

A photograph of a forest floor with green plants and trees in the background. The text is overlaid on the image.

Kentucky

Volume 12 Issue 1

Woodlands

Magazine

White Oak Initiative

Timber Harvesting Do's and Don'ts

Woodland and Wildlife Management Plans

Kentucky Woodlands

Volume 12 Issue 1 Magazine

Winter 2018

Promoting stewardship and sustainable management of Kentucky's family private forests.

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Editors's Note: We are also pursuing the use of SFI paper produced on SFI certified and American Tree Farm System certified land.

From the Editors of the Kentucky Woodlands Magazine:

Everyone seems to love bourbon these days, either to drink or talk about. Bourbon is made from water, grain, and wood. Bourbon without the wooden barrel, exclusively made of white oak, is just moonshine! Because of the increase in bourbon production there is also an increase in white oak use. Concerned industry, university, and other organizations formed the White Oak Initiative which is highlighted in this issue. The other articles in this issue address a variety of topics. They were selected to provide updates on continued forestry issues impacting landowners in Kentucky and new ones that are developing. There are two forest health articles, one concerning the Emerald Ash Borer as it continues to move across the state and an update on the Hemlock Woolly Adelgid infestation and program. We also have two good "how-to" articles in our Forestry 101 and Wildlife 101 departments outlining management planning critical to help you fully enjoy your woodlands. One topic that many are interested in, at some point or the other, is how to conduct a timber harvest. The article "Timber Harvesting Do's and Don'ts" simplifies the answer to this question. The magazine also maintains avenues for partners to provide organizational information such as the Kentucky Tree Farm Committee and the Kentucky Woodland Owners Association. We hope you enjoy this issue, and like always we appreciate your feedback.


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About the Cover:

The cover image, taken by Jeff Stringer, shows a bed of white and chestnut oak seedlings in Casey County resulting from a mid-story release. A mid-story release is a forestry practice designed to encourage oak development which is especially important given the difficulty in regenerating oak trees on higher quality sites.



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Photo courtesy: Carol Spence

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White Oak Initiative

by Jeff Stringer

White oak is a dominant species across the central, northern, and Appalachian hardwood regions from the mid-south to the Midwest (Figure 1). It is important ecologically and economically. Sustaining significant white oak resources is critical to the long-term survival and

growth of important economic sectors, including the forest products and distilling industries responsible for generating billions of dollars to local economies throughout the white oak region.

Currently, white oak growing stocks are sufficient to meet demand. However, research and long-term growth and drain projections indicate problems

in regenerating white oak and maintaining high-quality white oak growing stocks. Current forest data from the white oak region (Figure 2) shows a significant reduction in smaller-sized oak that indicates a shortage of large high-quality white oak in

the future. This means there is a sustainability problem looming for industries and wildlife species that are benefited by white oak.

Historical land-use practices including repeated wildfires are credited with creating conditions that made

it easy for oaks to regenerate. However, the reduction of these practices and lack of current management coupled with exploitive timber harvesting practices have resulted in decreasing natural regeneration success of white oak on moderate and good quality sites. Fortunately, researchers are discovering methods to manage the species for successful regeneration. The majority of white oak is growing on family forests (private non-industrial forests). It is to their advantage and necessary for maintaining the dominance of the species, if they, along with all private and public ownerships, employ research-based management to reverse negative trends in regeneration and loss of declining growing stocks (Figure 3). Given the long growth period, we need to work on white oak sustainability now to prevent a future crisis.

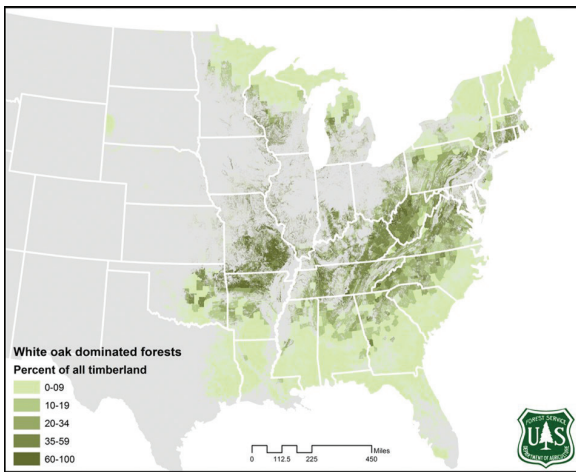


Figure 1. Dark areas indicate the white oak sourcing region.

USDA Forest Service, Southern Research Station Forest Inventory and Analysis Program. 2018. Unpublished data. Knoxville, TN: U.S. Department of Agriculture, Forest Service, Northern Research Station

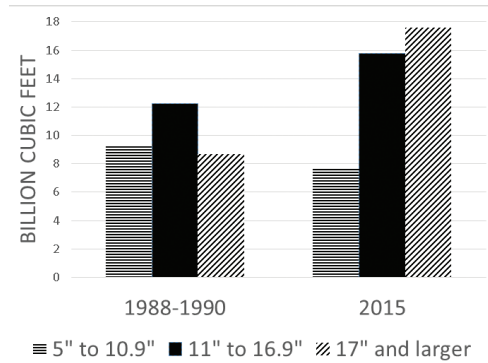


Figure 2. Size class data from Luppold 2017 USFS.

Figure 3. Understory of 3 to 4 foot tall native oak seedlings resulting from researched based management on the Taylor Farm in Kentucky.

Photo courtesy: Jeff Stringer



White Oak Initiative

The importance of white oak to the industries that are dependent on it and the ecosystem values it provides warrants a strategic and holistic approach to its sustainability, including monitoring, research, sustainable management and harvesting, and education. This must occur across state boundaries throughout the heart of the white oak region. The White Oak Initiative is a partnership comprised of industry, agency, university, and non-profits to bring together those dependent or invested in the economic, social, and/or environmental benefits of white oak. The Initiative is designed to actively develop and facilitate the implementation of practices specifically designed to conserve and sustainably manage white oak-dominated forests. The Initiative has a region-wide steering committee representing both industrial and non-industrial interests that will work to facilitate and coordinate white oak work.

While the White Oak Initiative is still in its infancy and membership is still evolving, several notable white oak projects have already been initiated. This includes research collaboration among several universities in the region and U.S. Forest Service researchers that are meeting to build research projects tackling various aspects of white oak sustainability. There are also two large coordinated projects involving 17 state forestry agencies in the region, facilitated by the University of Kentucky Department of Forestry and Natural Resources and the Kentucky Division of Forestry for the southern states, and the American Forest Foundation for northern states. The White Oak Initiative will help to facilitate these ventures as well as help find additional resources, educate elected officials, and promote research and technology transfer to sustain white oak. The Initiative also is aligned with the Kentucky Spirits Research Institute being developed at the University of Kentucky that has a direct concern with white oak wood availability. Both of these will collaborate to further research into the sustainability of the species.

White Oak Initiative Membership

The White Oak Initiative Steering Committee is meeting to develop the internal structure of the organization. Commitments have been made and funding procured for a director. Steering committee members have formed nine subcommittees to help move the Initiative forward. The membership committee has drafted entry principles and will be sending out information on how to join the Initiative to all those who have indicated an interest in the Initiative over the last two years as well as to aligned industries, agencies, organizations, and individuals. A web presence is being developed and when launched will provide updates on white oak projects, activities of the Initiative, and an entry portal for those interested in membership. Stay tuned for further information on the White Oak Initiative. If you have an interest in joining, please send your name, mailing address, email address, and if you are comfortable, your phone number, to the Forestry Extension office of the University of Kentucky at forestry.extension@uky.edu.

About the Author:

Jeff Stringer, Ph.D., is the chair of the University of Kentucky Department of Forestry and Natural Resources. He is also responsible for continuing education and research in hardwood silviculture and forest operations and serves as an editor of the *Kentucky Woodlands Magazine*.

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Early timber harvesting in Kentucky and throughout Appalachia utilized crosscut saws, axes, and large logging crews to extract the timber the best way they knew. Today, the forestry profession has a much better understanding of how timber harvesting operations can be used as a woodland management tool. Unfortunately, few woodland owners work with a professional forester to plan and conduct timber harvests on their woodlands.

Timber Harvests: Do's and Don'ts

by Billy Thomas

Few woodland management practices receive as much attention, positive and negative, as timber harvesting. This should not be surprising given the amount of change that occurs quickly during a timber harvest. Understanding a few timber-harvesting basics can help in making good decisions about your woodlands and harvesting. This article provides basic information on timber harvests, who can provide assistance, how to use a harvest to improve your woodlands, and a short list of do's and don'ts.

Are we running out of trees?

The sight of log trucks on the road or a recently harvested woodland may trigger some to question if we are overharvesting. Overall, the answer is no. We are not harvesting more wood than we are growing. Most of the woodlands in Kentucky have experienced timber harvesting at some point and many have been harvested multiple times, yet the relative area of woodlands in Kentucky has increased over 3 percent in the last 70 years. A quick review of the latest Kentucky forest inventory data collected by the U.S. Forest Service and

the Kentucky Division of Forestry (see Table 1) shows that after factoring in mortality and all forms of removal Kentucky is growing more than twice the sawlog volume that is removed.

However, a closer look at the data shows that higher quality trees are much more likely to be harvested than lower quality trees. Taking the very best and leaving the rest is called 'high-grading' and can lower long-term timber value. The data also show there are differences with respect to the species that are being harvested. While Kentucky has more than 100 native tree species, only about 50 have commercial timber value; of those with commercial timber value, a relatively few species account for the majority of harvested volume. Of the 821 million board feet harvested in 2015, more than 50 percent of the volume came from

Table 1. Average growth and removals of sawlog volume in Kentucky in board feet (Intl. ¼). Source: USDA Forest Service, Forest Inventory and Analysis Program.

Annual Timber Growth	Timber Volume (Board Feet – Intl. ¼)	Annual Timber Removals	Timber Volume (Board Feet – Intl. ¼)
Average annual gross growth	2,912,420,262	Average annual harvest removals	821,362,993
Annual mortality	692,751,994	Average annual other removals	119,635,424
Average Annual Growth TOTAL	2,219,668,317	Average Annual Removals TOTAL	940,998,416

oaks with white oak accounting for 16 percent of the total volume harvested in Kentucky. White oak is currently an abundant tree with many wildlife attributes but strong market demand and the increasing difficulty in regenerating it, especially on better quality sites creates some concern for it in the long-term.

Individual Roles in a Timber Harvest

Understanding the role of each individual involved in a harvest allows woodland owners to make sure they have their interests covered and increases the likelihood of a successful timber harvest.

