

Kentucky
Woodlands
Magazine

Volume 15 Issue 1

**Ins and Outs
of Forest Carbon**

**KY Maple
Syrup Project**

**KY NRCS
Tornado Recovery**

Kentucky Woodlands Magazine

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Cover photo courtesy: Jacob Muller

From the Editors of the Kentucky Woodlands Magazine:

What a year it's been out in the woodlands of Kentucky, the highs, and unfortunately, the lows. Far too many experienced devastation and heartbreak as severe storms and tornados wreaked havoc across their woodlands, leaving a feeling of uncertainty and despair. However, we also experienced all the things that makes Kentucky so great – neighbors helping neighbors and communities supporting communities. Through a collective response from landowners, contractors, and agencies such as the Kentucky Division of Forestry, the Natural Resource Conservation Service, and the UK Department of Forestry and Natural Resources, a rapid response was fronted to get information and aid out to those most in need. In this issue of Kentucky Woodlands Magazine, we highlight the diverse array of activities and resources that managers and landowners are taking part in across the state. From tornado response and resources to maple syrup and white oak conservation, from forest health threats and carbon opportunities to grapevines and wildlife, we cover a range of exciting topics. Thanks for being a part of the Kentucky woodlands community and we hope you enjoy this latest issue!

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RESTORING SUSTAINABILITY FOR WHITE OAK AND UPLAND OAK COMMUNITIES: AN ASSESSMENT AND CONSERVATION PLAN

A Brief Overview....

by Darren Morris and Jeff Stringer

White oak (*Quercus alba*) is considered the most important hardwood tree species in the eastern United States. Most, regardless of whether focused on wildlife, timber, or recreation, agree. White oak is also one of the most widely distributed of all the oaks, growing on a wide range of soils and sites throughout a very large geographic area. For this reason, white oak is considered a cornerstone species when managing for healthy and diverse upland oak forests.

Most forests throughout Kentucky are dominated by white oak and other oaks. While large oak trees are common in these upland oak forests, over the last several decades there has been a noticeable decline in the number of young oak seedlings and saplings, indicating a problem with oak forests being able to regenerate themselves. To regenerate, oak forests must produce enough acorns that will successfully germinate into small oak seedlings and have the proper conditions for these seedlings to grow into saplings and eventually overstory trees. While this sounds simple, in reality the story is complex.

In 2017 the University of Kentucky, the American Forest Foundation, and the Dendrifund established the White Oak Initiative (WOI) to shed light on white oak sustainability and the insufficient regeneration and recruitment of white oak and other upland oaks throughout most of the eastern United States. A steering committee was formed, representing a broad range of white oak stakeholders throughout the geographic range of white oak, to help guide the initiative. One of the first goals of the effort was the development of a foundational, region-wide assessment and conservation plan for white oak.

The White Oak Initiative Assessment and Conservation Plan was generated with input and review from hundreds of forestry experts, oak researchers, stakeholders, and other professionals. This plan also

represents the first-ever range-wide plan, covering most of the eastern United States, which addresses upland oak management with white oak as a cornerstone species. The White Oak Initiative and those involved in the development of this plan recognize the importance of future involvement of state foresters, universities, conservation organizations, forest industries, private landowners, and others interested in healthy white oak forests to ensure the continued success of the project's goals.

Regardless of one's level of involvement with white oak and white oak forest management, the 64-page Assessment and Conservation Plan (A&CP) was designed to provide valuable information for anyone interested in learning more about white oak and upland oak forests.

The A&CP Introduction section provides a basic overview of white oak as well as a look back at key events that led to the development of the White Oak Initiative. This introduction also covers a brief history of some of the challenges associated with white oak management and lists some of the hurdles that must be overcome in efforts to maintain healthy upland oak forests. The Assessment section begins with a technical introduction to white oak forests and highlights important concerns regarding insufficient white oak regeneration. Next, the Spatial Assessment section is broken down into three parts, including an ecological assessment of white oak; a section focusing on the economic, social, and wildlife benefits of white oak-dominated forests; and finally a spatial assessment of the potential for oak regeneration and growth among 146 EcoStates throughout the range of white oak. An EcoState is defined as an ecological region that shares similarities while respecting state boundaries. A scoring protocol for each EcoState provides information on the suitability of that region to accomplish management work that improves and maintains white oak sustainability. The document also includes the results of a Family Forest Owner Survey, in which

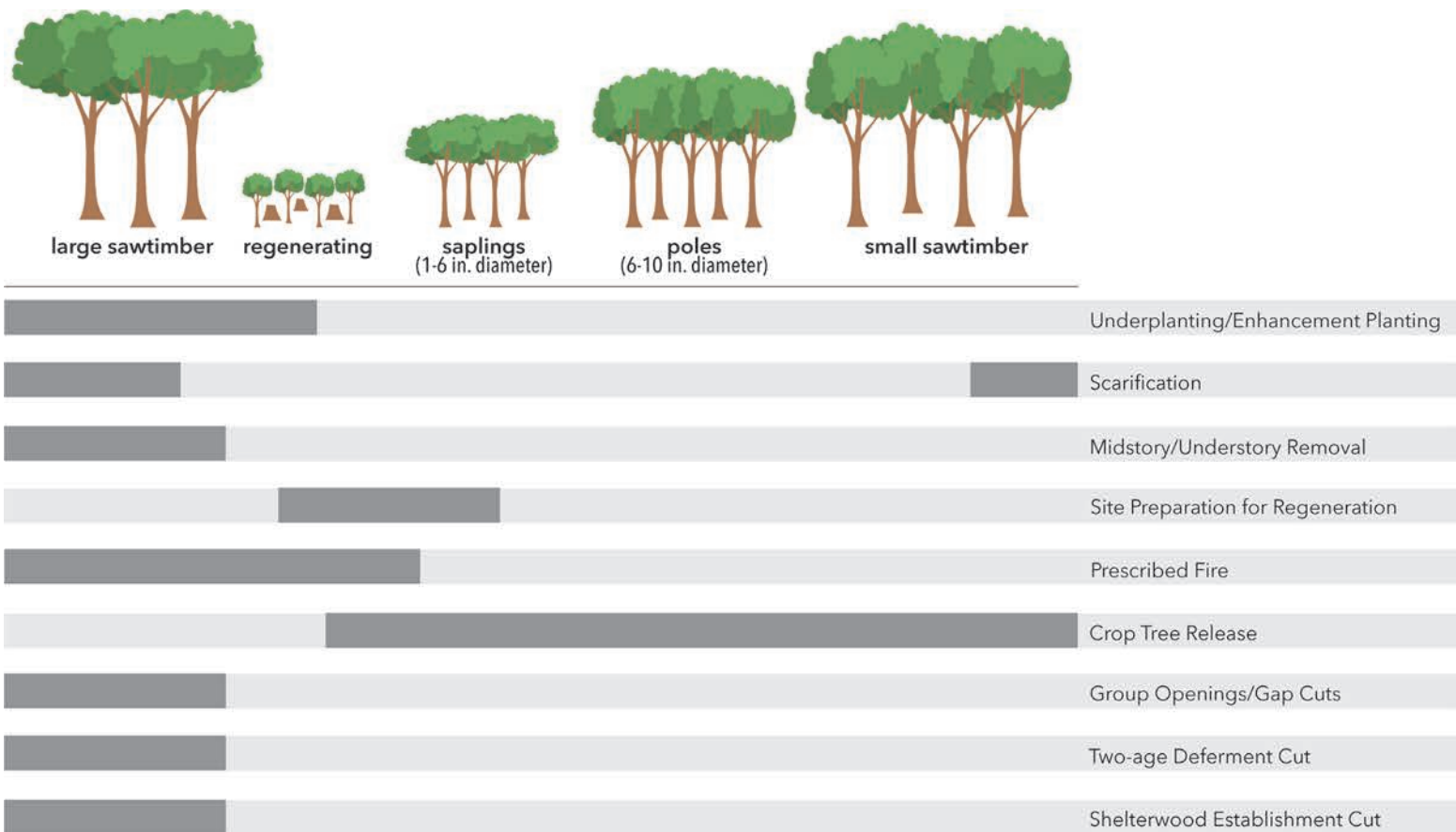


Figure 1 shows a range of developmental stages of a forest, with a mature forest on the far left progressing through regeneration that is released after a harvest and then growing to sawtimber size over time. While this figure is designed in a manner that indicates an intensive harvest of a mature forest, it is not meant to imply that all forests are to be managed in this manner. It does however provide the range of forest conditions that are likely to be encountered and indicates what practices are typically prescribed for a specific developmental stage. The figure shows each of the management practices (excluding afforestation) and when they occur during each development stage of a typical upland hardwood forest.

landowners provided feedback into their thoughts, experience, and willingness to become involved in white oak management. The report ends with a fairly deep dive into the management techniques that can be incorporated into upland oak forests of any age or condition, creating a healthy, productive forest (Figure 1). The final section of the A&CP is the Conservation Plan section. This section outlines the guiding principles through which short-term and ultimately long-term goals will be achieved.

Also throughout the A&CP are short articles about white oak, how the WOI was started, the WOI Executive Committee, Dendrifund, a tree farmer’s perspective, and more. The A&CP was written for landowners, foresters, forest managers, policymakers, and anyone who enjoys healthy upland oak forests. To download or print a copy of the plan, visit <https://www.whiteoakinitiative.org>. From the white

oak initiative home page, scroll down to the green bar labeled “ASSESSMENT & CONSERVATION PLAN” and click the link. Then scroll down to the Assessment & Conservation Plan section and click “Restoring Sustainability for White Oak and Upland Oak Communities: An Assessment and Conservation Plan.”

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KDF Corner

by Pam Snyder

The Kentucky Division of Forestry (KDF) has been extremely busy this past year. While some employees were deployed to fight wildland fires across the United States, others remained in the state to continue providing technical assistance to woodland owners while promoting our agency's mission. Part of that mission includes being prepared for the unknowns out in our forests. KDF employees receive Incident Command (IC) Preparedness training that can be applied to various types of emergency and natural disaster situations. Many forestry staff members hold IC qualified positions as sawyers, saw teams, dozer operators, firefighters, and other specialized jobs. These staff members can be quickly mobilized to provide emergency assistance.

