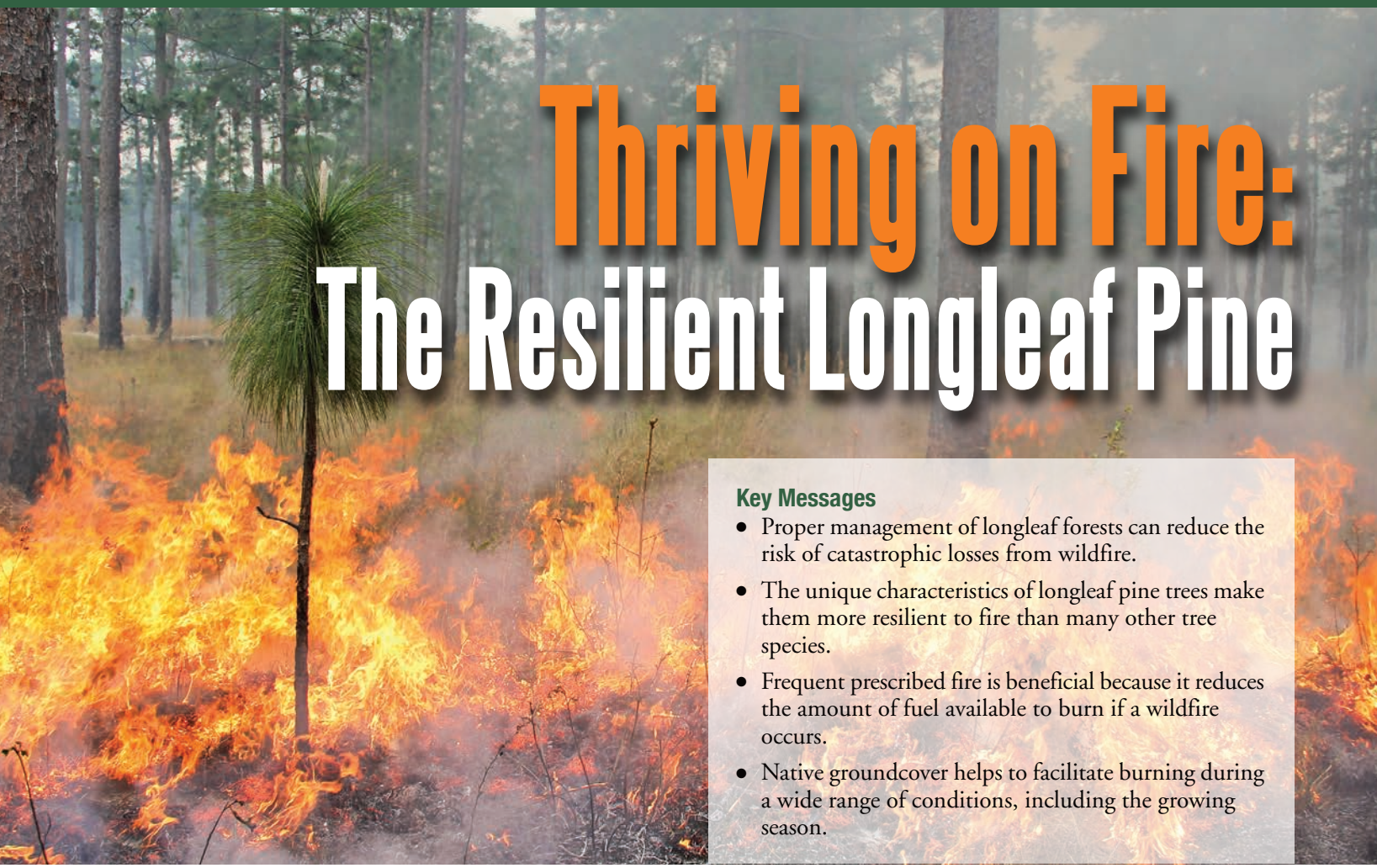

Thriving on Fire: The Resilient Longleaf Pine

Key Messages

- Proper management of longleaf forests can reduce the risk of catastrophic losses from wildfire.
- The unique characteristics of longleaf pine trees make them more resilient to fire than many other tree species.
- Frequent prescribed fire is beneficial because it reduces the amount of fuel available to burn if a wildfire occurs.
- Native groundcover helps to facilitate burning during a wide range of conditions, including the growing season.

Longleaf pine forests provide landowners with benefits such as valuable timber products, exceptional wildlife habitat, and recreational opportunities. Since growing longleaf pine is a long-term investment, landowners must continuously make management decisions and weigh future risks. In the coming decades, landowners may experience an increased risk in their woods due to climate change and other factors including increased insect and disease infestations, windstorms, and wildfire across forests nationwide. Fortunately, when it comes to wildfire, longleaf forests have a unique tolerance due to forest management practices and the fire-resistant characteristics of the tree itself. Proper management and the unique qualities of the tree could ultimately reduce the risk of catastrophic losses from wildfire.

Nature and humans have a long history of shaping the longleaf ecosystem and its ecological processes through fire. Natural fires were historically ignited by lightning, beginning in late spring. These fires were low intensity and frequent (every 2 -5 years on average depending on available fuels). Native Americans began applying fire over 10,000 years ago to manage the landscape for food and game, medicinal purposes, and many of the other reasons we do so today.

For millennia, fires burned across the southeastern landscape until they reached wetlands and mesic hardwood stands or until they were extinguished by rain. But today, the Southeast is fragmented, and various land use changes have altered existing fire patterns. Due to these changes, prescribed fire is an even more important tool for managing the forest.

