

*2012 Lower East Coast
Water Supply Plan Update
WORKSHOP #3
June 19, 2012*

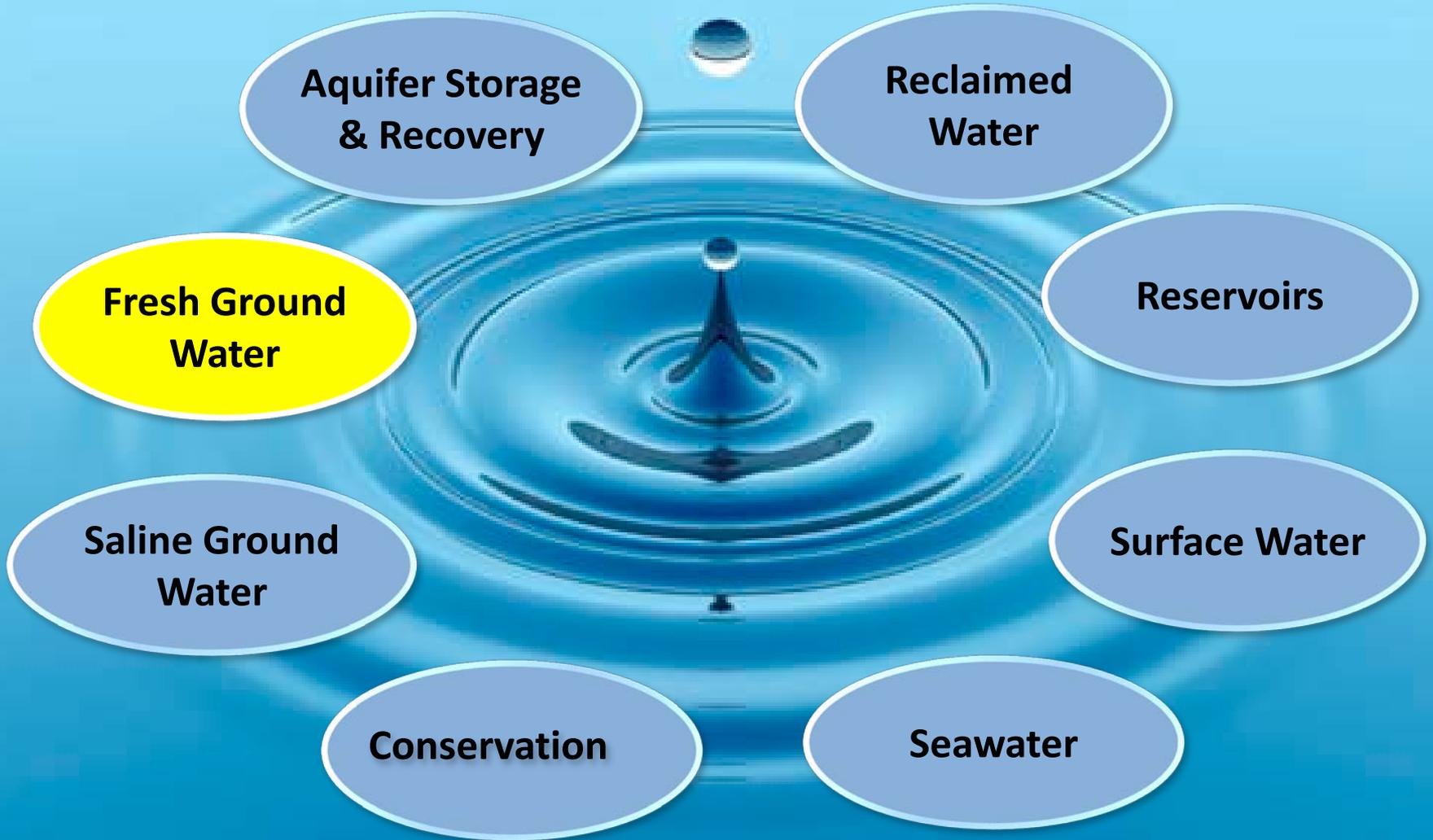
Water Source Options

Mark Elsner, P.E.
Section Administrator
Water Supply Development
Water Supply Bureau

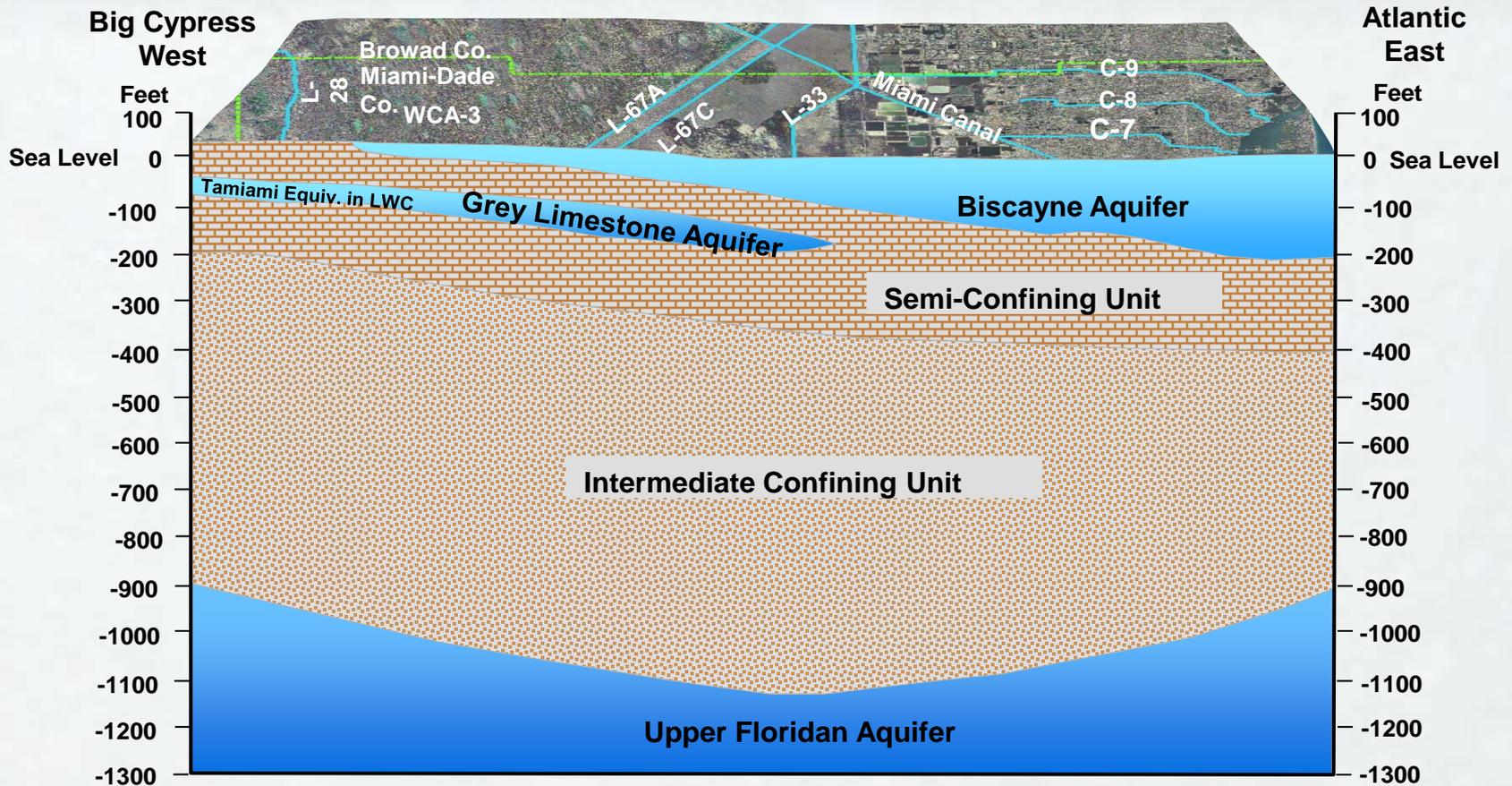
Total Demand Projections

Water Use Category	2010 (MGD)	2030 (MGD)	Increase (MGD)
Public Water Supply	845.3	1,005.9	160.6
Domestic Self-Supply	16.6	18.5	1.9
Agricultural Self-Supply	604.0	674.5	70.5
Industrial/Commercial/Institutional Self-Supply	44.3	56.6	12.3
Recreational/Landscape Self-Supply	148.9	152.8	3.9
Power Generation Self-Supply	11.7	33.3	21.6
Grand Total for LEC Planning Area	1,670.8	1,941.6	270.8

Water Source Options



General LEC Hydrogeologic Cross Section

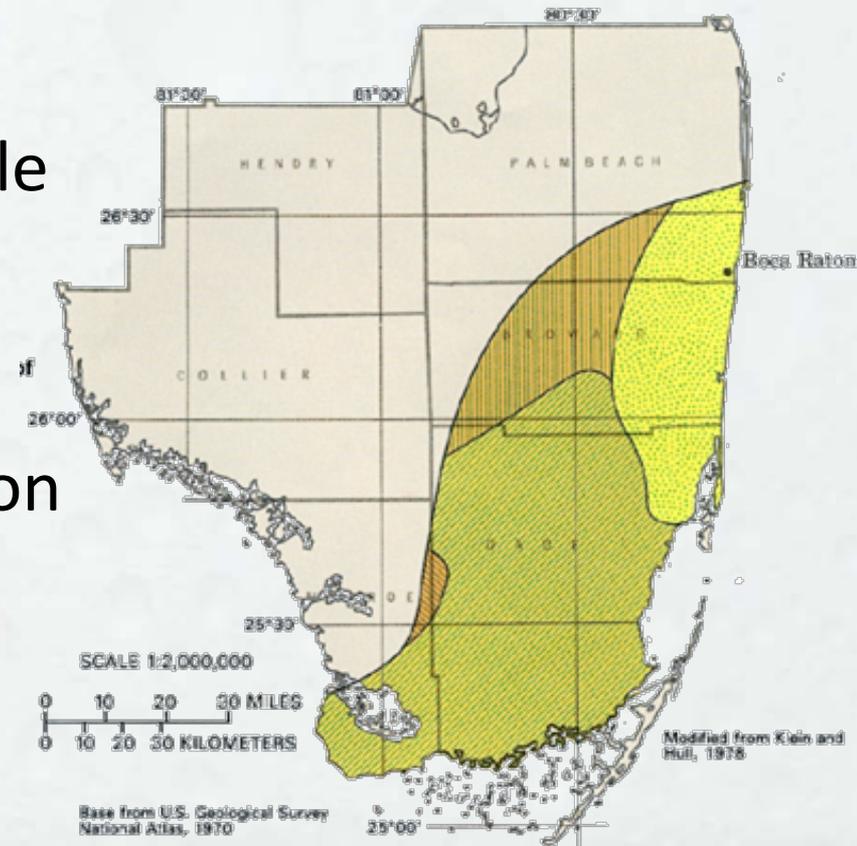


Fresh Groundwater

Surficial Aquifer System including Biscayne Aquifer

Increased withdrawals limited

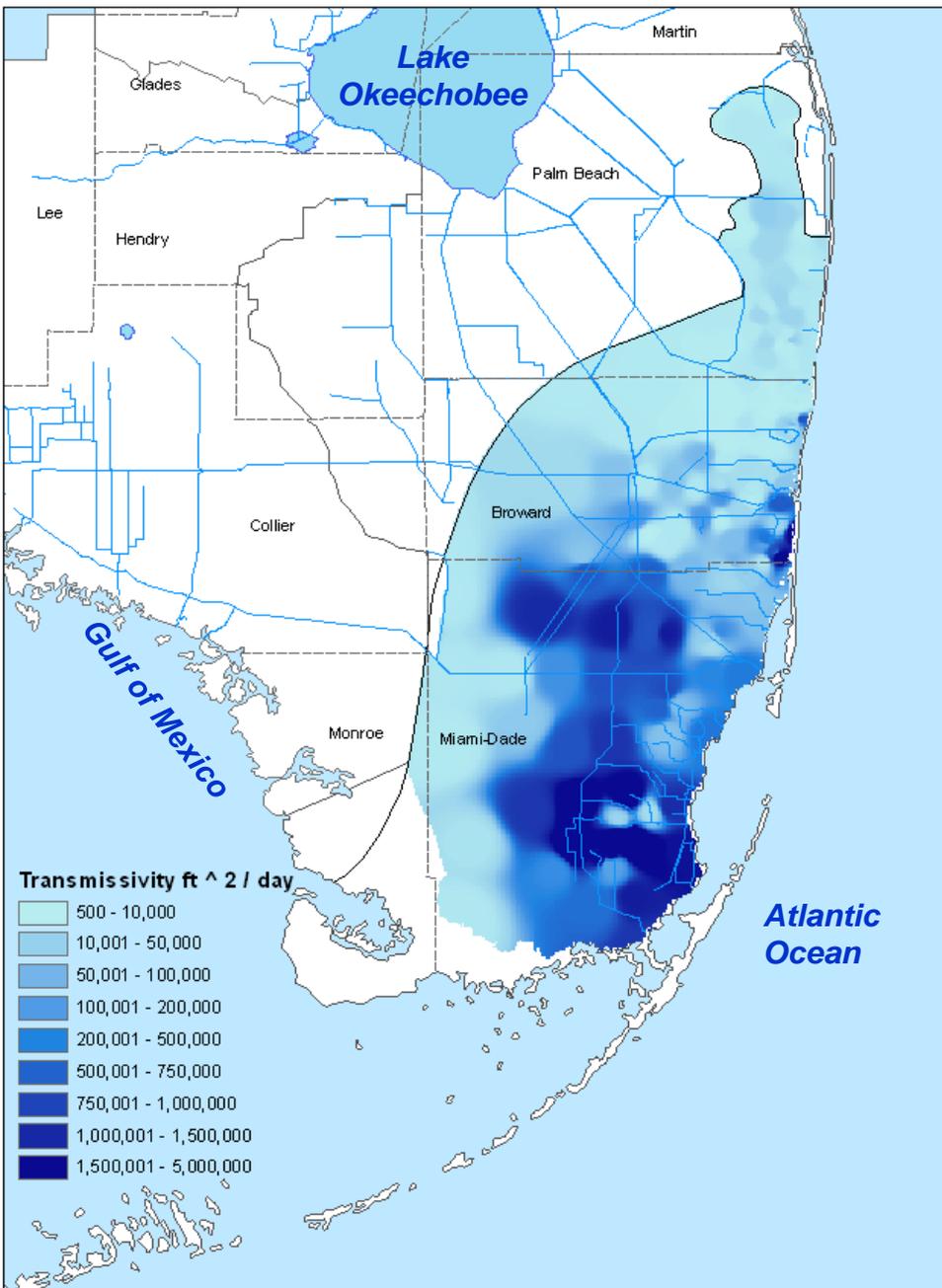
- Restricted Allocation Area Rule
- Wetland harm
- Pollution sources
- Threat of saline water intrusion
- Minimum flows & levels



Transmissivity

Biscayne Aquifer

- Highly permeable limestone, very productive
- Designated “Sole Source Aquifer” by USEPA

