

CENTRAL EVERGLADES PLANNING PROJECT



WCA 3A Decomp & Sheetflow Enhancement

PRESENTED BY

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Decomp Overview

- Intro/Background
 - ▶ Project Info/Yellow Book
 - ▶ Constraints/Uncertainties
- Management Measures
 - ▶ Measures/Screening for Plugs (RMA)
 - ▶ Measures/Screening of Management Measures
- Alternatives (Final Array)
 - ▶ Defined
 - ▶ Trends on Performance – Eco/Hydro/HU
- Next Steps

Intro: Decomp Overview

- Reconnecting significant portions of the remaining Everglades
- Restoring sheetflow from north of Tamiami Trail to Everglades National Park.
- Primary Methods/Management Measures (MM)
 - Backfilling of the Miami Canal (or portion)
 - Removal of Levees (portions) along Miami Canal
 - Hydropattern Restoration (Spreader system) along all or part of northern boundary of 3A

Project Background

- Part of the Yellow Book (CERP):
 - ▶ Water Conservation Area (WCA) 3 Decompartmentalization and Sheetflow Enhancement (Decomp)
 - ▶ Purpose: Reestablish ecological and hydrological connection between WCA 3A and 3B, the Everglades National Park & Big Cypress National Preserve
 - ▶ Features: New water control structures and the Modification or removal of levees, canals & water control structures in WCA 3A and 3B.
- Planning Constraints
 - ▶ Must not impact/degrade water quality: surface, inflows, within soil
 - ▶ Water Available for Restoration is Limited to existing flows into WCA 3A
 - ▶ Assume all inflows meet water quality standards
 - ▶ Do not impact existing water supply or flood control (savings clause)

Uncertainties

- Amount of water & timing/distribution (velocity) to achieve sheetflow
- Amount of water and timing/distribution of hydration to avoid soil loss & promote soil accretion
- Pattern of P uptake & spread - due to rehydration
- Designing operational flexibility to meet Project goals
- Plugs versus full back fill of MC: Hydrology
- Plugs versus full back fill of MC: Ecology
- Fill all of MC or just part for PIR 1

Note: As modeling & analysis proceeded the PDT continued to gain information which could be used to address some of these uncertainties.

Management Measures

Miami Canal

Retained

- Backfill (full & plug)
- No Fill (No Action)
- Spoil Mound Removal - To remove obstruction to flow
- Planted Spoil Mounds planted by FWC (same for all alternatives)
- Spreader Canal
- Tree Island Creation -Considered during design phase

Eliminated

- Shallowing of MC
- Piping
- Bladder
- Oxbows / meander modifications to MC
- Removal of C-11 Levee
- Everglades Rainfall Driven Operations – change current OPs
- Structure Removal
- Cap w/ backfill Miami Canal
- Degrade L-4 Canal

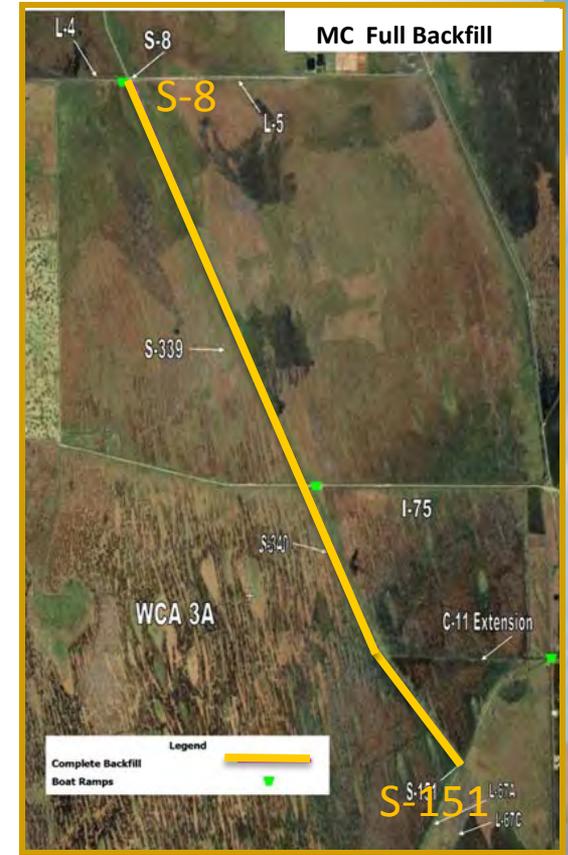
Screening Criteria/Methods

- Reduce Dryouts in Northern WCA 3A
- Reduce Ponding in Southern WCA 3A
- Water Quality – no impact
- Risk and Uncertainty - Reduce
- Compatibility with Adaptive Management
- Degree of Increased Sheetflow
- Spatial Extent of Ecologic and Hydrologic Connectivity
- Best Professional Judgment
- SFWMM results
- RMA modeling (plug configurations)-Example of initial screening

