

Forest Management for Wildlife:

**Understanding Basal Area, Canopy Closure, and
Arkansas's Historic Landscapes**



What is Basal Area?

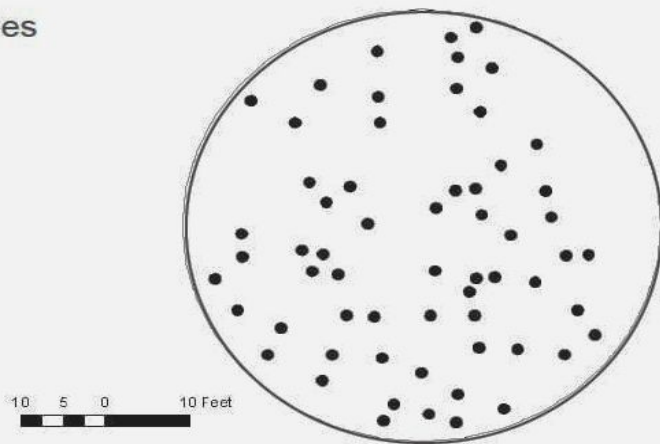
- Fundamental measurement in forestry.
- **Definition:** the Cross sectional area of a tree trunk at breast height (4.5 feet from the ground)
- **Stand Level:** The total basal area of all trees in a given area, usually expressed as ft^2/acre .



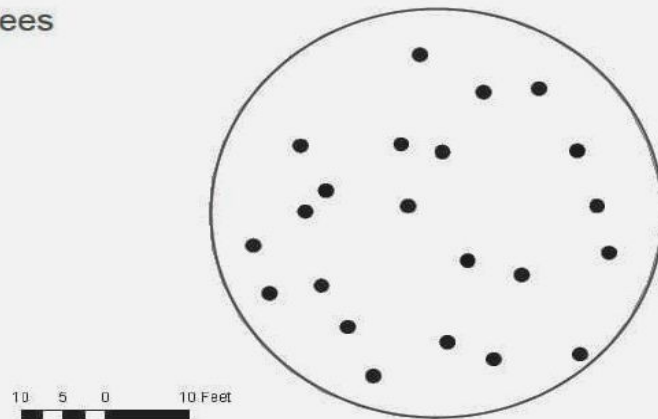
Basal area per tree, in square feet, for trees that are 1 to 30 inches				
DBH (in)	Basal Area (ft²)		DBH (in)	Basal Area (ft²)
1	0.005		16	1.396
2	0.022		17	1.576
3	0.049		18	1.767
4	0.087		19	1.969
5	0.136		20	2.182
6	0.196		21	2.405
7	0.267		22	2.639
8	0.349		23	2.884
9	0.442		24	3.14
10	0.545		25	3.409
11	0.66		26	3.688
12	0.785		27	3.978
13	0.922		28	4.28
14	1.069		29	4.593
15	1.227		30	4.909

