

Lasers in the Sky: High-Tech Missions Reveal the West's Critically Low "Frozen Reservoirs"?

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High above the jagged peaks of California's Sierra Nevada, the view from the cockpit is breathtaking. At first glance, the mountains appear draped in a pristine white blanket. But as the flight crew gears up for a high-stakes mission, the sensors onboard this specialized aircraft prove that looks can be deceiving.

"This is a distinct dry year," says Tom Painter, CEO of Airborne Snow Observatories.

Painter, who developed this technology at NASA, isn't relying on a visual inspection. His plane uses **LiDAR**, or rapid pulses of laser light, to calculate snow depth with surgical precision. "The LiDAR sprays out about 800,000 pulses per second," he explains. **The result is a 3D map of snow depth accurate to within three centimeters. The technology also helps determine how much water is stored in the snowpack.**

In the American West, where mountain ranges act as "frozen reservoirs," state water managers rely on this data as a survival guide. It helps them plan for exactly how much water will eventually reach the faucets of millions of people and the critical farm fields that feed the nation.

This year, the data is **sounding an alarm.**

A Record-Breaking "Spigot Shut-Off"

The national drought picture is increasingly grim. According to the latest U.S. Drought Monitor, more than 60 percent of the lower 48 states are now gripped by drought. It's the most widespread spring dry spell since the monitor began in 2000. While the Southeast is currently battling "summer-sized" wildfires in Georgia and Florida, the West is facing a different kind of crisis: a snow drought-fueled water shortage.

A record-warm winter followed by a blistering March heatwave, both fueled by heat-trapping pollution, has decimated the western snowpack. According to Climate Central, **the total water stored in the western snowpack this winter hit its lowest level on record right when it should have been hitting its annual peak.**

"In March the spigot shut off and it shut off across the entire western US," Painter says. **"Loss of snowpack like we've never seen. It's not in the record at all. So, this is unprecedented."**

The numbers back him up: the statewide snowpack in California stood at a mere 18 percent of average on April 1st and has declined ever since.

The Long, Dry Summer Ahead

Standing by a rushing stream outside of Reno, Nevada's Deputy State Climatologist Tom Albright says Spring runoff from snowmelt in the mountains is two months ahead of schedule. "We wish we could tell it to stay put a little longer," Albright says.

The danger of an early melt is two-fold. First, once that snow is gone, the landscape begins to dry out months ahead of schedule which can fuel wildfires. Second, major reservoirs on the Colorado River that are already critically low, will not be replenished due to the lack of snowpack. "What happens when we don't have the snowpack is we lose what water there was early and then we're left with this really long dry season," Albright says. When asked what concerns him most about the coming months, his answer is immediate: "Fire. Particularly because we have such a broad area that's affected."

The New Normal

For decades, the water systems of the West were built on the assumption that the snow would stay in the mountains until the heat of mid-summer. Climate change is rewriting that playbook.

While this year's drought is anomalous when looking at the historical record, experts warn it is a preview of the coming decades.

"As we look forward this year will become less and less unusual and may become not unusual at all at some point in the future," Albright warns.

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