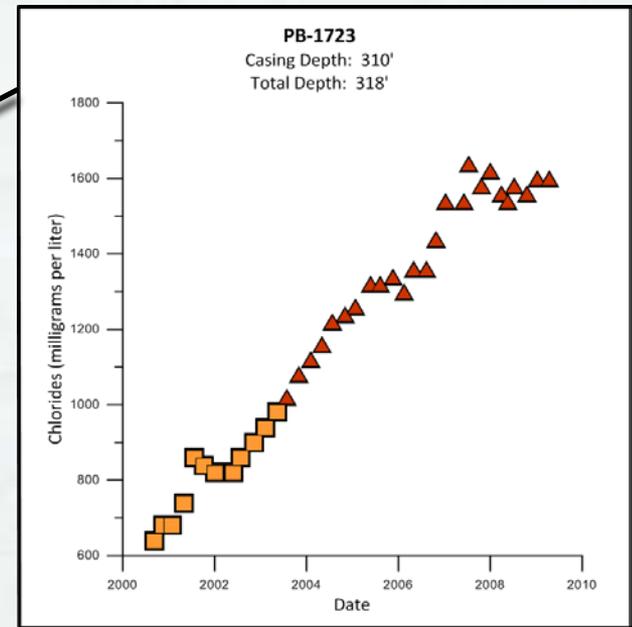


Saline Water Intrusion

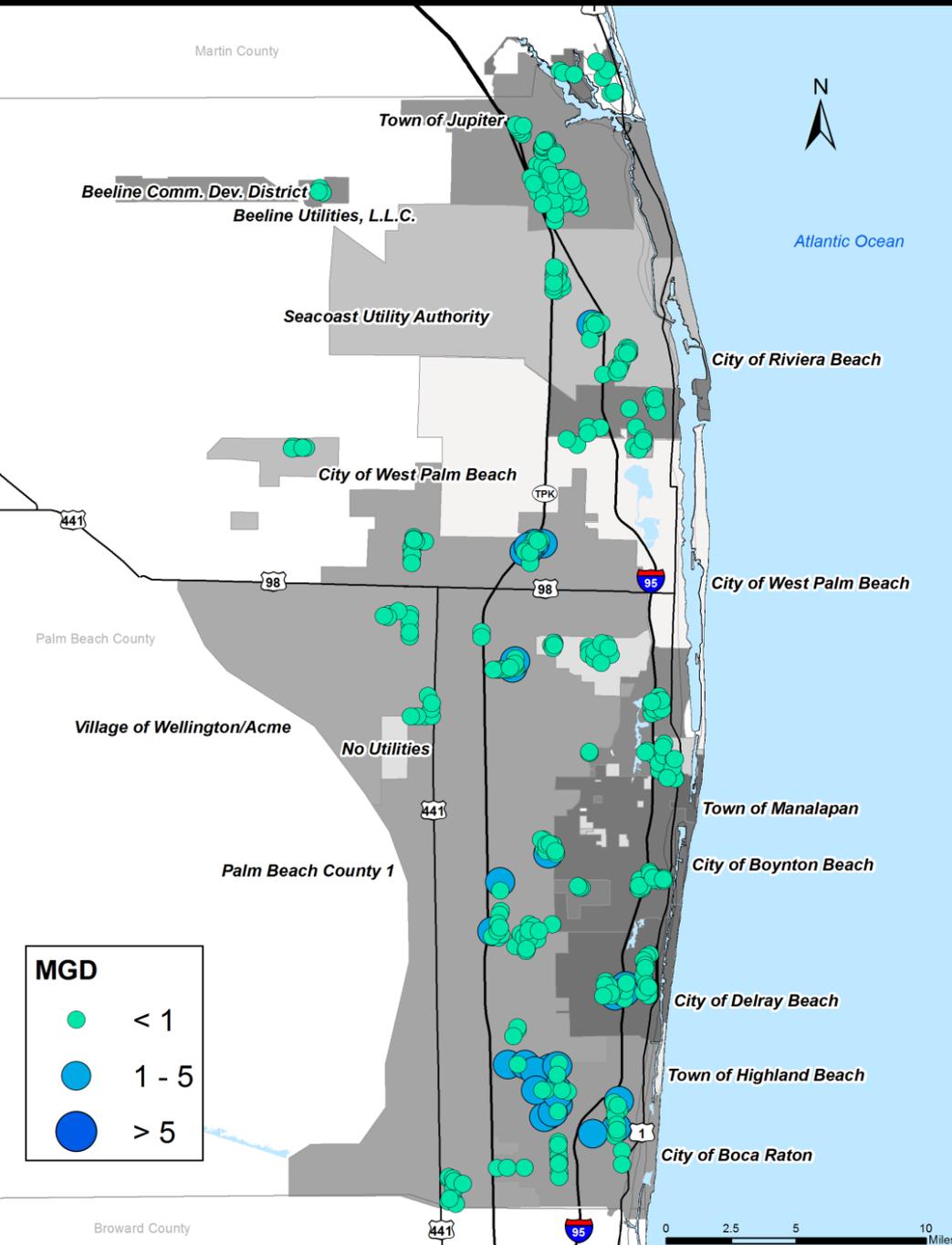
- Monitoring network
- Updated county maps in 2011
- Some coastal wellfields threatened
- Impact minimization
- Sea level rise
 - 4 county compact



2011 Freshwater-Saltwater Interface Maps

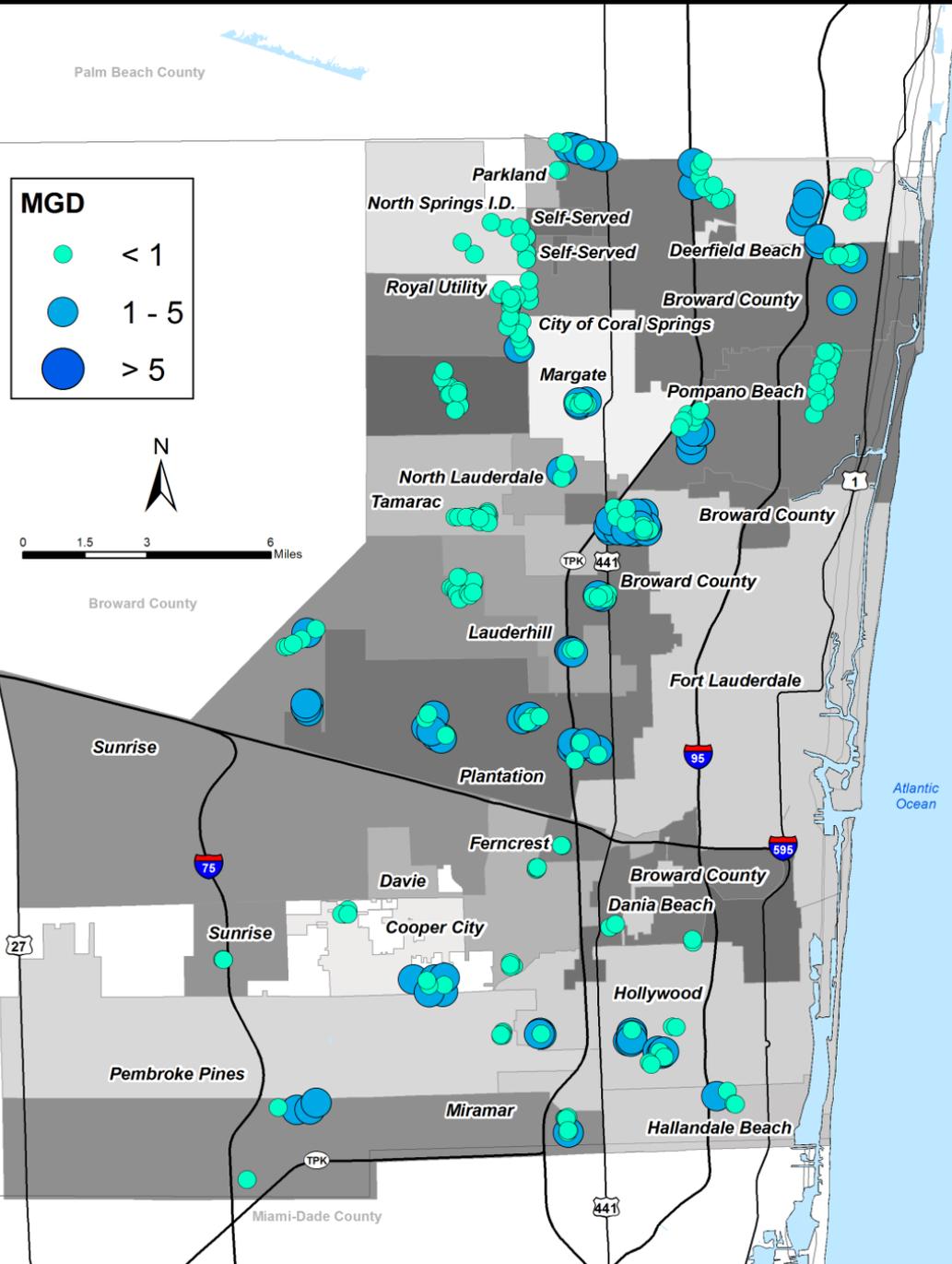


www.sfwmd.gov, click on Library and Multimedia, then enter in search window "saltwaterinterface"



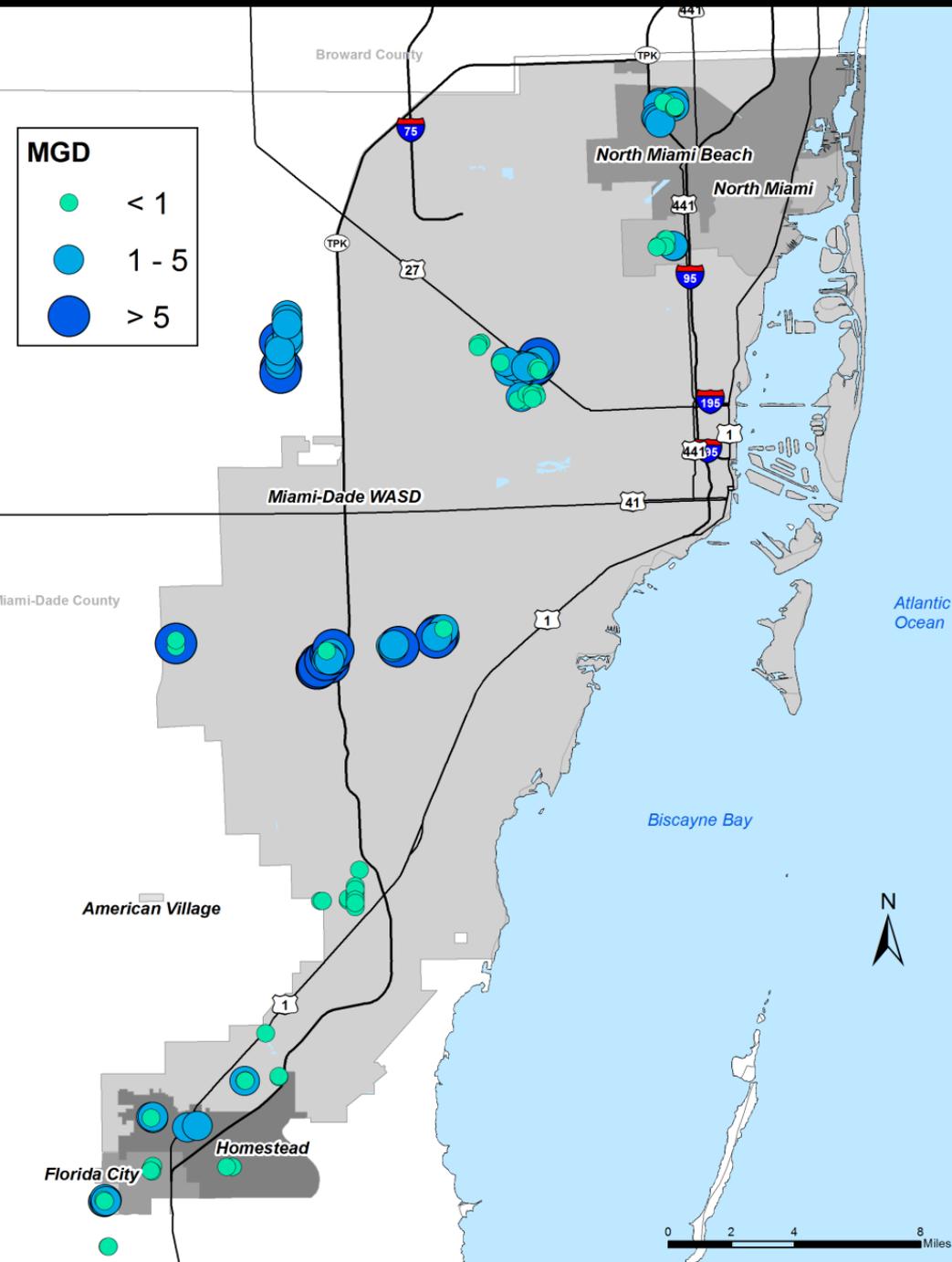
Palm Beach County

2010 Public Water Supply Surficial Aquifer System Withdrawals



Broward County

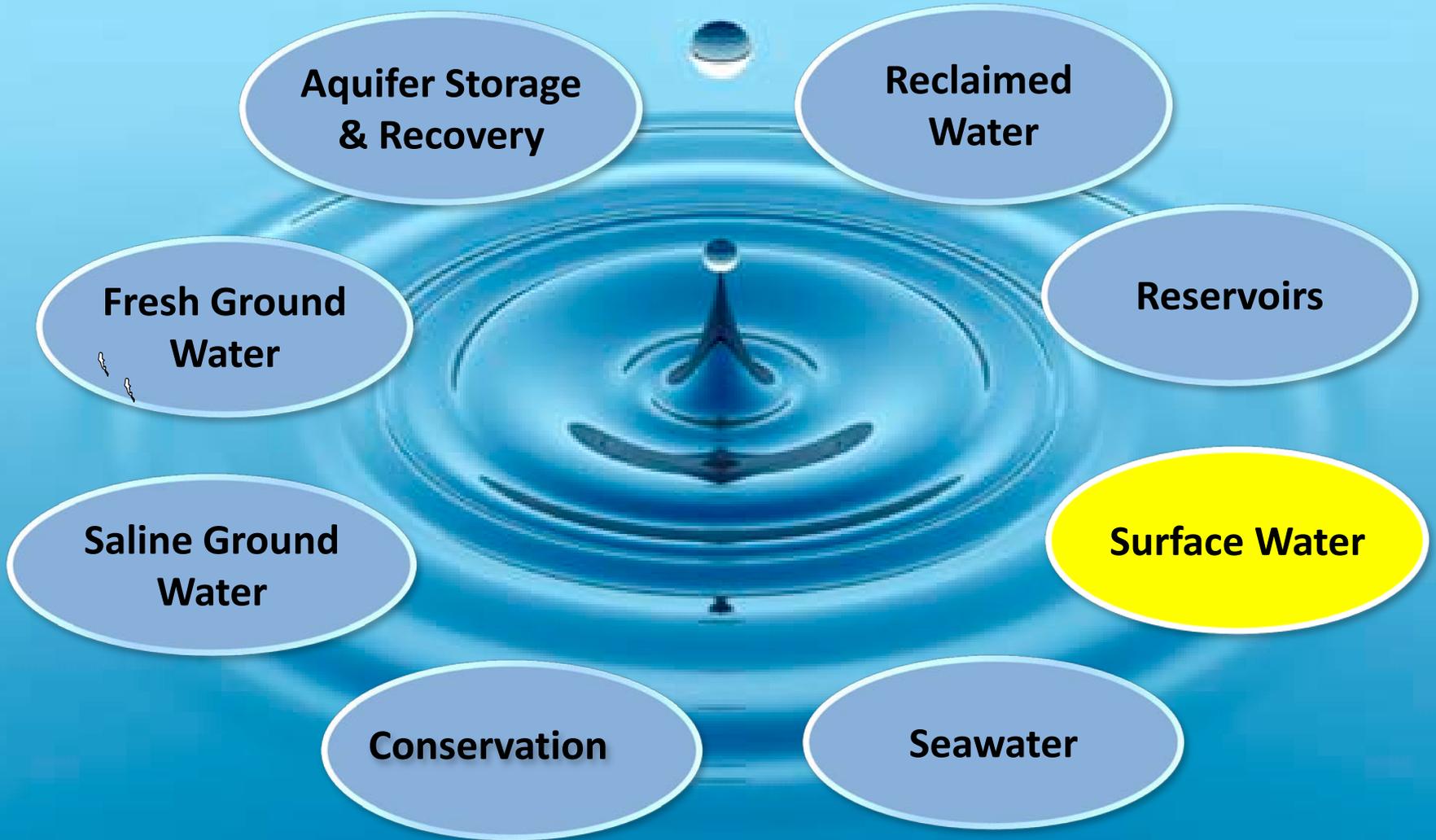
2010
Public Water Supply
Surficial Aquifer System
Withdrawals



