



Reviving  
*THE river OF grass*

## River of Grass Phase I Planning

Water Resources Advisory Commission Issues Workshop  
March 31/April 1, 2009

[sfwmd.gov/riverofgrass](http://sfwmd.gov/riverofgrass)

A white egret is captured in mid-flight, its wings fully extended, against a background of lush green grass. The bird is positioned on the left side of the frame, facing right. The text 'Reviving THE river OF grass' is overlaid on the right side of the image.

# Reviving

THE *river* OF *grass*

**Configuration Information Continued –  
Maps and Land Information  
Potential Project Impacts to Sugar Production Economics**

Matt Morrison, Lead Project Manager, Everglades  
Restoration

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# Maps and Land Information

RESTORATION PLANNING

- Graphical compilation of land related information
- Provide assistance to project teams in formulating proposed project footprints and configurations
- Guide project planning by distinguishing potential economic related impacts to sugar cane industry based on project location

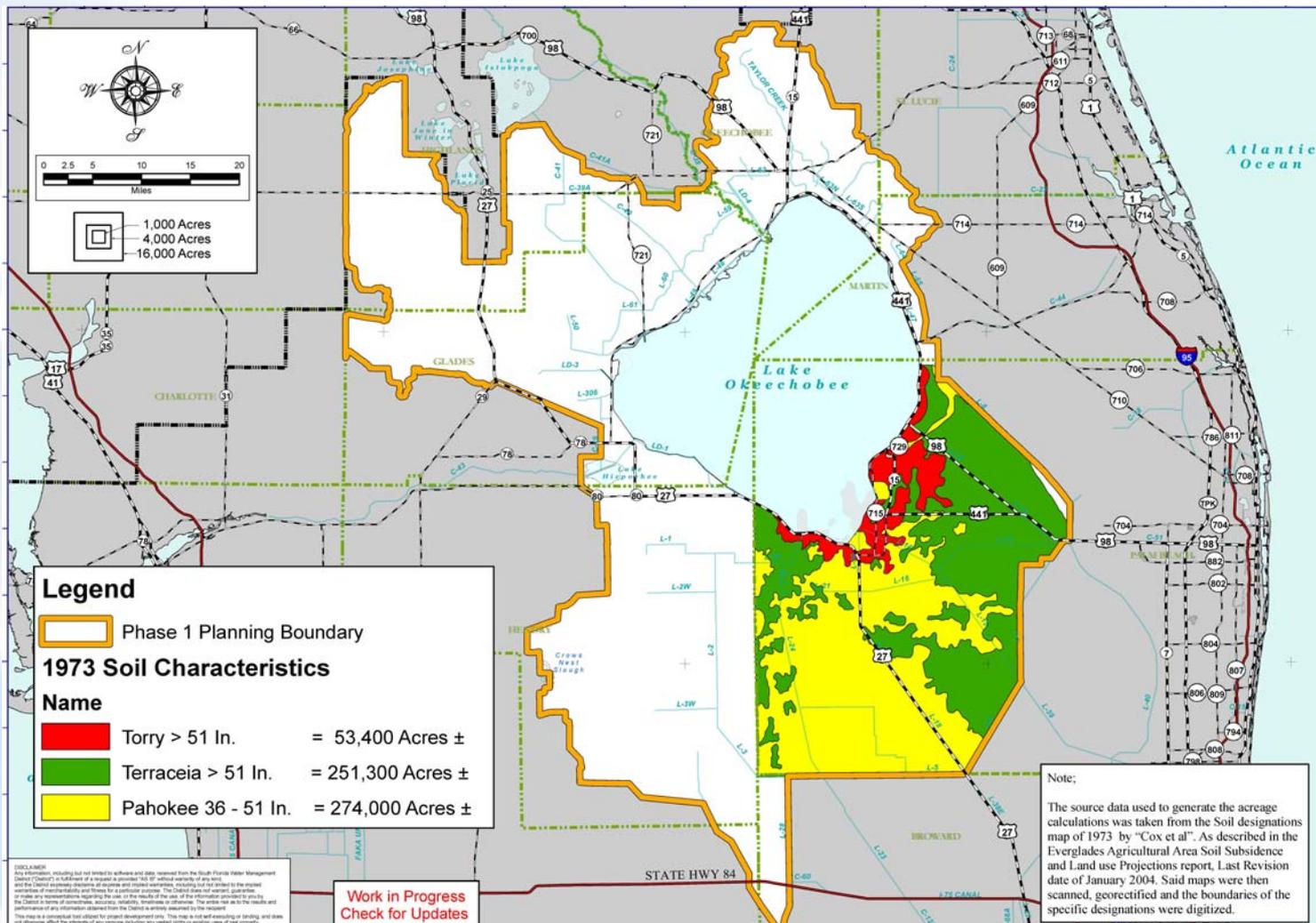
# Maps and Land Information

RESTORATION PLANNING

- Evaluate the potential economic impact on the sugar cane industry for the restoration project configurations
  - Consider historic and present production estimates
  - Cane Acreage, Yields, Number of Stubble Years and Varieties
  - Soils Types and Thicknesses
  - Transport Distances - Rail Network and Road
- Prepare regional economic impact analysis for proposed conversion of other agricultural lands to restoration project features

