REstoration, COordination, VERification (RECOVER)

Where Do We Go From Here?

System-Wide Synthesis and Uncertainties for Everglades Restoration

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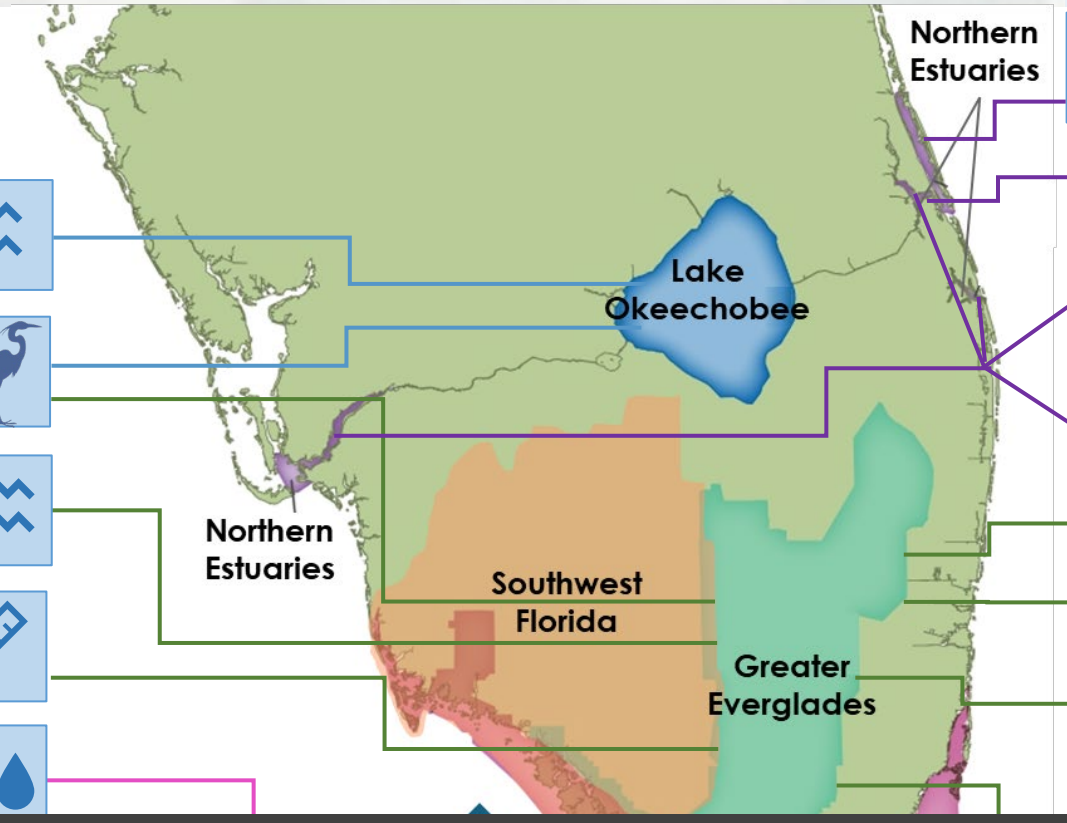
GEER April 22, 2025

Restoration, **Co**ordination, **Ver**ification

- **Interdisciplinary collaboration** of agencies, tribes, and institutions
- Conducts scientific and technical **evaluations** and **assessments** to improve the Comprehensive Everglades Restoration Plan's (CERP) ability to restore the south Florida ecosystem while providing for the region's other water-related needs
- Technical support to CERP with a **system-wide** and **integrative perspective**

MONITORING FOR CERP IS **SYSTEM-WIDE**



Lake Okeechobee **Benthic Invertebrates**

Wading Bird Colony Size, Location, & Timing

Landscape Pattern Ridge, Slough & Tree Island Mosaics

Everglades Depth Estimator Network (EDEN)

Hydrodynamic & Salinity Characteristics of Rivers & Estuaries

Coo

Mar
Refu

Juve

Fish
(**Seagrass** monitoring)

Benthic Infauna Monitoring & DNA barcoding SLE, IRL

Fish Telemetry and Health in SLE

Adult and Larval Oyster Monitoring CRE, SLE, LRE

SAV monitoring & mapping CRE & SLE & Southern IRL

Aquatic Fauna & Primary Production

Dry Season Prey Trophic Concentrations

Tree Island Condition WCA 3A & Southern Everglades

Alligator Status as a System Wide
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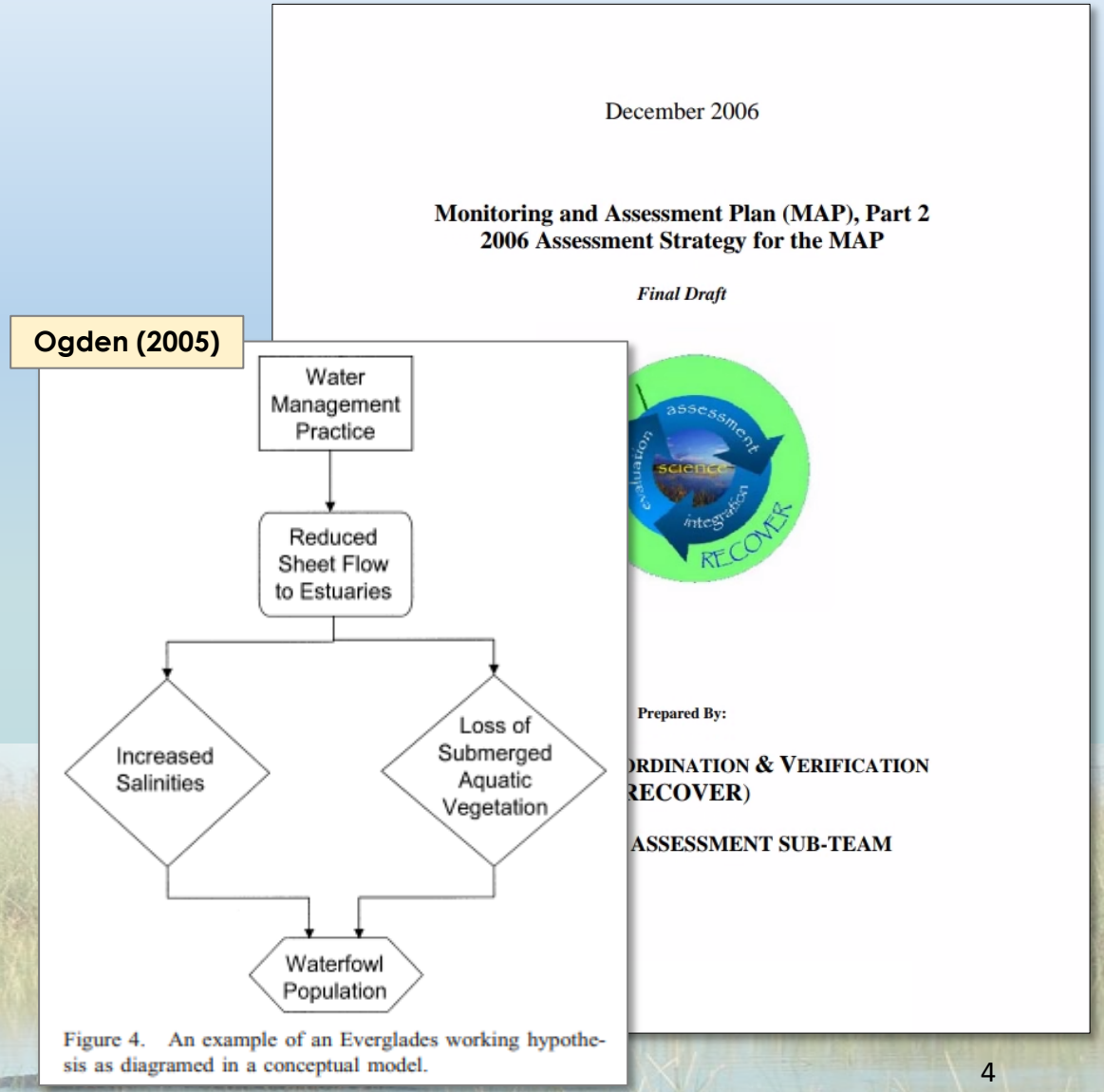
"*"**How do we want to characterize 'system wide' success?'** To do this requires identifying those physical, chemical, and ecological attributes that are critical to **measuring restoration success at the system level**" –* MAP 2006 Part B

