

Study: 58 million dry California trees threatened by drought

By Kurtis Alexander

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Photo: James Tensuan

A woman walks through The Dish in Palo Alto, Calif on Tuesday, Dec. 29, 2015. A study released by the Carnegie Institution for Science estimates that 58 million trees across California are experiencing severe water loss.

Beneath the canopy of snow that recently blanketed California's mountainsides are vast swaths of forest struggling to survive the drought.

A study released this week by the Carnegie Institution for Science counts as many as 58 million trees statewide suffering severe water loss — a startling toll marked by browning leaves and dying limbs that's far greater than previously thought and spanning spots once believed unharmed, like the dank redwood stands of the North Coast and the fog-shrouded Bay Area.

California Drought

“If you drive down (Interstate) 280 now, and you really look, you’re suddenly going to notice a lot of dead trees,” said Greg Asner, an ecologist at Stanford University who led the new study. “They weren’t like that in August, even in September.”

While tree deaths are natural, and even large die-offs aren’t beyond recovery, Asner said the current situation is alarming. It will have consequences not only for forests, he said, but also for humans who rely on them.

Wildfires are likely to become more destructive, rivers and lakes that are naturally cleaned by forest ecosystems may become degraded, and less carbon dioxide is apt to be soaked up by trees — an action needed to combat global warming— according to the research.

State of emergency

As these problems have become clear, Gov. Jerry Brown declared a state of emergency this fall over what he called the state’s “worst epidemic of tree mortality in modern history.”

The proclamation has led to increased efforts to rehabilitate California forests and to more research into the problem, including the state’s involvement in studies like the one by Washington’s Carnegie Institution.

“It will be important to bring their cutting-edge data and expertise to bear as the state seeks to address the effects of this epidemic of dying trees and aid in the recovery of our forests,” said Ashley Conrad-Saydah, deputy secretary for climate policy at the California Environmental Protection Agency.

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Photo: Leah Millis, The Chronicle

A group of dead pine trees stand on private land April 9, 2015 in the Sierra Nevada mountain range near Sequoia National Park, Calif. Pine trees across California, but especially in the central and southern ... [more](#)

Tree death toll: 12 million

The new study, published in the Proceedings of the National Academy of Sciences, follows a U.S. Forest Service report that identified 12 million trees killed by drought in California but left questions about how many more were vulnerable.

Asner and his team flew across the state several times using laser-guided imaging equipment unique to the Carnegie Airborne Observatory to measure water content in trees. Their observations were compared to older satellite data and mapped.

“Our maps reveal much wider, much larger-scale impacts on our forest than the dead trees would tell in themselves,” Asner said. “We found that there was measurable drought stress even in areas that are known to be more humid.”

According to the research, roughly 41,000 square miles of forest between Los Angeles and the Oregon border, containing as many as 888 million trees, experienced water loss since the drought began four years ago.

About 58 million trees suffered water losses greater than 30 percent, or about 7 to 10 percent of trees in most places, the research indicates. In an average non-drought year, only about 1 percent of California’s trees typically die.

Asner doesn’t know for sure if the drought-affected trees will perish but says they are the ones to keep an eye on — and should remain the focus of the state’s recovery efforts.



Photo: James Tensuan

Branches are seen in Palo Alto, Calif on Tuesday, Dec. 29, 2015. A study released by the Carnegie Institution for Science estimates that 58 million trees across California are experiencing severe water loss.

Beetles are another threat

As if the drought weren't enough of a threat, the trees also are being strained by bark beetles. In many areas, weakened stands are no match for the tiny insects, which feed on the trees and have multiplied during dry times.

Damage from both drought and beetle infestation is most dramatic in forests around Los Angeles and in the southern Sierra, according to the research.

Sugar pine, cedars and black oak are among those hit hardest.

John Hughes, who lives near Shaver Lake (Fresno County), knows all too well the toll, having to clear dead trees from his eight-acre property.



Photo: Michael Macor, The Chronicle

Butch Kronlund, president of the Coastlands mutual water company on Tuesday June 17, 2014, sprays a liquid into the trunk of a diseased California Bay Laurel tree to kill it. It's one of seven trees that tested positive for Sudden Oak Death that were found in the Coastlands neighborhood in Big Sur, Calif. Matteo Garbeletto, Ph.D., Director of U.C. Berkeley Forest Pathology and Mycology Laboratory, believes the dry conditions from this year's drought is actually

helpful in the fight against the tree killing pathogen known as Sudden Oak Death.

Dead trees are dangerous

“You have to take them down or they’ll fall on the house,” he said. “It’s just devastating...Everything here is red and dying.”

No parts of the state have been spared, according to the research.

Coastal redwoods on California’s North Coast have recently showed signs of distress, as have stretches of forest in Point Reyes, on Mount Tamalpais and in the Santa Cruz Mountains, Asner said.

While an El Niño weather pattern in the Pacific is expected to provide drought relief to California’s wildlands this winter, the researchers suggest that much of the state’s forests will remain in a weakened state indefinitely.

“Hopefully, a large fraction of the severely stressed trees will bounce back,” Asner said. “But we also don’t know if all of them will die.”

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