Biscayne Bay Coastal Wetlands Phase 1 Project Observed Benefits

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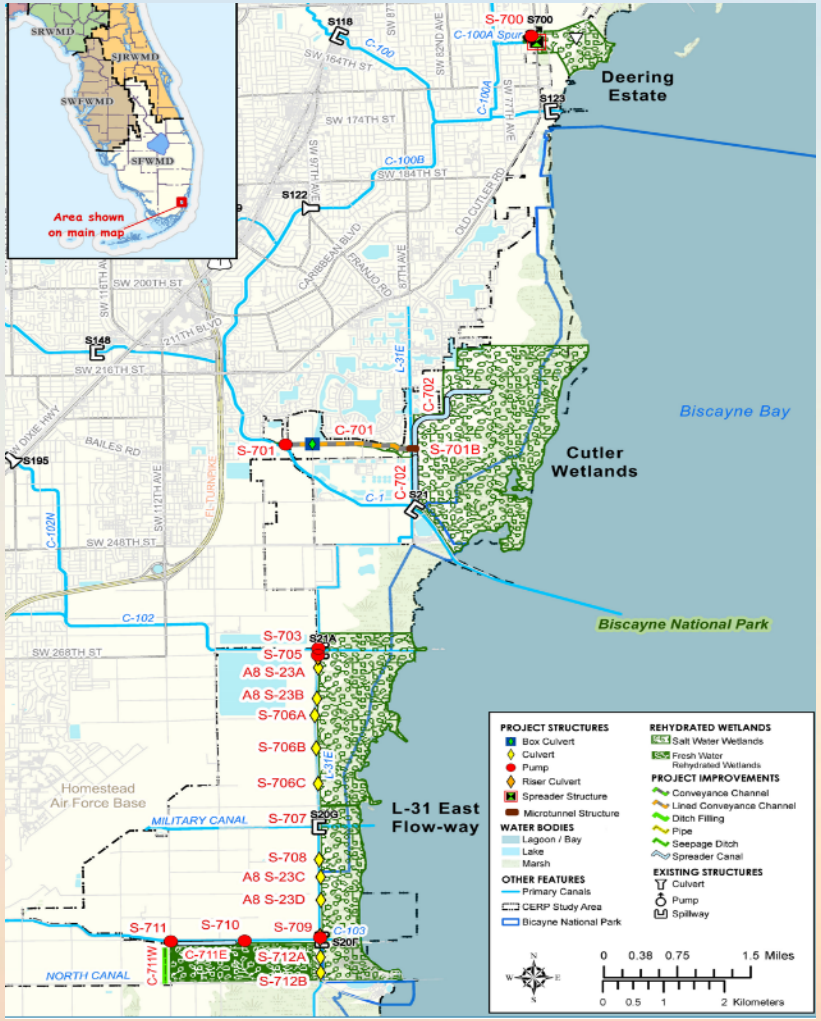
Biscayne Bay Coastal Wetlands Phase 1 Project

- **Objectives:**
  - ❑ Redistribute freshwater flow to minimize point source discharges to improve freshwater and estuarine habitat.
  - ❑ Reestablish productive nursery habitat along the shoreline.
  - ❑ Preserve and restore spatial extent of natural coastal habitat.
  - ❑ Restore nearshore and saltwater wetland salinity regimes.
  - ❑ Restore and improve quality, quantity, timing, and distribution of freshwater to Biscayne Bay, including Biscayne National Park.

- **Monitoring used to track project performance against restoration targets**



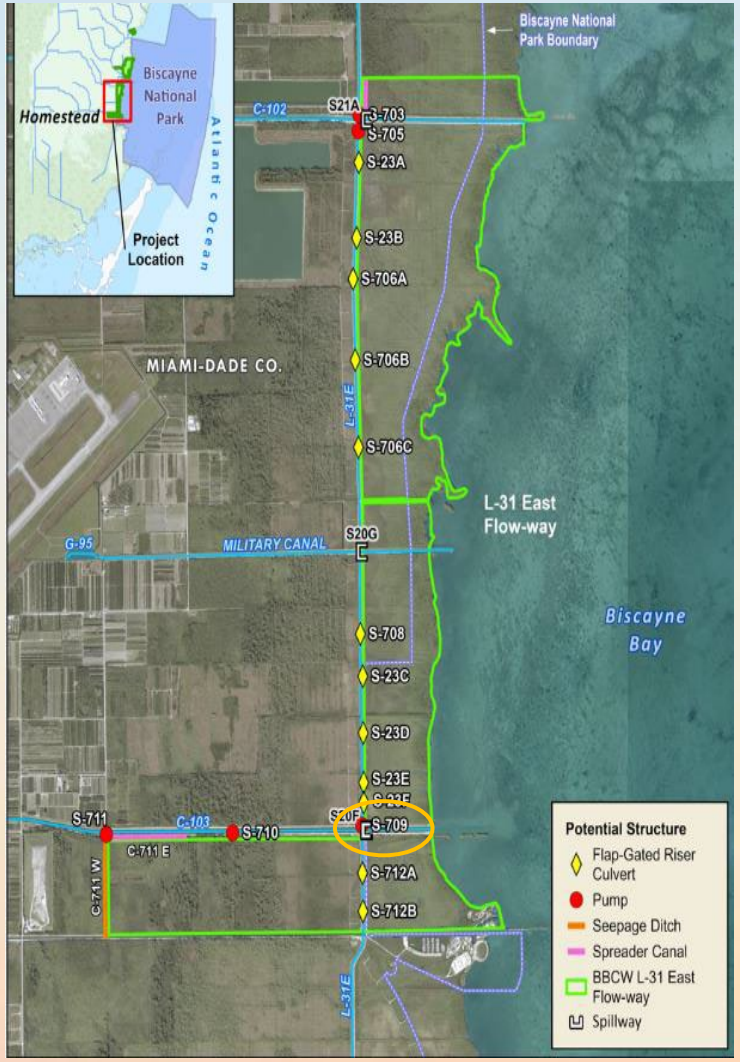
BBCW Phase I project components

Biscayne Bay Coastal Wetlands Phase 1 Project
L-31E Flow way

- **SFWMD completed construction of interim pump (S-709) & operated from August 2014–March 2019**
- **Results**
  - ✓ **Enhanced sheet flow to the coastal wetlands & Biscayne Bay**
  - ✓ **SFWMD and USACE completed construction of new pump station S-709 in March 2023**