SYSTEM-WIDE ASSESSMENT

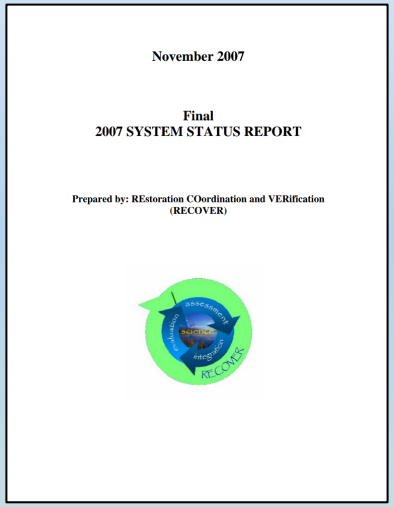
2006 MAP PART B, ASSESSMENT STRATEGY

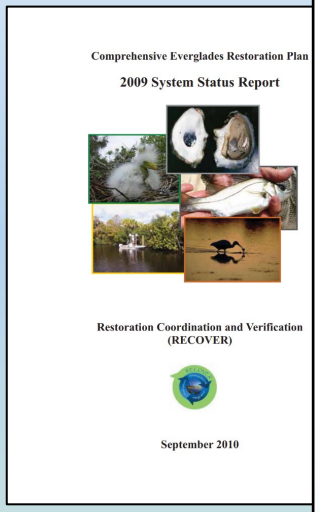
- **Section 7: System-Wide Performance Assessment**
  - *"…this Guidance outlines a reporting structure that is **hierarchal** in scale and integration culminating in a **system-wide synthesis**."*
    - ➢ Indicator → Module → System-Wide
    - ➢ Points of interface among modules
- **Section 8.3: Reporting Framework & Guidelines**
  - Link observations to ***hypotheses***

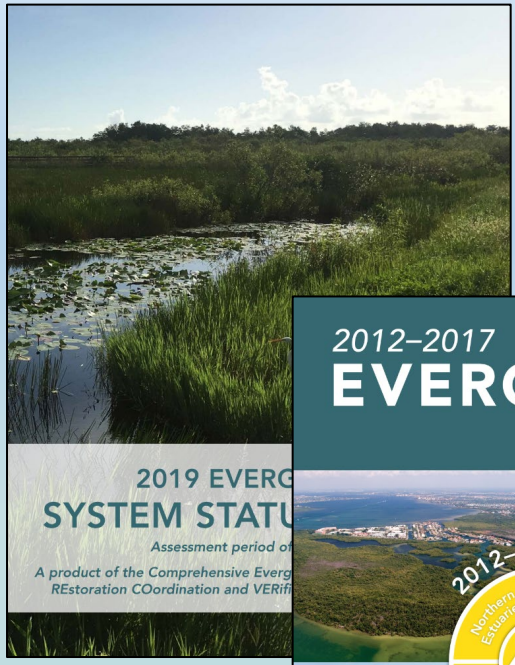


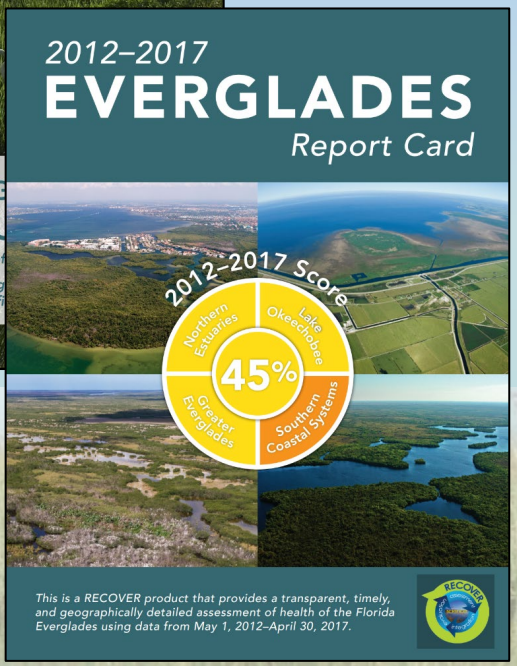
System Status Reports

- **System Status Re** 2014, 2019









2024 System Status Report

GREATER EVERGLADES | RIDGE AND SLOUGH PATTERN — RECOVER STATUS: FAIR

I) IMPORTANCE OF INDICATOR

- The ridge and slough landscape provides important habitat for diverse assemblages of plants and animals. It is the center of primary and secondary production and supports higher trophic consumers, such as wading birds and alligators.
- The ridge and slough landscape responds to changes in hydrology resulting from restoration efforts that im hydrological conditions, including the water quantity, quality, timing, and distribution across the ecosystem
- The desired restoration condition of the ridge and slough pattern includes linearly oriented ridges and slou water flow, with distinct microtopography and vegetation communities, and an elevation difference of at le and slough

Images: Aerial imagery of Water Conservation Area (WCA) 3A where the ridge-and-slough landscape showing distinct linear features orientated in water flow direction, and (right) degraded, lacking micro directional orientation of ridges and sloughs (Photo credits: Images by Christopher McVoy and SFWM (https://doi.org/10.17226/13422).

