Fact Sheet: Yuba-Feather
FORECAST-INFORMED RESERVOIR OPERATIONS

Reducing Flood Risk and Enhancing Integrated Water Management

October 10, 2019

The Yuba-Feather Rivers system has a long history of catastrophic floods. Since 1950, five major floods have resulted in 41 deaths, significant property damage, and devastating social and economic impacts.

Yuba Water Agency (Yuba Water), owner and operator of New Bullards Bar (NBB) Reservoir, and the California Department of Water Resources (DWR), owner and operator of Lake Oroville, are working with the U.C. San Diego, Scripps Institution of Oceanography, Center for Western Weather and Water Extremes (CW3E) to assess the potential of Forecast-Informed Reservoir Operations (FIRO). FIRO leverages scientific improvements in forecasting of atmospheric rivers, which are responsible for more than 90 percent of the flood damages in this region, to anticipate and better manage large storm events while providing opportunities to enhance water supply. A preliminary study indicated FIRO could significantly reduce flood risks in Yuba and Sutter Counties.

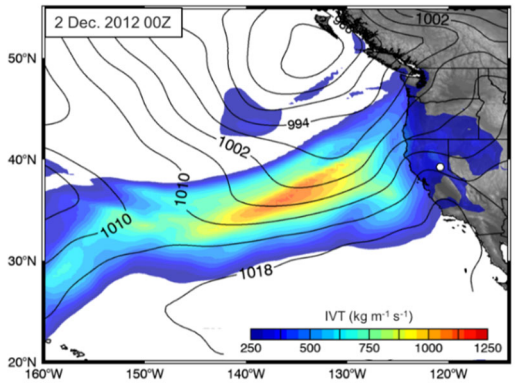
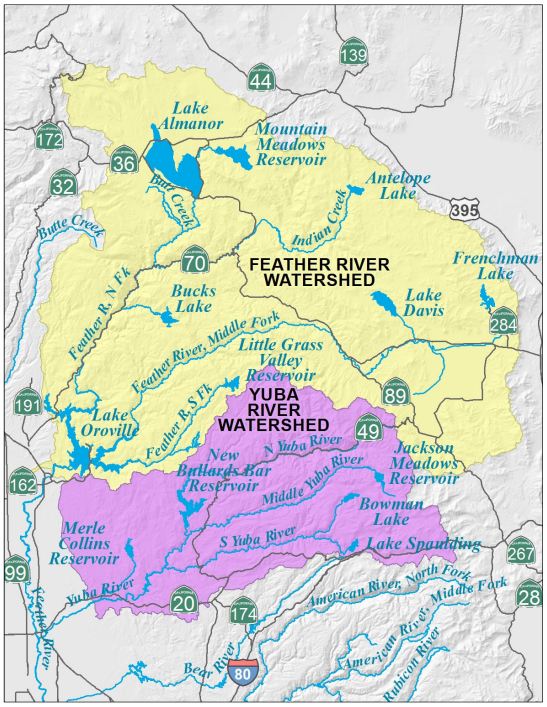


Image of an atmospheric river that made landfall on December 2, 2012 and impacted the Yuba-Feather watersheds.

Yuba-Feather FIRO builds on the Forecast-Coordinated Operations (F-CO) Program that Yuba Water and DWR created after a devastating flood in 1997. The F-CO Program seeks to improve public safety by reducing flood risk and coordinating flood operations between Lake Oroville and NBB Reservoir.



Yuba-Feather Rivers watersheds.

F-CO includes real-time runoff forecasting and an Advance decision support system. Other members of the F-CO Program include the U.S. Army Corps of Engineers and the National Weather Service.

Yuba-Feather River Watersheds and FIRO

FIRO researches opportunities to improve reservoir operations and reduce flood risks by improving weather and runoff forecasts. Atmospheric river storms cause major Yuba-Feather flood events. Understanding and better predicting regional rainfall and snow processes is fundamental to establishing forecast confidence. FIRO provides a pathway for integrating improved forecasts into reservoir operating procedures and, if shown to be viable, incorporating them into the USACE Water Control Manuals for the reservoirs.

FIRO Steering Committee Members

- Co-Chair F. Martin Ralph — *Director, CW3E, UC San Diego Scripps Institution of Oceanography*
- Co-Chair Curt Aikens — *General Manager, Yuba Water*
- Co-Chair John Leahigh — *Water Operations Executive Manager, DWR*
- Jay Jasperse — *Chief Engineer, Sonoma Water*
- Michael Anderson — *State Climatologist, DWR*
- Cary Talbot — *Program Manager, USACE, Engineer Research and Development Center*
- Alan Haynes — *Hydrologist-in-Charge, NOAA National Weather Service, California Nevada River Forecast Center*
- Joseph Forbis — *Chief, Water Management Section, USACE Sacramento*
- Molly White — *Chief, State Water Project Water Operations Office, DWR*
- Stephen Lindley — *Director, Fisheries Ecology Division, Southwest Fisheries Science Center, NOAA Fisheries*
- John James — *Project Manager, Yuba Water*

Some aspects of FIRO include:

- Developing an observational system to verify models to better predict precipitation and streamflow.
- Exploring use of inflow forecasts to inform decisions about releasing water before flood events to:
  - Create additional space in the reservoir to capture flood flows.
  - Lower downstream peak flood flows to enhance flood protection for communities downstream.
  - Increase opportunities for earlier spring refill.

Lake Oroville	
Capacity	3,537,600 acre-feet
Flood Pool	750,000 acre-feet
Year Built	1967
Watershed	2,320,000 acres
Owner	California DWR
Purpose	Water supply, flood protection, recreation, environmental, hydropower

NBB Reservoir	
Capacity	970,000 acre-feet
Flood Pool	170,000 acre-feet
Year Built	1969
Watershed	313,000* acres
Owner	Yuba Water
Purpose	Water supply, flood protection, recreation, environmental, hydropower

*The NBB Reservoir is on the North Yuba River. The entire Yuba River watershed area is 957,000 acres.

Interagency collaboration to evaluate the potential viability of FIRO is as important as the science underpinning it. A steering committee consisting of expert leaders, including dam operators, from key organizations meets quarterly on the Yuba-Feather FIRO viability assessment. FIRO assessments at Lake Mendocino and Prado Reservoir have paved the way for this approach.

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 NBB Reservoir under FIRO, an ongoing analysis is being conducted of the reservoirs' release capacities. At NBB, 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.