

Greater Everglades Ecosystem Restoration

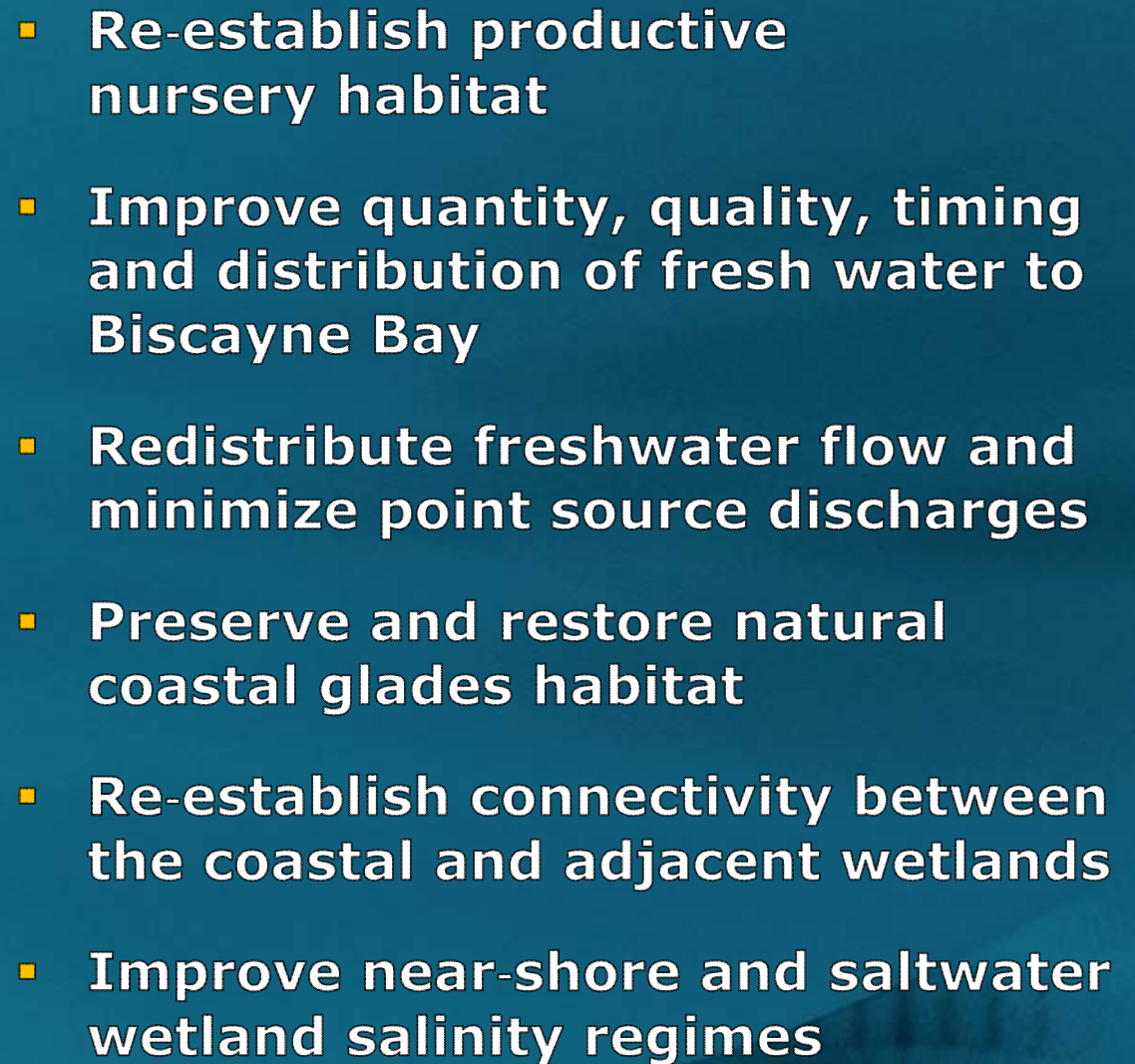
April 21-23, 2015

BISCAYNE BAY COASTAL WETLANDS RESTORATION BENEFITS

Presented by

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OUTLINE

- Deering Estate Flow-way - completed in 2012
- L-31E Culverts - completed in 2010
- Temporary Pump Test Pilot Project for L-31E Flow-way - conducted October 2014-April 2015
- Congress authorized the project in 2014; federal appropriations are pending