- **Woodland owners** are in charge of the property and have the final say in which trees are harvested. As appropriate, woodland owners should try to involve **family members and heirs** in timber harvest planning especially those likely to care for the woods in the future. Woodland owners need to ensure loggers and everyone else involved knows the boundaries, areas that need special protection and any other provisions that are important such as the use of roads, and fence and field maintenance as examples. Owners should also inform their **neighbors** that a timber harvest is planned—it is much better to resolve boundary issues before a timber harvest! At a minimum, follow the specifications in our timber trespass law, that indicates that all neighbors bordering the harvest receive a written notice via certified mail, restricted delivery, and return receipt requested at least 7 days in advance of the harvest (see http://forestry.ca.uky.edu/sites/forestry.ca.uky.edu/files/for109_0.pdf for more information).
- **Professional foresters** (ex. service foresters, industry foresters, consulting foresters) should be involved in timber harvesting planning. Their knowledge and training on how trees and woodlands grow and respond to harvesting is critical to ensure the future forest gets well established and the timber harvest meets your woodland management objectives. **Service foresters** (<http://forestry.ky.gov/regionaloffices/Pages/default.aspx>) with the Kentucky Division of Forestry can offer management assistance for no fee as well as mark the trees to be harvested for a small fee. **Industry foresters** are typically employees of a sawmill who can purchase the timber and plan the harvest. Private **consulting foresters** (<http://www.kacf.org/>) can also offer management assistance, walk woodland owners through the timber sale process, establish a timber basis for tax purposes, and represent the woodland owner's interests during the harvest for a fee or commission.
- **Loggers** play the critical, and dangerous, role of harvesting and transporting a woodland owner's logs to the sawmill. The role of the logger is to extract wood as efficiently as possible. The exact trees that loggers remove are based on what the landowner wants, market conditions, and adherence to the state mandated best management practices to protect water quality. A Kentucky Master Logger (www.masterlogger.org) is required to be on-site and in charge of all commercial timber harvests. A good logger also will safeguard residual trees as much as possible. Some loggers in Kentucky have gone above and beyond the minimum training requirements to become certified master loggers (www2.ca.uky.edu/cmlp/).
- **Timber buyers** may be a logger, a sawmill, or an independent timber buyer. Timber buyers are a party on the written contract, along with the woodland owner, and they establish the selling price of the timber once their offer or bid is accepted. Landowners are paid for their timber based on the agreed upon terms in the

written contract and should make sure the contract covers all areas of concern. Examples of timber sale contracts can be found at <https://mylandplan.org/content/sample-timber-sale-contract> and <https://tinyurl.com/p3snkel>.

- **Attorneys and tax preparers** should be involved in developing and/or reviewing your written contract. They can also help to ensure your rights are enforced and that any taxes due on the income from the timber sale are handled appropriately. For the latest information on timber taxes visit the National Timber Tax website at <https://timbertax.org>.

Timber Harvesting as a Woodland Management Tool

Timber harvests that are poorly planned and conducted are likely to yield unsatisfactory results. It is important to recognize that a timber harvest can be a useful woodland management tool to help you meet your management objectives. Below are five examples of how properly planned and conducted timber harvests can help woodland owners achieve their objectives for their woodland.

1. **Create the future woodland.** A timber harvest can set the stage for which trees are likely to dominate in the future woodland. Incorporating the knowledge of which trees are likely to respond to different types of harvests allows professional foresters to mark harvests that meet both long-term objectives and are economically feasible.
2. **Build woodland roads, trails, and firebreaks.** The equipment used in most timber harvesting operations can also be used to develop woodland roads, trails, and firebreaks. The ability to access your woodland property is critical to managing and enjoying it.
3. **Improve wildlife habitat.** Many woodland owners enjoy having wildlife on their property but may not realize that timber harvests can be beneficial to some wildlife species such as ruffed grouse and other species requiring young woodlands. A timber harvest can be a great way to create habitat and browse for wildlife - especially in areas that are dominated by woodlands.
4. **Removing sick or damaged trees.** Properly planned and conducted timber salvage operations following a disaster such as the emerald ash borer's attack on ash trees can allow woodland owners to

clean up their woodlands of dying trees and recoup a portion of the loss.

- 5. **Paying for other woodland conservation practices.** Investing a small portion of the proceeds from a timber harvest to pay for the implementation of other woodland management practices such as invasive species control allows woodland owners to forego having to pay out of pocket for those expenses.



Modern logging equipment and techniques make timber harvesting safer and more efficient. Working with a professional forester can help woodland owners increase woodland management benefits from their timber harvesting operations.

Timber Harvesting Do's and Don'ts

The following do's and don'ts are no substitute for individualized professional assistance, but they can increase your likelihood of having a satisfactory timber harvest experience that also meets your management objectives. It takes a while to grow our hardwood trees until they are economically ready to harvest, so you want to make sure you go in well informed and use the timber harvest as a management tool to get the future woodland started in the right direction.

Timber Harvesting Do's

- 1. **Do find and work with professional assistance.** Work with professionals to ensure that the timber harvest advances your management objectives. Review the individual timber harvesting roles section in this article to identify the professional assistance available to help you navigate the timber sale process.
- 2. **Do use timber harvesting as a management tool.** Planning a timber harvest as far in the future as possible allows planning and actions to ensure the woodland is ready to be harvested.
- 3. **Do utilize a written contract.** The contract can protect the woodland owner, buyer, and logger and keep everyone on the same page.
- 4. **Do monitor your woodland during and following the timber harvest.** Make sure the woodland is growing and progressing as it should following the harvest—guard against invasive plants and control them when spotted.



Photo courtesy: Renee' Williams

A timber harvest can be a useful management tool if it is conducted properly.

- 5. **Do treat your woodlands as the valuable resource they are.** Properly managed woodlands can be more productive and healthy. Too often, woodlands are forgotten until a crisis arises.

Timber Harvesting Don'ts

- 1. **Don't conduct a timber sale without a written woodland management plan.** A written woodland management plan prepared by a professional forester can help to make sure you know which trees you are selling, why you are selling them, and how the harvest can meet your management objectives.
- 2. **Don't (necessarily) take the first offer or rush into a timber harvest.** You would not sell your house without having some idea of what it is worth; why should your timber, which takes longer to grow than it takes to pay off a mortgage, be any different? How will harvesting advance your management objectives?
- 3. **Don't rely on verbal agreements to sell your timber.** Verbal agreements can lead to misunderstandings and unintended consequences.
- 4. **Don't conduct a timber harvest that degrades your woodlands.** Selective timber harvests just means that not all the trees are cut. Avoid timber harvests based only on a minimum diameter as well as those that just harvest the highest quality trees.
- 5. **Don't navigate the timber sale process uninformed.** It takes a long time to grow trees so when you decide to harvest utilize the professional assistance available before the first tree is harvested.

About the Author:

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FORESTRY 101



Woodland Management Plans

by Laurie Taylor Thomas

Kentucky has more than 12 million acres of woodlands with about 8 million acres considered family owned. The decisions these landowners make or don't make regarding their woodlands can have long-term environmental and economic effects, not only on their property, but on Kentucky as well. Fortunately, woodland owners are not alone in figuring out what they can or need to do with their woodlands and how to do it. There are public and private professional foresters across the state ready to assist woodland owners develop woodland management plans that can serve as a roadmap to producing healthy and productive woodlands that meet the landowners' objectives. This article discusses the common elements of a woodland management plan, the types and intensity of plans, and provides an overview of the professional forestry assistance available to Kentucky woodland owners.

Developing Objectives and Goals for your Woodland

By thoughtfully developing objectives and goals for your woodland you ensure you are investing your time and energy wisely and can better communicate with the professional foresters providing assistance. Well-defined objectives and goals can also help you avoid unwanted changes to your property. The national Forest*Assessment self-assessment guide (<https://www.forestasyst.org>, highlighted in Kentucky Woodlands Magazine Volume 8, Issue 1) suggests woodland owners think through and develop their objectives and goals by answering the following questions:

1. Do you wish to hunt or observe wildlife in your woodland?
2. Do you want your woodland to produce income?
3. Will you or others use the woodland for recreation?
4. Is the beauty of your woodland important to you?

Woodland Management Plan Elements

While no two woodland management plans are the same, several elements are common to most plans. Common woodland plan elements include: landowners' objectives or goals; property information such as location, maps, and/or aerial photos; woodland inventory data and descriptions; and specific woodland management prescriptions designed to meet the landowners' objectives or goals for their woodland. Other elements may be included depending on landowner interests and the type of woodland management plan.

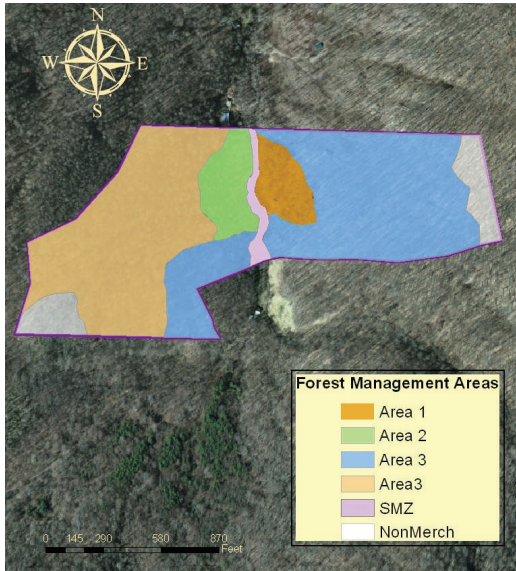
Landowner Objectives for the Woodland

When developing their objectives and goals for their property, the landowners should consider why they own their land and what their hopes and dreams are for the property; they should think comprehensively and long-term but recognize that objectives or goals may change as conditions in their woodlands and life change. The goals should be specific for current and future use of the property, because this will help determine the actions to be taken and avoided. Often landowners tell foresters, "I want to do what is right for the land and make a little money." Foresters use the landowner's objectives to make the management plan, so without specific objectives the forester can only make decisions based on their ideas of "what is good for the land," which might not support the landowner's objectives. The objectives and goals provide the essence of what the landowner cares about and what they want for and from the property. All woodland management plans are based primarily on the objectives and goals of the woodland owner. While the forester will be creating the plan, the woodland owner should take an active role in creating the plan by clearly defining their objectives; they should think of themselves as a co-creator of the woodland management plan.

Property Information and Maps

Property maps can provide a tremendous amount of information that is useful for the forester as well as landowners who want to enjoy their property. Maps developed by foresters typically include: stands or management units that share common features, woodland roads or trails, and other impor-

tant resource areas such as water bodies or other high-value areas. In order to create these maps, foresters will need to know the property boundaries. For information on marking woodland boundaries refer to Kentucky Woodlands Magazine Volume 11 Issue 1. The maps may be based off topographic maps or aerial photographs. Woodland owners may also want to check out their property by using several online mapping tools such as Google Earth (<http://earth.google.com>) or the United States Department of Agriculture Natural Resources Conservation Services (USDA



Woodland management plan maps often detail property boundaries, roads, trails, and stands or management units such as those depicted by the shaded areas in the map above.

