



South Florida Water Management District

A G E N D A

2017 Lower West Coast Water Supply Plan Update Stakeholder Kick-Off Meeting

Thursday, June 30, 2016
Bonita Springs Government Center
9101 Bonita Beach Road, Bonita Springs, FL
9:30 a.m.

1. **Introduction/Opening Remarks** (*Dean Powell, Chief, Water Supply Bureau, SFWMD*)
2. **Overview of the Plan Update and a Summary of the 2012 Lower West Coast Water Supply Plan Update** (*Mark Elsner, Administrator, Water Supply Development Section, SFWMD*)
3. **Progress Since the 2012 LWC Plan** (*Bob Verrastro, Plan Manager, Water Supply Planning Section, SFWMD*)
4. **Demand Estimates and Projections** (*Nathan Kennedy, Lead Economist and Cynthia Gefvert, Section Leader, Water Supply Planning Section, SFWMD*)
5. **Floridan Aquifer System Modeling** (*Pete Kwiatkowski, Administrator, Resource Evaluation Section, SFWMD*)
6. **2017 LWC Plan Goal, Objectives and Issues: Discussion**
7. **Project Highlight - Picayune Strand** (*Janet Starnes, Principal Project Manager, Lower West Coast Unit, SFWMD*)
8. **Next Steps** (*Bob Verrastro*)
9. **Adjourn**



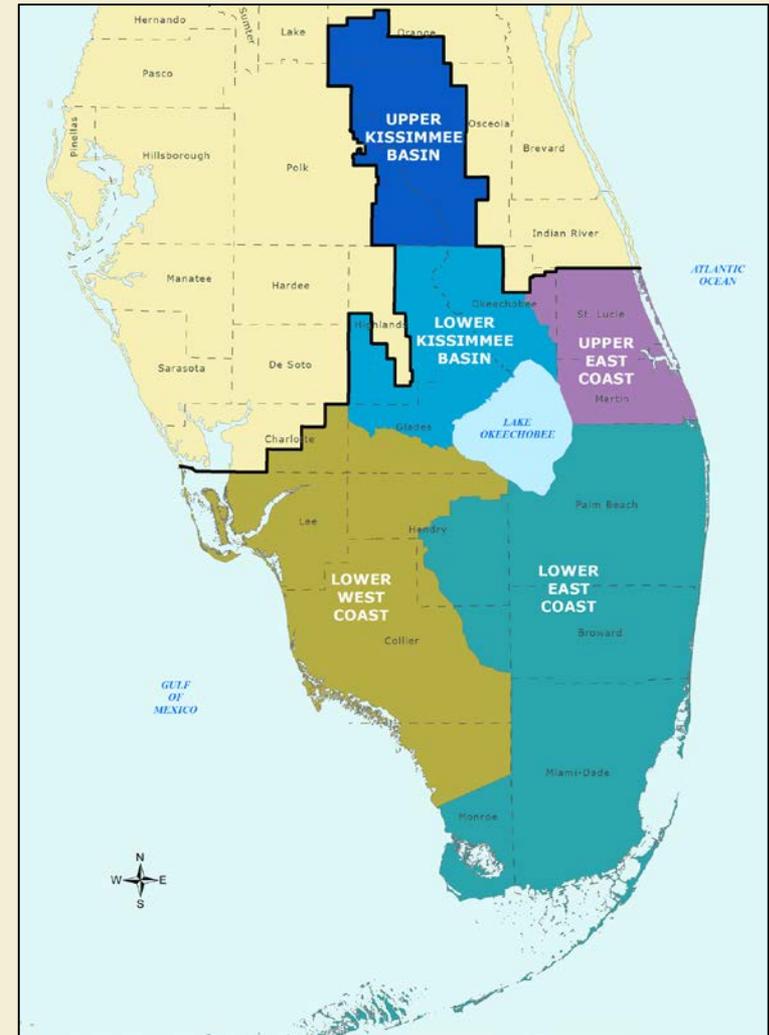
2017 Lower West Coast Water Supply Plan Update

Stakeholder Kickoff Meeting

June 30, 2016

Water Supply Plan Requirements

- 20-year planning period
- Demand estimates and projections
- Resource analyses
- Issues identification
- Evaluation of water source options, including conservation
- Water resource development
 - Responsibility of water management districts
- Water supply development
 - Responsibility of water users
- Minimum Flows and Levels
 - Recovery and prevention strategies



Lower West Coast Planning Area



- Includes:
 - Collier, Lee, and portions of Charlotte, Glades, Hendry, and Monroe counties
- Population:
 - 2014 1,036,466
 - 2040 1,634,390 (estimated)
- Major agricultural industry
- Significant environmental features

2017 LWC Water Supply Plan Update Schedule



Lower West Coast Water Supply Plan Update Process

Mid-2015

June 30, 2016

Late 2016

Early to Mid- 2017

Late 2017

Start Update Process

Kick-Off Meeting

Updates to Water Resources Advisory Commission and Governing Board

Governing Board Approval

2017 Lower West Coast Water Supply Plan Update

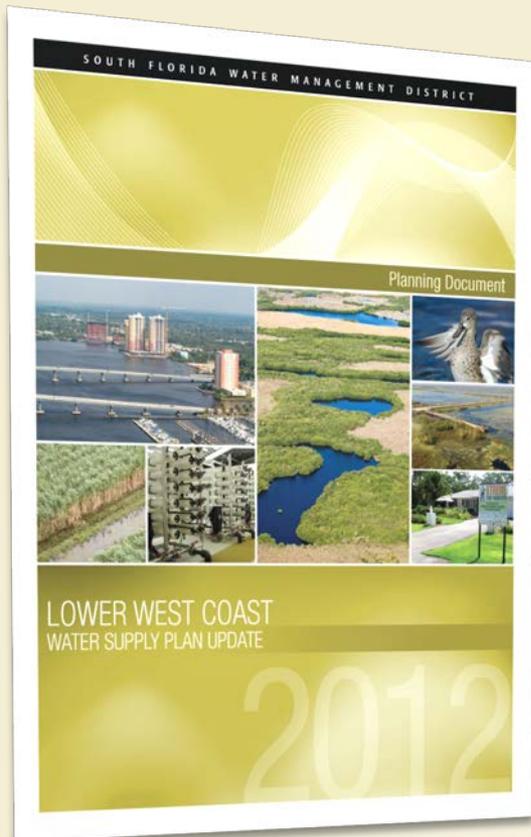


- Planning Horizon 2015 – 2040
- Public Participation
 - Water Resources Advisory Commission Issues Workshops
 - Updates to full Water Resource Advisory Commission
 - One-on-one meetings and discussions with stakeholders
 - Meetings with stakeholder groups
 - Governing Board presentations

2012 Lower West Coast Water Supply Plan Update

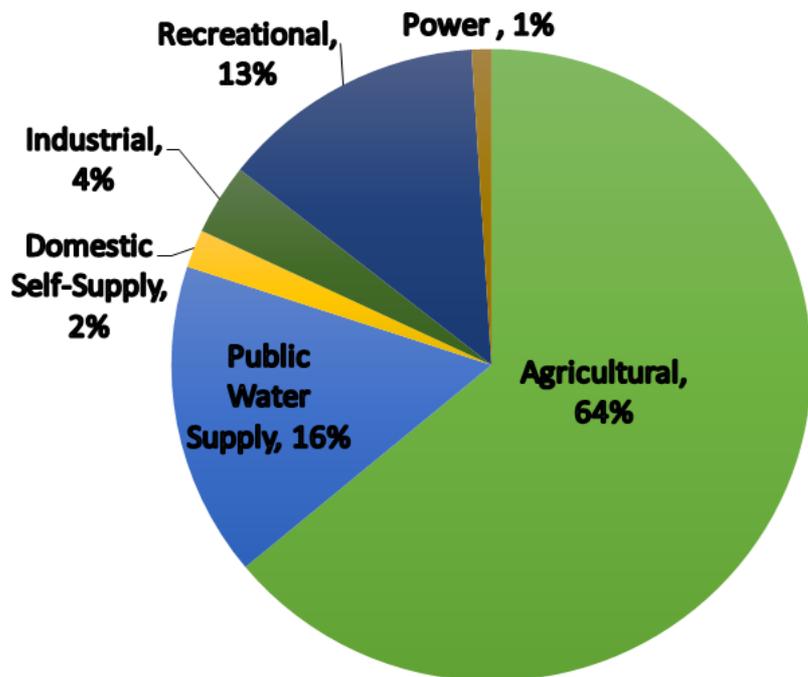
Plan Conclusion

The future water demands of the region can continue to be met through the 2030 planning horizon with appropriate management and continued diversification of water supply sources and completion of the necessary repairs to the Lake Okeechobee Herbert Hoover Dike.



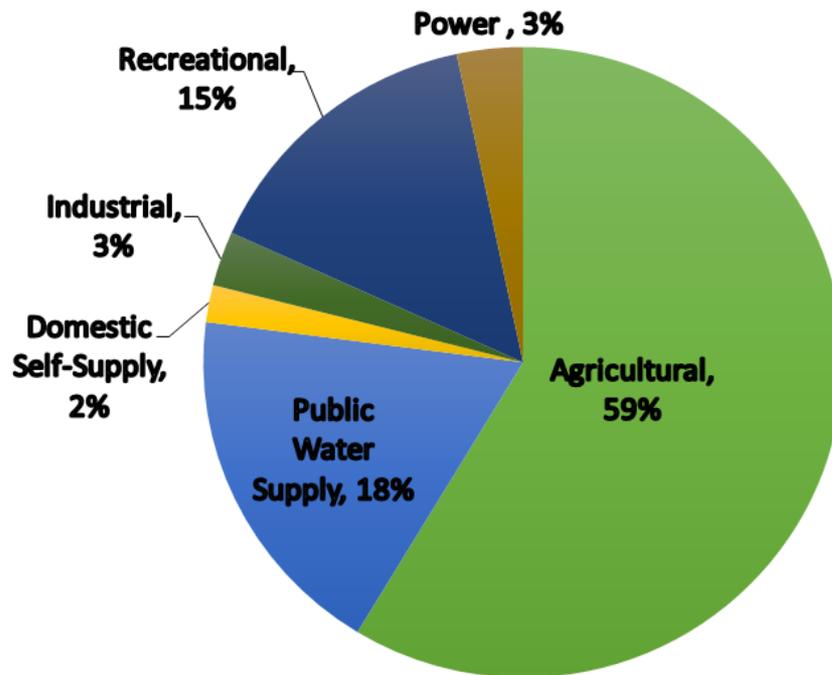
2012 Lower West Coast Water Supply Plan Estimated Gross Water Demands*

2010



Total = 971 MGD

2030



Total = 1,262 MGD

* Does include return flow

Summary of Issues in the 2012 Lower West Coast Water Supply Plan

- Limited opportunity to increase surficial and intermediate aquifer use
- Surface water availability (storage) limited
 - Lake Okeechobee Service Area (LORS 2008)
 - LOSA Restricted Allocation Rules
- Freshwater discharges affecting health of coastal resources
- Freshwater sources alone are not adequate to meet water needs



Water Source Options

Category	Surface Water	Fresh Groundwater	Brackish Groundwater	Reclaimed Water	Storage	Conservation
PWS		✓	✓		✓	✓
AGR	✓	✓	✓			✓
REC	✓	✓		✓		✓
ICI		✓	✓	✓		✓



Natural Resources

- Implementation of **surface water storage projects** will improve water resource management
 - ▶ CERP Caloosahatchee River (C-43) West Basin Reservoir Project
- Established **Minimum Flows and Levels** to protect resources from significant harm

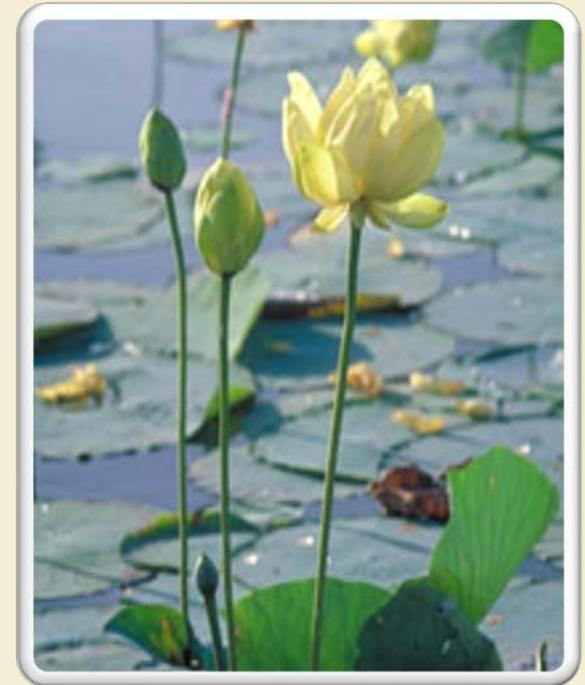


2012 Future Direction

- Additional efforts to understand aquifer systems, and identification of areas of available freshwater to meet future needs, especially agricultural water demands
- Continue aquifer monitoring programs
- Construct CERP Caloosahatchee River (C-43) Storage Reservoir
 - Water Reservation should be completed and adopted
- Implementation of local storage projects is encouraged

2012 Future Direction (cont.)

- Encourage and promote water reuse
- Continue to evaluate saltwater intrusion, including the potential impact of sea level rise
- Coordinate with local governments and utilities on comprehensive planning elements
- Apply Lower West Coast Floridan Aquifer System Model
- Continue to promote a water conservation ethic



Questions?





Progress Since the 2012 Lower West Coast Plan

Bob Verrastro, P.G.
Plan Manager

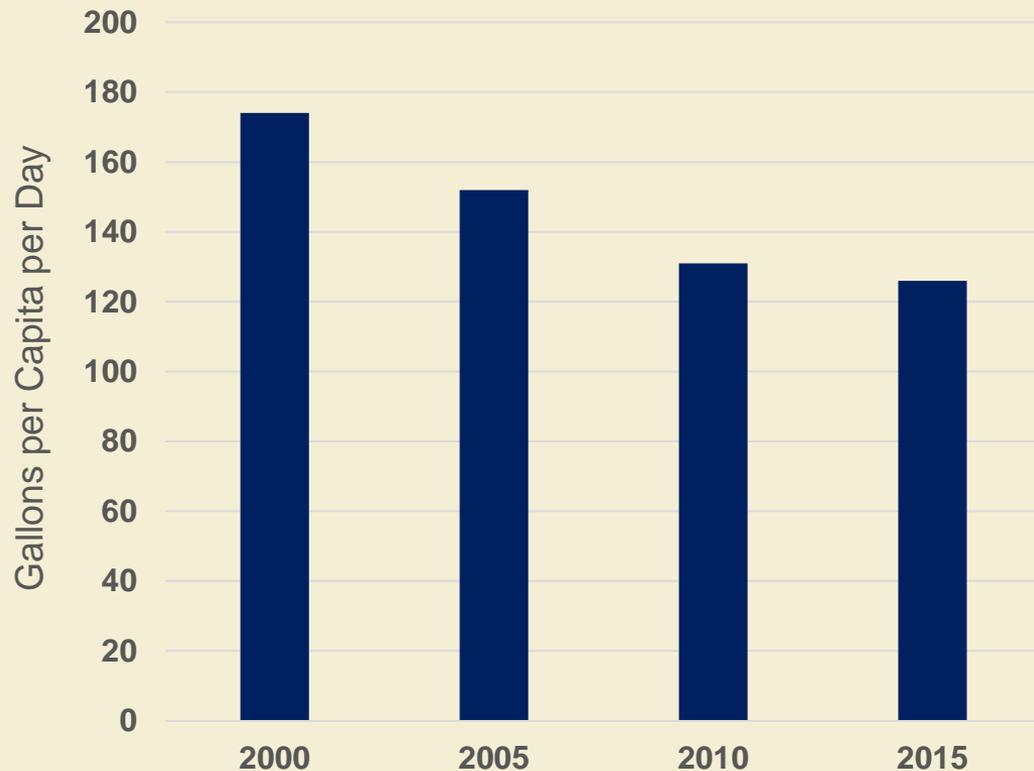
South Florida Water Management District

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Presentation Topics

- Conservation and Diversification
- Water Supply Project Support
- Watershed Initiatives
- Water Storage and MFLs
- Hydrogeologic Investigations

Water Conservation



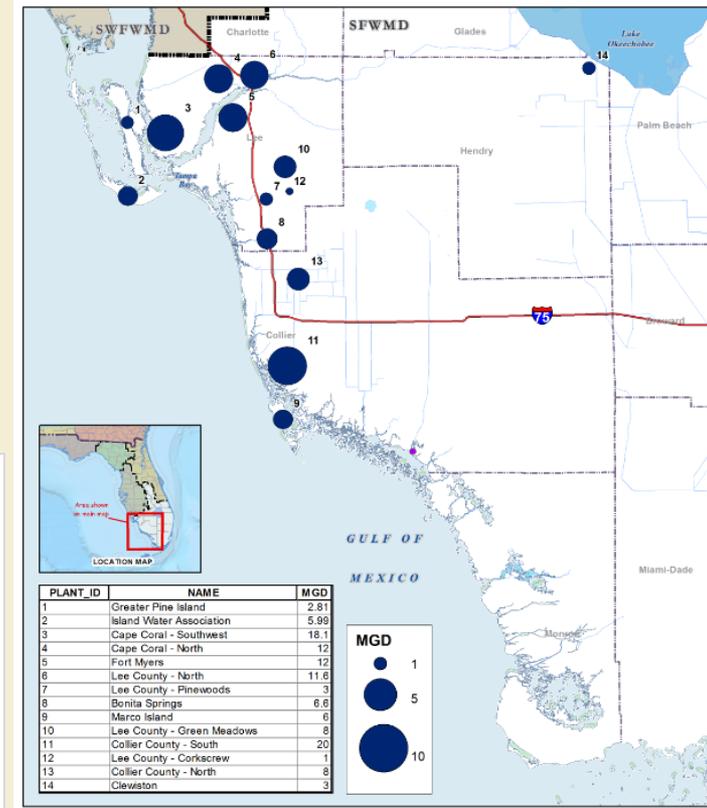
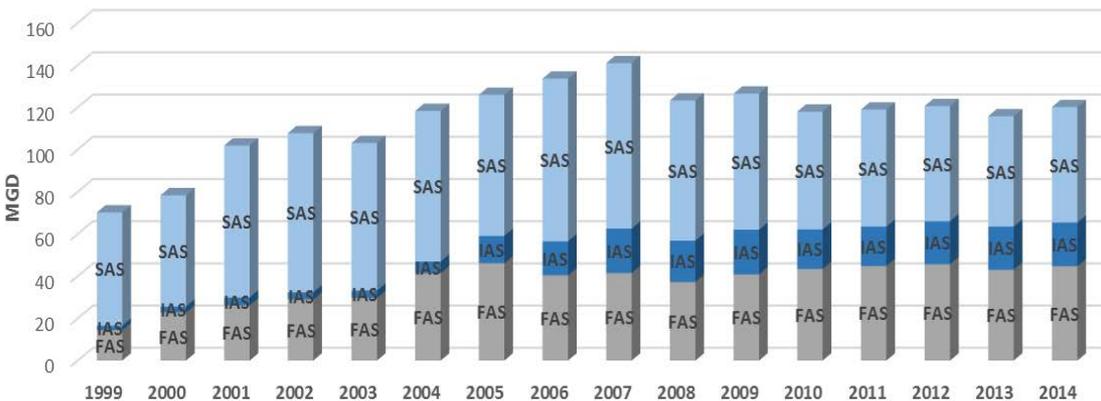
- LWC finished water supply (PWS) per capita use rate
- Agriculture
 - Continue with micro-irrigation
 - Best Management Practices