Unfortunately, some recent events hit all too close to home. On December 10, 2021 many Kentuckians experienced firsthand the incredible devastation that occurred from an unimaginable night of tornadoes. We mourn the loss of all Kentuckians who were tragically lost, and we will forever remember them. Immediately after the first tornadoes struck, the Division was on scene to assist the Kentucky Emergency Management Operations Center (EOC) in Frankfort.

As many Kentuckians anxiously waited for the storms to pass, the EOC sent communications out to the Division Director and Forest Protection Branch. Before dawn, the Division had mobilized saw teams, dozer operators, and more staff to the EOC. The division sent five saw teams to Graves County, two saw teams and two dozers operating to Marshall County, four saw teams to Hopkins County, one saw team to Fulton County, three saw teams to Muhlenberg County, and one saw team to Taylor County. Over an 11-day period, 46 KDF employees helped with tornado response and cleanup. The teams sawed limbs, trees, and removed debris to open roads in many communities across western Kentucky. Some employees were even housed at the Pennyriple State Forest Training Facility and the Pennyriple State Park Resort Lodge to aid in the cleanup.

In the weeks following the tornadoes, calls came flooding into the division requesting assistance and guidance on what to do with their damaged woodlands. The Division Director facilitated communication between multiple partners, includ-

ing the University of Kentucky's Department of Forestry and Natural Resources, Kentucky Woodland Owners Association, Kentucky Forest Industries Association, USDA Forest Service, USDA Farm Service Agency, and USDA Natural Resource Conservation Service. An internal division management team worked with the partners to develop a coordinated response, including tornado cost-share assistance fliers for woodland owners, aerial detection flights-GIS mapping projects, and postings on the Division's Facebook page.

As many of us know, Mayfield, Kentucky, was devastated by a large, destructive tornado, resulting in unimaginable damage that affected the entire community. The division selected Mayfield as host of the annual Kentucky Arbor Day celebration at Harmon Park on April 1, 2022.

The Arbor Day event provided a sense of hope, resiliency, and support for the Mayfield community. This article is dedicated to those forestry employees who lost everything in the tornado,

to those forestry employees who assisted with tornado cleanup, and all Kentuckians affected by the devastating events of December 10, 2021, a day that we will never forget.



Photos courtesy: Pam Snyder

KDF employee clearing down woody debris in western Kentucky after tornadoes devastated the area.

About the author: **Pam Snyder**, is the Forest Management Chief with the Kentucky Division of Forestry and works on a variety of forest management needs for private landowners, farmers, and governmental agencies. She is one of the editors of the Kentucky Woodlands Magazine.

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Kentucky Maple Syrup Project

by Billy Thomas and Jacob Muller

Can you make pure maple syrup in Kentucky? The answer is a resounding “Yes, you can!” In fact, there are a growing number of Kentucky woodland owners who are doing just that, and they recently wrapped up another season of maple tapping, boiling, and bottling. While maple syrup may be experiencing a resurgence in Kentucky, it is not a new activity. The resourcefulness of Kentuckians and an abundance of maple trees have facilitated maple syrup production for a long time at varying levels of intensity. In the past, when sugar was rationed and hard to come by, many Kentuckians filled that sweet void with pure Kentucky maple syrup. Now, with a budding demand for local foods and regional sustainability, the interest in Kentucky maple syrup is growing as fast as ever, as evidenced by the formation of the Kentucky Maple Syrup Association in 2017.

People often think of maple syrup as being a Canadian and New England-based product. Canada does produce more than 70 percent of the world’s supply of maple syrup, while Vermont claims more than one-third of all maple taps in the United States. Despite heavy production in the New England states, the United States still imports more maple syrup than it produces (Figure 1). Maple syrup is produced in a

Year	Production	Imports	Exports
1,000 U.S. gallons			
1997	1,298	3,651	655
2007	1,517	6,164	550
2017	4,385	5,720	1,046
2019	4,372	6,429	1,051

Figure 1. U.S. Maple Syrup Production 1997-2019.

variety of ways using special equipment, ranging from very simple to very complex. However, all techniques involve collecting maple sap from maple trees, evaporating off the excess water in the sap, and bottling or canning the finished product while adhering to strict food-grade standards.

Demand for maple syrup is high and growing, and the University of Kentucky Department of Forestry and Natural Resources has been receiving an increasing number of requests for maple syrup information and support from county extension agents, the Kentucky Natural Resources Conservation Service, maple syrup producers, and the Kentucky Maple Syrup Association. How does Kentucky currently fit into the maple syrup industry, and what is our potential? Can maple

syrup get woodland owners more engaged with their woodlands and support many other benefits associated with a well-managed woodland? What risks does climate change present to the maple syrup industry? These questions, along with educational requests about the abundant maple resources in Kentucky (Figure 2), prompted the UK Department of Forestry and Natural Resources to engage with key partners and seek funding to support the development of the Kentucky Maple Syrup Project.

The Kentucky Maple Syrup Project (<https://ky-maplesyrup.ca.uky.edu>) has numerous ongoing activities and a growing library of maple syrup-related information, including videos and recorded programs. In addition to maple syrup workshops, a major educational offering is the Kentucky Maple School, which typically takes place in November and features maple syrup experts as well as maple syrup supply vendors. The project is also working with new and current maple syrup producers on a community science project to help researchers better understand the maple resources in Kentucky. The data collected from this project, as well as field research on maple sap production in Kentucky, are filling an important knowledge gap, as nearly all the maple syrup research is conducted in the northern United States and Canada. To engage Kentucky youth, a Kentucky 4-H Maple Syrup Project youth curriculum has also been developed and is currently being piloted. If you want to stay in the loop on Kentucky maple syrup, make sure to check out the website and subscribe to the Kentucky Maple Syrup Project electronic newsletter by visiting <https://ky-maplesyrup.ca.uky.edu/resources>.

The maple syrup season happens during one of the slowest periods from an agriculture perspective—the middle of winter; this can make it an attractive enterprise for farmers and woodland owners who may have a little more time and flexibility on their hands.





Modern maple syrup production utilizes new technology including tubing (above), modern evaporators, and reverse osmosis systems that can greatly increase output and save significant time.

Once you start boiling, it won't take long for folks to start showing up to see what you are up to and lining up to sample (and maybe even buy) your product! If you are a producer who has made some great maple syrup, you have a chance to enter the Kentucky State Fair (<https://kystatefair.org/contact-us/>) to compete for a blue ribbon and bragging rights.

If you want to get your hands on some pure Kentucky maple syrup, you had better move quickly, because Kentucky producers typically sell their syrup, along with other maple goodies, as quickly as they can produce it. You might get lucky and find some at a farmers market or roadside stand. If you are not so lucky, then go ahead and mark the first Saturday in February on your calendar for the 2023 Kentucky Maple Day. The Kentucky Maple Day is an annual celebration of Kentucky maple syrup and the Kentucky sugar makers

who are producing it, and for now, it is your best chance to try some pure Kentucky maple syrup. If you think you would like to try making maple syrup on your own, you will find like-minded individuals and a community of support within the Kentucky Maple Syrup Project; please join us on this sweet journey!

Funding Support for the Kentucky Maple Syrup Project

The Kentucky Maple Syrup Project is being supported by the following grants as well as contributions from the University of Kentucky Department of Forestry and Natural Resources and the Kentucky Maple Syrup Association with support from the Kentucky Center for Agriculture and Rural Development and county extension agents in Kentucky.

- Enhancing the Awareness, Knowledge, and Understanding of Sustainable Maple Syrup Production Practices Among Current and Potential Maple Syrup Producers. USDA Agricultural Marketing Service Grant # AM200100XXXXG007.
- Economic Analysis of Maple Syrup Production Potential in Kentucky. USDA Kentucky NRCS Conservation Innovation Grant.
- Informing Management Practice Through Understanding the Effects of Species and Tree Characteristics on Maple Sap Volume and Sugar Content. USDA Kentucky NRCS Conservation Innovation Grant.

Maple Resources in Kentucky

- **Sugar Maple:** 33,868,868 (at least 11"); 706,617,127 total
- **Red Maple:** 29,768,904 (at least 11"); 891,300,006 total
- **Boxelder:** 3,620,991 (at least 11"); 79,567,785 total



Figure 2. Kentucky has an abundance of maple trees. Many people do not realize that boxelder is a type of maple trees. Maples that can be tapped for maple syrup are one of the few tree species in Kentucky that have an opposite branching pattern.

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A Tribute to Joe Ball

by Jeff Stringer



Photos courtesy: Renee Williams

Joe Ball was truly a leader for family forest owners in Kentucky. He was especially driven to fight for the small private woodland owner's ability to benefit financially from their woodlands. This included pushing the forest industry establishment to provide market information so that the small owner had an opportunity to get a fair price for their timber resource. A formidable task, given that each independent mill has its own pricing system that they hold close to the vest. This did not deter Joe, and he was quick to the warpath when it came to pursuing the open marketing of logs. When this subject came up around Joe, the prudent course of action was to find cover as quickly as possible. That was a good thing! We need more people like Joe who have the knowledge and steadfastness to stand at the pulpit and fight for what they believe. In the same vein, he was unabashed at taking on the federal bureaucracy so that woodland owners could reap the benefits of federal programs.

If it was not for Joe, neither the Kentucky Woodland Owners Association nor the Kentucky Forest Health Task

Force—both now vibrant, functioning organizations—would be with us. The development of the task force was Joe's idea, and he pushed the idea until those of us who had the platform to develop the task force did. The Kentucky Woodland

Owners Association was nearing collapse as plans were being made to mothball the venture and try to resurrect it in some way, shape, or form. Joe recognized the plight and reluctantly volunteered to preside over the association. Through his sheer willpower and tenacity, he pulled it out of the ashes and turned the association around. There are other initiatives and ideas that he fostered; some worked, others did not. If they did not, it was not because they were bad ideas or ill conceived. It was because they were ahead of their time. In some cases they made too much sense for bureaucracy or the system to handle. But he was never deterred.

