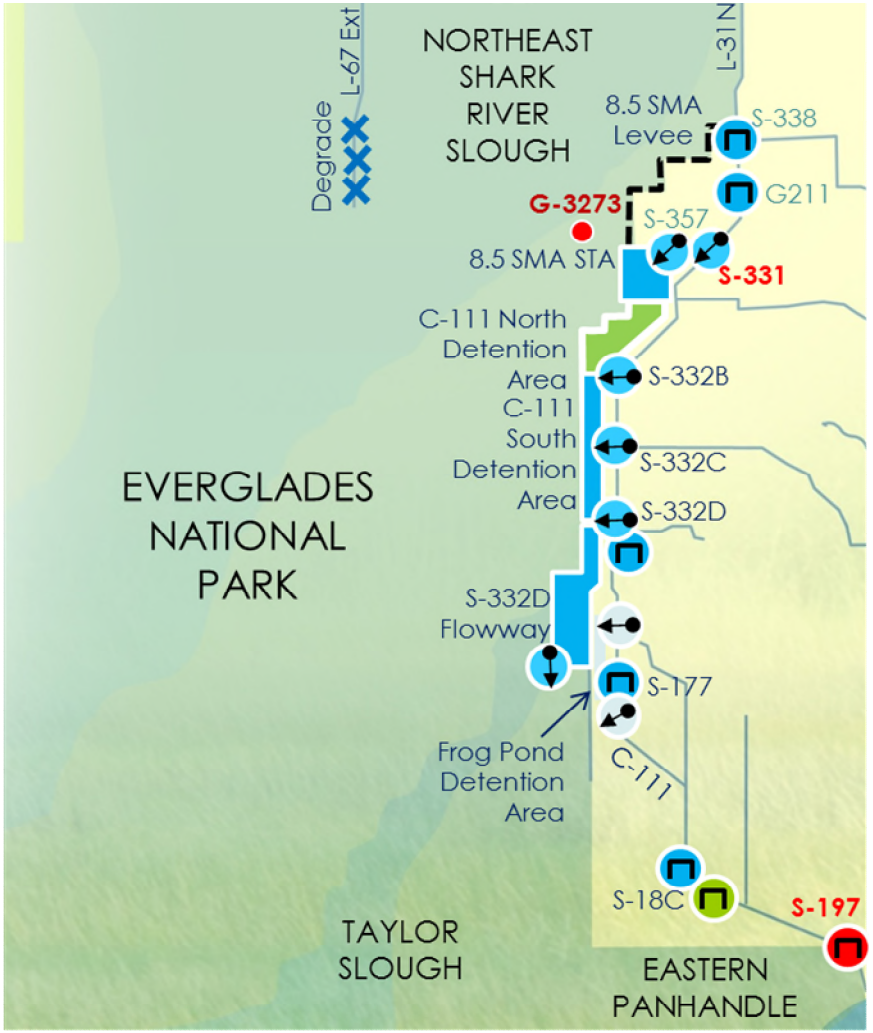
Topics of Interest (Summary Slide 1 of 2)

- Getting water to Taylor Slough and Eastern Florida Bay
- Reducing water levels in agricultural areas during the early dry season
- Getting water to Biscayne Bay
- Getting water to the Model Lands, Manatee Bay & Barnes Sound
- Providing habitat and breeding opportunity for the endangered Cape Sable Seaside Sparrow (CSSS)
- Considering the effects of sea level rise and saltwater intrusion



Topics of Interest (Summary Slide 2 of 2)

- Reducing flows at S-331 / increasing flows to NE Shark River Slough
- Considering opportunities to provide water for municipal use
- Understanding how ongoing projects (e.g. ModWaters / C111) will improve performance
- Improving seepage management efficiency
- Understanding on-farm practices and considerations

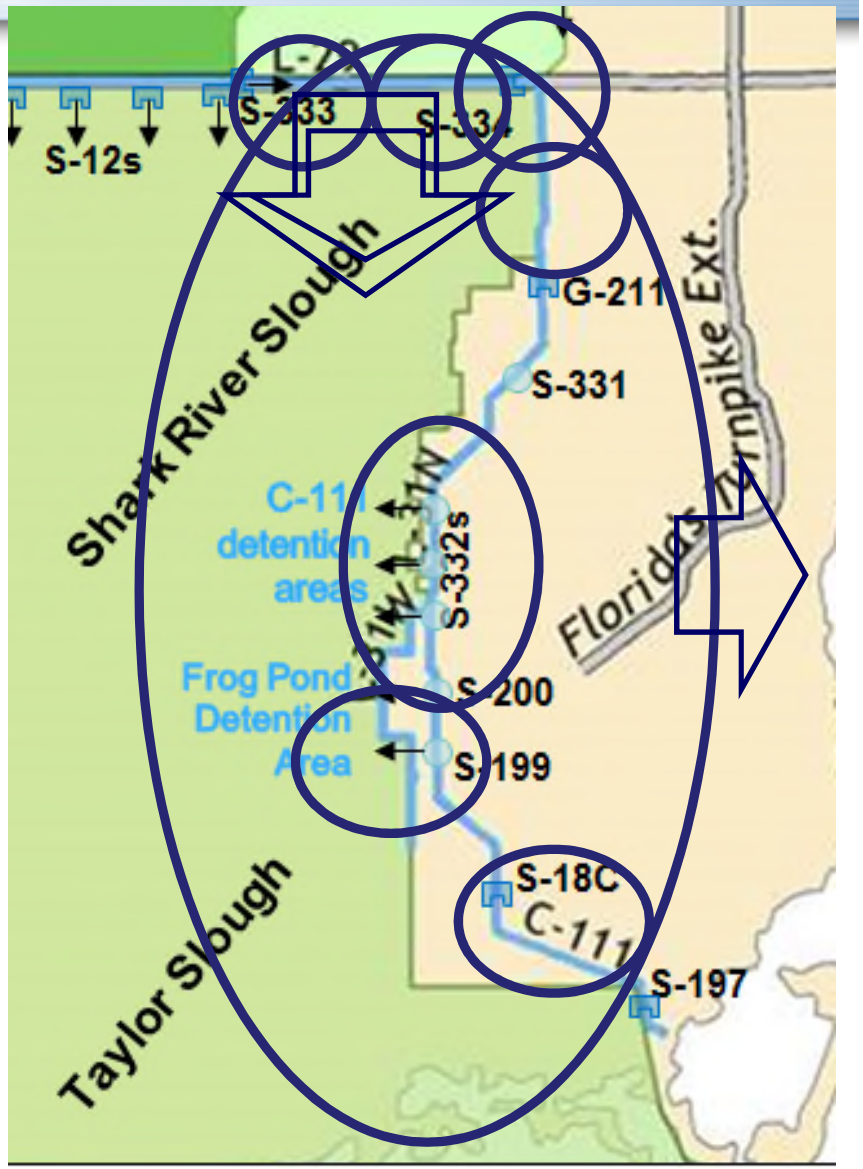


Summary of Some Proposed Options…

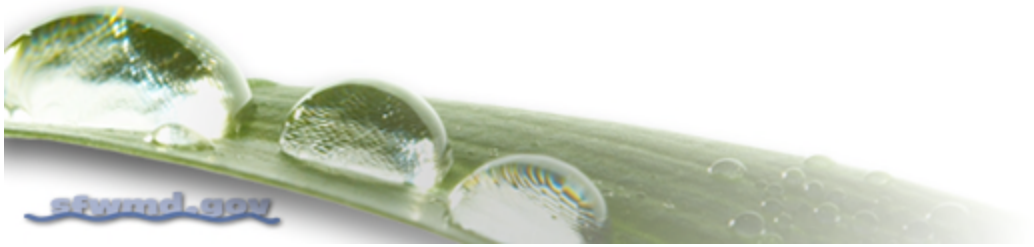
- Focus on completing or expediting existing planned projects
- Investigate operational changes
  - Optimize use of pumped systems (S332s, S199, S200)
  - Optimize structure criteria (S176, S177, S18C, S197, etc…)
  - Develop seasonal operations for canals
  - Explore “strategic” versus “ reactionary operations”
  - Refine existing L31E drawdown operations
- Improve or enhance the function or efficiency of the system though infrastructure changes
  - Addition of pump capacity and/or better dispersion of pumped water
  - Addition of drainage canals
  - Seepage walls or refined detention areas
  - Divide structure on C113
  - Store water in aquifer storage & recovery (ASR) systems or recharge wellfields

Ongoing Projects & Efforts (Recap)

- USACE
  - C111 South Dade, Increment 1 Field Test, ERTP, Combined Operations Plan
- Department of the Interior
  - Tamiami Trail Next Steps, Modified Water Deliveries
- CERP
  - C111 Spreader Canal Western
  - Central Everglades
  - Biscayne Bay Coastal Wetlands
- Rock Miners
  - L31N Seepage Wall
- FDEP – permit review and issuance



SOME ADDITIONAL DETAIL FOR YOUR REFERENCE…



Additional Detail: Getting Water to Taylor Slough and Eastern Florida Bay

Some Goals We Have Heard

- Provide more flow to Taylor Slough and Eastern Florida Bay
  - Early dry season flows are beneficial and could be a prevention strategy for hypersalinity
  - Try to avoid multi-season or multi-year low flow events

Things to Consider / Challenges

- Where can additional water for Taylor Slough be found (overland flow, via S331, other sources)?
- Is it possible to send more flow while providing for species management considerations?
- How to consider water quality?

Additional Detail: Reducing Water Levels in Agricultural Areas During the Early Dry Season

Some Goals We Have Heard

- Lower water levels gradually from August through December to allow for drainage during planting
- Try to lower water levels by about 0.5 feet
- Not trying to manage for extreme events, but rather to allow drainage during normal rainfall conditions

Things to Consider / Challenges

- Is it possible to lower water levels without causing undesirable drawdowns in other areas?
- If water is removed from agricultural areas, where can it be delivered?
- Will lower water levels in the early dry season cause shortages later in the dry season?

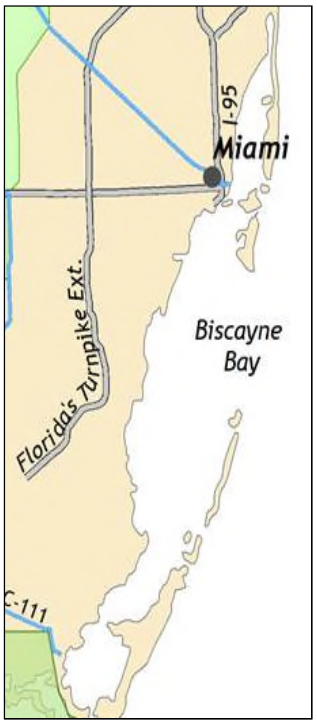
Additional Detail: Getting Water to Biscayne Bay

Some Goals We Have Heard

- Provide more early dry season flow to Biscayne Bay
  - Lower volume flows, spatially distributed are better than higher volume, single-point discharge releases

Things to Consider / Challenges

- Where can additional sources of water for Biscayne Bay be identified?
- Can existing projects (e.g., Biscayne Bay Coastal Wetlands) be further enhanced with additional water deliveries?
- Can current agricultural drawdown operations in L31E be refined to improve discharge patterns while retaining drawdown objectives?



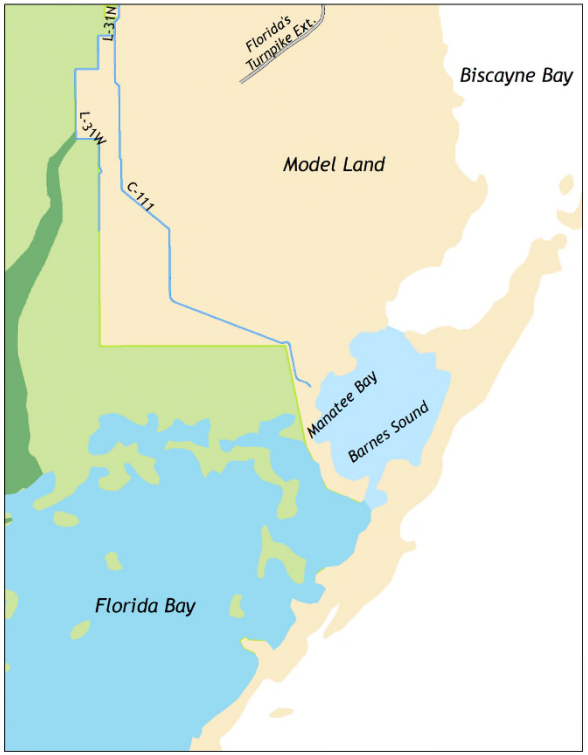
Additional Detail: Getting Water to the Model Lands, Manatee Bay & Barnes Sound

Some Goals We Have Heard

- Provide additional hydroperiod and water depth in the Model Lands
- Similar to Biscayne Bay, lower volume, spatially distributed flows to Manatee Bay are better than higher volume, single-point discharge releases

Things to Consider / Challenges

- What are Florida Power & Light considerations?
- How much water is needed in this area relative to what it already receives?



