

SIERRA NEVADA

Dramatic tree death increase since 1983 linked to warming

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Federal scientists have found that tree deaths in the Sierra Nevada increased over the past two decades, coinciding with rising temperatures and drought conditions.

If temperatures continue to rise, temperate forests that receive little rain and snowfall are poised for diebacks, according to findings released Monday by the U.S. Geological Survey's Western Ecological Research Center.

Over the past several decades, trees have grown faster in some other states' water-rich forests because of higher temperatures and other factors such as

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Tree deaths double

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greater precipitation, increases in atmospheric carbon dioxide and a rise in the number of cloudless days.

But arid forests such as California's, where water is limited, haven't been receiving more rain and snow to compensate for the warming climate, the study said.

Researchers Phillip J. van Mantgem and Nathan L. Stephenson, based at the Sequoia and Kings Canyon field station, studied more than 21,000 ponderosa pine, white fir, red fir, Jeffrey pine and other conifers in a network of old-growth plots in Yosemite and Sequoia national parks between 1983 and 2004.

They mapped tree deaths every year, and correlated short-term changes in tree deaths with parallel changes in climate and other potential factors. The stands chosen have never been logged and hadn't burned since the late 1800s. Over the study period, the temperature increased by about 1 degree Celsius.

The average mortality rate increased at 3 percent per year, meaning that the rate of tree deaths nearly doubled over the

study period.

The scientists found no evidence that new trees sprouted more or less frequently during the study period.

Tree deaths caused by insects and disease — which is linked to warmer weather and drought — were much higher than deaths caused by factors like breaking or uprooting.

In other studies being presented at meetings of the Ecological Society of America in San Jose this week, scientists reported that stress and diebacks have occurred from Alaska to Mexico, affecting more than 20 million hectares (almost 50 million acres) and many tree species since 1997.

Climate change models predict substantial shifts in weather patterns over coming decades in many regions, including higher temperatures and increases in duration and severity of extreme drought events, scientists say.

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