



**Arthur R. Marshall Loxahatchee  
National Wildlife Refuge**  
*14<sup>th</sup> Annual Science Workshop*



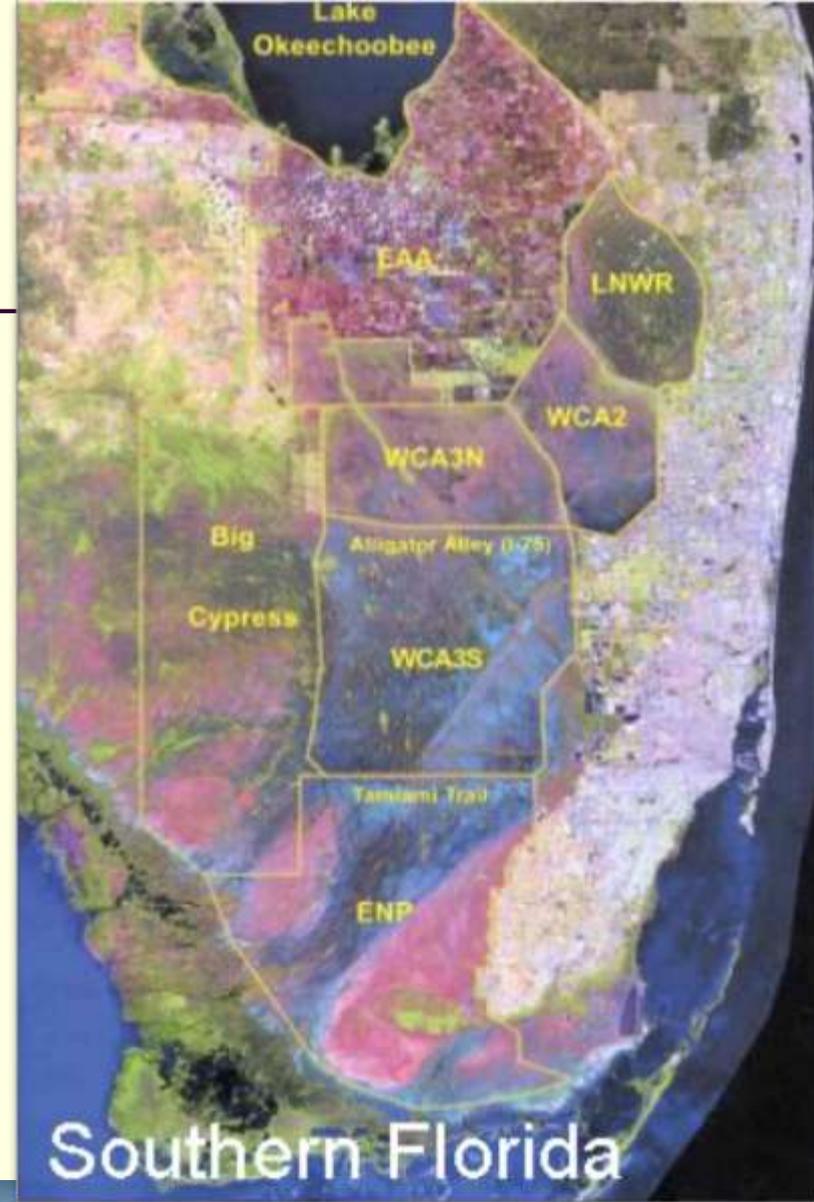
**Role of the  
Northern Everglades In the  
Greater Everglades Landscape**

**Rebekah Gibble, USFWS,  
A.R.M. Loxahatchee National Wildlife Refuge  
GEER 2017**



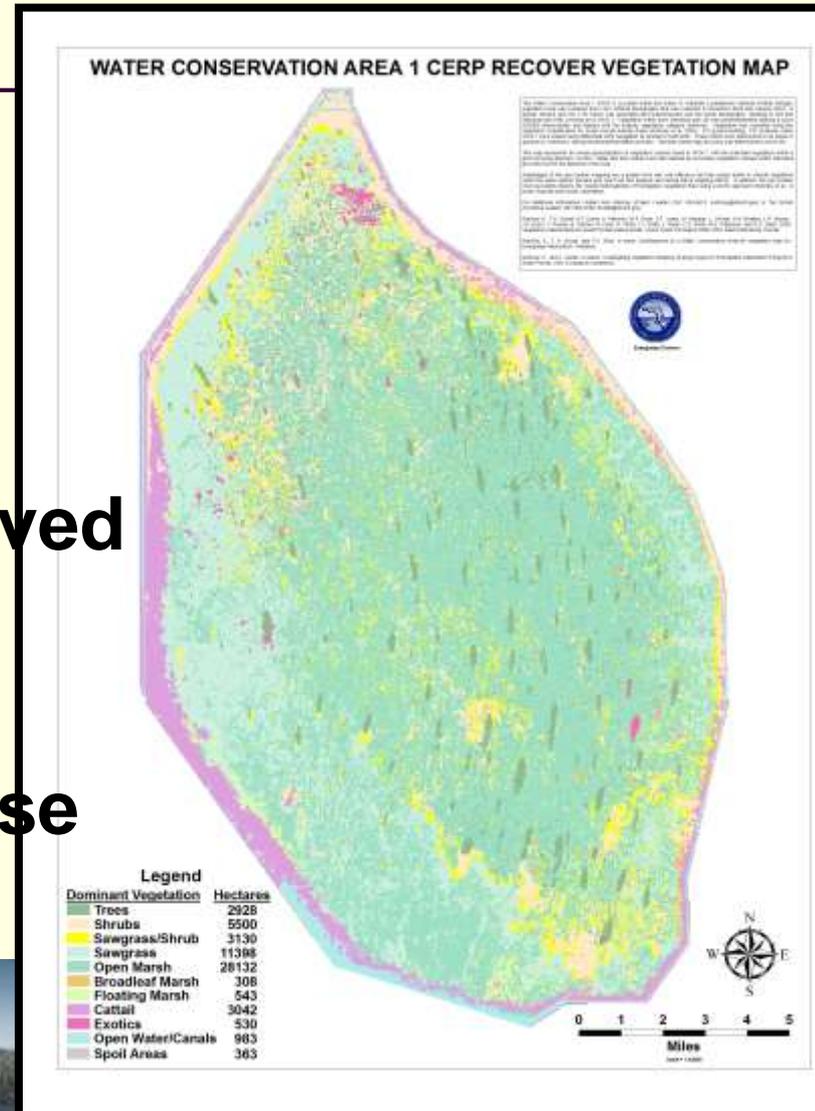
# Overview

- Unique attributes of the Loxahatchee Refuge
- Ecological Role
- Restoration



# Unique attributes

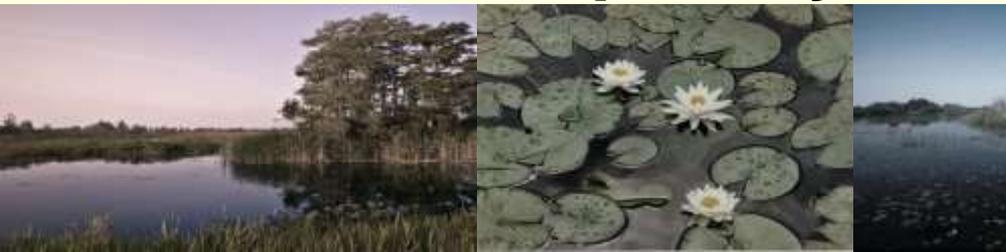
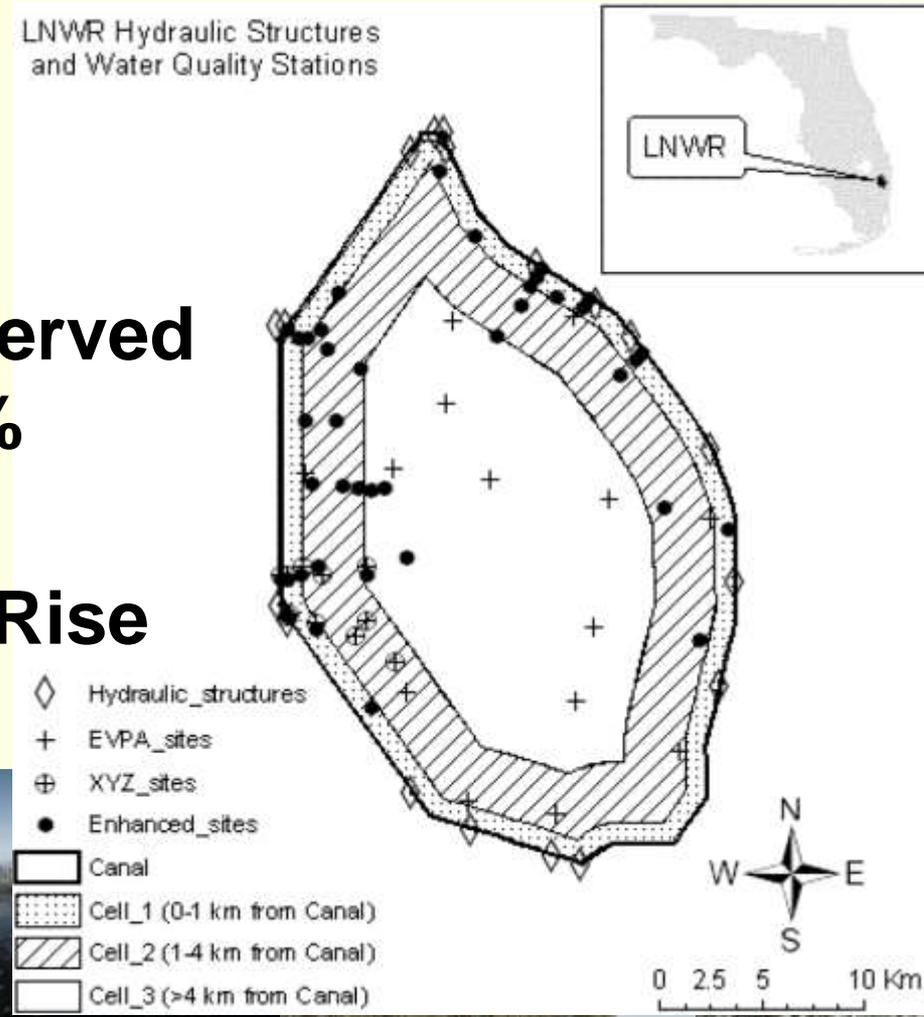
- Northern-most remnant
  - Unique geology/water quality/hydrology
  - Unique habitat
- Much of landscape preserved similarly to historic (40% impacted)
- Resilience to Sea Level Rise
- Wildlife first priority



