NATIONAL ACADEMIES Sciences Engineering Medicine

Recent Progress Towards Achieving Natural Ecosystem Restoration Goals in the Florida Everglades

Committee on Independent Scientific Review of Everglades Restoration Progress (CISRERP)

William A. Hopkins, Virginia Tech

Committee Membership

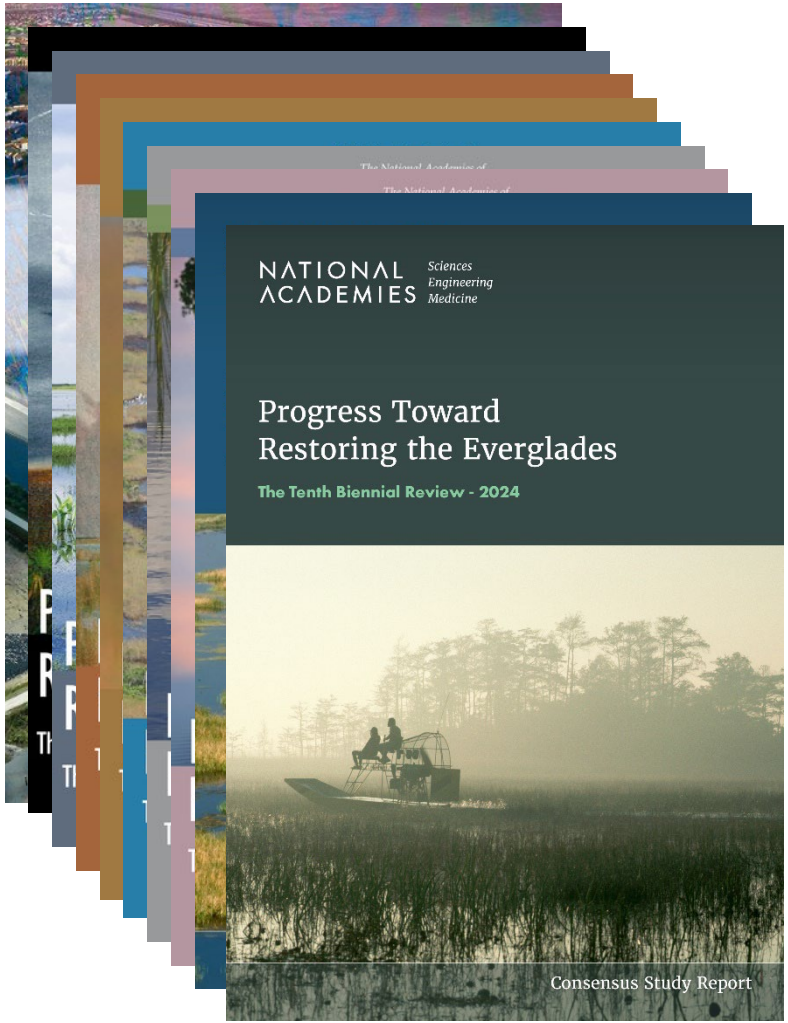
STEPHANIE JOHNSON, Study Director, NASEM

JAMES SAIERS, *chair*, Yale University
CASEY BROWN, University of Massachusetts
JOHN CALLAWAY, University of San Francisco
PHILIP DIXON, Iowa State University
CHARLES DRISCOLL (NAE), Syracuse University
MARLA EMERY, Norwegian Institute for Nature Research
MARGARET GITAU, Purdue University, IN
MATTHEW HARWELL, U.S. Environmental Protection Agency
WILLIAM HOPKINS III, Virginia Tech
TRACY QUIRK, Louisiana State University
K. RAMESH REDDY, University of Florida
HELEN REGAN, University of California, Riverside
ALAN STEINMAN, Grand Valley State University
JEFFREY WALTERS, Virginia Tech
DAVID WEGNER, Woolpert Engineering