L-31E Flow-way Temporary Pump Test



Deering Estate Flow-way Educational Wetland

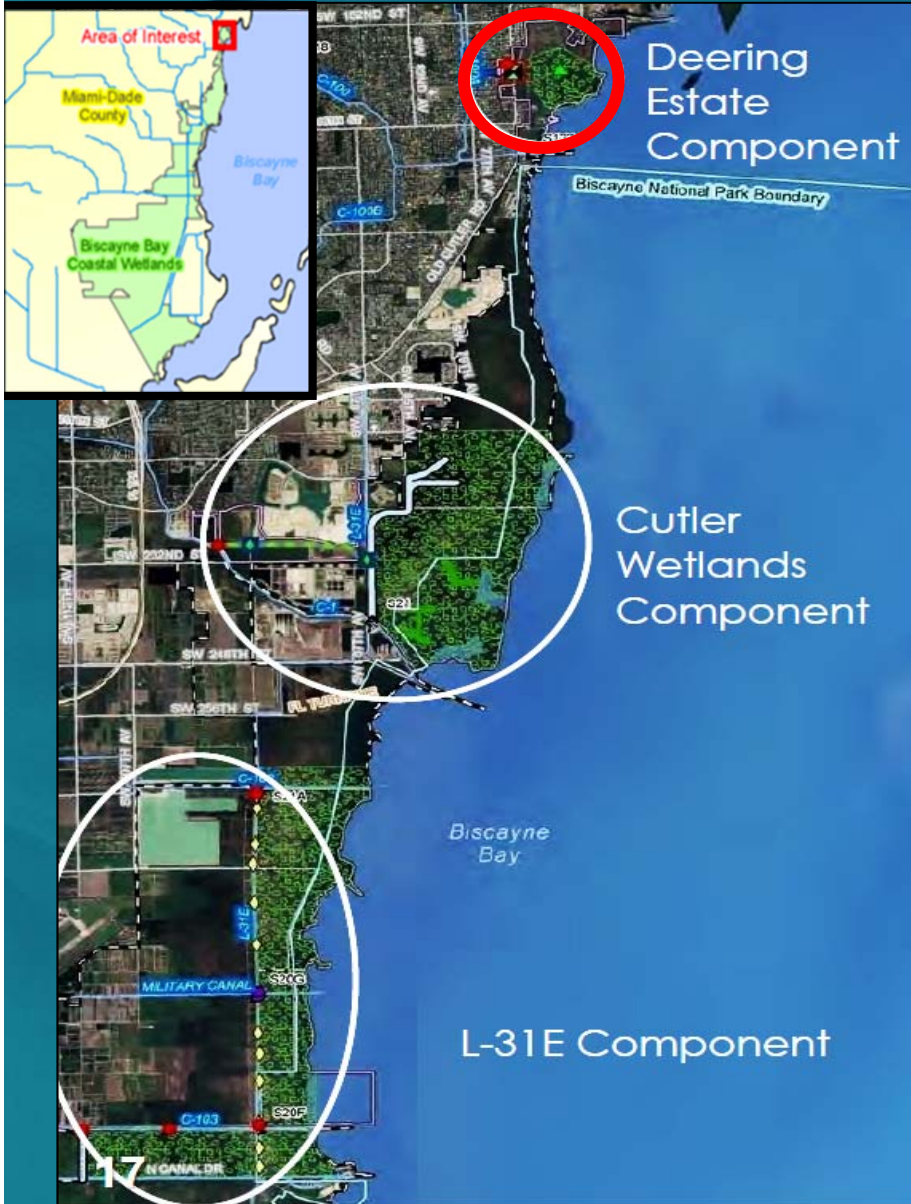


L-31E Flow-way Showing Project Features



Cutler Flow-way Showing Project Features

DEERING ESTATE FLOW-WAY



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

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)

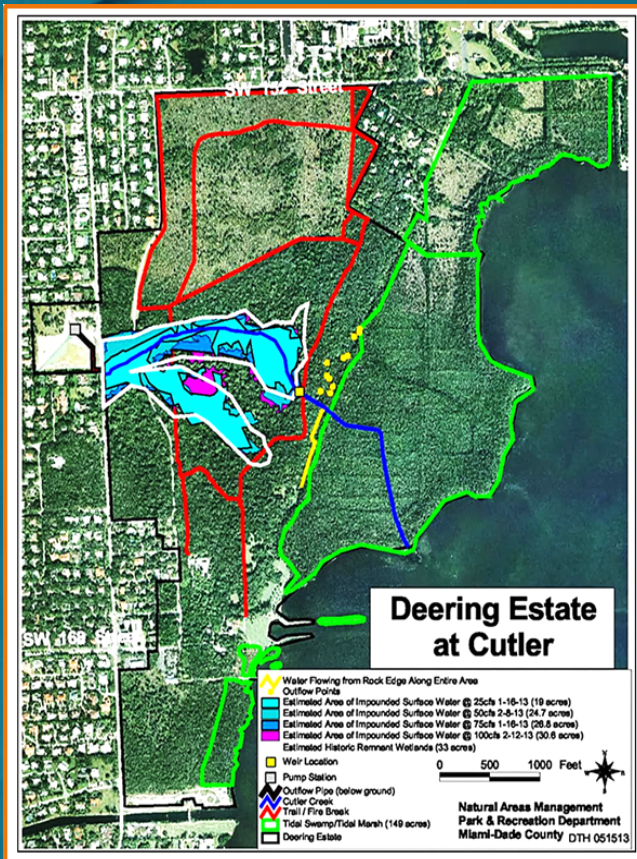


BBCW RESTORATION BENEFITS (DEERING ESTATE FLOW-WAY)

- 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%

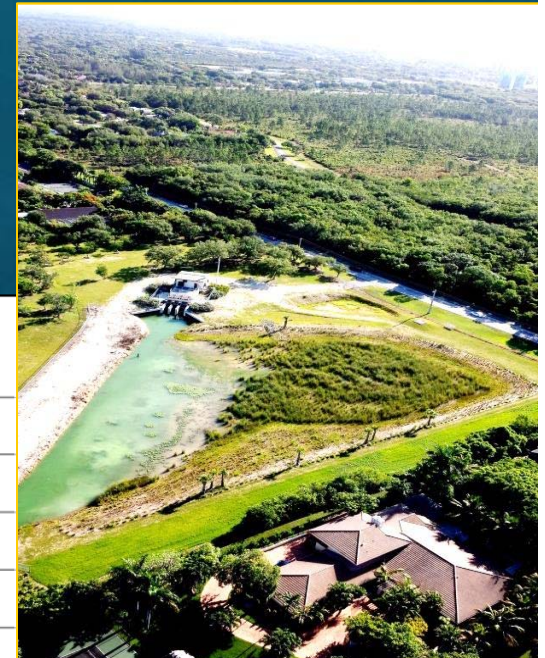
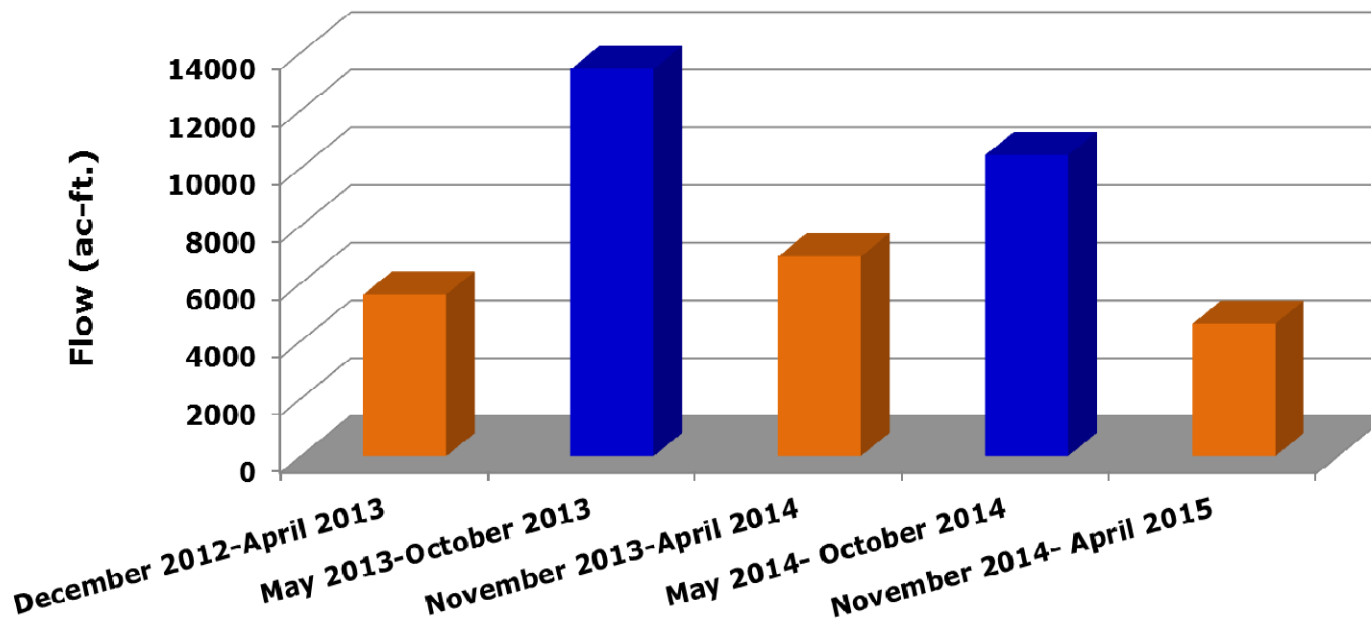