Additional Detail: Considering the Effects of Sea Level Rise and Saltwater Intrusion

Some Goals We Have Heard

- Attempt to identify the potential effects of sea level rise on South Dade groundwater and Everglades National Park
- Consider the sustainability and/or resiliency of an area to sea level rise and variability in weather patterns when making decisions

Things to Consider / Challenges

- What is the timescale associate with a project or operational decision relative to the timing of sea level rise?
- As water is moved, released or retained in the system, what are potential benefits or risks in the context of sea level rise?

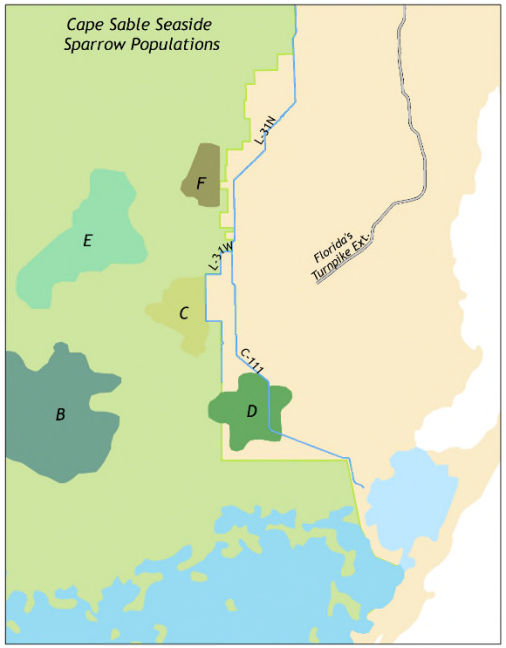
Additional Detail: Providing Habitat and Breeding Opportunity for the CSSS

<u>Some Goals We Have Heard</u>

- Attempt to increase the opportunity for sparrow breeding, both spatially and temporally from March through July (later dry season / early wet season)
- Target annual hydroperiods capable of sustaining sparrow habitat within their population areas

<u>Things to Consider / Challenges</u>

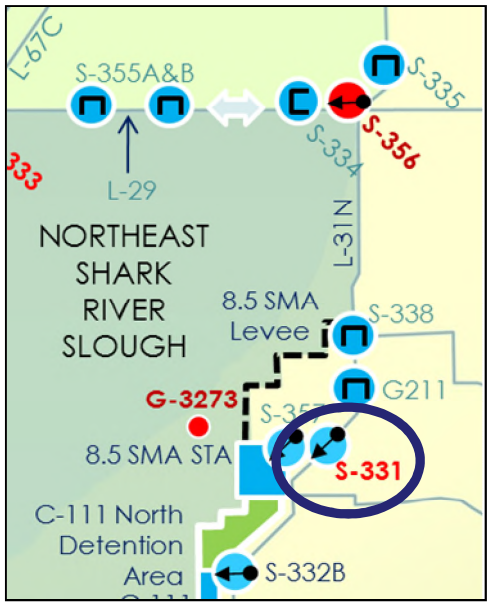
- How to best operate in order to minimize the impacts to sparrows during the nesting period?
- What is the best way to mutually integrate sparrow objectives with the objectives of Taylor Slough and Florida Bay?



Additional Detail: Reducing flows at S-331 / Increasing Flows to NE Shark River Slough

Some Goals We Have Heard

- Eliminate flood control discharges at S331
  - Already an objective of multiple projects including Central Everglades
- Rehydrate NE Shark River Slough rather than conveying down the South Dade Conveyance System (SDCS)
  - Will provide overland flow benefits to Taylor Slough and Florida Bay



Things to Consider / Challenges

- Could less flow at S331 reduce water levels in agricultural areas?
- Some water sent through S331 currently makes it into Taylor Slough – could reduction at S331 cause a shortfall?

Additional Detail: Considering Opportunities to Provide Water for Municipal Use

Some Goals We Have Heard

- If excess water is available consider finding a way to utilize this water for municipal sources including wellfield recharge or storage in ASR systems.

Things to Consider / Challenges

- Is the timing and capacity of excess water consistent with the capability of recharge or ASR systems?

Additional Detail: Improved Understanding

Some Topics for Discussion

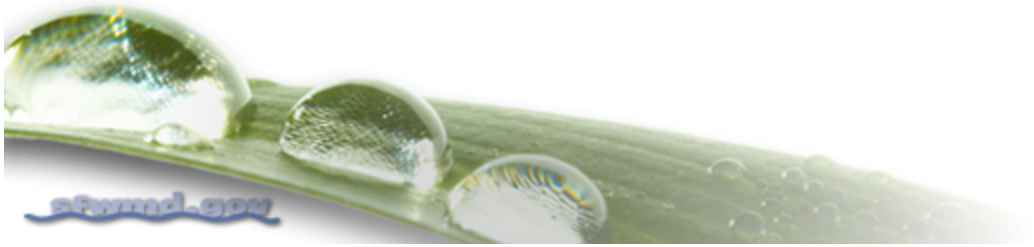
- Understanding how ongoing projects (e.g. ModWaters / C111) will improve performance
- Understanding seepage management efficiency and how existing or newer technologies affect performance
  - Seepage Walls
  - Refined engineering considerations for detention areas
- Understanding on-farm practices and considerations

We hope to provide useful information on these topics (and others) with presentations at today's workshop…

Questions and Discussion

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

FOOD FOR THOUGHT: BRENDA'S TIDBITS



Add Some Technical Complexities…

Varying Rainfall

Regulations

Evolving Agricultural Practices

Changing Infrastructure

Changing Objectives

Everglades Restoration

Automation of Structures

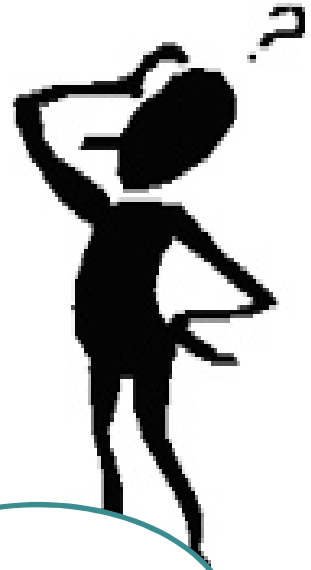
Monitoring And Modeling

Project Construction

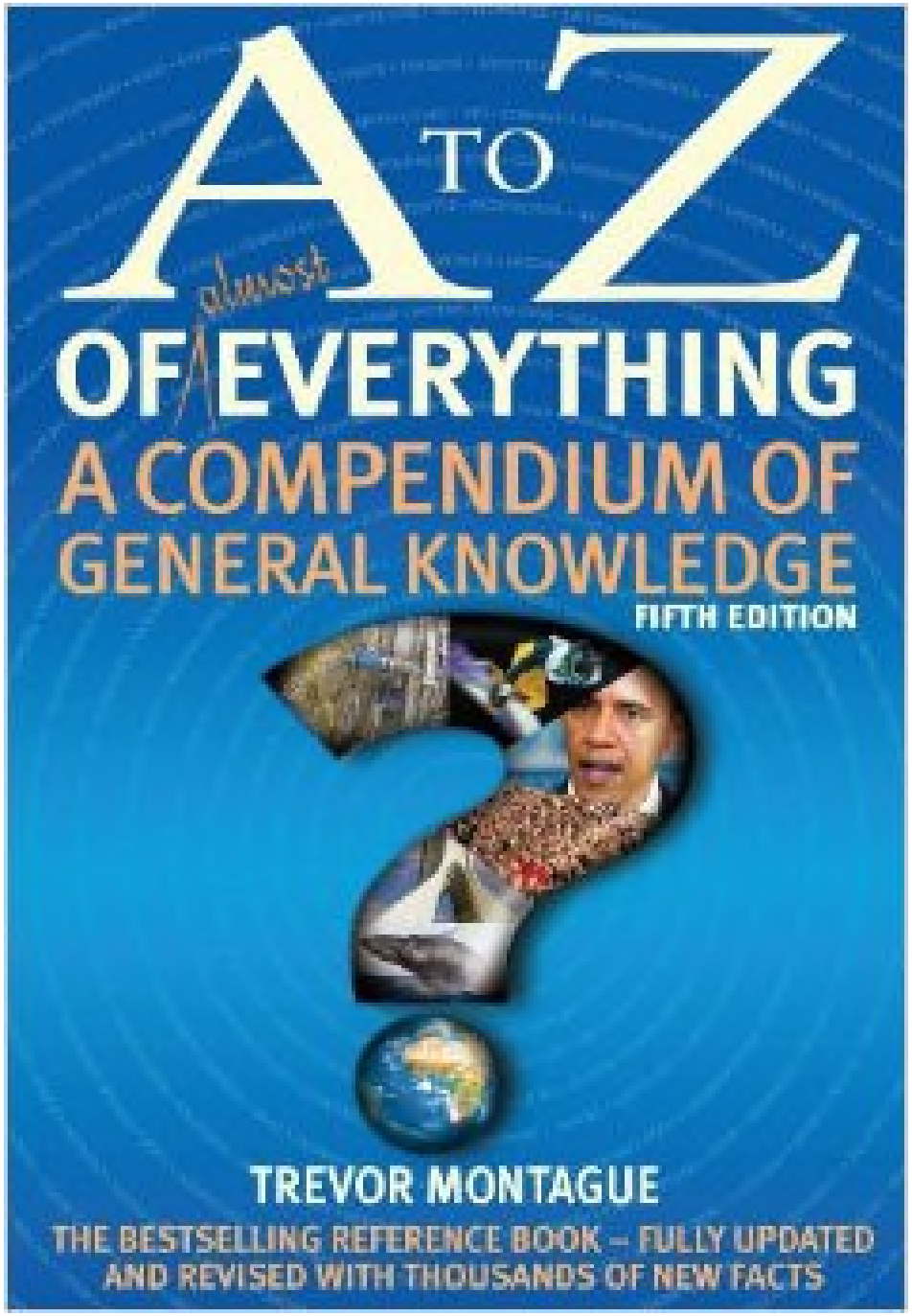
Sea Level Rise

?

What is Causing that Change?



THIS IS NOT AN



Operational Milestones in South Dade

1970 – Minimum Delivery Schedule

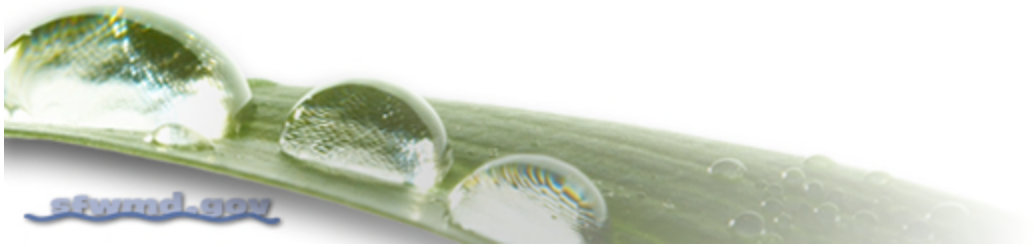
1983 – Experimental Water Deliveries (Pre-IOP)

2000 – Interim Structural and Operational Plan/Interim Operational Plan (ISOP/IOP)

