OHIO STATE UNIVERSITY EXTENSION

# *The Future of Oak is in Your Hands!*


***Dave Apsley***

***Natural Resources Specialist***

***Ohio State University Extension***

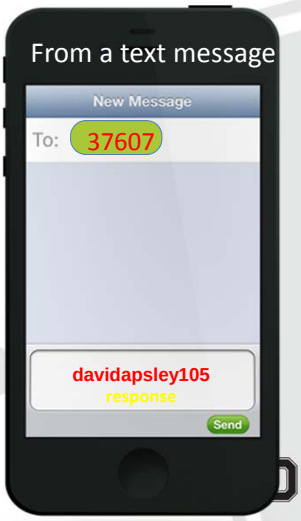

***Jackson, Ohio***

***Forest Connect 1-18-2017***

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

OHIO STATE UNIVERSITY EXTENSION

## Participating with Poll Everywhere




THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

OHIO STATE UNIVERSITY EXTENSION

# Your poll will show here

1

Install the app from pollev.com/app

2

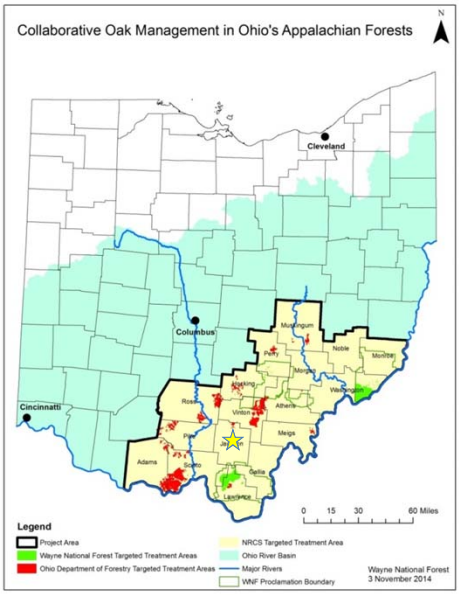
Make sure you are in Slide Show mode

Still not working? Get help at pollev.com/app/help

*or*

Open poll in your web browser

OHIO STATE UNIVERSITY EXTENSION




O STATE UNIVERSITY

FOOD, AGRICULTURAL,
NMENTAL SCIENCES

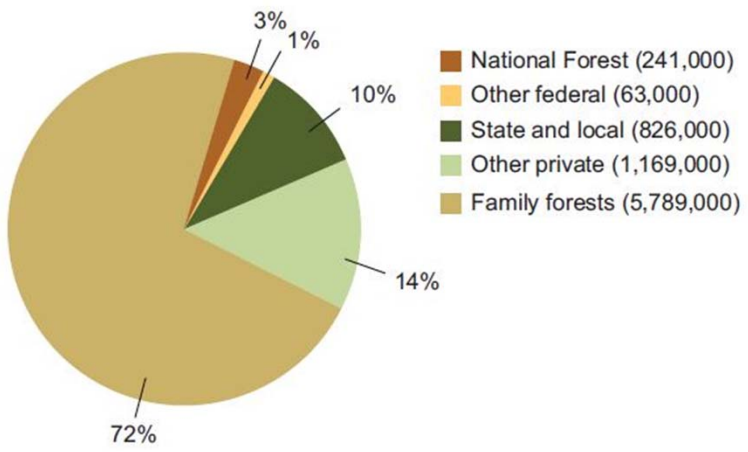



**Figure 8.**—Ownership of forest land (acres) by ownership category, Ohio, 2011.

OHIO STATE UNIVERSITY EXTENSION

# Today's Topics

- Why Care About Oaks?
- Oak Forests in Decline
- Oak Ecology
- The Process of Oak Regeneration
- Managing Young Oak After Regeneration
- Ohio's Collaborative Oak Restoration Efforts

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

OHIO STATE UNIVERSITY EXTENSION

# Why Care About Oaks?

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

7

OHIO STATE UNIVERSITY EXTENSION

# Top Ten Reasons to Care about Oaks

Based on:
David Wm. Smith' Keynote Address
***Why Sustain Oak Forests?***
*2nd Fire in Eastern Oaks Conference, Columbus OH*