NATIONAL ACADEMIES Sciences Engineering Medicine

2024 Biennial Report Focal Areas

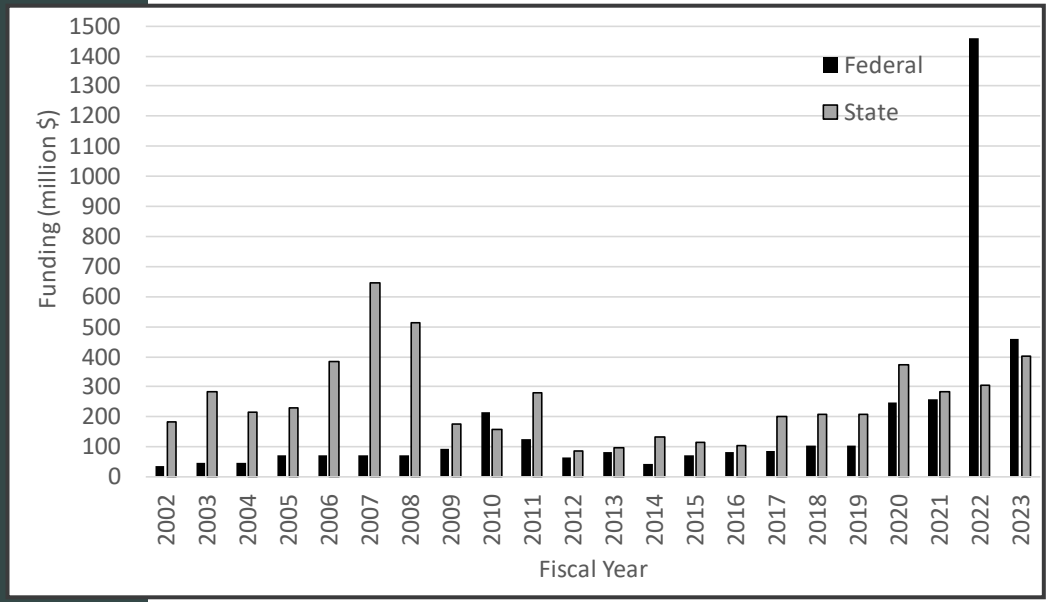
1. **Review of restoration progress**
2. Application of Indigenous Knowledge in CERP
3. Application of tools to evaluate the effects of climate change
4. Adaptive management and use of new info in decision making



Restoration Progress

Historic pace of implementation

- Record state/federal investments



Restoration Progress

Historic pace of implementation

- Record state/federal investments
- One project and two major project components complete
  - Melaleuca Eradication
  - CEPP New Water
  - C-44 Reservoir
- C-111 Spreader Canal Western was essentially complete

