

Longleaf Destinations



Recovery and Resilience of a Longleaf Forest in the Aftermath of Hurricane Harvey — The Nature Conservancy's Roy E. Larsen Sandyland Sanctuary

Brown-headed nuthatch. Photo by Matt Buckingham.

Located in Hardin County, two hours east of Houston Texas, The Nature Conservancy's Roy E. Larsen Sandyland Sanctuary is an example of the terrestrial and aquatic diversity of the western extent of the coastal plain in southeast Texas. This diverse landscape, historically known as the Big Thicket, includes wet pine savannas, bald cypress-water tupelo swamps, baygalls, bottomland hardwood forests, American beech-southern magnolia slope forests, mixed pine oak forest, xeric longleaf pine sandhills and woodlands, herbaceous seepage/pitcher plant bogs, and pine flatwoods.

The Sandyland preserve protects 2,848 acres with conservation easements (2,806 acres added in 1994 and 1995) to create a sustainable working forest and conservation area for longleaf pine and associated ecosystems. The original easements were granted with Temple-Inland, then were managed by Campbell-Global LCC, and are now held with CatchMark (Triple T). The Conservancy works cooperatively with Forest Resource Consultants (FRC) which oversees the easement property. The 5,654-acre project is contiguous with the 3,600-acre Village Creek Corridor Unit of the Big Thicket National Preserve. Since the Sandyland preserve is adjacent to Big Thicket National Preserve, it is included in the United Nation's UNESCO designation of the Big Thicket as a Biosphere Reserve.

The Sandyland Sanctuary serves as a public access nature preserve, a demonstration site for land and water management practices, an outdoor classroom for education and outreach

activities, and a conservation site for the protection of ecologically significant species. The site has been designated as one of the top 500 important bird areas by the American Bird Conservancy and is Site # 17 on the Upper Texas Coast Loop of Great Texas Coastal Birding Trail.

Flooding the Forest

The tannic waters of an 8.5 mile stretch of Village Creek, a major tributary of the Neches River, flows through the western edge of the preserve. The Neches, a historic water and current route for shipping and navigation, ultimately empties into the Gulf of Mexico. Village Creek has flooded parts of the preserve before, including during the most recent hurricanes of Ike (2005) and Rita (2008).

Hurricane Harvey brought unprecedented rainfall in 2017 with over 35 inches of rain falling in five days, compared to a regional average annual precipitation of 54 inches. Village Creek rose quickly and, within five days, had flooded most of the preserve. Average flood depth across the preserve was 12 feet, with some areas flooding as deeply as 20 feet. Flood water remained over much of the preserve for 3-7 days, with areas closer to Village Creek being flooded for as long as 22 days. Flood waters covered most of the xeric, ancient alluvial sand deposit ridge of the preserve, the heart of the longleaf pine woodland on the site.

Trees Like Water, But Only If They Can Breathe

The Nature Conservancy team started vegetation monitoring in 2014 and have been counting and measuring pines of all

sizes across the preserve since that time. Our plan was to understand how management treatments (including chemical and mechanical shrub clearing, and prescribed fire) were affecting tree reproduction and recruitment. Having those

Some Birds Don't Like Rain

Since 2015, avian surveys have been conducted at many of the vegetation monitoring plots where we are measuring the trees. Some of the most common birds heard before the flood



Texas trailing phlox *Pblox nivalis* ssp. *texensis*. Federally endangered species of the xeric longleaf uplands of the preserve. Photo by Matt Buckingham.



Scarlet catchfly (*Silene subciliata*), listed as state rare in TX. Found in longleaf uplands and often on transitional zones to baygall. Along with the Texas trailing phlox and white firewheel it benefits from the application of fire for maintaining a herbaceous dominated groundcover. Photo by Matt Buckingham.

