

National Parks

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THE LASSEN EFFECT

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FOR BATS?**

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Saving Goliath

Can a tiny beetle rescue Shenandoah's mighty hemlocks?

MORE THAN 20 YEARS AGO, A VISITOR FROM ASIA showed up in Shenandoah National Park. The new arrival was small and unassuming. In fact, if it weren't for little white tufts visible on eastern hemlock needles, you'd have been hard-pressed to notice the newcomer. Then, the hemlock woolly adelgid got busy doing what it does best: literally sucking the life out of some of the park's most majestic trees.

SHENANDOAH NATIONAL PARK OFFICIALS estimate that 95 percent of the park's eastern hemlocks have been lost to a pest that came from Asia. Dead hemlocks rarely fall and become known as "gray ghosts."

What followed has been an epic battle between one of Shenandoah's oldest and tallest residents and one of its newest and tiniest. And as in the David and Goliath parable, Shenandoah's giants are not winning. With little resistance from the trees and few natural enemies, the aphid-like insects have eaten their way through the park, feeding on the sap of the hemlock until the needles desiccate and fall off. Because the hemlock rarely falls when it dies, the victims of the infestation are known as "gray ghosts," somber reminders of what was lost. Today, park officials estimate that 95 percent of Shenandoah's hemlocks have succumbed to the adelgid.

To preserve Shenandoah's remaining hemlocks, a handful of park employees inject insecticide into the soil around each individual tree—a time-consuming process that must be repeated every seven years and is not sustainable in the long run. So the park has called for some outside help. *Laricobius osakensis* is a small brown beetle that feeds exclusively on the adelgid in its native habitat in Japan, keeping the population of the hemlock foe in check. Letting the beetle loose in Shenandoah might seem like a perfect solution to the problem, but introducing an exotic critter is no small matter in a park that is already beleaguered by hundreds of invasive species, from kudzu vine to European starlings.

Shenandoah officials passed on the idea of using other predatory beetles to control the adelgid because they thought the risks would outweigh the potential benefits. But scientists at Virginia Tech have conducted research showing that *L. osakensis* is unlikely to wreak havoc on the park's ecosystem. Those findings, and the fact that the beetle is a prey-specific predator whose life cycle

is synchronized with that of the adelgid, convinced park biologists to give it a try.

"Some refer to it as playing God to a certain extent, so we had a lot of deliberate dialogue here in the park," said Jim Schaberl, the park's chief of natural and cultural resources. "We didn't want to bring in something and then unintentionally cause harm."

The hemlock woolly adelgid, which was first documented on the East Coast near Richmond, Virginia, in 1951, most likely caught a ride on nursery trees shipped from Japan. Since then, it has colonized much of the tree's range from Georgia to Maine, including several national parks. Will Blozan, the president of the Eastern Native Tree Society, documented old-growth hemlocks in Great Smoky Mountains National Park a decade ago. Now, virtually all those hemlocks, including some 160-foot-tall giants, are dead. Located closer to the epicenter of the infestation, Shenandoah had even less time to react. The adelgid was first detected there around 1990, and in just a few years, it had torn through the entire park.

Nicknamed "the redwood of the East," the eastern hemlock is a towering conifer prized for its ornamental value. Its bark was widely used for tanning leather, but the relatively poor quality of the wood limits its use to roofing, boxes, or paper pulp. Within Shenandoah's ecosystem,

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though, the hemlock is irreplaceable. Migratory warblers favor it for their nests, and it provides valuable shade to residents of the park's streams such as brook trout, which need cool water.

"That's why we fight so hard to retain some level of those hemlocks out there," said park biologist Rolf Gubler, who's also a forest pest manager.

The insecticide Shenandoah staff have been applying is similar in chemical structure to nicotine. It's effective, but introducing the beetle is an appealing option because it would diminish the need for chemicals, and if the population takes hold, it would be more efficient than repeatedly treating infested trees one by one.

Until a decade ago, nobody even knew of *L. osakensis*' existence. The hemlock woolly adelgid wasn't a problem in Japan, so nobody there was looking for a solution. It was only after the pest triggered an epidemic in the United States that researchers here teamed up with their Japanese counterparts to survey the adelgid's native territory. After the predatory beetle was identified in 2005, it was shipped to the United

States, where scientists studied its biology and assessed the risk of releasing it into the wild to control the adelgid.

The first releases occurred in the region in 2012, and last November, Shenandoah biologists set 500 beetles free in a hemlock grove in the southern section of the park. The trees were suitable because they were contiguous, had never been treated with insecticide, and were relatively healthy while supporting enough adelgids to feed the predators. The beetles are difficult to raise in captivity, so scientists carefully select locations where they can potentially save the most trees. The hope is that they will reproduce in a natural environment and later, can be harvested and dispatched elsewhere.

The future of the eastern hemlock is still uncertain. The predatory beetles alone can't stop the adelgid infestation until they develop large and sustainable populations, but the combined use of insecticide and the pests' natural predators could give the trees breathing space until they develop some natural resistance. There is hope in the tree's history. Several thousand years ago, hemlock pollen virtually disappeared from the fossil record when the East Coast experienced a prolonged period of drought. The hemlock later returned in numbers.

"They'll be back," Blozan said. "It's a really patient tree." NP

NICOLAS BRULLIARD is associate editor of *National Parks* magazine.

THE LATEST SCOURGE

The adelgid (attacking a hemlock at left) has company. The emerald ash borer, another tree killer from Asia, has been moving swiftly through Shenandoah. To protect ash trees from further infestation, park authorities have restricted the use of firewood gathered or bought outside the park.