The cheapest gallon of water is the gallon we don't use

Reliance on Brackish Water

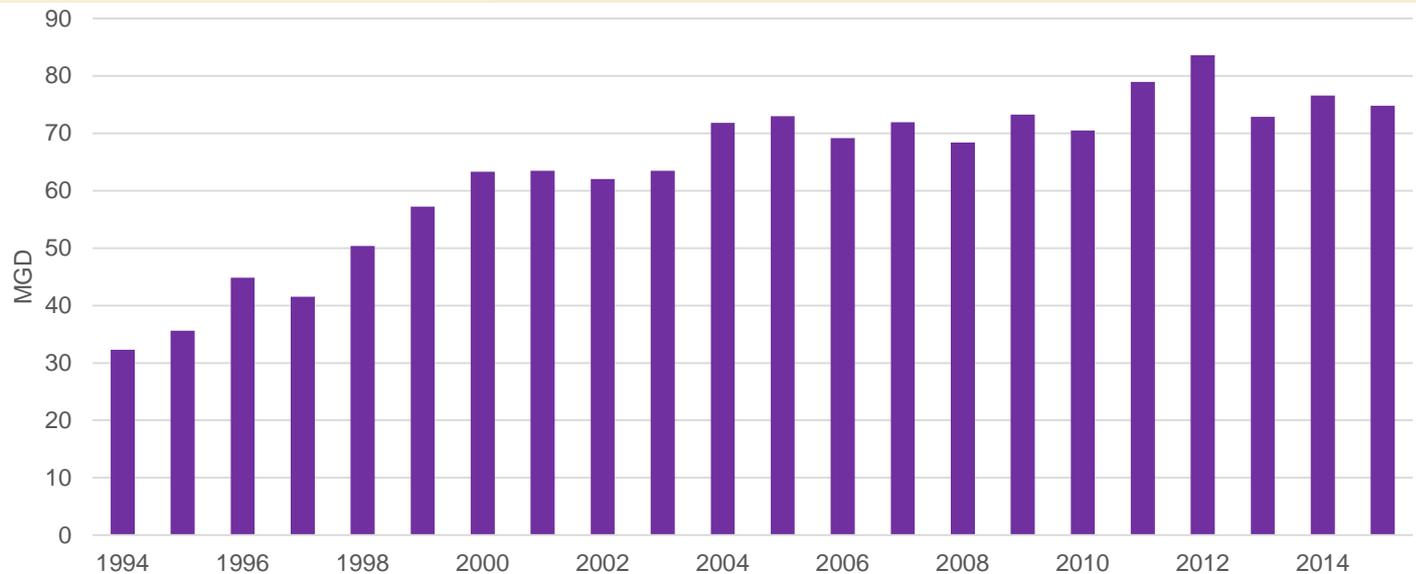
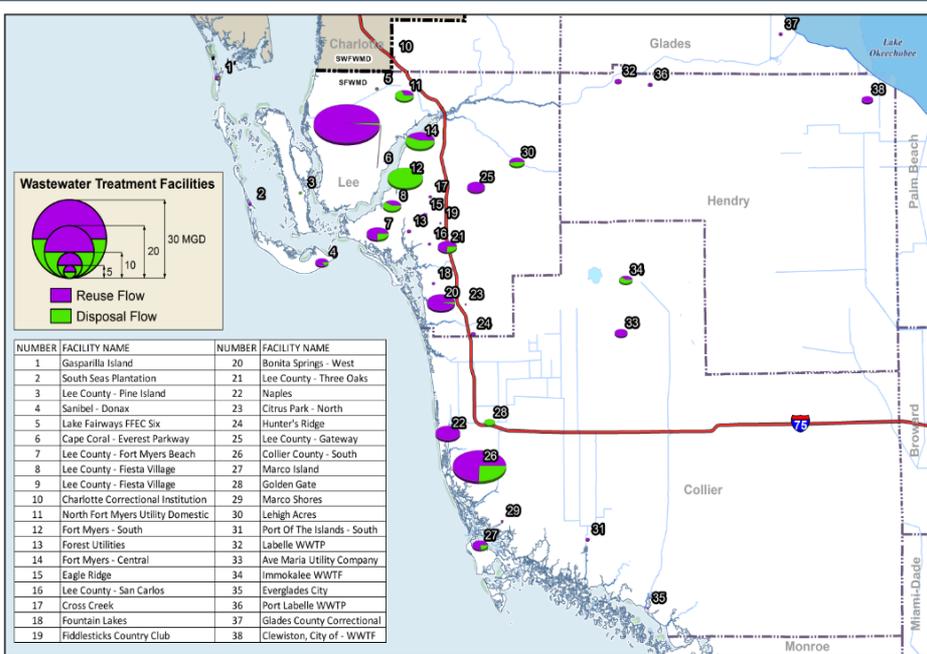
- 14 facilities
- 120 million gallons per day (mgd) of capacity
- Reverse osmosis (RO) treatment
- Floridan aquifer source

Lower West Coast Planning Area
Public Water Supply Water Withdrawals
(1999-2014)



Reuse in the Lower West Coast

- Currently about 80 mgd
- Approximately 90% reused!



Water Supply Project Support

- AWS Funding
 - Marco Island reclaimed water expansion
 - Naples ASR reclaimed water system
 - Everglades City improvements
 - Collier County ASR and RO supply improvements
 - LaBelle RO treatment plant
 - Lee County RO wellfield expansion

- 10.5 mgd of new capacity made available since 2012 Plan Update



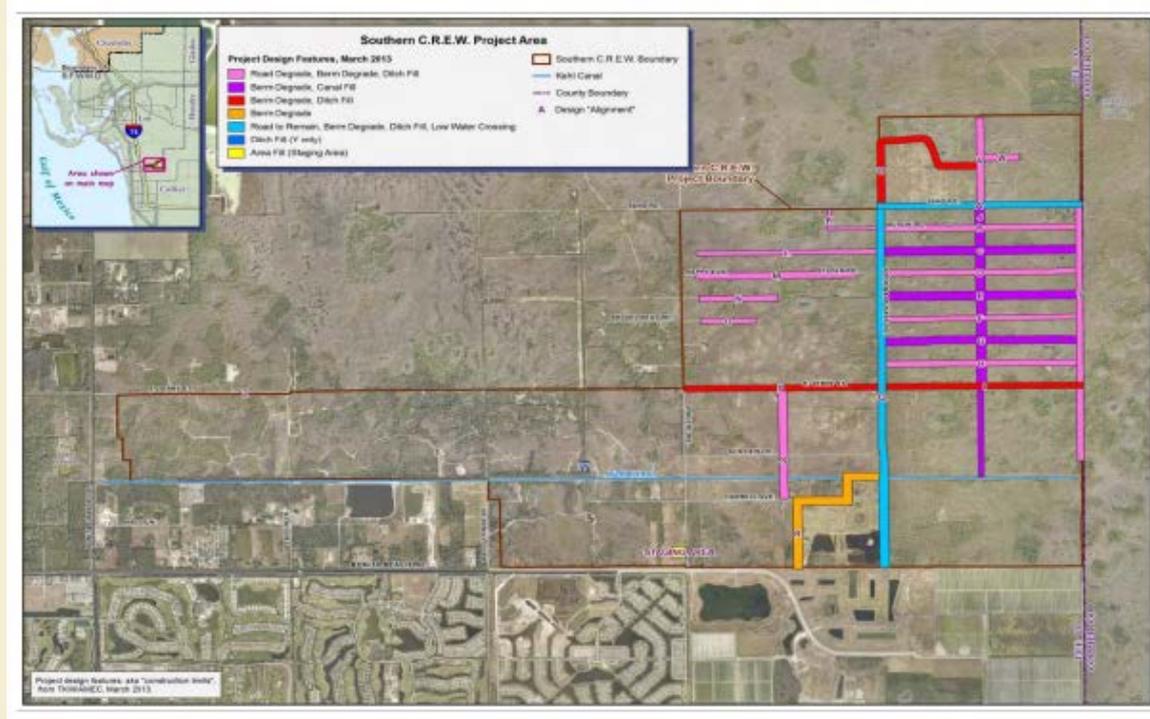
Clewiston RO Plant

Watershed Initiatives

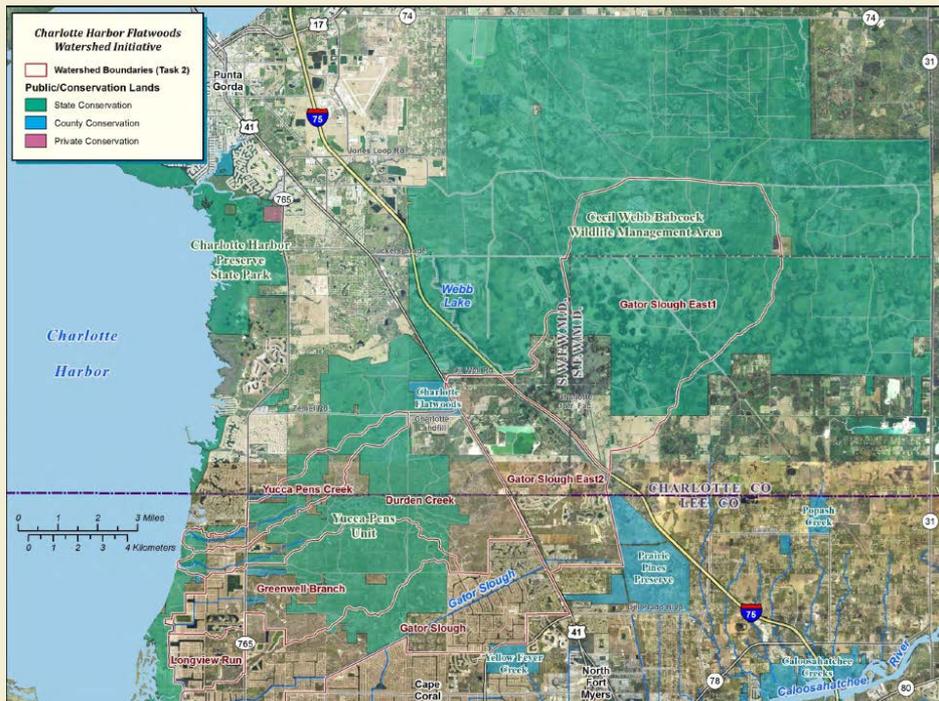
- Complements the District's core mission
- Supports local governments, special districts, private organizations, stormwater utilities, and water users
- Initiative Objectives
 - Manage flows to the Caloosahatchee River
 - Restore sheet flow and create hydrologic connections
 - Improve wetland hydroperiods
 - Create ecosystem corridors
 - Create natural storage, retention, and aquifer recharge
 - Improve water quality
- Interagency working teams, innovative funding mechanisms, cost-effective water resource projects

Southern Corkscrew Regional Ecosystem Watershed Restoration

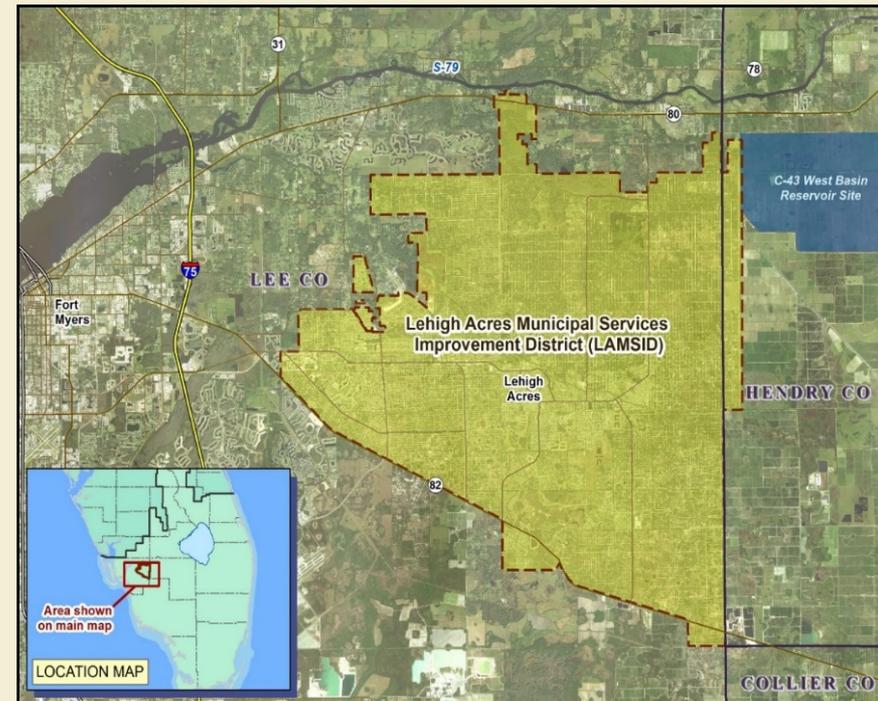
- Restoration of 4,000 acres
- Exotic vegetation, road and berm removal, ditch plugging
- Contract awarded in December 2015
- Increase natural storage, hydroperiod, and habitat improvements
- Maintain depths and water quality of the Imperial River



Watershed Initiatives (cont.)

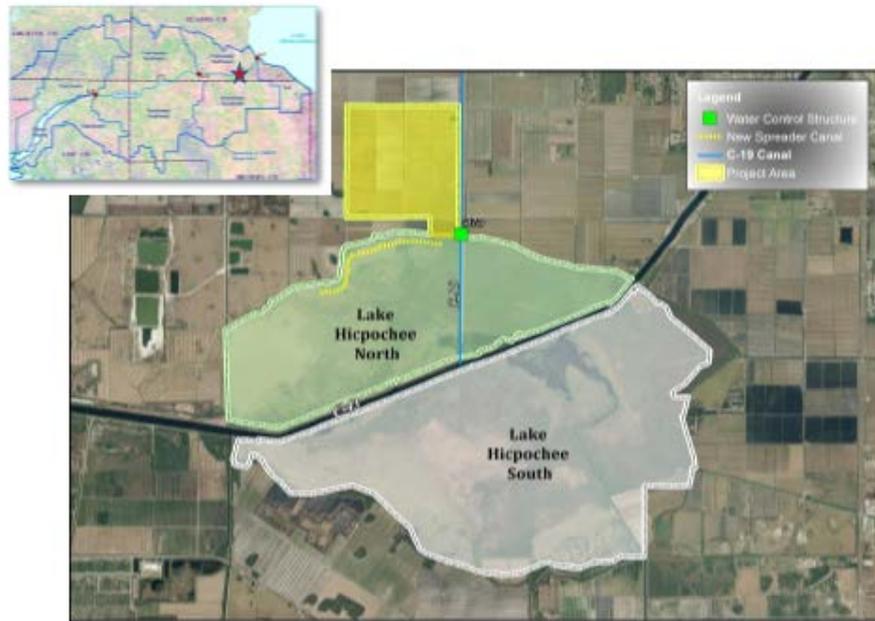


- Charlotte Harbor Flatwoods Initiative
 - Five watersheds, 90 square miles
 - 14 partners
 - Flow-ways disrupted by linear features



- Lehigh Headwaters Initiative
 - Lake rehydration, flow conveyance to Estero watershed

Watershed Initiatives (cont.)



■ Lake Hicpochee Hydrologic Enhancement

- Rehydration of former lake bed
- Storage capacity 1,279 acre feet
- Under construction

■ C-43 Water Quality Treatment and Testing Facility

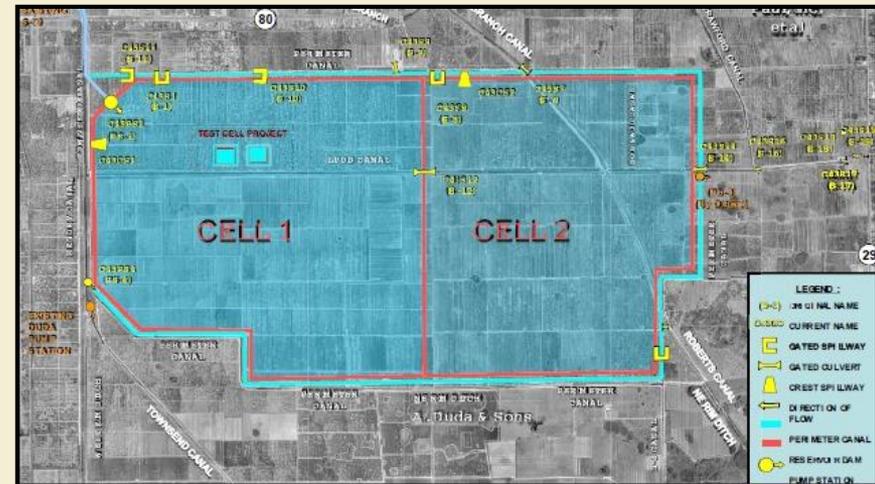
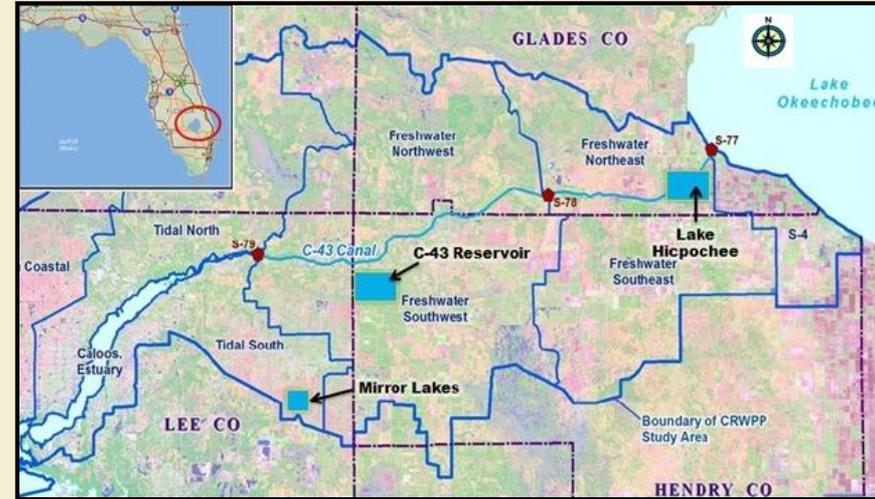
- Nitrogen reduction via wetlands
- Bioassays and mesocosm underway

Caloosahatchee River MFL Recovery Strategy

- CERP Caloosahatchee River (C-43) West Basin Storage Reservoir
 - 10,700-acre project footprint
 - Construction initiated November 2015
- Water Reservation Rule was adopted in May 2014
 - All surface water contained and released, via operation, from the C-43 Reservoir will be reserved from allocation

