Board of County Commissioners

Chapter 15, Article X
Wetland Conservation Ordinance

State of Wetlands Study
Work Session

January 24, 2023

Presentation Outline

- Background
- Technical Study
- Summary
- Next Steps

Background

- **Why Are We Here?**
  - Update the Wetland Conservation Ordinance to better reflect Board-directed policy and current regulatory climate
  - Make permit process and outcomes more streamlined, predictable and consistent
    - Identify and protect natural resources that are most important, functional, or rare
    - Re-define and clarify review criteria
    - Identify opportunities for streamlining process
  - Balancing natural resource protection with property rights

Background

BCC Policy Discussions

- December 2021: Work session on current wetland permitting and review processes
- Fall/Winter 2022: Wetland Tours
- December 2022: Work session on Regulatory Framework Study
  - Article X outdated; out of sync with policy and procedures
  - Numerous regulations and policies at the State and other counties may be of benefit for consideration in a new Orange County code
  - During interviews with staff, consultants and NGOs, important feedback and ideas for consideration in the ordinance update were received

Background

- State of the Wetlands Study
  - Most comprehensive recent study of its kind evaluating wetland changes over the past 30 years
  - Comparison of the historic inventory and condition of the County's wetland resources with present day using both mapping/aerials and field data
  - Assessment of the functional changes and trends in wetland loss and wetland fragmentation
  - Analysis of ecosystem services associated with loss of wetland function

Presentation Outline

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- **Technical Study**
  - **Wetland Mapping**
  - **Wetland Fragmentation**
  - **Wetland Functional Changes**
  - **Additional Analyses**
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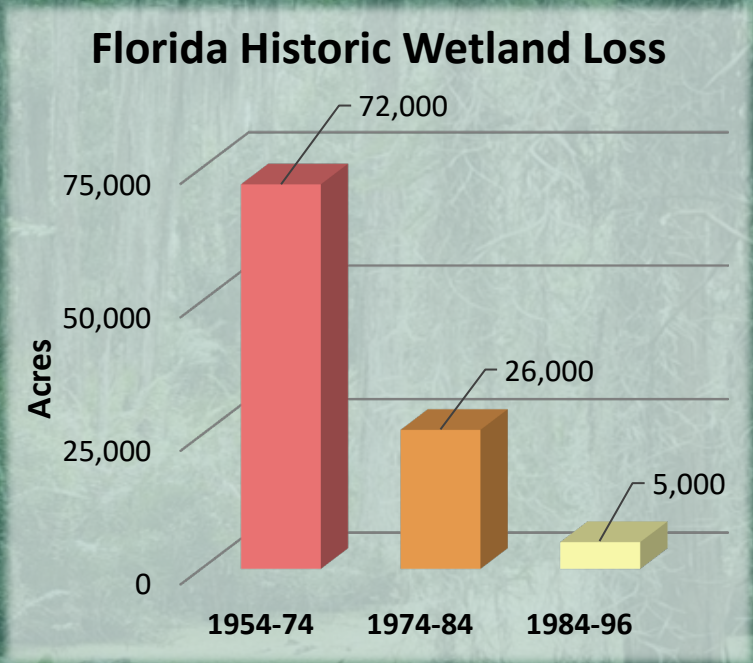
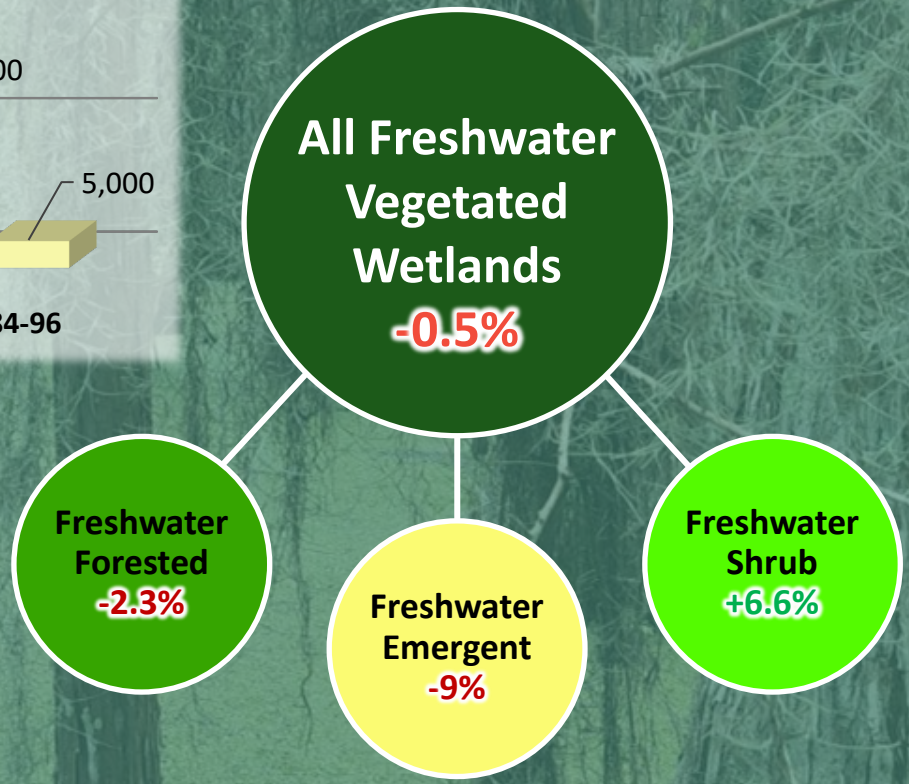
Technical Study

Wetland Mapping

- 1954 – 1996: Florida-wide studies have indicated significant loss of wetlands
- Rate of loss declined after implementation of wetland regulations such as:
  - 1972 - Clean Water Act
  - 1987 - No Net Loss Rule
  - 1989 - Orange County Wetland Ordinance
- 1984-2004: Central FL study of isolated cypress systems showed 26% loss
- Impact is unequal by wetland type, leading to loss in diversity
- The SOTW provides a wetland inventory for Orange County from 1990-2020

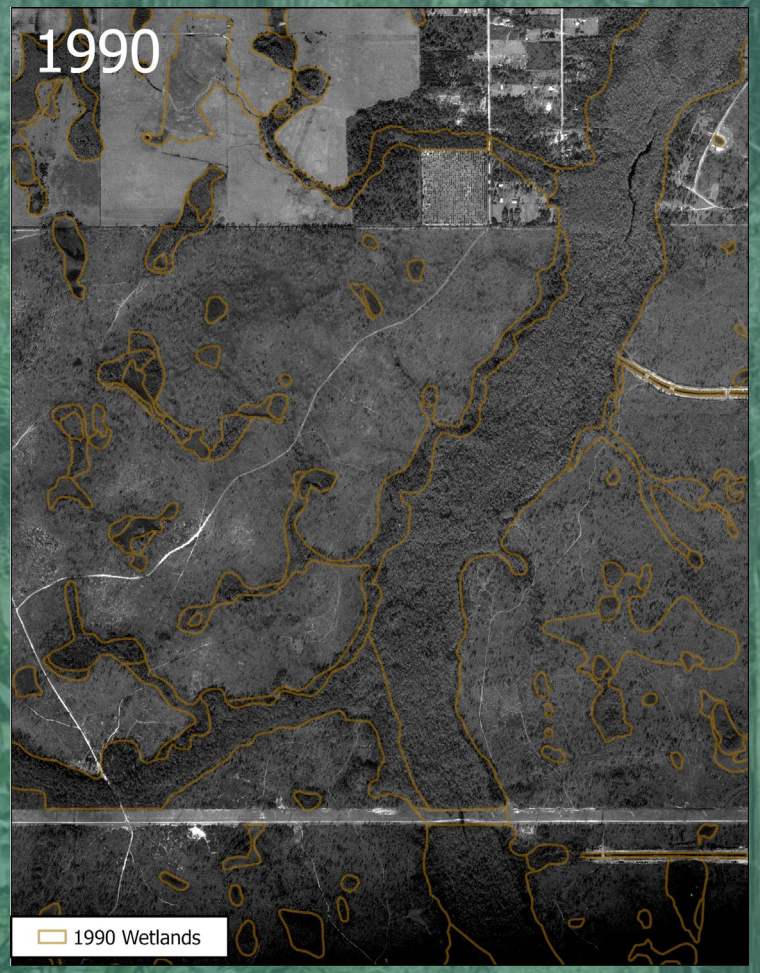




Technical Study

Wetland Mapping – Methodology and API

- Used Aerial Photointerpretation (API) by trained ecologists/analysts
- API is standard acceptable method used to create Land-Use/Land-Cover (LULC) datasets and maps from remotely sensed data
- API has been used extensively since the 1970s by local, state, and federal agencies to classify land cover, vegetation and soils.
- Wetland signatures include vegetation, texture, soil hydration
- Decadal mapping: 1990-2020