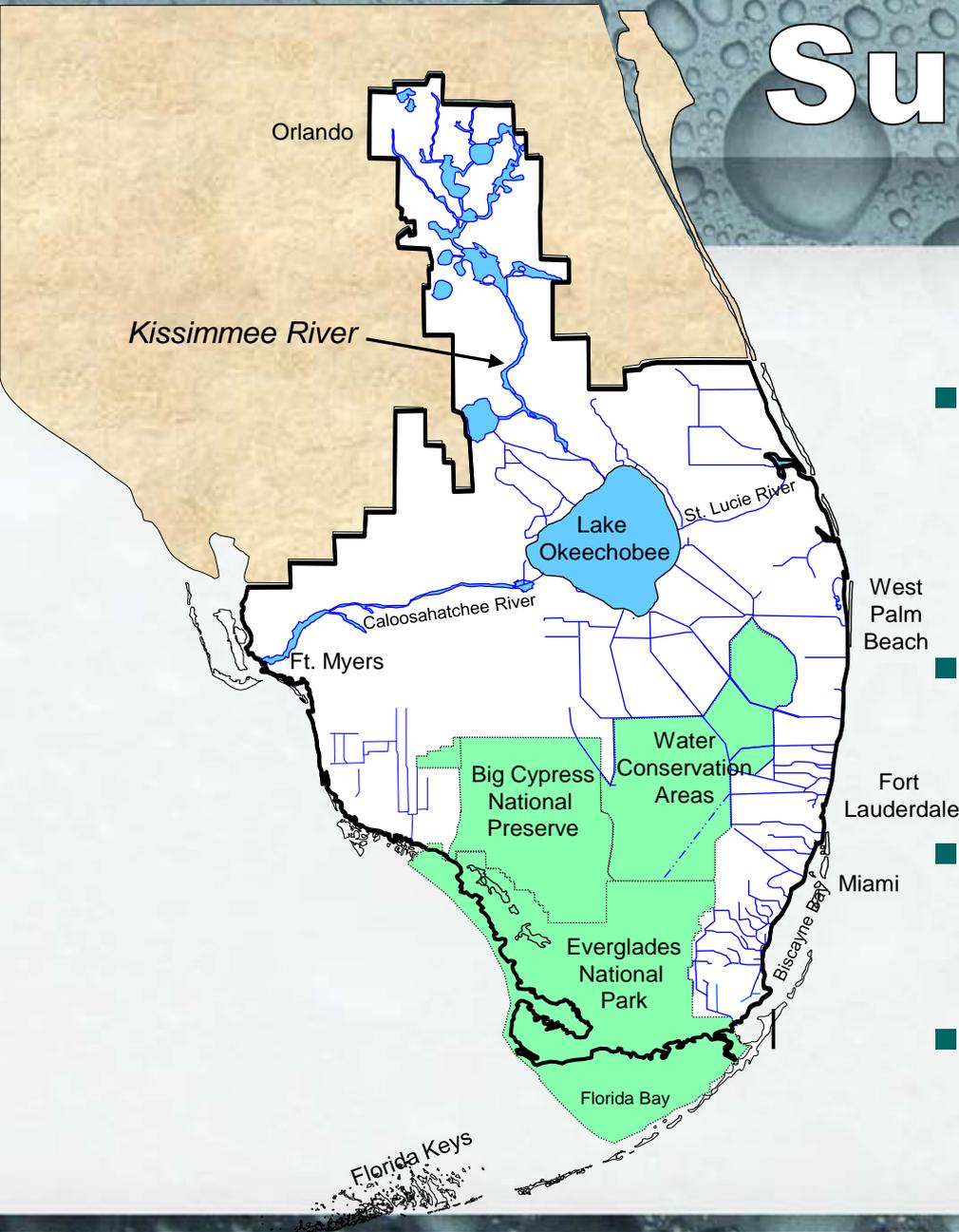
Miami-Dade County

2010 Public Water Supply Surficial Aquifer System Withdrawals

Water Source Options



Surface Water



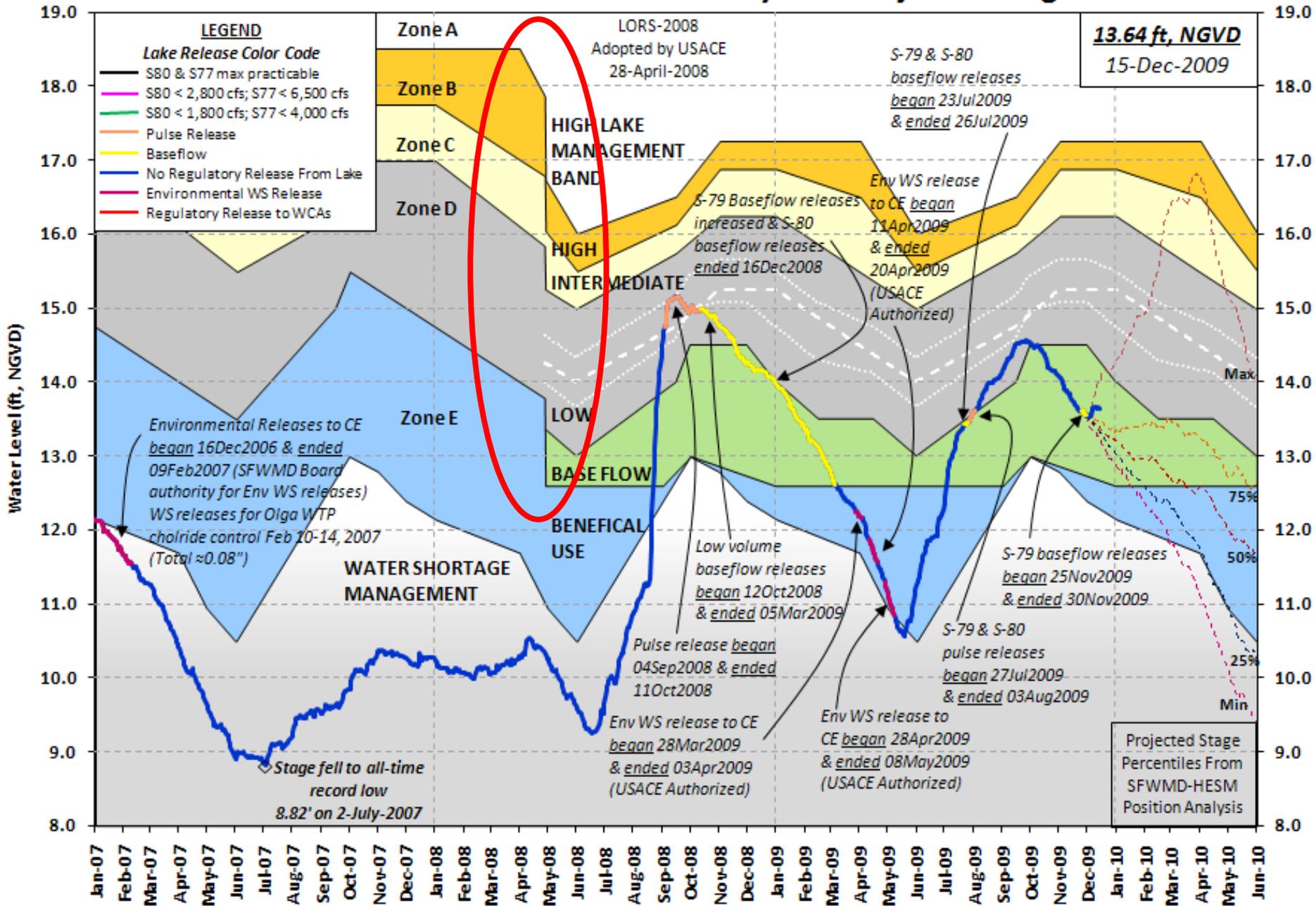
- Lake Okeechobee, Water Conservation Areas and canals
- Increased withdrawals limited
- LOSA and LECSA Restricted Allocation Area Rules
- Minimum flows and levels

Lake Okeechobee



- 730 sq miles
- 3.3 M acre-feet when at 13.5 ft
- Water supply for urban, agriculture and the environment
- Regulation schedule - LORS08

Lake Okeechobee Water Level History and Projected Stages



LOSA Restricted Allocation Area Rule

- **New Lake Okeechobee Regulation Schedule (LORS 08)**
 - Changed MFL from “prevention” to “recovery” status
 - Reduced existing legal user certainty from 1 in 10 to 1 in 6
 - Kept same water shortage trigger line
- **LOSA Restricted Allocation Area rule adopted 2008**



Lake Okeechobee

■ Agriculture

- LOSA – 703,989 acres
- EAA – 458,240 acres

■ Public Water Supply

- City of Okeechobee
- Back-up for LECSA

Environment

- Lake ecosystem
- Everglades
- Estuaries

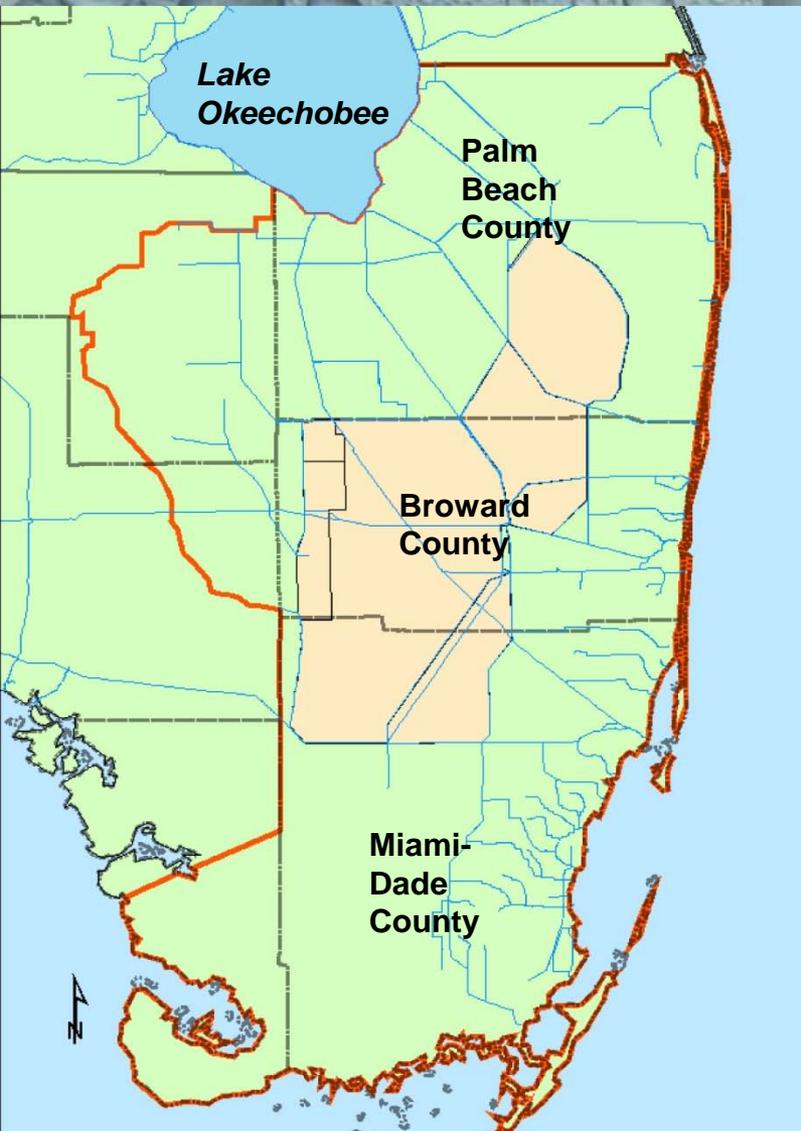


Water Conservation Areas

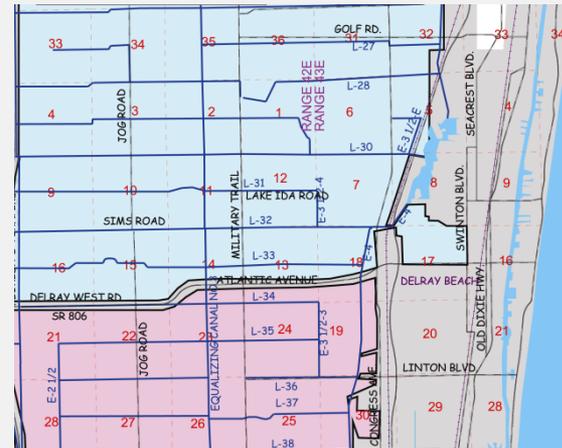


- 1,300 sq miles
- Provide water storage for flood control and water supply to east coast areas and Everglades National Park
- Regulation schedules represent seasonal and monthly limits for storage
- Minimum floor restricts releases unless water can be replaced
- Everglades Restoration Transition Plan for WCA 3A is complete; USACE approval pending

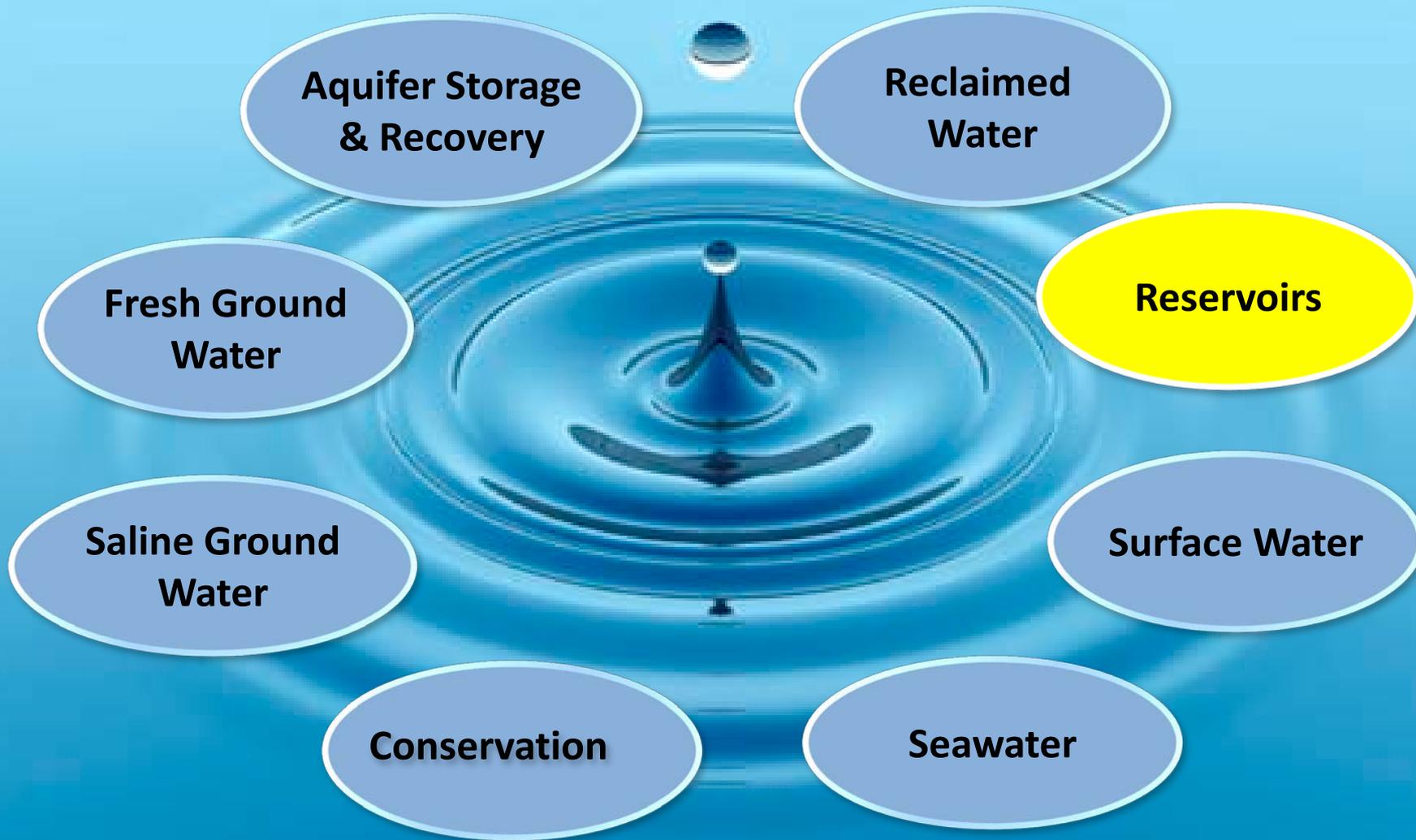
Canals



- Initially constructed for drainage and flood control
- Regional system: 1,800 miles
- Significant secondary and local canal systems
- Operation & structural changes
- Urban stormwater recycling



COMING UP



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Reservoirs

Dean Powell
Water Supply Bureau Chief
Water Resources Division



RESERVOIR:

A large natural or artificial lake used as a source of water supply

Source: Oxford Dictionary, 2012

L-8 Reservoir Project



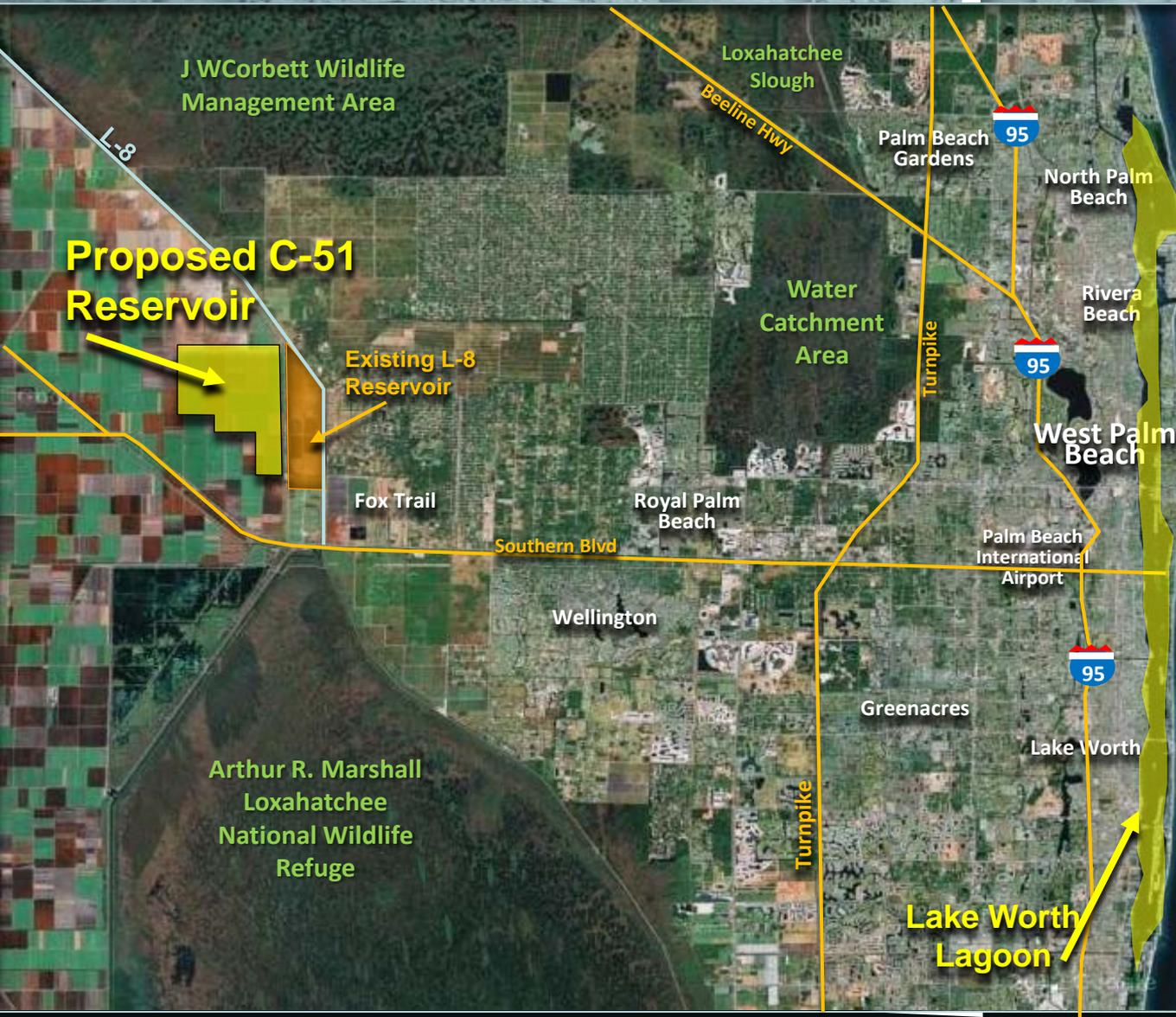
- Existing
- Northwestern Palm Beach County
- Former 950-acre rock mine
- 46,000 ac/ft of storage
- Capture and store excess surface water from L-8 basin
- Benefit South Florida's ecosystem and sustain regional water supplies