II) MODEL EXPECTATIONS OF PROGRESS TOWARDS INTERIM GOALS

- The Interim Goal for the 2026 increment used a ridge and slough stability index and predicted that slough sta (become more stable, increase pattern persistence) in WCA2A and Everglades National Park (ENP) but woul WCA3. As a result, ridge stability would increase in WCA3B, southern WCA3A but would become less stab Ridge stability in northern WCA3A was expected to stay the same.[3]

III) REAL WORLD STATUS AND TRENDS

- There was a minor improvement in ridge and slough pattern condition from the Baseline Period to the Repor overall condition varies among regions, from a degraded condition in northern WCA3A and WCA3B to a co WCA3A.
- From the Baseline Period to the Reporting Period, microtopographic variability at the systemwide level incre lowest and highest variability occurring in northern WCA3A (WCA3AN) and southern WCA3A (WCA3AS). Higher variability indicates distinct microtopography, which is desirable.
- From the Baseline Period to the Reporting Period, systemwide mean vegetation community distinctness incr community distinctness is a measure of segregation of species composition among ridge and slough patches community distinctness is desirable.
- There was no difference in systemwide mean ridge and slough elevation difference or the correlation betwee composition and water depth (Mantel-r) from the Baseline to the Reporting Period.

Table 1. Ridge and slough status during the Baseline Period (Water Year (WY) 2011-WY2017), Reporting and WY2024. The last column shows the change in status from the Baseline to the Reporting Period.

Indicator	Baseline Period	Reporting Period	Current Status (WY2024)
Ridge and Slough Pattern	Poor	Fair	Fair

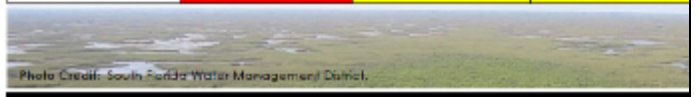


Photo Credit: South Florida Water Management District.

SEPTEMBER 2024

GREATER EVERGLADES | REGIONAL SUMMARY — RECOVER STATUS: FAIR

I) OVERVIEW

- The Greater Everglades includes the Water Conservation Areas (WCAs) (including Arthur R. Marshall Loxahatchee National Wildlife Refuge), Everglades National Park (ENP), and eastern Big Cypress National Preserve (Figure 1).
- The landscape includes a peat-dominated system of ridges, sloughs, and tree islands, higher elevation prairies and pine rocklands with marl substrates, and some areas of cypress and other forested wetlands.
- Challenges include: loss of overall water volume within the landscape coupled with unnatural timing and distribution of flows, disruption of sheetflow due to the system of canals and levees, unnatural recession rates and excessive dry-downs below the soil surface, loss of peat soil, drowning of tree islands, elevated nutrients in inflowing water and legacy nutrients within and near canals and structures, and system-altering invasive species.

Figure 1. Sub-regions within the Greater Everglades

II) KEY TAKEAWAYS

- Monitoring data for Greater Everglades indicators are consistent with expectations from the 2026 increment of Interim Goals (i.e., little to no change)[3] (Table 1). Little change was expected within the Greater Everglades region by 2026 because few projects were expected to be implemented (Figure 2, Table 2).
- Hydrologic conditions improved in Shark River Slough (SRS) and flow improved in Taylor Slough (TS) during the Reporting Period, largely due to incremental testing and final implementation of the Combined Operational Plan.
- Low hydroperiods and water depths remain a concern in northern WCA3A, TS, and Lostmans Slough, and more water is need dry season (March – May). Conversely, higher than normal water levels remain a concern in southern WCA3A.
- Except for two years of record wading bird nesting, hydrologic improvements have not yet translated to significant ecologic re
- Invasive species, including Brazilian Pepper (*Schinus terebinthifolius*) and the Asian swamp eel (*Monopterus albus*), are impa islands and aquatic fauna, respectively, and are also causes of concern.

III) REAL WORLD STATUS AND TRENDS

Table 1. Status of Greater Everglades indicators during the Baseline Period (Water Year (WY) 2005-WY2017), Reporting P (WY2018-WY2024), and the most current data available (varies by indicator). The Change from Baseline column shows t in status from the Baseline Period to Reporting Period (up arrow for better, down arrow for worse, horizontal arrows for n Status for Apple Snail/Everglade snail kite and the Spatial Extent of Vegetation indicators are not available.

Indicator	Baseline Period	Reporting Period	Current Status	Change from Baseline Period	Progress Towards Interim Goa
Interim Goal Indicators					
Hydroperiod/Depth	POOR	POOR	FAIR	↑	Consistent with Interim Goal
Water Volume and Sheetflow	POOR	FAIR	FAIR	↑	Consistent with Interim Goal
Soil Oxidation	POOR	FAIR	GOOD	↑	Consistent with Interim Goal
Spatial Extent of Vegetation	N/A	N/A	N/A	-	Not enough information availa
Ridge and Slough Pattern	POOR	FAIR	FAIR	↑	Consistent with Interim Goal
Tree Island	FAIR	FAIR	FAIR	↔	Consistent with Interim Goal
Marl Prairie	FAIR	FAIR	FAIR	↓	Some areas consistent with Interim
Aquatic Fauna (wet season)	FAIR	FAIR	FAIR	↓	Consistent with Interim Goal
American Alligator	FAIR	FAIR	FAIR	↑	Consistent with Interim Goal
Wading Birds	POOR	FAIR	POOR	↑	Consistent with Interim Goal
Everglade Snail Kite	N/A	N/A	N/A	-	Not enough information availa
Non-Interim Goal Indicators					
Aquatic Fauna (dry season)	GOOD	FAIR	GOOD	↓	-
Periphyton	FAIR	FAIR	FAIR	↔	
Overall Region Status					
Greater Everglades	POOR	FAIR	FAIR	↑	Consistent with Interim Goal

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COMPREHENSIVE EVERGLADES RESTORATION PLAN | RECOVER

2024 SYSTEM STATUS REPORT

SYSTEM-WIDE SUMMARY

The System Status Report (SSR) is a REstoration, COordination, VERification (RECOVER) product that provides a transparent, timely, and geographically detailed assessment of the Florida Everglades. The 2024 SSR applies system-wide monitoring to assess progress of the Comprehensive Everglades Restoration Plan (CERP) and Interim Goals and Interim Targets (IGIT) for the period May 1, 2017 through April 30, 2024.