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LNWR Hydraulic Structures and Water Quality Stations



# Peat/WQ

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- **Historically, nearly completely rainfall driven**
  - **Low nutrient input**
- **Deep layer of peat (Loxahatchee Peat)**
  - **Up to 12 feet thick**
  - **Protects surface water from limestone**
  - **Low minerals**
  - **Oligotrophic water**
  - **One of slowest accretion rates (1 mm/yr)**



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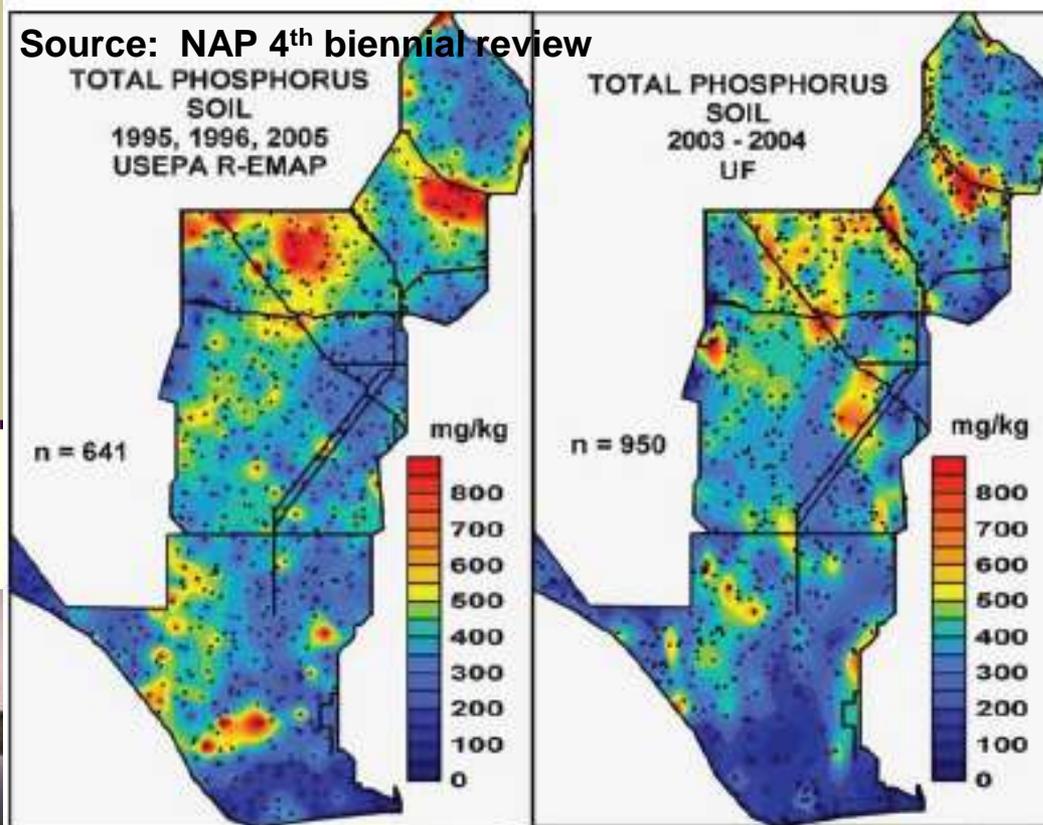


