

Progress and Prospects for Connecting the Climate Research and Water Management Communities: Predictions, Applications, and Decision-Making

Robert Webb

**NOAA/OAR Earth System Research
Laboratory
Boulder, CO**

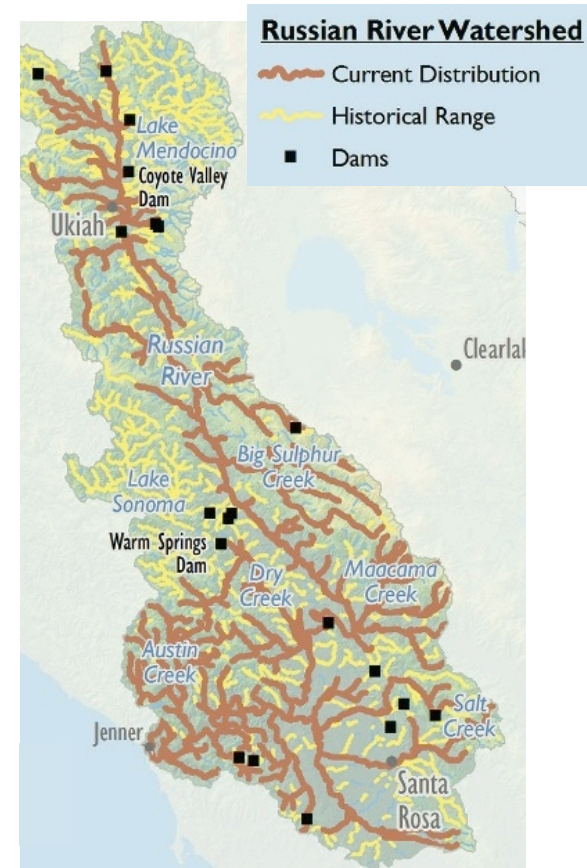
Jay Jasperse

**Sonoma County Water Agency
Santa Rosa, CA**

Russian River Basin

Environmental Management Challenges

- Native salmonid impacted by:
 - changes in stream flow (Eel River imports↓)
 - water temperature ↑
 - flood control/water supply dams
 - channel incision/geomorphology
 - ocean productivity
 - hatchery (genetic diversity↓ & disease↑)
 - invasive species competition
 - land use practices
- Minimum stream flows support both river recreation and fish habitat/passage for Endangered Species Act listed populations.



