

**Sixth Annual Forecast Informed Reservoir Operations (FIRO)  
Draft Workshop Agenda  
August 6-8, 2019  
Scripps Institution of Oceanography, Seaside Forum, La Jolla, California**

**Purpose**

The Annual FIRO Workshop organized by the Center for Western Weather and Water Extremes (CW3E) at Scripps Institution of Oceanography, University of California San Diego (UCSD), brings together experts on Forecast-Informed Reservoir Operations (FIRO), including its underlying science, engineering, forecasting and policy dimensions, with a broader community of interested organizations, programs and individuals. It fosters discussion of current experiences, opportunities, and challenges related to assessing FIRO viability and to implementing associated methods and tools. It also considers FIRO's potential applicability to additional facilities. The Workshop provides a forum to share recent advances and lessons learned, and to discuss the next steps in advancing the science, predictions, engineering tools, and policies that can enhance the viability of FIRO at the reservoirs being examined currently, and that can potentially increase the range of conditions and facilities for which it could be useful.

**Organizing Committee**

F. Martin Ralph (Workshop Co-Chair), UCSD/Scripps Institution of Oceanography/CW3E  
Cary Talbot (Workshop Co-Chair), USACE/ERDC  
Curt Aikens, Yuba Water Agency (Co-Chair Yuba-Feather FIRO)  
Jay Jasperse, Sonoma Water (Co-Chair Lake Mendocino FIRO)  
John Leahigh, California Dept. of Water Resources (Co-Chair Yuba-Feather FIRO)  
Greg Woodside, Orange County Water District (Co-Chair Prado FIRO)

**TUESDAY, AUGUST 6**

1:00-1:30pm    Opening Session

Welcome and Workshop Goals (Marty Ralph, Cary Talbot)  
Participant Introductions (Arleen O'Donnell)  
Overview of Agenda and Logistics (Arleen)

**Session I – Overview of FIRO Approach and Projects (Project Status, Highlights, Current Issues)**

1:30-1:45        FIRO Approach and Framework - Marty Ralph, CW3E

1:45-2:15        Lake Mendocino - Jay Jasperse, Sonoma Water

2:15-2:45        Prado Dam - Greg Woodside, Orange County Water District

2:45-3:15        Yuba-Feather - Curt Aikens, John Leahigh, CA DWR

3:15-3:30        Break

3:30-3:50        FIRO Decision Support Tool for Lake Mendocino - Chris Delaney, Sonoma Water

- 3:50-4:05 Operational Experience Using the FIRO-based Major Deviation at Lake Mendocino in WY 2019 - Patrick Sing, USACE
- 4:05-4:30 Comparing how the EFO, Hybrid, and Water Control Manual Handled the '86, '97, and '06 Events when Scaled up to a 200-and-500-year Return Period  
Dave Reynolds, University of Colorado
- 4:30-4:50 USACE Leadership Perspectives on FIRO - Sean Smith, USACE
- 4:50-5:15 Discussion
- 5:15 Adjourn for the Day

### **WEDNESDAY, AUGUST 7**

8:00-8:30am Coffee and networking

#### **Session II – Commonalities and Differences between FIRO Viability Assessments Underway**

- 8:30-9:30 Current Water Operations Capabilities/Challenges
- Lake Mendocino - Nick Malasavage, USACE
  - Prado Dam - Rene Vermeeren, USACE
  - Yuba-Feather – John Leahigh, CA DWR
- 9:30-10:30 Environmental Considerations
- Lake Mendocino-Josh Fuller/Natalie Manning, National Marine Fisheries Service
  - Prado Dam - Ken Corey, US Fish and Wildlife Service
  - Yuba-Feather – Curt Aikens, Yuba Water Agency
- 10:30-10:45 Break
- 10:45-11:45 Forecast Needs
- Forecast Information Requirements, including Lead Times - Joe Forbis, USACE
  - Today's Forecasting Capabilities and Gaps - Alan Haynes, CNRFC
  - Weather/hydrology Forecasting Challenges and Improvement Strategies -  
Rob Hartman, Robert K. Hartman Consulting Services
- 11:45-12:00 Discussion
- 12:00-1:00 Lunch (provided)

#### **Session III – FIRO Supported Research in Action – Highlights of Recent Progress and Future Directions**

1:00-1:30 Improving Hydro-meteorological Observations

- AQPI - Rob Cifelli, NOAA OAR
- Observations with Focus on Atmospheric River Recon - Anna Wilson, CW3E

1:30-2:15 Improving Meteorological and Hydrological Models

- WestWRF - Luca Delle Monache, CW3E
- GSSHA - Chuck Downer, USACE Engineer Research and Development Center
- National Water Model - Ed Clark, National Water Center, NOAA NWS

2:15-2:45 Understanding Physical Processes to Improve Forecasts

- High-intensity Precipitation Processes and Forecasting - Nina Oakley, DRI
- Sources of AR Forecast Error and Efforts to Address Them – Forest Cannon, CW3E

2:45-3:00 Break

3:00-3:15 Perspectives on Science and Technology Advances to Enable FIRO –  
Mike Anderson, CA DWR

3:15-4:15 Adaptive Water Control Plans – Fantasy or Opportunity?

Panel Discussion - Translating Forecast Skill into Adaptive Management

- Jay Jasperse, Sonoma Water (moderator) and remarks from:
- Marty Ralph, CW3E
- Robin Webb, NOAA OAR
- Alan Haynes, NOAA NWS
- Cary Talbot, USACE ERDC

#### **Session IV – Posters and Reception**

4:15-6:00 Poster Session and Reception

6:00 Adjourn for Day

#### **THURSDAY, AUGUST 8**

8:00-9:00 am Coffee and Networking

#### **Session V – Recap of WY19 and Future Issues**

9:00-9:30 Overview of WY19 Significant AR Events that Affected FIRO Projects (Forest Cannon)

9:30-11:00 Long-term Vision for FIRO and Ideas on How to Get There

- Development of Week 2-3 AR Forecast Tools - Mike DeFlorio, CW3E

- Future of IVT and Precipitation Projections Using Regional Climate Models - Mimi Hughes, NOAA ESRL
- Climate Adaptation and FIRO - California Water Resources Management Perspective – Mike Anderson, CA DWR
- Perspectives on Incorporating Climate Scenarios into FIRO – Mike Dettinger, USGS Emeritus with comments from Sean Smith, USACE

11:00-11:15 Break

**Session VI – Future Challenges and Opportunities: The Next Five Years and Looking Beyond California**

11:15-12:15 FIRO Opportunities and Applications

- Turlock Irrigation District - Wes Monier, Chief Hydrologist
- Folsom Updated WCM – Joe Forbis, USACE Sacramento District
- Leveraging Multi-benefit Observation Networks (Jay Jasperse, Sonoma Water)

12:15-12:30 FIRO Opportunities Beyond California: What are We Hearing from Other States and Regions?

12:30 Workshop Adjourns

**12:30-2:00 Workshop Debrief (FIRO Steering Committee members and staff only)**