Source: Davis/Ogden 1994

# Peat/WQ

- Historically, nearly completely rainfall driven
  - Low nutrients

■ Deep layer of peat (Oxahatchee Peat)  
■ Water from limestone



Source: Davis/Ogden 1994

# Peat/WQ

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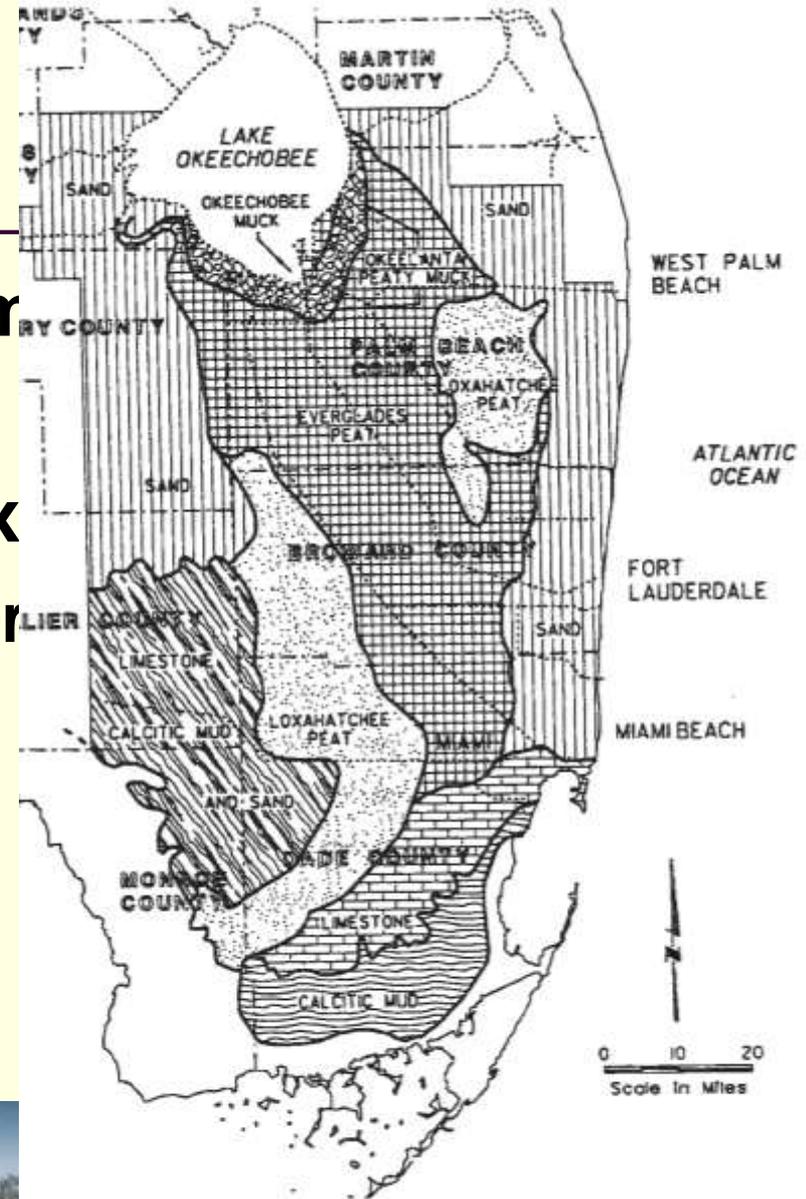
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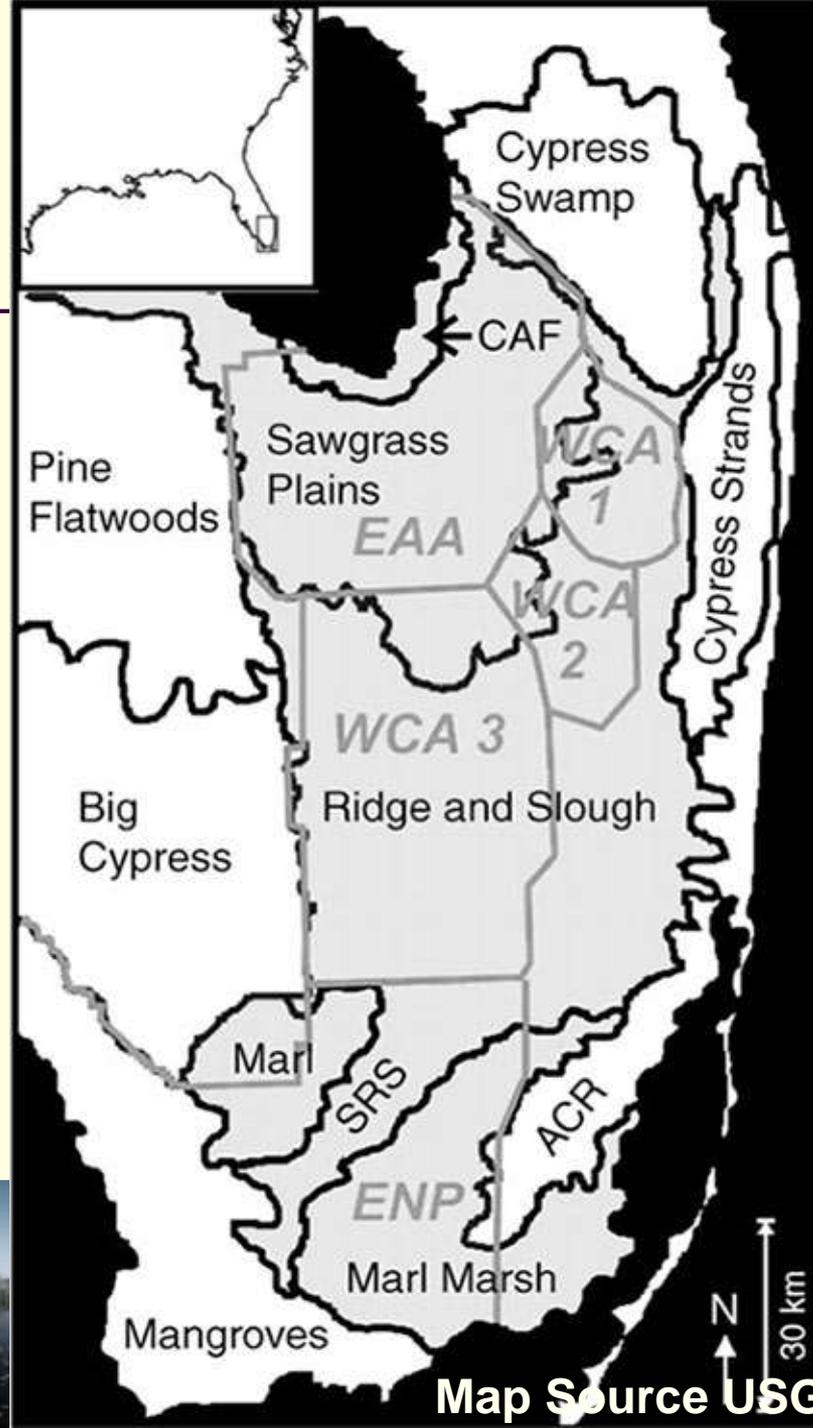
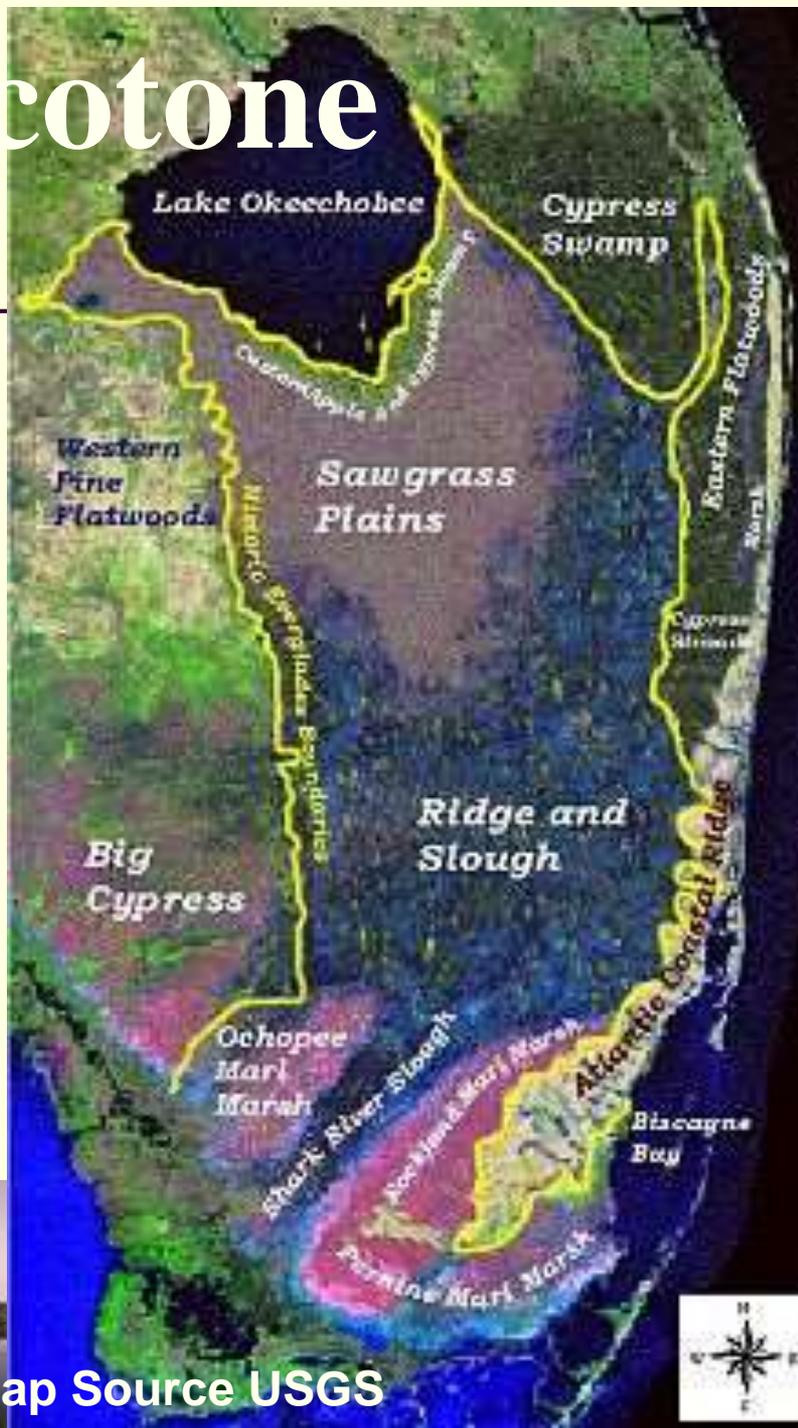


7.7 Map of surface sediments covering south Florida. (Adapted from Davis/Ogden et al., 1948.)

Source: Davis/Ogden 1994



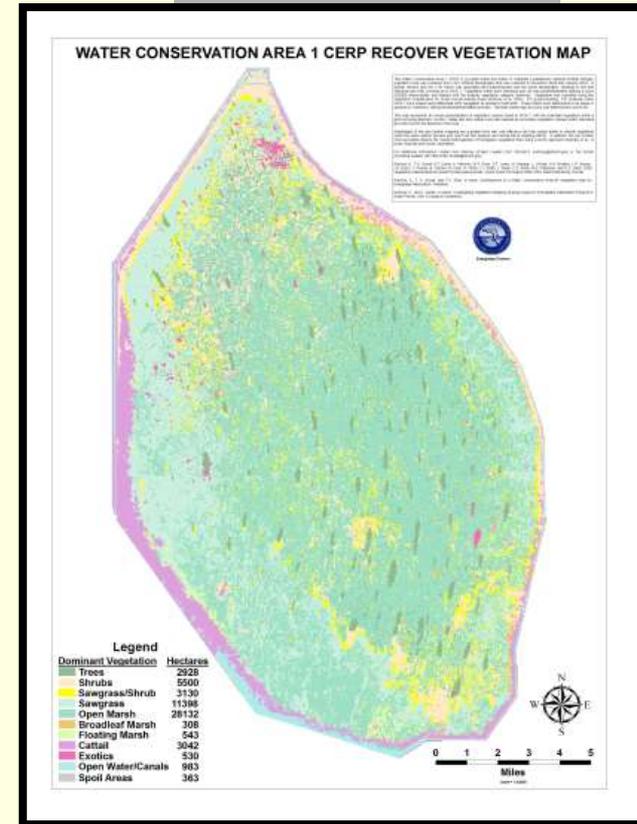
# Ecotone



# Tree Islands



- Highest density
  - 45,000
- Two types:
  - Pop up islands (Bay heads)
  - Strand Islands (Holly)
    - Form solely from peat accretion and successional processes.



