

# Drought Issues and Challenges in South Florida 2006-2007



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South Florida Water Management District  
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# Challenges of Drought Management



- You don't know it's coming
- You don't know when it's going to be over
- You can't make it rain
- Impacts go on and on and on.....
- Options are limited
- Every decision is subject to Monday morning quarterbacking

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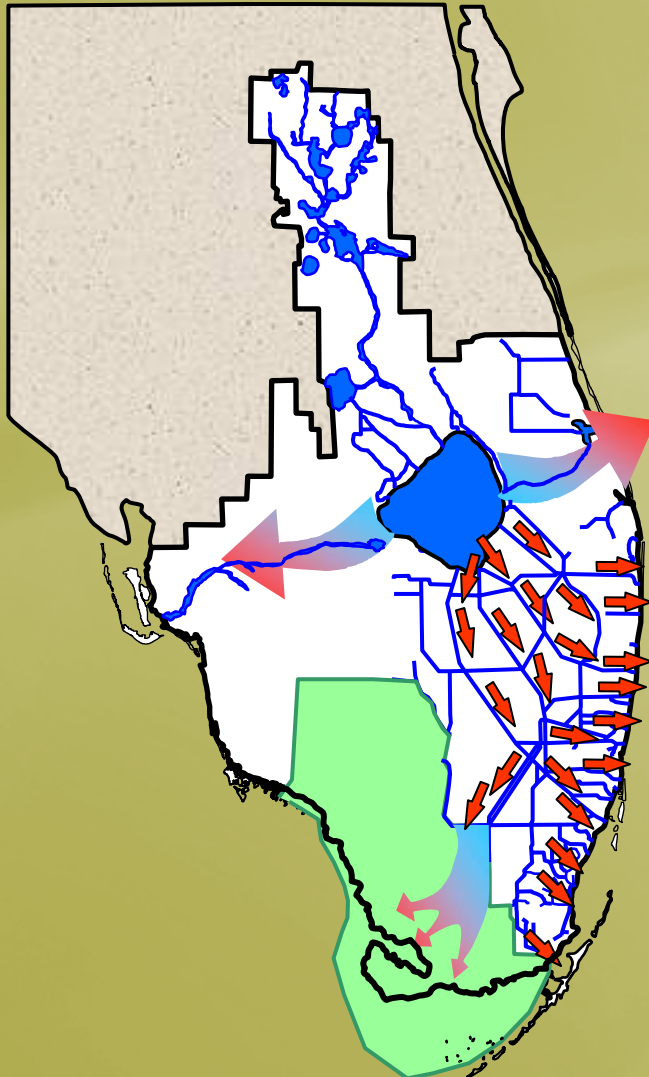


# Key Management Options

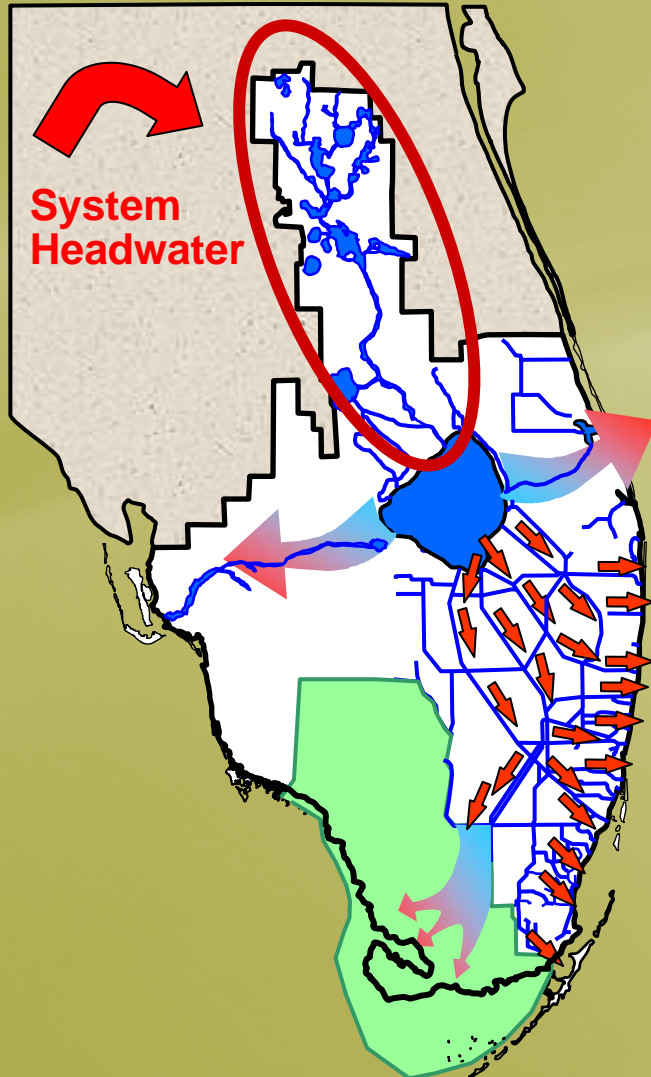


- **Prioritizing regional system operations**
- **Deviations from ACOE regulation schedules**
- **Water restrictions**
- **Enforcement**
- **Utility Operations – AWS/shift pumpage**
- **Reclaimed water for recharge**
- **Stormwater recharge**
- **Agricultural water deliveries & cutbacks**
- **Golf course cut-backs**
- **Environmental enhancement opportunities**

# Lake Okeechobee: Heart of the Regional System

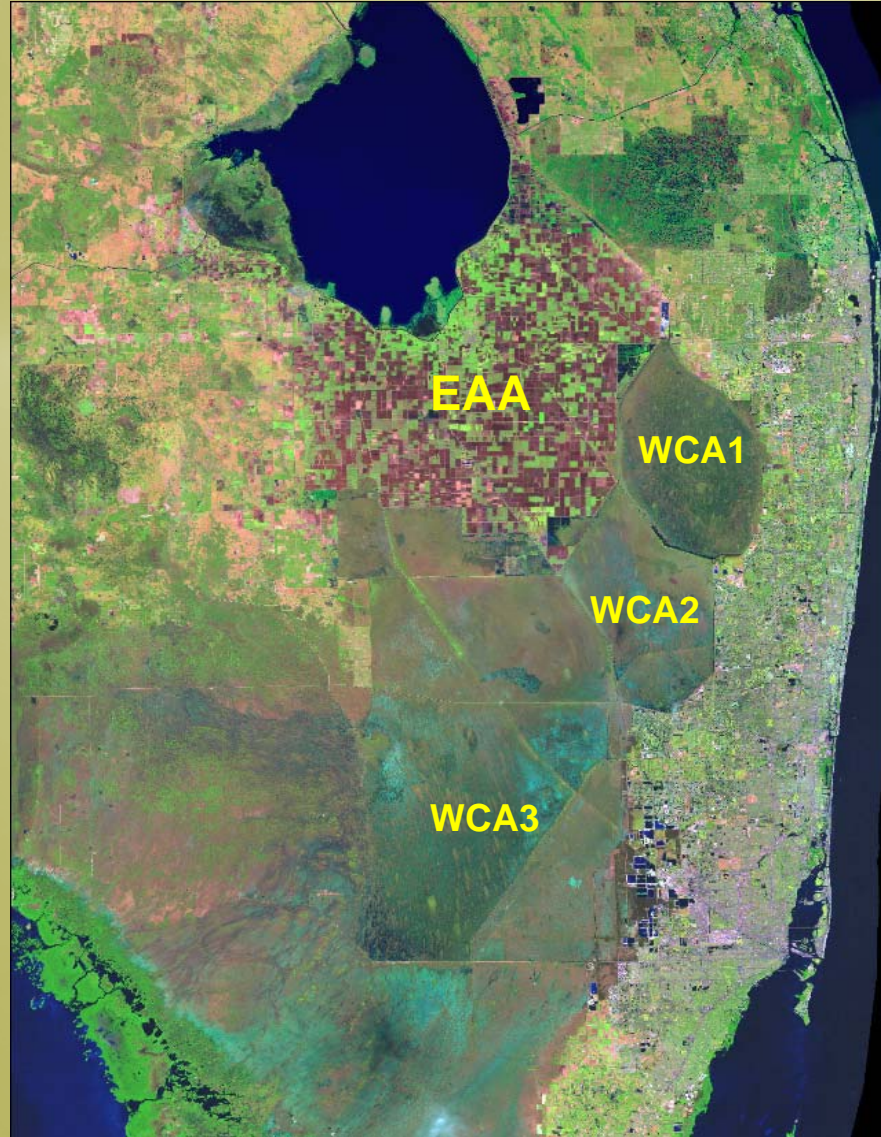
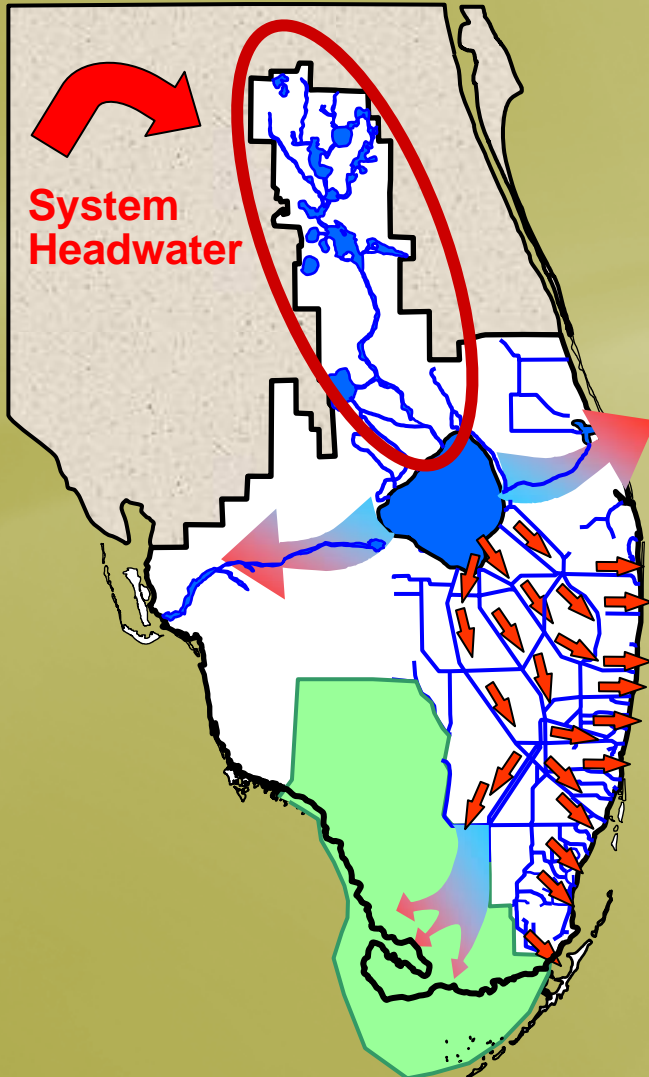


