

INFLUENCE OF WILDLIFE ON BOTTOMLAND HARDWOOD RESTORATION IN DEGRADED RIVER BASINS IN EAST TEXAS, USA

Ryan J. Jacques¹, Jeremy Stovall¹, Christopher Comer¹, Hans Williams¹ and Matt Symmank²

¹Arthur Temple College of Forestry and Agriculture, Stephen F. Austin State University

²Texas Parks and Wildlife Department

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Introduction

- Bottomland hardwood forests (BLH) are major forested wetlands found within the Blackland Prairie and Post Oak Savannah ecoregions of Texas.
- These ecoregions have significant wet/dry seasons with the majority of precipitation falling in the winter and spring, occasionally causing significant flooding and drought conditions.
- The shrink-swell properties, characteristic of vertic soils, pose increased challenges for root growth.
- Historically anthropogenic activities such as, urban development, conversion to row croplands, and intentional fire suppression have degraded these ecoregions as a whole.
- Annual variations in rain fall frequency and total precipitation have decreased restoration success.

Objectives

- Determine if herbivory causes a significant impact on the success of BLH restoration attempts using multiple silvicultural techniques.
- Determine the most effective and economical procedures to mitigate wildlife impact on seedling survival in bottomland hardwood forest restoration sites by testing four treatments versus a control.



Above: Species potentially impacting seedling survival: (Left) White-Tailed Deer (*Odocoileus virginianus*), (Right) Feral Swine (*Sus scrofa*).

