

WETLAND RESTORATION OUTCOMES IN CENTRAL FLORIDA: AN EXAMPLE FROM TWO EASEMENTS ON RANCHLAND



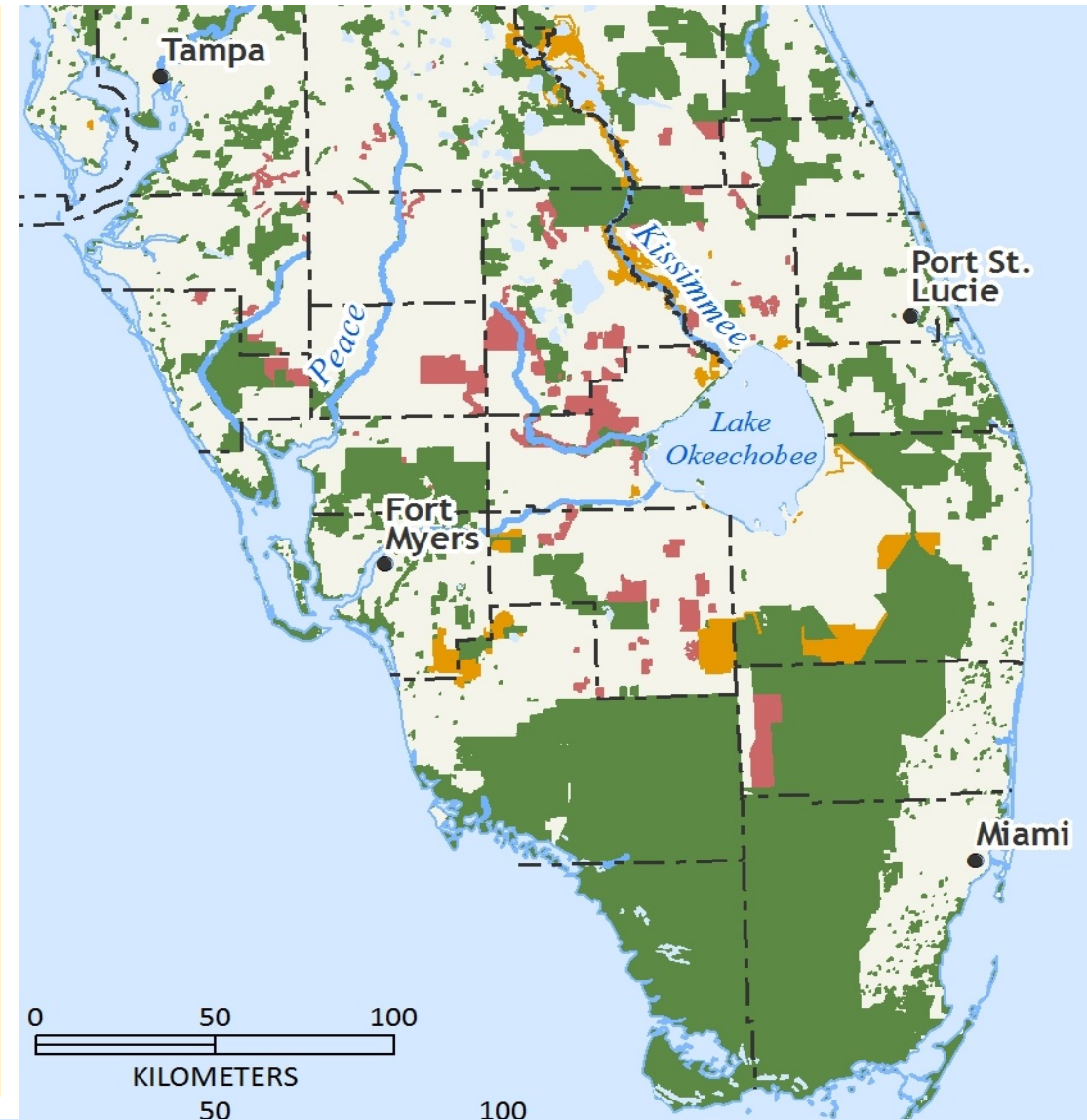
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GEER 2019- Cape Coral – April 23rd 2019

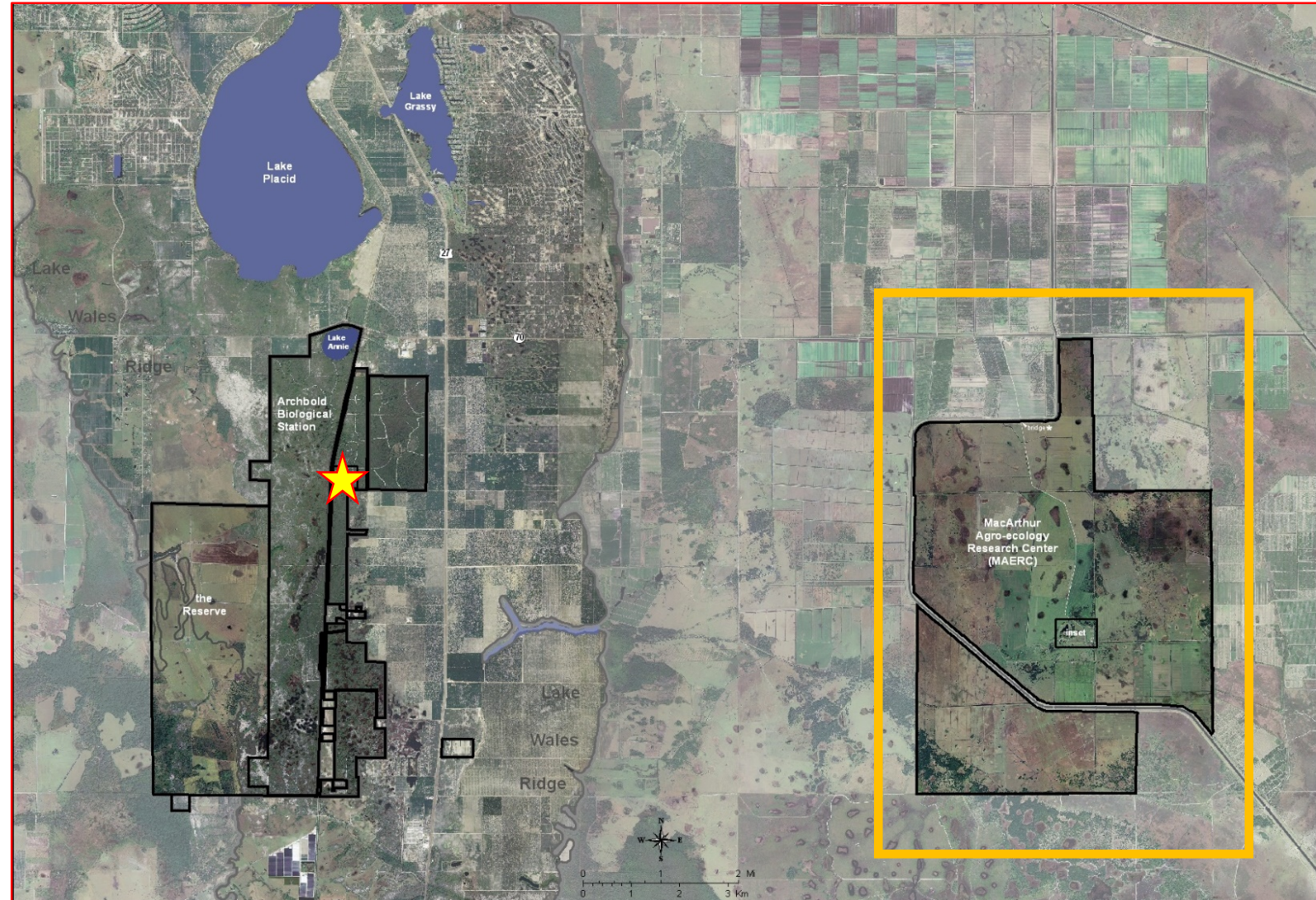
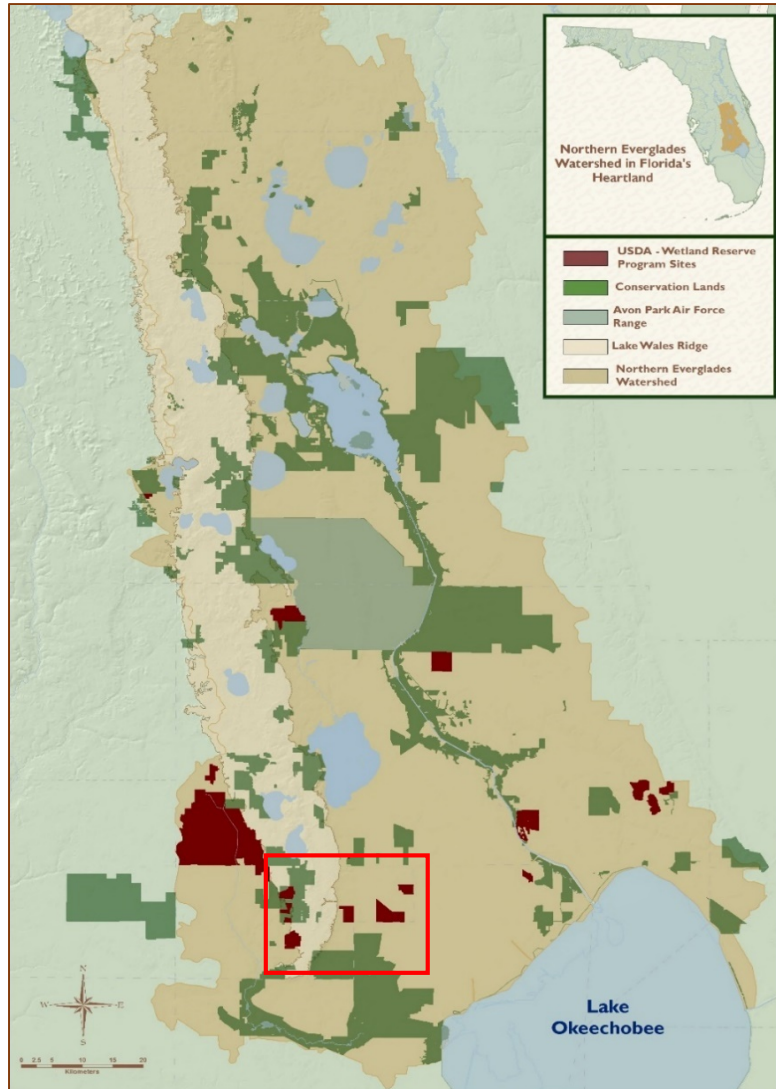
The Wetland Reserve Program & its utility

