

Conjunctive Use of Aquifer Storage and Recovery for Water Management and Ecological Restoration

September 13, 2011

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Presentation Objectives

- Update on Ecological Restoration and Water Storage Projects
- Integration of ASR with these endeavors
- Moving Forward

Kissimmee River Restoration Project 1994 - 2013



status:

- Acquire 102,000 acres of historica river floodplain
 - 100% complete; \$300 million invested
- Remove 2 large water control structures
 - 1 structure removed
- Backfill 22 miles of canal
 - ~ 65% complete
- Recarve 9 miles of remnant river channel
 - ~ 60% complete
- Rehydrate 26,500 acres of river floodplain
 - ~ 60% complete

Kissimmee River Restoration Vegetation Response



Pre-restoration



Post-restoration









Kissimmee River Restoration Phase I Response: Wading Birds



Northern Everglades and Estuaries Protection Program

- Passed by Florida legislature in 2007
- Requires watershed protection plans for
 - Lake Okeechobee
 - St. Lucie
 - Caloosahatchee





Dispersed Water Management and Hybrid Wetland Treatment



- Shallow water distributed across landscapes using relatively simple structures
- Components
- Cost-Share cooperative projects
- Easements
- Payment for Environmental Services

Dispersed Water Management Projects Underway



Already constructed



Funded through construction

RIDA WATER MANAGEMENT DISTRICT

CERP ASR Capacity Correlates with Basin-Specific Water Availability



<u>Site</u>	Capacity (r	ngd)
Lake Okeechol	bee 1,00	0
Caloosahatche	e 22	20
L-8 Basin	5	50
C-51 Basin	17	0
Central PBC	7	5
<u>Hillsboro</u>	15	<u>50</u>
TOTAL	1,6	65

Note mgd = million gallons per day

The 2011 Dry Season

Lake Okeechobee Water Level History and Projected Stages



200 wells = 1BGPD = raise or lower Lake O by 2.5' in one year

2012 ain't looking much better.....



Kissimmee River ASR Pilot Project

- Recovery efficiency near 100%
- No acute or chronic toxicity or bioaccumulation
- Some arsenic during first cycle, but later diminished
- Apparent phosphorous reduction – how long will it last?







Paradise Run: Connecting an abandoned floodplain with the former Kissimmee River channel

Conceptual Design for 50-mgd ASR System



Paradise Run: a 10-well, 50-mgd ASR Demonstration System Conceptual Design as the next phase of CERP?



Taylor Creek ASR System

 System originally built and tested 20 years ago •Well has mechanical Lake integrity Okeechobee •Pumps still work! UIC permit application in 2007 Limited Aquifer **Exemption currently** pending with USEPA



Seminole Brighton ASR Pilot Project



Lake Okeechobee

•Tribe has completed the siting evaluation Exploratory well constructed in 2007 Conceptual design for a 1 mgd system is complete •Currently on "hold" due to funding limitations

C-43 Water Quality Treatment & Testing Facility

- Purpose Identify feasibility to reduce total nitrogen in the C-43 to improve water quality in the downstream estuary
- Water quality studies began in 2009
- Conceptual design of test facility is planned in 2012
- Possible location Floridan exploratory well?





Lakeside Ranch STA

- A 2,700-acre STA, adjacent to Lake Okeechobee which will provide up to 19 metric tons of annual phosphorus reduction
- Currently under construction
- Potential site for integration of another 10-well ASR system for drought protection









SOUTH FLORIDA WATER MANAGEMENT DISTRICT North Palm Beach County Part 1:

L-8 Reservoir

Description/Benefit:

- Improve water levels in Loxahatchee Slough
- Increase freshwater deliveries to Northwest Fork of Loxahatchee River

Status:

- Reservoir is providing 47,000 acre-feet of storage
- Water currently exceeds drinking water standards for chlorides
- CERP Phase 2 includes up to 10 ASR wells in this area





ASR Integration with STAs



•ASR for drought protection and increased storage options

- •Reduced frequencies of bypasses
- •Additional nutrient reduction?
- •Prevention of undesirable vegetation and/or bird species habitation
- •Many wells can be installed within footprints of large land holdings

ASR Integration with STAs

- STA 1W 6,700 acres - needs 95 acft/day to stay hydrated
- 6 wells, 30 mgd
- Cost Estimate: \$30M





Hillsboro ASR Pilot Project



- Began cycle testing in January 2010
- Mechanical filtration coupled with UV
- Recovery efficiency about 25% during first 2 cycles
- Aquifer has higher salinity
- Simple design

Hillsboro ASR Pilot

- Fits within a canal right-of-way
- Surface footprint of about ¼ acre
- In 90 days, this system will store 1,350 ac/ft
- Site 1
 Impoundment anticipates integration



Water Management Components

Loxahatchee NWR

L-40 Canal