Technical Study

Wetland Mapping – Selected Wetland Types

Mixed Hardwoods

Cypress Domes

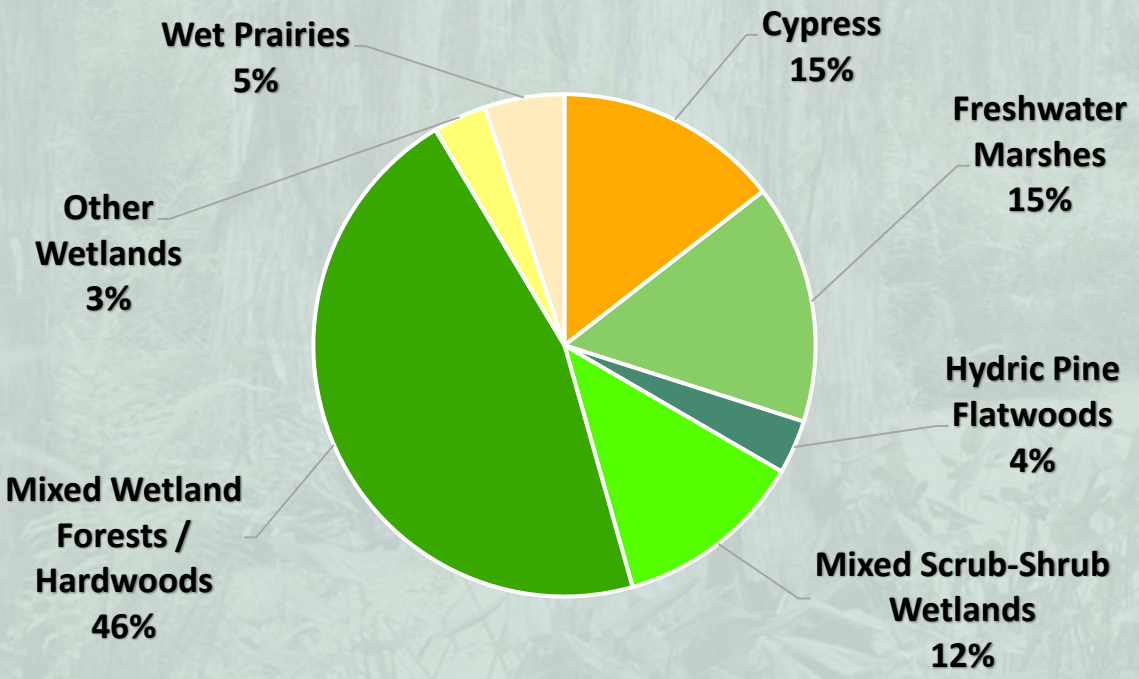
Freshwater Marshes

Hydric Pine Flatwoods

Technical Study

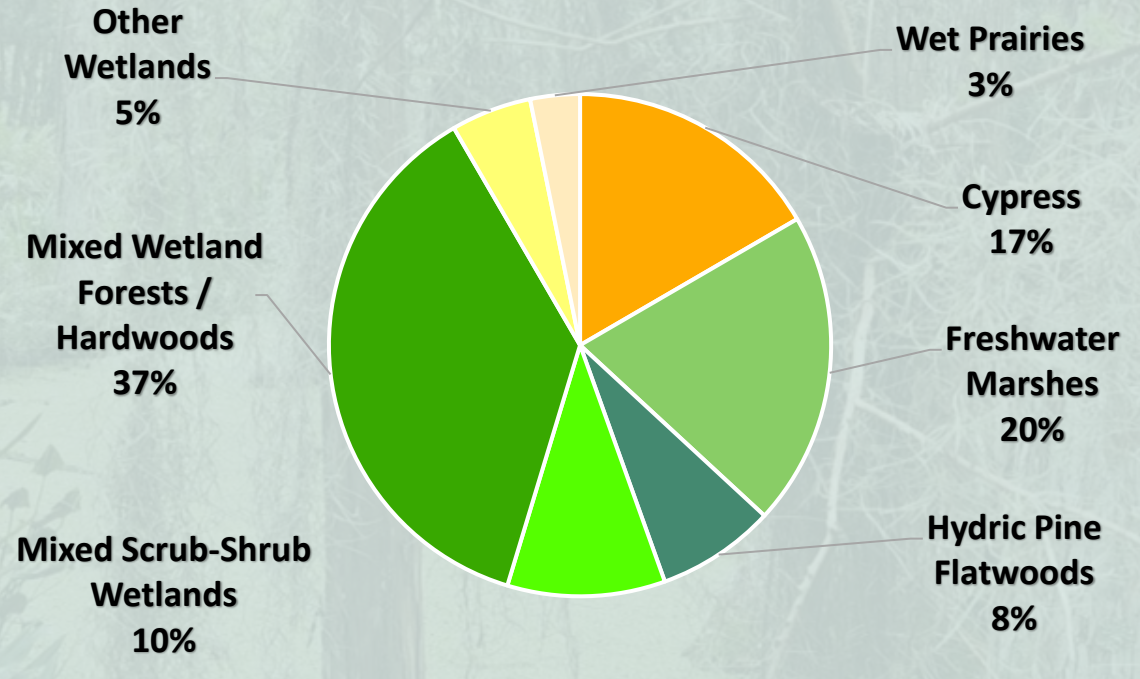
Wetland Mapping – Changes in Orange County Wetland Coverage

