

# High temperatures killed pinyon trees, researchers say

By Patrick O'Driscoll, USA TODAY

DENVER — High temperatures were the underlying cause of a massive die-off of pinyon pines in the recent Southwest drought, a research team reported Monday.

One of the authors, David Breshears of the University of Arizona, said the findings suggest global climate change could cause similarly fast changes in other ecosystems.

The team of 13 scientists from institutions in Arizona, New Mexico, Kansas, Colorado and Utah did not link the tree kill directly to global warming, the heating of Earth's atmosphere aggravated by the burning of fossil fuels. That would require more research over a longer period. But the researchers said the unusual speed of this large die-off, within just two or three years, raises concern about how to deal with the changing climate.

"Climatologists are predicting that we're going to get more droughts, and they are going to be hotter," said Breshears, a professor of natural resources and member of Arizona's Institute for the Study of Planet Earth. "This drought was hotter than the previous drought that we were able to study in detail. A hotter drought looks like it had bigger effects."

He said it will take decades for the region's pinyon woodlands to recover. Consequences may include widespread erosion and loss of vital food for wildlife and a subsistence pine nut crop for Indian tribes and other rural residents.

The report, published online Monday in the *Proceedings of the National Academy of Sciences*, comes amid a flurry of research — and debate — on weather-related costs of climate change.

Two papers earlier this year argued that global warming may be making hurricanes more intense, like those that blasted Florida last year and Louisiana, Mississippi and Texas this year. Another study last year implied a link between warming and the decline of sugar maples in New England.

For millions of pinyons, also spelled piñons, the immediate cause of death was infestation by bark beetles. During years of drought across the West, several beetle species ravaged millions of acres of forests in many states. But drought and higher temperatures made the pinyon tree, hardier than most pine trees, more susceptible to insects.

The species that the team studied is found mostly in the Four Corners states of Arizona, New Mexico, Utah and Colorado. The pinyon is the official tree of New Mexico, the hardest-hit state.

Pinyons grow more slowly and are smaller than the statuesque pine species common in wetter mountain ranges to the north. But pinyons are better acclimated to harsh conditions across the desert Southwest and Great Basin.

Breshears said the researchers compared the recent drought with another major drought in the Southwest in the 1950s that also killed pinyons. But the die-off this time was more widespread. The dead trees reached into higher zones that normally are wetter and more able to withstand drought.

The report concludes that hotter temperatures are the "trigger leading to rapid, drought-induced die-off. ... (The results) highlight the potential for such die-off to be more severe and extensive for future global-change-type drought under warmer conditions."

Breshears said the die-off across 60,000 square miles of pinyon woodlands "will change the look of the Southwest in a lot of places."