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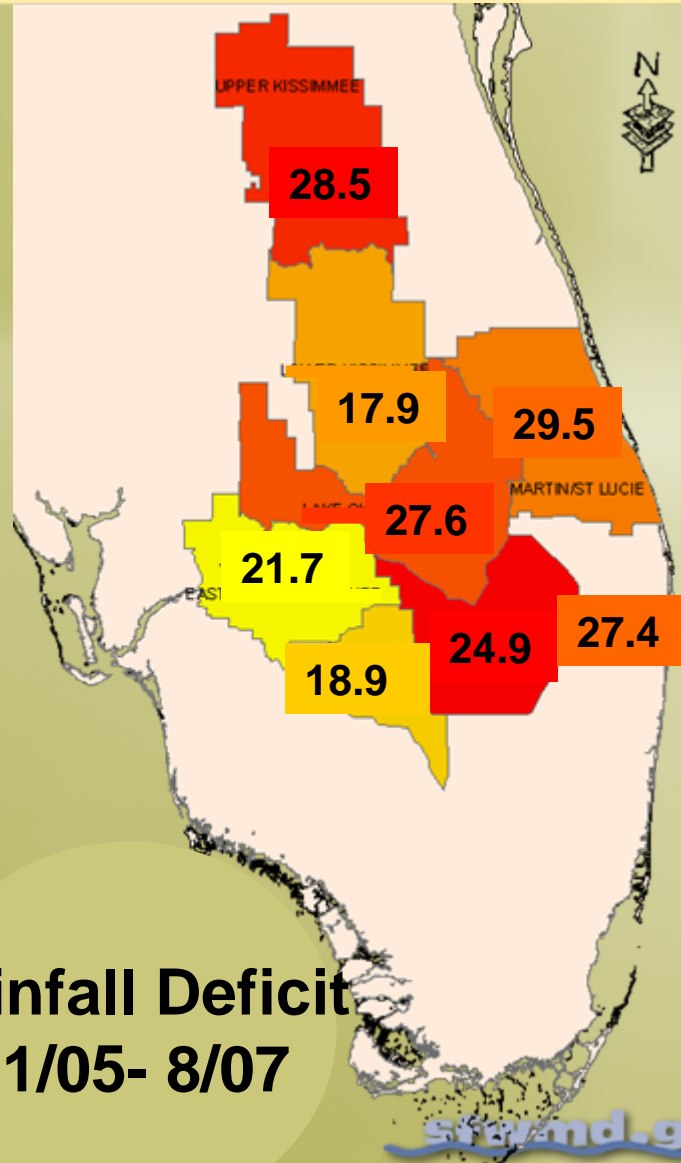
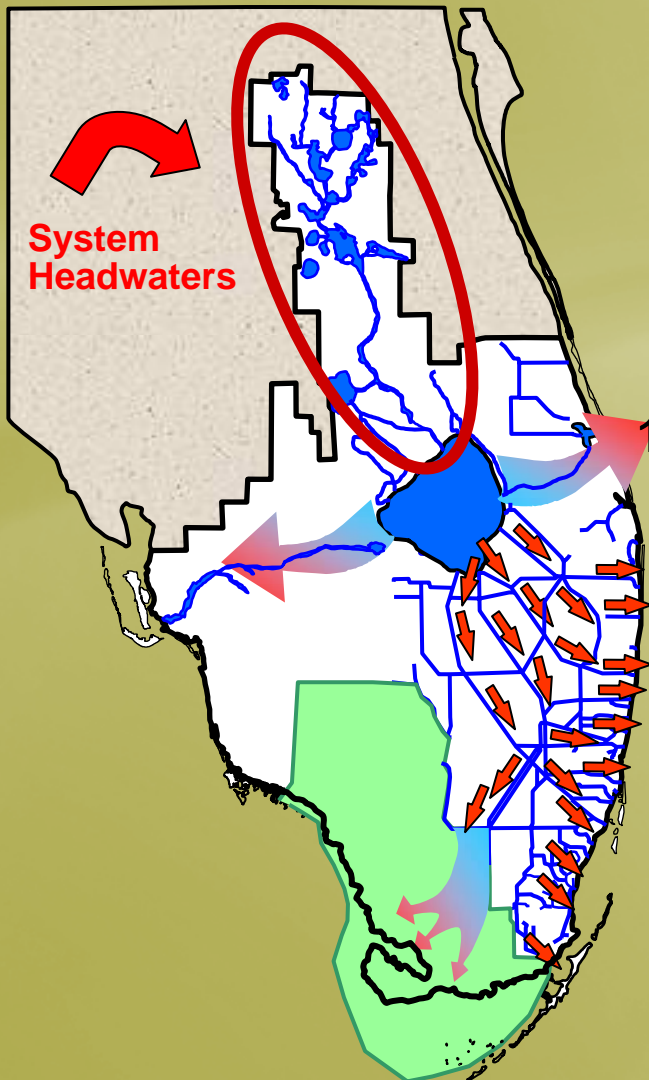




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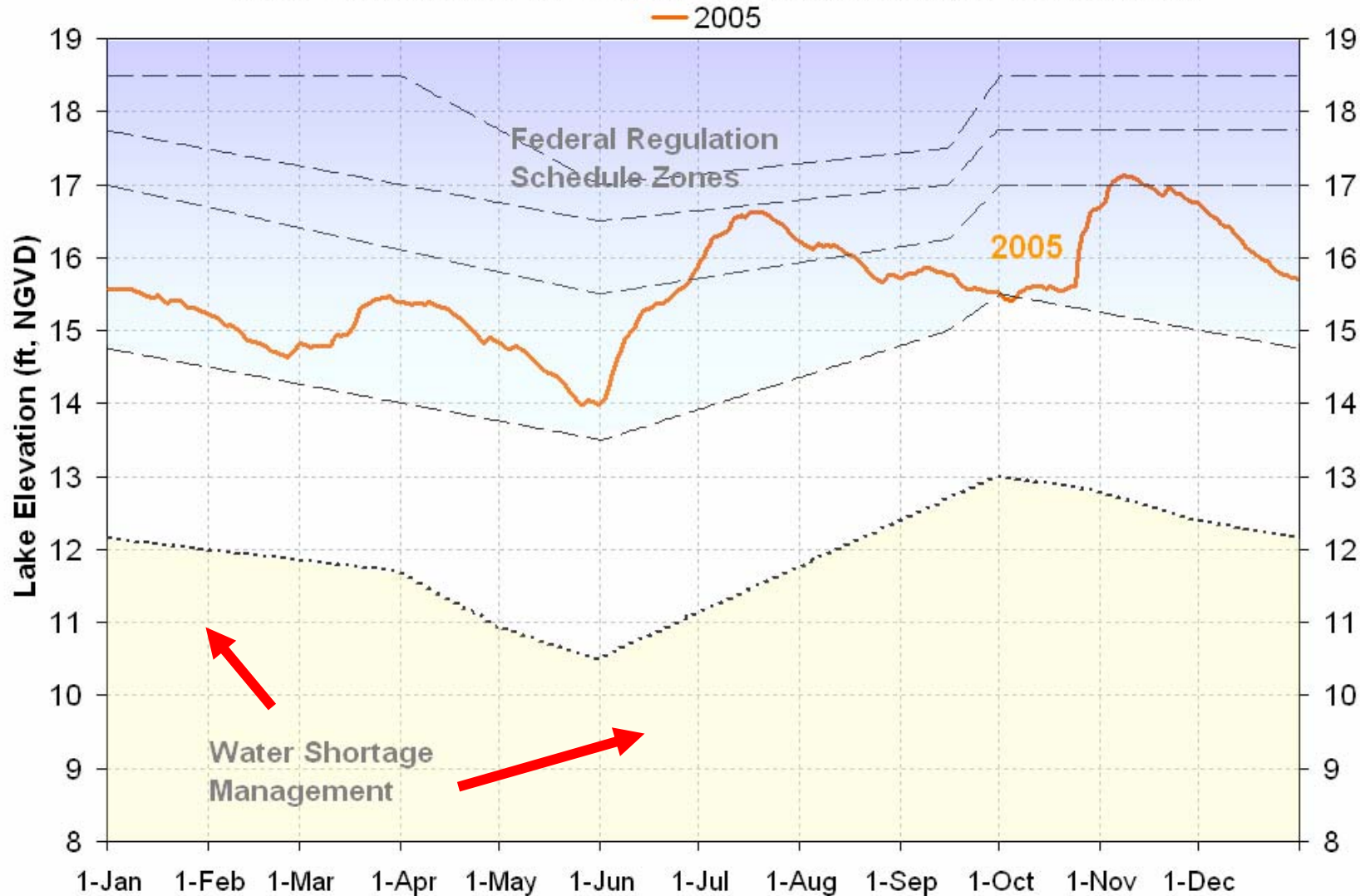
**Rainfall Deficit**  
**11/05- 8/07**