Delineation of the Historical Freshwater Wetland Slough in Deering Estate and Areas of Inundation at Different Pump Rates

BBCW RESTORATION BENEFITS (DEERING ESTATE FLOW-WAY)

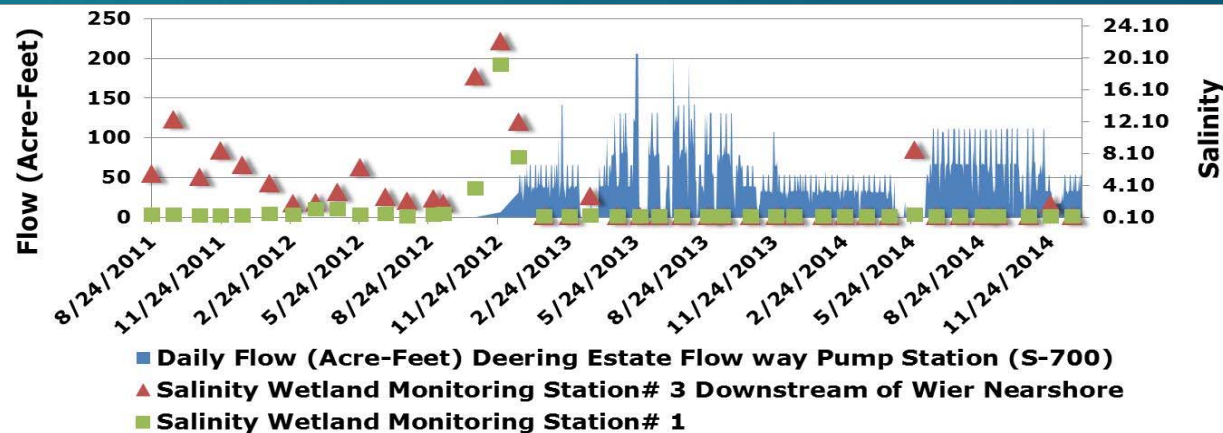
- Approximately **40,970 ac-ft.** of fresh water redirected to historic remnant wetlands
- Timing of flows to the wetlands at Deering Estate has been improved

Discharges Through Deering Estate Pump Station (S-700)

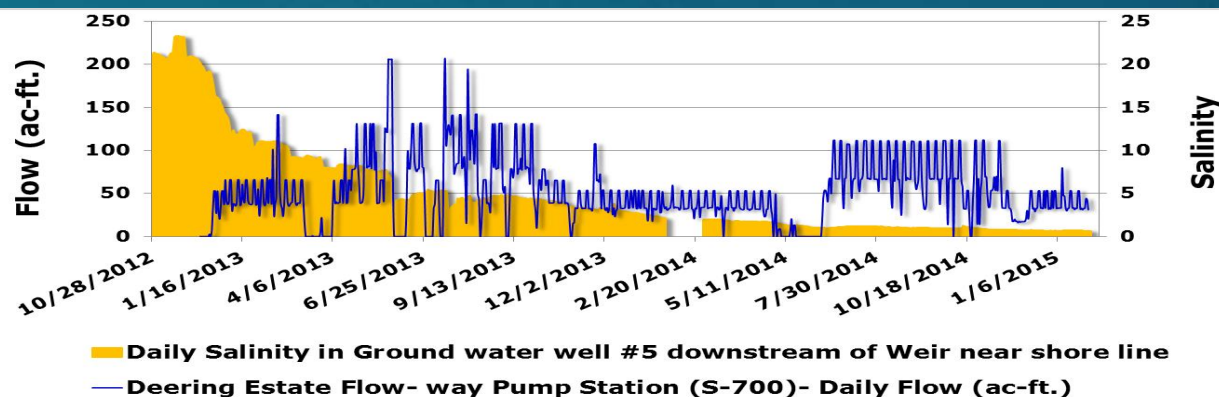


BBCW RESTORATION BENEFITS (DEERING ESTATE FLOW-WAY)

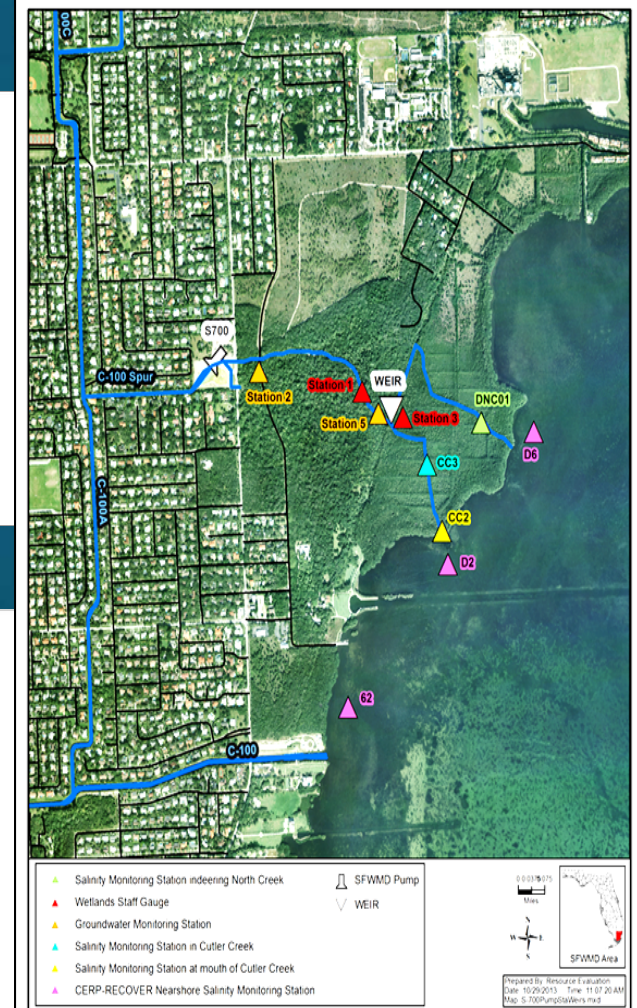
- Reduced salinity in groundwater and surface water



Comparison of Surface Water Salinity at Deering Estate Wetland staff Gauges 1 and 3 Versus S-700 Daily Flow

