

# Is Shortleaf a Modern Day Phoenix?



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Selective Cut – spring burn  
Robbers Cave WMA, SE Oklahoma

- Growing season burn
- Purpose to thin shortleaf regen on seed tree cut  
10,500 stems/ac.

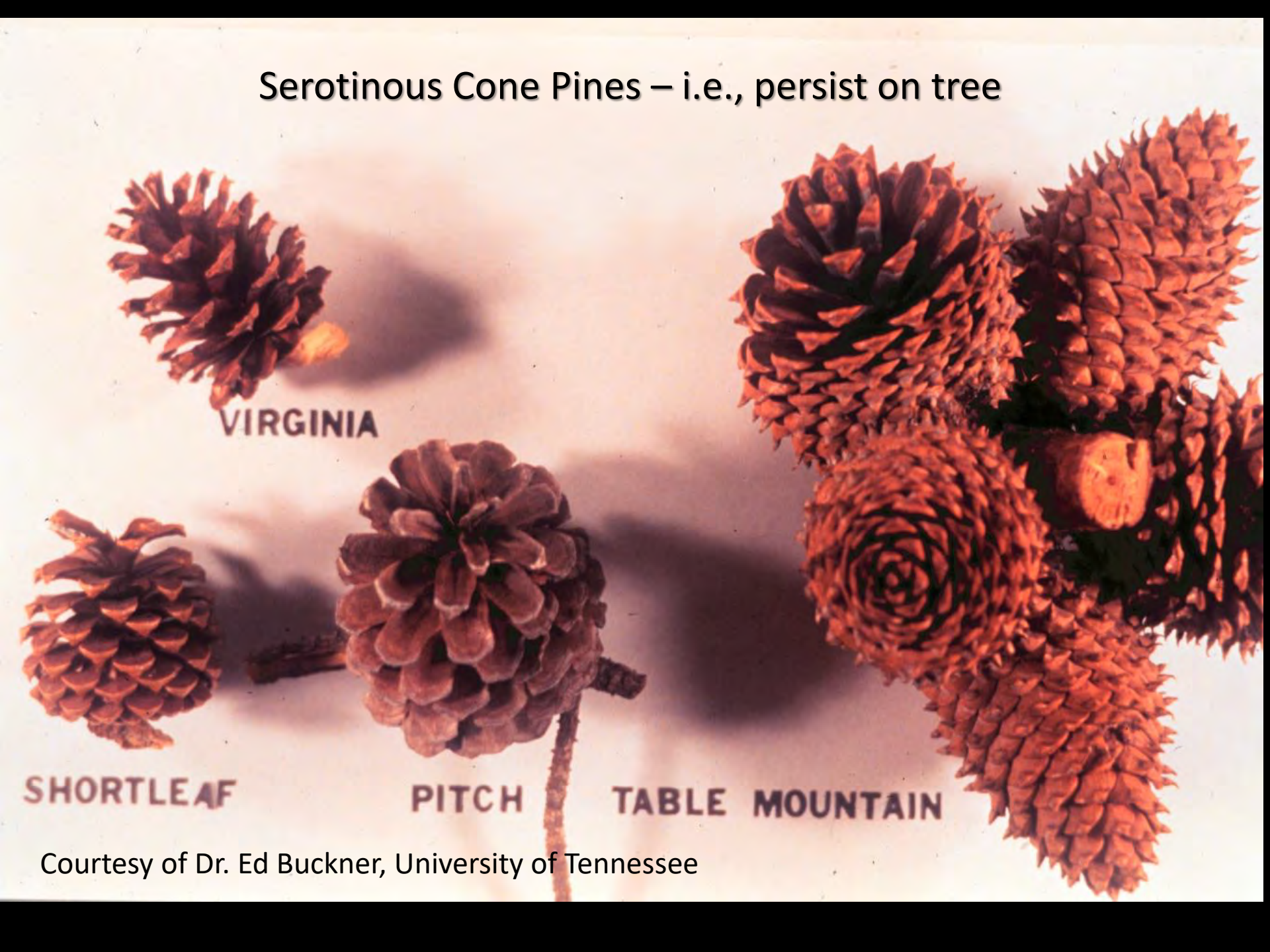
Results:

Post-burn 22,000 stems/ac

Robbers Cave WMA, SE Oklahoma  
July 1987



# Serotinous Cone Pines – i.e., persist on tree



VIRGINIA

SHORTLEAF

PITCH

TABLE MOUNTAIN

Courtesy of Dr. Ed Buckner, University of Tennessee

# Ecological Gradients and Eastern Pines:

Longleaf

Shortleaf

Loblolly

Sand

Slash

Spruce

Pond

Virginia

Eastern White

Table Mountain

Pitch

Moisture

Soil texture

Climate

Morphological Characters-Fire

Rooting habit

Reproduction-cone serotiny

Seedling fire tolerance

Rocket stage

Epicormic branching

Bark

Fire frequency

# Eastern Pine Ecological Gradients

## MOISTURE

More Xeric

Intermediate

More Mesic

Sand

Longleaf

Shortleaf

Table Mountain

Virginia

Pitch

Loblolly

Eastern White

Slash

S. Florida Slash

Spruce

Pond

# Eastern Pine Ecological Gradients

## SOIL TEXTURE

More Coarse

Intermediate

More Fine



Sand

Longleaf

Shortleaf

Table Mountain

Virginia

Pitch

Loblolly

Eastern White

Slash

S. Florida Slash

Spruce

Pond



# Eastern Pine Ecological Gradients

## ECOLOGICAL AMPLITUDE





Shortleaf-Longleaf-Wiregrass  
Red Hills Southwest Georgia

*FIRE REGIME: surface - low intensity/very high frequency*



*Pitch-Shortleaf Pine*

*Pine Barrens New Jersey*

*FIRE REGIME: surface - low intensity/high frequency  
mixed  
stand replacement*