Key Messages

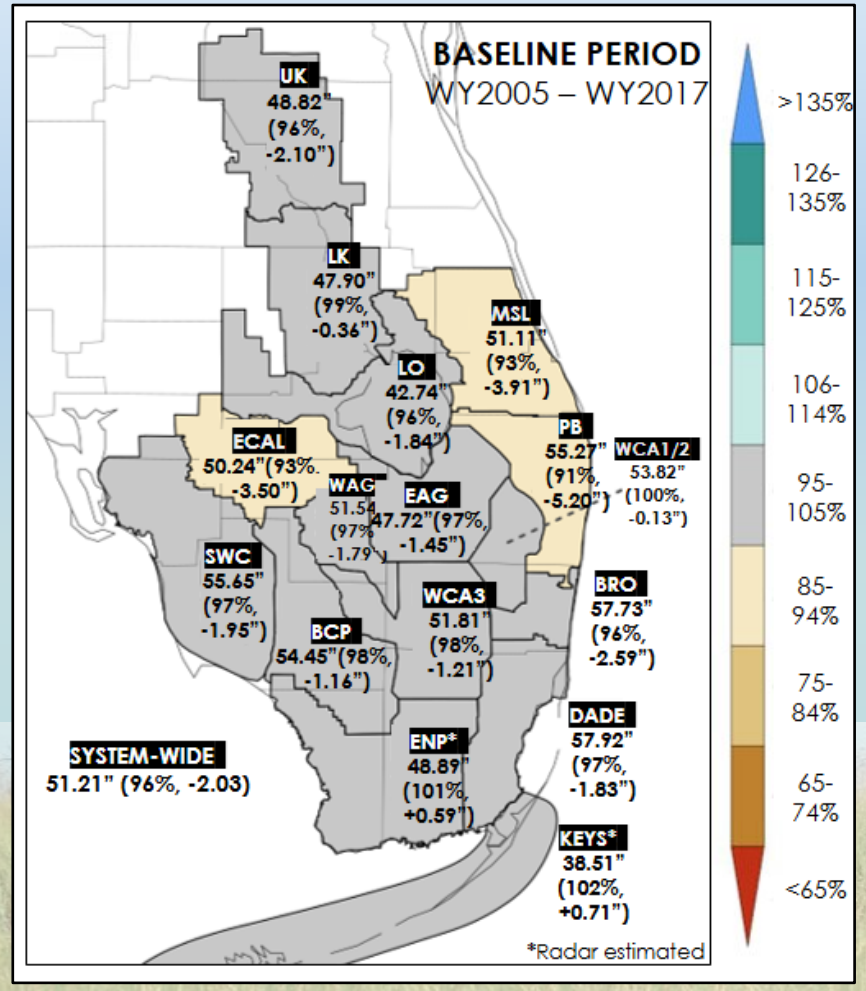
- While CERP construction and implementation is underway, modeling for most indicators expected little to no change in status for 2026. Most RECOVER regions and ecological indicators remain in an undesirable condition and will take time to improve even where hydrological benefits have been observed because of incremental project completion and updated operational plans. With the continued completion of projects, substantial improvements are expected across many indicators.
- Weather and changes in water management operations were the primary drivers of observed conditions in the Reporting Period (Water Years 2018 – 2024).
- CERP Projects need to be expedited to prevent further decline throughout the system. In the meantime, water managers should utilize allowable flexibility in operations to maximize benefits and minimize further declines.
- Continuous, system-wide monitoring is key to link hydrologic changes with indicator conditions across the Everglades. Failing to do so limits our ability to report on annual statuses, compare real world status and trends with model expectations of progress towards Interim Goals and Interim Targets, and provide a metric of restoration success.

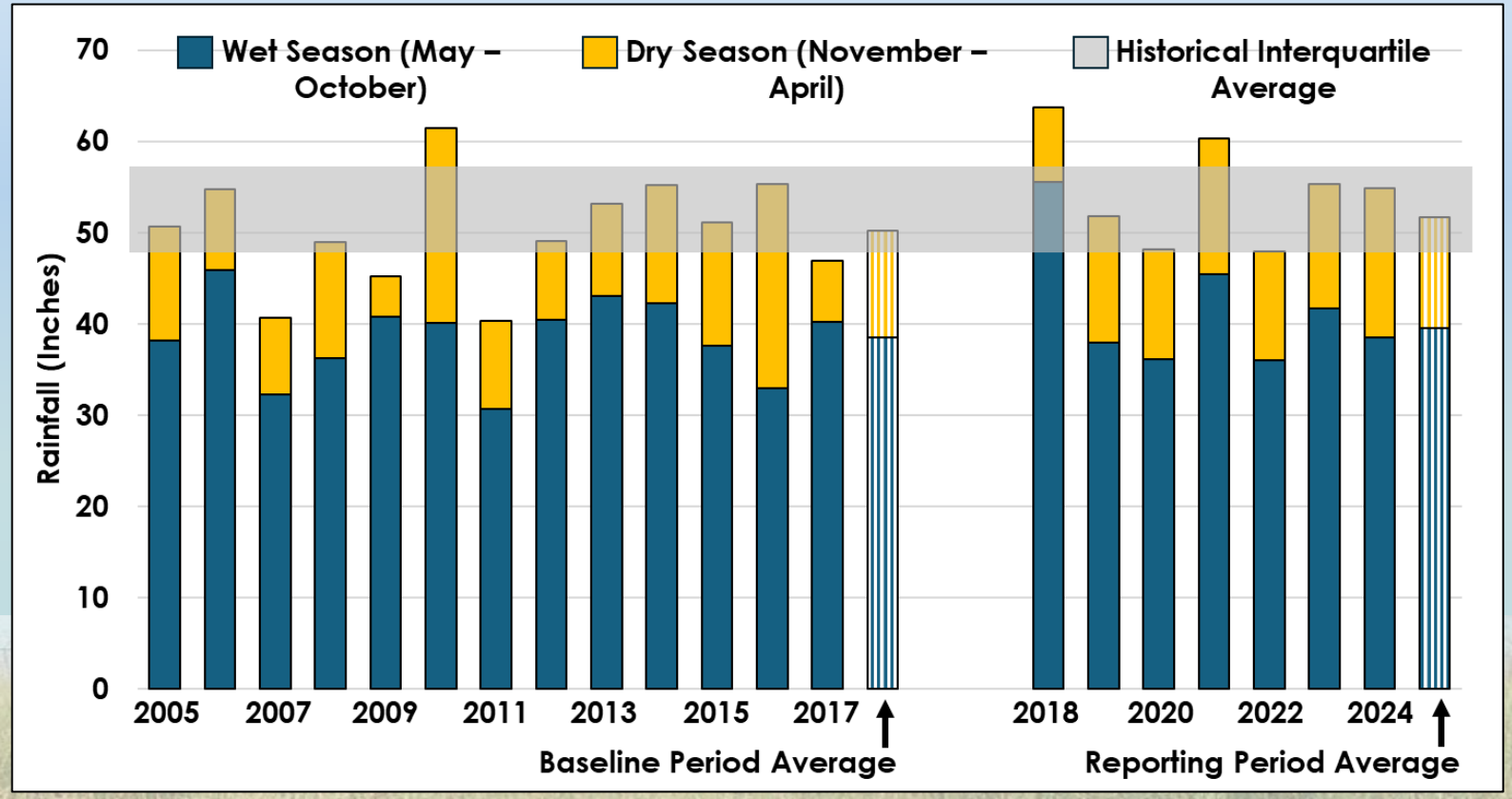
	Lake Okeechobee	Northern Estuaries	Greater Everglades	Southern Coastal Systems	Water Supply and Flood Protection
RECOVER Status (Water Year 2024)	POOR	POOR	FAIR	POOR	GOOD
Consistent with Expectations for 2026 IGIT?	Mixed	No	Yes	Mixed	Yes