60 sq/ft Basal Area (%) Acre Plot

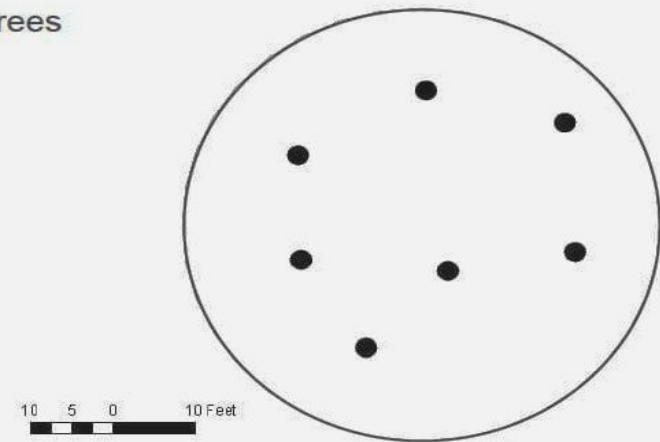
6-in trees



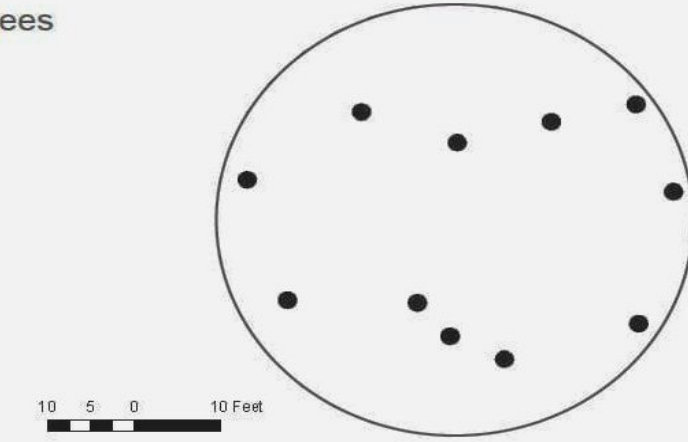
10-in trees



18-in trees

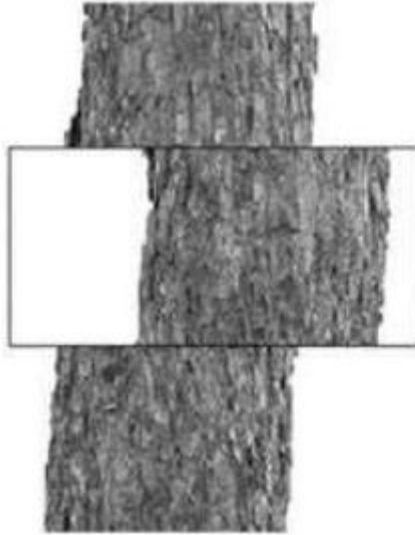


14-in trees

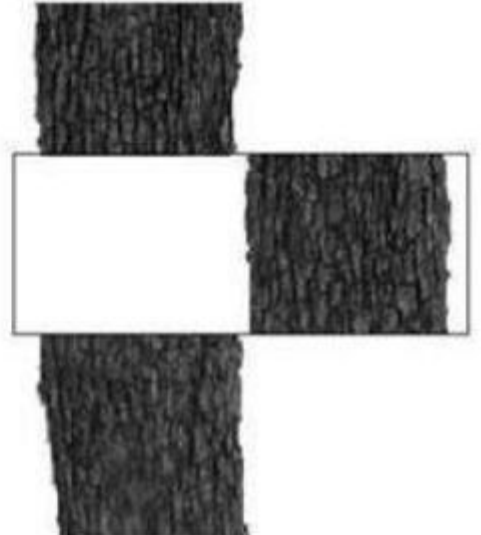


Variable Radius Plot

10 Factor Prism = Quick and easy way to determine BA



In (count it)



Out (do not count it)

Putting Basal Area to Work

- **Indicator of stand density**
- **Timber Management**
- **Wildlife Habitat Assessment**



From Tree Trunks to Tree Tops: The Connection

- Basal Area and Canopy Closure are Directly Related
- What is Canopy Closure?
- Why it Matters



Managing the Canopy for Wildlife

Sunlight is Key:

High Canopy Closure (>80%):

- Limited understory growth.
- Favors shade-tolerant plants.
- Good for species that need mature, closed-canopy forests (e.g., some songbirds, squirrels, turkeys).

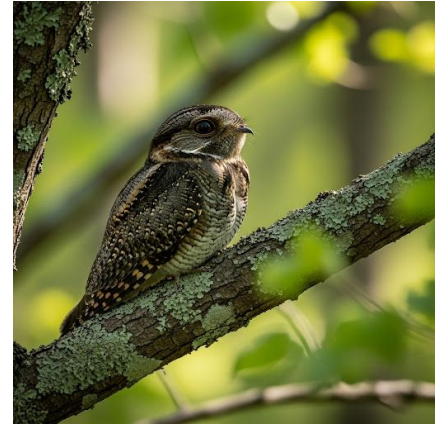
Low Canopy Closure (<50%):

- Promotes a diverse and abundant understory.
- Excellent for species like Northern Bobwhite Quail, Wild Turkey, and provides abundant forage for White-tailed Deer.



Why Diversity Matters: Creating a Wildlife Mecca

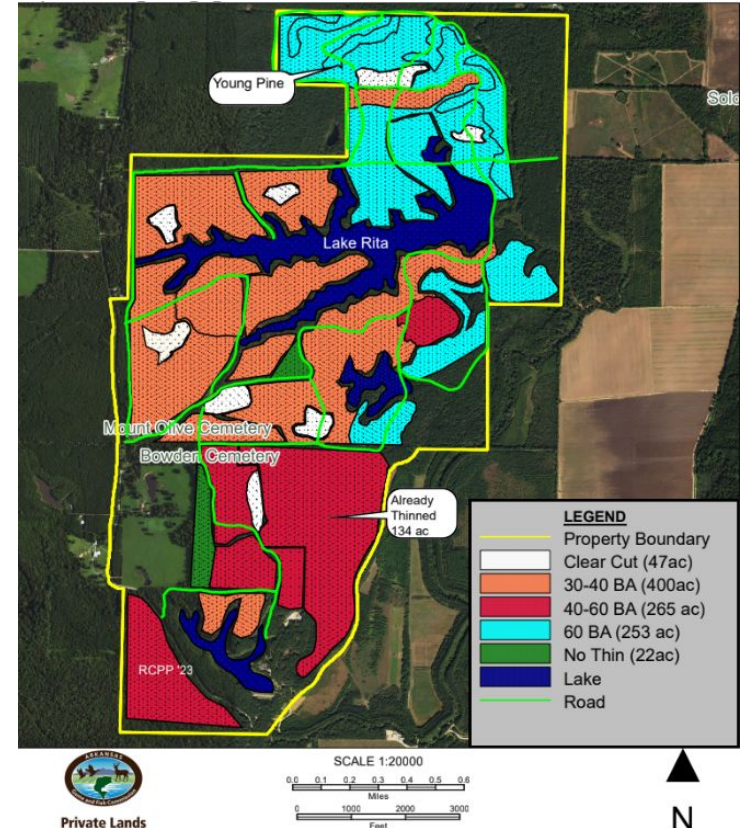
- **Wildlife Needs are Diverse**
- **Structural Diversity**
- **Compositional Diversity**
- **Age Diversity**



Management for Diversity: A Varied Approach

Use a variety of management techniques across the landscape:

- Variable Retention Thinning
- Prescribed Fire
- Creating Gaps
- Protecting Sensitive Areas



Site Index: Understanding Your Land's Potential

What is Site Index?