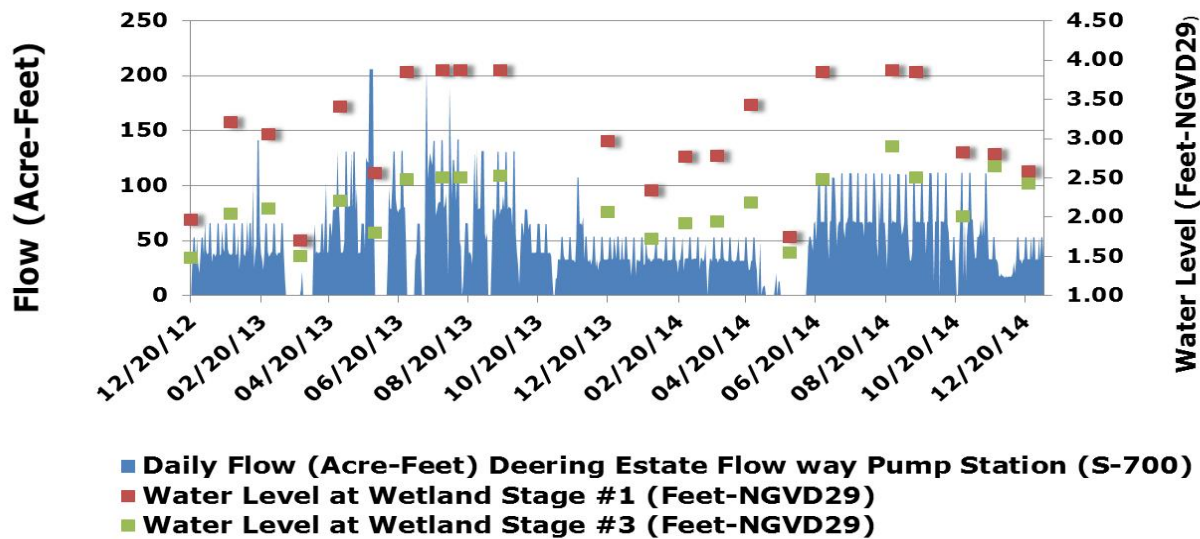


Comparison of Salinity Concentrations in Groundwater Well #5 Near the Historic Remnant Wetlands of Deering Estate Versus S-700 Daily Flow



Ecological Monitoring Stations for the Deering Estate Flow-way

Cutler Creek Historic Remnant Wetland

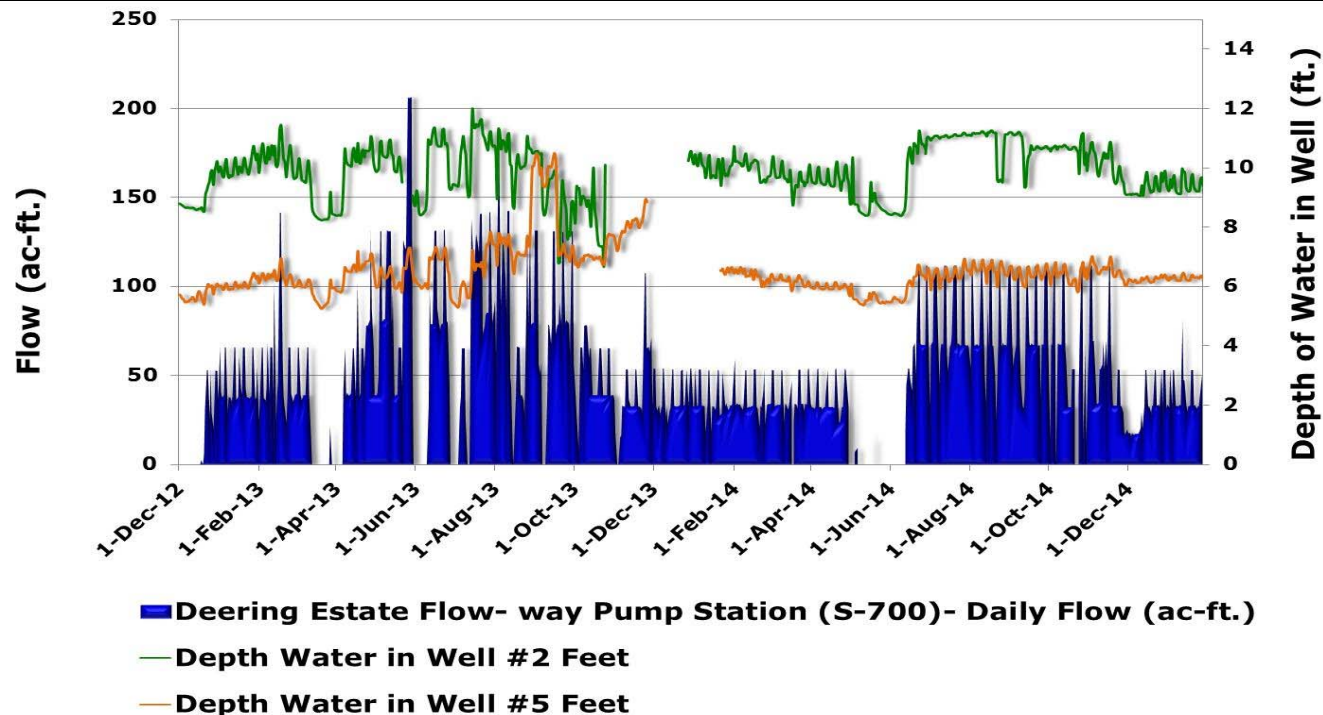


Water Levels at Deering Estate Staff Gauges 1 and 3 Versus S-700 Daily Flow

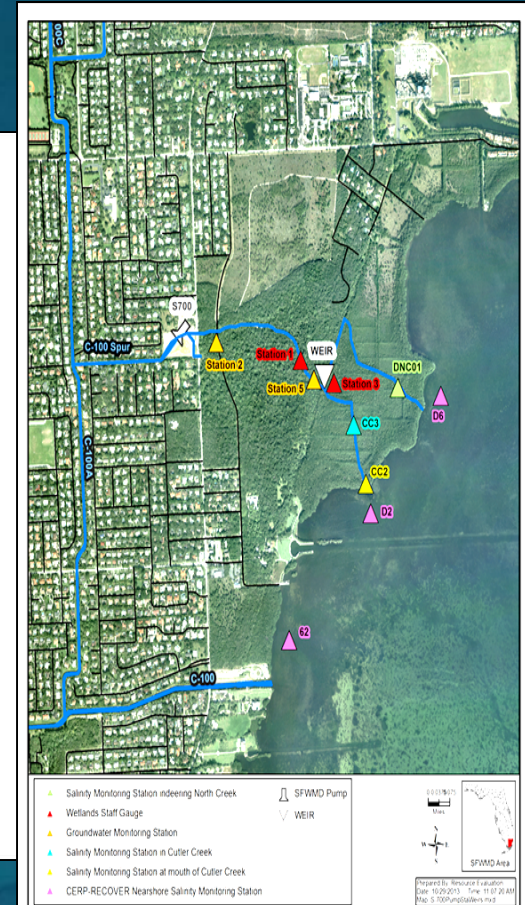


BBCW RESTORATION BENEFITS (DEERING ESTATE FLOW-WAY)

- Groundwater stage rose noticeably at monitoring stations 2 and 5, and water levels varied according to pump operations