COHO



CHINOOK



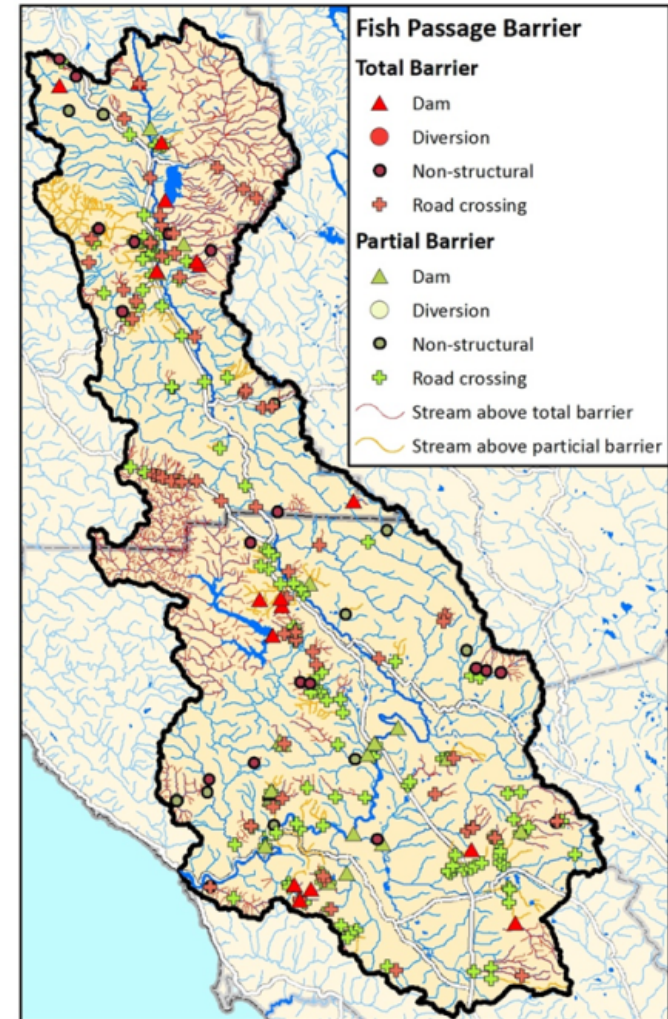
STEELHEAD



Russian River Environmental Management

Challenge: Lake Mendocino

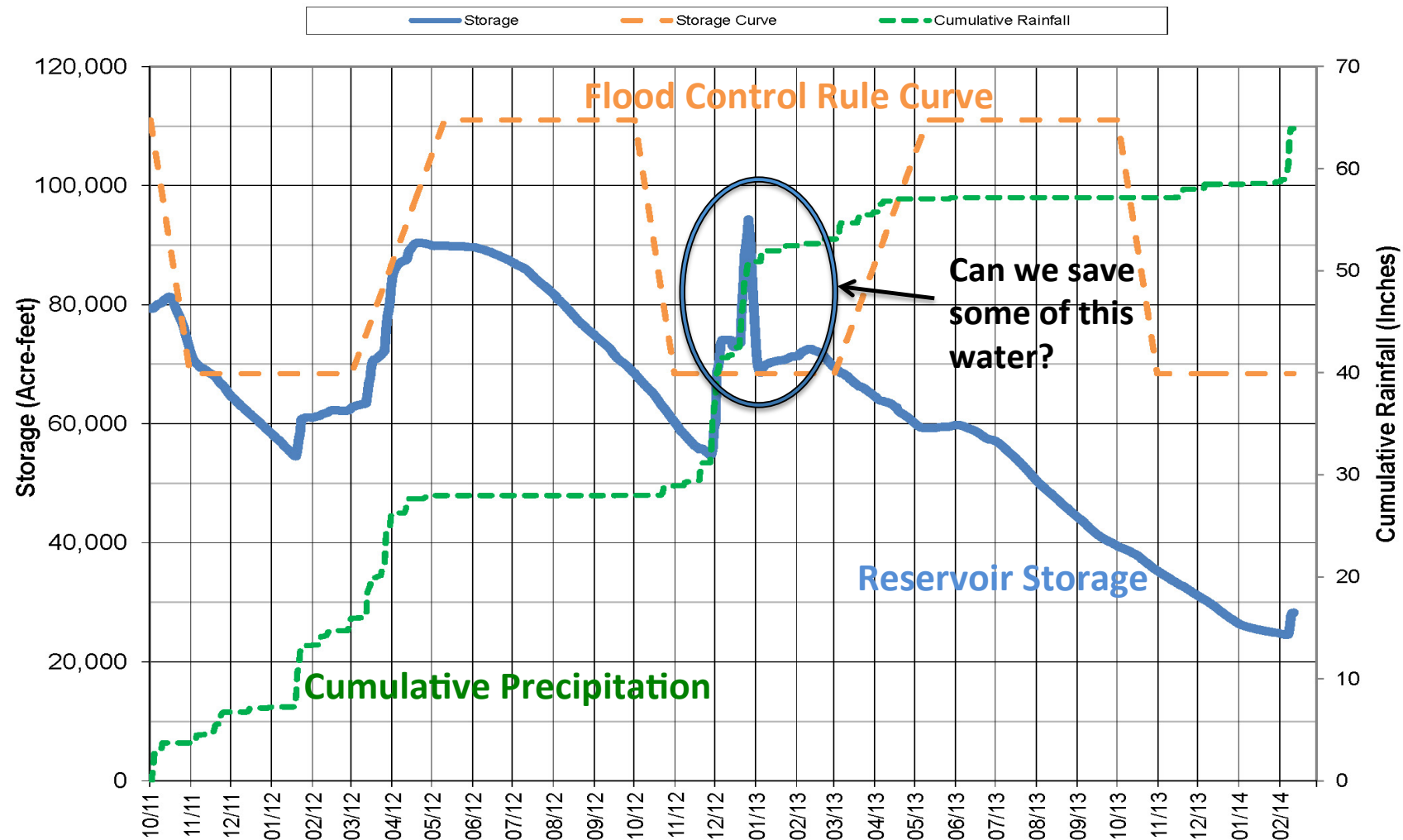
- Lake Mendocino is one of two major reservoir projects used to manage water supply for the Russian River watershed.
- Provides flood control
- Provides water supply for
 - minimum stream flows
 - agriculture
 - municipal and industrial use