1990 Wetland Coverage



Total Wetland Acres = 159,346

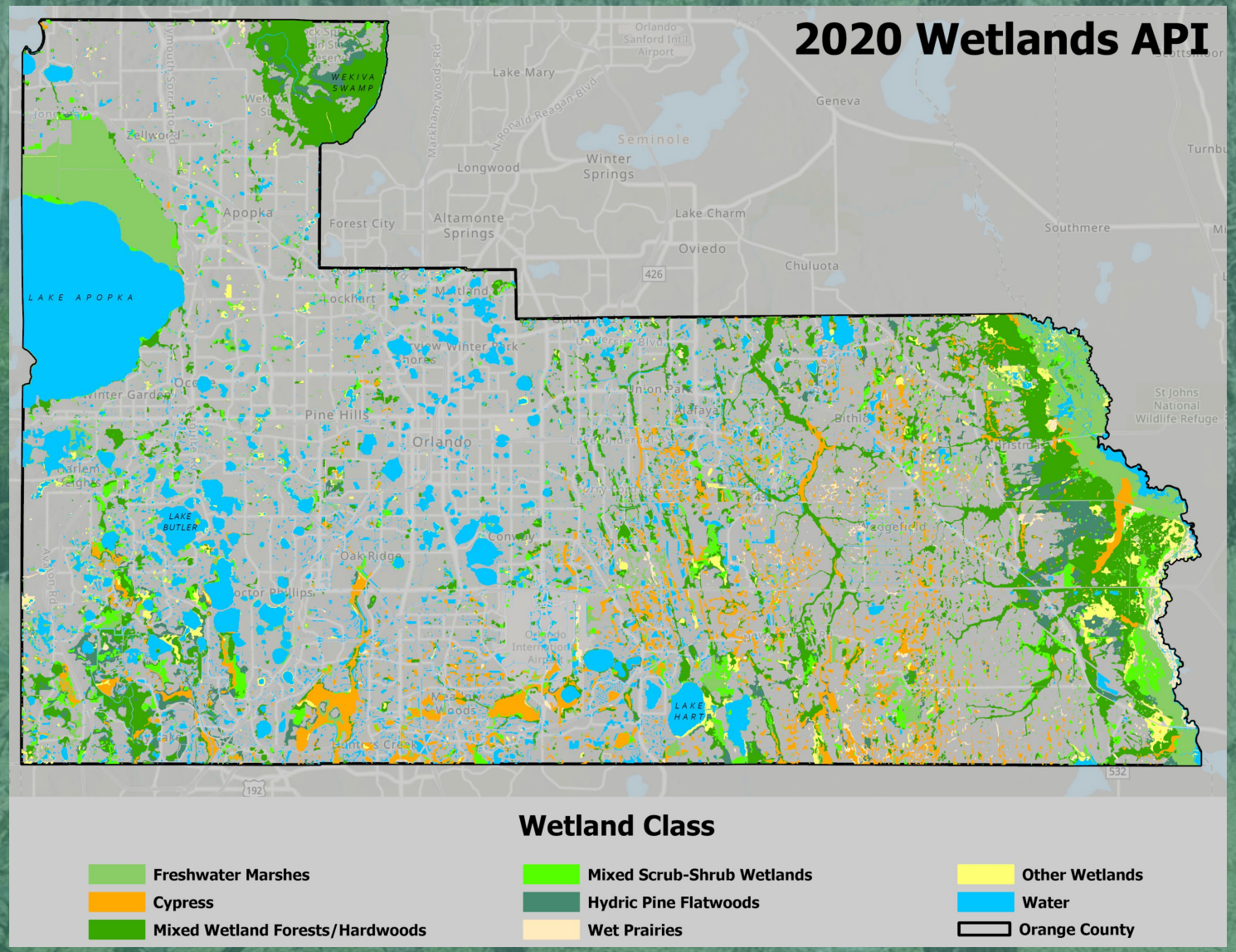
2020 Wetland Coverage



Total Wetland Acres = 160,707

Technical Study

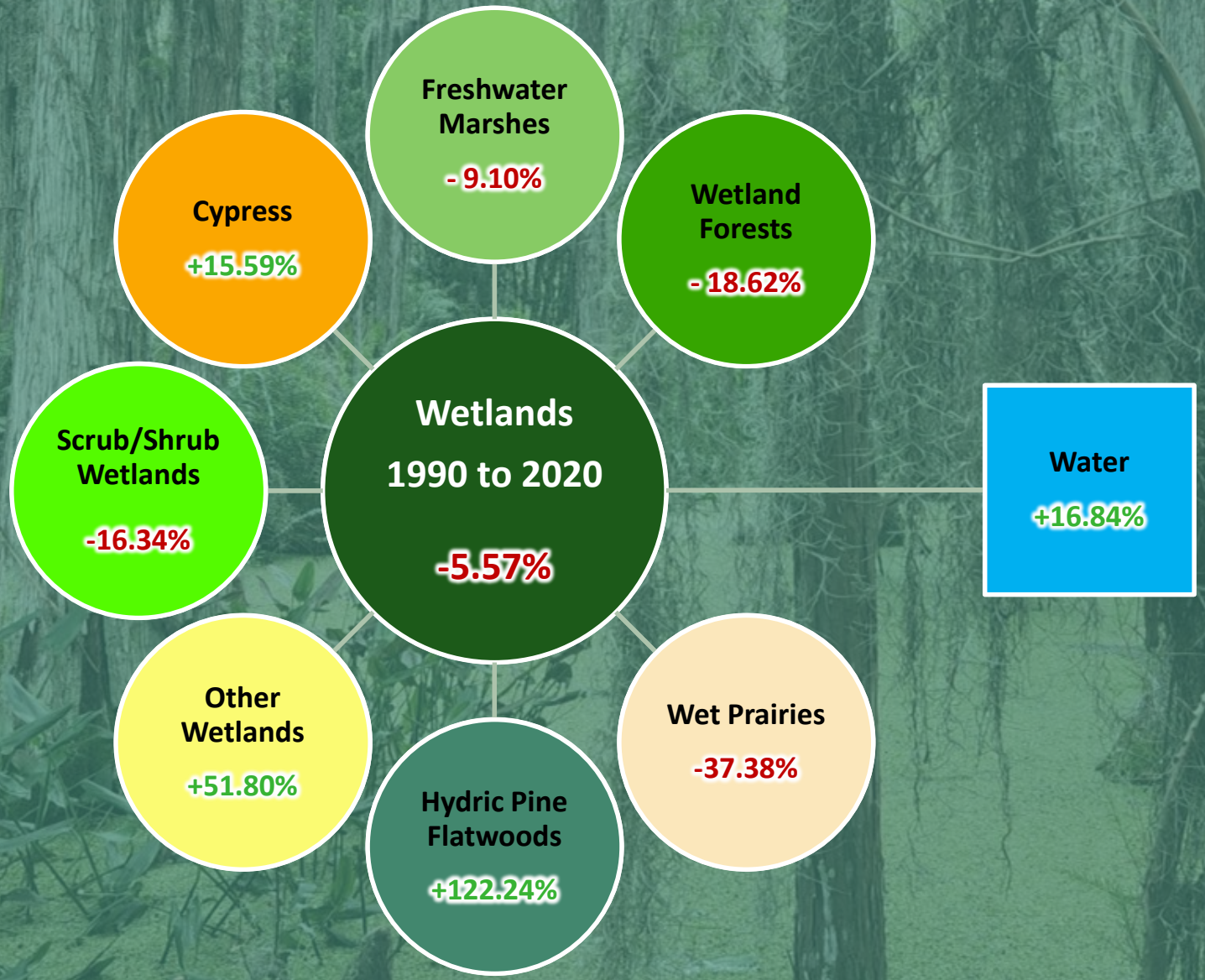
Wetland Mapping – Changes in Orange County Wetland Coverage



Technical Study

Wetland Mapping – Changes in Orange County Wetland Coverage

Removing Lake Apopka Restoration Area (10,231 acres)