OCTOBER 2024

Looking Ahead: Synthesis

- **Meteorologic Data**: Rainfall, climatological patterns, major storm events

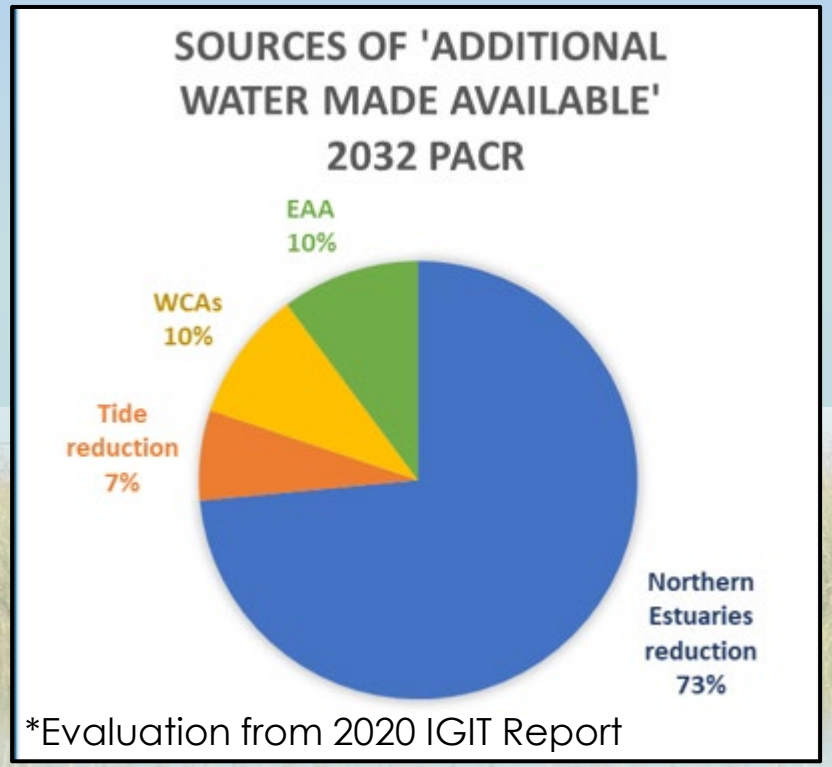




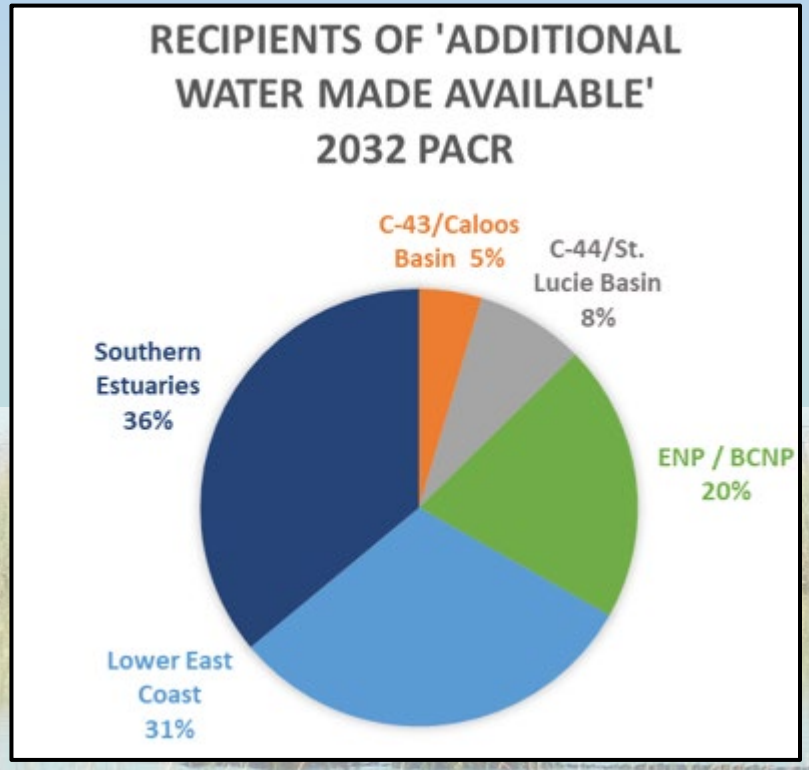
Looking Ahead: Synthesis

- **Meteorologic Data**: Rainfall, climatological patterns, major storm events
- **Hydrologic Data:** System-wide and regional change in hydrology
  - **System-Wide hydrological indicator:** Water Volume, AKA "Water Budget"

Water Volume - Water redirected and stored by CERP projects and where that additional water "made available" goes