I am able to recount these events and many more, because I was close to the action when all of this unfolded. I fully supported Joe's visions for woodland owners and was in lockstep with his drive to see that woodland owners were (and are) treated right. Now, agreeing on how to get there was a whole different matter! Many times, those around us would think it might come to blows over how to construct an enterprise or what path to take to achieve a goal. However, what both of us always understood about one another was that we were fighting for the same goal and on the same team. I will always be highly appreciative of that. If I were picking my team to advance woodland owners in Kentucky, Joe would be the first one I would choose. Few can take his place, he advocated for so many that never knew or heard of him, and his thumbprint is on Kentucky. I miss him and always will.



Joe Ball peeled back the bark of this ash tree to show Kentucky's Commissioner of Agriculture Ryan Quarles the damage the Emerald Ash Borer has caused to ash trees throughout Kentucky.

The Ins and Outs of Forest Carbon

by Jacob Muller

If you haven't realized it yet, trees are incredible organisms! Not only do they make their own food, but they are generous with their leftovers. Through a process called photosynthesis, they can feed themselves while at the same time, helping to maintain life on this planet. No big deal. Their leaves soak in sunlight and pull carbon dioxide (CO_2) out of the atmosphere and mix it with water absorbed through their roots to create sugars and oxygen. The sugars, which contain carbon (the "C" in CO_2), is then distributed throughout the tree, from the roots to the branches to the buds. Oxygen (the "O" in CO_2), the other byproduct of photosynthesis, is then released back into the air.

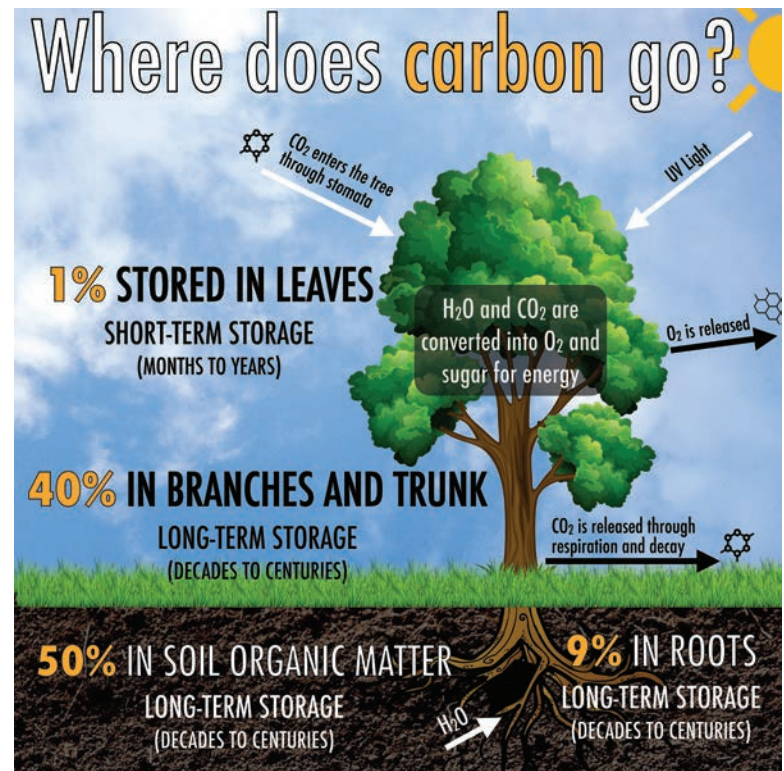
The forest carbon cycle

When we talk about carbon, we're usually talking about carbon cycling through the atmosphere and ecosystem, including the soil. In fact, nearly 50% of forest carbon is stored in the soil. Around 40% is stored in the trunk and branches (the wood), and roughly 10% is stored in the roots. As trees get older and die, they begin to decay. Through this process, the carbon is released; some molecules go directly into the soils while others are converted back into CO_2 and released into the atmosphere. This is part of the carbon cycle. However, through the burning of fossil fuels to provide energy for our ever-growing energy demands, coupled with deforestation and poor forest management, we find an imbalance in the carbon cycle. There is simply too much carbon in the atmosphere.

Carbon storage, more than just wood

When we talk about carbon storage in forests, we're referring to the actual carbon stored in tree tissue and soil. However, there is another key element that we can't overlook and that is carbon sequestration. Sequestration is the process that occurs when trees take additional carbon out of the air through photosynthesis. This process has been compared to a savings account. The storage of carbon is your savings while sequestration is the annually accruing interest on your capital. Younger forests generally have less savings but greater interest. A mature forest typically has lots

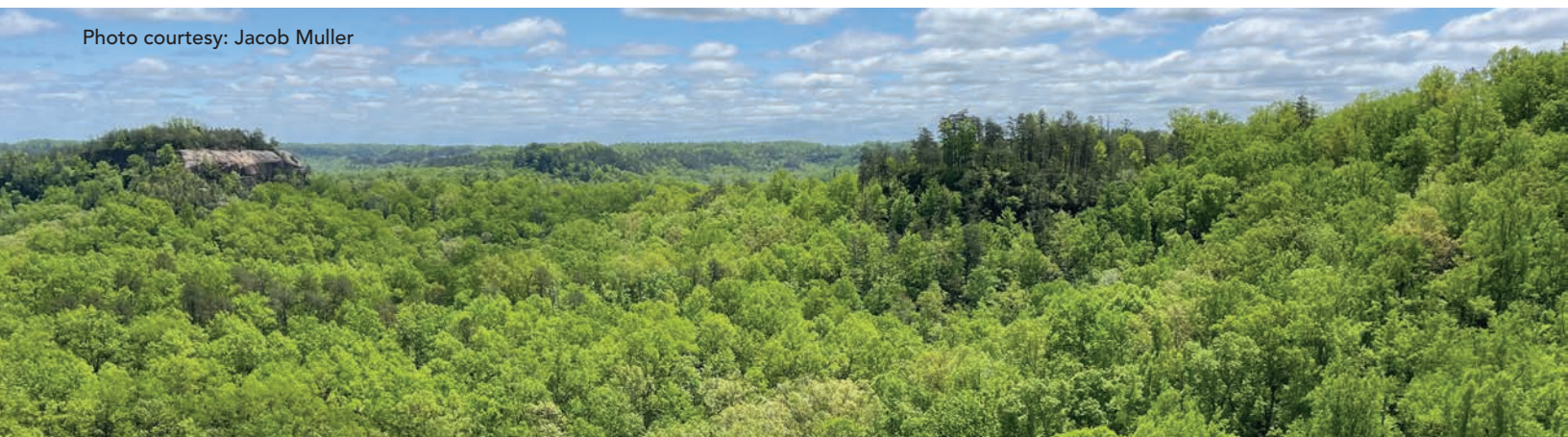
of savings but perhaps accruing at a lower interest rate. In other words, young forests don't store as much carbon as mature forests but sequester carbon at a higher rate. Why is this important? Because the way in which we manage our forests can have profound impacts on carbon storage and sequestration.



Carbon forestry is sustainable forestry

Without an eye to the future, sustainable forest management is unachievable. To achieve a carbon-focused management plan, it is critical that we diversify our portfolios. This includes reforestation and afforestation, retaining big trees for longer periods of time, and reconsidering what a suitable rotation age is for your stand. Managing for carbon isn't mutually exclusive to other goals related to wildlife, water, recreation, and sustainable forest manage-

Photo courtesy: Jacob Muller



Sustainable, sound forest management is carbon-focused management!



KEEPING FORESTS AS FORESTS STORES MORE CARBON



SUSTAINABLE HARVESTING PRACTICES CAPTURE MORE CARBON



SUSTAINABLE WOOD PRODUCTS STORES MORE CARBON



PROTECTING FOREST HEALTH, KEEP OUT INVASIVE MAINTAINS CARBON

ment. In fact, carbon-focused forest management is sustainable forest management.

When a tree is cut down and used for a timber product, a large amount of carbon is stored as furniture or other building materials. However, it is unavoidable to have some carbon footprint on timber harvesting, commonly due to unmerchantable timber byproducts and small diameter logs, logging equipment, and log hauling. As with every forest action (including timber harvesting), there are costs and benefits that must be weighed by each forestland owner. Fortunately, many programs are in place to help landowners make better management decisions. From NRCS cost-share funding to sustainable forestry certification to state foresters, there is no shortage of resources to help landowners make sound management decisions. One relatively new consideration for woodland and forestland owners is an emerging forest-carbon market.

Carbon offset markets

Forest-carbon markets are making a big splash in the forestry world. If you work in forestry or own forested lands, you've likely already heard about carbon markets. Carbon-offset markets were created to help reduce the amount of atmospheric carbon and account for carbon being sequestering and stored in the forests. Many large companies are monitoring their carbon footprints (whether voluntarily or mandated) and pay forestland owners to help offset their emissions through sound, sustainable forest-management practices. These are what we refer to as carbon credits.

A carbon credit represents an emission reduction of one metric ton of CO₂. Generally, there are three types of projects that are eligible to produce carbon-offset credits. For each project type, the carbon "developers" must be able to show how their management actions are storing and sequestering more carbon than they would otherwise produce. The project types include afforestation/reforestation projects, avoided conversion projects, and improved forest management projects to increase carbon stocking in the forest (see boxed text). Determining

what project might be right for your land takes careful analysis. There are many different options available to forest and woodland owners, so take your time and consult with a forester to determine whether a carbon project might be right for your land. As with any other land-management decision, there are costs and benefits. And if you haven't started thinking about your forest opportunities, it's the perfect time to reach out to a forester to help you develop a forest management plan.

Key Eligibility Requirements

Every carbon offset project must meet three basic requirements: additionality, permanence, and non-leakage.

Additionality requires the forest project sequester more carbon than in a "business as usual" scenario. Project must demonstrate that the carbon sequestration would not have happened without the development of the specific offset project.