Predicting Natural Succession:

- **High Site Index:** Rapid growth.
Requires more frequent management (thinning, fire) to maintain open, early successional habitats.
- **Low Site Index:** Slower growth.
Easier and more natural to maintain open woodlands, savannas, or glades.

Implications for wildlife management:



Tables — Forest Productivity (Tree Site Index): shortleaf pine (Coile, Schumacher 1953 (530)) — Summary By Map Unit

Summary by Map Unit — Garland County, Arkansas (AR051)
Summary by Map Unit — Hot Spring County, Arkansas (AR059)

Summary by Map Unit — Garland County, Arkansas (AR051)

Map unit symbol	Map unit name	Rating (feet)	Acres in AOI
4	Bigfork-Rock outcrop complex, 3 to 15 percent slopes	45	18.8
6	Bigfork-Yanush-Carnasaw complex, 20 to 40 percent slopes	45	47.5
8	Bismarck-Carnasaw complex, 3 to 8 percent slopes	45	6.8
9	Bismarck-Carnasaw complex, 8 to 20 percent slopes, very stony	45	17.7
10	Bismarck-Carnasaw complex, 20 to 40 percent slopes, very stony	45	28.7
17	Carnasaw gravelly silt loam, 8 to 20 percent slopes	70	0.1
23	Ceda gravelly loam, 0 to 3 percent slopes, frequently flooded	70	9.9
37	Yanush very gravelly silt loam, 3 to 12 percent slopes	65	2.8

Subtotals for Soil Survey Area

132.2

Summary by Map Unit — Hot Spring County, Arkansas (AR059)

Map unit symbol	Map unit name	Rating (feet)	Acres in AOI
4	Bigfork-Rock outcrop complex, 3 to 8 percent slopes	55	183.2
5	Bigfork-Rock outcrop complex, 40 to 60 percent slopes	45	18.0
13	Carnasaw-Bismarck-Sherless complex, 3 to 8 percent slopes	70	5.7
14	Carnasaw-Bismarck-Zafra complex, 8 to 20 percent slopes, very stony	70	165.3
15	Carnasaw-Bismarck-Zafra complex, 20 to 40 percent slopes, very stony	70	7.7
16	Ceda gravelly fine sandy loam, 0 to 1 percent slopes, occasionally flooded	70	49.7
93	Yanush-Ceda complex, 0 to 8 percent slopes	65	49.9
94	Yanush-Carnasaw-Bigfork complex, 8 to 20 percent slopes	65	596.9
95	Yanush-Bigfork-Carnasaw complex, 20 to 40 percent slopes	60	81.7

Subtotals for Soil Survey Area

1,158.0

Totals for Area of Interest

1,290.2

Letting the Land Lead the Way

Site is King

- **Soil Type:** Sand vs Clay or Deep vs Shallow
- **Topography:** South and West vs North
- **Hydrology:** Elevation / Flood frequency