- Voluntary program: purchases/lease private land on degraded or former wetlands in need of restoration. Pay for the wetland restoration
- NRCS allow grazing (Compatible use permit)
 - Ranchlands perfect candidates for the program.
- Ranchlands are important part of the landscape in central Florida
- Holding more water on these lands may reduced negative impact on lake Okeechobee and the Everglades
 - No dedicated funding for monitoring Success of the restoration



Map date: November 2016. Data: Environmental Systems Research Institute, Florida Geographic Data Library, Florida Natural Areas Inventory, University of Florida Center for Landscape Conservation Planning, U.S. Census Bureau, U.S. Geological Survey. Projection: Albers Conical Equal Area

Archbold Biological Station and the Headwaters of the Everglades!



History of wetland restoration at ABS

- **Previous study at BIR fully operational cattle ranch**

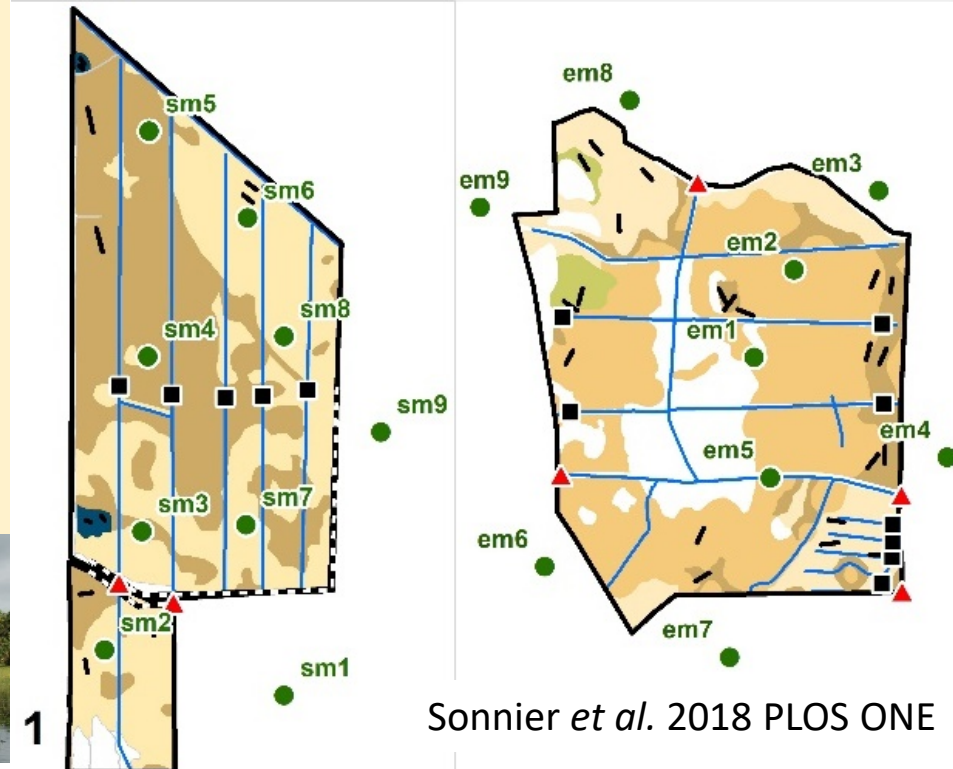
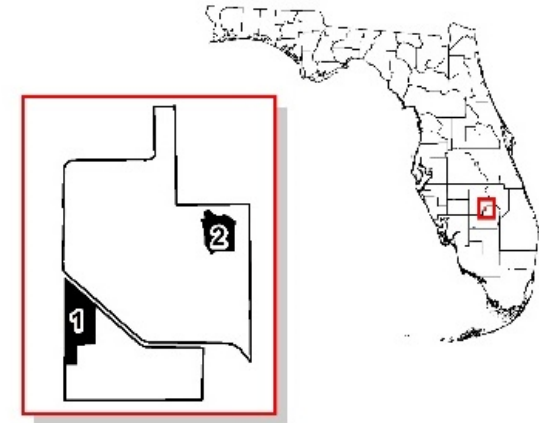
- 3000 cow-calf
- 10,500 acres

- **2 WRP easements (800 acres)**

- South marsh easement
- East marsh easement

- **Results :**

- Water levels and hydroperiod increased following restoration.
- Floristic quality and cover of wetland adapted species increased following the restoration.
- Cattle grazing had a neutral effect on success of restoration.