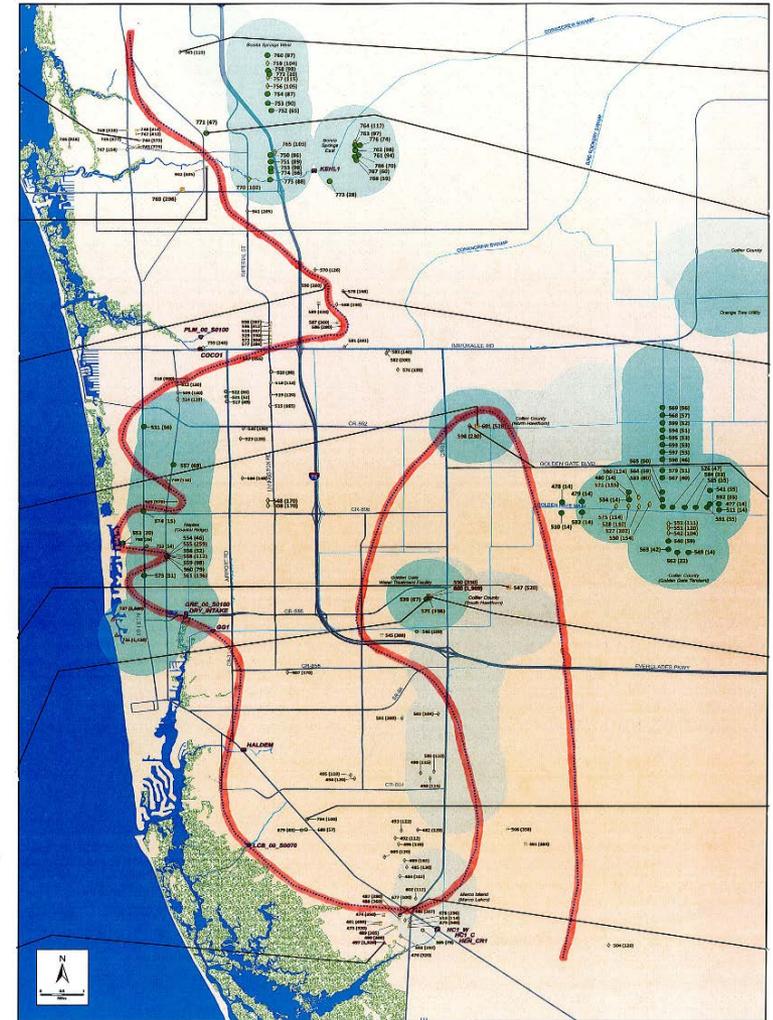
C-43 Reservoir

- 10,500-acre reservoir, 2 cells
- 170,000 acre-feet of storage
- Improve timing, quality, and quantity of water to the Caloosahatchee Estuary
- 4 construction packages
- Cell 1 construction underway (pre-load and demolition)



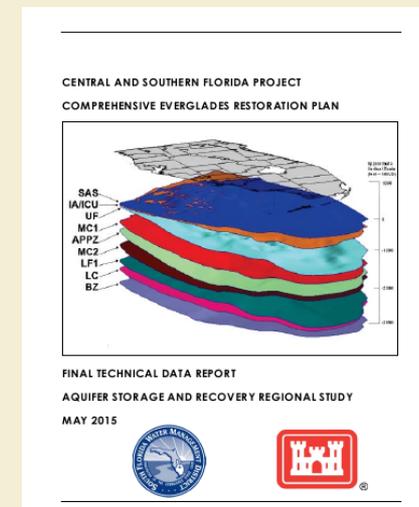
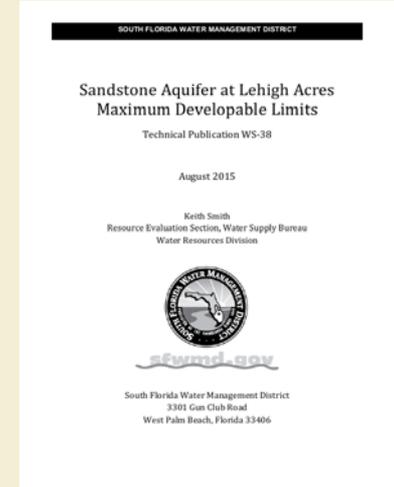
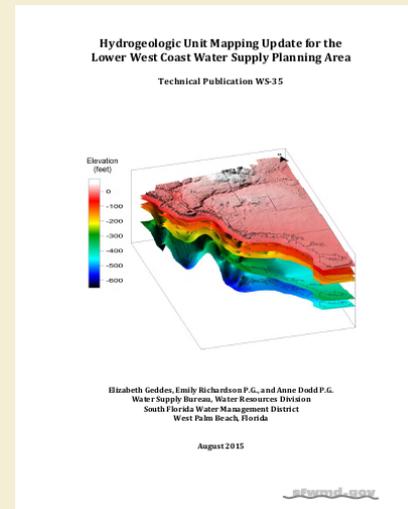
2015 Saltwater Interface Update

- Update and comparison to 2009 mapping
- Multiple PWS wellfields completed in water table, Lower Tamiami, and Sandstone aquifers
- No major changes, but interface is dynamic
- Maps published on SFWMD website



Hydrogeologic Evaluations

- LWC Hydrogeologic Unit Mapping Update
 - Results integrated into the SAS/IAS groundwater model
- Sandstone Aquifer Wells at Lehigh Acres
 - Monitoring groundwater water levels relative to the Maximum Developable Limits
- CERP ASR Regional Study
 - Fewer wells, but phased, multi-well implementation supported by National Academy of Science



Questions?





Demand Estimates and Projections

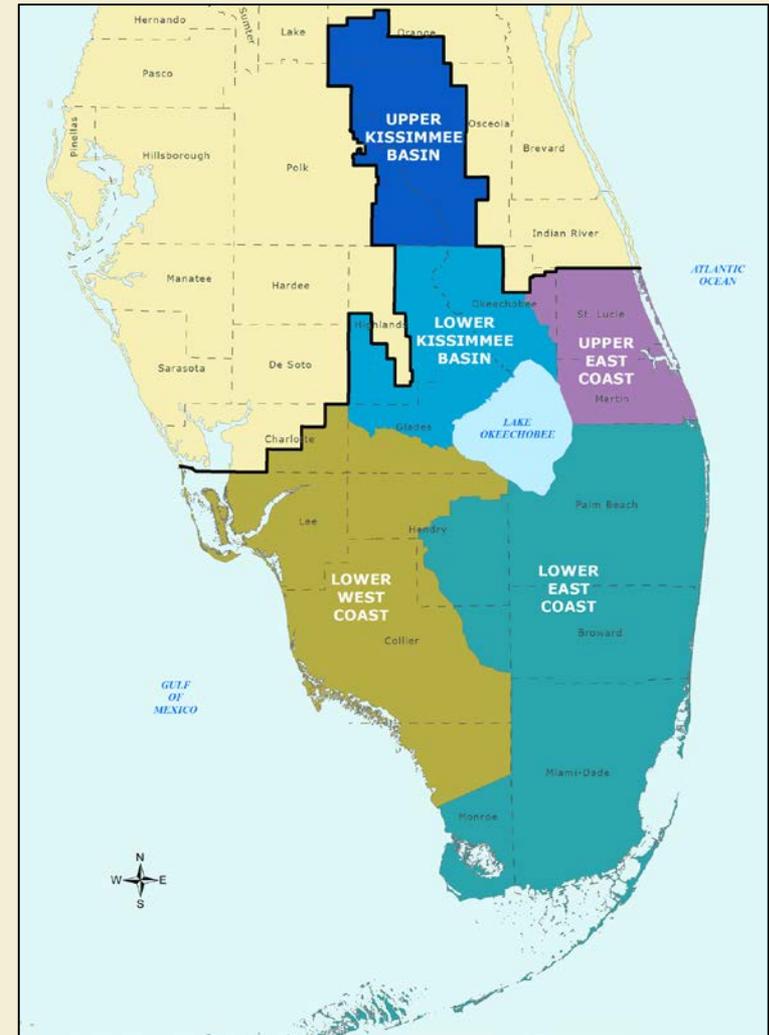
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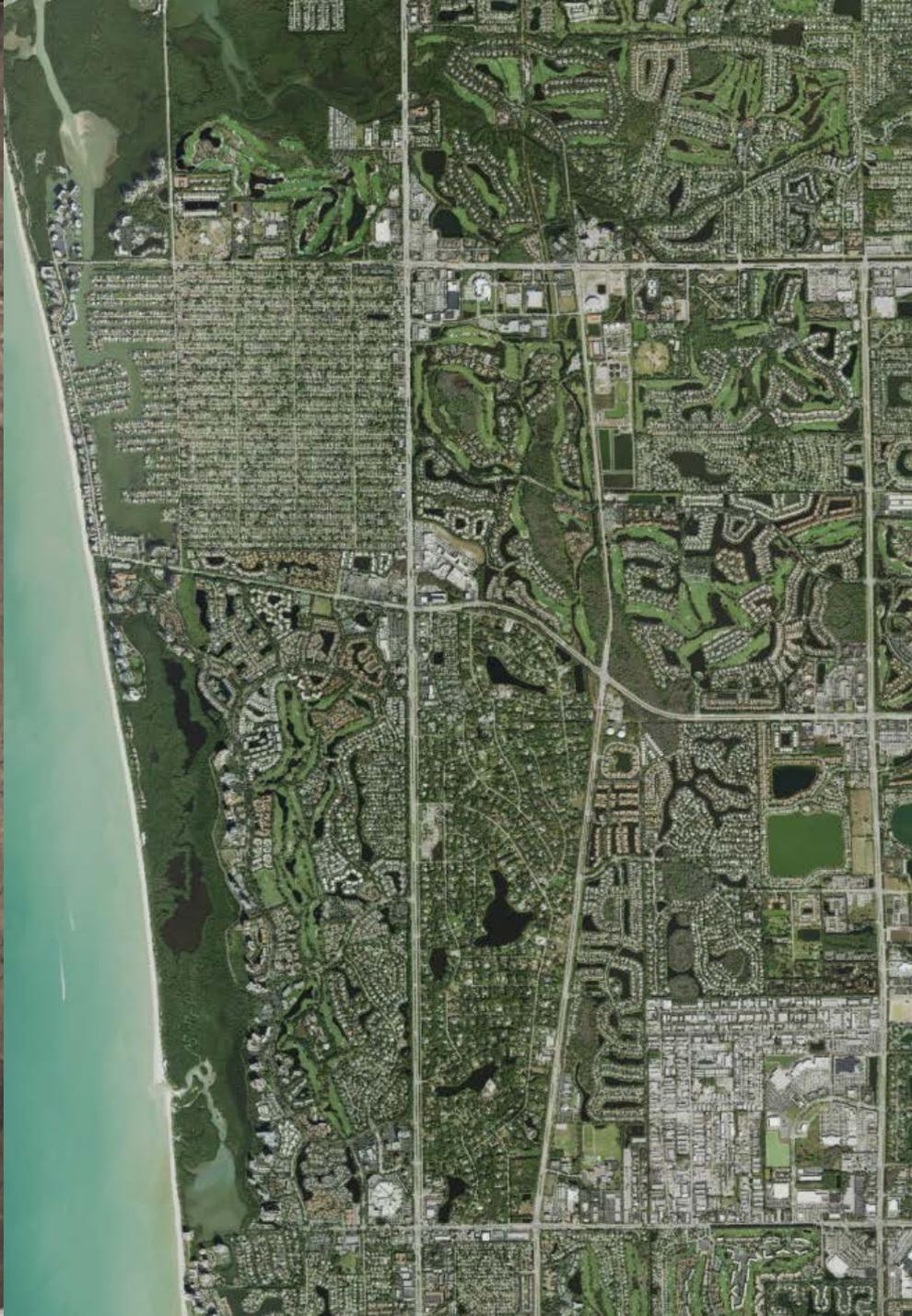
South Florida Water Management District

June 30, 2016

Observations Since the 2012 LWC Update

- Less golf development
- Citrus and sugarcane are still the dominant crops
- Robust economic growth
- Highest population growth rates in the US
- Expanding utility service areas





Water Demand Categories

1. Public Water Supply
2. Domestic Self-Supply
3. Industrial/Commercial/Institutional Self-Supply
4. Recreational/Landscape Self-Supply
5. Power Generation Self-Supply
6. Agricultural Self-Supply

Principles for Urban Demand Estimates and Projections

- Section 373.709, F.S.
- Maintain medium-BEBR county totals
- Accurately describe relative growth across LWC
- Identify and use best available data
- Simple, reproducible, and transparent methodology

Methodology – Population Projections

Define Current and 2040 Service Area Boundaries

- Coordination with 25 utilities

Estimate 2010 – 2014 Baseline Populations

- US Census and BEBR annual reports

Distribute BEBR 2015 – 2040 Projections to Service Areas

- Based on MPO and RTPO 2040 projections

Review Population Projections with Stakeholders

- Adjustments made based on local input

Methodology – Population Projections

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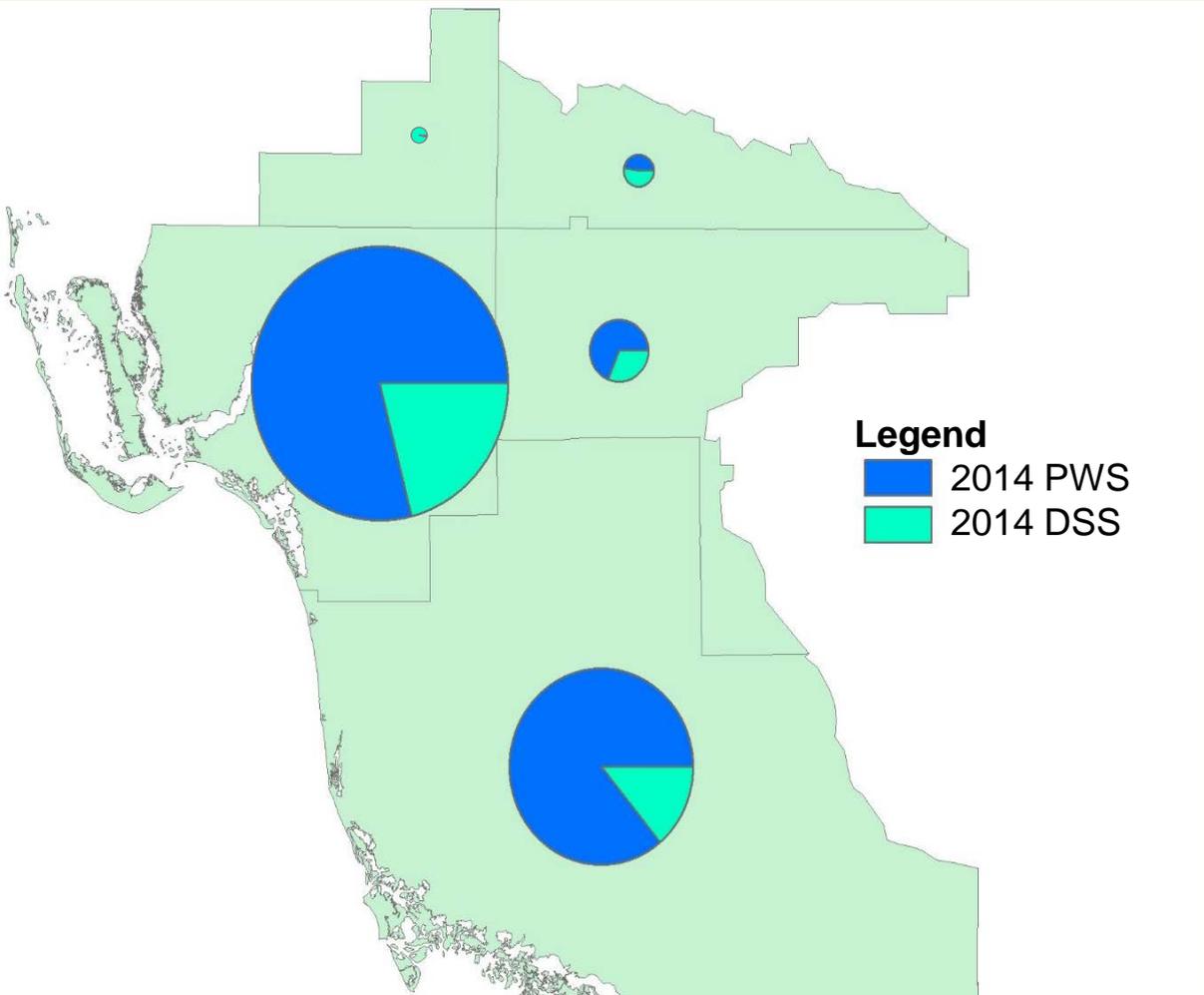
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2014 Population Estimates



		2014
Charlotte	PWS	72
	DSS	1,968
	Total	2,040
Collier	PWS	289,738
	DSS	47,045
	Total	336,783
Glades	PWS	4,253
	DSS	4,610
	Total	8,863
Hendry	PWS	23,297
	DSS	10,641
	Total	33,937
Lee	PWS	515,921
	DSS	137,564
	Total	653,485
LWC Total	PWS	833,280
	DSS	201,828
	Total	1,035,108