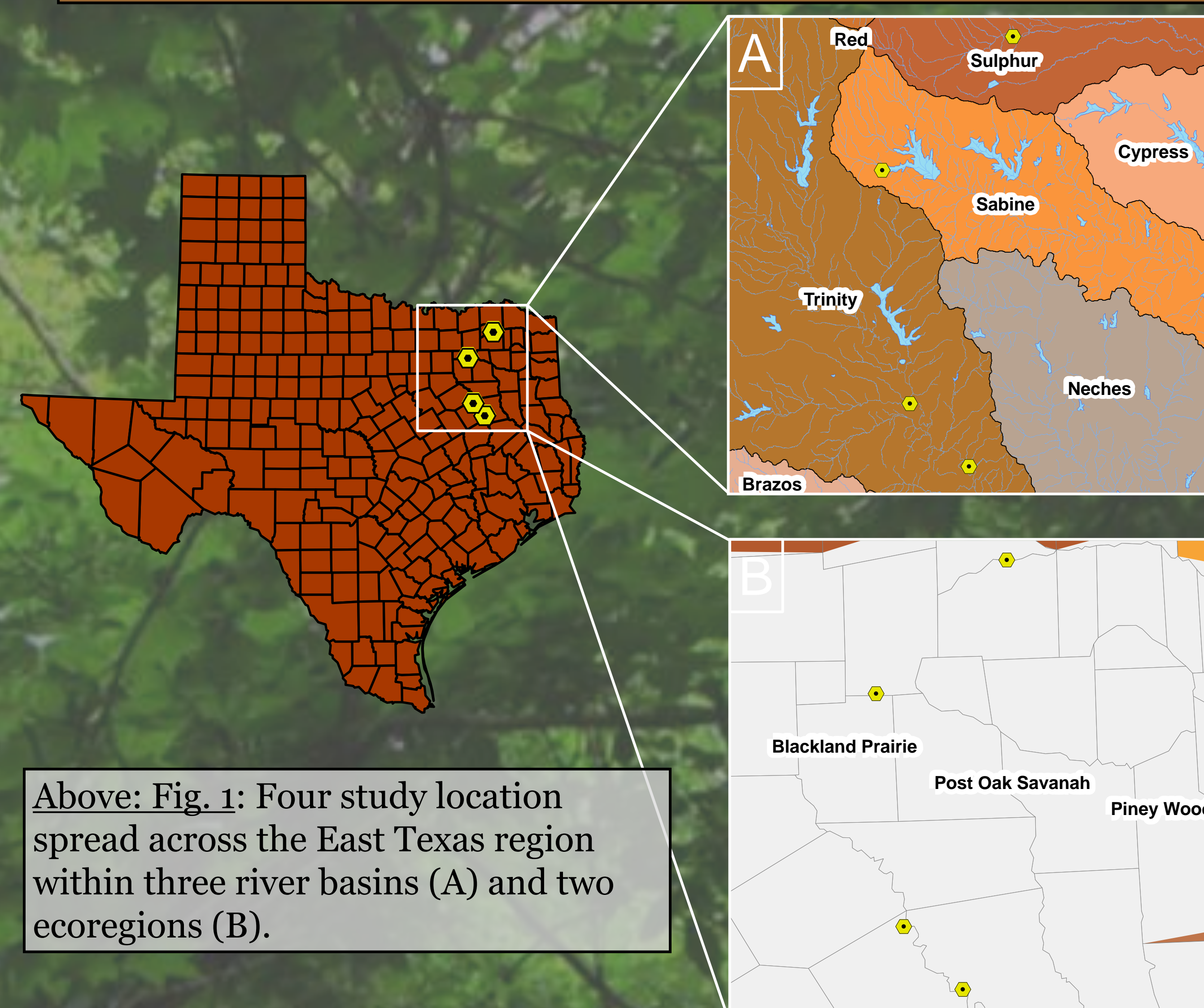


Above Left to Right: Mitigation techniques used: portable electric fence, individual tree shelters, 8ft high fence..

Below Left to Right: Seedling exposed due to herbaceous weed control and covered by the surrounding vegetation.



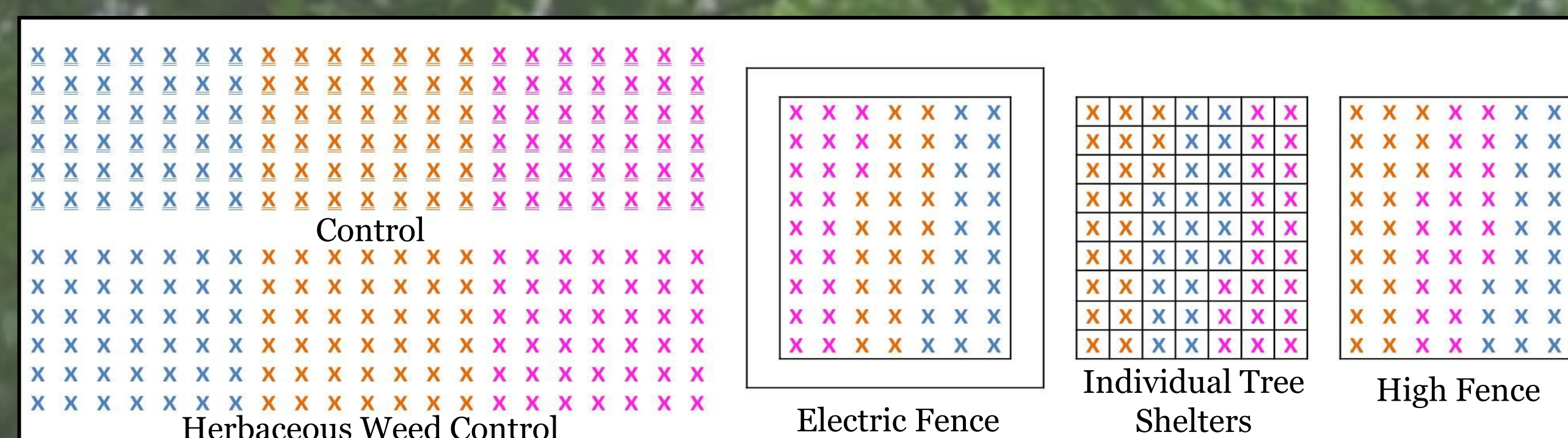
Study Sites



Above: Fig. 1: Four study location spread across the East Texas region within three river basins (A) and two ecoregions (B).