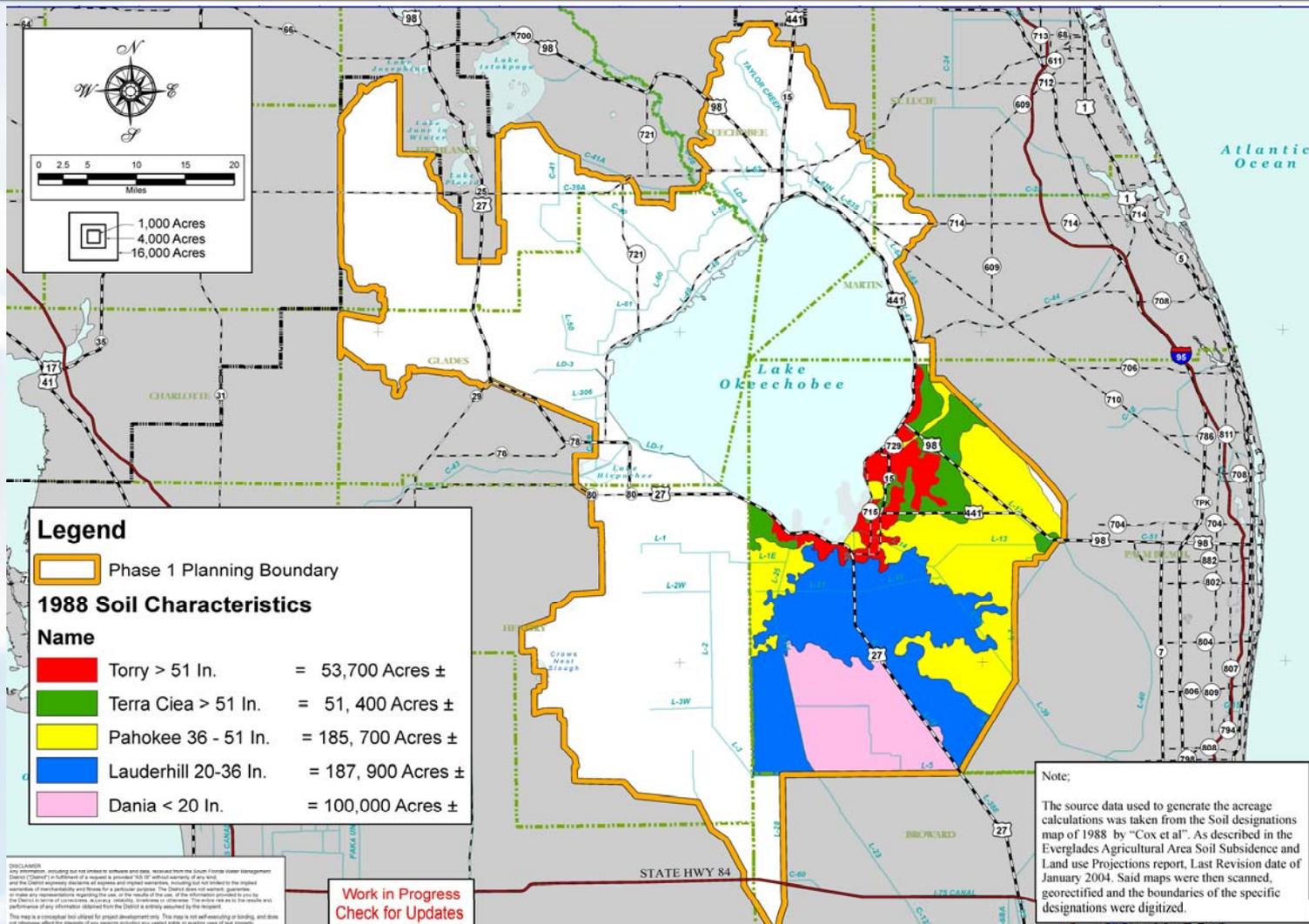
# Soil Characteristics 1973

RESTORATION PLANNING



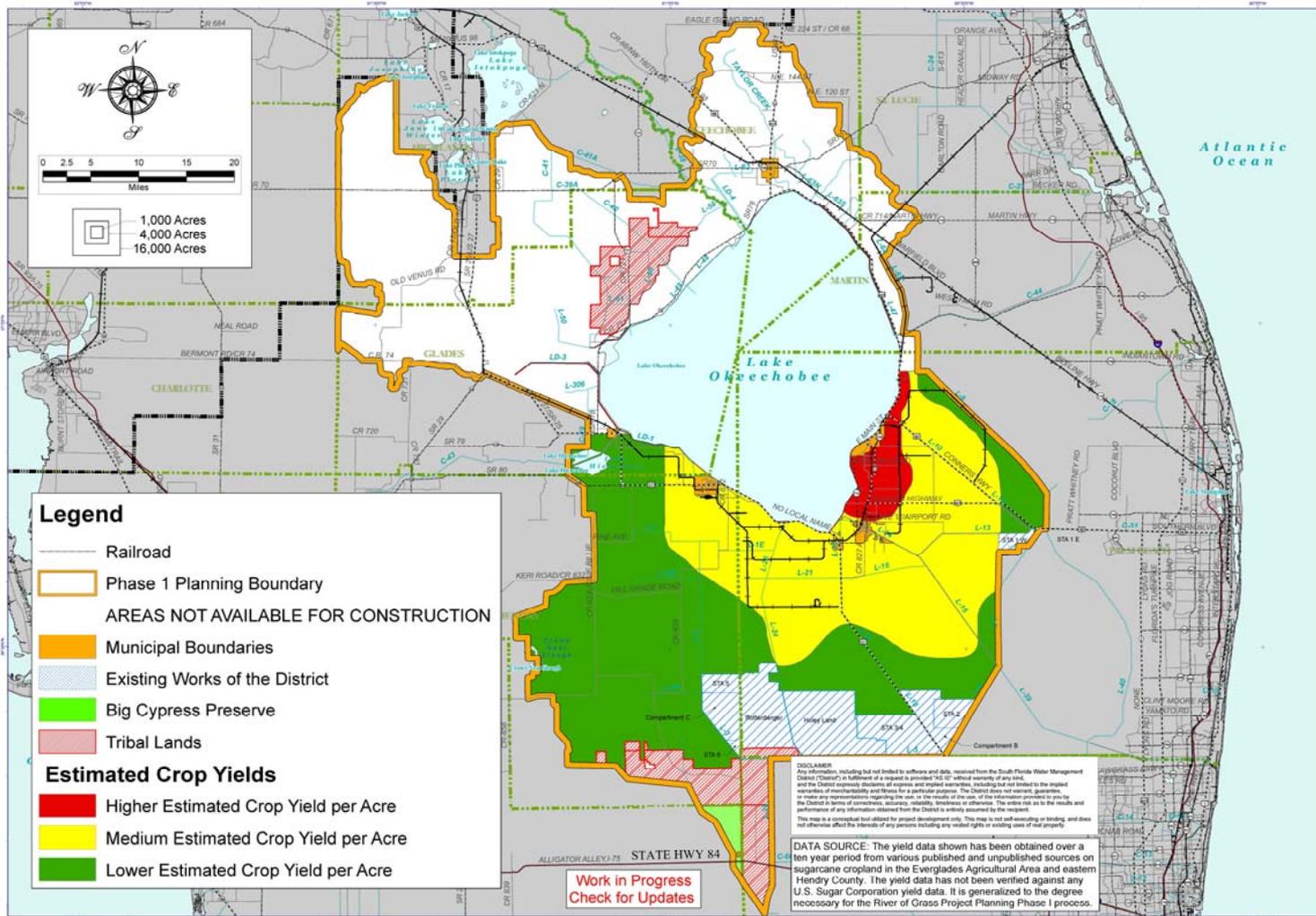
# Soil Characteristics 1988

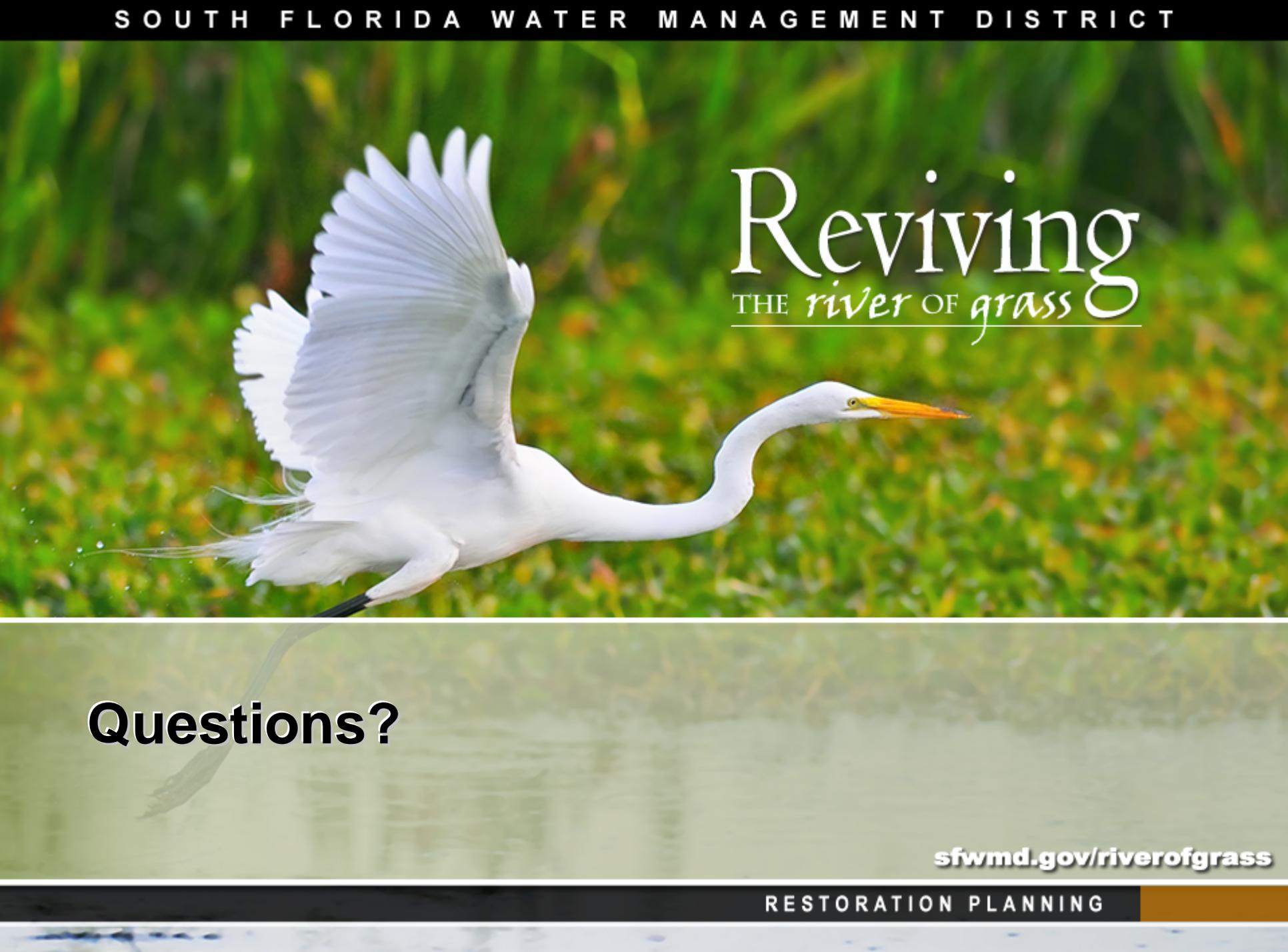
RESTORATION PLANNING



# Estimated Sugar Cane Crop Yields

RESTORATION PLANNING



A white egret is captured in mid-flight, its wings fully extended, flying over a body of water. The background is a lush green field of grass. The text 'Reviving THE river OF grass' is overlaid on the right side of the image.

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**Questions?**

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RESTORATION PLANNING



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## **Configuration Information Continued – Hydrologic Modeling Performance Summary Maps**

Cal Neidrauer, Chief Engineer, Operations Control

Walter Wilcox, Lead Engineer, Interagency Modeling Center

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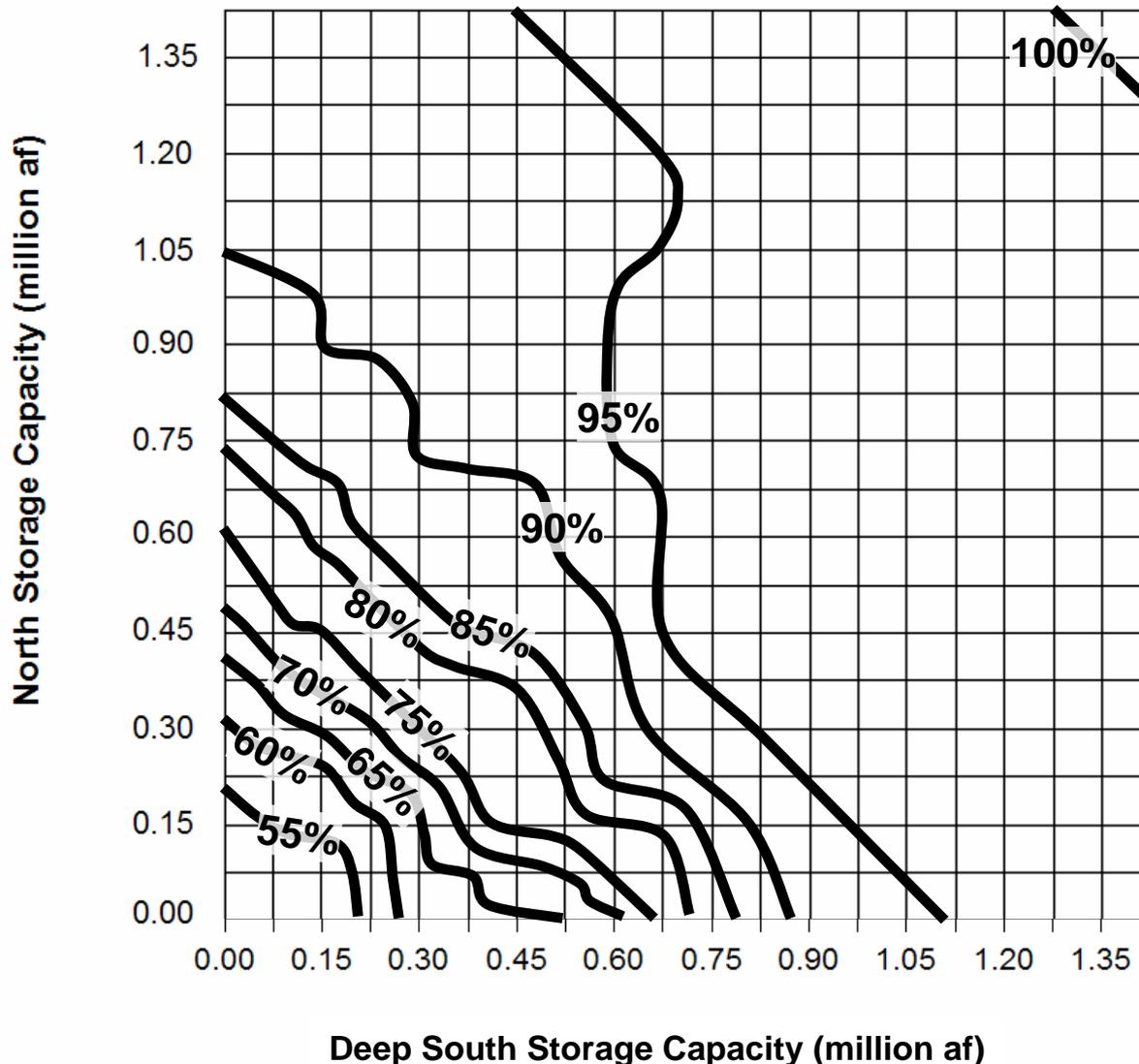
# Performance Summary Maps

RESTORATION PLANNING

For the ROG Phase-1 Configuration Planning exercise (March 31 – April 1), 5 key performance measure summary maps have been developed to provide general guidance for sizing of storage features north & south of Lake Okeechobee:

1. Percent Reduction in Lake-Triggered High Discharges to the Northern Estuaries
2. Lake O Stage Envelope - Standard Score Above
3. Everglades Demand Target Delivered – Standard Score
4. Dry Season Everglades Demand Target Delivered – Standard Score
5. Annual Average Flow to the Everglades – for use in sizing south treatment area