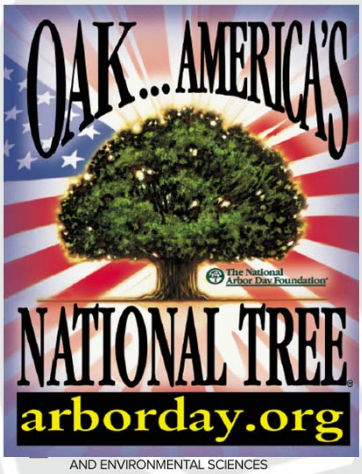
Adapted from a presentation by Dan Yaussy,
***Why Should We Care About Oaks?***
Northern Research Station, US Forest Service Delaware OH

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

# 10. America's Tree

The oak tree is a symbol of American forests

- It has stature among tree species
- Legislation passed by Congress, 2004






OHIO STATE UNIVERSITY EXTENSION

# 9. Cultural

Oaks hold a place in our shared cultures and mythologies.

- Symbol for strength and endurance
- Can you think of examples?

## Oaks Give Us Hope!

## Don't Worry if Your Job Is Small

By Anonymous

Don't worry if your job is small,
And your rewards are few.
Remember that the mighty oak,
Was once a nut like you.





## 8. Aesthetics

- Oaks add color, shape, contrast and stability to virtually every landscape
- In all four seasons
- In both rural and urban settings.

OHIO STATE UNIVERSITY EXTENSION

# 7. Ecological Standing

The oaks have ecological "standing." David Wm. Smith borrows the word "standing" from the legal profession where it implies "a connection."

- The oaks have been "connected" for millions of years.
- They have been displaced, replaced, and then returned over a notable length of geologic time.
- There is little question that they are of significant ecological importance.
- They influence the entire ecosystem
  - Fire
  - Wildlife
  - Understory plants

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

OHIO STATE UNIVERSITY EXTENSION

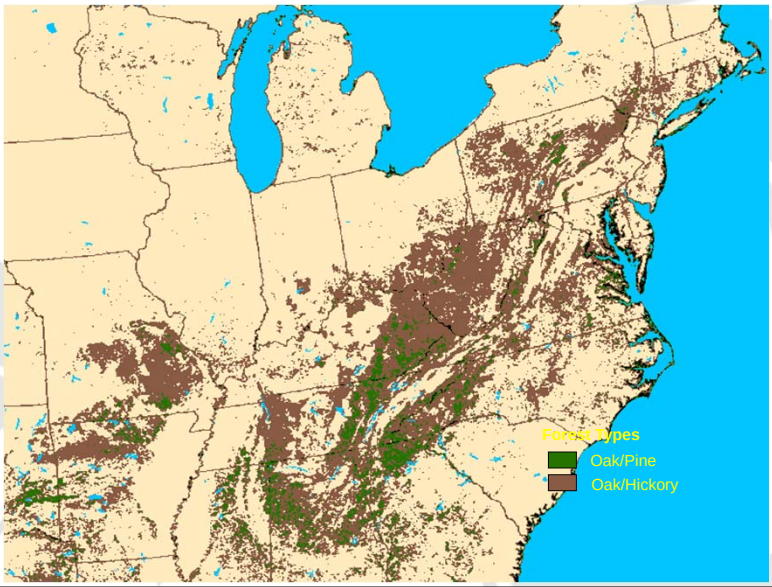
# 6. Geographically Widespread

- There are at least 31 oak species in the Eastern United States
- At least one oak species is adapted to or will grow on virtually every forest site in the East
- Ohio has at least 15 species and many more hybrids

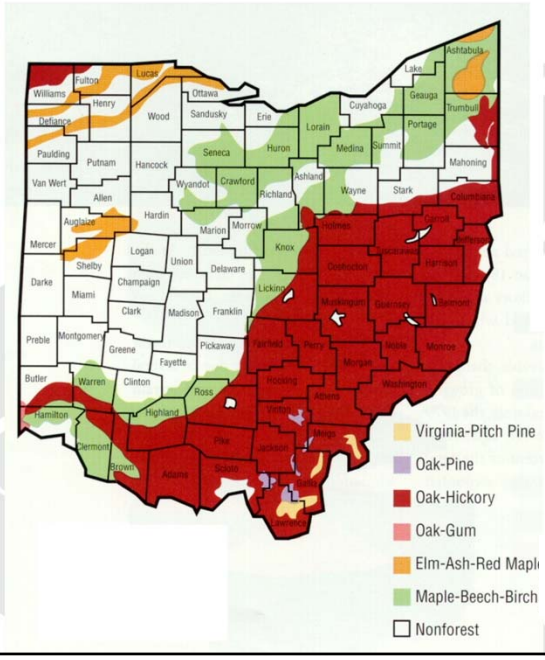
THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