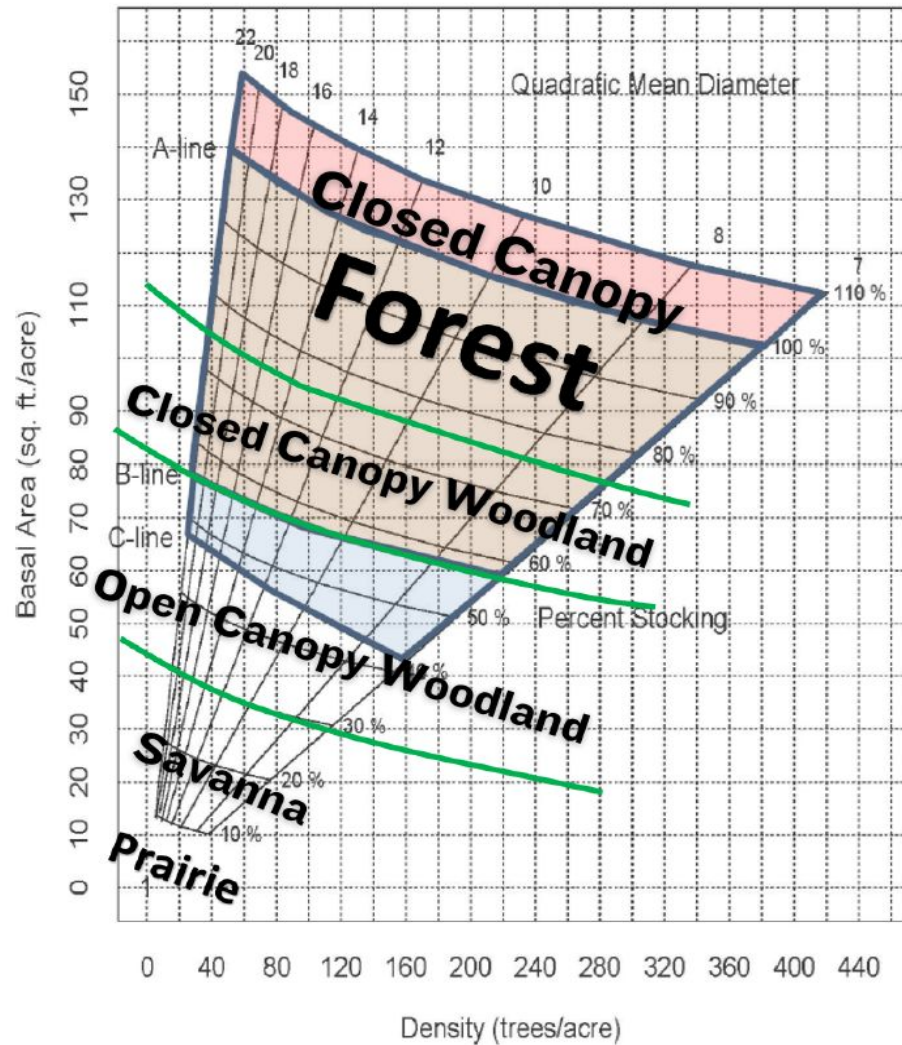




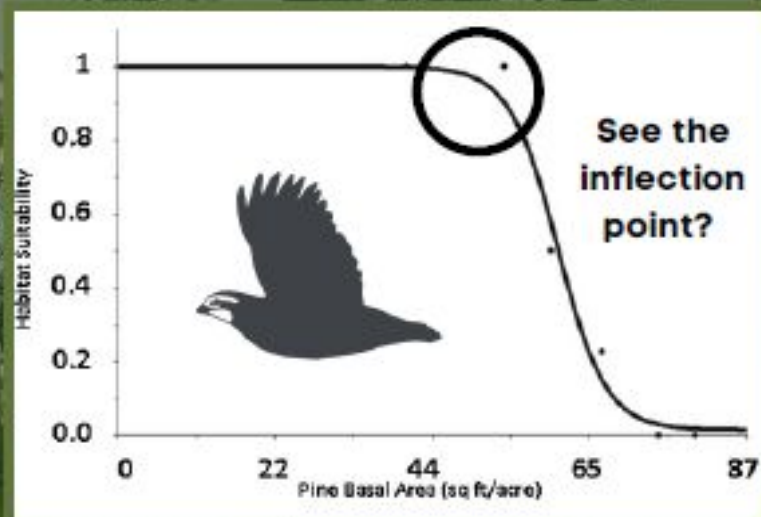
Historic Ecotypes in Arkansas

- Historically, Arkansas was not a continuous, dense forest. It was a diverse mosaic of:
 - **Bottomland Hardwood Forests:** Along rivers and in low-lying areas.
 - **Upland Oak-Hickory Forests and Woodlands:** In the Ozark and Ouachita Mountains.
 - **Pine Woodlands and Savannas:** Particularly in the Coastal Plain and Ouachitas.