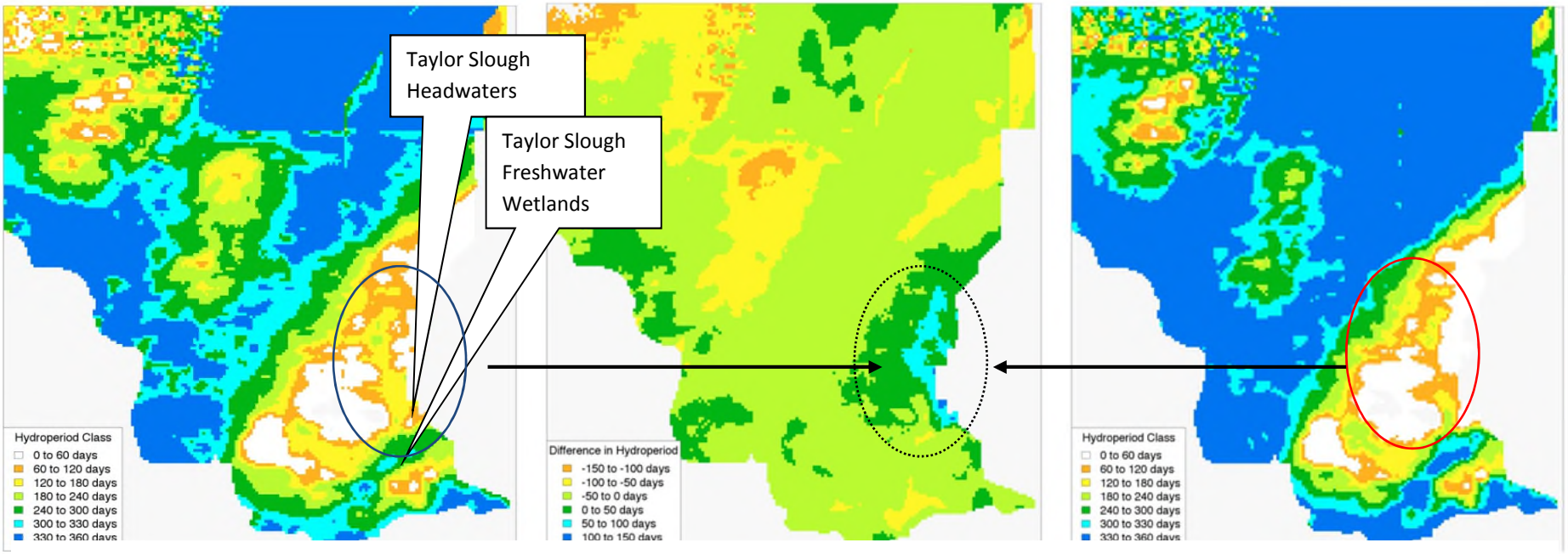
2012 – Everglades Restoration Transition Plan

Additional Information

- Regional surface and groundwater level changes over the last 20 years due to changes in regional operations:
  - Taylor Slough hydroperiod comparison
  - Monitoring Station EPSW (Located south of C-110 Canal in ENP)
  - S-18C tailwater
- Covers pre-IOP period (1992–1999) compared to the IOP period (2000–2012)
- 2014 System Status Report by RECOVER, Chapter 7



Hydroperiods Based on Everglades Depth Estimation Network (EDEN)

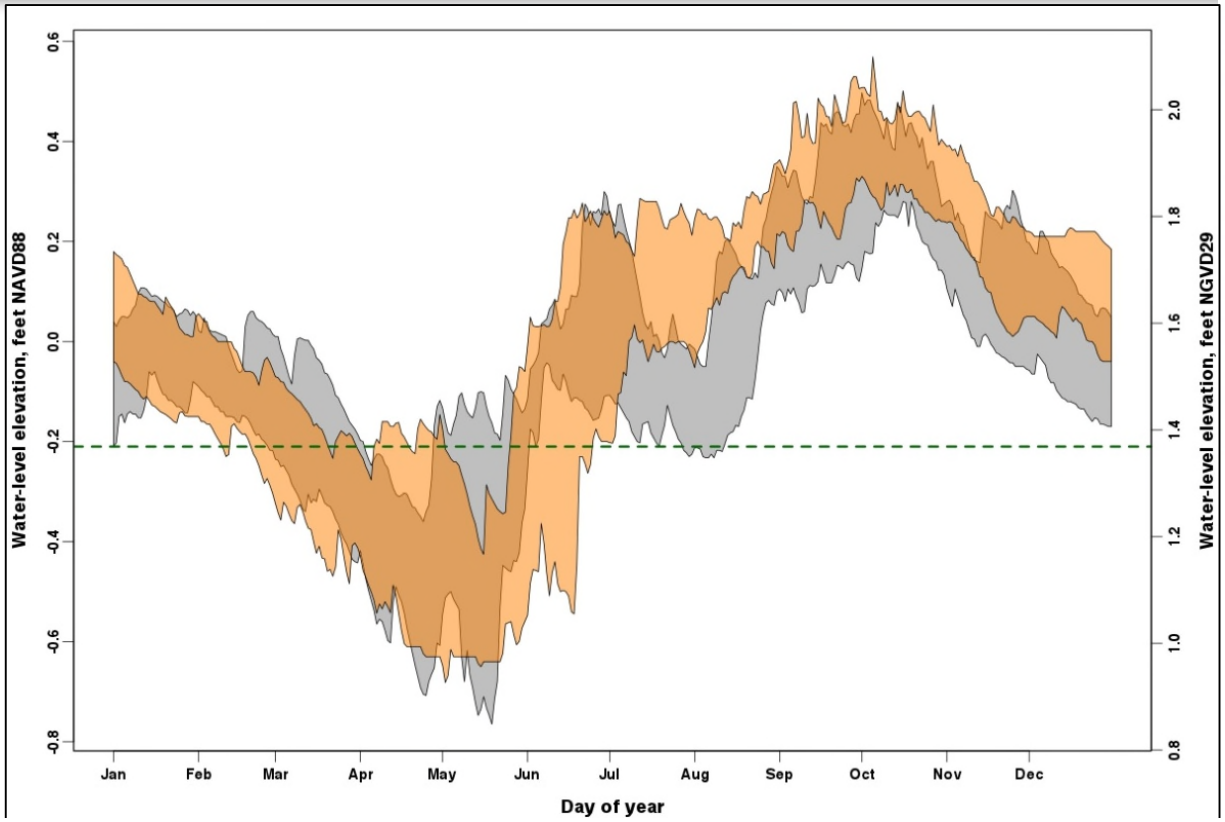


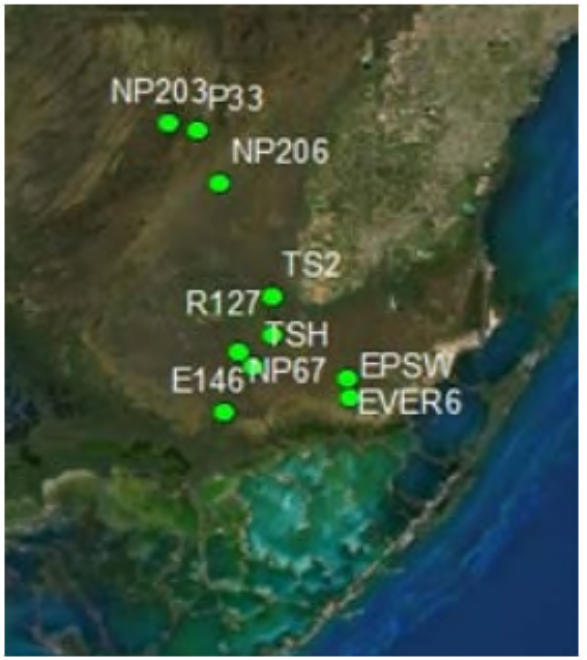
Left panel depicts average annual hydroperiods in ENP for the IOP period (2000–2012). Hydroperiod classes range from 0 to 60 days (white), 60 to 120 days (orange), 120 to 180 days (yellow), 180 to 240 days (light green), 240 to 300 days (light blue), and 330 to 360 days (dark blue).

Right panel depicts average annual hydroperiods in ENP for the pre-IOP period (1992–1999). Center panel depicts the difference between average annual hydroperiods for IOP less pre-IOP period. Hydroperiod difference classes include -150 to -100 days shorter (orange), -100 to -50 days shorter (yellow), -50 to 0 days shorter (light green), 0 to 50 days longer (dark green), 50 to 100 days longer (light blue), 100 to 150 days longer (dark blue).

The circled area in each figure represents the same area of interest that indicates increased hydroperiods between the two time periods.

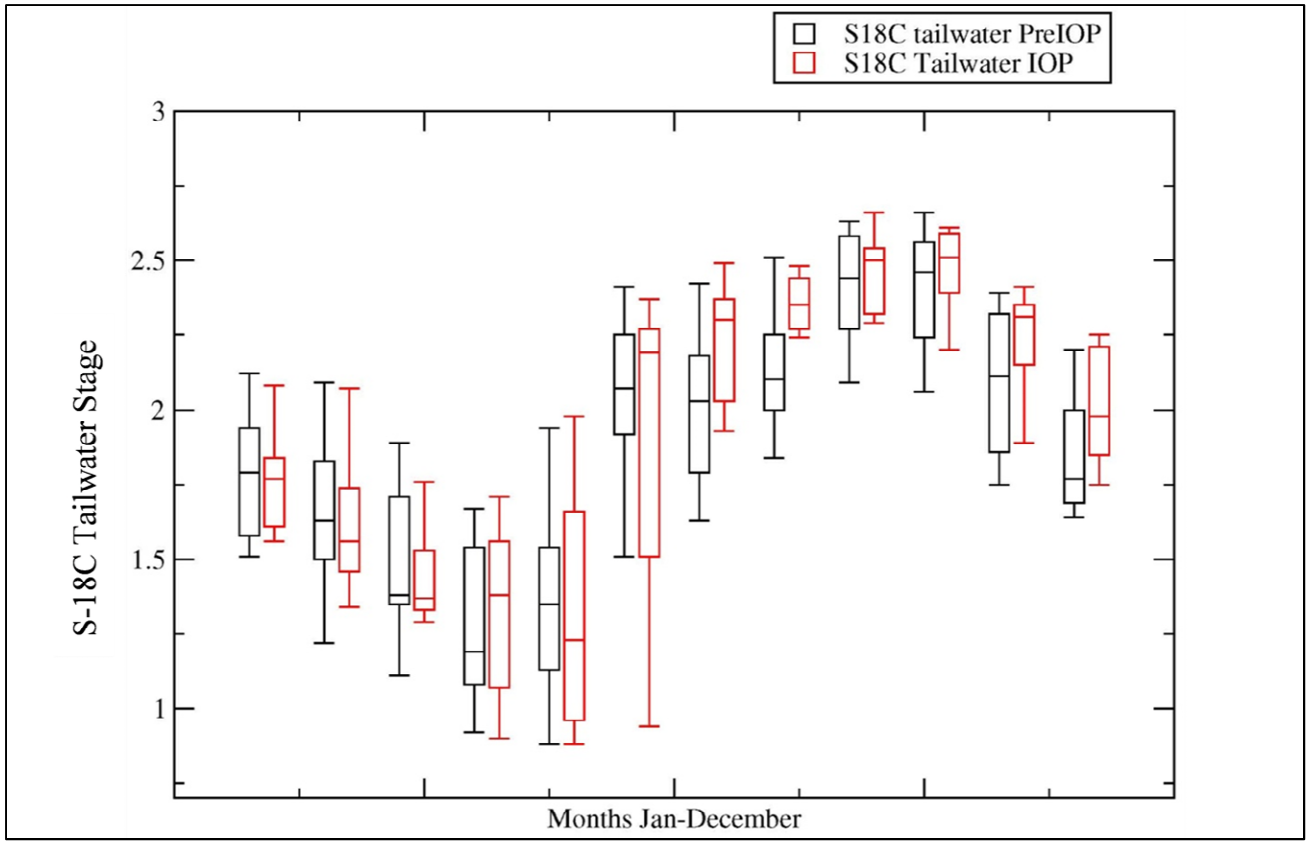
ENP Panhandle - EPSW





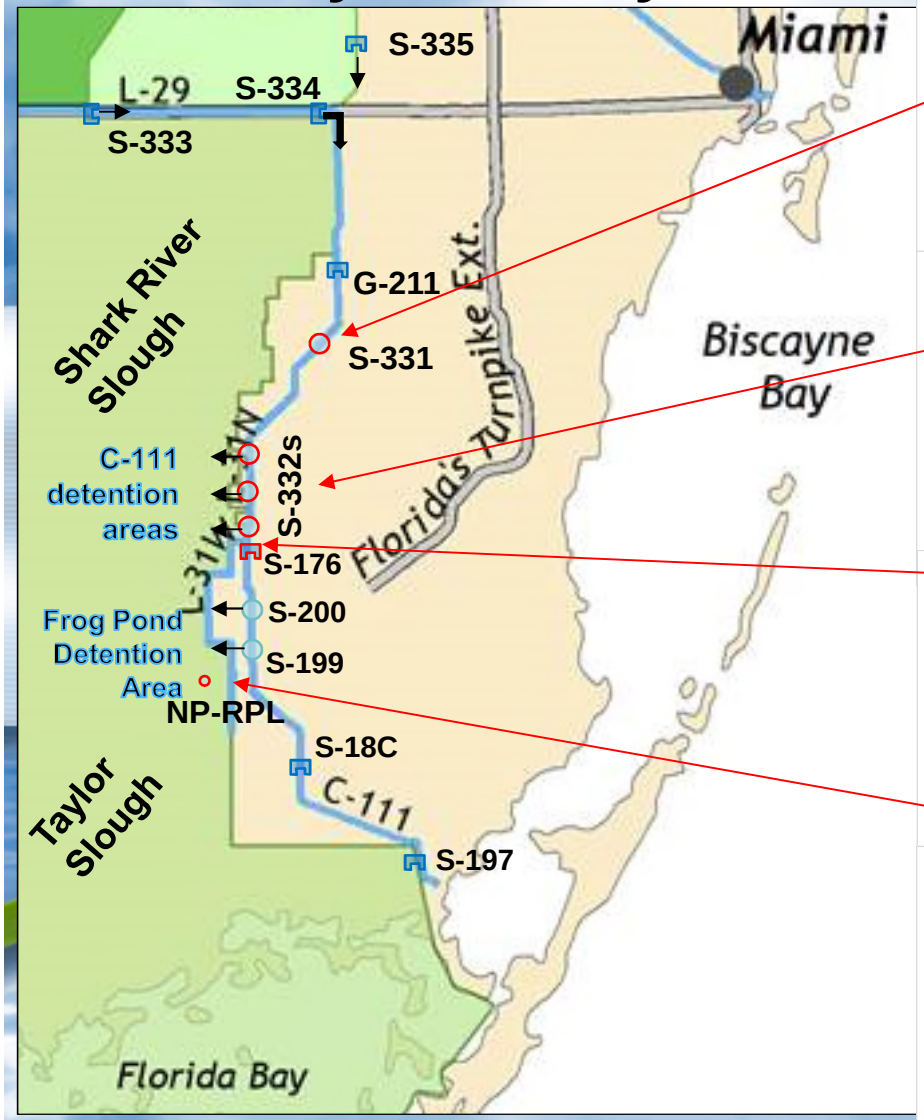
Comparison of interquartile (25th percentile to 75th percentile) stages between pre-IOP period (1991–1999 as gray ribbon) and IOP period (2000–2012 as light orange ribbon) at EPSW. The overlap of data distributions between these periods is shown in dark orange. The dotted line is ground elevation.