Methodology – Population Projections

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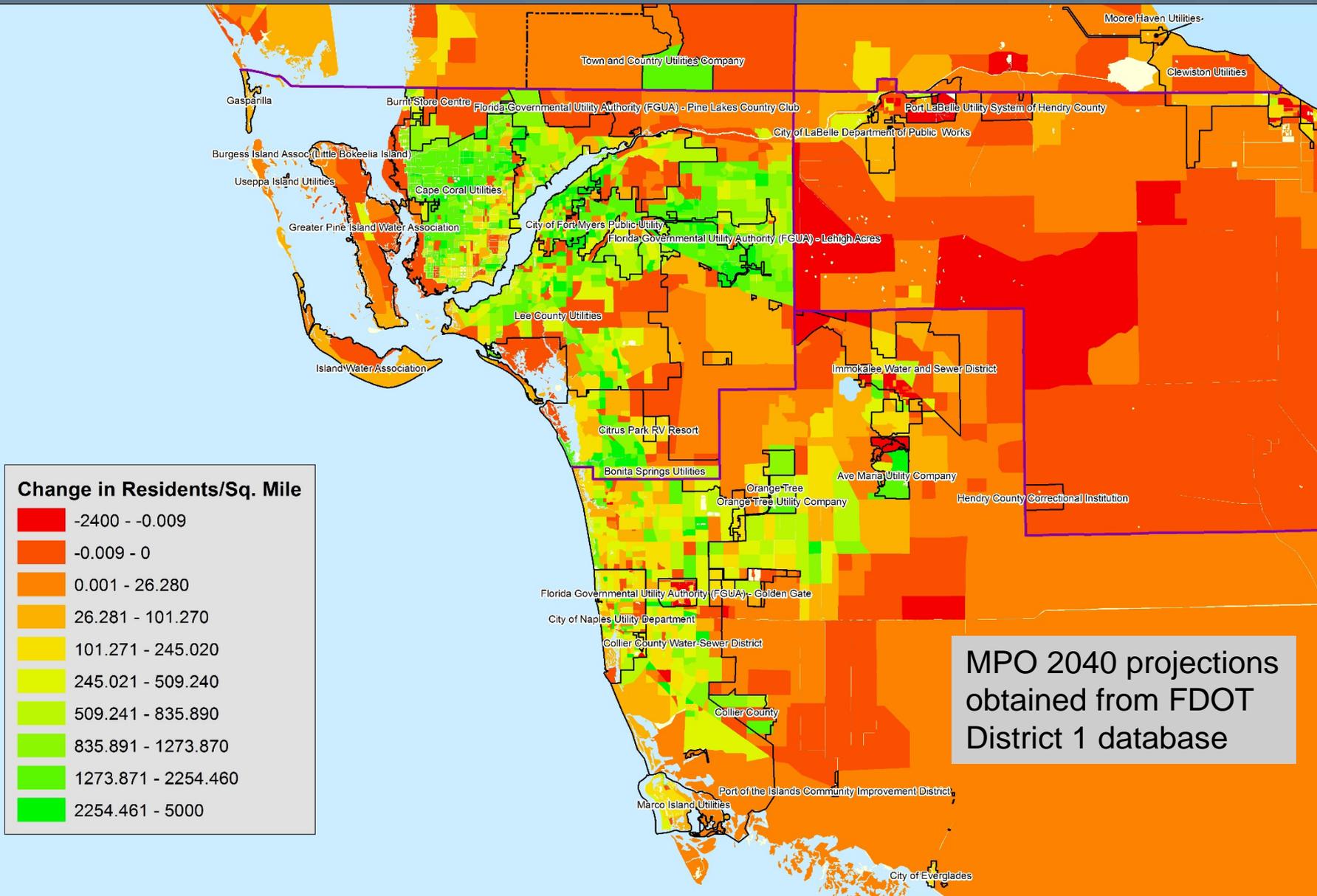
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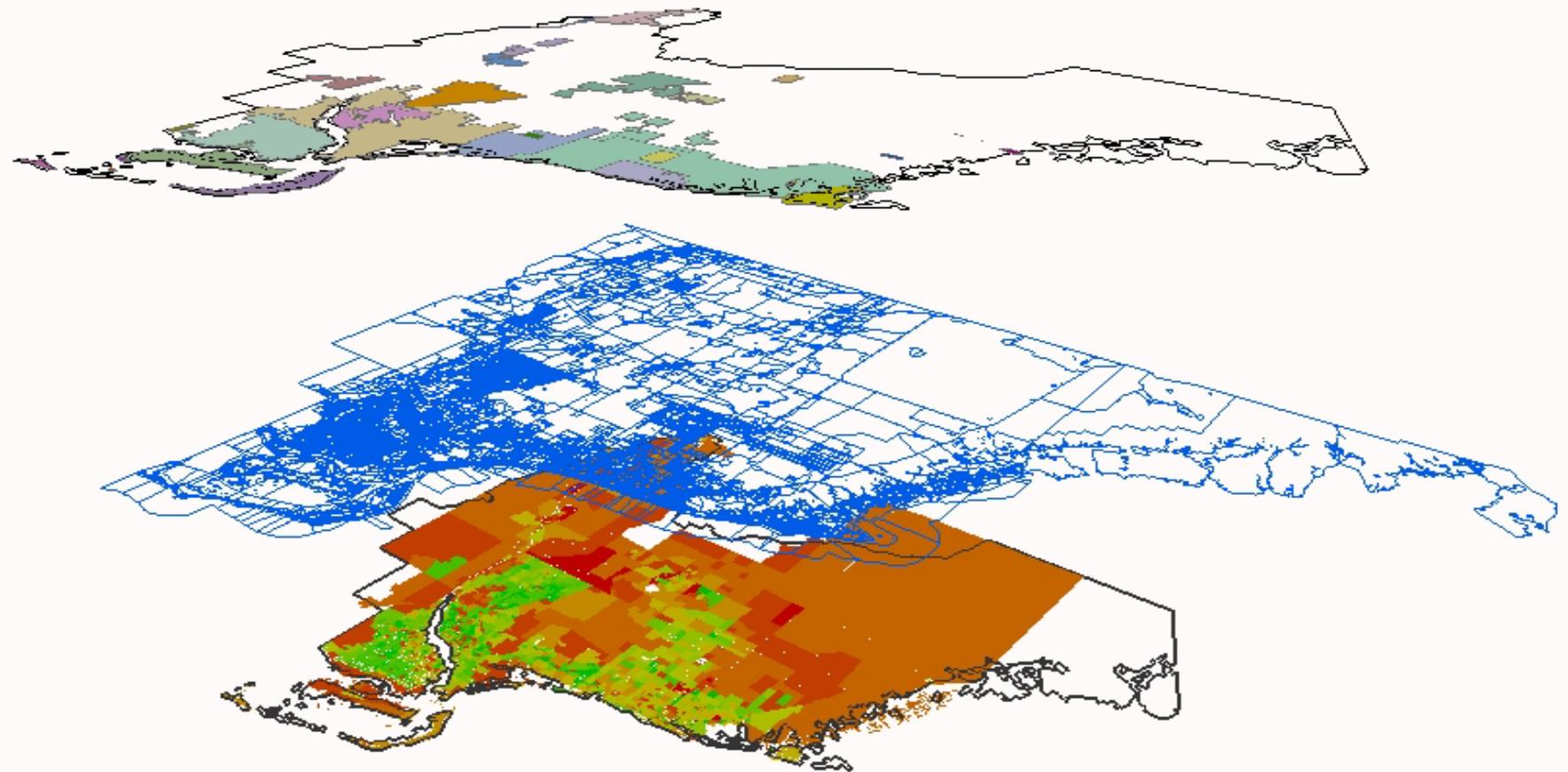


Change in Residents/Sq. Mile

Red	-2400 - -0.009
Dark Orange	-0.009 - 0
Orange	0.001 - 26.280
Light Orange	26.281 - 101.270
Yellow-Orange	101.271 - 245.020
Yellow	245.021 - 509.240
Light Green	509.241 - 835.890
Green	835.891 - 1273.870
Dark Green	1273.871 - 2254.460
Bright Green	2254.461 - 5000

MPO 2040 projections
obtained from FDOT
District 1 database

Methodology – Population Projections



Methodology – Population Projections

Define Current and 2040 Service Area Boundaries

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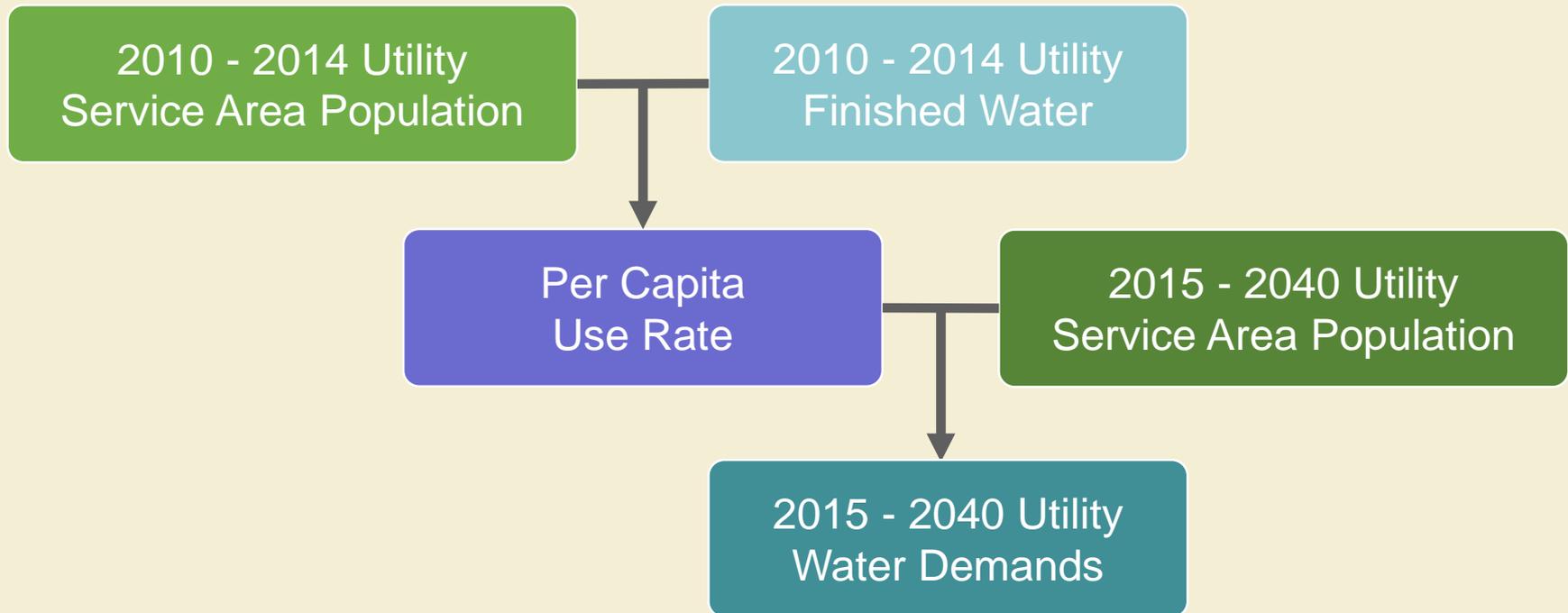
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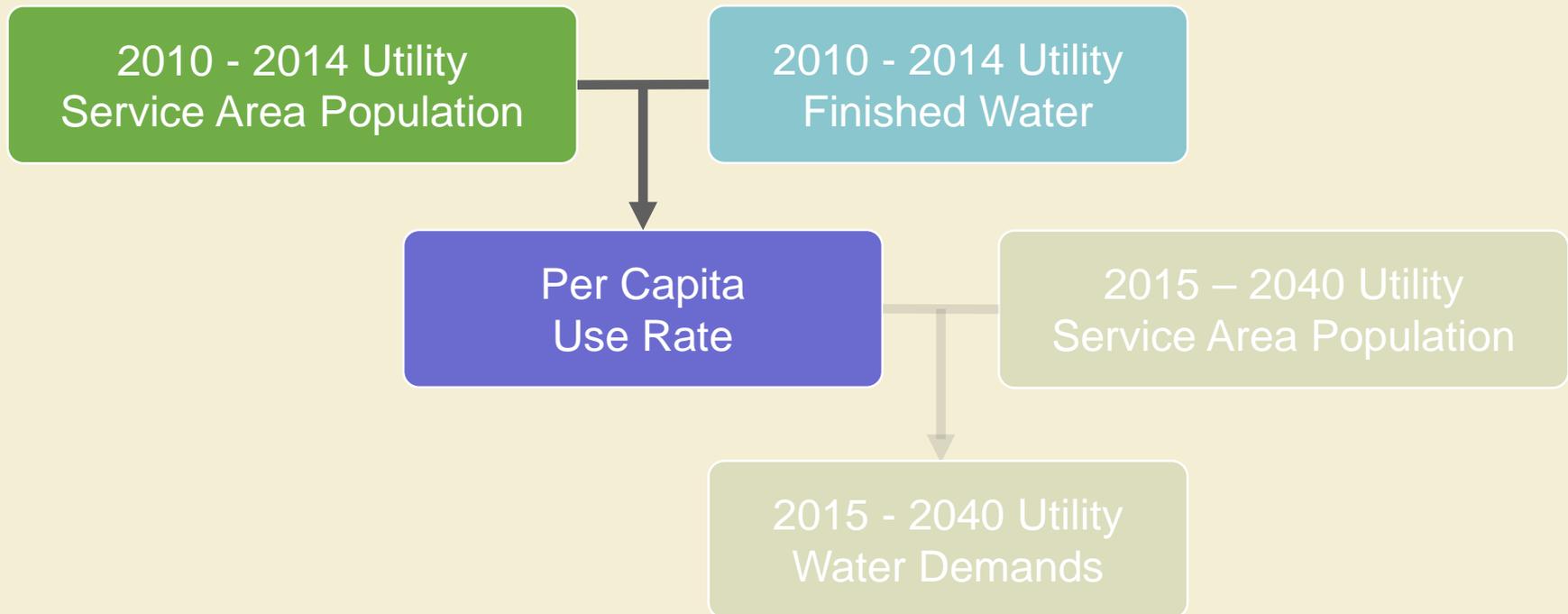
LWC Population Projections

		2014	2040	% Change
Charlotte	PWS	72	26,500	36,706%
	DSS	1,968	2,152	9%
	Total	2,040	28,652	1,304%
Collier	PWS	289,738	414,394	43%
	DSS	47,045	72,865	55%
	Total	336,783	487,259	45%
Glades	PWS	4,253	4,606	8%
	DSS	4,610	6,102	32%
	Total	8,863	10,708	21%
Hendry	PWS	23,297	23,029	-1%
	DSS	10,641	13,028	22%
	Total	33,937	36,057	6%
Lee	PWS	515,921	868,312	68%
	DSS	137,564	205,554	49%
	Total	653,485	1,073,866	64%
LWC Total	PWS	833,280	1,336,841	60%
	DSS	201,828	299,701	48%
	Total	1,035,108	1,636,542	58%