Pilot pump test S-709

L-31E Flow way new pump station S-709



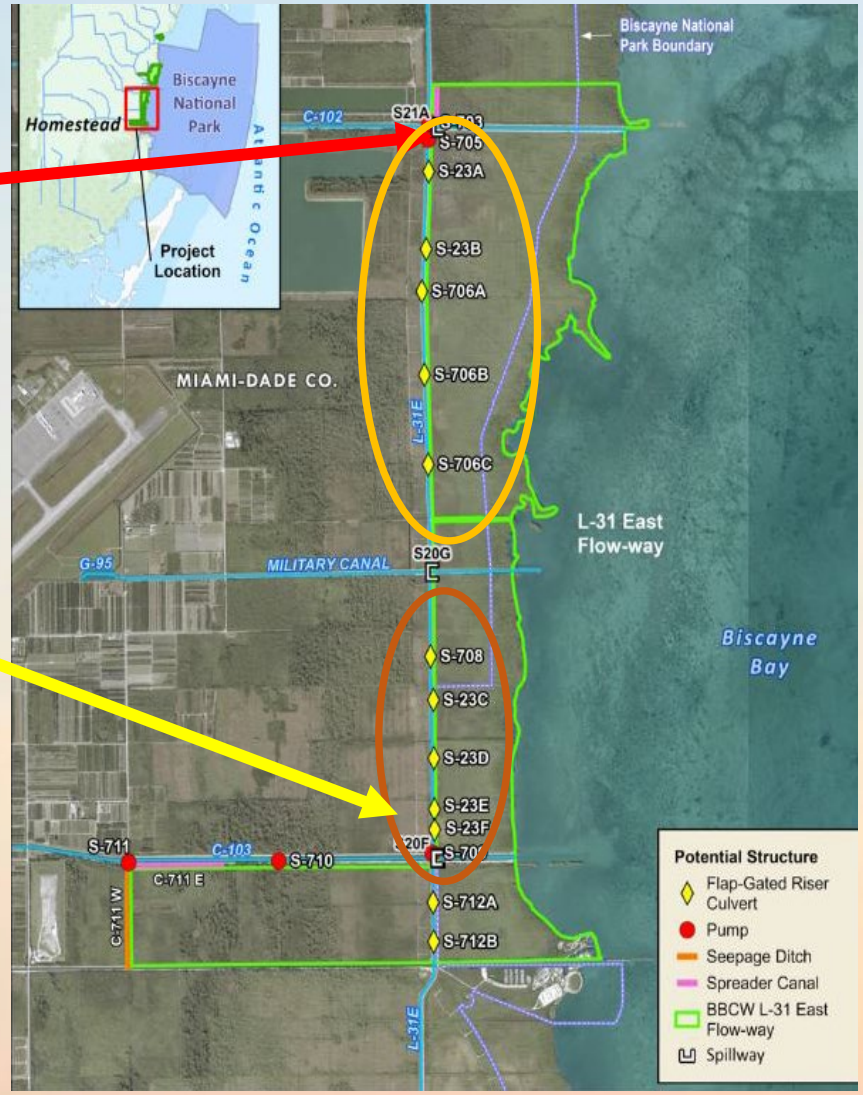
L-31E Flow way component features

Biscayne Bay Coastal Wetlands Phase 1
Project L-31E Flow way

Pump Station S-705

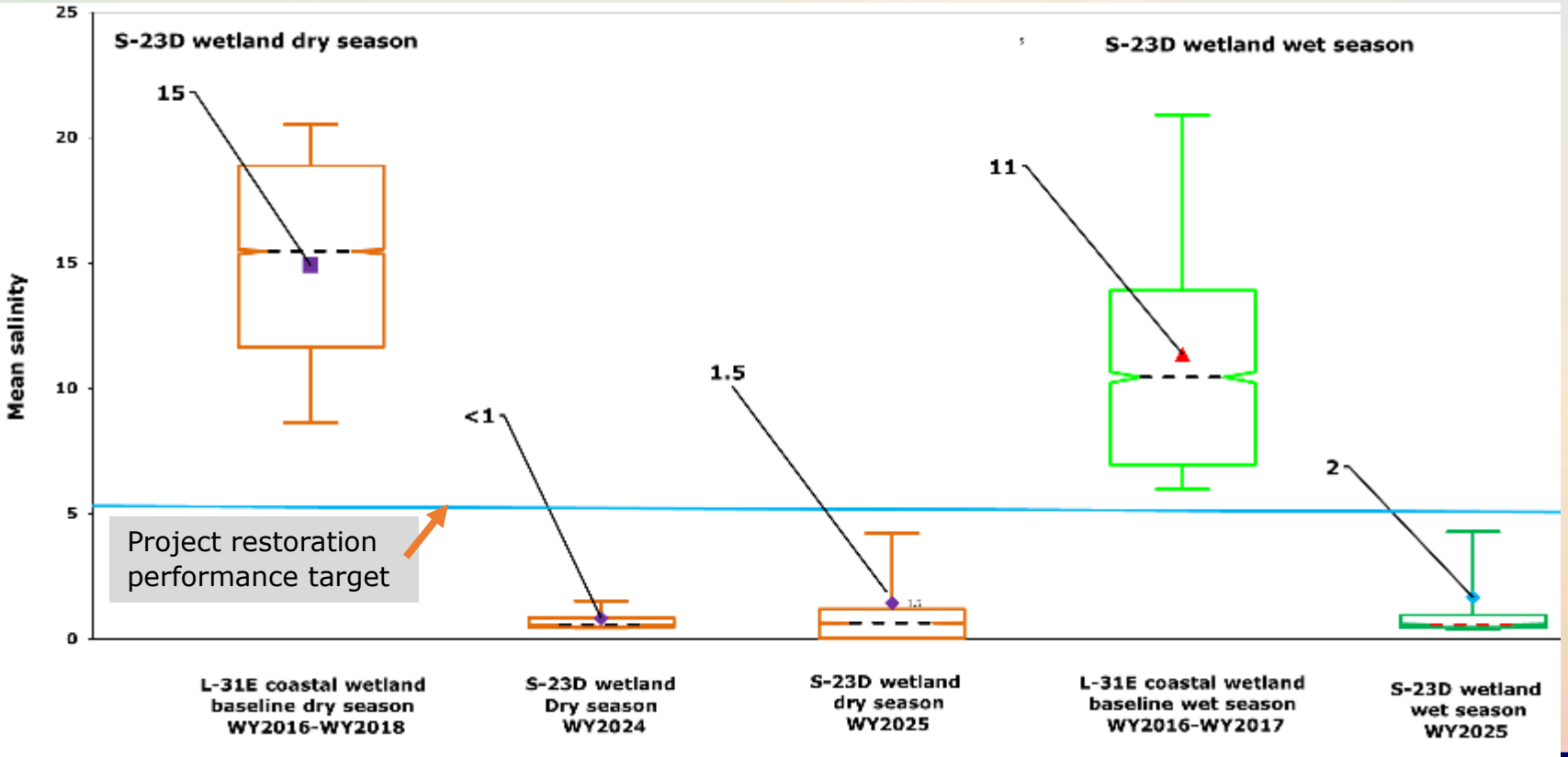
L-31E Flow way culvert providing redistributed freshwater to the coastal wetlands and Biscayne Bay

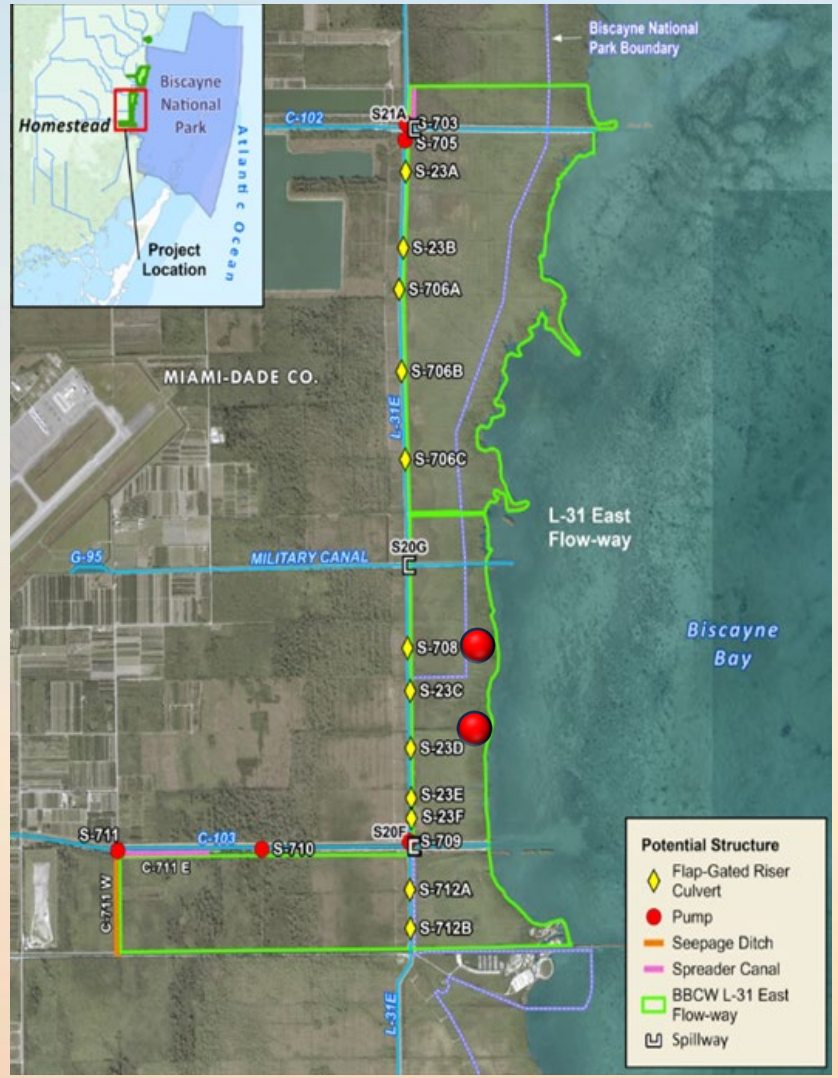
Pump Station S-709



Biscayne Bay Coastal Wetlands Phase 1 Project
L-31E Flow way Coastal Wetlands Salinity

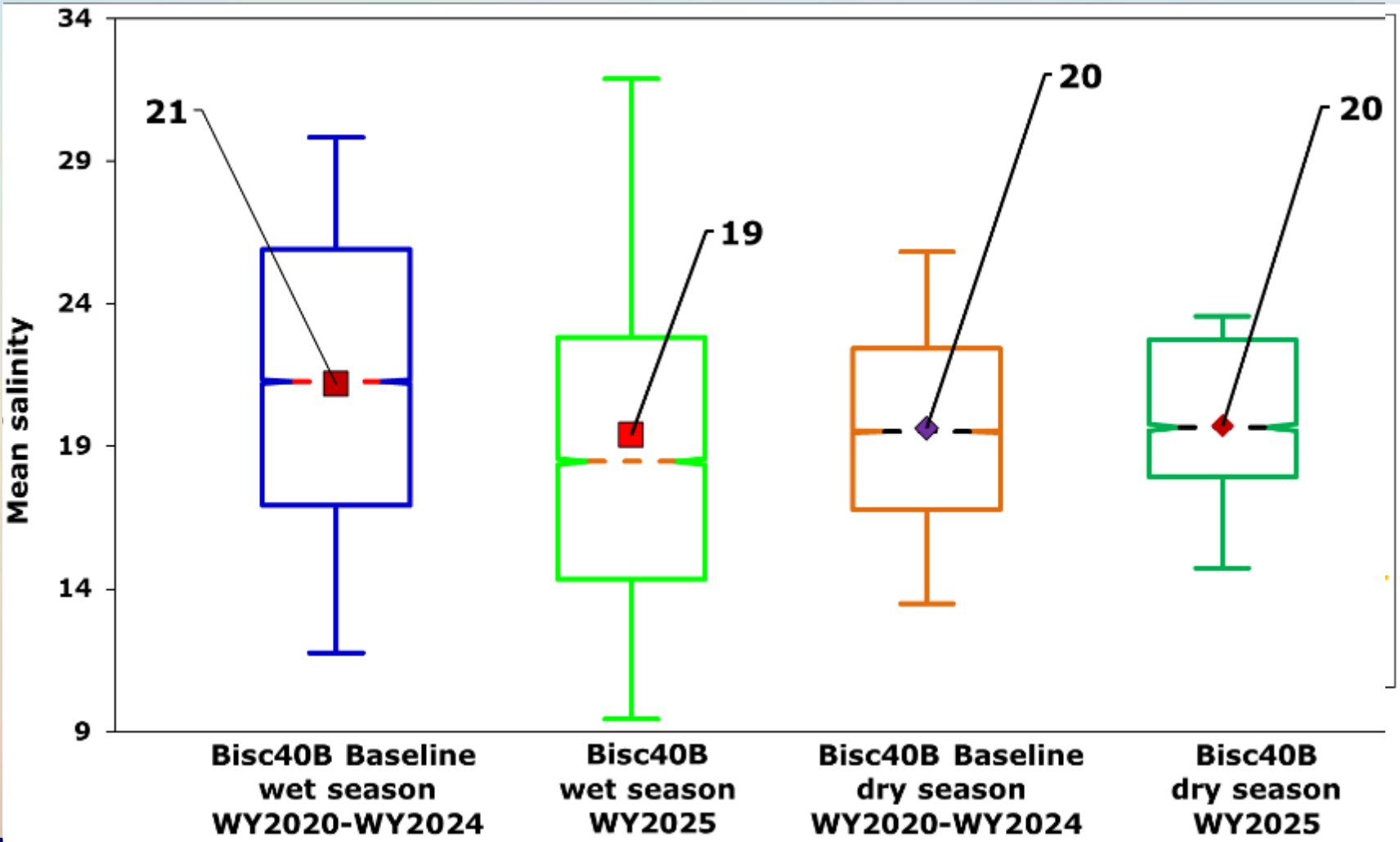
- **Improved flow to the coastal wetlands and decreased salinity**
  - ✓ L-31E Flow way pump station S-709 diverted ~14,000 ac-ft freshwater to the coastal wetlands, Biscayne Bay, and Biscayne National Park.
  - ✓ Hydroperiods in the target costal wetlands increased over 300 days/year.
  - ✓ Salinity decreased in the coastal wetlands.