 - **Prairies, Glades, and Barrens:** Open, grassy areas with few trees, maintained by fire and specific soil conditions.





Northern Bobwhite Habitat Suitability Index (HSI) Model



HSI is represented on a scale of 0 to 1 with 1 being suitable habitat (chances of occupancy high) and 0 being unsuitable habitat.

SAVANNA

- Quail Occupancy Probability Very Good
- Quail Density - High
- Grassland Specialist Present

OPEN CANOPY WOODLAND

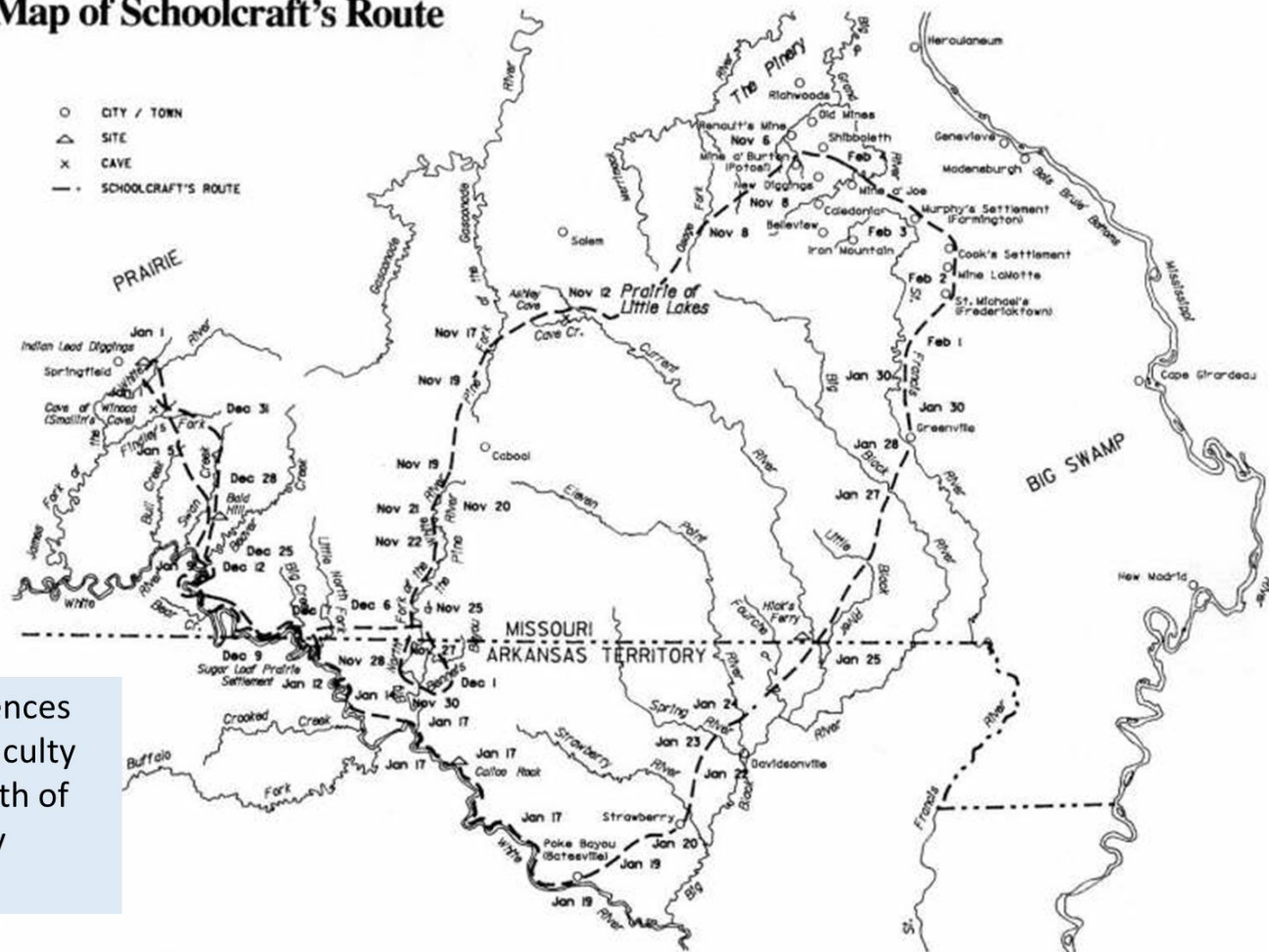
- Quail Occupancy Probability Good
- Quail Density - Low
- General Wildlife Improvements