Restoration Progress

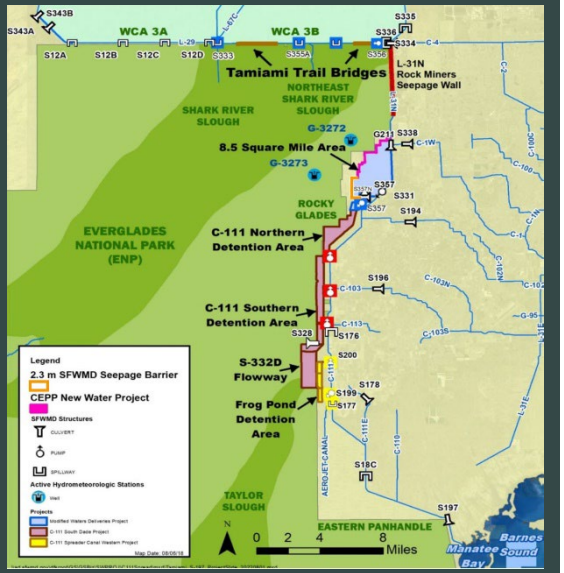
Historic pace of implementation

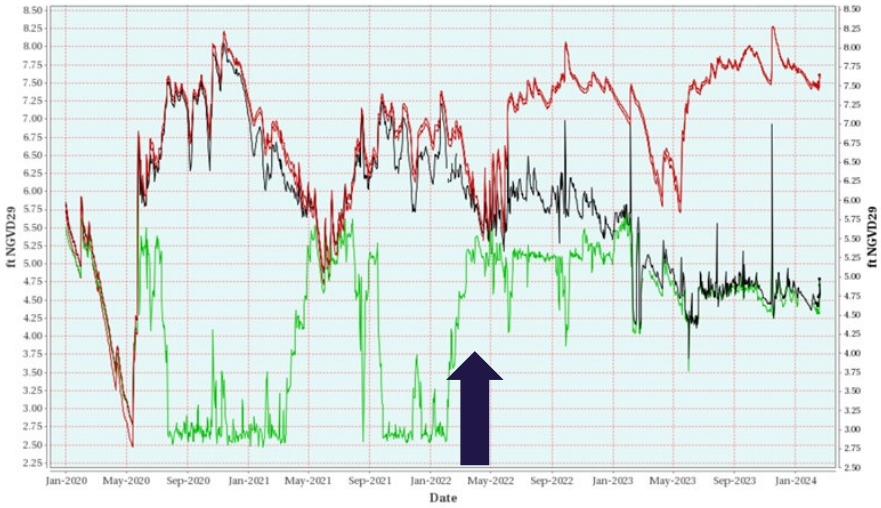
- Record state/federal investments
- Six projects under construction
  - Picayune Strand
  - C-43 Reservoir
  - Indian River Lagoon-South
  - Biscayne Bay Coastal Wetlands
  - Broward County Water Preserve Areas
  - Central Everglades Planning Project

CERP Restoration Benefits

CEPP New Water

- Seepage barriers reduce flood control constraints in 8.5 sq. mi area





Provisional data, if present, are indicated by square symbol.

DBKey	Station	Agency	Data Type	Unit	Statistic	Frequency	Strata	Gate/Pump#
07103	ANGEL	WMD	WELL	ft NGVD29	MEAN	DA	0	N/A
37740	LPG2	WMD	STG	ft NGVD29	MEAN	DA	0	N/A
WN173	S357_H	WMD	STG	ft NGVD29	MEAN	DA	0	N/A

CERP Restoration Benefits

Invasive Plant Management

- Biocontrol measures have been successful for two priority invasives
  - 75% reduction in Melaleuca
  - Air-potato reproduction controlled (no longer a priority invasive plant)