NRCS) Web Soil Survey (<http://websoilsurvey.nrcs.usda.gov>), which contains a wealth of information beyond soils.

Woodland Inventory Data and Descriptions

The woodland inventory is a crucial part of the management plan that the forester will complete for the landowner. By conducting a resource assessment of the property, the forester will be able to provide detailed information about species composition and density in each of the stands or management units, identify potential concerns, such as invasive species, as well as provide timber volume and other planning data needed for timber harvests. The intensity of the inventory will be based on the type of woodland management plan and the interests of the woodland owner. For example, woodland owners interested in participating in carbon offset programs such as the Kentucky Nature Conservancy's Working Woodlands program (<https://tinyurl.com/y8gg94ug>) will require a more intensive woodland inventory to accurately record carbon sequestration.

Woodland Management Prescriptions

This section of the management plan is where the forester matches the woodland owner's objectives and goals with the woodland resources of the property. The prescription of activities can include: woodland health management activities such as controlling invasive species; practices

to encourage the growth of certain trees, such as crop tree release; or how timber harvesting should be implemented to ensure proper tree regeneration as well as post-harvest activities. This section of the woodland management plan also typically includes a schedule of the management activities along with site specific details of how to implement the prescriptions.



Example of forest stand improvement practice prescription: mid-story trees are marked for removal to increase sunlight levels near the forest floor to enhance the regeneration of desired tree species.

Photo courtesy: Jeff Stringer

Types of Woodland Management Plans

There are numerous types of woodland management plans that can vary in length from a few to many pages. The woodland plans will cover the management plan elements discussed previously to varying degrees based on the interests and needs of the owner. Woodland owners should make sure the plan they receive will fit their needs. For example, if the owner is interested in accessing financial assistance programs they should get either a Kentucky Forest Stewardship Plan (FSP) or a Conservation Activity Plan for Forest Management (CAP-FM) as they are required to participate in most USDA NRCS programs. Financial assistance programs help woodland owners offset the costs to implement forestry and conservation-related practices (for more information <http://www/nrcs.usda.gov/programs/> or contact a local NRCS office). Ultimately, the type of plan the landowner chooses will be based on their individual situation. The following is an overview of the most common types of woodland management plans developed in Kentucky.

Kentucky Forest Stewardship Plan

The Kentucky Forest Stewardship Plan (FSP) is offered through the Kentucky Division of Forestry (KDF). This plan utilizes a standard template developed by the U.S. Forest Service Forest Stewardship Program (<https://www.fs.fed.us/managing-land/forest-stewardship/program>) to meet all the federal requirements of the national forest stewardship program. The FSP has a 10-acre minimum requirement and, in addition to the common plan elements mentioned above, it includes the following: a description of the desired woodland condition; suggested monitoring activities to be done by the forester or landowner; it must be reviewed and renewed, revised, or rewritten at the end of the specified management period or sooner, as needed, to be considered current. A KDF forester will visit the property and landowner to discuss stewardship opportunities for no fee.

Conservation Activity Plan for Forest Management

The USDA NRCS has also developed a forest management

plan template called the “Conservation Activity Plan – Forest Management” (CAP-FM) that is similar in many ways to the Kentucky Forest Stewardship Plan. CAP-FMs are forest management plans that are site-specific and address one or more resource concerns on land where forestry-related conservation activities or practices will be planned and applied. Financial assistance through NRCS may be available to help cover the cost of developing a plan which can range from approximately \$1,350 to \$6,400 depending on the size of your woodland.

Kentucky Woodland Management Plan

For landowners with less than 10 acres or those not needing a more detailed plan there is an alternative that is less comprehensive than the FSP or CAP-FM. These plans contain the same common elements mentioned above but in a shortened version. Its important to note, these plans do not meet the requirements for financial assistance through NRCS. The KDF can develop these woodland management plans for no fee, but they can also readily be developed by private consulting foresters for a fee.

Kentucky Woodland Practice Plan

A Kentucky woodland practice plan is a detailed, written prescription used to lay out specific, on-the-ground forestry practices. These practice plans typically focus on a single practice such as tree planting, invasive species removal, or site preparation for regeneration, but could also include multiple practices. These practice plans are developed by the KDF and can be used with existing FSPs and CAP-FMs or not. In addition to a detailed description of the prescription, these woodland practice plans may include a map of where the work is to be accomplished.

Woodland Management Assistance

Woodland owners are strongly encouraged to work with professional foresters in the development of their management plans regardless of the type of plan they choose. Professional foresters work directly with the woodland owner to create a management plan that meets the landowner’s goals and objectives and is appropriate for the property. Below are the various groups of foresters available to work with Kentucky woodland owners.

Kentucky Division of Forestry

In addition to forest health protection, wildland fire management, master logger training, tree seedling nurseries, urban forestry assistance, and forestry education, the KDF employs service foresters to work one-on-one with woodland owners in the development of an appropriate management plan. Visit <http://forestry.ky.gov> or call (502) 564-4496 to connect with a KDF service forester in your area.



Photo courtesy: Billy Thomas

Professional forestry assistance for Kentucky woodland owners is available through the Kentucky Division of Forestry as well as private consulting foresters.

Kentucky Association of Consulting Foresters

The Kentucky Chapter of the Association of Consulting Foresters of America is the organization that represents the professional consulting foresters in Kentucky. In addition to assisting woodland owners with timber sales, timber appraisals, and timber trespass issues, consulting foresters can develop woodland management plans for woodland owners. Visit www.kacf.org to locate a consulting forester.

Kentucky Technical Service Providers

The USDA NRCS certifies Technical Service Providers, which are professional foresters interested in working with NRCS programs, to develop CAP-FMs for woodland owners in Kentucky. The cost of these plans may be covered with NRCS financial assistance. To receive a CAP-FM, visit your local NRCS office (<https://www.nrcs.usda.gov/wps/portal/nrcs/main/ky/contact/local/>) and let them know you would like to sign up to have a forest management plan developed for your property. Visit <https://techreg.sc.egov.usda.gov/CustLocateTSP.aspx> to find TSPs certified to develop CAP-FMs.

A woodland management plan is an important tool in producing healthy and productive woodlands. By working with one of the state’s many public or private foresters, Kentucky woodland owners can make wise, informed decisions regarding the care and management of their property. And this in-turn can create positive, long-term environmental and economic benefits.

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Wildlife 101

The Value of a Wildlife Management Plan

by Matthew Springer

Whether you would like to include wildlife in a woodland management plan that focuses on timber production or develop a plan that only focuses on wildlife, a healthy ecosystem is always the goal. There are practices, such as invasive species removal, that work for all objectives and can be a solid way to start a woodland or wildlife management plan. The two plans can take different tracks depending on your objectives for your property. Several wildlife management strategies that benefit specific or numerous wildlife species would not be found within a woodland management plan for many reasons, the most obvious is managing your property that is not wooded. In many cases the non-wooded areas can be more important for some wildlife species. Some are less obvious, as they may be a small addition to an area of your property, such as building a 30 square foot vernal pool designed to hold a little water after rain storms in your woodland. This type of habitat has nothing to do with managing your trees for timber, but can be included to help many wildlife species that live within your woodland.

How are wildlife and woodland management plans similar?

The simplest way to put it, and the most important thing to keep in mind, is that good hardwood management is good wildlife management. A large, healthy, diverse woodland will produce adequate food and cover for any of its native wildlife species. The key word here is “diverse.” A healthy woodland for wildlife should have a diverse age structure and a diverse number set of tree species. The age structure is more difficult to work into smaller properties as more area is required to establish all the different ages of woodland stands in sizes that are meaningful to wildlife. We will discuss this in a little more detail in the next few sections.

More importantly, how are wildlife and woodland management plans different?

One of the big ways a wildlife management plan differs from a woodland management plan is that it can incorporate more habitat types outside of woodlands. Wildlife-friendly habitat practices that are not woodland management practices may occur within the woodland, next to a woodland, or completely unrelated to a woodland in the middle of a grass field. Other ways a wildlife management

plan can differ include practices that may not always be advantageous for creating the most timber down the road, for example refer to hinge cutting below or think of the creation of snags (standing dead trees). Some strategies commonly used for wildlife will be covered in the next section. Keep in mind that one or all of these strategies may be used on a property, depending on the size and composition of the property along with the goals of the landowner.

Increase the amount of early successional habitat

There is one phrase that wildlife managers in hardwood woodlands say frequently when talking about timber harvests and wildlife, “Cut it hard!” In many cases, har-



Early successional forest habitat surrounded by older forest created by a small group opening.

vests often remove scattered trees, and lack areas where the woodland is allowed to regenerate. The lack of young woodlands, 15 years old or less, is a limiting factor for many wildlife species and throughout most of the hardwood region there is a limited number of young regenerating stands. The easiest way to produce this habitat is to make sure that large openings are created in the woodland when a harvest occurs. Young woodlands are pivotal habitat to species such as ruffed grouse, but also provide

Photo courtesy: Brian Lockhart, USDA Forest Service, Bugwood.org

benefits to other species, for example migrating songbirds, deer, elk, and turkeys, just to name a few. Ideally you want to put one large (10+ acres) or several small (1-5 acre) openings on the property to maximize the benefit. For many wildlife species, we need to approach this on a larger landscape scale—think in terms of 1,000-plus acres.

Photo courtesy: Jeff Springer



Group openings in close proximity to each other are a great strategy to use to increase early successional habitat without putting in one large opening.

A good rule of thumb for wildlife species that rely on this type of woodland is to have about 20 percent of your woodland habitat be less than about 15 years old within a larger managed habitat. Most landowners of course do not have large acreages, so landowners should consider what types of habitats are present on neighboring properties to assess potential wildlife needs.

Another option to increase early successional habitat for properties that may have fields or roads includes edge feathering your woodlands along those borders. Edge feathering creates a transition of habitat from grasses, to bushes and young trees, to the larger trees of the woodland. This action creates younger structure immediately adjacent to fields or roads. The practice helps increase the amount of woody cover available on the ground, something that is usually limited in the fields but needed for species such as songbirds, quail, and rabbits. The strategy has multiple benefits, including increasing browse and soft mast availability and creating scrub habitat that species such as the grouse,



Edge feathering creates varying levels of cover from the ground to the canopy by transitioning from low level cover up to mature trees in a 30 – 60 foot band along the entire forest edge. It can be used to help create early successional habitat along field and forest borders with great success.

wild turkey, a long list of songbirds, and even fawns use for nesting, cover, and shelter.