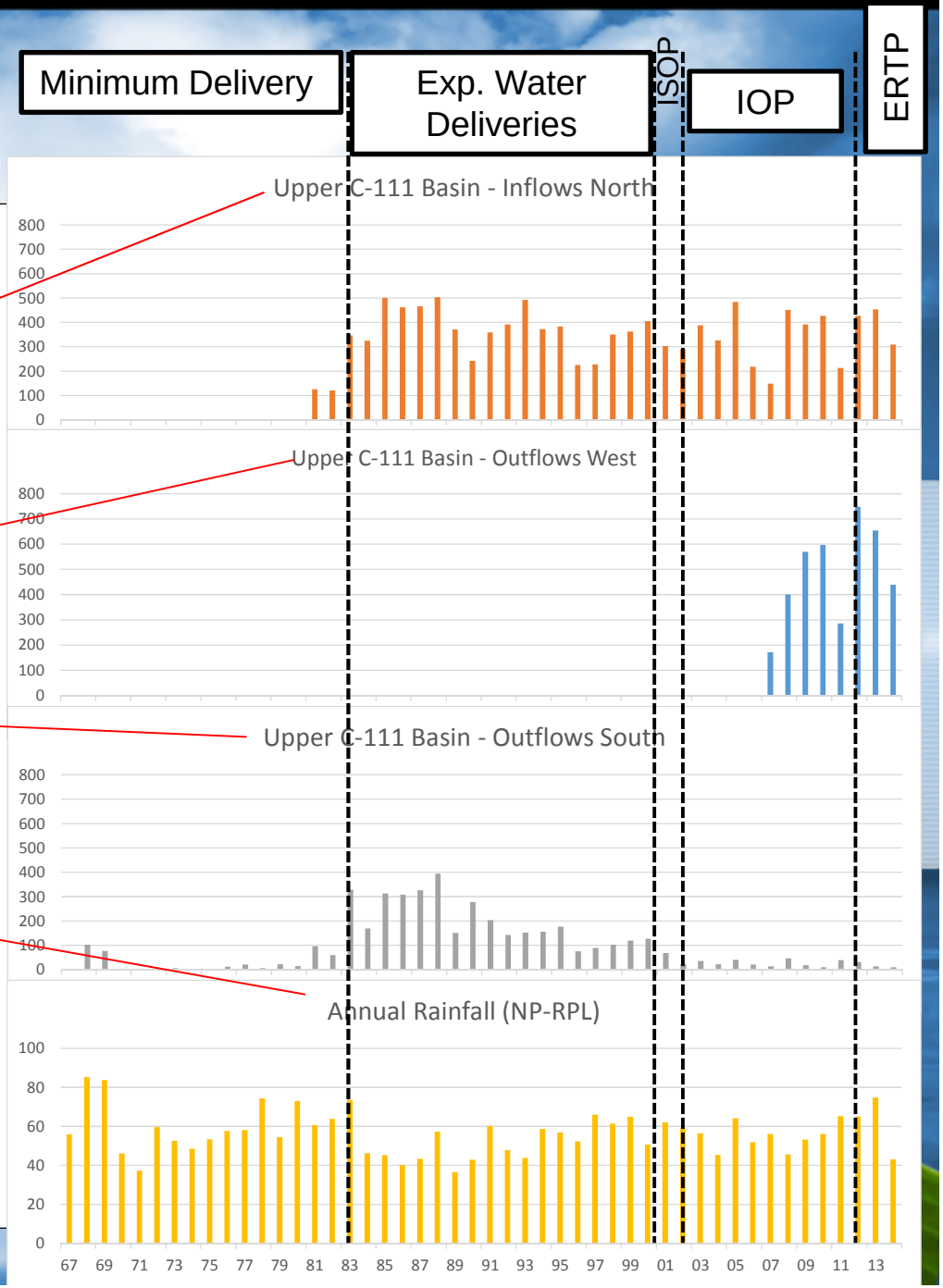
S-18C Tailwater Stages



- S-18C tailwater stages pre-IOP (1991–1999 in black) and during IOP (2000–2012 in red) box-and-whisker plots.

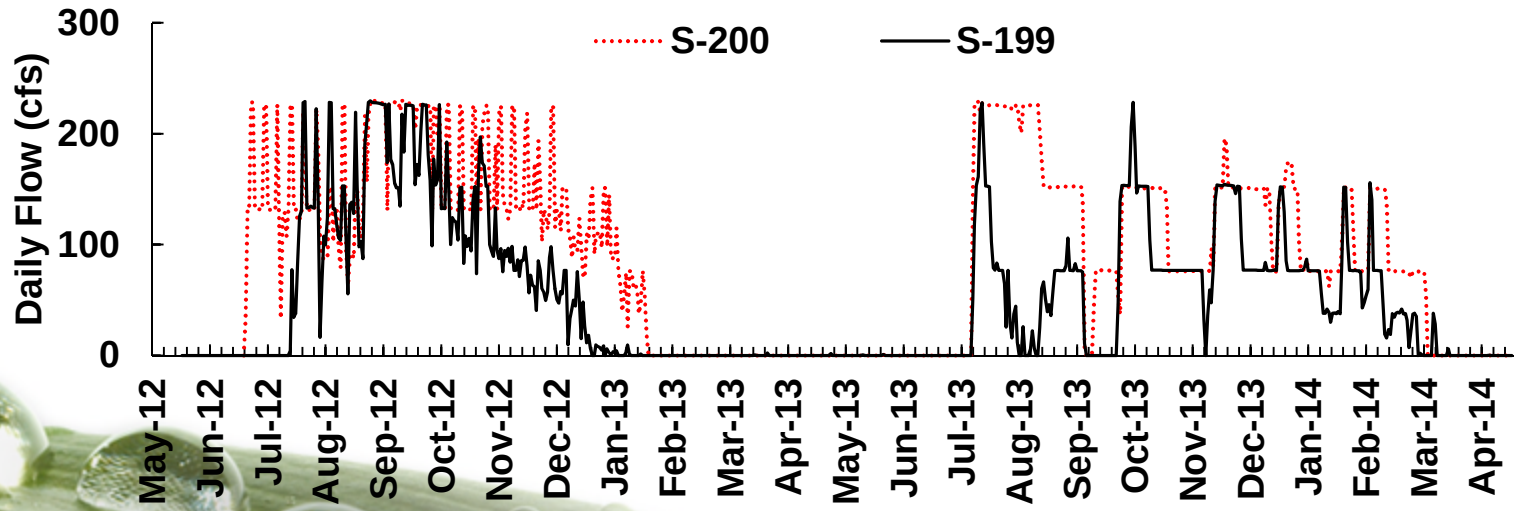
South Dade Conveyance System





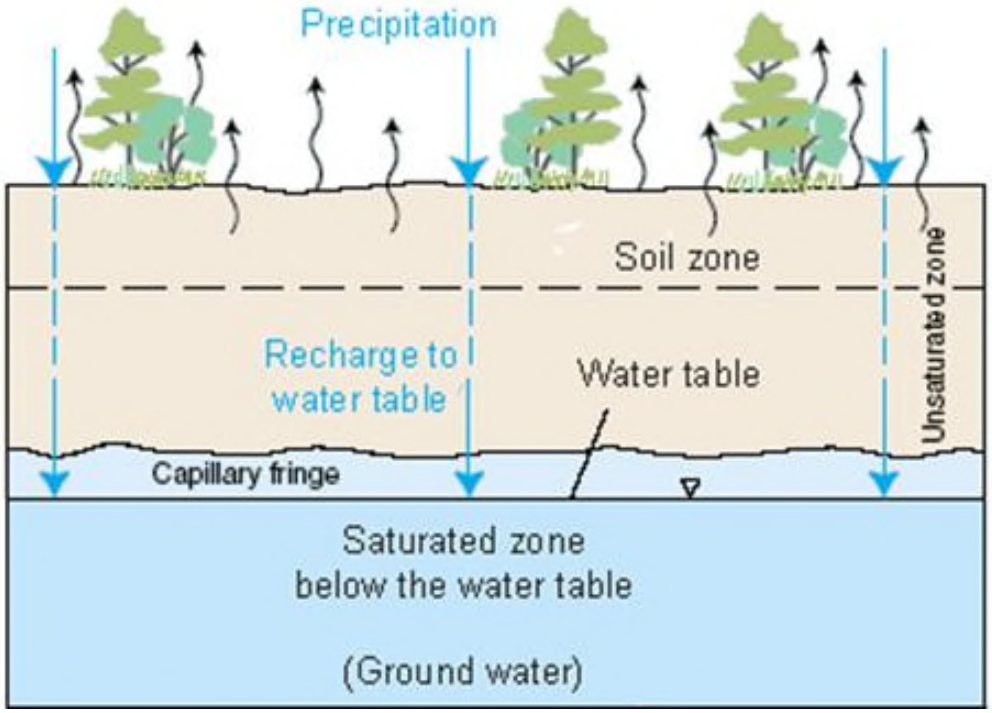
C-111 SCW Project Operations

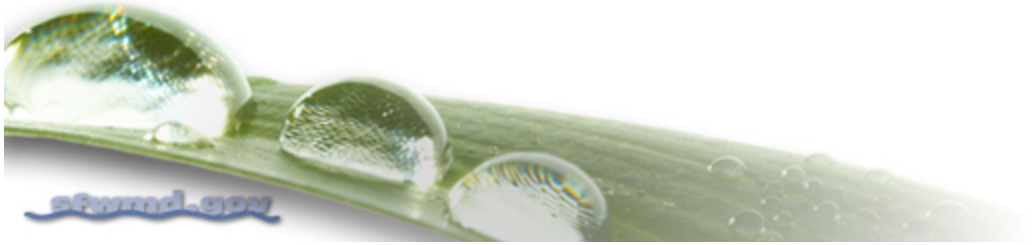
- Frog Pond Detention Area includes the S-200 Inflow Pump Station with three 75 cfs pumps (225 cfs total capacity), above ground channel and adjacent detention area.
- Aerojet Extension Canal includes the S-199 Inflow Pump Station with three 75 cfs pumps (225 cfs total capacity), and the above ground channel connected to the existing Aerojet Canal
- Pumping is initiated prior to S-177 reaching the open trigger for flood control operations, individual pumps allow for flexibility in operations



What is Important to Grow Crops?