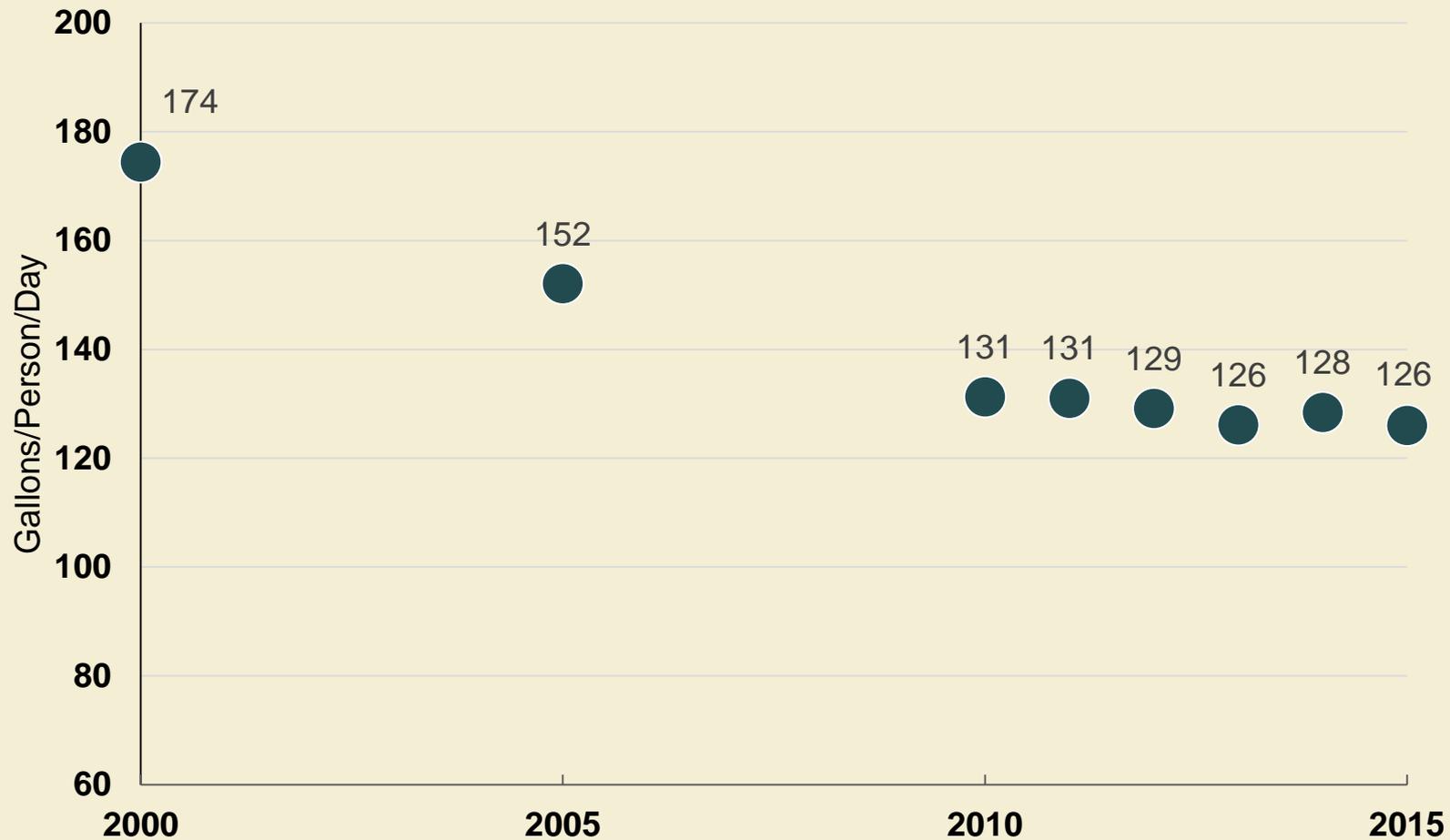
Methodology – Public Water Supply



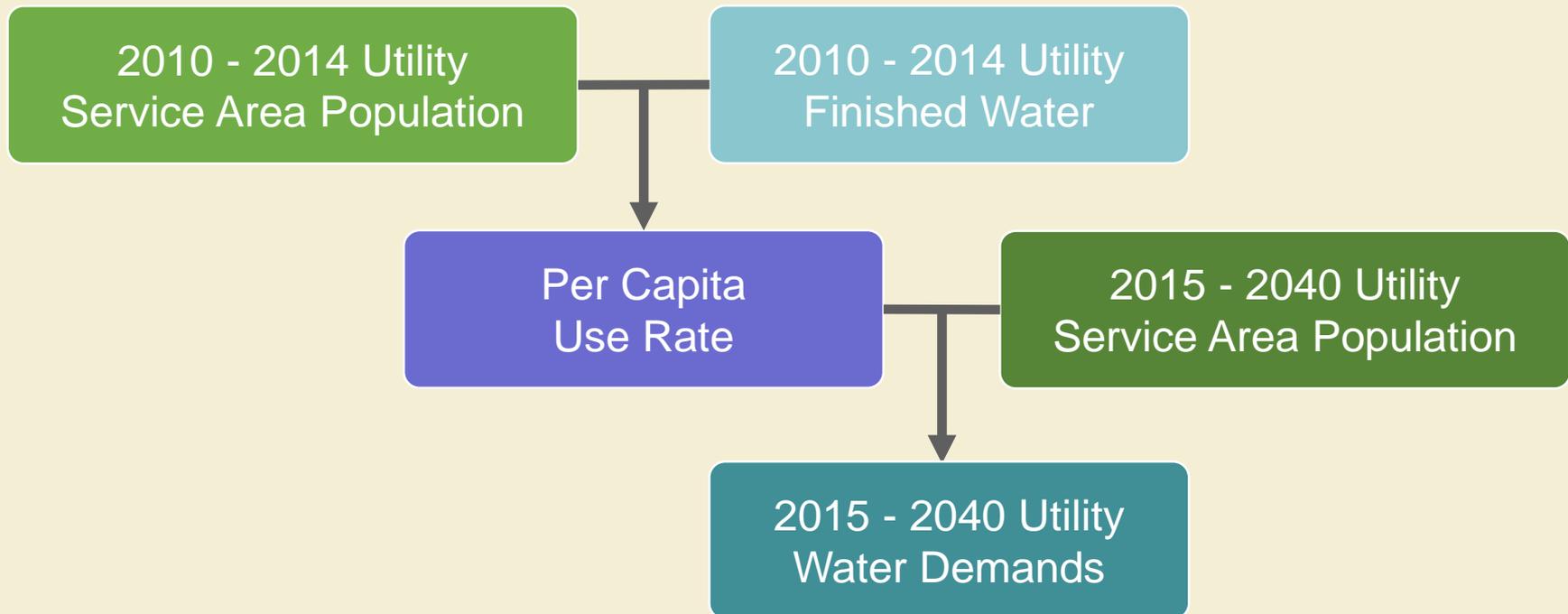
Methodology – Public Water Supply



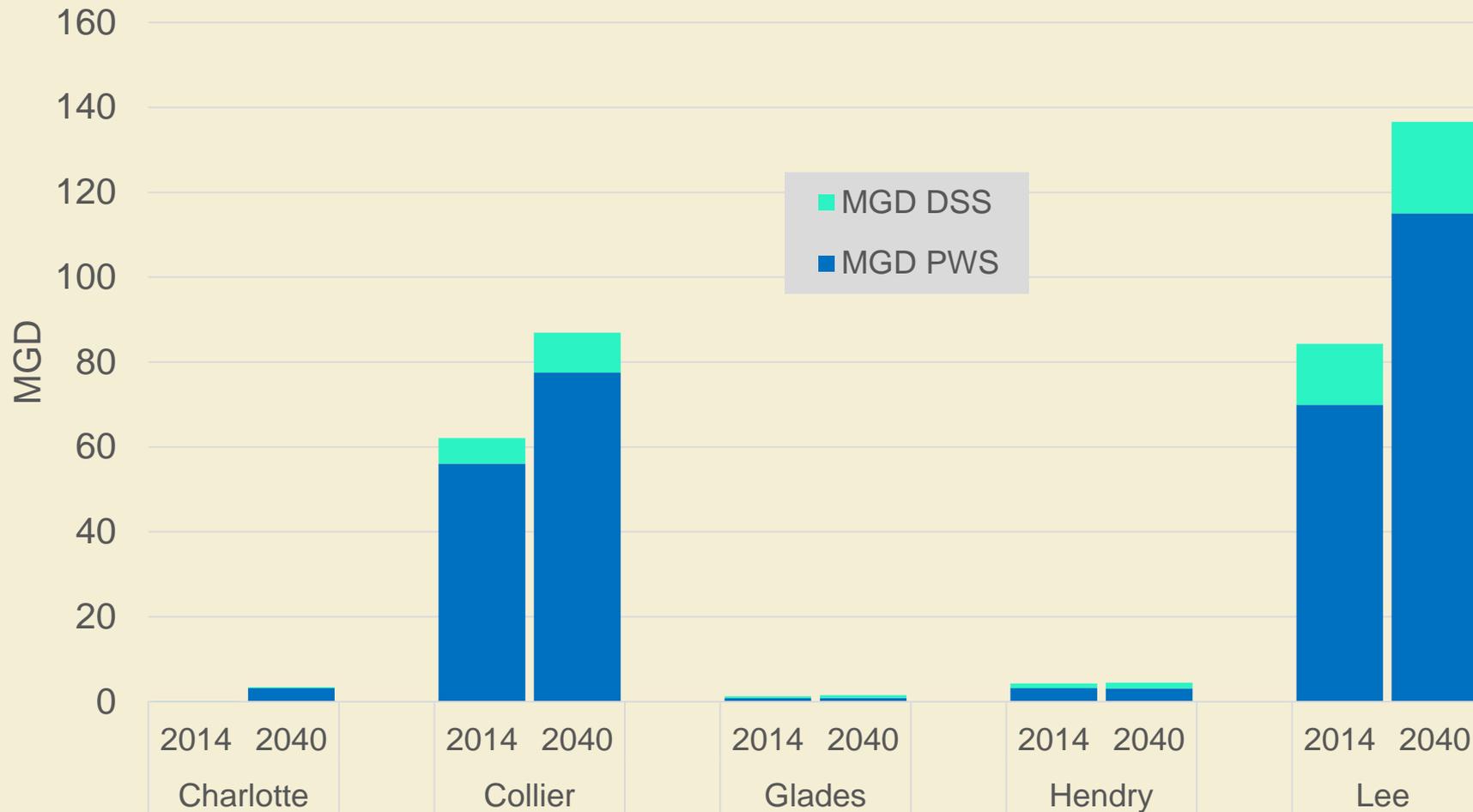
LWC Regional Average PCUR



Methodology – Public Water Supply



PWS and DSS Projected Demands



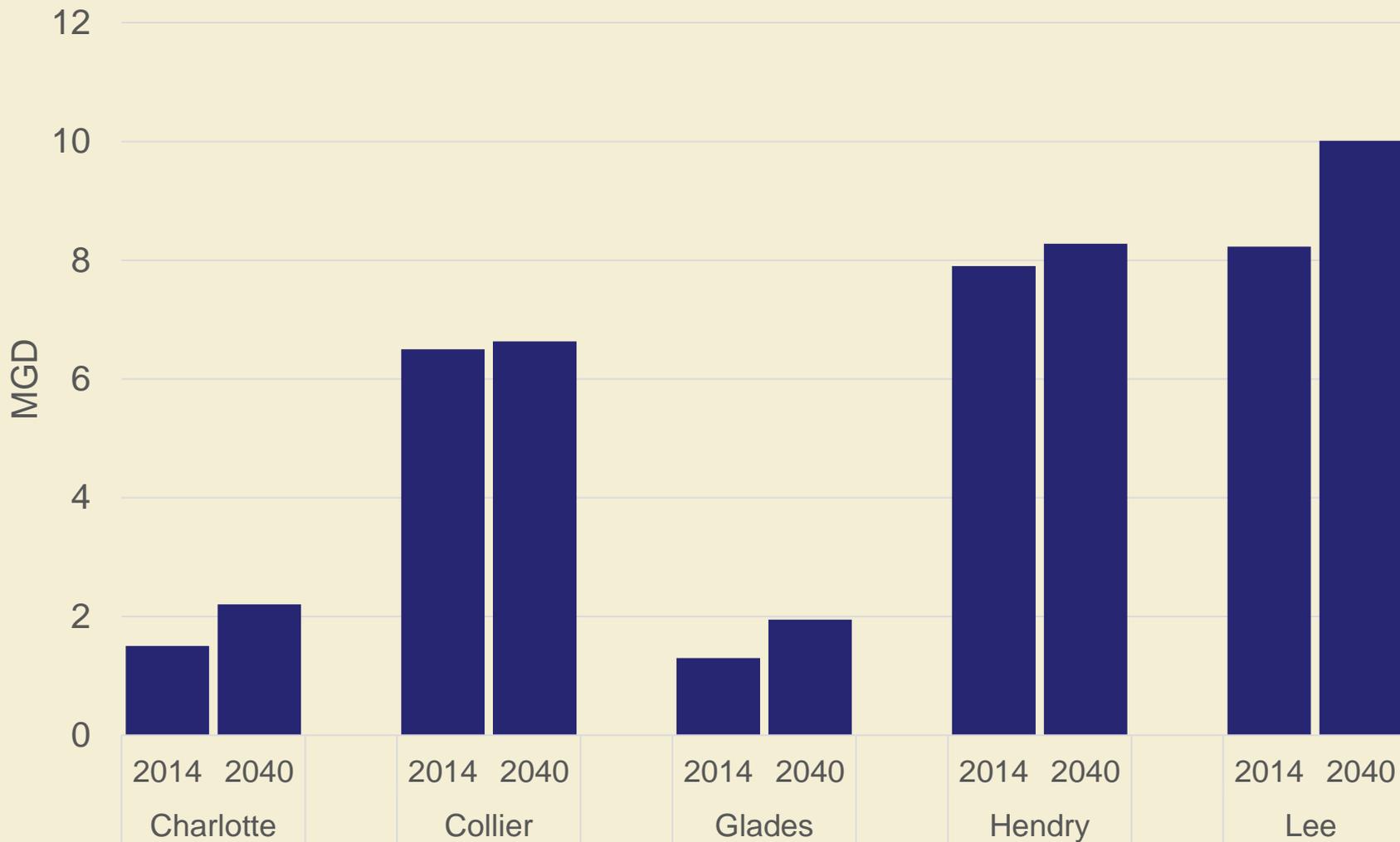
Water Demand Categories

1. Public Water Supply
2. Domestic Self-Supply
3. Industrial/Commercial/Institutional Self-Supply
4. Recreational/Landscape Self-Supply
5. Power Generation Self-Supply
6. Agricultural Self-Supply

Industrial/Commercial/Institutional Self-Supply

- Main User Categories
 - Mining operations
 - Processing of agricultural products
 - Geothermal heating and cooling
- Methodology
 - Baseline estimates based on permitted allocation
 - Water returned directly to withdrawal source not considered demand
 - Mining operations projected to grow with region's population

Industrial/Commercial/Institutional Projected Demands

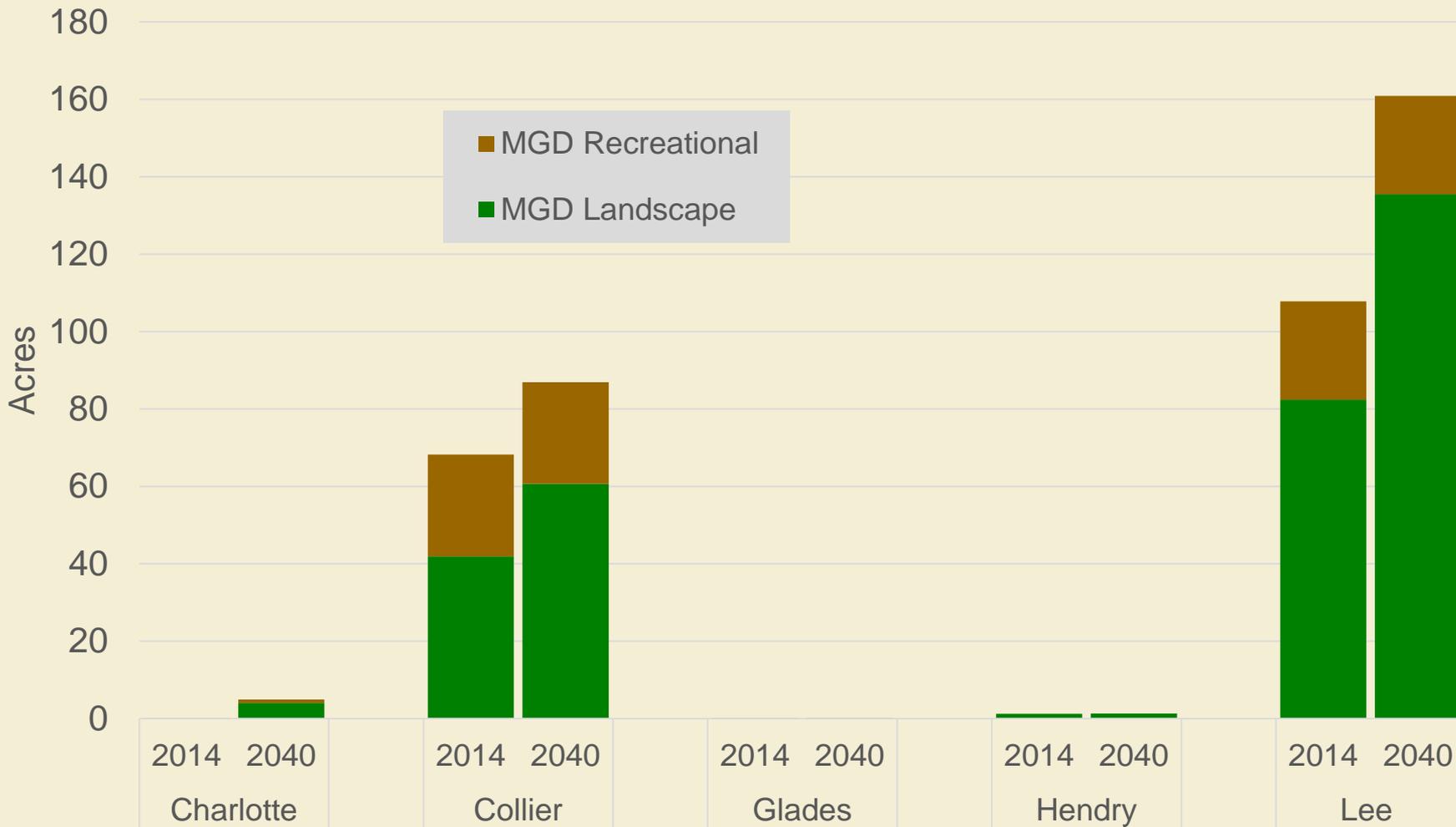


Recreational/Landscape

■ Methodology

- 2014 acreage based primarily on District land use data
- Water demands based on reported volumes
- Landscape category projected to grow with population
- Only planned and approved golf construction

Recreational/Landscape



Power Generation Self-Supply

- **Power generation facilities in the LWC**
 - Lee County Solid Waste Energy Recovery Facility
 - FPL Babcock Ranch Solar Energy Center
 - US Sugar – Clewiston
 - FPL Fort Myers
- **Projected Water Demands**
 - 2014: 0.4 MGD
 - 2040: 15.4 MGD

Agricultural Self-Supply

Agricultural Projections

- 2013 – Sections 570.93 and 373.709, F.S.: FDACS to develop state-wide agricultural projections
- Water management districts required to consider the projections in water supply planning
- Projections done annually, at one time for entire state
- Results referred to as Florida Statewide Agricultural Irrigation Demand (FSAID)

Agricultural Self-Supply

Factors Creating Uncertainty

- Market conditions change; growers adapt
- Many crops/acres changes from year to year
- Future plans are proprietary
- Regional conditions – crop diseases, land-use changes
- Growers follow different methods

Agricultural Demands

- Past plans have used AFSIRS to estimate and project water use
- Full FSAID report to be published in early July
- Will coordinate with FDACS and agricultural stakeholders to review acreage and water demand current estimates and projections
- Will finalize agricultural projections in late summer

*Agricultural Field-Scale Irrigation Requirements Simulation

LWC Water Demands Summary

Water Use Category	Water Demands (mgd)		
	2014	2015	2040
Public Water Supply	124.3	130.0	199.7
Domestic Self-Supply	21.3	22.2	33.2
Recreational/Landscape	177.6	180.5	254.3
Industrial/Commercial/Institutional	25.4	24.7	29.1
Power Generation	0.4	0.4	15.4
Agriculture	<i>In Development</i>		

Questions?





Floridan Aquifer System Modeling

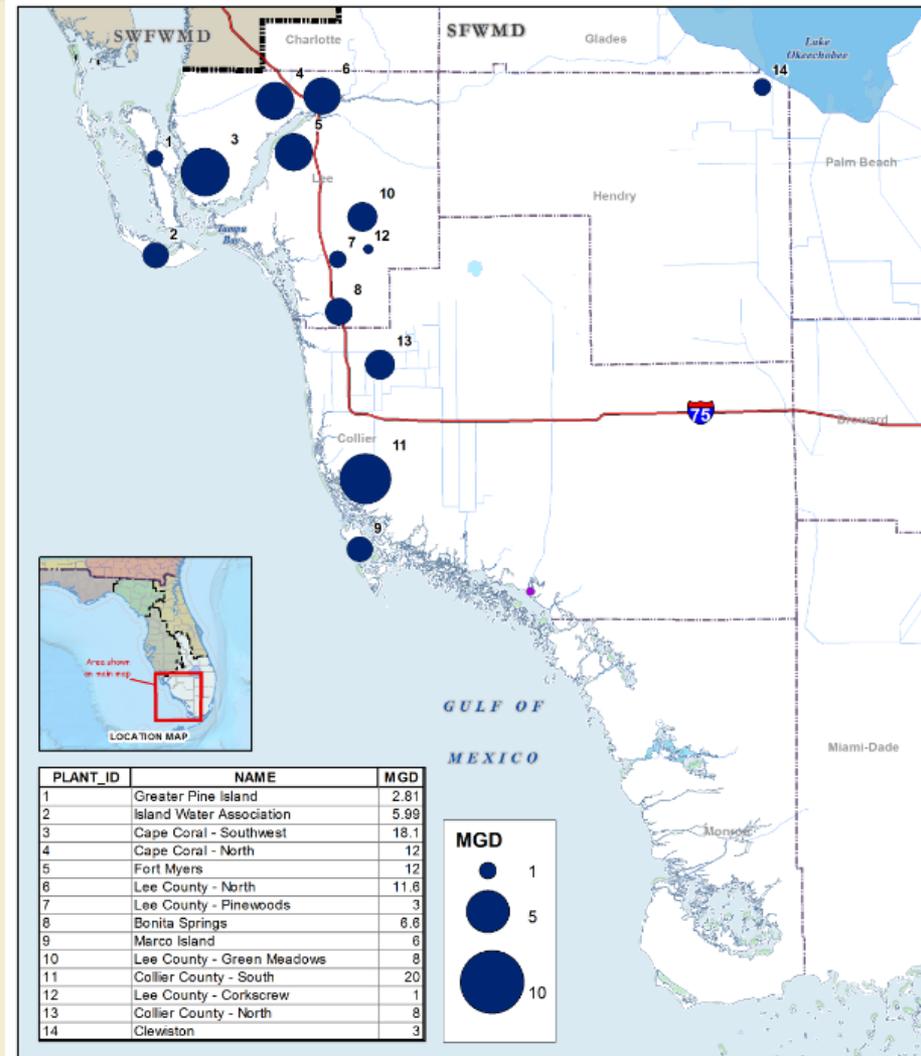
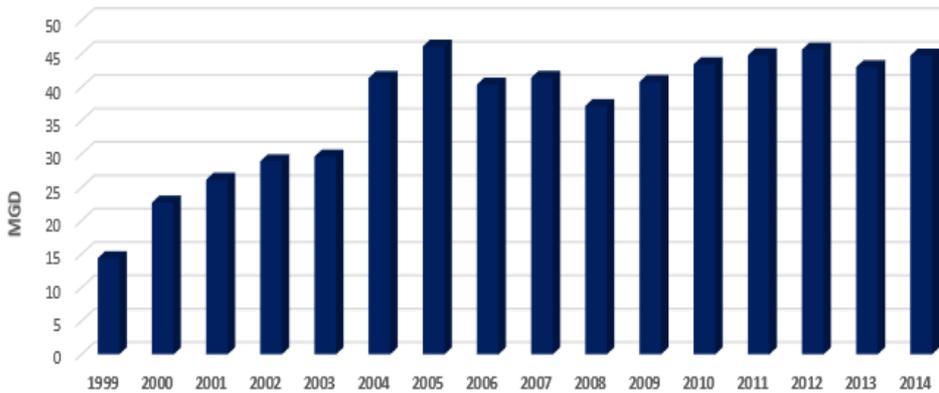
Peter J. Kwiatkowski, P.G.
Resource Evaluation Section Administrator
South Florida Water Management District

June 30, 2016

Brackish Water from Floridan Aquifer System

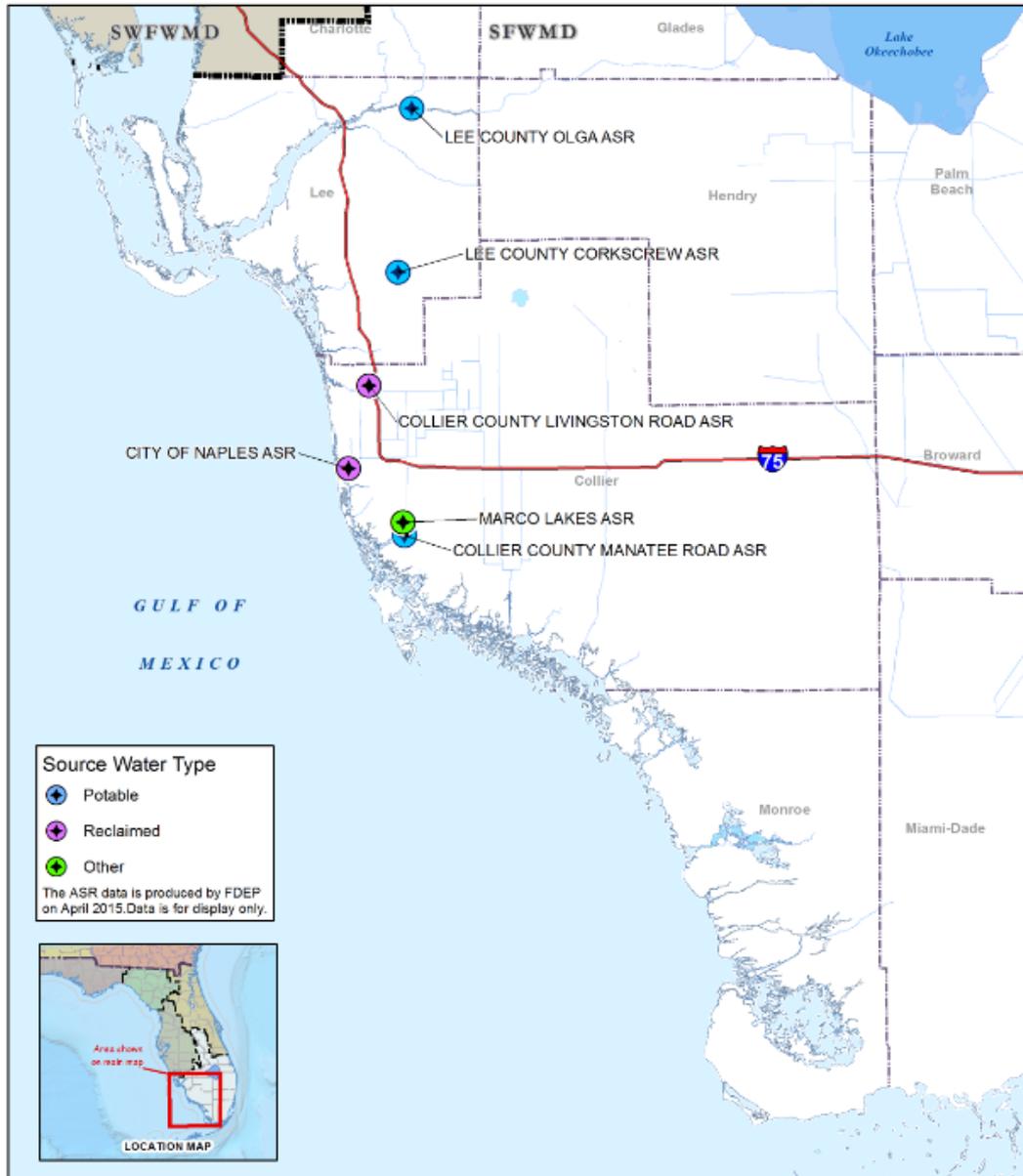
- 14 facilities
- 120 mgd of capacity
- Reverse osmosis treatment