MM: Miami Canal Configurations

- North MC: S-8 to S-339
- Full MC: S-8 to S-151
- Full MC Plugged: S-8 to S151
- Interstate -75: S-8 to I-75
- Central MC: S-339 to S-340
- South MC: S-340 to S-151
- Various Plug configurations
- *Various Combinations of the above*
- *Measures that were considered equally for all alternatives*
 - ▶ Spoil Mounds Removal Along MC
 - ▶ Retain FWC planted Spoil Mounds
 - ▶ Tree Island Creation

MM: Example MC Configurations



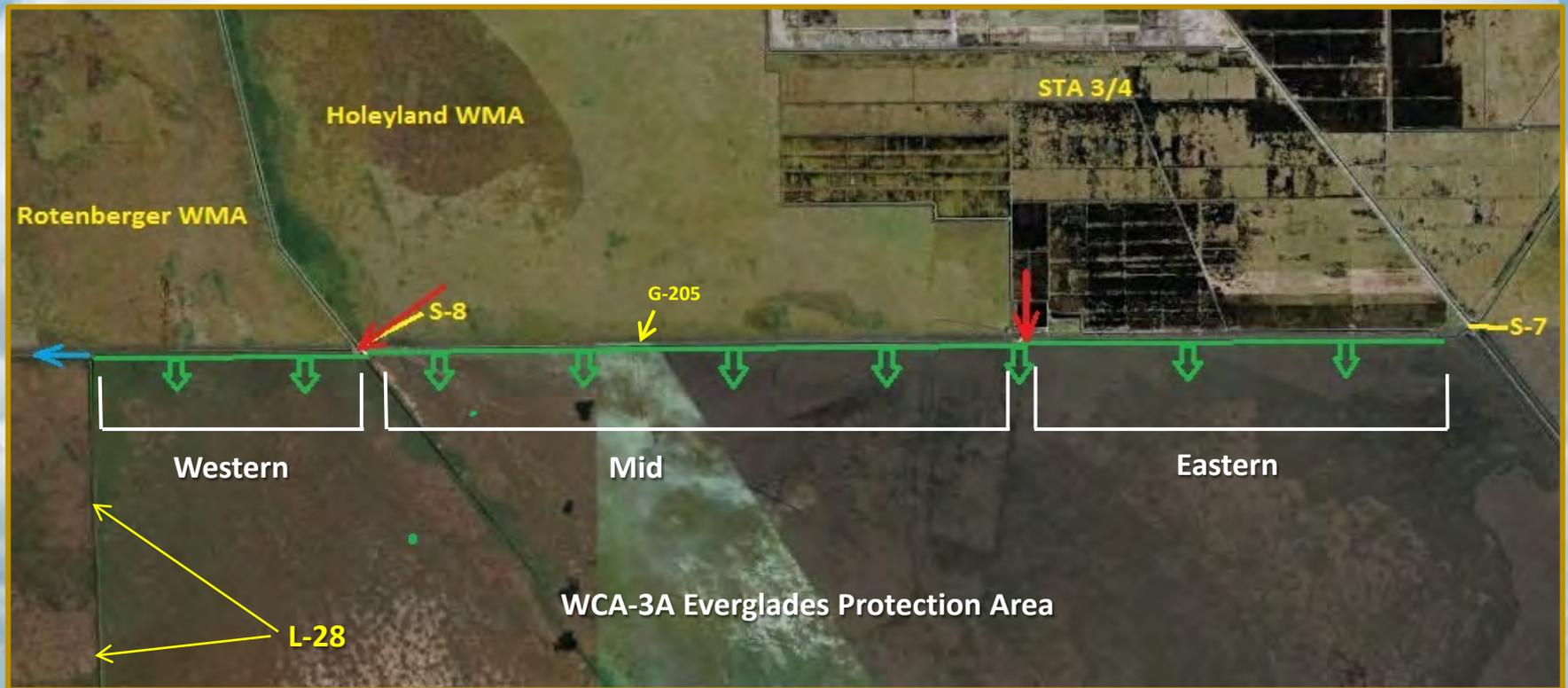
Legend

- Backfill
- Boat Ramps

MM: Hydropattern Restoration

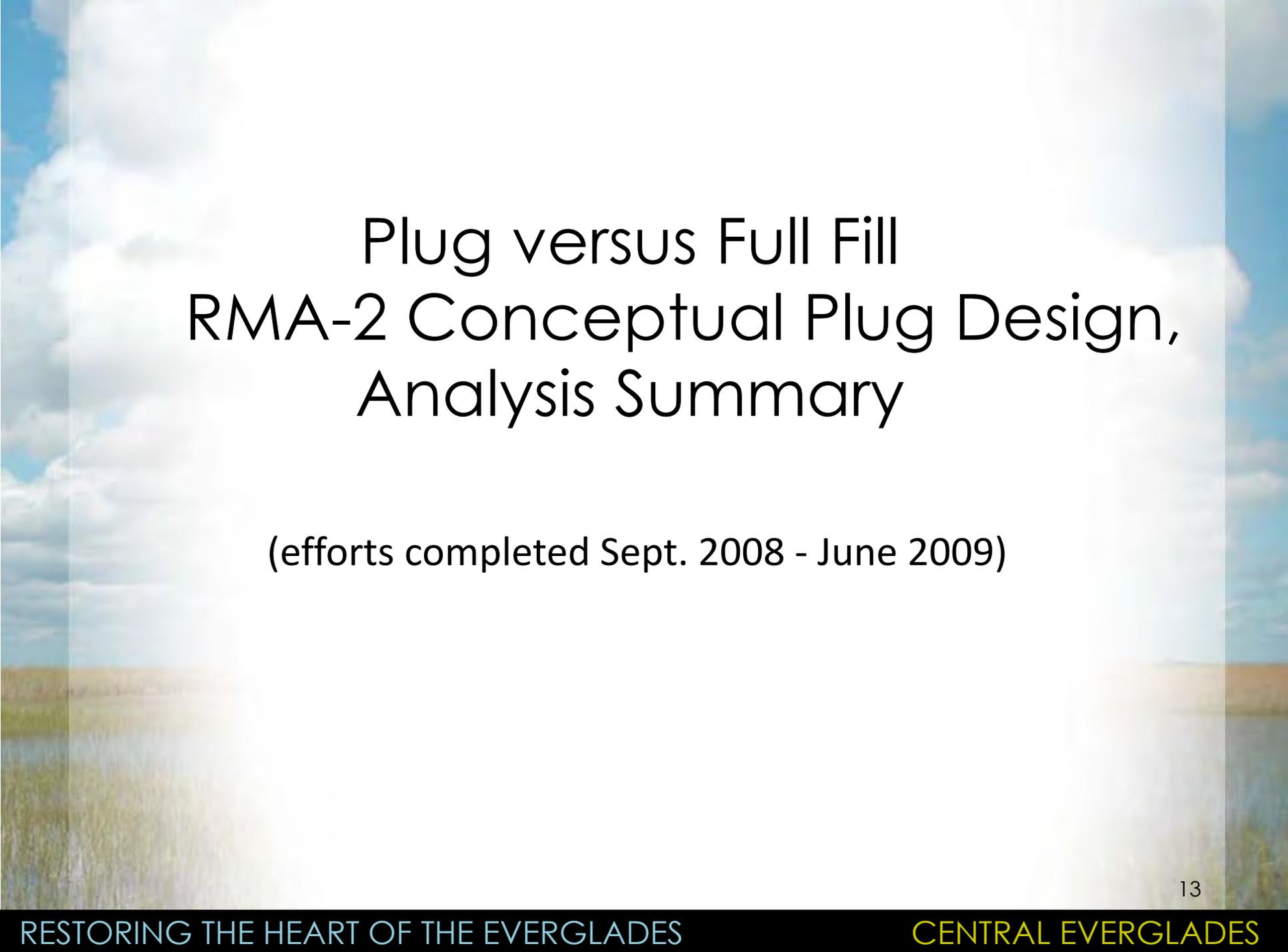
- Western: from S-8 along L-4 to L-28
- Mid: from S-8 to STA 3/4 along L-5
- East: East along southern edge of STA ¾
- West of G-205: from G-205 west to L-28
- East of G-205: from G-205 east along L-5 to S-7
- Full HRF: from L-28 to S-7 along L-4 and L-5
- Operations Strategies and Intent
- *Various Combinations of above*