# Wildlife

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- **Important habitat for many species; managed for wildlife as first priority**
  - **Snail kites**
  - **Alligators**
  - **Wading Birds**
  - **Small mammals**



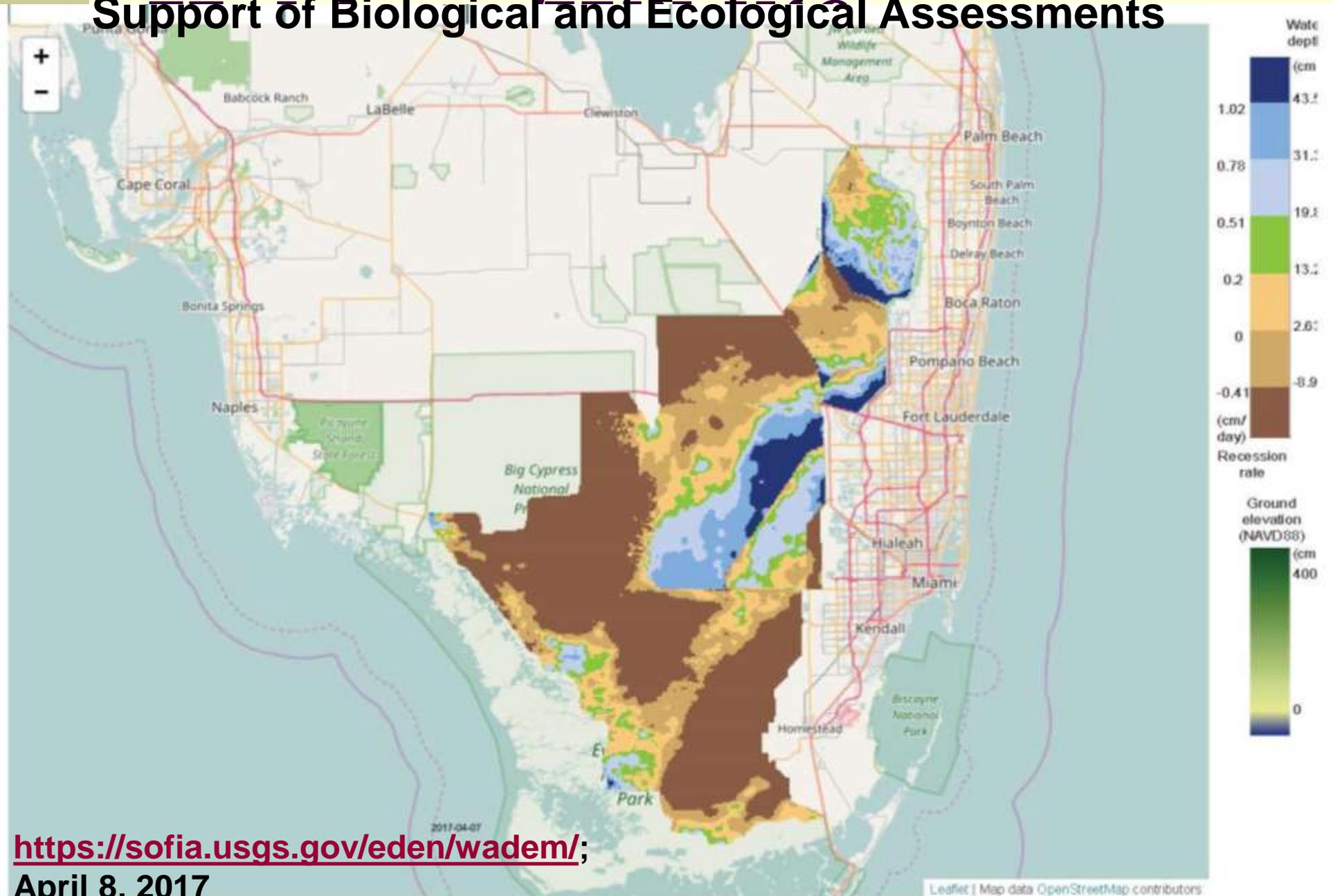
# 2016 Snail Kite Nesting - GE

Wetland	Total number of active nests <sup>A</sup>	Number of active nests with known fate <sup>B</sup>	Number of successful nests <sup>C</sup>	Number of failed nests	Number of young banded	Observed number of young fledged <sup>D</sup>	Daily survival rate	Relative contribution to range-wide nesting effort	Relative contribution to range-wide fledgling production	Apparent nest success (± SE)	Avg nest productivity (± SE) <sup>E</sup>
Everglades National Park	4	4	1	3	2	1	0.92	0.005	0.002	0.25 (±.22)	1 (±0)
Loxahatchee NWR	6	6	5	1	10	8	1.00	0.008	0.013	0.83 (±.15)	1.6 (±.4)
WCA3A	11	11	0	11	0	0	0.92	0.014	0	0	0
WCA3B	5	5	0	5	0	0	0.93	0.006	0	0	0

Source: FWC/UF



# Everglades Depth Estimation Network (EDEN) for Support of Biological and Ecological Assessments



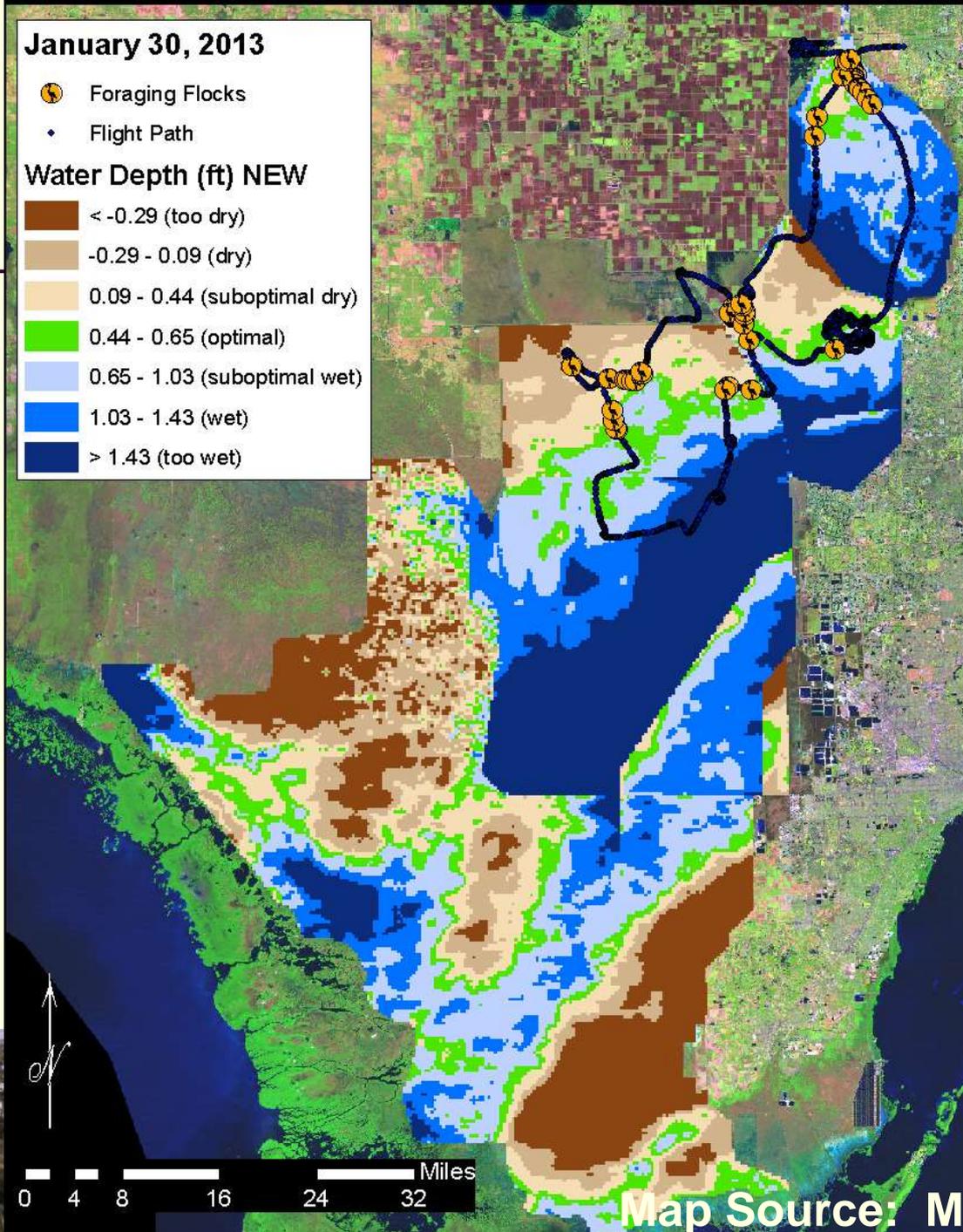
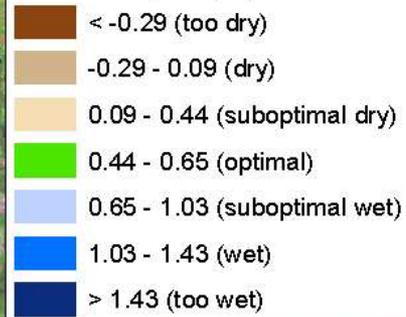
<https://sofia.usgs.gov/eden/wadem/>;

