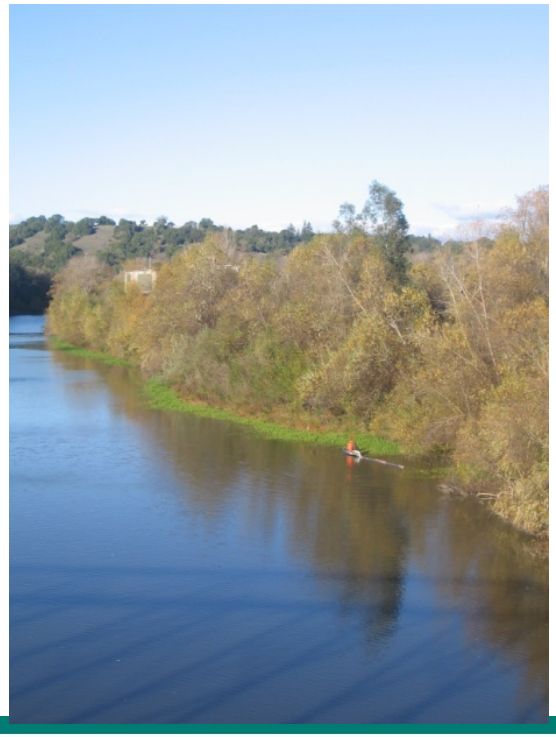


Developing Adaptation Strategies That Address the Spectrum of Extremes, From Floods to Droughts

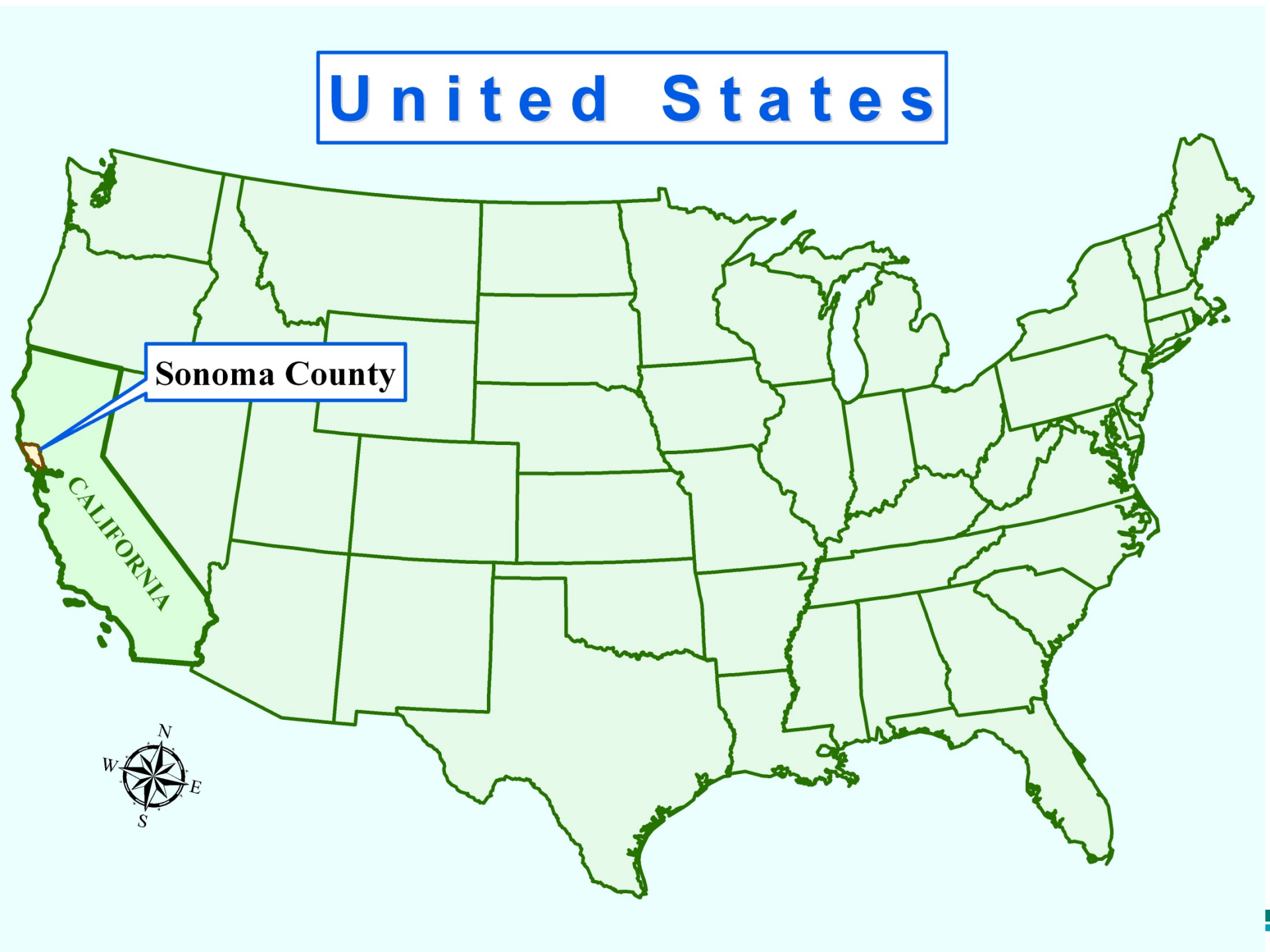
Advisory Committee on Water Information Webinar - June 27, 2013