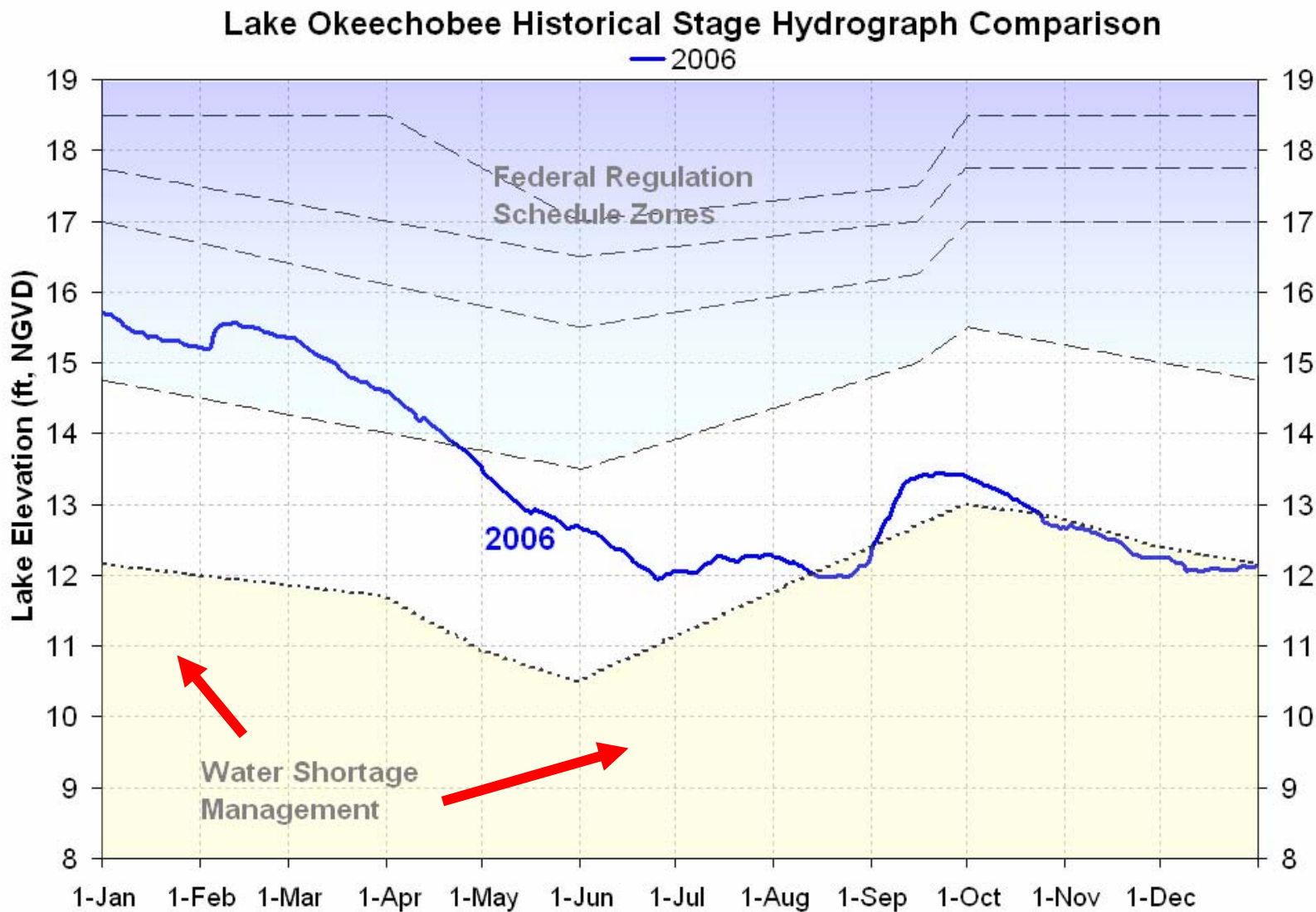
# Hindsight .... Drought started after Hurricane Wilma in November 2005



Lake Okeechobee Historical Stage Hydrograph Comparison

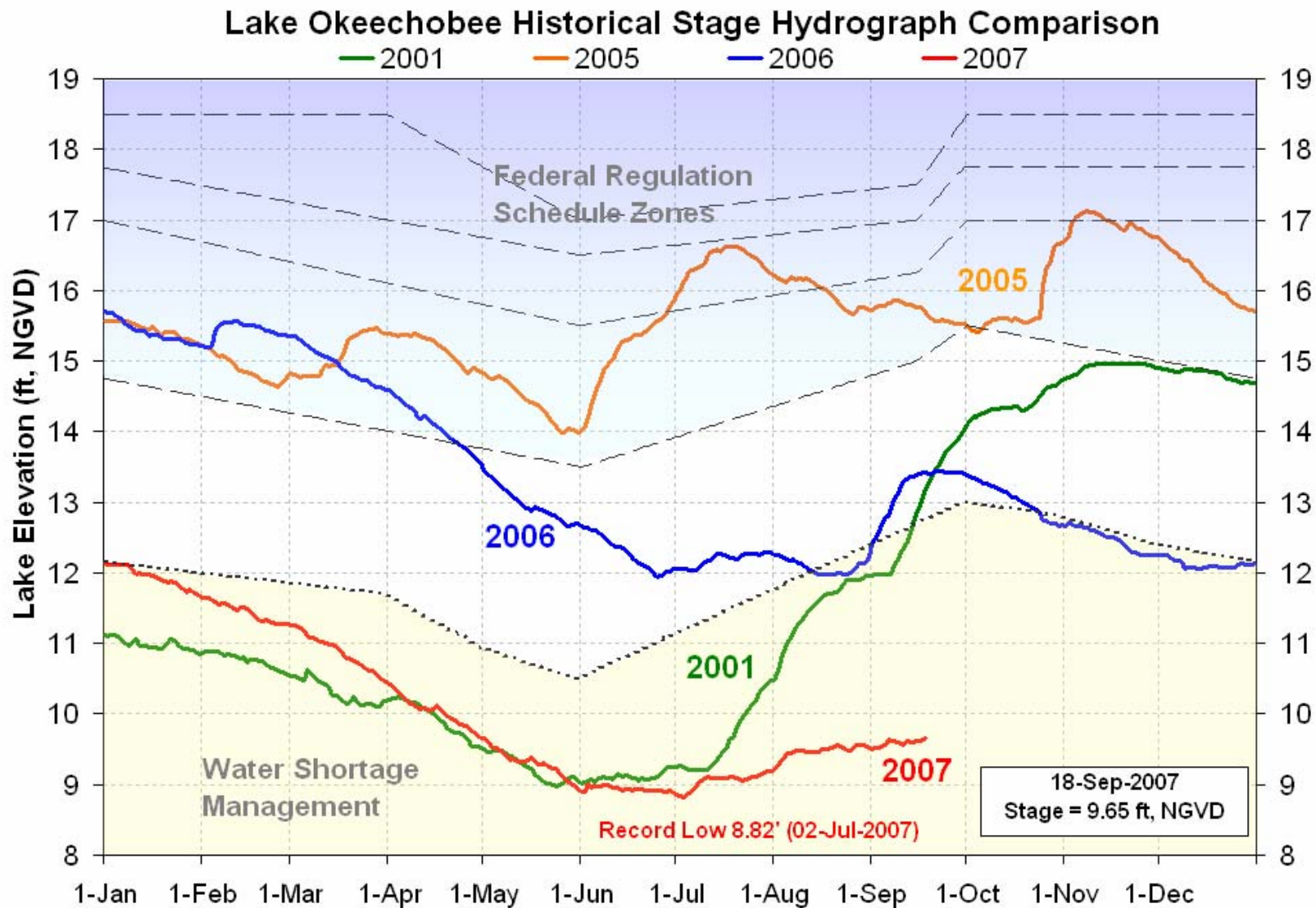


# ACOE Operations in 2006 to Lower Lake Before Hurricane Season





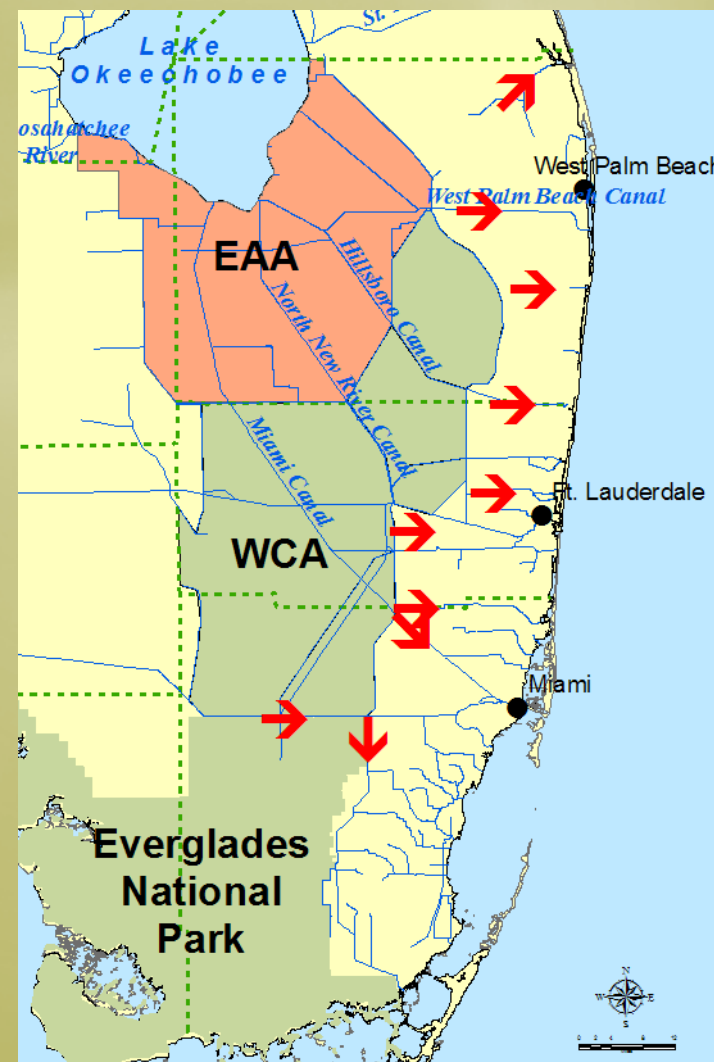
# Wet Season Bust in 2006 & 2007



# Reliance on Regional CSF System

Water deliveries to maintain high groundwater levels during the dry season & recharge wellfields