Rainfall, micro-topography, soil water content, infiltration, capillary movement and root zone depth are important factors

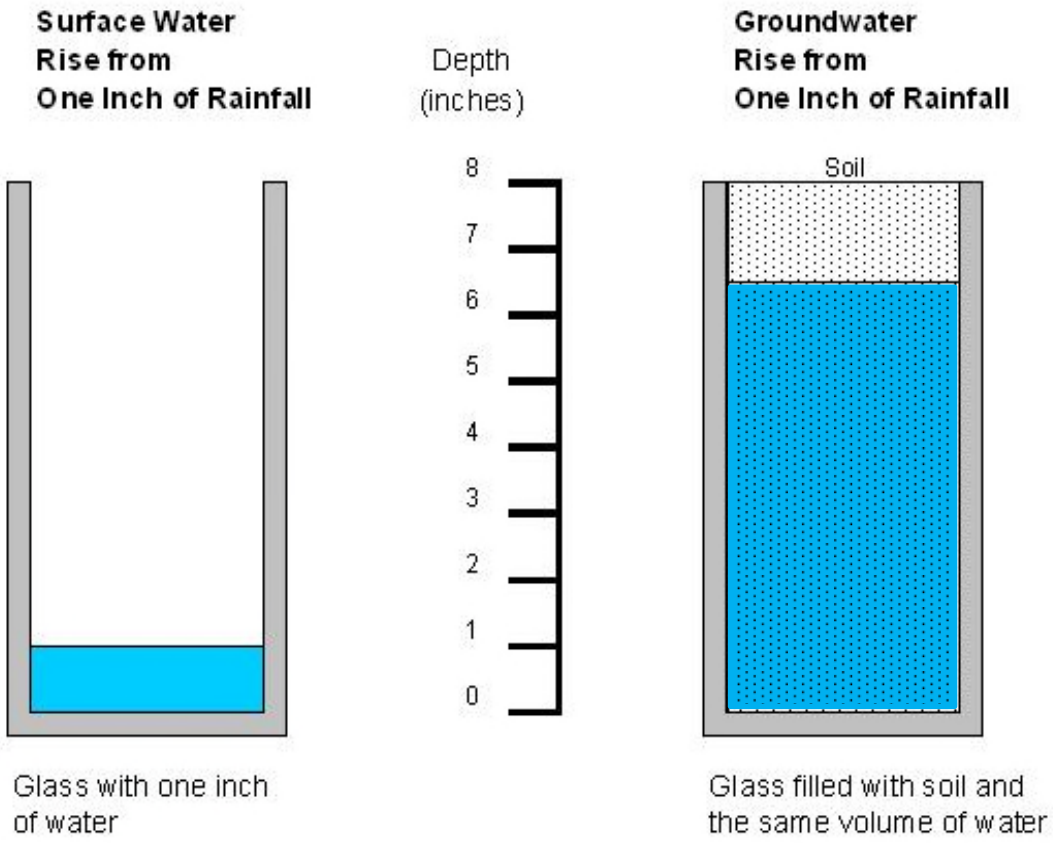


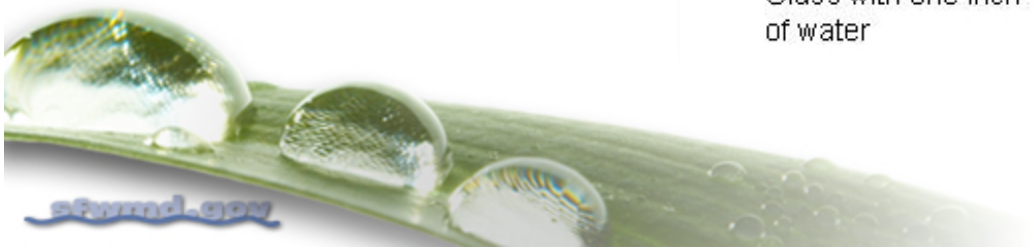


Comparison of Surface Water and Groundwater Rise from One inch of Rainfall

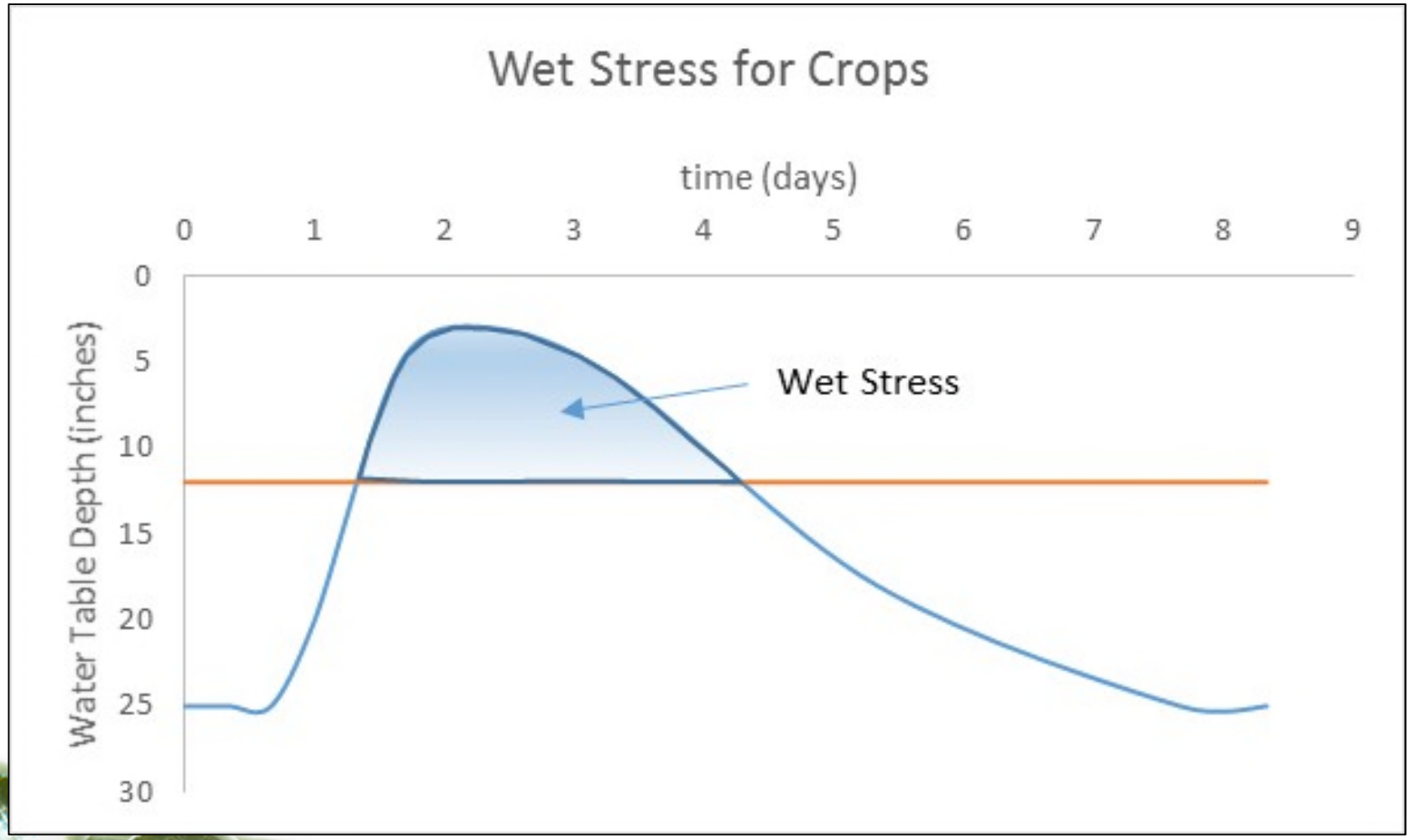
Why is Seepage Control Important?

Or Why is Retaining Capacity for Local Runoff Important?