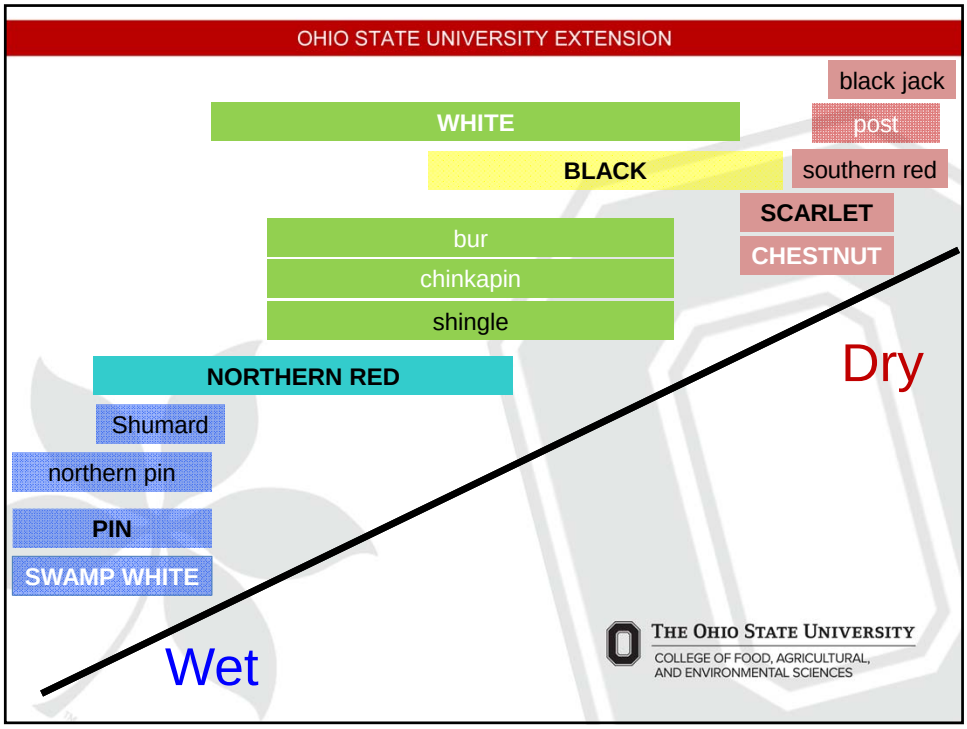
OHIO STATE UNIVERSITY EXTENSION

# Oak Forests




OHIO STATE UNIVERSITY EXTENSION






OHIO STATE UNIVERSITY EXTENSION

# 5. Wood Quality

The wood from most oak species is noted for its strength, durability, rot resistance, high energy value, and visual appeal that make it ideal for a host of important wood products.

- Think about a world without oak floors, fine furniture, kitchen cabinets, railroad ties, bourbon and wine barrels, firewood, and pallets.

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

OHIO STATE UNIVERSITY EXTENSION

# 4. Wildlife Habitat

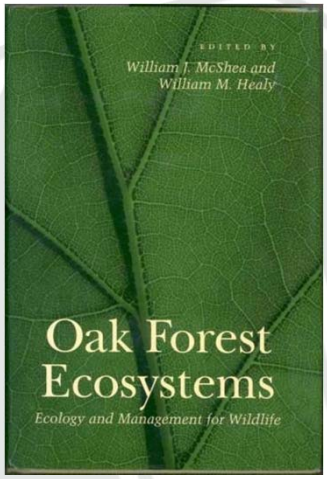
- The oaks provide essential habitat components for many wildlife species, including large and small mammals, birds, amphibians, and reptiles.
- The volume and quality of food provided by acorns are essential for a host of species. The durability and size of oak cavity trees are seldom matched by associated tree species.

