

FLORIDA'S CLASS V AQUIFER RECHARGE - OPPORTUNITIES AND CHALLENGES

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INTRODUCTION

FLORIDA'S UIC PROGRAM

- Injection wells are critical to managing our waters/waste streams
 - Municipal wastewater
 - Industrial wastewater
 - Stormwater/Surface water
 - Drinking water treatment residuals
- They can also
 - Provide large storage volumes
 - Restore groundwater levels
 - Mitigate saltwater intrusion
 - Improve Spring flow



Florida's surface waters benefit greatly from injection wells

INTRODUCTION

UIC DRIVERS IN FLORIDA

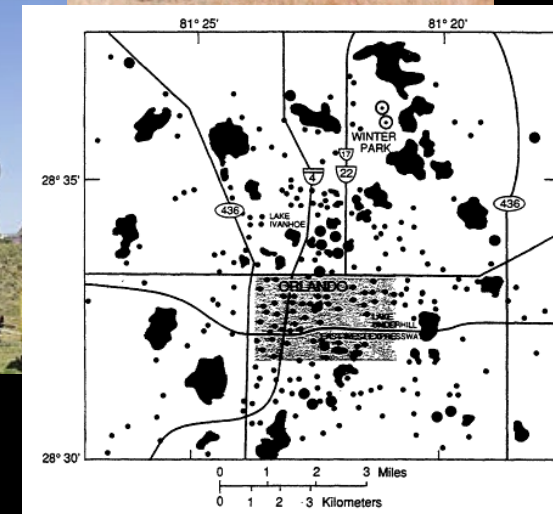
- Environmental
 - Recharge wells are environmentally sound
 - Florida geology is favorable for UIC opportunities
- Cost
 - Typically lowest capital cost alternative
 - Comparably lower O&M costs
- Legislative
 - Senate Bill 64 is the key driver over the next decade
 - Emphasis on improving surface water quality



PAST RECHARGE PRACTICES

THE EARLY YEARS

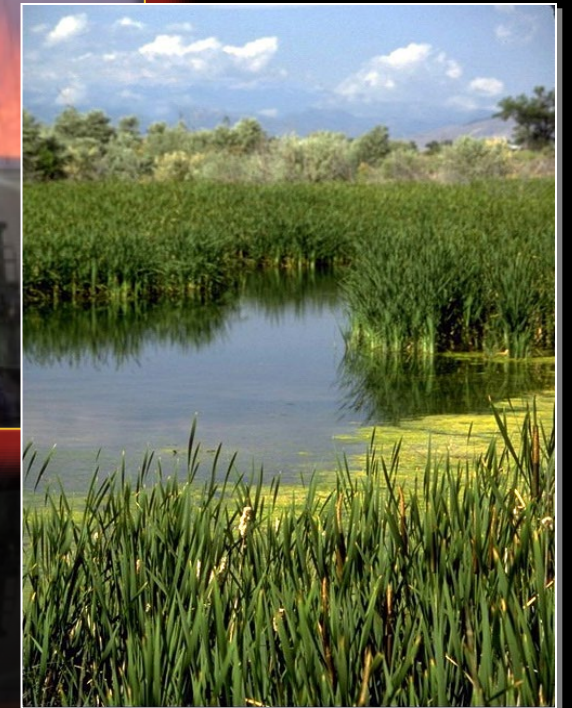
- Drainage wells were a big part of developing Florida
 - Many drainage wells constructed in Florida in the 1910's and 1920's
 - Following major hurricanes, new wells would be constructed
 - This practice continued into the 1950's and 1960's, with many lake level control wells installed throughout Florida
 - Much of Florida could not be developed without drainage wells



RECHARGE PRACTICES

FLORIDA RECHARGE WELLS

- Florida is shifting from predominantly injection wells to aquifer recharge
- **Managed Aquifer Recharge** includes source waters of various quality
 - Potable (drinking) water
 - Raw surface water
 - Partially treated surface water
 - Stormwater
 - Partially treated stormwater
 - Untreated groundwater
 - Partially treated groundwater
 - Reclaimed water
 - Further purified reclaimed water
 - Treated industrial wastewater