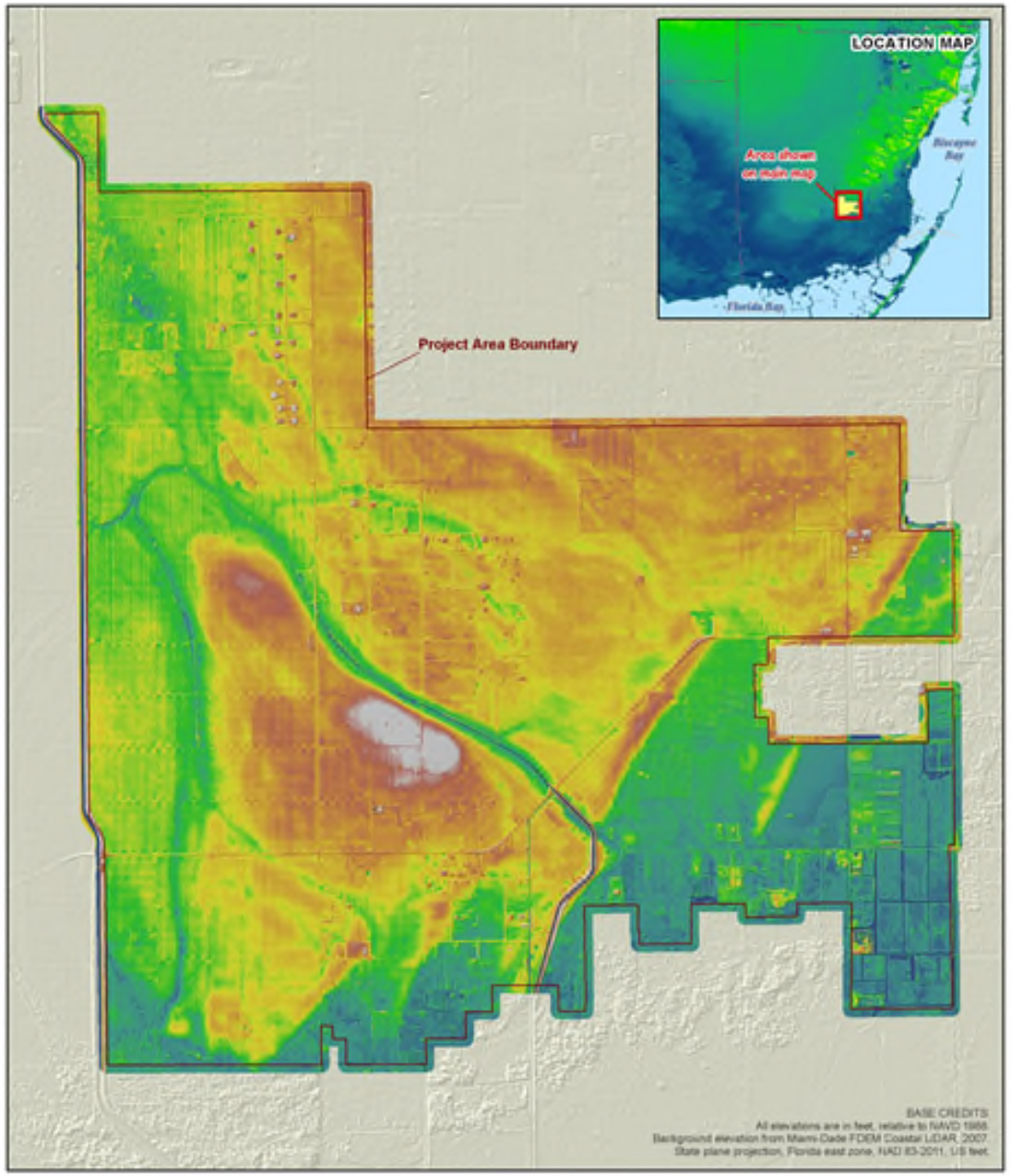


Duration Important too



SOUTH

STRICT



LiDAR Topography for C-111 Basin

0 0.2 0.4 0.6 0.8 1 Mile

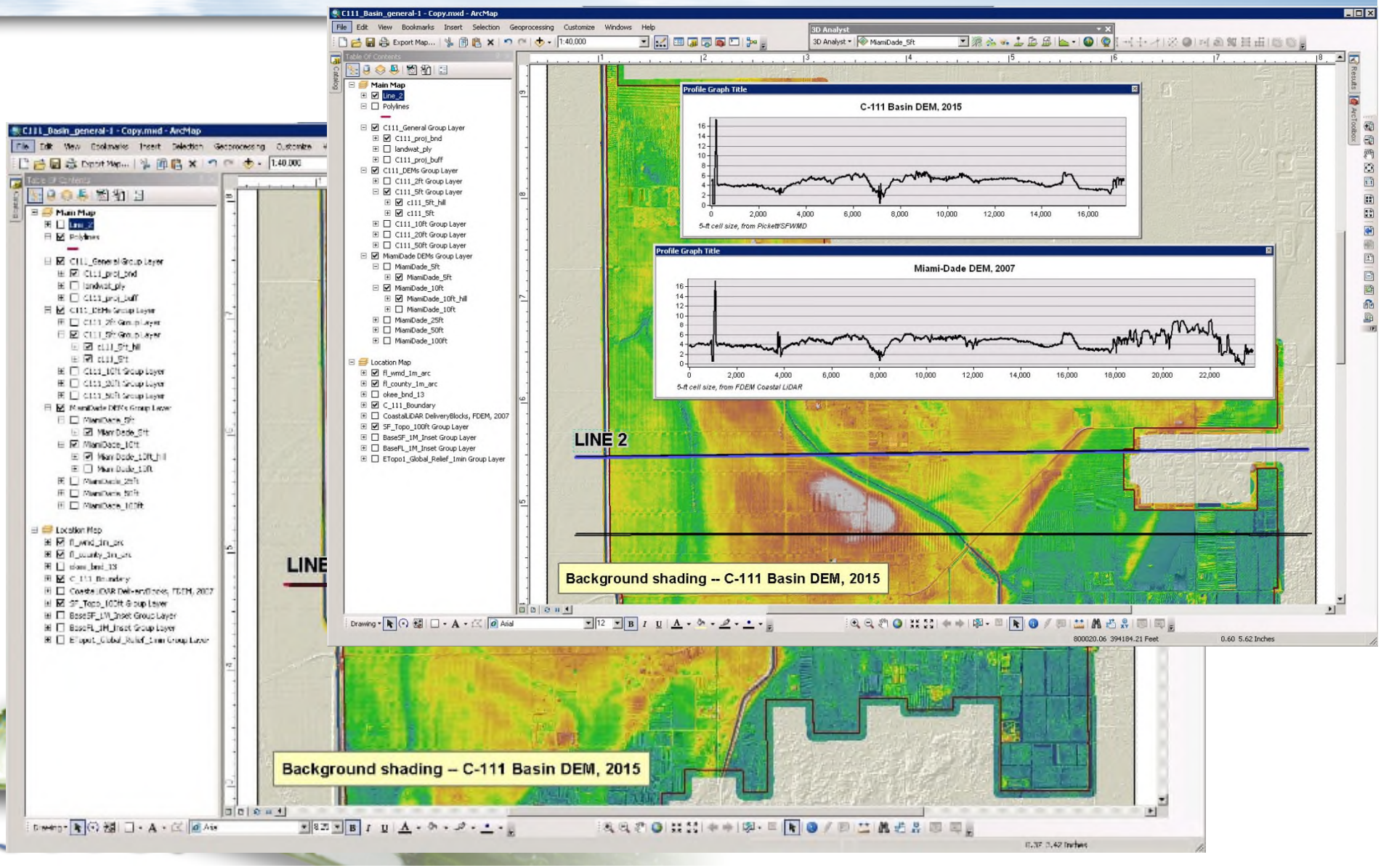
0 0.5 1 1.5 Kilometers

IMPORTANT DISCLAIMER:
This map is a conceptual or planning tool only. The South Florida Water Management District does not guarantee or make any representation regarding the information contained herein. It is not self-executing or binding, and does not affect the interests of any persons or properties, including any present or future right or use of real property.

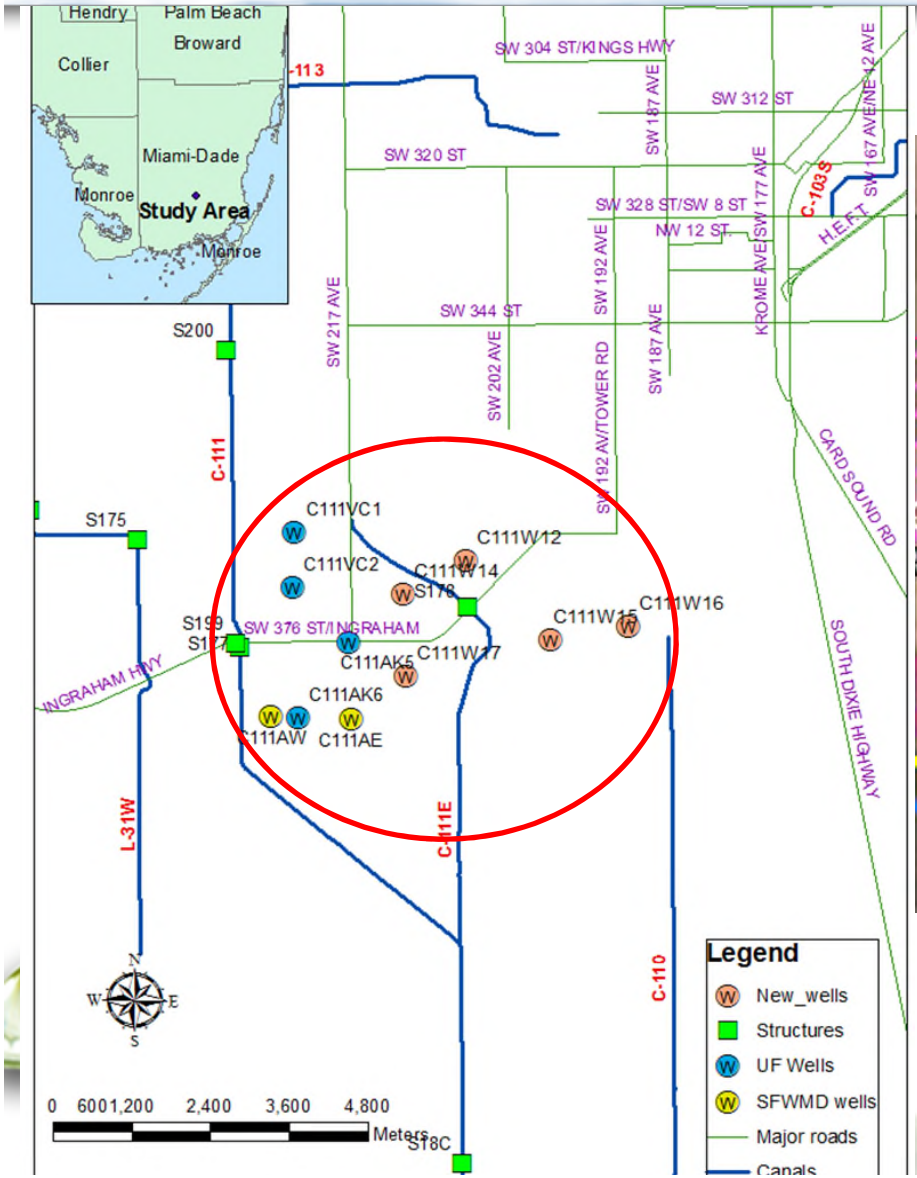
South Florida Water Management District
3301 Gun Club Rd. West Palm Beach, FL 33406
561-686-8800 – FL WATS 1-800-432-2045
P.O. Box 24680 – West Palm Beach, FL 33416-4680