Photo courtesy of Bob Williams



*Shortleaf-bluestem  
Southeast Oklahoma*

*FIRE REGIME: surface - low intensity / high frequency*

# Eastern Pine Ecological Gradients

## FIRE FREQUENCY

More  
Frequent

Intermediate

Less  
Frequent

Longleaf

Shortleaf

Loblolly

Pitch

Pond

Sand

Slash

S. Florida Slash

Table Mountain

Virginia

Eastern White

Spruce

Pine-bluestem Pushmataha WMA  
SE Oklahoma

# Frequent fire acts as a ecosystem filter

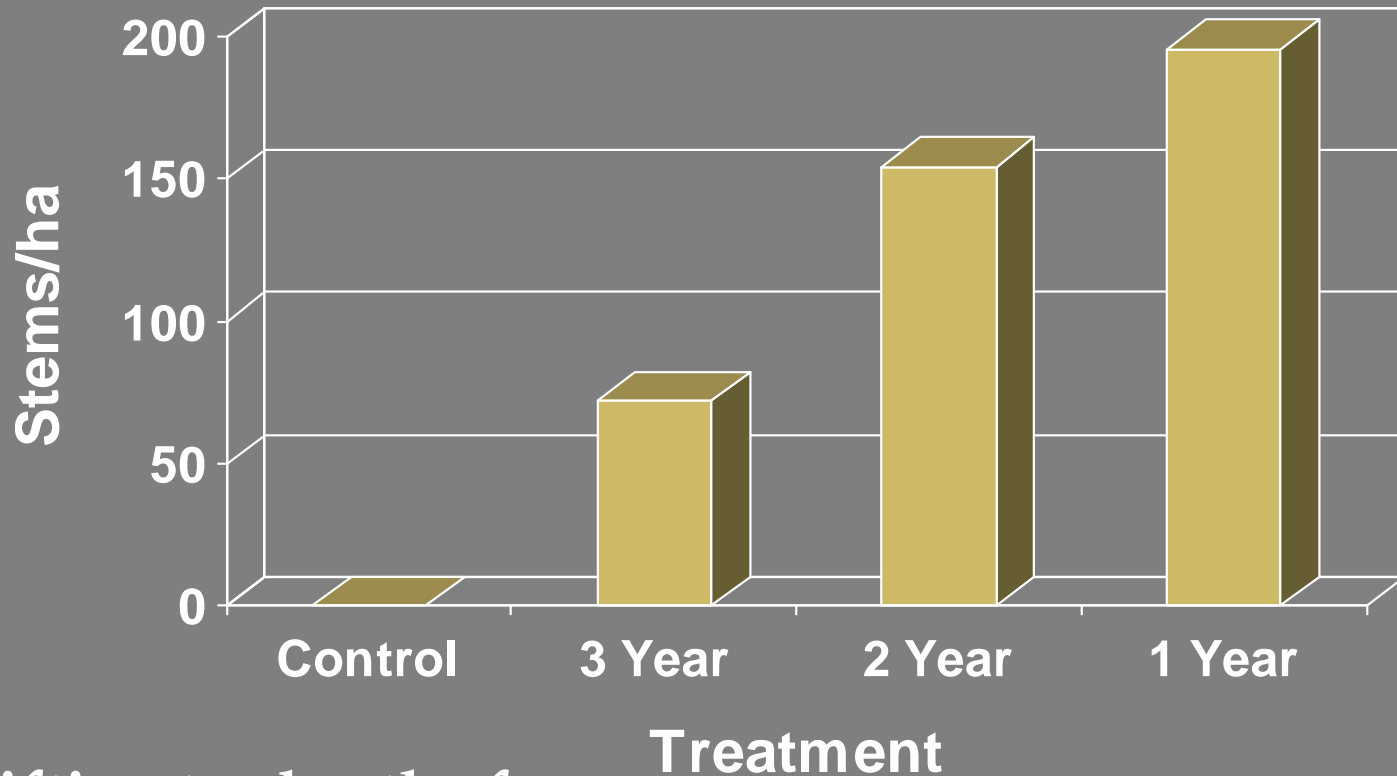
*Hypericum densiflorum*  
*Vitis palmata*  
*Toxicodendron radicans*  
*Ostrya virginiana*  
*Berchemia scandescens*  
*Acer rubrum*  
*Vitis rotundifolia*  
*Prunus mexicana*  
*Quercus spolia*  
*Carpinus caroliniana*  
*Juniperus virginiana*

Frequent fire takes out some species

Frequent fire facilitates other species establishment

Gives competitive dominance to others

## Shortleaf Pine Stems/ha >3 m in Height Stoddard Fire Plots - Late March 2004



Is shifting to shortleaf  
Few loblolly stems are present

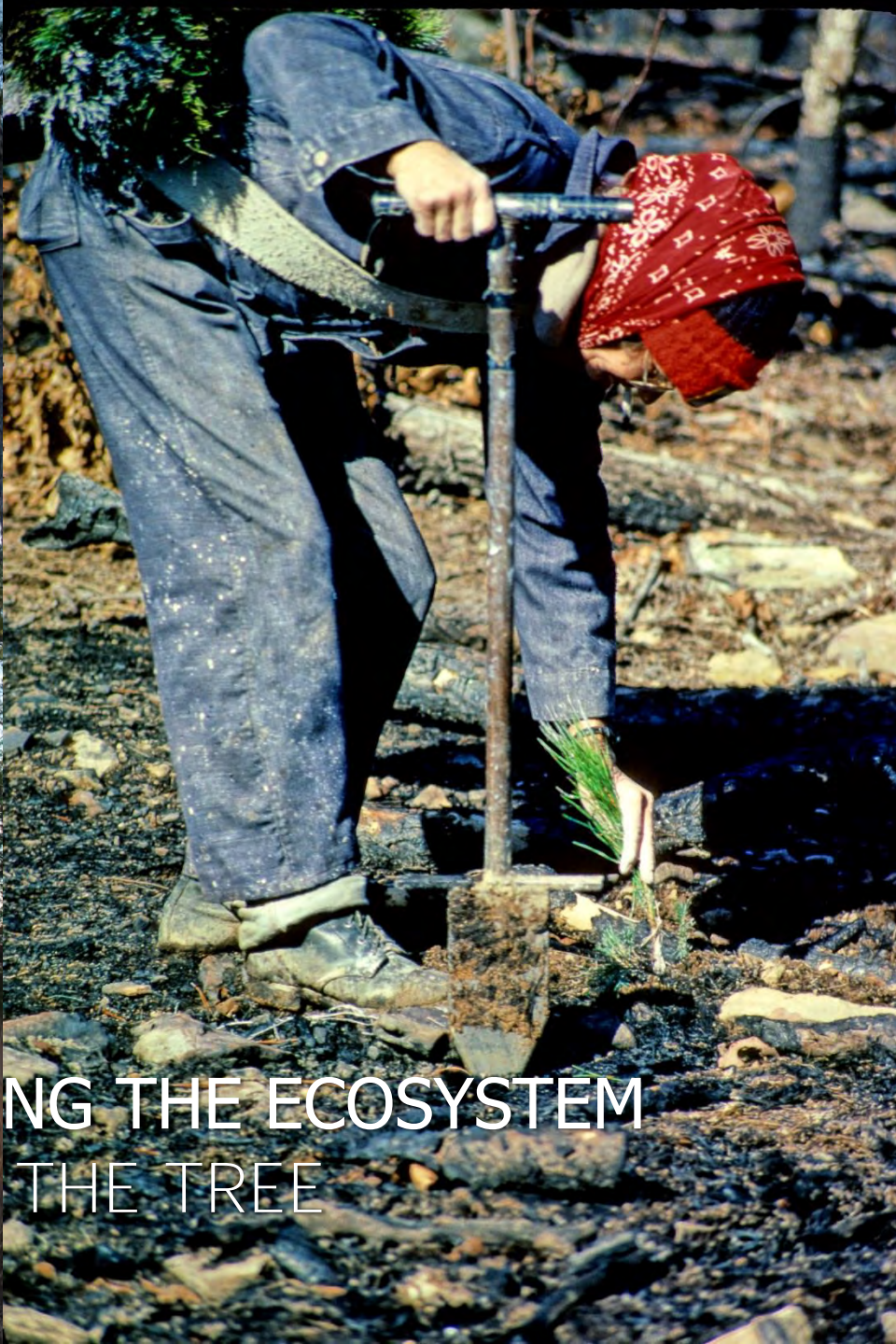
*Study established in 1959*





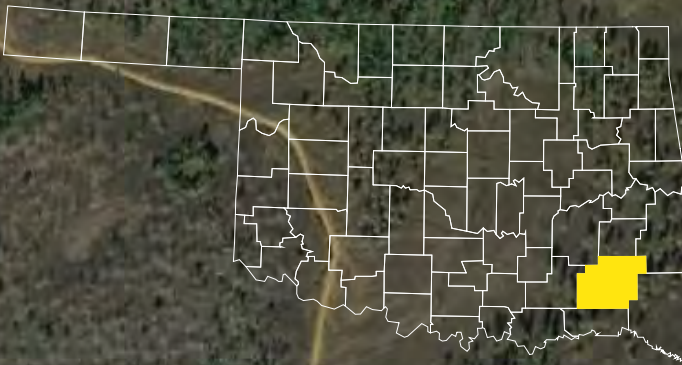
- Fire was historically important ~2-12 (18) yr return interval across the range of shortleaf.





