

*A group of environmental activists  
moved an endangered conifer to  
North Carolina in an attempt to save it.  
Are their extreme efforts bold or simply misguided?*

# Rewilding A Native

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**T**ime has not been kind to *Torrey taxifolia*, a slow-growing federally endangered conifer known for the sharp scent its needles release when they are crushed. Fossils of branches and leaves lead botanists to speculate that the tree once blanketed the southern Appalachian Mountains. Now struggling for survival, it is confined to a narrow strip of habitat in southern Georgia and along the eastern banks of the Apalachicola River in northern Florida.

But *Torrey*'s luck might be changing. Last summer an activist group called the Torrey Guardians planted 31 *Torrey* seedlings near Waynesville in an effort to save the species from global warming's onslaught. They believe that moving the tree north will increase its ability to produce seeds. Though it will take years to determine whether the group is right, their work highlights what is fast becoming a pressing question for the conservation community: In the face of human-induced climate change, when is it okay to interfere with nature in order to save it?





### Glacial relict

The nation's largest *Torrey taxifolia* grows in Warren County, on a Ridgeway farm near Norlina. Historians believe Congressman Weldon Edwards planted it on his Poplar Mount plantation in the mid-1800s. Photos reveal that more than a century later, the evergreen stood 53 feet tall, with a 45-foot crown. Over time the large branches died, leaving the tree a thin, gnarled shadow of its former self.

The wild *Torrey* population has suffered a similar fate. In the early 1900s approximately 600,000 of the trees lived in the wild, where healthy adults grew as tall as 60 feet and up to 3 feet around. The species began dying during the 1950s, and by the mid-1960s, the adult trees were gone. Botanists

suspect several different fungi are partially to blame. *Torrey* was added to the federal Endangered Species List in 1984, and today fewer than 1,000 specimens survive. Unfortunately, almost all are stunted saplings that cannot produce seeds. Most of them grow in the Florida steepheads, deep ravines that slice through the bluffs on the Apalachicola River's eastern bank.

*Torrey* belongs to the ancient yew family. The most recent fossils from the genus *Torrey* come from the upper layer of rock formed during the Cretaceous period—100 million years ago. They were found in North Carolina and Georgia. During the last Ice Age, which peaked 18,000 years ago, plants from the Appalachian Mountains migrated

south as the ice sheets advanced. Many of these plants, *Torrey* included, found refuge in the moist, shady steepheads, where they remained after the glaciers receded. *Torrey* is now endemic to its Apalachicola habitat. Many consider it one of the world's most endangered conifers.

*Torrey* expert Robert Nicholson speculates that although the reasons behind *Torrey*'s decline are complex, global warming is likely a factor in its current situation. "If you look at the tree's geologic history, it is more at home in cooler habitats," Nicholson says. "By settling in this cool, moist place, it has positioned itself as a canary in the coal mine. Rising temperatures will have an impact on the tree."





The nation's largest *Torrey* still stands in Norlina at around 150 years old, but it definitely was in better health in the early 1970s (inset).



#### *Deep-time perspective*

Conservation activist Connie Barlow encountered her first *Torrey* while working on her 2001 book "Ghosts of Evolution." After exploring the role the steepheads played in preserving the biodiversity of present-day North American forests, she began examining *Torrey*'s plight from the perspective of geologic history, or deep time.

In her book, Barlow proposes that millions of years ago, *Torrey taxifolia* got trapped in the Florida panhandle because it lacked a seed disperser. She suggests the tree would have moved north under ideal circumstances. She expands this theory in a 2004 article, "Bring *Torrey taxifolia* North—Now," published in *Wild Earth* magazine. Together with co-author Paul S. Martin, Barlow asserts that global warming will further decrease the tree's chance of survival, if it stays where it is. The writers call for moving the tree north to the Southern Appalachians in order to save it.

Already there is mounting evidence that the tree can succeed in North Carolina. A small grove has thrived in Asheville's Biltmore Gardens for more than 65 years. Bill Alexander, Biltmore's forest historian, agrees with Barlow about moving *Torrey* and believes our state will make a suitable habitat for the tree. "It's been planted in private gardens for at least 100 years, and it's not known to be invasive," he says. "Plus, it's unlikely to survive in the wild."



The U.S. Fish and Wildlife Service administers an official recovery plan for endangered species. Scientists are working to preserve wild *Torreya*, clone the genotypes and then replant the offspring in or near the tree's native habitat. But Barlow believes more must be done now to save the tree. Landowners can legally plant *Torreya* on private property as long as the seeds come from private stock, and for Barlow, this looks like the best solution. Because *Torreya* represents a tree that has survived on Earth for millions of years, she says, moving it is grounded in an effort to save biodiversity. "*Torreya* is really a symbol of the increasingly difficult decisions conservationists will face as they try to decide what is native and what interventions will be used to preserve this biodiversity," she adds.