*Evaluation from 2020 IGIT Report



Assessment protocol under development: data processing methodology by SFWMD

Looking Ahead: Synthesis

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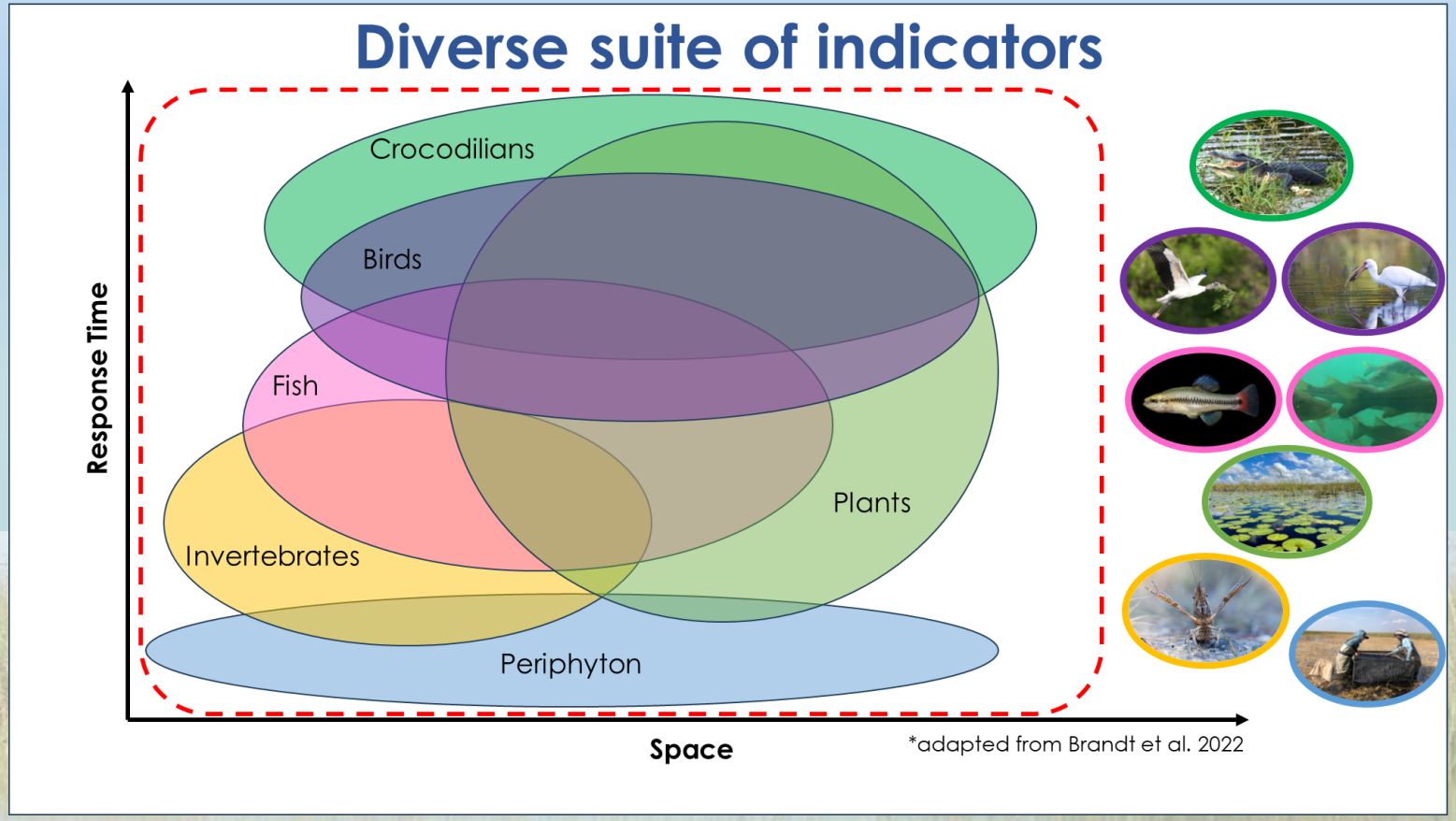
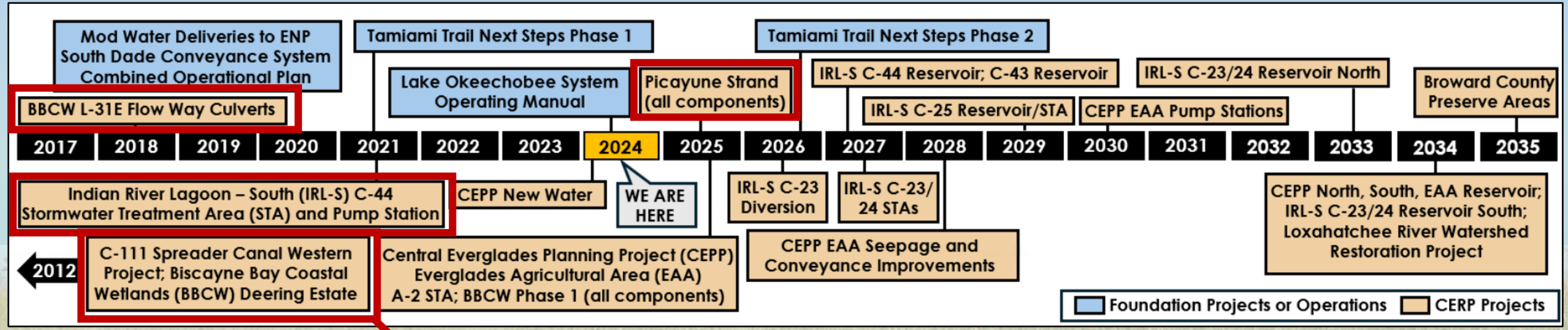
- **Ecological Monitoring Data**
  - RECOVER Monitoring and Assessment Plan
  - CERP project-level monitoring
  - External data



Uncertainties for Restoration

- **Timing of Project Implementation:** progress toward Interim Goals and Targets
  - Operational plan updates
  - Only partial implementation of 4 projects in 2024 SSR Reporting Period
  - Integrated Delivery Schedule (IDS) adjustments

(Timeline based on draft 2024 IDS; does not include projects in Planning)



Projects with partial implementation in 2024 SSR Reporting Period

Uncertainties for Restoration

- **Timing of Project Implementation:** progress toward Interim Goals and Targets
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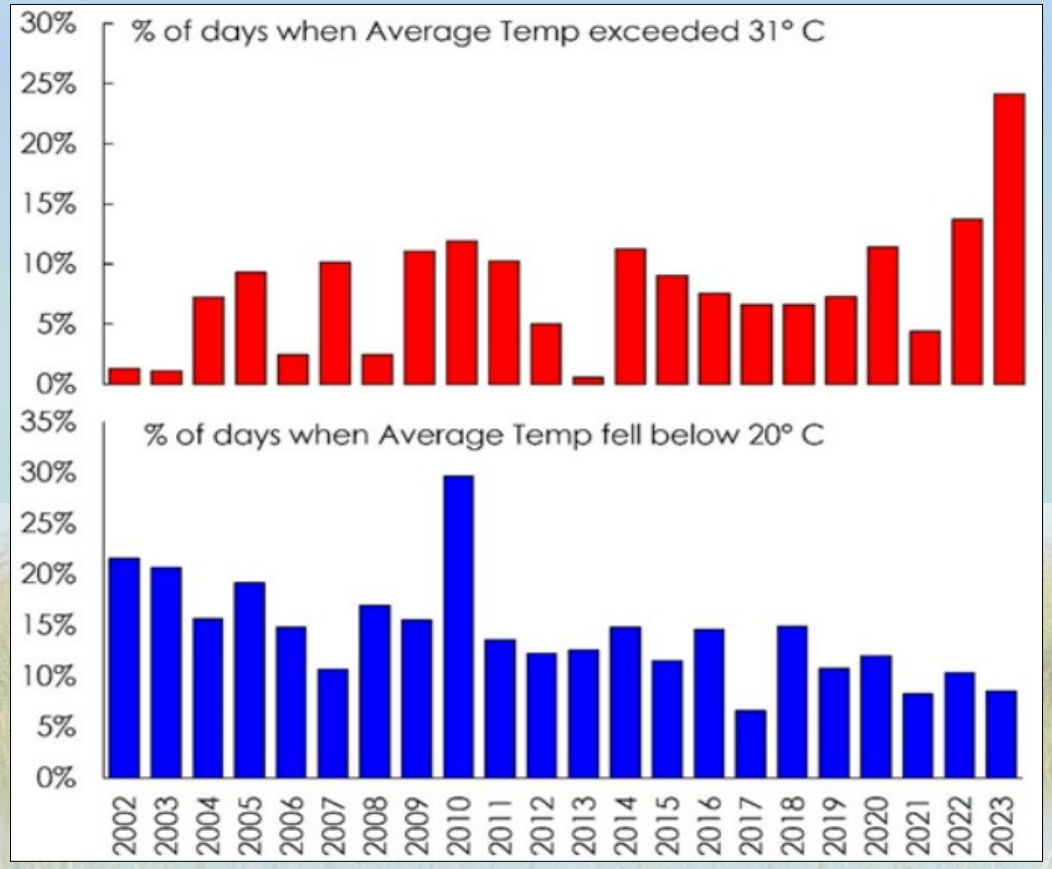

Warming Regional Temperatures in the Caloosahatchee Estuary:
Percent time water temps >31°C increased, temps <20°C decreased

(2024 SSR – Northern Estuaries: Oyster)