Permanence is verified in each project by undergoing periodic site visits and audits of inventory reports by an independent third party during the life of the project.

Proof of non-leakage requires that projects do not result in an unintended increase in emissions in another location. Leakage is the biggest concern involving afforestation projects where cropland is being converted back to forests.

Final thoughts

The importance of forests and forest carbon can't be overstated. Photosynthesis is the oldest and most efficient form of carbon capture that has ever been developed on this planet. Carbon markets may not be right for every landowner, but through sustainable, well-planned forestry, we can help ensure every forest is meeting its full potential—serving multiple management objectives to meet multiple goals. Whether your aim is to increase timber values, improve wildlife habitat and recreational opportunities, or simply just to improve its general aesthetics, there is always an opportunity to improve the function of the forest to help store and sequester carbon for many generations to come. If you would like more information about forest carbon and carbon markets, please reach out to UK Forestry Extension or contact your local forester.

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Photo courtesy: Darren Morris

The oak group is one of the most important groups of trees on the North American continent, possibly even the entire northern hemisphere. The oak genus (*Quercus*) is comprised of 200 to 300 different species worldwide with 60 to 70 species native to the United States. There are 20 oak species believed to be native to Kentucky. There are many species of oaks, and they are numerous across the eastern United States. In fact, Kentucky's forests are classified as Oak-Hickory type because approximately 75% of our forests are composed of oaks and hickories. In addition to their diversity and dominance in our forests, they are economically important and are often a foundational species of many ecosystems.

Why Are Oaks Important?

Many of our oak species are some of the most harvested and valuable trees in Kentucky. Oak wood is typically heavy and strong and one of the most popular hardwoods used in the United States. It is widely used for flooring, cabinetry, furniture, bourbon barrels, lumber, and other wood products. Nine oak species were among the top 20 tree species harvested in Kentucky (Brandeis 2017). These oaks play a significant role in Kentucky's forest industry economic contribution to the state.

FORESTRY 101 Oaks of Kentucky

by Laurie Taylor Thomas



In 2020, oak trees continued to supply over half of the wood exported from the state with more than \$165 million in exports of barrels and lumber.

“
The oak is often called the king of trees, and it is a legendary symbol of strength, grandeur and venerable age.

-- Mary Wharton

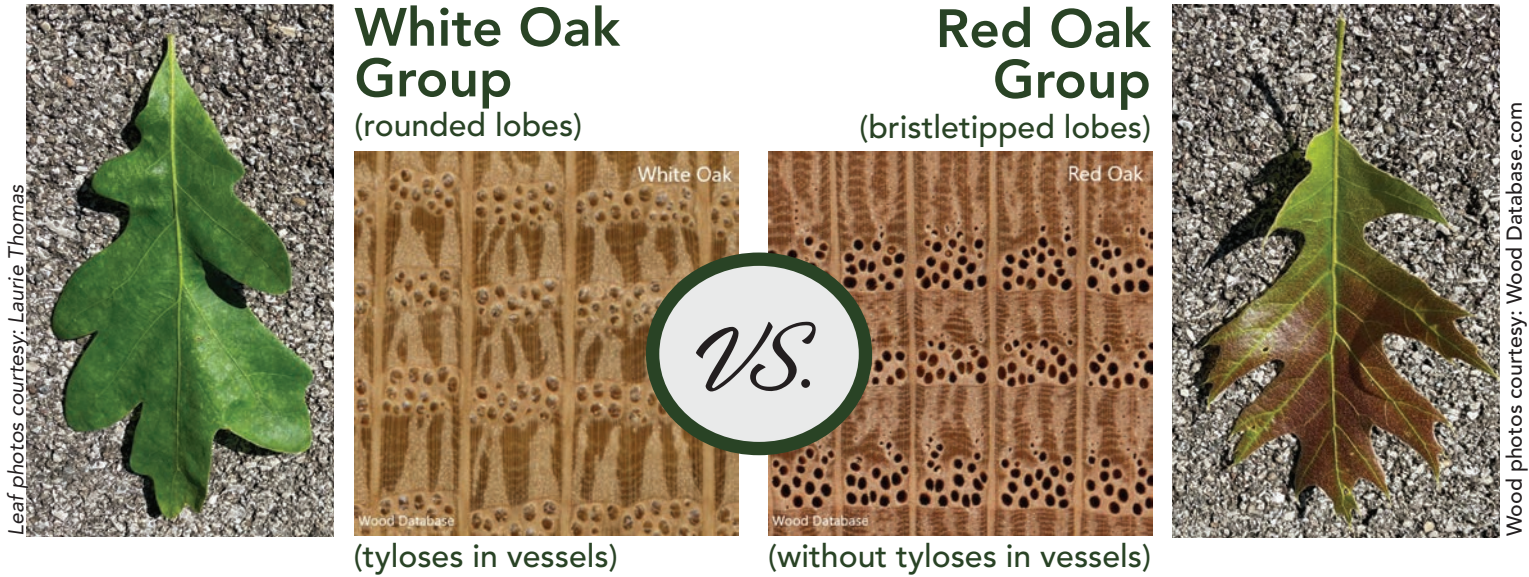
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Oaks are not only important economically they are also critically important to many wildlife and pollinator species found in our forests. According to the National Wildlife Federation oak is one of the top 10 trees for wildlife. It is estimated that oaks host more than 530 species of caterpillars that provide critical nutrition for breeding bird success. The acorns provide food for more than 100 U.S. vertebrate species, including blue jays, quail, wild turkey, wood duck, squirrels, rabbits, raccoons, and deer, and are considered one of the most valuable food resources available for wildlife. Additionally, large oak trees provide critical habitat for warblers—including the threatened cerulean warbler—cavity nesting birds, black bear dens, and roosting sites for forest-dwelling bats.

Oak trees provide other important benefits as well. Many can live up to several hundred years, which helps stabilize a forest community and helps sequester carbon. Their roots help hold the soil in place, which can protect water quality, and their leaf litter can help improve the soil's fertility.

White Oaks vs. Red Oaks

Oaks are generally grouped into the white oak group or the red oak group based on similarities in botanical features as well as wood anatomy. White oaks have leaves without bristle-tipped lobes; the acorns mature in one growing season and are typically sweet; and the summerwood vessels are angled, small and thin-walled, and contain tyloses. Red oaks mostly have leaves with bristle-tipped lobes; the acorns mature in two growing seasons; they are usually bitter; and the summerwood vessels are rounded, large and thick-walled, and do not contain tyloses. The presence of tyloses in the vessels of the white-oak wood makes it desirable for "tight" cooperage or barrels used to store and or transport liquids, such as bourbon. Because the wood is liquid "tight," it will not leak.



Leaf photos courtesy: Laurie Thomas

Wood photos courtesy: Wood Database.com

Landowners for Oaks Series
BLACK OAK (*Quercus velutina*)
 Laurie Thomas and Darren Morris, University of Kentucky Department of Forestry and Natural Resources FOR-140

Black Oak (*Quercus velutina*)
 Black oak is a common and widely distributed oak that is part of the red oak group. It is a medium-sized tree that can grow up to 80 feet in height. Like many red oaks it is suitable for timber products and its fruit, the acorn is a valuable wildlife food. Black oak can be found on a wide variety of sites including those with moist and well drained soils but is most often found on medium to poor soils often associated with a south or west facing aspect.

Identification
 The leaves of black oak are highly variable as you can see in the photos. They are usually between 4 and 10 inches long with 5 to 7 lobes. The lobes have bristle tips, a distinctive characteristic of red oaks. Sun leaves (leaves found on the outermost layer of the canopy) tend to be shiny and thick with deep sinuses (spaces between lobes) while leaves growing in the shade tend to be broader, less shiny and papery.

Figure 1: Black oak range map. Photo courtesy: Atlas of United States Trees.

Figure 2: Black oak leaves with deep lobes are usually found in full sun. Photo courtesy: Keith Kanick, Maine Forest Service, Bugwood.org

Figure 3: Large black oak leaves are usually found in shaded locations. Photo courtesy: Chris Evans, University of Illinois, Bugwood.org

Figure 4: Notice the variability of black oak leaves. Photo courtesy: T Davis Spohn, The Ohio State University, Bugwood.org

This publication is part of the White Oak Initiative's (www.whiteoakinitiative.org) Landowners for Oaks Series designed to provide foundational information necessary for sustainable management of white oak and upland oak forests.

The Landowners for Oaks Series is produced by the Cooperative Extension Service, University of Kentucky, Department of Forestry and Natural Resources (<http://fs.naturalsources.org>) in support of the White Oak Initiative.

Authors: Laurie Thomas and Darren Morris, UK Forestry and Natural Resources. Published as University of Kentucky's Cooperative Extension publication FOR-140.

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Cooperative Extension Service
 Forestry and Natural Resources Extension
 College of Agriculture, Food and Environment

Due to the ecological and economic importance of the oaks, a series of publications called Landowners for Oaks has been created as part of the White Oak Initiative. This series includes the main upland oak species found in this region: white oak (*Quercus alba*), chinkapin oak (*Quercus muhlenbergii*), chestnut oak (*Quercus montana*), post oak (*Quercus stellata*), northern red oak (*Quercus rubra*), black oak (*Quercus velutina*), scarlet oak (*Quercus coccinea*), and southern red oak (*Quercus falcata*). The series provides landowners information on the botanical and useful identification characteristics including, leaves, buds, and fruit; information on growth, size, and regeneration; and light and moisture requirements of each species.

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healthywoodsapp.org

New Invader Alert: Spotted Lanternfly

by Ellen Crocker, Jonathan L. Larson, and Ric Bessin

There's a new invasive insect attacking trees—the spotted lanternfly. While this invasive insect has been attracting attention for a while in the Northeast, gathering in large numbers and feeding on trees, last year it was detected in southeastern Indiana, just across the river from Kentucky (Figure 1). Spotted lanternfly poses a major risk to trees in forests, landscapes, and orchards.

While we don't want to find spotted lanternfly in Kentucky any time soon, the sooner it is detected after it arrives, the more options will be available for managing it. Join us in a search for this unwelcome insect!

