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Graduate student Arielle Koshkin, left, takes notes as snow hydrologist Anne Nolin measures snow reflectivity at the site of the 2021 Caldor Fire near Twin Bridges, Calif.

After wildfires, burnt trees may disrupt water supplies

BRITTANY PETERSON
Associated Press

TWIN BRIDGES, Calif. — In a California forest torched by wildfire last summer, researcher Anne Nolin examines a handful of the season's remaining snow, now darkened by black specks from the burned trees above.

Spring heat waves had already melted much of the year's limited snowfall across California and parts of the West when Nolin visited in early April. But she and her colleague are studying another factor that might have made the snow vanish faster in the central Sierra Nevada — the scorched trees, which no longer provide much shade and are shedding flecks of carbon.

The darkened snow is "primed to absorb all that sunlight" and melt faster, said Nolin, who researches snow at the University of Nevada, Reno.

As climate change fuels the spread of wildfires across the West, researchers want to know how the dual effect might disrupt water supplies. Communities often rely on melting snow in the spring to replenish reservoirs during dryer months. If snow

melts earlier than normal, that would likely leave less water flowing in the summer when it's most needed, Nolin said.

Multiple studies indicate that snow in a burned forest disappears up to several weeks sooner than snow in a healthy forest because of the lack of a shade canopy and carbon shedding from trees that intensifies the absorption of sunlight.

Water forecasting factors in variables including snow density, soil moisture and air temperature. Although dark accumulation on snow isn't widely measured, Tim Bardsley, a hydrologist with the National Weather Service, said it is a contributing factor to the timing of snowmelt and is worth considering incorporating into supply forecasting.

Dust, ash and soot similarly affect snow by causing it to absorb more light in what's known as the "albedo effect." But California officials are increasingly worried about carbon, which absorbs even more.

"It was like, OK, we really need to understand this. This is the new norm," said David Rizzardo of the California

Department of Water Resources.

In some fire-damaged areas, state officials are beginning to map snow from planes with cameras that measure albedo and have plans to upgrade remote sensing stations as well.

Already, a warming climate is leading to earlier snowmelt and leaving places more vulnerable to wildfire, said Noah Molotch, who researches water and snow cycles at the University of Colorado, Boulder. A burned area "exacerbates the impact of drought" by leading to even dryer conditions in hotter months, he said.

Nolin and graduate student Arielle Koshkin hiked into the El Dorado National Forest for one of their final measuring trips earlier this month when the region typically has the most snow accumulation. Little remained when they arrived in part because of unusually high temperatures this spring and a long streak of cloudless days.

Late-season storms have since blanketed the carbon-coated snow with several inches of fresh powder, which Nolin said could help slow the melt.

NOTICE to SHAREHOLDERS of BERKSHIRE HATHAWAY and the UNION PACIFIC CORPORATION

If you are planning to attend either the April 30 shareholders meeting of Berkshire Hathaway Inc. in Omaha, Neb., or the Union Pacific Corp., May 12 shareholders meeting to be held via the web, please note:

The following are questions Berkshire Hathaway Chairman and CEO Warren Buffett, BNSF Railway President and CEO Katie Farmer and Union Pacific Chairman, President and CEO Lance Fritz **DO NOT WANT TO BE ASKED.**

- Mr. Fritz: Glassdoor and *Money Magazine* reported on **the worst-performing¹** employers when it comes to transparency, trustworthiness, leadership, career opportunities, culture, and values. **Union Pacific was ranked as the very worst.** Are you proud of that? If not, why not do something to correct it, like fairly compensating locomotive engineers and other frontline workers who kept the supply chain moving during the pandemic? You raised rates on shippers, but your essential workers didn't get an extra dime. It's apparent that UP is having a hard time hiring people. Don't you think you could more easily recruit new employees if you treated your current workforce better?
- Mr. Buffett: You have described the BNSF Railway as one of Berkshire's "giants" and as a "towering Redwood²." But even a Redwood can rot. **Don't you think it's pretty rotten that under BNSF's "Hi-Viz" attendance policy workers have a hard time getting a day off?** Some have been penalized because they needed surgery or were called for jury duty. Do you approve of this? Is this the work of a giant?
- Mr. Fritz, Ms. Farmer and Mr. Buffett: In the past six years, the workforce at the nation's largest railroads has been cut by a third. Today's railroaders work long hours on long trains. **According to Vice³, Members of Congress from both sides of the aisle are concerned about a workforce that is understaffed, overworked and fatigued at a rail network responsible for hauling most of the country's hazardous materials.** Will you pledge not to further reduce the size of train crews?
- Mr. Fritz: You said that last year was UP's "most profitable year ever."⁴ Mr. Buffett and Ms. Farmer: You reported that BNSF's earnings were a record for your railroad⁵. **Both UP and BNSF have made cash hauls, but when it comes to employment policies, aren't you off track? Isn't it time to invest in crews and safety?**



A message from the Brotherhood of Locomotive Engineers and Trainmen.

Dennis Pierce, National President.

For more information, please visit: <https://ble-t.org>

¹Money Inc, "The Worst Companies to Work For in 2019" <https://moneyinc.com/worst-companies-to-work-for/>

²Dallas Morning News, "Warren Buffett calls this Fort Worth company a 'towering redwood.' Here's why," Feb. 24, 2019. <https://www.dallasnews.com/business/2019/02/24/warren-buffett-calls-this-fort-worth-company-a-towering-redwood-here-s-why/>

³VICE, "'The Worst and Most Egregious Attendance Policy' Is Pushing Railroad Workers to the Brink," April 5, 2022. <https://www.vice.com/en/article/5dgezn/the-worst-and-most-egregious-attendance-policy-is-pushing-railroad-workers-to-the-brink>

⁴Railway Age, "UP's Fritz: 2021 'Most Profitable Year Ever' (UPDATED), Jan. 20, 2022. <https://www.railwayage.com/freight/class-i/up-fritz-2021-most-profitable-year-ever/>

⁵Trains.com, "BNSF Railway reports record financial results for 2021," Feb. 27, 2022. <https://www.trains.com/trn/news-reviews/news-wire/bnsf-railway-reports-record-financial-results-for-2021/>

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