MM: Hydropattern Restoration



3 sections with new pump stations to redistribute inflows

- 1. Western – degrade L-4 Levee from S-8 to L-28 (3.3 miles)**
- 2. Mid – spreader canal parallel to L-5 Levee (8.5 miles)**
- 3. Eastern – gap “remnant” L-5 (5 miles; 1000’ gaps at 0.5 mile intervals)**



Plug versus Full Fill RMA-2 Conceptual Plug Design, Analysis Summary

(efforts completed Sept. 2008 - June 2009)

RMA-2 Modeling Scoping/Overview

- Test Miami Canal Backfill Options: Use available data to construct a hydraulic model
- Evaluate effects of various Miami Canal plug management measures
 - Question: **“For a given plug length, what is the optimal plug spacing to mimic the full backfill case?”**
- Output to assist in screening & determine optimal use of limited fill
- Strengths: flexible mesh; steady and unsteady state; various types of boundary conditions; roughness as a function of flow depth; USACE Jacksonville District in-house expertise
- Weaknesses: surface water/ponded conditions only (no consideration of groundwater interaction); limited period of simulation
- Outputs: water depths, velocity magnitude & direction, flow volumes.

RMA-2 Set-Up & Performance Measures

Inflow @ S-8 = 950 cfs

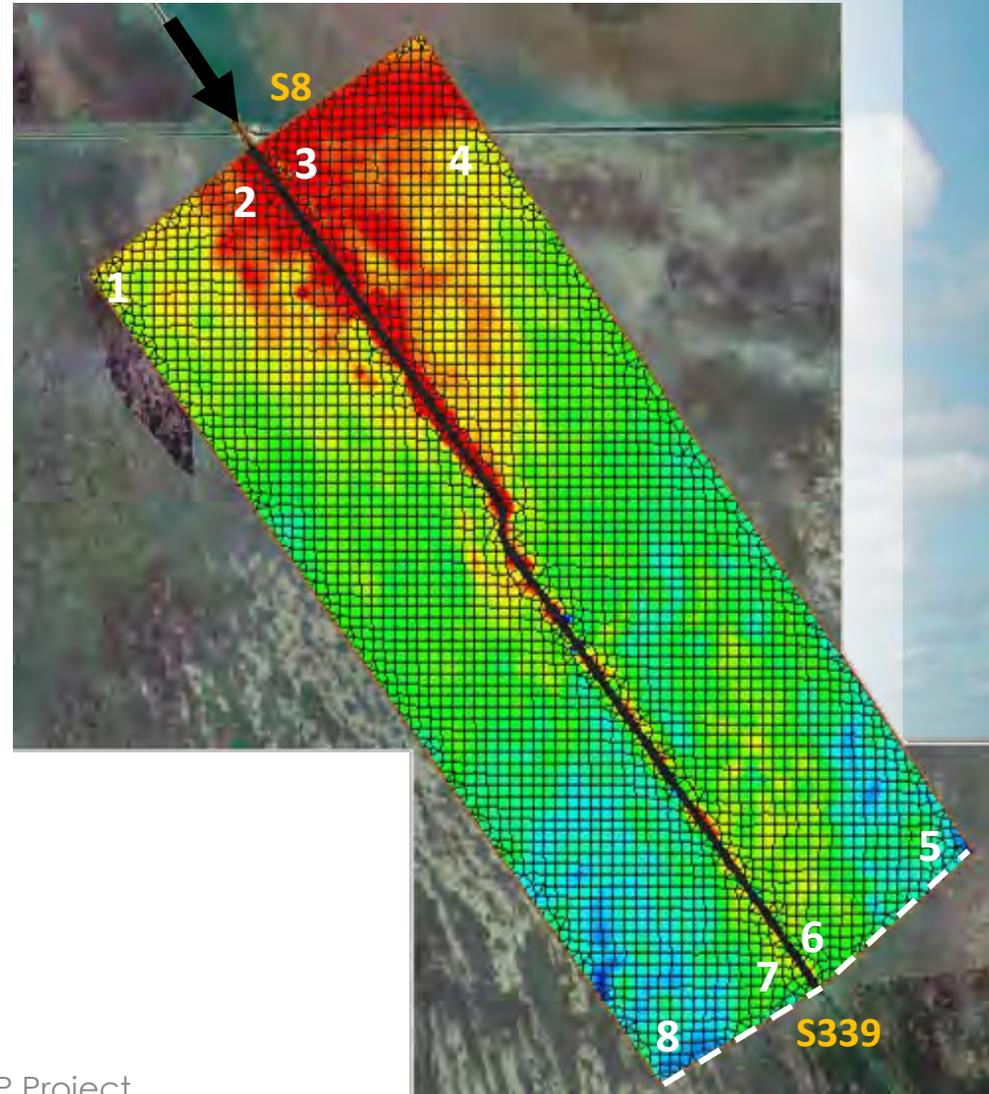
Surface Elevation @ S-339 =
10.66 ft NGVD

Final Performance Measures:
Used to compare each modeled
plug configuration with the full
backfill case.