The threat

Spotted lanternfly feeds on a wide range of trees, gathering in large numbers, sucking sap, and stressing trees over time. As these insects feed, they decrease the plant's health and can cause mortality. Their high numbers on trees (and the black, sooty mold that accompanies their feeding) pose a particular threat to wine production, fruit growing, and Christmas tree production. Although the outcomes of infestations in diverse woodland settings and natural areas are less clear than in more uniform agricultural and landscape settings, the added drain on trees' resources may compound existing tree stress issues and trigger decline.

The regulatory response to spotted lanternfly can also impact Kentuckians. Restrictions on the movements of goods like lumber, the need for quarantines, and even the requirement of permits to travel or move goods out of infested areas could all have consequences for those living in infested areas.

What should we look for?

Spotted lanternflies start life as eggs, then progress through nymphal stages before becoming adults.

Eggs are laid in masses that typically contain 30-40 eggs and are coated in a putty-like substance. Initially this coating is white, but it darkens over time to look

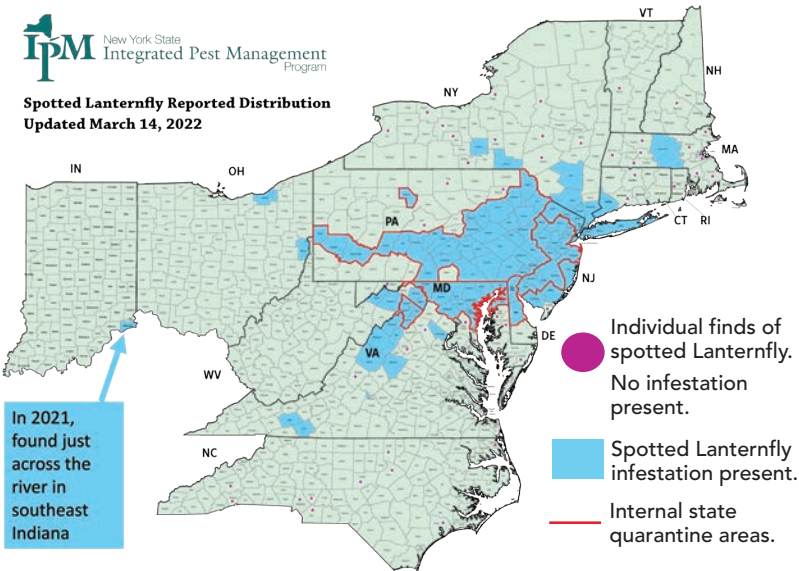


Figure 1. Spotted lanternfly was recently detected in southeast Indiana.



Figure 2. Spotted lanternfly egg masses.

Photo courtesy: Emelie Swackhamer, Penn State University, Bugwood.org

like mud (Figure 2). These egg masses can be found on natural objects like logs but have also been found on many human-made objects like vehicles and equipment. Egg masses can be found from fall through early summer.

Nymphs of spotted lanternfly develop through several stages before reaching adulthood and looks different depending on what stage it is in. At first, nymphs are black with white dots (Figure 4). Then they go through a stage that is black with red patches and white spots (Figure 5). Nymphs of all stages will jump when approached. Look for nymphs from late spring to early fall.

Spotted Lanternfly...



Figure 3. Adult spotted lanternflies are distinctive-looking insects with a pink-khaki coloration and spots and stripes on their wings, and, when viewed from the side, is vaguely teardrop shaped.

Photo courtesy: Ric Bessin, University of Kentucky

Adults are over an inch long with a mixture of stripes and spots on their wings. Adult spotted lanternflies (Figure 3) are quick and will run and jump when approached. The color of their wings is khaki pink. When their front wings are open, a second, smaller pair of wings underneath can be seen that are red with black spots. Look for the adults in the summer and fall.



Figure 4. Younger nymphs (black and white).

Photo courtesy: Lawrence Barringer, Pennsylvania Department of Agriculture, Bugwood.org

Figure 5 below. Older nymphs (black with red patches and white spots).

Photo by Eric R. Day, Virginia Polytechnic Institute and State University, Bugwood.org



Signs on trees

Spotted lanternflies feed by inserting piercing mouthparts into host plants, which allows them to suck sap. This drain of resources stresses plants and results in other notable signs and symptoms, including:

- Wilted foliage
- Branch dieback
- Accumulation of "honeydew," a sticky, sugary fecal material
- Black, sooty mold growing in honeydew
- Increased visitations of flies, bees, and wasps feeding on honeydew

What does it feed on?

Tree-of-heaven, an invasive plant that is a problem on its own, is the primary host plant of spotted lanternflies, but they are also known to feed on over 70 different species of plants. Potential hosts include willow, maple, apple, walnut, pine, and stone fruit trees. They may also be found on hops plants, grape vines, and other orchard crops.



Figure 6. Tree-of-heaven has compound leaves composed of many leaflets, with small lobes at the base that have glandular dots on the underside.

Photo courtesy: Ellen Crocker

How to spot tree-of-heaven

Tree-of-heaven plants bear these recognizable features:

- Large (1-4 feet long) compound leaves with many

- (10-24) spear-shaped leaflets with smooth edges (Figure 6)
- Small lobes at the base of leaflets, with a distinctive glandular bump on the underside
- Branches and stems that give off an unpleasant smell when cut (like rancid peanut butter)
- Smooth, green bark when young, turning gray with age (Figure 7)
- Very large tree growth (greater than 80 feet tall) is possible, but it is also common to see dense thickets of smaller trees that are clonally connected through roots



Figure 7. Tree-of-heaven bark changes with age, but large trees have a smooth grey color.

Photo courtesy: Chris Evans, University of Illinois, Bugwood.org

Tree-of-heaven must be carefully distinguished from native look-alikes like black walnut and sumac.

Have you seen spotted lanternfly?

1. Take a photo or capture the specimen.
2. Get it identified by submitting it to your local extension professional or forester.

If spotted lanternfly is discovered and the infestation is relatively contained, efforts will be made to locally eradicate the insects to prevent their continued local spread and establishment. This is done with a combination of insecticide treatment of potential host trees and eradication of tree of heaven and other preferred hosts. The sooner the spotted lanternfly is reported, the better—and the higher the probability of effectively controlling it.

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Wildlife 101

Some Like it Dry, Some Like it Sweet: Balancing Grapevine Presence in Your Woods

by Matthew T. Springer

Many times in natural resource management, decisions are situational and dependent on either the site-specific environment or the overall goals of the landowner. A prime example of this is dealing with, and finding a balance with, wild grapevines (*Vitis spp.*) in your woods. Some of us may be more familiar with the benefits of the cultivated grapevine (*Vitis vinifera*), but there are over a dozen identified species of wild grapevines in the eastern United States. Grapevines can be viewed negatively by foresters from a timber-production standpoint. However, those with a wildlife interest believe they are an integral food and cover component within a forest. Where you fall is dependent completely on the goals of your forest management plan, but there are ways to balance both timber production and having a healthy amount of grapevines in the woods to provide wildlife benefits.

Wildlife Value

Before we get into why grapevines are a problem, let us start with the positives of grapevines. Grapevines offer a highly nutritious and reliable food source for more than 80 wildlife species. This generally takes the form of the soft mast that the vines produce, but the foliage can be consumed as forage by many different species as well as the insects that live on the vines and become food for birds. For birds, the vines offer escape cover from predators as well as nesting material. In Kentucky, grapevines are especially important to many bird species and mammals including wild turkey, ruffed grouse, squirrels, rabbits, white-tailed deer, black bear, elk, and many species of songbirds.

Timber Production Issue

While grapevines may be good for wildlife, they may cause damage to trees. With grapevines, it usually is situationally dependent on how negative their presence is, but they can be incredibly harmful to certain

forest-management goals. Grapevines can damage hardwood trees by breaking tops and limbs, twisting and bending the tree's bole, and uprooting trees. Unfortunately, these things negatively impact tree and timber quality, and in some cases even kill the tree.

Grapevines do incredibly well on high-quality sites and locations with ample sun. They compete for light and canopy space as they grow in a stand which may result in creating dense amounts of vines and foliage in tree branches creating a major issue in extreme weather events as the extra weight may cause those tree branches or tops to fail. Unfortunately, many woodland owners experienced a prime example of this following the last few ice storms in Kentucky.

One of the issues with managing grapevines is their ability to be prolific. Grapevine density is usually highest within the 10- to 20-year-old stands when an aggressive harvest has previously occurred. In a study on their presence and treatment in young forest stands in the Hoo-sier National Forest, stand densities reached upwards of 1,200 vines per hectare within this stand age class. This density quickly dropped off to almost 10% of that in stands 10 years older (Morrissey et al. 2009). Older stands or those that had not been as heavily harvested will have a substantially lower density of vines.

Finding a Balance

Ultimately, managing grapevines will come down to two primary issues: 1) goals of the landowner and 2) logistical limitations in treating grapevines within the stand. From the standpoint of the landowner, if the goal is timber production, then an aggressive removal approach of grapevines is warranted. If wildlife is a component of the forest-management plan, then leaving some grapevines is warranted. The amount should be based on the habitat needed to meet the wildlife-management goals for species being managed. Some species such as wild turkey or ruffed grouse will require more grapevines on



the property than white-tailed deer.

The good news is that both timber production and wildlife can be balanced when it comes to grapevine management. You can leave grapevines in areas where stands are lower quality, riparian areas, or on the edges of the forest where the grapevine will thrive making management difficult. In high-value stands that are within a few years of a harvest or areas immediately adjacent to regularly traveled trails that may present a safety hazard if a tree falls, a more aggressive treatment approach is warranted.

One strategy is to manage areas called “arbors.” Arbors are open areas within the canopy where grapevines will become incredibly dense and thick making it almost impossible to treat. These areas will provide good cover and ample food for wildlife. To mitigate the vines growing into surrounding trees, you can remove border trees to restrict the spread of the vines and keep the arbor where you want it to occur. Active management to reduce or eliminate grapevines outside of these designated arbors ensure other areas do not become arbors, helping to create the balance between wildlife and timber production.