**% Reduction in Lake-Triggered High Discharges to the Northern Estuaries**

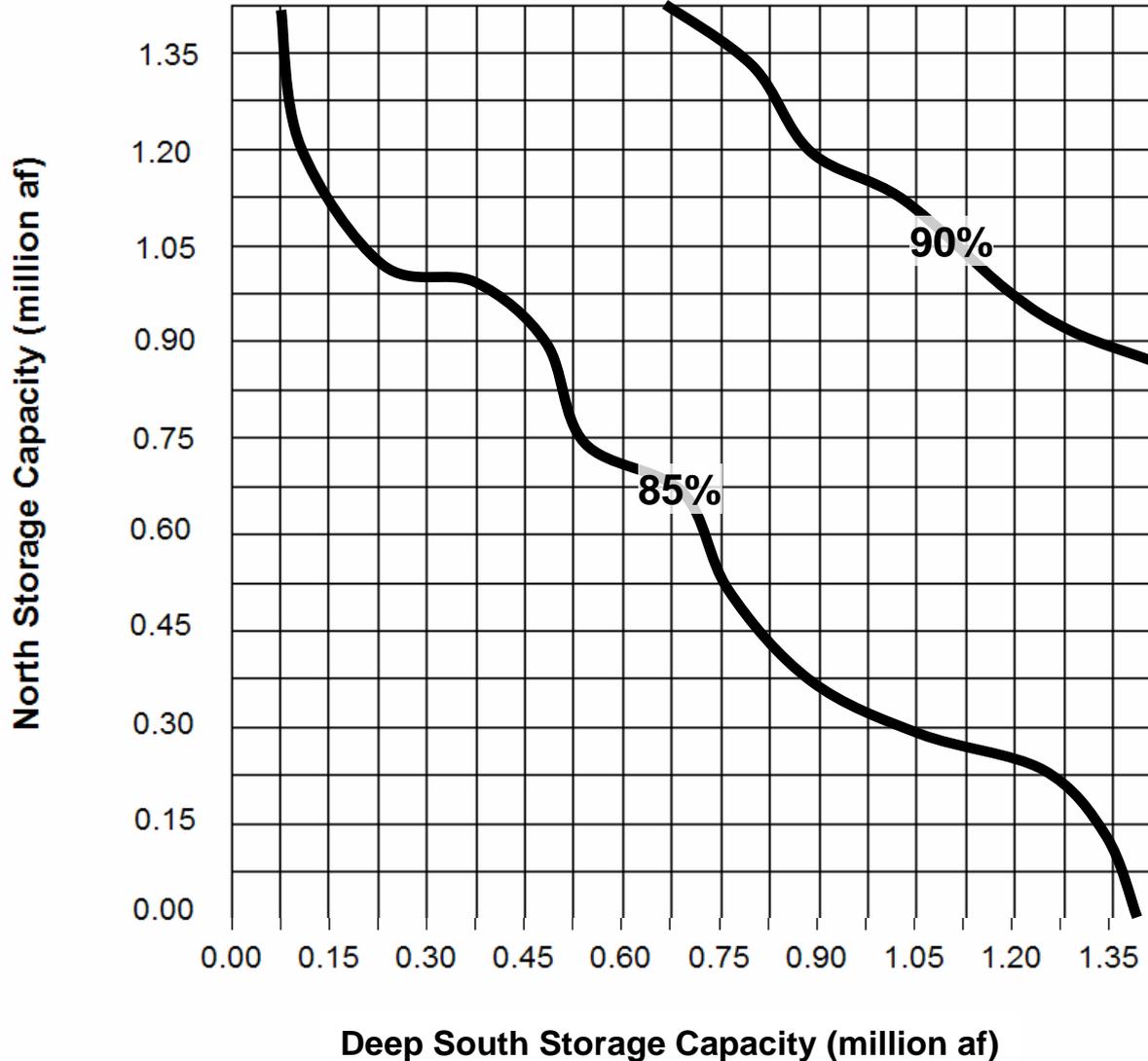


Performance Maps provide guidance for selecting storage size combinations to achieve desired levels of performance.

Results from RESOPS Model simulations of specific configurations will consider more detailed specifications and performance may vary from the general guidance provided here.

*Note:*  
 Each of the 400 points used to create this map represents an optimized operation of the corresponding storage configurations. Approx. 350 RESOPS model simulations were performed for each storage configuration.

### High Lake O Stage Envelope - Standard Score

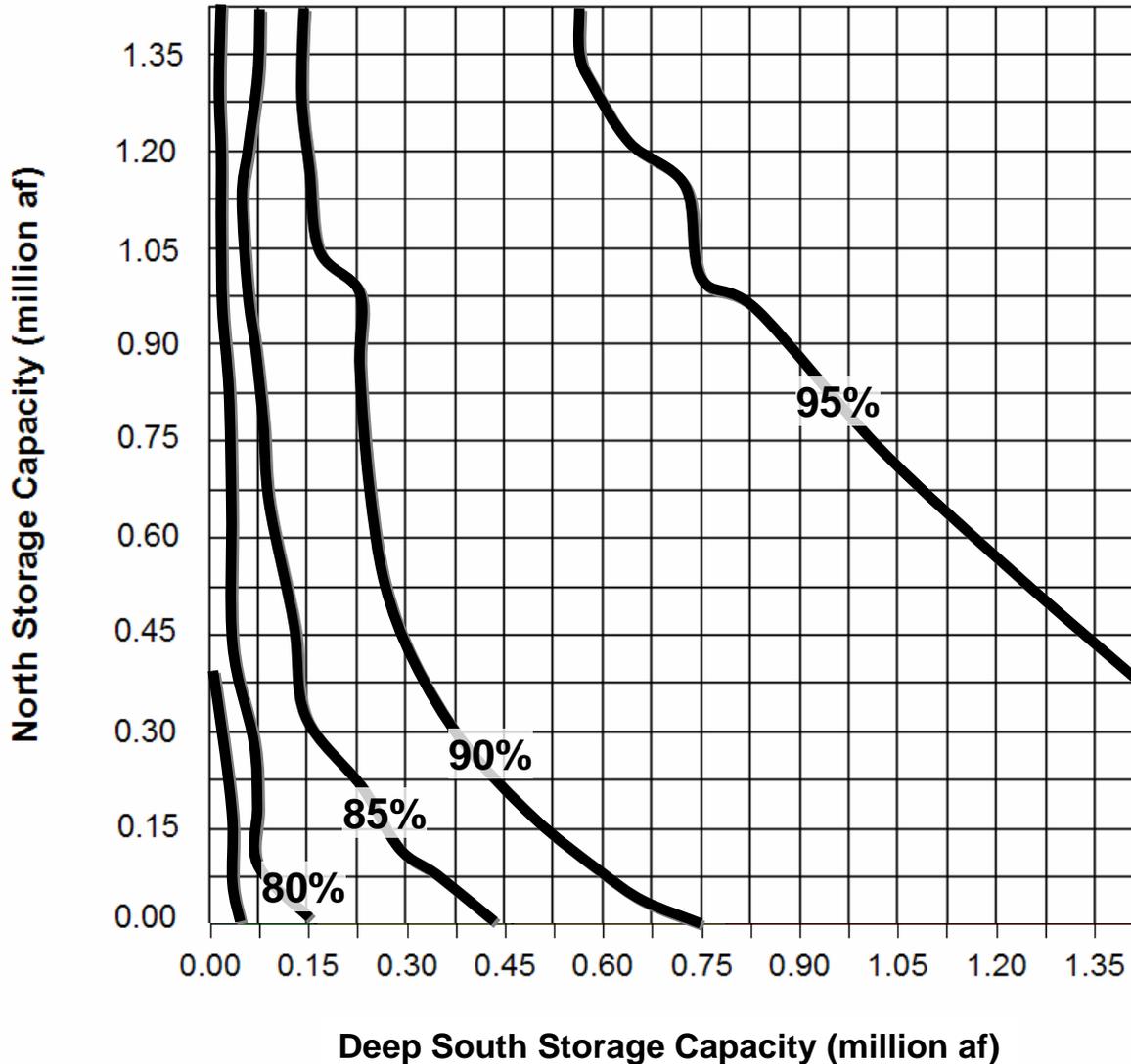


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Everglades Demand Target Delivered – Standard Score



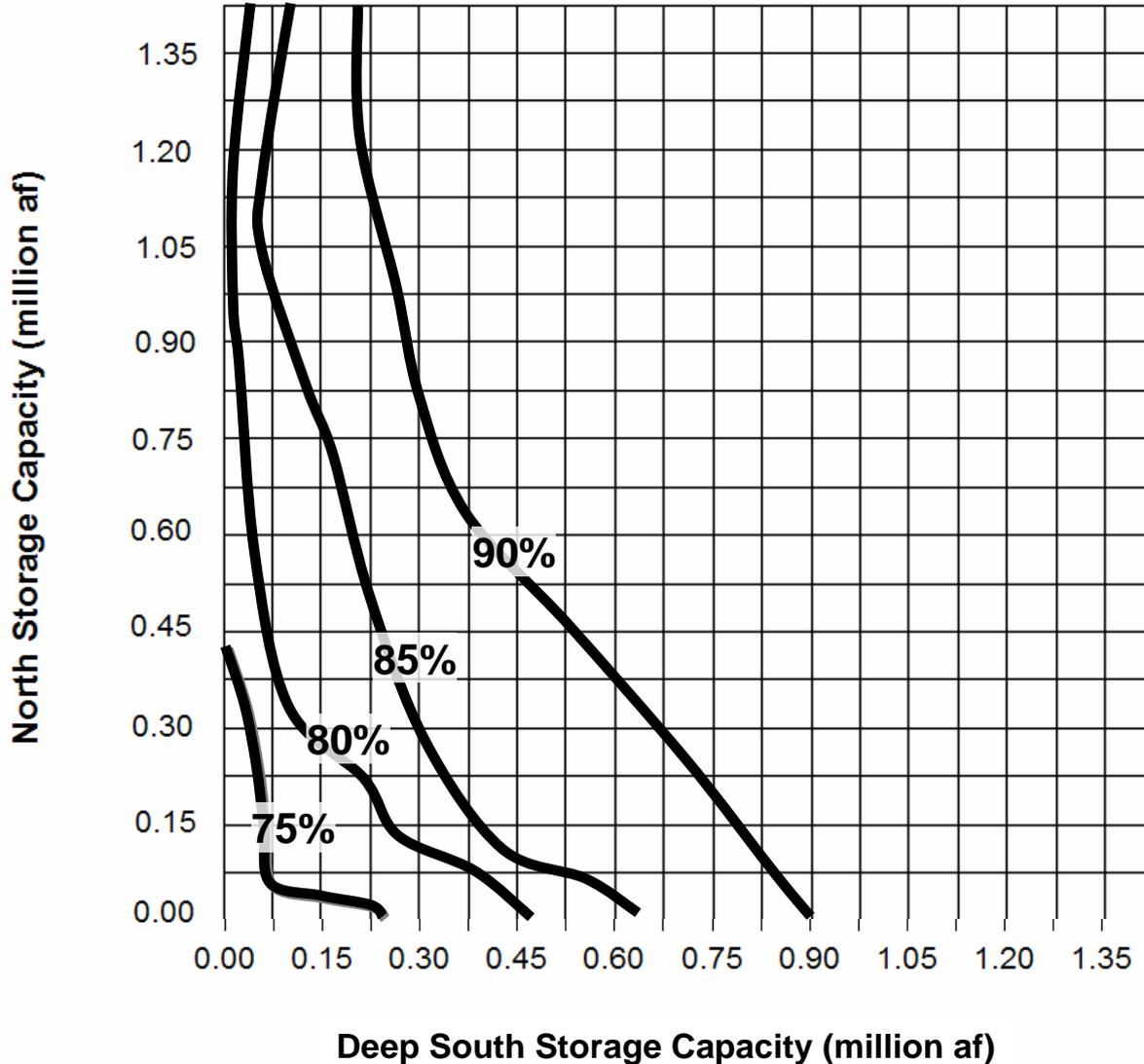
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### Dry Season Everglades Demand Target Delivered – Standard Score