Uncertainties for Restoration

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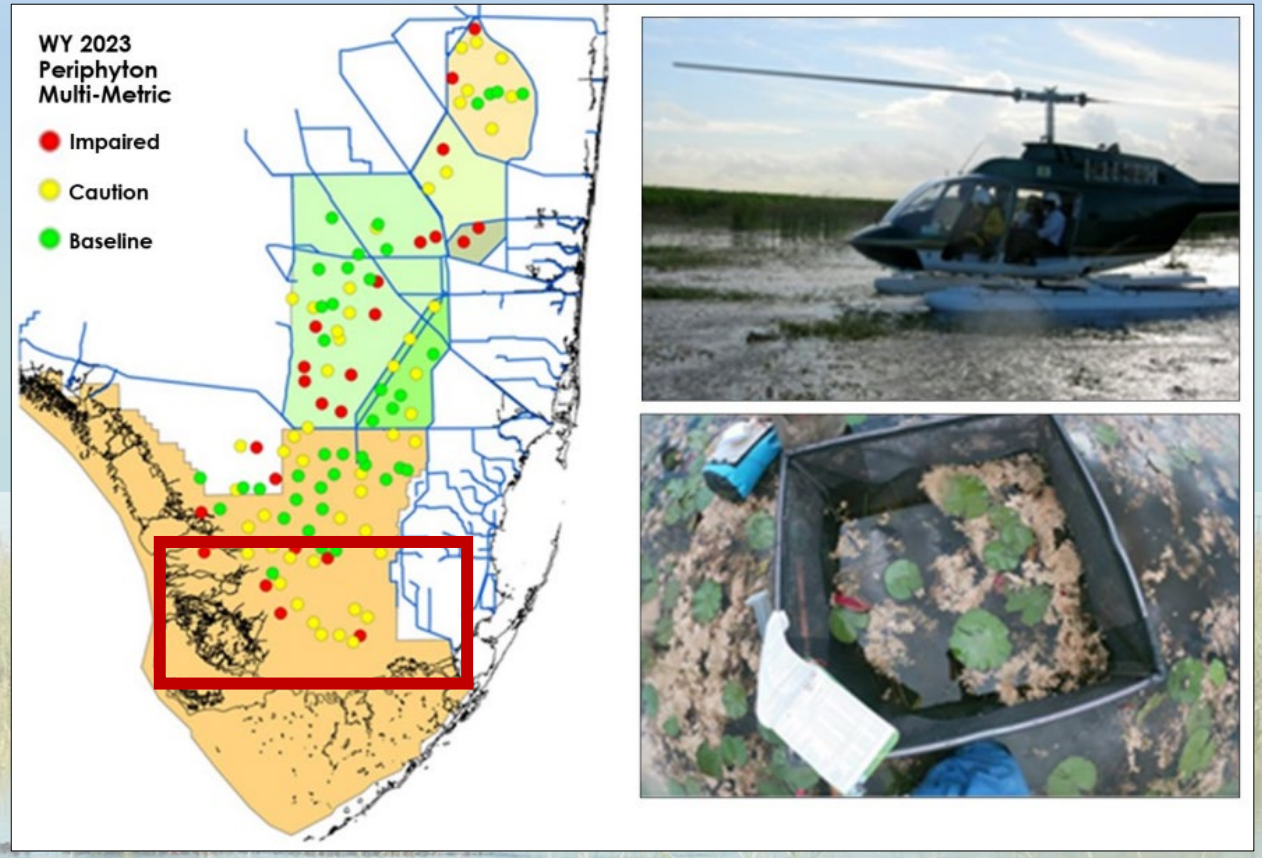
Saltwater intrusion in oligohaline ecotone: Marine-sourced phosphorus led to reduction of periphyton biomass and calcareous diatoms.

(2024 SSR – Greater Everglades: Periphyton)



Uncertainties for Restoration

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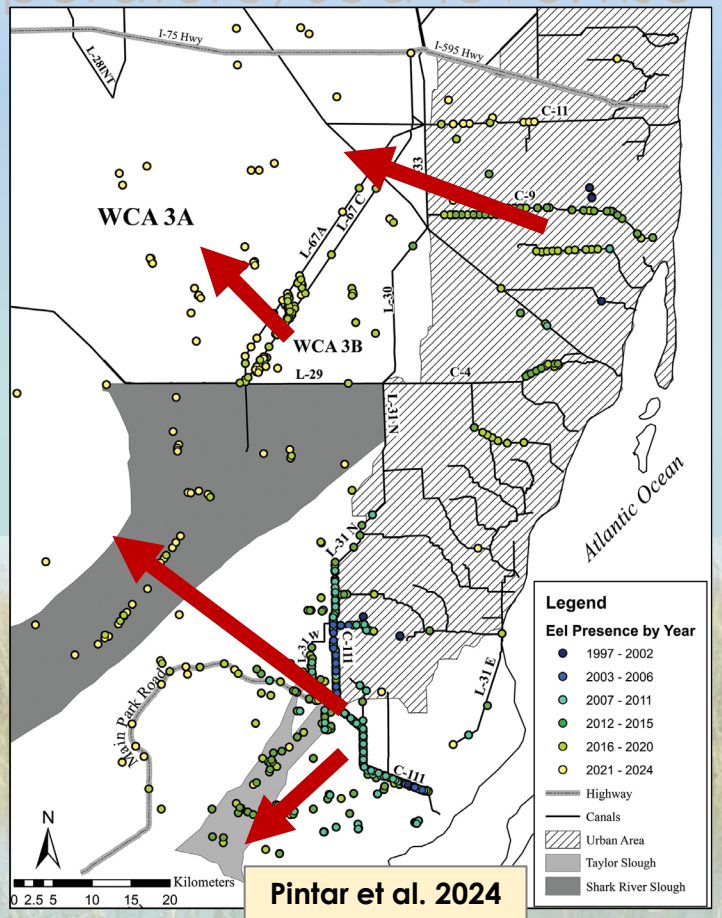
- **Climate Change**: long-term trends in precipitation, temperature; sea-level rise
- **Invasive Species:** impacts on native fauna