L-8 Reservoir

Recent Regional Water Resource Benefits

- In 2004 and 2005 used for flood control to protect local communities during hurricanes
- In 2010, used for FPL cooling system, reducing demands on groundwater supplies
- In 2011 pilot project utilized small pumps to send freshwater to the federally designated “Wild and Scenic” Northwest Fork of Loxahatchee River
- In 2007 and 2011 provided deliveries to the City of West Palm Beach

C-51 Reservoir Project



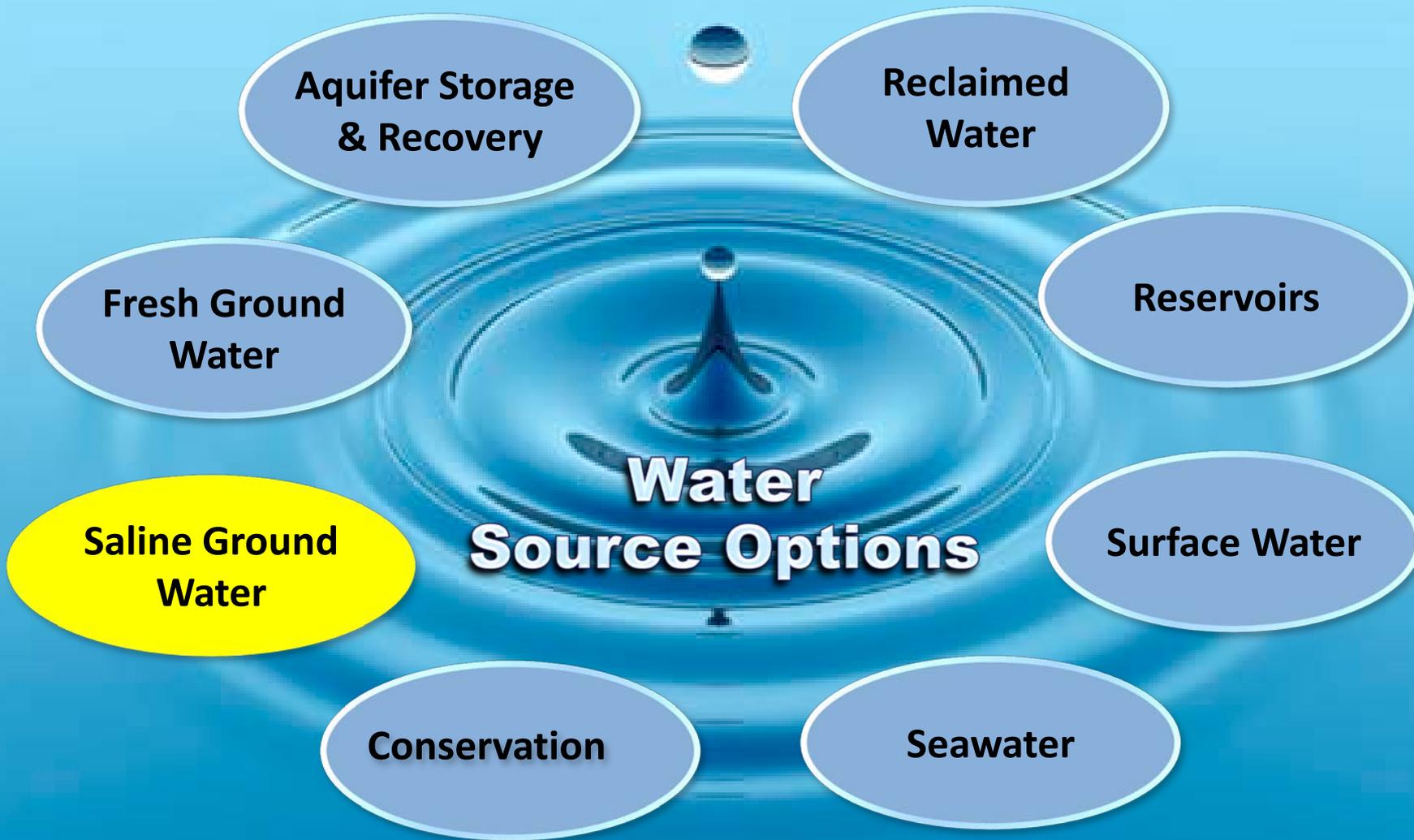
- Proposed
- Located in western Palm Beach County
- 75,000 ac/ft of storage
- Capture and store excess surface water from C-51 basin
- Increased water storage and delivery to help benefit South Florida's ecosystem and sustain regional water supplies
- Reduce harmful discharges to the Lake Worth Lagoon

C-51 Reservoir

Preliminary Design and Cost Report

- I. Background/Introduction
- II. Water Demand Projections
- III. Water Availability Analysis
- IV. Conveyance Analysis
- V. Water Quality Discussion
- VI. Cost Estimates

COMING UP



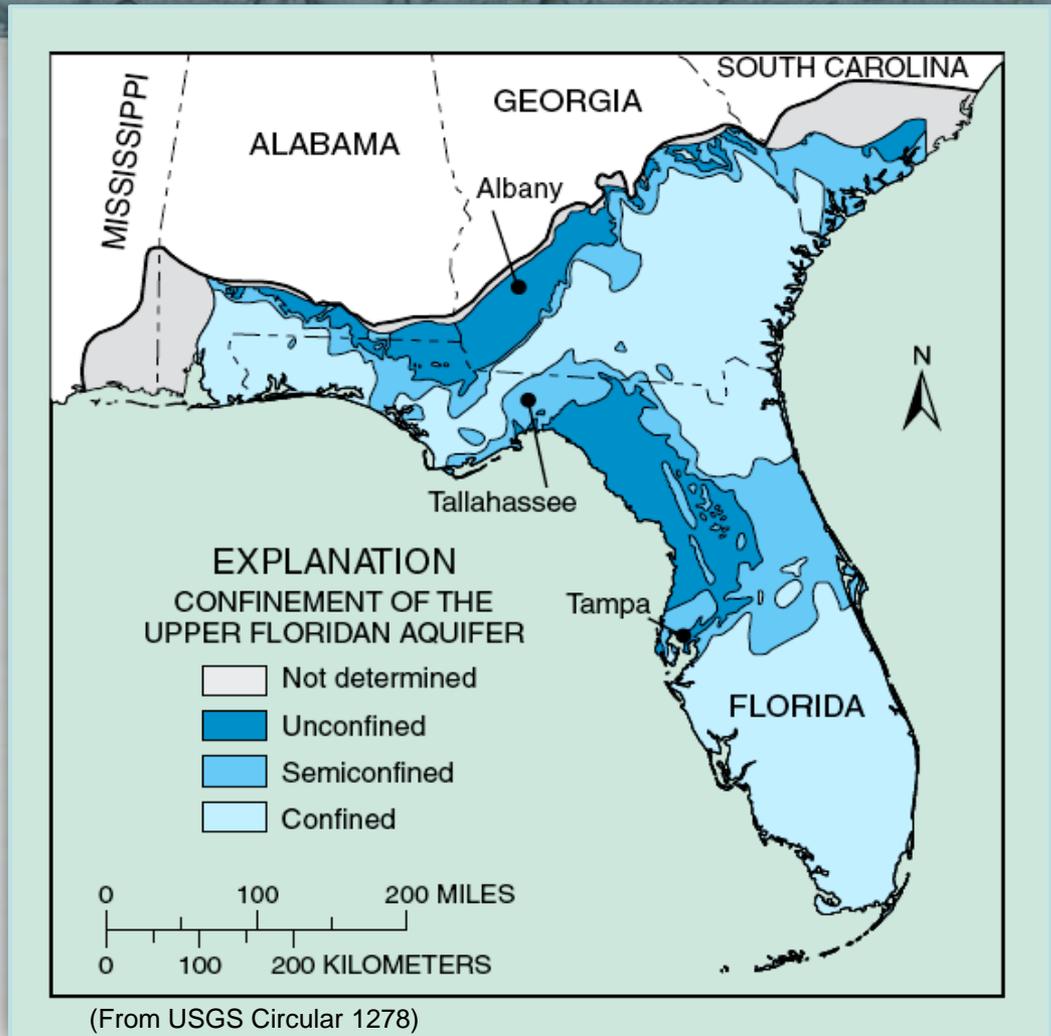
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Saline Ground Water

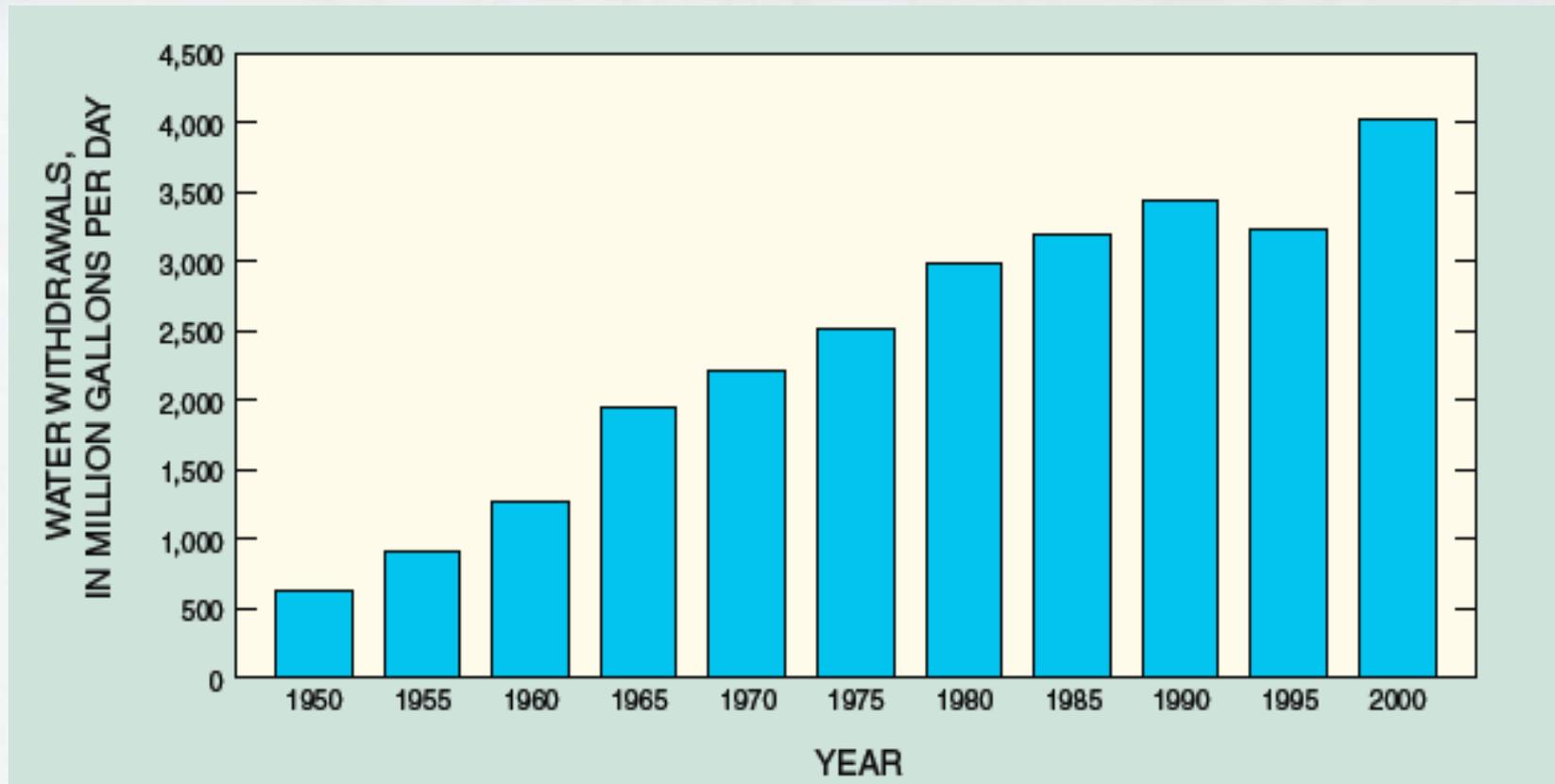
Bob Verrastro, P.G.
Lead Hydrologist
Water Supply Bureau

Floridan Aquifer System

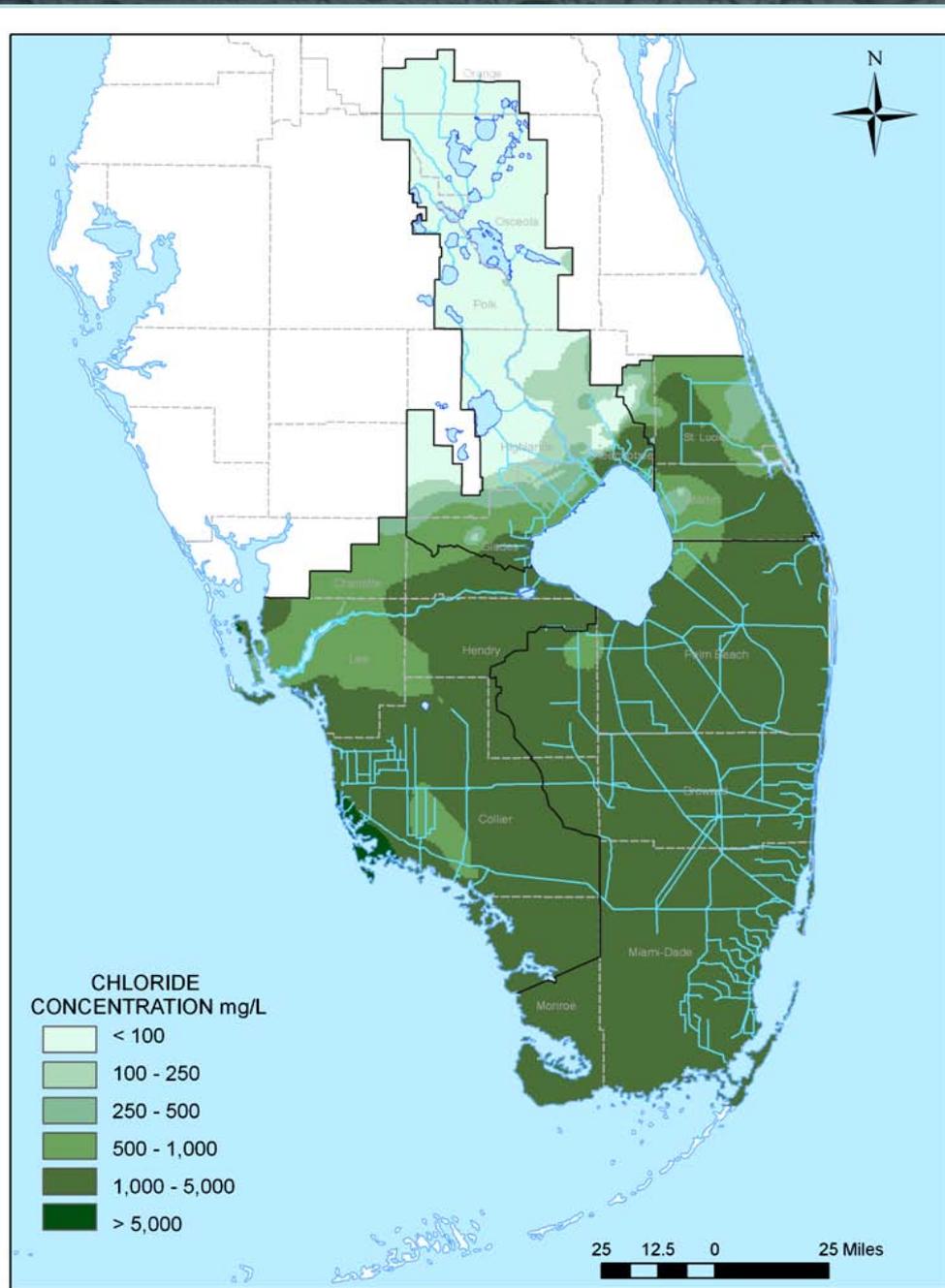
- Recharge Area in Central Florida (Unconfined)
- Confined aquifer in south Florida – less water released from storage, greater drawdowns



