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BISCAYNE BAY COASTAL WETLANDS RESTORATION BENEFITS

Presented by

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BISCAYNE BAY COASTAL WETLANDS PROJECT OBJECTIVE

- Re-establish productive nursery habitat
- Improve quantity, quality, timing and distribution of freshwater to Biscayne Bay
- Redistribute freshwater flow and minimize point source discharges
- Preserve and restore natural coastal glades habitat
- Re-establish connectivity between the coastal and adjacent wetlands
- Improve near-shore and saltwater wetland salinity regimes

SFWMD PHASE 1 EXPEDITED PROJECTS

- Expedited design, construction and pilot testing on several Phase 1 project components

  - ✓ L-31E Tidal Restoration Components
  - ✓ L-31E Pilot Pump Test
  - ✓ L-31E Interim Pump
  - ✓ Deering Estate Flow-way
  - ✓ Cutler Flow-way

- Provides for early ecosystem restoration benefits by distribution flows along coast and near shore including Biscayne National Park

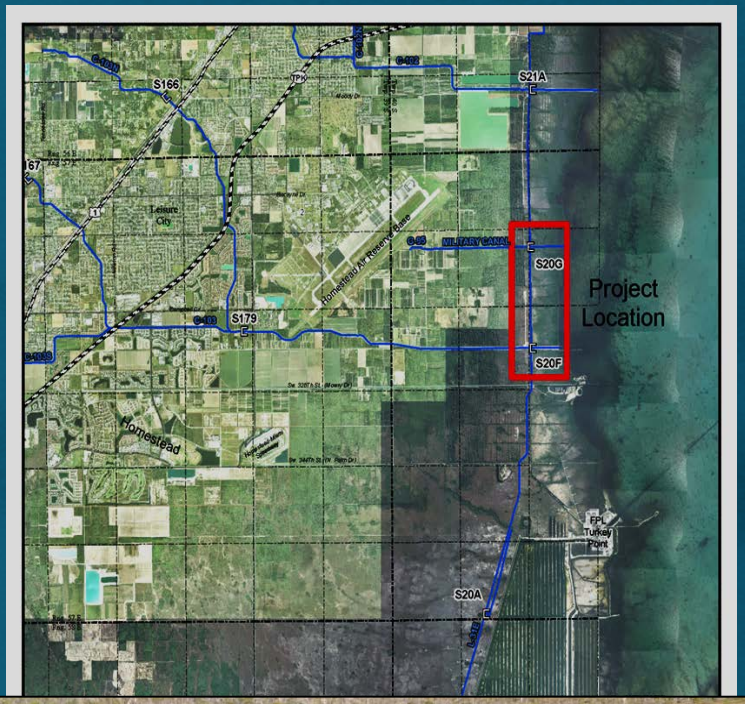
SFWMD EXPEDITED PROJECT

- L-31 E Tidal Restoration

  ✓ Construction completed June 2010

BBCW L-31E PILOT PUMP TEST PROJECT

- Purpose:
  - ✓ The L-31E Pilot Pump Test was used to verify that the pump station identified in the Biscayne Bay Coastal Wetlands Phase 1 PIR;
    - ➢ Pump Station is properly located and sized for redirecting available water through four flap-gated culverts in the L-31E Levee that open to adjacent coastal wetlands
    - ➢ Divert water from point source discharge and redistribute through culverts to remnant tidal creeks



BISCAYNE BAY COASTAL WETLANDS
L-31E Pilot Pump Test

a.

b.

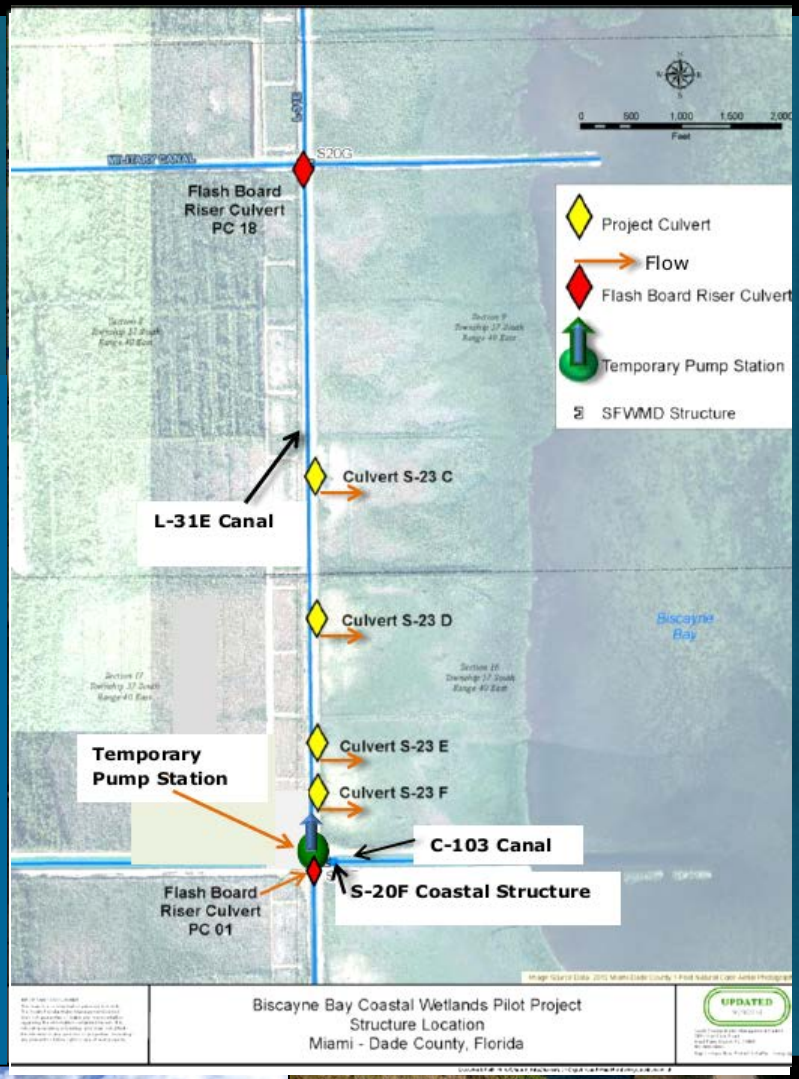
c.

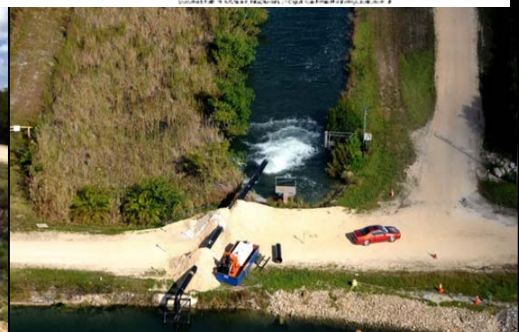
Flow

E

BBCW L-31E PILOT PUMP TEST PROJECT

- Temporary pilot pump dry season operations started October 2014
- Enhanced sheetflow to historic tidal creeks
- Pumping maintained L-31E canal stage at optimal level ~2.20 FT-NGVD29





BBCW L-31E INTERIM OPERATIONS and PUMP INSTALLATION

- BBCW L-31E Interim electric Pump installation completed March 2016

BBCW RESTORATION BENEFITS L-31E CULVERTS

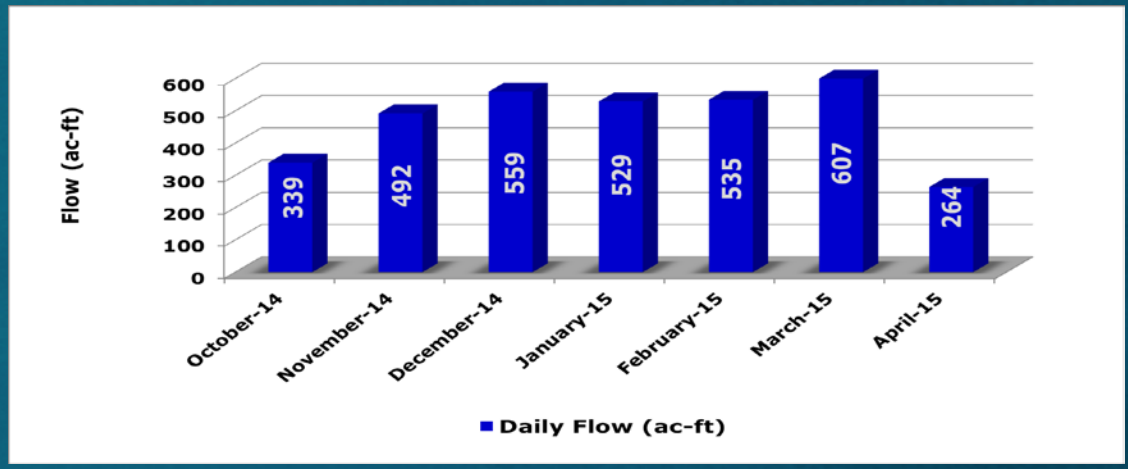
- L-31E Culverts diverted +28,638 ac-ft of water from the C-102 and C-103 canals since November 2010

Period	WY2011	WY2012		WY2013		WY2014		WY2015		WY2016	
	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season
S-23A	0	957	141	785	32	444	17	433	0	783	40
S-23B	0	232	13	487	0	390	16	918	26	1482	93
S-23C	0	1610	183	1265	93	129	13	1057	1557	1632	66
S-23D	0	2190	70	2043	0	865	70	1681	3571	3104	151
Total	0	4989	407	4580	125	1828	116	4089	5154	7001	349