April 8, 2017

January 30, 2013

- 📍 Foraging Flocks
- ◆ Flight Path

**Water Depth (ft) NEW**

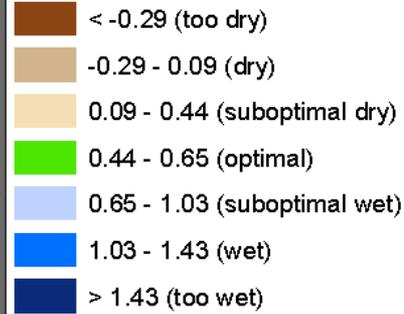


Map Source: M. Cook, SFWMD



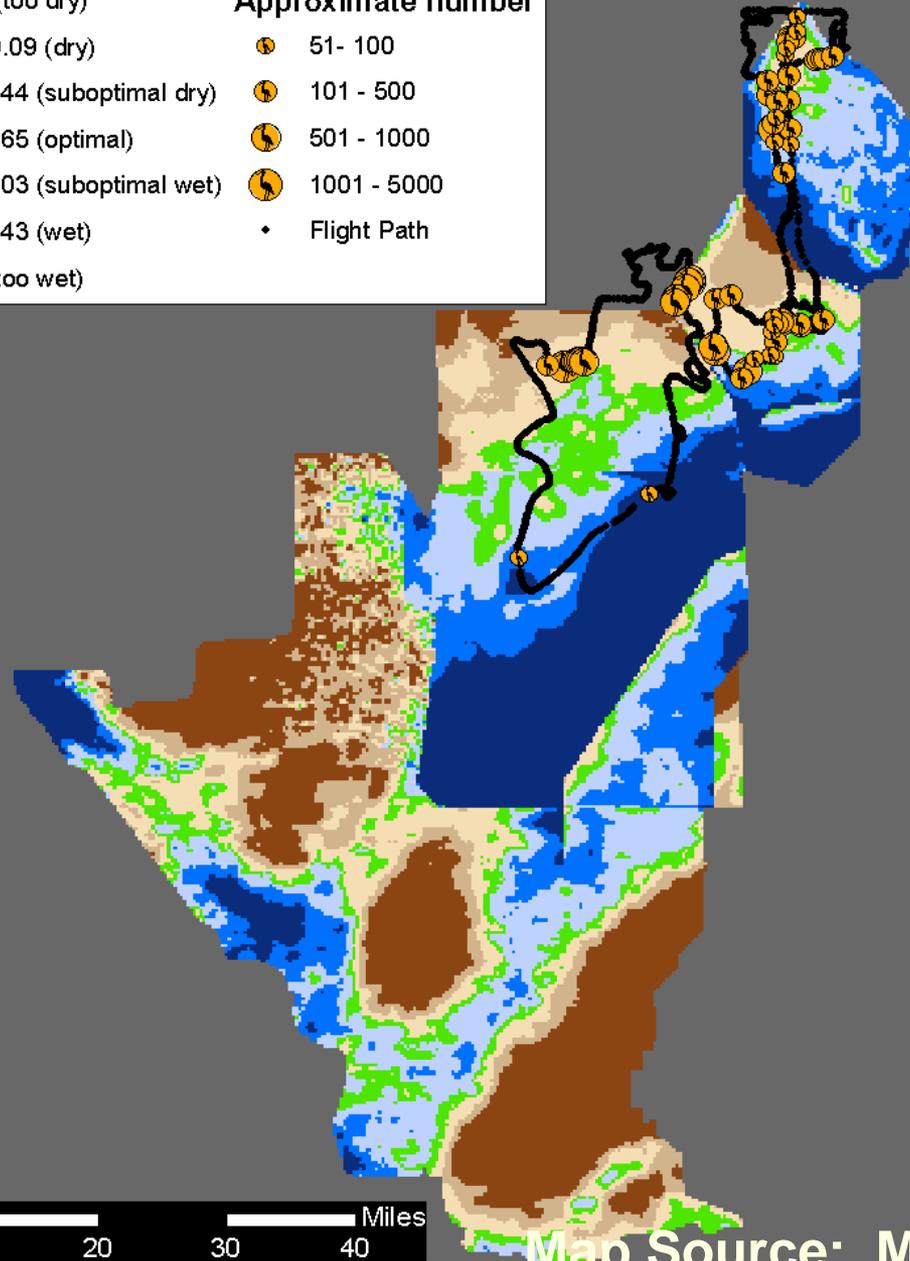
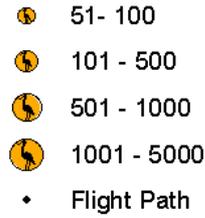
February 6, 2013

Water Depth (ft) NEW



Foraging Flocks

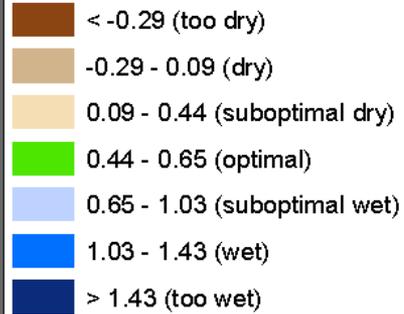
Approximate number



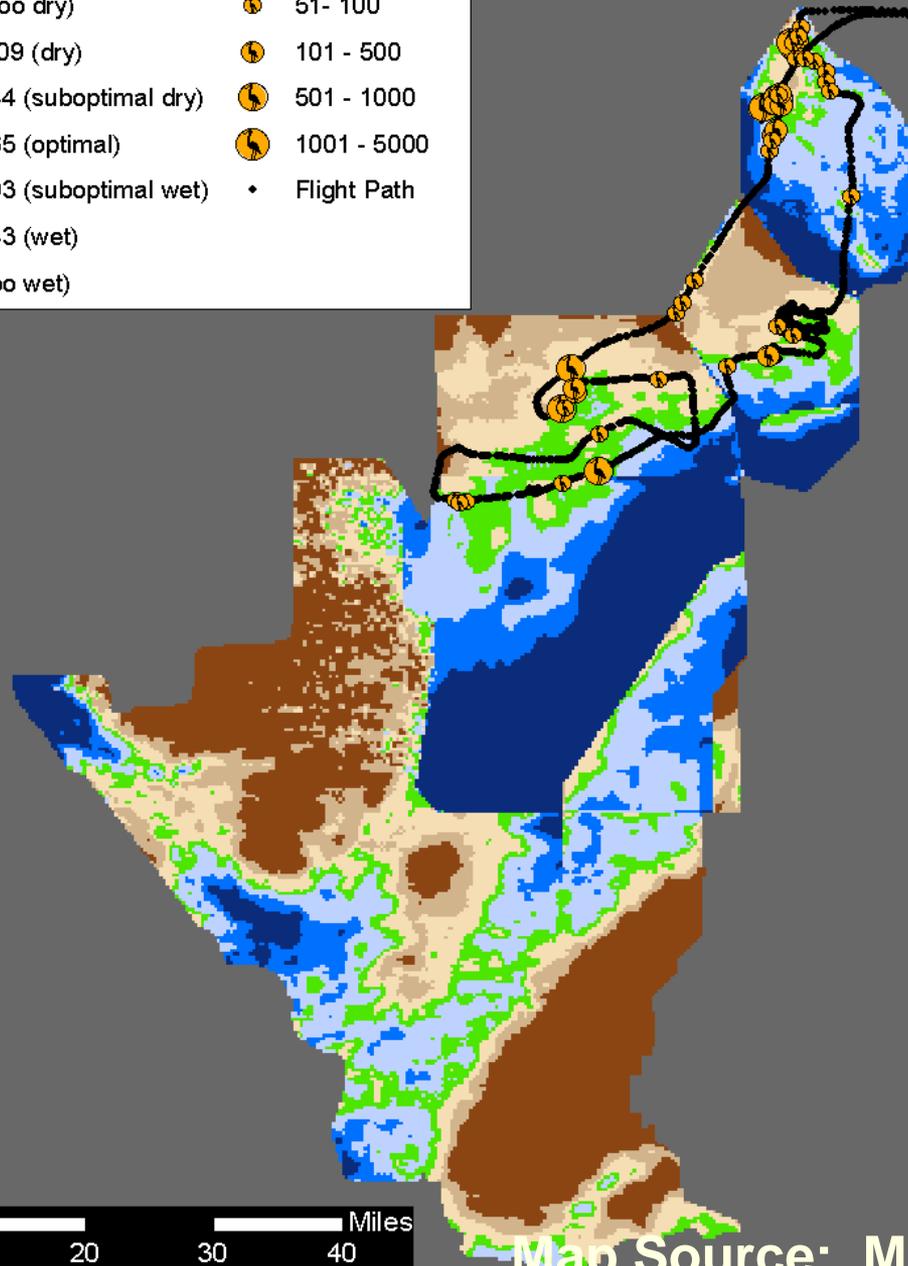
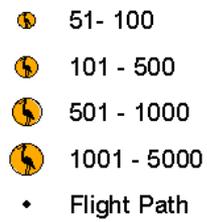
Map Source: M. Cook, SFWMD