Use of the Floridan Aquifer



Total Demand from the Floridan Aquifer System from 1950 to 2000
(USGS Circular 1278)

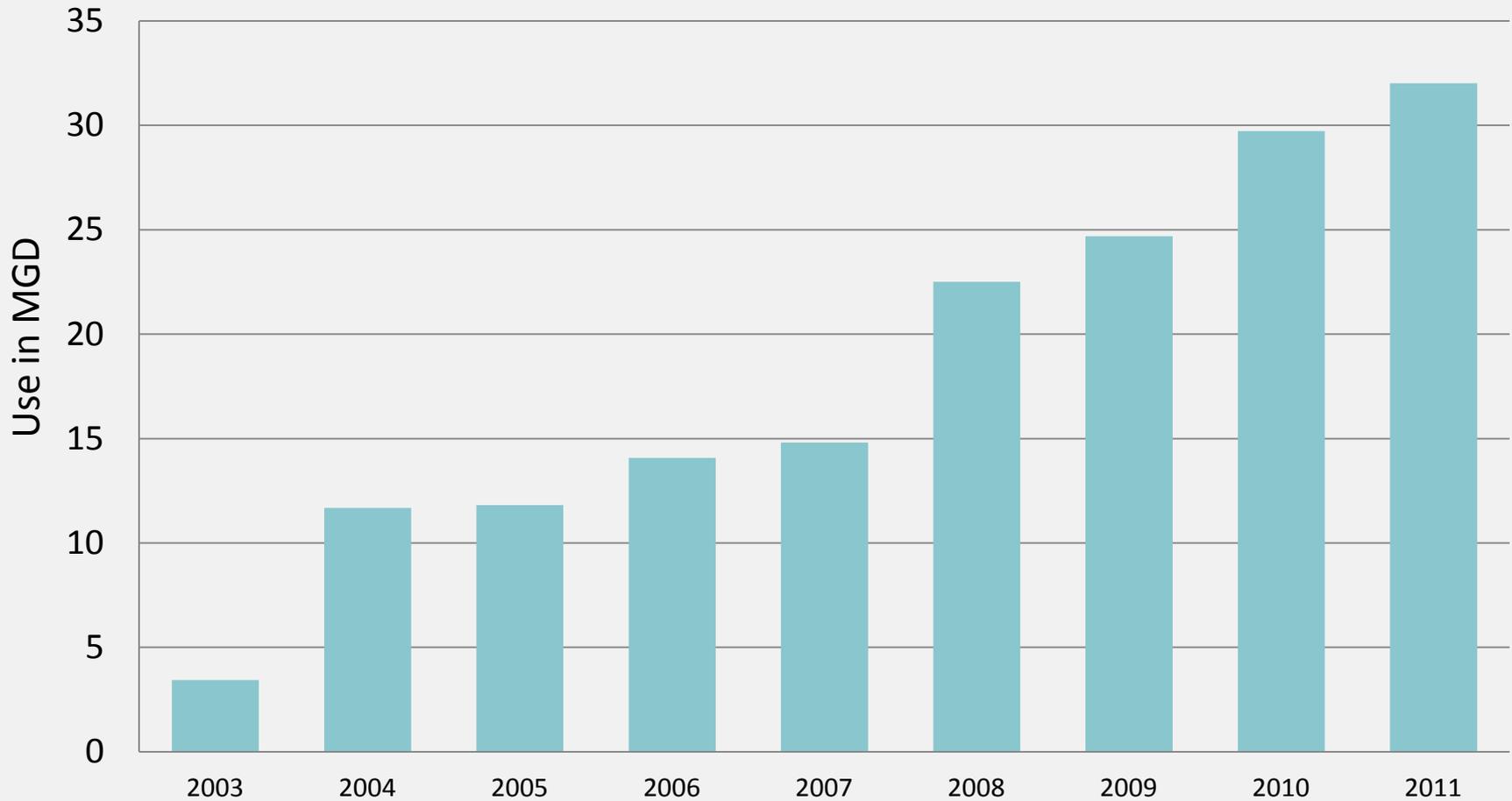


Chloride Concentrations in the Upper Floridan Aquifer

In LEC

- Chlorides above 1,000 mg/L require treatment by membrane process
- Wells are deeper and treatment costs are higher than surficial sources
- Wellfield design is critical to maintaining dependable water quality

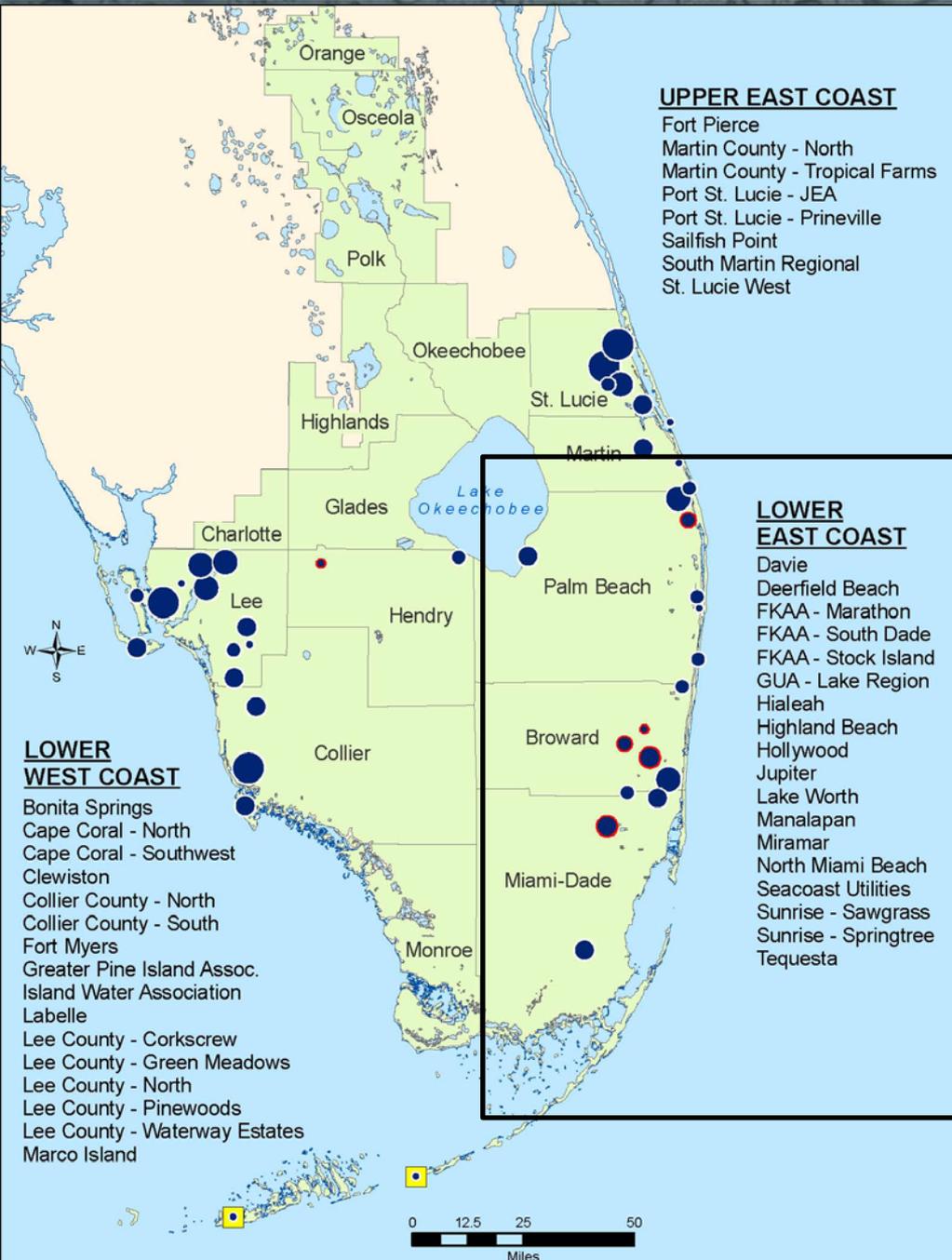
Floridan Aquifer Withdrawals in LEC in 2011 – 32 MGD



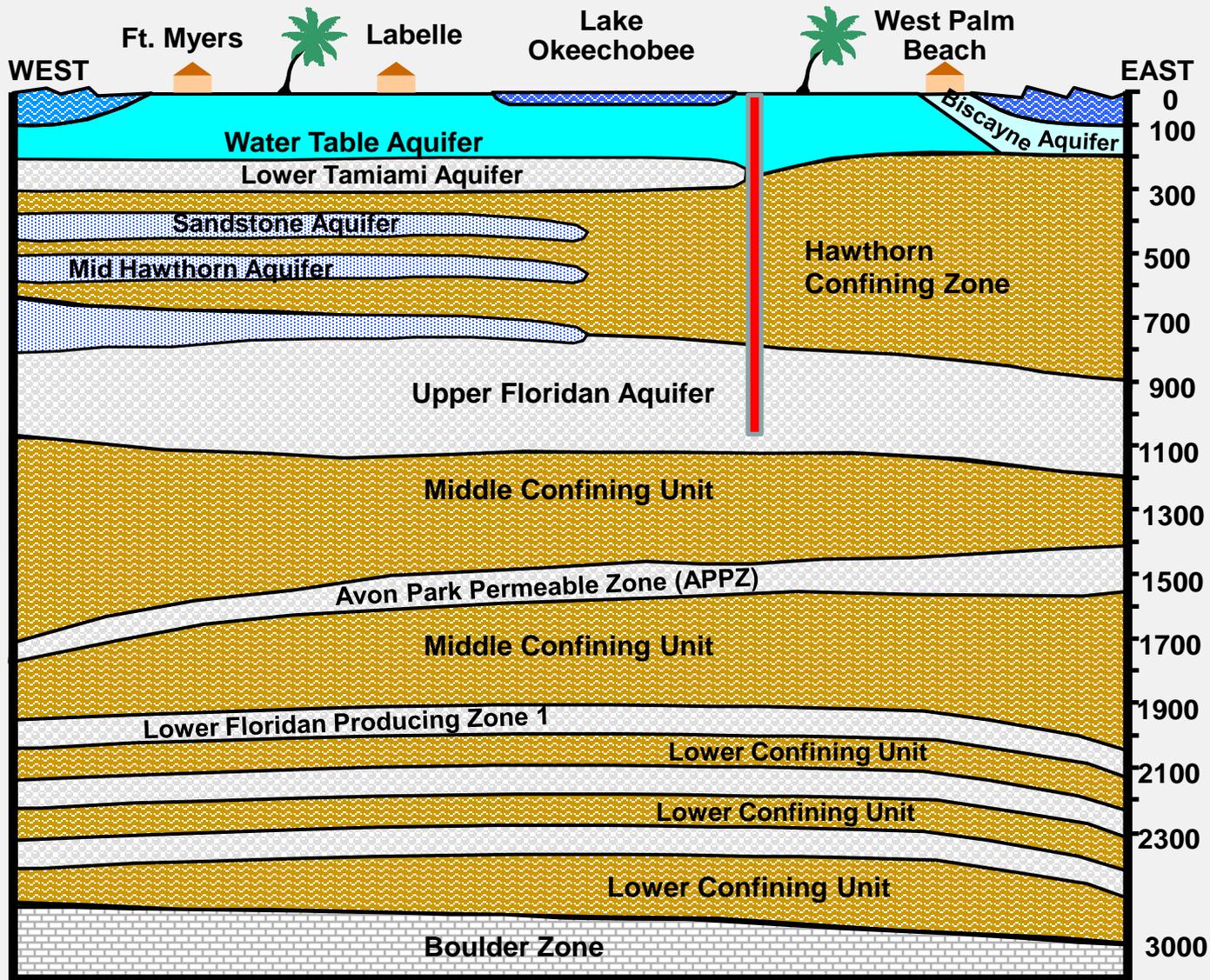
Potable Water Desalination Plants in 2012

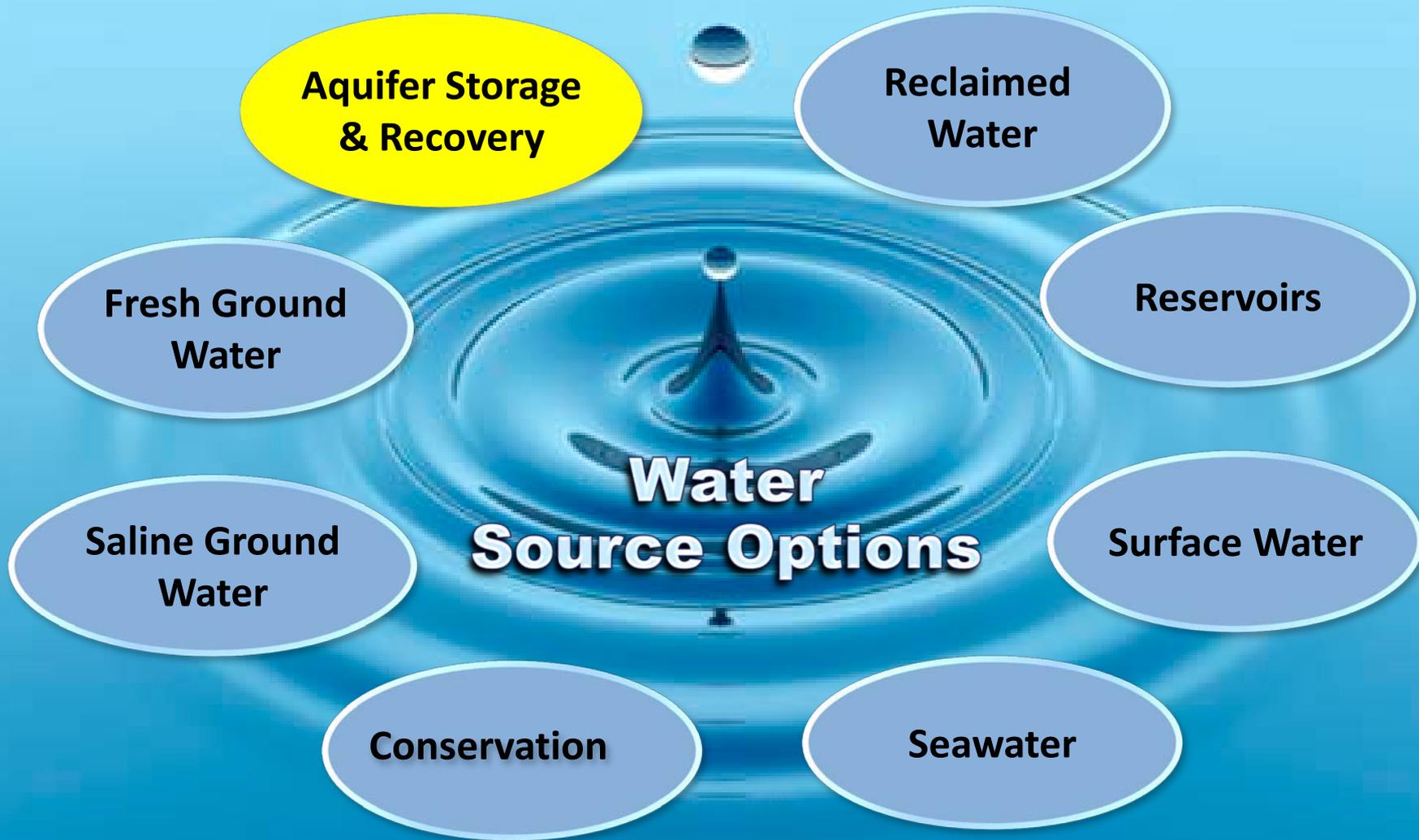
Number of Facilities in LEC: 13

Total Treatment Capacity in LEC: 85.7 MGD



Generalized Aquifer System of South Florida





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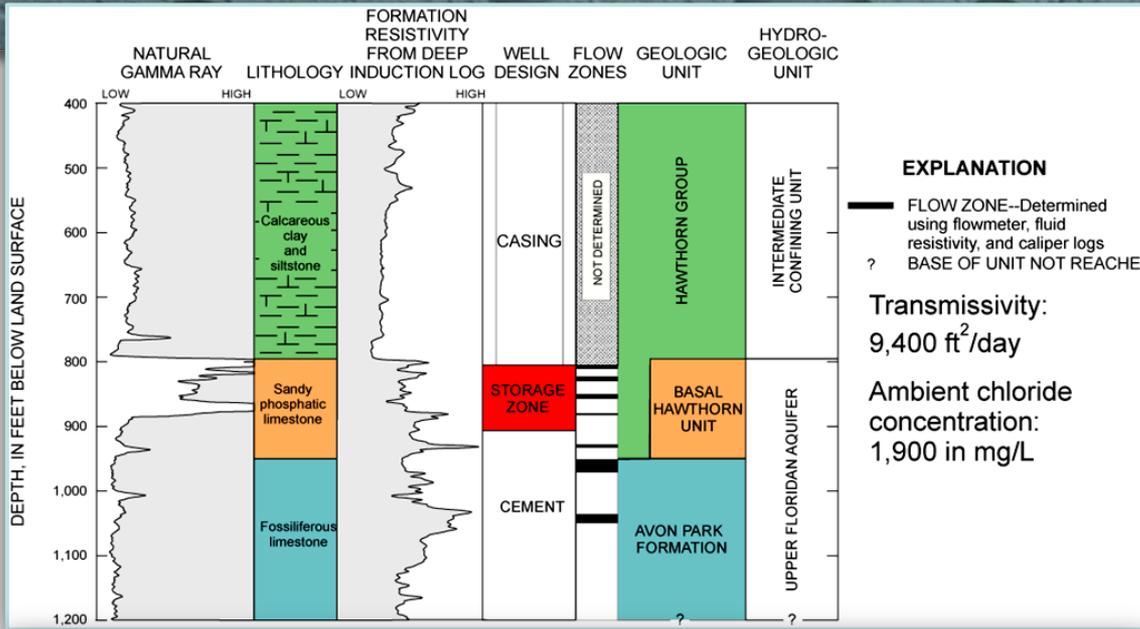
Aquifer Storage & Recovery (ASR)