BBCW RESTORATION BENEFITS L-31E PILOT PUMP TEST PROJECT

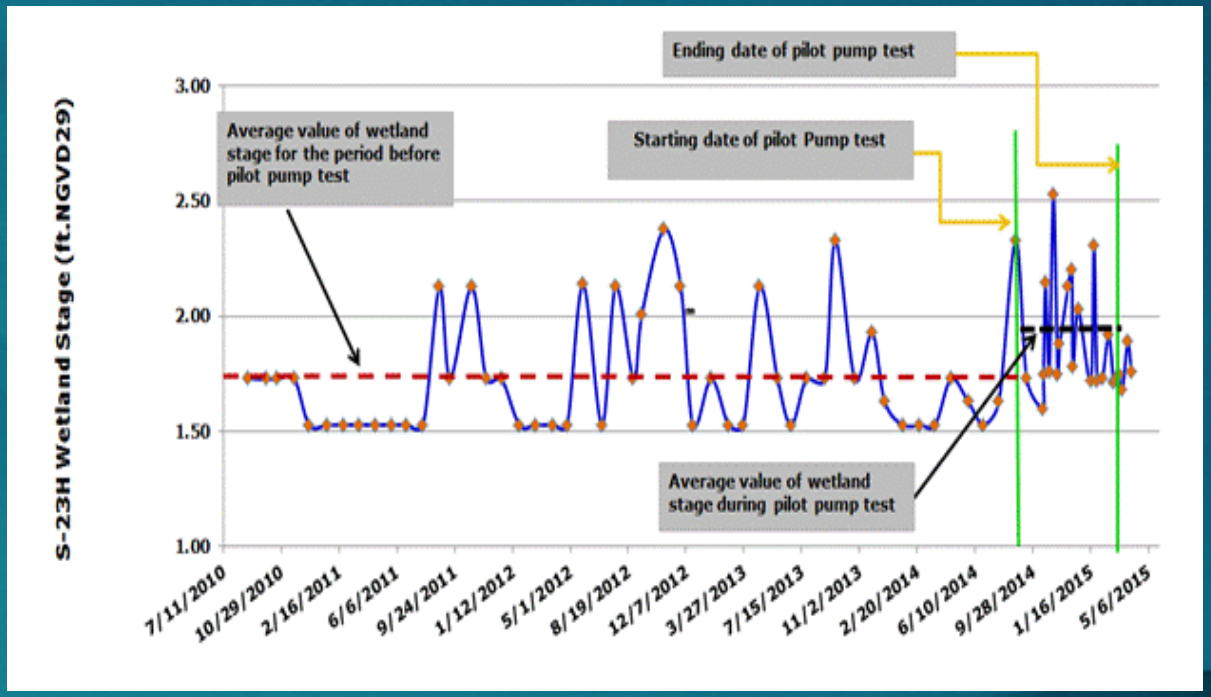
- + 3,300 acre-feet of freshwater diverted from point source to overland flow
- Improved tidal wetlands and near shore salinity conditions

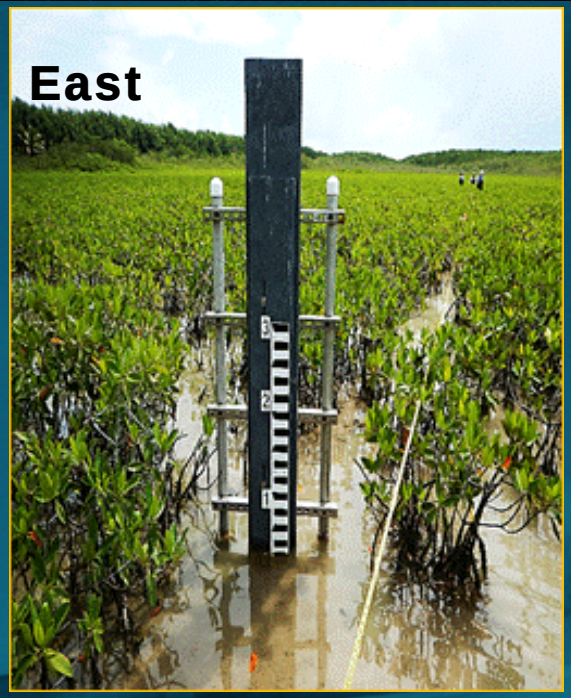
Comparison of Monthly Total Flow in Acre-Feet (ac-ft) through L-31E Pilot Pump



BBCW RESTORATION BENEFITS L-31E PILOT PUMP TEST PROJECT

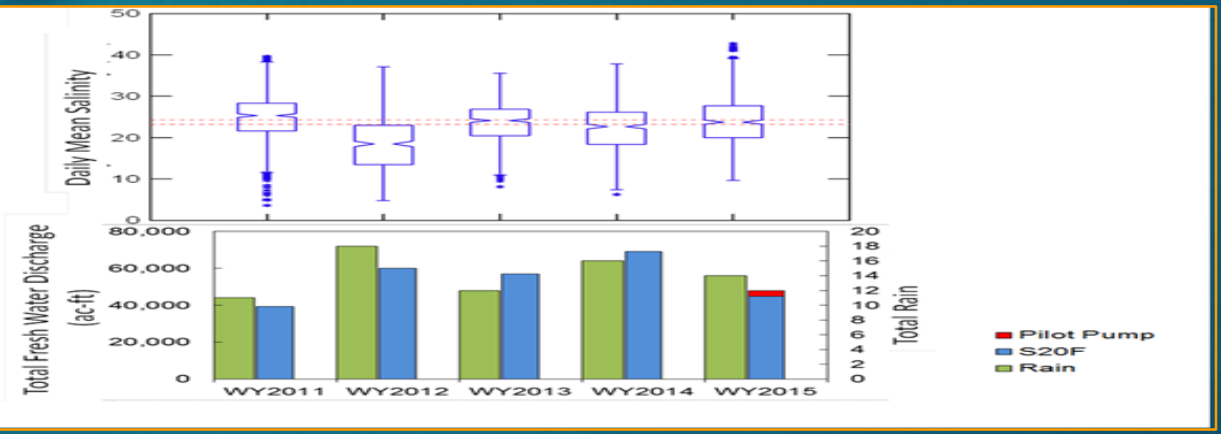
- Rehydration of coastal wetlands along east &west sides of L-31E Canal



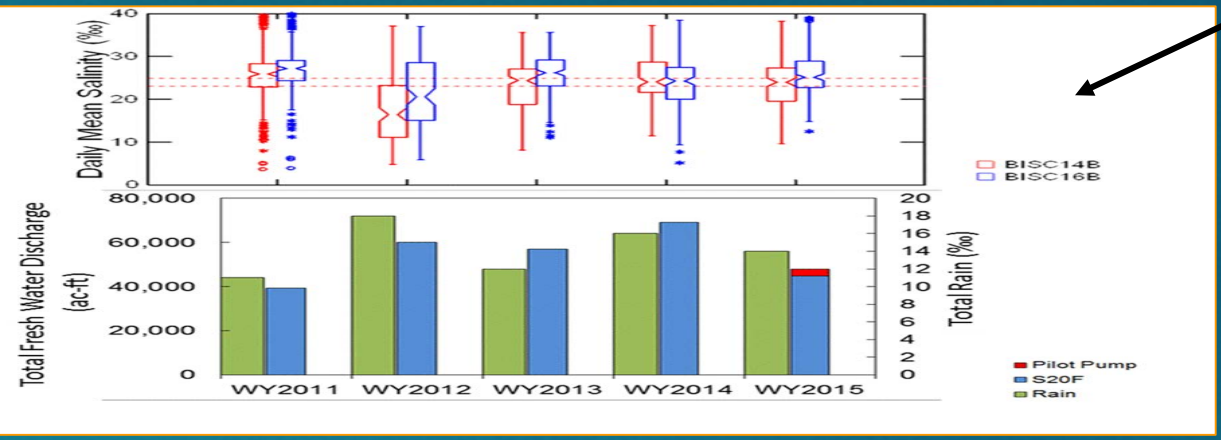


BBCW RESTORATION BENEFITS L-31E PILOT PUMP TEST PROJECT

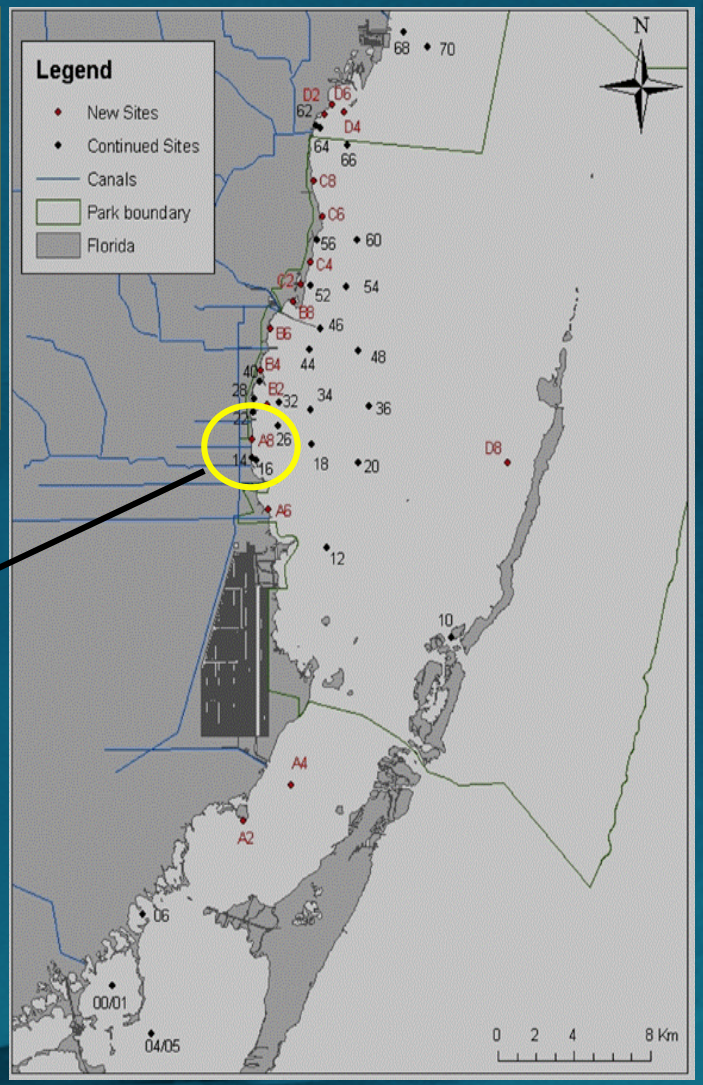
Nearshore Biscayne Bay Salinity Within Vicinity of L-31E Flow-way (RECOVER/BNP Monitoring Stations)