Native Grasslands

Native warm-season grasses (NWSG) occur within grassland/prairie habitat and typically a woodland management plan would not include management of this type of habitat. NWSG provide vital food, cover, and nesting habitat for pollinator species, many of our migrating song and game birds, mammals such as rabbits and voles, and—for those deer hunters—they act as an excellent food source, bedding area, and fawning habitat for white-tailed deer. These areas require some form of disturbance every few years to help prevent them from turning into a monoculture or young woodland. Part of your wildlife management plan will cover when and how that should be accomplished, be it fire, mowing, disking, or chemical.

Photo courtesy: Brian Lockhart, USDA Forest Service, Bugwood.org



Though group openings may not look appealing after the initial harvest, these areas quickly create excellent wildlife habitat after one or two growing seasons.

Photo courtesy: Matthew Springer



Native grasslands provide valuable food and cover for many wildlife species. Consistent disturbance through fire, mowing, disking, or herbicide creates a field that has a diverse plant composition and vegetative structure, making excellent habitat for many wildlife species.

Hinge Cutting (Browse Cut)

Hinge cutting is a tool used often in Northern states to help increase the availability of woody browse and cover for wildlife in winter. Basically a tree, usually softer wood species such as red maple, is cut in a manner that leaves it partially connected to its stump, causing the top to fall on the ground, but still allowing a minimal flow of nutrients to the tree top, keeping it alive for an extended period of time. The stress causes the tree to throw off additional nutritious sprouts as well as making the tree top available as cover and browse for many wildlife species.



Photo courtesy: Quality Deer Management Association

Hinge cutting can be a useful tool to reduce small undesirable timber species while providing browse and cover for many wildlife species at the same time as the trees will continue to grow for several years after being cut.

Food Plots

Food plots are a management strategy that has grown in popularity over the last decade and has multiple benefits for wildlife, but it is important to remember that they should only be a part of a larger wildlife-habitat management strategy. There are many different options for both placement and planting, and talking with a wildlife biologist on how to include these in a wildlife management plan will help you use this strategy most effectively. Small decisions, such as plant selection, can have huge benefits for many wildlife species over the long term. Conversely, a food plot not well planned can become a headache with time spent fighting weeds or dealing with lackluster growth, not meeting the cover or nutritional needs of the wildlife you planted it for.

Vernal Pools or Water Holes

Vernal pools or water holes can be made for the same purpose or completely separate reasons. A vernal pool basically is a shallow, less than three feet deep, usually no more than 20 feet in diameter, temporary wetland that holds water during wet periods of the year. These areas are vital for many of our amphibian species who use them for breeding purposes. Water holes are similar to vernal pools in that they are usually small in size, but are designed to be deeper

than a vernal pool, four feet or more in many cases. The reason being, water holes are meant to hold water the entire year and act as a water source for wildlife species during the dry periods of summer. Deer, elk, bear, turkeys, quail, a multitude of smaller songbirds, amphibians, and reptiles will all use this water source if available. Water holes have gained attention recently by deer hunters, who will take advantage of their wildlife value by hunting near them during the hot and dry early archery season. Placing a vernal pool or water hole on your property does not require much space. However, if you have a permanent water body already on or close to your property, then a water hole may not be necessary. Even if another water source is present, adding a vernal pool will still help increase wildlife diversity and the survival of our sometimes-overlooked wildlife species.

Other Resources

This was a very brief introduction to multiple strategies that exist for wildlife. By no means did this article go into the detail needed to really understand the implementation or strategies relating to them. There are also several other strategies that can be incorporated into your property that were not covered, so if you are looking for more information relating to wildlife habitat and habitat-management techniques please visit the “Habitat How-To’s” publication series (<https://fw.ky.gov/Wildlife/Pages/Habitat-How-To%27s.aspx>) available from the Kentucky Department of Fish and Wildlife Resources (KDFWR). This series covers most types of management used within Kentucky for wildlife and a healthy ecosystem. In addition, KDFWR employs private land biologists (https://fw.ky.gov/Wildlife/Documents/privatelands_biologists.pdf) to work with private woodland owners. These private land biologists will visit your property and work with you to develop a wildlife management plan based on your goals free of charge as long as your property is 25 acres or larger. Financial support may be available through Farm Bill programs to help implement or maintain some of these wildlife-management strategies. These programs are dependent on many factors, such as previous land practices, location, or availability of funds. However, it is well worth asking your local state forester or wildlife biologist if there are any programs to help you implement your wildlife plan.

About the Author:

Matthew Springer, Ph.D., Assistant Extension Professor of Wildlife Management with the University of Kentucky Department of Forestry works on a variety of wildlife management needs for private landowners, farmers, and governmental agencies.

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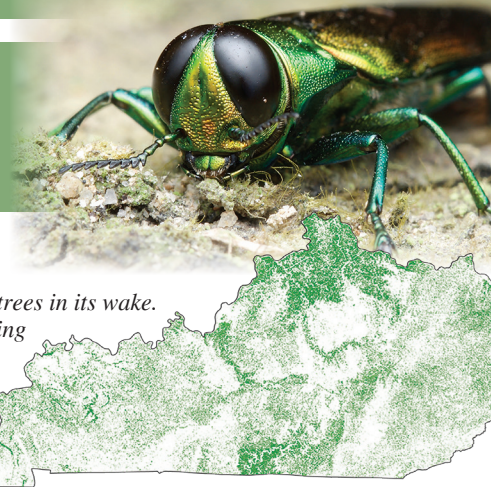


Emerald Ash Borer

by Ellen Crocker, Lee Townsend, and Abe Nielsen

Editors Note: This article is a part of our continuing effort to provide you with information about EAB and what you can do about it. A previous article, “Recommendations for Ash Management in Kentucky” by Jeff Stringer, addressed what actions you can take depending on the level of EAB in your woods. This article builds on the previous by adding information from a recent statewide map of ash mortality from EAB (Figure 1), produced by KDF’s Forest Health Specialist Abe Nielsen, based on ground and aerial surveys. The smaller map shows where ash trees are located across the state (green) versus where they are less abundant (white). Where does your woodland fall?

The emerald ash borer (EAB) continues to spread through Kentucky, leaving a trail of dead ash trees in its wake. What are your options for managing your woodland in light of this disaster? It depends on where you live, the amount of ash on your property, and how extensive ash mortality is in your area.



Emerald Ash Borer Damage In Kentucky

The emerald ash borer (EAB) is a beetle from Asia that has killed millions of ash trees across the United States since its accidental introduction nearly 20 years ago. EAB larvae kill trees by tunneling and feeding just under the bark of trees, cutting off the flow of water and nutrients. All of our native ash trees as well as white fringetree are highly susceptible to EAB and it is believed that EAB will practically eliminate ash from our forests and woodlands. EAB can fly, but people also help spread it to new sites through movement of firewood.

Green Zone: No EAB Damage...Yet

EAB has not been found in these areas yet; for now, your ash trees likely are doing well. Unfortunately, the borer is on the way and your ash is on borrowed time.

Be on the Lookout for EAB

Symptoms of EAB infestation include crown die back, epicormic shoots, splitting bark exposing serpentine galleries, D-shaped exit holes, and woodpecker activity. See something suspicious in the green zone? Let your county agent know or report to Kentucky Division of Forestry Forest Health Specialist Abe Nielsen, abe.nielsen@ky.gov, (502) 782-7172.

Make a Plan

EAB is moving and being moved. The infestation will spread over the entire state in just a few years. In the green zone, you have time to make a plan of action. Check your property for ash trees. They are common in some areas and rare in others. Knowing what you have in your woodland will better enable you to plan.

For example:

- Do you want to harvest your ash before it is lost?
- When the ash dies, what do you want to replace it (and how can you manage for those species)?
- Are there any trees that you want to protect with treatment?

Also, keep in mind that management practices aimed at encouraging ash growth (ex. crop tree release, planting) will not be effective against EAB and are not worth your time or money. Instead, prioritize management practices that will build the post-EAB woodland you want.

The map above shows the distribution of ash trees across Kentucky.

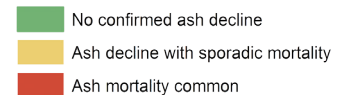
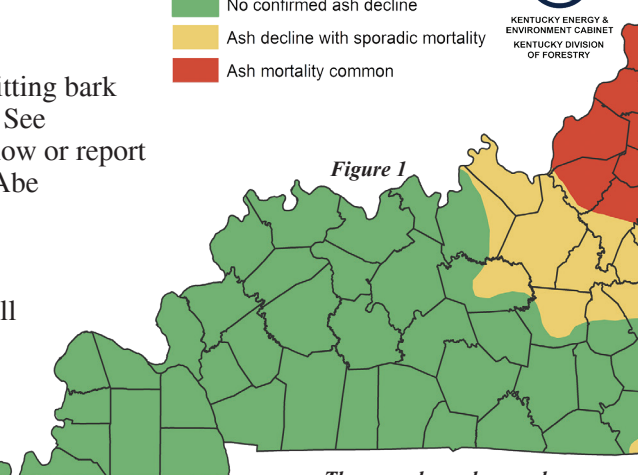


Figure 1



The map above shows ash mortality across Kentucky.





Yellow Zone: Sporadic Ash Decline and Mortality

EAB infestations are still developing and spreading in these areas. Usually the borer is present for four to seven years before obvious symptoms are noticed. In some areas, the beetles might not have reached your trees yet. Either way, EAB is nearby and will cause widespread mortality of ash over the next few years.

Harvest Trees

Increasing numbers of trees in this area will die in the near future by EAB so consider working with a professional forester soon to assess the value of ash in your woodland and plan a harvest. Ambrosia beetles and secondary borers will begin to infest ash stressed or dying from EAB attack if left standing for too long. Don't delay harvest or the value of ash timber may be dramatically decreased.

Managing Invasive Plants

The arrival of EAB also seems to go hand in hand with growth of invasive plant species in woodlands. When ash trees die, canopy openings let any invasive plants that are already present there take off. Because of this, in sites with many ash trees it can be helpful to scout for and remove invasive plants prior to widespread mortal-

ity from EAB. This may keep invasive plants from taking over your woodland and preventing desirable trees from regenerating.

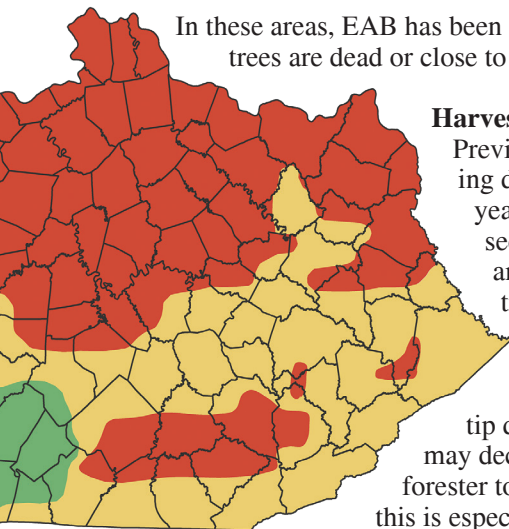
Time to Treat Trees

For most woodland owners, treatment of ash is not a viable option except for in the case of valuable landscape trees. However, if you have ash you want to protect, there are several preventive treatment options available for healthy trees. Ash trees with DBH of 20 inches or less can be treated using a soil drench containing the active ingredient imidacloprid. Mid-March to mid-April is a good time to apply this treatment, which must be repeated annually. Tree care professionals have products and techniques that can protect larger diameter trees and allow applications at extended intervals.



