The Future of OAK is in Our Hands!

Dave Apsley

Natural Resources Specialist

Ohio State University Extension

apsley.1@osu.edu

This Evenings Topics

- Why care about oaks?
- What is happening with oak in Ohio?
- Oak ecology and fire adaptations
- Solutions to the oak regeneration problem

Some Ohio Forestry Statistics

- 8.0 million forest acres
- More than corn & soybeans
- 85% privately owned
- 70% family forest
- 66% in Appalachia
- $27 billion contribution to Ohio's economy

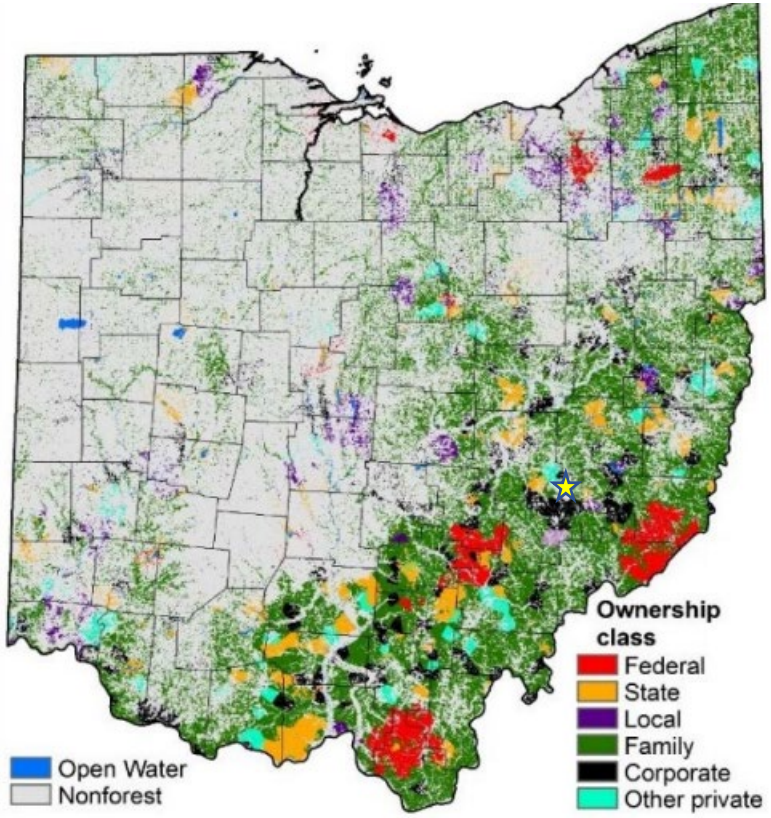
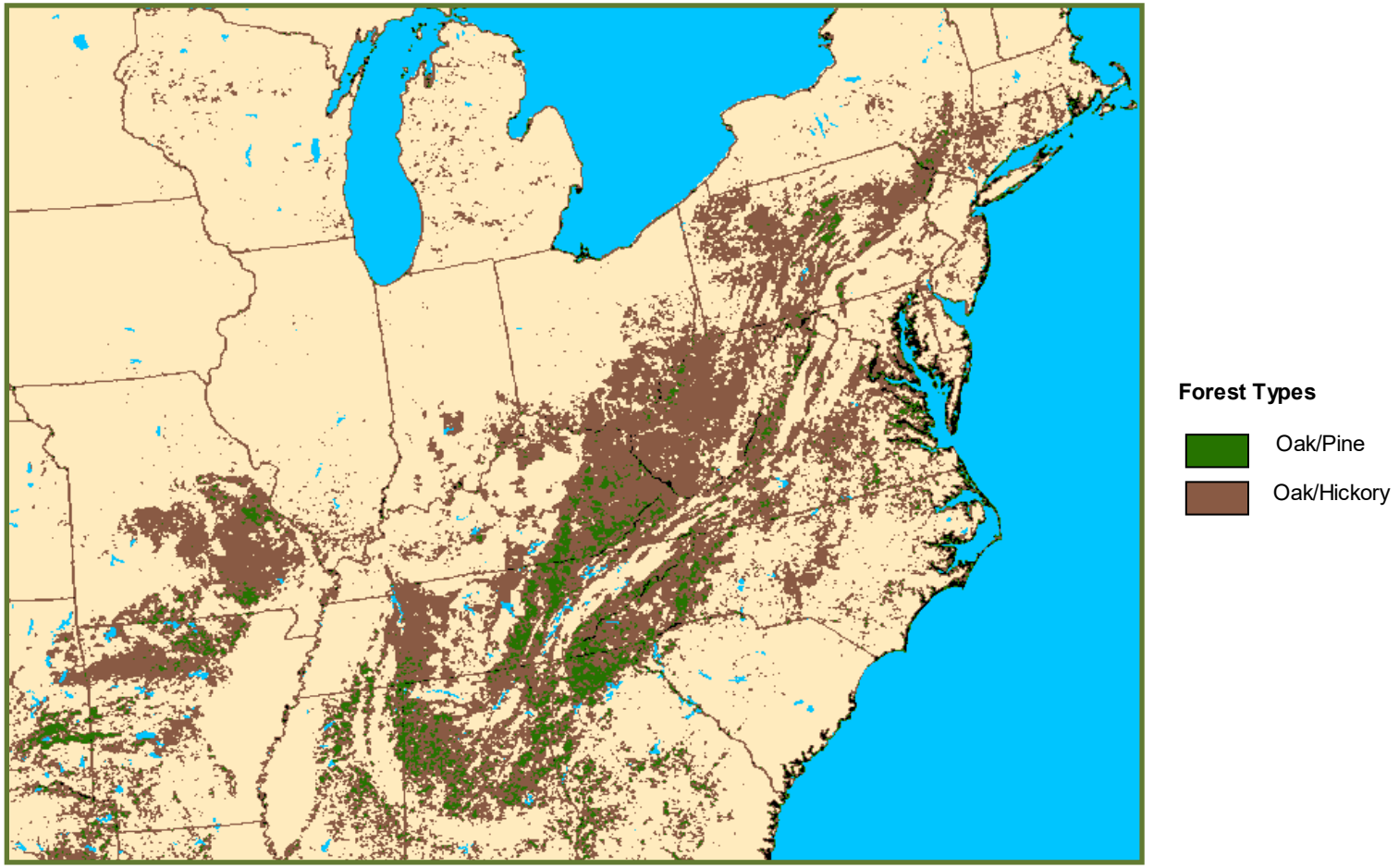