**February 13, 2013**

**Water Depth (ft) NEW**



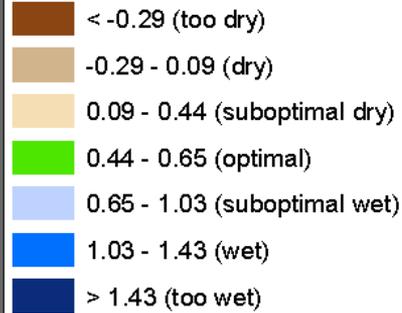
**Foraging Flocks**



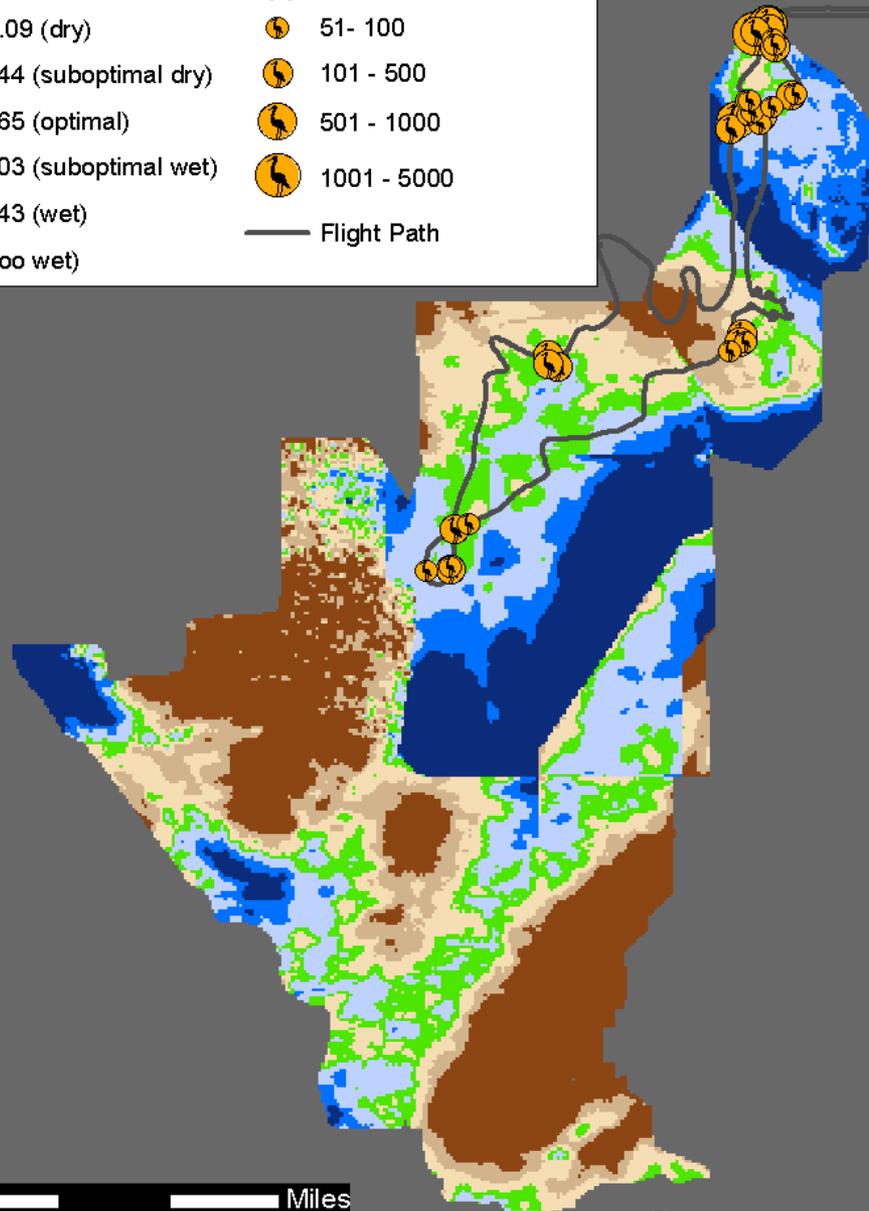
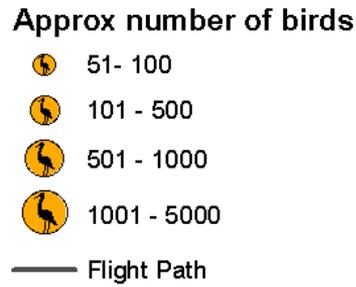
Map Source: M. Cook, SFWMD

**March 6, 2013**

**Water Depth (ft) NEW**



**Foraging Flocks**

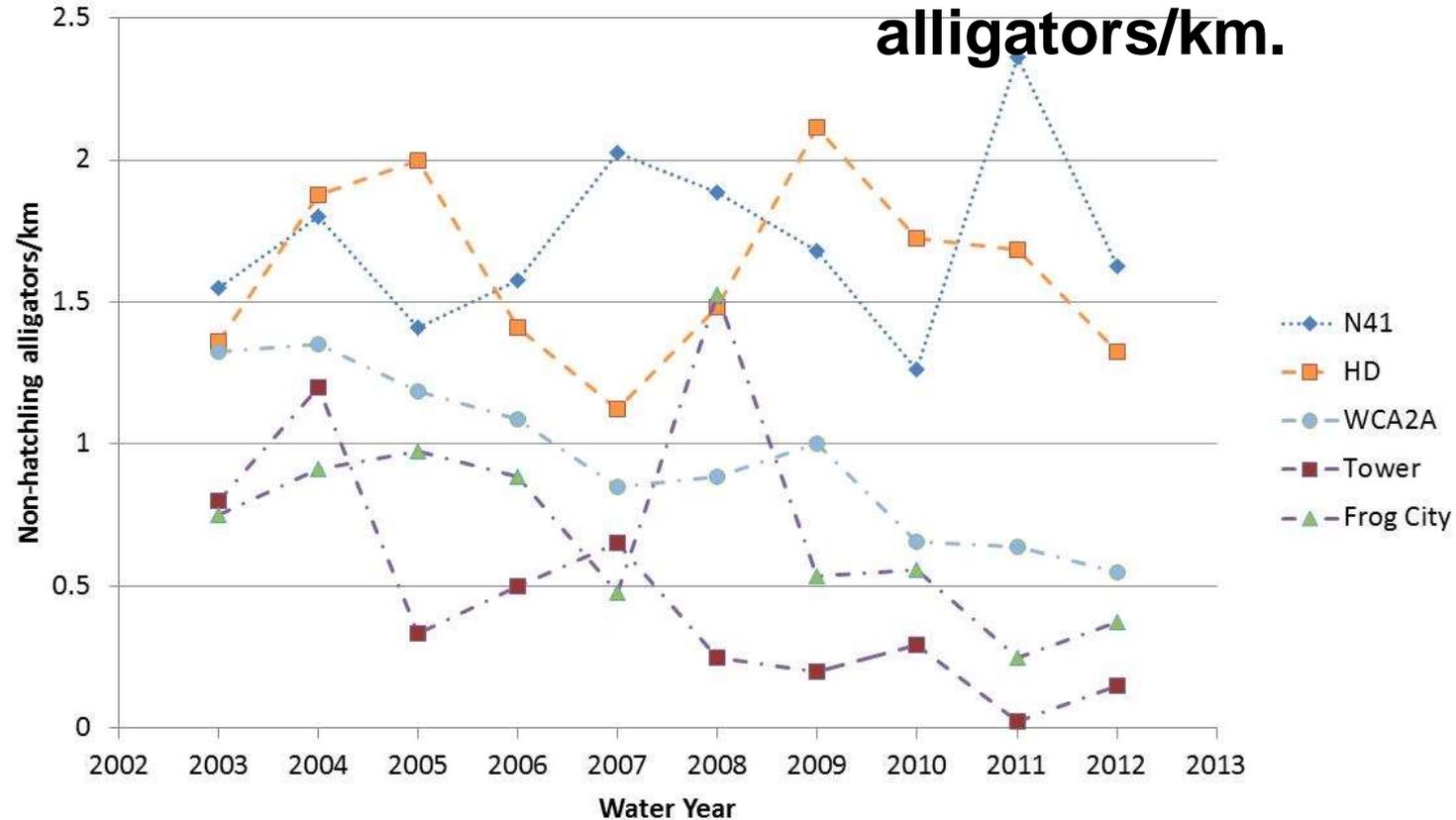


Map Source: M. Cook, SFWMD



# Alligators

Alligator densities  
in Lox: 4.0 – 8.2  
alligators/km.



2014 RECOVER Report:

Areas with dry downs that last longer than 60 days or repeatedly occur at intervals more frequently than once every three to five years are not likely to support populations of alligators that are at or approaching restoration targets.