Salinity at nearshore RECOVER monitoring stations within vicinity of the L-31E Culverts



Comparison of salinity measured at BISC14 (50 meters off shore) and BISC16 (300 meters off shore)

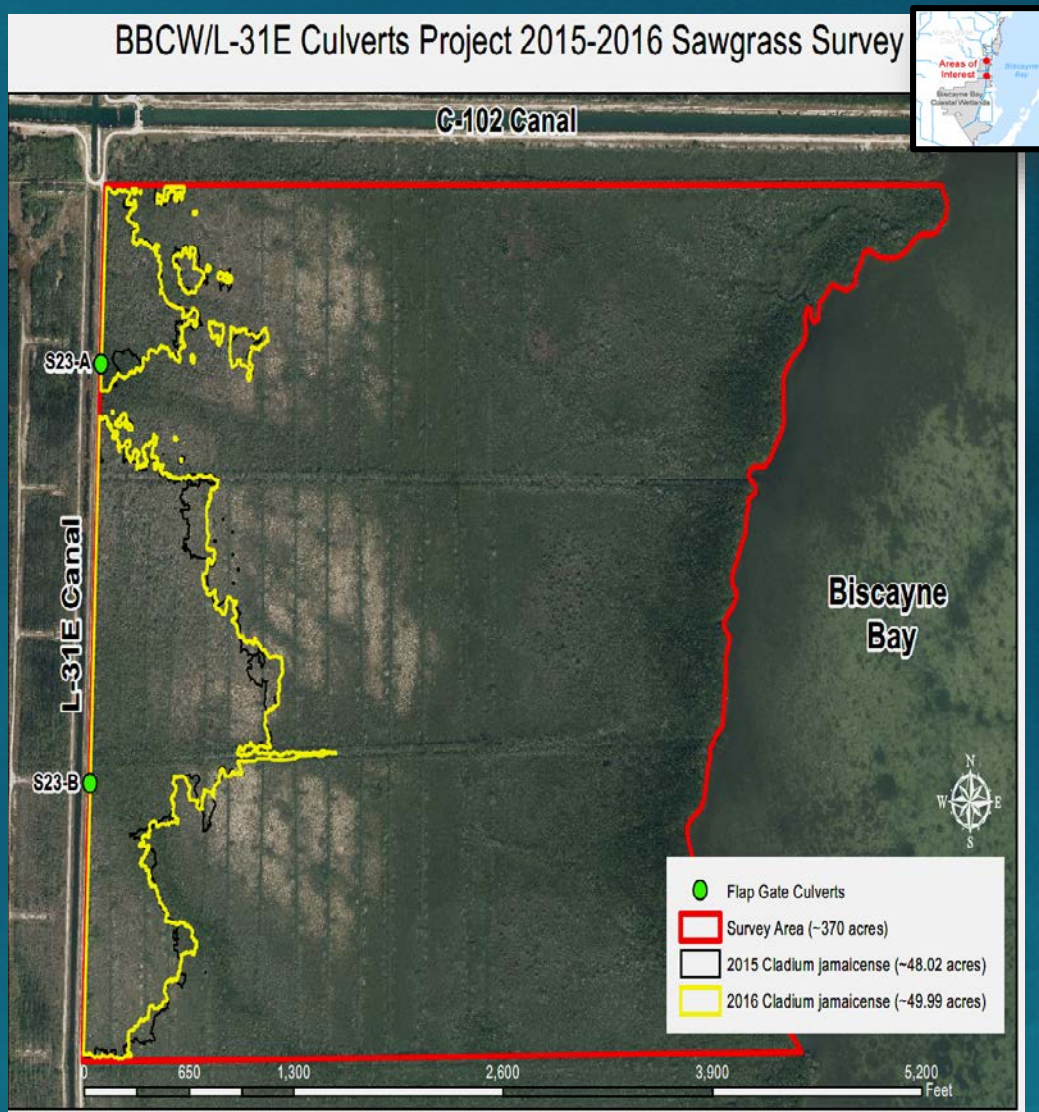


BBCW RESTORATION BENEFITS L-31E CULVERTS

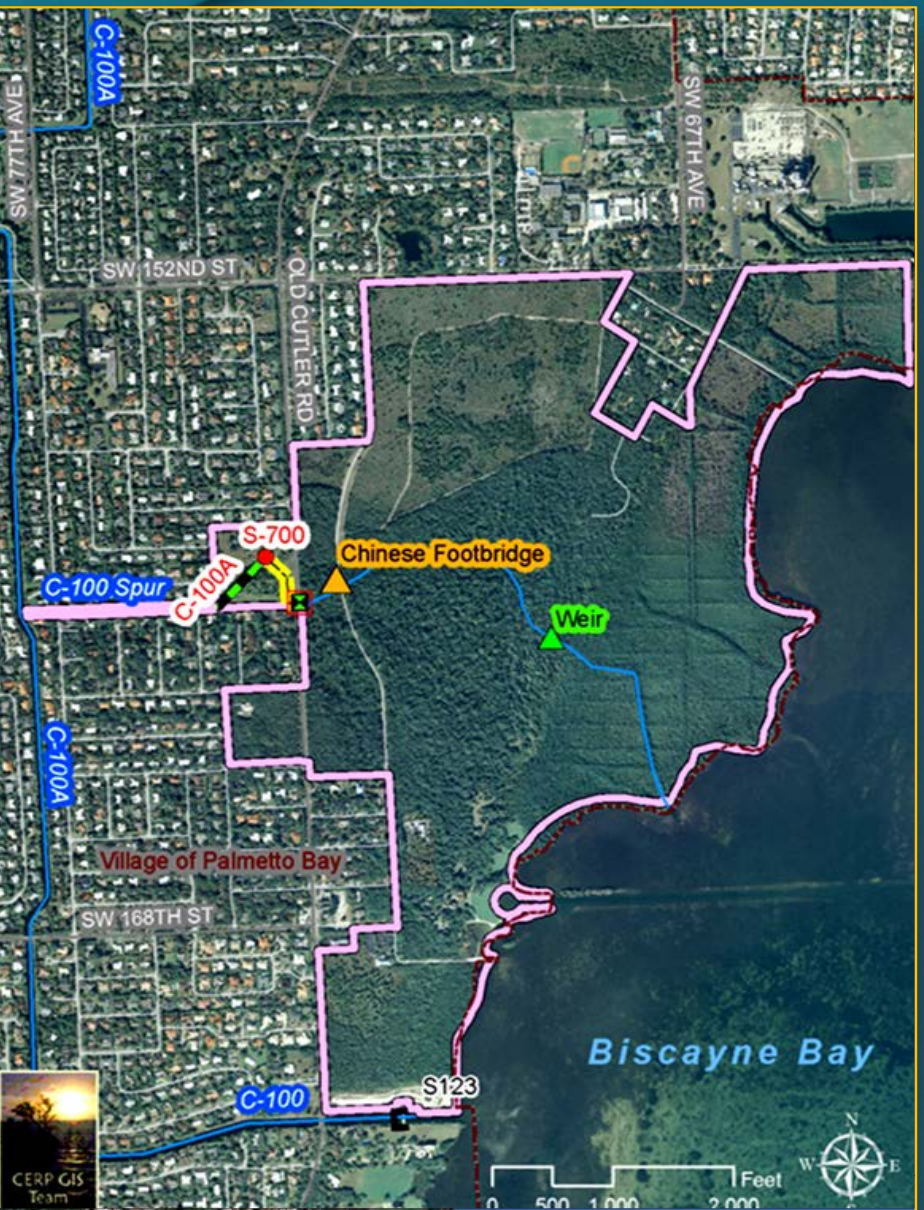
- Expansion of sawgrass observed
- Various species of birds, amphibians, invertebrates, fish, and reptiles were observed

BBCW RESTORATION BENEFITS L-31E CULVERTS

- Increases in sawgrass acreage assessed by mapping
  - ✓ 2013 mapping - 43 acres
  - ✓ 2015 mapping - 48 acres
  - ✓ 2016 mapping – 50 acres



