

## Promoting hurricane resistance in planted longleaf pine stands

Mature longleaf pine woodlands of the southeastern U.S. support high biodiversity and are home to many imperiled species. But longleaf pine ecosystems have been reduced to 5.5% of their historic range. They also face threats from increasing hurricane activity.

Hurricanes routinely occur in the Atlantic and Gulf Coastal Plain, including most of the native range of longleaf pine. A 300-year-old longleaf pine will endure tropical storm winds nearly 50 times throughout its life, even in the inland portions of its range.



*Moderate hurricane damage to a longleaf pine stand located near Chipola, Florida. Photo by Seth Bigelow*

Ecologists are beginning to recognize that hurricane disturbance is an integral part of the longleaf pine ecosystem. Yet, severe winds from hurricanes and other windstorms can cause setbacks to restoration efforts of the species. Managing planted longleaf pine stands in a way that promotes resistance to severe wind can help ensure success of longleaf pine restoration efforts.

To better guide how longleaf pine stands can be managed to promote wind firmness, we surveyed hurricane mortality in stands of longleaf pine after Hurricane Michael in 2018. We selected 87 plots stretching from northwest Florida to southwest Georgia. Our findings provide guidance on how to increase wind resistance in longleaf pine for landowners who wish to maintain open-canopy woodlands. First, mortality was highest in fragmented landscapes. Minimizing roads and edges, and planting new stands adjacent to existing stands can all boost wind resistance. Second, trees with high taper (ratio of breast-height

diameter to height) were the most windfirm. High stem taper can be promoted in stands by maintaining lower stocking through frequent and low-intensity thinning. Third, trees with canopies taller than surrounding trees were particularly vulnerable to wind damage, whereas trees with a low height relative to neighbors were more windfirm. Managing stands to develop a smooth canopy can help resist damaging winds. Maintaining some diversity in size and age of trees is also important, because surviving midstory individuals are crucial to site recovery from wind damage.

Many large-scale efforts to restore longleaf pine ecosystems emphasize coordinated planting throughout its range. Managing newly planted stands in a manner that increases wind firmness is an essential part to ensuring restoration efforts can withstand the risk posed by increasing hurricane activity.

### MORE INFORMATION

Whelan, A.W., S.W. Bigelow, C.L. Staudhammer, G. Starr, J.B. Cannon. 2024. Damage prediction for planted longleaf pine in extreme winds. *Forest Ecology and Management* 560, 121828. <https://doi.org/10.1016/j.foreco.2024.121828>

### CONTACT

Andy Whelan, [andrew.whelan@colostate.edu](mailto:andrew.whelan@colostate.edu)  
Dr. Jeffery Cannon, [jeffery.cannon@jonesctr.org](mailto:jeffery.cannon@jonesctr.org)  
Dr. Seth Bigelow, [sbigelow@talltimbers.org](mailto:sbigelow@talltimbers.org)

### KEY POINTS

Longleaf pine ecosystems are threatened by increasing hurricane activity which may set back restoration efforts throughout its range.

Managing stands to reduce fragmentation, increase taper, and increase canopy smoothness can improve resistance to severe winds.

Management decisions can affect longleaf pine wind resistance and contribute to the success of range-wide conservation efforts.