



# ASR Update

South Florida Ecosystem Restoration Task Force Meeting

September 20, 2006

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



# Presentation Objectives

- Provide an update on the CERP Aquifer Storage and Recovery Pilot Projects
- Provide an update on the CERP ASR Regional Study
- Present other ASR and deep well projects and issues



# Implementation Strategy



**CERP ASR PROGRAM**

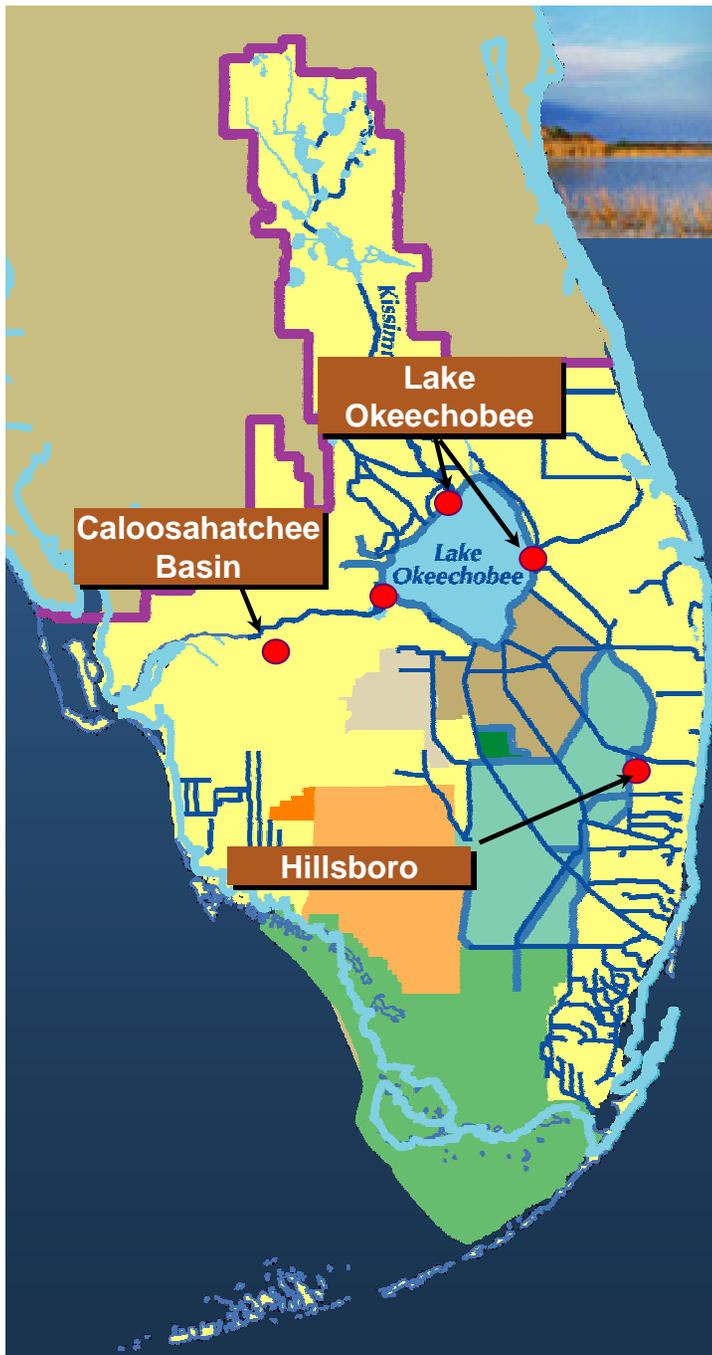


**Regional Study**



**Pilot Projects**

# Five ASR pilot sites were originally to be tested



| <u>Pilot Project Sites</u> | <u>ASR Wells</u> |
|----------------------------|------------------|
| Caloosahatchee River       | 1                |
| Kissimmee River*           | 1                |
| Moore Haven                | 1                |
| Port Mayaca*               | 3                |
| Hillsboro                  | 1                |