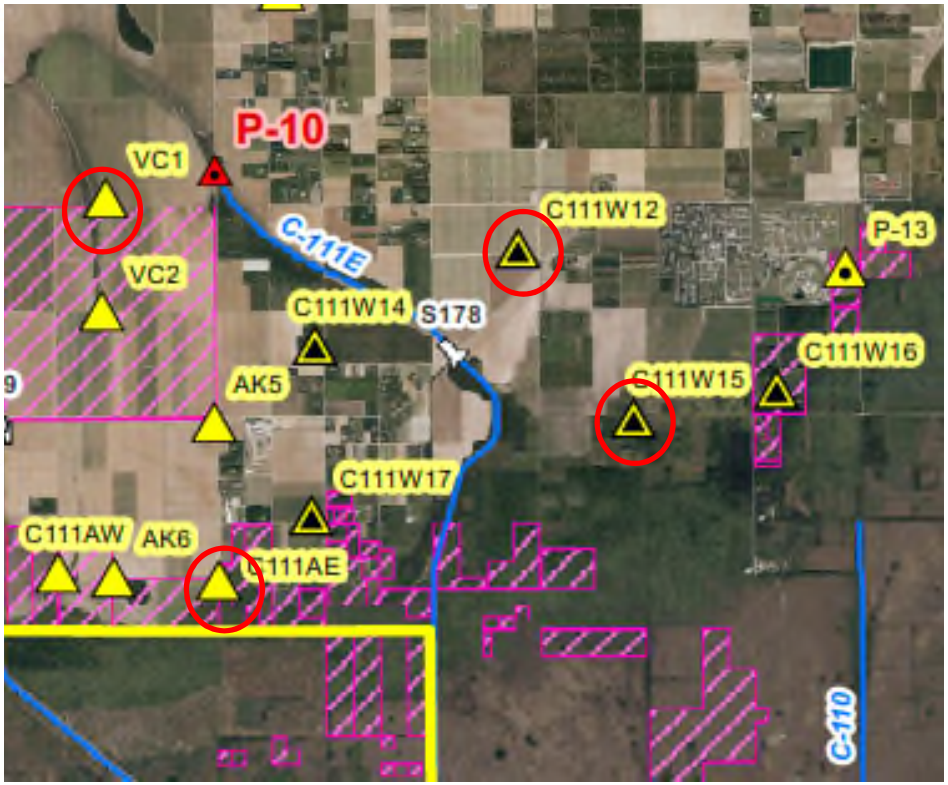
IT
GEOSPATIAL SERVICES
June 30, 2015

Recent LiDAR Data

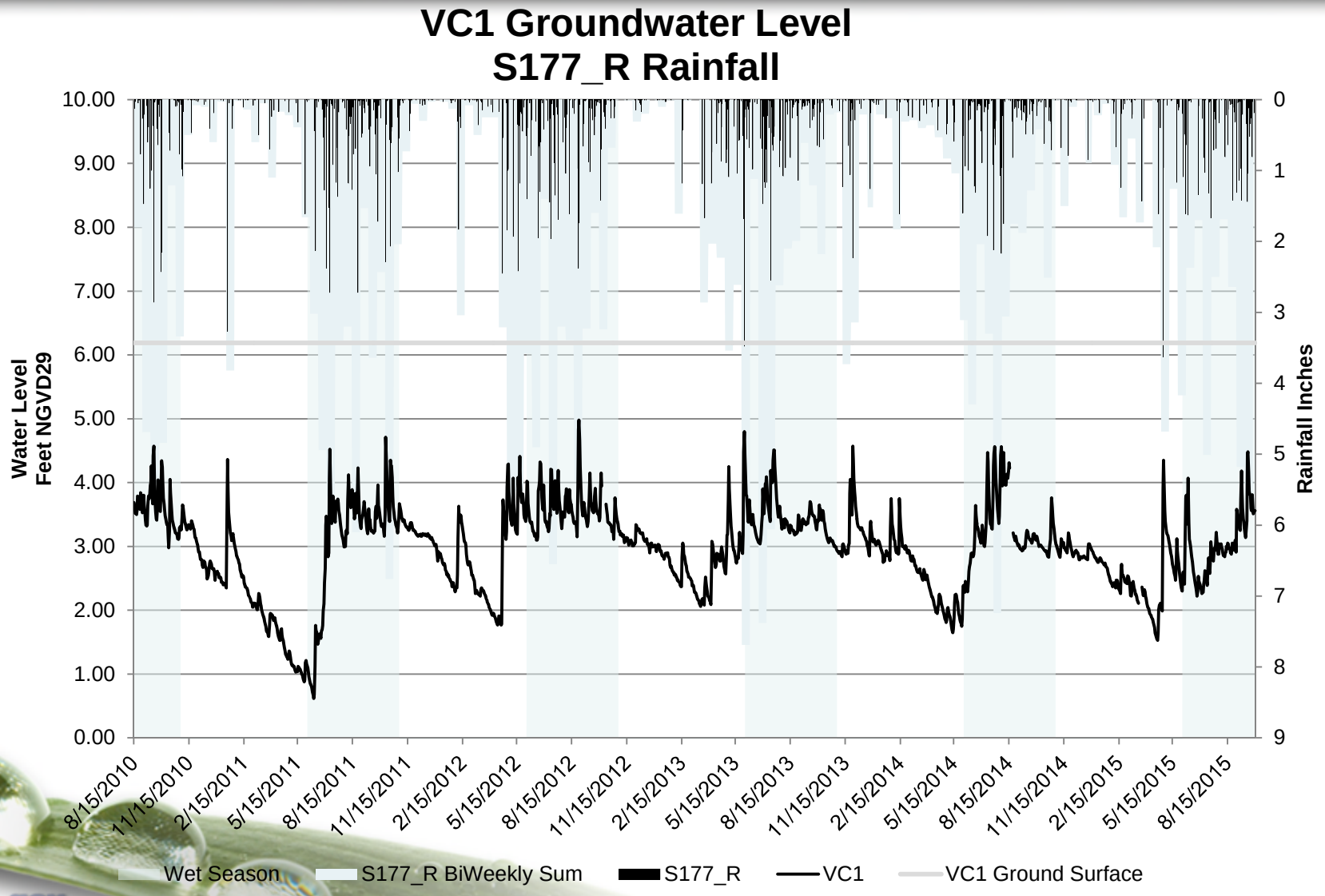


IFAS Study Area

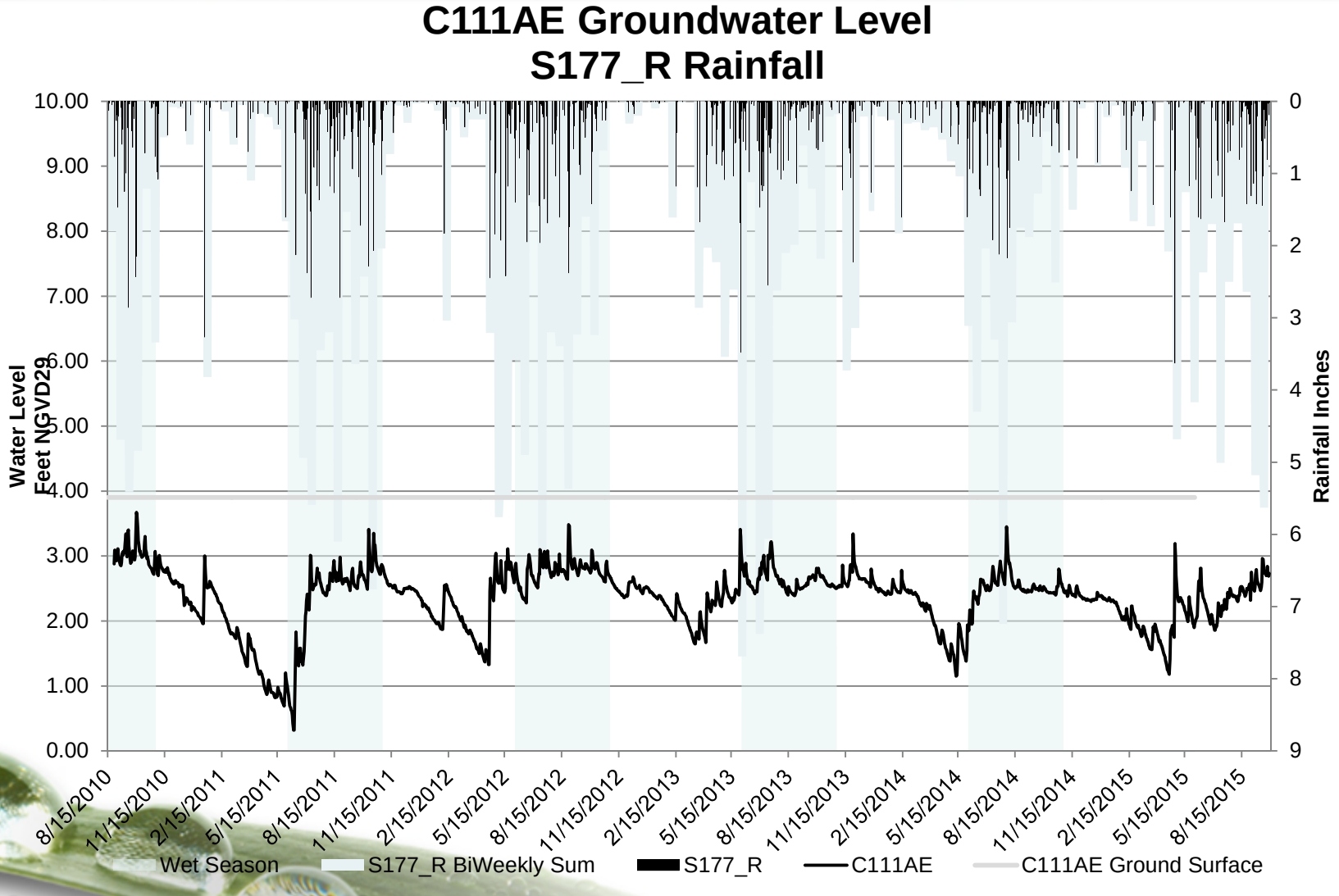




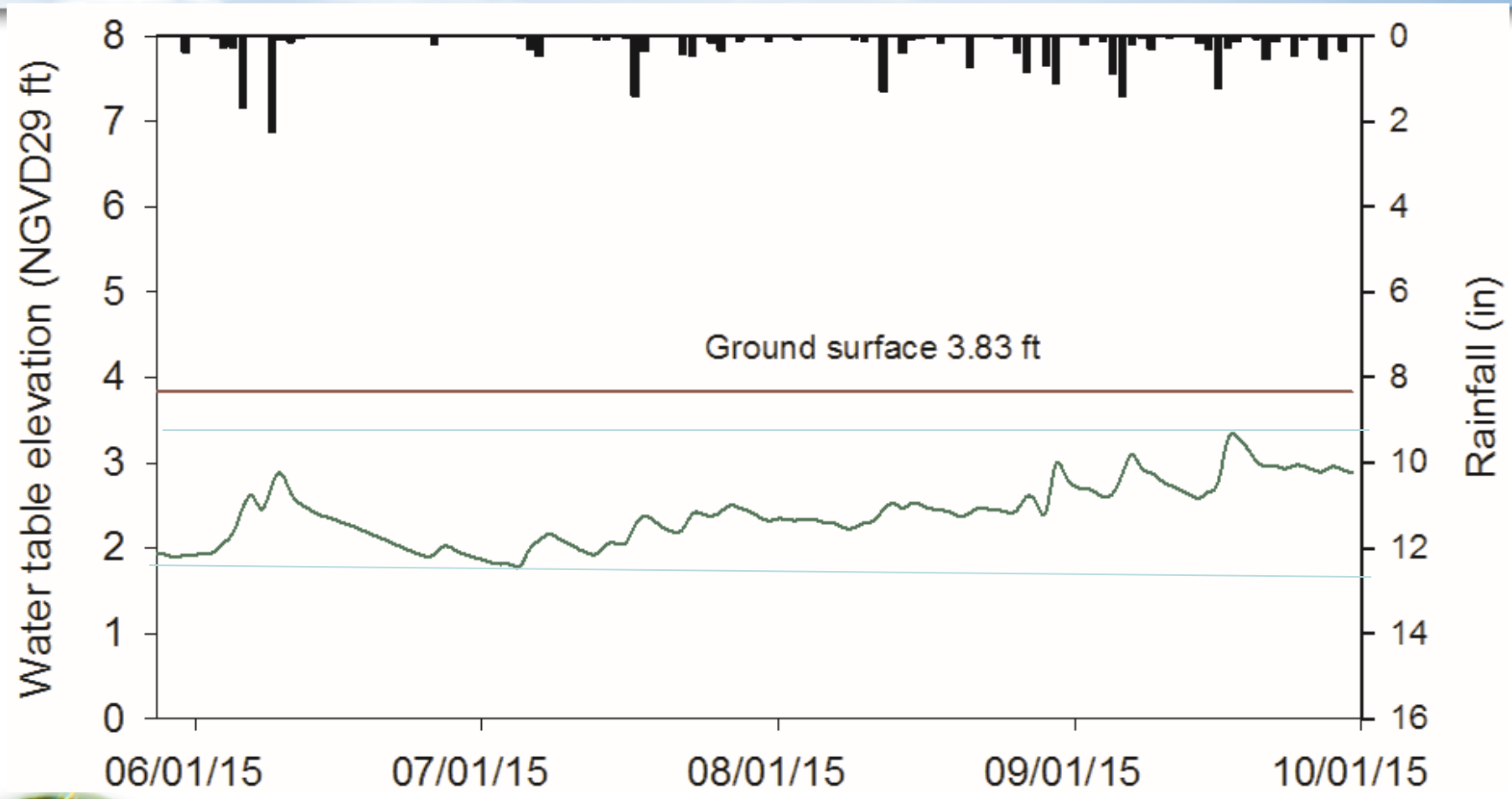
IFAS Groundwater Well Monitoring



IFAS Groundwater Well Monitoring

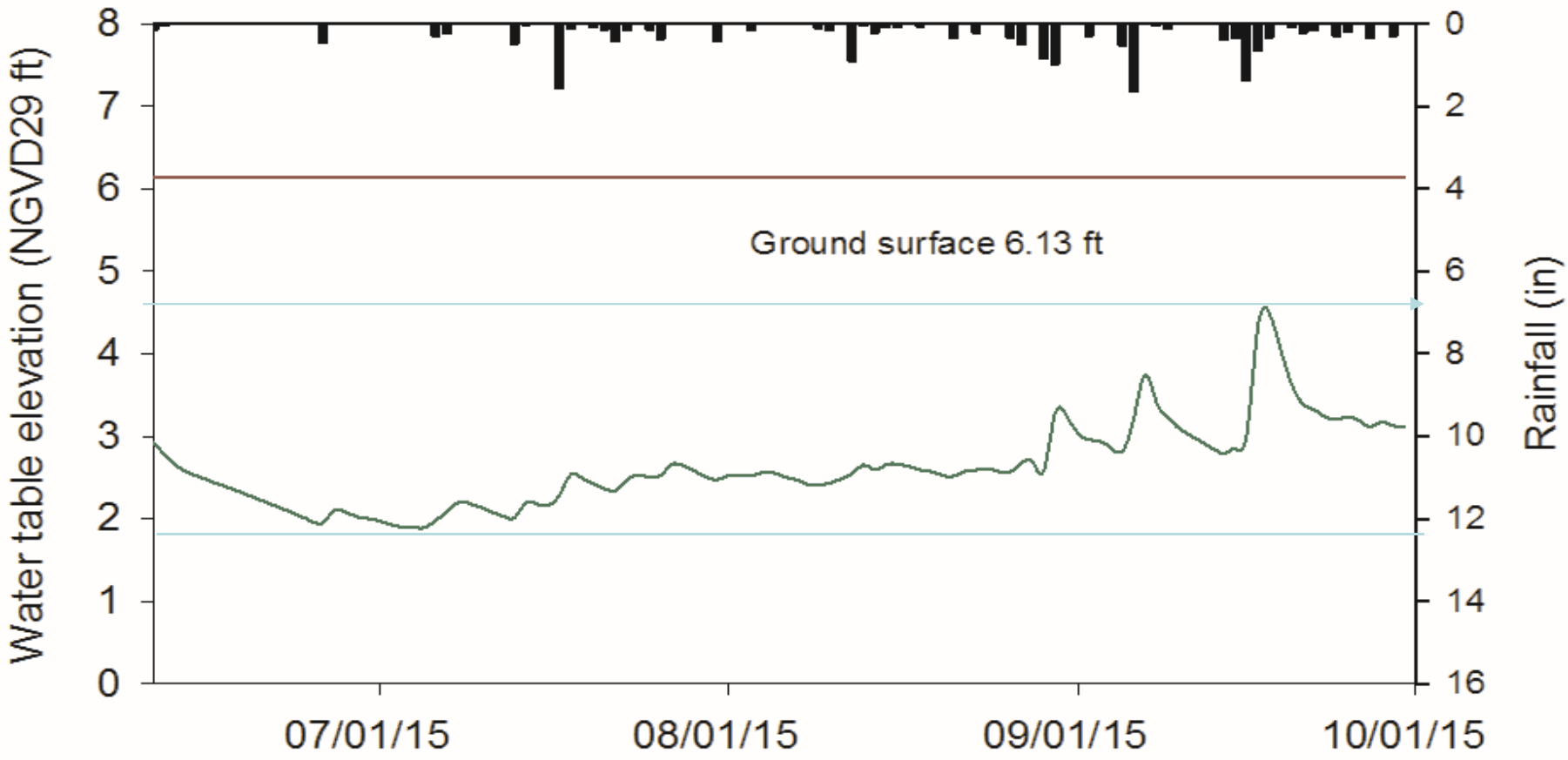


IFAS Monitoring Well Southeast of S-178



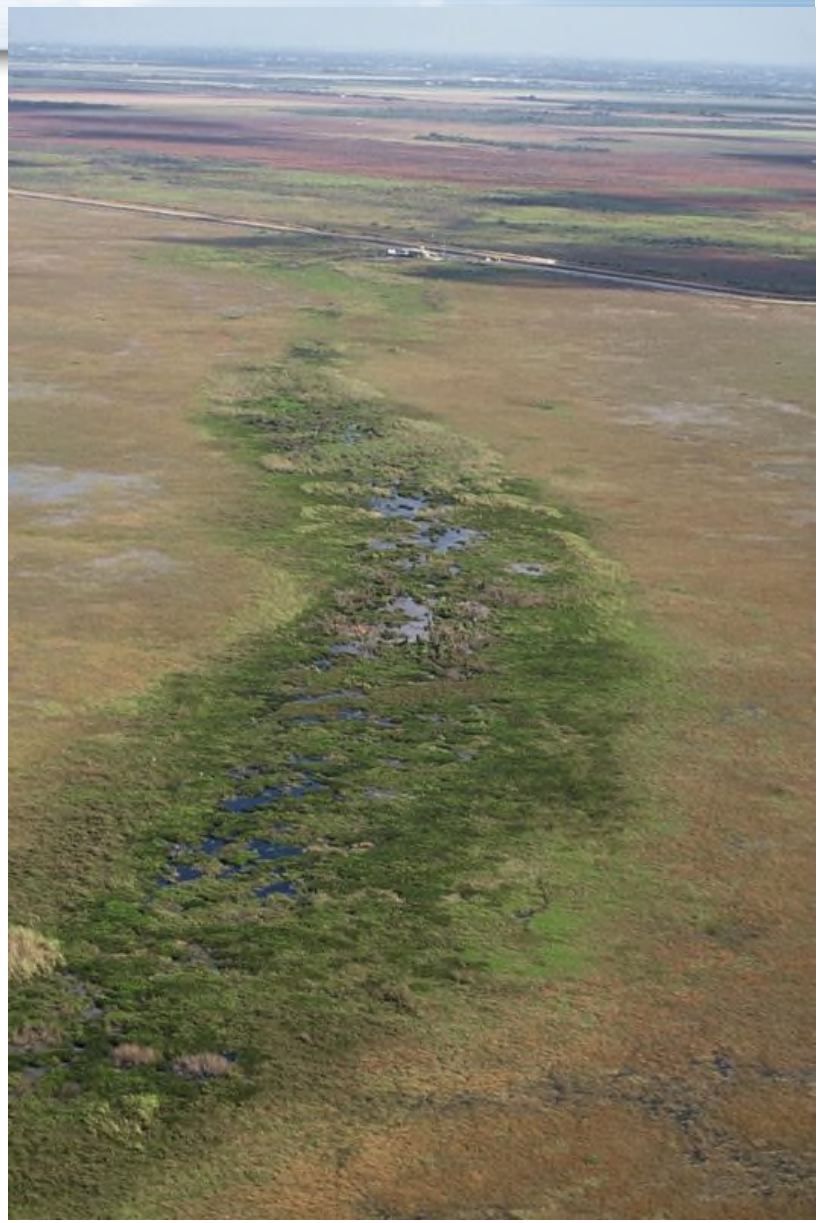
C111W15 showing water table elevation with ground surface and rainfall for the period 28 May 2015 to September 2015.