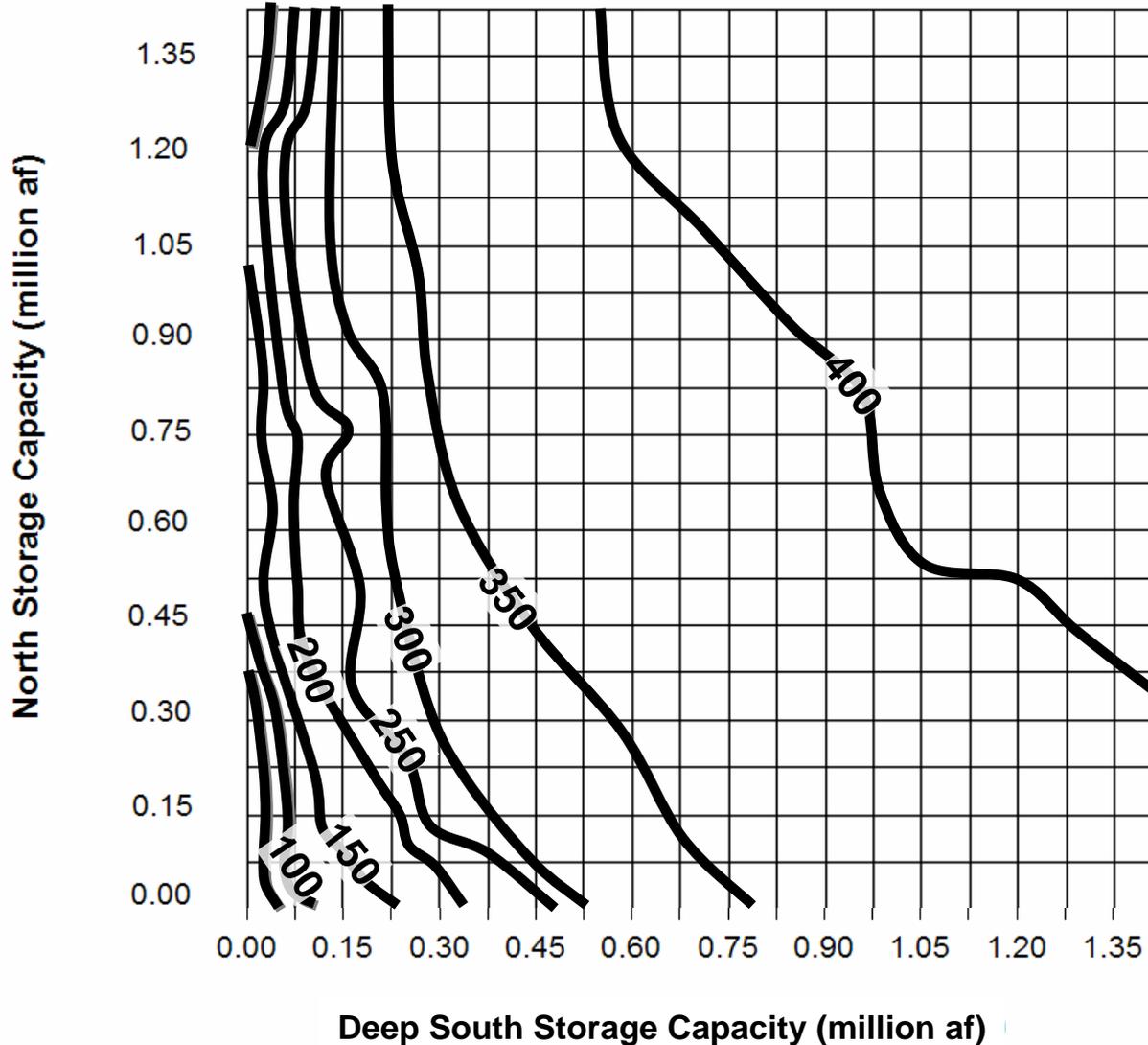


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Increase in Mean Annual Flows to the Everglades (1000 ac-ft/yr)

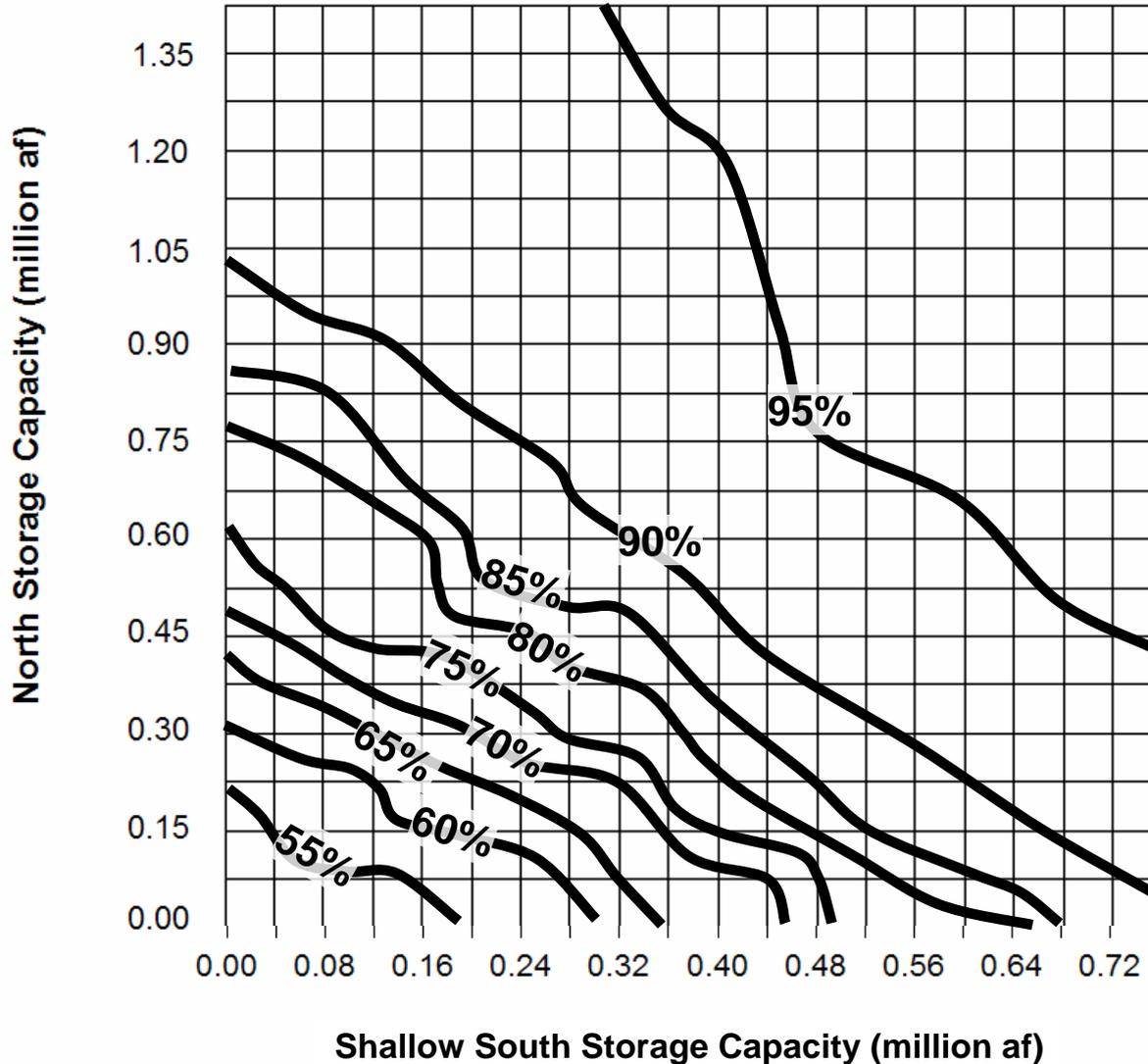


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**% Reduction in Lake-Triggered High Discharges to the Northern Estuaries**

