



TENNESSEE
**EMERGING FOREST
THREATS**
**Management Options for
Healthy Forests**

WHY DOES IT MATTER TO ME ?

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



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](#)

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EMERGING THREATS & HEALTHY FOREST MANAGEMENT

Tennessee Forests

Over half of Tennessee is covered by highly visited and productive forests. These 14 million acres of forests are composed mainly of hardwood tree species such as yellow-poplar, white and red oaks, hickories, maples, and sweetgum. With over 335,000 owners, 83% of Tennessee's forests are privately owned. Forests contribute \$21.7 billion per year to Tennessee's economy with private forest timber sales totaling \$288 million in 2011. Tennessee is also capable of generating upwards of \$734 million per year from Great Smoky Mountains National Park attendance. Despite high economic contributions, forests of Tennessee are subject to a host of disturbances that threaten forest health and revenue. Invasive species, wildfires, and droughts among others are key factors in forest productivity decline within the state. However, landowners have a suite of management options that help to mitigate damage while reducing their forests' overall vulnerability.

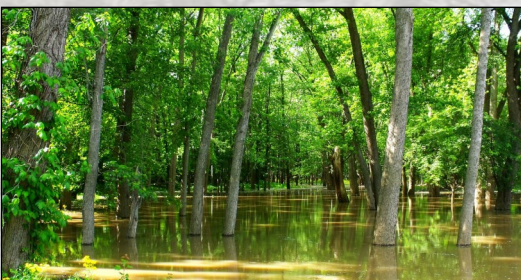


Threats to Our Forests

Threats from Wildfire — Increased fuel loads and more frequent droughts can increase wildfire frequency and intensity within the Southeast. Other impacts include habitat destruction and fragmentation, and biodiversity declines. Prescribing fire to reduce these fuel loads and periodic thinning remain essential techniques. However, timing and control must be appropriate during periods of drought. Salvage logging after extreme weather events or significant timber losses reduces fuel loads and risk of pest or disease outbreaks. Incorporating fire-resistant species may also mitigate wildfire risks.



Threats from Flooding — Extreme precipitation events (more than 2.5 inches in a day) are a common disturbance event within the southeast U.S. Floods impact forest productivity by altering soil conditions and exposing or burying root systems. Reductions in stream water quality, aquatic habitat, aesthetics, and soil productivity can also be observed after flood events. Management practices to mitigate damage include post-disturbance revegetation, maintaining the area's natural hydrology and 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 Drought — Increasing drought frequency and extreme heat can be damaging to forest stands and ecosystems in Tennessee while also impacting water quantity and quality, and species biodiversity. Heat and water stress can leave stands more vulnerable to pests and diseases and may result in minor to substantial dieback. Drought conditions also lead to increased wildfire potential, accelerated soil organic matter decomposition, and changes in vegetation. Management options include thinning to reduce stand water stress, maintaining a canopied riparian zone to reduce stream temperatures, incorporation of drought-resistant 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 Invasive Species — Invasive insects, diseases, and plants can impact forest yield, water quality, and biodiversity and may lead to habitat destruction and fragmentation and loss of aesthetic value in recreation areas. Invasive insects and plants can also outcompete native species for resources, and their effects may be exacerbated during periods of drought. There are management practices to control these threats, including prescribed burning, thinning, proper herbicide or pesticide application, and decreasing the movement of firewood or woody debris. Early detection is critical to finding outbreak areas before the problem can multiply and spread.

Invasive insects such as hemlock woolly adelgid can be treated with insecticide to protect hemlock trees, while other insects such as emerald ash borer may be harder to manage and may warrant a salvage harvest.

Invasive diseases such as laurel wilt, which attacks sassafras, can be carried by insects or accidentally transported by humans, making some of these invasive issues difficult to track.

Invasive plants like kudzu, nonnative honeysuckle and privet, microstegium, princess tree, tree-of-heaven, and many more, can spread easily in disturbed areas and often require multiple years of management to effectively mitigate.



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Threats from Tornadoes — Tornadoes and severe wind events can be locally damaging, and increasing storm frequency will continue to impact forest productivity and timber revenue in areas prone to wind events. Strategies to mitigate wind damage from these events include rotational harvesting to reduce stand age uniformity, modifying thinning frequencies, and clear-cutting smaller exposed stands at maturity while avoiding clear-cut operations at sites susceptible to wind-throw. Following a wind event, salvage harvests may help reduce fuel loads and recover some timber value when applicable.



Threats from Ice Storms — Ice storms are another, lesser known threat to forests. Higher elevations in eastern Tennessee may be more likely to see this type of weather, but ice storms may occur in other areas as well. 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 needles are retained year-round and hold ice. As little as $\frac{1}{4}$ inch of ice can cause breakage. Adaptation to these events includes increasing spacing width, adjusting thinning frequencies to reduce the probability of damage after fresh thinning, and planting resistant species. Post-disturbance monitoring and management of damaged trees may also aid in preventing pest outbreaks and attacks on green timber.

Summary — These threats impact the economic and ecosystem value of Tennessee's forests. Threats from insects, disease, and invasive plants, destructive wildfires, and damaging storms are amplified by warming temperatures and changes in rainfall frequency and amounts. The management methods listed on this sheet are just a few of the available options that help woodland owners improve resilience and reduce risk. Consult your local Area Forester or county extension office for more information about threats and corrective measures appropriate for your forested land.

More information on threats to forest health can also be found at www.ProtectTNForests.org

FOR MORE INFORMATION ON
MANAGEMENT OPTIONS FOR YOUR WOODLANDS:

Contact your local Area Forester or the
Tennessee Division of Forestry office at
615-837-5520

www.tennessee.gov/agriculture/forests