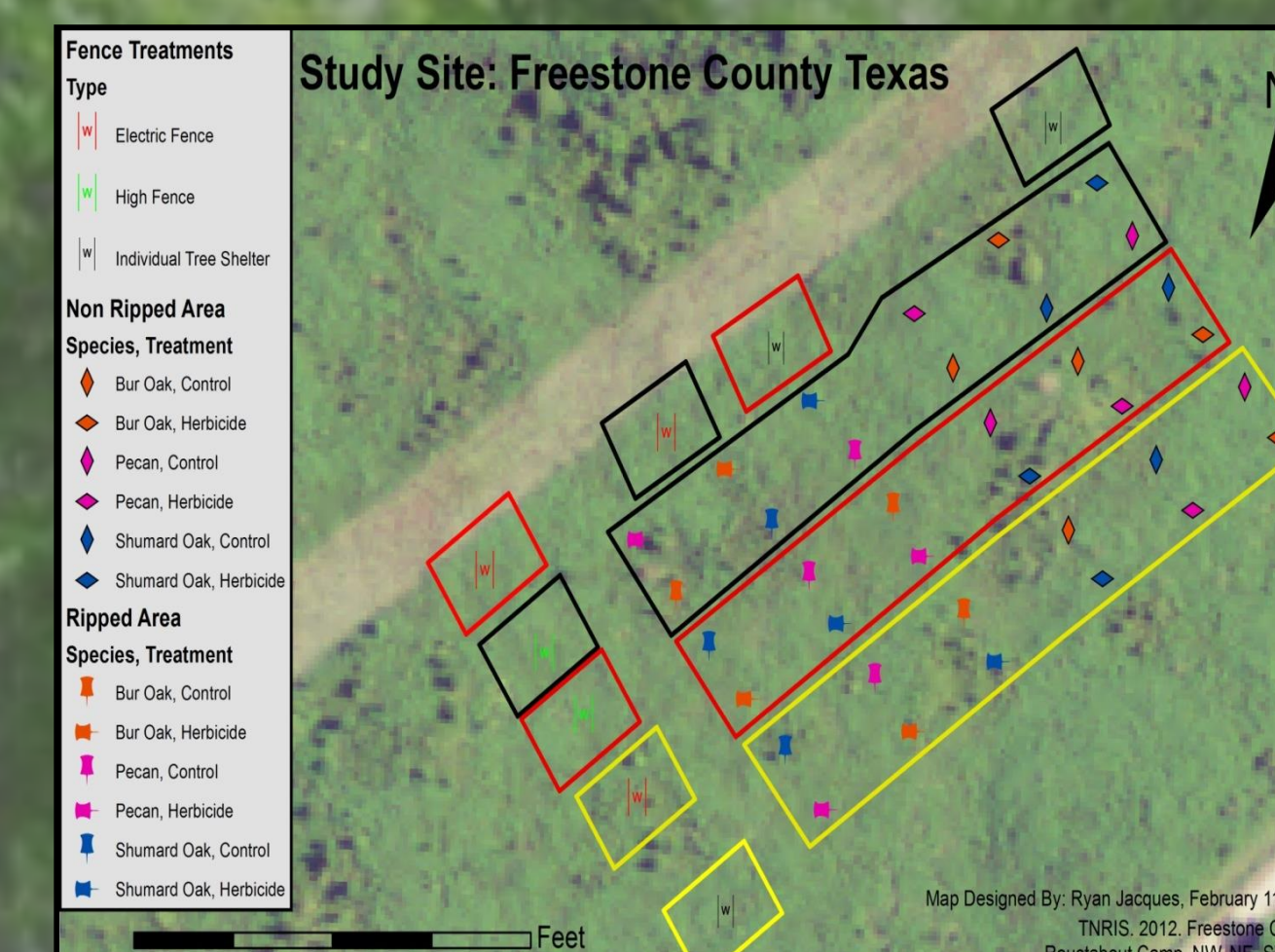
Methods

- *In situ* restoration experiment replicated across four locations (Fig. 1)
- Randomized complete block split-split-plot design
 - Whole-plot (Forested, Open Field)
 - Sub-plot (8ft High Fence, Individual Tree Shelters, Portable Electric Fence, Herbaceous Weed Control) (Fig. 2)
 - Sub-sub-plot (Bur Oak, Shumard Oak, Pecan)
- Three blocks at the sub-plot level within each whole-plot (Fig. 3)
- Planted 1/0 bare root seedlings within 50% canopy covered forested areas and within ripped open field areas



Above: Fig. 2: The layout of one block within one of the whole-plot areas. Each color represents a different species and the lines represent the fence type or lack thereof.