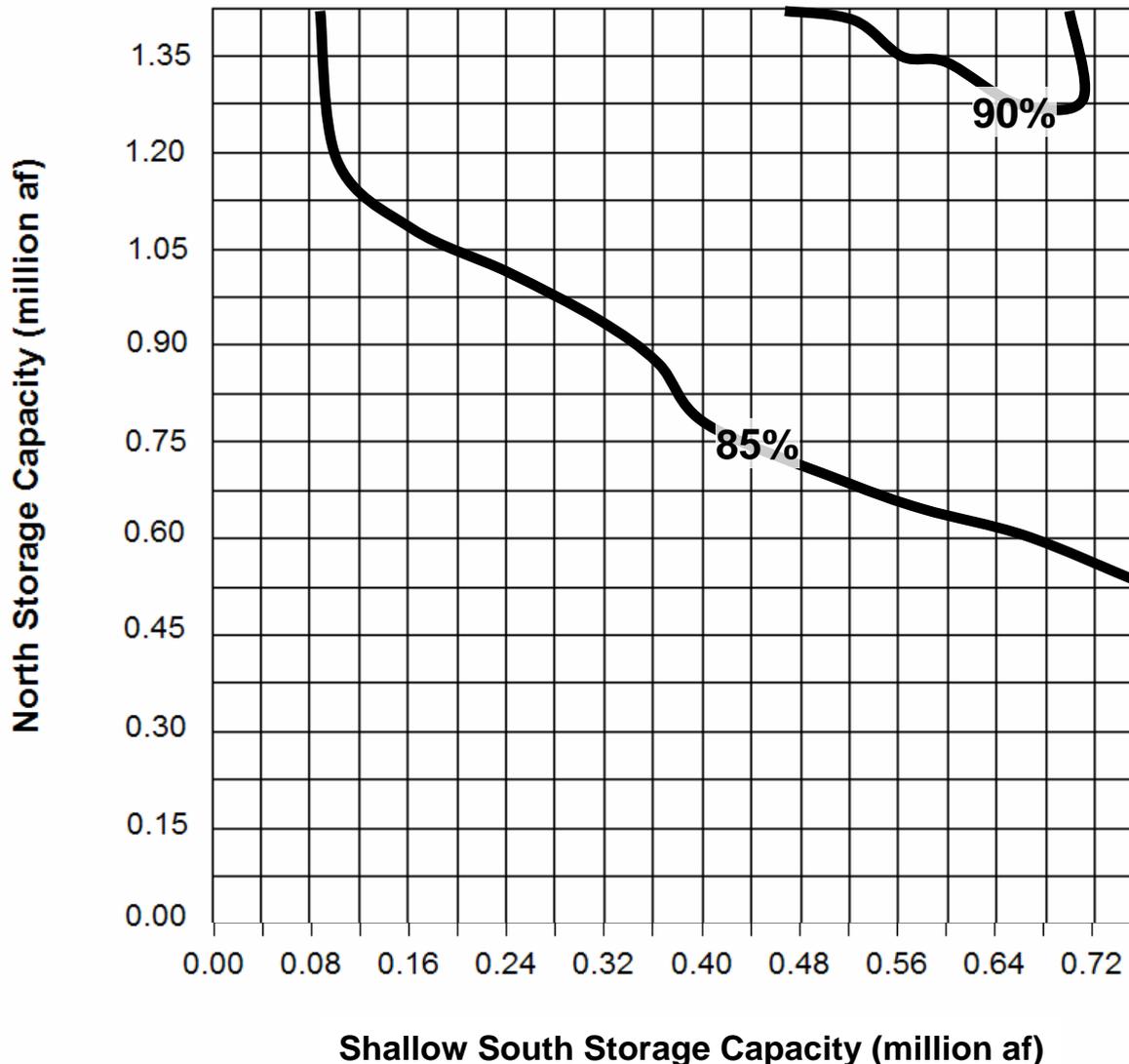


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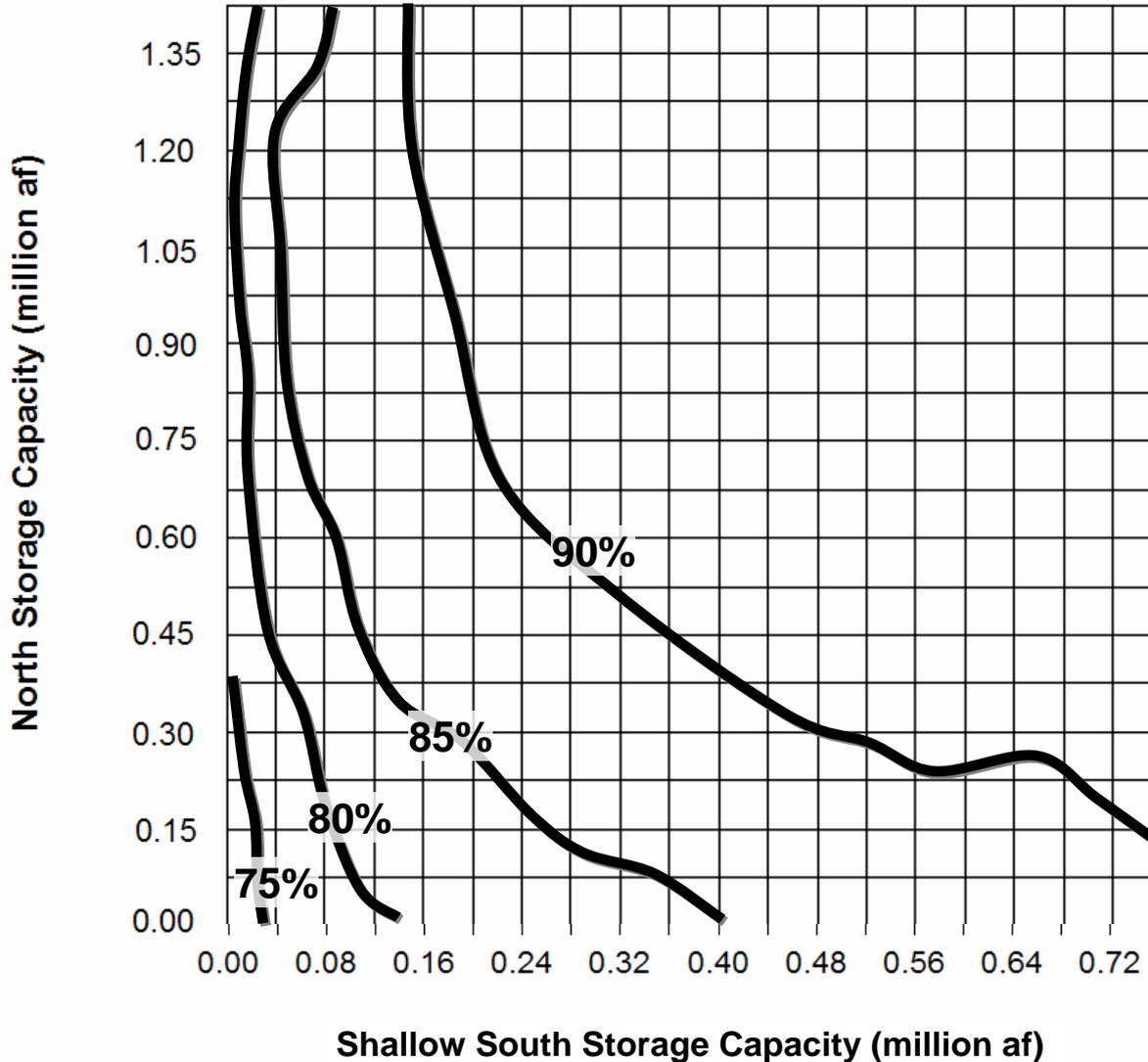


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Everglades Demand Target Delivered – Standard Score

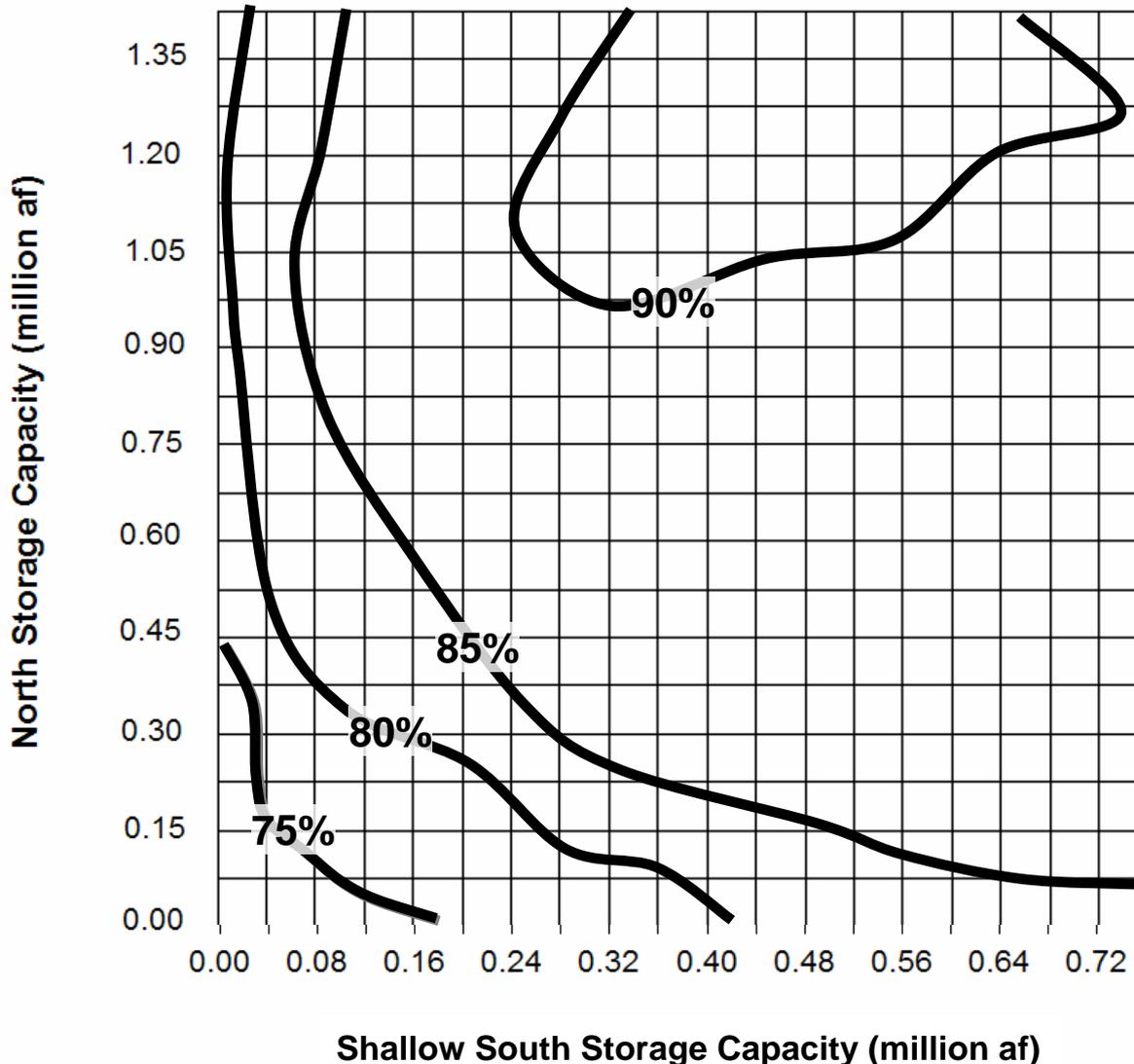


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Dry Season Everglades Demand Target Delivered – Standard Score