RECHARGE PRACTICES

FLORIDA MANAGED AQUIFER RECHARGE VARIATIONS

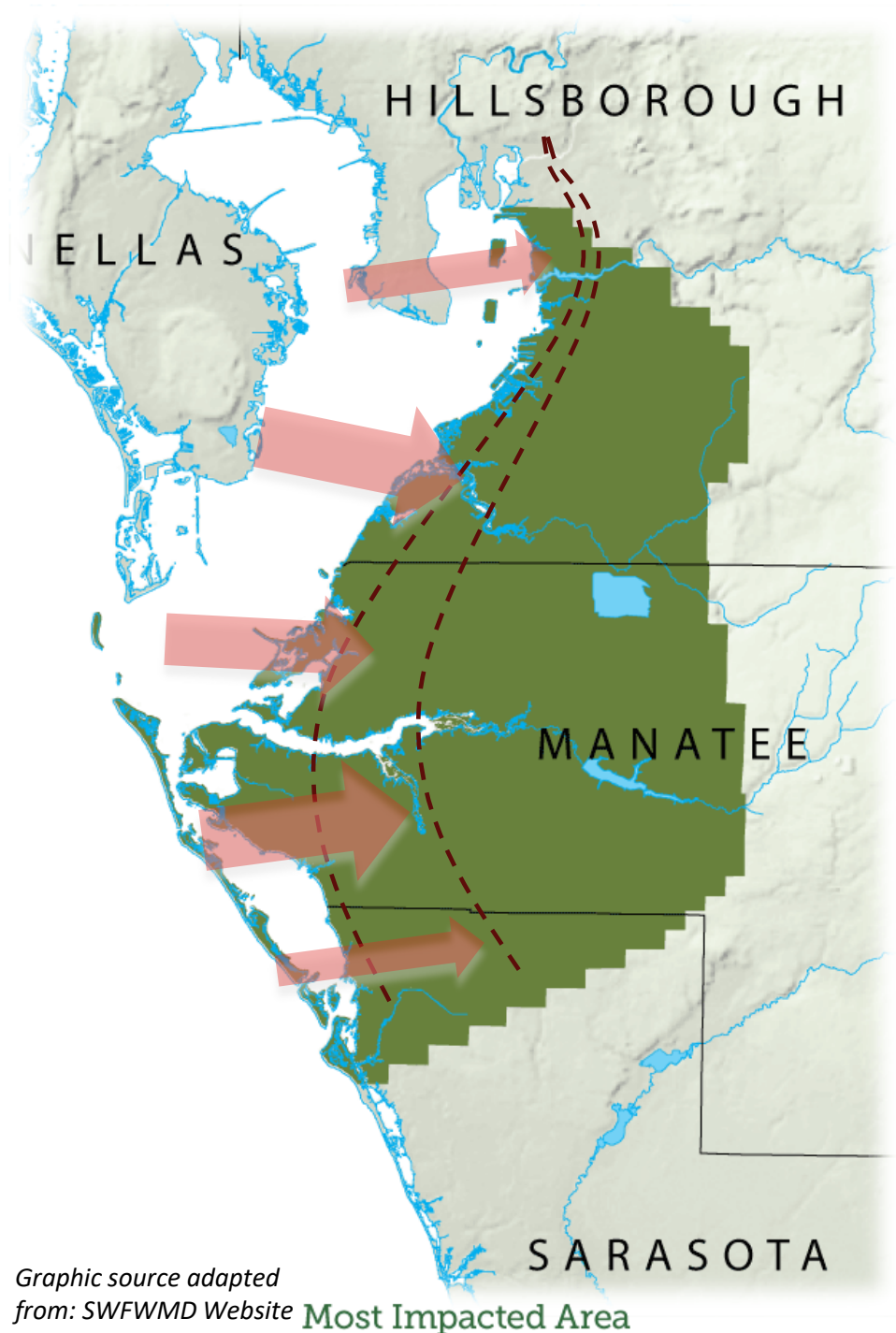
- Aquifer Storage Recovery (ASR) (Peace River, Tampa)
- Aquifer Recharge (Manatee County, St. Cloud)
- Saltwater Intrusion Barrier (Hillsborough County)
- MFL Recovery Strategy (Flatford Swamp, USR)
- Drainage Wells (Ocala, Gainesville, Orlando)
- Lake Level Control Wells (Orlando)
- Stormwater Management (Live Oak, Madison Co)
- Industrial Wastewater Beneficial Recharge (Tropicana)
- Spring Flow Restoration (Little Orange Creek)
- Indirect Potable Reuse Systems (JEA, Clearwater)