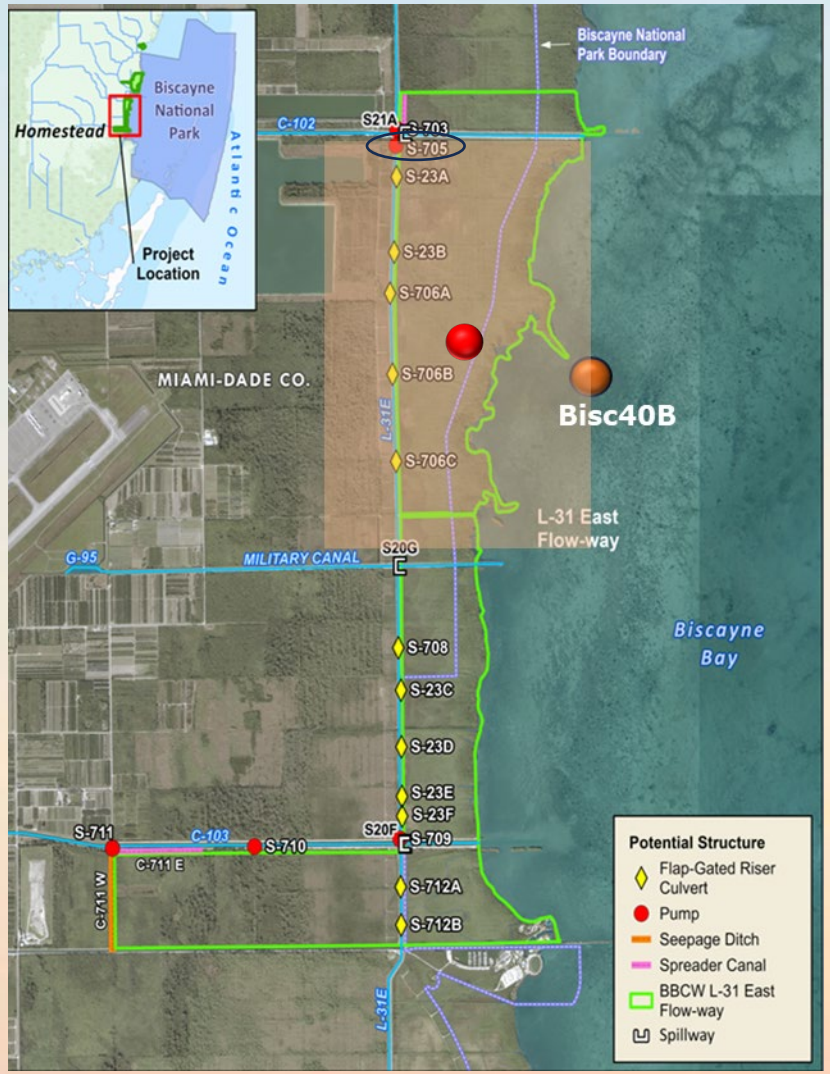




Biscayne Bay Coastal Wetlands Phase 1
Project L-31E Flow way Pump Station S-705 Pilot Pump Test

- Improve flows and salinity in the coastal wetlands

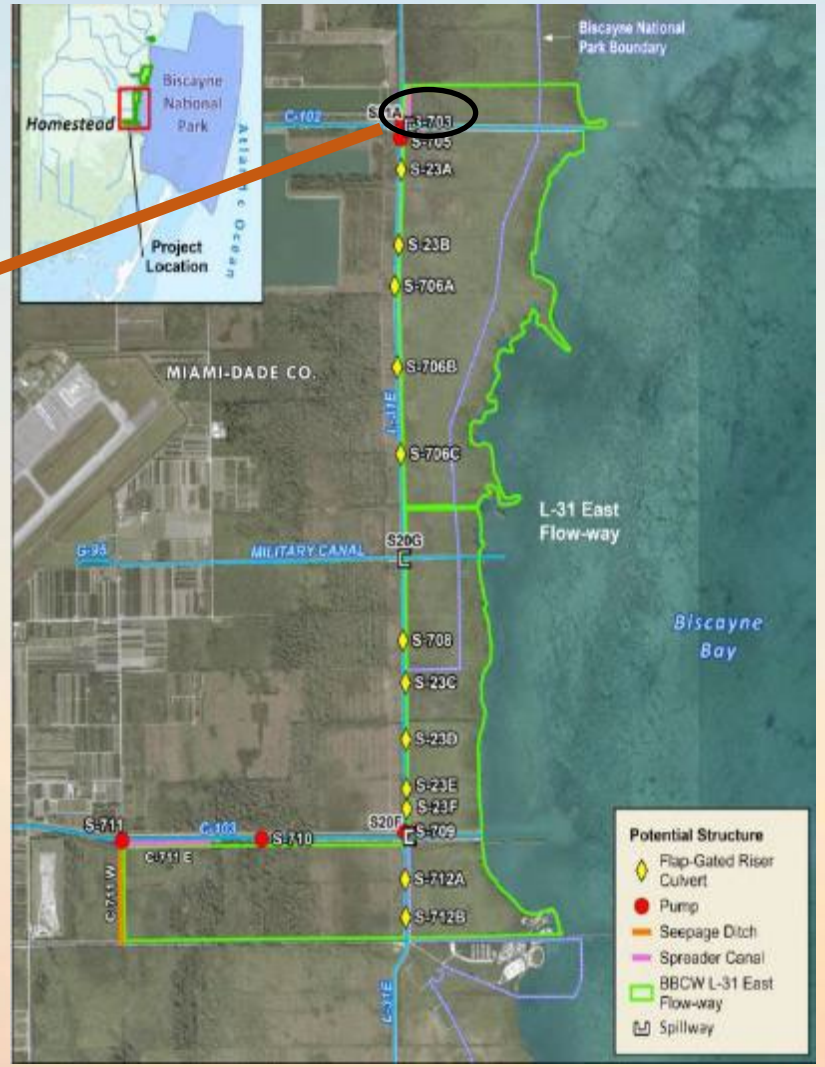




Biscayne Bay Coastal Wetlands L-31E Flow way-Pilot Pump Test

- **Improve flows shallow spreader pump station S-703**

L-31E Flow way pump station S-703, S-703 shallow spreader and cuts along spreader



Biscayne Bay Coastal Wetlands Phase 1
Project Deering Estate

- **The Deering Estate Flow way**
  Construction completed April 2012

- **Goals:**

  - ❑ **Redirect up to 100 cfs freshwater to the coastal wetlands and Biscayne Bay**

  - ❑ **Re-hydrate the historical sloughs of Deering Estate and restore a more natural freshwater flow regime**

  - ❑ **Establish an educational wetland**

Deering Estate Pump Station (S-700)

Coastal Structure S-123 on C-100 canal

Deering Estate component features

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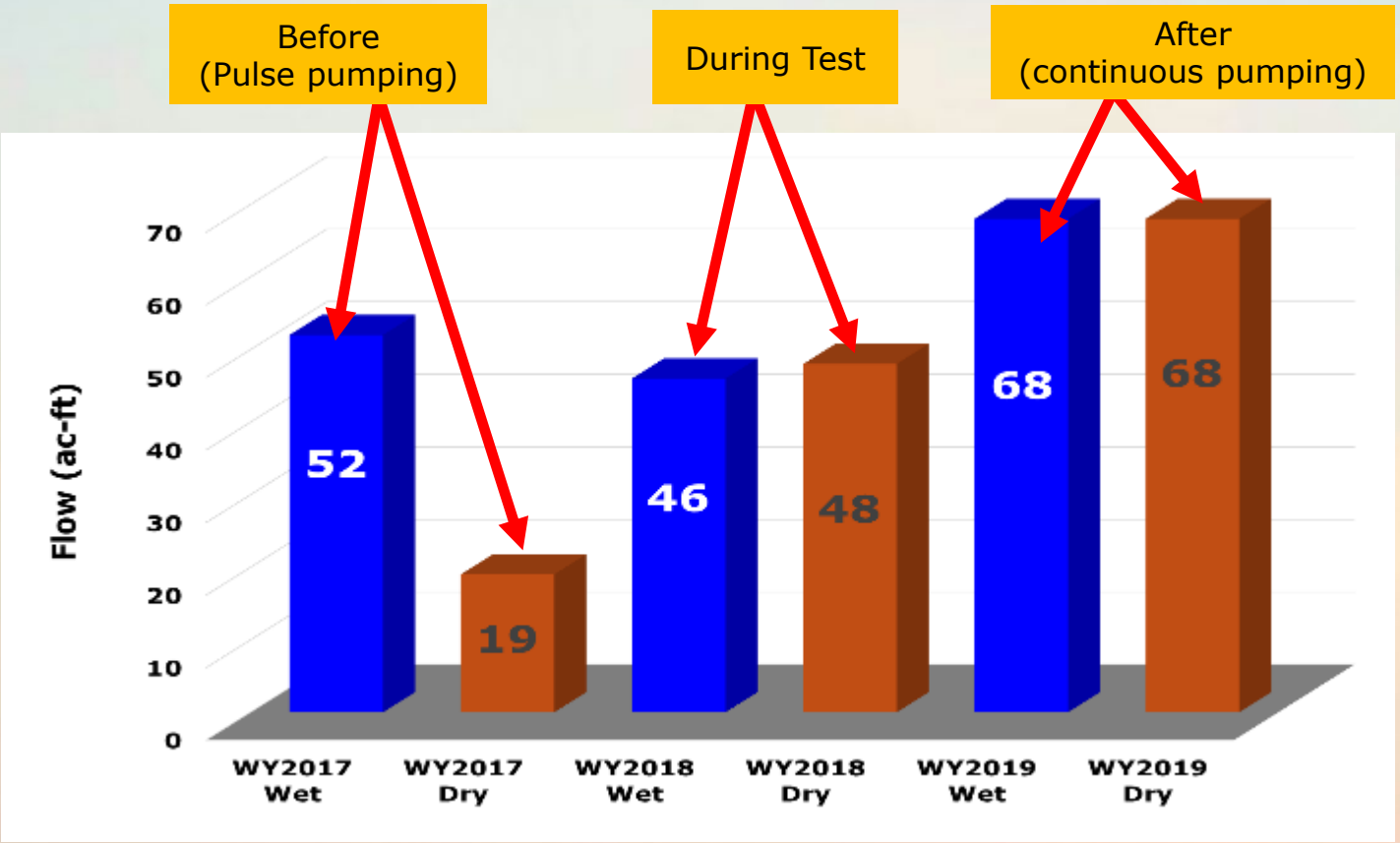
Biscayne Bay Coastal Wetlands Phase 1 Project
Deering Estate – Adaptive Management

- Redistributes freshwater to hydrate coastal wetlands & moderate nearshore salinities
- WY2017: Pump test compared pulse releases versus continuous pumping at rates of 25-100 cfs