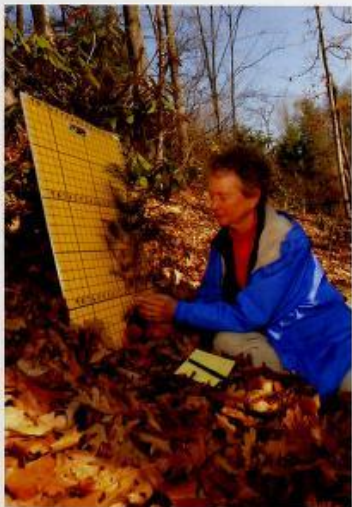
#### Rewilding in North Carolina

In 2004 Barlow formed Torreya Guardians ([www.torreyguardians.org](http://www.torreyguardians.org)), an all-volunteer Web-based group dedicated to saving the tree. She wanted to engage citizens in *Torreya*'s predicament and create a forum for discussing the pros and cons of moving the Eastern species of this genus north. "I wanted to move the debate forward and provide a model for citizen naturalists, even those who disagree, to prove you don't have to be an expert to do something useful. It is possible to take action on behalf of one species."

Group members include scientists, botanists, horticulturists and ecologists—not all of whom share Barlow's commitment to planting the tree outside its native range. Waynesville horticulturist Lee Barnes focused his dissertation on propagating *Torreya* with tissue culture. He joined the group early on and agreed to help disperse seeds to botanical gardens and private land-owners in the Southeastern Appalachians. Biltmore's Alexander, also a member, collected and donated 310 seeds to the cause. But the Biltmore supply of *Torreya* seeds isn't guaranteed. Last fall Alexander reported that because of the drought, the garden's trees produced no seeds at all.

The project still has a way to go. "I think less than a dozen have done well," Barnes says. "The seeds need to go through freezing and thawing cycles to germinate, and we tried to do that in a refrigerator. We're now learning from the Atlanta Botanical Garden how to improve our technique, so we hope to send more seeds out."

Meanwhile a small group of Torreya Guardians began planning a "rewilding" that would bring the tree north. They located a South Carolina nursery with 30 seedlings, all propagated from the champion tree in North Carolina, and started looking for planting sites near Waynesville, so Barnes could monitor the trees and collect seeds.



Left, Linda McFarland of the Corneille Bryan Native Garden measures the growth of a *Torreya* seedling at the Lake Junaluska garden. Horticulturist Lee Barnes checks a seedling named for conservationist Maxilla Evans planted at the Evans family's Waynesville property.





Small metal tags mark seedlings that were planted by the *Torrey* Guardians and named after different conservationists.

#### LEARN MORE

Assisted migration has been covered in scientific literature and the popular press. A working group sponsored by the National Science Foundation plans to release recommendations related to the issue later this year. For information, visit [www.nd.edu/~hellmann/MRWorkingGroup/Managed\\_relocation.html](http://www.nd.edu/~hellmann/MRWorkingGroup/Managed_relocation.html).

Waynesville resident Sara Evans joined the Guardians after meeting Barlow. "When I heard about Connie's love for *Torrey* and her plans to move it," Evans says, "I felt a deep connection to her." Evans' mother, Maxilla, had a similar passion for *Shortia galactifolia*, an evergreen perennial called Oconee bells for its distinctive white flowers. In 1990 Maxilla helped establish the Corneille Bryan Native Garden, a 1-acre preserve located near Lake Junaluska that is home to 500 species of trees, shrubs and other plants. Evans now lives on her mother's land for half the year. When she learned the Guardians were looking for planting sites, she quickly volunteered her property and the Bryan Garden.

On July 30, 2008, 11 volunteers gathered at the Lake Junaluska garden to plant 10 *Torrey* seedlings. Linda McFarland, chair of the garden's board of directors, was one. "When I first heard about the planting, I thought it was a nice opportunity for the garden," she says. "But the more I learned about it, the more compelling it became. The debate over how to preserve plants, which includes reintroducing *Torrey*, captured my attention. It's interesting to be a part of it."

The garden sits at 2,600 feet above sea level, in a shady ravine surrounding a stream fed by seeps and springs. Eight of the seedlings were planted on east-facing slopes, in the understory. The other two were planted in sunnier locations, so the Guardians could compare the trees' progress. "We chose these two microclimates intentionally so we can give people advice on where *Torrey* will grow and thrive," Barnes says. The group planted both male and female trees, spacing them so they could cross-pollinate. "Our goal is for them to be healthy in five to 10 years, when they will likely produce seeds," Barnes says.