LWC Planning Area
Public Water Supply FAS Water Withdrawals
(1999-2014)



Aquifer Storage and Recovery

- Used to store reclaimed water, surface water, and potable water
- 18 active ASR wells – Floridan aquifer system



Lower West Coast Groundwater Modeling

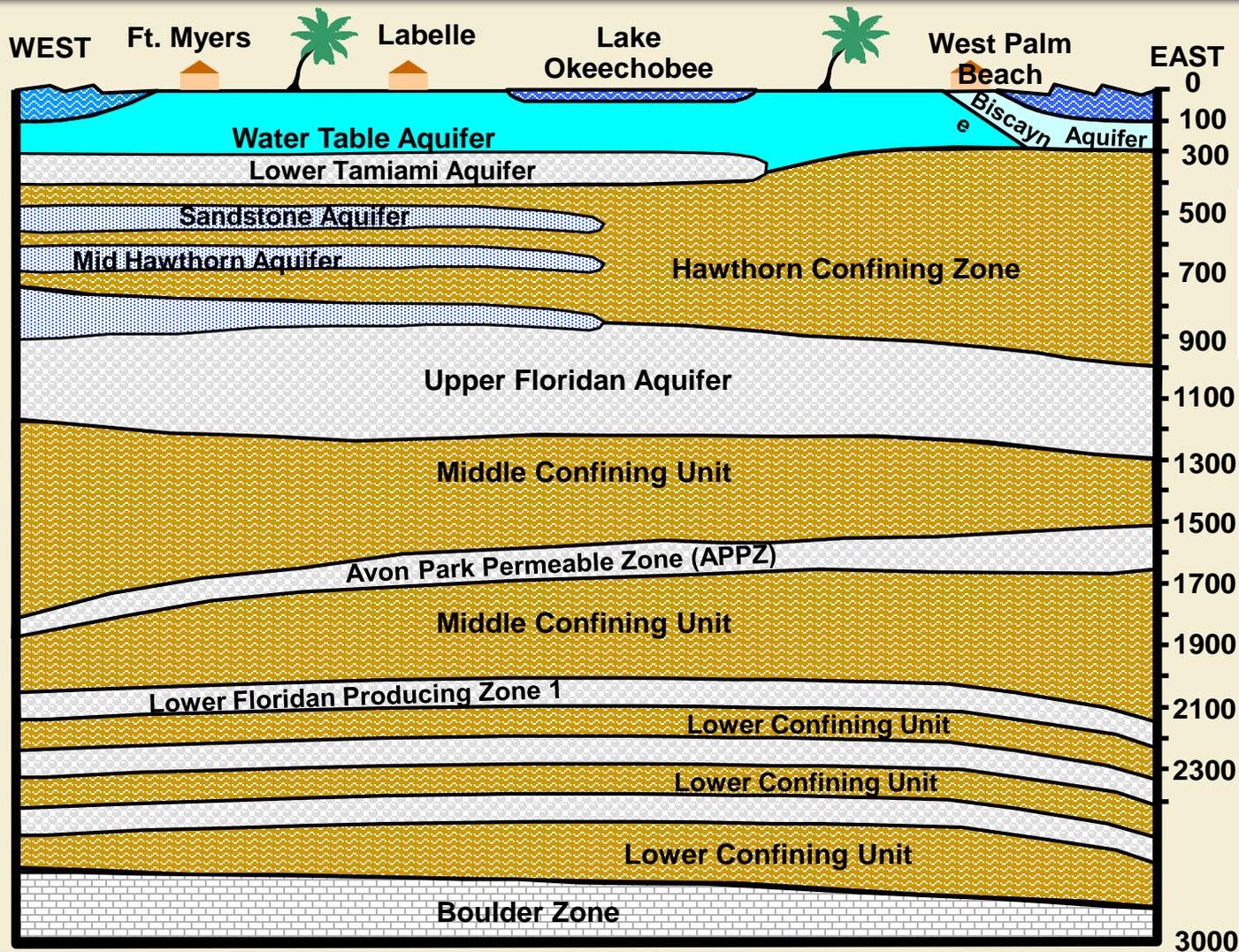


- West Coast Floridan Model
 - Assess water levels and water quality
- Lower West Coast Surficial and Intermediate Aquifer Model
 - In development

Modeling Objectives

- Conduct a regional-scale, planning-level evaluation of the FAS as a water supply source
- Evaluate the potential of existing and proposed facilities to meet 2040 water demands
- Focus analysis on potential changes to water quality (TDS) and water levels
- Consider the modeling results in LWC Plan Update process when determining if proposed FAS projects:
 - Are generally feasible
 - Have the potential to meet projected demands

Model Layering



West Coast
Floridan
Model Layers

Layer 1

Layer 2

Layer 3

Layer 4

Layer 5

Layer 6

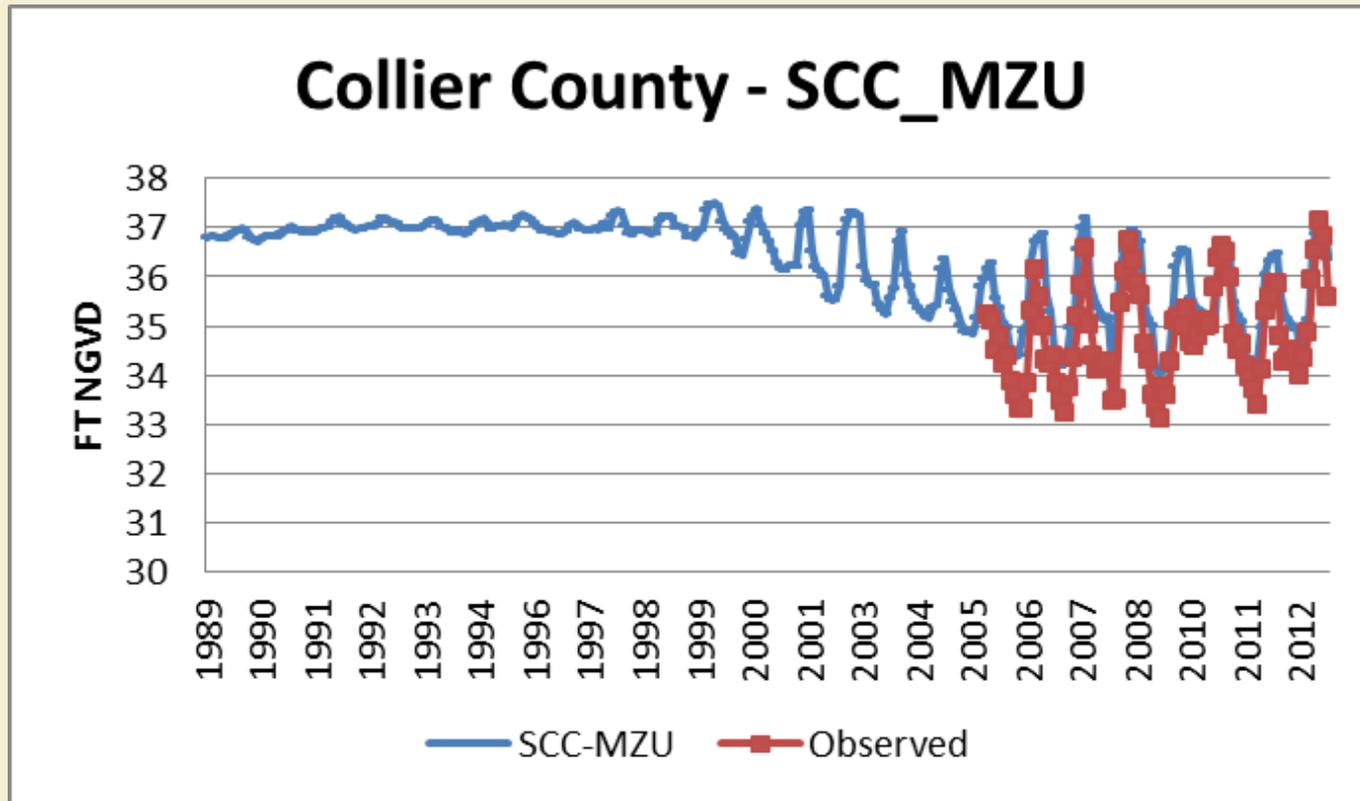
Layer 7

Model Status

- Model has been developed in stages, it has undergone peer review, and the peer-review recommendations have been incorporated
- Primary revisions for this phase include:
 - Reorientation of model grid to coincide with the ECFM model grid
 - Extend simulation period to 20 years
 - Incorporate additional water level and water quality data, including UIC wells
 - Incorporate additional modifications to the model hydrostratigraphy for consistency with other District models

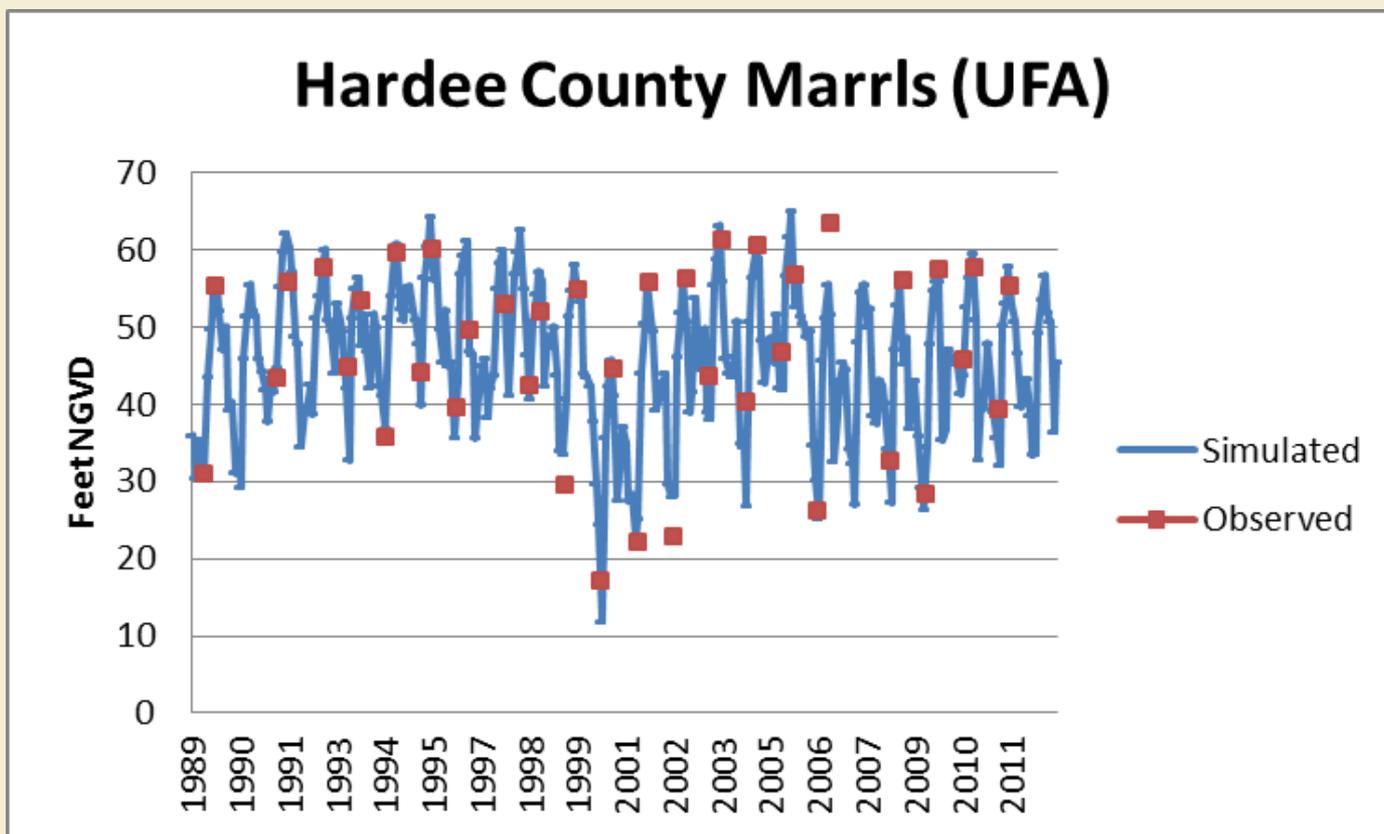
Water Level Calibration Example

- Collier County monitor well's water level responding to regional drawdowns from the Collier County Utilities FAS wellfield and Marco Lakes ASR wellfield



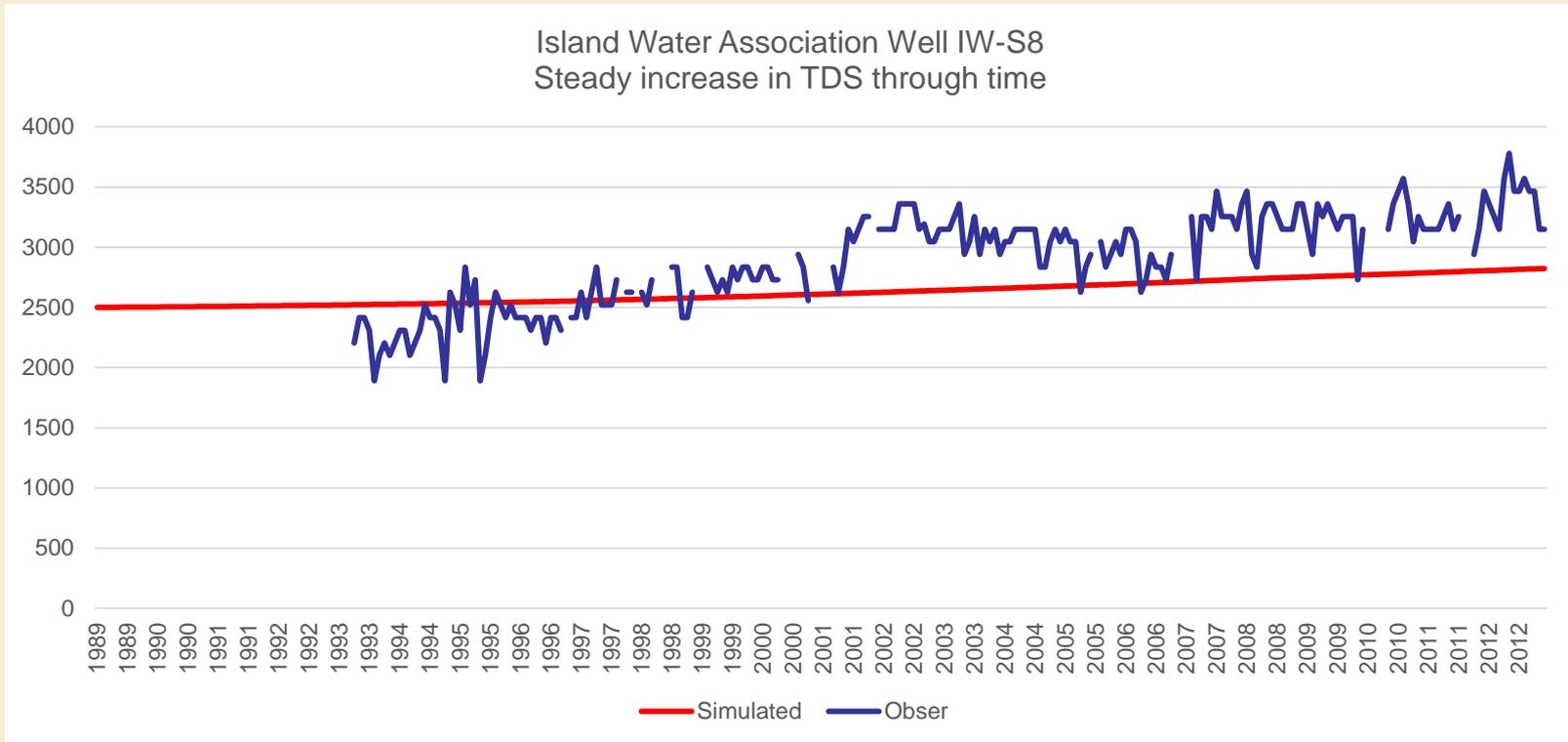
Water Level Calibration Example

- Agricultural operations in area cause monthly water level variations of 20 to 30 feet



Water Quality Calibration Example

- Island Water Association (Sanibel Island) showing steady increase in TDS values with model also suggesting increase but not at the same rate
- Challenge – Regional Model vs. Well Data

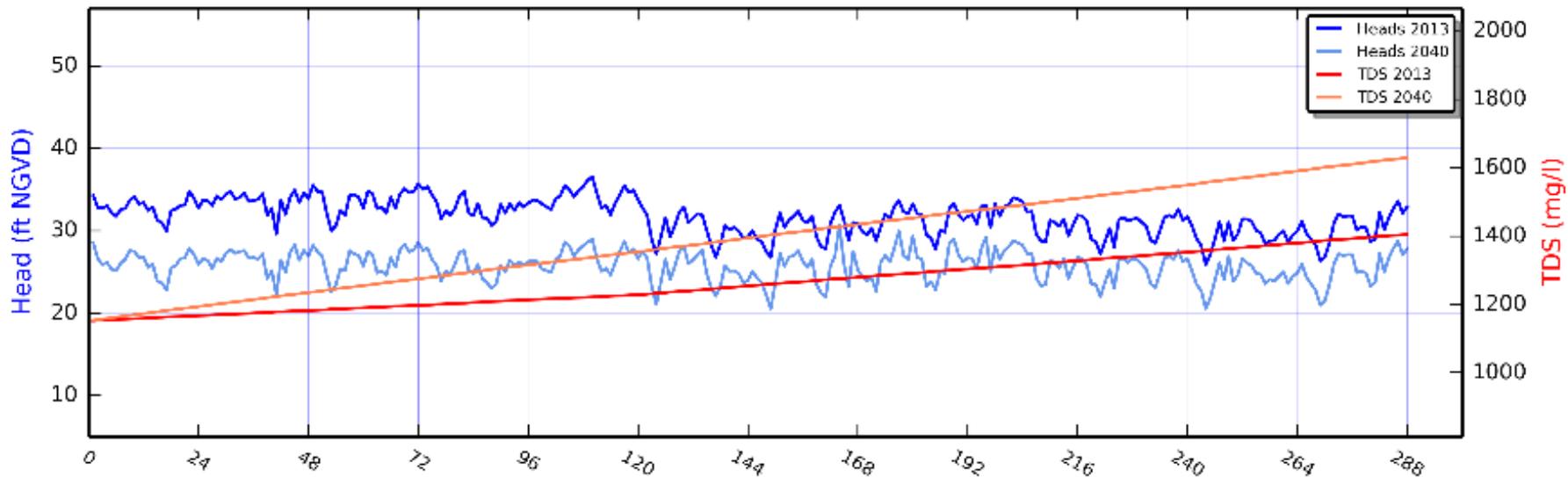


Interpreting Results

- Relative comparisons between model runs
 - 2014 Base Case
 - 2040 Simulation
- Points of comparison
 - End of model run (Month 300)
 - 1-in-10 year rainfall deficit
 - Change from initial condition to end of model run
- Graphic representation of performance
 - Show changes in water levels (NGVD29)
 - Display differences in water quality (TDS)
 - Illustrate variations in flow (horizontal and vertical)

Hydrograph Example: Water Level and Quality for Period of Record

IRF-RO Layer: 1



Schedule

- Complete calibration September
- Simulations October
- Public workshop November
- Model documentation February

Questions?