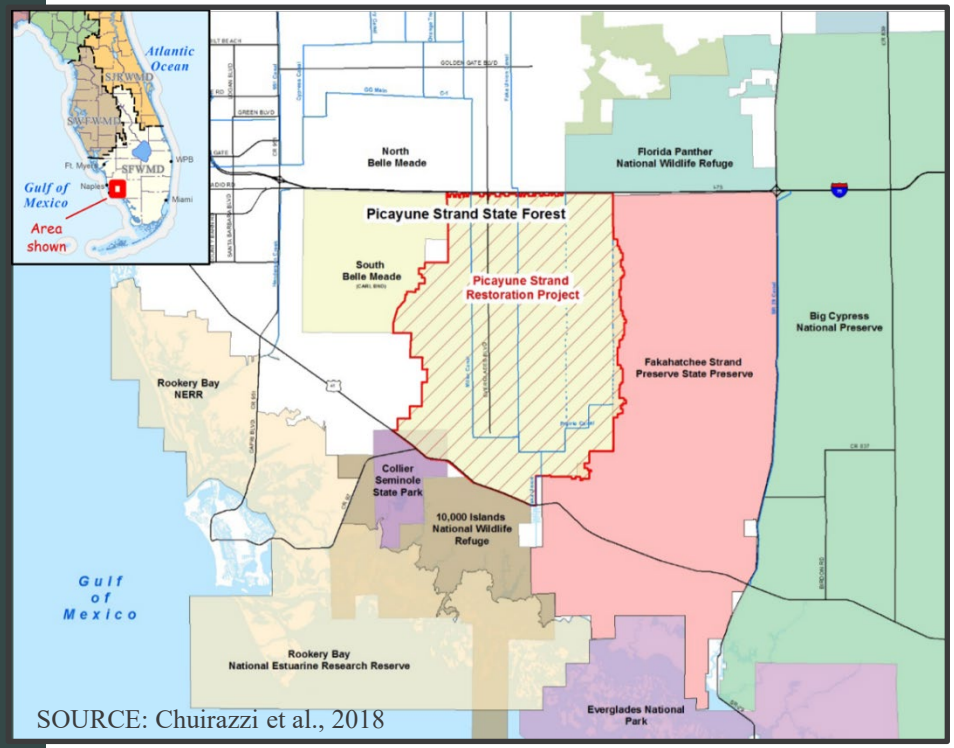

UF, PHOTO BY ANN MURRAY


UF HERBARIUM, PHOTO BY MARC S. FRANK

CERP Restoration Benefits

Picayune Strand

- First CERP project under construction
- Primary components include plugging drainage canals, degrading roads, and removing logging trams to restore 55,000 acres of habitat