Downstream of Deering Estate Pump Station Spreader

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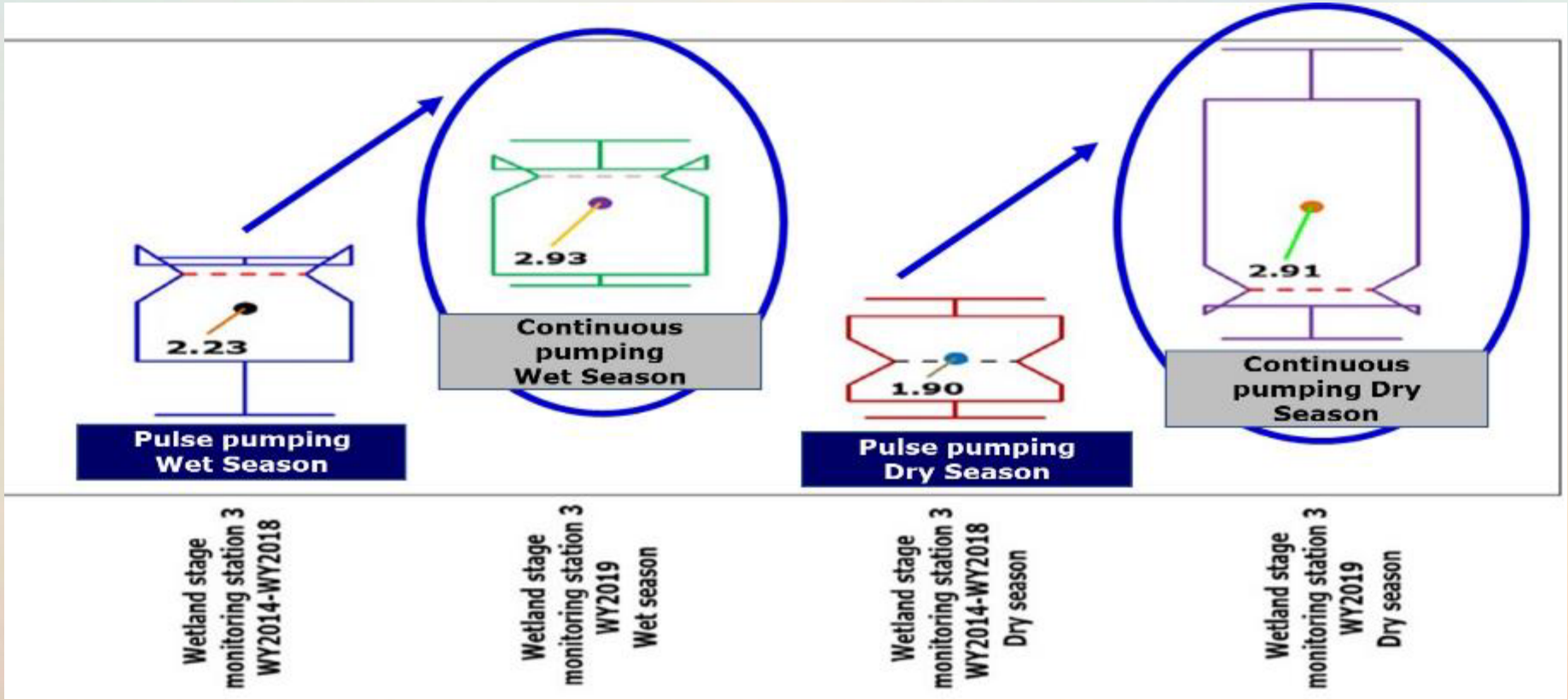
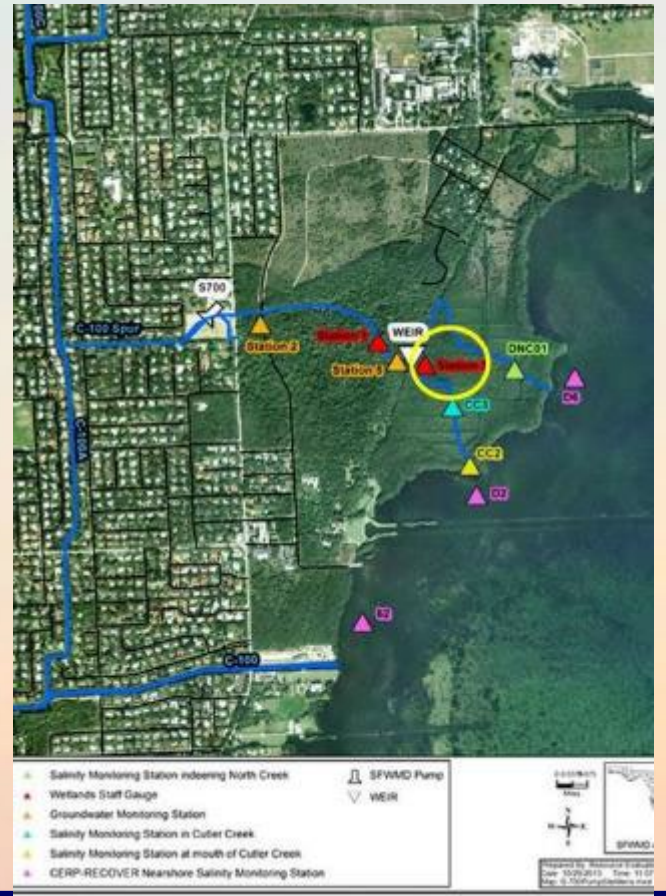
Biscayne Bay Coastal Wetlands Phase 1 Project
Deering Estate - Stage

- **WY2019: S-700 pump station modified from pulse releases to daily continuous pumping at ≥ 25 cfs**

  - ✓ **Result: Increase of 0.7 ft in Wet season and 1.0 ft in Dry season**





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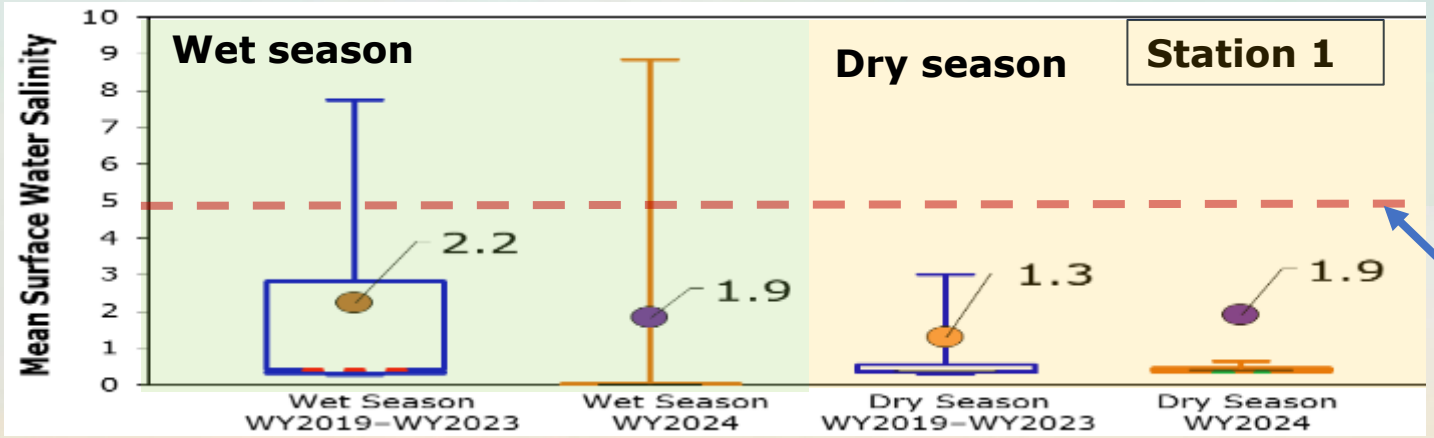
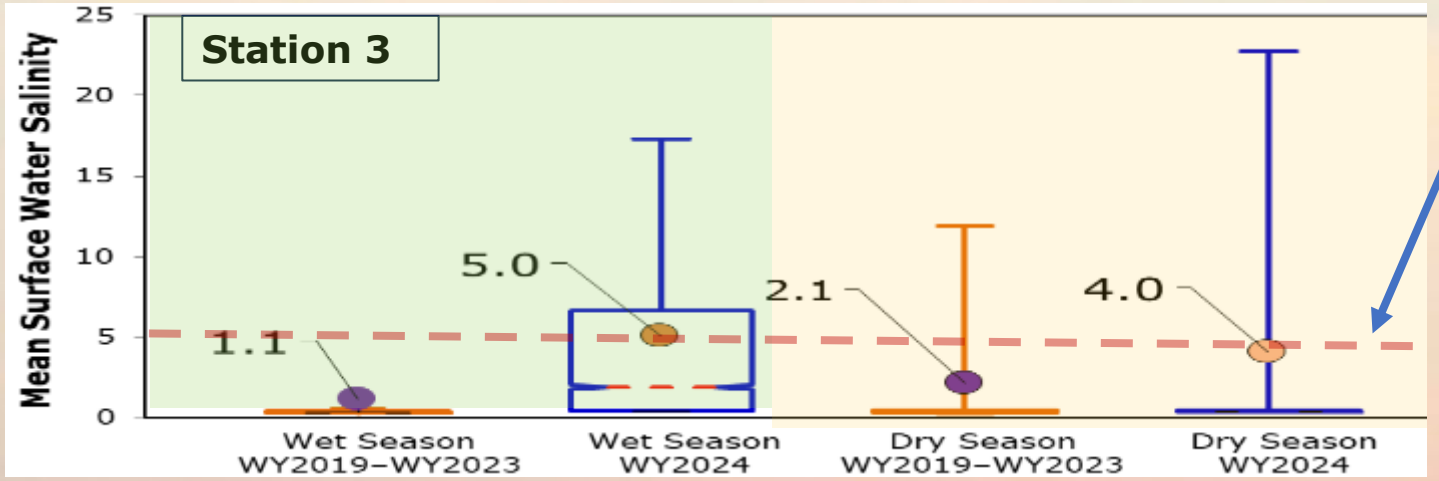
Biscayne Bay Coastal Wetlands Phase 1 Project
Deering Estate – Wetlands Surface Water Salinity

✓Result: Surface water salinity in coastal wetlands

- Overall, salinity in WY2024 wet and dry seasons at both monitoring stations did not exceed 5, a project restoration performance target.



