South Florida Water Management District

AGENDA

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

Scope, Schedule, Process
Population and Water Demands
FAS Model Results
Water Source Options and Projects
Conclusions and Comprehensive Review

Lower West Coast Water Supply Plan Update Process

Mid-2015
- Start Update Process

June 30, 2016
- Kick-Off Meeting

Late 2016
- Updates to Water Resources Advisory Commission and Governing Board

Early to Mid-2017
- Governing Board Approval

Late 2017
- Conclusions and Comprehensive Review
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
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*

* 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

<table>
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<tr>
<th>Category</th>
<th>Surface Water</th>
<th>Fresh Groundwater</th>
<th>Brackish Groundwater</th>
<th>Reclaimed Water</th>
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</table>
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

June 30, 2016
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)

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<td>2013</td>
<td>55</td>
</tr>
<tr>
<td>2014</td>
<td>50</td>
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Map showing the locations of water supply plants in the Lower West Coast Planning Area.
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
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

Nathan Kennedy & Cynthia Gefvert
Lead Economist Section Leader
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
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
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
Define Current and 2040 Service Area Boundaries
• Coordination with 25 utilities

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Methodology – Population Projections

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## 2014 Population Estimates

<table>
<thead>
<tr>
<th>County</th>
<th>PWS</th>
<th>DSS</th>
<th>Total</th>
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<td>1,968</td>
<td>2,040</td>
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<tr>
<td>Collier</td>
<td>289,738</td>
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<td>336,783</td>
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<td>Glades</td>
<td>4,253</td>
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<td>Hendry</td>
<td>23,297</td>
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<tr>
<td>Lee</td>
<td>515,921</td>
<td>137,564</td>
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<tr>
<td>LWC Total</td>
<td>833,280</td>
<td>201,828</td>
<td>1,035,108</td>
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</table>

**Legend**
- Blue: 2014 PWS
- Green: 2014 DSS
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
MPO 2040 projections obtained from FDOT District 1 database.
Methodology – Population Projections
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
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Review Population Projections with Stakeholders
- Adjustments made based on local input
## LWC Population Projections

<table>
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<th>% Change</th>
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<tr>
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<tr>
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<tr>
<td>Total</td>
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<td>DSS</td>
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<td>Total</td>
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<td>4,606</td>
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<tr>
<td>DSS</td>
<td>4,610</td>
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<td>Total</td>
<td>8,863</td>
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Methodology – Public Water Supply

- 2010 - 2014 Utility Service Area Population
- 2010 - 2014 Utility Finished Water
- Per Capita Use Rate
- 2015 - 2040 Utility Service Area Population
- 2015 - 2040 Utility Water Demands
Methodology – Public Water Supply

2010 - 2014 Utility Service Area Population

→

2010 - 2014 Utility Finished Water

Per Capita Use Rate

→

2015 – 2040 Utility Service Area Population

2015 - 2040 Utility Water Demands
LWC Regional Average PCUR

Gallons/Person/Day

- 2000: 174
- 2005: 152
- 2010: 131 131 129 126 128 126
- 2015: 126

South Florida Water Management District
Methodology – Public Water Supply

PWS and DSS Projected Demands

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<td>Lee</td>
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MGD

- **MGD DSS**
- **MGD PWS**
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

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<tr>
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<td>6</td>
<td>1</td>
<td>8</td>
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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

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<td>60</td>
<td>40</td>
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<td>Glades</td>
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<td>0</td>
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<td>Hendry</td>
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<td>0</td>
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<tr>
<td>Lee</td>
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</table>
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

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<th>Water Use Category</th>
<th>Water Demands (mgd)</th>
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<td>Public Water Supply</td>
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<tr>
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Questions?
Floridan Aquifer System Modeling

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

June 30, 2016
Groundwater Use in Lower West Coast

- Multi-layered aquifer system
- Different areas of the planning region tap different parts of the aquifer system
- Floridan aquifer system (FAS) continues as major water supply source
Brackish Water from Floridan Aquifer System

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

- Cell size: 2,400 ft × 2,400 ft
- Calibration: 1989 to 2013
- Monthly simulation periods
- Vertical extent: Upper Floridan Aquifer (Layer 1) to the Boulder Zone (Layer 7)
- Water quality included
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
Collier County monitor well’s water level responding to regional drawdowns from the Collier County Utilities FAS wellfield and Marco Lakes ASR wellfield.
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

- Heads 2013
- Heads 2040
- TDS 2013
- TDS 2040

Head (ft NGVD)

TDS (mg/L)
# Schedule

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<tr>
<td>Complete calibration</td>
<td>September</td>
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<tr>
<td>Simulations</td>
<td>October</td>
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<tr>
<td>Public workshop</td>
<td>November</td>
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<td>Model documentation</td>
<td>February</td>
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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

- **Scope, Schedule, Process**
- **Population and Water Demands**
- **FAS Model Results**
- **Water Source Options and Projects**
- **Conclusions and Comprehensive Review**

**Lower West Coast Water Supply Plan Update Process**

- **Mid-2015**: Start Update Process
- **June 30, 2016**: Kick-Off Meeting
- **Late 2016**: Updates to Water Resources Advisory Commission and Governing Board
- **Early to Mid-2017**: Governing Board Approval
- **Late 2017**: Conclusions and Comprehensive Review
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 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?

- Plan information can be found at: [www.sfwmd.gov](http://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. Section Administrator
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Picayune Strand Restoration

- Gulf of Mexico
- Atlantic Ocean
- Lake Okeechobee
- Picayune Strand State Forest
- Picayune Strand Restoration Project
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

Prairie Canal Summer 2008

Southern End of Plugged Prairie Canal 2016

Prairie Canal July 2009

Prairie Canal March 2016
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
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

- Full Hydrologic Restoration
- Partial Hydrologic Restoration
- Future Hydrologic Restoration
- Filled Canals (37%)
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
“…hard to recognize, but there used to be a canal somewhere in the foreground.” – Merritt Canal Plugged
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