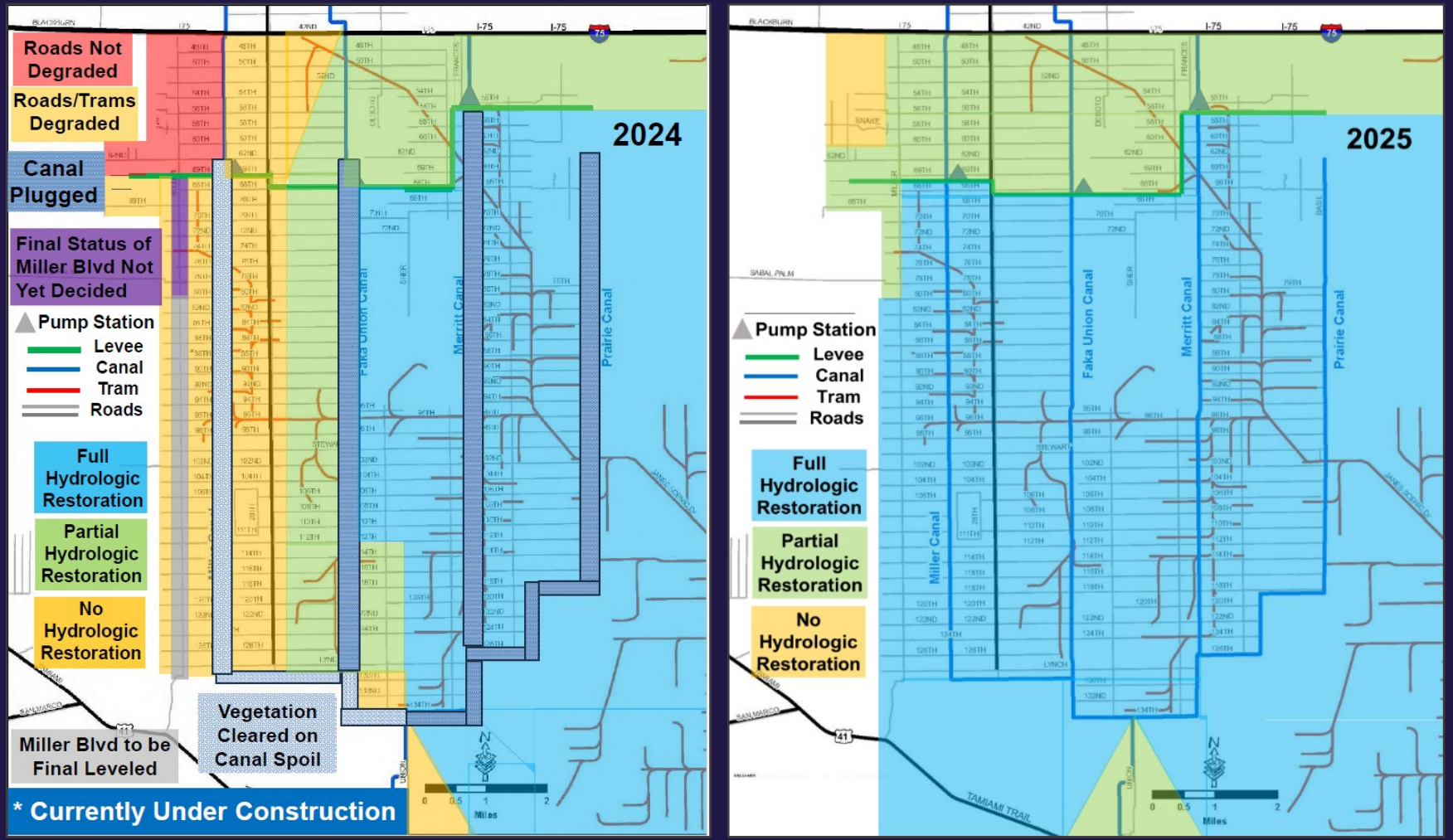
SOURCE: Chuirazzi et al., 2018

CERP Restoration Benefits

Picayune Strand

- First CERP project under construction
- Primary components include plugging drainage canals, degrading roads, and removing logging trams to restore 55,000 acres of habitat
- In total: plugging 48 miles of canals, and removing/degrading 260 miles of roads

Photos looking north from 100th Avenue toward the Merritt Canal: (top) in October 2010 prior to canal filling and (bottom) in May 2024, 9 years after canal filling. *SOURCE: M. Duever, pers comm, 2024.*