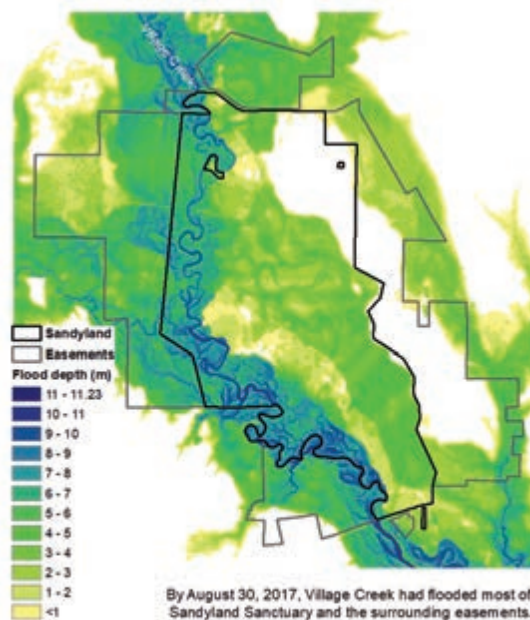


The white firewheel is considered rare in Texas found only in Hardin, Tyler and Polk Counties in southeast Texas. Photo by Matt Buckingham.

detailed measurements from before the flooding meant that we could also understand how the flooding affected the trees.

Overall, the canopy-sized trees survived the flooding almost completely unscathed. Only 2% of trees (all species combined) were lost. Longleaf regeneration did not fare as well, especially in areas where the flood waters covered the plants completely for multiple days. Overall, approximately 15% of grass-stage, rocket-stage, and sapling-sized longleaf succumbed. The dead pines were clustered in areas with deeper flood water, meaning that there was 100% mortality of the young pines in some areas, but very few pines died elsewhere on the preserve. We hope that having surviving canopy-sized pines throughout the stands means that those young pines will soon be replaced. Monitoring will continue to assess the need for supplemental planting. We will also continue to check on the overstory trees for a few more years to see whether any trees that were stressed by the flooding eventually die from other causes.

were pine warblers, northern cardinals, white-eyed vireos, and blue jays. Most of the birds in the area are ground-foraging (44%), followed by foliage insectivores (25%), bark insectivores (24%), and aerial insectivores (5%). Surveys were repeated in the spring after the flood, and many of the same species were heard; the distribution of species among the foraging guilds also remained very similar. Three bird species became much less common: blue jays, brown-headed nuthatches, and northern mockingbirds. These three species don't migrate, so they were in the area during the storm. We're not sure why they are less common now, but they could have flown away to avoid the storm and flooding, or perhaps some individuals were killed during the storm. The yellow-throated vireo, a migratory species that was not present during the storm, became more common. Northern bobwhite, another resident species, also became more common. In fact, while we knew that bobwhite was present on the preserve, we had never heard them during our point-count surveys until



Hurricane Harvey's record flooding of the Roy E. Larsen Sandyland Sanctuary, Hardin County, Silsbee, Texas.



Before Harvey 2015



October 2017

after the flooding. Bird surveys in the spring of 2019 will be conducted to see whether these changes are temporary.

Eyes and Action on The Future Forest

One issue of concern after the flood is the introduction of non-native/invasive species into new areas of the preserve. Of particular concern with the extensive floodwaters is the potential for new locations of Chinese tallow. Preserve staff continue to monitor the preserve for new infestations of tallow and other undesired species.

Much of the past year was needed for recoup and repair of equipment, inventory, vehicles, building and road infrastructure, and personal residences. Given these factors and the unknown amount of stress on forest stands, the preserve was not subjected to prescribed burns for one year following the flooding event. With the movement of organic material and woody debris, pre-burn assessment and burn prescriptions will include physical inspection of the burn unit. Ignition patterns may be altered to protect mature longleaf if accumulations of materials would cause

detrimental fire behavior, or in other areas where soils were scoured of pine needle and leaf litter.

Rare species of the preserve will continue to be surveyed. To date, three species of rare plants of the preserve, the endangered

Texas trailing Phlox (*Phlox nivalis* spp. *texensis*), state threatened Scarlet Catchfly (*Silene subciliata*), and White Firewheel (*Gaillardia aestivalis* var. *winkleri*), all appear to have suffered no significant loss.

The preserve will continue to serve as a demonstration site to understand more about the impacts of natural disturbances on our environment and human-made resources. While our infrastructure was significantly impacted from this event, the resilience of our iconic longleaf pine ecosystem and other associated systems was significant.

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Roundstone Native Seed LLC is proud to be a part of The Longleaf Alliance. It is our passion, our drive, and our mission to make a positive difference in the natural landscape by working alongside longleaf conservationists and enthusiasts. We are grateful that the seeds we gather and produce grow into appropriate longleaf ecosystem understory.



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