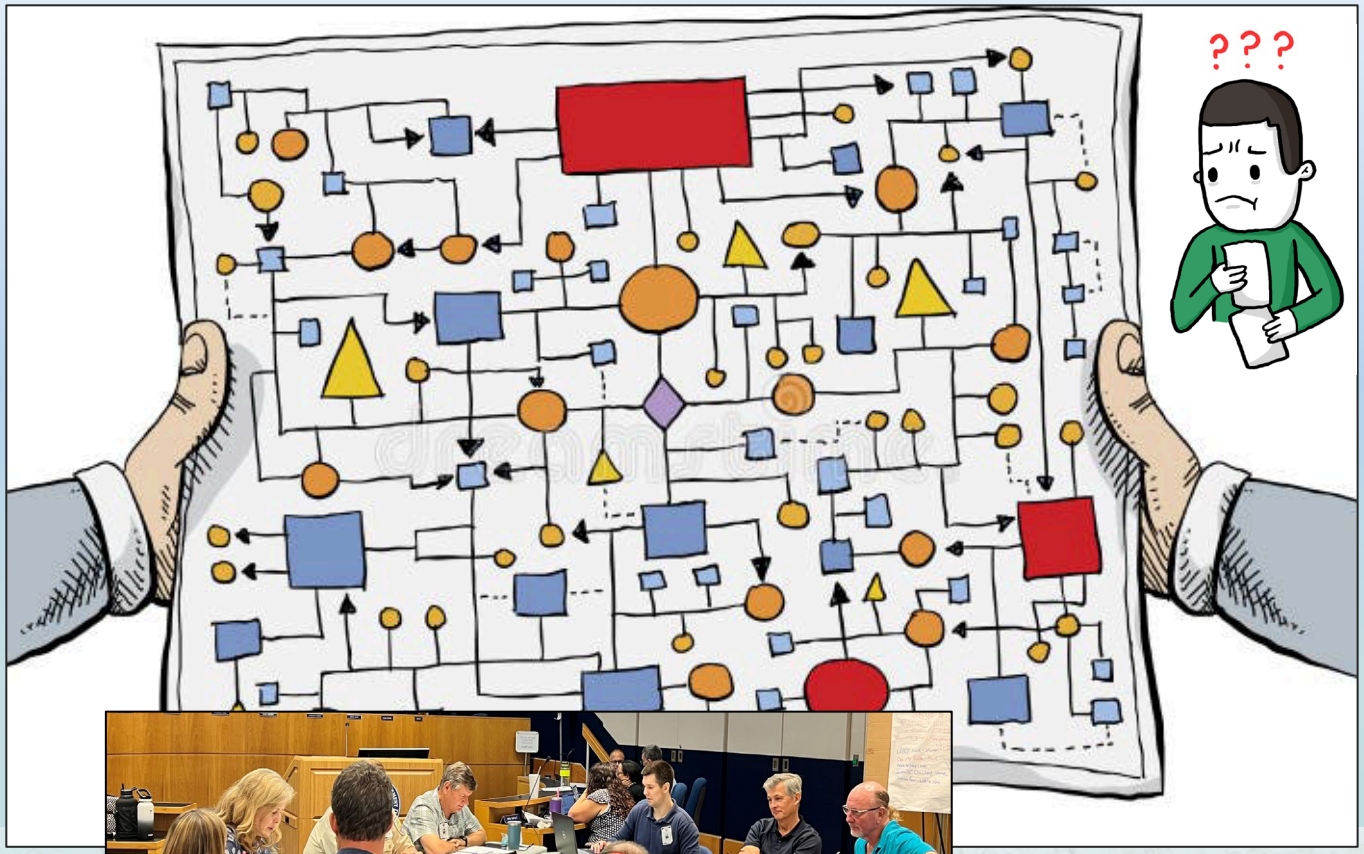

Photo Credit: Neylan Bryan

Asian swamp eel expansion: uncertainty of impacts to native species could dampen benefits from hydrologic restoration

(2024 SSR – Greater Everglades: Wet & Dry Season Aquatic Fauna)



“Where do we go from here?”

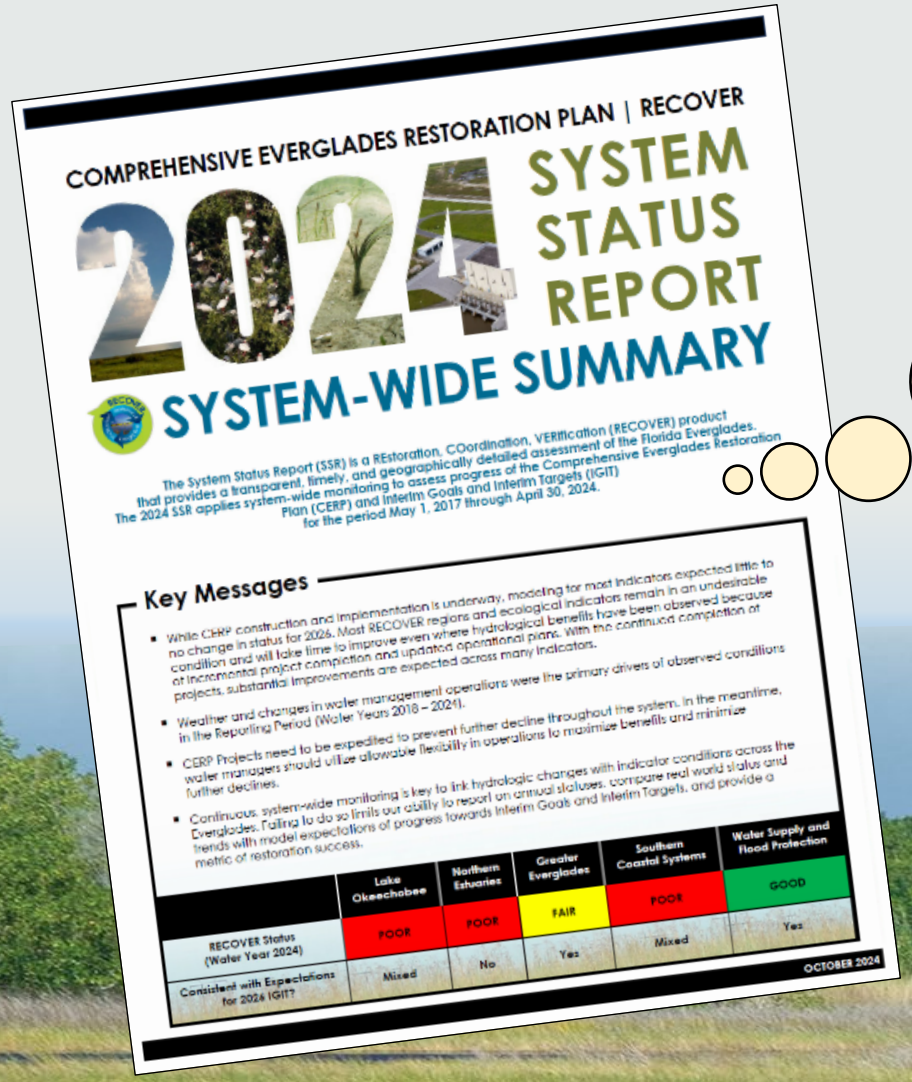


Want to be part of the conversation? Contact us!

Planning for Future Reporting on System-Wide Performance of CERP

- **When and where we see restoration progress depends on**:
  - Timing of project implementation
  - individual & cumulative project performance
  - ecological response time
- Uncertainties will make discerning **causal relationships** between CERP and restoration outcomes challenging
- **Ramp up coordination**

THANK YOU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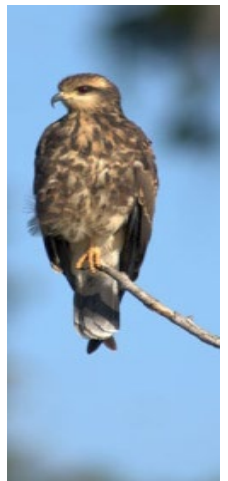
OCTOBER 2024

Pick up a copy of the 2024 SSR System-Wide Summary on your way out!



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GEER April 15, 2025