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Lead Hydrologist
Water Supply Bureau



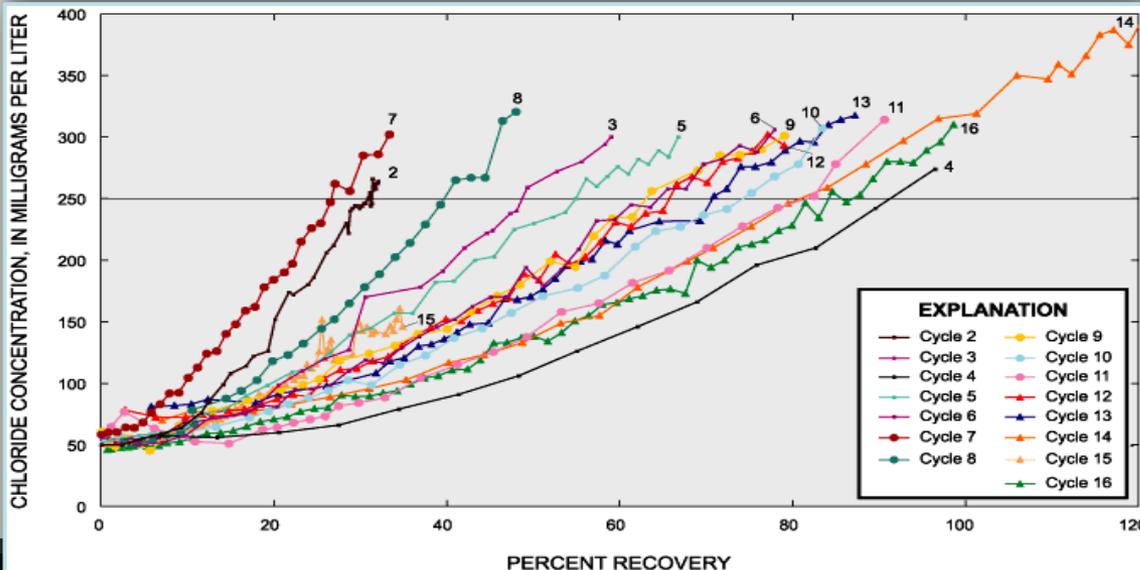
The Sunrise Springtree ASR Well

The Boynton Beach System



To date, the most successful ASR system in LEC..... why?

- Targeted storage zone at top of FAS
- Sandy, low transmissivity interval
- Multiple successive cycles
- Recovery efficiency near 100%



Interesting Tests are on Their Way....

West Palm Beach

- High capacity well: 8 MGD
- Completed in a FAS zone with 3,000 mg/L TDS
- Pursuing a “minor” aquifer exemption to test surface water without disinfection

Miami-Dade West & Southwest Wellfields

- Idle since 2000
- UV systems recently installed
- Will test with groundwater from Biscayne aquifer



Lessons Learned from the CERP ASR Projects



- High capacity (5 MGD) wells are possible
- Minimally treated surface water works well as a source
- Tests indicate arsenic mobilization can be inhibited, but costs are high
- Ongoing studies support reduction in disinfection requirement

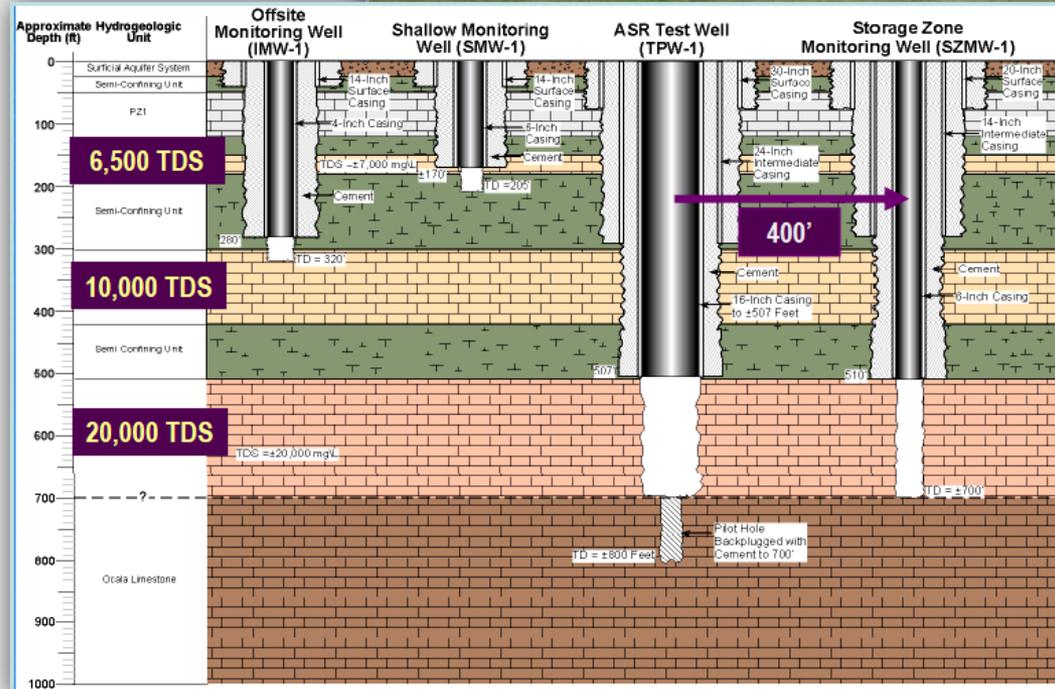
Marco Island System

- Largest ASR system in the SFWMD
- 7 wells, 9 MGD capacity, since 1997
- Arsenic not a problem
- 1.7 billion gallons currently stored
- Pump treated surface water to ~750' deep – sandy portion at top of Floridan aquifer



Englewood ASR System: Reclaimed Water

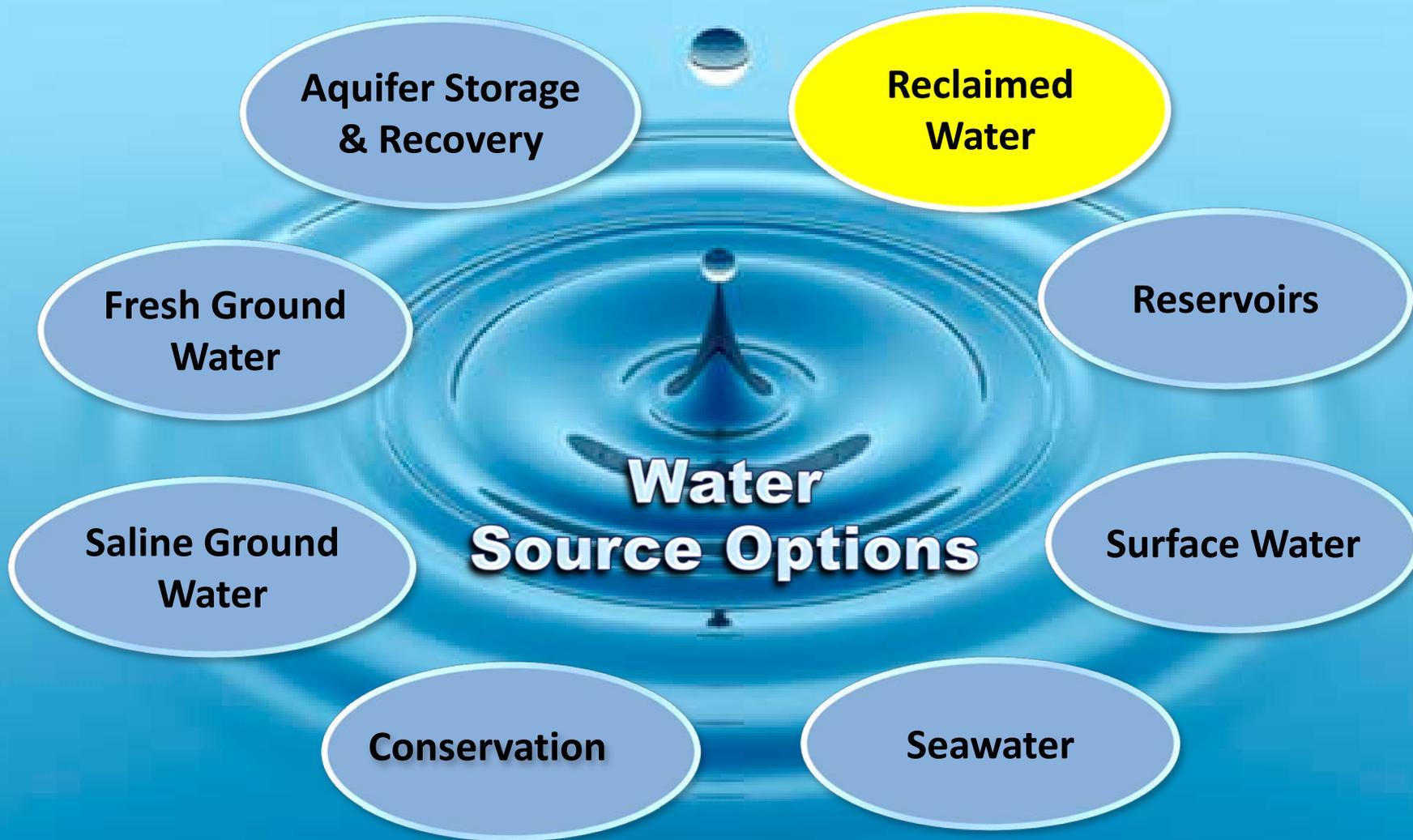
- Potential well design to comply with Ocean Outfall Rule
- Completed in Floridan aquifer zone with $>10,000$ TDS water
- Recovered water is routed to reuse pump station
- Blended with reclaimed water
- No additional treatment required
- Recovery efficiency is not critical; well provides for wet weather disposal capacity



Conclusions

- ASR is a viable technology, but a robust commitment to testing must be made
- Well design and construction is critical to achieving high recovery efficiency
- Native water quality in the aquifer currently drives the degree of treatment
- Technology exists to inhibit arsenic mobilization
- Studies expected to demonstrate only limited treatment necessary
- Use of raw water would facilitate larger testing programs

COMING UP



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Water Reuse

Rick Nevulis, P.G.
Reuse Coordinator
Water Supply Bureau

What is Reclaimed Water?

- **Wastewater that has received at least secondary treatment and basic disinfection**
 - Reused after flowing out of a domestic wastewater treatment facility
- **“Reuse” means the deliberate application of reclaimed water, in compliance with DEP and SFWMD rules, for a beneficial purpose**
 - Criteria used to classify projects as “reuse” or “effluent disposal” are contained in Rule 62-610.810, F.A.C.



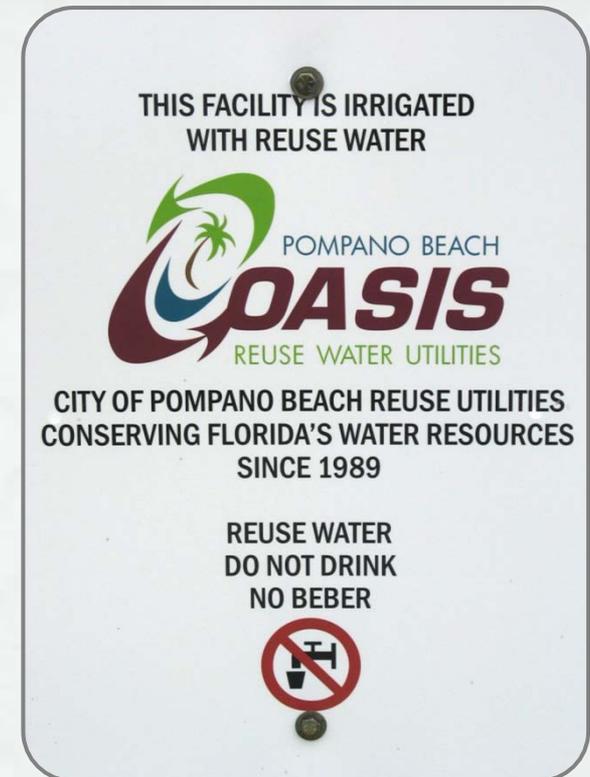
Types of Water Reuse



- **Slow-rate land application**
(e.g., irrigation)
- **Rapid-rate land application**
(e.g., rapid infiltration basins)
- **Industrial applications**
(e.g., cooling water)
- **Ground water recharge**
(e.g., recharge wells)
- **Indirect potable reuse**
(officially none in the State)
- **Wetlands creation, restoration and enhancement**
- **Other uses such as toilet flushing, fire protection, construction dust control, aesthetic purposes and recreational uses**

Reclaimed Water – Its Role in the LEC Water Supply Plan

- Reduces reliance on regional water resources
- Conserves resources and is an environmentally sound alternative to traditional disposal methods, such as ocean outfall or deep well injection
- Potential credits or offsets could result in increased water availability

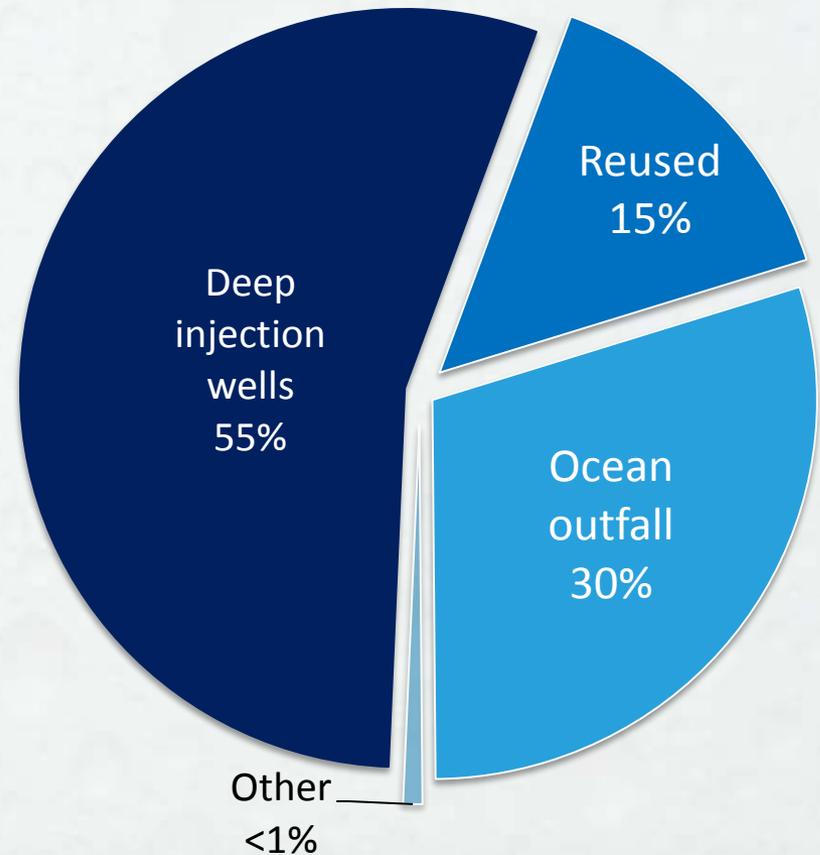


Current State of Reuse in the LEC Planning Area

Wastewater Disposal

In the LEC 2011:

- Wastewater ~590 MGD
- Reused ~89 MGD
- Disposed ~500 MGD



Water Reuse in the LEC

Reclaimed water is used primarily for irrigation...