- SFWMD Canals
- local / secondary canals
- Regional recharge +/- 900 MGD
- Limited reuse & AWS in Lower East Coast



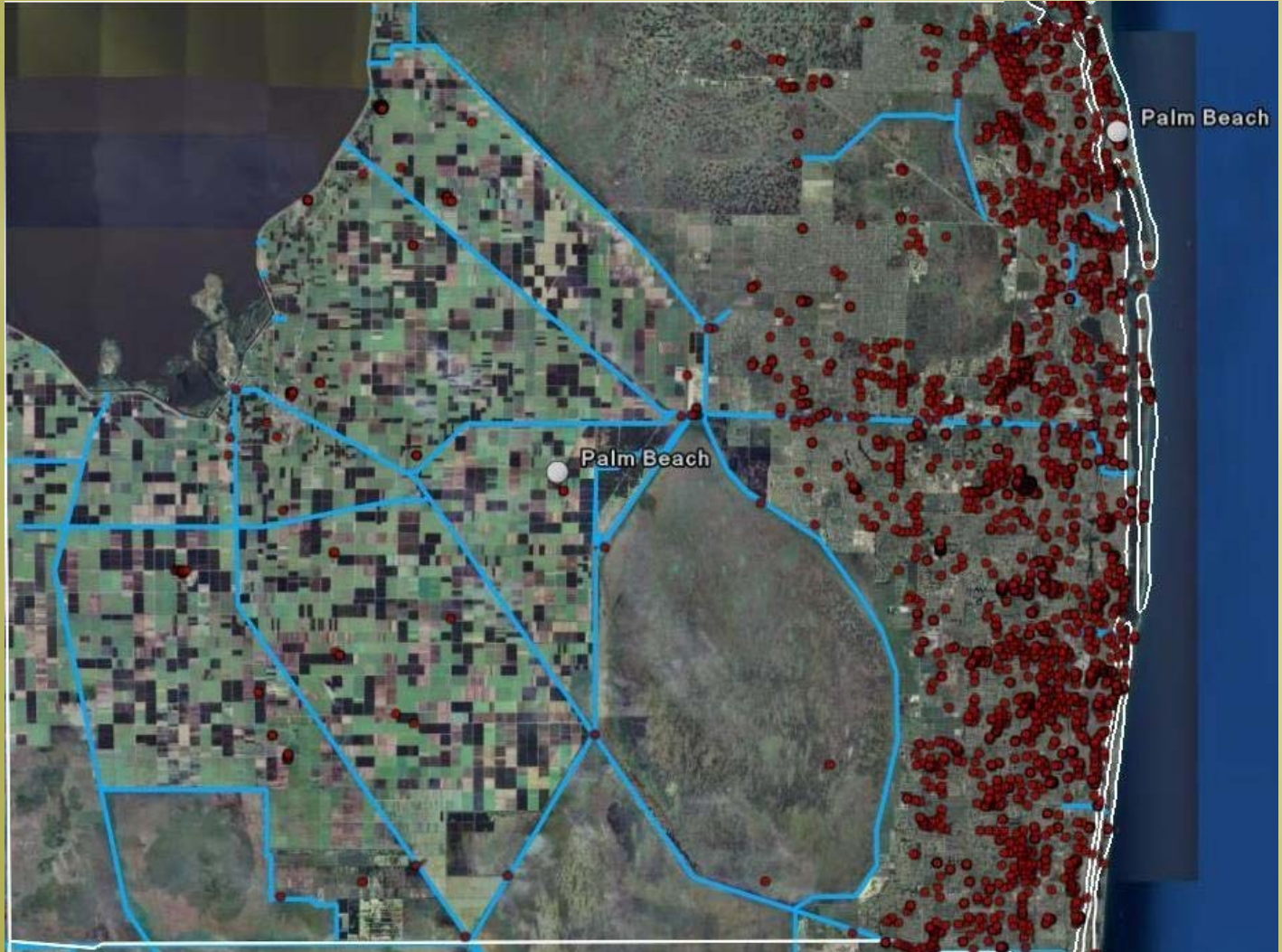


# Regional Canal Conveyance – Palm Beach County





# Consumptive Use Permits



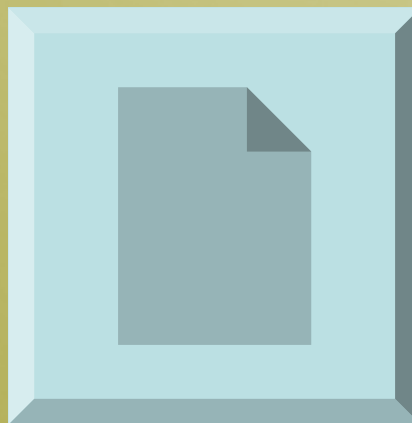


# Prioritized Operation of CFS System



## #1 Priority:

**Protection of coastal wellfields  
& public water supplies**



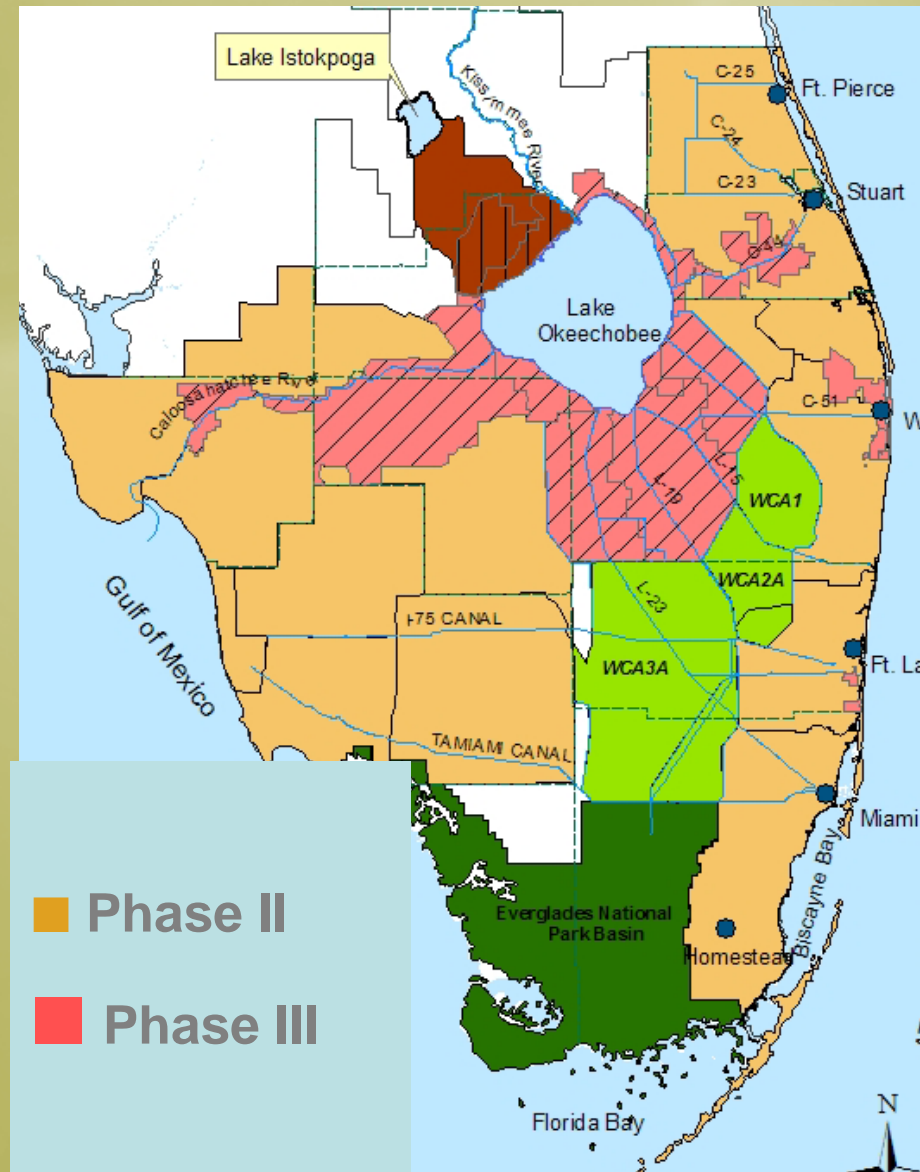
# Water Restrictions in South Florida

Restrictions started in November, 2006

Increasing levels of restrictions as drought intensified

WMD enforcement  