How to Treat Grapevines

Timing for treating grapevines will vary by method during the year, but a good guideline is to treat grapevines at around five years before the stand will be harvested. Multiple types of treatments are effective, including mechanical and chemical. For mechanical treatment, use loppers, brush axes, machetes, or handsaws, while chainsaws should be avoided for safety concerns. Make two cuts on the vine to help keep track of treated plants, one at about head height and another cut a few inches to a foot off the ground. If the vines contact the ground in multiple areas, then you want to treat them at each point they are contacting the ground. Regardless of size, make sure every vine is severed. Grapevines do not tolerate shade well, so they are easier to treat in forested sections with a full canopy. After grapevines are cut they will sprout, but in the areas with little sunlight these sprouts will die off in a few years. For wildlife, they are also great browse, which also aids in killing the vine off. In areas of higher light, a chemical treatment will be required. Chemically, you can treat grapevines using 2,4-D or Tordon101R using the cut stump method during the early spring and fall. A 20% solution of glyphosate can be applied as a basal spray to cut stumps. As with all herbicide applications, make sure to follow the label. Remember the label is the law.

About the Author: **Matthew Springer**, Ph.D., Assistant Extension Professor of Wildlife Management with the UK Department of Forestry and Natural Resources works on a variety of wildlife management needs for private landowners, farmers, and governmental agencies.

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Photos courtesy: page 14: Renee' Williams;
page 15: fruit and seedling: JC, OSU, Bugwood.org; leaf and vines: Renee' Williams



KWOA

Kentucky Woodland
Owners Association

www.kwoa.net

Resolutions

by Doug McLaren, KWOA President

How are your new year's resolutions progressing? Statistics show that 23% of folks quit their resolutions within two weeks. Only 19% actually complete resolutions. I fall somewhere in between. Failing to continue or complete resolutions happen for a wide variety of reasons. I am sure that our good intentions fail because our habits need to change to accomplish these lofty goals.

Being a woodland owner has similar results. We tend to set some impressive goals for our woodlands as well as for ourselves. Achievement to accomplishment takes continuous efforts on our part as a woodland owner. As I travel the state with the responsibility of president of the Kentucky Woodland Owners Association (KWOA) as well as a professional forester, I have seen many remarkable accomplishments by woodland owners.

My travels take me to some of the most enthusiastic owners who have resolved to bring their woodlands into compliance with their management plans. It is amazing how many individuals have made this resolution and how many have seen it through. Each of these owners of properties—some small, some rather large—have set goals to manage their properties for a wide variety of end uses. Each began with a resolution, a management plan, and a desire to accomplish.

I believe the difference between a traditional new year's resolution and this woodland management resolution is the connection that each of us have with our woodlands. Every woodland owner that I have met has a deep connection with the property. Woodland owners always are eager to discuss the struggles and hard work it takes to complete the individual management requirements. The discussions made by these hardworking woodland owners are quickly followed up with statements, "I would do it again. I enjoy the work. I love being in the woods."

The organization of KWOA, too, has made resolutions in recent years to help the well-seasoned owner and those who are new to managing woodlands. KWOA has been making New Year's resolutions throughout its existence: to make the connection between KWOA, the woodland owner, and related organizations to support the owner more effectively.

It is much easier to accomplish any task or resolution when you feel that you have a support system. KWOA has continued to help achieve that support. During COVID, KWOA quickly adapted from face-to-face experiences to videos to continue supporting woodland owners' need for information. The recently introduced Wood Post of KWOA brings timely pieces of information that are then linked to more extensive information. Our newsletter brings future notices of information relevant to the owners of woodlands. The website updates our members and partners to what is important. KWOA is working to bring relevant management concerns to woodland owners.

We do hope that if you are a woodland owner, you are a KWOA member. By joining you are quickly involved with a wide range of very enthusiastic owners of woodlands. All have a strong desire to share their ideas for a well-designed woodland that meet their goals. Belonging to KWOA does make the journey of woodland management "resolutions" a much more meaningful and exciting experience. If you are a member, thank you. If you are not, please consider joining to investigate the excitement and motivation of being a woodland owner making what is good better.

For more information visit www.kwoa.net



Kentucky Tree Farm Committee Newsletter

The Kentucky Tree Farm Committee is responsible for administering the Tree Farm program in Kentucky. One of the most difficult but enjoyable responsibilities of the committee is selecting the annual Tree Farmer and Logger of the year award winners. Read on to learn about the most recent Kentucky Tree Farm Committee award winners.

Program to Undergo Third-Party Certification Assessment this Summer

The Kentucky Tree Farm Program will be undergoing another third-party certification assessment this summer. The assessment process is important in two ways. First, it affirms the great work that landowners are doing in managing their woodlands. Secondly, the assessment reviews how the Kentucky Tree Farm Program is operating and how the committee can better serve tree farmers. The tree farm inspectors will be working with the

tree farmers who have been randomly selected by the third party. PricewaterhouseCoopers (PWC) will set up Zoom meetings or conference calls with the landowners to conduct the assessments. The findings will be processed and brought before the Kentucky Tree Farm Committee. You may contact the Kentucky Tree Farm Committee through the Kentucky Forest Industries Association at 502-659-3979 if you have any questions.

Tree Farm Awards Presented at the KFIA Annual Meeting



The 56th annual meeting of the Kentucky Forest Industries Association (KFIA) recently took place, and the Kentucky Tree Farm Committee presented a number of awards for outstanding work related to managing our forests. Traxler Farms, located near Vanceburg, KY, was honored as the 2021 Kentucky Tree Farmer of the Year. Phil Traxler and Laurie Yanoshek have completed a wide range of management activities on their woodlands, including field days, demonstrations and timber stand improvement on nearly all of their 321-acre tree farm.

Also honored at the meeting was past Kentucky Tree Farmer of the Year winner Taylor Tree Farm from Danville, KY, which was named the national North Central Region Tree Farmer of the Year in 2021 by the American Tree Farm System, making it only the third tree farm from Kentucky to receive this prestigious award. The Taylor Tree Farm is one of only a handful of tree farms in Kentucky that has been certified for 50 years. Clifton Taylor and his sons have completed all types of management activities to improve their woodlands along with a number of timber sales, including a recent harvest that resulted in certified white oak being sold to make whiskey barrels in Ireland.



James Baunach was honored as the Kentucky Tree Farm Inspector of the Year. He works as a service forester for the Kentucky Division of Forestry in Campbellsville, KY. Mr. Baunach works closely with woodland owners, providing advice on how to manage their woodlands. He has also completed a number of inspections of tree farms and is involved with promoting the Kentucky Tree Farm Program to interested landowners.



The final award was presented to Kenny Smith of Collett & Smith Logging in Roark, KY, who was named the 2021 Kentucky Logger of the Year for his outstanding work in properly harvesting and removing timber for landowners. Mr. Smith operates two mechanized logging crews that follow good logging practices that protect water quality and leave woods in good shape for future timber production. Both the Logger and Tree Farmer of the Year winners were presented with Stihl chainsaws sponsored by Bryan Equipment Company of Loveland, OH, the Stihl distributor for Kentucky.





Kentucky Natural Resources Conservation Service

KY NRCS Assists Woodland Owners with Tornado Recovery

by Justin Pius, State Public Affairs Specialist, USDA's Natural Resources Conservation Service



On December 10, 2021, an EF4 tornado, with wind speeds in excess of 190 miles per hour, ripped through 170 miles of Kentucky. All of Kentucky was in shock as day broke on December 11 and news outlets reported the devastation found in cities such as Mayfield. As damage was assessed, it became obvious to local Natural Resources Conservation Service (NRCS) staff that in addition to impacts to homes and businesses, many Kentucky agriculture and woodland owners along the tornado's path were severely impacted as well. Farmers found entire barns gone, poultry houses in ruins, livestock missing, and miles of fencing destroyed. Acres upon acres of woodlands and associated timber resources had been severely damaged as well.

After receiving reports of the damage to Kentucky's woodlands, NRCS state conservationist Greg Stone requested and received disaster-assistance funding through the Environmental Quality Incentives Program (EQIP). Receiving this type of EQIP disaster assistance is a first for Kentucky NRCS. "When the impacts to our farming communities became apparent, it was imperative that NRCS assist in any way possible," said Mr. Stone.

Environmental Quality Incentives Program Benefits Woodland Landowners

EQIP can assist individual landowners with technical and financial resources, providing one-on-one help to plan and implement conservation practices to recover from disasters. Although NRCS has a variety of conservation practices at its disposal, in this situation it became apparent that Kentucky woodland owners who had sustained damage from the tornado and associated winds had a tremendous unmet need for help. To be effective, NRCS had to redirect staff and rely heavily on partners, such as the Kentucky Division of Forestry (KDF), to assist with the workload. Through

these concentrated efforts, NRCS enrolled 120 applicants throughout 16 counties in Kentucky, offering almost \$3.5 million in woodland disaster assistance to impacted landowners.

Damaged woodlands primarily will be addressed utilizing the Woody Residue Treatment (practice standard #384). The practice standard was designed for areas with undesirable woody material that, if left alone, creates harmful conditions to the forest, wildlife, livestock, or landowners. "When the ground is covered with timber, it doesn't give the forest floor the ability to regenerate and grow for the future," explained Jon Shultz, NRCS State Forester.

Untreated woody residue creates habitat for bark beetles, bacteria, and diseases that are hazardous to the regeneration of the forest stand. Bark beetles feed on downed timber, their populations explode, and once that food supply is exhausted, they begin to feed on healthy trees. They also transfer fungal pathogens that kill trees as a secondary vector. Bacteria build-up on degraded timber can cause the trees to grow at a slower rate and, in some cases, kill the tree growth completely. Management of excessive woody residue helps break these cycles. Likewise, it also benefits the forest stand by reducing the risk of wildfires, providing adequate sunlight for regeneration, and accelerating decomposition to improve soil health.