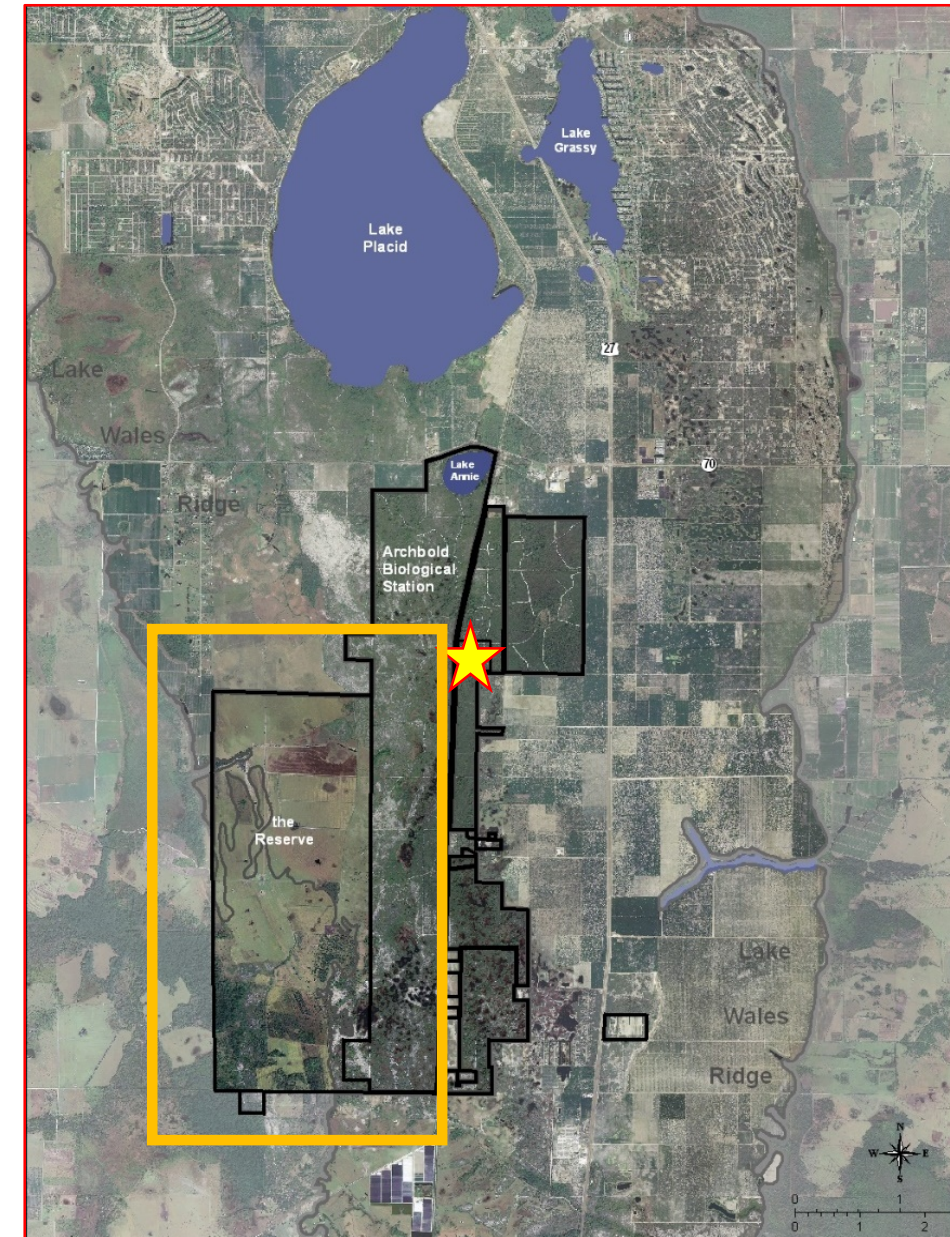
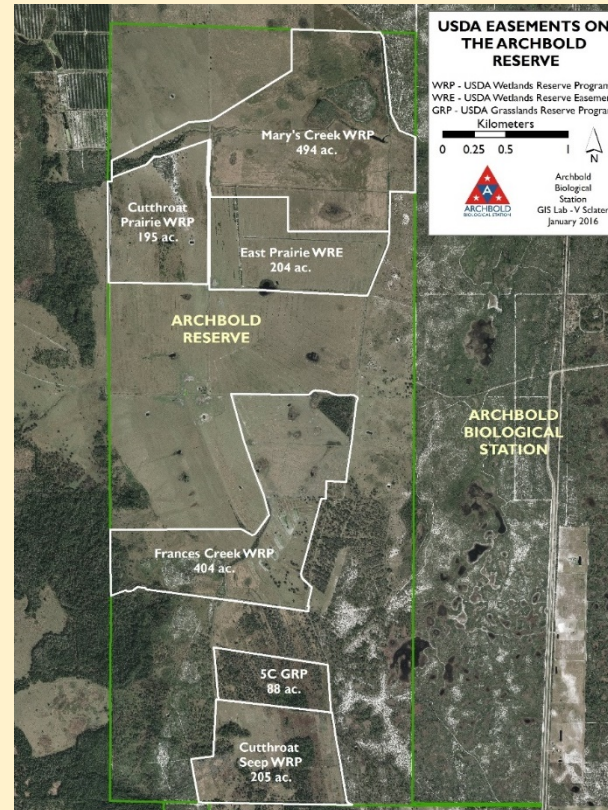
Archbold Biological Station Reserve

- **Cattle ranch (acquired in 2002)**
 - 3600 acres
 - Not operational
 - Cattle used as a management tool (not everywhere)
 - Degraded pastures
- **5 restoration easements**
 - Mary's Creek WRP (494 acres)
 - Frances Creek WRP (404 acres)



Photo: J. Daskin

Cutthroat Grass Communities
(*Coleataenia abscissa*)



Impact of restoration on seasonally flooded depressional wetlands

- **Despite drainage they remained wet part of the year**
- **Determine the success of restoration**
 - Did restoration increased water levels ?
SFWs in restored pastures > SFWs in restored pastures
 - Did restoration increase diversity, floristic quality and promote wetland adapted plant species?
SFWs in restored pastures > SFWs in restored pastures
- **Determine the influence of cattle grazing on these restored wetlands**