DEERING ESTATE FLOW-WAY



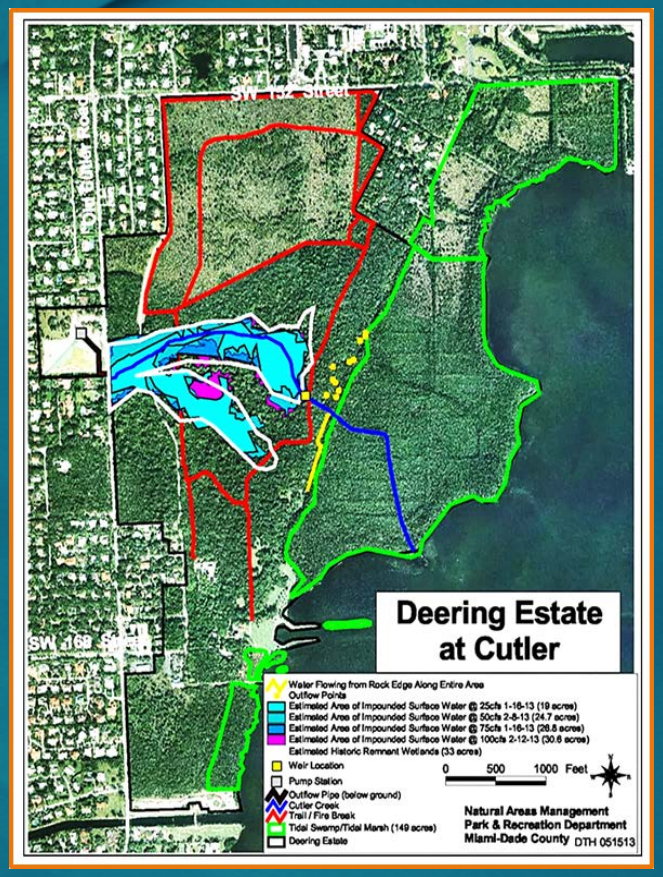
The Deering Estate Flow-way is located in Southeastern Miami-Dade County

- Construction completed April 2012

The goals include:

- Redirect up to 100 cfs freshwater to the coastal wetlands
- Re-hydrate the historic wetland and restore a more natural freshwater flow regime
- Establish an educational wetland

BBCW RESTORATION BENEFITS DEERING ESTATE FLOW-WAY



Delineation of the Historical Freshwater Wetland Slough in Deering Estate and Areas of Inundation at Different Pump Rates

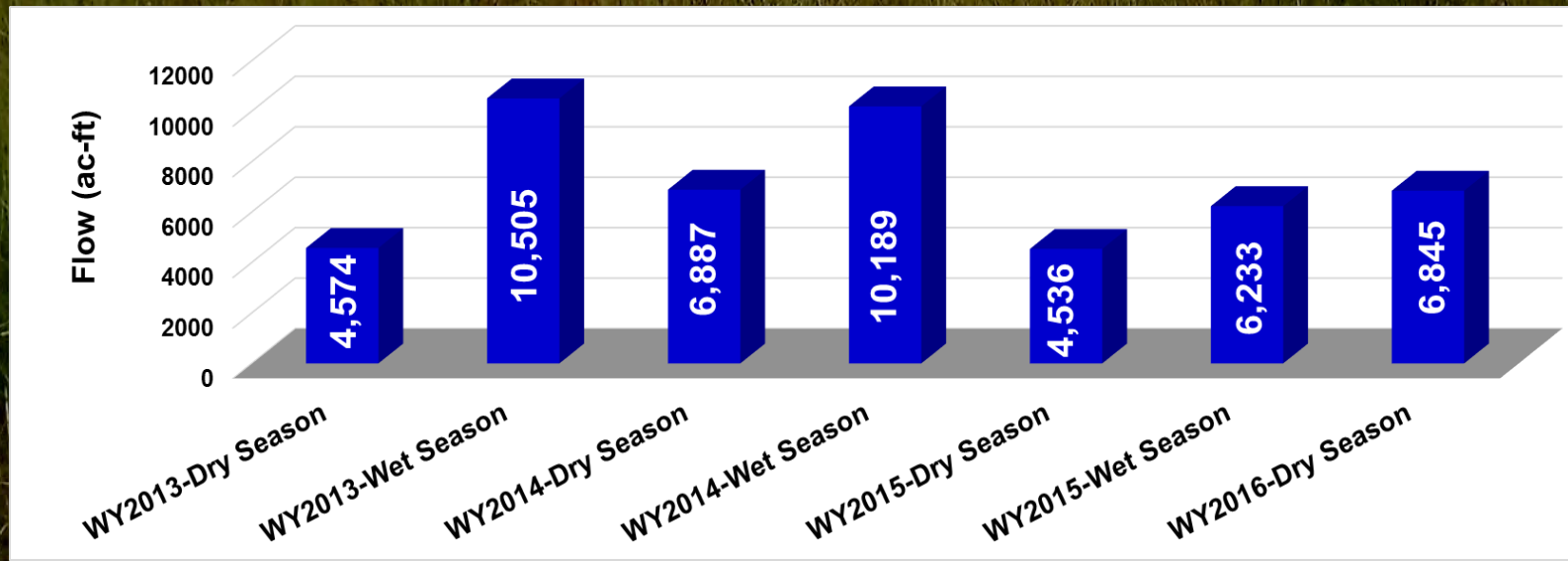
- Determined extent of inundation under various pumping rates

Estimated Acreage of Impounded Surface Water Under Different Pumping / Flow Rates within Deering Estate

Pumping Rate(cfs)	Duration of Testing (hours)	Estimated Acres of Impounded Surface Water	Percentage of Inundate Historic Remnant Wetlands within Cutler Creek
0	5	0	0%
25	5	19	58%
50	5	25	76%
75	5	27	82%
100	5	31	94%

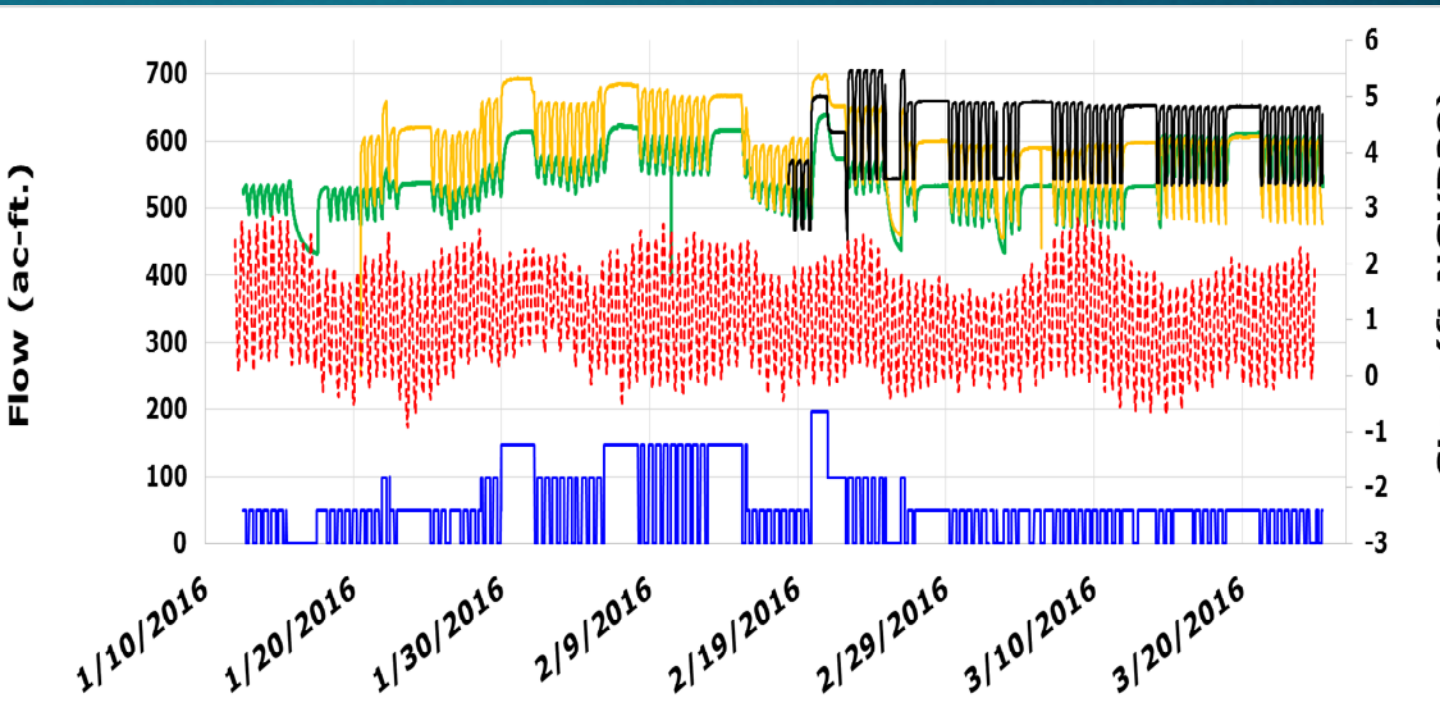
BBCW RESTORATION BENEFITS DEERING ESTATE FLOW-WAY

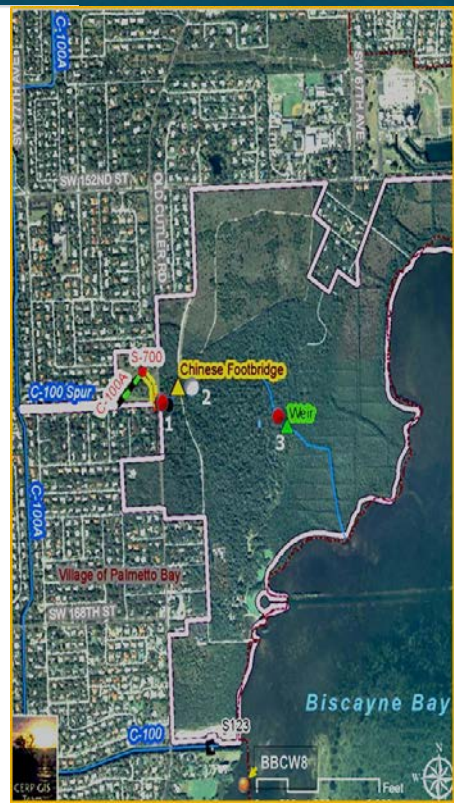
- Approximately 45,233 ac-ft of freshwater redirected to historic remnant wetlands
- Timing of flows to the wetlands at Deering Estate has been improved