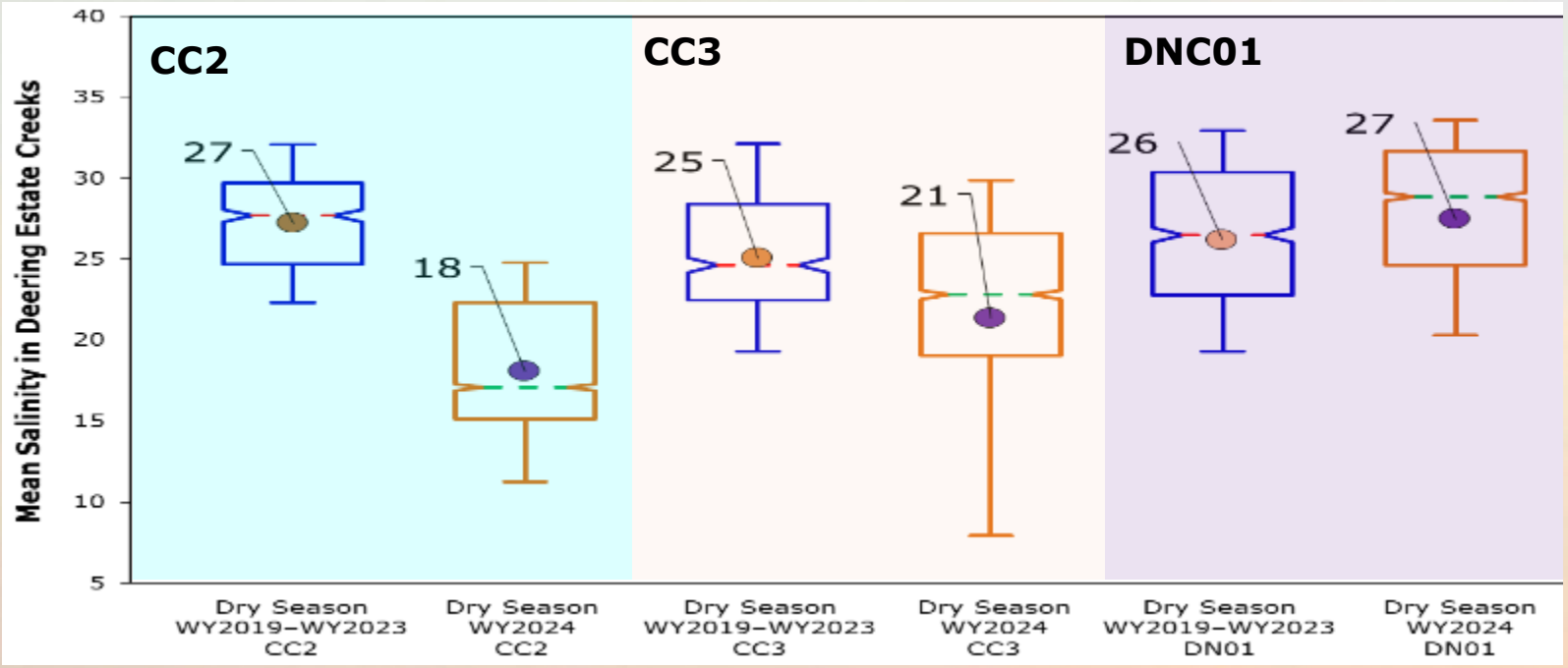


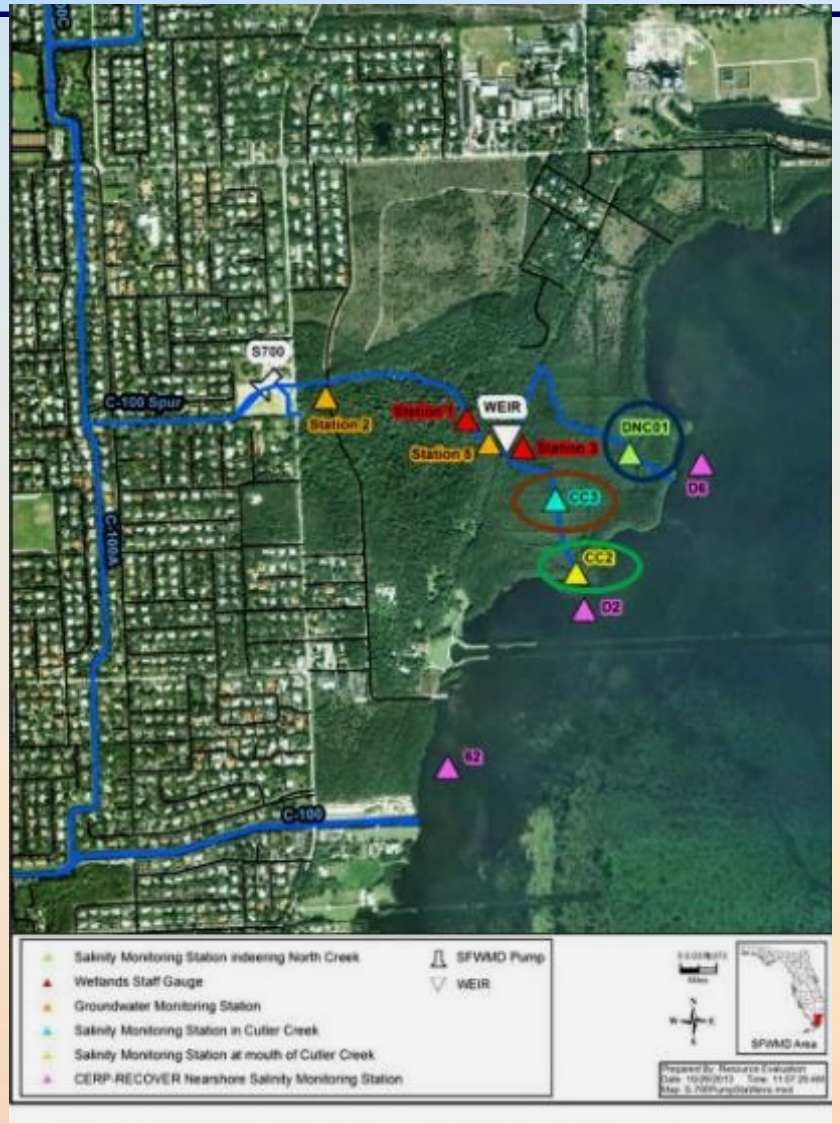
Project restoration performance target

Biscayne Bay Coastal Wetlands Phase 1 Project
Deering Estate – Deering Estate Creeks Salinity

✓ Result: Surface water salinity in Deering Estate Creeks

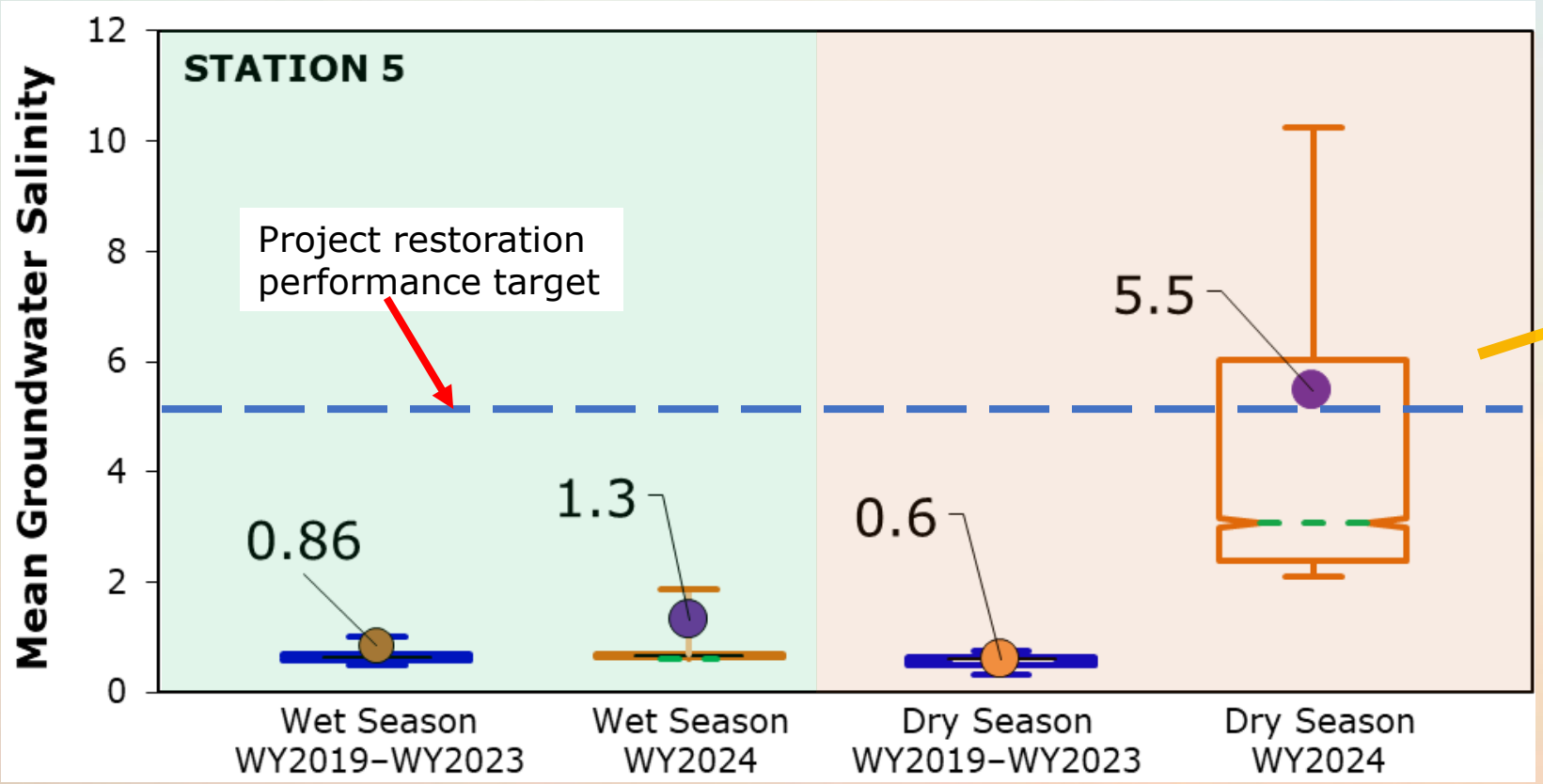
- Overall, in WY2024, salinity concentrations in Deering Estate Flow-way creeks improved in wet and dry seasons and in North Creek were slightly higher compared to WY2019–WY2023.

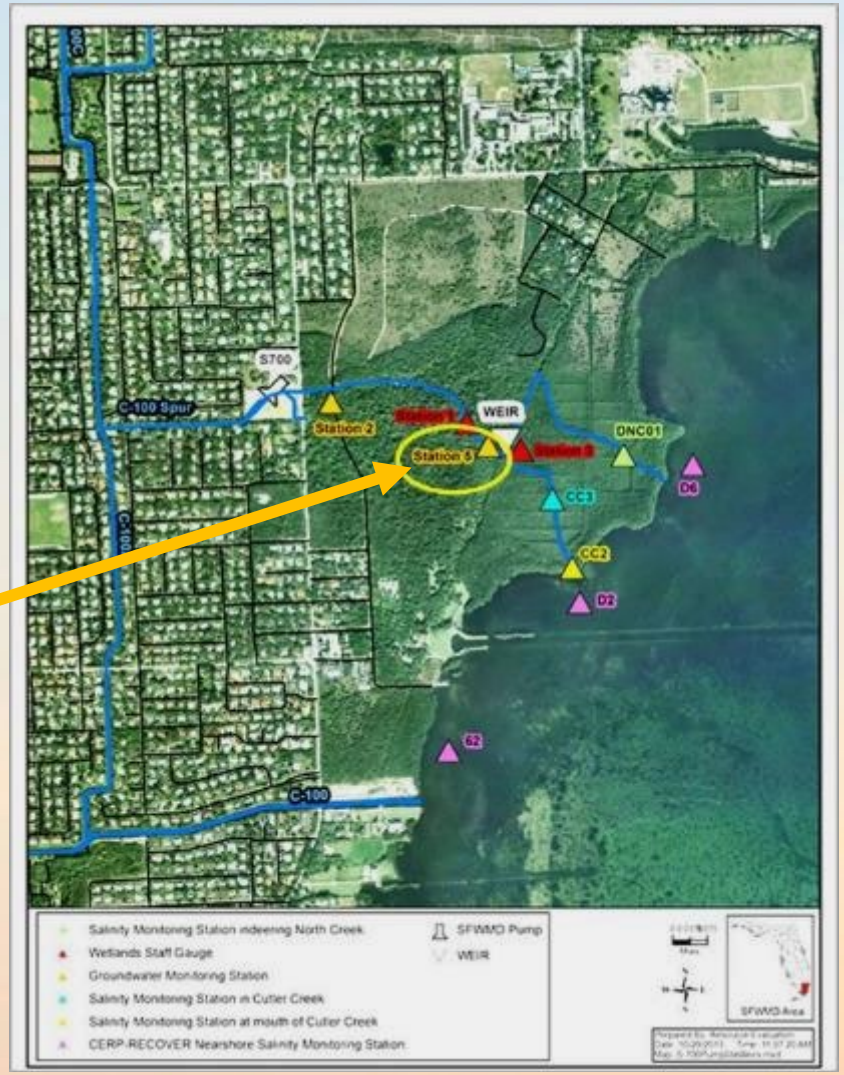




Biscayne Bay Coastal Wetlands Phase 1 Project
Deering Estate –Groundwater Salinity

- Mean groundwater salinity values at station 5 in the wet and dry seasons of WY2024 were higher than in WY2019–WY2023.