IT'S ABOUT RESTORING THE ECOSYSTEM  
NOT JUST THE TREE

February 1, 2015



- — Pushmataha County
- Major Highways
- Pushmataha WMA

0 10 km



# TREATMENTS

<b>Control</b> (no thin or burn)	$n = 3$
<b>RRB</b> (Rough reduction burn, 4-yr)	$n = 3$
<b>GDv4</b> (Growing and Dorm burn, ~4-yr)	$n = 3$
<b>HT</b> (harvest pine, thin hardwood)	$n = 3$
<b>HTTB</b> (harv pine, thin hdwd: thin, burn)	$n = 3$
<b>HT4</b> (harvest pine, thin hardwood, burn)	$n = 3$
<b>HT3</b> (harvest pine, thin hardwood, burn)	$n = 2$
<b>HT2</b> (harvest pine, thin hardwood, burn)	$n = 3$
<b>HT1</b> (harvest pine, thin hardwood, burn)	$n = 3$
<b>HNT1</b> (harvest pine, burn – Oak Sav.)	$n = 3$
<b>PBS</b> (thin hdwd, pine-bluestem, ann. burn)	$n = 1$
<b>CCSP</b> (clearcut, burn, rip, plant loblolly, burn)	$n = 3$

Natural Regeneration with fire



# FOCAL TREATMENTS

<b>HT</b> (harvest pine, thin hardwood)	$n = 3$
<b>HTTB</b> (harv pine, thin hdwd: thin, burn)	$n = 3$
<b>HT4</b> (harvest pine, thin hardwood, burn)	$n = 3$
<b>HT3</b> (harvest pine, thin hardwood, burn)	$n = 2$
<b>HT2</b> (harvest pine, thin hardwood, burn)	$n = 3$
<b>HT1</b> (harvest pine, thin hardwood, burn)	$n = 3$
<b>CCSP</b> (clearcut, burn, rip, plant loblolly, burn)	$n = 3$

## PURPOSE:

- TO DETERMINE THE EFFECTS OF FIRE FREQUENCY AND OVERSTORY COVER ON SHORTLEAF REGENERATION
- TO DETERMINE EFFECTS OF THINNING AND FIRE ON STAGNATED STANDS

# Treatment acronyms

EXAMPLE: **HT4**

- **'H'** - all pines were harvested
- **'T'** - half the hardwood basal area thinned, **'NT'** means no hardwoods thinned
- The **number** refers to the burn cycle - in this case every **4 years**
- The HT treatment had no fire

• Control – no treatment











HT4



HT3

# 2002



HT2



HT1





HT4



HT3

2013



HT2



HT1



# HT No fire



1984



2002



7-26-2012

HT > HTTB



7-27-2012

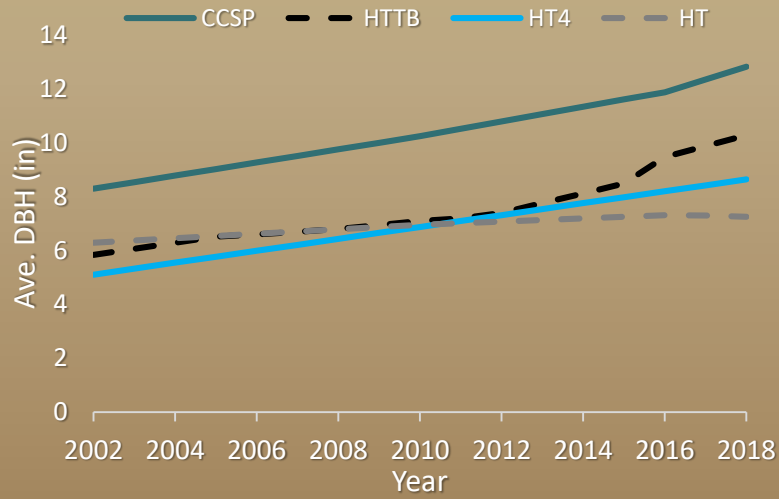
HTTB: SAME AS THE HT, IN 2012 THINNED ON 24' x 24' SPACING