Red Zone: Ash Mortality Common

In these areas, EAB has been established for several years and most ash trees are dead or close to it.



Harvesting Dead Ash

Previously, landowners were advised that standing dead ash should be harvested within a couple years of being killed by EAB. However, many secondary borers including ambrosia beetles are attracted to and infest dying or dead ash trees. Their activity alters the potential uses of wood. Because of this, we advise harvesting standing dead ash as soon as possible, preferably as soon as you see branch tip dieback. Otherwise, the value of your logs may decrease sharply. Working with a professional forester to plan a harvest is always a good practice but this is especially true in light of the rapid decline of trees attacked by EAB, ambrosia beetles, and other borers.

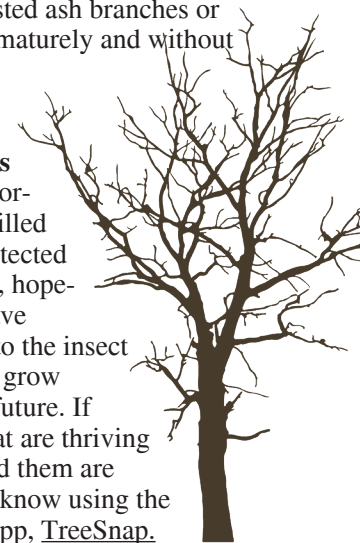
Keeping Your Woodland Safe

Dying and dead ash trees are prone to fall, or they are prone to snap off 10 to 20 feet above the ground and are dangerous, so if you have ash trees near your house, a frequently used trail, or any other structure or place where people spend

time, consider tree pruning and removal options. EAB-infested ash branches or stems may fall prematurely and without warning.

Look for Healthy Ash Trees

While the vast majority of ash will be killed by EAB unless protected with an insecticide, hopefully some trees have genetic resistance to the insect that can be used to grow healthy ash in the future. If you see any ash that are thriving while others around them are dead, let scientists know using the TreeSnap mobile app, TreeSnap.org, so they can be added to ongoing research efforts to fight EAB.



Want more information on how to deal with emerald ash borer in your woodlands?

Visit the UK Forestry Extension website EAB page: forestry.ca.uky.edu/eab



Hemlock Heroes: Fighting Hemlock Woolly Adelgid

by Ellen Crocker and Abe Nielsen

The invasive Hemlock Woolly Adelgid (HWA) is a tiny insect that has had a catastrophic impact since its arrival, killing many of our native hemlocks. HWA was first reported in Virginia in the 1950s and has since slowly spread into 21 states. It was initially confirmed in Kentucky in 2006 and can now be found infesting hemlocks throughout the state's Eastern counties, causing widespread tree death.

So what has been the response to this devastating pest? Land managers and researchers are exploring many different approaches to better protect hemlocks from HWA. A national HWA initiative, first implemented by the Forest Service's Forest Health Protection program and including state and federal agencies, university researchers, and nongovernmental organizations, is working to research and develop management tools to slow the spread of HWA and minimize its impacts. Examples of current control approaches include:

- **Chemical insecticide applications:** Treating individual trees with an insecticide provides an effective but temporary solution that must be reapplied every five to seven years. Insecticides are a limited option because they are short-term, time consuming, and costly on large scales. However, they are an important tool in protecting high-value hemlock areas until longer-term strategies can be established.
- **Biological control releases:** Release of specific predatory insects that feed on HWA may provide an option for sustainable control of HWA in the future. However, this strategy requires patience and a long-term commitment. Predatory beetles that feed on HWA have been released as a part of a multiagency biological control program since the 1990s. Releases continue today and success of these insects in controlling HWA varies across sites depending on their ability to establish successful populations.
- **Silvicultural practices:** Research has shown that increased light exposure on hemlocks reduces HWA

What is HWA?

Hemlock woolly adelgid (HWA) is a small non-native, sap-sucking insect. It feeds on hemlocks, sucking energy and nutrients, draining the tree as well as causing leaves to dry up and drop. Look for signs of HWA including cottony white egg sacks on the underside of hemlock branches, dull grey needles, thinning canopies, and tree death.



Photo courtesy: Bruce Watt, University of Maine, Bugwood.org

abundance. Because of this, practices such as forest thinning could prove to be a useful tool in large-scale HWA management

- **Genetic conservation efforts:** Identifying and reintroducing hemlocks that are genetically resistant to HWA is a major goal for restoration efforts. While this approach is likely to take longer to develop, it would provide a sustainable option for HWA management with trees that are better able to defend themselves against the insects or that are less attractive to them.

Long-term, a combination of these and other approaches will likely be needed to ensure that hemlocks are able to survive despite HWA.

Why are hemlocks important?

Hemlock trees densely shade riparian areas, regulating stream temperature, which in turn benefits the many insects, fish, and other aquatic organisms that call these areas home. In addition, hemlocks provide important habitat for birds and other animals. These unique forest systems may undergo drastic changes as HWA threatens to functionally eliminate eastern hemlock from the southern Appalachians.



Case Study: KDF's Hemlock Approach

The Kentucky Division of Forestry (KDF) has been chemically treating hemlocks on important ecological areas since 2009. In that time period, KDF has treated over 148,000 hemlocks. In addition, Kentucky's Office of the State Entomologist released predatory beetles from 2008-2014 and that work continues today with releases led by KDF. Chemical treatments span many public sites on both state and federal property including state parks, nature preserves, and conservation areas within the Daniel Boone National Forest. The goal of this work is to preserve critical hemlock habitat until more sustainable options for protecting hemlock can be implemented on a large scale.

Photo courtesy: Jason Van Driesche, Bugwood.org

What can you do to control HWA?

If you have hemlocks on your property, chemical application with the insecticide imidacloprid is a great option on small scales. Imidacloprid chemical treatments have been shown to suppress HWA populations for a minimum of five years. The cost of concentrated imidacloprid is reasonable and application via a soil drench is straight-forward, enabling landowners to treat their own hemlocks on a five-year schedule. Keep in mind that each situation is different and imidacloprid should not be applied as a soil drench near bodies of water (other approaches are available for those sites). Learn more about treating your hemlocks on the UK Forestry Extension website at https://forestry.ca.uky.edu/hemlock_woolly_adelgid

Extreme weather bugs HWA?

Unlike most insects, HWA continues its development through the winter period, making it susceptible to extremely cold temperatures. In early 2014, Kentucky experienced a polar vortex that produced frigid temperatures and as a result caused HWA mortality in Eastern Kentucky. Unfortunately, HWA populations are able to rebound quickly after such declines, but rapid weather changes and extreme weather events in late winter/early spring may help prolong hemlock health in infested areas.

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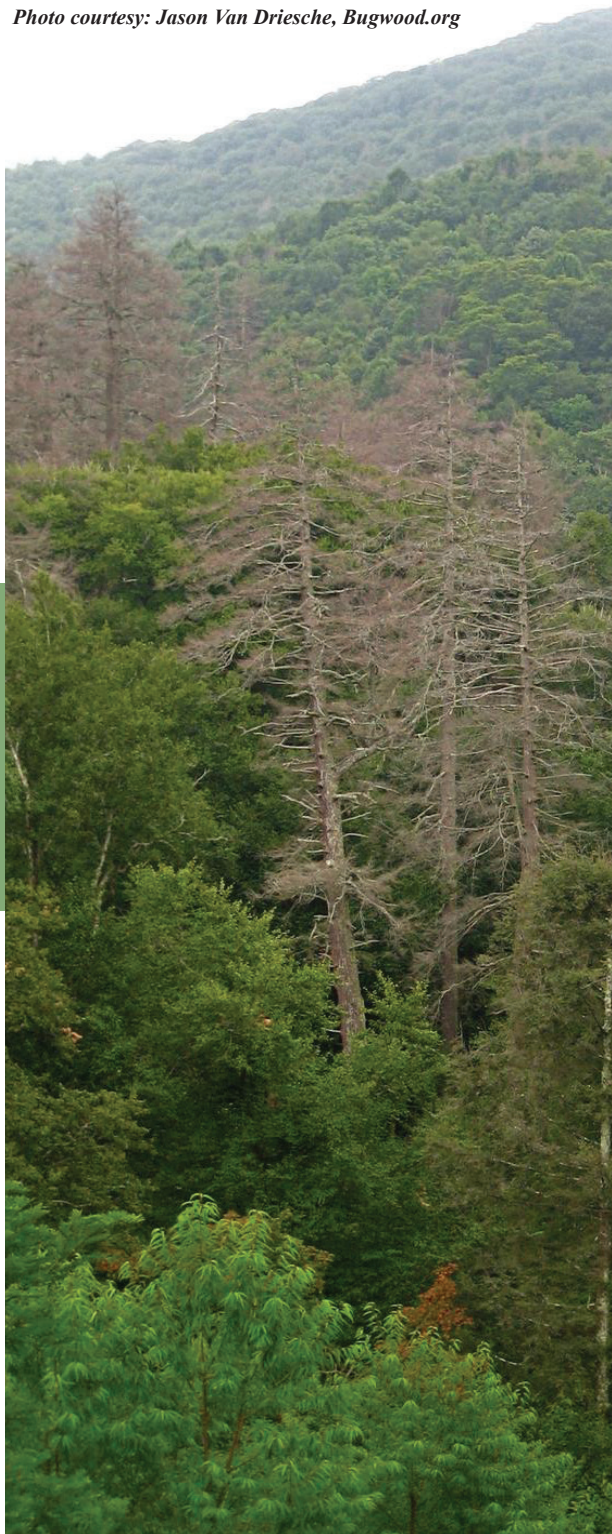
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Diverse Woodlands, Diverse Owners, Similar Passions

by Doug McLaren, KWOA President

www.kwoa.net



The woodlands of Kentucky Woodland Owners Association (KWOA) membership are as diverse as each of the members. When the opportunity allows for conversation about one another's woodlands in this organization, quickly you recognize the diversity of woodlands that exist across the state of Kentucky. Two reasons prevail: the owners, many of which are families, and the location of the land.