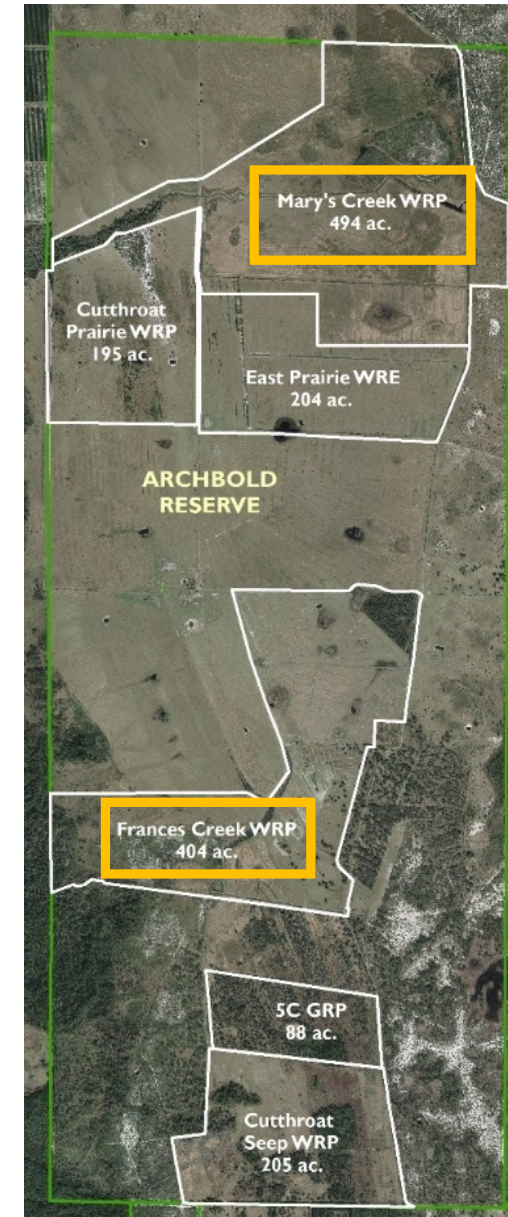


Archbold Reserve WRP timeline & construction

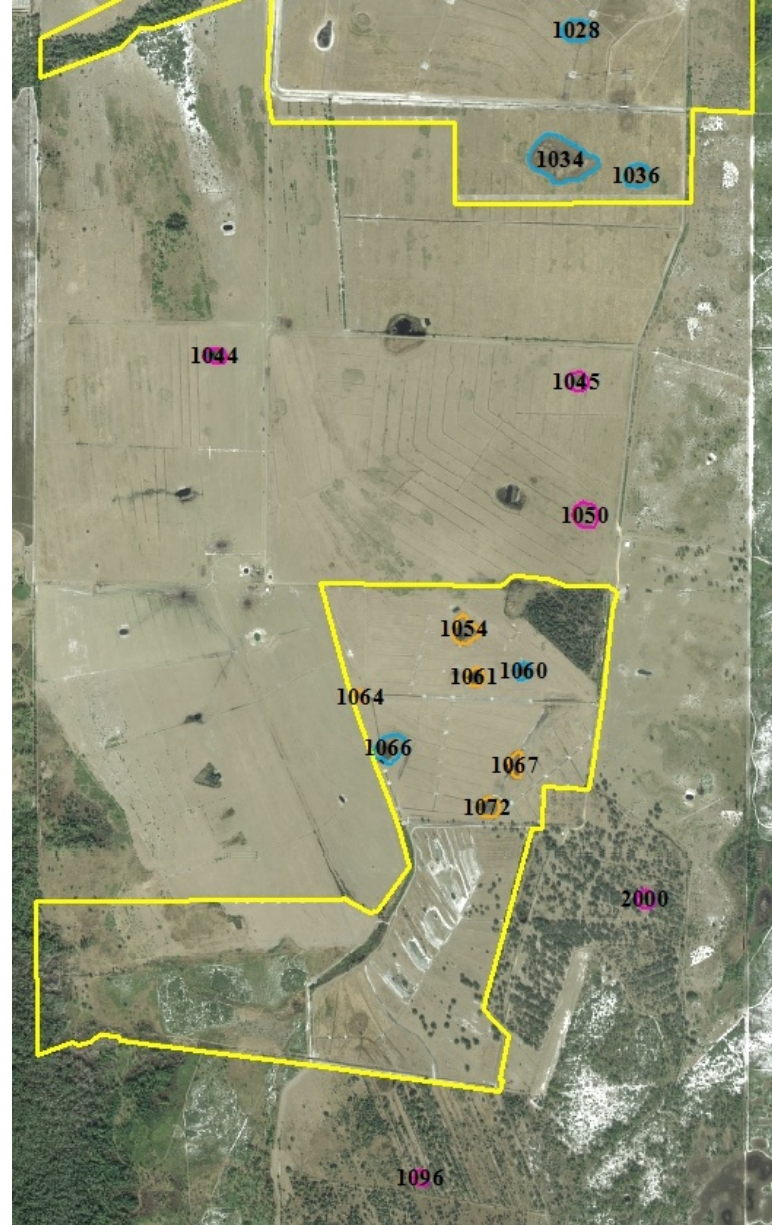
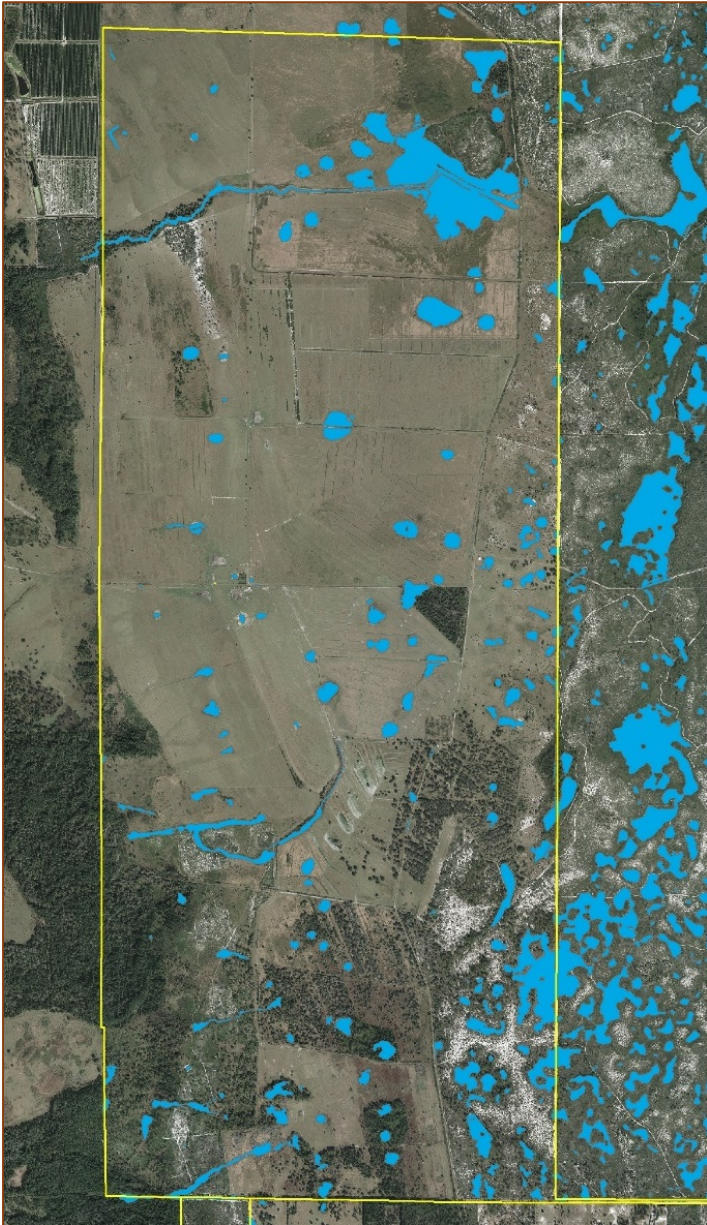
	Acquisition		Design & permitting				Contracting & construction				Native revegetation		
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Mary's Creek		A			D Phase I	C			D Phase II				C
Frances Creek			A			D	C				N		N

• Construction

- Ditch plugs (no ditch filling)
- Weir structure in Mary's creek
- Revegetation (side project)