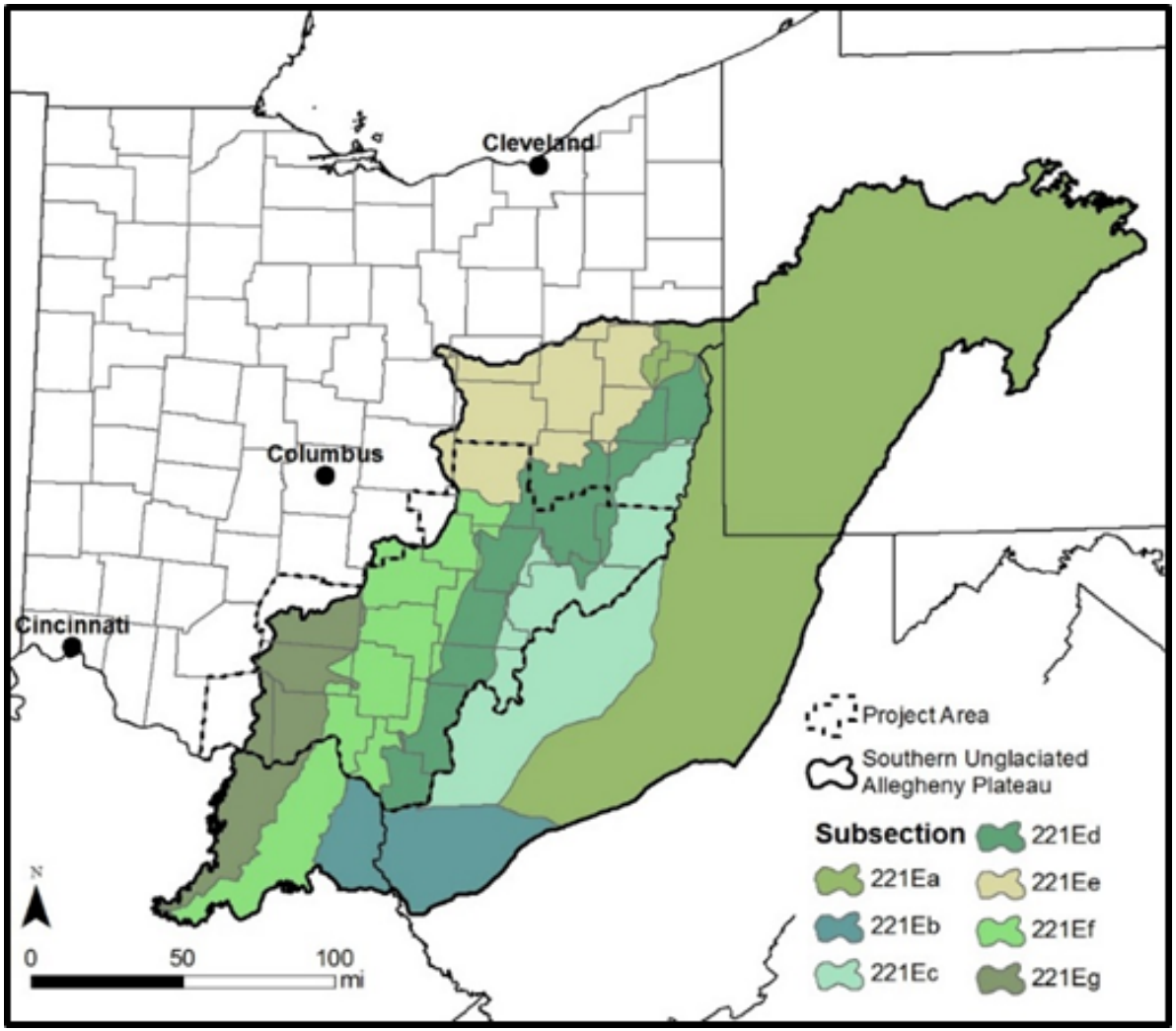
Figure 2.—Distribution of forest land by ownership class, Ohio, 2014.