With those seedlings in the ground, the group caravanned to Waynesville to plant 21 more—including one from the Atlanta Botanical Garden—on Evans' land. The mountainside property sits higher than the garden, at 3,400 feet, so the Guardians will compare the two elevations. It too has different microclimates, some shady and moist, others sunny and drier. Now each is home to a *Torrey* seedling.

Barlow photographed the trees and, in the spirit of Jane Goodall, gave them names



instead of numbers. Each seedling bears an inscribed silver tag in honor of a conservationist. Walking among them you will encounter John Muir, Rachel Carson, Annie Dillard and Maxilla Evans.

#### Conservation controversy

By actively rewilding *Torrey* in Waynesville, the Guardians became the first group in the country to attempt "assisted migration," a controversial practice of moving a species to save it. Amidst mounting evidence that plants and animals are already trying to escape to cooler climates to survive global warming, scientists are considering the possibility that without human help, many may not be able to make the move. There are too many obstacles—cities, highways, bridges, farms—in the way. Assisted migration, once dismissed by conservationists may become a tool they rely on to avoid extinction.

*Torrey* expert Nicholson, the conservatory manager at Smith College's Botanic Garden, is among those experts who believe humans should take steps to help plants and animals survive global warming. "We've always impacted the landscape, and there will have to be more management from us in the future," he says. "We have to figure out how to do that."

Not everyone agrees that moving species is the best strategy. Biology professor Mark Schwartz of the University of California-Davis has studied *Torrey* for 20 years. In his article "Conservationists Should Not Move

The group planted both male and female trees, spacing them so they could cross-pollinate. "Our goal is for them to be healthy in five to 10 years, when they will likely produce seeds," says horticulturist Lee Barnes.



*Torreyia*," which appeared alongside Barlow's in *Wild Earth*, he argues that far too little is known about the consequences—intended and otherwise—of assisted migration, and he insists the practice should be undertaken with extreme caution. He believes that assisted migration should take place only when extinction is imminent, after conservationists have exhausted efforts to revive native populations. Instead of moving *Torreyia* north, Schwartz counters, now is the time to explore local solutions.

Peter White, director of the N.C. Botanical Garden, is another expert who views assisted migration as an extreme strategy for saving plants. "When do you abandon hope of preserving nature where it is?" he asks. In the case of *Torreyia*, White agrees with Schwartz. He thinks moving plants can be useful but believes assisted migration should be done as part of federally administered recovery plans. A better strategy, he says, is to preserve genetic diversity in seed banks, because it is easier and cheaper.

The debate over global warming is a useful one, he adds, because it raises the issue of the role that humans play in shaping our environment. "The effects of global warming are hard to predict," White says. "Some plants might thrive. Up until now, it's been survival of the fittest. Now, how do we filter out man's role and then let the fittest survive? Assisted migration gets at the heart of the question: What is man's role, and what is nature's role?"

For Rob Evans, a plant ecologist with North Carolina's Plant Conservation Program, assisted migration sounds a number of alarms. He too believes conservationists must first do everything possible to preserve plants in their native habitat, and he cautions against encouraging private landowners to get involved in moving plants. "How do you decide which plants to move and why?" he asks. "Sometimes individual efforts take away from urgent conservation needs. People with the best intentions can move things around and strongly affect natural dynamics in a way that creates problems." Although *Torreyia* is a native species, there are numerous examples of introduced non-native invasive species such as kudzu and Japanese stiltgrass that are choking native ecosystems.

Barlow is well aware of the potential for such ecological disaster, yet she still believes that rewilding *Torreyia* in North Carolina is the right thing to do. "It's not introducing a new species, but returning a deep-time native to the state," she says.

As of April 2009, 30 of the rewilded seedlings were growing. Those planted in sunny, drier locations showed signs of sunscald, but the others looked healthy. Many had sprouted new growth, and all measured close to 18 inches tall. Because the trees were planted during the drought, Barnes watered them weekly for a month, but he has since left them alone. The *Torreyia* Guardians plan to monitor the seedlings, without helping them, as long as they are alive.



*Torreyia taxifolia*, an evergreen conifer tree, features large seeds and needles that emit a strong scent when crushed. Above left, structures of a male tree, and right, a developing fruit on a female tree.

By taking action on behalf of *Torreyia taxifolia*, the *Torreyia* Guardians provide a fascinating case study on assisted migration. Only time will reveal the lessons we can learn from it. From the start, Barlow has embraced the debate over how far we should go to preserve *Torreyia*—and our environment—in the face of climate change. For her, it all comes down to a commitment to save this prehistoric species. "If this is really what this tree needs, and it works," she says, "I will be able to help a species with tremendously ancient roots to survive." ☘

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