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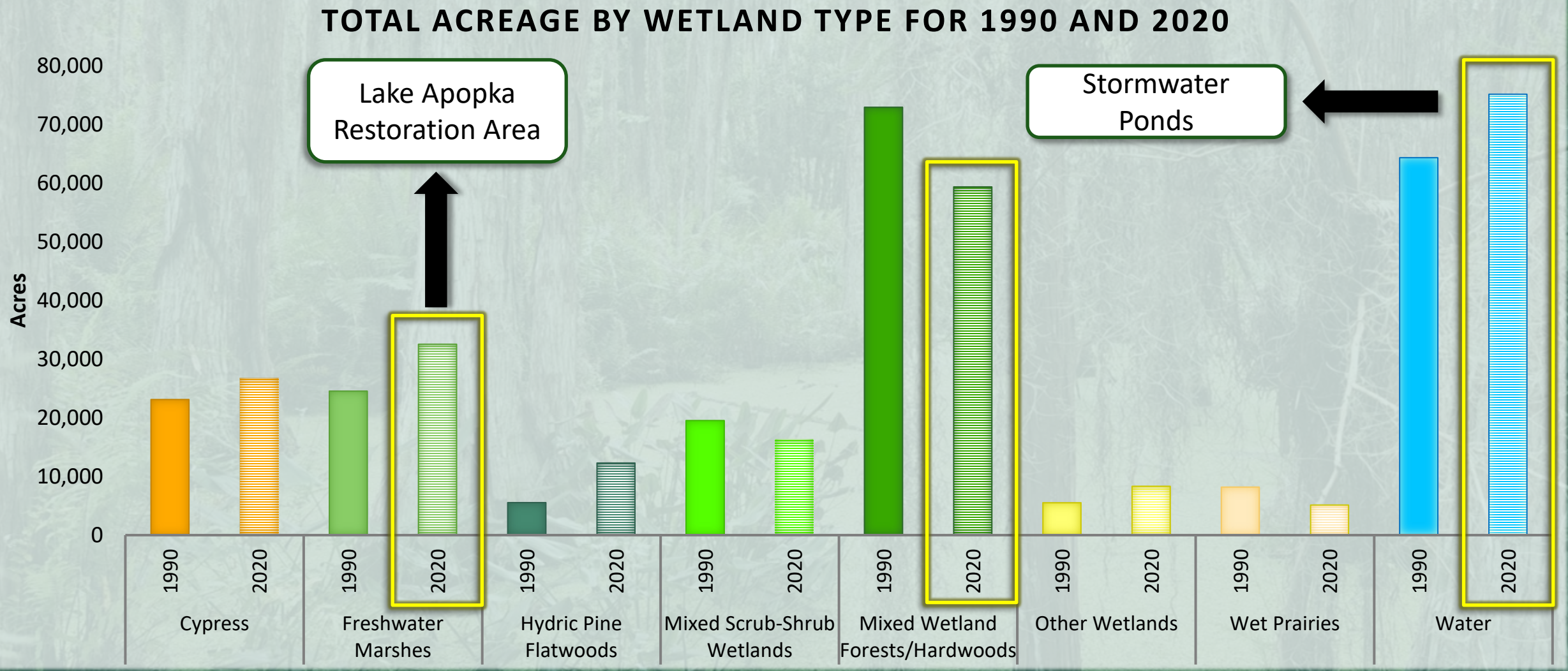
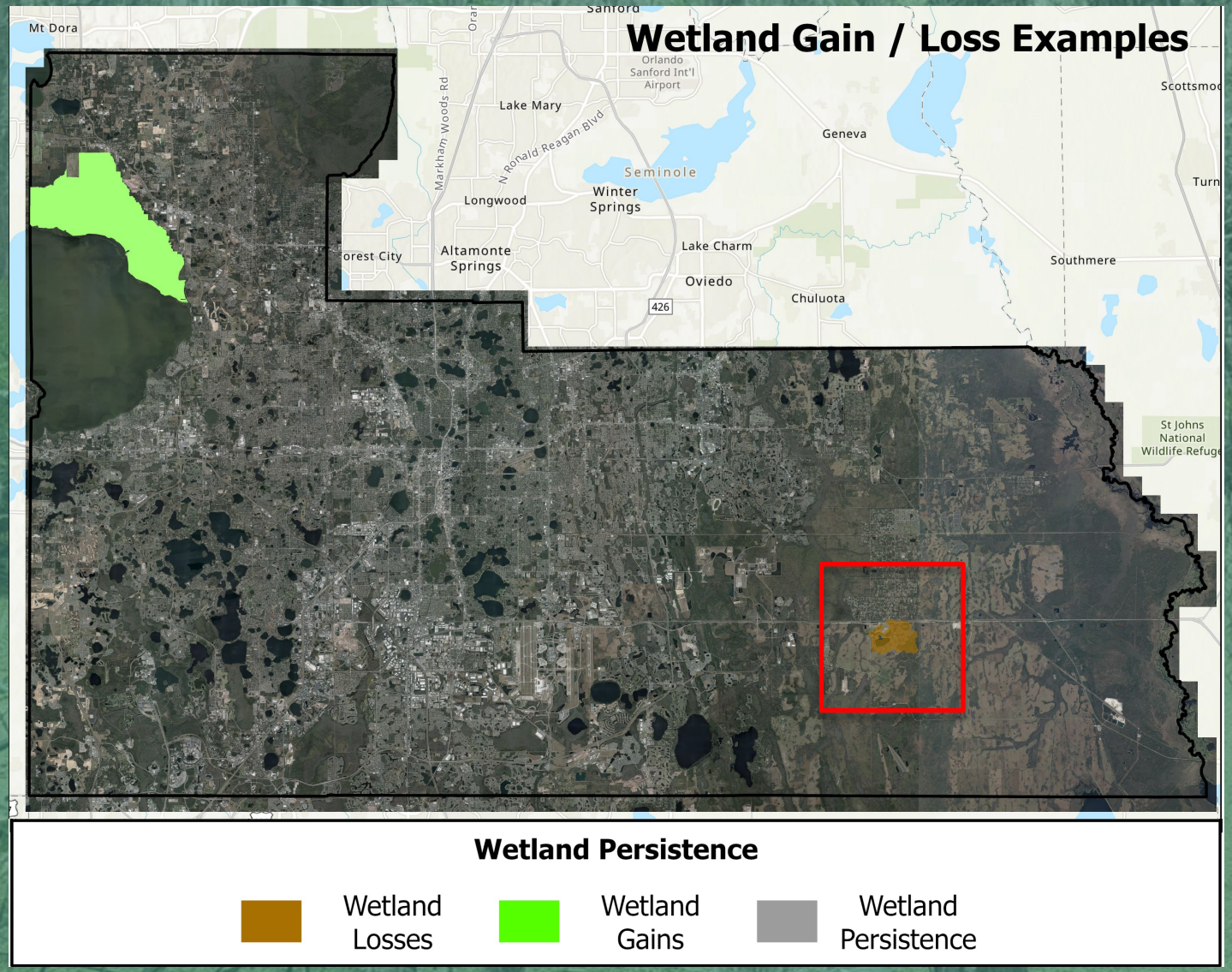