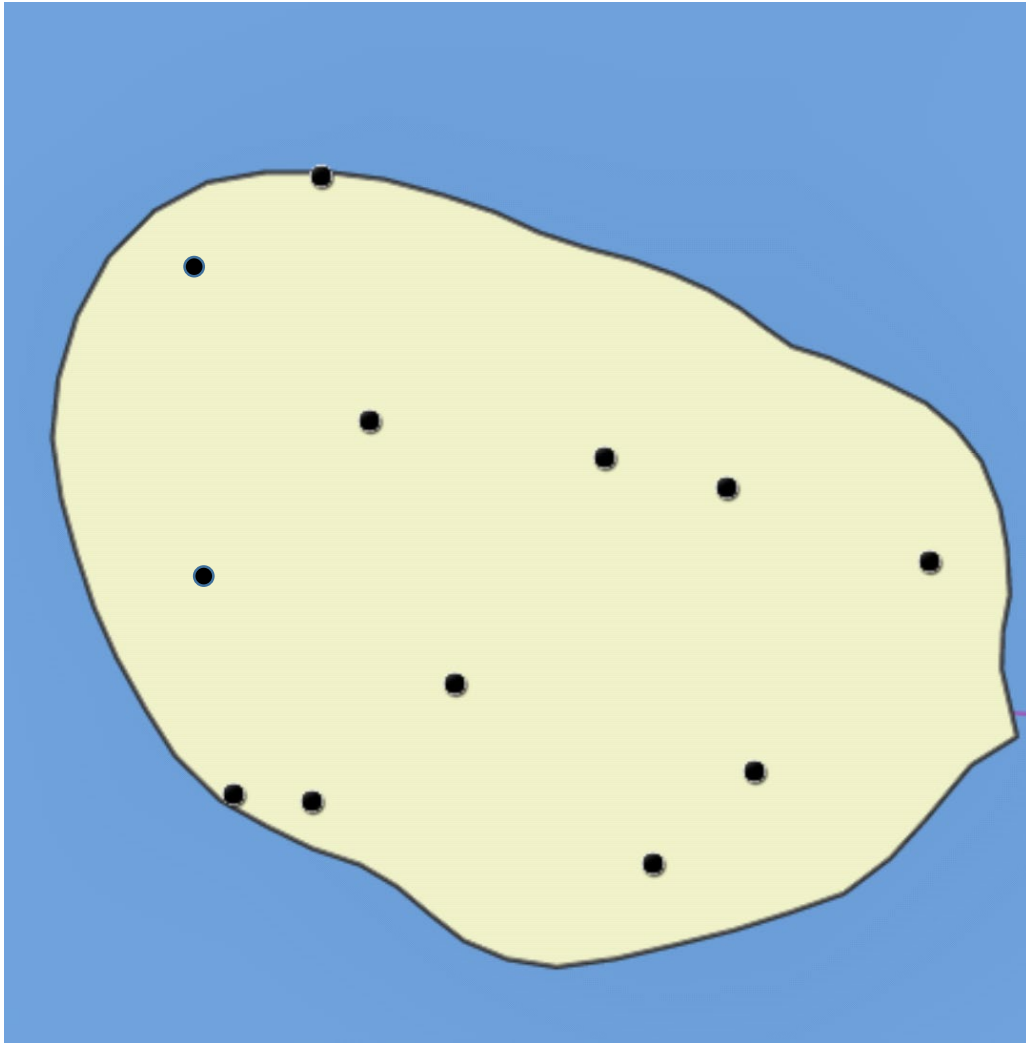


Material & methods: Wetland selection



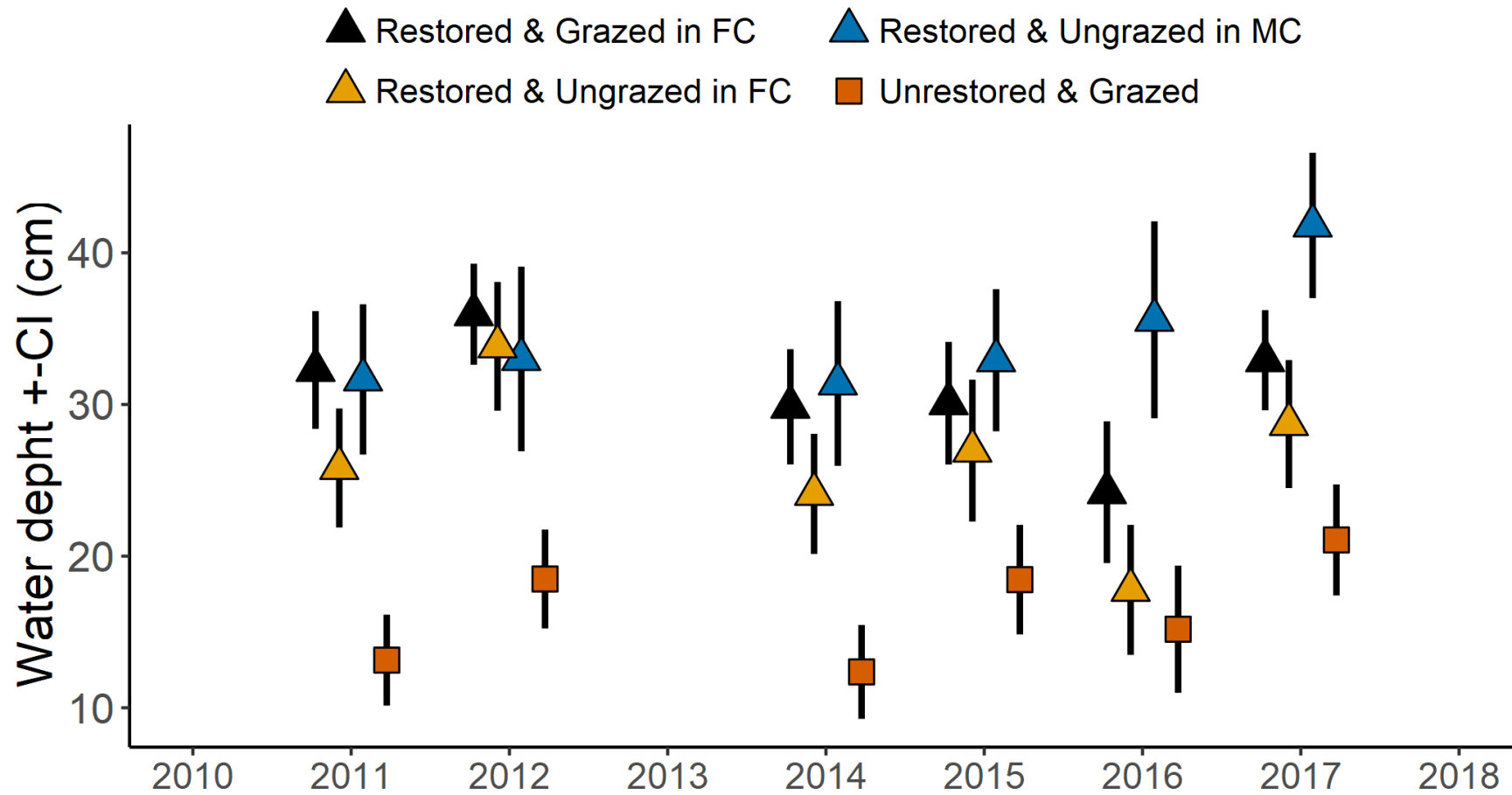
- 15 seasonal flooded wetlands:
 - 5 unrestored & grazed wetlands
 - 5 restored & fenced wetlands
 - 5 restored and grazed wetlands
- Fencing occurred earlier in Mary's Creek and Mary's Creek includes only fenced wetlands

Material & methods: Monitoring hydrology & vegetation



- 12 randomly located & permanent quadrats (1-m² quadrats)
- Record species cover in each quadrat (2011, 2012, 2014 & 2016).
 - species richness (at plot & wetland levels), beta diversity (degree of heterogeneity between plots), facultative upland cover and obligate wetland cover.
- Water depth at each random plots (measured in spring and August every year 2011-2018)
 - Average water depth in August in each wetland.

