MOUNTAINS

WORD FROM THE SMOKIES

Plant life makes comeback after 2016 wildfires

Word from the Smokies
Alix Pfennigwerth
Guest columnist

A few days after the arson-caused 2016 Chimney Tops 2 wildfire spread across 11,000 acres of Great Smoky Mountains National Park, Rob Klein, a National Park Service fire ecologist, hiked up the park's Bull Head Trail.

Amid the charred, blackened landscape, tiny wisps fluttered through the air. He wondered if it was some sort of insect. But as he knelt to pick one up, he suddenly realized what he was seeing: dozens of the tiny, winged seeds of Table Mountain pine.

To understand why this was happening, Klein needed to understand more about Table Mountain pine trees and their cones.

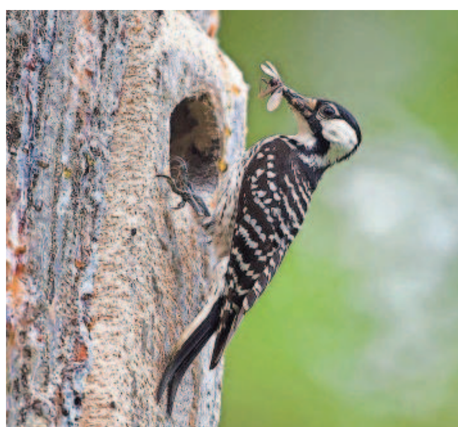
Table Mountain pine, native to southern and central Appalachia, grows on high, dry, rocky slopes, including about 18,000 acres in the Smokies. It produces seed-bearing pinecones that are sealed tightly shut with a glue-like resin.

Try prying one of these stout, prickly cones open with your bare hands, and you'll find the task nearly impossible. But light a fire near that cone, and the resin melts easily away, allowing the cone to unfurl and release dozens of seeds. By clearing understory growth and leaf litter accumulation, fire also creates an ideal germination habitat for Table Mountain pine seedlings.

Pine species throughout the world produce similar resin-sealed cones, a phenomenon scientists call "cone serotiny." The common thread across species exhibiting cone serotiny? Fire. The trait is typically always associated with ecosystems in which fire is a recurring, natural process.

"When people think about the Southern Appalachians, they think about temperate rainforests, waterfalls, or beautiful rivers," said Klein, who recently received a regional NPS Wildland Fire and Aviation Excellence Award. "But fire is a really critical part of the ecosystem. It just tends to operate in a different part of the landscape."

Specifically, it tends to operate in pine- and oak-dominated forests in the drier, western portion of the park. These forests make up over a third of the park's landscape.



The federally endangered red-cockaded woodpecker needs old-growth pine forests that burn regularly in order to thrive. PROVIDED BY US FISH AND WILDLIFE SERVICES, MARK RAMIREZ

A Table Mountain pine seed, released from a Table Mountain pinecone, on ground burned by the 2016 Chimney Tops 2 fire, near Bull Head Trail in Great Smoky Mountains National Park, Dec. 1, 2016. PROVIDED BY ROB KLEIN

National Park Service fire ecologist Rob Klein discusses the impacts of the 2016 Chimney Tops 2 fire on forest vegetation during a 2017 field trip. The fire impacted several trails in the park, including Cove Mountain Trail, pictured here. PROVIDED BY KATHERINE MEDLOCK OF THE NATURE CONSERVANCY

Studies of soil and pond charcoal indicate that these forests have burned regularly for at least the past 10,000 years. Research on tree growth rings and fire scars — which provide shorter-term, but finer-resolution information — has found that before the park's establishment in 1934, fires burned every five to 15 years in the western part of the park. Some of these fires likely ignited naturally by lightning strikes, but many were wisely set by Native American populations, as they had been for millennia, to maintain healthy ecosystems and wildlife habitat.

When Great Smoky Mountains National Park was established in 1934, fire on this landscape changed profoundly. In an effort to protect structures, lives, and resources, "the federal government had an aggressive policy of putting all fires out," Klein said. But by the 1980s, researchers and park managers "started to notice that pine trees were not reproducing and species like the red-cockaded woodpecker — which lives in old-growth pine forests that burn regularly and is now federally endangered — were starting to disappear."

By putting every fire out, we inadvertently removed fire's ability to naturally maintain these landscapes. Plant, insect, and wildlife species that relied on fire-adapted habitats were disappearing. Dense, shrubby thickets and woody debris accumulated in the understory, and fires were likely to be more intense and more destructive.

But things changed in 1996 when the park released a new fire management plan.

"Prior to 1996, the only thing the park could do with fire was put it out," Klein said. Under the new plan, park managers could use prescribed fire, also known as controlled burns, to reduce hazardous fire fuel loads that posed a threat to park infrastructure, surrounding communities, and natural ecosystems.

Controlled burns are useful and generally low-risk because fire managers can conduct them on their own terms, under precise temperature, humidity, and wind conditions. Park managers continue to put out all unnatural wildfires like the arson-caused Chimney Tops 2 wildfire and the more recent Thomas Divide wildfire that started from a downed powerline outside the park boundary.

"If we're able to reduce fuels and create a more resilient forest by using prescribed burning under the conditions that we choose," Klein said, "fuels will be reduced in the event of an unplanned wildfire, and the forest will be able to survive and recover better."

After collecting data on the effects of controlled burns in the park for over 20 years, Klein said the fires have been successful at removing hazardous fuels and overgrowth and returning these forests to a more natural and resilient state. While the park has limited resources and typically can't burn more than a few thousand acres each year, by prioritizing high-fuel zones near surrounding communities and ecologically important ecosystems, they can maximize their impact and, in the long-term, decrease the risk of destructive wildfires like the Chimney Tops 2 wildfire.

About three months after Klein originally hiked up Bull Head, he made the trek again. What he saw left him in awe: thousands upon thousands of tiny Table Mountain pine seedlings, fluorescent green needles reaching towards the sun out of the charred earth.

Hike Bull Head today, and you'll find those same Table Mountain pines, now a forest of chest-high trees. A forest just doing its thing, telling the story of fire and adaptation in the aftermath of a destructive fire season.

"We're watching this natural process, which has been occurring for thousands of years," Klein said. "We're watching it occur and unfold right in front of our eyes. And that's a pretty cool thing."

Alix Pfennigwerth is a freelance science writer who contributed this story in collaboration with Great Smoky Mountains Association. Previously, she worked as a biologist for the U.S. Geological Survey and the National Park Service. You can follow her on Twitter @a_pfennigwerth and reach her at alix.pfennigwerth@gmail.com.

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