

KENTUCKY'S EMERGING FOREST THREATS

Healthy Forests Management Options

WHY DOES IT MATTER TO ME ?

It is important for private forest landowners to prepare for the likelihood of increasing threats to their forest lands. Private forests make up the largest holdings of forestlands in the southeastern U.S. These properties collectively will be crucial in protecting the overall health of our landscape. Management that uses the most current forest science will better enable landowners to protect their land and resources, and to contribute positively to the conservation and productivity of South Carolina's forestlands.



The mission of the Southeast Climate Hub is to develop and deliver science-based, region-specific information and technologies, with USDA agencies and partners, to agricultural and natural resource managers that enable climate-informed decision-making, and to provide access to assistance to implement those decisions. This is in alignment with the USDA mission to provide leadership on food, agriculture, natural resources, rural development, nutrition, and related issues based on sound public policy, the best available science, and efficient management.

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The [USDA Southeast Climate Hub](#)
in association with the Kentucky Division of Forestry and
the University of Kentucky Forest Health Extension
Alexandra Blevins (Alexandra.blevins@ky.gov) 502-382-1720
Ellen Crocker (e.crocker@uky.edu)

EMERGING THREATS & HEALTHY FOREST MANAGEMENT

Introduction - Kentucky's predominately hardwood forests are some of the most diverse in the country. Yellow-poplar, white oak, chestnut oak, sugar maple, American beech and many other species are incredibly abundant across the state. This diversity in forest species composition plays a crucial role in maintaining the overall health of Kentucky's forests. Nearly 50% of Kentucky's land area, 12.4 million acres, is classified as forested and 88% is privately owned by local land managers. The total contribution of these forests to Kentucky's economy is approximately \$13 billion per year. The ecosystem services they provide are also valued in the billions of dollars. However, Kentucky's forests are impacted every year by a host of threats such as invasive species, pests and pathogens, extreme weather, and wildfires. Studies show that changes in climatic conditions are increasing the severity of these threats. Fortunately, forest managers may employ several adaptation options that help mitigate damages while reducing the vulnerability of their stands. Management plans designed to maintain the high rate of species diversity in Kentucky will be crucial to combat future threats.



Threats from Invasive Species/Insects/Disease - Invasive plants, insects, and disease are responsible for



severe damage and mortality in Kentucky forests and can impact biodiversity, forest water yield, and water quality. The prolonged growing season associated with climate change will likely extend the insect/disease outbreak season. Many tree diseases such as laurel wilt disease, a relatively new disease to the state, are distributed by forest insects and can cause rapid and significant mortality. Additionally, some forest health threats may stimulate other threats. For example,

emerald ash borers kill healthy ash trees, which opens the overstory and allows for invasive plant species to occupy the forest floor. Ranges of invasive plants and insects may extend northward in the state due to winter warming trends. These milder winters fail to destroy imported insects and plants. This may result in habitat destruction/ fragmentation and loss of aesthetic value in recreational areas.

Additionally, invasive species may outcompete native or planted species for resources during periods of drought, which leads to a reduction in overall species richness. Fortunately, there are management practices to control these threats, including prescribed burning, thinning, removal of "high risk" trees, and proper herbicide or pesticide application. Salvaging logs following disturbance events such as wildfires and storms, peeling and burning infested logs, and decreasing the movement of dead wood or woody debris also limit outbreak potential. Early detection is critical, especially after stress events, to finding outbreak areas before the problem can multiply and spread.

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Threats from Drought - Increasing drought frequency is a major stress that leaves forests more susceptible to opportunistic attacks from insects and pathogens. This increase may change the species that are site appropriate over time in Kentucky and also impacts water quantity and quality. Drought conditions also lead to increased wildfire potential and changes in dominant vegetation. Adaptation options include promoting diverse age classes and species diversity, maintaining a canopied riparian zone to reduce stream temperatures, incorporating drought-tolerant species, and using prescribed burns to reduce fuel loads and wildfire risk. Monitoring for signs of disease or pest activity will provide an early advantage to landowners for fighting outbreaks.



Threats from Wildfire - Increased fuel loads and more frequent droughts may increase wildfire frequency and intensity within the southeast. Fortunately, Kentucky's predominately hardwood forests are less susceptible to wildfire damage than pine forests. However, Kentucky currently experiences up to \$5 million per year in fire suppression costs alone due to increased wildfire activity. Additionally, Kentucky experiences the highest rate of arson-related wildfires in the southeastern U.S. Other impacts from wildfire include habitat destruction and fragmentation, and biodiversity declines. Reducing fuel loads by utilizing adaptation measures such as prescribed burns and periodic thinning has proven to



lessen wildfire risk in forest stands. During high fire risk periods, land managers should refrain from prescribed burning. Salvage logging after extreme weather events or significant timber loss reduces fuel loads and the chances of wildfire, pest, or disease outbreaks. Incorporating fire-resistant species such as yellow poplar and certain oak species may also mitigate wildfire risks.

Threats from Flooding - Extreme precipitation events (more than 2.5" in a day) are a common disturbance event throughout the southeastern U.S. which can severely impact forest stands. Management practices to mitigate damages include post-disturbance revegetation, maintaining the area's natural hydrology/riparian zone health, planting flood-tolerant tree species, monitoring damaged or susceptible trees for outbreaks or fungal growth, and implementing proper erosion control structures such as culverts and drainage ditches where needed.

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Threats from Ice Storms - Ice storms are another devastating threat to southeastern forests, and ice storm damages could become more frequent with warming winters. As ice builds on branches, the weight of the ice exceeds the carrying capacity of the branch and it breaks. Pines collect more ice compared to hardwoods because their year-round needles are able to hold ice. Additionally, pines branches break under less weight than hardwoods, making pines particularly vulnerable to ice storms. Recent ice storms have been experienced across western, central, and northern Kentucky. Adaptation to these events includes reducing stocking levels, adjusting thinning frequencies to reduce the probability of damage after fresh thinning, and incorporating resistant species. Post-disturbance monitoring of damaged trees will aid in preventing pest outbreaks.

Threats from Storms - Tornadoes and straight line winds can be locally damaging and cause timber revenue loss. Increases in storm frequency are related to warming air and water temperatures. Adaptation to mitigate wind damage includes rotational harvesting to reduce stand age uniformity, incorporating resistant species, modifying thinning frequencies, and clearcutting smaller exposed stands at maturity while avoiding these operations within large stands.

Summary - These threats impact the economic and ecosystem value of Kentucky's forestland. Changes in climatic conditions such as longer growing seasons, increased year-round temperatures, and variable precipitation rates are expected for the state. Impacts from insect and invasive species outbreaks, harmful diseases, destructive wildfires, and intense storm activity are amplified by these warming temperature trends and changes in rainfall frequency and amounts. These issues compounded with a lack of management and short-sighted timber harvesting can harm forest stands. The biodiversity of Kentucky's forests remains the biggest advantage against forest health threats. Therefore, incorporating practices to support the diversity of forest stands is crucial. The adaptation methods listed in this fact sheet are just a few of the options that help land managers improve forest resilience and reduce risk. Consult your local Extension agent, consulting forester, or a service forester from the Kentucky Division of Forestry for more information about threats and corrective measures appropriate for your forested land.

FOR MORE INFORMATION ON
MANAGEMENT OPTIONS FOR YOUR
WOODLANDS:

Contact your local County Forester or the
Kentucky Division of Forestry Office at
502-564-4496

<http://eec.ky.gov/Natural-Resources/Forestry>