*\*Part of the Lake Okeechobee Pilot Project*



# Lake O and Hillsboro Pilots are starting construction !

- Hillsboro construction contract awarded in December 2005
  - Zoning issue delayed construction until August 2006 with completion in February 2007
  
- Kissimmee River construction initiated in July 2006
  - Completion planned in August 2007



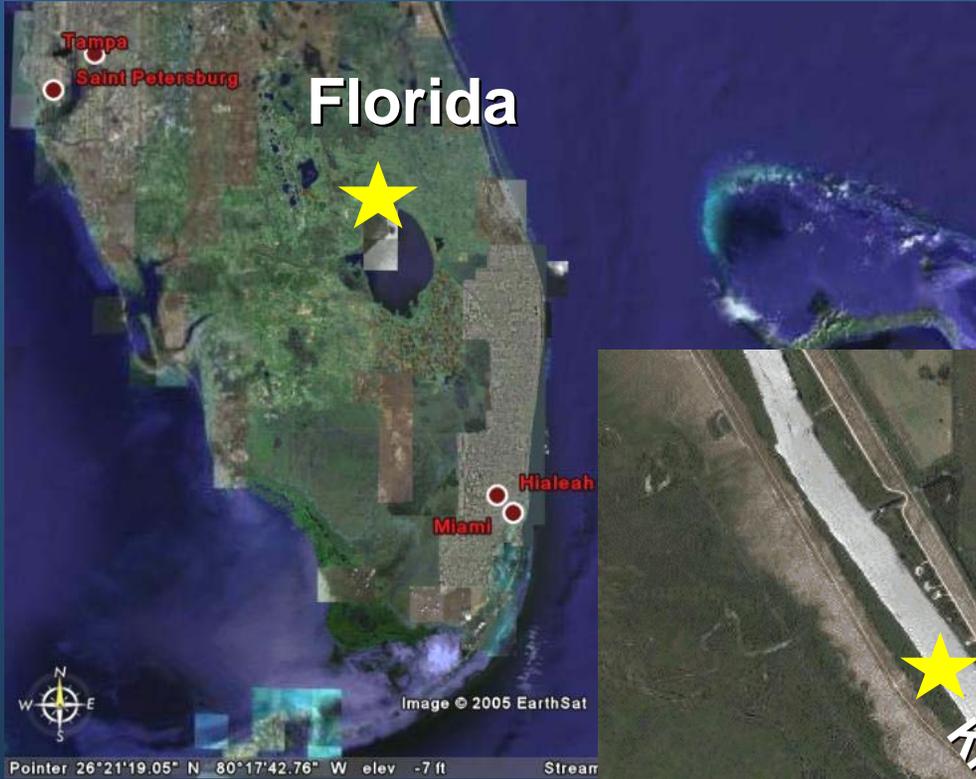
# Hillsboro ASR Pilot Project







# Kissimmee River Pilot Project





# Kissimmee River Site Plan





# The Other Pilots

- Port Mayaca multi-well system slated for construction in FY 2007 – may be delayed
  - Need UIC permit
- Caloosahatchee River – QRB directed explorations may be delayed until 2008
  - Sand and unstable formation encountered at exploratory well at Berry Groves