Correlation Coefficient (R) of
absolute **velocity magnitude**

Correlation Coefficient (R) of **along
canal velocity**

Flow across MC transect - 2 miles
upstream of S-339; extends 100 ft
out, on both sides of MC



CERP Project

RMA-2 Model Test Matrix:

18 Total Plug Configurations Evaluated

LENGTH (ft)	500	1000	2000	4000	10000
SPACING (ft)					
1000	X		X	X	
3000	X	X	X		
5000	X	X			X
10000		X	X	X	X
15000	X				
20000			X	X	
25000	X	X			

Results Summary

Results for all 18 configurations were ranked and scored:

Combined Score: was created by adding the scores for each PM, for each plug configuration

The lower Combined Score → better performance.

Configuration #	Plug Length	Plug Spacing	Combined Score	Fill Volume req'd for MC plugs to S-151(MCY)
14 (optimal)	4000	2000	3	3.01
10	2000	1000	5	3.01
1	500	1000	9	1.51
6 (optimal with available fill)	1000	3000	10	1.13
11	2000	4000	18	1.51
2	500	3000	22	0.65

* Available fill onsite along Miami Canal ~2.66 MCY (based on 2008 Decomp site survey)
Does not include fill made available by HRF feature.

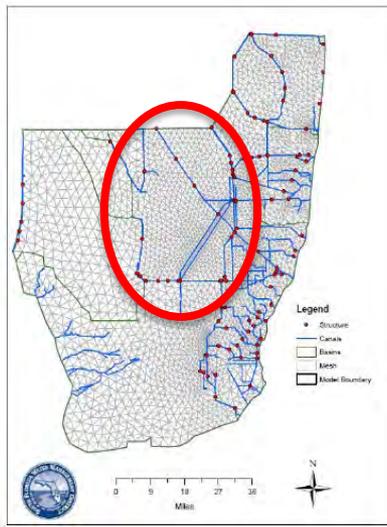
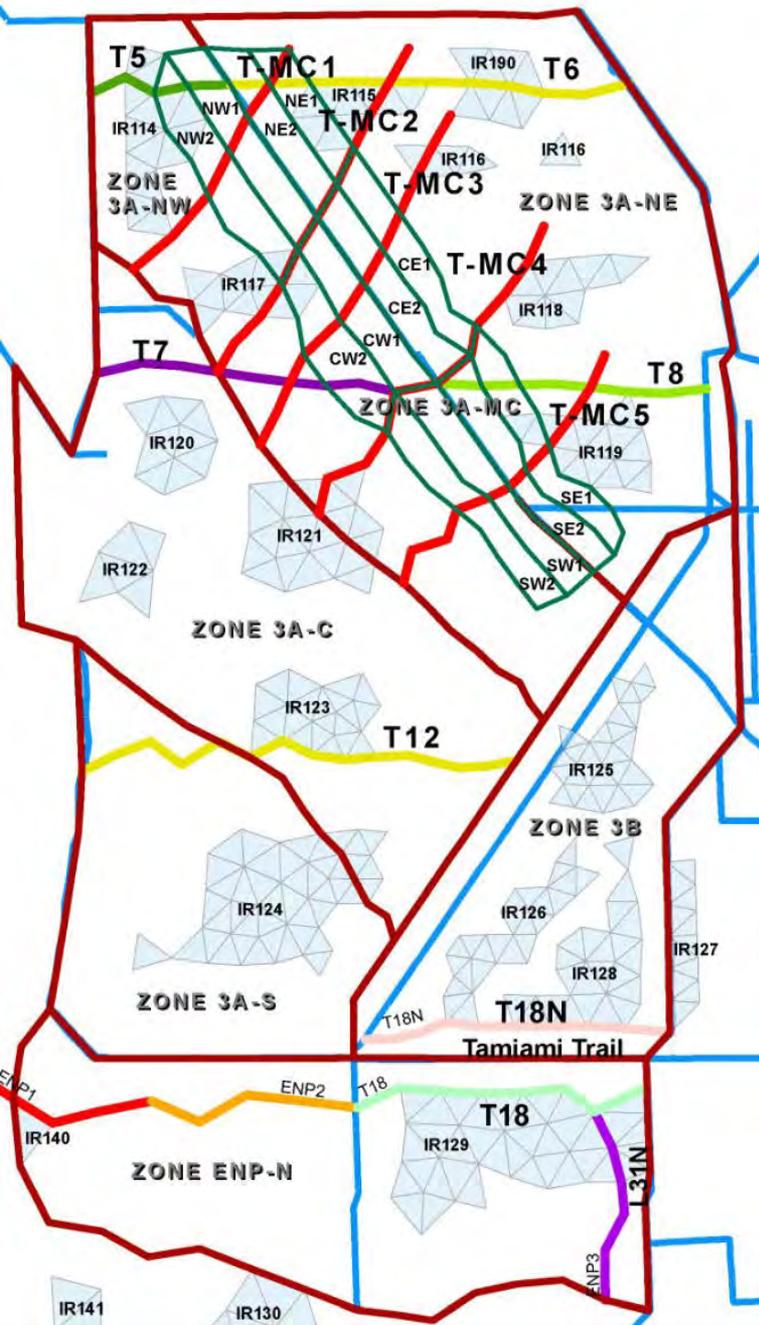