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

OHIO STATE UNIVERSITY EXTENSION

# Oaks and Wildlife

- More than 90 wildlife species use acorns
  - from bears to songbirds
- "Acorns are the most important wildlife food in the deciduous forests of North America"
- "Without hard mast it is difficult to imagine that temperate forests could sustain more than a handful of vertebrate species"




THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

OHIO STATE UNIVERSITY EXTENSION

## Oaks Depend on Wildlife for Seed Dispersal


*Elmer Verhasselt, Bugwood.org*

- Squirrels
- Mice
- Chipmunks
- Blue Jays
  - can move 3 miles
- Crows

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

21

OHIO STATE UNIVERSITY EXTENSION

## 3. Community Stability

- The oaks are among the longest living tree species in the East and, therefore, tend to stabilize forest communities that are subjected to outside forces—both natural and man caused.
- The presence of oaks in forested communities tends to make those same communities more resilient.

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

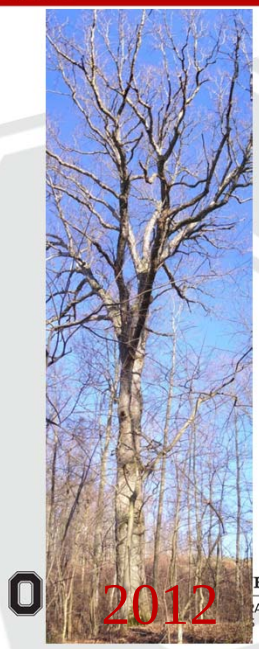
OHIO STATE UNIVERSITY EXTENSION

# Oak Lifespans

http://bigtree.cnre.vt.edu/TreeAge.htm

| | Average Life | Maximum |
|---|---|---|
| **Oak, Black** | 100 | 225 |
| **Oak, Chestnut** | 300 | 400 |
| **Oak, Northern Red** | 200 | 400 |
| **Oak, Pin** | 100 | 150 |
| **Oak, Post** | 250 | 450 |
| **Oak, Scarlet** | 80 | 180 |
| **Oak, White** | 300 | 600 |

OHIO STATE UNIVERSITY EXTENSION

OHIO STATE UNIVERSITY EXTENSION

## 2. Endangered Ecosystem

- The rate change in species composition of eastern forests is unprecedented
- We are seeing changes in less than a single generation of oaks that we would have expected in 10 to 20 or more generations.
- >50% loss of upland oak habitats expected throughout the Eastern US
  - USGS.1995. *Endangered Ecosystems of the United States: A Preliminary Assessment of Loss and Degradation*

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

OHIO STATE UNIVERSITY EXTENSION

## 1. We Caused the Problem

- We are a significant part of the problem so we must diligently and deliberately be part of the solution.
- We have no choice but to work toward sustaining our oak forests.

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

OHIO STATE UNIVERSITY EXTENSION

# Oak Forests in Decline

"Oaks in were present in the past.
Oaks are here now.
Will they be here in future?"

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

27

OHIO STATE UNIVERSITY EXTENSION

# The Situation

- 60% of mature forests in Ohio are dominated by oak and hickory overstories
- Oaks are not regenerating in sufficient numbers to ensure their future

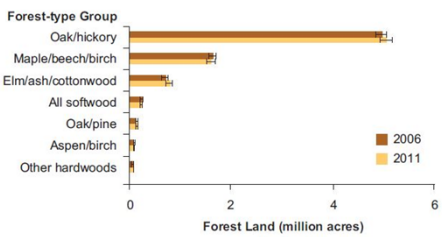



**Figure 22.**—Area of forest land by forest-type group, Ohio, 2006 and 2011. Error bars represent 67-percent confidence intervals around the estimated mean.