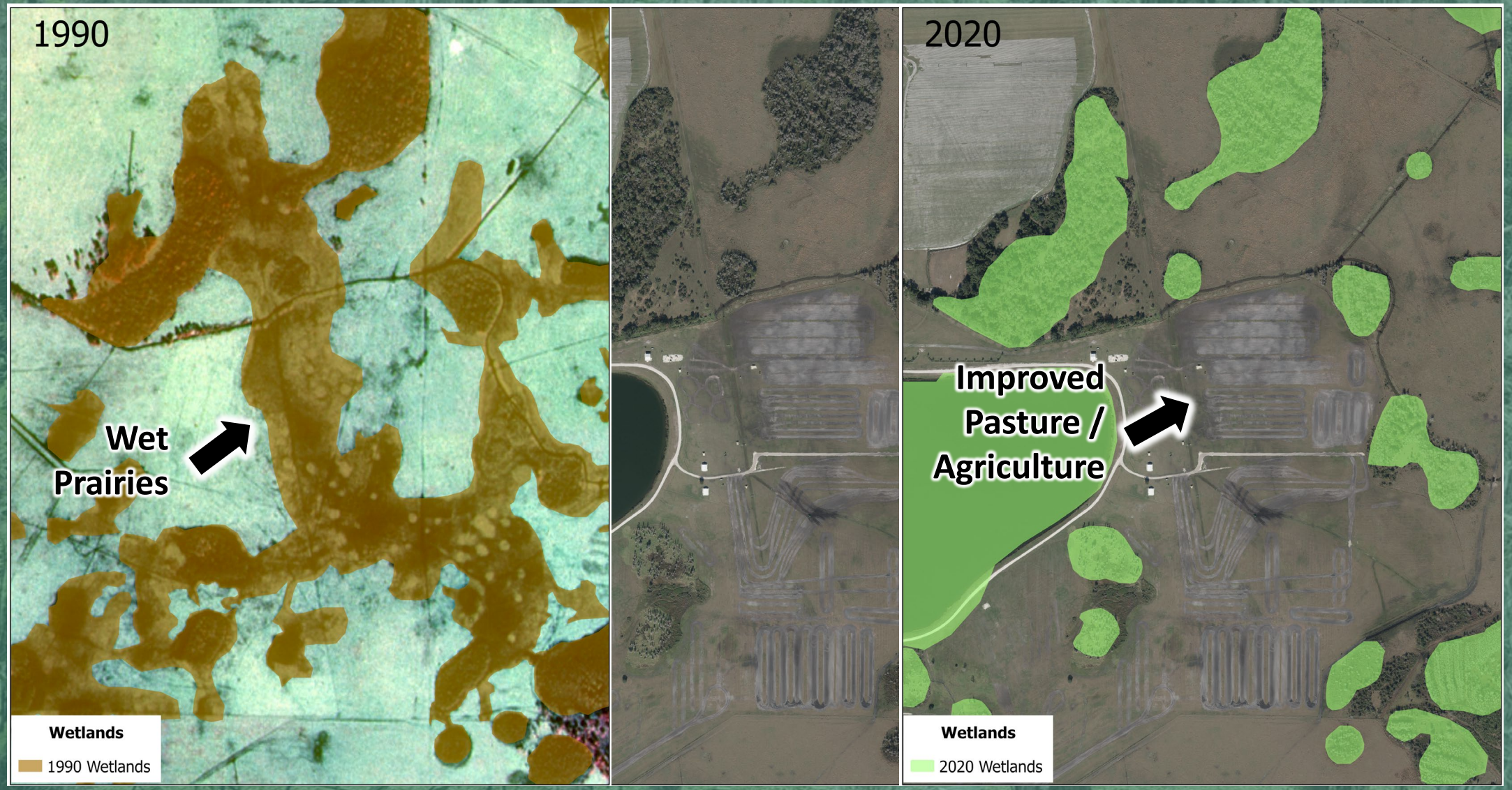
Technical Study

Wetland Mapping – Persistence Maps / Change Detection



Technical Study

Wetland Mapping – Persistence Maps (Wetlands Lost)



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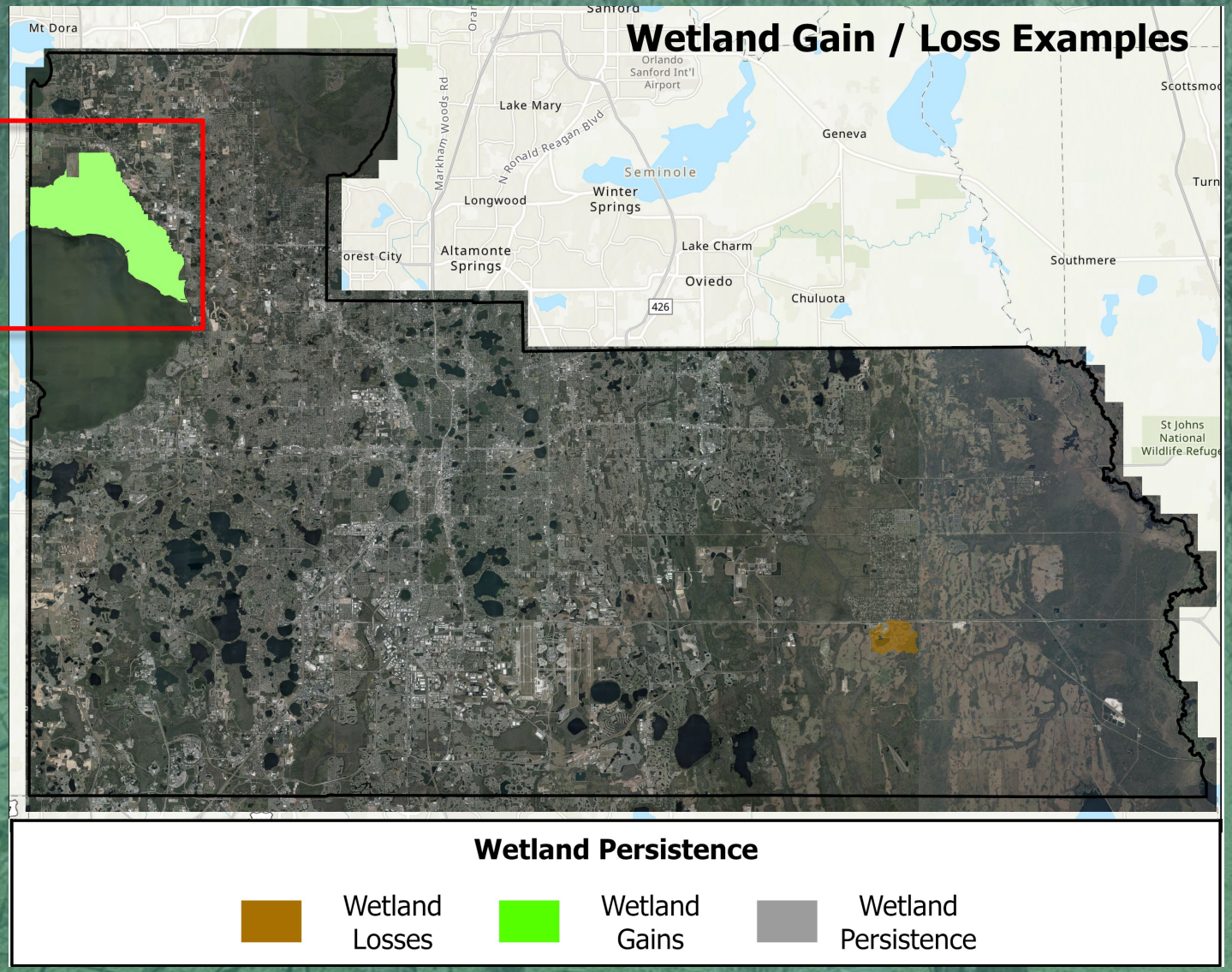
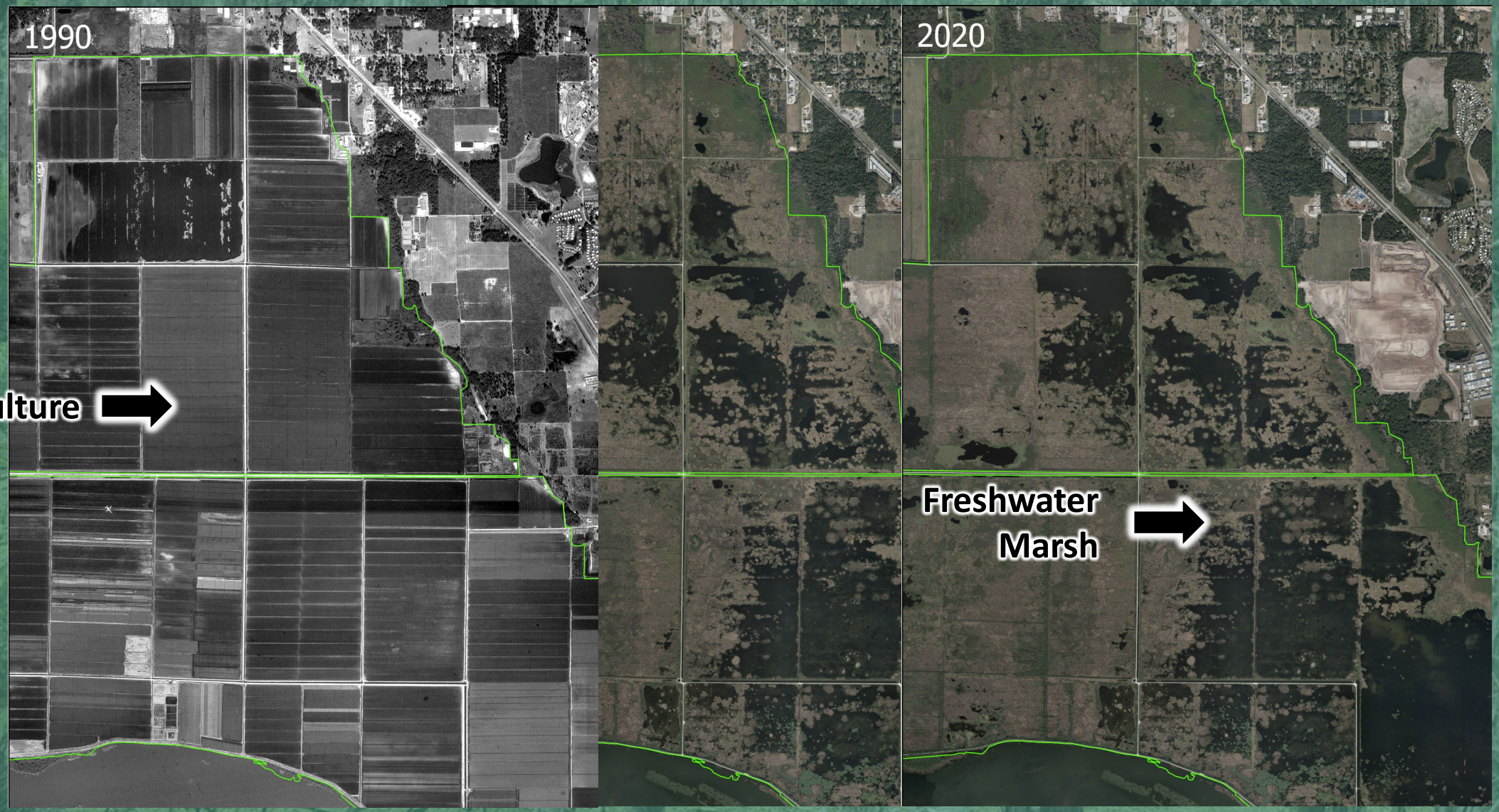
Wetland Mapping – Persistence Maps / Change Detection