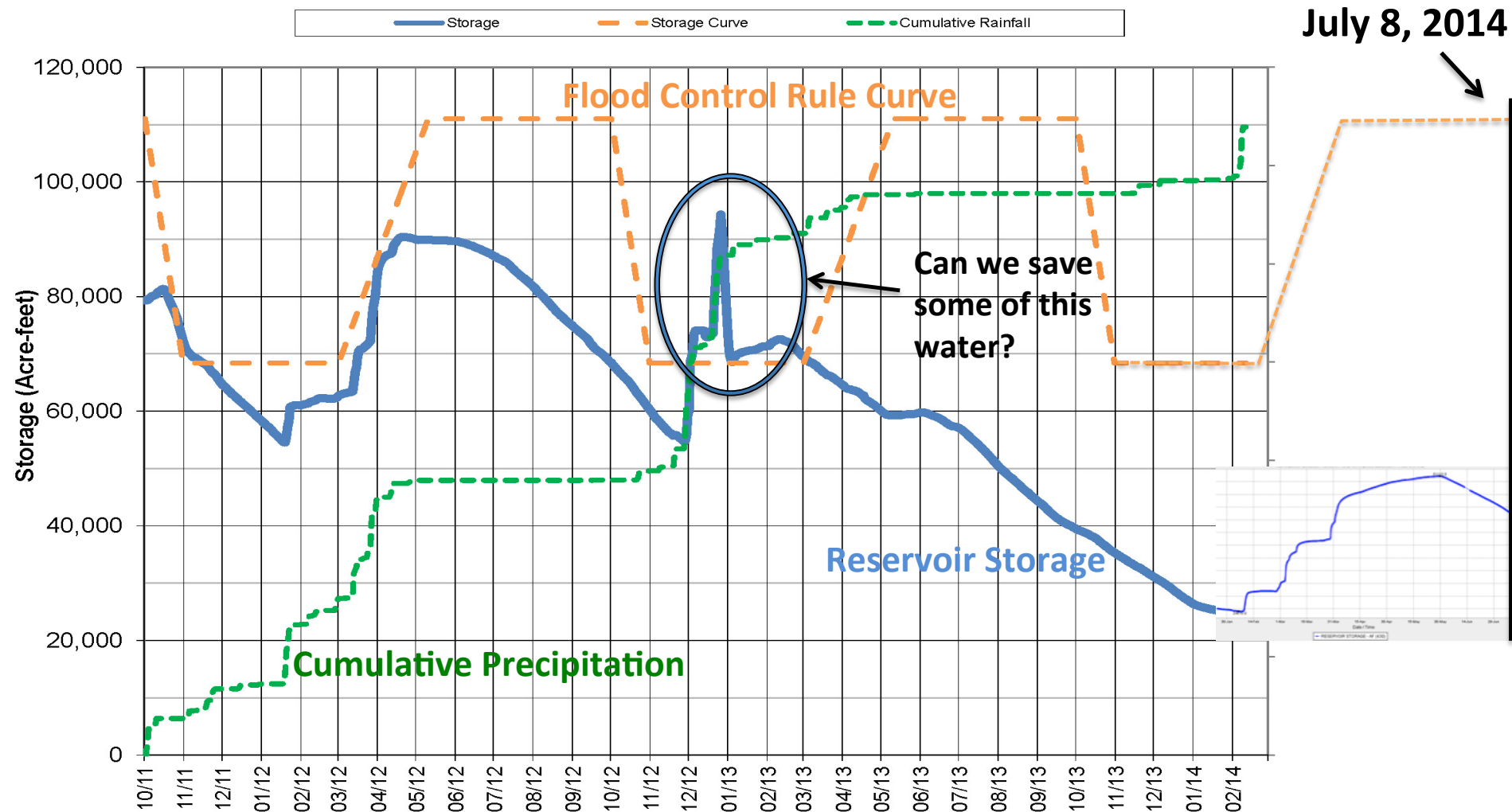
Lake Mendocino

Environmental Intelligence Challenge

Lake Mendocino Water Years 2012 - 2014



Lake Mendocino Water Years 2012 - 2014



Lake Mendocino

Environmental Intelligence Needs - 1

To “save some of this water” from improved early warning

Need to know large scale dynamics of extremes to predict the timing of the next extreme precipitation event

- ✓ reliable and skillful hazard outlooks at 0 to 14 days
(do not immediately evacuate water from flood pool by implementing “forecast based operations”)
- ✓ reliable and skillful subseasonal outlooks at 15 to 45 days
of risk for extreme precipitation events before the end of the winter/spring rain season *(able to hold additional water in flood pool space until seasonal rule curve changes)*

Lake Mendocino

Environmental Intelligence Needs - 2

To “save some of this water” by informed preparedness

Need to know the large scale climate dynamics of extremes to predict changes in extreme precipitation event risk

- ✓ reliable and skillful seasonal outlooks at 3 to 6 months of conditional risk of more or less extreme precipitation events over the winter/spring rain season (*hedging strategies in managing flood pool space decisions to implement forecast-based operations*)
- ✓ reliable and skillful multiseason to multi-decadal outlooks of risk for more/less extreme precipitation and drought (*hedging strategies in managing water supplies, minimum flow releases, and consumptive uses*)

Lake Mendocino

Environmental Intelligence Needs - 3

To “make better use of saved water”

- ✓ reliable and skillful site-specific short term frost forecasts and subseasonal-to-seasonal cold outbreak outlooks (*guide and reduce the use of water from the Russian River to spray their vineyards to protect the grape blossoms*)
- ✓ reliable and skillful 0 to 14 days precipitation forecasts and subseasonal-to-seasonal streamflow outlooks (*guide hatchery releases to maximize vitality of native populations*)
- ✓ reliable and skillful subseasonal-to-seasonal coastal upwelling outlooks (*guide management of native and hatchery fisheries*)

Lake Mendocino

Environmental Intelligence Needs - 4

To “make better use of saved water”

- ✓ reliable and skillful seasonal to decadal outlooks of the nutrient content of upwelled water (*guide management of native and hatchery fisheries*)
- ✓ reliable and skillful annual to multi-decadal outlooks of local sea level rise (*inform water supply requirements to manage salt water intrusion in estuaries*)
- ✓ reliable and skillful projections of changes in West Coast’s Mediterranean climate (*inform the sustainability of current reservoir systems and water management practices to meet the full spectrum of water supply requirements*)