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

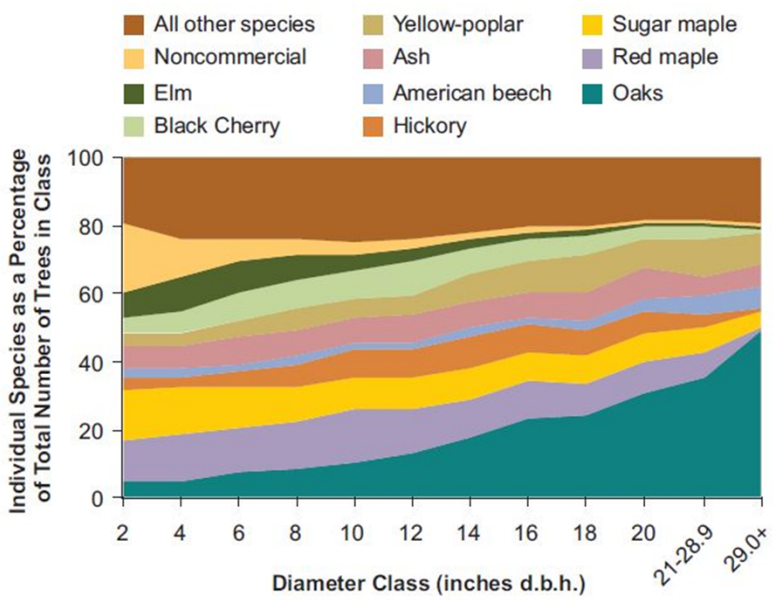



**Figure 25.**—Species composition by diameter class on forest land, Ohio, 2011.

OHIO STATE UNIVERSITY EXTENSION

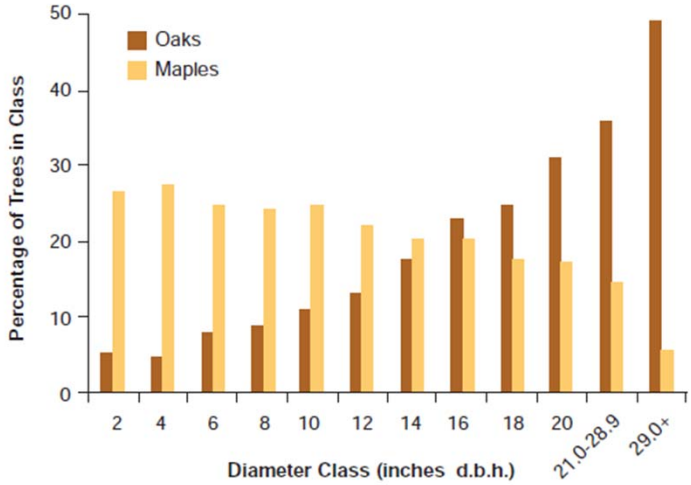



**Figure 26.**—Oaks and maples as a percentage of all trees by diameter class on forest land, Ohio, 2011.

OHIO STATE UNIVERSITY EXTENSION

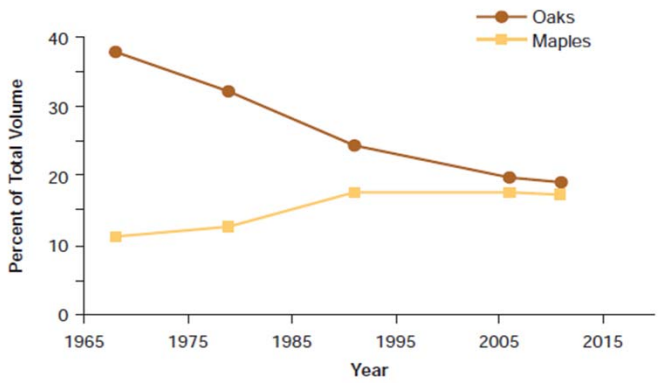



**Figure 27.**—Oak and maple species groups as a percentage of total growing-stock volume, Ohio, 1968 to 2011.

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

## Your poll will show here

1 Install the app from pollev.com/app

2 Make sure you are in Slide Show mode

Still not working? Get help at pollev.com/app/help
*or*
Open poll in your web browser

OHIO STATE UNIVERSITY EXTENSION

## Why the decline?

- Oaks gain a competitive advantage from disturbance (fire, livestock grazing, other?)
- In many cases the more severe and frequent the disturbance the more oak is favored
- Many of our forests in SE Ohio became established during or shortly after historically high levels of disturbance

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

OHIO STATE UNIVERSITY EXTENSION

## Why the decline?

- The type, frequency and severity of disturbance in our forests have changed
  - Fire is much less frequent
  - Livestock grazing and other man caused disturbances have also decreased
  - Timber harvesting practices have shifted toward individual tree removal
    - Often target dominate oaks
    - Do not allow adequate light to reach forest floor

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

# Oak Ecology





# Oak Fire Adaptations

- Mature oaks have relatively thick bark
- Oaks have the ability to compartmentalize damage
- Seedlings have relatively large root systems with buds below the soil surface
- Oaks leaves are designed to burn

OHIO STATE UNIVERSITY EXTENSION

# Oak Regeneration Strategy

- Acorn crops are cyclic
- Large pulses of oak regeneration occur at irregular intervals
- If adequate resources are available, oak seedlings invest energy into developing large root systems
- Rapid re-sprouting and shoot growth following disturbance