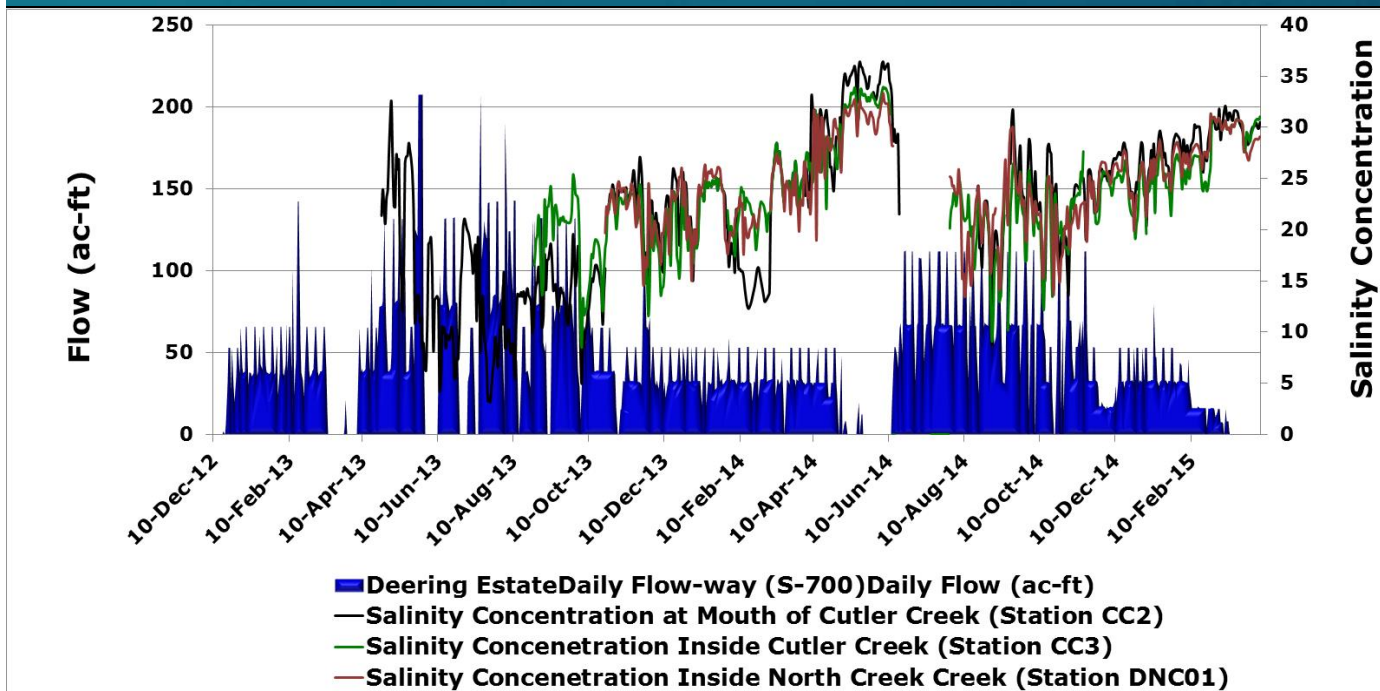
Comparison of Water Levels at Deering Estate Staff Gauges 1 and 3 within Vicinity of Historic Remnant Wetlands of Deering Estate Versus S-700 Daily Flow



BBCW RESTORATION BENEFITS (DEERING ESTATE FLOW-WAY)

IMPROVE NEAR-SHORE SALINITY REGIMES

- ✓ Reduced salinity in Cutler Creek, North Creek and nearshore at Mouth of Cutler Creek

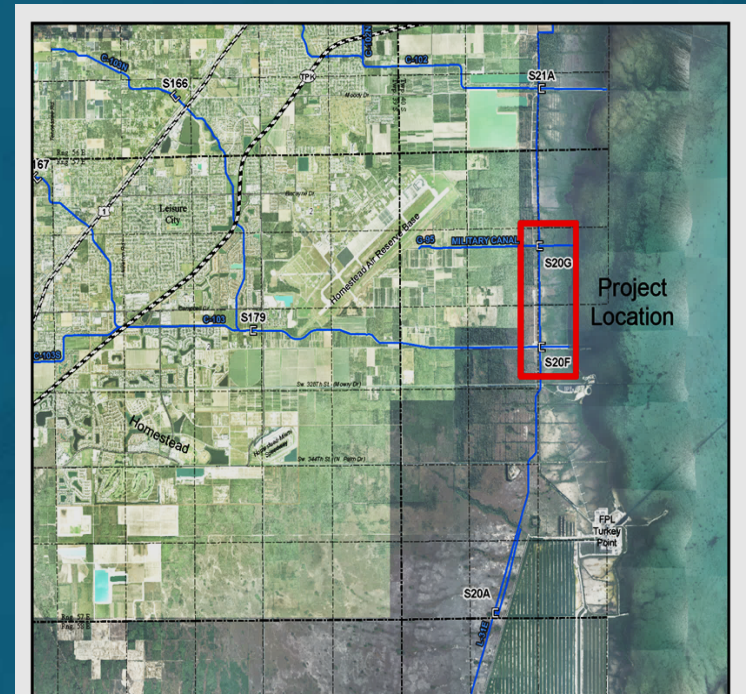


Comparison of Surface water Salinity at Deering Estate Nearshore Salinity Monitoring Stations (Mouth of Cutler Creek, Inside North Creek, and Inside Cutler Creek) Versus S-700 Daily Flow