Additional NRCS Assistance

In addition to the EQIP disaster assistance, Kentucky NRCS is aiding the tornado recovery through the

Emergency Watershed Protection (EWP) program. EWP helps protect communities from additional flooding, damages to their watersheds, and soil erosion. Tornado recovery through the EWP program will consist primarily of removing debris within watersheds and helping reshape eroded streambanks. With the cooperation of 15 qualified local sponsors, NRCS has identified 87 sites in western Kentucky that are eligible for the EWP recovery assistance due to the damages sustained during the tornado. All sites have been funded for construction, and the estimated cost for completion is approximately \$3 million.

Helping People Help the Land – the NRCS Mission

The motto at NRCS is "helping people, help the land," and that was certainly needed as disaster struck Kentucky. NRCS wants to thank our partners in forestry for their continued help in recognizing landowners in need and informing them of the assistance that NRCS can provide. A special thank you goes to Brandon Howard, state forester with the KDF. Under Mr. Howard's leadership, KDF has done a fantastic job informing landowners impacted by these storms about the help Kentucky NRCS can provide. Also, Bob Bauer, with the Kentucky Forest Industries Association, has played a role in supplying NRCS program information to local contractors and loggers. These folks are on the ground helping landowners recover from this disaster. As we move forward, we look to strengthen our partnerships in the forestry community by continuing to work with them to help people help the land.



NRCS Programs address critical environmental needs. The photos above show downed timber caused by the December tornados, and these areas will be addressed using Woody Residue Treatment.

Photos courtesy: NRCS

Tree-level Evaluation of Red and Sugar Maple Sap Production Characteristics in Kentucky

by Zachary J. Hackworth, John M. Lhotka, Billy Thomas, and Thomas O. Ochuodho

Maple syrup producers judge the quality of a sugarbush tree based on two characteristics: total volume and sugar content of the sap yielded by the tree during the tapping season. Larger sap volumes and sugar contents are directly correlated with higher syrup production. In 1946, C.H. Jones, a researcher at the University of Vermont, developed an equation for estimating the volume of sap required to produce one gallon of maple syrup. Known as “Jones Rule,” this equation has been revised over the years to accommodate changing maple syrup standards and is presented below in its current formulation.

$$\text{Sap Volume (in gallons)} = \frac{87.1}{\text{Sugar Content (in } ^\circ\text{Brix)}} - 0.32$$

Figure 1 (right) is a graph of this equation for the typically encountered range of sap sugar contents (1–5 °Brix). From this figure, we see that the sap volume required to produce one gallon of syrup decreases sharply with higher sap sugar contents. Therefore, to make a maple syrup operation most economical, it is the goal of producers to tap maple trees that yield the greatest sap volumes with the highest sugar content.

However, how can producers know which are the highest-quality trees without tapping them? Research studies—some dating to the 1800s—have related tree and forest characteristics with sap production. For example, it is well-known that sap sugar content is usually much higher from sugar maple (*Acer saccharum*) than from red maple (*Acer rubrum*). However, much of this research has occurred in areas with a thriving commercial maple syrup industry, such as the northern United States and Canada. Studies of sap production in more southerly latitudes, including Kentucky, are relatively sparse due to suboptimal conditions for syrup production created by shorter winters and a higher prevalence of red maple than sugar maple in these forests. In fact, no studies evaluating climate, site, or tree influence on maple sap production have been conducted in Kentucky.

To aid the state’s growing guild of syrup producers in production planning, we initiated a study of red and sugar maple sap production, with the goal of estimating seasonal sap volume and sugar content yield per tap and assessing the relationship of tree characteristics with these characteristics. We identified 75 red maples and 75 sugar maples, ranging from 6 inches to 36 inches in diameter at breast-height (dbh), in four stands on Berea College Forest near Berea, Kentucky. The four study sites represented an array of forest conditions, comprising different aspects, slope positions, and site productivities (for example, areas near perennial streams and dry ridgetops). For each

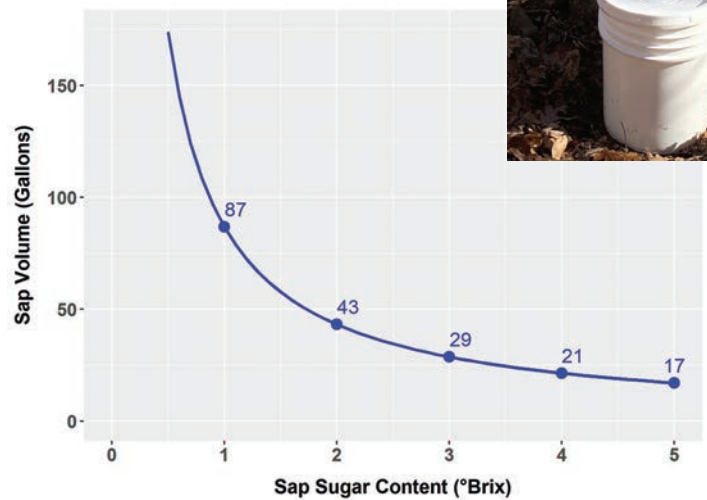


Figure 1. Jones Rule—the sap volume required to produce one gallon of maple syrup at 66 °Brix across the range of maple sap sugar content typical in Kentucky.

sample tree, we installed a single-tap, gravity-driven collection system: one 5/16-inch spile was inserted into a tap hole of equal diameter drilled with a cordless drill, and tubing was used to connect the tap to a lidded bucket. We collected and measured sap volume for each sample tree weekly between the first week of January and the second week of March in 2020 and 2021. To compare sap production with tree characteristics, we were interested in evaluating the relationship of sap volume and sugar content to a tree’s crown class. Crown class identifies the position of a tree’s canopy relative to the height of the main forest canopy and is a measure of both tree size and competitiveness.

There are four crown class categories described below based on crown position.

Dominant: A large tree in the main forest canopy whose tree crown can receive abundant sunlight from the top and sides. A Dominant tree has a large dbh and tree crown size and is among the tallest and largest trees in the forest canopy.

Codominant: A tree in the main forest canopy whose tree crown can receive abundant sunlight, predominantly from the top of its crown. A Codominant tree is a “typical” tree growing in the main forest canopy.

Intermediate: A tree whose crown is growing near the bottom of the main forest canopy and receives very little sunlight, only at the top of its crown. An Intermediate tree has a smaller dbh and crown and is shorter than Dominant and Codominant trees.

Overtopped: A tree whose crown is growing entirely below the main forest canopy and receives no direct sunlight. An overtopped tree has a smaller dbh and crown size and is shorter than other crown classes.

Results... On average across 2020 and 2021, we collected 8.9 gallons of sap per tap from sugar maple and 5.7 gallons per tap from red maple. The maximum sap volume collected per tap was approximately 30 gallons for both species. Average sap sugar content for red maple was 1.4 °Brix across both years, ranging from 0.8 to 2.4 °Brix. Sugar content for sugar maple averaged 1.8 °Brix across both years and ranged from 0.7 to 4.2 °Brix. Both sugar content and sap volume yield were significantly higher for sugar maple than red maple.

Sap volume and sugar content were significantly different not only between tree species but also between crown classes. Dominant and Codominant trees produced the largest sap volumes, averaging 10.6 and 9.4 gallons per tap respectively across both maple species (Figure 2). Intermediate trees produced significantly lower volumes at an average of 5.2 gallons, and Overtopped trees yielded the lowest volumes at 3.8 gallons. Similarly, the sap from Dominant and Codominant trees had higher sugar contents, with an average of 1.8 °Brix across both species, while sap from Intermediate and Overtopped trees was significantly lower at 1.5–1.6 °Brix.

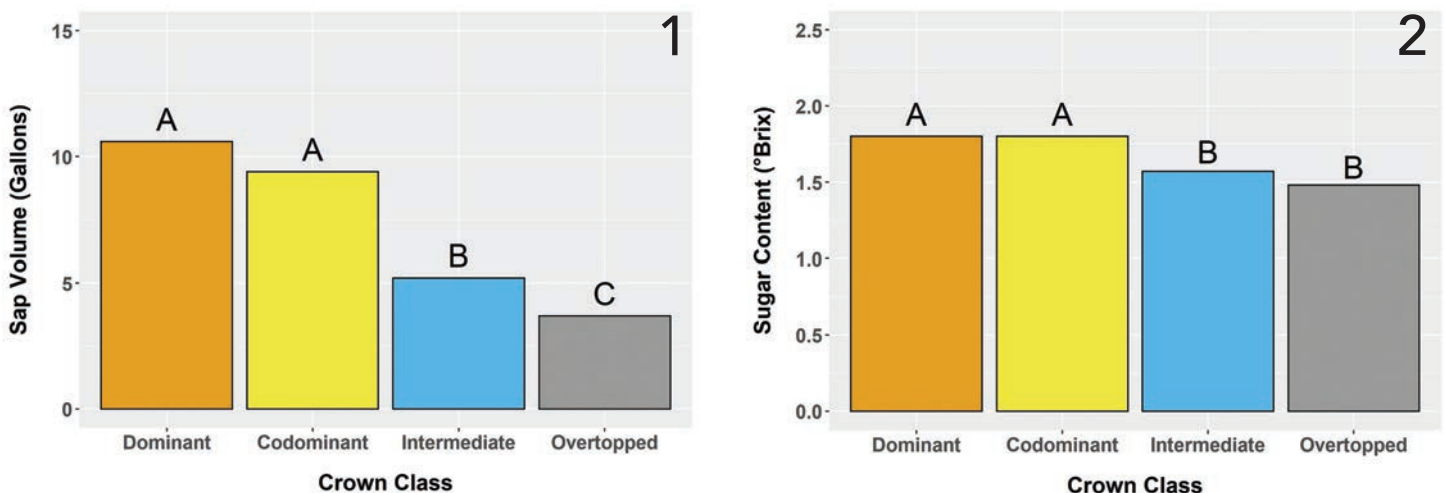


Figure 2. Comparison of average red and sugar maple 1) sap volume and 2) sugar content among tree crown classes. Letters on the graphs represent significant differences between crown classes.