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

37

OHIO STATE UNIVERSITY EXTENSION

OHIO STATE UNIVERSITY EXTENSION

# The Process of Oak Regeneration

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

39

OHIO STATE UNIVERSITY EXTENSION

United States Department of Agriculture
Forest Service
Northern Research Station
General Technical Report NRS-33

USDA

**Prescribing Regeneration Treatments for Mixed-Oak Forests in the Mid-Atlantic Region**

TATE UNIVERSITY
OD, AGRICULTURAL,
ENTAL SCIENCES

40

OHIO STATE UNIVERSITY EXTENSION

# Cardinal Rules of Successful Oak Regeneration

- There must be competitive oak regeneration in advance of final overstory removal
- This advanced regeneration must be released in a timely manner (Loftis 2004)

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

41

OHIO STATE UNIVERSITY EXTENSION

# Establishment Requirements

- Intermediate Light
- Regeneration is not competitive until it is of considerable size.
  - Historically 4.5 feet tall
  - Root collar diameter >0.75 inches
- Established regeneration must be released

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

42

OHIO STATE UNIVERSITY EXTENSION

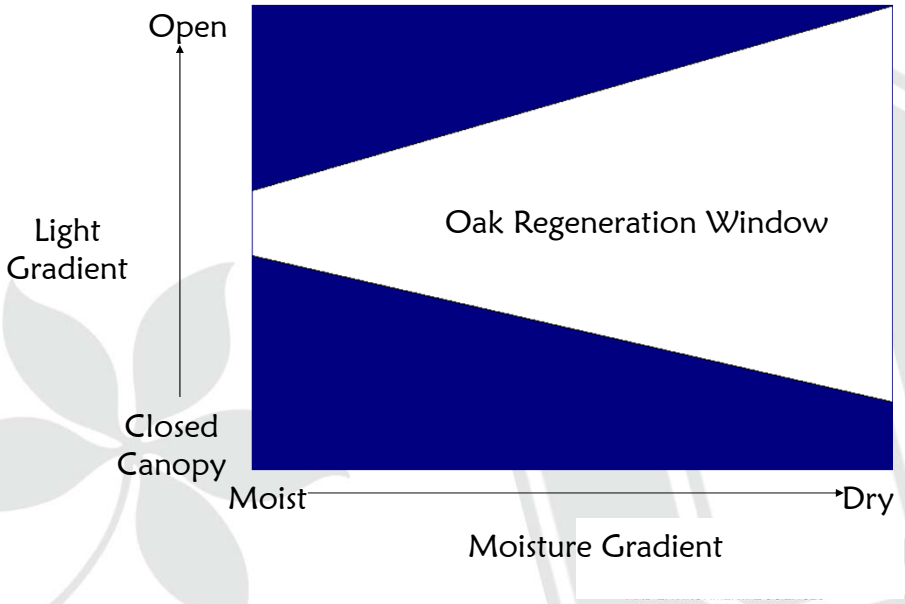
# Other Considerations

- Regenerating oaks becomes more difficult as site quality improves (Lorimer 1993)
- High densities of small oak seedlings are needed to obtain large oak advanced regeneration on high quality sites (Loftis 1990, Miller and others 2004)
- The keys to moving small seedlings into advanced oak regeneration is to control understory shade and protect from deer browsing ( Miller and others 2014, and Brose 2008)

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

43

OHIO STATE UNIVERSITY EXTENSION




Johnson, Shifley, and Rogers

## Your poll will show here

1. Install the app from pollev.com/app
2. Make sure you are in Slide Show mode

Still not working? Get help at pollev.com/app/help

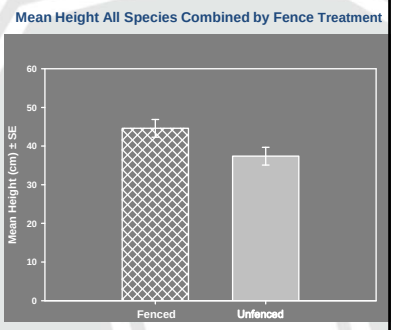
*or*

Open poll in your web browser



# So What About Deer?

- Deer are not the main factor limiting deer in most of Ohio, but…..
  - Deer do consume acorns
  - And browse regeneration
- In other states they often are
  - At low densities, aggressive hunting targeting female deer may help
  - At high deer densities, fencing may be the only option




THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

OHIO STATE UNIVERSITY EXTENSION

# Oak Silviculture in a nutshell!

- “Cut and Pray” rarely works
- Plan to manage cohorts of new oak seedlings before and after good acorn crops
- Employ management activities that improve the competitiveness of these seedlings
  - Midstory removal
  - Partial overstory removal (Shelterwood)
- Remove the overstory canopy once seedlings are competitive

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

47

## Your poll will show here

1 Install the app from pollev.com/app

2 Make sure you are in Slide Show mode

Still not working? Get help at pollev.com/app/help
*or*
Open poll in your web browser

OHIO STATE UNIVERSITY EXTENSION

## Shade Tolerance Ratings of Some Ohio Tree Species

| INTOLERANT | INTERMEDIATE | TOLERANT |
|---|---|---|
| black locust | American elm | American beech |
| bigtooth aspen | black oak | American basswood |
| black cherry | boxelder | black gum |
| black walnut | chestnut oak | eastern hemlock |
| cottonwood | eastern white pine | flowering dogwood |
| pin oak | green ash | red maple |
| red pine | hickories | slippery elm |
| scarlet oak | northern red oak | sugar maple |
| sycamore | white ash | |
| sweet gum | white oak | |
| Yellow-poplar | | |

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

OHIO STATE UNIVERSITY EXTENSION

## Oak Regeneration Harvests

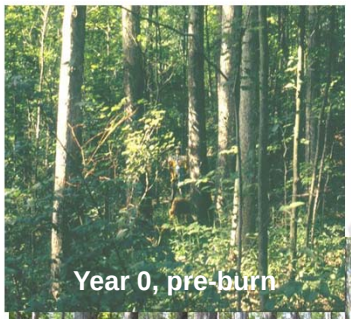
- Single tree harvests favor shade tolerant species
- Clearcuts favor shade intolerant species
- Shelterwood harvests can favor oaks which need intermediate light to regenerate
  - If interfering vegetation is reduced by:
    - Fire
    - Herbicides
    - Other

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

50

OHIO STATE UNIVERSITY EXTENSION

# Using Fire to Control Interfering Vegetation







OHIO STATE UNIVERSITY EXTENSION


UNIVERSITY
ULTURAL,
ENCES

OHIO STATE UNIVERSITY EXTENSION

# Using Herbicide Treatments to Mimic Fire

IO STATE UNIVERSITY
F FOOD, AGRICULTURAL,
ONMENTAL SCIENCES

OHIO STATE UNIVERSITY EXTENSION



THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL,
AND ENVIRONMENTAL SCIENCES

IO STATE UNIVERSITY
F FOOD, AGRICULTURAL,
ONMENTAL SCIENCES

OHIO STATE UNIVERSITY EXTENSION

# Managing Oak After Regeneration

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL,
AND ENVIRONMENTAL SCIENCES

58

OHIO STATE UNIVERSITY EXTENSION

**Vinton Furnace – Woodland Demonstration Area**
**1998 Clear Cut - Summary of Regeneration Inventory - March 2009**

| Hardwood stems greater than 1.0 inches d.b.h. | | |
|---|---|---|
| Species | DBH Inches | Trees Per Acre |
| American Beech | 1.4 | 10 |
| Big tooth aspen | 2.3 | 115 |
| Black cherry | 2.6 | 23 |
| Blackgum | 1.4 | 70 |
| Black locust | 3.0 | 5 |
| Black oak | 1.8 | 15 |
| Black walnut | 3.1 | 5 |
| Flowering dogwood | 1.4 | 35 |
| Elm | 1.6 | 45 |
| Hickory | 1.6 | 88 |
| American Hornbeam | 1.4 | 113 |
| Northern red oak | 1.9 | 20 |
| Red maple | 1.7 | 283 |
| Sassafras | 1.2 | 3 |
| Scarlet oak | 1.6 | 13 |
| Sumac | 1.5 | 88 |
| Sourwood | 2.6 | 13 |
| Sugar maple | 1.3 | 8 |
| White ash | 1.5 | 10 |
| White oak | 1.9 | 83 |
| Yellow buckeye | 1.8 | 20 |
| Yellow- poplar | 2.0 | 605 |
| TOTAL | 1.81 | 1665 |
| ALL OAKS | 1.84 | 130 |

