Research to Refine the Design of PES Programs in Florida Ranchlands: Shifts in Vegetative Communities

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Need for Ecosystem Services in the Northern Everglades

• In the Northern Everglades, ranchers are being paid to provide ecosystem services
  – Water Retention
  – Nutrient Reduction
**BENEFITS**
- Increased water storage
- Reduction of nutrient run-off

**RISKS**
- Forage loss

**BENEFITS**
- Enhance Wetland Habitat

**Baseline wetland**
Response of Vegetation to Enhanced Hydrology

- Plant species richness consistently declines with increased water depth (*Toth et al. 2010*)
- Increasing wetness associated with sedges and hydrophytes (*Toogood and Joyce 2009*)
- Under flooded conditions, greater cover of floating leaved and submersed species; dominated by obligate wetland species (*Battaglia and Collins 2006*)
- Prolonged wetness prevents many species from recruiting in wetlands
### Wetland Vegetation Indicator Status

<table>
<thead>
<tr>
<th>Indicator Code</th>
<th>Indicator Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBL</td>
<td>Obligate Wetland</td>
<td>Almost always a hydrophyte, rarely in upland</td>
</tr>
<tr>
<td>FACW</td>
<td>Facultative Wetland</td>
<td>Usually a hydrophyte, occasionally in uplands</td>
</tr>
<tr>
<td>FAC</td>
<td>Facultative</td>
<td>Commonly occurs in wetlands and uplands</td>
</tr>
<tr>
<td>FACU</td>
<td>Facultative Upland</td>
<td>Occasionally a hydrophyte, but usually in uplands</td>
</tr>
<tr>
<td>UPL</td>
<td>Obligate Upland</td>
<td>Rarely a hydrophyte, almost always in uplands</td>
</tr>
</tbody>
</table>

- **FACU species not expected to occur in wetlands with deep and prolonged hydroperiods**
Predictions

• If wetland habitat is enhanced due to implementation of the FRESP WMA:

• We expected:
  – Decreased plant species richness due to increases in depth and duration of inundation
  – Increased abundance of obligate wetland and facultative wetland species
  – Decreased abundance of upland species (forage grasses)
Vegetation Monitoring - Transects

Surveyed in 2005 and 2012
Buck Island Ranch

- Random points were selected to assess vegetation
- 14 wetlands within; 10 outside
- Improved pasture wetlands
- 2006-2009
Nutrient Reduction Project

- Photo monitoring points
- Surveyed 2008 and 2012
- Aerial photos
- P Addition
- Water addition
Did Forage Decrease?

- At Alderman Ranch
  - 72% of plots contained Bermuda Grass prior to project implementation
  - 70% of plots contained Bermuda Grass after
  - 40% of plots contained Bahia grass before
  - 30% contained Bahia after

- At Williamson Ranch
  - 28% of plots contained Bahia grass prior to implementation
  - 24% of plots contained Bahia grass after

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Forage at Alderman

<table>
<thead>
<tr>
<th>Year</th>
<th>Percent Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>15% (±5)</td>
</tr>
<tr>
<td>2012</td>
<td>13% (±5)</td>
</tr>
</tbody>
</table>

Forage at Williamson

<table>
<thead>
<tr>
<th>Year</th>
<th>Percent Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>10% (±5)</td>
</tr>
<tr>
<td>2012</td>
<td>12% (±5)</td>
</tr>
</tbody>
</table>
Little change in richness and wetland plants over time
Lykes West Waterhole Vegetation shifts

1999 Landuse
- Mixed Shrubs
- Wet Prairies
- Emergent Aquatic Vegetation
- Freshwater Marshes
- Graminoid Prairie - Marsh

Typha latifolia: Cattail

2011

Existing Pump from Grove
Outfall
At water retention sites, why so little change in wetland habitat?

- Wetland hydrology driven by rainfall patterns
- Wetlands still dry down during dry season
- Forages grasses are very resilient
Landowner Decision Tool

Hydroperiod (days)

Smith 2006
FRESP: Florida Ranchlands Environmental Services Project

Participating Florida Ranchers