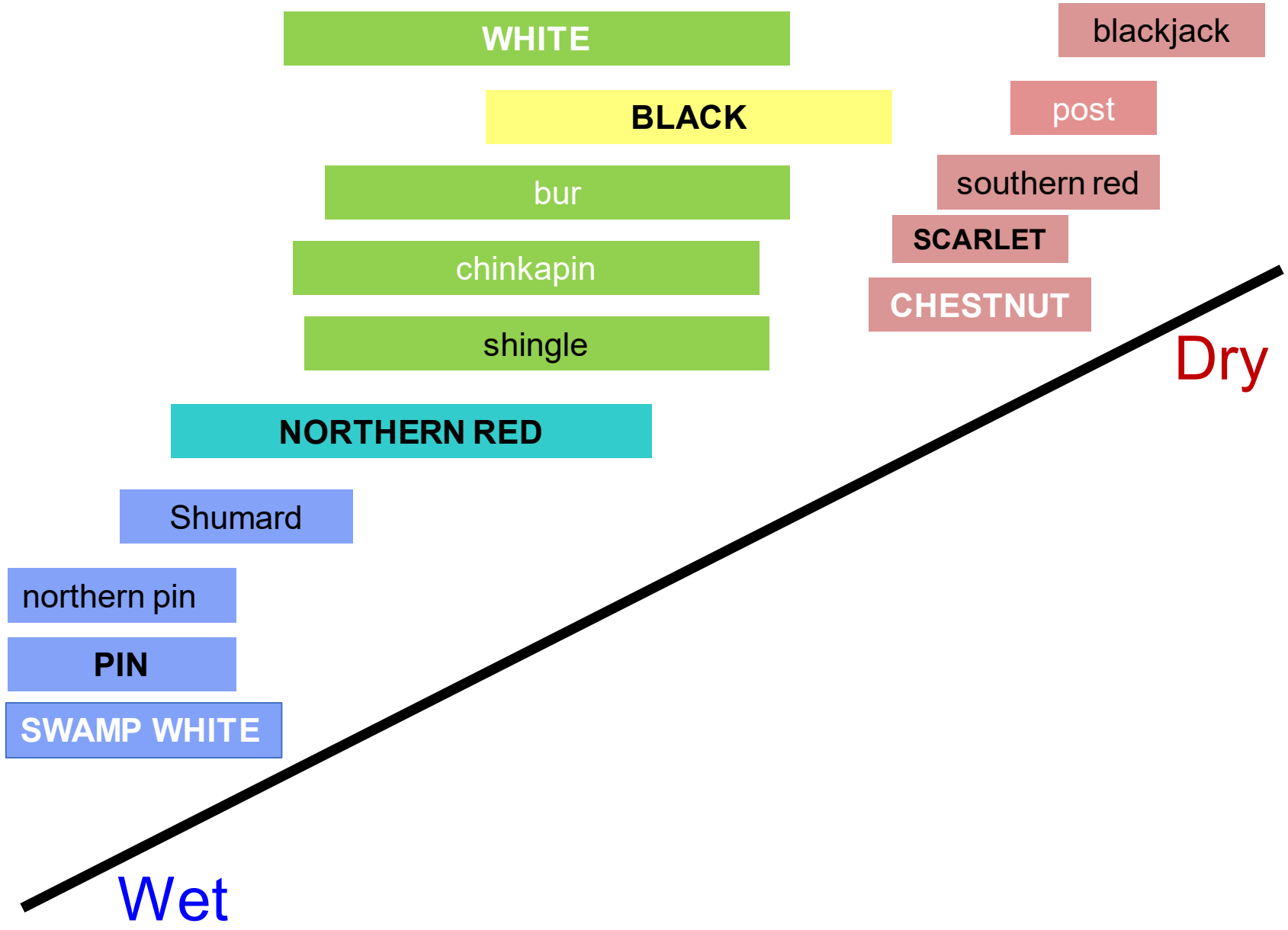
Albright, Thomas A. 2018. Forests of Ohio, 2017.
Mehmood, Sayeed. 2018. Ohio's Forest Economy

Oak dominated Forests in SE Ohio



Southern Unglaciated Allegheny Plateau



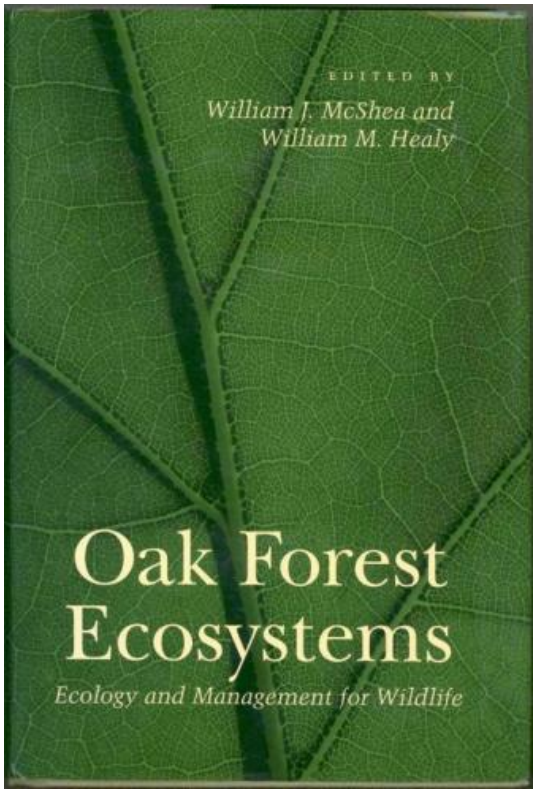

WHITE
BLACK
bur
chinkapin
shingle
NORTHERN RED
Shumard
northern pin
PIN
SWAMP WHITE
blackjack
post
southern red
SCARLET
CHESTNUT
Dry
Wet

Why care about OAKS?

- Oaks can live for hundreds of years which helps to stabilize forest communities
- Oaks provide habitat for a wide variety of wildlife species
- Appalachian Oaks contribute greatly to Ohio's forest industry which generates $27 billion in total economic activity annually
- 67% of trees harvested in Ohio are oaks

Oaks and Wildlife

- More than 90 wildlife species use acorns
  - from black bear 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”



Oaks Depend on Wildlife for Dispersal

Elmer Verhasselt, Bugwood.org

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

Oaks and Forest Products

- 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.