History of Fire



Map of Schoolcraft's Route



"One of the greatest inconveniences we experienced (was)... the difficulty of finding... wood and water, both of which are indispensable." Henry Schoolcraft, 1818

19th Jany 1837

The Evening on My arrival at the place of our Camp, I found tents clothing & blankets & every combustible of Camp Equipt totally destroyed by fire - field Notes Saved by being in My saddle bags & it Suspended On the limb of a tree.

George Catlin, 1832 MO

"Every acre of these vast prairies burns over during the fall or early in the spring...the fire slowly creeps with a feeble flame...where the wild animals often rest in their lairs until the flames almost burn their noses, when they will reluctantly rise, and leap over it, and trot off amongst the cinders, where the fire has passed and left the ground as black as jet."

Letters and Notes, Vol. 2, No. 33, 1841





1897

1890

1885

1884

1877

1870

1855

SCOTCH-IRISH AMERICAN

DELAWARE

SHAWNEE

1846

1823

1815

1812

1806

CHEROKEE

1792

1790

1786

1780

OSAGE

1769

1767

EXPANSION

1755

1752

QUAPAW

1728

1704

1696

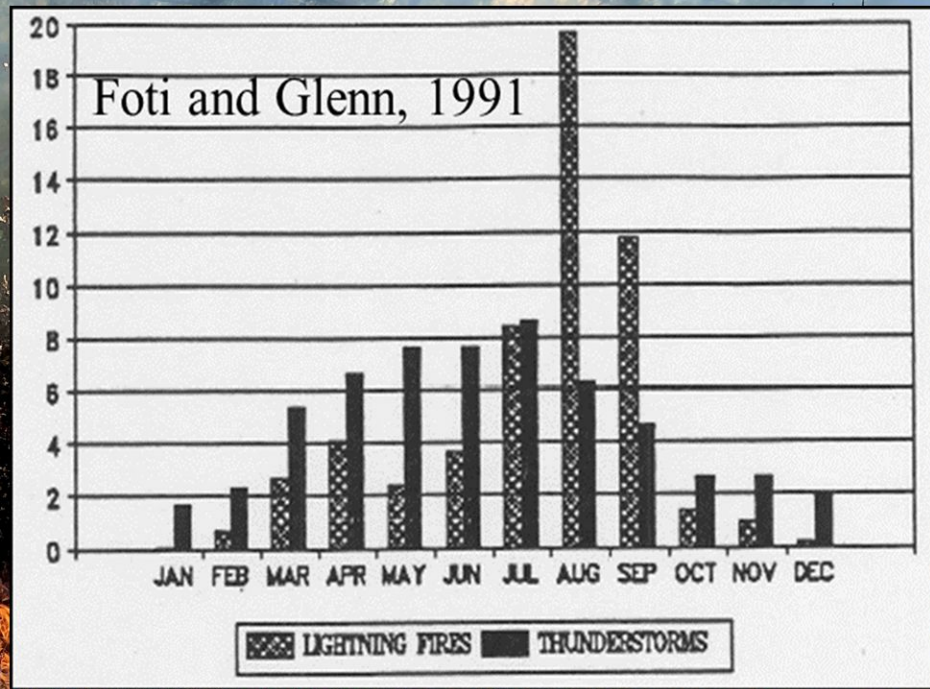
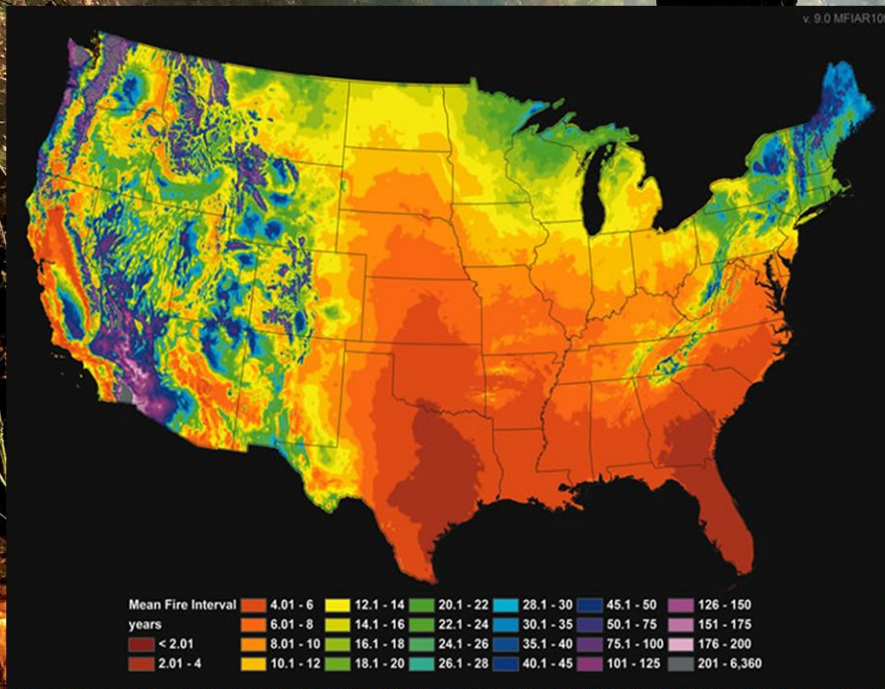
FIRE SCAR DATES AND
RELATED CULTURES