BBCW RESTORATION BENEFITS DEERING ESTATE FLOW-WAY

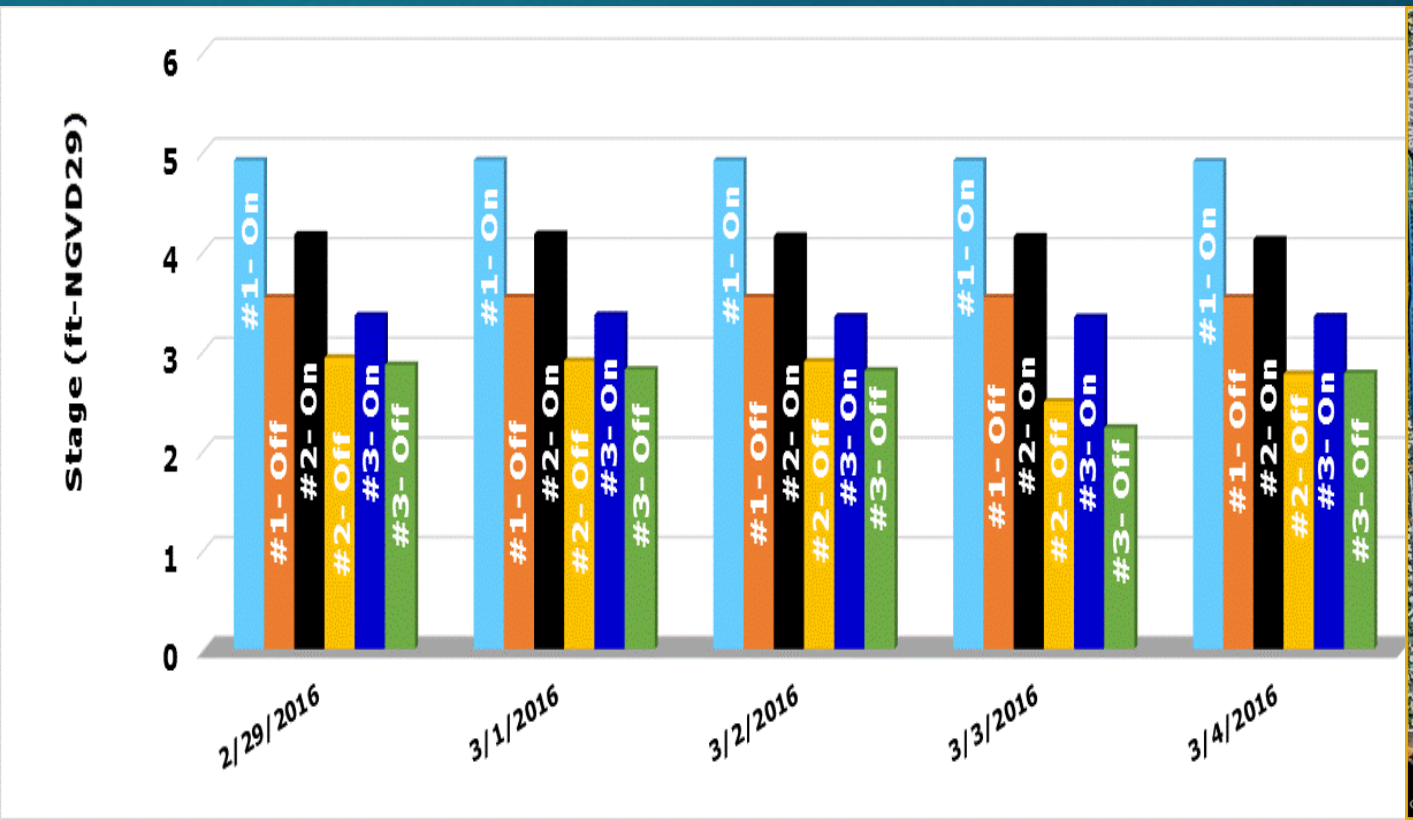
- Stage declines with distance from pump

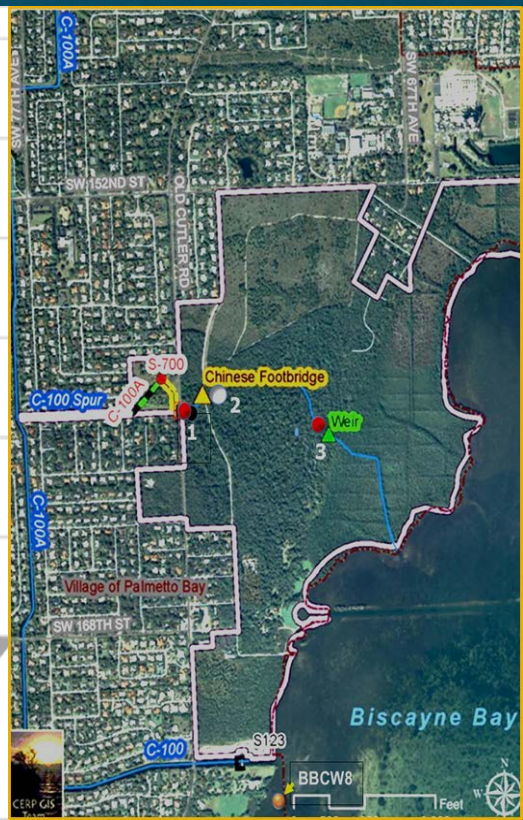




BBCW RESTORATION BENEFITS DEERING ESTATE FLOW-WAY

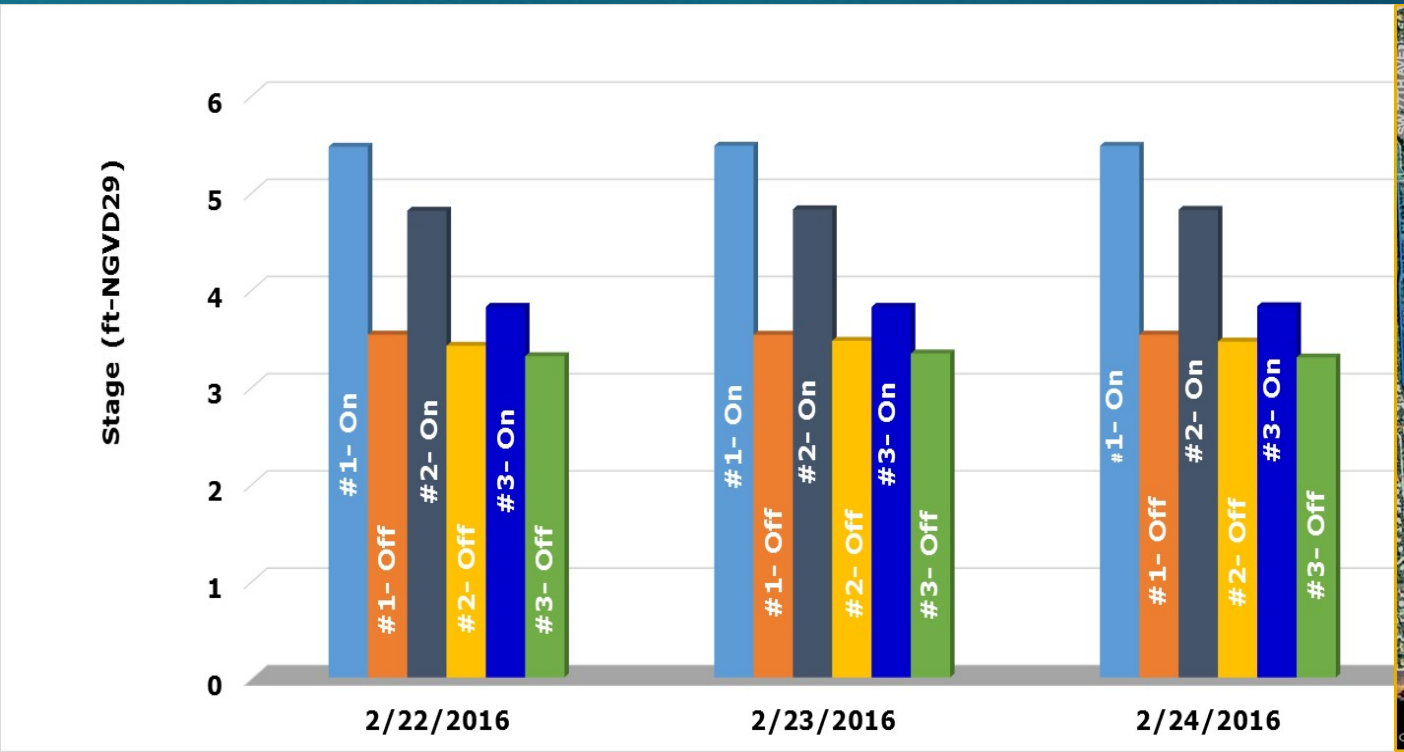
- Verification of pump operation under fix stage range (25 cfs)