- 19,934 residences
- 58 golf courses
- 47 parks
- 13 schools

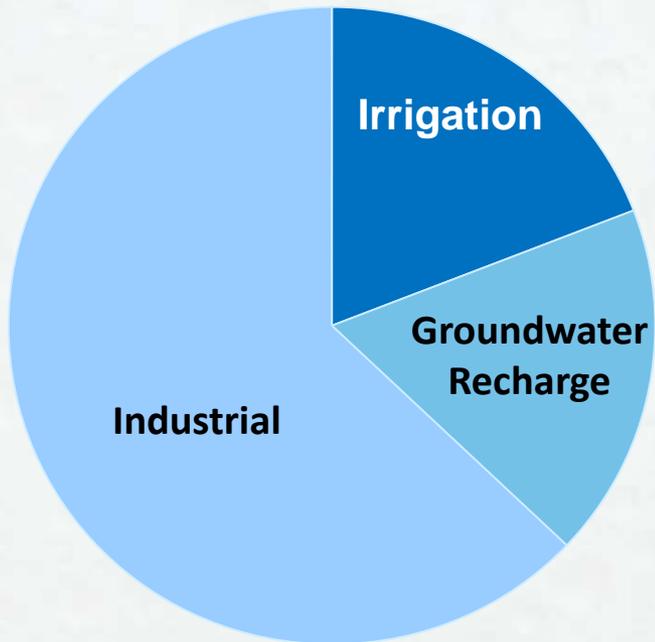


But is also used for other applications...

- Cooling water (FPL)
- Wetland hydration
- Processes at WWTPs

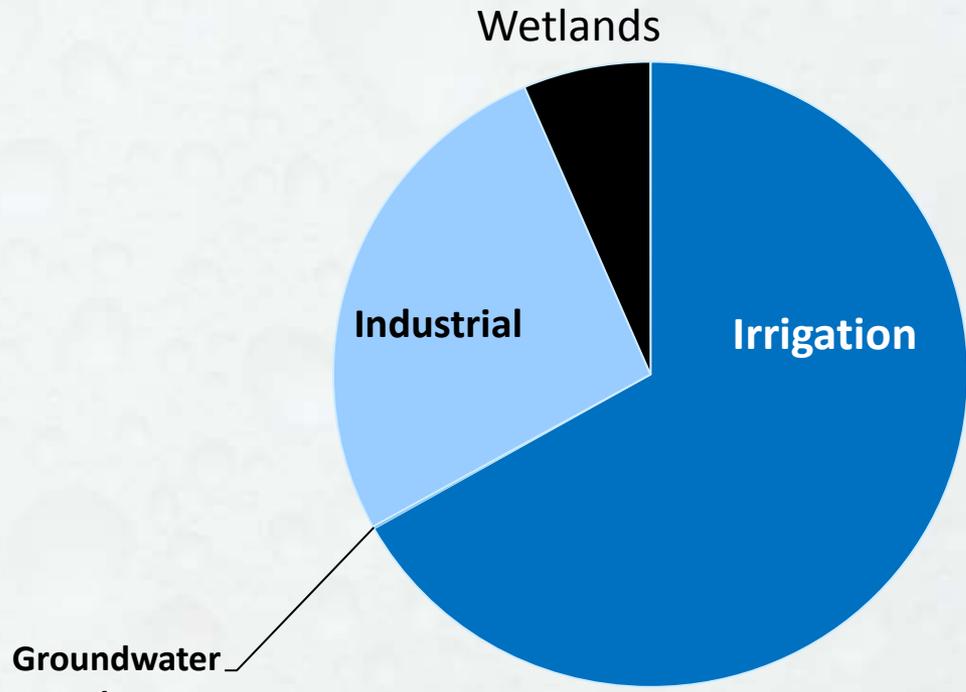
How is Water Reused in the LEC?

**Broward, Miami-Dade,
Monroe Counties**



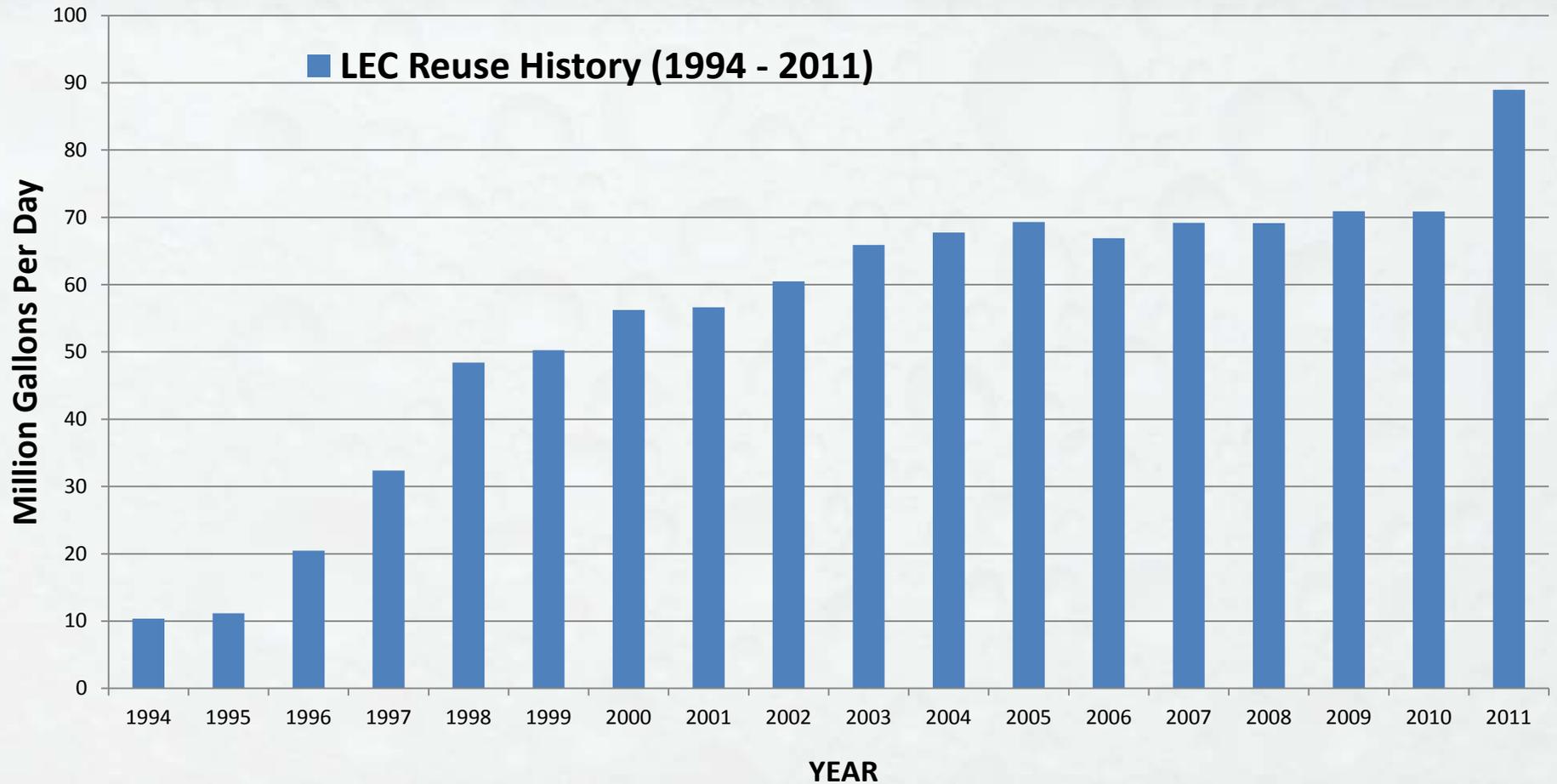
6% Reuse (27 MGD)

Palm Beach County



54% Reuse (62 MGD)

LEC Reuse History (1994-2011)



Loxahatchee River District

- Reused an average of 8.2 MGD in 2011
- Primarily for irrigation
(14 golf courses, 14 parks, 3 schools, and over 4,400 residences)
- Uses concentrate from the Town of Jupiter for supplementation of reclaimed water
- Reuses treated wastewater to protect the Loxahatchee River and eliminate harmful discharges



Palm Beach County Water Utilities

- Southern Regional facility reused an average of 16.8 MGD in 2011 (9 golf courses, 2 parks, 1 school, and over 6,000 residences)
- Mandatory Reuse Zone established to promote reuse of water
- Successful use of reclaimed water to hydrate created wetlands
- Now sending almost 20 MGD to FPL for cooling water



Pompano Beach Utilities

- Pompano Beach diverts some wastewater from Broward County's ocean outfall pipeline and treats it to reclaimed water standards
- Reused an average of 1.5 MGD in 2011
- Primarily for irrigation (2 golf courses, 5 parks, road medians, and over 90 residences)



Miramar Utilities

- Reused 2.3 MGD in 2011
- Primarily for irrigation (2 parks, 2 schools, road medians, and over 760 residences)
- By providing reclaimed water for irrigation, the City was able **to retire permits and increase their water use permit allocation**



Duck Key – Florida Keys Aqueduct Authority

- Small system (0.11 MGD capacity)
- Additional infrastructure will provide reclaimed water to residential and commercial customers
- Primarily for irrigation
- Reduces disposal of wastewater directly into shallow injection wells

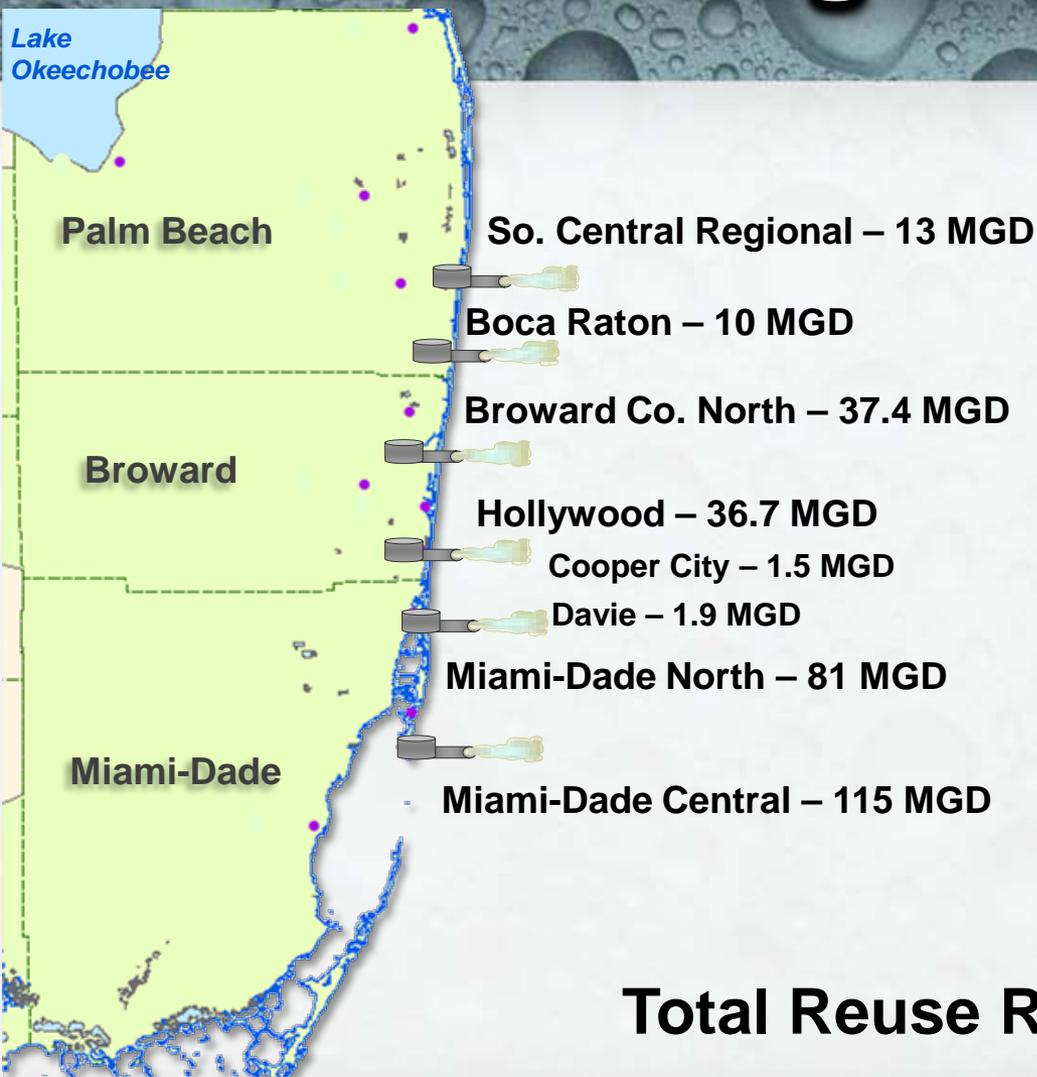


2008 Ocean Outfall Legislation



- Requires a reduction in flow/nutrients to the ocean by 2018
- Requires utilities to reuse 60 percent of discharge by 2025
- Requires utilities to submit a plan by July 2013

2008 Ocean Outfall Legislation (cont.)

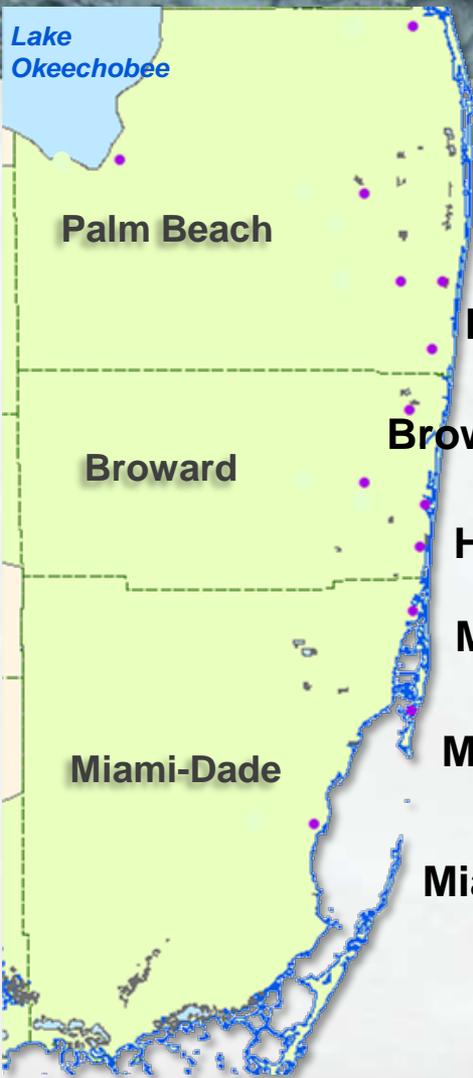


REQUIRED WATER REUSE BY 2025

- Palm Beach: 14 MGD
- Broward: 47 MGD
- Miami-Dade: 117 MGD

Total Reuse Required = 178 MGD

2008 Ocean Outfall Legislation (cont.)



Current plans to meet the 60% reuse requirement

So. Central Regional - increased irrigation

Boca Raton - increased irrigation

Broward Co. North – increased irrigation in N. Broward and S. Palm Beach

Hollywood – recharge of the Upper Floridan aquifer

Miami-Dade North

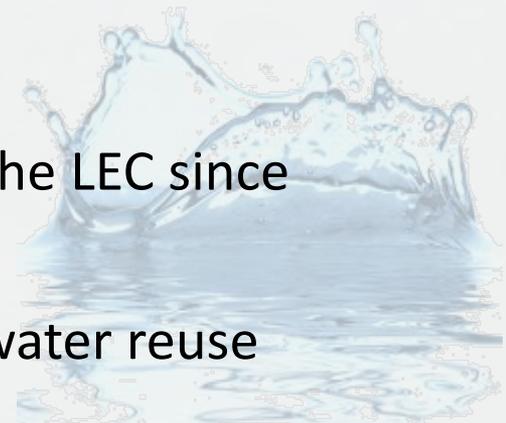
Miami-Dade Central

Miami-Dade South

**recharge of the Upper Floridan aquifer
and FPL cooling water**

Issues and Incentives for Water Reuse

- Daily, seasonal and annual fluctuations in supply and demand
- Means to optimize use of reclaimed water
 - increased storage, supplementation, and/or interconnects
- Coordination between utilities, end users, and SFWMD
- Potential Credits/Offsets for water reuse
- Mandatory Reuse Zones as an option
- Alternative Water Supply Funding
 - over \$37 million in funding for 101 projects in the LEC since 1997
- Numeric Nutrient Criteria – unknown impact on water reuse