IFAS Monitoring Well North of S-178



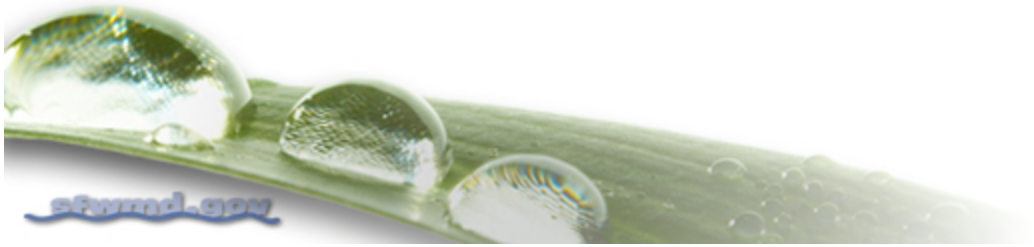
C111W12 showing water table elevation with ground surface and rainfall for the period 11 June 2015 to September 2015.

Questions and Discussion



Food for Thought: Information re Water Management in South Dade

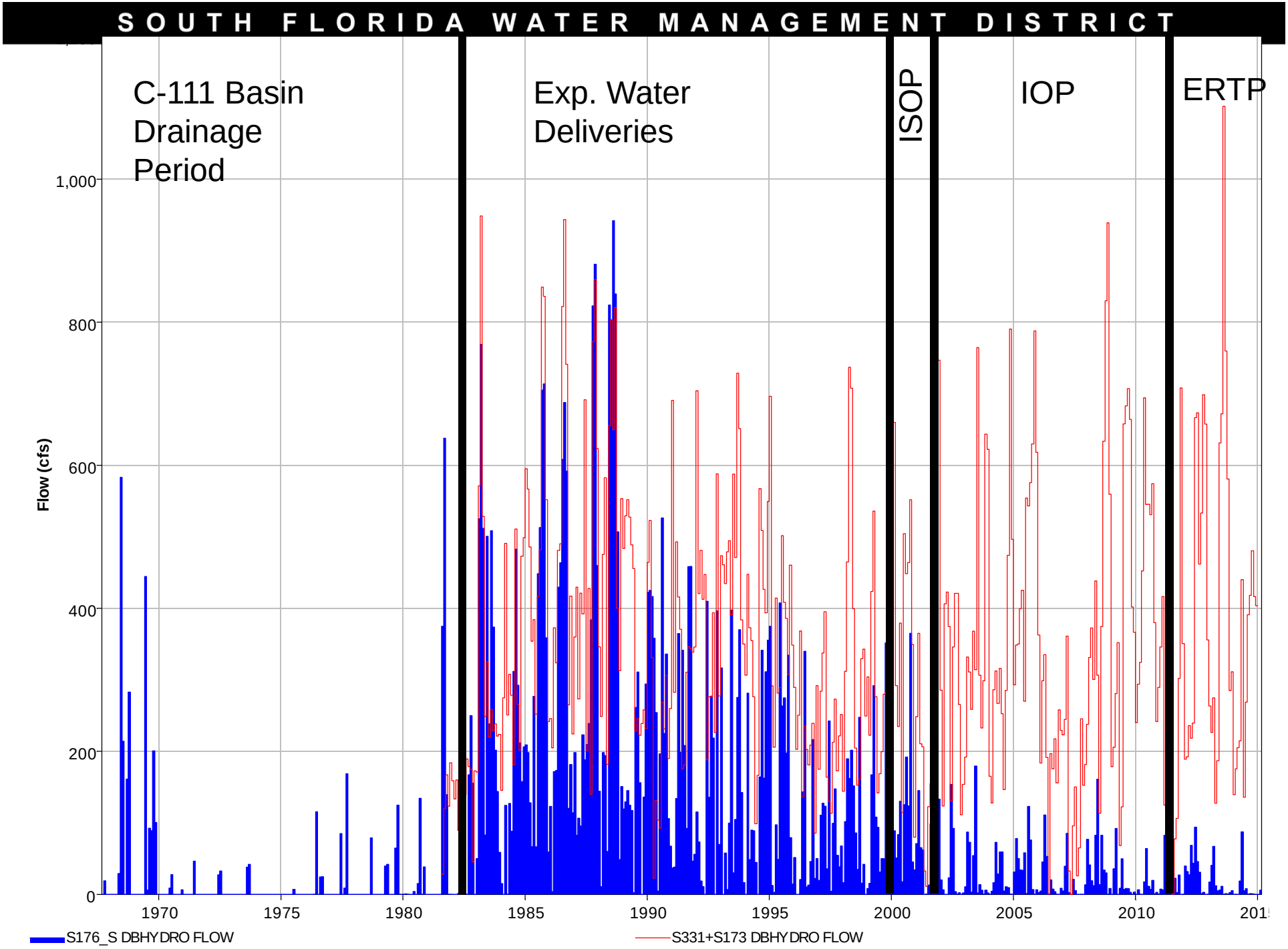
- Operations: John Mitnik, SFWMD
- Water Quality: Stuart Van Horn: SFWMD
- Seepage Barriers: Bill Baker, MacVicar Consulting, Inc.
- Current and Future Function of C-111 South Dade Project: Donna George, USACE
- On Farm Practices: Dr. Crane, IFAS TREC



Questions and Discussion

South Dade Investigation: Next Steps

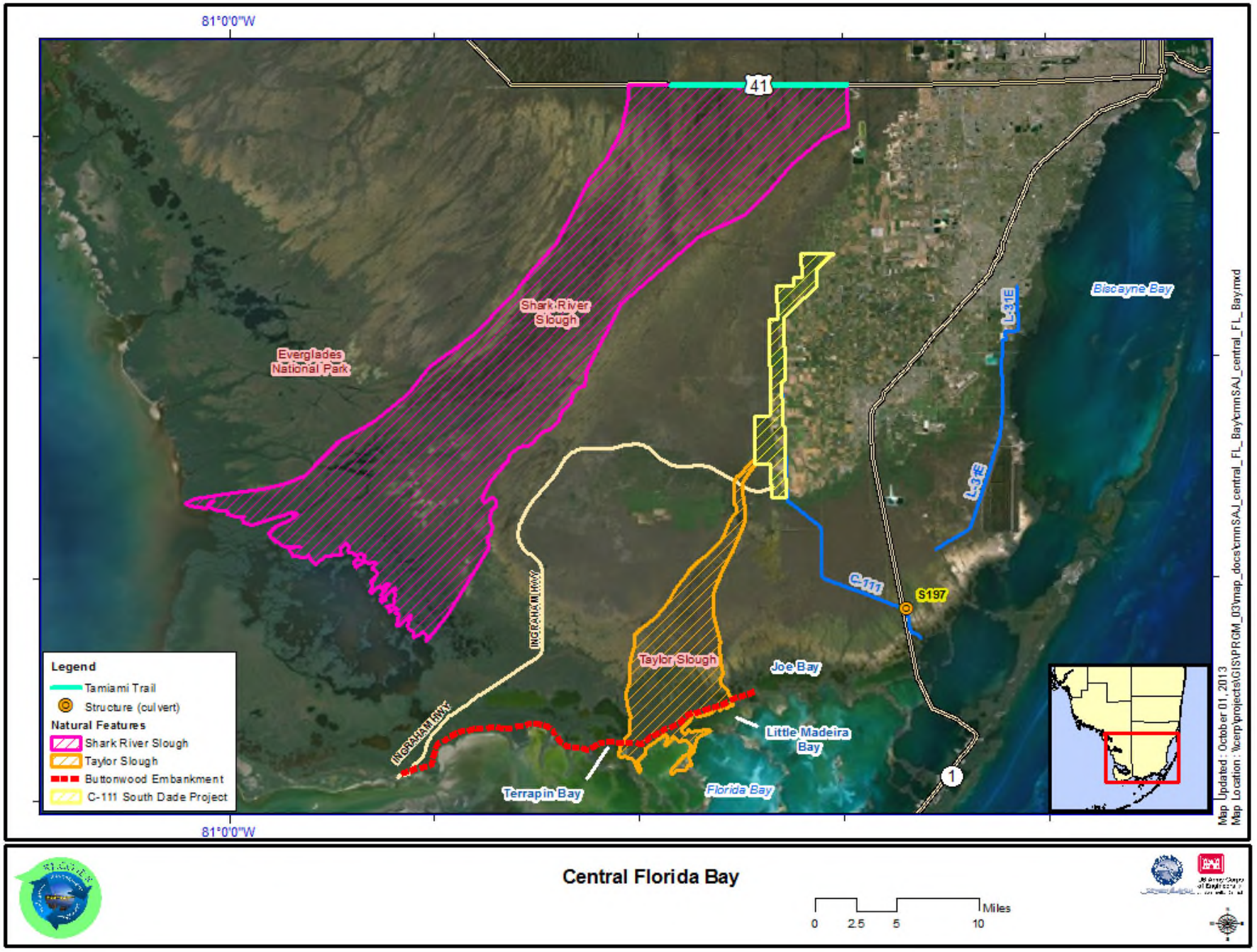
- Initial information sharing
  - ✓ Today's kickoff and brainstorm
  - ✓ In-depth meetings as requested (through September)
- Workshops:
  - ✓ October 15
  - Next Workshop Week of November 16th - 20th
  - December and January (if needed)
  - Review initial model results: Identify trends in system performance and observations.
  - Refine options available to change system performance: size and locate options, describe operations
  - List of options able to meet or partially meet desired outcomes


SOUTH FLORIDA WATER MANAGEMENT DISTRICT
C-111 Basin Drainage Period
Exp. Water Deliveries
ISOP
IOP
ERTP
Flow (cfs)
1,000
800
600
400
200
0
1970
1975
1980
1985
1990
1995
2000
2005
2010
S176_S DBHYDRO FLOW
S331+S173 DBHYDRO FLOW

Changes in South Dade S-176

	Period of Interest			
Information	Minimum Deliveries 1970-1982	Experimental Program: 1983-1999	ISOP/IOP: 2000-2011	2012 Water Control Plan: 2012-Current
Generalized Ops	5.5/5.0	4.5/4.1	5.0/4.75 Col 1 4.9/4.7 Col 2	5.0/4.75 Col 1 4.9/4.7 Col 2
Observed Mean	3.43	4.26	4.33	4.48
Observed High (90th percentile)	5.13	4.83	4.78	4.77
Notes		Many brief changes for tests	Pre-Storm Drawdown 4.0	Pre-Storm Drawdown 4.0

SOUTH FLORIDA WATER MANAGEMENT DISTRICT



Central Florida Bay

0 2.5 5 10 Miles

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Map Updated: October 01, 2013
Map Location: \\cerp\projects\IGIS\PRGM_03\map_docs\cmnSAJ_FL_Bay_Sthrn_Biscayne\cmnSAJ_FL_Bay_Sthrn_Biscayne.mxd

Legend

Structure (gated culverts)

Estuaries between Southern Biscayne Bay and Northeast Florida Bay

0 1.25 2.5 5 Miles

US Army Corps of Engineers Jacksonville District