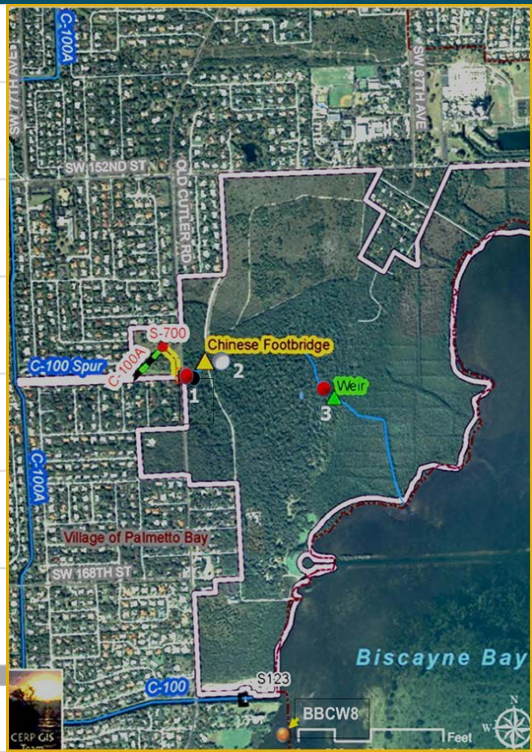




BBCW RESTORATION BENEFITS DEERING ESTATE FLOW-WAY

- Verification of pump operation under fix stage range (50 cfs)



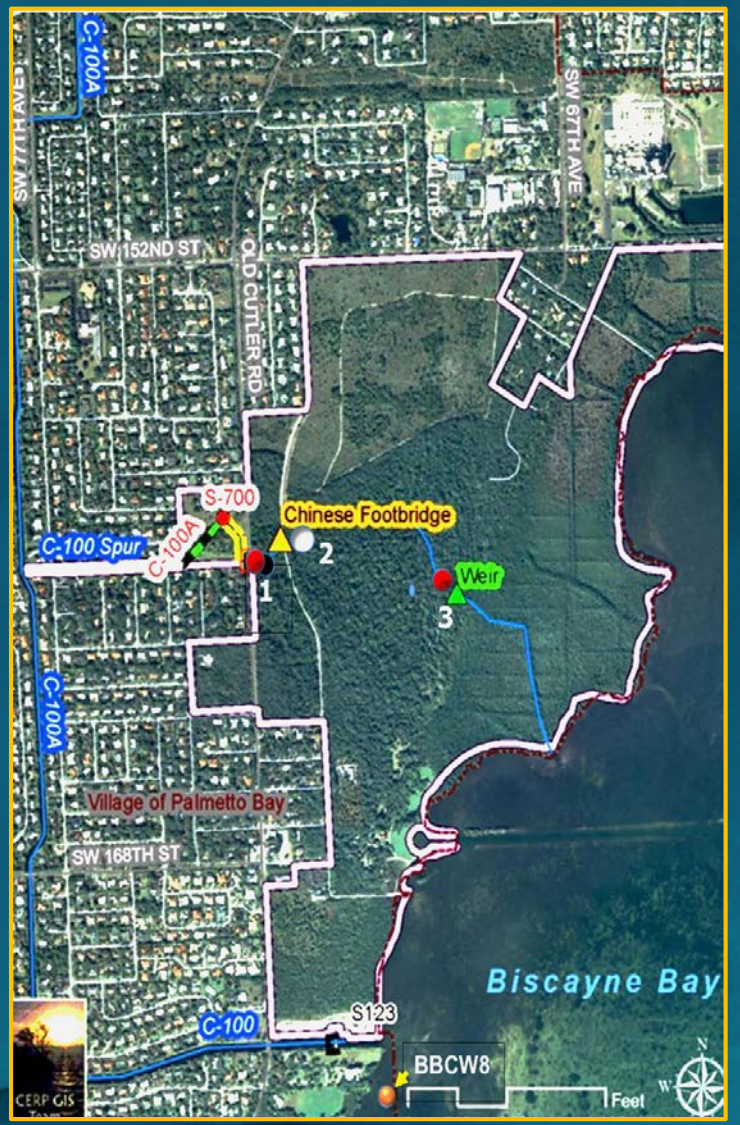


BBCW RESTORATION BENEFITS DEERING ESTATE FLOW-WAY

- Comparison of pulse versus continuous pumping

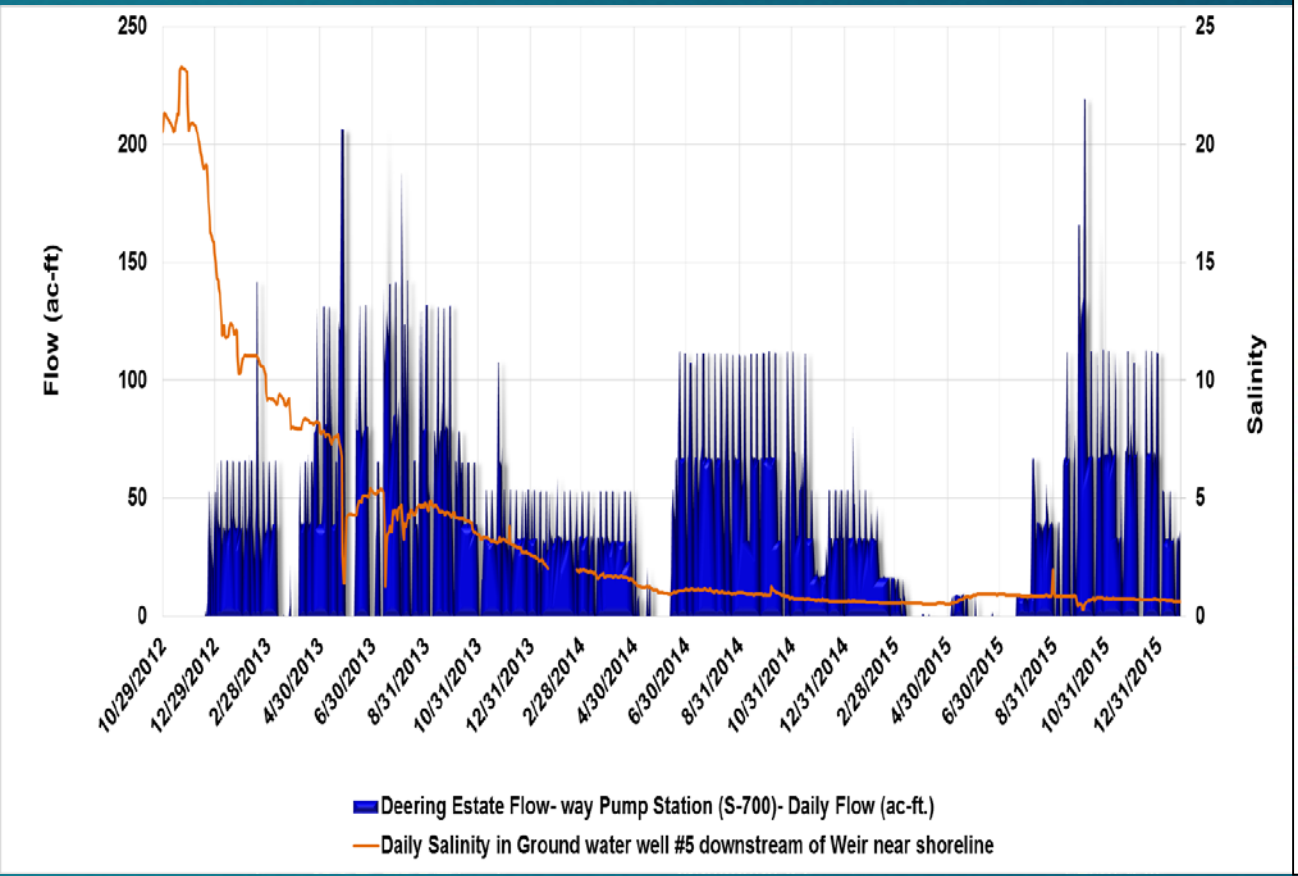
Rate (cfs)	Pump	Location	Pumping	Duration (hours)	Water Level	Changes in stage (ft-NGVD29)
25	On	Station#1	Pulse	7	4.80	0.10
			Continuous	30	4.90	
		Station#2	Pulse	7	4.10	0.07
			Continuous	30	4.17	
		Station#3	Pulse	7	3.26	0.10
			Continuous	30	3.36	

Rate (cfs)	Pump	Location	Pumping	Duration (hours)	Water Level	Changes in stage (ft-NGVD29)
50	On	Station#1	Pulse	7	3.37	1.00
			Continuous	22	4.36	
		Station#2	Pulse	7	4.71	0.15
			Continuous	22	4.86	
		Station#3	Pulse	7	3.58	0.50
			Continuous	22	4.01	