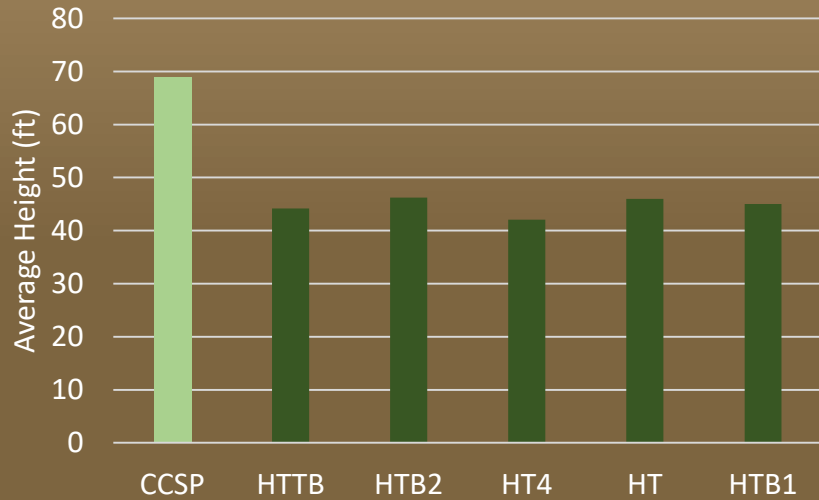
3-15-2013 & 3-25-2017



7-12-2018

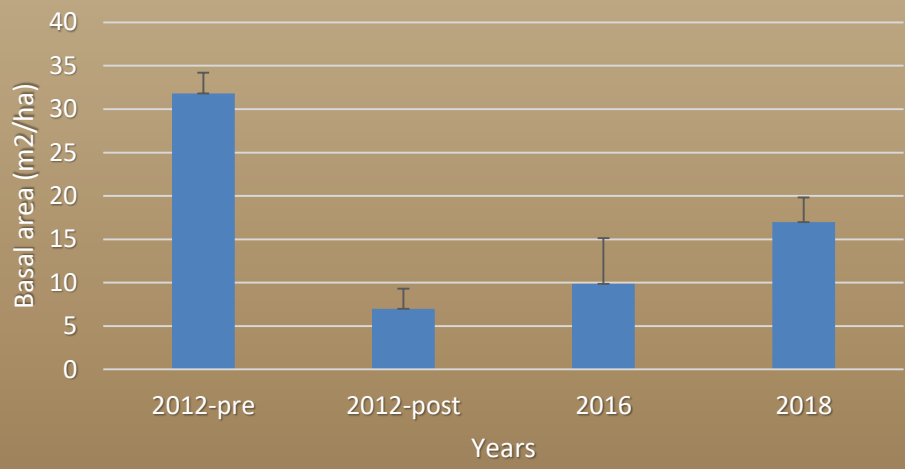


Loblolly had 3-4 yr head start

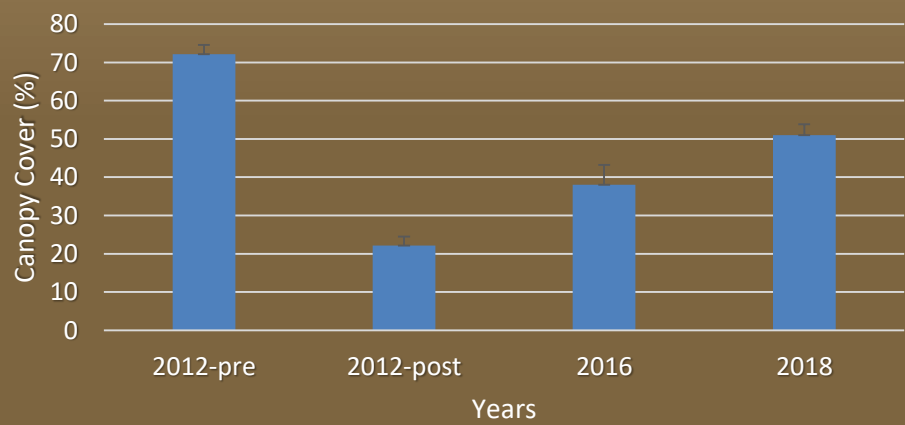


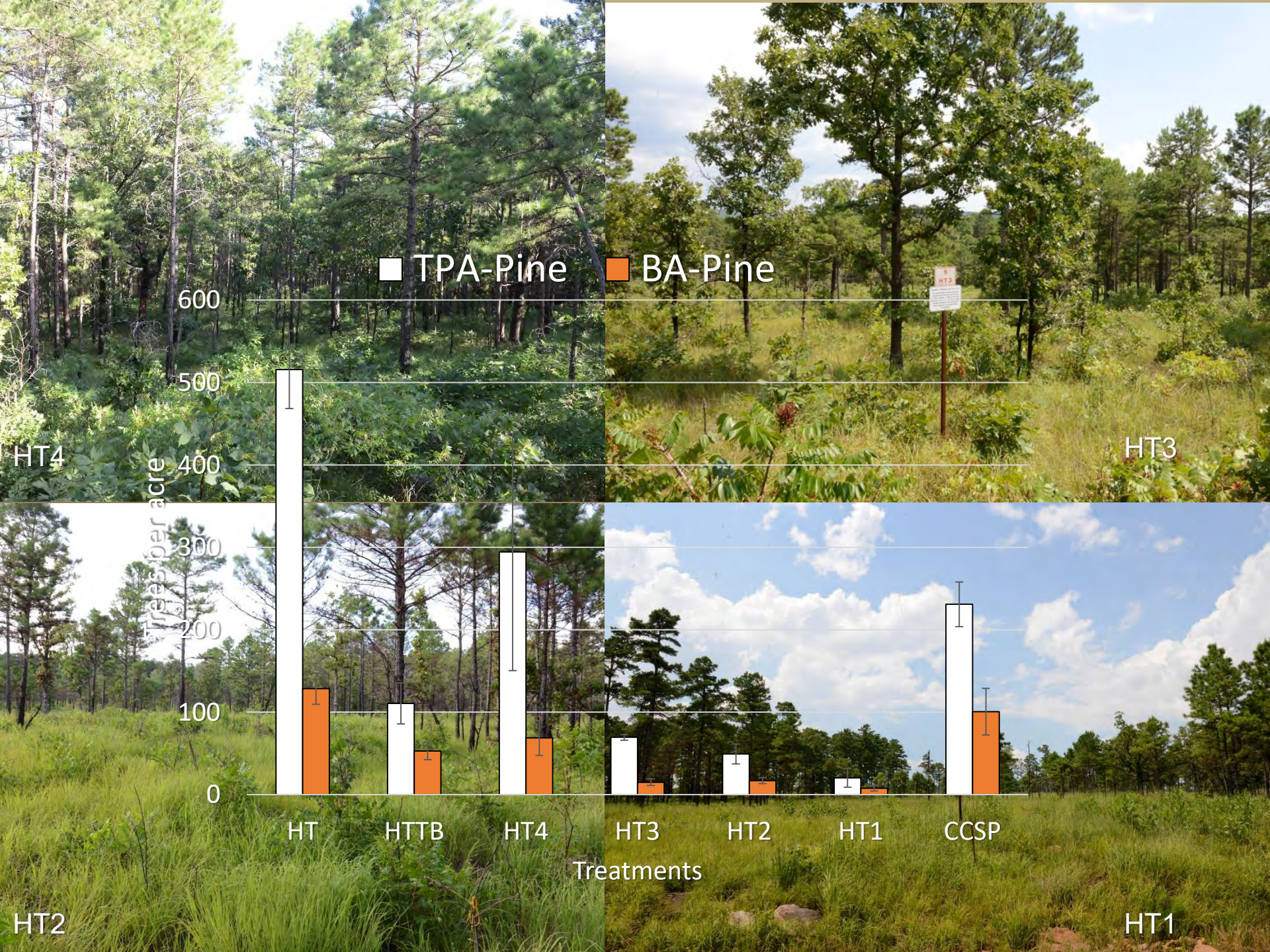


BA Response to Thinning-HTTB