Monitoring stations within Deering Estate and associated nearshore stations

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Biscayne Bay Coastal Wetlands Phase 1 Project
Deering Estate – Vegetation Response

✓ **Results:**

- **Sawgrass began to establish naturally in the slough**
- **State-endangered ferns increased in abundance in both hammock plots**
- **Native species richness largely increased in upland hammock sites**

Rare ferns stable/increasing

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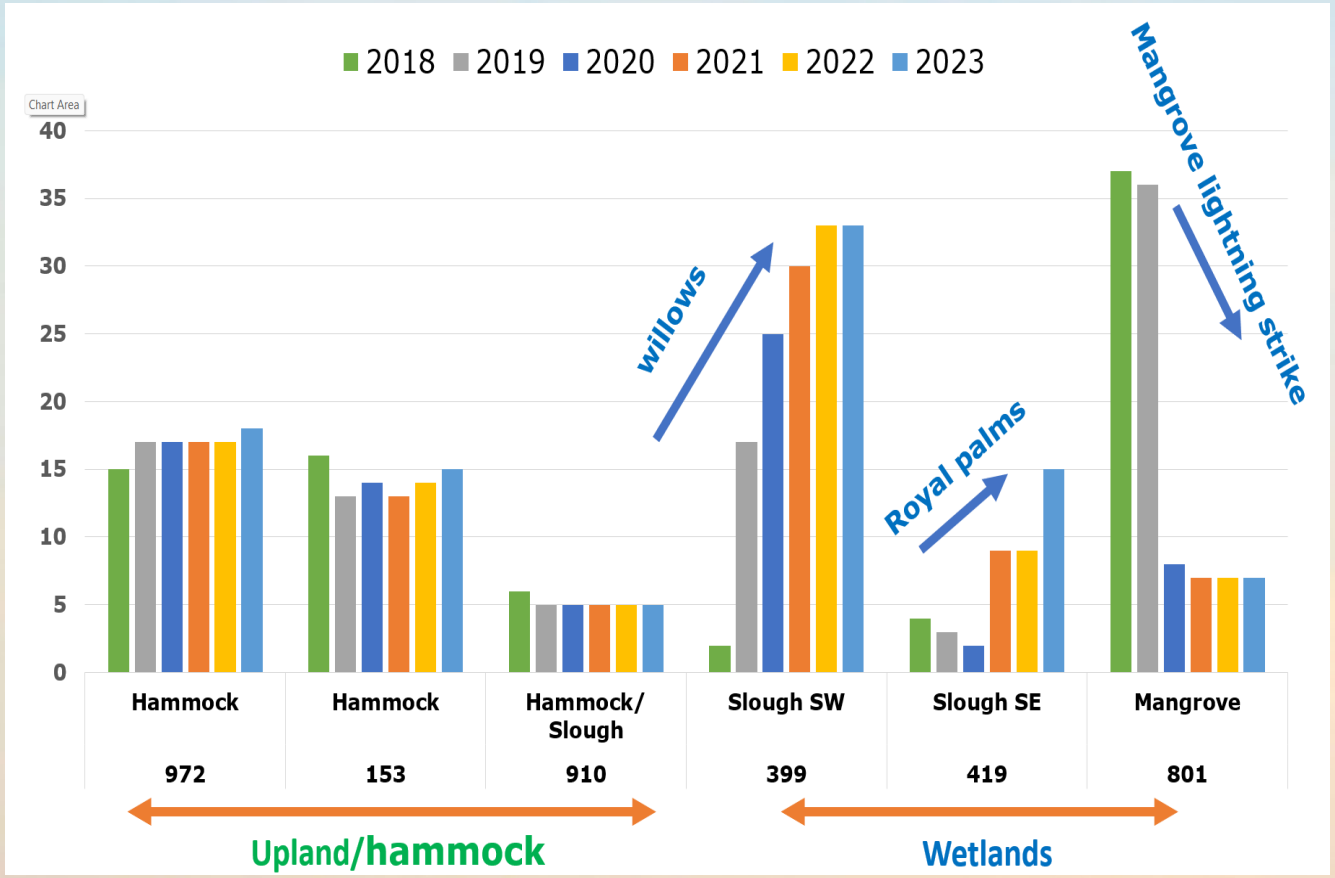
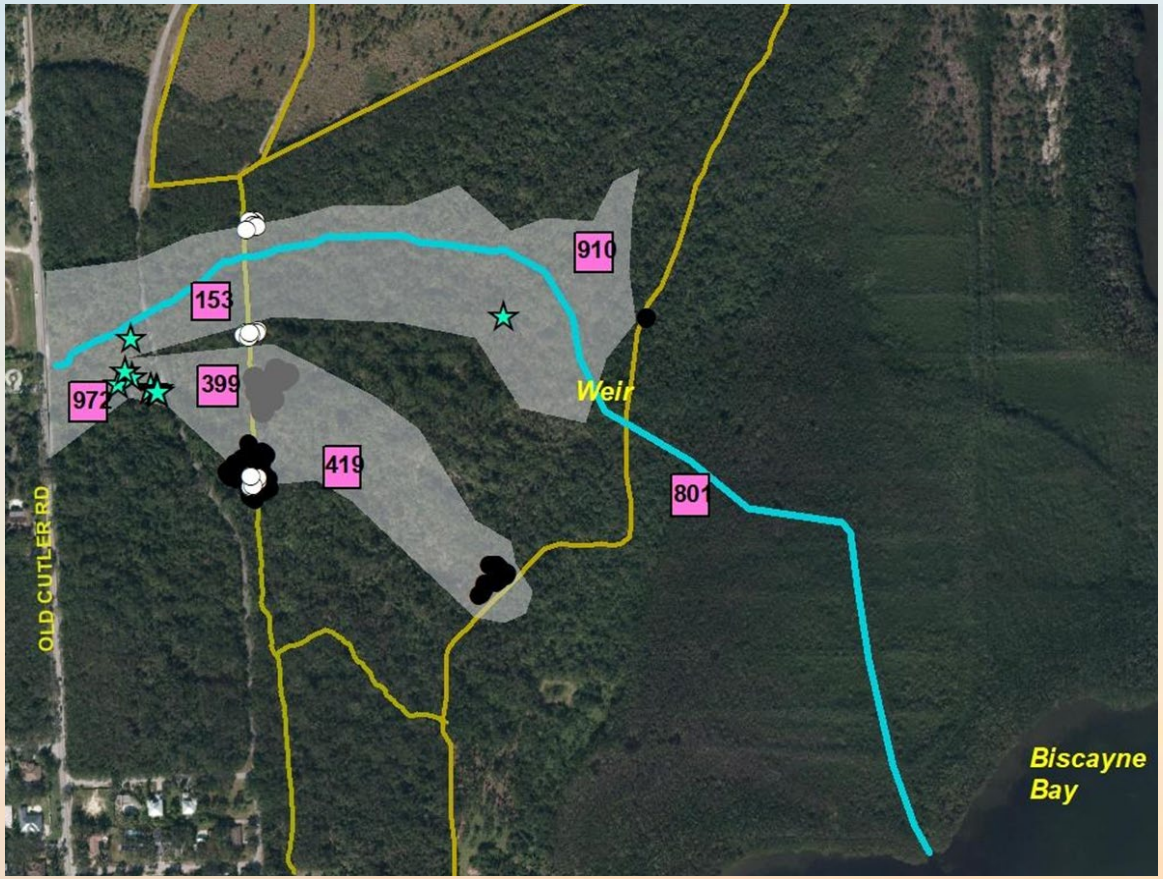
Biscayne Bay Coastal Wetlands Phase 1 Project
Deering Estate – Vegetation Response

❑ **Return of sawgrass in 2017**





Number of trees in each plot over 6 years

❑ **Several freshwater plants are recruiting. In 2022, first occurrence in a research plot (#399)**

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Biscayne Bay Coastal Wetlands Phase 1 Project
Deering Estate

- Critically endangered small tooth Sawfish in Deering Estate shoreline

- Increase in population of starfish nearshore of Deering Estate Component

- Additional freshwater from Deering Estate is linked to the observation of an offshore freshwater spring in Biscayne Bay

- Prescribed fire to control invasive plant species and expansion sawgrass, and improving habitat in Deering Estate component -December 2023