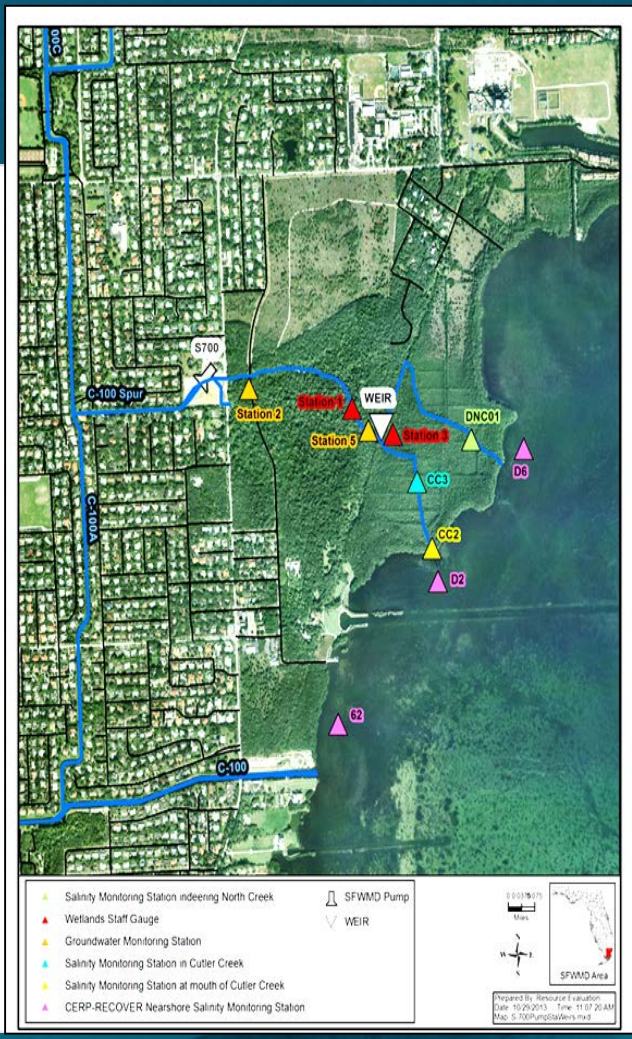


BBCW RESTORATION BENEFITS DEERING ESTATE FLOW-WAY

- Reduced salinity in groundwater



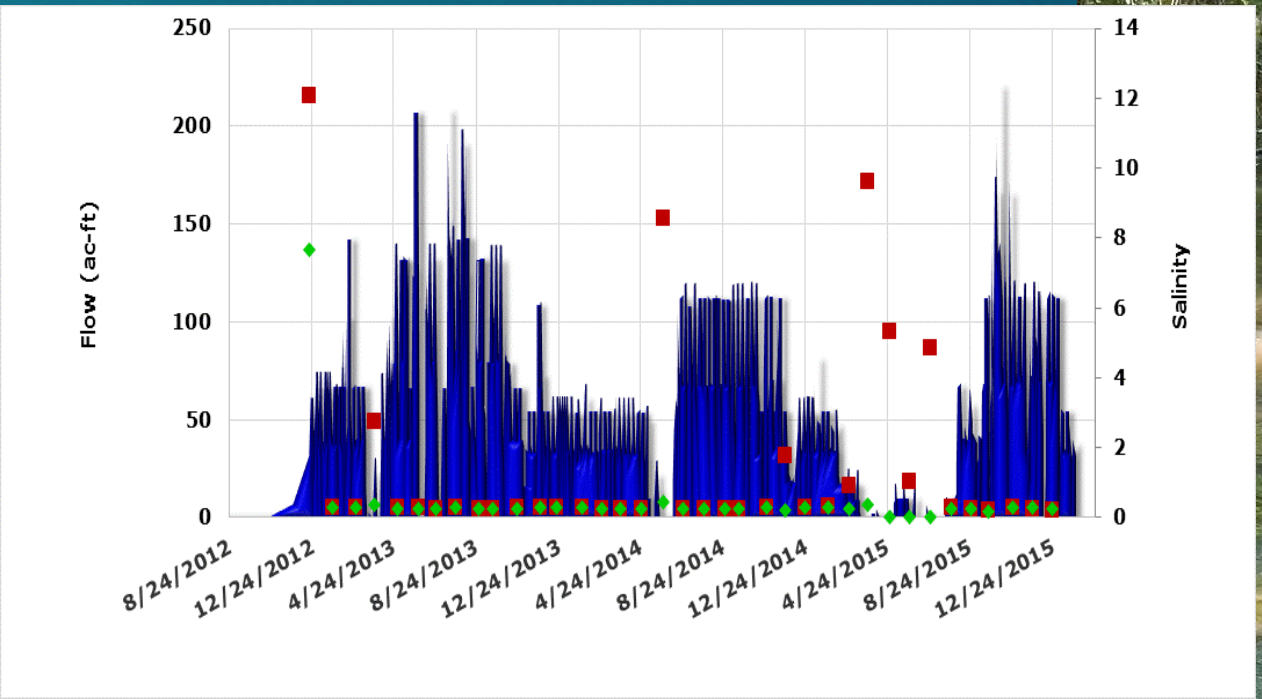
Comparison of Salinity Concentrations in Groundwater Well #5 Near the Historic Remnant Wetlands of Deering Estate Versus S-700 Daily Flow

