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Weather balloons in Sonoma County carry forecasting promise



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Anna Wilson, with the Scripps Institution of Oceanography, releases a weather balloon to study atmospheric rivers in the region. The balloon was released Sunday at 4 p.m. at the Bodega Marine Labs at the same time as another was released near Lake Mendocino in Ukiah. (John Burgess/The Press Democrat)

MARY CALLAHAN

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BODEGA BAY

A series of winter storms that deluged Sonoma County and produced flooding around the region this year may prove a boon to scientists investigating the phenomena known as atmospheric rivers and the art of forecasting as a reservoir management tool.

Teams of researchers with UC San Diego's Scripps Institution of Oceanography have set up stations in Bodega Bay and Ukiah over the past month to use as launch sites for a series of weather balloons carrying instruments high into the sky during periods of heavy rainfall.

Most of the rain has been produced by long, narrow, moisture-laden plumes meteorologists refer to as atmospheric rivers. And with all the back-to-back storms this winter, researchers have collected loads of data.

"It's been a very active season," scientist Anna Wilson said during an interview in the rustic wooden building at the UC Davis Bodega Marine Lab, where she's temporarily set up shop through the end of March.

Wilson and her counterparts so far have dispatched nearly 80 huge helium-filled balloons from Bodega Bay alone, working out of the marine lab station set up Jan. 7.

Each is armed with a radiosonde, an instrument that transmits real-time data of moisture content, wind speed, wind direction, temperature and barometric pressure back to the launch site for comparison with the Ukiah site, as well as against predicted forecasts.

The Ukiah site at the city's water treatment plant has been in use since Jan. 22, Wilson said.

Scientists at each location release balloons simultaneously about every three hours during atmospheric river events.

The dual-site data collection allows for analysis of

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moisture content and other key characteristics of each atmospheric river as it passes above the coastline, across the coastal mountains and inland toward the upper portion of the Russian River watershed near Lake Mendocino, Sonoma County Water Agency spokesman Brad Sherwood said.

What exactly is an atmospheric river?

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The balloons are driven by winds that typically run to the northeast or east during atmospheric river conditions.

Despite a life span of less than two hours, the balloons can travel 80 miles or more and rise up to 15 miles high, expanding as they go until they finally pop and the instruments are disabled, Wilson said. More than 75 percent of the moisture, however, is in the lower two miles.

The effort is part of an ongoing, 4-year-old initiative undertaken by Scripps' Center for Western Weather and Water Extremes, for whom Wilson works, in partnership with the Sonoma County Water Agency, the U.S. Army Corps of Engineers and agencies.

Its objective is determining whether refined forecasting of atmospheric river events could help water managers better determine when to release or retain stored water behind flood-control dams during winter months.

At issue is how best to balance the need of building water supply for future dry periods against ensuring there is room behind the dam to collect more runoff without spilling over the top if another storm comes.

Those involved call the strategy Forecast-Informed Reservoir Operations, or FIRO.

The project was launched in 2013 during a critical period of the recent drought, and in the aftermath of an incident that displayed the disadvantages of current operational rules for Coyote Dam at Lake Mendocino.

The lake has a capacity of 122,500 acre feet; one acre foot is enough water to flood a football field 1-foot deep.

The existing protocol, developed in 1959 and revised in 1986, requires the Army Corps of Engineers to keep the reservoir level below 68,000 acre feet from November to March, and gradually increase storage up to 111,000 acre feet by May.

After substantial rainfall in December 2012, the Army Corps, following its dictates, released about 25,000 acre feet of water, dropping the reservoir level by about 35 percent, unaware that would be last rain the region received for about two years.

Water managers and their scientific partners hope the work they're doing will allow use of meteorological modeling to better predict the appearance, duration and strength of the atmospheric rivers that determine the region's water supply, promoting more informed dam management at Lake Mendocino and reservoirs around the West Coast, where atmospheric rivers are prevalent. "If you're going to risk holding water behind the dam, you have to have confidence that you can say, no atmospheric river is coming," Wilson said.

The team hopes to publish its draft findings this year as part of its preliminary viability assessment of predicting the results of atmospheric rivers.

While the strategy "is still just a hypothetical," Wilson said, "the bottom line is making sure the forecast is good enough to be sure there is no chance of flood risk. We really hope to be able to

help provide, with the Sonoma County Water Agency, a robust water supply for all uses.”

You can reach Staff Writer Mary Callahan at 707-521-5249 or mary.callahan@pressdemocrat.com. On Twitter @MaryCallahanB.

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