1,300 violations  
\$ 350,000 collected

Local govt. enforces single-family home violations

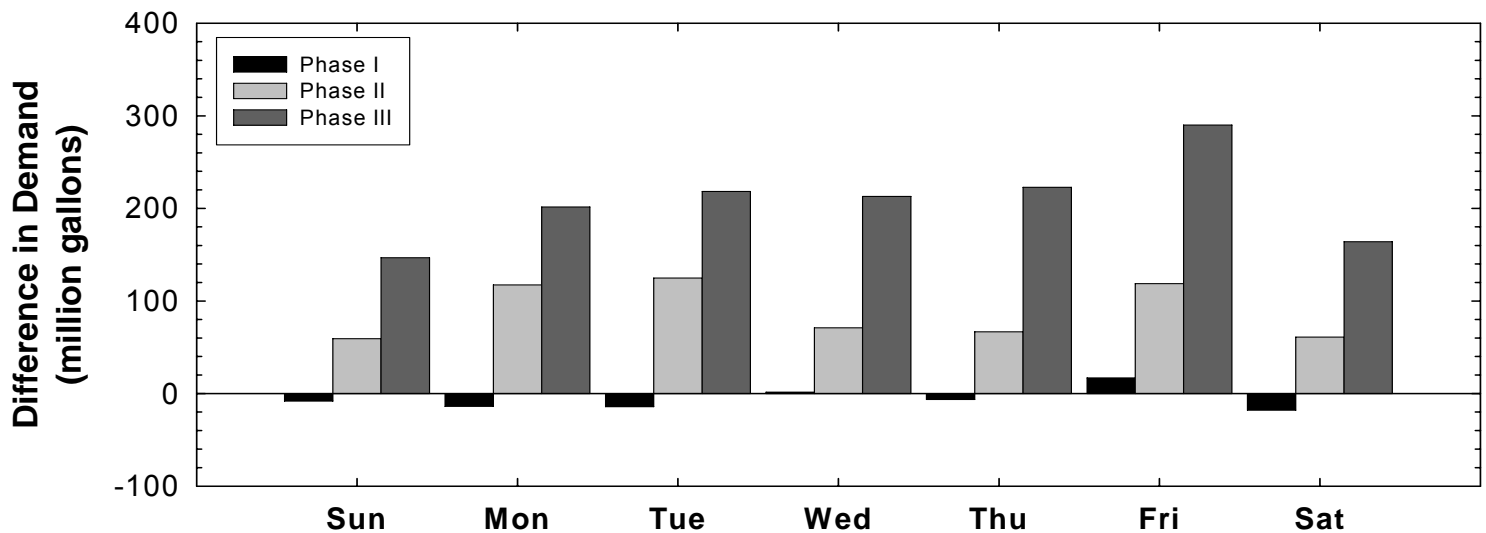
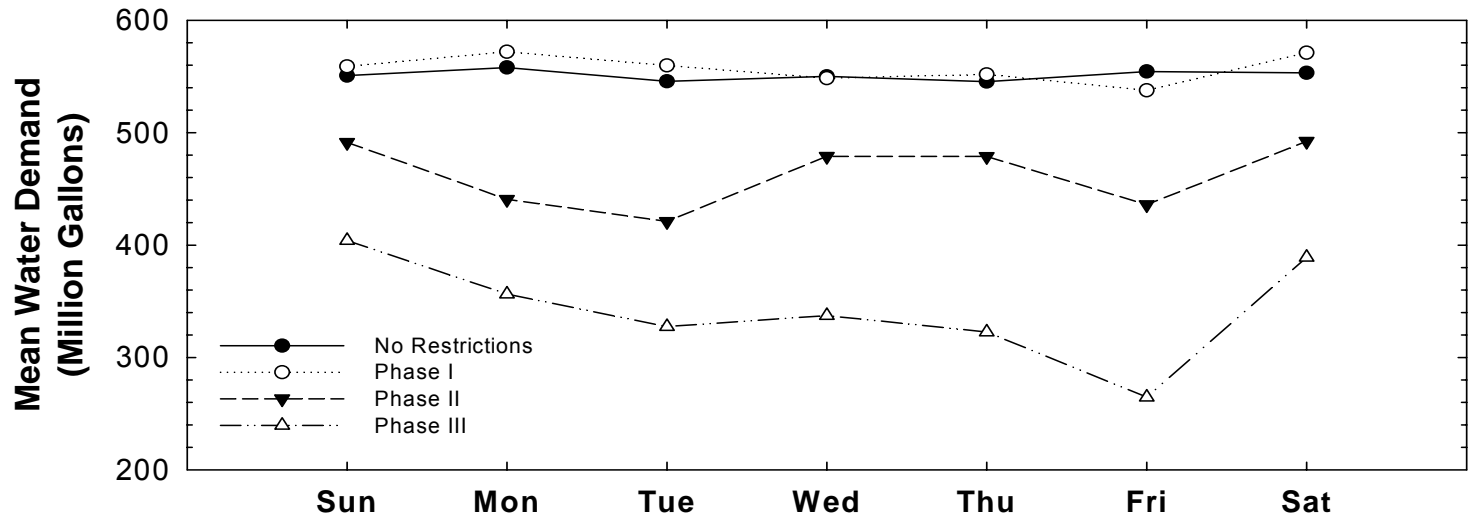


Phase II

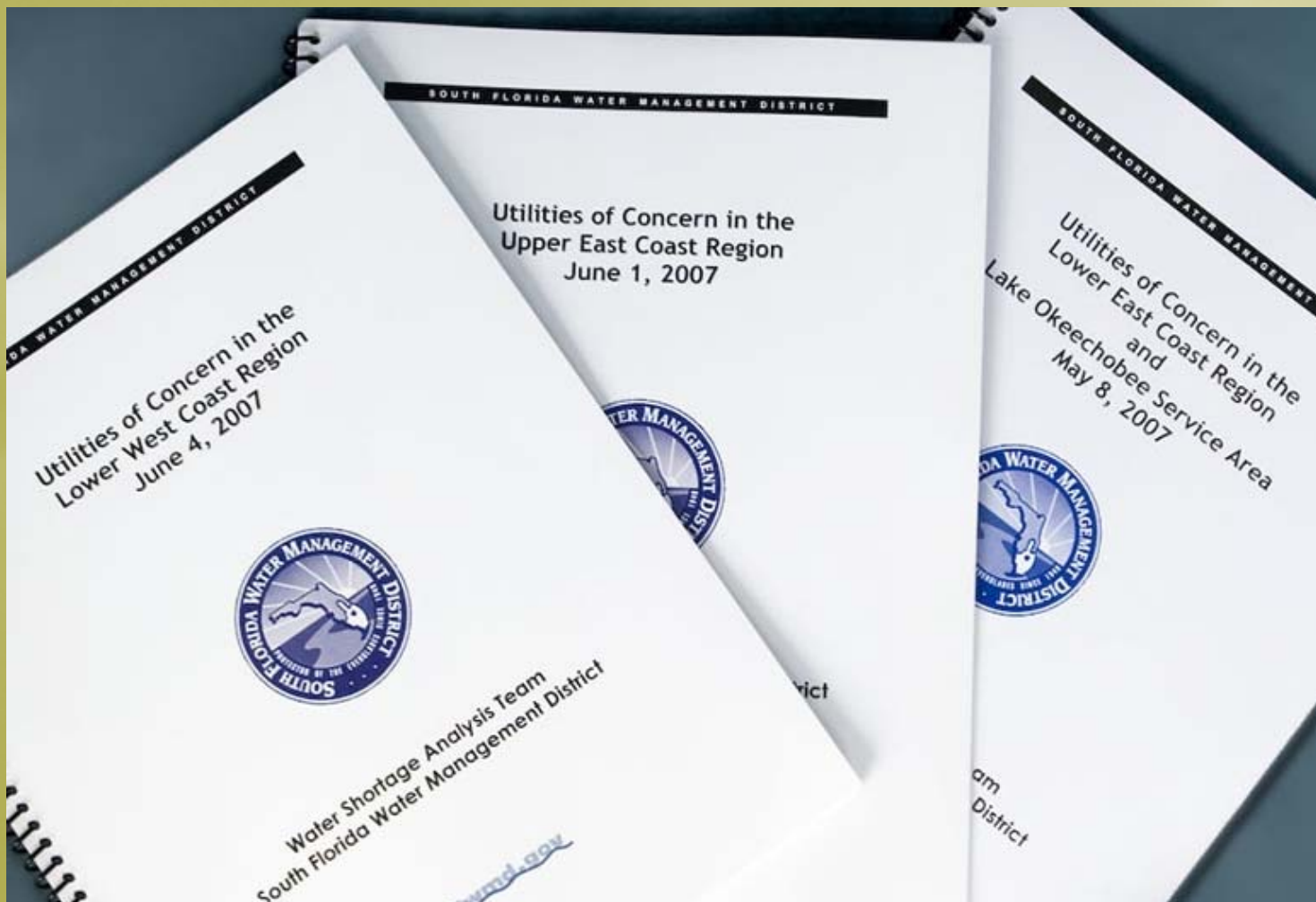
Phase III



# Demand Reductions in Response to Water Restrictions in Lower East Coast

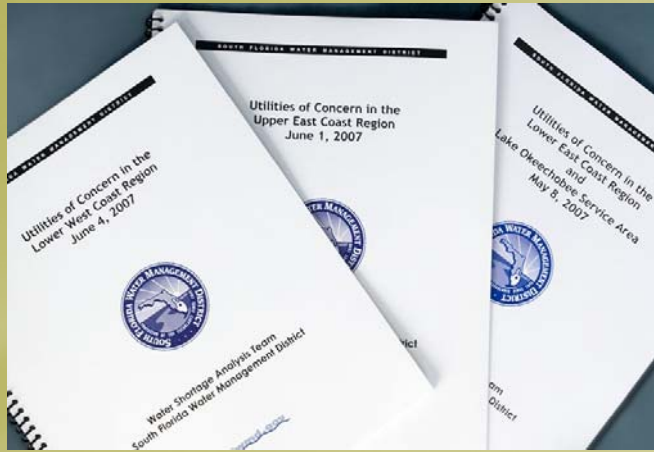


# “Utilities of Concern” or “at Risk”





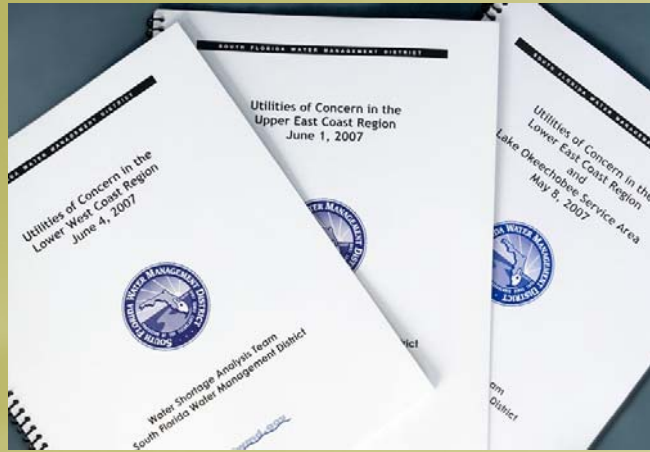
# “Utilities of Concern” or “at Risk”



***“Utilities of Concern”***: wellfields near saltwater interface, but also have a western wellfield, AWS or interconnects