Technical Study

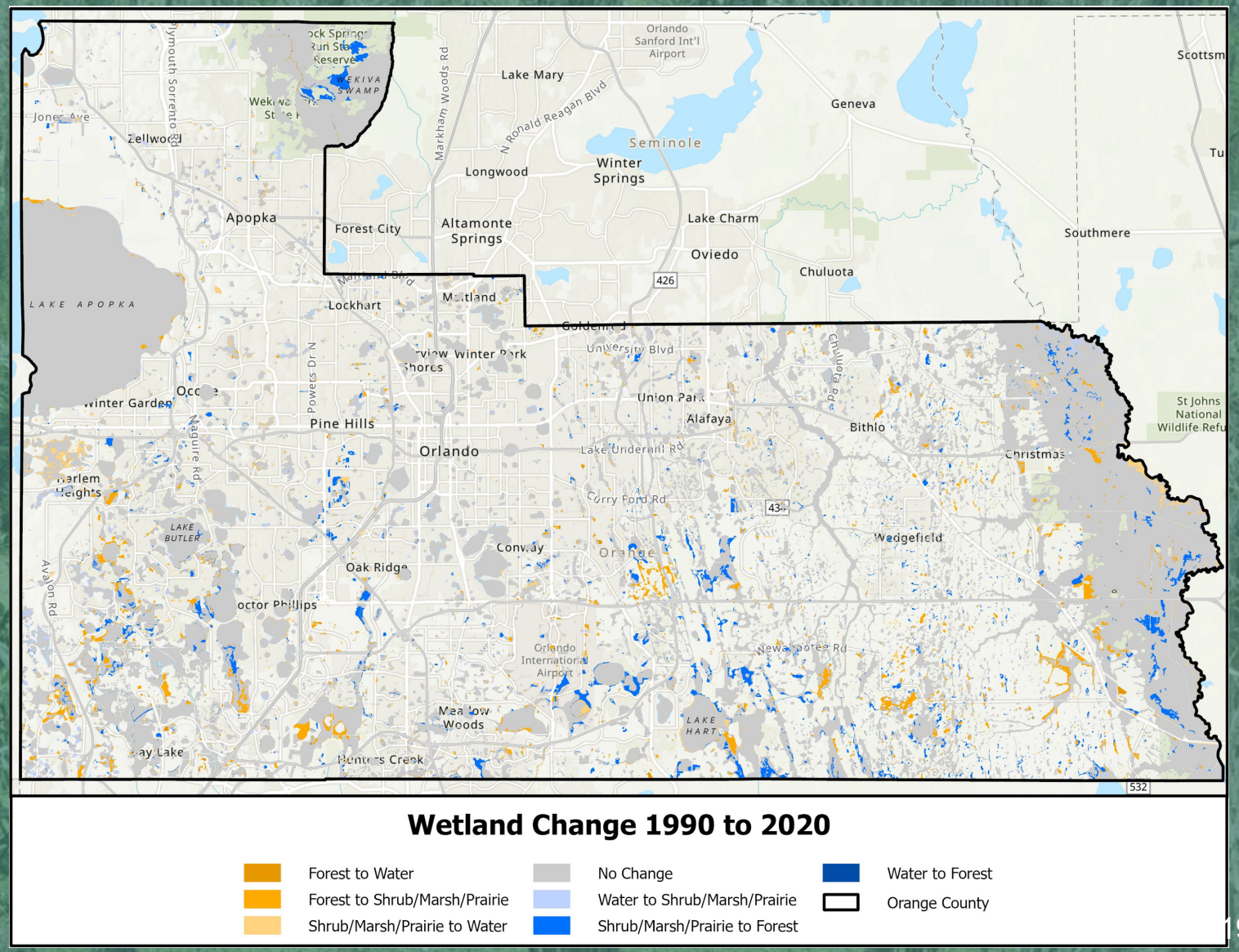
Wetland Mapping – Persistence Maps (Wetlands Gained)



Technical Study

Wetland Mapping – Wetland Change

- Many of the surface water and wetlands do not appear to change in 30 years
- Succession is occurring in some wetlands (shrub to forested system)
- Changes equally occurring with losses of forested systems to shrub/herb systems (canopy removed)
- Changes in wetland type impact biodiversity



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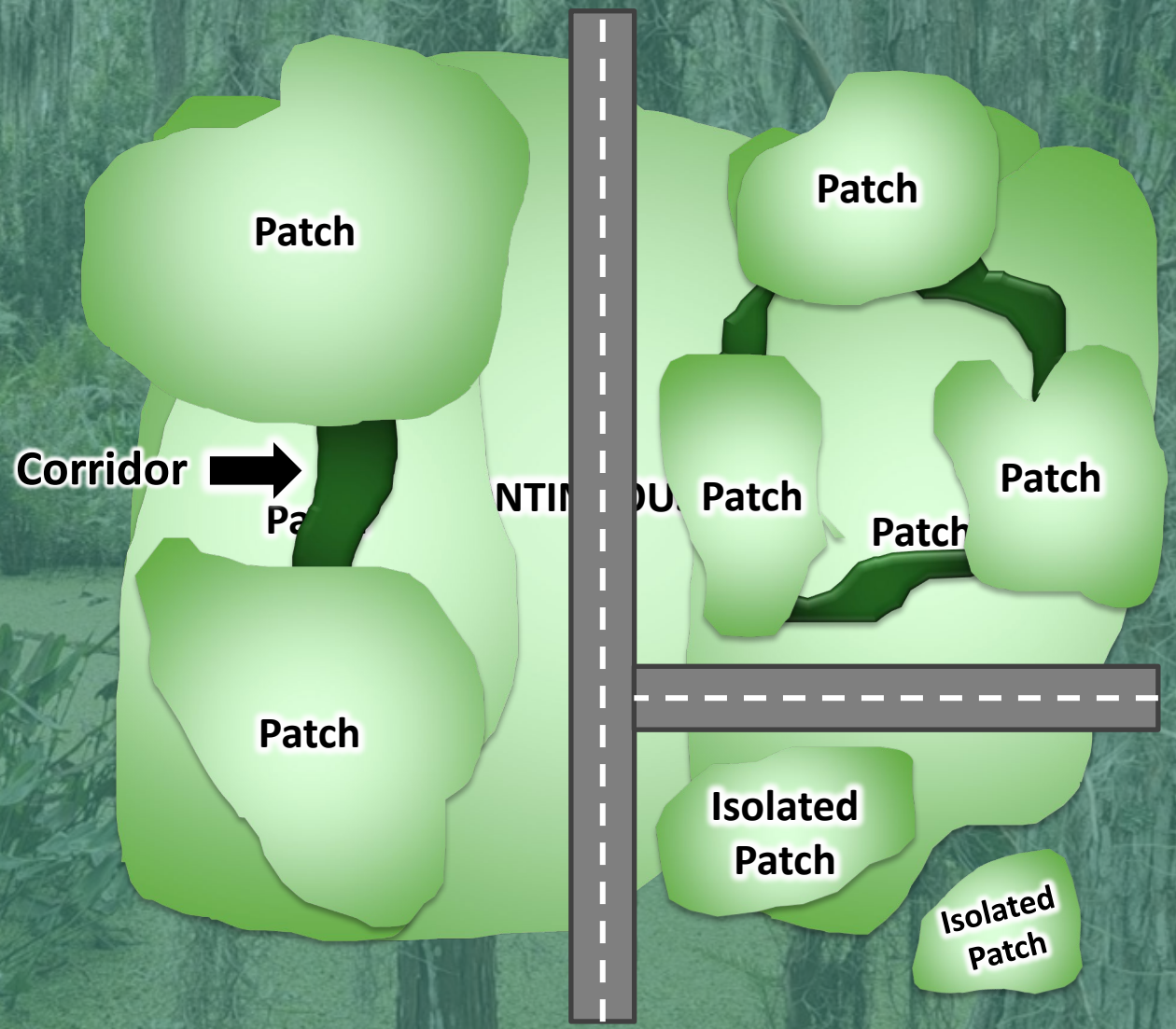
Technical Study