BBCW L-31E PILOT PUMP TEST Project

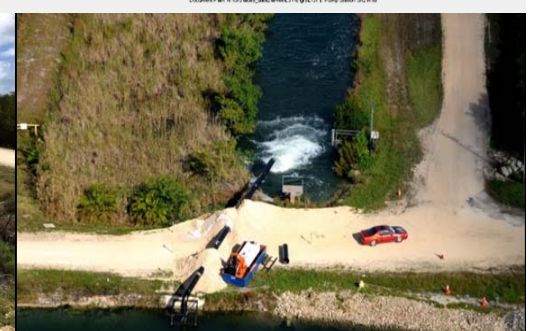
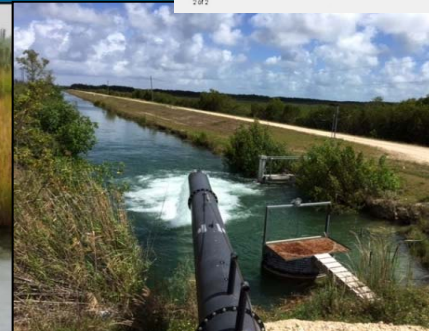
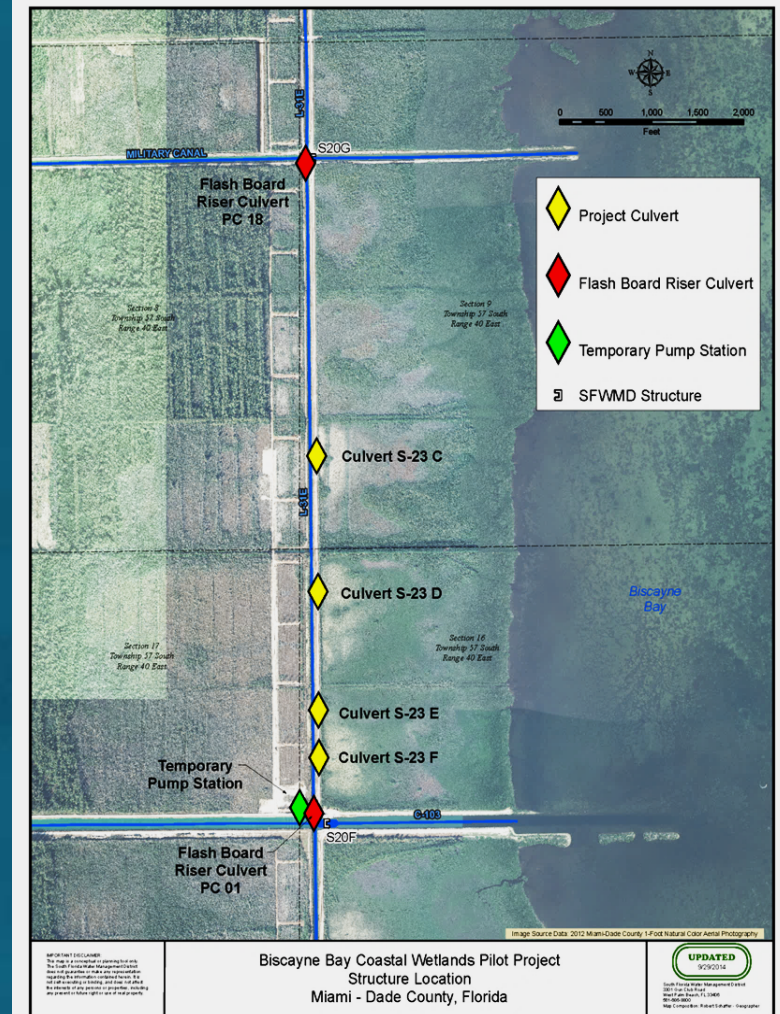
□ Purpose: divert water from point source discharge and redistribute through culverts to remnant tidal creeks

- ✓ Minimize point source discharges
- ✓ Improve environmental water delivery
- ✓ Deliver freshwater to historic-tidal creeks
- ✓ Hydrate coastal wetland areas
- ✓ Improve nearshore salinity regimes



BBCW L-31E PILOT PUMP TEST Project

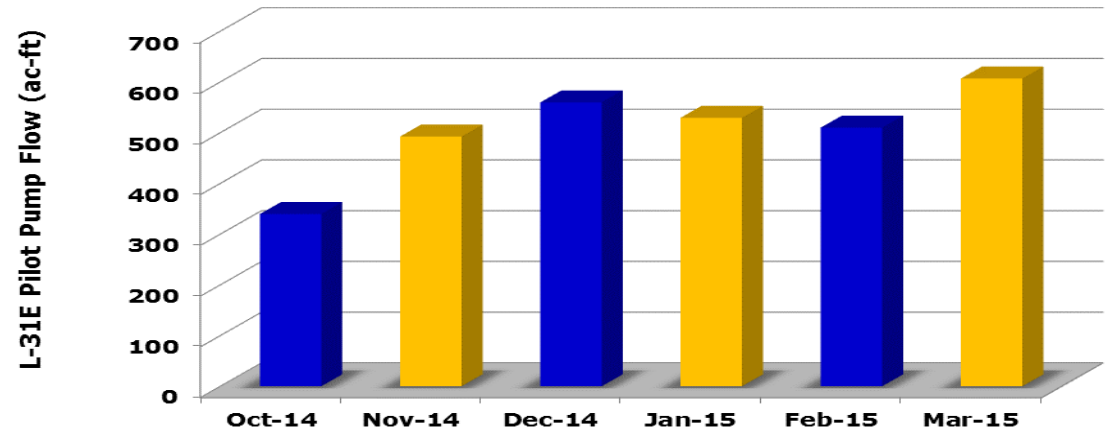
- Temporary pilot pump dry season operations started October 2014
- Water conditions allowed test to be extended from 3 months to 6 months
- Enhanced sheetflow to historic tidal creeks
- Pumping maintains L-31E canal stage at optimal level ~ 2.20 FT- NGVD29