Source: [http://141.232.10.32/pm/ssr\\_2014/Docs/ssr\\_full\\_2014.p](http://141.232.10.32/pm/ssr_2014/Docs/ssr_full_2014.p)

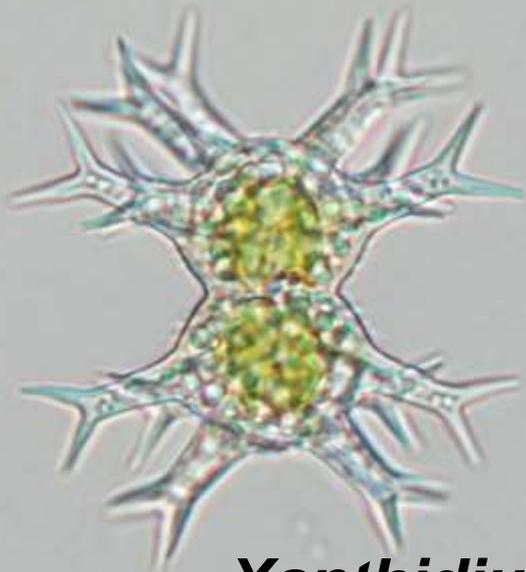


# Periphyton

- Metaphyton
- Global hotspot for desmids
- Interior (central) sites



Species ID and Photo Credits: Barry Rosen, USGS



*Xanthidium*



*Staurastrum*

Micrasterias



Triploceras



# Invasives

- **Plants**

- Melaleuca
- Lygodium

- **Animals**

- Pythons
- Nile monitors
- Laurel Wilt
- Cypress Looper



- **Research and monitoring**

- Integrated mgt
- Lygodium retreat freq.