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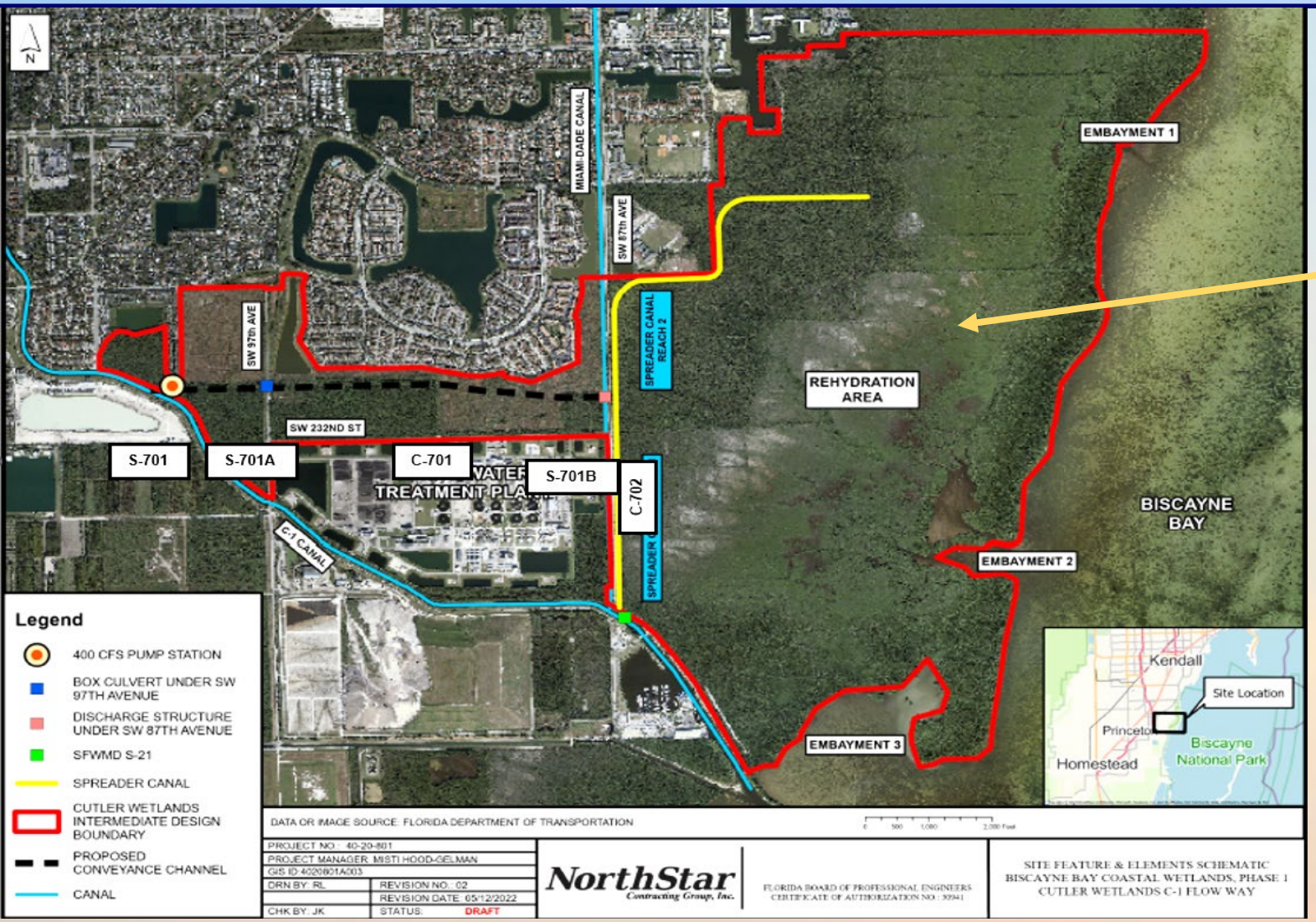
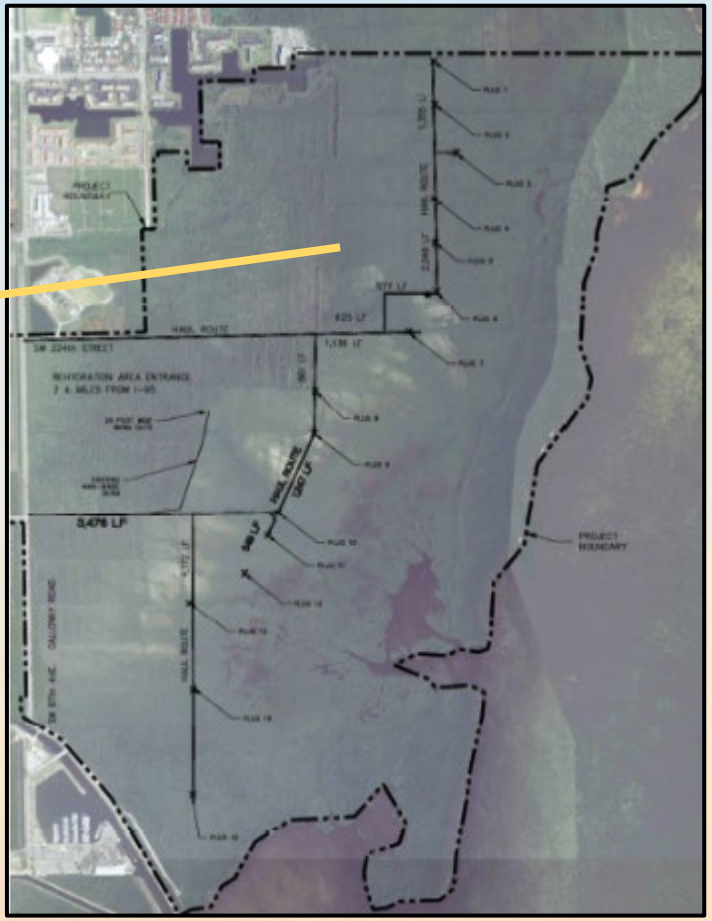
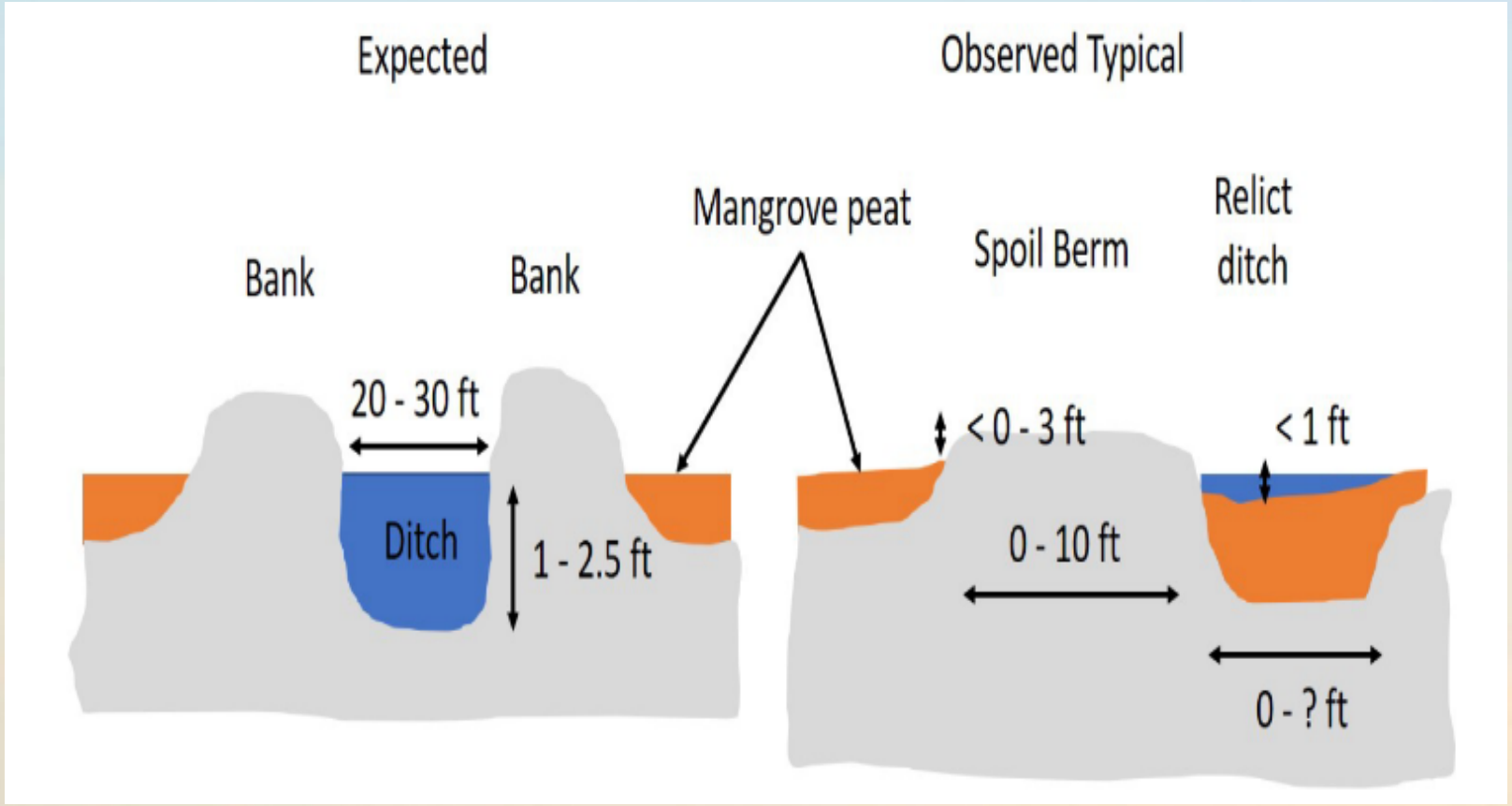
BBCW Cutler Coastal Wetlands Flow way Site Investigation Improve Flows

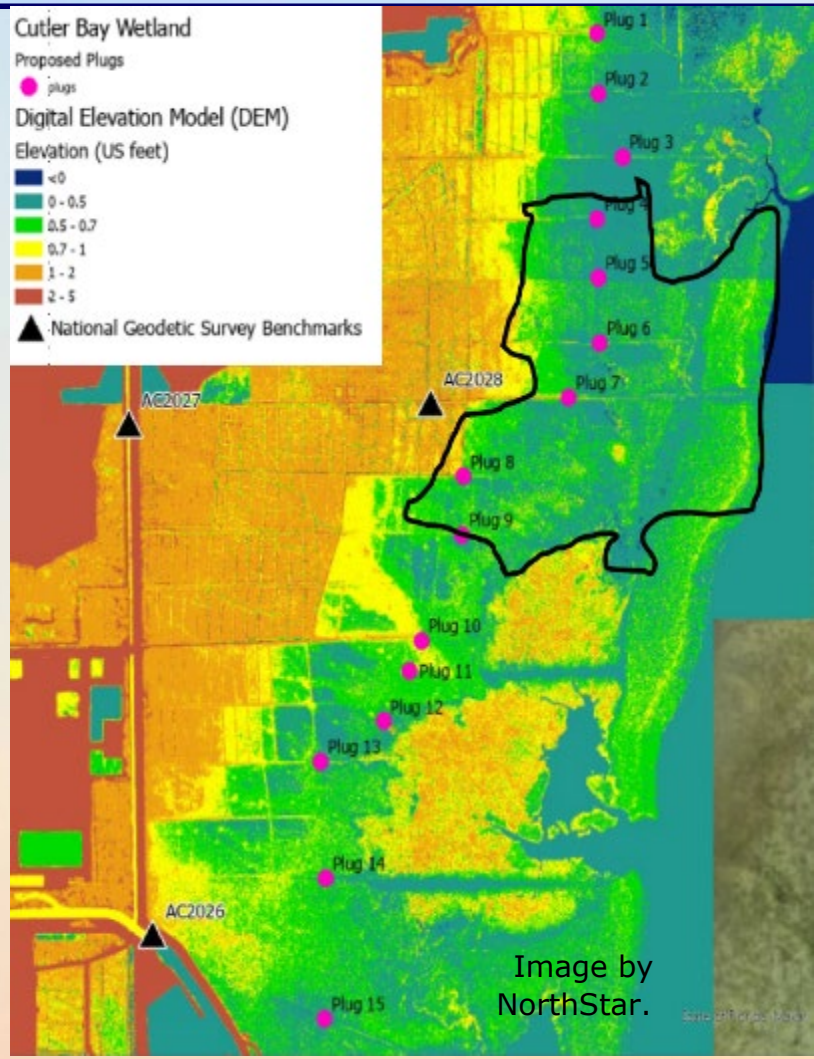




- Evaluate proposed ditch plug locations (15)
- Site Reconnaissance
- Elevation Cross-sections

BBCW Cutler Coastal Wetlands Flow way Expected vs. Observed Relief





- ✓ Left-expected local relief to be encountered along west to east diches.
- ✓ Right-Observed relief typically encountered.