SWUCA MIA AQUIFER RECHARGE PROGRAMS

The Southern Water Use Caution Area (SWUCA) Most Impacted Area (MIA) has experienced significant saltwater intrusion (SWI) due to over-pumping of the aquifer

- Primarily due to agricultural over-pumping inland
- Once saltwater encroachment has occurred, it is nearly impossible to reverse impacts and affected aquifer is lost
- SWFWMD's goal is to not stop SWI completely, but rather to slow it down
- Aquifer recharge wells using various source waters could significantly control further damage to the aquifer



SWFWMD SWUCA MIA AQUIFER RECHARGE PROGRAMS

The **Southern Water Use Caution Area (SWUCA) Most Impacted Area (MIA)** has experienced significant **saltwater intrusion (SWI)** due to over-pumping of the aquifer

SWUCA recovery Strategy Five Year Assessment 2016 - preliminary analysis concluded that the benefits of aquifer recharge in the UFA on the order of 10 MGD in the MIA would be sufficient to meet the saltwater intrusion minimum aquifer level (SWIMAL).

1. SHARP (operational)
2. City of Bradenton Aquifer Recharge (not yet constructed)
3. Flatford Swamp (likely only will reach limited test phase)
4. Manatee County SWWRF RW-1 (3 MGD since 2018)
5. Manatee County North WRF RW-1 (constructed, not in operation)



Graphic source adapted from: SWFWMD Website **Most Impacted Area**

WEST CENTRAL FLORIDA AQUIFER RECHARGE PROGRAMS

Other aquifer recharge into the Upper Floridan aquifer (UFA) that is not accounted for in the SWFWMD model but would have significant impacts if stopped

1. St Petersburg AHPZ = 5.5 BGY or 15 MGD
2. Tropicana Suwannee Limestone = 600 MGY or 1.6 MGD
3. Manatee County Cortez Rd Injection Well = 1.8 BGY or 4.8 MGD



