

# Researchers want to know: Will sound put bark beetles on the run?

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The search for an effective weapon against armies of destructive bark beetles chewing through forests across the West has taken an unusual turn through '80s rock and into, of all places, the voice box of conservative talk show host Rush Limbaugh.

Researchers say they might have found a sonic repellent for the insects -- a digitally altered version of their own calls -- and the federal government is listening.

For years, forest managers and scientists have sought a way to slow the bark beetle invasion, which, bolstered by drought, has killed an estimated 12 million trees in the Cleveland and San Bernardino national forests alone, providing fuel for a series of costly, destructive wildfires. Forests throughout Colorado, New Mexico, Arizona, Montana and Wyoming are rapidly succumbing, too.

The insects burrow into pine trees to mate and lay their eggs. Their population has exploded since the end of the last century, and they show no signs of slowing down in many western forests.

Rich Hofstetter took that as a challenge. About five years ago, Hofstetter, an assistant professor at Northern Arizona University's School of Forestry, began experimenting with the effects of sound on bark beetles. His goal: to find that one fingernails-on-the-blackboard type of noise that the bark beetles just won't tolerate. Next, and perhaps more difficult, is to find a way to send that sound out and into forests facing attack from the quarter-inch insects.

Hofstetter first tried subjecting bark beetles to rock music. Much as U.S. forces bombarded holed-up Panamanian dictator Manuel Noriega with loud music in the days preceding his 1990 surrender,

Hofstetter hoped a little Guns & Roses piped beneath the bark of a tree might cause the beetles to leave.

### **Wrong Song?**

Perhaps the song they chose -- "Welcome to the Jungle" -- sent the wrong message. In any case, the music failed to elicit a reaction among the beetles in laboratory experiments.

Hofstetter's team turned next to the human voice. While the sound of Limbaugh's voice might repulse political liberals, recordings of his program don't do much for bark beetles.

Limbaugh didn't answer a request for comment on the use of his voice as a potential beetle deterrent. Hofstetter maintained that Limbaugh was chosen because his voice was readily available -- not because the researchers thought there was anything particularly annoying about Limbaugh's voice.

Still, Hofstetter acknowledged that the technician tasked with spending hours watching the beetles' reaction to Limbaugh isn't a fan -- he chose to play the recording backward to avoid hearing the radio host's point of view.

Hofstetter then refocused the experiment to use the beetles' own calls.

"They actually have quite a rich repertoire of noises they make together to communicate," Hofstetter said. "We started to look into what happens if we try to manipulate that communication, and we found that we could actually alter their behaviors."

### **beetle mania**

As it turns out, beetles change their behavior only when they hear noises they are familiar with, Hofstetter discovered.

"It really comes down to whether the patterns of sounds are biologically relevant to the insect," he said.

Using phloem -- the layer of tree tissue beneath the bark where beetles lay their eggs -- and tiny speakers similar to those used in musical greeting cards, they've been able to monitor the effects noise have on beetles in captivity.

The scientists saw the most profound results when they digitally altered the regular beetle noises and played them back through the

speakers. The beetles went mad with confusion.

Some tried to escape, while others stopped in their tracks. Others turned violently on their fellow beetles.

"We're tricking them to think it's another species that's entered into their gallery, and they're kind of defending (themselves) -- but they end up chewing their mate," Hostetter said. "It's hard to watch."

He confessed to having nightmares related to the beetle-on-beetle savagery, and said he sometimes feels bad about causing it. But ultimately, the research is meant to help solve a big problem, he said.

### **Federal Interest**

Hofstetter, together with a sound technician and a couple of student researchers, conduct their tests inside U.S. Forest Service's Rocky Mountain Research Station in Colorado.

This summer, the team will move the technology out of the lab and into the forest, where they plan to begin fitting imperiled trees with audio devices about half the size of a shoebox.

Though unconventional, the research has spurred interest from a handful of private firms interested in marketing the technology, Hofstetter said.

The U.S. Forest Service, which is struggling to cope with the beetle outbreak, also has showed interest.

"This is a fascinating concept, which we understand is still in testing phase and being studied very carefully," agency spokesman Joe Walsh said.

"The Forest Service is always open to any idea that can help in lessening problems caused by bark beetles."

Still, questions remain about the how the science could be used to protect the forests at large.

"Of course there are always challenges in any large-scale field operation," Walsh noted.

Hofstetter said the technology could be used to save individual trees -- either those with high value, or that are located in areas with extreme fire risk. It is unclear how much each device might cost, he said but he anticipated his methods would be cheaper --

and better for the environment -- than spraying trees with chemicals.

In the meantime, his team is considering ways to protect wide swaths of forest, perhaps by channeling the sounds through the ground. While that technology might be a ways off, the beetle problem doesn't appear likely to subside anytime soon.

Even in Southern California, where the problem has slowed, the threat of another wave remains, Hofstetter said.

"These insects typically are cyclical in that they come back in 10 or 20 years," he said. "When the trees come back, so do the beetles."

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