



Weather balloons gather data in the Yuba and Feather river watersheds during atmospheric rivers

by **YubaNet**

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YUBA COUNTY, Calif. December 23, 2019 – Earlier this month, Yuba Water Agency (YWA) invited media to the launch of the first weather balloon by scientists from the Scripps Institution of Oceanography from a YWA facility.

Atmospheric river storms, which provide half of California’s annual precipitation, can cause major Yuba-Feather flood events. Forecast-Informed Reservoir Operations (FIRO) researches opportunities to improve reservoir operations and reduce flood risks by improving weather and runoff forecasts. The research is focused on both watersheds simultaneously, as Bullards and Oroville dams are operated in coordination to minimize downstream flood impacts.

On a rainy morning, University of California’s Scripps Institution of

Oceanography scientists were busy preparing for the launch of the first weather balloon. The launch was coordinated with the FAA and nearby Beale Air Force base.

After inflating the balloon, a sensor sonde is attached to the balloon, similar to those launched out of planes by hurricane researchers.

The sensor data, transmitted in real time to the researchers, is part of a toolset used to create new forecasting model and procedures. If shown to be viable, the new models could be incorporated into the U.S. Army Corps of Engineers Water Control Manuals for the reservoirs.

Coordinating the temporary flight restriction for the launch zone



The weather balloon is ready to receive the sensor attachment

Anna Wilson, PhD., CW3E Field Research Manager makes one last check before launch



Launch preparations complete



Carly Ellis, of Scripps Institution of Oceanography and John James of Yuba Water Agency ready to launch



Once the balloon reaches 25,000 meters (15.5 miles) in altitude, the sensor will drop back down to earth



This tiny sensor transmits temperature, pressure, moisture and wind data



Tracking the balloon and receiving data in real time

Photos YubaNet

99 Luftballons – or more

During AR events, a weather balloon will be launched every three hours to collect temperature, pressure, moisture and wind data to

help researchers better understand the vertical structure of the atmosphere during storms. This will ultimately help with atmospheric river predictions, which will provide more flexibility for water releases at the dams.

"We might launch dozens or even hundreds of balloons during the winter, it all depends on the frequency of ARs," said Dr. Wilson while monitoring the balloon's trajectory and the data received. The balloon, and more importantly its payload, can ascend as high as 15 miles into the atmosphere before the sensors fall back to earth, slowed by a parachute. The balloons also travel several hundred miles across the terrain and this one likely ended up in Nevada. Most times the sensors can't be recovered, but collecting data on both ascent and descent gives scientists a better picture of the conditions inside an atmospheric river.

ARs are becoming more frequent and more more significant as global warming trends increase their intensity

"ARs are strengthening and becoming even bigger contributors to the annual [precipitation] total, and California's topography is ideally aligned to extract increasingly heavy precipitation from strengthening ARs," the **Scripps study**, 'Precipitation regime change in Western North America: The role of Atmospheric Rivers' states, "Notwithstanding the challenges stemming from a more volatile precipitation regime, California can take solace in the fact that it is not projected to dry as are the other Mediterranean climate regions around the world."

Implementing FIRO maximizes the use of existing infrastructure and significantly reduces flood risk says Yuba Water Agency

Yuba Water, CW3E, and DWR will conduct FIRO within the context of existing operations and future improvements within the Yuba-

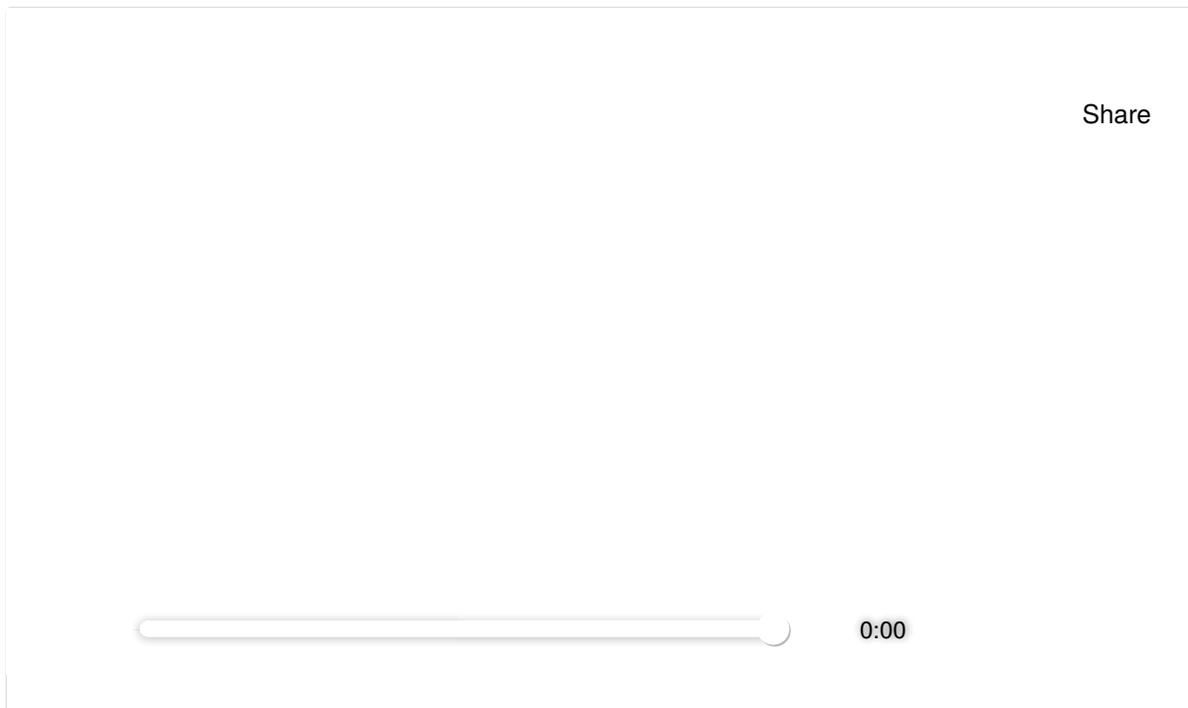
Feather system. To achieve the full potential for operating Lake Oroville and New Bullards Bar Reservoir under FIRO, an ongoing analysis is being conducted of the reservoirs' release capacities.

At New Bullards Bar, Yuba Water is planning to construct a new high-capacity, low-level outlet (secondary spillway) to allow larger releases of water in the early stages of a storm event, preserving storage space to contain peak inflows.

While DWR can already release water from Lake Oroville at low lake levels, it is also conducting a Comprehensive Needs Assessment to identify improvement priorities, appropriate solutions, and potential changes to bolster the integrity and resiliency of the Oroville Dam complex to further reduce flood risks downstream.

FIRO is being developed and tested as a collaborative effort in the Russian River Basin (Lake Mendocino), the Santa Ana River Basin (Prado Dam), and the Yuba-Feather River Basins.

Below is the video of the launch, courtesy Yuba Water Agency.



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