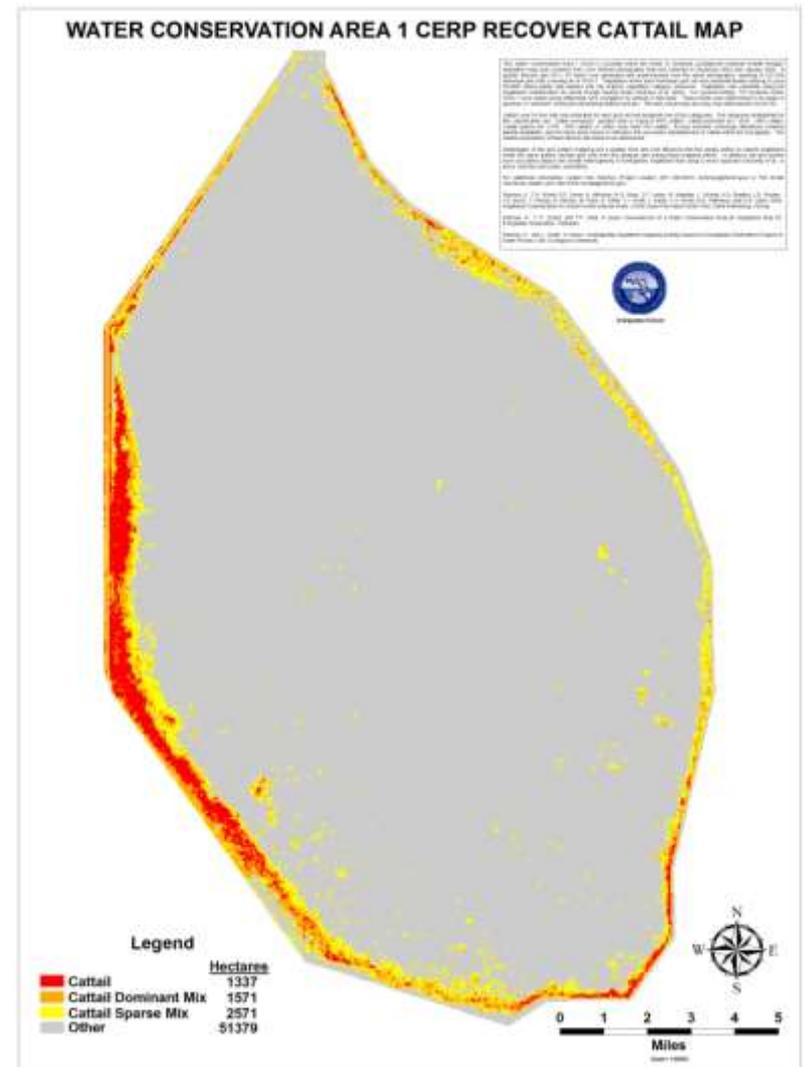


- **Biocontrol**
  - eDNA
  - Triage



# Restoration

- R&S degradation
- Ongoing WQ impacts
- Hydrology
- CERP
- Climate change



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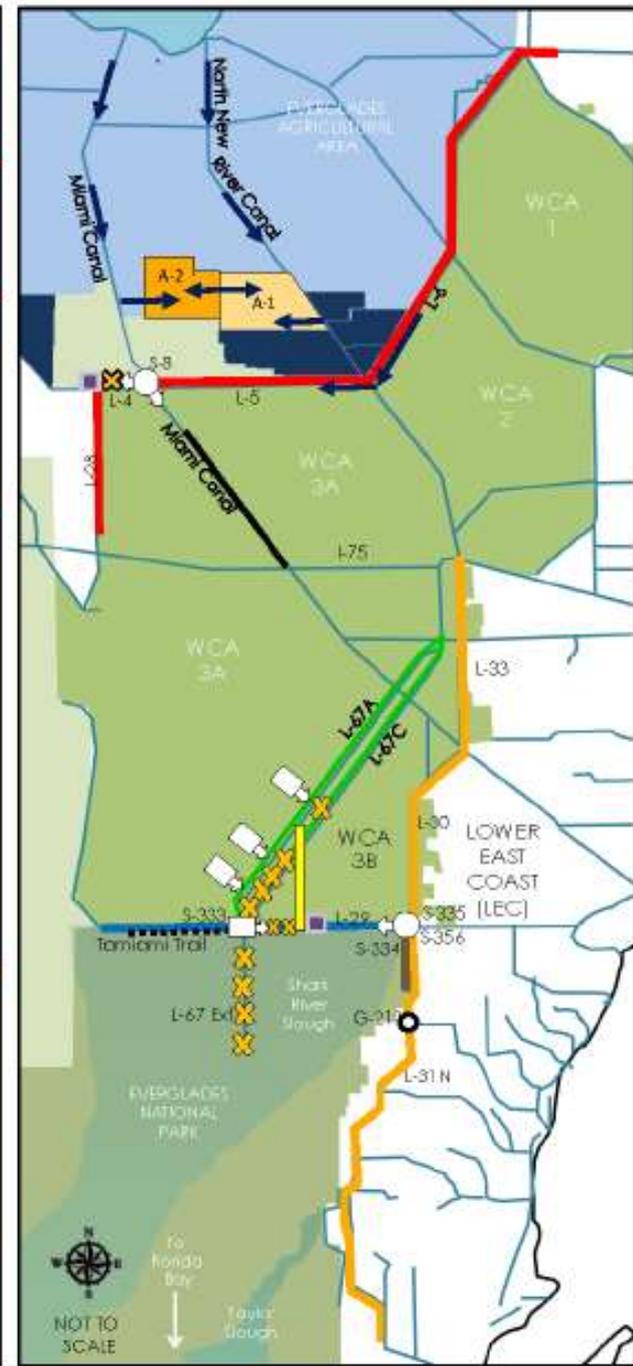
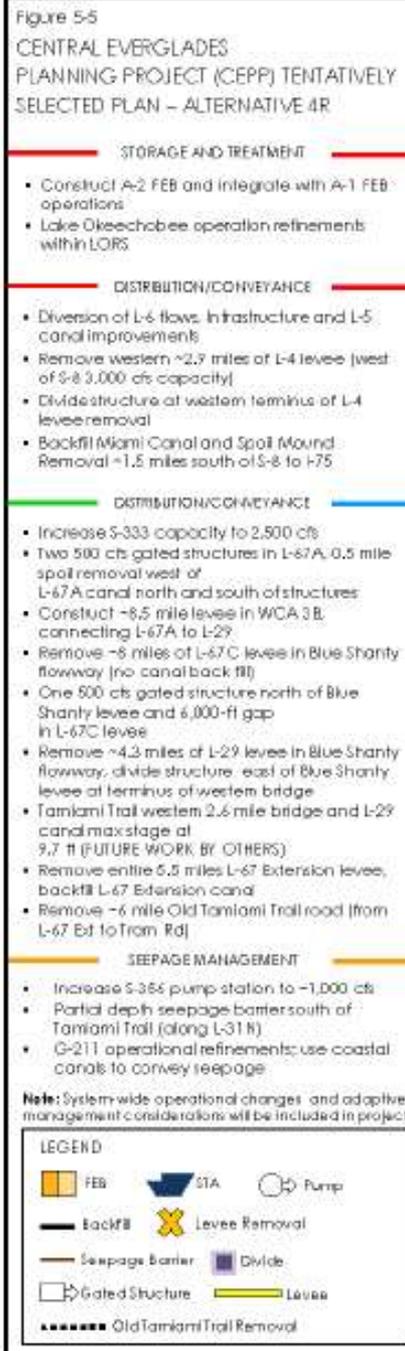
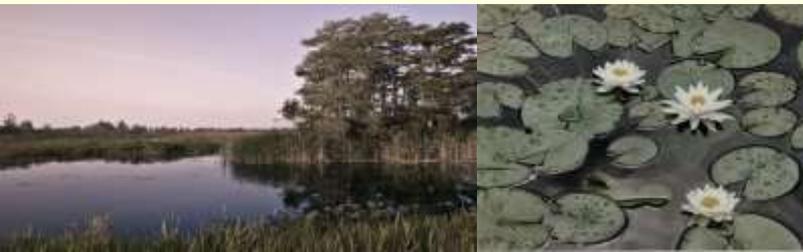
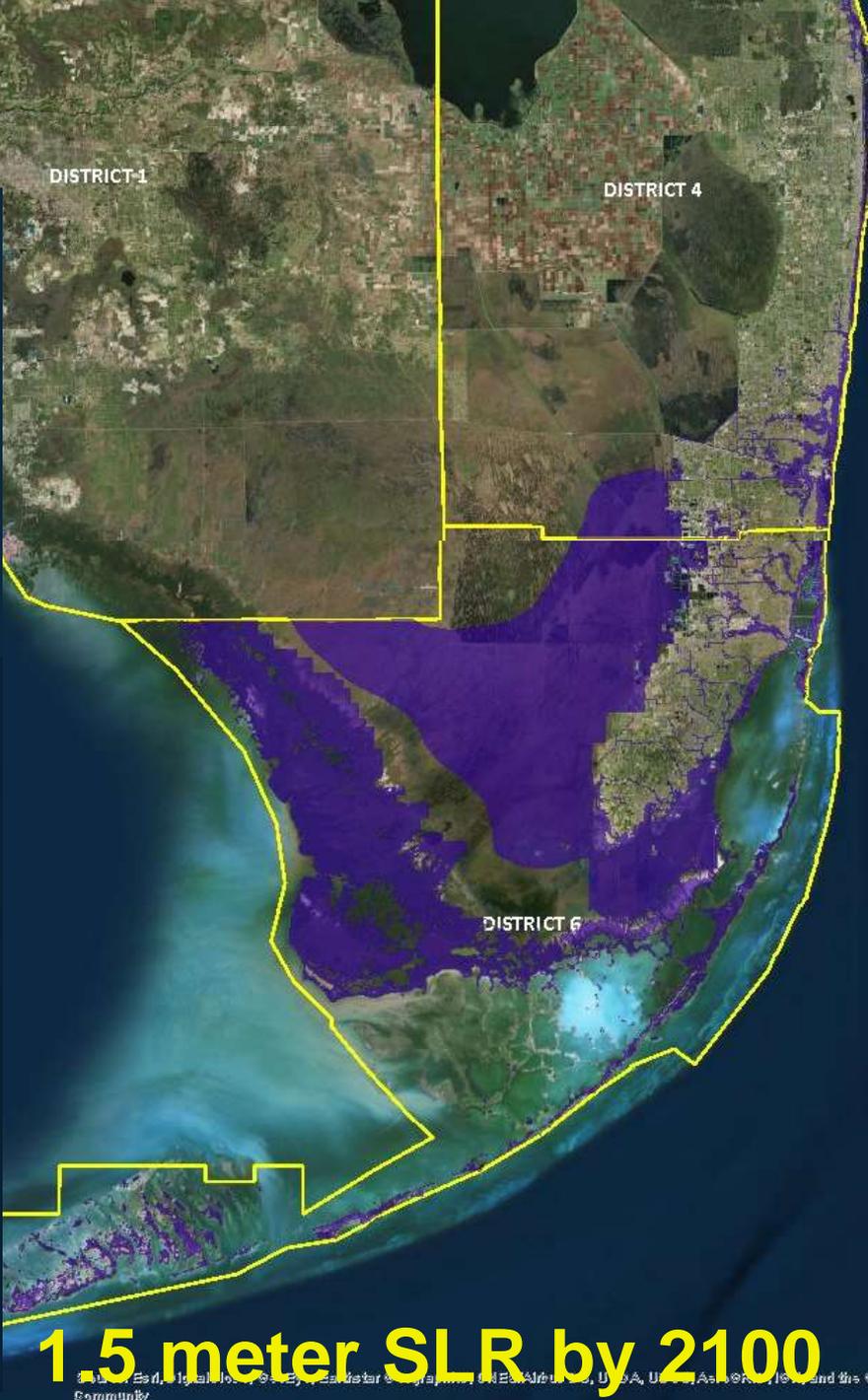
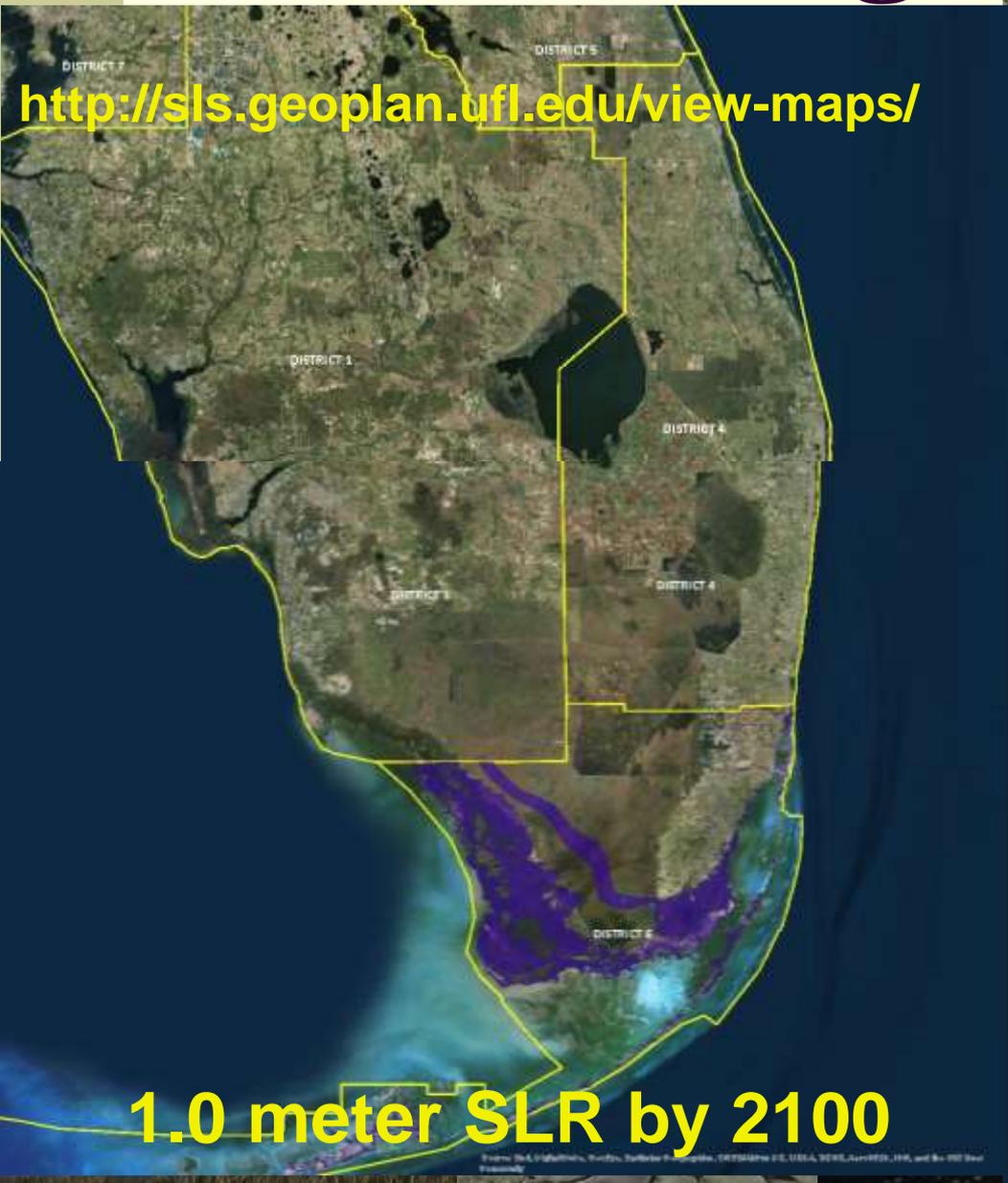


Figure I-2. CEPP Alternative 4R and Alternative 4R2 (Selected Plan) Project Components



# Climate Change

<http://sls.geoplan.ufl.edu/view-maps/>



Florida State University, University of Florida, University of South Florida, University of Central Florida, University of North Florida, University of West Florida, University of Tampa, University of State of Florida System, and the Community

# Ongoing Work – Management Recommendations

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- **Developing Hydrology PM**
- **Developing Habitat quality index**
- **Invasives treatment monitoring**
- **Tree island surveys**
- **Vegetation surveys**
- **EIRAMP surveys**



*Thank You!*