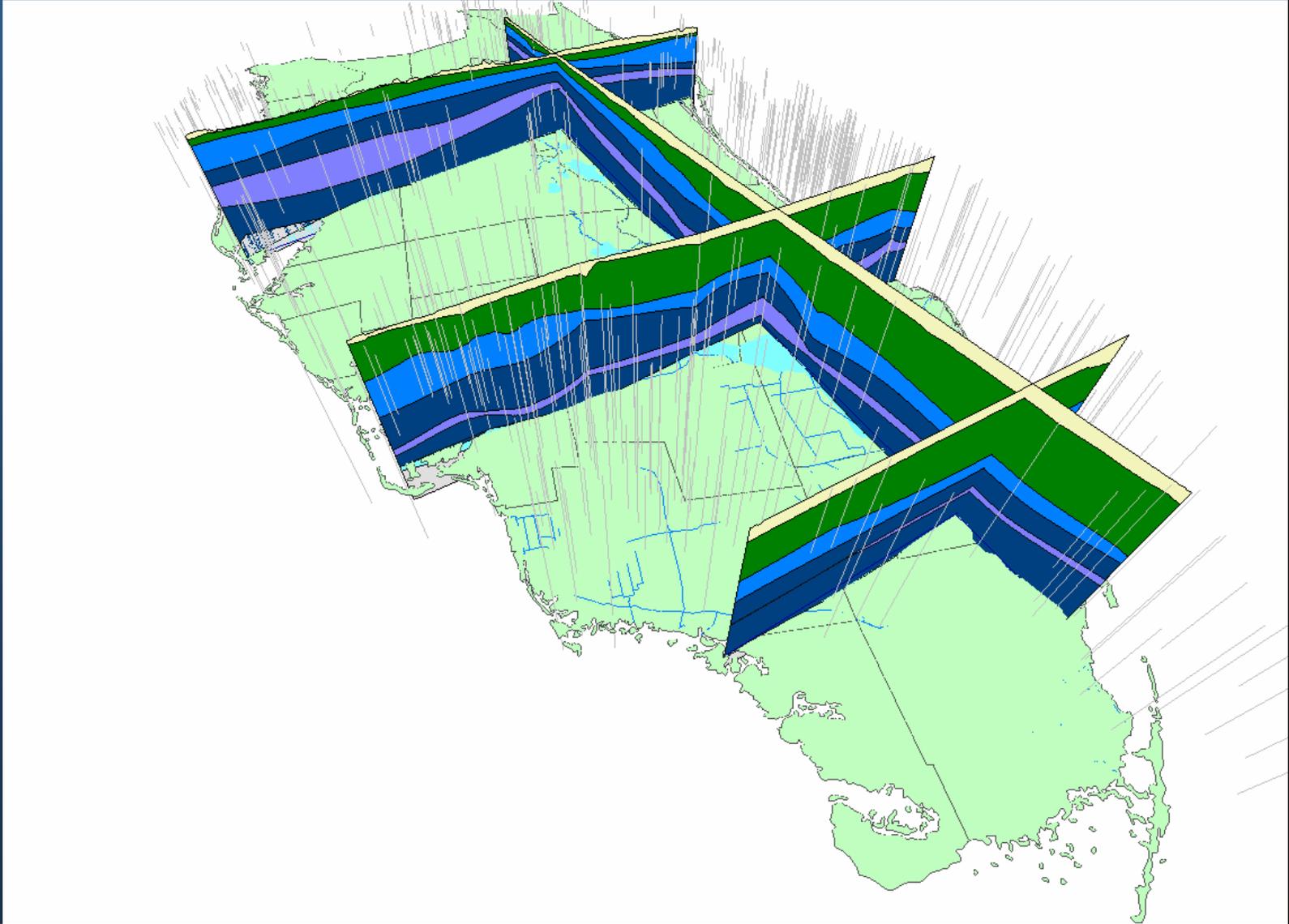


# ASR Regional Study

## Completed Tasks

- Hydrogeologic framework - USGS
- Water quality and literature databases
- Evaluation of pressure-induced changes
- Geophysical evaluations
- Well siting study
- Phase 1 Ecotoxicology
- Geochemical evaluation existing systems