Wetland Fragmentation – Background

- Habitat destruction typically leads to fragmentation
- Division of habitat into smaller and more isolated fragments, separated by human-transformed land cover.
- Fragmentation impacts ecosystem function, hydrology, habitat, and species composition (i.e., invasive cover)
- Selected metrics compared:
  - Edge: perimeter of wetland
  - Shape Index: perimeter/√patch area
  - Contiguity: spatial connectiveness



Technical Study

Wetland Fragmentation – Changes from 1990 to 2020

WETLAND TYPE	Total Edge (mi)		
	1990	2020	Trend
Cypress	564.74	754.90	↑
Freshwater Marshes	1,008.19	1,194.72	↑
Hydric Pine Flatwoods	129.44	371.21	↑
Mixed Scrub-Shrub Wetlands	697.80	815.60	↑
Mixed Wetland Forests / Hardwoods	1,083.09	1,189.78	↑
Other Wetlands	278.45	297.17	–
Wet Prairies	279.89	619.44	↑
Water	739.19	995.91	↑

Technical Study

Wetland Fragmentation – Changes from 1990 to 2020

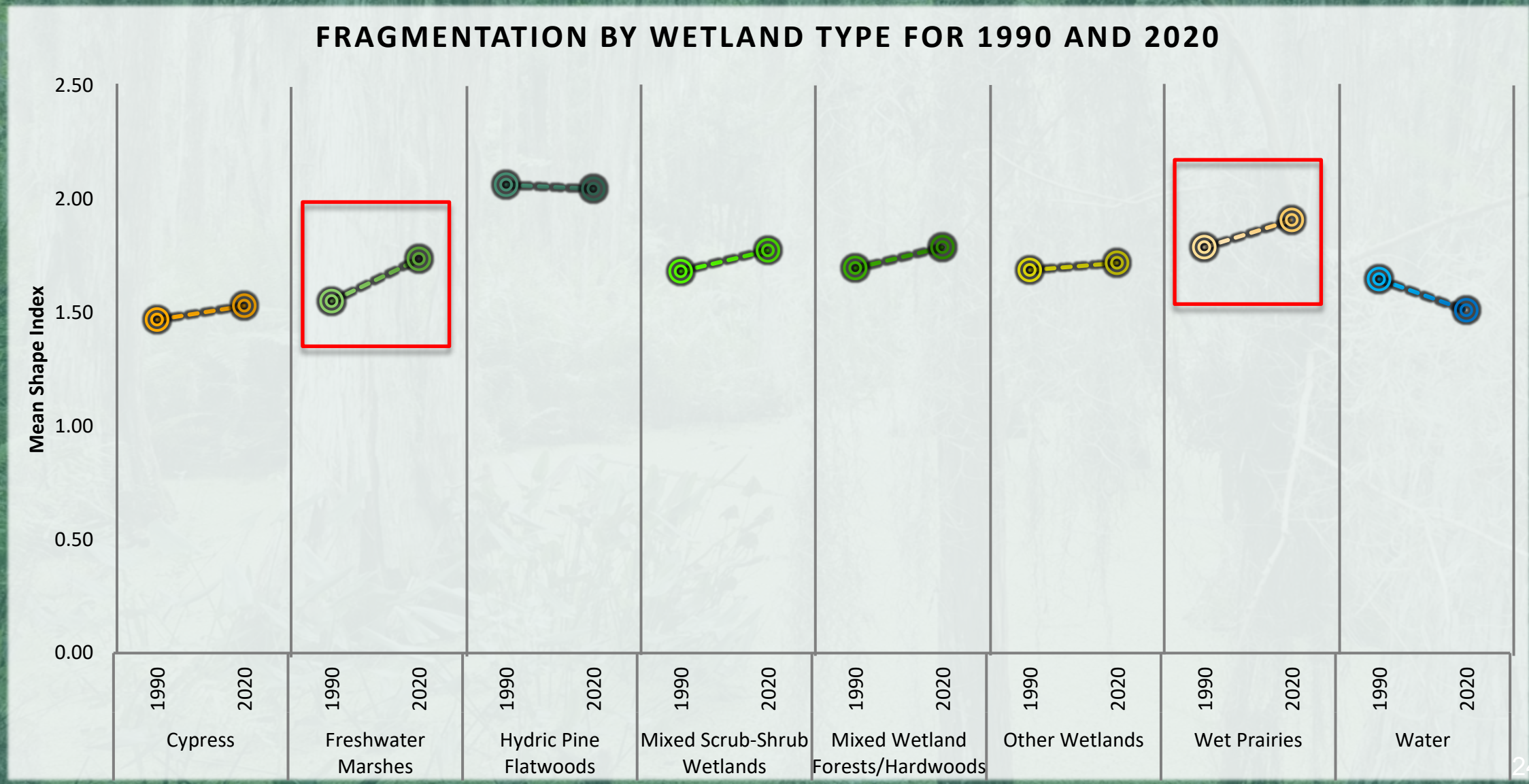
WETLAND TYPE	Mean Contiguity Index		
	1990	2020	Trend
Cypress	0.90	0.89	
Freshwater Marshes	0.83	0.77	↓
Hydric Pine Flatwoods	0.92	0.89	↓
Mixed Scrub-Shrub Wetlands	0.88	0.86	↓
Mixed Wetland Forests / Hardwoods	0.89	0.88	
Other Wetlands	0.85	0.81	↓
Wet Prairies	0.82	0.78	↓
Water	0.84	0.84	

Technical Study

Wetland Fragmentation – Changes from 1990 to 2020

Most Fragmented

Least Fragmented



Technical Study

Wetland Mapping and Fragmentation – Key Takeaways

- Between 1990-2020:
  - Overall loss of acreage is ~5.6% or ~8500 acres
  - Losses most dramatic for wet prairies (37%); mixed wetland forested/hardwoods systems (19%), all system types are important in order to achieve diversity
  - Gains in hydric pine flatwoods (>100%)
  - Composition of the wetland types is changing over time, with succession evident in some cases, and anthropogenic impacts in others
- Loss in acreage is not equivalent to change in wetland function
- Fragmentation impact on wetlands varies significantly by wetland type:
  - Moderate decline in contiguity and increased fragmentation for freshwater marshes and wet prairies
  - Cypress and hydric pine appear to be more robust and present less fragmentation impacts