St. Petersburg

Tropicana

Manatee CRIW

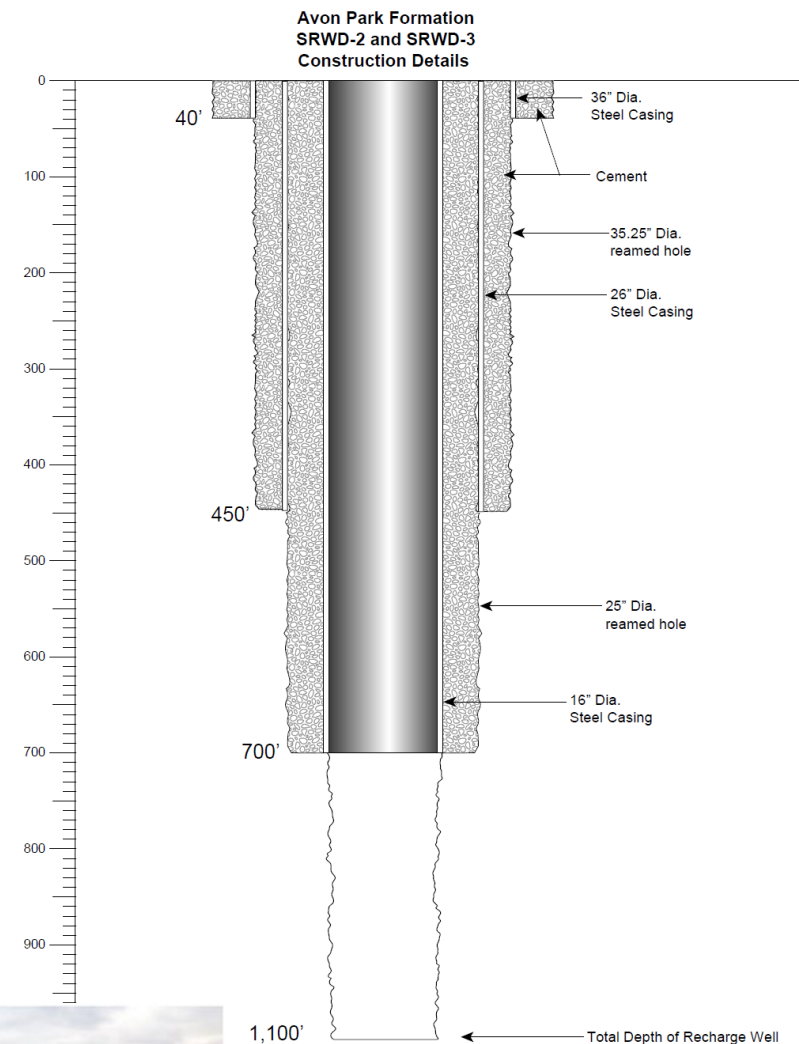


Graphic source adapted
from: SWFWMD Website **Most Impacted Area**

CASE STUDY

HILLSBOROUGH COUNTY SHARP

- South Hillsborough Aquifer Recharge Project (SHARP) uses reclaimed water to replenish the aquifer
- Several wells have been installed on the non-USDW side of the saltwater interface to improve water levels and slow SWI
- The initial three recharge wells are installed, with others under development
- Operation and start-up of the initial wells has been successful
 - Water levels in the northern part of the SWUCA MIA have seen recent improvements
 - Groundwater credits may apply to allow for additional regional public water supply
 - Considerable reduction in nutrient discharges to Tampa Bay with elimination ultimate goal