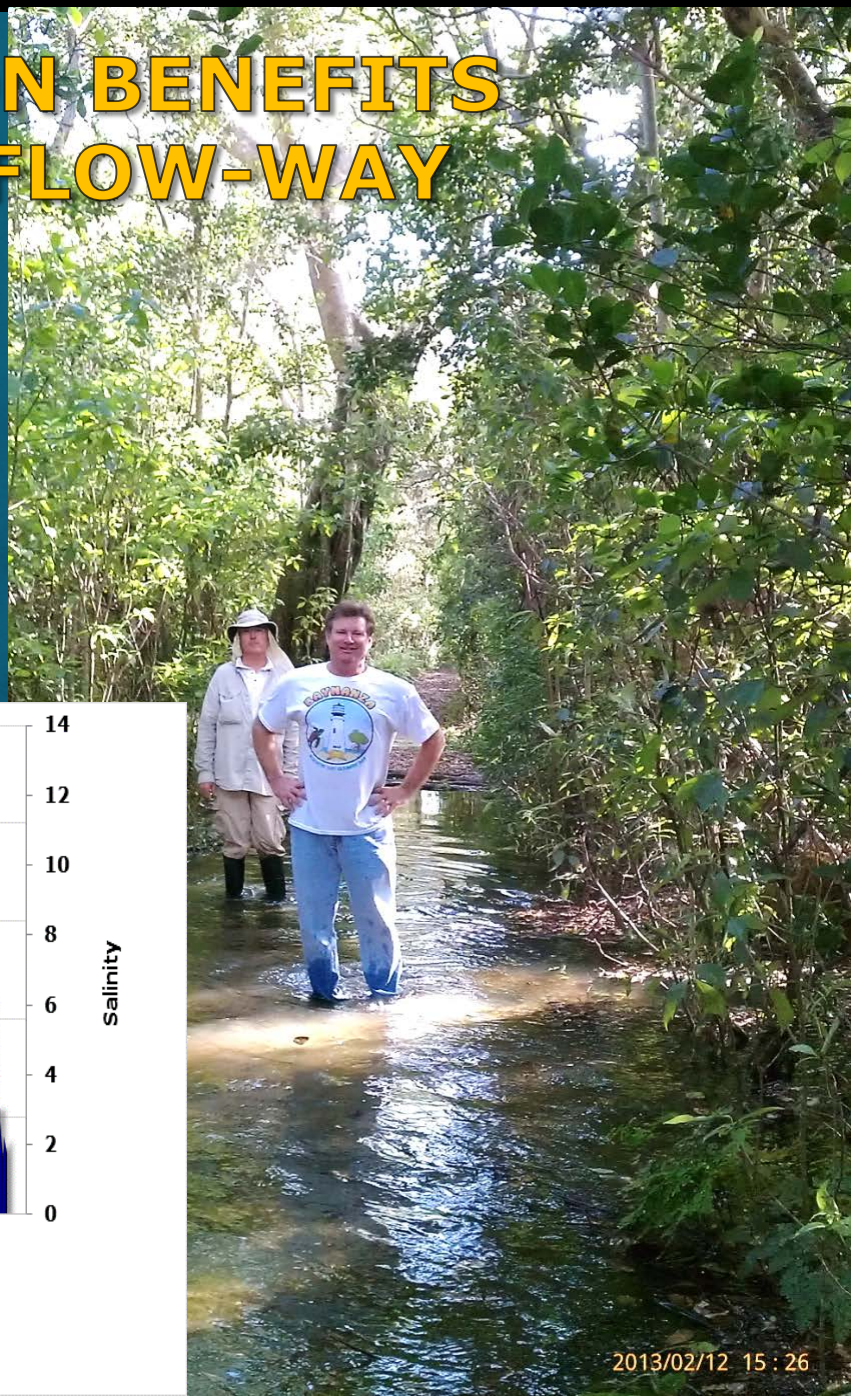


Ecological Monitoring Stations for the Deering Estate Flow-way

BBCW RESTORATION BENEFITS DEERING ESTATE FLOW-WAY

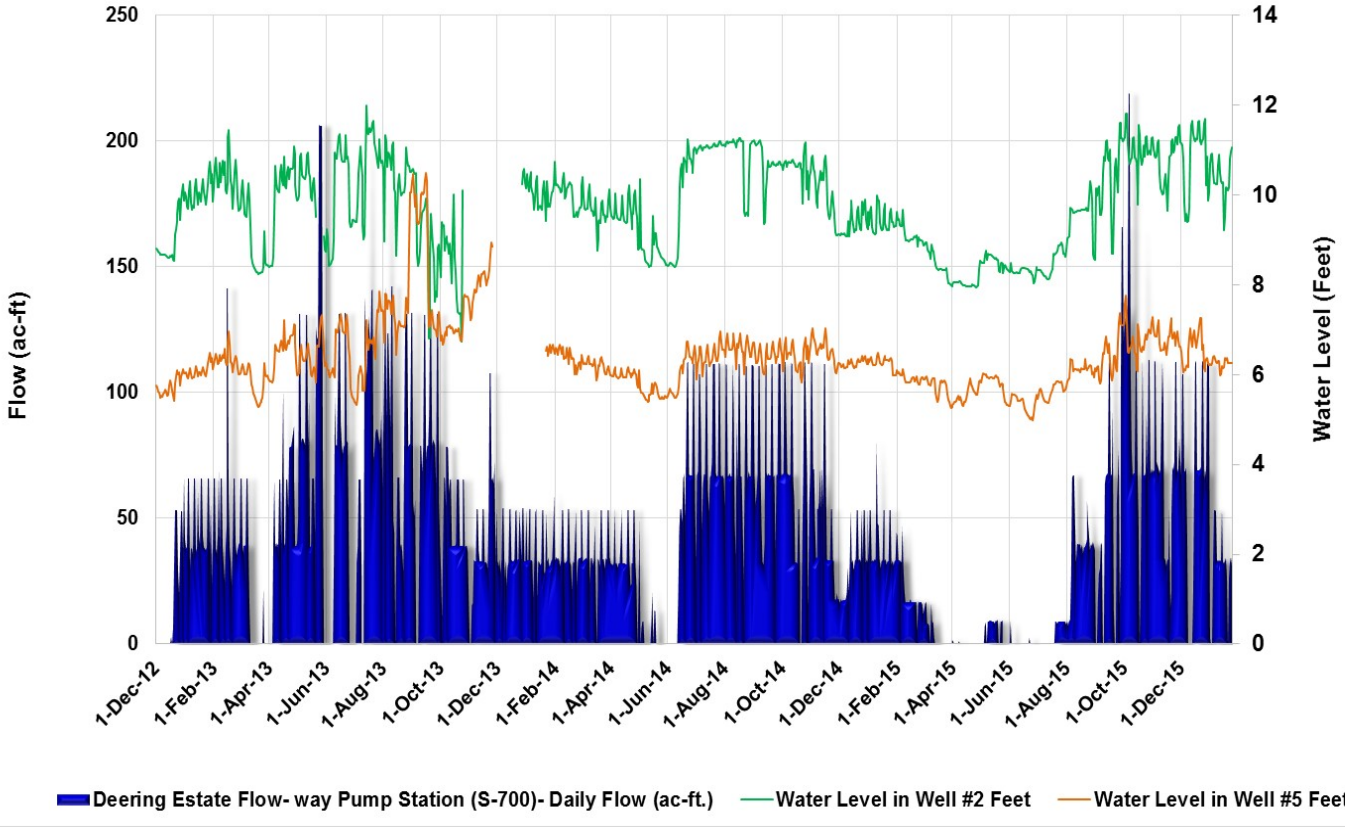
- Reduced salinity in surface water

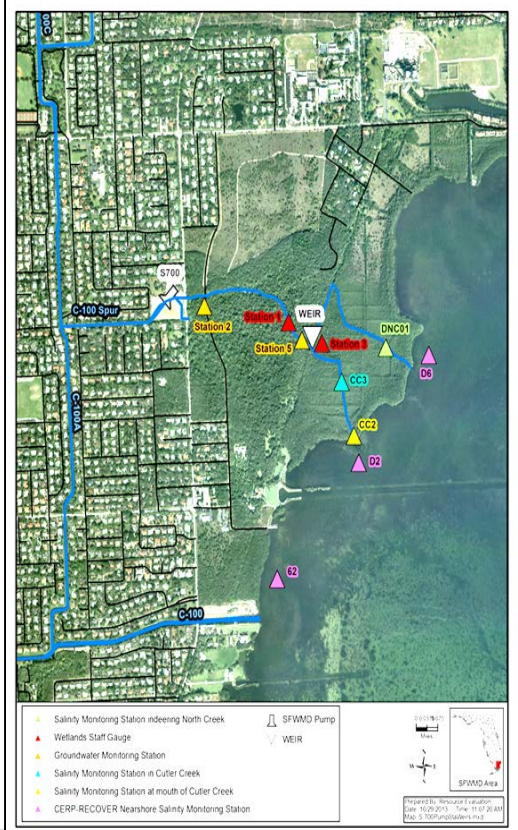




BBCW RESTORATION BENEFITS DEERING ESTATE FLOW-WAY

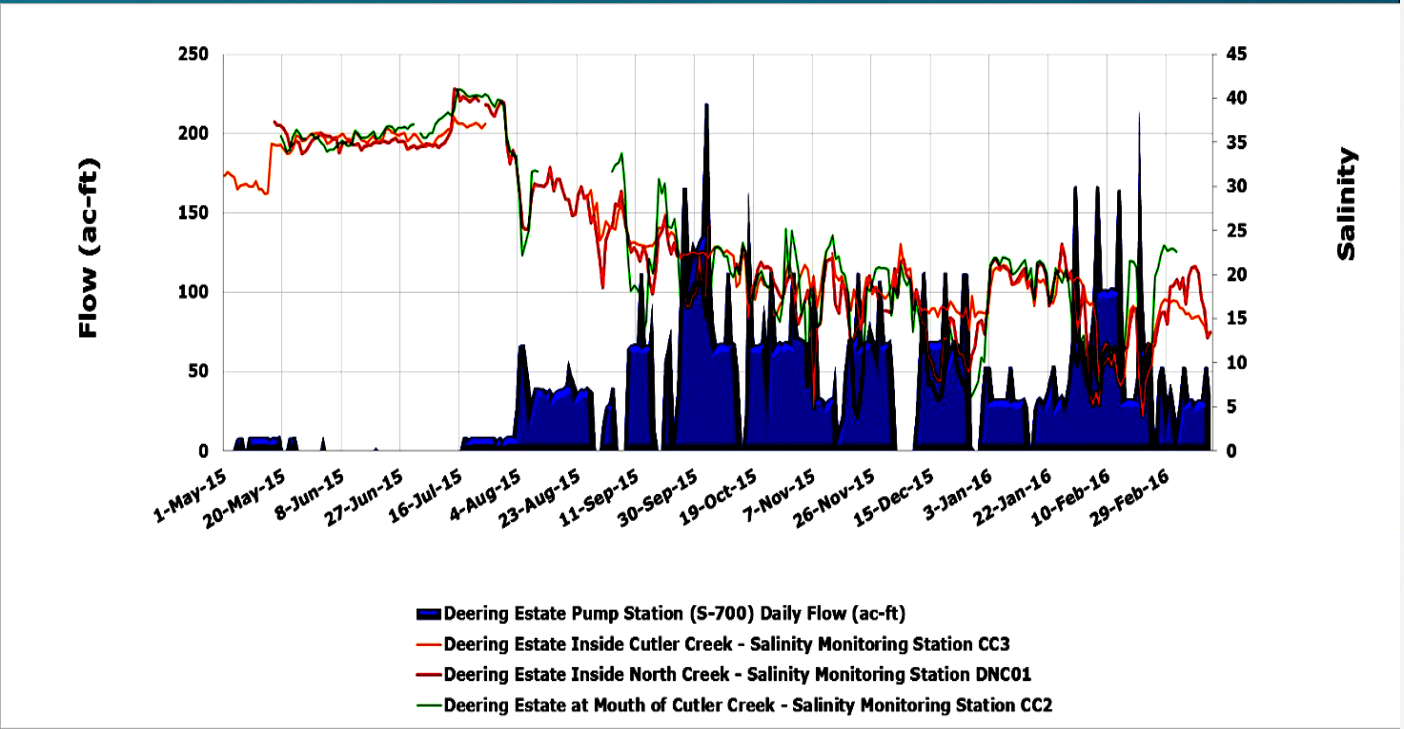
- Groundwater stage rose noticeably at Groundwater monitoring stations, and water levels varied according to pump operations





BBCW RESTORATION BENEFITS DEERING ESTATE FLOW-WAY

- Improved salinity regimes for the Deering Estate Flow-way Creeks



BBCW RESTORATION BENEFITS
DEERING ESTATE FLOW-WAY

REMAINING PHASE 1 PROJECT FEATURES

- **US Army Corps of Engineers is the lead agency for design and constriction of remaining phase 1 features**
  - 2015-2016 Fiscal Year $2.6 million for Design

- **Five pump Stations**
  - ✓ S-703 (50 cubic feet per second)
  - ✓ S-705 (100 cubic feet per second)
  - ✓ S-709 (40 cubic feet per second)
  - ✓ S-710 (40 cubic feet per second)
  - ✓ S-711 (40 cubic feet per second)
- **Inverted siphon (S-707)**
- **Six L-31E Culverts**
- **Freshwater wetland between C-103 Canal and North Canal**

SFWMD EXPEDITED PROJECT

- Cutler Flow-way Features

  - ✓ Design completed November 2009
  - ✓ Design update schedule for 2019
  - ✓ Construction schedule 2020 to 2021

CONCLUSIONS

- **Environmental benefits from the L-31E Culverts are already being realized**
  - ✓ **Point source discharges from the C-103 Canal were reduced or eliminated**
  - ✓ **Monitoring results demonstrated an improvement of hydrologic conditions in response to the pump test**
  - ✓ **The L-31E Pilot Pump Test resulted in improved saltwater wetlands salinity regimes, enhanced sheet flow, rehydration of freshwater and saltwater wetlands**
  - ✓ **Pumping maintained the stage within the L-31E Canal at the optimal level of approximately 2.20 feet NGVD**

CONCLUSIONS

- **Environmental benefits from the Deering Estate Flow-way are already being realized**
  - ✓ **Reduced point source discharge from canals has been reduced**
  - ✓ **Improved quality of water and timing of flows to the wetlands has been improved**
  - ✓ **Rehydration of historic coastal wetlands**
  - ✓ **Wetland plant species are proliferating including expansion of sawgrass, upland plants have died off and new wetland vegetation species are emerging**

All metrics indicate a successful project.

Thank You

BISCAYNE BAY
COASTAL WETLANDS

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