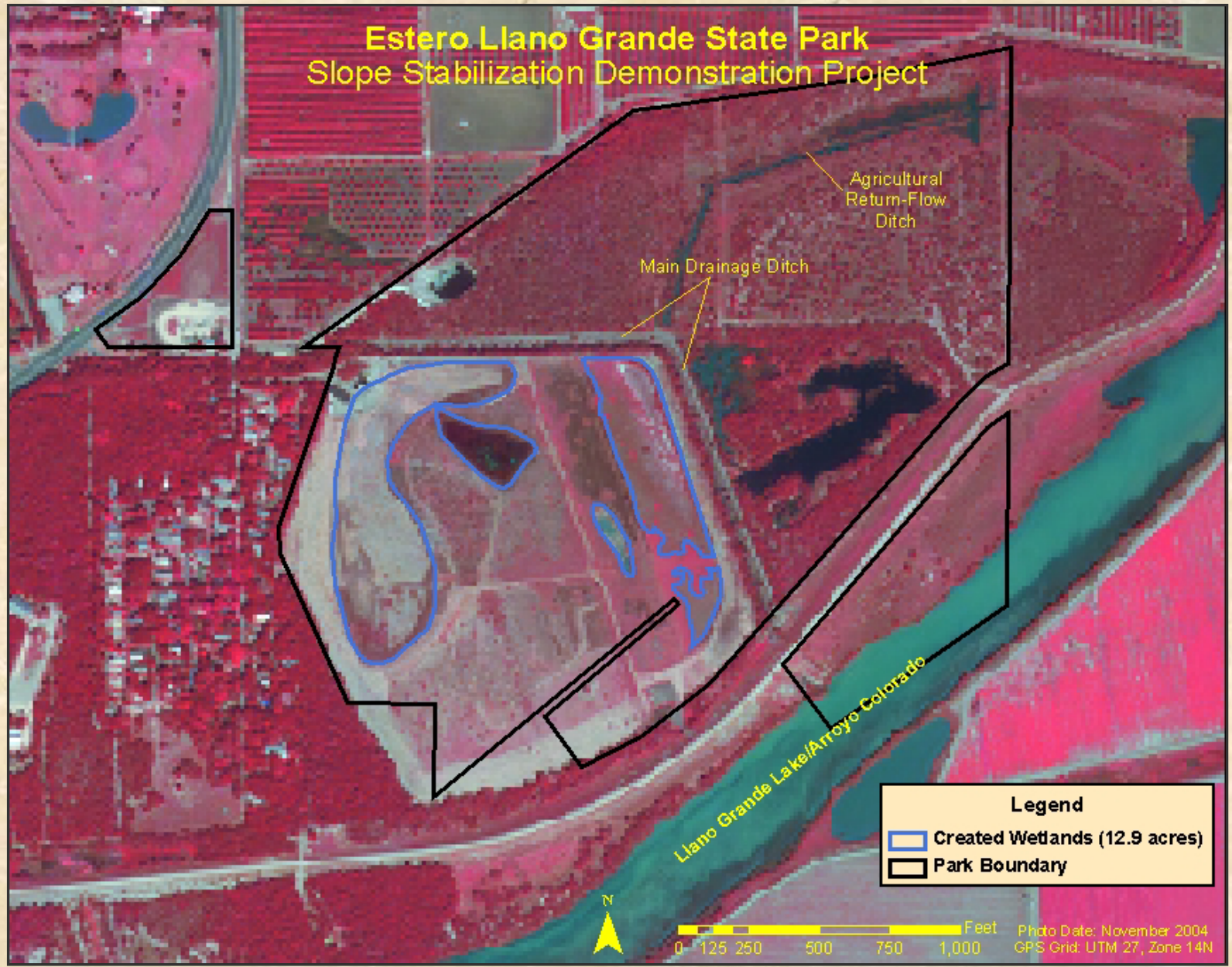


**Slope-Stabilization  
Demonstration Project  
Estero Llano Grande State Park, Weslaco**

**Texas Parks and Wildlife Department  
Alan Plummer Associates, Inc.**

**Presented by Chris Hathcock, TPWD  
January 16, 2008**

# Estero Llano Grande State Park Slope Stabilization Demonstration Project



**Legend**

- Created Wetlands (12.9 acres)
- Park Boundary

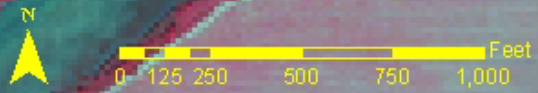


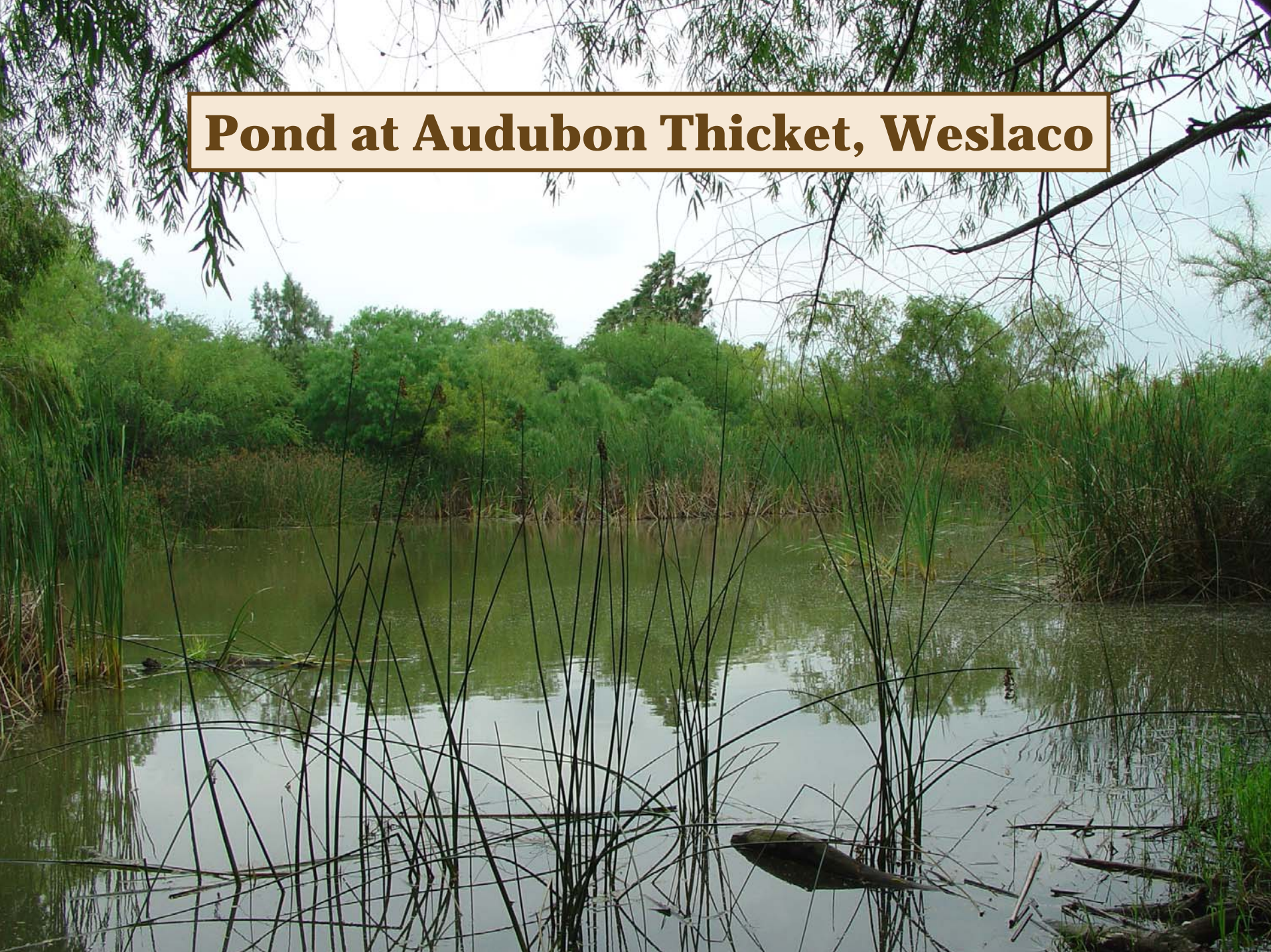
Photo Date: November 2004  
GPS Grid: UTM 27, Zone 14N



# Wetland next to Resaca del Rancho Viejo in San Benito



# Pond at Audubon Thicket, Weslaco



El Morillo Resaca (Bentsen State Park) Choked with  
Common Reed (*Phragmites australis*)





“Sugar Cane” Resaca



**Mexican Ash & Sugar Hackberry on Resaca Bank**





Mexican buttonbush (*Cephalanthus salicifolius*)







# Bioengineering

## Definition:

*erosion-control techniques using both living and inert materials*

live = plants (aquatic, wetland-margin, and bank)

inert = erosion cloths, logs, rip-rap, walls, etc.

## Benefits:

- Control bank erosion
- Reduce sediment loads into Arroyo Colorado
- Improve water quality
- Improve wildlife habitat

# Demonstration Project

- **Evaluation of six different techniques**
  - two replicates for each
  - two controls
- **Measures**
  - “roughness” of vegetation as it relates to flow
  - effectiveness in minimizing slope erosion
  - effectiveness in reducing sediment loads
  - water quality improvement