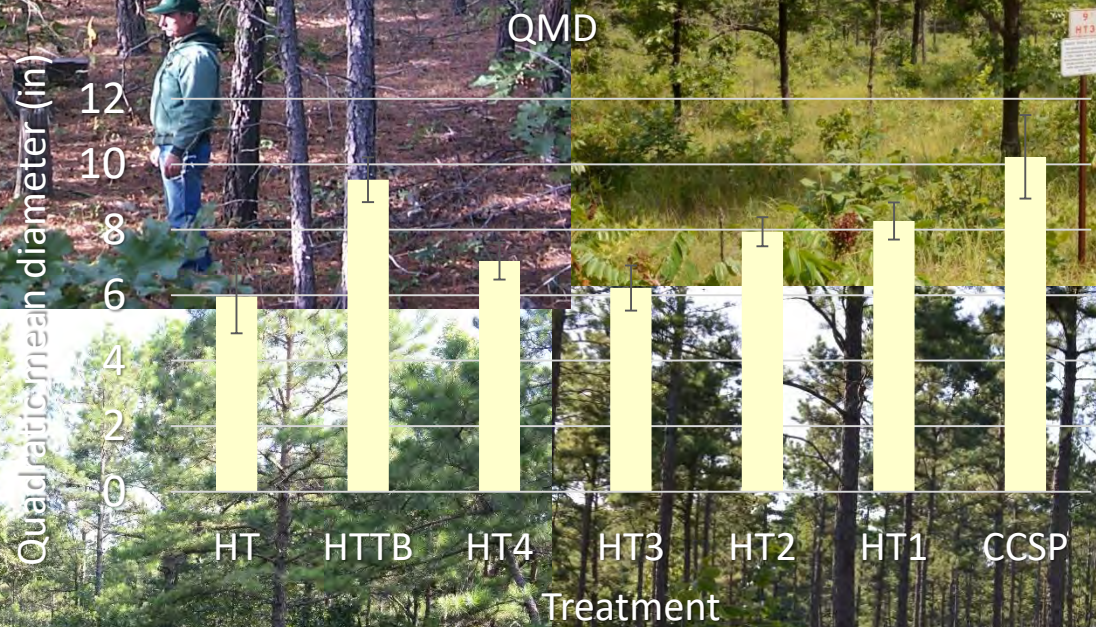


Canopy Cover Response to Thinning



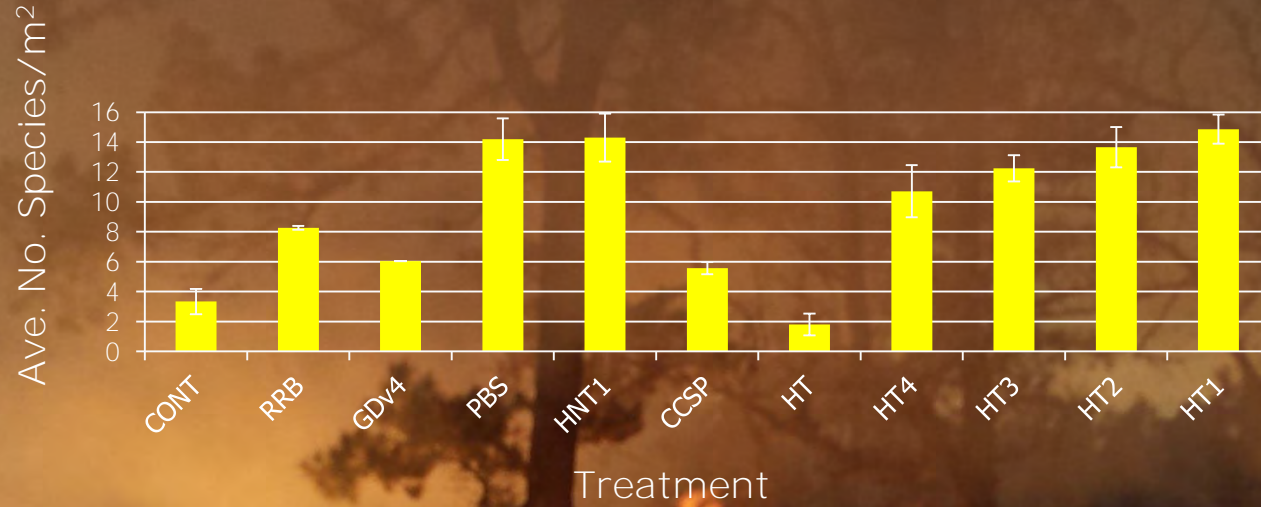




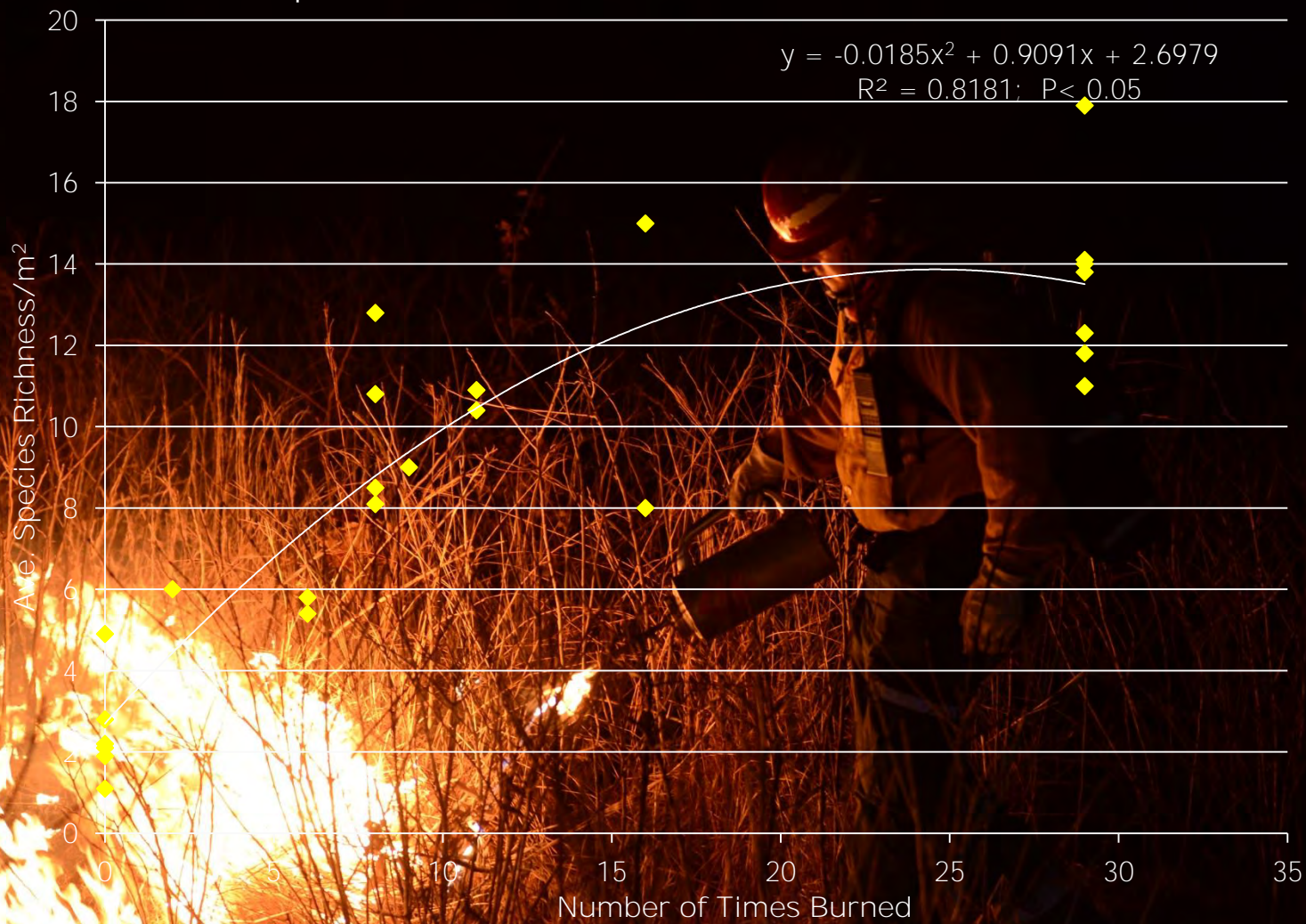




# Herbaceous Species Richness



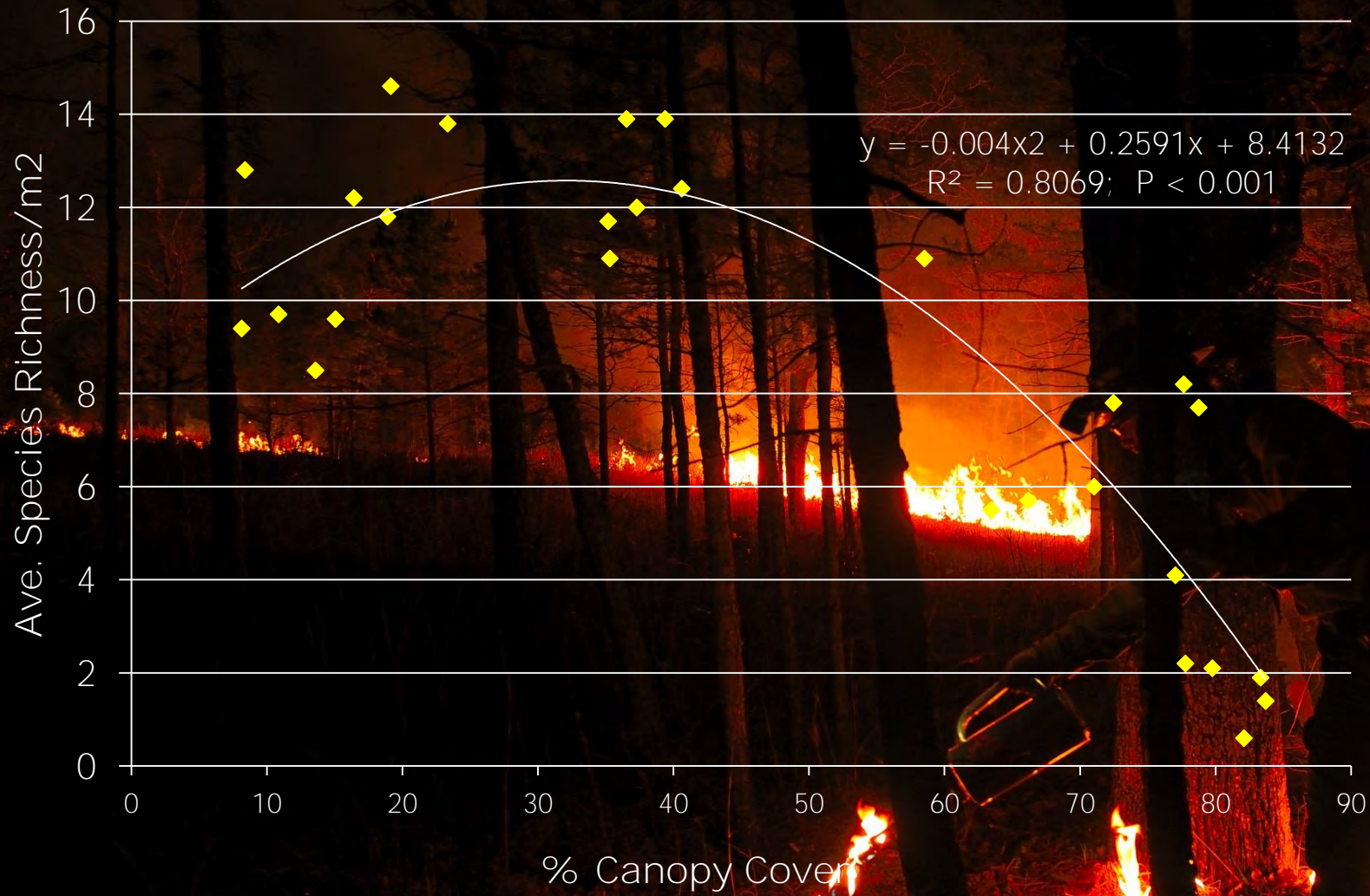