***“Utilities at Risk”***: wellfields near saltwater interface, but with no western wellfields, and/or limited AWS or interconnects

# “Utilities of Concern” or “at Risk”



DEP Emergency Order to facilitate back-up wellfield operations: allowed exceedance of some secondary drinking water standards & sodium

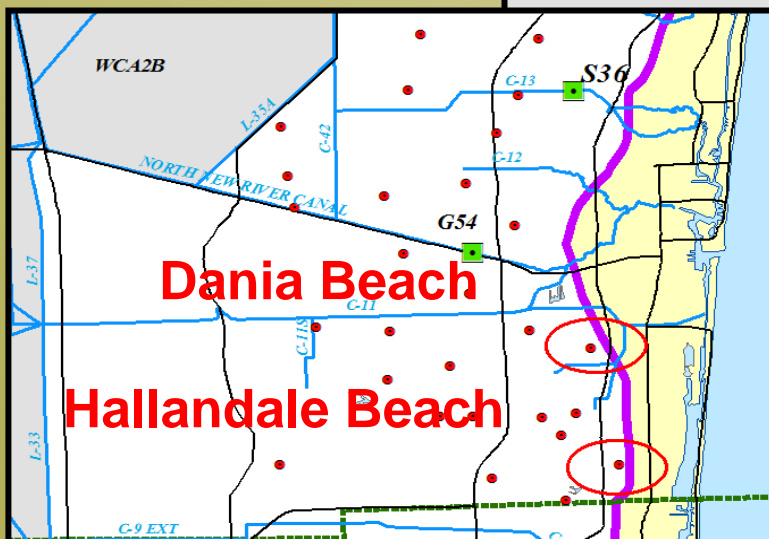
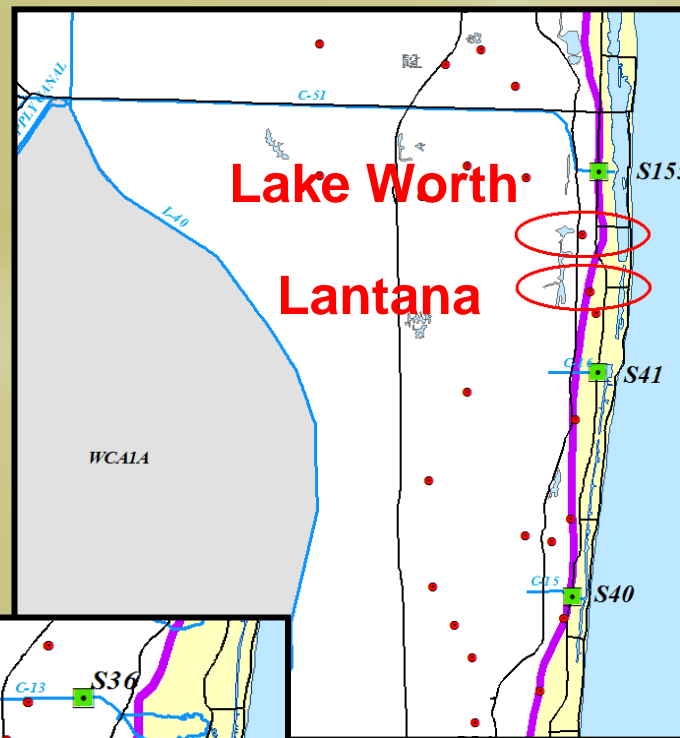
**Surprise Findings:** Most utilities had no definitive contingency plans for loss of source, limited interconnect agreements and/or unidentified or untested interconnects



# Utilities at Risk

## Lake Worth, Lantana, Dania, Hallandale

- WMD Emergency Orders limiting or prohibiting pumpage of eastern wells
- Phase III water restrictions (one day a week irrigation)



# Emergency Groundwater Recharge Options Using Reclaimed Water



Increase recharge by:

- Increase reclaimed water flows to permitted wetland systems
- Activation of back-up rapid infiltration or percolation systems
- Discharge to stormwater management systems
- Groundwater replenishment via isolated canals

## Benefits:

Increase groundwater recharge  
Prevent saltwater intrusion  
Environmental enhancement  
Fire protection

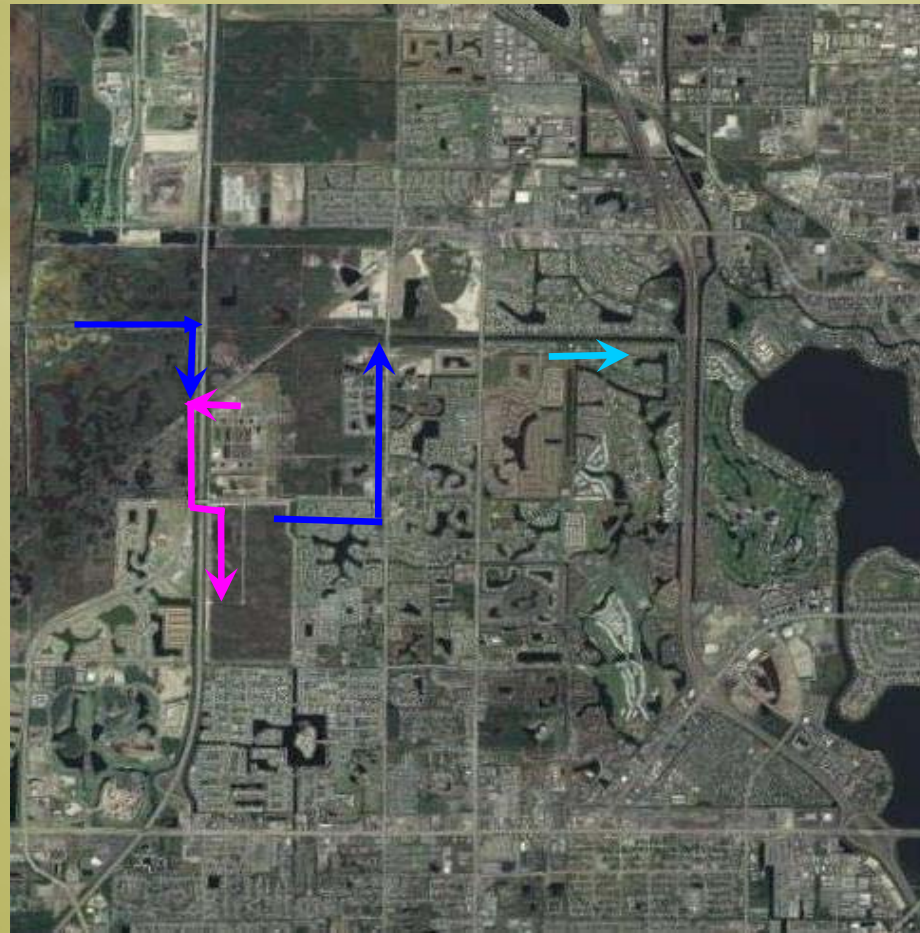




# City of West Palm Beach: Reclaimed Water to Wetland to Aquifer Recharge



- Deliver L-8 reservoir water & mix with reclaimed water
- L-8 chlorides diluted by reclaimed water
- Wetland recharge offsets wellfield pumpage
- Wellfield returns water to surface water supply for utility
- Emergency Order approved by DEP





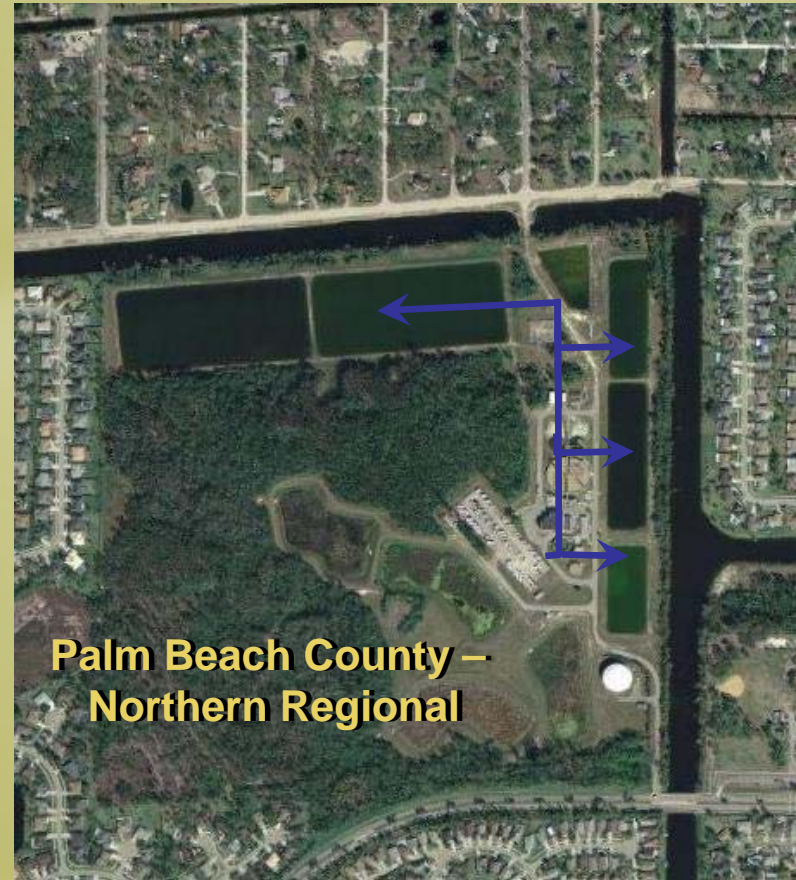


# Rapid Infiltration or Percolation Systems

- Most of these systems already permitted as back-up recharge systems
- Emergency Order approved by DEP