Figure 2.2. Glades-LECSA Model Domain with Canal, Mesh, and Structure Locations.

Regional Simulation Model (RSM Model Mesh)

RSM Zones:

- 3A-NE, 3A-NW
- 3A-MC, 3A-C
- 3A-S, 3B, ENP-N

- Indicator regions used for performance measures
- Transects used for performance measures
- Region is divided into seven zones

Zones delineated

- to capture the spatial extent of the structural components
- based on differences in existing conditions within the study area.

Final Array of Alternatives

- 20 combinations: Miami Canal Fill & Northern Hydropattern Restoration
- Screened to 10 combinations (for RSM Modeling)
 - ▶ Full HRF: North-Central, North Only, North-South, No MC Fill, Full MC, Full MC Plugged
 - ▶ HRF West of G-205: North-Central, North Only, North-South, No MC fill
- Analysis as of October 2011: Six alternatives were modeled



Alternative A



Alternative B



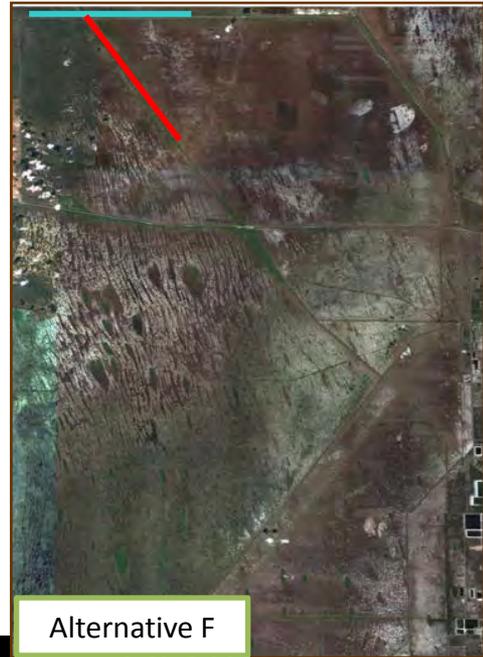
Alternative C



Alternative G



Alternative E



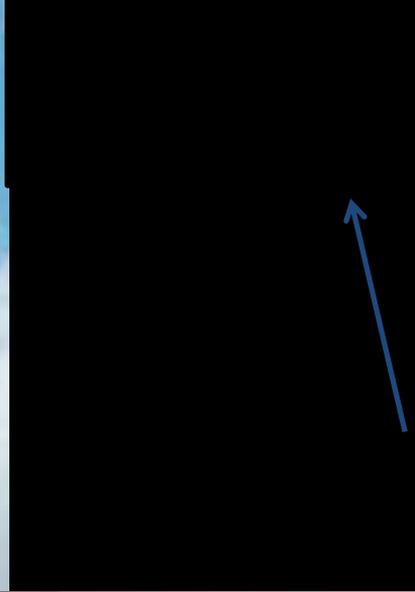
Alternative F

Evaluation of Alternatives

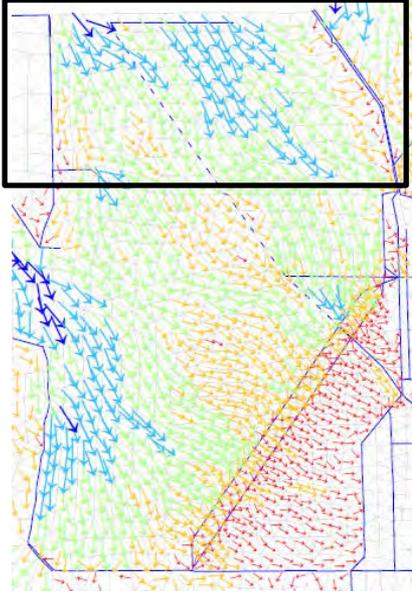
- Perspectives Considered in Analysis:
 - ▶ Hydrological Improvements – via graphics (ex: flow vector maps)
 - ▶ Ecological Improvements – Anticipated response to hydrologic changes
 - ▶ Habitat Units based on Performance Measures (Hydro & Eco)

Average Annual Overland Vector

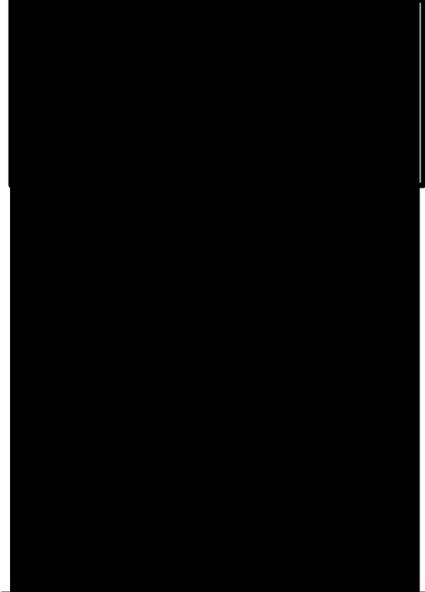
Dry Year (1989)