# Species Richness and Times Burned

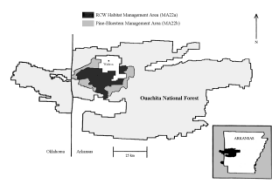


# PFHRA-Plant Community Composition

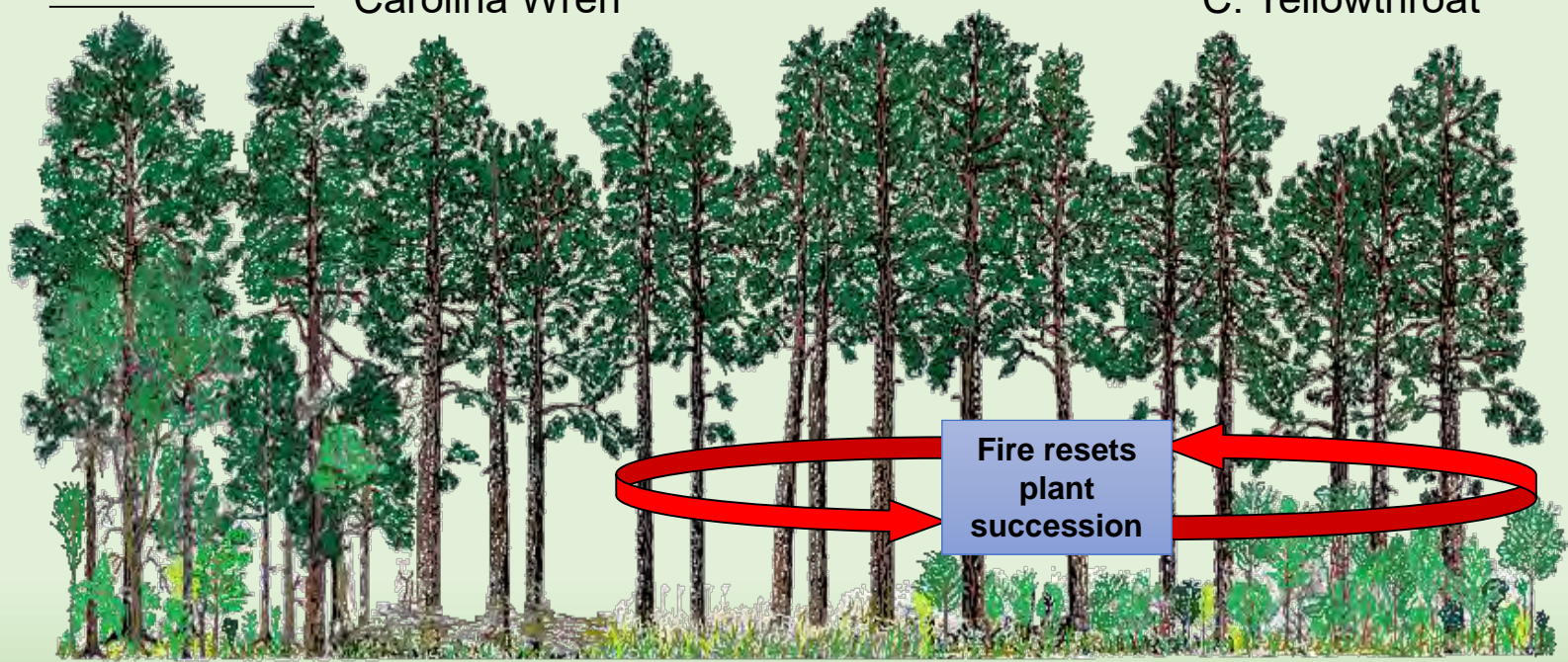
Category	1983	2016
Herbaceous	52	349
Woody vines	8	11
Woody shrubs	16	27
Trees	21	33
Total	97	400