**Palm Beach County – Southern Regional**



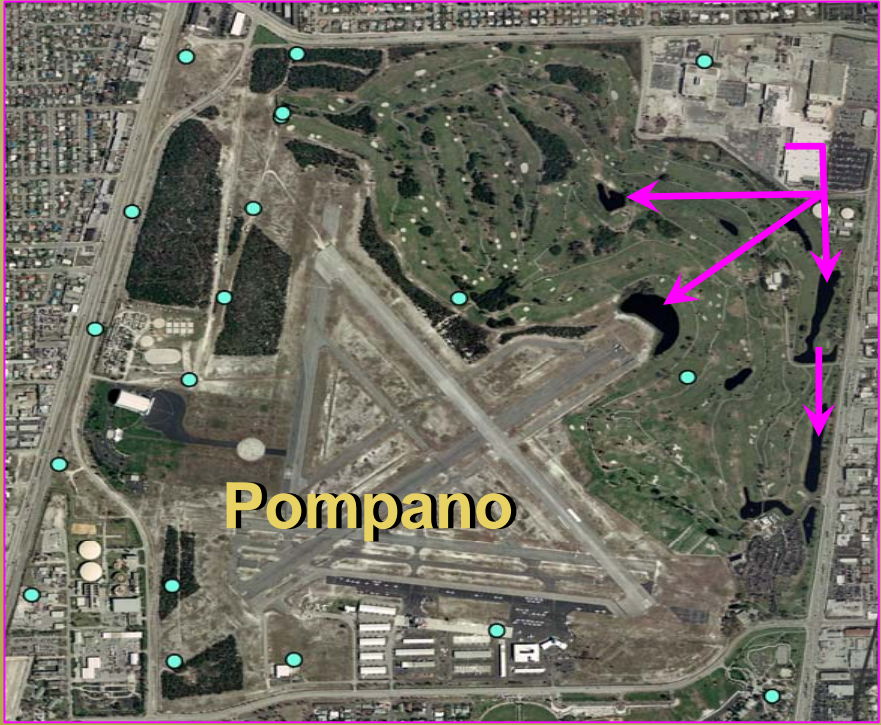
**Palm Beach County – Northern Regional**



# Stormwater Management Systems



- Stormwater ponds at treatment facilities and golf courses

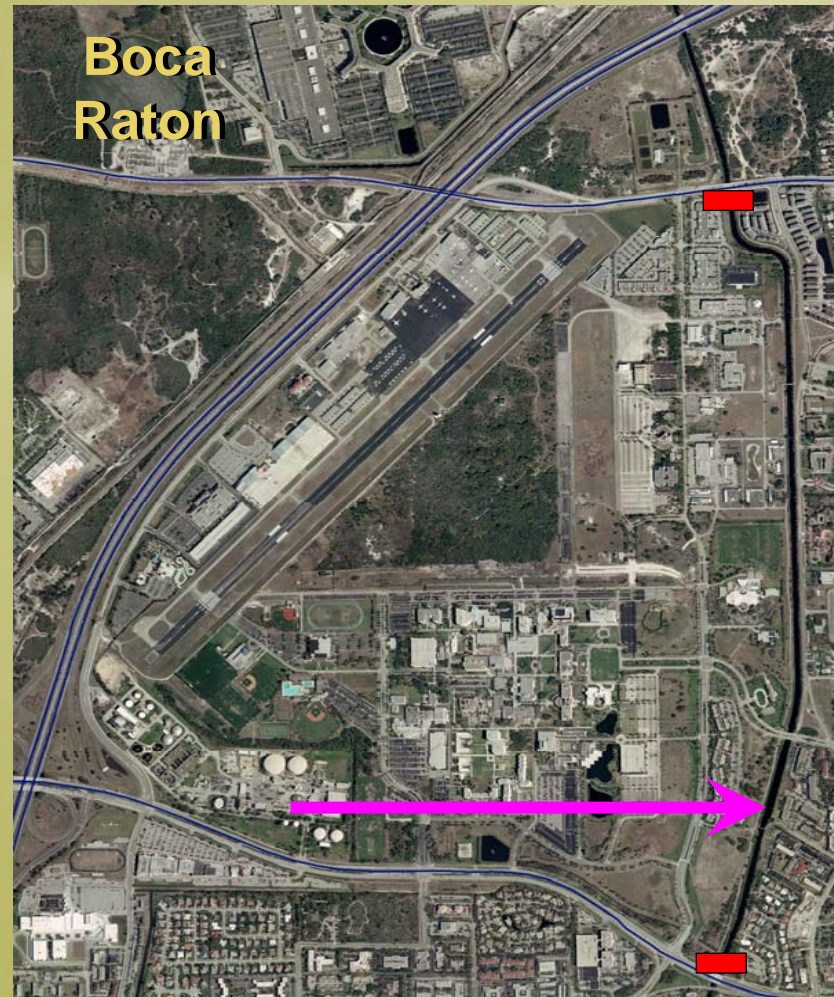




# Groundwater Recharge via Isolated Canals



- Use isolated canals as groundwater recharge system

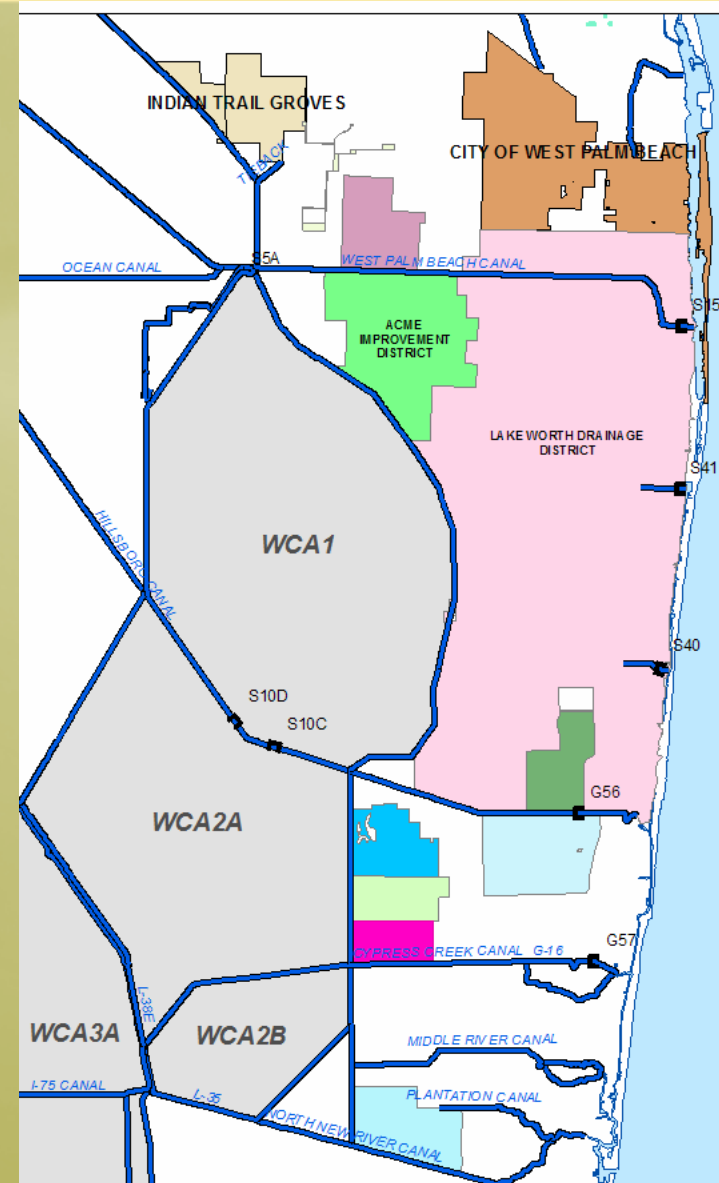




# Capturing Stormwater for Recharge

Even in drought, heavy rainfall can exceed regional canal capacity

More than 2 BILLION gallons of water moved into local storage to minimize discharges to tide





# Regional System Operation for Agricultural Water Deliveries



Measures to mitigate economic impacts to agriculture

(+/- 500,000 acres in EAA)





# Temporary Forward Pumps



**14 temporary  
100-cfs  
forward pumps  
installed**



# Temporary Forward Pumps

- 45% cutback of 1-in-10 irrigation demands
- Pumps insufficient to deliver full allocation





# Golf Course Water Restrictions

- Alternative water restrictions implemented
- No specified watering days or times
- Performance-based cutbacks: of 15%, 30% & 45%
- Weekly on-line reporting of metered water use
- Civil penalties for non-reporting & overpumpage