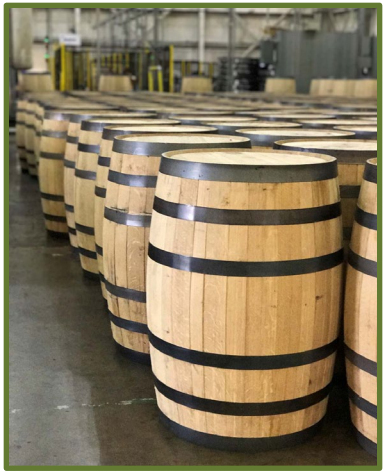


Photo by Meredith Harless-Speyside Bourbon Cooperage

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

Approximate Oak Lifespans

	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

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

Potential effects of climate change on oaks

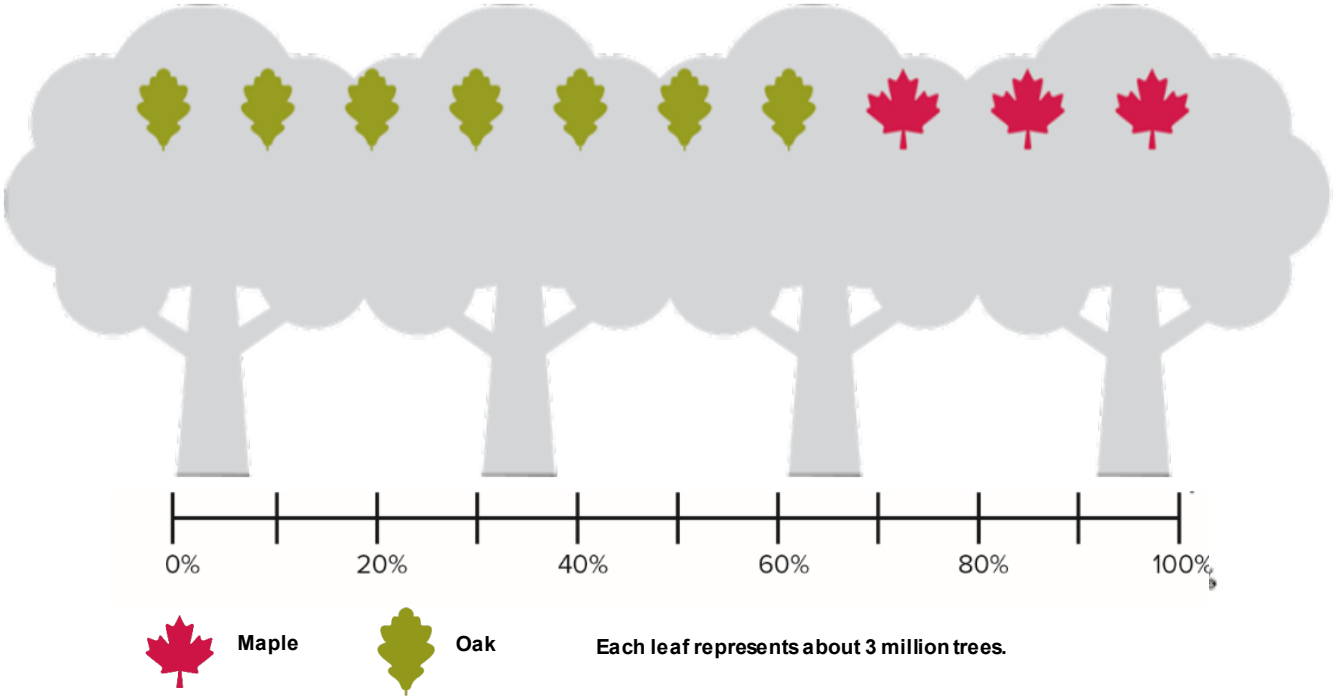
- As a group oak may fare better under climate change
- With exceptions (e.g., northern red oak), this group should be competitive under hotter and drier conditions in Ohio

Iverson, L. R. Et. Al. 2017. Multi-model comparison on the effects of climate change on tree species in the eastern U.S.: results from an enhanced niche model and process-based ecosystem and landscape models. *Landscape Ecology*. *32(7)*

Oaks were here in the past, are here now, but what about the future?

Large

≥15 inch diameter



Source: Thomas Albright. 2018. U.S.D.A. Forest Service, Northern Research Station, Forest Inventory and Analysis. From 2017 FIA Ohio Data

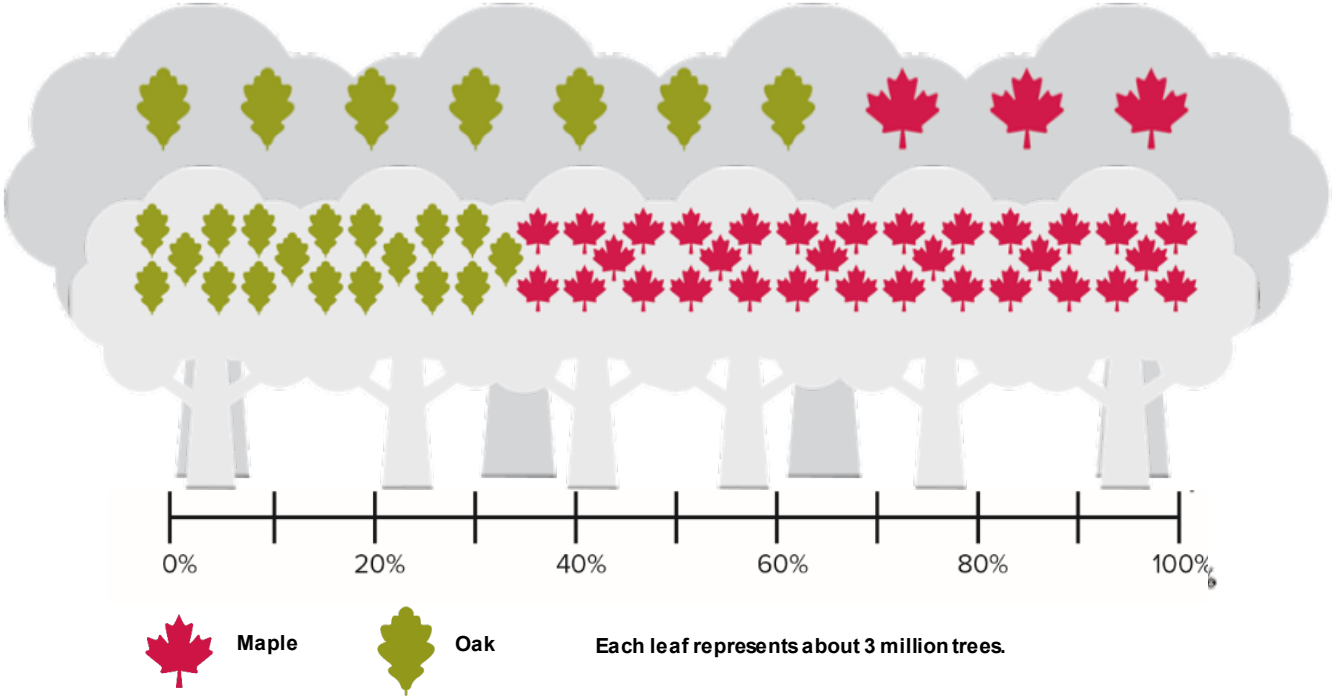
Oaks were here in the past, are here now, but what about the future?

Large

≥15 inch diameter

Medium

5-14.9 inch diameter



Source: Thomas Albright. 2018. U.S.D.A. Forest Service, Northern Research Station, Forest Inventory and Analysis. From 2017 FIA Ohio Data

Oaks were here in the past, are here now, but what about the future?

Large

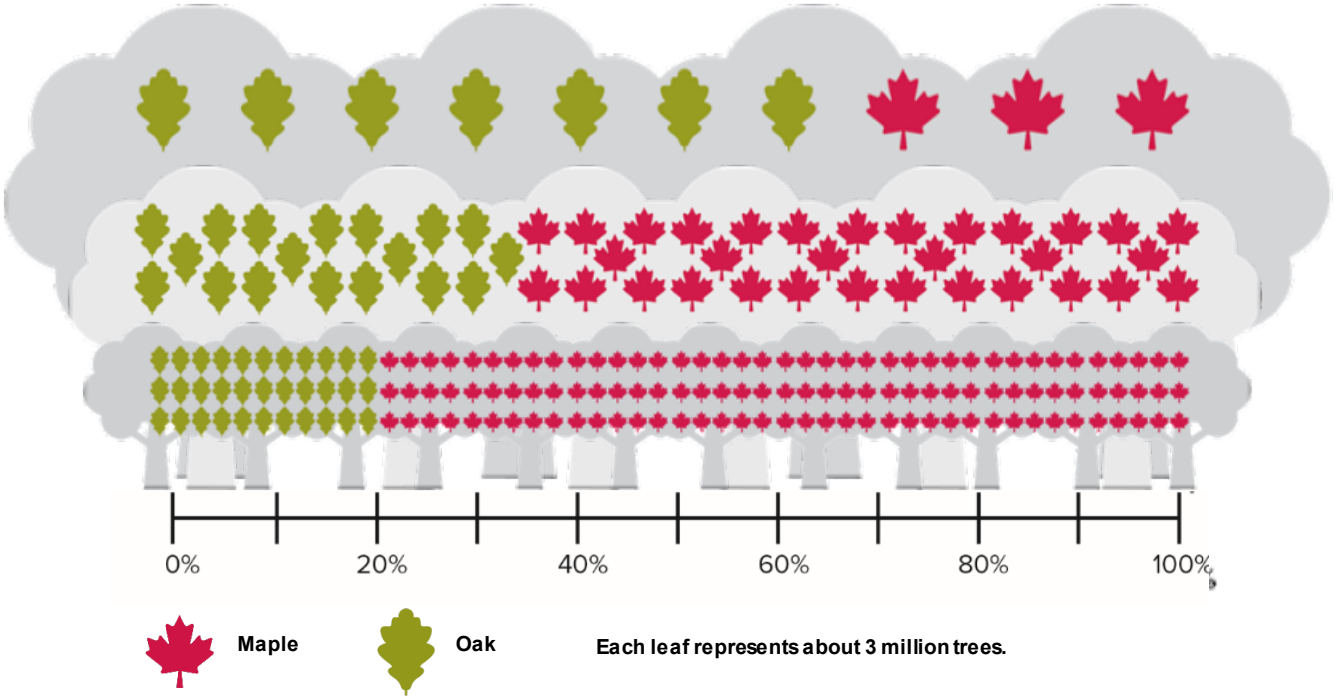
≥15 inch diameter

Medium

5-14.9 inch diameter

Small

1-4.9 inch diameter



Source: Thomas Albright. 2018. U.S.D.A. Forest Service, Northern Research Station, Forest Inventory and Analysis. From 2017 FIA Ohio Data

Ohio's Forests

- 60% of mature forests in Ohio have oak dominated canopies
- Oaks are not regenerating in sufficient numbers to ensure their future

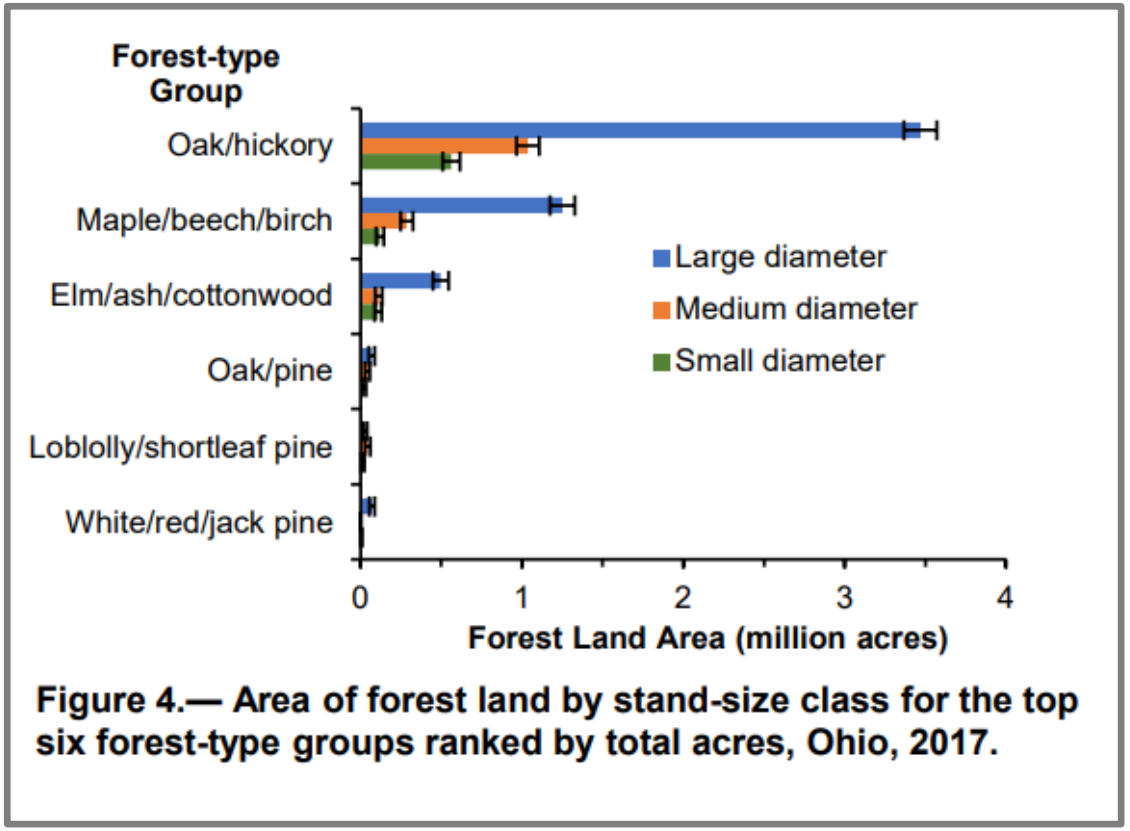


Figure 4.— Area of forest land by stand-size class for the top six forest-type groups ranked by total acres, Ohio, 2017.

Albright, Thomas A. 2018. Forests of Ohio, 2017. Resource Update FS-171. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 4 p. https://doi.org/10.2737/FS-RU-171.

Growth to Removal

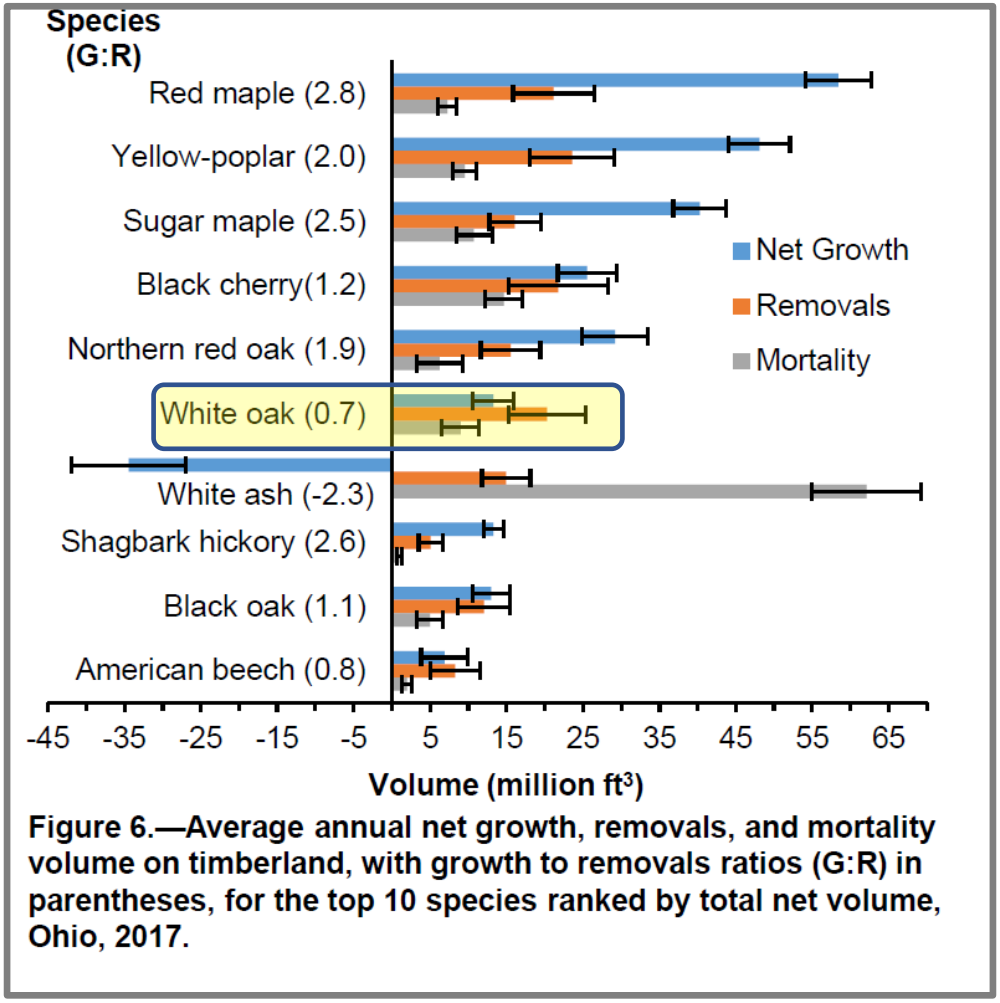


Figure 6.—Average annual net growth, removals, and mortality volume on timberland, with growth to removals ratios (G:R) in parentheses, for the top 10 species ranked by total net volume, Ohio, 2017.

Albright, Thomas A. 2018. Forests of Ohio, 2017. Resource Update FS-171. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 4 p. https://doi.org/10.2737/FS-RU-171.

What is causing these trends?

- The type, frequency and severity of disturbances in our forests have changed
  - Fire has been absent from landscape for 80+ years
  - Livestock grazing and other man caused disturbances have also decreased
  - Timber harvesting practices have shifted toward individual tree removal
    - Harvests often target dominant oaks
    - ***"Oaks have a bounty on them"***
    - Most harvests don't allow enough light to reach the forest floor

OAK Fire Adaptations

- Mature oaks have relatively thick bark
- Oaks (especially white oaks) have the ability “wall off” damage
- Seedlings have relatively large root systems with buds below the soil surface, which allows them to sprout after disturbance
- Oaks leaves are “designed” to burn

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

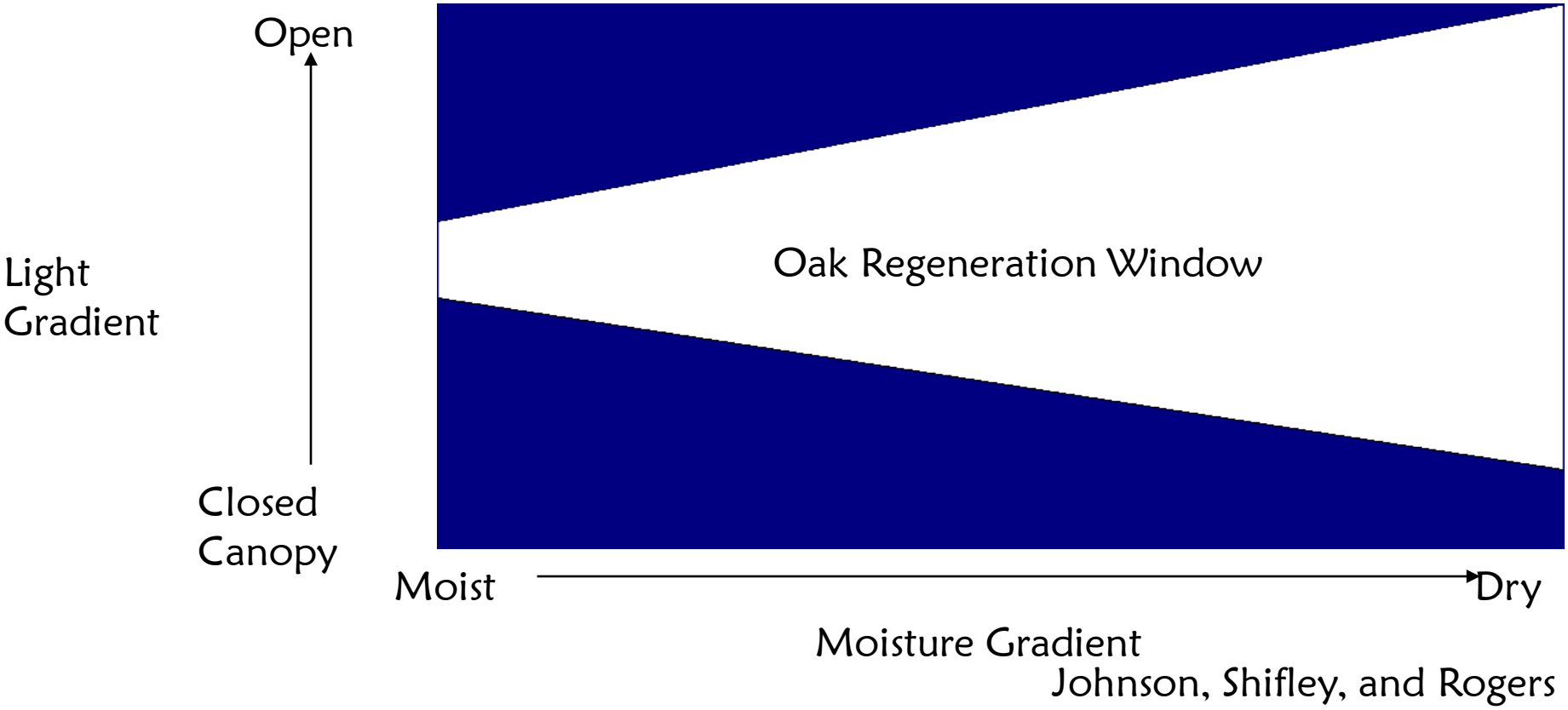
Establishment Requirements

- 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

Shade Tolerance

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		

Todd Hutchinson
USFS NRS



Johnson, Shifley, and Rogers

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)

Oak Silviculture in a nutshell!

- "Cut and Pray" rarely works

- Plan to manage new oak seedlings before and after good acorn crops

- Use treatments that improve the competitiveness of these seedlings
    - Low shade removal
    - Partial overstory removal (Shelterwood)

Oak Regeneration Harvests

- Single tree harvests favor shade tolerant species
- Clearcuts can favor shade intolerant species without planning and management for oak
- Shelterwood harvests can favor oaks which need intermediate light to regenerate
  - If interfering vegetation is reduced by:
    - Fire
    - Herbicides
    - Other



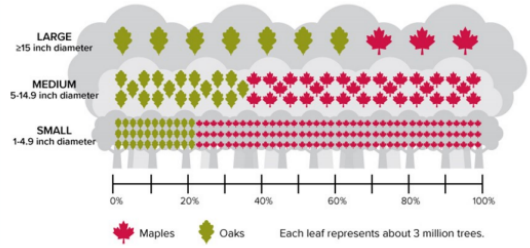



Help us keep OAK in our FUTURE

Why is oak so important?

Oaks are important for so many reasons. They are well adapted to Southeast Ohio growing conditions and are long-lived providing stability to our woodlands. In addition they:

- produce acorns which are a key food for many wildlife species, from songbirds to white-tailed deer
- provide many other important habitat benefits for wildlife
- grow timber used to produce many valuable forest products like barrels, flooring, cabinets and furniture
- sustain our local economy by providing jobs and income for woodland owners
- enhance the many recreational benefits, like bird watching and hunting, that our forests provide



Relationship between oak and maple (mostly red maple) populations in 17 counties in Southeast Ohio, the priority forest area for oak management. Source: Thomas Albright. 2018. USDA Forest Service, Northern Research Station, Forest Inventory and Analysis. 2017 FIA Ohio Data.

Why are we concerned?

Oaks still dominate our woodlands in Southeast Ohio, but we are starting to see a concerning trend. When these large canopy oaks die or are harvested they are often replaced by species other than oak. Typically, the replacement trees are shade loving species like red maple which become established under oak canopies and deprive smaller oaks of the light that they need to survive and compete (see graphic above).

Shelterwood is an example of a type of harvest that can help to establish young oaks.

Why is oak in jeopardy?

Young oaks are a bit like Goldilocks. Too much light from heavy cutting like clearcutting and they often lose the battle to light loving species like tulip-tree. Too little light from no cutting or "select cutting" and they lose to shade loving species like red maple.

When young oaks get "just the right amount" of light from partial canopies they can grow large "carrot-like" roots (see picture right). These roots give them the ability to sprout and grow rapidly after cutting and other disturbances like fire.

What "oak friendly" solutions are available?

Over the past few decades with the help of researchers we've uncovered some "oak friendly" practices that can help to encourage young oaks. Tools like prescribed fire (see picture left), herbicides and cutting can be used to remove low shade from trees growing under the main canopy which can help young oaks get started. Once these young oaks develop deep tap roots, proper timber harvests (e.g. shelterwood harvest, see photo front) can be designed to allow them to grow into the canopy.

What can YOU do?

If you would like to enhance oaks in your woods be sure to **contact your State Service Forester** at the Ohio Department of Natural Resources who will help you to:

- evaluate your situation
- develop a plan of action for your woods
- determine if you are eligible for funding or other assistance
- provide recommendations to help you to leave an oak legacy for the future

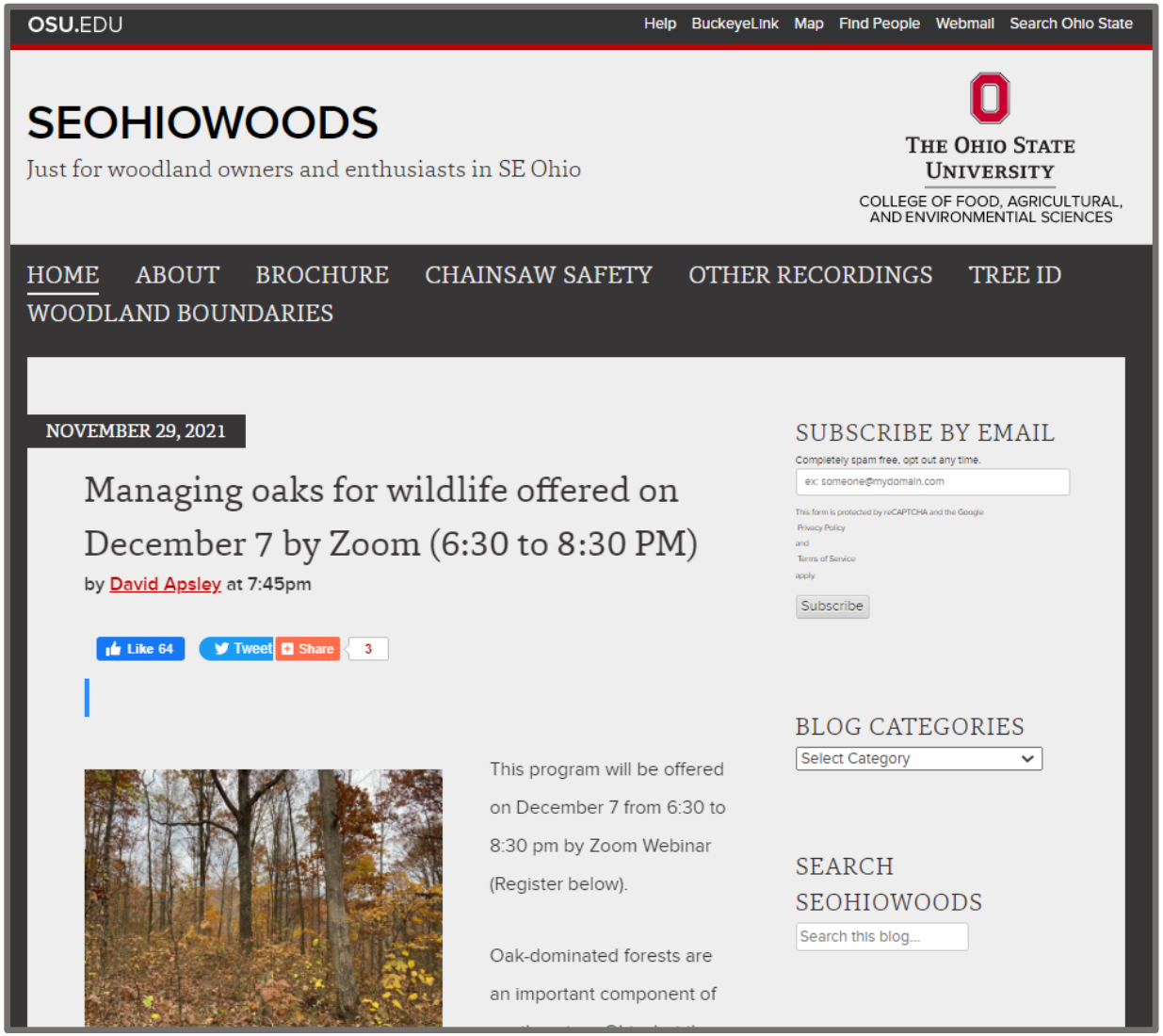
The future of oak is in our hands

The Ohio Department of Natural Resources receives funding assistance from the United States Department of Agriculture in the delivery of certain programs. In accordance with Federal law and U.S. Department of Agriculture policy, this institution is prohibited from discriminating on the basis of race, color, national origin, sex, age or disability. For more information visit: https://www.fns.usda.gov/usda-nondiscrimination-statement

Authors:
David Apsley, Natural Resources Specialist
Ohio State University Extension

Jamie Dahl, Forest Outreach Coordinator
Central State University Extension and McIntire-Stennis

u.osu.edu/seohiowoods



CFAES OHIO STATE UNIVERSITY EXTENSION

"A Day in the Woods" and "2nd Friday Series" programs are sponsored by the Education and Demonstration Subcommittee of the Vinton Furnace State Forest in cooperation with Ohio State University Extension with support from partners including:

Ohio Federation of Soil and Water Conservation Districts

USDA United States Department of Agriculture Natural Resources Conservation Service

HOCKING COLLEGE

SFI IMPLEMENTATION COMMITTEE OHIO

OHIO BIRD CONSERVATION INITIATIVE

RUFFED GROUSE SOCIETY

Ohio Forestry Association FOUNDATION

NWTF Conserve. Hunt. Share.

U.S. FISH & WILDLIFE SERVICE

pixelle SPECIALTY SOLUTIONS

WOOD WATER RECREATION WILDLIFE CERTIFIED TREE FARM

THANK YOU!

QUESTIONS?