Owning woodlands in Kentucky is a great privilege. Each landowner feels a deep responsibility for the care, no matter what the size of the parcel. Whether you have purchased the land or have inherited it, you as the owner of these woodlands can maintain and manage it in a variety of ways. Members of the KWOA pride themselves in doing what is best for the future of the woodland. Each of the woodland owner manages according to their preferences.

In Kentucky, there is a rich diversity of timber species, each having its own character, value, and use and many owners enjoy the opportunity to manage the trees for future saw timber as a working forest. Other owners enjoy the opportunity to manage the land as wildlife habitat, wildlife ranging from those species that can be hunted during regulated seasons to those activities of simply watching residual and migratory bird species and other non-game species utilizing the land.

Watershed management always has been a valuable management opportunity for these woodland owners. Properly managed woodland acres provide high quality water for downstream owners and users. Other owners and managers of woodlands enjoy the opportunity to simply provide ecosystem services of good water, oxygen cycles, and recreational benefits for their families as well as others.

Kentucky woodland owners, whether they are members of the KWOA or not, enjoy talking about their "patch of woodlands" no matter what the size. Quickly it is discovered that their woodlands differ not only because of their management styles and techniques but simply due to the location. Different locations, different soils. With different soils comes different growing capabilities and potential. Simply stated, with the diverse soil types that we have across Kentucky you have to expect a variety of trees to be growing with different growth potentials. These are bases for the conversations that members of the Kentucky Woodland Owners Association have when they come together in both formal and non-formal settings, field days, conferences, or seminars. They are always talking about their woodlands, their management styles, and the reasons for owning their family woodlands. The diversity of each of the woods that are being managed across Kentucky is simply the result of good intentional management of the diverse woodland stewards.

Become a member of the Kentucky Woodland Owners Association and become part of the conversation. Join us at our website www.kwoa.net and look for the next opportunity to become part of the conversation at a meeting—either in your "neck of the woods" or in one of the other regions of the state. We welcome you to share the story of your woodlands.

Photo courtesy: Renee' Williams

For more information log on to www.kwoa.net



Kentucky Tree Farm Committee Newsletter

National Leadership Conference

The Kentucky Tree Farm Committee sent four committee members to the National Leadership Conference (NLC) in late February in New Mexico. NLC provides an opportunity for the American Tree Farm Leaders from all over the country to discuss issues and ways to improve and expand the American Tree Farm System (ATFS). A wide range of topics were discussed and committee members provided roundtable input on how to do innovative landowner outreach-education, committee administration, training for inspecting foresters, certification program and financial costs.

The main theme for the meeting revolved around collecting information on the issues being faced in the field and how to make the ATFS system work efficiently. Also, it was revealed that Louisville, Kentucky, has been selected as the site for the Leadership meeting on February 26–28, 2019, which will offer an opportunity to showcase our program and state.

Certification and Tree Farm Assessment

The Kentucky Tree Farm Program continues to maintain certification for all woodland owners in the ATFS program. In late 2017, it was announced that financial assistance will not be required from the state program over the next couple of years, which has put on hold plans to charge Tree Farmers in the program. Certification is maintained by assessments to ensure that performance measures and standards are being met to manage the private woodlands in the program.

The Tree Farm system has recently undergone an assessment in Kentucky to review randomly selected Tree Farms to show that all standards are being followed. The assessment was conducted by an independent firm and 17 properties were selected for field visits. The visits typically last a little over an hour on site and includes reviewing the management plan, discussing management interests and looking at the objectives of the owner. The assessment is conducted every four years and ensure the products from the Tree Farms are being produced in a sustainable manner. Any issues or concerns that come from the assessment are shared with the Kentucky Tree Farm Committee to assist woodland owners in Kentucky to maintain certification standards.

Clifton Taylor Named Kentucky Tree Farmer of the Year

Clifton Taylor from Danville, Kentucky, was recently honored as the 2017 Kentucky Tree Farmer of the Year at the Kentucky Forest Industries Association's 53rd Annual Meeting. In addition to a plaque recognizing his achievement, Taylor was presented a Stihl chainsaw donated by Bryan Equipment Sales from Loveland, Ohio, who is the regional distributor for Stihl Incorporated.



Clifton Taylor and family received the Kentucky Tree Farmer of the Year Award at the 53rd Annual Meeting of the Kentucky Forest Industries Association.

The 1,100-acre Taylor Tree Farm in Casey and Boyle counties is managed for a wide range of benefits, including timber production, wildlife and recreation. The farm has been certified since 1972 and improvements on the farm have included harvesting white oak logs for the Irish Distiller's "American Oak Project" and extensive work on 150 acres to maintain future availability of oak. There has also been work completed on miles of forest roads to maintain access for forest management, fire control, and recreational purposes.

Clifton is a past winner of the 2016 Kentucky/Tennessee Society of American Foresters Baggenstoss Award that honored him for his lifetime commitment to forest management. He takes an active role in all forest management on the property and is very active with a number of organizations that support forest management and conservation.



**Interested in becoming a
Kentucky Tree Farmer?**

**Ask your forester or call 502.695.3979
to learn how you can become an
official Kentucky Tree Farmer.**



The Economic Contribution of the Kentucky Forest Sector

Kentucky's family owned forests (or woodlands) not only supply countless environmental benefits but are also the first link in the supply chain of the Kentucky forest sector. For the last six years UK Forestry Extension has been documenting the economic contribution of our forests to highlight their importance and the need for more support. Since 2015, the overall Kentucky forest sector has remained stable ranging from \$8.79 billion in direct contributions to an estimated \$8.35 billion in 2017. The total economic contribution ranged from \$13.67 billion in total contributions to an estimated \$13.25 billion in 2017. Figures 1 and 2 show the 2016 distribution of employment (26,000+) and economic contribution by each of the six forest sub-sectors that make up the Kentucky Forest sector. Utilizing 2016 economic data along with employment and production information from Kentucky's forest sub-sectors allows the estimation of changes in the economic contribution of the forest sector in 2017 (Table 1).

Most of the economic contribution is derived from the harvesting of timber and processing of the wood resource. Importantly, this economic contribution is generated from timber resources in all 120 counties of the Commonwealth, harvested by over 1,200 logging firms and processed at facilities located in 112 counties. Kentucky forest industries include 742 wood, paper, and paper converting manufacturing facilities across the Commonwealth (Figure 3). The distribution of these facilities indicates the economic contribution is an important economic force for both rural and urban communities.

An estimated 762 million board feet of Kentucky hardwood logs were harvested in 2017, which was less than half the volume grown. However, there is an increasing concern over the sustainable supply of high quality logs of some species such as white oak used for bourbon barrels, veneer and high-quality lumber. Table 2 provides delivered log prices collected by the Kentucky Division of Forestry.

As indicated, Kentucky's forests directly provide the wood resources for a significant portion of the forest sector's economic contribution. In total, each acre of harvested timber

Figure 1. Direct Employment by Kentucky Forest Sub-Sectors (2016)

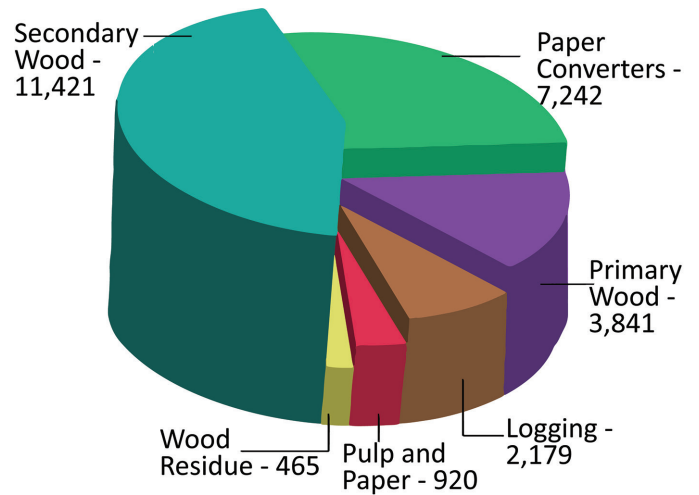


Figure 2. Direct Economic Contribution by Kentucky Forest Sub-Sectors in Millions (2016)

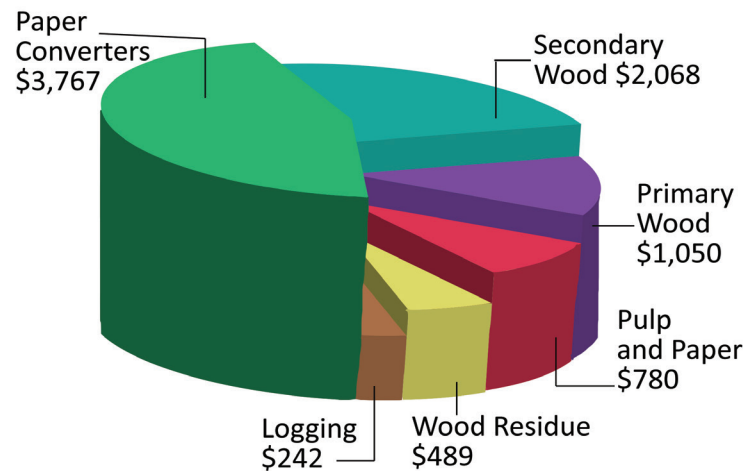
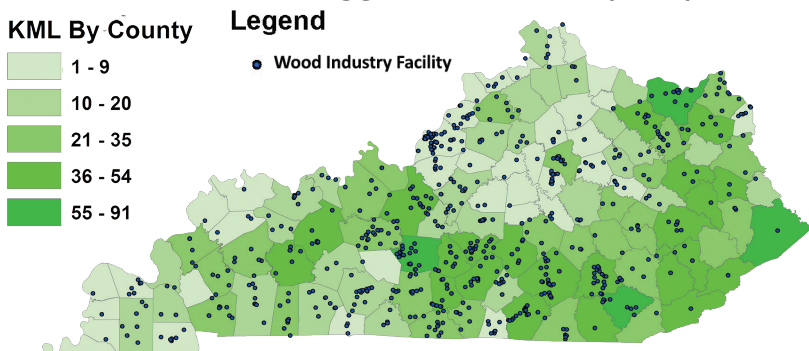


Figure 3. Kentucky Wood Industries and Master Logger Distribution (2018)



Source: Kentucky Master Logger Database and Kentucky Forest Products Industry Directory

Table 1. Estimated Kentucky Forest Sector Economic Contribution in 2017		
Forest Sub-sector	Millions	% Change from 2016
Logging	\$255	+5.3%
Primary Wood Mfg.	\$1,106	+5.3%
Secondary Wood Mfg.	\$2,081	+0.62%
Pulp and Paper	\$664	-15.0%
Paper Converters	\$3,767	0.0%
Wood Residue	\$480	-1.84%