**176 courses in LEC**  
**147 courses in LWC**  
**36 courses in UEC**





# Environmental Enhancement Opportunities







**June 2006**



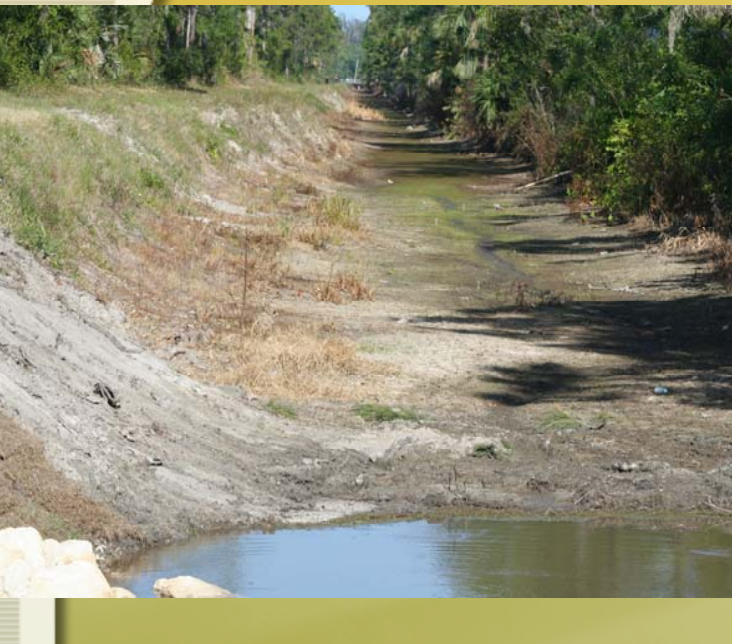
**May 2007**
















**St. Lucie Canal**  
**May 2007**

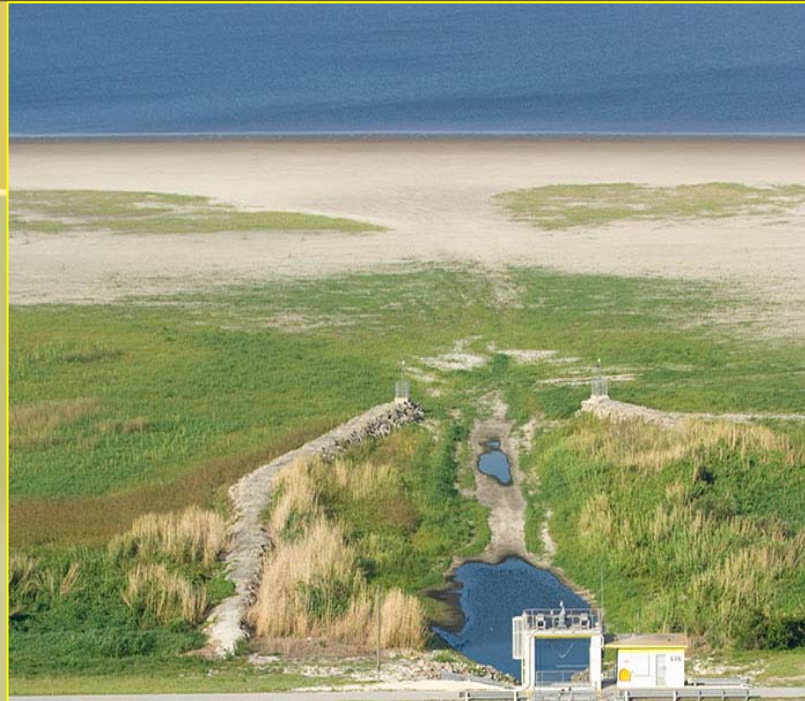


ENT DISTRICT





# SOUTH FLORIDA WATER MANAGEMENT DISTRICT





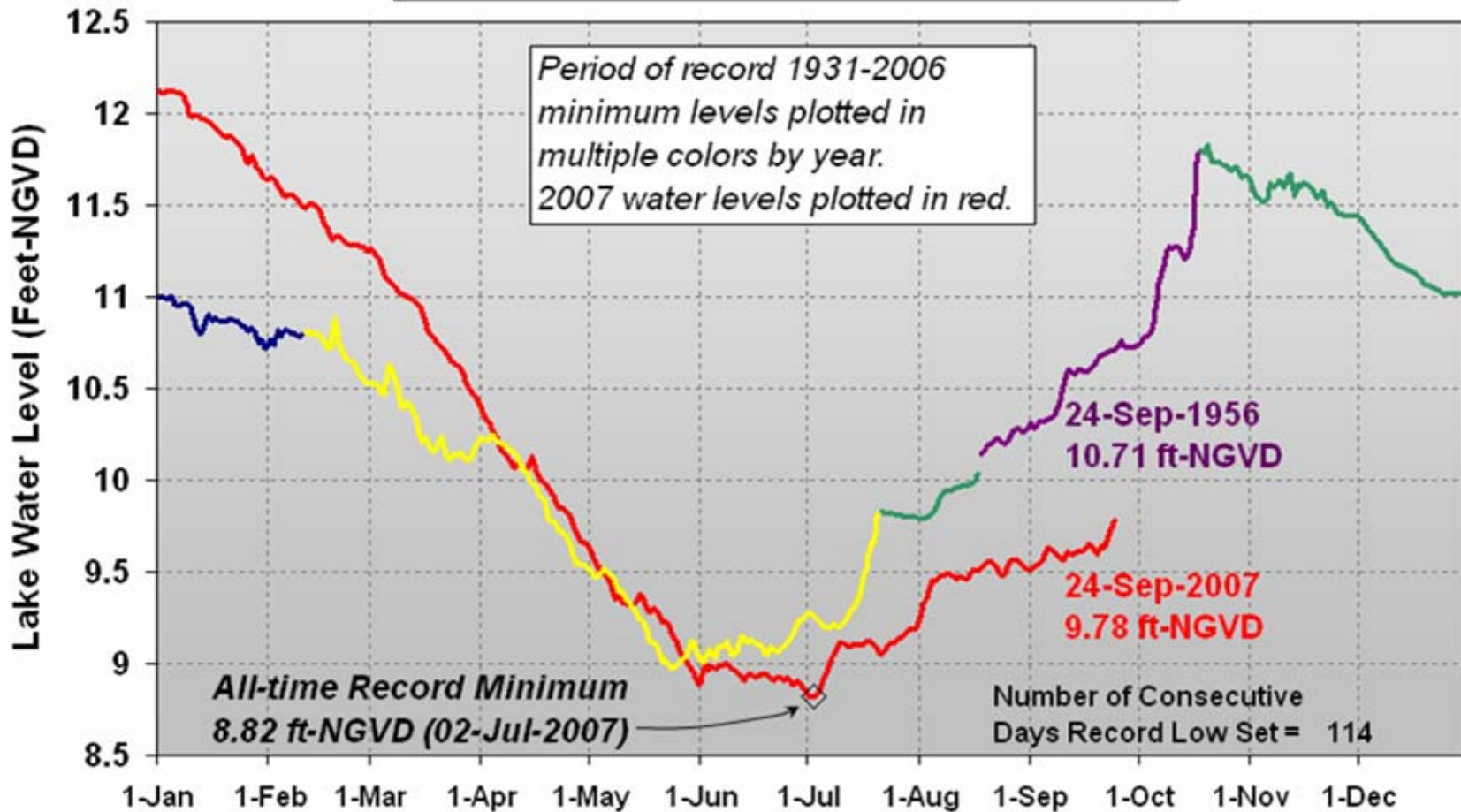
# Outlook for 2008? BAD NEWS ☹️



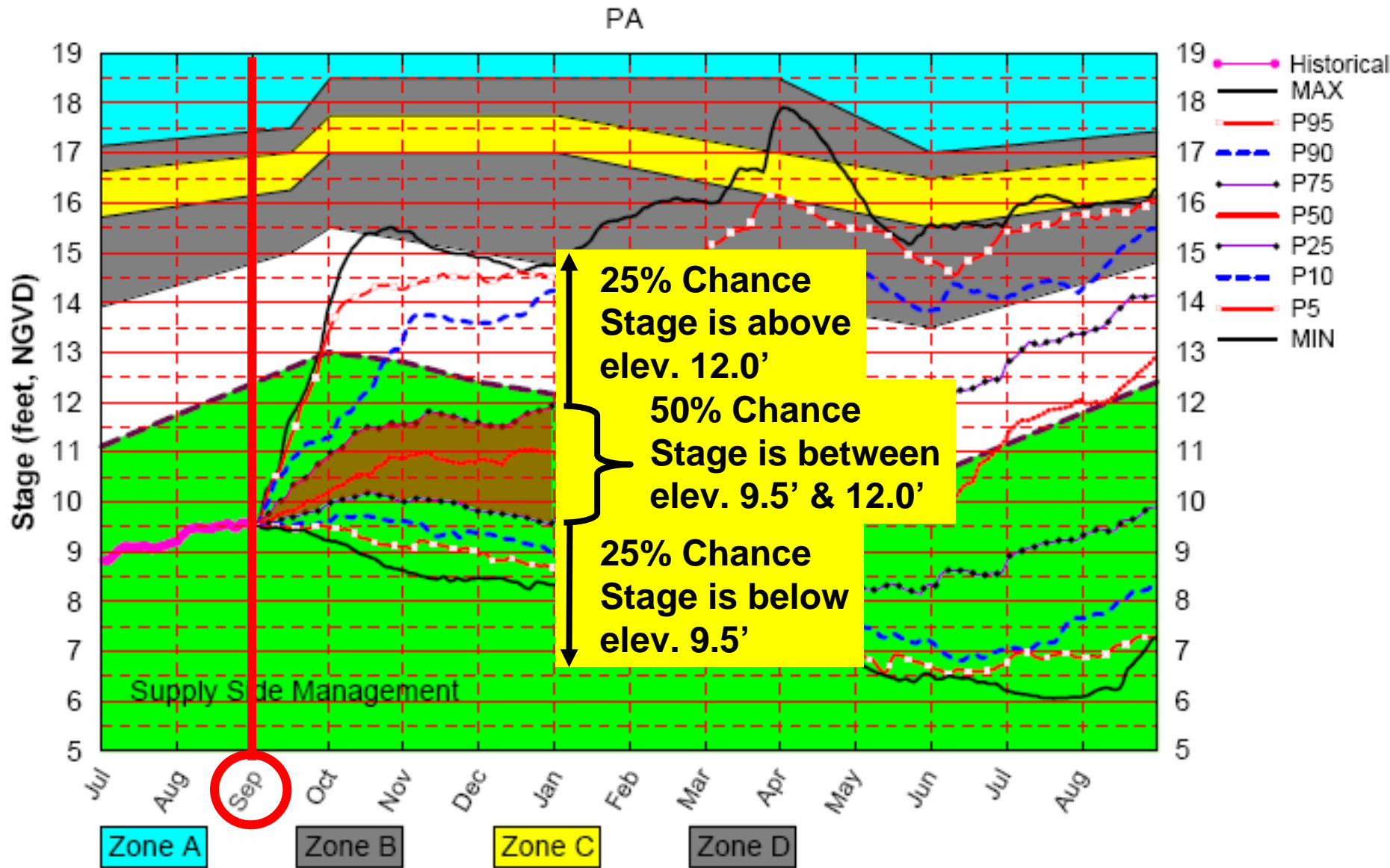
## Lake Okeechobee

Period of Record 1931-2006 Minimum Water Levels

— 2007 — 1982 — 2001 — 1981 — 1956



# Lake Okeechobee SFWMM September 2007 Position Analysis



(See assumptions @ [http://www.sfwmd.gov/org/pld/hsm/sfwmm\\_pa.html](http://www.sfwmd.gov/org/pld/hsm/sfwmm_pa.html))



# Pray for Rain! \*\*



(\*\* over the Kissimmee Valley & Lake)