Revised 5/23/17

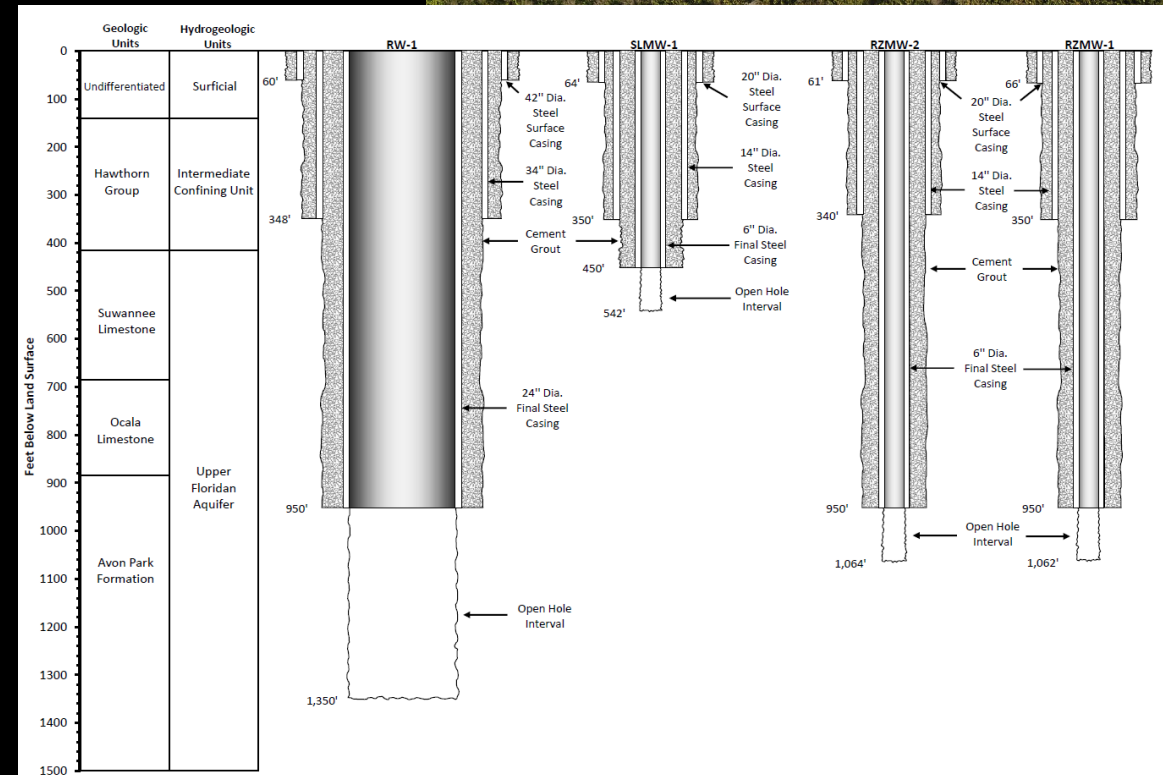
Recharge Well Construction Details

Permit Application



CASE STUDY FLATFORD SWAMP

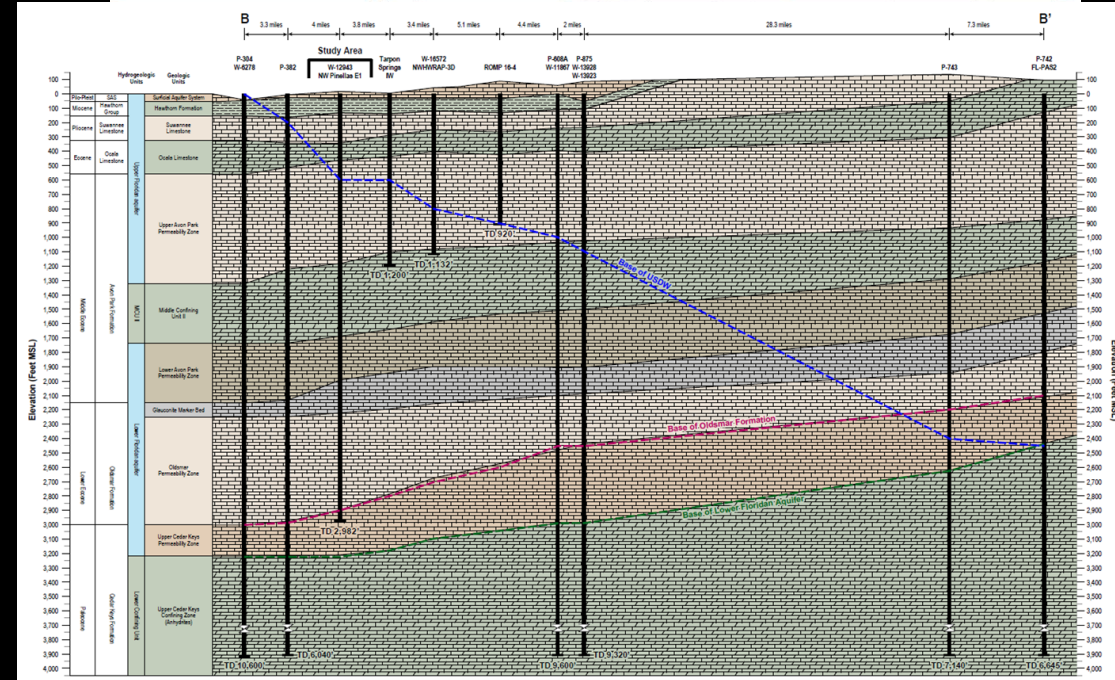
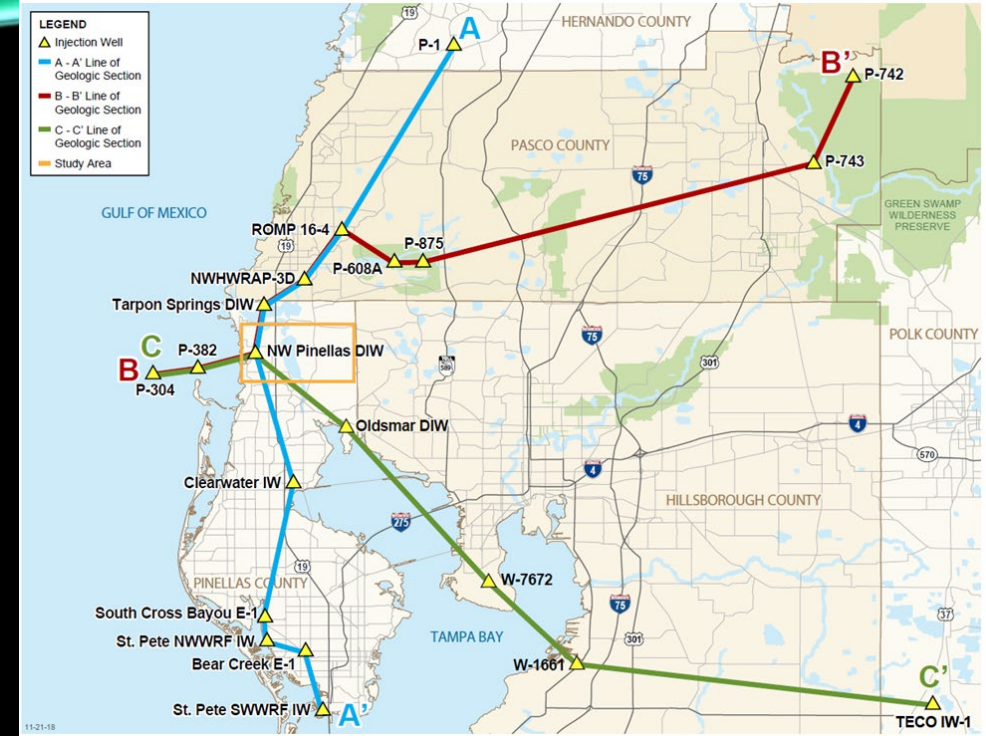
- Flatford Swamp Aquifer Recharge system installed by the SWFWMD to
 - restore hydroperiods to improve forested uplands
 - assist with SWUCA recovery efforts
- Surface water is available nearly year round
- Permitted for raw surface water initially, then disinfection required upon request to use well
- Good institutional control, multiple monitoring wells could provide an excellent opportunity to study attenuation of microorganisms in aquifer
- This project is designed to protect the aquifer from saltwater intrusion (permanent loss) but is treated like it will result in widespread contamination
- A real opportunity to improve the environment and the science is being lost while further aquifer loss occurs
- More than \$6M invested on this moving target