Discussion

Stakeholder Participation

June 30, 2016



Next Steps

Bob Verrastro, P.G.
Plan Manager

South Florida Water Management District

June 30, 2016

2017 LWC Water Supply Plan Update Schedule



Lower West Coast Water Supply Plan Update Process



Next Steps

- Agricultural Coordination
 - Finalize demand projections
- Utility Coordination
 - Distribute wastewater profiles for review by utilities, cities, and counties
- Continue correspondence with local governments through public or individual meetings in LWC area
- Continue development of FAS and SAS/IAS groundwater models
- Ongoing coordination with Central and Northern Everglades Planning Projects

Next Steps (cont.)

Next Stakeholder Workshop: Nov-Dec 2016

■ Meeting focus:

- FAS groundwater model
- Evaluation of water resources
- Lower West Coast MFLs
- Everglades restoration progress
- Reports on LWC agriculture

Need Water Supply Plan Information?

The screenshot shows the website for the Lower West Coast Water Supply Plan. The header includes the South Florida Water Management District logo and navigation menus for Home, About Us, Managing & Protecting Water, Protecting & Restoring Ecosystems, News, and Library & Materials. The main content area features a large image of a flooded area with a warning sign, a map of the planning area, and a 'VIEW LARGER' button. Below this is a 'RELATED LINKS' section with various topics like water supply planning, alternative water supply, and water conservation. The central text describes the 2017 update to the plan, which assesses projected water demands and potential sources of water for the period from 2014 to 2040. A '2012 LOWER WEST COAST WATER SUPPLY PLAN UPDATE' section lists several documents for download, including planning documents, appendices, and support documents. A 'NOTE' requests contact information for document requests. The 'Upcoming Events' section lists a 2016 kick-off meeting and other events. The 'Related Contacts' section provides contact information for Robert Varnado.

- Plan information can be found at: www.sfwmd.gov
 - Then click “Lower West Coast Plan”
- Workshop announcements sent by email
- Next meeting: **Nov-Dec 2016**

Questions?

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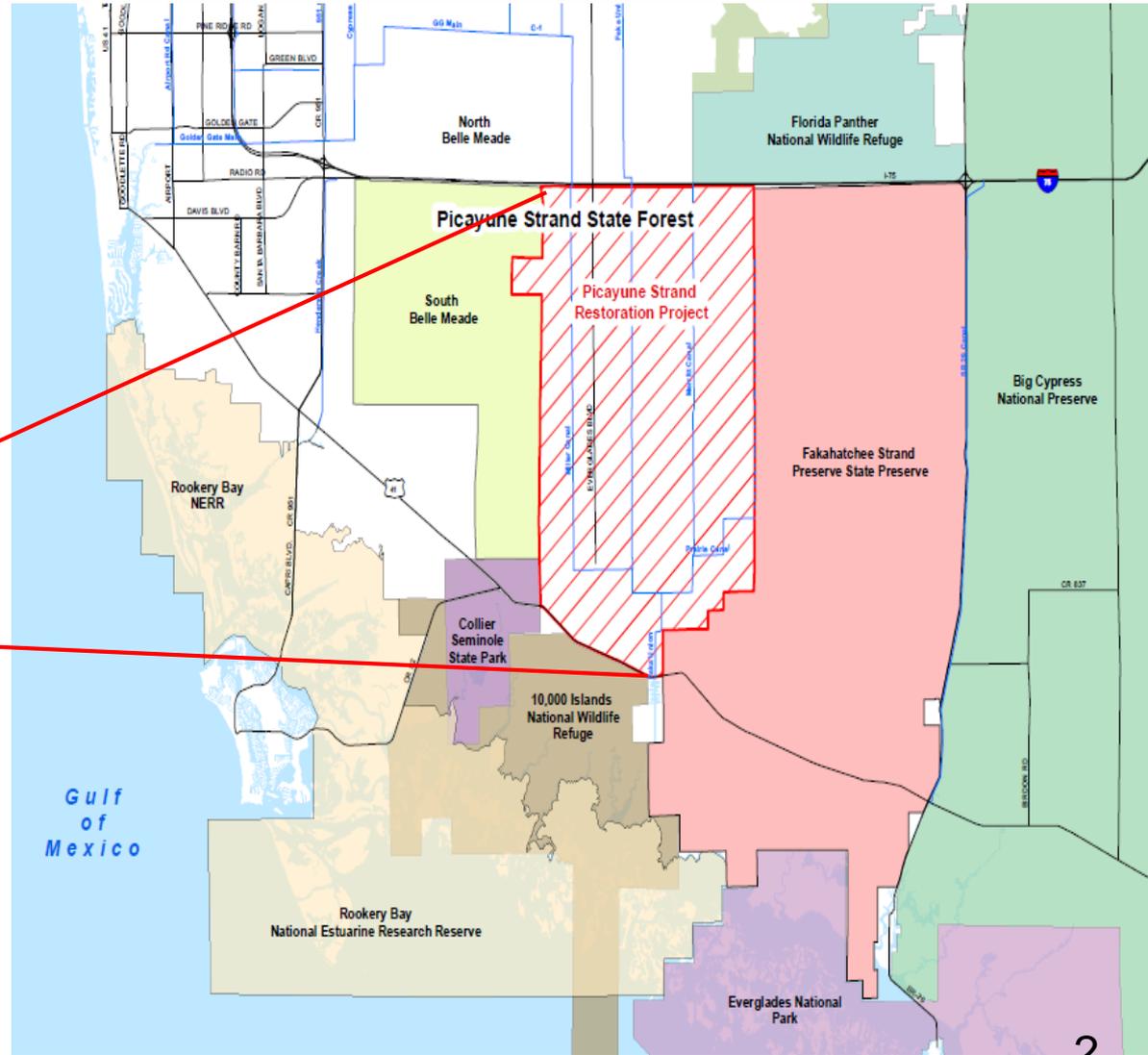
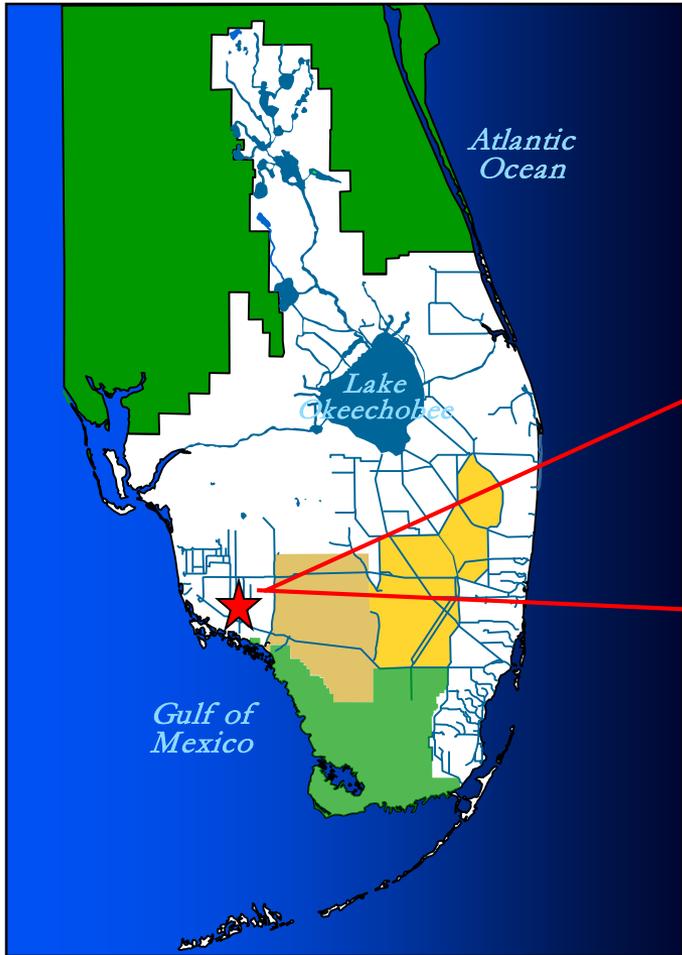
■ **Mark Elsner, P.E.
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Picayune Strand Restoration Project

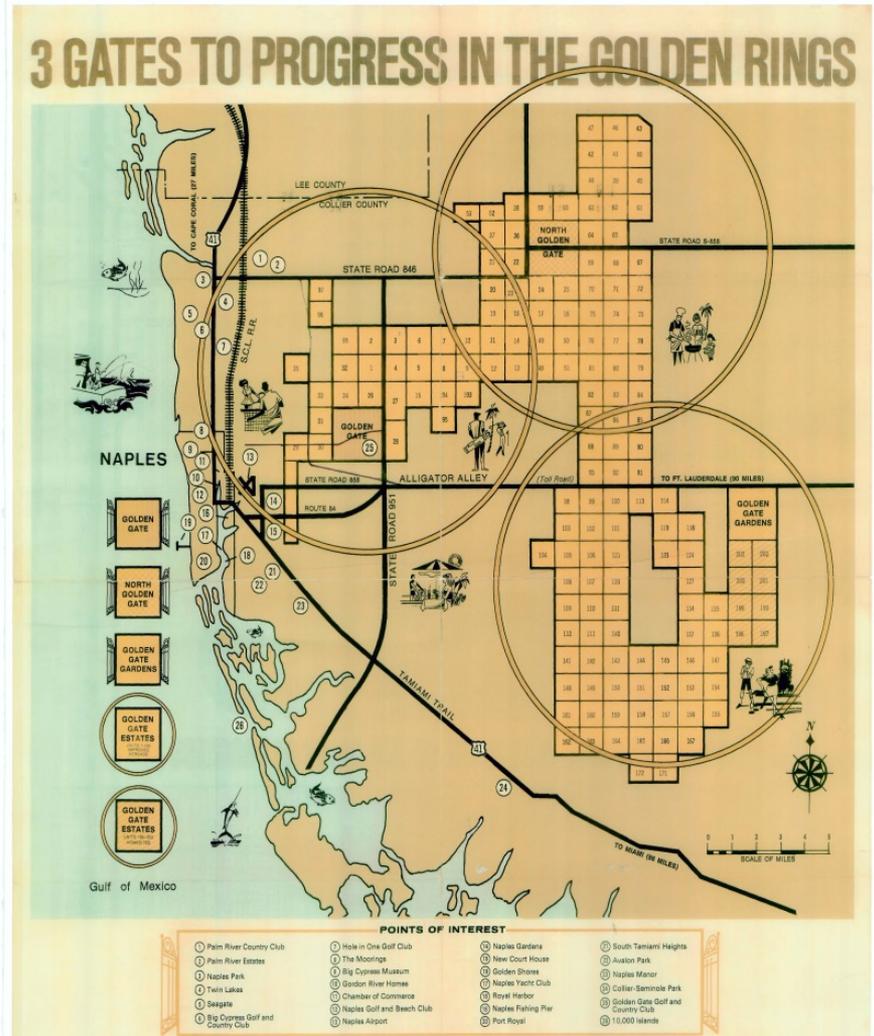
**Janet Starnes, Principle Project Manager
South Florida Water Management District
June 30, 2016**

Picayune Strand Restoration

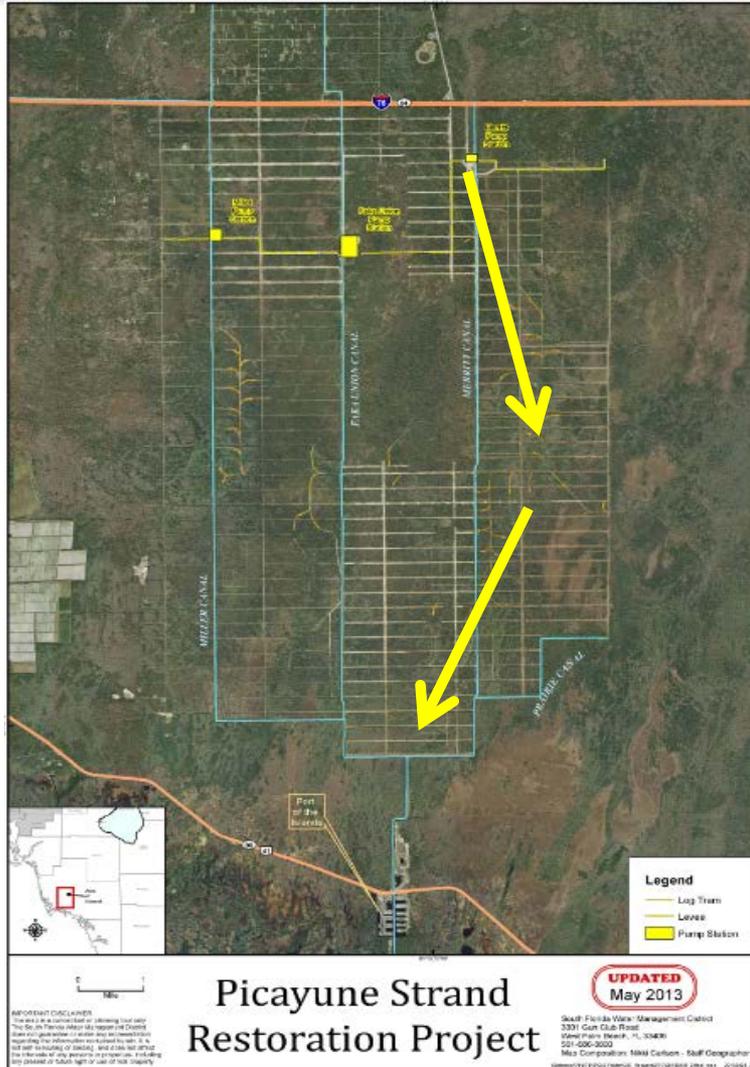


Background

- Golden Gate Estates was originally designed as the largest suburban development in the country
- Golden Glade Estates was created in the 1960s
- Four major canals very effectively drained the area resulting in an altered ecosystem



Picayune Strand Restoration



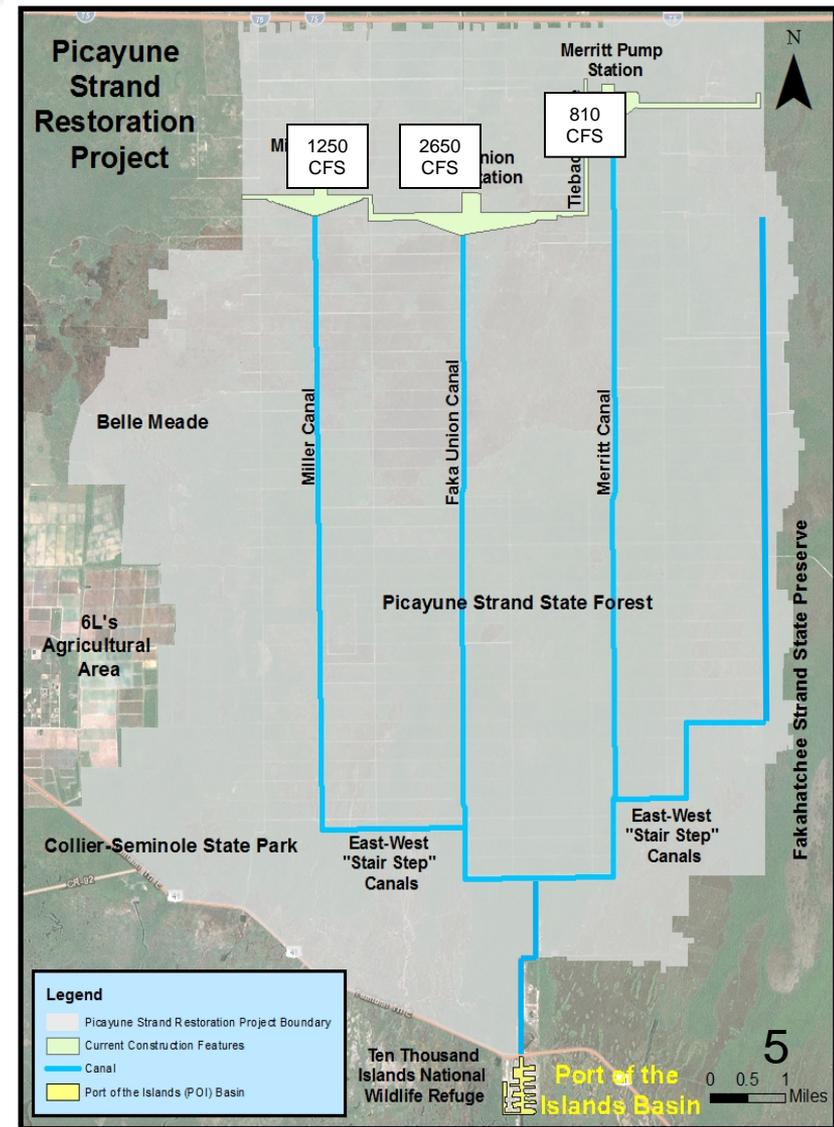
■ Purpose

- Restores pre-drainage watershed flow pattern to a sheet flow condition
- Restores upland/wetland habitat in watershed
- Increases groundwater levels
- Restores habitat for endangered/threatened species (panther, woodstork)
- Restores freshwater flows to estuaries
- Provides for better fire management

Picayune Strand Restoration Project

Project features include:

- Three pump stations
 - Merritt – 810 cfs
 - Faka Union – 2650 cfs
 - Miller – 1250 cfs
- Plugging 42 miles of canals
- Removing 285 miles of roads
- Removing 62 miles of tram roads
- Protection features for adjacent lands
- Manatee mitigation feature