Proper Management Decreases Wildfire Risk

Proper forest management can influence the impacts of fire on a stand when it is exposed to wildfire. Thinning correctly, and at the right intervals, increases timber value and promotes healthier forest conditions, which ultimately enhances resilience to wildfires. Further, applying prescribed fire reduces the amount of fuel available to burn. When forests are fire suppressed, fuel from shed bark, needles, and other forest debris builds up. During a wildfire, these stands can burn with high intensity, and fire can climb into the crown, often significantly damaging trees.

Increasing and often extended drought conditions, likely to become more frequent with climate change, have the potential to increase the frequency and severity of wildfires. Wildfire can be catastrophic, leading to economic losses, water quality issues, damage to structures and homes, and even worse, endanger human health and safety. There is also evidence that inhaling smoke from wildfires could be more harmful than


A.


B.


C.

smoke from prescribed fire. Therefore, it is important to conduct prescribed burning where it is feasible. In fact, the longleaf ecosystem is fire-adapted and thrives with frequent, low-intensity fire as typically seen during prescribed burns.

Longleaf Pine Provides an Advantage

Fire shapes longleaf pine forests in many ways. It prevents fire-intolerant species from dominating forest stands, controls invasive plants, minimizes insects and diseases, increases groundcover plant diversity, and stimulates seed production and flowering.

Longleaf pines have traits that make them more resistant to wildfire than many other tree species, pine and hardwood alike. In the "grass" stage of a longleaf pine, the terminal bud is shielded from fire by long needles that protect it. The needles absorb and deflect the heat, and as a result, the bud is often spared from exposure to lethal temperatures. Any needles that are burned, grow back quickly.

While longleaf is fire adapted, it is not fire-proof. It is important to have a well-written burn plan and stay within the designated parameters to avoid damaging the stand. When trees start to grow in the "rocket" stage until the young trees reach 5-6 feet in height, they can be still be vulnerable to fire, especially when the terminal bud or "candle" is elongating. There may still be some mortality, even with prescribed burns, if care is not taken. Burning on an interval that prevents fuel

A.) Prescribed fire is a critical tool for managing southeastern forests. Photo credit: Jennifer Fawcett **B.)** Fire can be more intense in fire suppressed stands due to the build-up of fuel. Photo credit: Jennifer Fawcett **C.)** Costly midstory reduction treatments may be needed in stands that aren't burned regularly. Photo credit: Lisa Lord. **D.)** Fire plays a role in increasing and maintaining plant diversity on both mesic and xeric sites. Photo credit: Lisa Lord.

from accumulating near young longleaf is vitally important as it prevents more intense fires from damaging the young pines.

By the time the tree reaches 8 feet in height and 2 inches in diameter at ground level, the bark has thickened, insulating and protecting it from the heat. The lower limbs become pruned by fire, so the canopy of the trees remain above flame lengths. The protective needles and thick bark allow landowners and managers to burn their stands earlier and across a wider range of conditions and seasons with less risk than burning young loblolly or slash pine stands. These other pines don't become fire resistant until around 10 years of age. Cost savings may also be available to landowners who utilize prescribed burning since frequent fire can reduce the need for more expensive mechanical or chemical treatments to control unwanted vegetation.

Finally, longleaf with native groundcover is advantageous because the combination of needle cast and understory fuels facilitate burning during a wide range of conditions, including the growing season.

Conclusion

Longleaf offers resilience for an uncertain future. As a result of climate change, we may encounter more droughts, windstorms, and wildfires. Longleaf, even densely planted, is more resilient to these disturbance events and better adapted to survive.

Longleaf offers the ability to burn (better needle cast) and tolerate (bark and fire adapted early stages) fire under a wider range of conditions as compared to other southern yellow pine species. Landowners should consider planting or restoring longleaf or maintaining their existing longleaf forests as one way to reduce risk from wildfires. The longleaf pine ecosystem is not only physically adapted to tolerate fire, but the ecosystem itself thrives when fire is present.

Active longleaf management may be more costly but incentive programs are available to assist landowners with firebreaks, burning, establishment, midstory hardwood control, and other practices. Check with your local state forestry agency or the USDA Natural Resources Conservation Service office to see what resources may be available to you.

References

Addington, R. N., Hudson, S. J., Hiers, et al. 2015. Relation ships among wildfire, prescribed fire, and drought in a fire-prone landscape in the southeastern United States. International Journal of Wildland Fire 24: 778–783.

Brey, S.J., E.A. Barnes, J.R. Pierce, C. Wiedinmyer, and E.V. Fischer. 2018. Environmental conditions, ignition type, and air quality impacts of wildfires in the southeastern and western United States. Earth's Future 6:1442–1456.

Davis, L. S. and R.W. Cooper. 1963. How prescribed burning affects wildfire occurrence. Journal of Forestry, 61, 915–917.

Frost, C. 1993. Four centuries of changing landscape patterns in the longleaf pine ecosystem. Pages 17–43 in Hermann, S.M., editor. Proceedings of the Tall Timbers Fire Ecology Conference, 18. Tall Timbers Research Station, Tallahassee, FL.

Kupfer, J.A., A.J. Terando, P. Gao, C. Teske, and J.K. Hiers. 2020. Climate change predicted to reduce prescribed burning opportunities in the south-eastern United States. International Journal of Wildland Fire.

Outcalt, K.W. and D.D. Wade. 2004. Fuels management reduces tree mortality from wildfires in southeastern United States. Southern Journal of Applied Forestry 28(1):28–34.

Varner, J.M., D.R. Gordon, F.E. Putz, and J.K. Hiers. 2005. Restoring fire to long-unburned Pinus palustris ecosystems: novel fire effects and consequences for long-unburned ecosystems. Restoration Ecology 13(3):536–544.

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