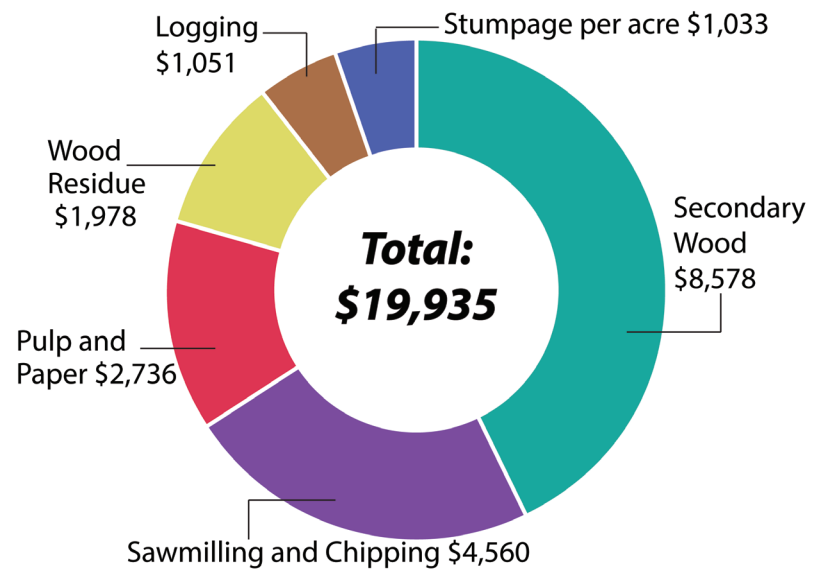
Figures 1, 2 and Table 1 Sources: IMPLAN Data for Kentucky and the Kentucky Forest Products Industry Directory

Table 2. Kentucky Delivered Log Prices in 2018 in \$/MBF and Change from 2017.			
Species	Log Quality		
	High	Medium	Low
Walnut	\$1,929 -9.8%	\$1,255 26.2%	\$435 8.1%
White Oak	\$1,183 -2.3%	\$691 17.2%	\$315 0.3%
Red Oak	\$827 1.8%	\$552 9.8%	\$312 40.3%
Sugar Maple	\$840 11.4%	\$557 22.6%	\$295 10.3%
Ash	\$664 14.7%	\$454 8.3%	\$267 30.7%
Yellow-poplar	\$566 6.2%	\$377 4.7%	\$244 28.6%
Hickory	\$552 27.2%	\$410 23.6%	\$254 49.6%
Red Maple	\$452 7.9%	\$368 21.1%	\$213 12.1%

Table 2 Sources: Kentucky Division of Forestry's Delivered Log Price Data (MBF = 1,000 board feet)

contributes an estimated \$19,935 to Kentucky's economy; Figure 4 highlights the distribution of this economic contribution starting with the woodland owner. The most value is added by the secondary industry. Thus, ensuring that our raw material is processed into a final product in the state is extremely important to our economy. While woodland

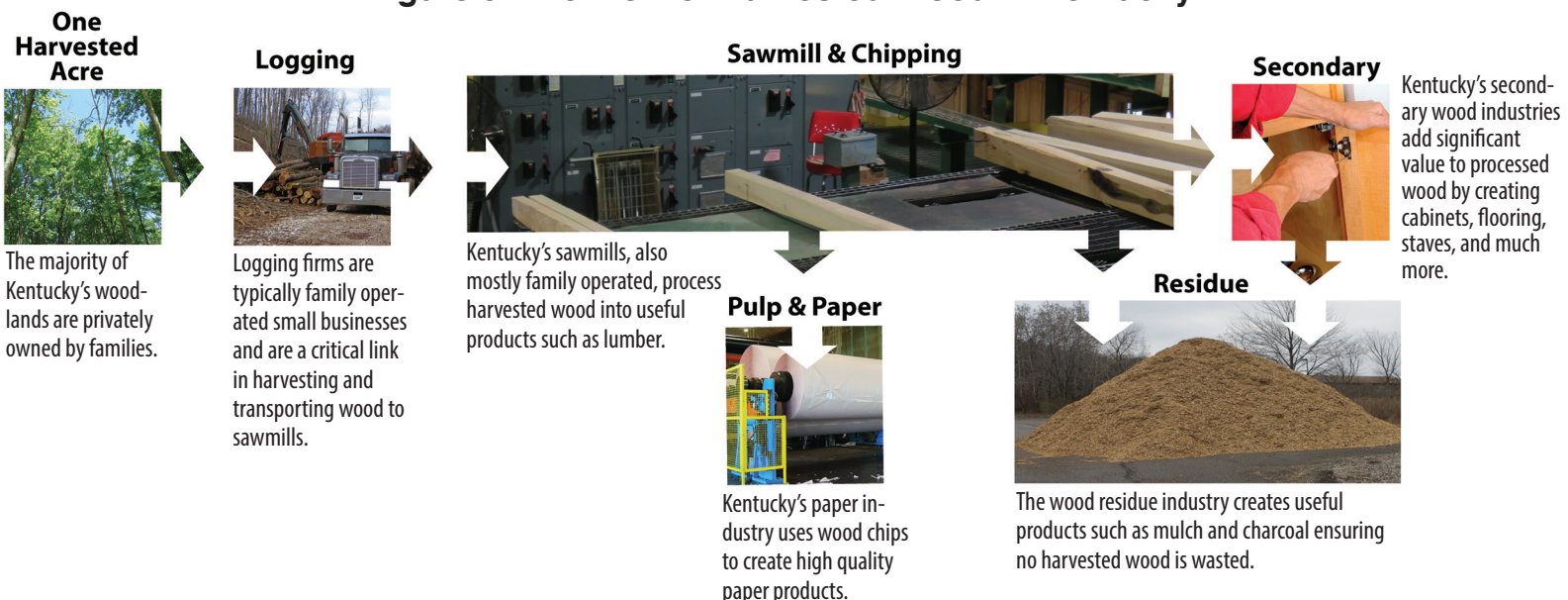
Figure 4. The Economic Value of a Harvested Woodland Acre to Kentucky



Source: IMPLAN Data for Kentucky and the Kentucky Forest Products Industry Directory

owners and logging are individually the smallest direct contributors, without woodlands and logging, the vast majority of our wood using industries would collapse. Figure 5 depicts the wood supply chain for the majority of harvested wood in Kentucky.

Figure 5. The Flow of Harvested Wood in Kentucky



This conceptual model traces the flow of harvested wood through numerous forest industries in Kentucky. Woodland owners grow, manage, and protect their woodlands and are the foundation of the Kentucky forest sector. Logging firms harvest and transport the wood to sawmills that convert the wood into products utilized by other wood industries such as cabinet and flooring manufacturers, paper makers, and residue users. Nearly all of the wood harvested in Kentucky is transformed into useful products and energy.

The Effect of Timber Harvesting on Forest-dwelling Bats

by Jeff Stringer and Phillip Arant

A number of bat species in North America are under attack from a fungal disease called “white nose syndrome.” This fungus spreads in caves during winter hibernation and debilitates bats, many times ultimately resulting in mortality. Several species of cave hibernating bats spend the summer, giving birth and living in hardwood forests throughout Kentucky. In the forest, they rest during the day under the bark of shaggy barked trees or in cavities and fly at night to feed on insects. Females stick together, giving birth to one pup and staying together as they rear the young. After the young can fly, females and young scatter and for the rest of the summer feed in the forest until they migrate back to the caves in the fall.

The Indiana bat and the northern long-eared bat are two notable summer forest dwelling species in Kentucky that have been federally listed as threatened or endangered. As such they are protected from harm and harassment through the Endangered Species Act. Because these two species spend time in the forest in the summer, as do many others, they pose a particular concern for woodland owners and forest industry. The concern can be legal—over violation of the Endangered Species Act—and/or a concern for perpetuation of these species and the health of the forest ecosystem in which they play an important role.

Dr. Michael Lacki, wildlife faculty at the University of Kentucky Department of Forestry and Natural Resources, is a leading expert on North American bat species. Recently he and silviculture and forest operations faculty, Drs. John Lhotka, Marco Contreras and Jeff Stringer, have partnered to determine the impact of timber harvesting on forest-dwelling bats in Kentucky and to determine if specific harvesting designs can actually improve bat habitat. The research study was supported by the forest industry and the U.S. Fish and Wildlife Service. Three 300-acre forest areas in Eastern Kentucky were chosen for this study. One on private land in Breathitt County, one at the University of Kentucky’s Robinson Forest and one at Kentucky Ridge State Forest managed by the Kentucky Division of Forestry. Each 300-acre tract was divided into three sections. One section was left uncut. Half

of the timber was selectively harvested from the other two sections (Figure 1). In one section, the timber was removed

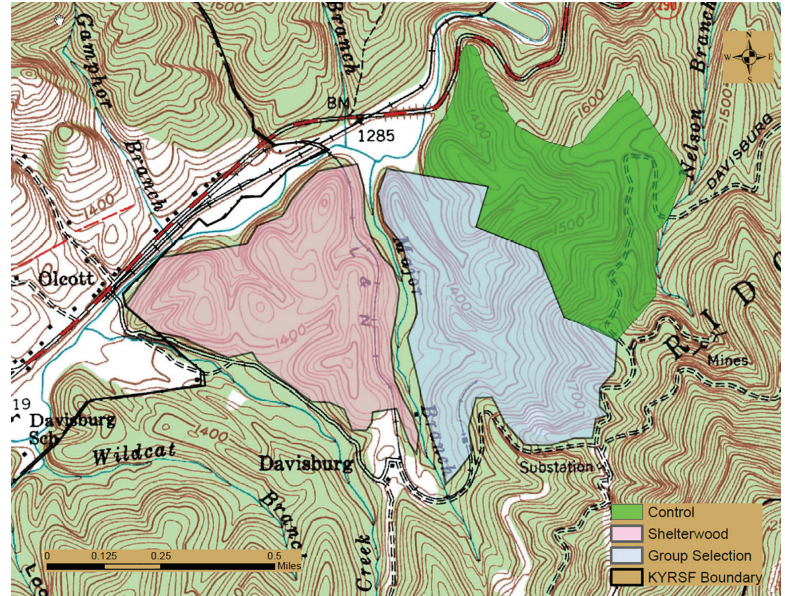


Figure 1. Topographic map of the Kentucky Ridge State Forest 300-acre study site showing the uncut, shelterwood, and group open sections.

using a shelterwood harvest, where 50 percent of the over-story trees were removed evenly across the entire 100 acres (Figure 2). In the third section, timber was removed in groups creating 1 to 1½ acre openings (Figure 3). The area around the openings was left undisturbed except for the construction of skid trails connecting the openings. Phillip Arant, University of Kentucky Forest and Natural Resources Sciences research assistant, used acoustic recorders (Figure 4) to determine what species were flying and feeding in the harvested and uncut areas and what specific areas within each section were being used. Bats also were caught and released to ensure that the species identified



Figure 2. 100-acre shelterwood harvest section at Robinson Forest.