# Canopy Cover





- \_\_\_\_\_ Pine Warbler \_\_\_\_\_
- \_\_\_\_\_ E. Wood Pewee \_\_\_\_\_
- \_\_\_\_\_ Chipping Sparrow \_\_\_\_\_
- \_\_\_\_\_ Indigo Bunting \_\_\_\_\_
- \_\_\_\_\_ Ovenbird \_\_\_\_\_ Bachman's Sparrow
- \_\_\_\_\_ Whip-poor-will \_\_\_\_\_ Prairie Warbler
- \_\_\_\_\_ Carolina Wren \_\_\_\_\_ C. Yellowthroat



**Control**      **WSI**      **1<sup>st</sup> growing season**      **2<sup>nd</sup> growing season**      **3<sup>rd</sup> growing season**

**Time since burned**

# Point – usable space for bobwhites becomes unusable 4 years post-burn

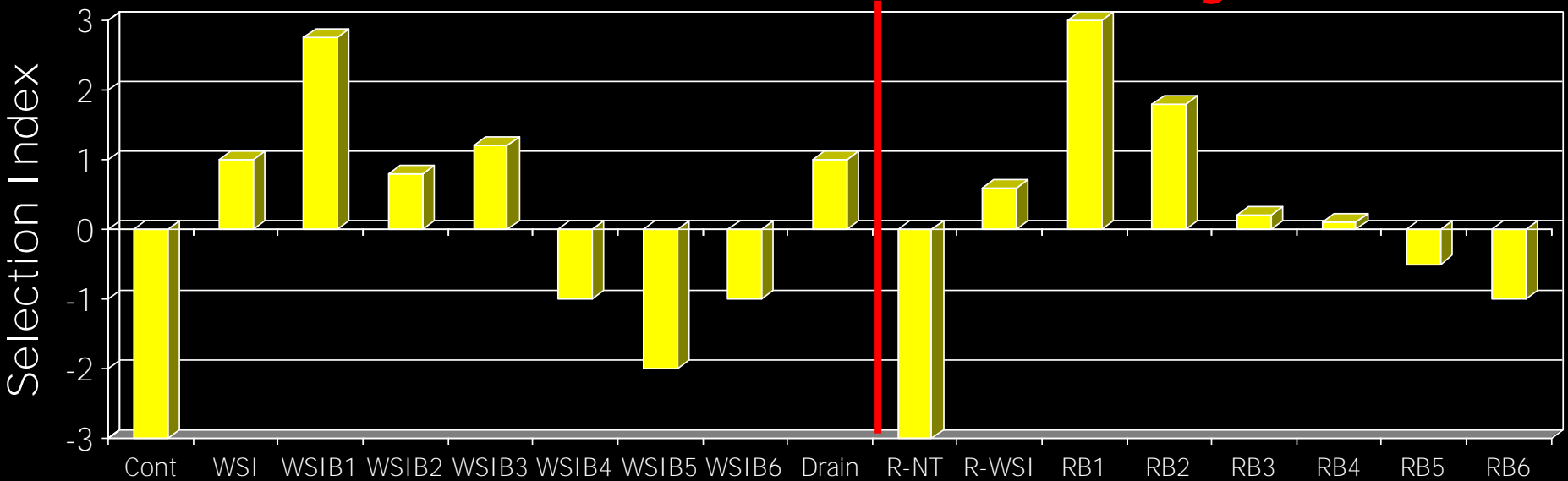


Habitat Selection by Northern Bobwhites

**Used**

**Mature**

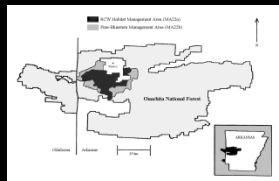
**Regen**



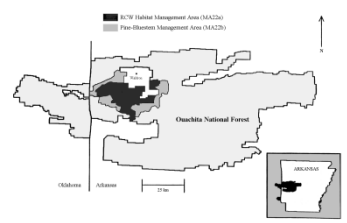
**Avoid**

Habitat Cover Types

**FREQUENT FIRE IS ESSENTIAL**

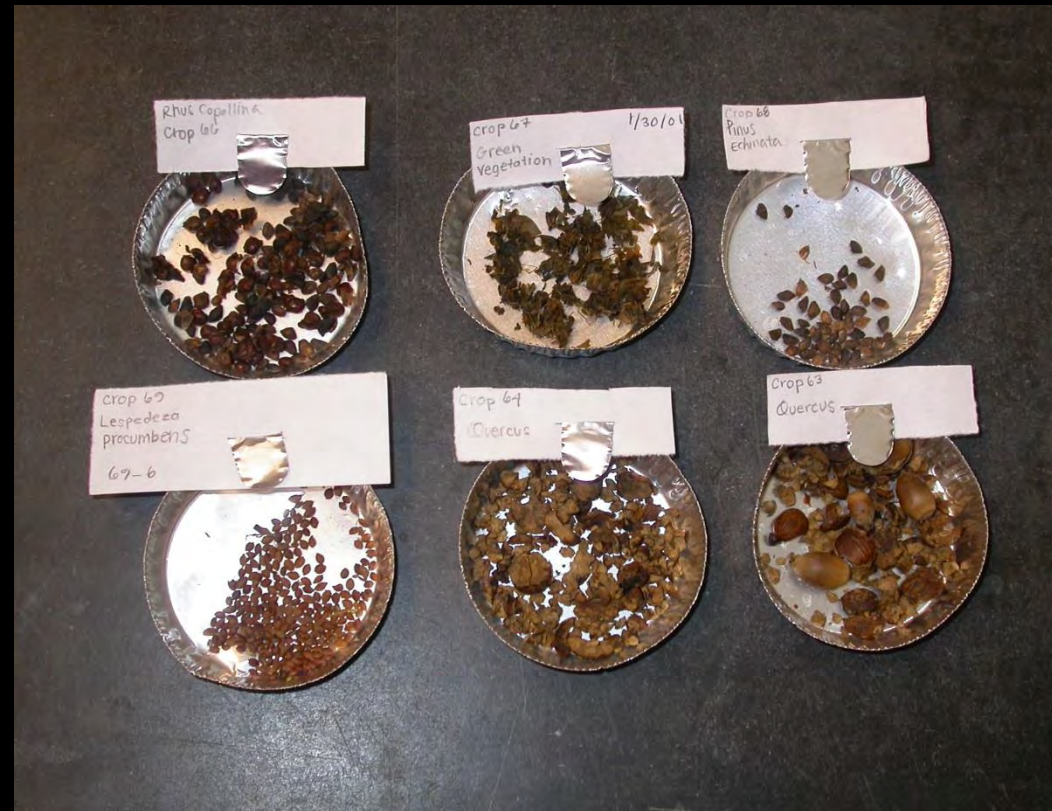






# Top Autumn & Winter Quail Foods

1. Shortleaf pine
2. Post oak
3. Prostrate lespedeza
4. Kobe lespedeza
5. Winged sumac
6. Green Vegetation
7. Black oak
8. Slender lespedeza
9. Beggar-lice
10. Orthopterans



Shortleaf pine seed had among the highest gross energy, fat, and crude protein of food items analyzed.