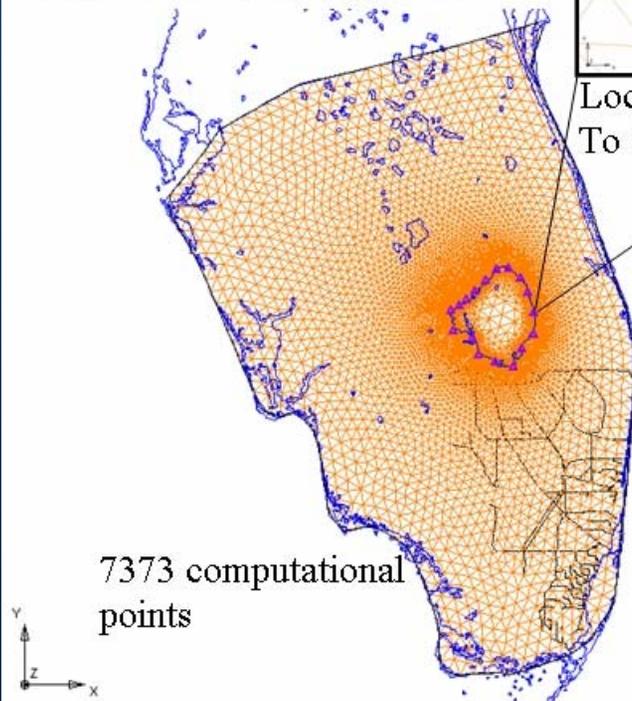
# Integrated Regional Correlation



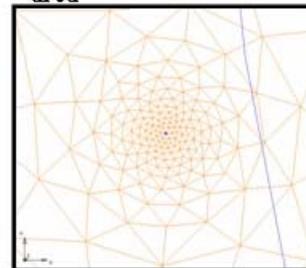
# Groundwater Modeling

## Three Scales of Model Resolution

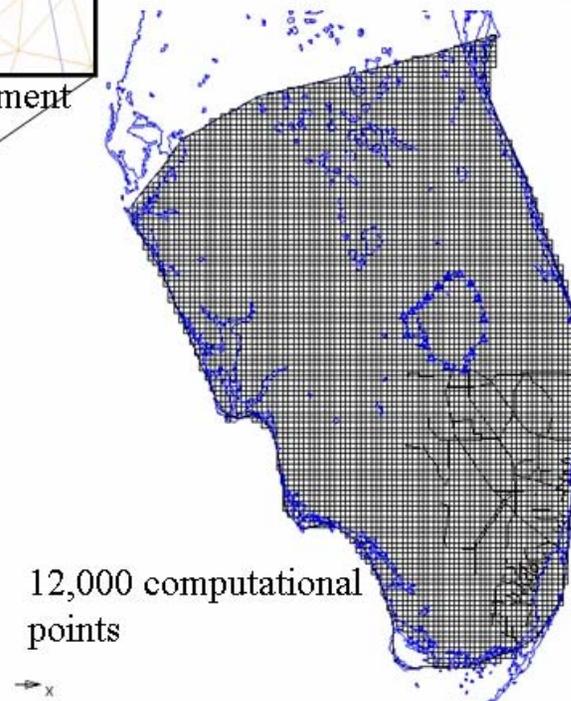
Variable density Mesh  
1,000 ft to 25,000 ft



100,000 calculation  
Points in County-sized  
area



Constant Grid  
10,000 ft X 10,000 ft





# Ecological and Environmental Studies

- **Baseline ecological assessment**
- **Bioaccumulation studies**
- **Mercury Methylation studies**
- **Lake O water quality model simulations**
- **Ecotoxicologic effects of source and recovered water**
- **Mesocosms (during cycle testing)**