Figure 3. A. An overhead view of the 100-acre group opening section at Robinson Forest. B. (below) A newly installed 1½ acre group opening at Robinson Forest.

Photos courtesy: Jeff Stringer



from the acoustical data were in-fact present and to determine their condition (Figure 5).

The study is still ongoing and initial data indicate that bats use the open areas within harvests to move about and feed. This includes skid trails and haul roads that allow them to fly efficiently through the forest and harvest openings that provide them room to successfully hunt.

Figure 6 shows the increase in the average acoustically recorded pulses from all species of bats during a 24-hour period between the uncut section and a group opening at one of the study sites. The research also has shown that species behave differently and use different areas within the harvests. Some fly around and feed in the middle of the harvested openings, some spend time on the edge of the openings, and some use the streamside management zones. It

is important to note that these behaviors and use of different habitats within the harvests

may change over time, particularly as regeneration of the openings and the understory in the shelterwood starts to develop. Based on the distribution of use by different species, the data



Figure 4. Acoustic sampling device and data recorder used to record pulses emitted by bats at one of the study sites.

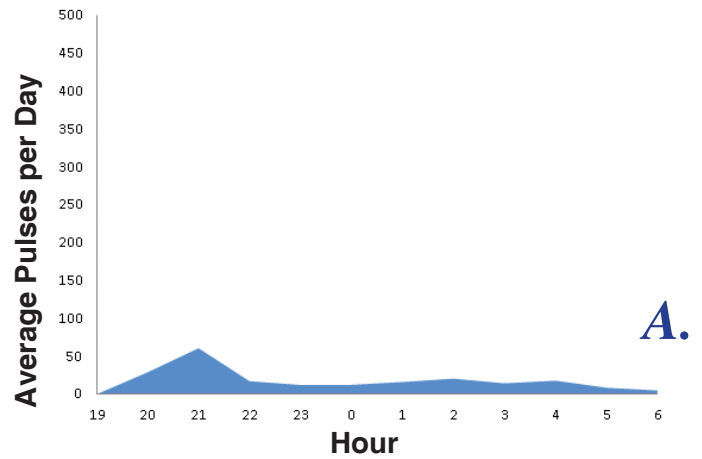
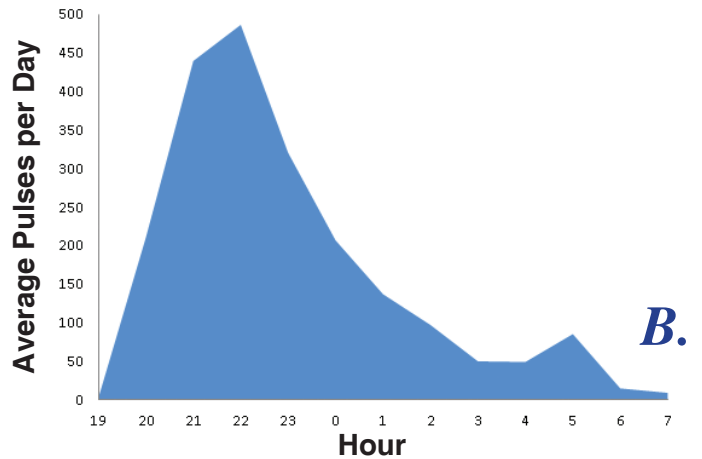


Figure 6. Figure A shows the number of pulses recorded over an average 24-hour period in the uncut section compared to B showing the number of pulses associated with one of the group openings.



indicates that leaving areas within a harvest or adjacent to it relatively undisturbed is important for some species. In all cases the harvests, which were selective using a shelterwood or group openings and which had intact forests around the tracts, did not result in the loss of bat species. Initial data also indicates that harvesting provided habitat attributes that were used by a number of bat species, including those federally listed. Continuation of the study will allow the research team to finalize data on the initial response to harvesting and watch to see how use of the harvested areas changes as natural regeneration develops. This study will ultimately yield information that can help guide forest management, use, and harvesting while maintaining the habitat attributes important for our bats.

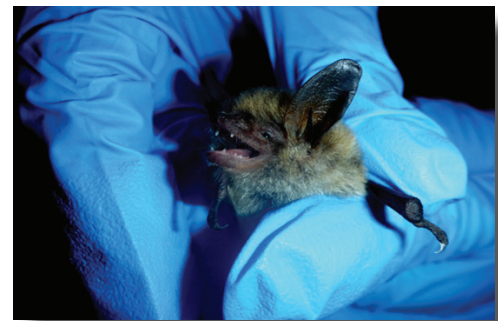


Figure 5. Long-eared bat captured using a mist net at Robinson Forest.

About the Author:

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Funding Available to Support Forestry Related Water Quality Practices

The Ohio River Basin Water Quality Trading Pilot Project is announcing funding for forestry practices (i.e., tree planting) to reduce nutrient runoff and enhance water quality on farmlands in Ohio, Indiana, and Kentucky. The Electric Power Research Institute (EPRI), American Farmland Trust, and state level partners are supporting installation of management practices that generate “water quality credits”, which can be used towards achieving broader water quality improvements. Under this funding opportunity, EPRI is releasing \$400,000 across Ohio, Indiana, and Kentucky and covers up to 80% of the total project costs. Project applications will be reviewed on a rolling basis until all funds are expended. Projects must be fully installed and verified by the state agency no later than November 15, 2019. Visit <http://wqt.epri.com> for more information and application forms.



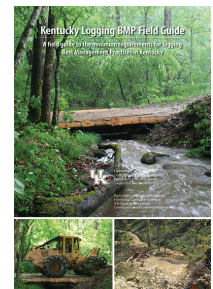
Stringer Named UK Forestry Department Chair

Dr. Jeff Stringer, an editor of Kentucky Woodlands Magazine, has been selected as chair of the Department of Forestry and Natural Resources. Jeff is a former Extension Professor at the University of Kentucky Department of Forestry and Natural Resources with expertise in forest management and timber harvesting operations. Many woodland owners and all Kentucky Master Loggers know Jeff through his decades of Extension programs across Kentucky. He is also well known in the forest industry and works closely with many agriculture, forestry, and natural resource organizations and agencies in Kentucky and the region. While we may not see Jeff at as many educational programs as we have in the past he will still be involved in numerous efforts (such as the White Oak Initiative) that will directly benefit Kentucky’s woodland owners, loggers, and forest industry.



Updated Logging BMP Field Guide Released

An updated logging Best Management Practices (BMP) Field Guide is now available by visiting <https://forestry.ca.uky.edu/loggers>. This updated guide serves as a field reference to ensure logging operations meet the mandatory BMP minimum requirements for water quality protection. Loaded with color photographs and drawings the guide is a great resource for loggers and woodland owners to ensure they are in compliance with logging BMP requirements.



Upcoming Dates To Remember:

2019 Dates:	Event:	Location:	Contact:
Feb. 21, 28 Mar. 7, 14, & 21	Getting To Know Your Woodlands Webinars	Webinar Series via web	www.ukforestry.org
March 26-27	KY Woodland Owners Assoc. Annual Meeting	Pennyrile State Forest Resort Park	www.kwoa.net or 606-782-1317
March 30	Ohio River Valley Woods and Wildlife Workshop	Clifty Falls State Resort Park	www.tristatewoods.org or 859.257.7597
April 2 - 4	Kentucky Forest Industries Association Annual Meeting	Embassy Suites, Lexington	www.kfia.org
Sept. 20 - 21	Kentucky Wood Expo	Masterson Station Park	www.kfia.org

NEWS TO USE

Getting to Know Your Woodland Webinar Series

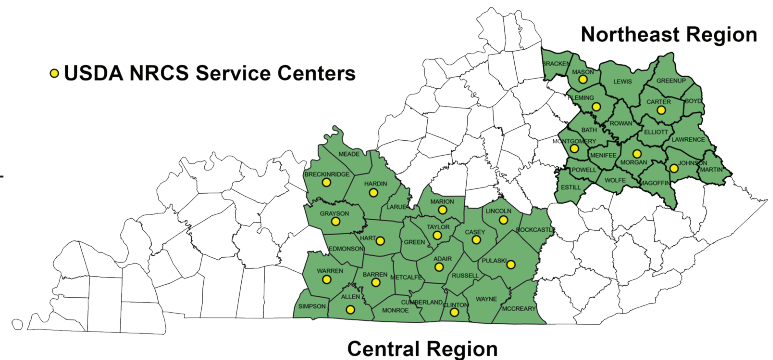
UK Forestry and Natural Resources Extension is teaming up with universities around the region to offer a new webinar series titled Getting to Know Your Woodland. This webinar series will be hosted live by participating County Extension Offices with recordings available online after the live events. This 5-part webinar series will take place on February 21, 28, March 7, 14, and 21, 2019. Topics include: understanding your woodland and how to develop a woodland management plan; managing your woodlands; identifying and managing woodland threats; wildlife and woodlands; and accessing technical and financial assistance to help you

manage your woodland. Make plans now to attend this webinar series. For more information and to find the nearest hosting location please visit <https://forestry.ca.uky.edu/webinars>



Woodland Management Help in Central and Northeast Kentucky

Woodland owners in Central and Northeast Kentucky have a new opportunity to receive woodland management plans through a recently awarded Regional Conservation Partnership Program project entitled “Increasing Farm Bill Participation and Benefits”. The project’s primary goal is to service a backlog of requests for woodland management plans in KDF’s Central and Northeast regions. The University of Kentucky Department of Forestry and the Kentucky Division of Forestry developed and were awarded this USDA Natural Resources Conservation Service (NRCS) project that utilizes financial assistance through the Environmental Quality Incentives Program (EQIP) to develop new woodland management plans for Kentucky landowners. A new woodland management template that meshes components of the current KDF forest stewardship plan and the NRCS Conservation Activity Forestry Management Plan has been developed to be more user friendly and valuable for landowners. If you have been



waiting to have a woodland management plan developed and your property is in the project area, please visit your local NRCS office and let them know you want to participate in the UK Forestry—RCPP program. Got questions or need more information? Please email or call Billy Thomas at billy.thomas@uky.edu or 859.257.9153.

UK Forestry and Natural Resources Extension Wins National Family Forest Education Award

The University of Kentucky Forestry and Natural Resources Extension team won the national Family Forest Education Award presented by the National Woodland Owners Association and the National Association of University Forest Resources Programs in October 2018. This is the second time that UK Forestry and Natural Resources Extension has won this national award which is presented to an educational institution that has delivered the most effective education program benefiting family forest owners over the past five years. Visit www.UKForestry.org to learn more about the programs and resources available for Kentucky woodland owners.



Photo courtesy: Laura Lhotka



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