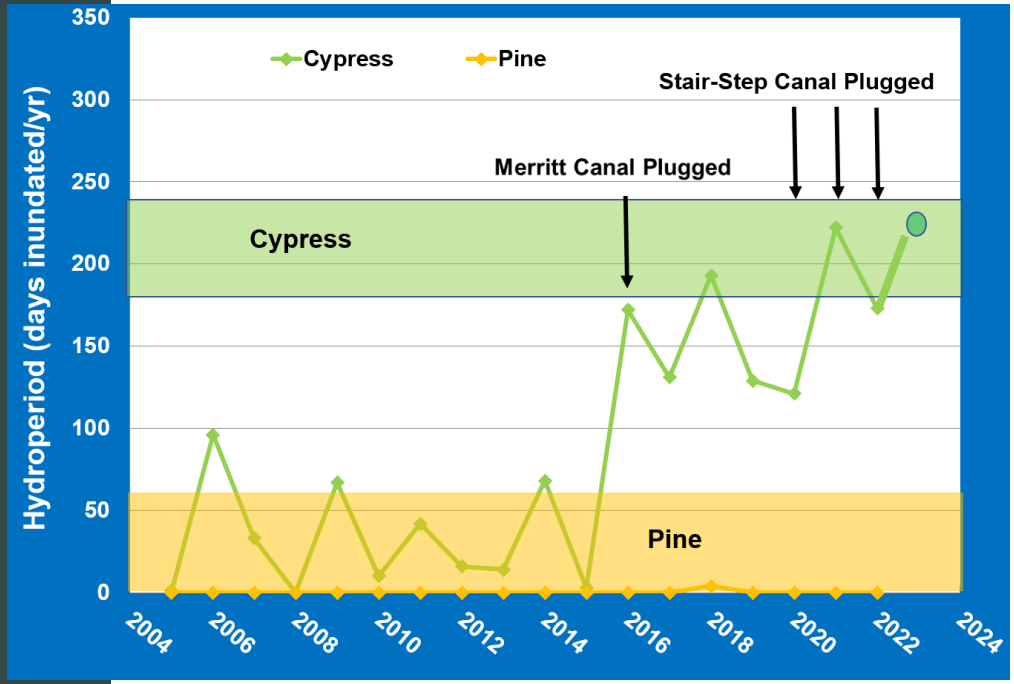


SOURCE: M. Duever, consultant to the SFWMD, personal communication, 2024

CERP Restoration Benefits

Picayune Strand

- Hydroperiod duration extended in cypress habitat in region between Prairie and Merritt Canals

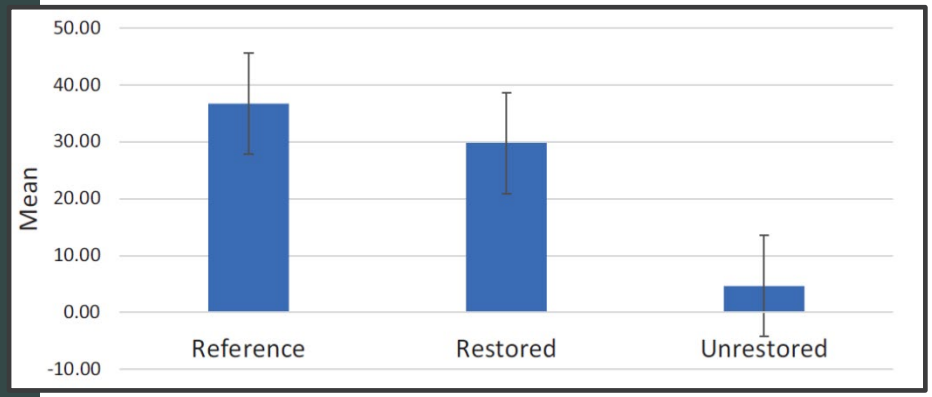


Changing hydroperiods relative to the target hydroperiods for cypress and pine habitats at site SGT4W6, located between the Prairie and Merritt Canals and near the Stairstep canals, filled in 2007, 2015, and 2021, respectively. *SOURCE: Duever, 2023.*

CERP Restoration Benefits

Picayune Strand

- Hydrological restoration leading to favorable response in flora and fauna
  - Vegetation recovery documented in NASEM 2018 and 2023 reports (wont be surveyed again until 2025/2026)
  - Macroinvertebrates responding favorably
    - Increase in species richness in cypress habitats
    - Colonization by long hydroperiod species such as crayfish, limpets, and freshwater sponges



Mean macroinvertebrate species richness for reference, restored, and unrestored sites, with data pooled among all three sampling periods. Error bars represent the 95% confidence interval around the mean. *SOURCE: Gaglia, 2022.*