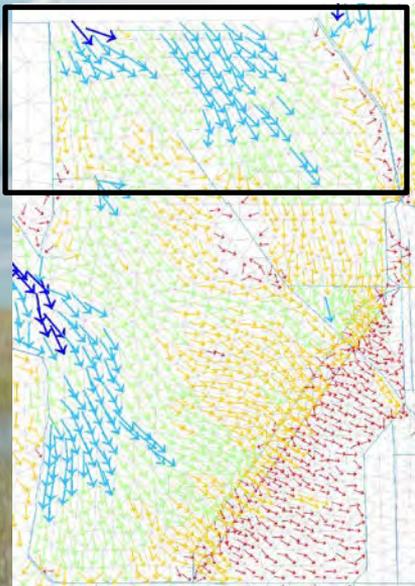
I-75



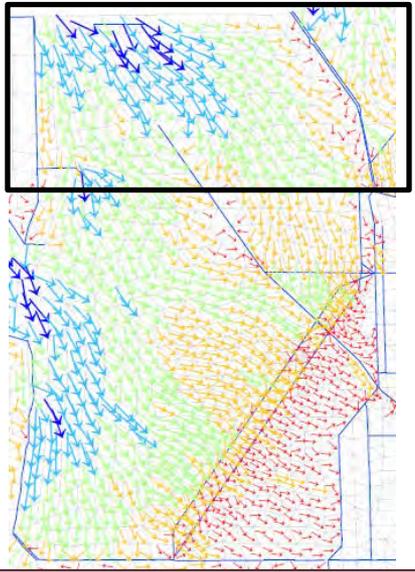
Alt C: Full HRF/Full MC Plugged



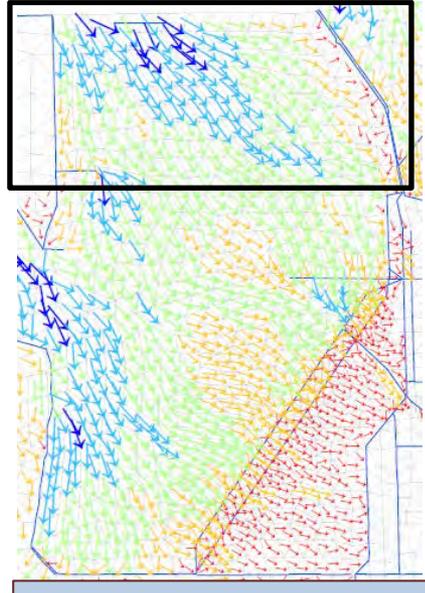
ALT G: Full HRF Only



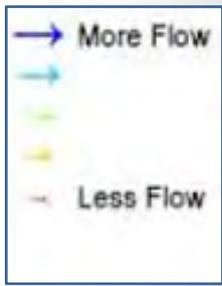
ALT B: Full HRF/North MC



ALT F: West HRF/North MC



ALT E: West HRF/Full MC



Direction Magnitude

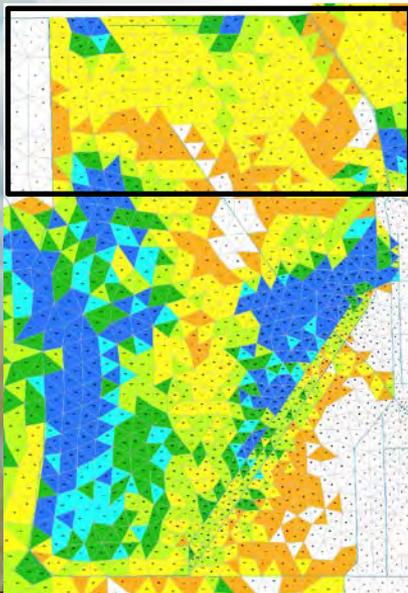
Average Annual Hydroperiod Distribution

Dry Year (1989)

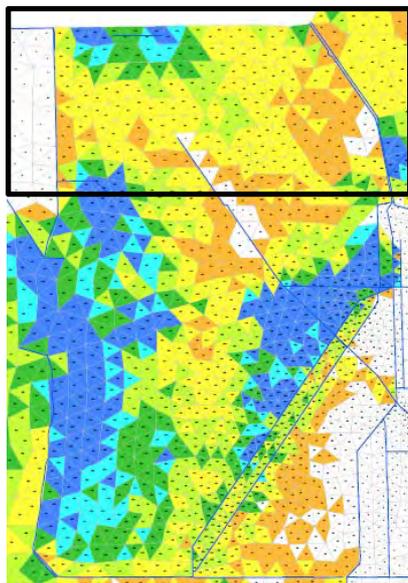
ALT A: Full HRF/Full MC

Alt C: Full HRF/Full MC Plug

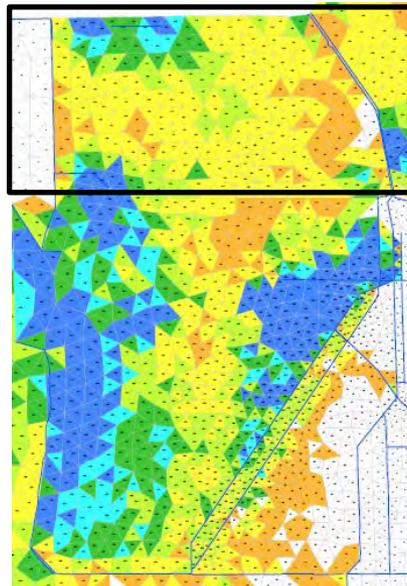
ALT G: Full HRF Only



ALT B: Full HRF/North MC



ALT F: West HRF/North MC



ALT E: West HRF/Full MC

Hydroperiod Class

- 0 to 60 days
- 60 to 120 days
- 120 to 180 days
- 180 to 240 days
- 240 to 300 days
- 300 to 330 days
- 330 to 365 days

Evaluation Trends

- Hydrologic & Ecological:
 - Alternative ranking for RSM Modeling relative to the project objectives
Alt A and Alt E > Alt C > Alt B and F > Alt G
- Little change seen South of I-75 except where MC was completely filled.
- Habitat Units:
 - ▶ Alternatives ranked based on HU's:
 - ▶ Alt E > Alt A > Alt C > Alt F > Alt B > Alt G
 - ▶ Consistent with Independent Ecological Evaluation
- HU lift as compared to FWO

FWO	Alt A	Alt B	Alt C	Alt E	Alt F	Alt G
367,550	458,517	432,081	449,614	462,568	435,770	381,224

Next Steps

- Complete Decomp Status Report & Associated Reviews - February 2012
- Decomp PDT to provide Detailed Presentations to CEPP as needed.
 - ▶ Plan Formulation Details
 - ▶ Lessons Learned
 - ▶ Detailed Recommendations

Questions/Discussion