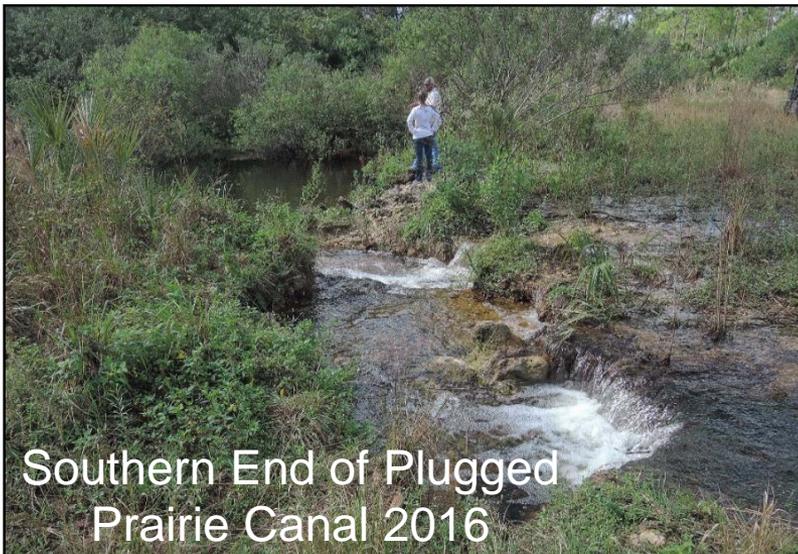


Prairie Canal

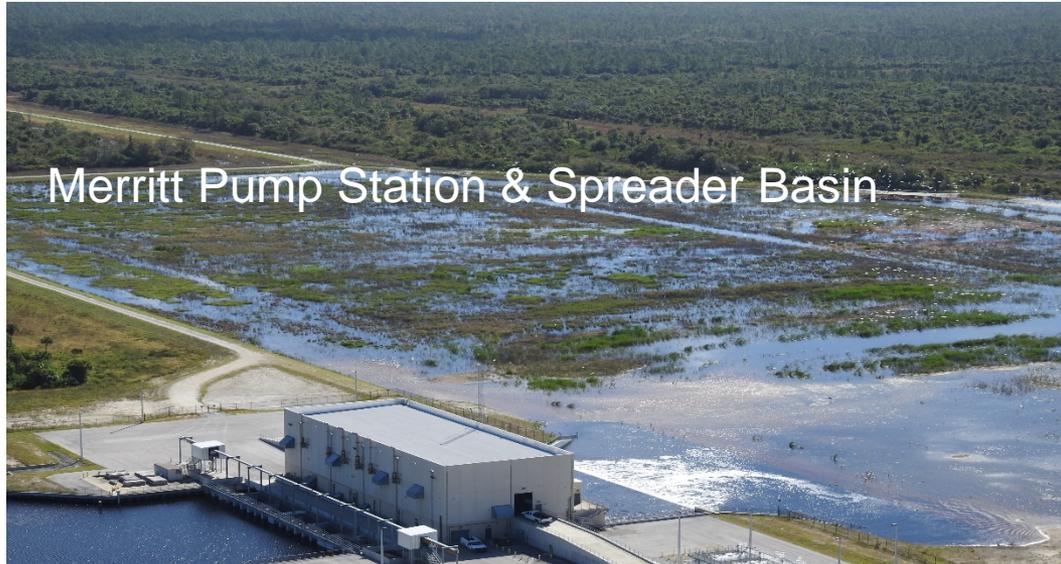
- North end of Prairie Canal after it was filled and the spoil was leveled



Prairie Canal Restoration to Date



Merritt Pump Station – 810 cfs



- Construction Complete
 - June – July 2014
- Commissioning
 - August - September 2014
- Canal Plugging
 - October 2014 – June 2015
- Operational Testing and Monitoring Period
 - October 2014 to June 2016
- Transfer to SFWMD
 - June 2016



Faka Union Pump Station - 2650 cfs

- Construction Complete
 - November 2015
- Commissioning
 - December 2015
- Operational Testing and Monitoring Period
 - January 2016 to December 2016
- Transfer to SFWMD
 - January 2017
- Canal Plugging
 - March 2020



Faka Union Pump Station – Intake Area



Miller Pump Station



- Contract Award (USACE):
September 5, 2013
- Notice to Proceed (USACE):
November 2013
- Construction Complete:
November 2017
- Commissioning: December 2017
- Operational Testing and Monitoring
Period:
 - One-Year Duration following
completion of Commissioning
- Transfer to SFWMD: TBD
- Miller Road Removal: Earliest March
2017
- Canal Plugging: March 2020

Manatee Mitigation Feature

- South of Port of the Islands on the western bank of Faka Union Canal
- Mitigates for effect on warm water refugium in Port of the Islands
- Construction Start – April 2015
- Construction Complete – April 2016
- Long-term monitoring to determine effectiveness

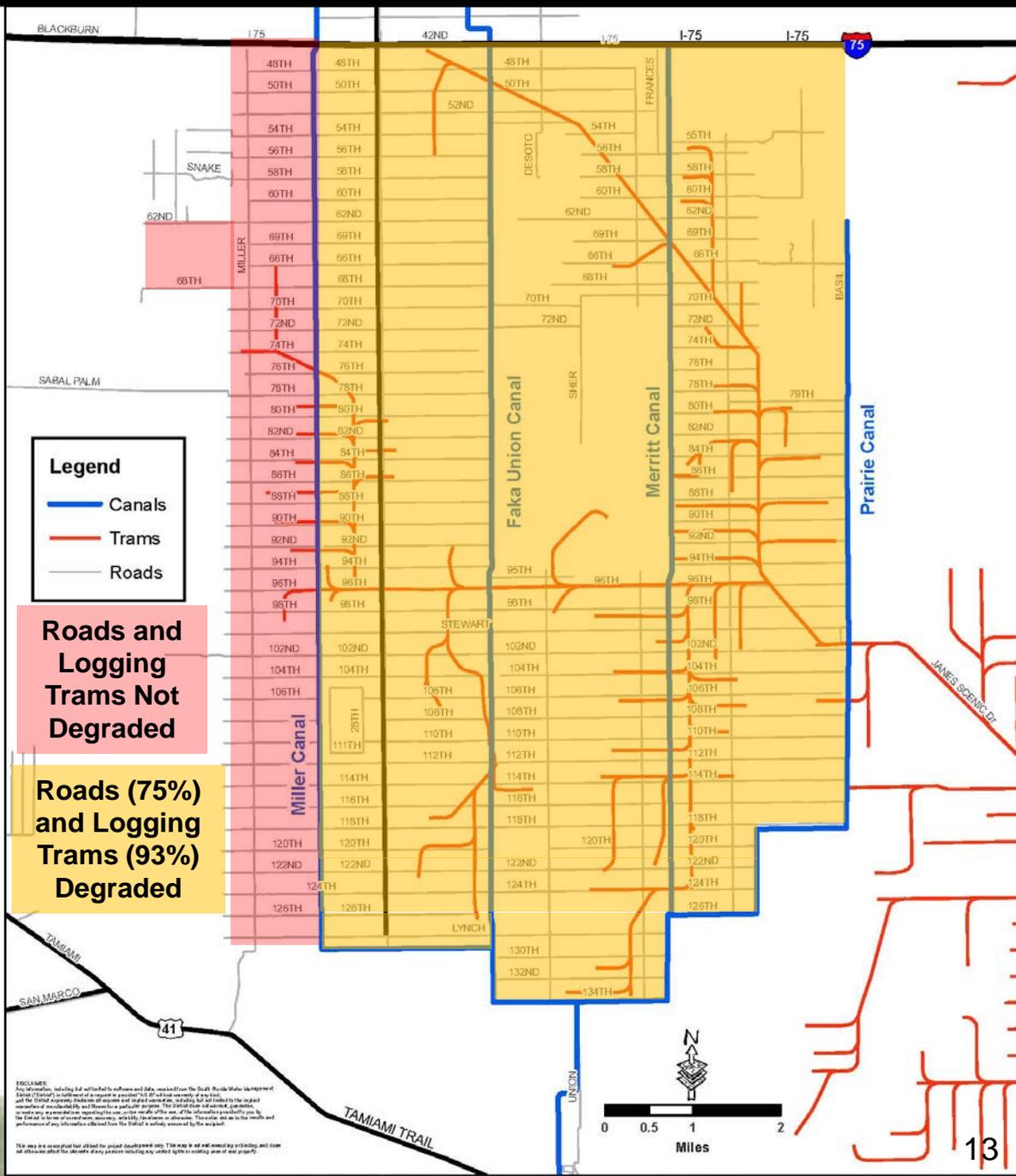


Hydrologic Restoration

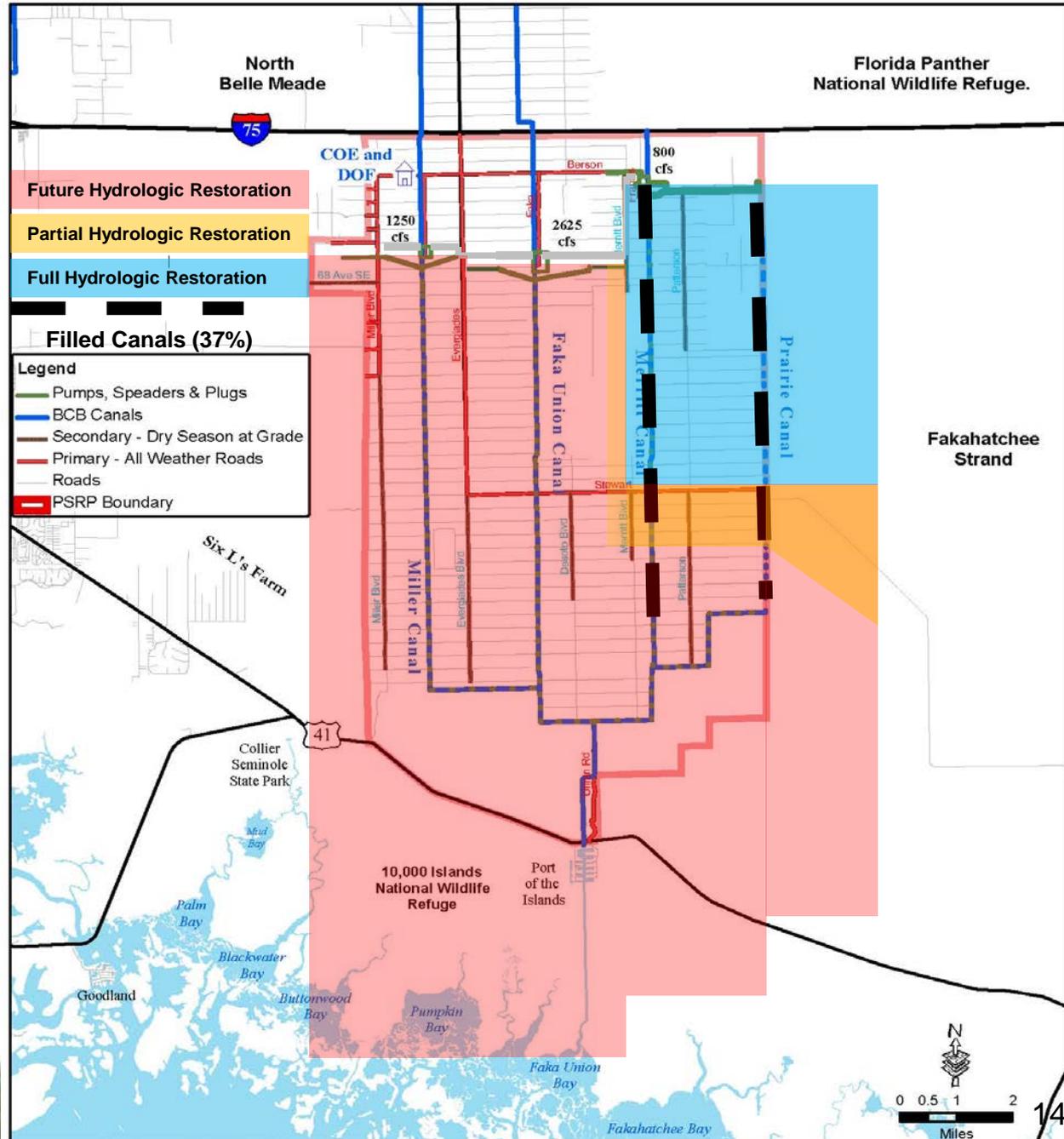
- Sheet flow is key to restoration
 - Eliminate wet season surface water drainage
 - Plug canals – effects extend 1+ miles
 - Eliminate dry season groundwater drainage
 - Fill most of length of canals – effects extend 2-3 miles
 - Remove all unnaturally elevated substrates
 - Roads
 - Logging trams
 - Home sites
 - Spoil associated with roads and canals



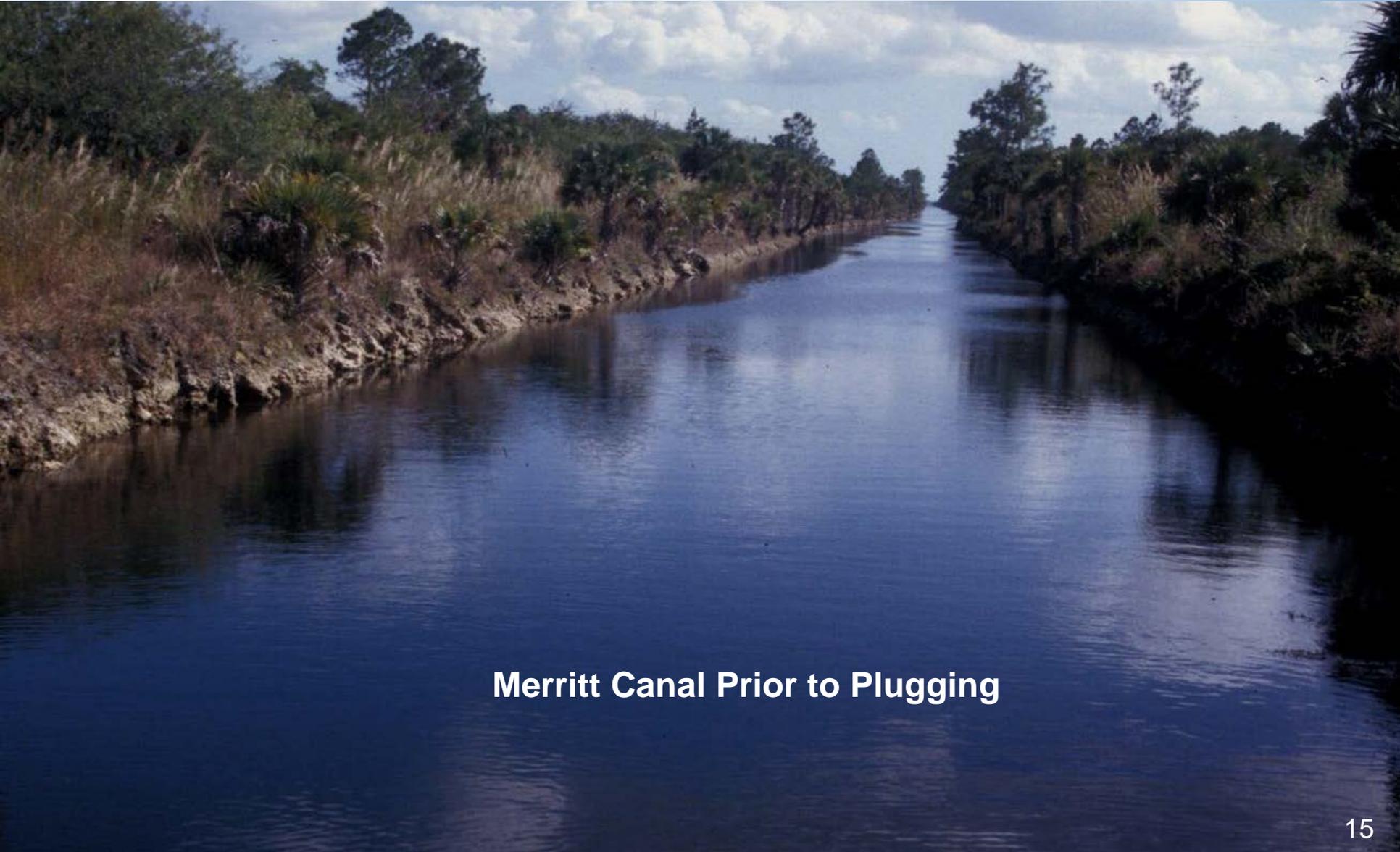
- Degrade 285 miles of roads and/or adjacent spoil
- Fill 42 miles of canals with adjacent spoil
- Degrade 62 miles of logging trams



■ Current Status of Hydrologic Restoration



Merritt Canal



Merritt Canal Prior to Plugging

Merritt Canal

**Merritt Canal Plugged
Looking North from Stewart Boulevard
January 2016**



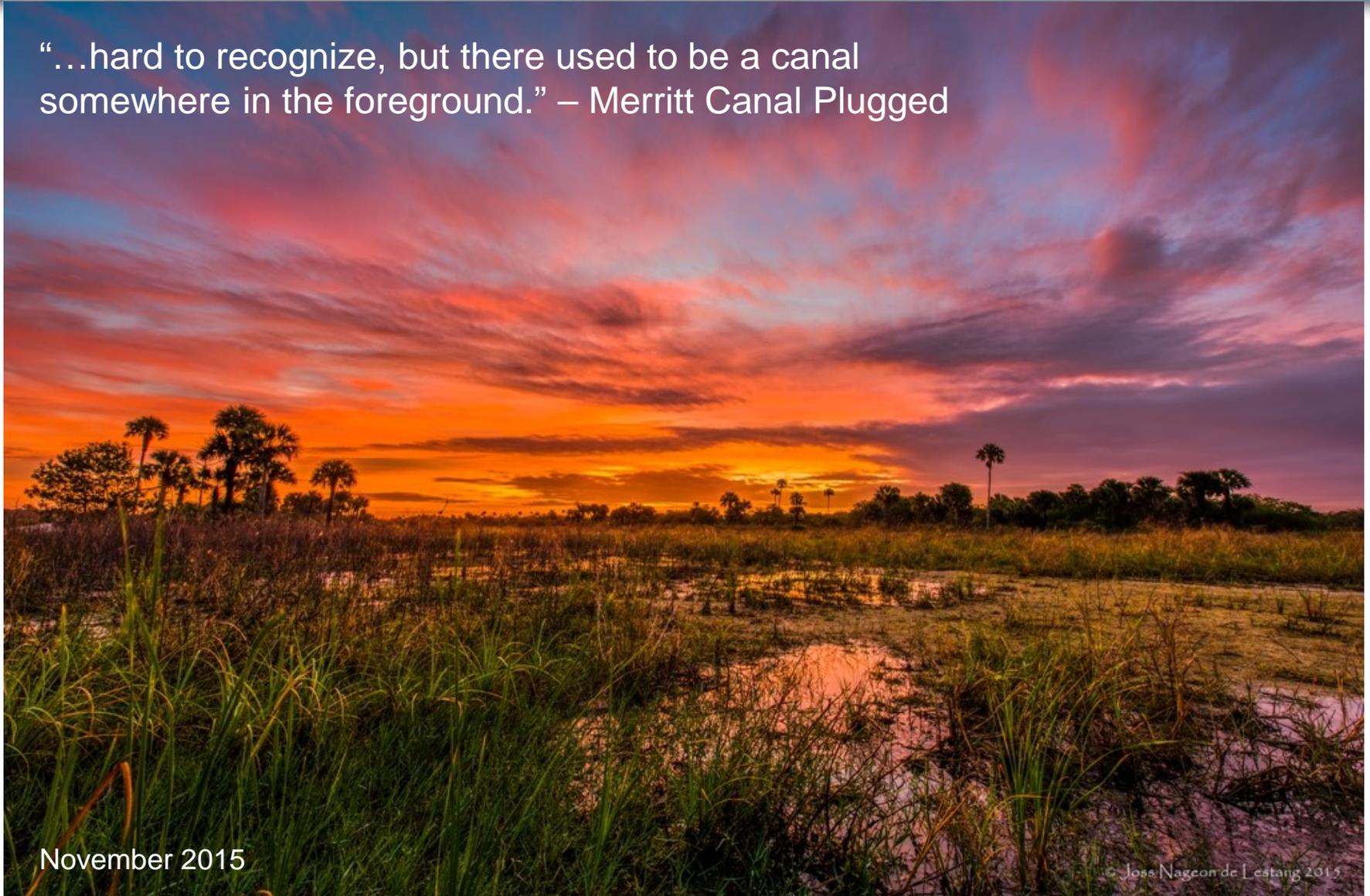
Merritt Canal

Merritt Canal Plugged
Looking North to Merritt Pump Station
December 2015



Questions?

“...hard to recognize, but there used to be a canal somewhere in the foreground.” – Merritt Canal Plugged



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 Bonita Springs Government Center

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2017 Lower West Coast Water Supply Plan Update

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