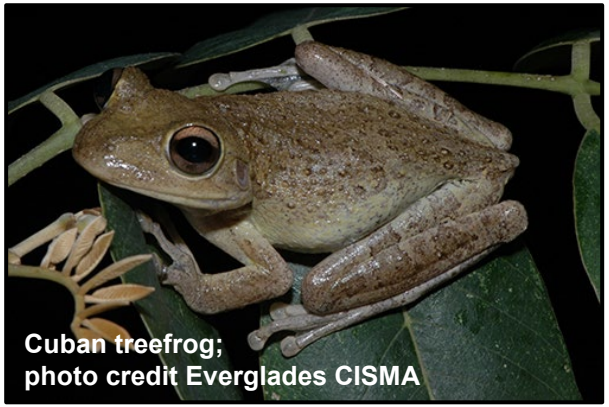

Everglades crayfish; Photo Josh Olive

CERP Restoration Benefits

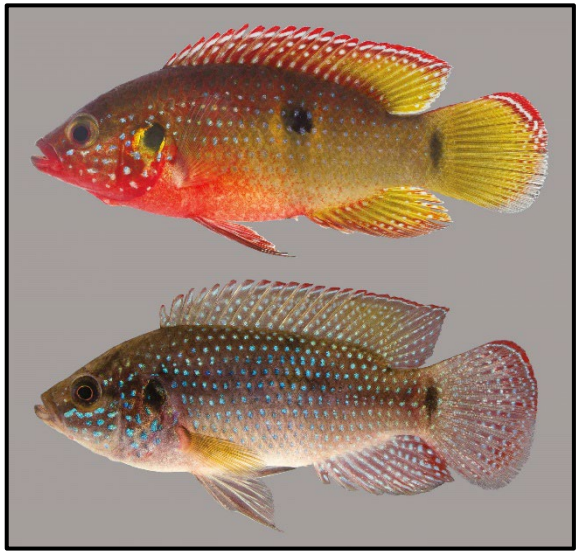
Picayune Strand (Challenges)

- Recovery of fish and amphibians remains a challenge due to invasive species

- Committee recommended alternative methods for monitoring amphibians (e.g., passive acoustic techniques)



Cuban treefrog;
photo credit Everglades CISMA

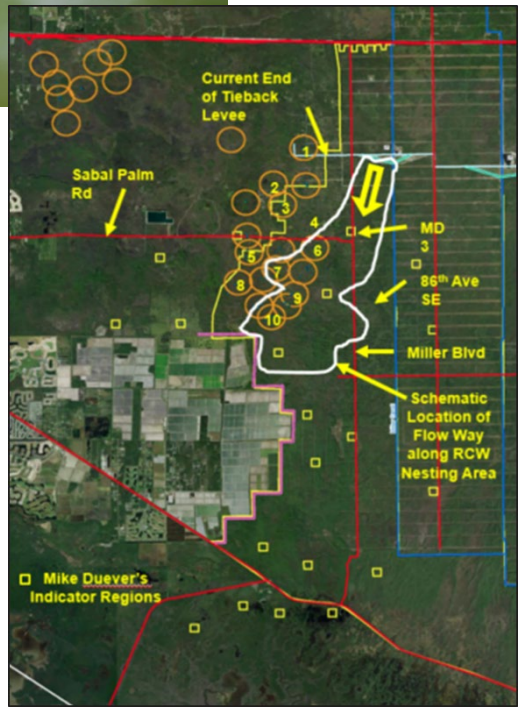


African Jewelfish; Florida Museum photo by Zachary Randall

CERP Restoration Benefits

Picayune Strand (Challenges)

- Unanticipated impacts to habitat for threatened red-cockaded woodpeckers in the adjacent South Belle Mead Tract (west of original project area)
- Emphasizes the need for effective adaptive management