*Masters et al. 2016*

# Fire variables

Frequency

Season

Intensity

Residence time

Heat per unit area



# Frequency of Fire:

Fire frequency is one of the most if not the most important of all the fire variables

- 3 years is a ecological threshold
- Shift from woody to herbaceous dominance

Is imperative because it is a system driver

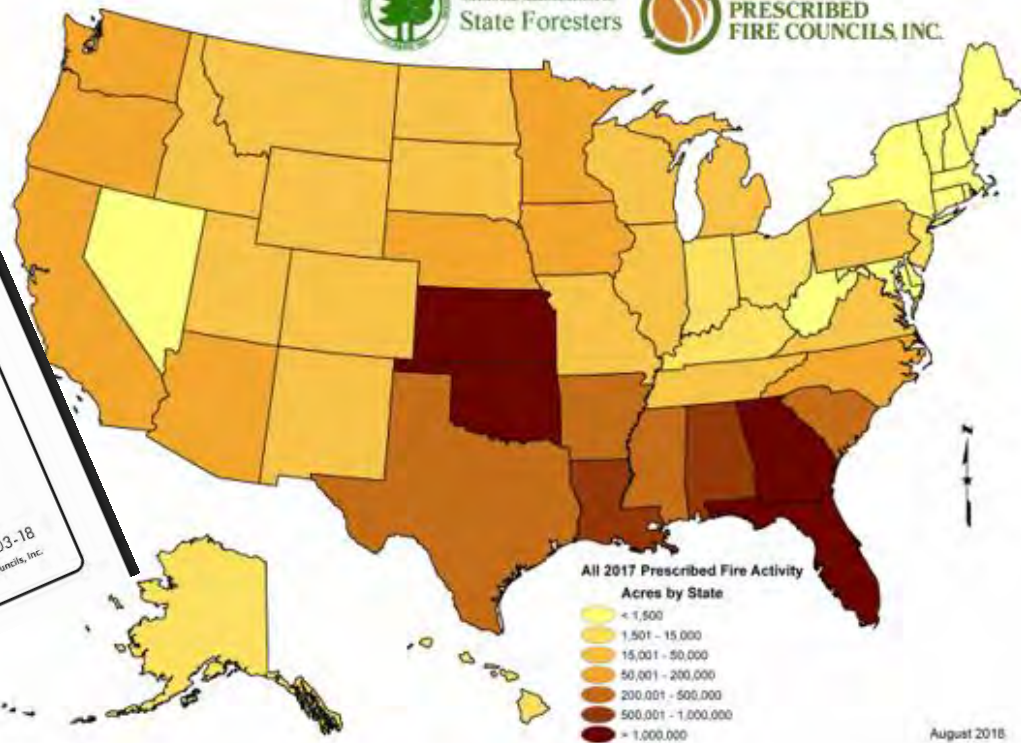
Results (continued)



NATIONAL ASSOCIATION OF  
State Foresters



COALITION OF  
PRESCRIBED  
FIRE COUNCILS, INC.



August 2018

Figure 9. Acres of all prescribed fire use by state. Coarse acreage classes were created using a histogram that determined the most significant breaking points in acres reported.



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# Summary Points:

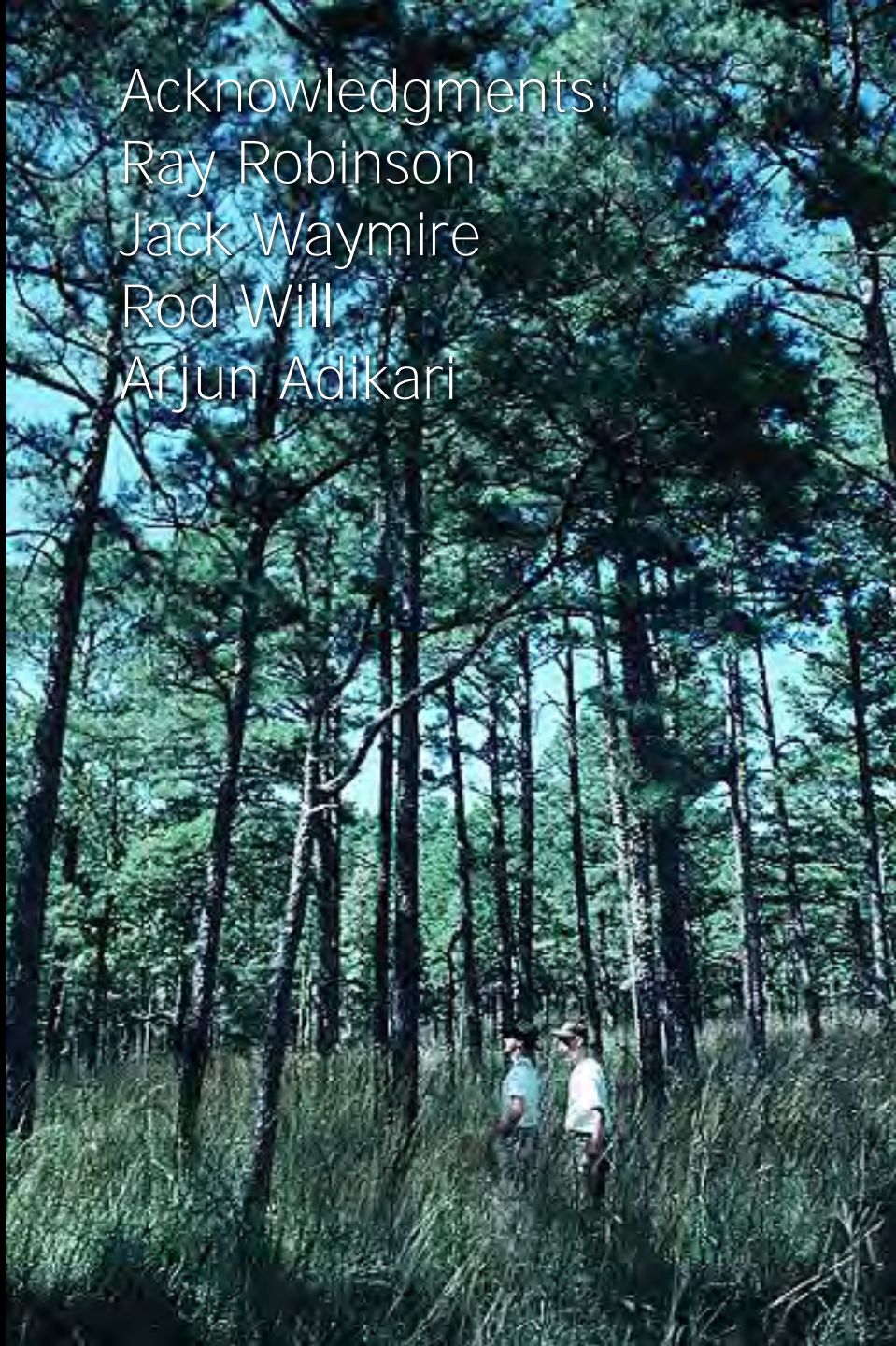
- Shortleaf is fire adapted not fire dependent
- Think ecosystem not individual trees
  - Restore ecosystem – with fire
- You can regenerate shortleaf with fire
- Fire is essential for ecosystem- 3 years is a ecological threshold
- Rekindle a PASSION for fire –
  - not caviler
  - not risk aversion
- Think big ... or go home      **JUST DO IT!**



Oklahoma Agricultural  
Experiment Station



Acknowledgments:  
Ray Robinson  
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Rod Will  
Arjun Adikari



Quail Unlimited





*“Land management is an art that builds  
on history and is based in science”*

*Herbert L. Stoddard, Sr.*