**Remember:
there are babes in the woods.**











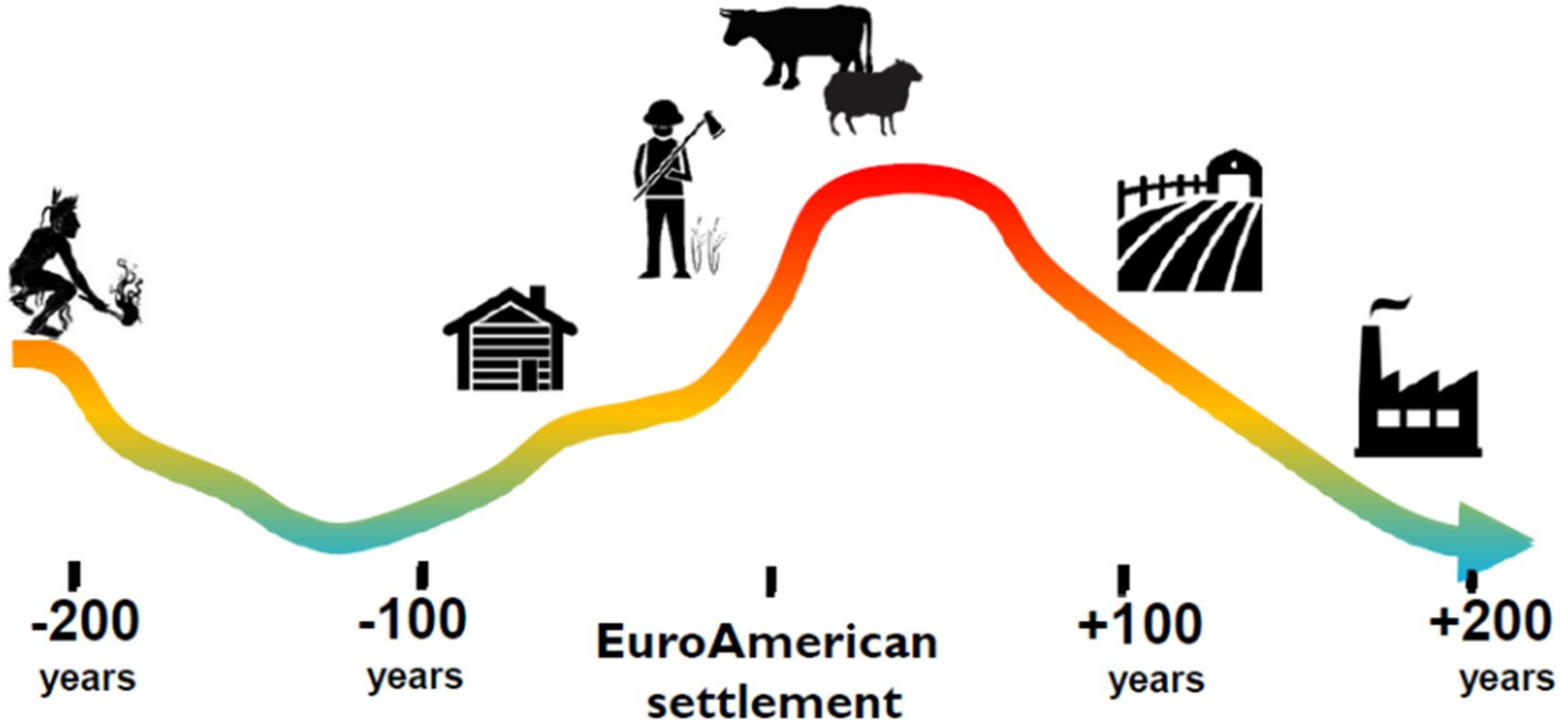
Fire in the Ozarks

Burning by humans has shaped the landscape

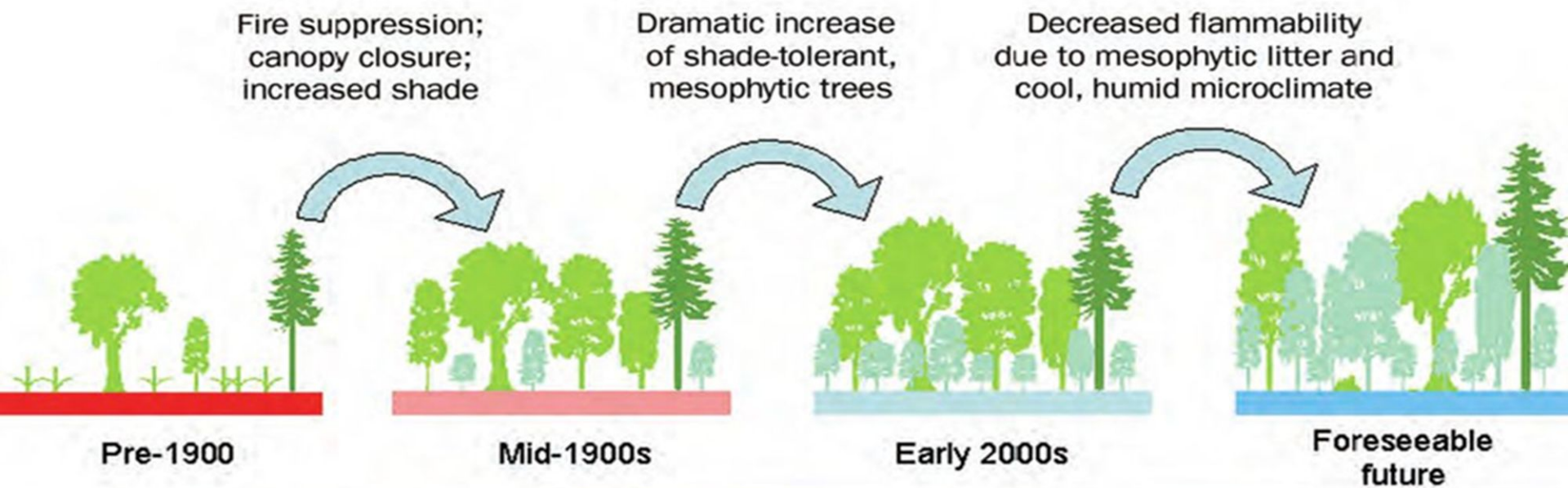
By Denise Henderson Vaughn

April 9, 2024

The Wave of Fire



Fire importance



Norwacki and Abrams, 2008

Wild Turkey

Succession without fire

Pine Warbler

Red-eyed Vireo

Summer Tanager

Carolina Chickadee

Carolina Wren

Tufted Titmouse

White-breasted Nuthatch

Yellow-breasted Chat

Common Yellowthroat

Indigo Bunting

Northern Cardinal

Prairie Warbler

White-eyed Vireo

Mourning Dove

Northern Bobwhite

Killdeer

Night Hawk

Wild Turkey

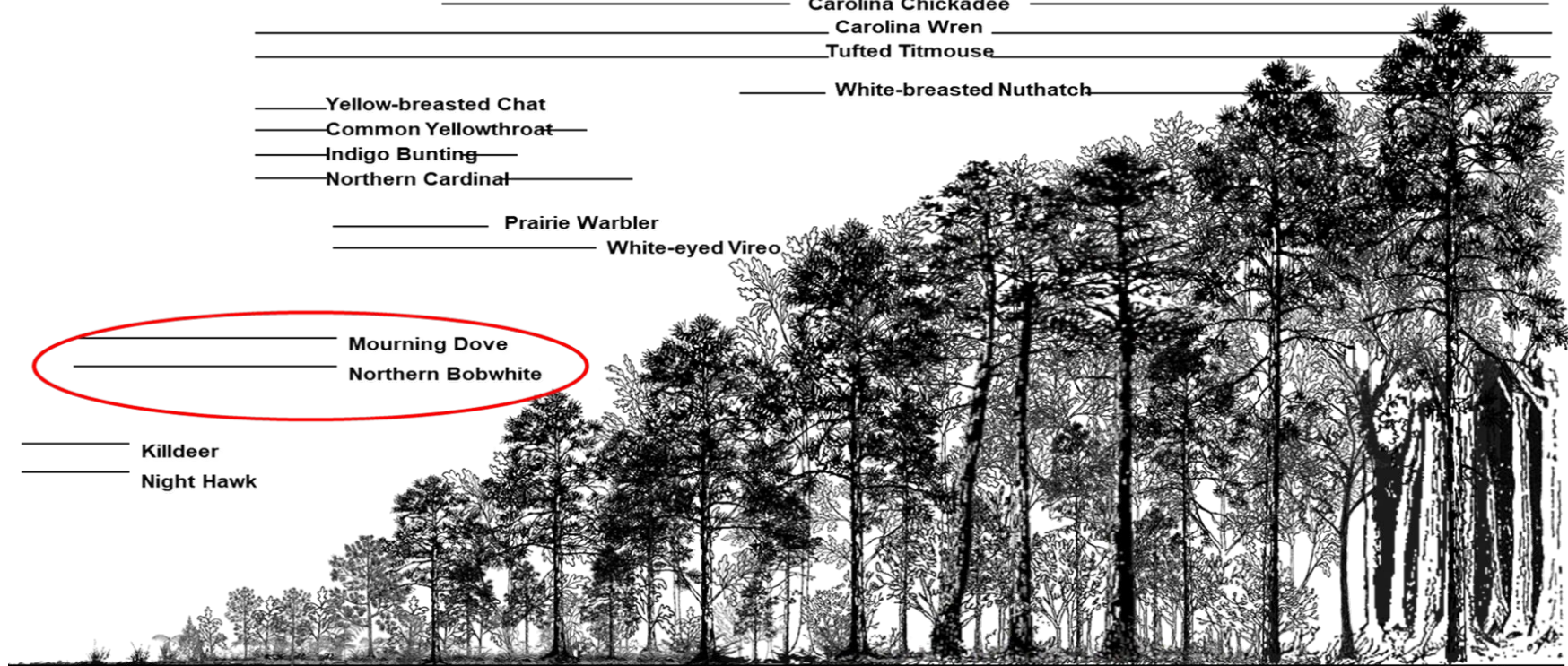
Red-bellied Woodpecker

Pileated Woodpecker

Whip-poor-will

Oven Bird

Worm-eating Warbler



Masters 2007

Mourning Dove

Northern Bobwhite

Pine Warbler

Chipping Sparrow

Bachman's Sparrow

Indigo Bunting

Northern Cardinal

Prairie Warbler

Cooper's Hawk

Eastern Wood Pewee

Brown-headed Nuthatch

Red-headed Woodpecker

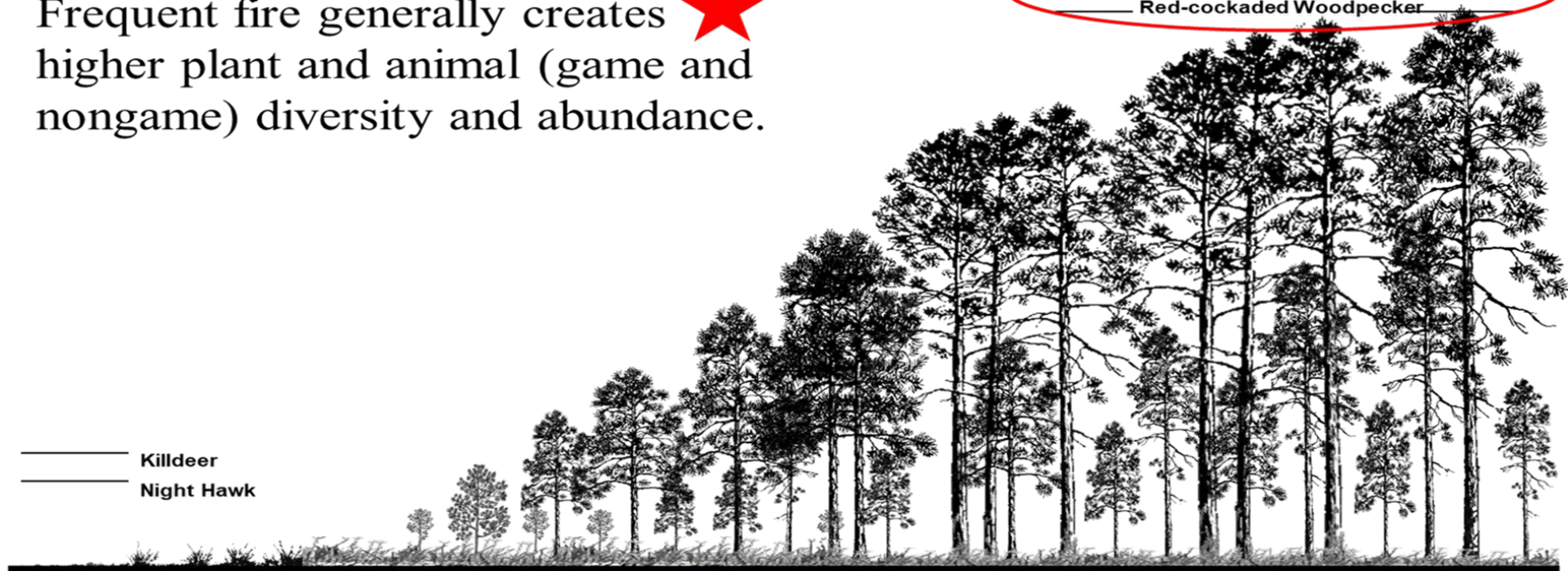
Red-cockaded Woodpecker

Succession with fire

Frequent fire generally creates  higher plant and animal (game and nongame) diversity and abundance.

Killdeer

Night Hawk



Masters 2007

Connecting the Dots for Wildlife

Example 1: Quail Management:

- **Historic Ecotype:** Pine or Oak Savanna.
- **Management:** Thinning to a low basal area (30-50 ft²/acre) to create an open canopy, followed by prescribed fire to encourage native grasses and forbs.

Example 2: Turkey Management:

- **Historic Ecotype:** Mix of open woodlands / savannas and mature forest.
- **Management:** Create a mosaic of conditions with areas of lower basal area for nesting and brood-rearing, and areas of higher basal area for roosting and mast production.

Summary

- Basal area is a simple yet powerful tool for measuring forest density.
- Basal area and canopy closure are directly linked and are critical for managing wildlife habitat.
- Understanding the historic ecotypes, site conditions, and site index of your property is essential for setting realistic and effective management goals.
- By actively managing our forests for diversity, we can create healthier, more resilient ecosystems that support a rich community of wildlife.



QUESTIONS?