**Mid-Depth Emergent**  
**Soft-Stem Bulrush (*Schoenoplectus tabernaemontani*)**



A photograph of a Mid-Depth Emergent Arrowhead plant (Sagittaria sp.) in a wetland. The plant has a central cluster of broad, green, arrow-shaped leaves. Several stems rise from the base, bearing clusters of small, white, five-petaled flowers. The surrounding area is a mix of green and brown grasses, with some other plants visible, including one with a large, heart-shaped leaf on the right. The ground is damp and appears to be a natural, uncultivated area.

**Mid-Depth Emergent  
Arrowhead (*Sagittaria* sp.)**





**Shallow Emergent**  
Alkali Bulrush (*Bulboschoenus maritimus*)

# Lower Slope/Water Margin

Sedges (Cyperaceae) and water hyssop (*Bacopa monnieri*)





**Lower Slope/Water Margin**  
pennywort (*Hydrocotyle bonariensis*)



**Pennywort along Pond Margin  
(City Park in Brownsville)**



**Entire Slope & Water Margin**  
Creeping Lovegrass (*Eragrostis reptans*)



**Middle and Upper Slope**  
Carolina Wolfberry (*Lycium carolinianum*)

A photograph of a field with purple flowers and a green text box. The background shows a natural setting with dry grasses, green foliage, and small white flowers. A semi-transparent green box is overlaid on the top half of the image, containing yellow text. The text lists the project contributors: Martha Garcia, TPWD; Kay Jenkins, TPWD; Loretta Mokry, Alan Plummer Assoc., Inc.; Tim Noack, Alan Plummer Assoc., Inc.; and Jennifer Owen, TPWD.

**Project Contributors:**

Martha Garcia, TPWD

Kay Jenkins, TPWD

Loretta Mokry, Alan Plummer Assoc., Inc.

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