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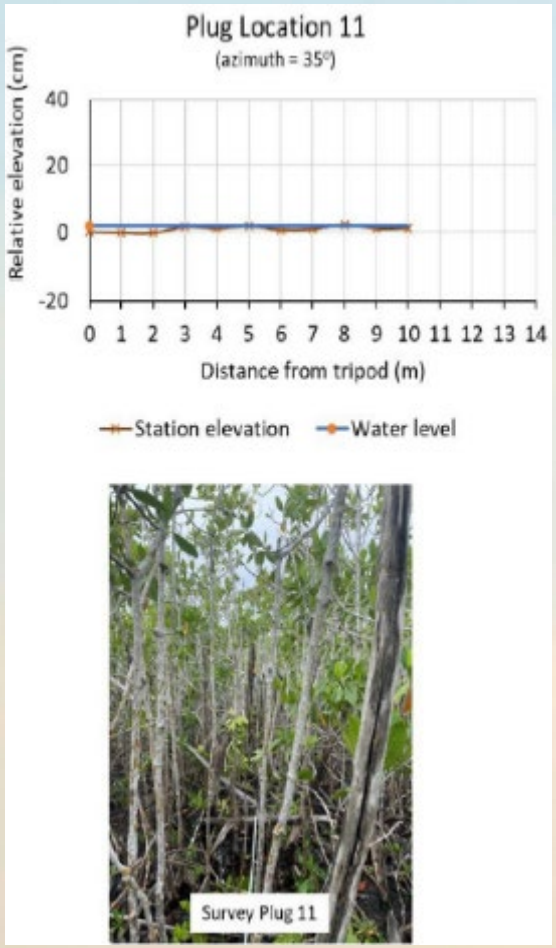
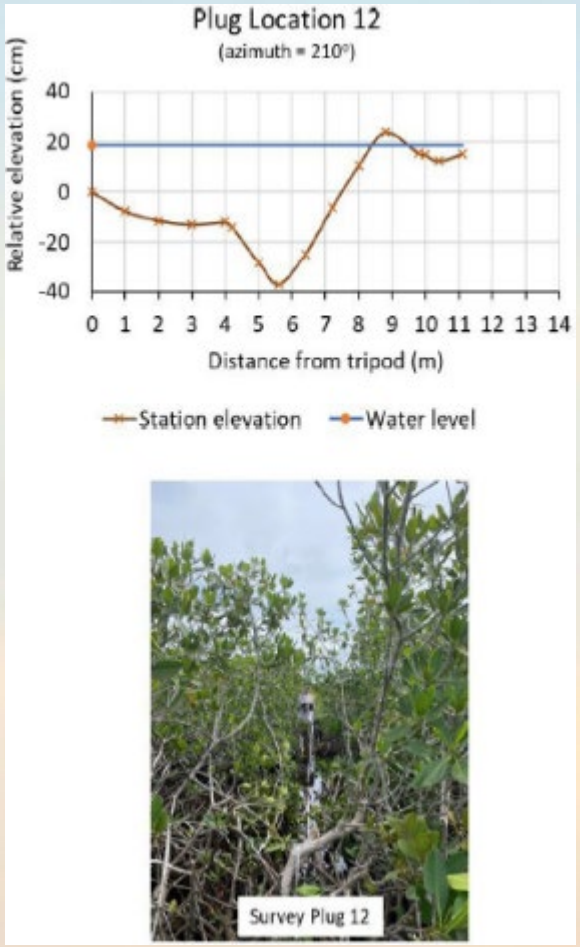
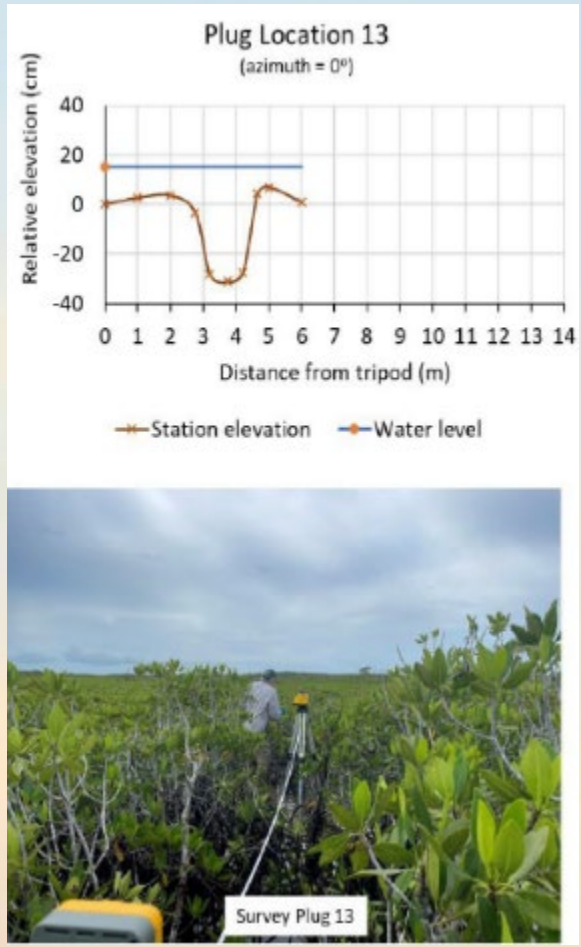
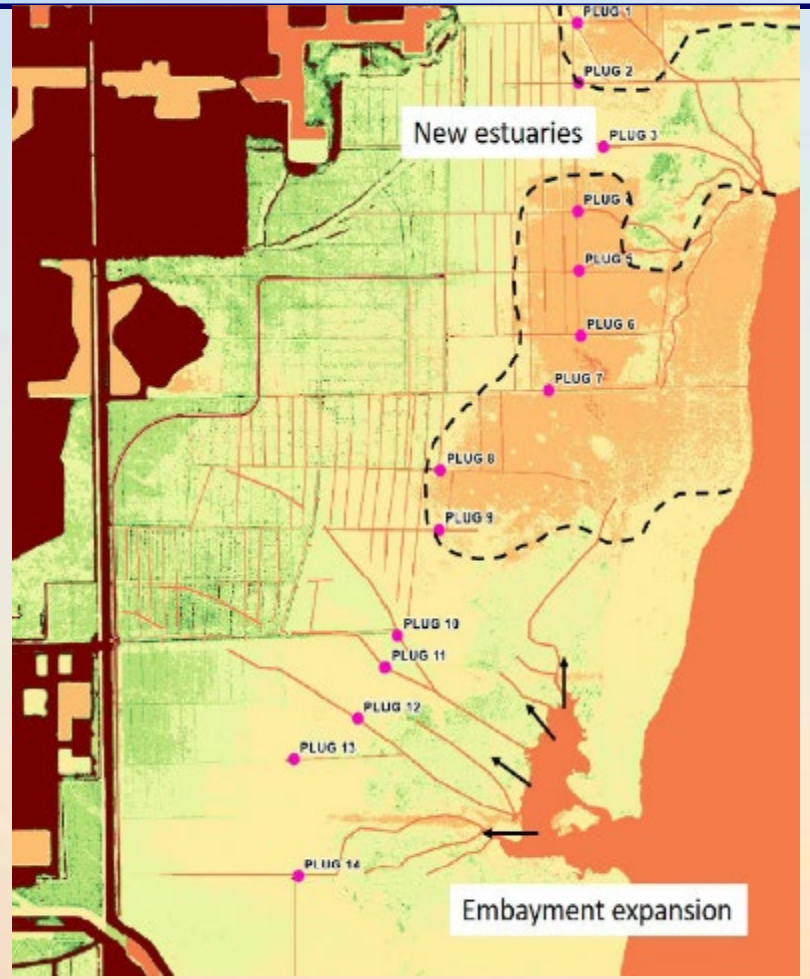
BBCW Cutler Coastal Wetlands Flow way Elevation Profiles









Expected response of project area to sea level rise and no pumping. New estuaries are anticipated to form in low-lying areas adjacent to the Bay. Existing embayments will expand inland. DEM image by NorthStar.

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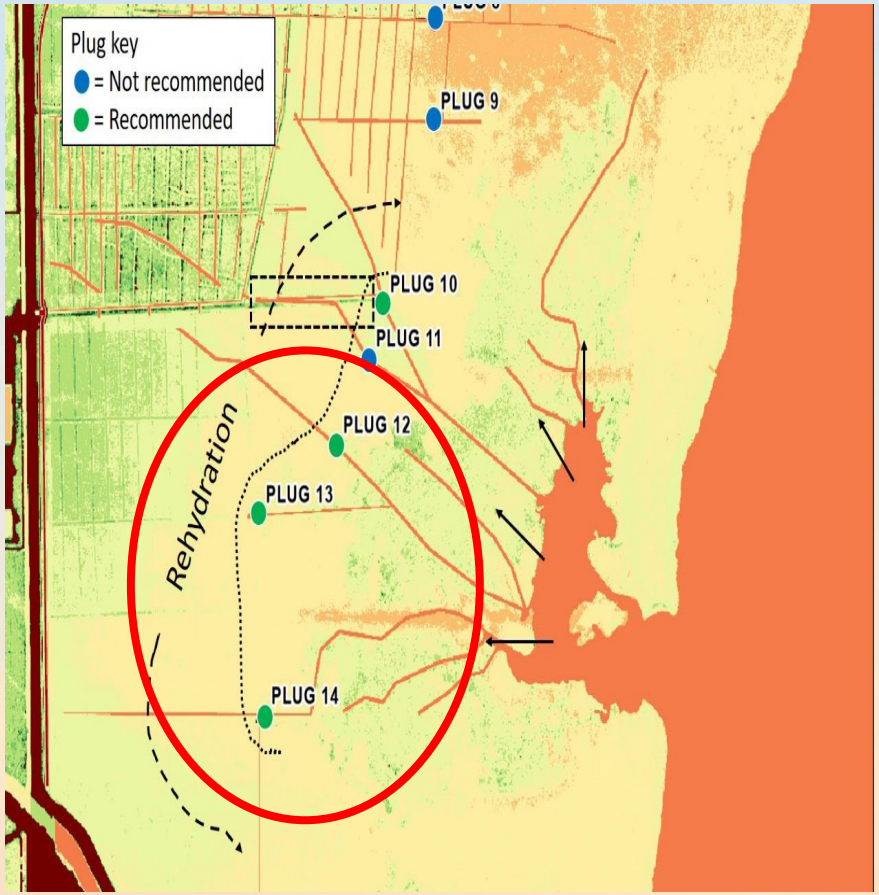
BBCW Cutler Coastal Wetlands Flow way Plug Installation

- **Plug Recommendations:**
  - Install Plugs 12 - 14
  - Remove segment of road/berm leading to Plug 10
- **SFWMD & USACE Decision:**
  - Evaluate need for Plugs 12 – 14 post-construction as adaptive management measure.
  - Install berm gaps during construction.



- Removal of road/berm segment (dashed line box) is recommended to facilitate sheet flow into and through the rehydration zone.
- Installation of plugs at 12 – 14 will reduce channelized flow and promote the formation of a wetland rehydration zone. image by NorthStar.

Mangrove Terrapin in Deering Estate Coastal Wetlands