# Project Expenditures to Date

| Project              | USACE Costs<br>(\$M est) | SFWMD Costs<br>(\$M est) | Total         | Original Scheduled Budget<br>(thru FY06) |
|----------------------|--------------------------|--------------------------|---------------|------------------------------------------|
| Caloosahatchee Pilot | \$1.2                    | \$2.0                    | \$3.2         | \$4.6                                    |
| Hillsboro Pilot      | \$1.6                    | \$2.3                    | \$3.9         | \$12.8                                   |
| Lake O Pilot         | \$6.7                    | \$4.3                    | \$11.0        | \$23.0                                   |
| Regional ASR Study   | \$7.4                    | \$4.7                    | \$12.1        | \$34.2                                   |
| <b>Totals</b>        | <b>\$16.9</b>            | <b>\$13.3</b>            | <b>\$30.2</b> | <b>\$74.6</b>                            |

| CERP ASR Program Report Card                                                        | Schedule        | Progress Addressing Issue (%) |      |      |      |      |      |      |      |      |      |
|-------------------------------------------------------------------------------------|-----------------|-------------------------------|------|------|------|------|------|------|------|------|------|
| Issue Team Items - 1999                                                             |                 | 10                            | 20   | 30   | 40   | 50   | 60   | 70   | 80   | 90   | 100  |
| 1. Characterize the Quality/Suitability/Variability of Source Waters                | On Schedule     | Grey                          | Grey | Grey | Grey | Grey | Grey | Grey | Grey | Blue | Blue |
| 2. Characterize the Regional Hydrogeology and Water Quality of the Floridan Aquifer | Behind Schedule | Grey                          | Grey | Grey | Grey | Grey | Blue | Blue | Blue | Blue | Blue |
| 3. Analysis of Critical Pressure for Rock Fracturing                                | On Schedule     | Grey                          | Grey | Grey | Grey | Grey | Grey | Grey | Grey | Grey | Blue |
| 4. Analysis of Site and Regional Changes in Head and Flow Patterns                  | Behind Schedule | Grey                          | Grey | Blue |
| 5. Analysis of Water Quality Changes during Movement and Storage                    | Behind Schedule | Grey                          | Grey | Grey | Grey | Blue | Blue | Blue | Blue | Blue | Blue |
| 6. Potential Effects on Mercury Bioaccumulation                                     | On Schedule     | Grey                          | Blue |
| 7. Relationship between Storage Zone Properties, Recovery Rates and Recharge Volume | Behind Schedule | Grey                          | Grey | Grey | Blue |





# CERP ASR Program Report Card

| CERP ASR Program Report Card                                                        | Schedule | Progress Addressing Issue (%) |    |    |    |    |    |    |    |    |     |  |
|-------------------------------------------------------------------------------------|----------|-------------------------------|----|----|----|----|----|----|----|----|-----|--|
| CROGEE Recommendations- 2002                                                        |          | 10                            | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |
| 1. Increase number of monitor wells at pilot sites and expanded cycle test duration | █        | █                             | █  | █  |    |    |    |    |    |    |     |  |
| 2. Increased emphasis on geochemical reactions                                      | █        | █                             | █  |    |    |    |    |    |    |    |     |  |
| 3. Community and ecosystem-level ecological effect analysis                         | █        | █                             | █  |    |    |    |    |    |    |    |     |  |
| 4. Extended duration of bioassay testing and biological impact monitoring           | █        |                               |    |    |    |    |    |    |    |    |     |  |
| 5. Expanded Ecosystem Modeling                                                      | █        |                               |    |    |    |    |    |    |    |    |     |  |



# Schedule for CERP ASR Project Completion

Calendar Year

2007

2008

2009

2010

2011

Cycle Testing

Report

Other Pilots and Regional Study

Where does CERP ASR go from here?

Cycle Testing

Report

Other Pilots and Regional Study

Where does CERP ASR go from here?



# **LOER Subsurface Projects**

- **Reactivation of Taylor Creek ASR System**
- **Pilot ASR Study at the Seminole Brighton Reservation**
- **Construct a 10-well ASR System**
- **Deep Injection/Recharge Well Feasibility Study**



# Issues

- **Competing uses – ASR vs. Supply Wells**
- **Funding restrictions = project delays**
- **Arsenic**
  - Drinking water standard now 10 ppb
  - Appears to be caused by dissolution of minerals in limestone
  - Generally decreases over several cycles
  - We can add a treatment process if we have to



**Questions?**