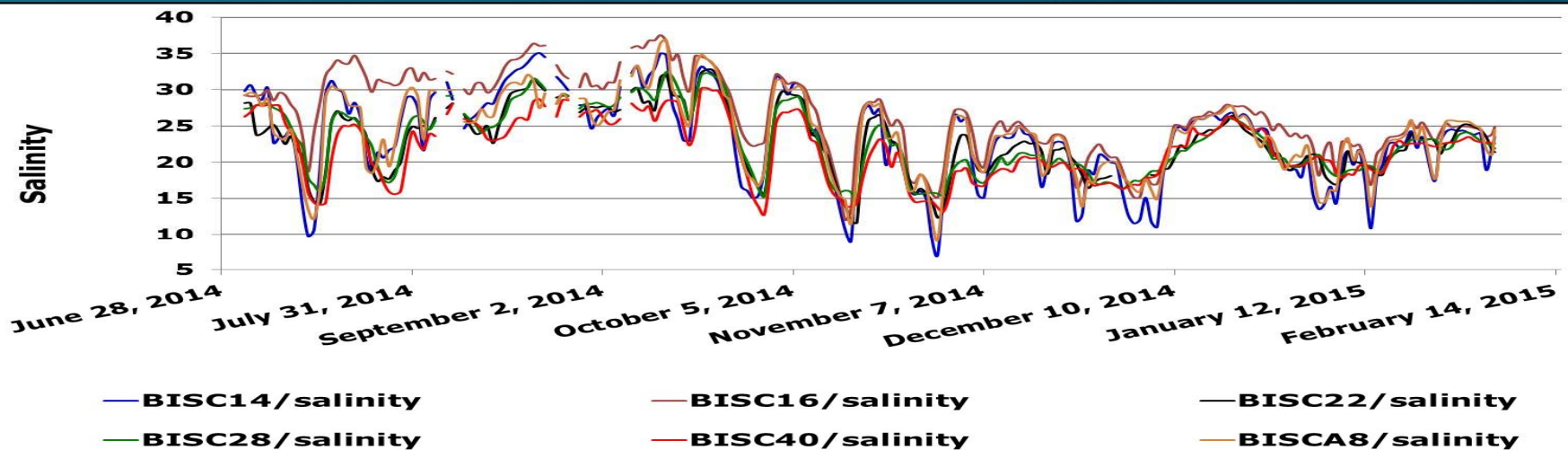
BBCW L-31E PILOT PUMP TEST Project

- **+ 3,000 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

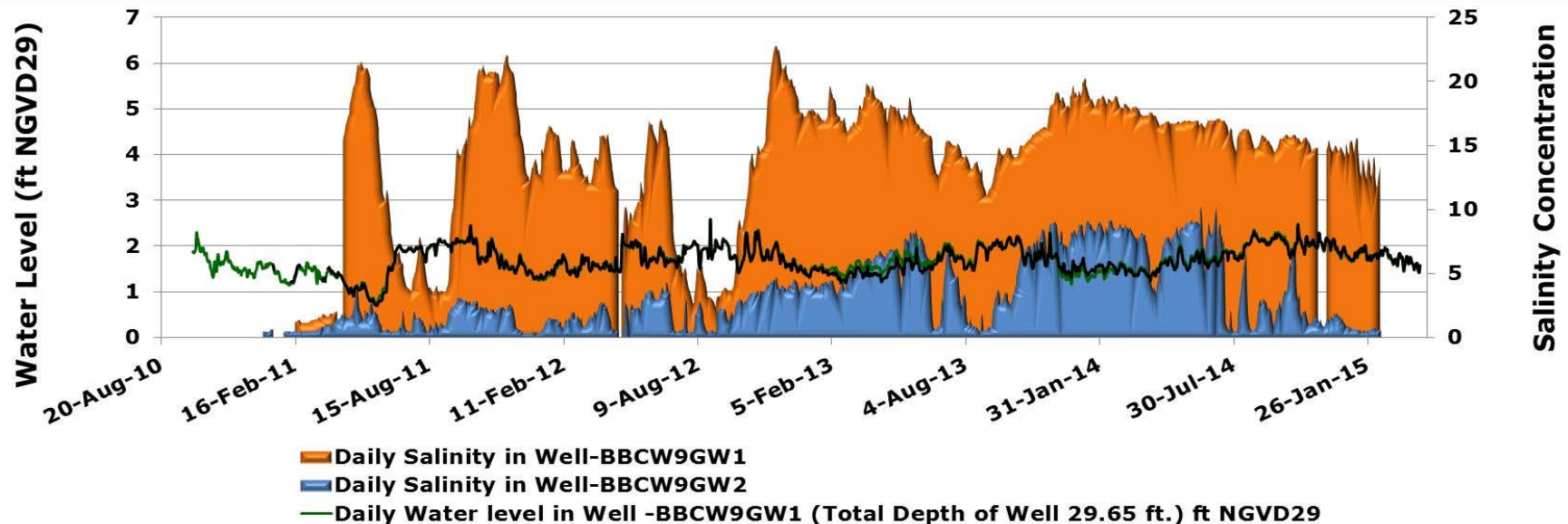


Nearshore Biscayne Bay Salinity Within Vicinity of L-31E Flow-way (RECOVER/BNP Monitoring Stations)



BBCW L-31E PILOT PUMP TEST Project

- Rehydration of coastal wetlands along east & west sides of L-31E Canal
- Reduced salinity and increased stage in groundwater



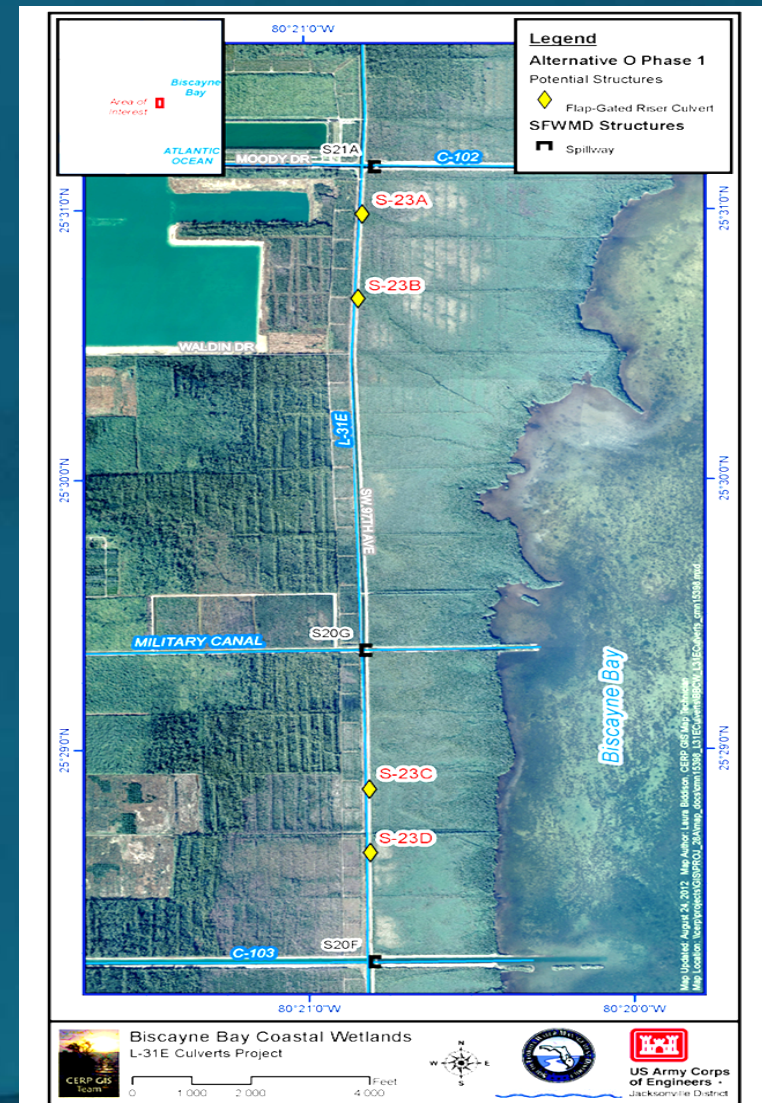
Comparison of Water Level and Salinity in Groundwater Monitoring Stations BBCW9GW1 and BBCW9GW2 within Vicinity of L-31E Pilot Project

BBCW RESTORATION BENEFITS (L-31E CULVERTS)

The L-31E Culverts is located in Southeastern Miami-Dade County

The goals of the L-31E Culverts include:

- ✓ Minimize point source discharges
- ✓ Improve environmental water delivery
- ✓ Deliver freshwater to historic-tidal creeks
- ✓ Hydrate coastal wetland areas
- ✓ Improve nearshore salinity regimes