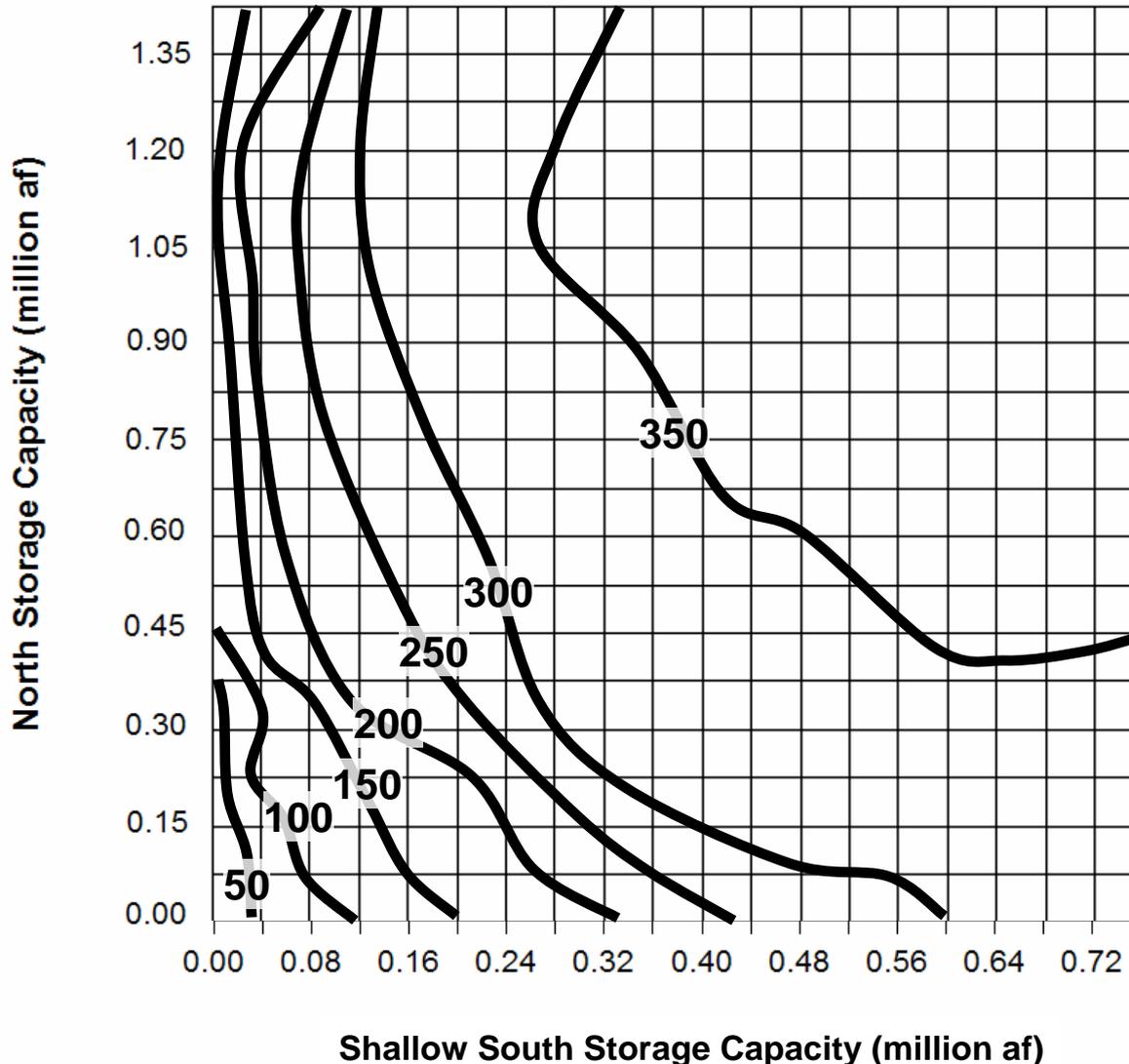


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Increase in Mean Annual Flows to the Everglades (1000 ac-ft/yr)



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# South Treatment Area Sizing

RESTORATION PLANNING

**Preliminary Estimates of Additional Treatment Area.  
Assumes the Reservoir Provides TP Treatment.**

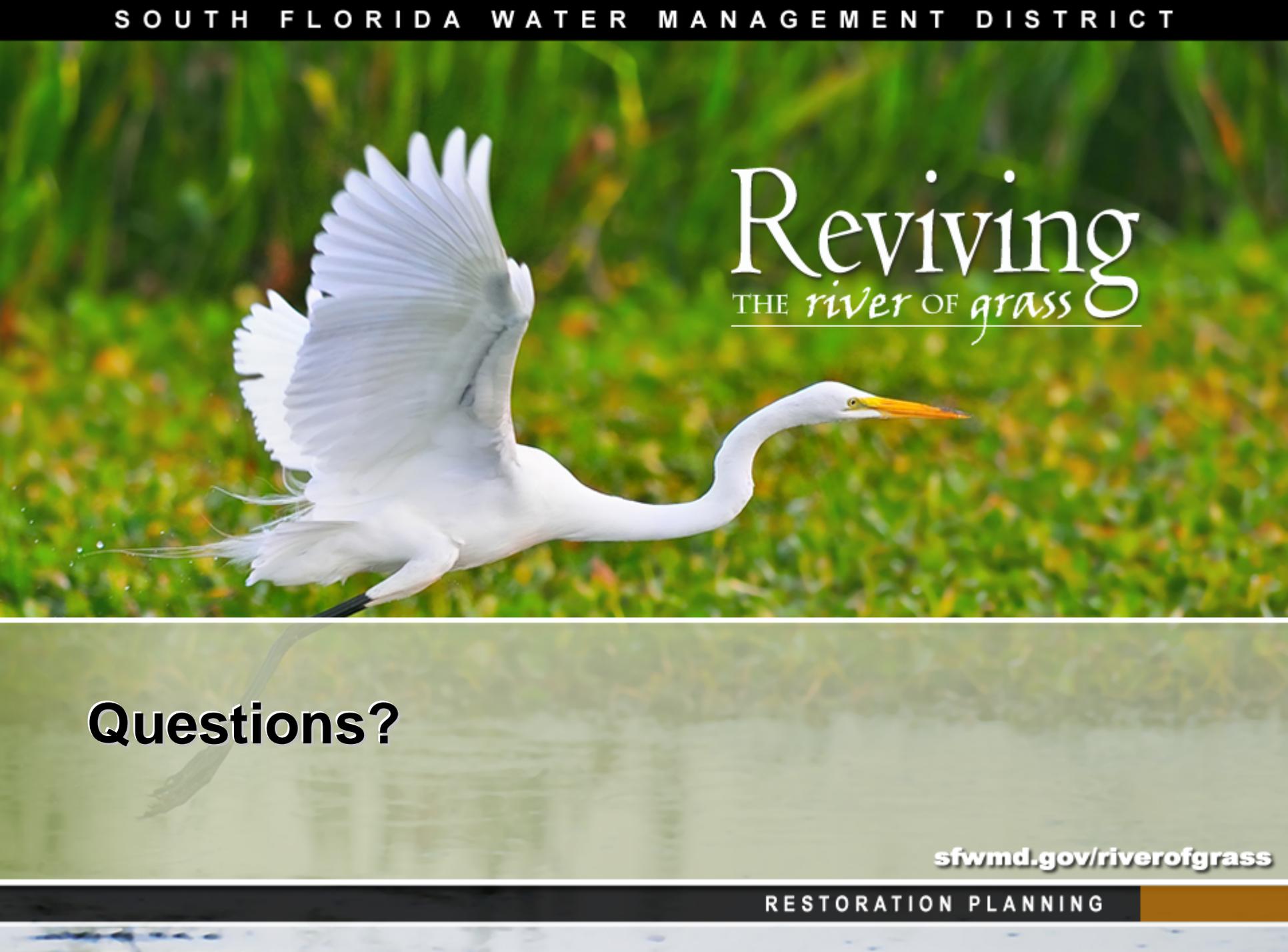
Additional Flow to Everglades (AF/yr)	Preliminary Estimate of Additional Treatment Area (acres)				
	Assumed Lake TP (ppb)				
	40	80	100	150	200
50,000	2,100	3,800	4,600	6,500	8,100
100,000	3,000	5,300	6,400	8,900	11,000
150,000	3,800	6,800	8,200	11,300	13,900
200,000	4,600	8,300	10,000	13,600	16,800
250,000	5,300	9,800	11,700	16,000	19,700
300,000	6,100	11,300	13,500	18,400	22,500
350,000	6,800	12,700	15,300	20,800	25,300
400,000	7,500	14,200	17,100	23,200	28,200
450,000	8,200	15,700	18,800	25,500	31,000
500,000	8,800	17,200	20,600	27,900	33,800

# South Treatment Area Sizing

RESTORATION PLANNING

**Preliminary Estimates of Additional Treatment Area.  
Assumes the Reservoir Provides **NO** TP Treatment.**

Additional Flow to Everglades (AF/yr)	Preliminary Estimate of Additional Treatment Area (acres)				
	Assumed Lake TP (ppb)				
	40	80	100	150	200
50,000	3,700	5,600	6,400	8,400	10,200
100,000	4,700	7,300	8,500	11,300	13,700
150,000	5,700	9,100	10,600	14,100	17,100
200,000	6,600	10,900	12,700	16,900	20,500
250,000	7,500	12,600	14,800	19,700	23,900
300,000	8,400	14,400	16,900	22,500	27,200
350,000	9,300	16,100	19,000	25,300	30,500
400,000	10,200	17,900	21,200	28,100	33,700
450,000	11,000	19,700	23,300	30,800	37,000
500,000	11,900	21,400	25,400	33,600	40,300

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**Questions?**

[sfwmd.gov/riverofgrass](http://sfwmd.gov/riverofgrass)

RESTORATION PLANNING



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## **Configuration Information Continued – Considerations for Developing a Proposed Configuration**

Sue Ray, Chief Engineer, Everglades Engineering

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# Available Resources and Tools

RESTORATION PLANNING

- Vision Statement, Goals, and Phase I Planning Process Scope
- Problems, Objectives, and Constraints Table
- Approaches and Concepts
- RESOPs Performance Measures / Indicators
- RESOPs Performance Maps

Available on the Reviving the River of Grass Website,  
Related Materials - *Restoration Project Planning*

# Proposed Configuration

RESTORATION PLANNING

- Provide level of detail necessary to convey your Concept and the aspects that are important to you
- Entire Configuration evaluated based on ability to achieve goals and cost
- Entire Configuration needs to be functional
- Ability for water to flow from start to finish

# Components of a Proposed Configuration

RESTORATION PLANNING

- Probably more than one component per proposed Configuration
- Each component serves one or more function
  - Storage
  - Treatment
  - Conveyance
- Components are typically interconnected based on functional relationship

# Moving Water – Gravity Flow

RESTORATION PLANNING

- Water flowing downhill to lower elevation
- Requires a structure at water source (e.g. Lake Okeechobee) to regulate amount of flow downstream
  - Structure – Adjustable or Fixed
- To move water to the final destination depends on:
  - Starting Elevation
  - Downstream Topography
  - Frictional Resistance to Flow

# Moving Water – Pumped Flow

RESTORATION PLANNING

- Water flowing uphill to a higher elevation
- Requires a mechanical system with power source (e.g. Pump Station) to lift the water
- If higher elevation sufficient, water can gravity flow to final destination

# Acreage Required

RESTORATION PLANNING

- Component has infrastructure features
  - Roads, Embankments, Seepage Canals
- Assume 10% of acreage is required for infrastructure features of a component
- Example
  - Total Area of a Component = 10,000 acres
  - Acreage Required for Infrastructure Features
    - $10,000 \text{ acres} \times 10\% = 1,000 \text{ acres}$
  - Remaining Acreage Available for Water
    - $10,000 \text{ acres} - 1,000 \text{ acres} = 9,000 \text{ acres}$