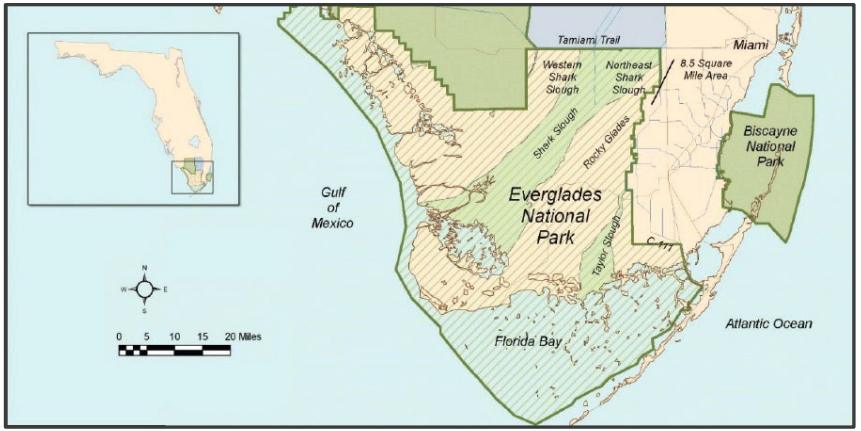


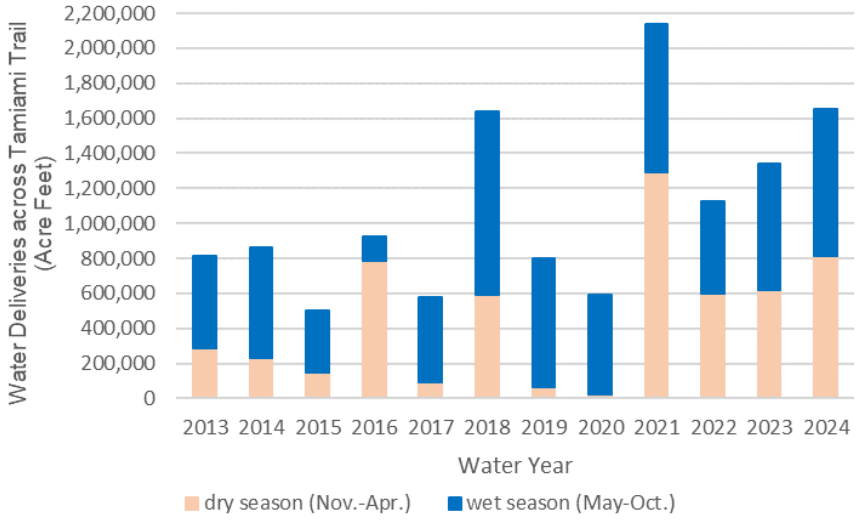
Potential impacts of surface flows from Picayune Strand on RCW territories (orange circles) in South Belle Meade. Pink line indicates Southwest Protection Feature, white area the projected flow-way from Miller pump station to the Feature, and yellow line the current western boundary of the Picayune Strand Restoration Project footprint. *SOURCE: USACE et al., 2023b.*

Restoration Benefits

Combined Operational Plan (COP)

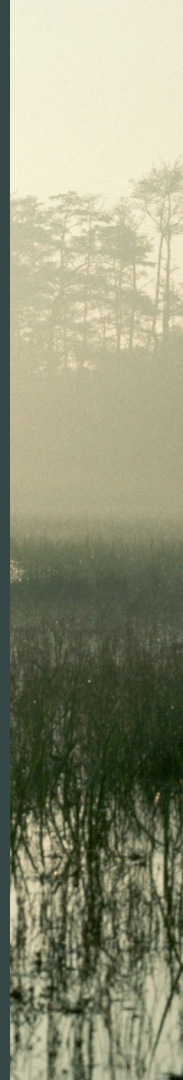
- generally achieving hydrological objectives
  - Increased water deliveries across Tamiami Trail (especially during dry season)
  - Restoring historical flows between Western and Northeastern Shark River Sloughs
- rehydration of Northeast Shark River Slough is largest step to date toward restoring the Central Everglades
- adverse effect on habitat for endangered Cape Sable Seaside





Summary

- In ‘23-’24, Everglades restoration proceeding at a remarkable pace, with record funding
- Important early benefits evident, including:
  - success of seepage management by CEPP New Water that enabled increased flows
  - hydrological and ecological recovery underway in Picayune Strand
  - control of Melaleuca and air potato
  - rehydration of Northeast Shark River Slough
- Some key challenges include:
  - impacts to habitat for RC Woodpeckers near Picayune Strand, and for CCS Sparrows affected by the Combined Operational Plan (COP)
  - invasive vertebrates in Picayune Strand
  - *More Broadly*: information on restoration progress is difficult to find and interpret because CERP lacks a centralized mechanism for multi-agency reporting of project-level outcomes



NATIONAL ACADEMIES Sciences Engineering Medicine


NATIONAL
ACADEMIES
Sciences
Engineering
Medicine