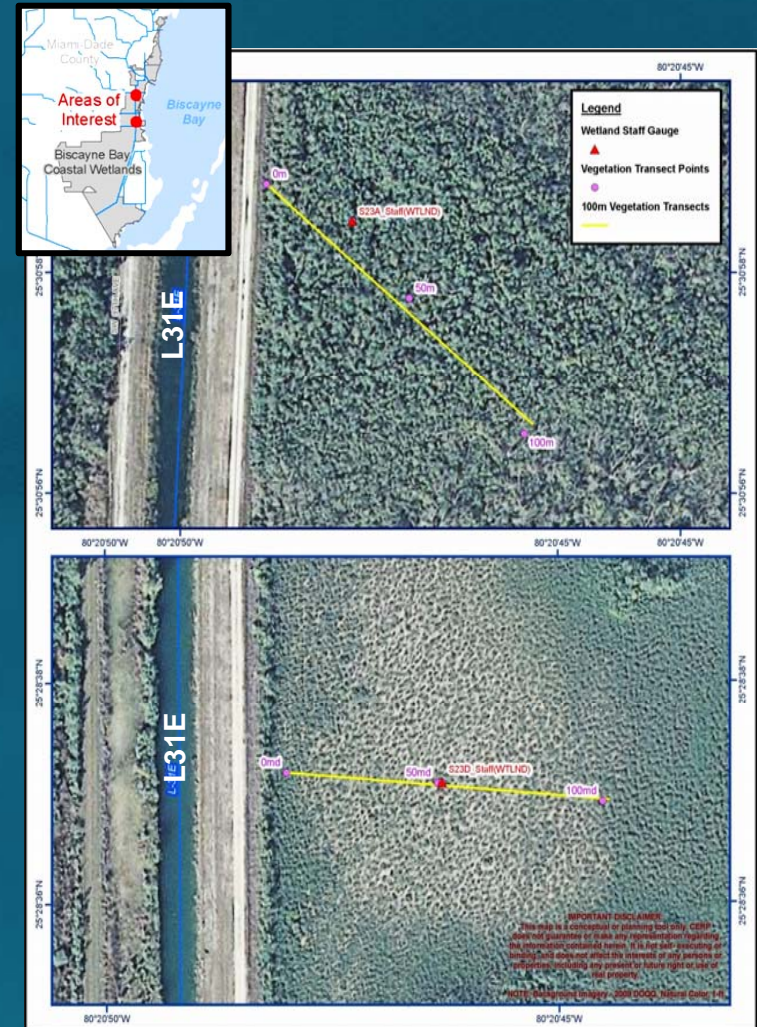
BBCW RESTORATION BENEFITS (L-31E CULVERTS)

- Re-directed **11,944 ac-ft.** fresh water from the C-102 and C-103 canals
- Enhancing sheet flow and rehydration fresh and saltwater wetlands



BBCW RESTORATION BENEFITS (L-31E CULVERTS)

- Implemented vegetation monitoring to detect changes in response to increased freshwater flows
- Statistical analysis of data along two 100 meter transects in wetlands did not detect major changes
- However, expansion of sawgrass observed within project boundary



LOCATION OF TRANSECTS EAST OF THE
LEVEE AT CULVERT S23-A AND S-23D

BBCW RESTORATION BENEFITS (L-31E CULVERTS)

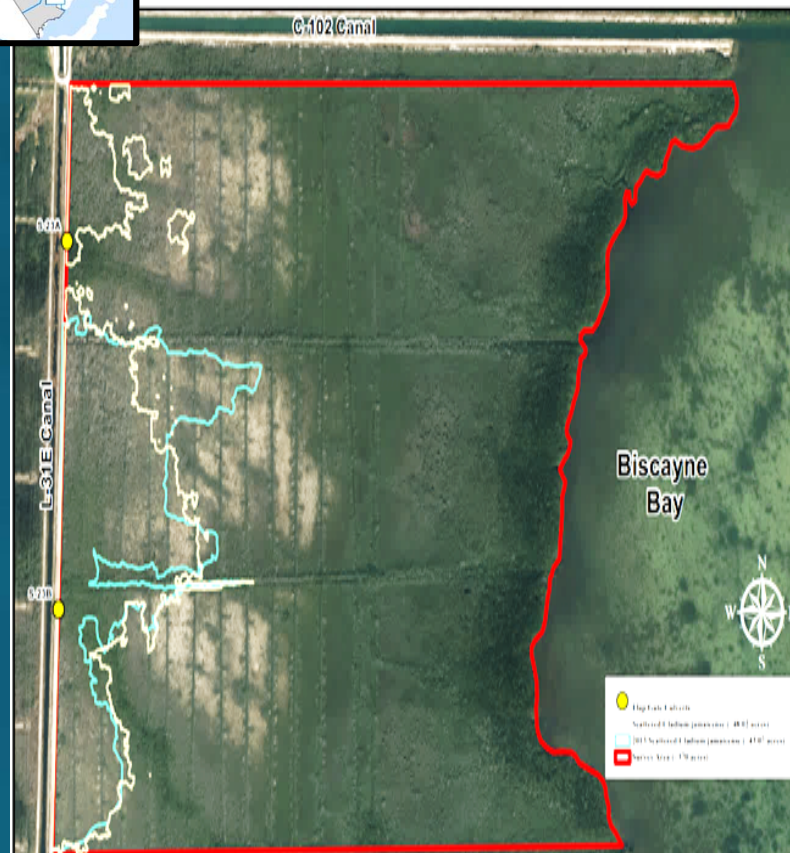
Increases in sawgrass
acreage assessed by
mapping

2013 mapping- 43.07
acres

2015 mapping- 48.02
acres



BBCW L-31E Culverts Project - 2013 & 2015 Sawgrass Survey



BBCW RESTORATION BENEFITS (L-31E CULVERTS)

Expansion of sawgrass

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



CONCLUSIONS

FRESH WATER DELIVERED TO PROJECT

Deering Estate Flow-way Pump Station diverted **41,000** ac-ft. of water to coastal wetlands since December 2012

Temporary Pilot Pump Project diverted **+ 3,000** ac-ft. of water to L-31E Wetlands

L-31E Culverts diverted **11,944** ac-ft. of water from the C-102 and C-103 canals since November 2010

Timing of flows to the wetlands at Deering Estate Flow-way has been improved by supplying freshwater during the dry season

CONCLUSIONS

RE-ESTABLISH CONNECTIVITY BETWEEN THE COASTAL AND ADJACENT WETLANDS

- ✓ The Deering Estate Flow-way and L-31E Culverts help restore the hydrologic connection to coastal wetlands

IMPROVE NEAR-SHORE AND SALTWATER WETLANDS SALINITY REGIMES

- ✓ Reduced salinity in groundwater and surface water
- ✓ L-31E Temporary Pilot Pump Test improved tidal wetlands and near-shore salinity conditions

CONCLUSIONS

RESERVE AND RESTORE NATURAL COASTAL GLADES HABITAT

Wetland stage and inundation have been increased

Vegetation within vicinity of Deering Estate Component
responding to changed hydrology with die-off of
upland vegetation & emergence of wetland species

Reduced Non-Native Vegetation

Expansion of sawgrass observed

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

ACKNOWLEDGEMENTS

Miami-Dade County Parks, Recreation and Open
Spaces Department

Miami-Dade County Dept. Regulatory & Economic
Resources, Environmental Resources Management,
Restoration & Enhancement Section

Deering Estate at Cutler and the Deering Estate
Foundation

Key Biscayne National Park

Fairchild Tropical Botanic Garden

Miami-Dade County, Environmentally Endangered
Species Program

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Thank You

**SCAYNE BAY
ASTAL WETLANDS
STORATION BENEFITS**

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