# Embankment Heights

RESTORATION PLANNING

- Embankment Height
  - Height above ground elevation
- Water Depths above Ground ~ 2 to 4 Feet
  - Typical embankment height ~ 6 Feet
  - Embankment typically vegetated
- Water Depths above Ground Greater than 4 Feet
  - Typical embankment height ~ 2 times the water depth
  - Embankment typically protected

# Seepage Control

RESTORATION PLANNING

- Configuration can not adversely impact the ground water and surface water levels on adjacent lands
- Maintain water level / Storage capacity
- Reduce other operational controls such as pumping
- Seepage Control Features
  - Seepage Canals, Liners, Cutoff Walls
- Type of seepage control feature based on water depth/site geology combination and costs

# Operational Requirements

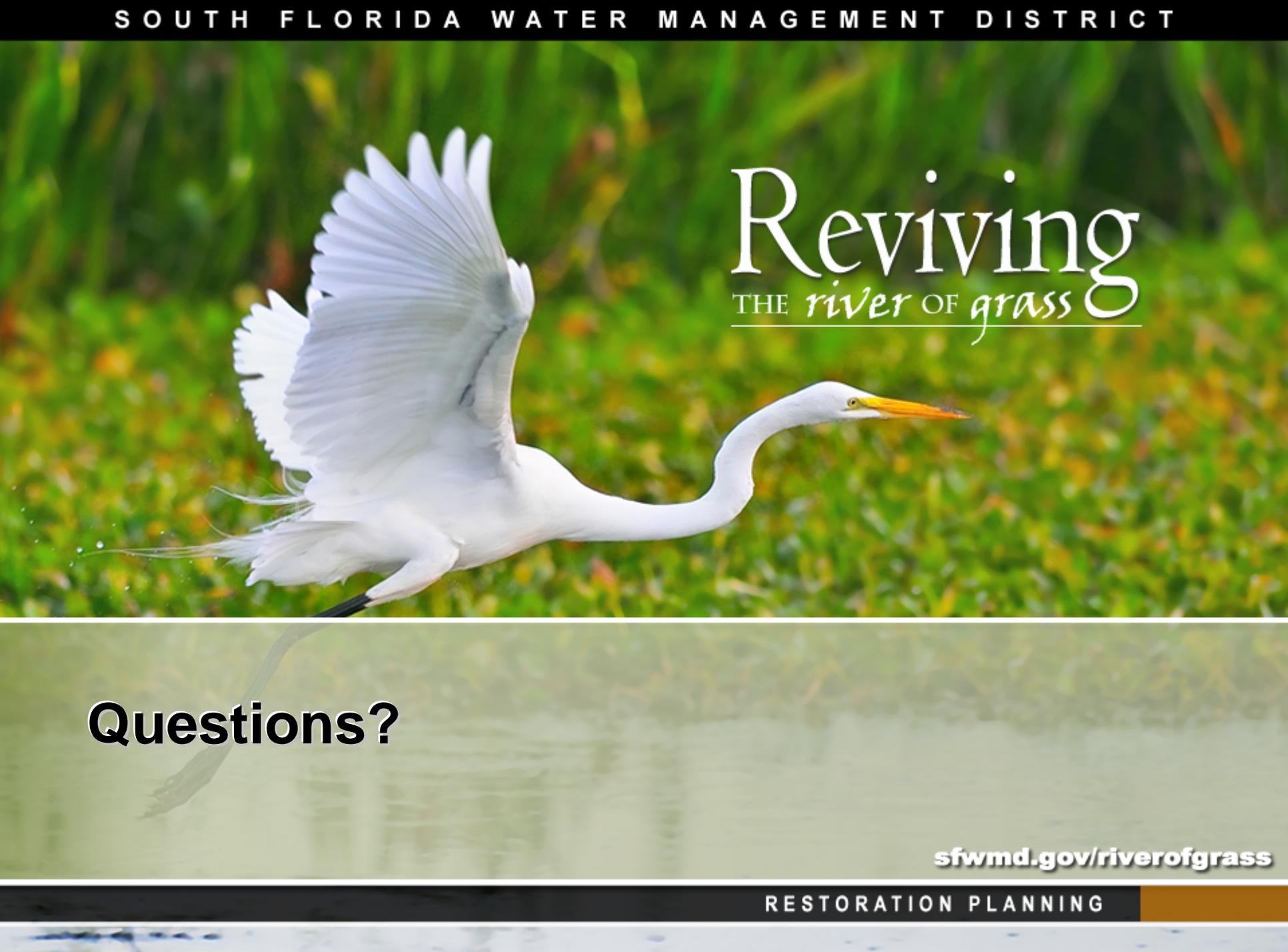
RESTORATION PLANNING

- Examples of operational requirements that could limit ability to achieve benefits
  - Gravity Flow Only from Lake Okeechobee
    - When levels too low to gravity flow, no flow out of Lake Okeechobee to benefit other areas
  - Use only a specific Lake Okeechobee Regulation Schedule
  - No flow from Lake Okeechobee diverted for water supply needs or to storage components north or south of Lake Okeechobee
  - Storage components can not go dry
  - Treatment components can go dry

# Summary Advice

RESTORATION PLANNING

- Provide enough details to convey the intent of your Proposed Configuration and the most important aspects to you
- Specifying requirements not important to you may create unwanted restrictions that limit benefits achieved or undeservedly increase costs

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**Questions?**

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RESTORATION PLANNING



# Reviving

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## Configuration Information Continued - Instructions

Temperince Morgan, River of Grass Project  
Liaison/Northern Everglades Program Implementation  
Manager

[sfwmd.gov/riverofgrass](http://sfwmd.gov/riverofgrass)

# Team Configuration Exercise

RESTORATION PLANNING

- Purpose and Description
- Instructions
- Tentative Schedule
- Available Tools/Reference Materials

# Phase I Planning Process- Scope

RESTORATION PLANNING

- “Determine the range and general location of acreage needed north of the Everglades Protection Area for storing, treating, and delivering the water flows needed to restore the Everglades, while enhancing ecological values in Lake Okeechobee and the northern estuaries.”

# Team Configuration Exercise- Purpose and Description

RESTORATION PLANNING

- **Provide stakeholders with an opportunity to develop Conceptual Configurations** that you believe may best achieve restoration objectives while considering constraints and other relevant factors
  - Utilize information discussed during previous workshops that may be relevant when considering various options for storing, treating, and delivering water

## Purpose and Description (cont.)

RESTORATION PLANNING

- Following the Team Configuration Exercise, Proposed Conceptual Configurations will undergo further assessment and evaluation by SFWMD staff to estimate benefits, costs, and potential economic impacts
- Ultimate intent is to develop a shorter list of viable configurations that can be presented in draft form to the SFWMD WRAC and Governing Board at their June meetings

# Purpose and Description (cont.)

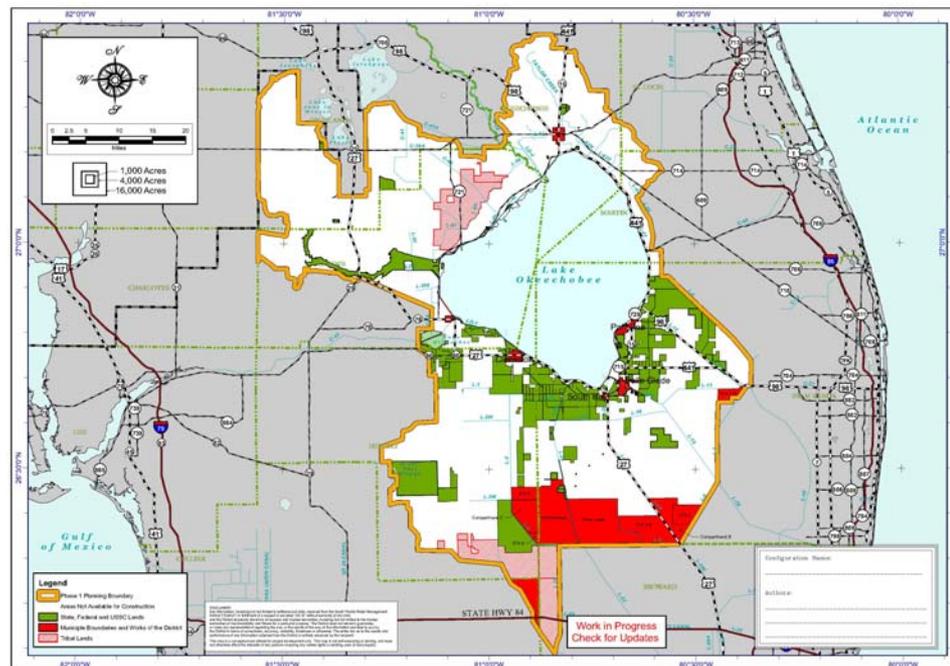
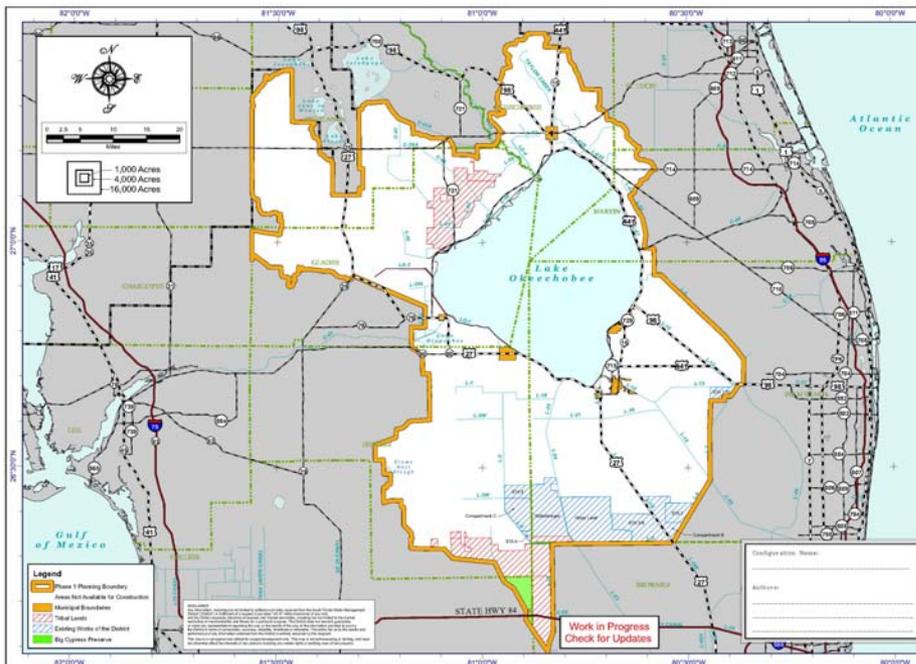
RESTORATION PLANNING

- To that end, we would like to develop the **fewest number of unique concepts/configurations as possible**, so we are asking that you **team up with others and work together to identify a Team Configuration**
- Two days are scheduled for the Team Configuration Exercise
  - March 31<sup>st</sup>- April 1<sup>st</sup>
  - Royal Palm Beach Cultural Center