CASE STUDY

PINELLAS COUNTY LAKE TARPON MAR

- Objective to capture surplus surface water when available to restore groundwater levels in the Northern Tampa Bay area
- Well respected environmental groups have stated that discharges detrimental to Tampa Bay
- Obtain partial groundwater credits to supplement reclaimed water system
- Base of the USDW is shallow (<500 ft bls)
- Proposed injection zone is seawater (TDS more than 30,000 mg/L)
- Permit application submitted over 3 years ago
- Point of contention is whether disinfection is needed before injection
- FDEP concern is that water may potentially migrate eventually to a USDW and coliform and other microorganisms may not die-off
- SWFWMD co-funding demonstrates regulatory support



PRESENT RECHARGE PRACTICES

LOST OPPORTUNITIES

- FDEP has stated that EPA no longer supports using source waters containing coliform bacteria
 - The science supports rapid coliform die-off
 - All water requires disinfection, introducing chemicals unnecessarily into our aquifers that is often cost-prohibitive to implement
 - We have a dataset of over 100 years in Florida that has demonstrated the safe and effective use of drainage wells for stormwater management
- Fundamental to the UIC program is that your injection activities not result in a higher level of treatment for future potential drinking water use
 - Even if coliform did not die off this fresh groundwater is much easier and less costly to treat than native groundwater
 - RO treatment would be required at many of these sites

PRESENT RECHARGE PRACTICES

LOST OPPORTUNITIES

- Example aquifer recharge projects that have been unnecessarily delayed, shelved or canceled
 - Suwannee River WMD – Aquifer recharge projects to restore baseflow in the Suwannee River
 - Little Orange Creek – Pilot project (1 mgd) to restore spring flow in the SJRWMD
 - Hillsborough County Lake Mead – Stormwater recharge to control neighborhood flooding when other traditional stormwater solutions are difficult
 - Lost or plugged drainage wells that are not allowed to be replaced
 - Everglades restoration
 - Indirect potable reuse applications
- Many ASR applications (e.g., Peace River, North Port) have also lost momentum due to the total coliform issue and unnecessary need for treatment

OUR FUTURE RECHARGE WELLS

- Less treatment prior to recharge as aquifer treatment becomes better recognized
 - We must, as a state, recognize coliform die-off occurs naturally
- Recharge wells must become more common with stormwater management and flood protection
- Recharge wells will assist with major water issues in Florida
 - Red tide and blue/green algae
 - Recovery strategies in WUCAs
 - Lake Okeechobee water quality issues
 - MFLs and spring recovery strategies
 - Combat sea level rise and saltwater intrusion
- FDEP programs (e.g., CFWI) will rely on MAR solutions to have any chance of success



SUMMARY

- Properly designed, permitted, and operated recharge systems can improve groundwater and surface waters while making FL more sustainable
- Flashy availability and lack of topography make treatment impractical for stormwater applications
- Study after study demonstrate microorganism inactivation in aquifer
- A significant portion of our drinking water, particularly in central FL, is groundwater originating from drainage wells
- Florida should establish a workgroup (TAC) to meet with EPA to advance recharge of natural surface waters and learn from FL history
- Time is of the essence as we continue to lose the battle with saltwater intrusion in this state surrounded by saltwater



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QUESTIONS?