Black oak prior to release
January 2011

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

**Vinton Furnace – Woodland Demonstration Area**
**1998 Clear Cut – Crop Tree Release (Crown Touching) – January 2011**

| Species, d.b.h. and crown class of potential crop trees prior to release | | | | | | |
|---|---|---|---|---|---|---|
| Species | Ave. Diam. (in) | Dominant | Codominant | Intermediate | Supressed | Ave. Crown Class* |
| Black Cherry | 4.38 | 1 | 11 | 3 | 0 | 2.1 |
| Black Oak | 2.32 | 3 | 22 | 8 | 9 | 2.5 |
| Hickory | 2.67 | 2 | 30 | 18 | 5 | 2.5 |
| Red Oak | 1.76 | 0 | 4 | 5 | 5 | 3.1 |
| Scarlet Oak | 2.83 | 2 | 12 | 5 | 9 | 2.8 |
| White Oak | 2.92 | 8 | 57 | 35 | 16 | 2.5 |
| White Walnut | 4.4 | 1 | 0 | 0 | 0 | 1 |
| Yellow-Poplar | 3.78 | 10 | 32 | 9 | 5 | 2.2 |
| Total | 3.1 | 27 | 168 | 83 | 49 | 2.4 |
| All Oaks | 2.7 | 13 | 95 | 53 | 39 | 2.6 |

*Crown Class Ratings: 1 = Dominant, 2 = Codominant, 3 = Intermediate, 4 =Suppressed

| Crown Touching Release*; Number of crop trees on plots and average number of trees removed per crop tree | | | | |
|---|---|---|---|---|
| Crop Trees | Number | Ave. Diam. (in) | Ave. Crown Class* | Ave. # Cut Trees per Crop Tree |
| Released | 169 | 3.3 | 2.5 | 6.3 |
| Not Released | 158 | 2.9 | 2.4 | 0 |

*A 184 plots (16.5 ft. radius) were established in the 9.9 acre demonstration area. Plots were placed a ½ chain grid. When present the best two potential crop trees were marked. Crop trees on even number plots received a 4 sided release in January 2011.

Black oak after release
January 2011

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

OHIO STATE UNIVERSITY EXTENSION

# Ohio's Collaborative Oak Restoration Efforts

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

OHIO STATE UNIVERSITY EXTENSION

# Joint Chief's Landscape Restoration Partnership

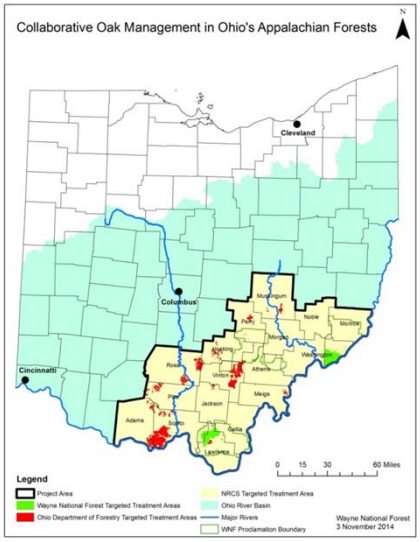
Multi-year partnership between the Forest Service and Natural Resources Conservation Service to improve the health and resiliency of forest ecosystems where public lands meet across the nation


THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

OHIO STATE UNIVERSITY EXTENSION

# Focus on Appalachian Ohio

- Oak forest ecosystem in Unglaciated Allegheny Plateau region of Ohio
- 72% family owned forests (less than 10% public lands)
- 2008 Wayne NF, NRCS and Ohio Division of Forestry signed MOU




OHIO STATE UNIVERSITY EXTENSION

## Oak-hickory Restoration

- Forest stand improvement
- Coordinated *Ailanthus* treatments
- Prescribed fire
- Feral swine control

## Cross-boundary Coordination

- *Ailanthus* aerial mapping
- Outreach Coordination
- Integrated inventories
- Forest Adaptation Planning & Practices Workshop
- Modeling Silviculture and Prescribed Fire Needs at the Landscape Scale

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

OHIO STATE UNIVERSITY EXTENSION

# More obstacles…..

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

OHIO STATE UNIVERSITY EXTENSION

# Questions?


***David Apsley***

740-710-3009

apsley.1@osu.edu

**http://u.osu.edu/seohiowoods**


THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES