




Restoring Upland Oak Forests
David Halley, RF/CF/ACF
March 2023



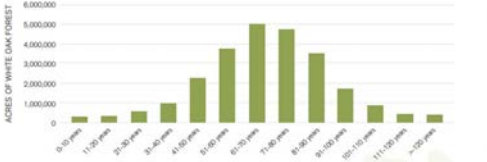
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The Challenge with Restoring Oak

- **Clearcutting:** The probability of replacing an existing oak stand with a new one by just cutting it down and letting grow back is zero or unacceptably low.
- **It's a Process:** It is more of a process than a single event. It takes a sequence of timed treatments, including prescribed burning, to work.
- **It's Complicated:** It requires oversight from a professional forester to oversee the process.
- **Accelerated Harvests:** Oak is in high demand and harvesting is being accelerated to harvest high-quality white oak.

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White Oak Forests: Now
(Source: White Oak Initiative)

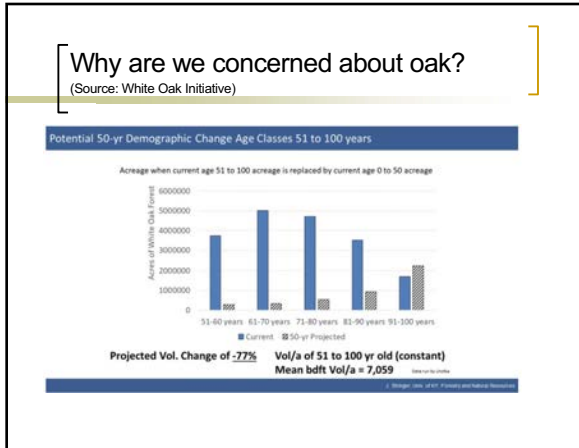


The age class distribution of white oak across Illinois, Indiana, Kentucky, Missouri, Ohio, and Tennessee shows the number of acres of white oak-dominated forests in different age classes. The curve shape indicates a lack of younger age classes needed for replacement over time.

Source: FPA Data, version 11/2020

www.whiteoakinitiative.org 13

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- ### Take Aways for Existing Oak Forests:
- **White Oak Forest are Largely Mature:** About 75% of all surveyed white oak acres can be classified as at least mature (> 75 years or older).
 - **Lack of White Oak Reestablishment:** Older white oak forests are not being replaced by younger white oak trees at a pace that will support long-term sustainability. Competing species such as maple, yellow poplar, beech and pine are shading out oak trees and preventing them from regenerating.
 - **Economics of Oak:** The demand of quality oak timber is high. With high demands comes high volume removals.
 - **White Oak Does Not Have a Bright Future:** Without intervention the American white oak population will begin to decline in 10 to 15 years, with more extreme declines over the next several decades.

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Action Is Needed:

- Reversing the decline of white oak is possible, but intervention must begin today

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What you have to start with:

- **Mature Oaks in Place:** Overstory already dominated by mature oaks (>50 square feet of basal area per acre)
- **Prescribed Burning Possible:** Landowner is willing to use fire
- **Adequate Stocking:** Stocking will support multiple commercial harvests
- **Site Quality Not Too Productive:** Should not exceed 80 Site Index. Conditions may be too competitive

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Steps in the Modified Oak Shelterwood Process

- **Preparatory Cut:** Remove undesirable species, seed sources, poorly formed and diseased stems. Improve understory sunlight levels.
- **Herbicide Treatment:** Hardwood stump sprouts
- **Advanced Oak Regeneration:** Wait 4-5 years following thinning (roots)
- Make sure you have established oak regeneration (>0.50" RCD)
- **Release Burn:** Spring (during leaf expansion). Strive for moderate to high intensity burn.
- **Shelterwood Harvest:** Maintain 25-50 oaks per acre. Release the understory oaks.
- **Final Regenerative Harvest:** Competitive oak in place


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Starts with Preparatory Cut – Modified Oak Shelterwood



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Preparatory Cut




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Preparatory Cut – Stage 1

- Do before age 80 years
- Focus on removing:
 - Remove undesirable species and seed sources
 - Suppressed, intermediate and weak codominant crown positions
 - Remove understory and midstory (Most important)
 - Improve conditions for oak regeneration
 - 75% of canopy should be maintained.
 - Avoid large canopy gaps

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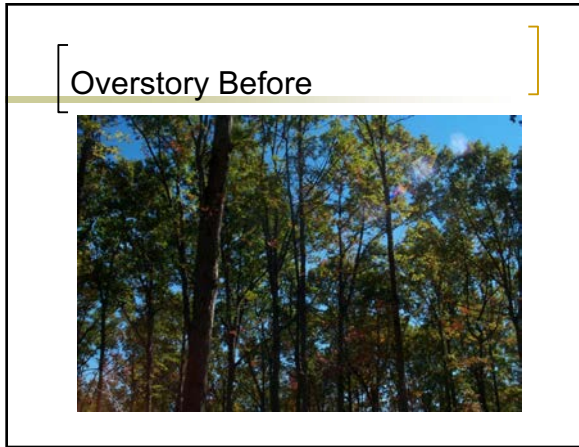
Preparatory Cut



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Understory Before



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One year after



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Whole Tree Chipper



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Preparatory Cut: 1 year after.
Advanced regeneration started




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Understory After



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Understory after Preparatory Cut



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Understory After



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Nursery: Growing baby trees



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One year after



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What no thinning looks like



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Herbicide Treatment

- Following Preparatory Cut:
 - Treat hardwood stumps sprouts (poplar, maple, sweetgum)
 - Use herbicide with no ground activity (i.e. glyphosate, triclopyr ester)
 - Treat any midstory or understory tree not harvested
 - Basal treatments or hack-n-squirt

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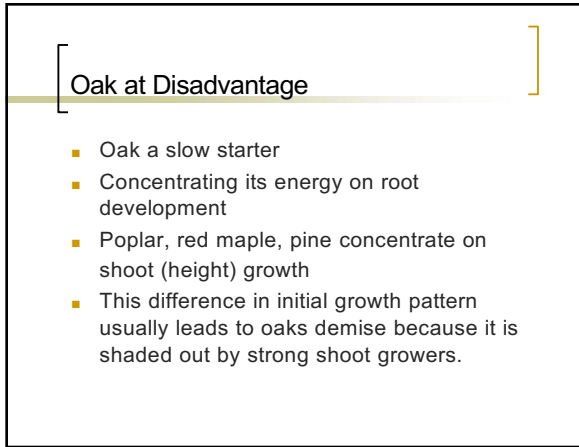
After Preparatory Cut – Need to wait

- Oak a slow starter, focusing on root development.
- Other, species focused on height growth.
- Root Collar Diameter: >0.50 inches
- Need to tip the balance in oaks favor
- Oak is better adapted to fire
- May require three to six years

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Control What Grows in Your Next Forest:
We have to tip the balance



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Now We Are Ready



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For This



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Release Burning for Oak



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Release Burning for Oak



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Why Spring

- Burning window: From bud swell on non-oak species to full leaf expansion
- Done in late March through May. Early April ideal.
- Non-oak species much more susceptible to fire in growing season. Thin bark, poor root system.
- Non-oak species most susceptible to damage
- Winter burns have little or no impact on changing species composition
- Fire will select for oak.
- If oak > 0.50" RCD, only 5% mortality.

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Controlled Burning:
"Mother Nature's Herbicide"



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Burn vs. Non-Burn



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One Week After Burn



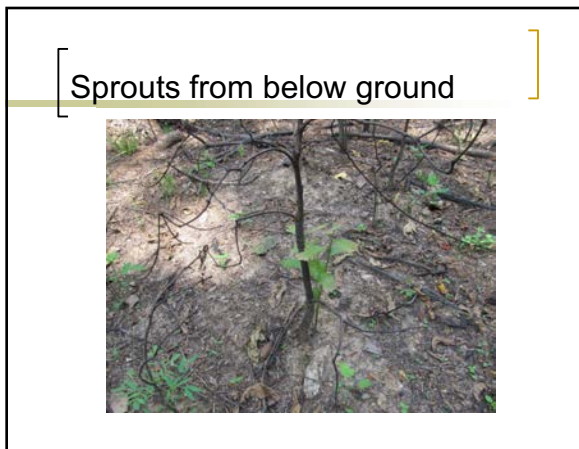
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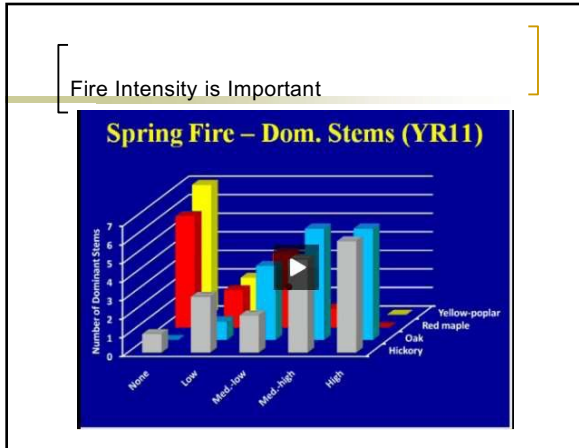
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[Two months after burn]



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[Two months after burn]



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[Release Burning Strategies for Oak]

- Thinning paves the way for fire do its job
- Wait 4-5 years following thinning (roots)
- Make sure you have oak regeneration
- Wait for oak to develop (>0.50" RCD)
- Burn in spring (during leaf expansion)
- Strive for moderate to high intensity burn.
- Reevaluate in 3 to 5 years before removing additional overstory. Maybe second burn

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Shelterwood Harvest

- Done after Preparatory Cut
- Done after release burn
- RCD >0.50"
- Reduce the stocking between 40% and 60%
- Maintain 25 to 50 high quality oaks (and hickory) per acre. MARK!
- Remove all poplar, pine, sweetgum, beech and red maple.

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Shelterwood Harvest



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Shelterwood Harvest



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Shelterwood Harvest



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Shelterwood Harvest



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Final Regenerative Harvest (Clearcut)

- Done after Preparatory Cut
- Done after release burn
- Done after Shelterwood Cut
- Maybe burn one last time
- Re-inventory (competitive oak seedlings)
- Final regenerative harvest (Clearcut)
- Crop Tree Release in the future

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Steps in the Modified Oak Shelterwood Process

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"The mighty oak was once a tough nut who stood its ground"



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2023 Webinars

March 9: Restoring Upland Oak Forests
Dave Halley, True North Forest Management Services

May 25: An Update on State and Federal Regulation of Drainage and Wetlands
Andrew Brannan, NCSU Extension

September 7: Wildlife Health
Sarah Van de Berg, N.C. Wildlife Resource Commission

November 2: Building and Maintaining Trails
Ann Savage, NCSU Parks, Recreation and Tourism



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Save the Date!

**Advanced
White Oak Regeneration Training**
September 12-13

Carrboro, N.C.

This training is designed for
natural resource professionals and experienced landowners

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Article on Tree Farm Website

Download at
www.ncreefarm.org/wp-content/uploads/2022/05/oak-shelterwood.pdf

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**Modified Oak Shelterwood in
Appalachian Piedmont**
By David Halley

SCAN ME


<https://www.ncreefarm.org/wp-content/uploads/2022/05/oak-shelterwood.pdf>

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Contact Info

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The logo for True North Forest Management Services features a circular emblem on the left containing a stylized tree and a compass rose. To the right of the emblem, the words "TRUE NORTH" are written in a large, bold, green serif font. Below "TRUE NORTH", the words "FOREST MANAGEMENT SERVICES" are written in a smaller, green, sans-serif font.