Mary's Creek & Frances Creek Hydrological response

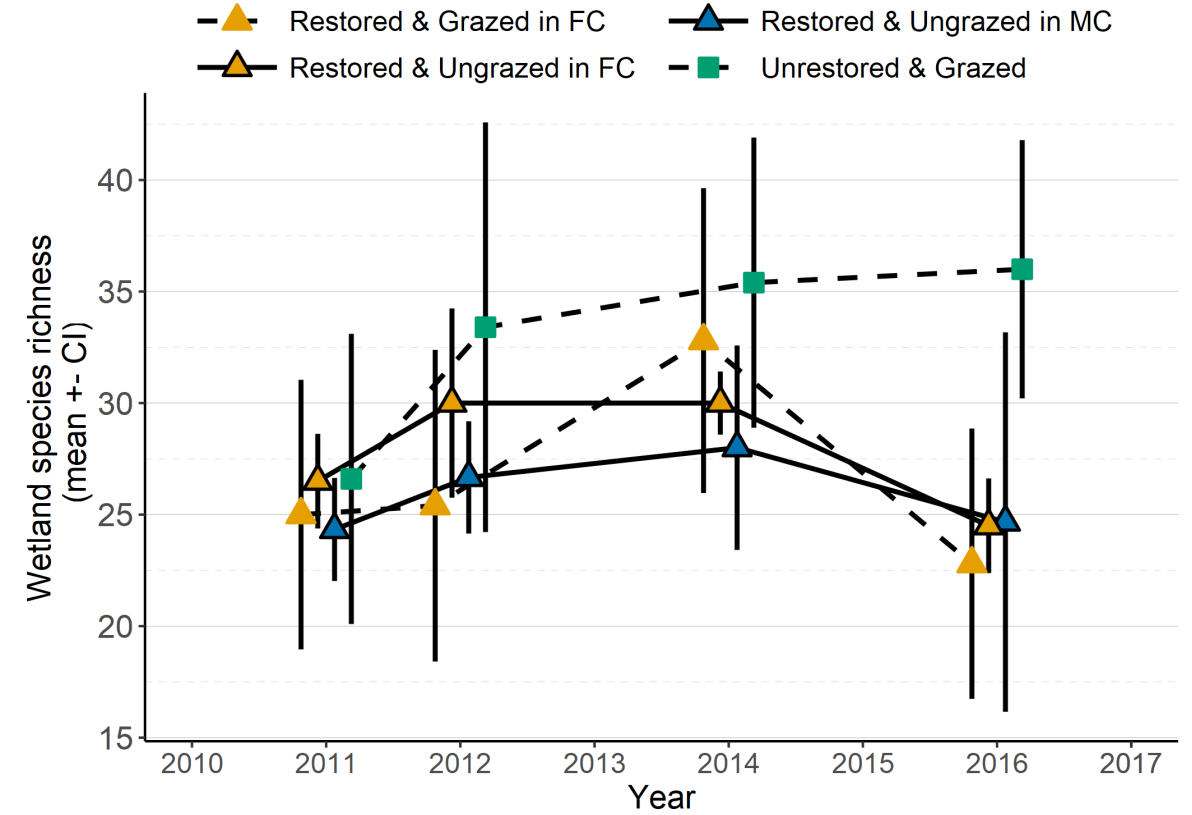
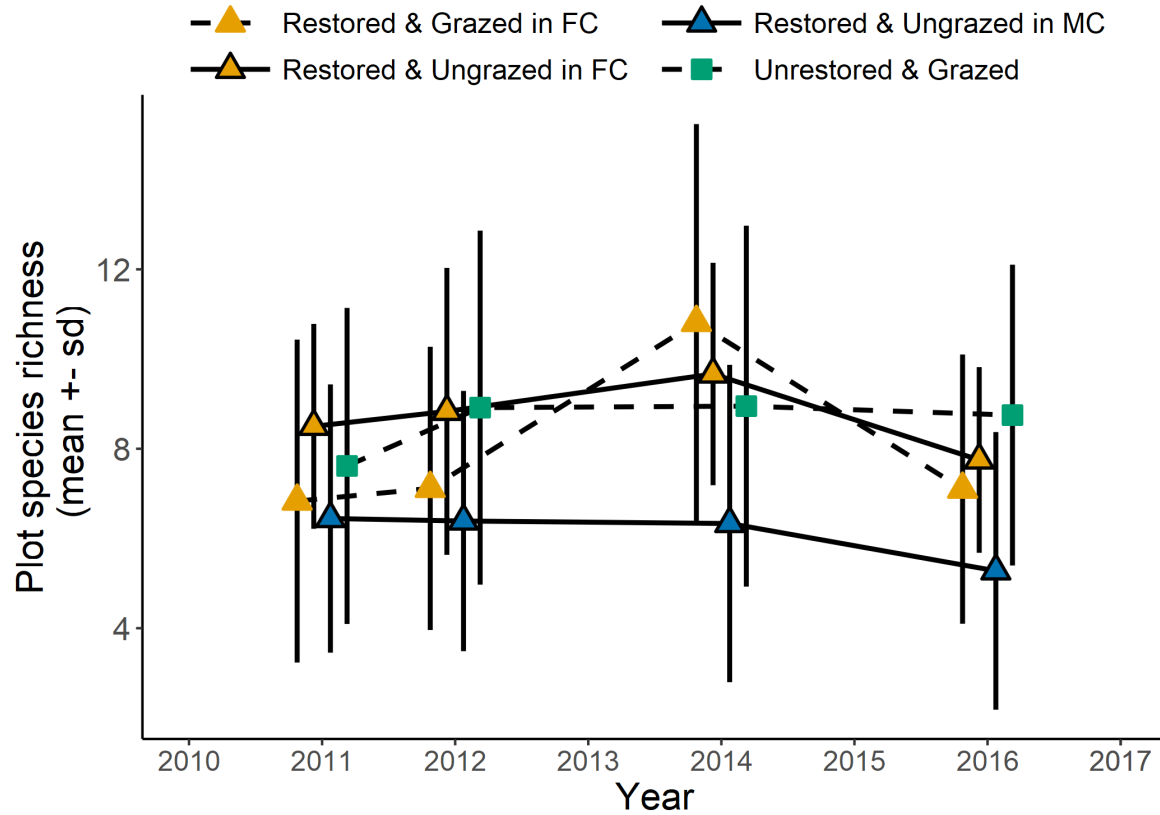


Restored wetlands had significantly higher water levels than unrestored wetlands

(restoration: $F_{1,12}=9.4$, $p=0.01$; grazing: $F_{1,12}=0.01$, $p=0.96$)

Sonnier *et al.* in prep

Mary's Creek & Frances Creek Vegetation response



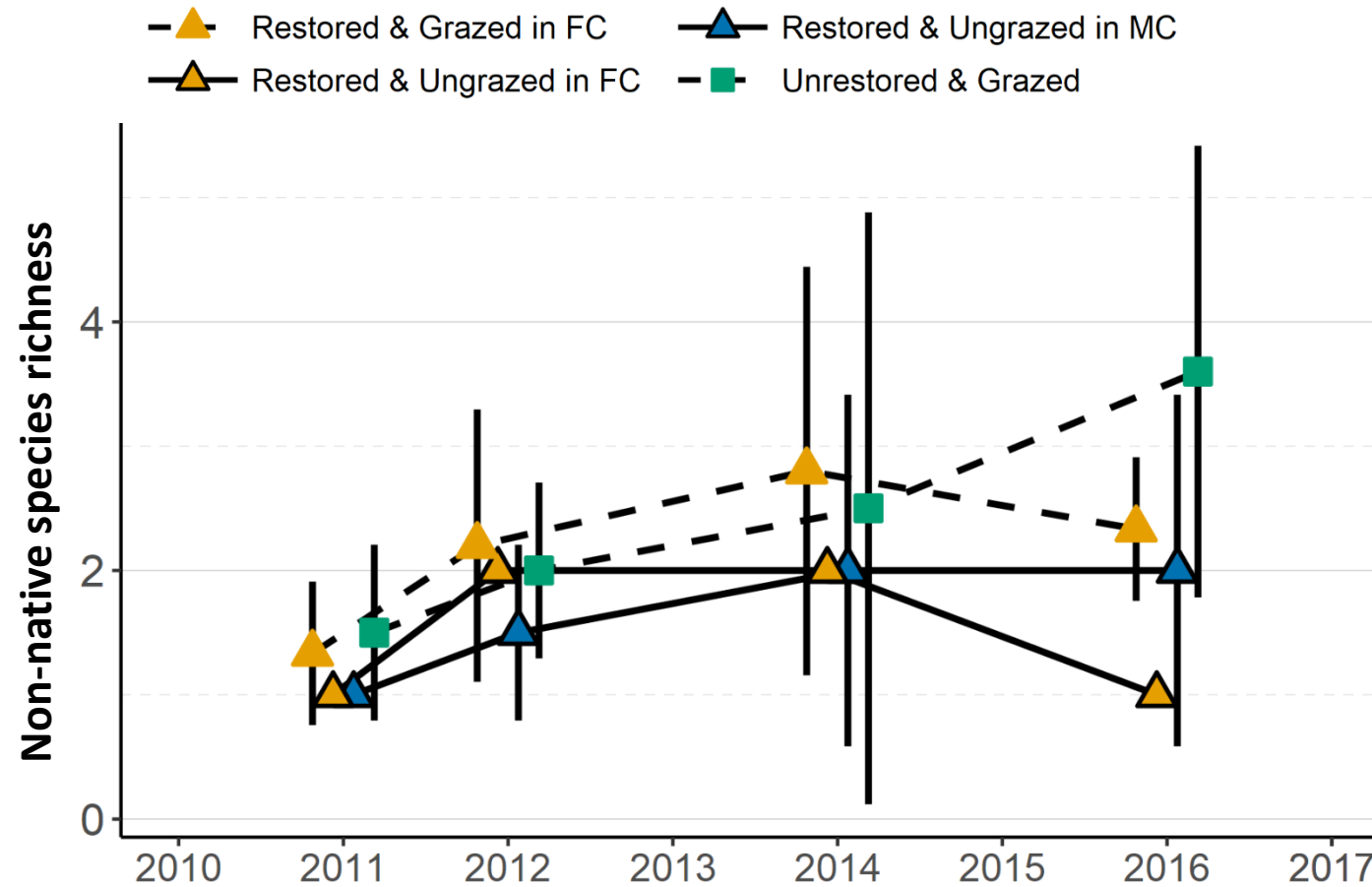
No evidence for higher diversity at both plot and wetland level following restoration.