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Technical Study

Wetland Functional Changes – Field Assessment Methods

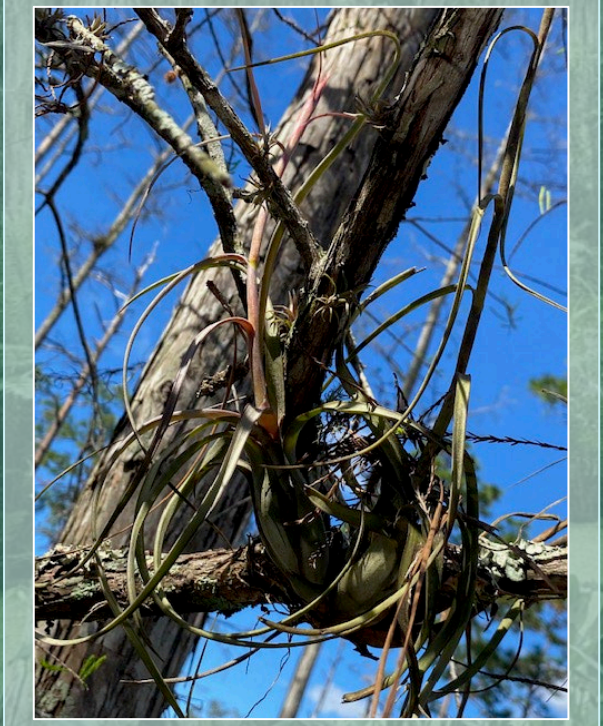
- Selected 50 onsite mitigation sites using CAI permit data
- Used a ranking mechanism for site selection
  - CAI permits issued >10 years ago
  - Prior to UMAM (or equivalent)
  - One of the five types: wetland forested mixed/wetland hardwoods, cypress, hydric pine, wet prairies, and freshwater marshes
- Objective:
  - Use for mapping quality assurance
  - Use as surrogate for functional change, looking beyond acre loss
- Metrics collected: functional data (UMAM), % invasive cover class
- Selected sites (15): using hyperspectral imaging using an UAS

Technical Study

Wetland Functional Changes – Interesting Findings

Threatened -State

Sarracenia minor
(Hooded Pitcherplant)

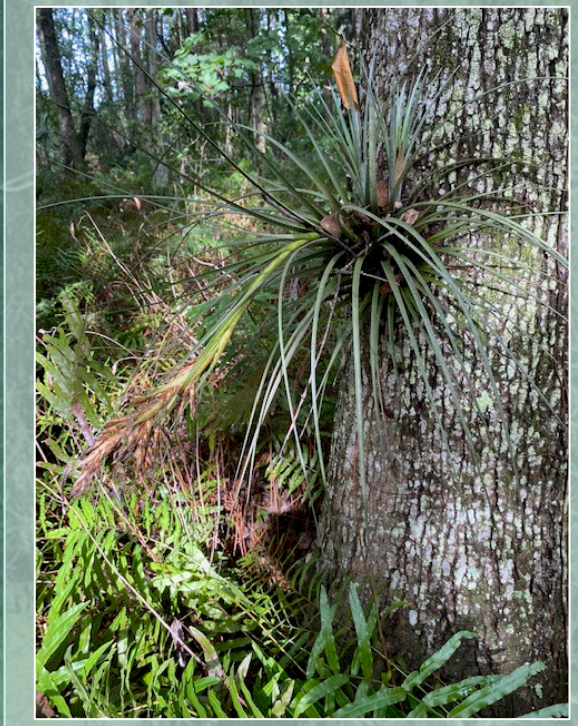


Threatened -State

Tillandsia balbisiana
(Northern Needleleaf)

Threatened -State

Dendrophylax porrectus
(Jingle Bell Orchid)



Endangered - State

Tillandsia fasciculata
(Cardinal Airplant)

Technical Study

Wetland Functional Changes –Summary Results

Wetland Type	Number of Sites	Permit UMAM	Current UMAM	% UMAM Change (Avg)	Number Sites Gained Function	Number Sites Lost Function	% Exotic Category (Avg)
Cypress	10	0.77	0.77	1%	6	4	2.70
Mixed Forested	20	0.77	0.71	-7%	6	14	2.70
Freshwater Marsh	12	0.83	0.74	-10%	1	11	2.60
Wet Prairie	2	0.70	0.83	19%	2	0	1.00
Hydric Pine	4	0.79	0.85	8%	3	1	1.25
Mixed Shrub	3	0.74	0.64	-12%	0	3	3.30
All Sites	**51**	**0.78**	**0.74**	**-4%**	**18**	**33**	2.51

Exotic % Category	Exotic % Present
1	< 1%
2	1% to 5%
3	5% to 25%
4	25% to 50%
5	> 50%

Technical Study

Wetland Functional Changes – Key Takeaways

- Some sites surrounded by development were of very high quality.
- Remote/rural sites maintained or gained wetland function over time.
- Wetland functional loss is highest for shrub systems, followed by freshwater marshes and mixed hardwoods.
- Wetland functional gains for wet prairies and pine flatwood systems.
- Many freshwater marshes are transitioning to a scrub-shrub or forested system.
- Hydrology impacts often lead to increased exotic presence.
- Exotic vegetation was often observed in the edges of the systems (initial 25').
- Higher level of assessment is needed when considering preserving/planting an upland buffer to avoid woody species from migrating into herbaceous systems.
- A robust maintenance program helps ensure long term health of the system.

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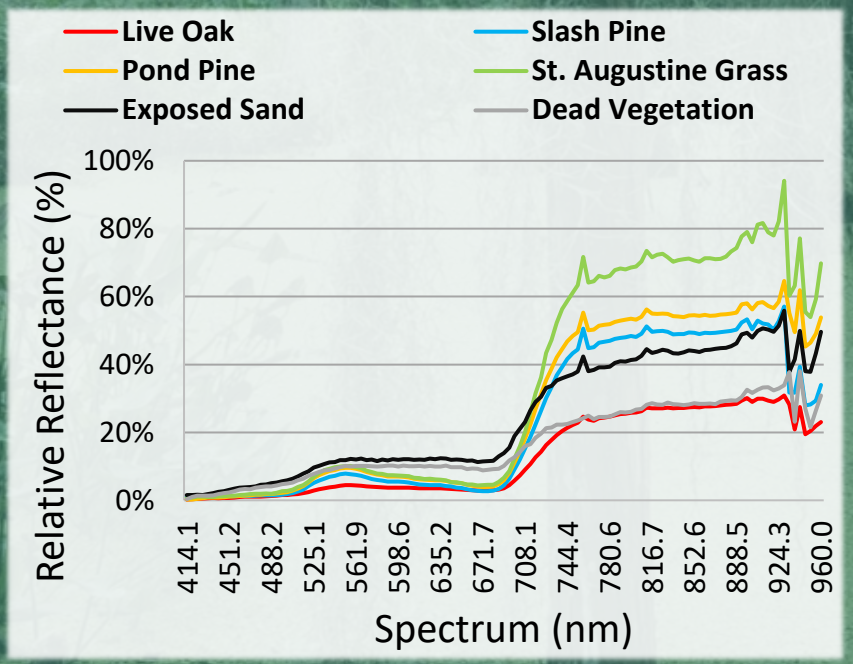
Technical Study

Additional Analyses – State of the Wetland Study Report

- Correlations of population change with wetland coverage change and fragmentation metrics
- Correlations of wetland losses with impaired systems
- Examining functional loss in context with other variables: land use change, population growth and others
- Development of wetland health indices based on remote sensing (UAS analysis)
- Conceptual scenario estimate of wetland loss by 2050
- Impacts of wetland loss modeling



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Summary

- Approx. 5.6% loss of wetland acreage County-wide from 1990-2020 (excluding Lake Apopka North Shore restoration area)
  - Most acreage loss in wet prairies (37%), and mixed wetland forested/hardwoods systems (19%)
  - Some wetland types actually gained acreage: hydric pine flatwoods (>100%)
- Composition of wetland types is changing over time; some due to succession and others anthropogenic impacts
- Remote/rural sites were better at maintaining or gaining wetland function over time; some sites surrounded by development were also of very high quality
- Gain/loss of wetland functionality over time dependent on system type and other factors

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Next Steps

- April 11, 2023: Wetland Ordinance Board Discussion
- January 2023 - May 2023: Internal draft ordinance meetings
- February 2023 - June 2023: Stakeholder Charrettes
- July 2023 - November 2023: LPA/EPC/DAB/SAB work sessions
- September 2023: BCC work session on draft ordinance
- December 2023: BCC ordinance adoption hearing