# Instructions

RESTORATION PLANNING

- Base Maps will be provided for you to draw your proposed configuration



# Instructions (cont.)

RESTORATION PLANNING

- Tables will be set up around the room each with a facilitator, computer, and reference materials for use during this exercise
  - Facilitator - assist with using Google Earth™, the reference materials, and documentation
  - Computer - Google Earth™ with access to map and land information; links to other reference materials
  - Facilitator Packet - map atlas, hydrologic and water quality performance summary maps/tables, cost information, etc. (more detail on this later)

# Instructions (cont.)

RESTORATION PLANNING

- In addition,
  - Wall maps - posted on the walls around the room for easy viewing
  - Reference library - hard copies of reference documents
  - Staff Floaters -
    - General facilitation/questions
    - Technical expertise - modeling, water quality, engineering, economic impacts, costs

# Instructions (cont.)

RESTORATION PLANNING

## ■ Team Configurations-

- As we approach the end of the Phase I Planning Process, we will need to reduce the range of possible configurations into a shorter list of viable configurations that best achieve restoration objectives while considering constraints and other relevant factors
- Therefore, we would like to develop the fewest number of unique concepts/configurations as possible
- Hence, we are asking you to team up with others and work together to identify a **TEAM CONFIGURATION** that reflects your collective approach/ideas

# Instructions (cont.)

RESTORATION PLANNING

- Team Configurations (continued)-
  - If a group is able to develop a Team Configuration, but there are a few areas of disagreement or minor differences, you can note these differences and they will be considered during the assessment and evaluation process
  - Each team will need to identify a TEAM SPOKESPERSON to-
    - Report back to the larger group regarding your Team Configuration
    - Answer questions posed by District staff during the evaluation

# Instructions (cont.)

RESTORATION PLANNING

- Documentation for each Proposed Conceptual Configuration is needed to ensure each configuration is assessed uniformly and consistent with the information you provided
  - SFWMD staff will need to fully understand intent and aspects that are most important to you
  - Critical pieces of information will be necessary to complete the assessments
  - Facilitator will assist with completing forms

# Instructions (cont.)

## ■ Documentation-

- Facilities Symbols Key- provides consistent symbol for each facility type so that configuration drawings are legible, consistent, and easy to follow
- Forms –
  - 1 - Summary Sheet of Proposed Configuration including configuration name, team members, spokesperson and general configuration description
  - 2 - Summary Sheet identifying various components of the configuration
  - 3-5 - Provides additional detail for each storage, treatment, or conveyance feature as needed to complete assessment
  - 6 - Identifies infrastructure and other potential impacts that might result from the proposed configuration

# Instructions- Summary

RESTORATION PLANNING

- **Develop Team Configuration-** Work as a team(s) to develop a proposed Team Configuration for evaluation
  - Utilize the reference materials provided to assist with development of configuration
  - Utilize the information in the forms to generate discussion regarding what aspects of the configuration are most important to the team/authors
    - e.g., feature type, location, or operations
  - Facilitator can assist with reference materials and forms/documentation
  - Identify Team Spokesperson

# Instructions- Summary (cont.)

## ■ Draw final sketch

- Utilize the 11"x17" base maps for sketching/drafting configurations
- Once team has developed the proposed configuration, draw a final sketch of the configuration on the table-top base map (2'x3')
  - Using the symbols key
  - Labeling the features per Form 2

# Instructions- Summary (cont.)

## ■ Complete the documentation

- Assistance from the facilitator
- Focus on communicating the aspects of the configuration that are most significant/important to the team/authors
  - Accuracy regarding intent
  - Example -
    - Sizing- team could prefer that a feature is sized to
      - Achieve a particular outcome (eliminate discharges to the estuary)
      - To fit on a particular location/set of parcels
      - To achieve a specific amount of storage at a certain depth

# Tentative Schedule (March 31<sup>st</sup>- April 1<sup>st</sup>)

RESTORATION PLANNING

- March 31<sup>st</sup>
  - Follow-Up on Configuration Information
    - Hydrologic Modeling Performance Summary Maps
    - Considerations for Developing a Proposed Configuration
    - Overview of Instructions for Team Configuration Exercise
  - Team Configuration Exercise
- April 1<sup>st</sup>
  - Continuation of Team Configuration Exercise (if necessary)
  - Team Presentations
  - Group Discussion

# Available Tools/Reference Materials

RESTORATION PLANNING

- River of Grass Vision Statement and Goals
- Problems, Objectives, and Constraints Table
- List of RESOPS Performance Measures/Indicators
- Map Index- Google Earth, Wall Maps, Map Atlas
- Hydrologic and Water Quality Summary Maps/Graphics
- March 20 Presentation which includes Configuration Information
- On-site and web library available
- Staff- facilitators and floaters



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## Next Meeting/Future Meeting Topics

Temperince Morgan, River of Grass Project Liaison/Northern Everglades Program Implementation Manager

[sfwmd.gov/riverofgrass](http://sfwmd.gov/riverofgrass)

# Next Meeting- Date and Location

RESTORATION PLANNING

## Next WRAC Issues Workshop

**April 16-17, 2009**

**SFWMD  
Lower West Coast Service Center  
2301 MacGregor Blvd  
Ft. Myers, FL  
10:00 a.m. – 4:00 p.m.**

# Next Meeting- Meeting Topics

RESTORATION PLANNING

## Meeting Topics

- Group Configuration Results
  - Modeling results
  - Benefits information
  - Initial cost estimates

# Phase I Planning

## Future Meetings and Topics

RESTORATION PLANNING

### Future Meetings

(10:00 a.m. – 4:00 p.m.)

- May 6, PB County Fire & Rescue Dept., Herman W. Brice Training Complex, West Palm Beach
- May 19, John Boy Auditorium, Clewiston, FL

### Future Meeting Topics

- Modified Group configurations
  - Modeling Results
  - Benefits Information
  - Cost Estimates
- Short List Configurations
- SFWMD Configurations
- Presentations and Topics as Identified by Participants

# Phase I Planning

## www.sfwmd.gov/riverofgrass



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- ☞ Kissimmee
- ☞ Lake Okeechobee
- ☞ Everglades
- ☞ Coastal Areas

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### Restoration Project Planning

On December 16, 2008, the South Florida Water Management District Governing Board voted to accept a contract with the United States Sugar Corporation to acquire more than 180,000 acres of agricultural land for Everglades restoration. This historic transaction provides water managers with the unprecedented opportunity to store and treat water on a scale never before envisioned for the benefit of America's Everglades, Lake Okeechobee and the St. Lucie and Caloosahatchee rivers and estuaries.

With full public involvement, the first phase of *River of Grass* restoration project planning is under way. Through a series of [Water Resources Advisory Commission](#) Issues Workshops, the Phase 1 planning process will determine viable configurations for constructing a managed system of water storage and treatment to support ecosystem restoration efforts.

Informa  
decision  
planning

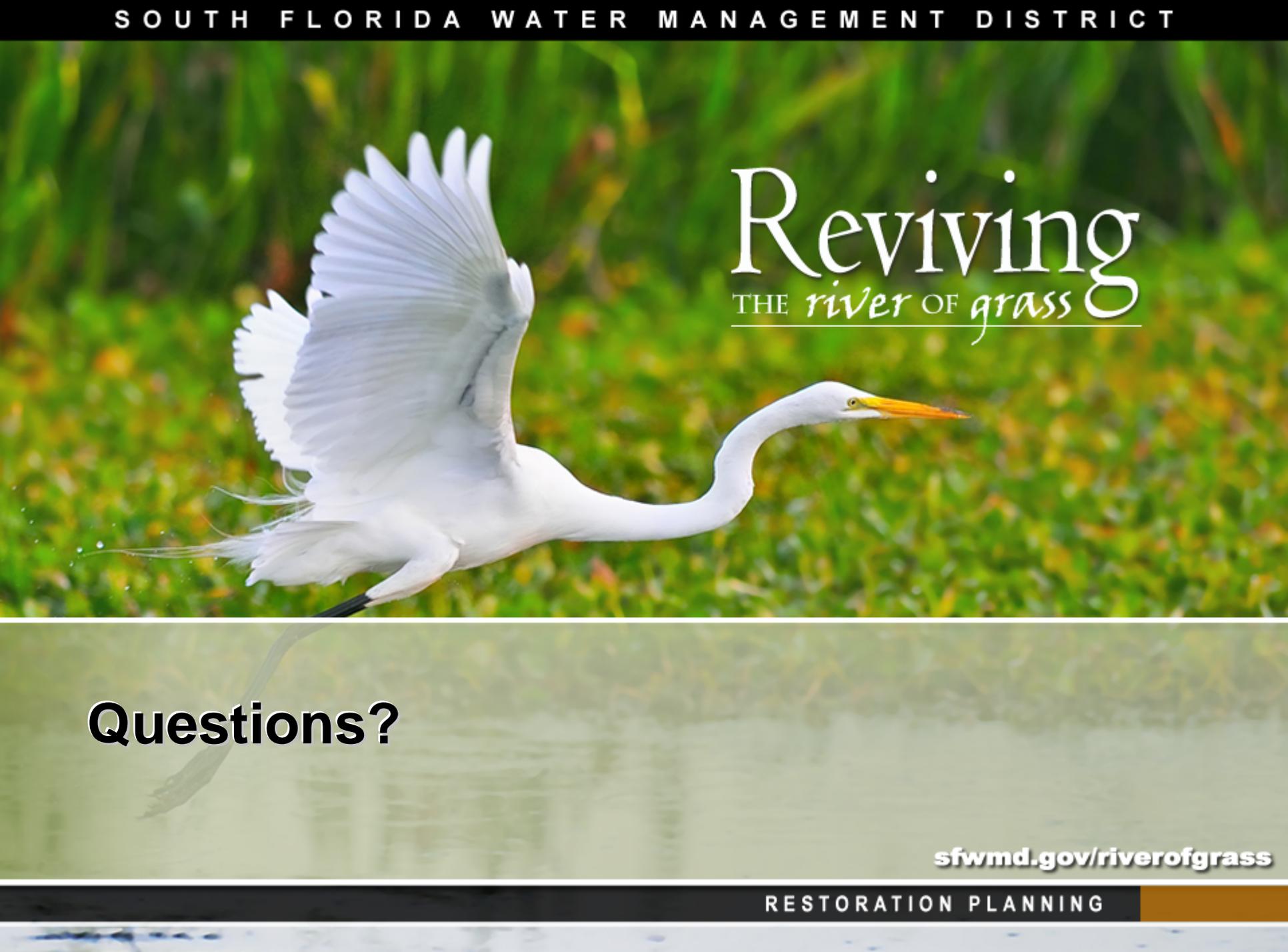
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#### RELATED MATERIALS

- ☞ [Public Workshops: Dates, Agendas, Presentations, Minutes](#)
- ☞ [News, Fact Sheets, Public Information](#)
- ☞ [Reservoir Sizing and Operations Screening \(RESOPS\) Model](#)



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