No effect of grazing

plot-level (restoration: $F_{1,12}=0.4$, $p=0.55$; grazing: $F_{1,12}=0.7$, $p=0.40$)

wetland-level (restoration: $F_{1,12}=3.96$, $p=0.07$; grazing: $F_{1,12}=0.1$, $p=0.96$)

Mary's Creek & Frances Creek Vegetation response

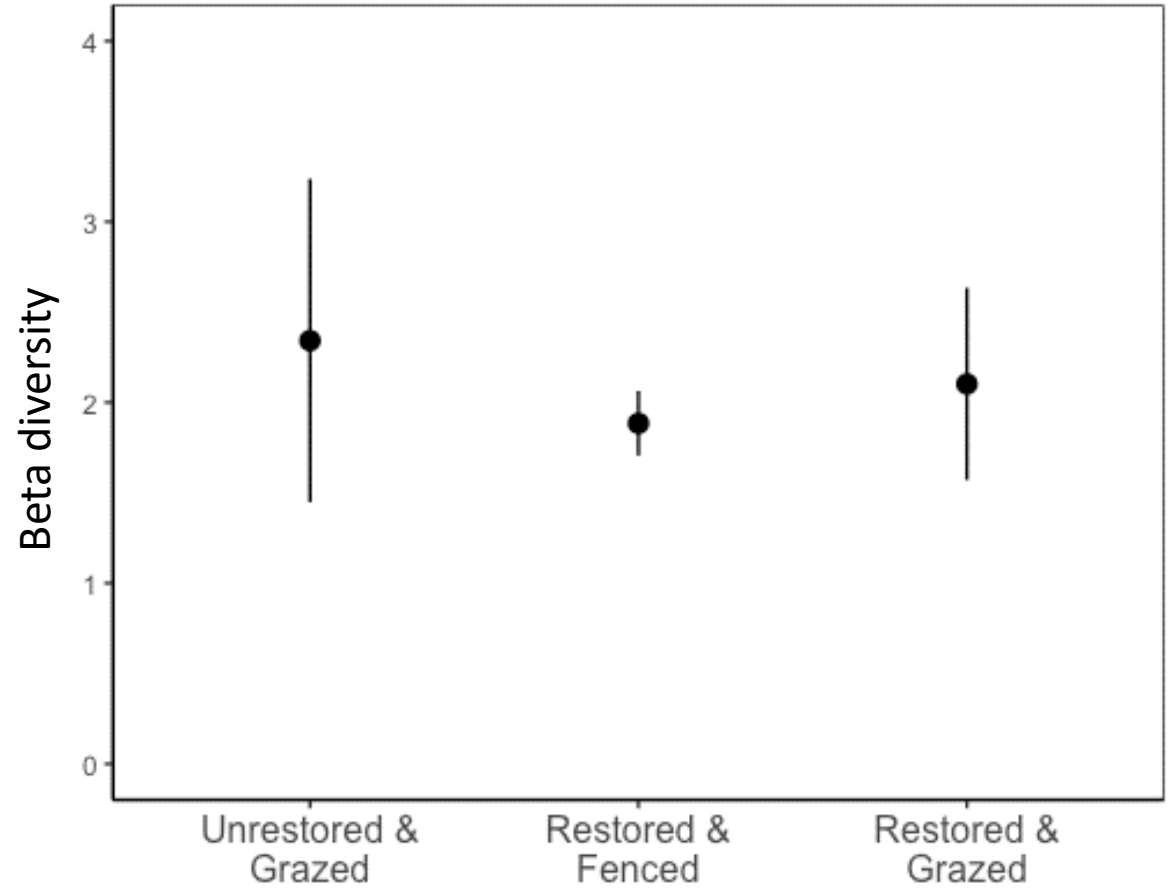
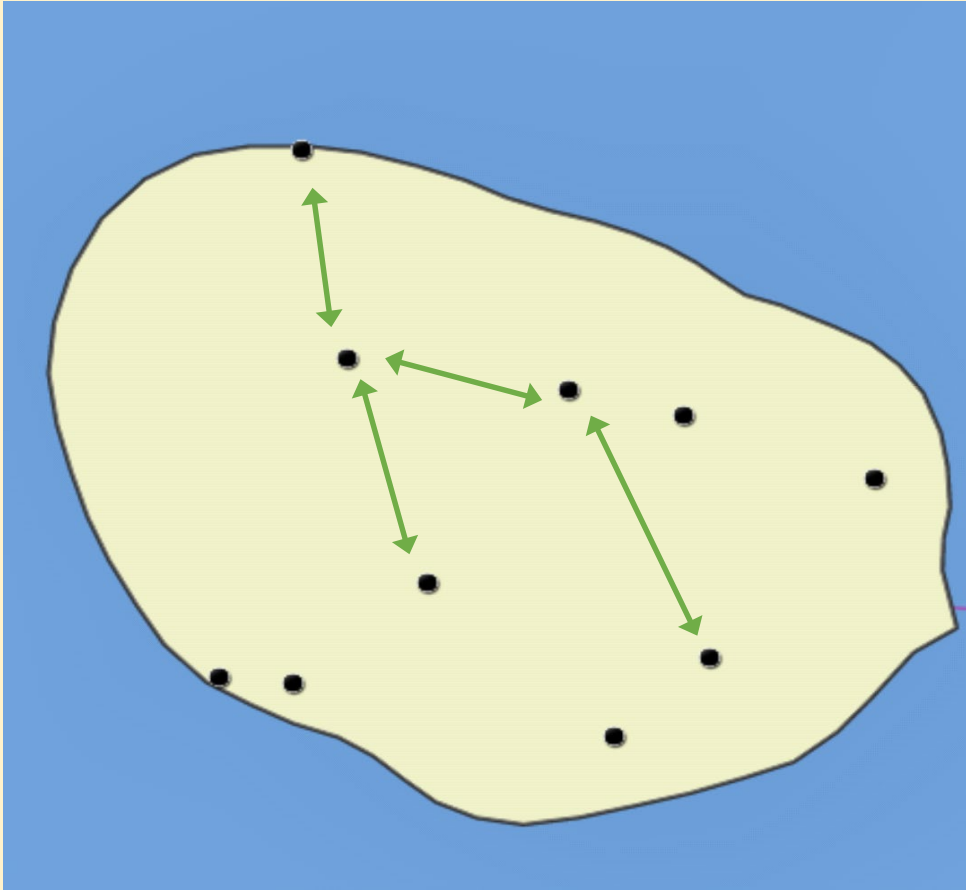


Non-native species richness (~2 species per wetland) not influenced by restoration

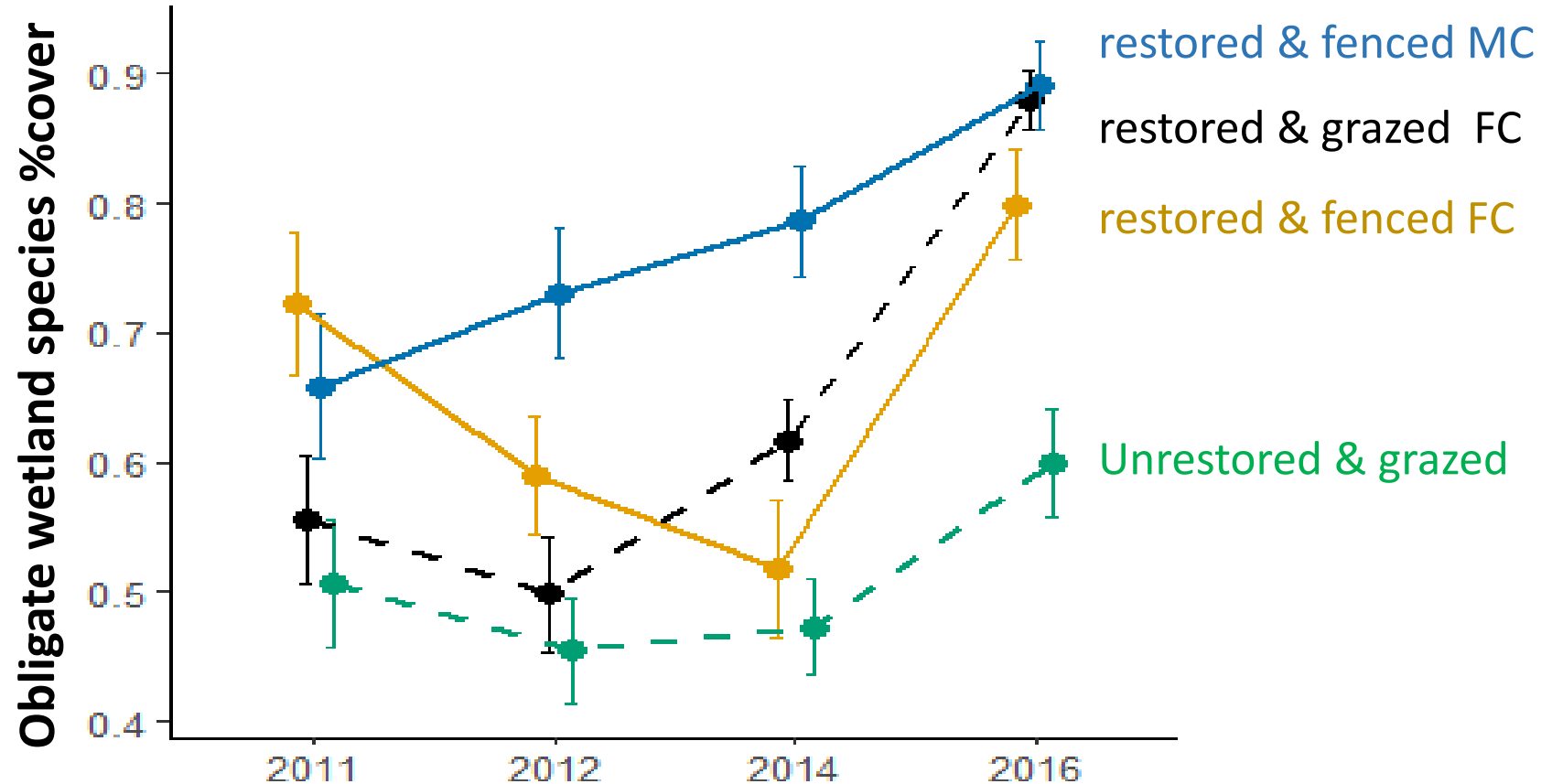
(restoration: $F_{1,12}=0.5$, $p=0.50$; grazing: $F_{1,12}=1.2$, $p=0.29$)

