WETLAND RESTORATION AT BUCK ISLAND RANCH
A SUCCESS STORY?

G. Sonnier, P. Bohlen, H. Swain, S. Orzell, E. Bridges and B. Boughton
The Wetland Reserve Program
WRPs at Buck Island Ranch
The South Marsh and East Marsh

South marsh and East Marsh (748 acres)
Objectives

1- Was the hydrological restoration successful at restoring hydrology?

H1 = Sites are becoming wetter

2- Was the hydrological restoration successful at restoring plant communities?

H1 = Obligate and facultative wetland species will increase in abundance

H2 = Floristic quality increased following restoration
### Material & Methods: Buck Island Ranch

a fully operational cattle ranch

<table>
<thead>
<tr>
<th></th>
<th>Improved pastures</th>
<th>Semi-native pastures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle load</td>
<td>+++</td>
<td>+</td>
</tr>
<tr>
<td>Fertilization</td>
<td>++</td>
<td>0</td>
</tr>
<tr>
<td>Seeding</td>
<td>+++</td>
<td>0</td>
</tr>
<tr>
<td>Ditching</td>
<td>+++</td>
<td>+</td>
</tr>
</tbody>
</table>

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The table above compares the improvements made to Improved and Semi-native pastures at Buck Island Ranch. The symbols '+++', '+', and '0' indicate the level of improvement or absence of certain practices. For instance, Cattle load has been significantly increased in Improved pastures (++), whereas Seeding has been completely eliminated (0), and Ditching has been moderately increased (+) in Semi-native pastures.

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The diagram on the right visually represents the distribution of Improved and Semi-native pastures across the ranch. The areas marked in green correspond to Improved pastures, while those in purple denote Semi-native pastures.
Material & Methods: Buck Island Ranch, a fully operational cattle ranch

Wetland within improved pastures

Wetland within semi-native pastures
Material & Methods: WRPs at Buck Island Ranch
The South Marsh and East Marsh

WRPs are located in semi-native pastures and in lowest elevations of the ranch.
Material & Methods: Sites & Timeline

Groundwater wells

Vegetation sampling

2003  2004  2005  2006  2007  2008  2009  2010  2011  2012  ...

Vegetation sampling

Hydrological restoration
Material & Methods:
Following Water Levels

Hydrological restoration

Groundwater wells
Material & Methods: Following Shift in Vegetation

- Transects established in 2005 in different plant community types.
- 10 plots along each transect for a total of 300*1 m² quadrats.
- Second sampling in 2012.
- Record presence and cover of each vascular species.

Vegetation sampling

Hydrological restoration

Vegetation sampling
Material & Methods: Following Shift in Vegetation Wetland indicator status

- Diversity of Obligate Wetland species
- Cumulative Cover of Obligate Wetland species
Material & Methods: Following Shift in Vegetation Specialist vs. ubiquitous species as indicator of wetland quality (0-10)

- Hymenachne amplexicaulis
- Phyla nodiflora
- Diodia virginiana
- Thalia geniculata
- Gratiola hispida
- Polygala incarnata
- Ludwigia suffruticosa
- Juncus effusus
- Utricularia purpurea
- Canna flaccida

(Wighted) Average of coefficient of conservatism in each plot
Material & Methods: Statistical Analysis

- **GDW**: Time series

- **Species Survey:**
  - Permanent transect/plots → Repeated measurement design
  - Plots are nested within transects → Nested design

→ **Generalized Linear Mixed Models**

Stratified by analysis WRP and vegetation types separately
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Results: Hydrology of the South Marsh
Numbers of flooded days

- Pre-restoration:
  - 2004: Low
  - 2005: Low
  - 2006: Low
  - 2007: Low

- Post-restoration:
  - 2008: Moderate
  - 2009: High
  - 2010: Very High
  - 2011: Moderate
Results: Hydrology of the South Marsh
Numbers of flooded days

![Graph showing numbers of flooded days pre- and post-restoration over years 2004-2011. The x-axis represents years, and the y-axis represents the number of flooded days. The graph includes a color scale for cumulative rainfall (cm) with values 80, 100, 120, 140.]
Results: Hydrology of the East Marsh

Numbers of flooded days

pre-restoration

Number of Flooded Days

Cumulative Rainfall (cm)

post-restoration


80 100 120 140
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Results: Shift in Wetland Indicator Status

Cover of obligate wetlands species varies between community types (highest amount of obligate in Sawgrass Marsh).

Higher cover of facultative upland species in South Marsh → Land conversion more effective?
Results: Shift in Wetland Indicator Status

Cover of obligate wetlands species increased following restoration in most community types and in both WRPs. (H5 is verified)

Effect size higher in south Marsh.
Results: Shift in Floristic Quality

Floristic Quality lowest in Bahiagrass pastures
Floristic Quality increased in most community types (H4 is verified)
- Hydrological restoration increased hydroperiod in the South Marsh, but we could not confirm it did so in the East Marsh.

- Hydrological restoration increased cover of Obligate Wetland Species. Cover of facultative wetland species do not necessarily increased.

- Hydrological restoration improved floristic Quality in both WRP's.
Take Home Message

- Beta diversity increased suggesting that sites are becoming more heterogeneous following restoration.

- Most plots were grazed suggesting grazing is not detrimental to restoration success.
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Thank you. Any Questions?