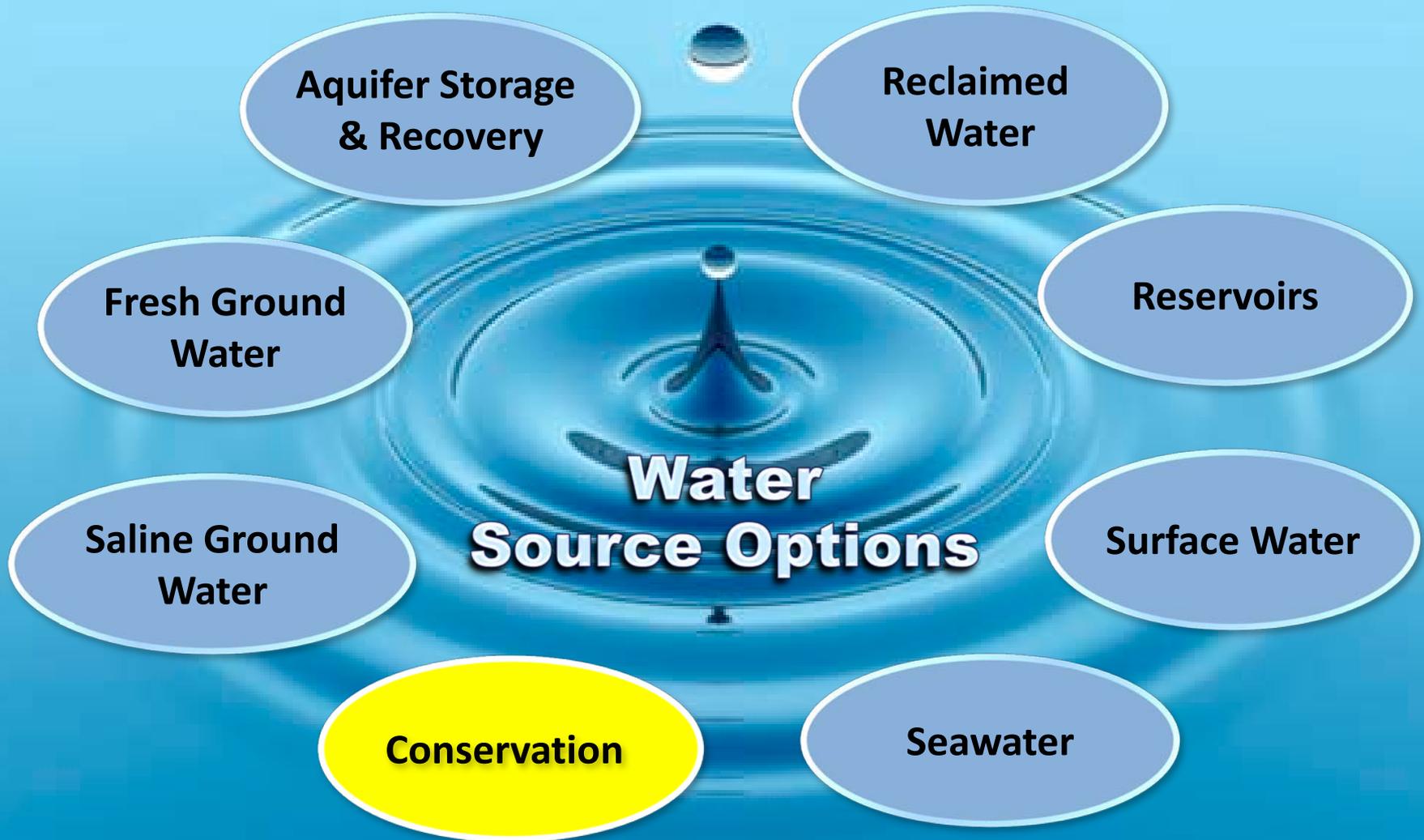


Future of Reclaimed Water in the LEC

- Reclaimed water is expected to continue as an integral part of the water resources in the Lower East Coast Planning Region
- “Mature” water reuse systems will continue to optimize the use of reclaimed water
- Growing water reuse systems will focus on reducing disposal through ocean outfalls and deep-well injection, while maximizing the use of reclaimed water



COMING UP



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Water Conservation

Robert Wanvestraut
Water Conservation Analyst
Water Supply Bureau

What We Used to Hear About Conservation

- ✓ It's not as certain or reliable as expanding plant capacity
- ✓ It's too small to matter
- ✓ It eats at revenue
- ✓ It's outside of our means



What We Know About Conservation

- ✓ Less expensive than new sources
- ✓ Can be reliable
- ✓ Meet gap between supply and demand
- ✓ Reduces severity of water shortages
- ✓ Reduces wasteful use
- ✓ Lowers carbon footprint
- ✓ Reduces wastewater flows
- ✓ Reduces peak demands
- ✓ Reduce, defer or eliminate the need for capacity expansion



Conservation

Water Conservation is any beneficial reduction in water loss, waste or use and typically includes:

- Incentive programs for high-efficiency devices
- Conservation rate structures
- Water audits
- Efficiency/conservation ordinances
- Public education campaigns



Cost comparison per 1,000 gallons of water

	Hardware	Cost to Save or Create 1,000 Gallons
Water Conservation	High-efficiency fixtures/appliances	\$0.40 to \$3.00
New Facility Construction	Nanofiltration	\$3.42 to \$9.46
	Reverse osmosis (RO)	\$4.41 to \$11.33
Expansion of Existing Facility	Nanofiltration	\$3.13 to \$9.07
	RO	\$3.69 to \$10.38

Water Supply Cost Estimation Study and Phase II Addendum (2007) prepared by Camp Dresser & McKee, Inc.,

Conservation Strategies

Low Cost Measures:

- Florida Water Star, WaterSense, ENERGYStar based ordinances can reduce residential use by ~ 30% on new construction
- Conservation Rate Structures

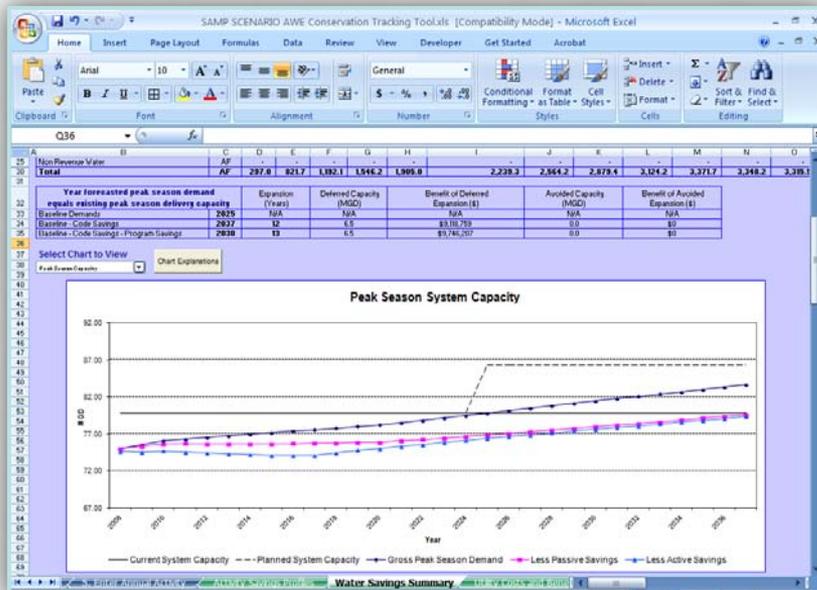
For Other Measures:

- Costs can be offset by rebates, grant or cost-share programs
- Planning tools can help identify the most-cost effective approaches for individual service areas



Utility Conservation Relies on Analysis and Planning

...Maximizing the benefits and reliability of conservation requires service-area specific analysis, goal-based planning implementation and monitoring



Fortunately, there are many **tools** and **resources** to help utilities plan, implement and track conservation programs

Conservation Summary

County	2000 gpcd	2005 gpcd	2010 gpcd
Palm Beach	219	203	157
Broward	153	139	124
Miami-Dade	168	157	139
Monroe	216	211	198
LEC Planning Area Average	176	163	140

Increasing conservation will help to meet 2030 demand.

Examples of Success

Utility	2006 gpcd	2010 gpcd
Miami-Dade WSD	153	142
Palm Beach County WUD	126	108
Pompano Beach	222	178
Cooper City	117	95

There are many factors affecting this decline, conservation is one of them.

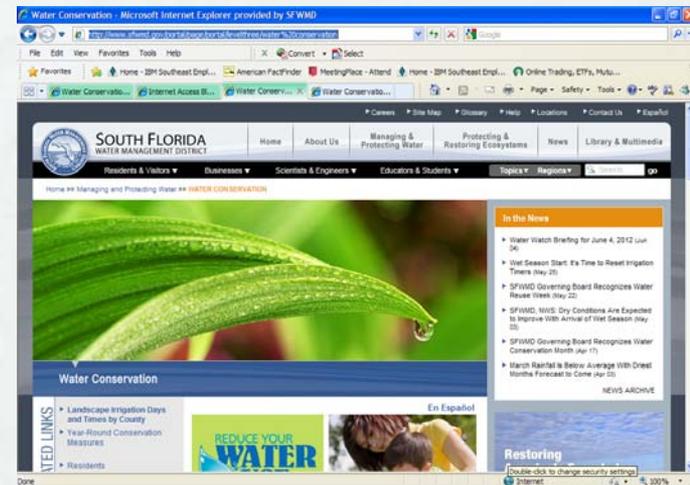
SFWMD's Water Conservation Plan (2008)

- Drafted as per a stakeholder driven process which included representatives from:
 - Local governments,
 - Utilities
 - Commercial users
 - Developers
 - Environmentalists
- Contains a suite of measures
 - Education & Marketing
 - Voluntary & Incentive
 - Regulatory



How the SFWMD Can Help

- Technical assistance & advice on conservation hardware, technology and program design
- Technical assistance on creating a goal-based conservation plans
- Model ordinances (conservation) and review of local ordinances for technical accuracy and standards
- WaterSIP cost-share program
- SFWMD's conservation webpage www.savewaterfl.com provides comprehensive information for major user groups

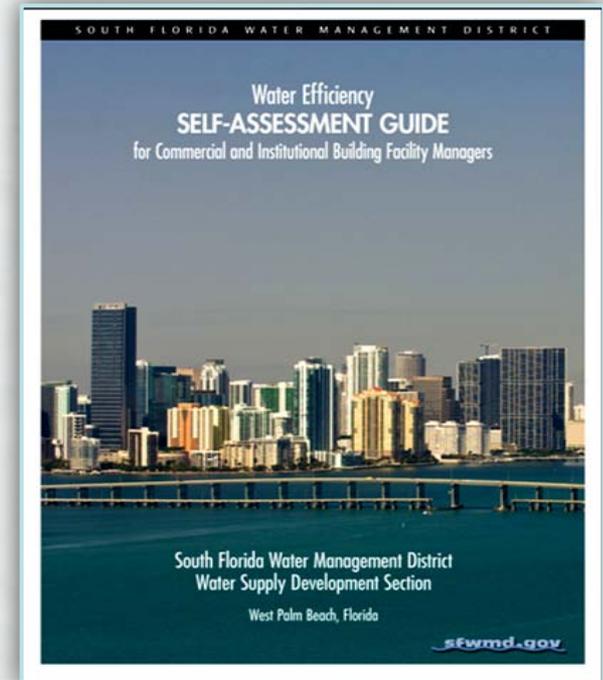


How the SFWMD Can Help (cont.)

SFWMD staff available to train local staff to conduct water use assessments of municipal facilities

SFWMD's *Self-Assessment Guide for Commercial & Institutional* users is available free

Can be part of a utility's outreach to these users



Contact Information

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"When the well runs dry, we know the worth of water"

"A penny saved is a penny earned."

A stylized, cursive signature of Benjamin Franklin, written in black ink.

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Lower East Coast
Water Supply *more...*

Mark Elsner, P.E.
Section Administrator
Water Supply Development
Water Supply Bureau

Funding

Alternative Water Supply Funding Program

- FY97-FY12 Lower East Coast
 - 206 projects funded
 - \$88 M allocated
 - 165 MGD of new water capacity

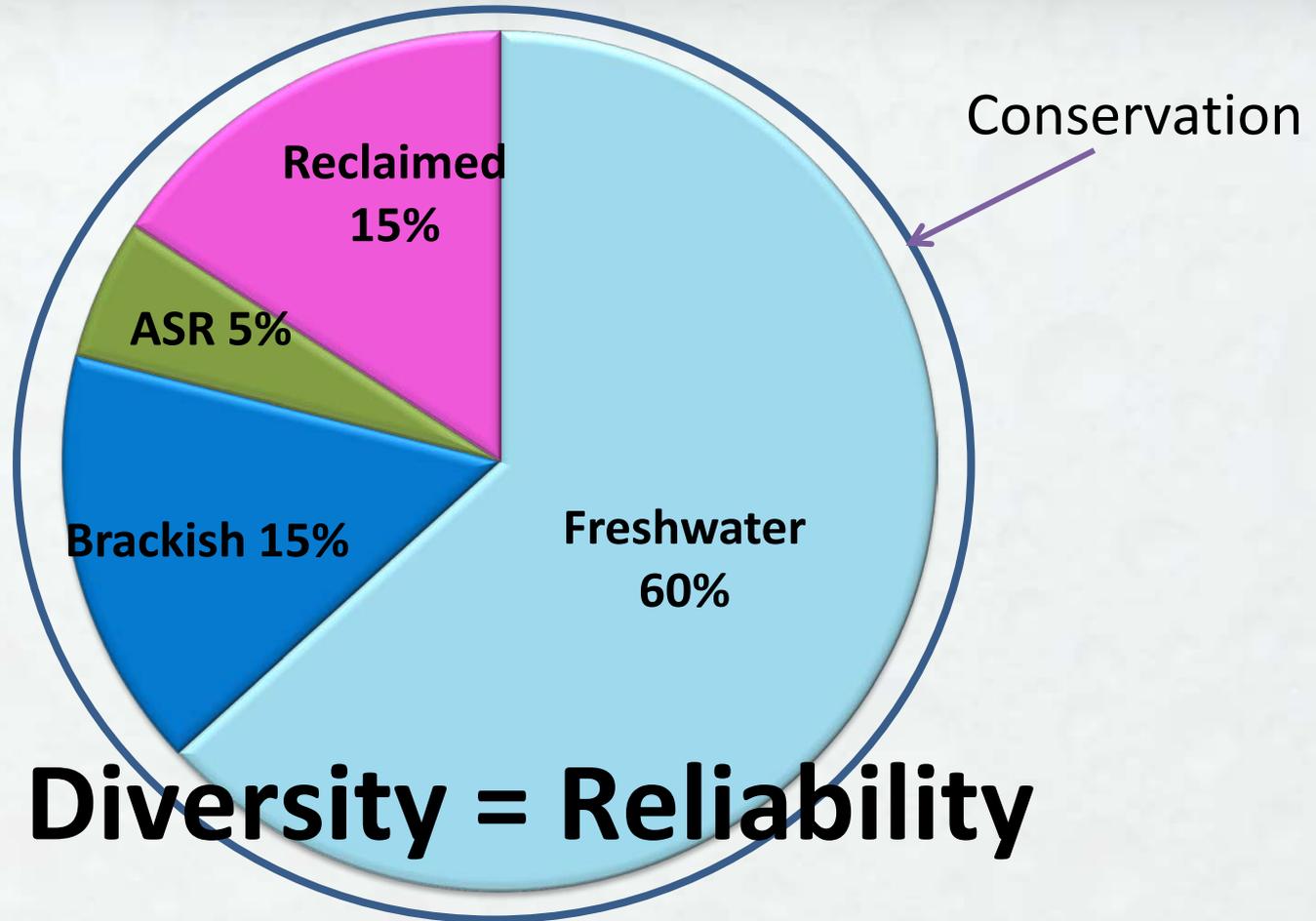


Water Savings Incentive Program (WaterSIP)

- Water savings hardware or technology
- FY03-FY12 Lower East Coast
 - 92 projects funded
 - \$2.7 M allocated
 - 4.23 MGD estimated water savings



Integrated Water Supply Portfolio Example



Water Source Options: Public Water Supply and Domestic Self-Supply

- Continued use of **Surficial Aquifer System**
- Increased use of **Floridan aquifer**, where needed
- Look for opportunities for increased efficiency through **water conservation** and meet non-potable demands with **reclaimed water**
- If needed, implement storage projects



Water Source Options: Agricultural Irrigation

- Continued use of **surface water** (Lake Okeechobee) as primary source in LOSA and **Biscayne aquifer** in Miami-Dade County
- Look for opportunities for increased efficiency through **water conservation** and Best Management Practices (BMPs) Program
- Stormwater retention/tailwater recovery where possible



Water Source Options: Landscape Irrigation

- Continued use of **Surficial Aquifer System** and **surface water** (local canals)
- Increased use of **reclaimed water**, especially in areas where threatened by salt-water intrusion
- Look for opportunities for increased efficiency through **water conservation**



Water Source Options:

Industrial, Commercial, Institutional Self-Supply

- Continued use of existing sources: **Surficial Aquifer System** and **surface water**



Water Source Options: Power Generation Self-Supply

- Continued use of **Surficial Aquifer System** and **Floridan aquifer**
- Increased use of **reclaimed water**
- Majority of supply met with seawater



Thank You



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