Mary's Creek & Frances Creek Vegetation response

No evidence for higher beta diversity in restored wetlands

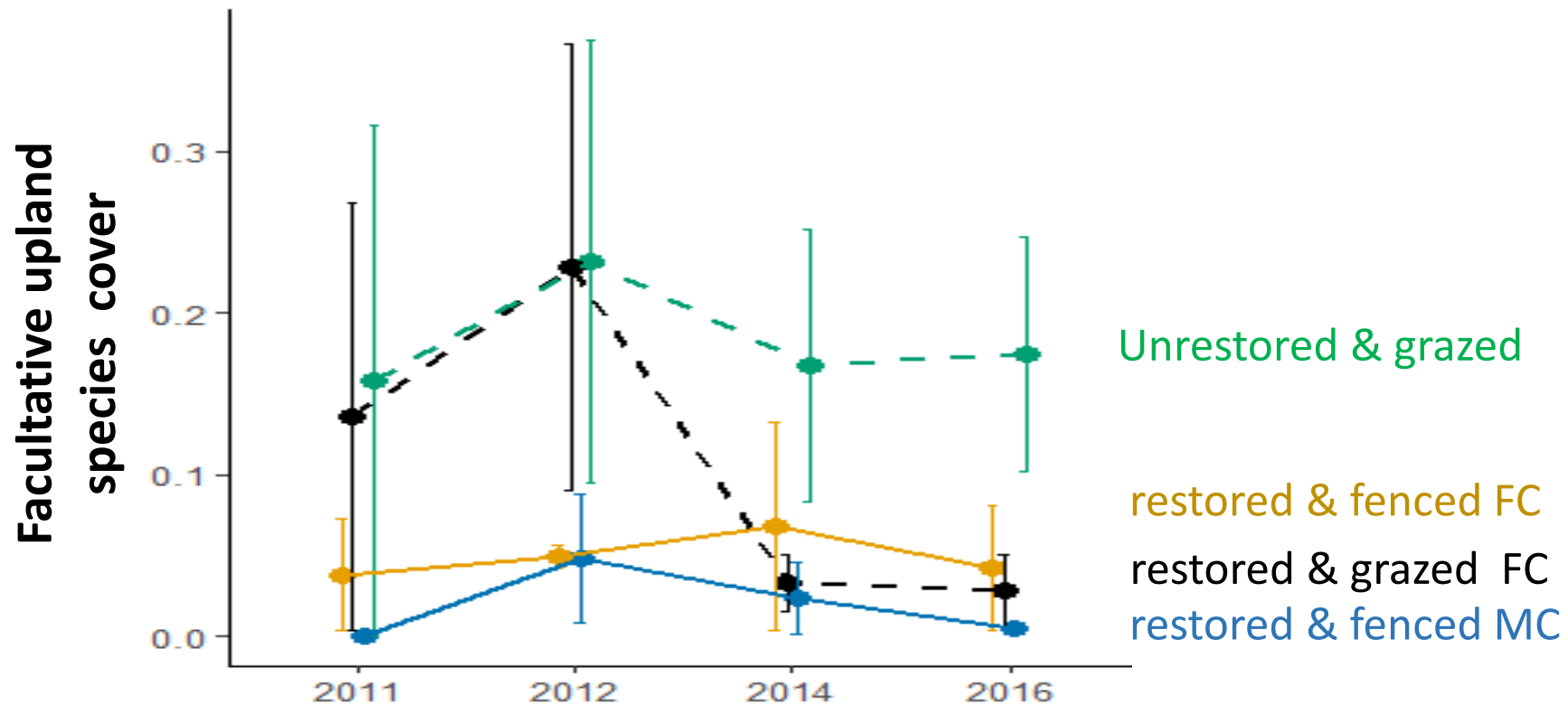


Mary's Creek & Frances Creek Vegetation response



By 2016, cover of obligate species higher in restored wetlands.

Mary's Creek & Frances Creek Vegetation response



Cover of facultative upland species higher in unrestored wetlands.

No evidence for a negative effect of grazing

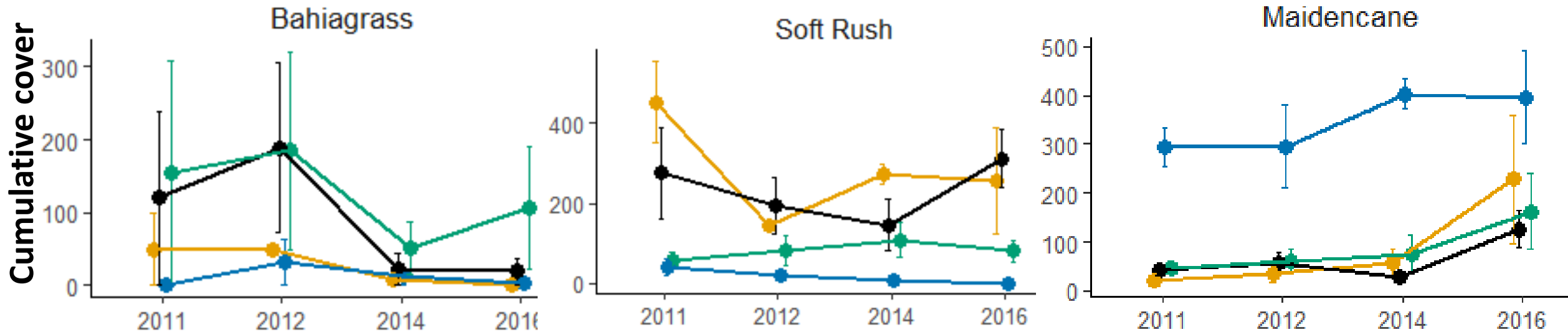
Mary's Creek & Frances Creek Species of interest response

Unrestored & grazed

restored & grazed FC

restored & fenced FC

restored & fenced MC



Soft rush (*Juncus effusus*) cover not related to restoration

Bahiagrass (*Paspalum notatum*) cover decrease in restored wetlands.

Maidencane (*Panicum hemitomon*) more abundant in fenced & restored wetlands.

Take home message

- Higher water levels in restored wetlands independently of grazing treatment.
- No significant differences in species richness and beta diversity between restored and unrestored wetlands at the reserve (contrary to outcome in BIR WRPs).
- Cover of obligate wetland species was higher in restored wetlands at the reserve and associated with a lower cover of facultative upland species in unrestored wetlands.
- Wetland species classification useful tool to study the success of restoration.



Aknowledgments

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