Right: Fig. 3: The layout of one whole-plot with the colored outlines denoting the different blocks.



Methods (Continued)

- Spot herbicide application to appropriate plots once a year using Makaze[®] Herbicide (AI: Glyphosate, 41%)
- Non-fenced plots contain 42 seedlings/species/block
- Fence treatments contain 21 seedlings/species/block
- Measure and record herbivory occurrences, height, and diameter of each seedling initially, year 1, and year 2
- Conduct 14 day, trail camera surveys at 1 camera/100 acres to determine population density estimates for white-tailed deer and feral swine for each location
 - August - September 2015
 - Buck:Doe Ratio survey (Jacobson et al. 1997)
 - Feral swine simple counts method (Holtfreter et al. Unpublished Data)

Preliminary Results

Mortality Data as of March 2015		Anderson County % Herbivory Mortality			Freestone County % Herbivory Mortality		
		Pecan	Bur	Shumard	Pecan	Bur	Shumard
8ft High Fence	Forest	0.0	0.0	0.0	0.0	0.0	2.4
	Open Field	0.0	0.0	0.0	0.0	0.0	0.0
Portable Electric Fence	Forest	31.7	31.7	31.7	1.6	0.0	1.6
	Open Field	0.0	0.0	0.0	0.0	1.6	0.0
Individual Tree Shelter	Forest	0.0	0.0	0.0	0.0	0.0	0.0
	Open Field	0.0	0.0	0.0	0.0	0.0	0.0
Herbaceous Weed Control	Forest	0.0	0.8	0.0	97.6	34.1	12.7
	Open Field	0.8	0.0	4.0	0.8	0.0	0.8
Control	Forest	0.0	0.0	1.6	98.4	31.7	9.5
	Open Field	0.8	3.2	2.4	0.0	0.0	0.0

Mortality Data as of March 2015		Hopkins County % Herbivory Mortality			Hunt County % Herbivory Mortality		
		Pecan	Bur	Shumard	Pecan	Bur	Shumard
8ft High Fence	Forest	0.0	0.0	0.0	0.0	0.0	0.0
	Open Field	0.0	0.0	0.0	0.0	0.0	0.0
Portable Electric Fence	Forest	0.0	0.0	0.0	0.0	0.0	0.0
	Open Field	0.0	0.0	0.0	1.6	0.0	0.0
Individual Tree Shelter	Forest	0.0	0.0	0.0	0.0	0.0	0.0
	Open Field	0.0	0.0	0.0	0.0	0.0	0.0
Herbaceous Weed Control	Forest	0.0	0.8	0.8	0.0	0.8	0.0
	Open Field	1.6	0.0	1.6	-	-	-
Control	Forest	0.0	0.0	0.8	0.8	0.0	0.0
	Open Field	4.8	0.0	2.4	-	-	-

Anticipated Results

- Do wildlife cause significant levels of mortality to these species of seedlings in the BLHs of East Texas?
 - Based on preliminary results tree shelters and high fence seem to be working, while electric fence failed at least once.
 - Comparison between control and herbaceous weed control treatment is inconclusive at this point.
- Is there a correlation between wildlife population density and seedling survival rates?
- Which fence array is the most successful, economical, and practical way to mitigate for wildlife in the BLHs of East Texas?

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Literature Cited:
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Holtfeter, R. W., S. S. Ditchkoff, J. B. Grand, T. D. Steury, and B. L. Williams. Unpublished data. Simple counts from camera traps as indices of wild pig abundance.