Individual-tree sap production characteristics in Kentucky are much different than in the northern United States and Canada. The results of this study provide current and aspiring syrup producers with Kentucky-specific estimates of expected sap volume and sugar content per tap and a new tool in crown class with which to evaluate potential new sugarbush trees. To maximize productivity, producers should tap the largest available maples, as trees in taller crown classes displayed higher sap volume and sugar content.

About the Authors: **Zachary J. Hackworth** is a Research Forester in the UK Department of Forestry and Natural Resources with a research focus on silviculture and forest management. He holds a M.S. in Forest and Natural Resource Sciences.

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Want to learn more about Kentucky's forests and wildlife?

Check out these UK Forestry Resources:



For Kentucky forestry and wildlife publications and resources visit our website.

www.UKForestry.org



Watch nearly 300 Kentucky videos on forestry and wildlife by visiting our YouTube channel.

<https://www.youtube.com/c/UKForestryandNaturalResourcesExtension>



To stay up-to-date on the latest Kentucky forestry and wildlife news and updates by liking us!

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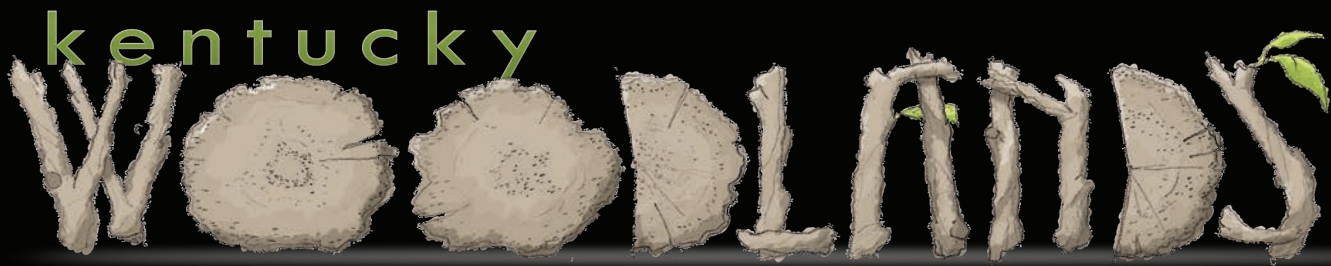
To enroll, please contact the Center for Forest & Wood Certification (CFWC) or the Kentucky SFI Implementation Committee for assistance in developing a plan to become certified.

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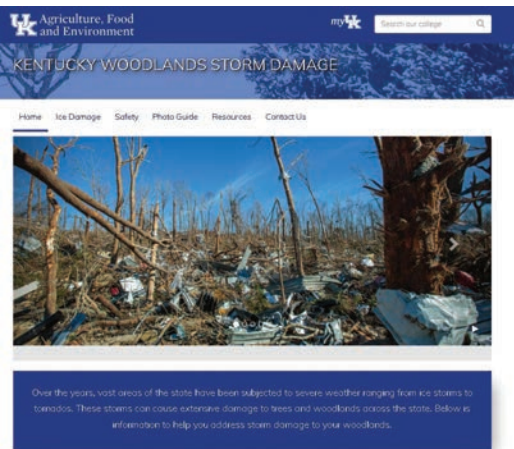


Storm Damaged Woodland Resources

Weather events such as tornadoes and ice storms are major weather events that can have significant impacts on Kentucky woodlands and their owners. Following storms it is important to take extreme caution when entering any wooded areas with storm-related hazards such as downed power lines and trees, storm debris, and widow-makers (loose branches and hung-up stems high in the canopy). To help woodland owners and natural resource professionals safely deal with storm damaged woodlands the UK Forestry and Natural Resources Extension team has developed a woodland storm damage website

located at <http://kytimberdamage.ca.uky.edu>. The site has links to publications on safety in the woods, timber salvage decisions, and managing your woodlands following severe storm damage. We will continue to develop materials related to our response to storm damaged woodlands in Kentucky and post them to that site. The Kentucky Woodland Owners Association also has also compiled content on tornado support resources located at <https://www.kwoa.net/tornado-support-resources.html>.

For additional questions about woodland damage, please reach out to our silviculture specialist, Dr. Jacob Muller at Jacob.Muller@uky.edu



Welcome to Jon Shultz— Kentucky's New Natural Resources Conservation Service State Forester

Jon is from Ferndale, California, and was raised on the family cattle ranch in the heart of the Redwood Region. He attended college at Humboldt State University studying Forestry and Rangeland Management and started his career with the local resource conservation district before transitioning to the Natural Resources Conservation Service. After 12 years with NRCS in California he took the opportunity to come to Kentucky as the NRCS State Forester. Because Kentucky is a largely forested and privately owned state, he intends to work with the talented NRCS staff and the private landowners they serve, as well as invaluable partners, on forestland conservation issues. His immediate goal is to expand the scale and scope of forestland conservation, all the while keeping sound planning in the forefront of everything NRCS does. You can reach Jon at 859.224.7370 or Jon.Shultz@usda.gov.



Upcoming Dates To Remember:

Dates:	Event:	Location:	Contact:
July 12, 2022	Adaptation Planning and Practices for Kentucky Forests: Preparing for Climate Change Virtual Event	Zoom meeting via the Web	www.Forestadaptation.org/KY-APP
July-August 2022	Kentucky Woodland Owners Short Course	Zoom meeting via the Web & Pennyryle State Forest, and Berea College Forest	https://wosc.ca.uky.edu/
July - December 2022	From the Woods Today (each Wednesday)	Zoom meeting via the Web	FromtheWoodsToday.com
October 4, 2022	KY Tree Farmer of the Year Field Day	Lewis County	859.257.7597
November 5, 2022	Kentucky Maple School	Breathitt County	https://ky-maplesyrup.ca.uky.edu/ky-maple-school

NEWS TO USE

2022 Kentucky Woodland Owners Short Course

Do you want to learn how you can make your woodland healthier and more productive? Are you interested in attracting more wildlife to your property? Are you considering selling

Kentucky Woodland Owners Short Course



your timber? The 2022 Kentucky Woodland Owners Short Course (WOSC) can help you achieve your goals for your woodland! The live on-line sessions feature forestry and

wildlife experts and the in-person field tours provide an opportunity to see practices while also connecting you with organizations and agencies who can assist in caring for your woodland. Registered 2022 WOSC attendees will have access to all online sessions (live and recordings) and an optional choice of one field tour at either Pennyriple State Forest or Berea College Forest—

the Pennyriple tour will be a guided self-driving tour with fairly short walking distances at each location while the Berea tour will be a walking tour covering approximately 2.5+ miles over the course of the day. The on-line sessions are on July 19, 21, 26, and 28; the Pennyriple State Forest woodland and wildlife tour takes place on August 6 and the Berea College Forest tour is on August 13. For more information and to register for the 2022 WOSC please visit <https://wosc.ca.uky.edu/2022WOSC>.

Give Your Woodland Knowledge A Boost
KENTUCKY WOODLAND OWNERS SHORT COURSE WEBINARS AND TOURS

- JULY 19: Woodland Management Activities & Tree ID (7 PM - 8:30 PM ET)
- JULY 21: Forest Health
- JULY 26: Wildlife Management
- JULY 28: Woodland Management in a Changing Climate

Watch all 4 webinars and attend 1 Woodland and Wildlife Tour

AUGUST 6: Pennyriple State Forest (Self-driving tour with several stops and short walks during the day)

OR

AUGUST 13: Berea College Forest (Walking tour of well-managed forest (about 2.5+ miles))

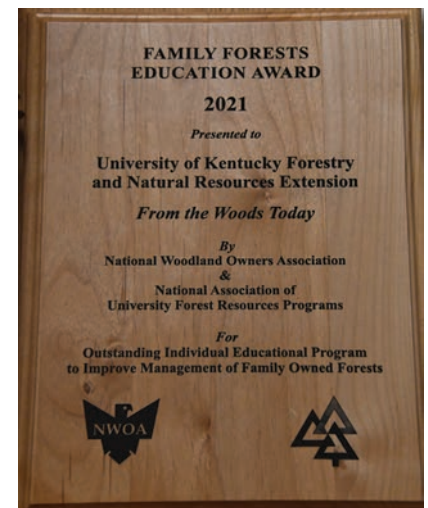
9:30 AM - 3 PM

Register at <https://wosc.ca.uky.edu/>

University of Kentucky Forestry and Natural Resources Extension

From the Woods Today Wins National Award

Each Wednesday at 11 AM Eastern Time the UK Forestry and Natural Resources Extension team offers an online program called "From the Woods Today". This program recently won the national Family Forests Education Project Award which was focused on educational programming responses to the COVID pandemic. The award is co-sponsored by the National Woodland Owners Association and the National Association of University Forest Resources Programs. The weekly program offers relevant and timely information about woodlands, wildlife and various related topics impacting Kentucky's woodlands, their owners, and those who depend on them. The show can be accessed via the social conferencing platform Zoom and on Facebook Live with recordings posted on YouTube. Reneé Williams and Billy Thomas, information specialist and extension forester, respectively, welcome UK specialists and partner organizations to share their vast knowledge of Kentucky's forests and the wildlife that calls them home. Make sure to tune in to From the Woods Today by visiting <http://www.FromTheWoodsToday.com>.



Kentucky House Joint Resolution 41 Passes!!!



The 2022 Kentucky legislative session may end up being a BIG one for Kentucky woodland owners. Initially conceived by Dr. Jim Corum, Kentucky Woodland Owners Association Director at Large, House Joint Resolution 41 was 20+ years in the making. The resolution directs the Department of Revenue and the University of Kentucky's Department of Forestry and Natural Resources to recommend equitable property tax assessment procedures for well-managed forests. The resolution was introduced to the legislature by Representative Adam Bowling, District 87 (Bell and Harlan counties).



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Kentucky Woodland Owners Short Course

A stylized illustration of a tree with a brown trunk and a green, rounded canopy.

The WOSC provides those with an interest in woodlands and wildlife a series of educational programs focused on practices that can make Kentucky woodlands healthier and more productive. Register for online and in-person sessions at <https://wosc.ca.uky.edu/register>