Sonoma County Water Agency

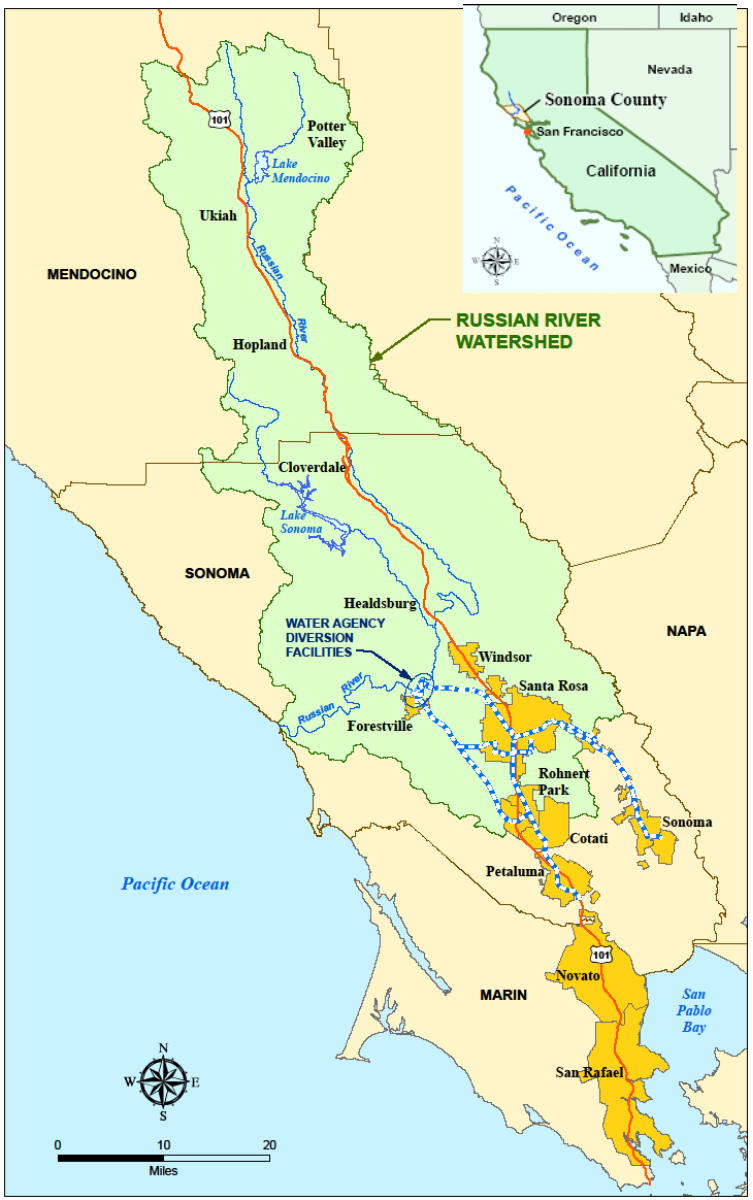
Grant Davis, General Manager

Jay Jasperse, P.E. - Chief Engineer

United States



About the Sonoma County Water Agency



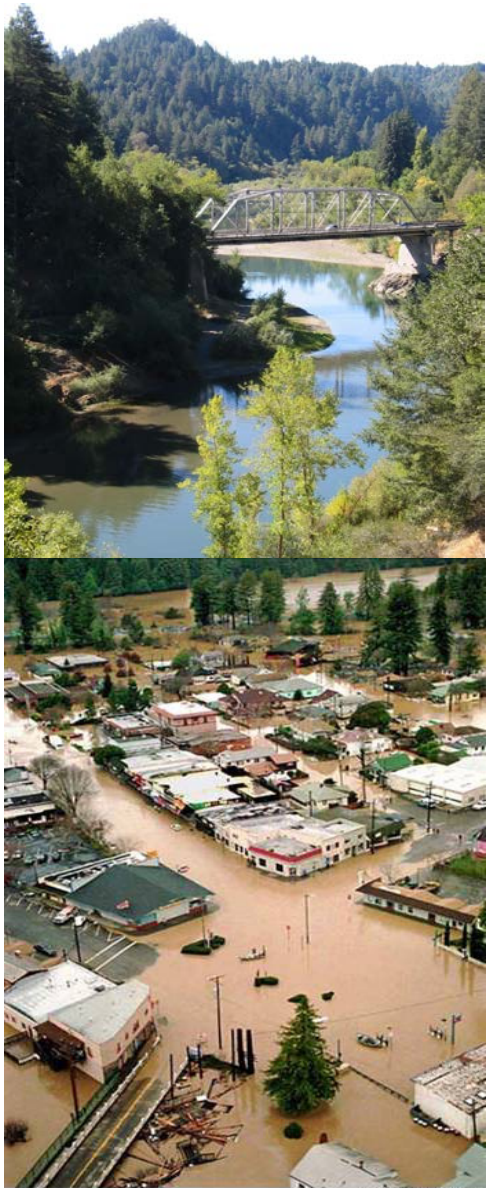
- **Wholesale Water Supplier for ~600,000 people**
  - Russian River Primary Supply
- **Wastewater Collection and Treatment**
  - Recycled Water Distribution
- **Flood Protection Services**
- **Power Generation & Renewable Energy Development**

Key Themes: Improve Resilience of Water Supply, Management & Infrastructure

- **Implementing Integrated Water Resource Management Programs & Projects**
- **Use Science As A Basis For Management Decisions & Policy Development**
- **Engage Stakeholders & Form Partnerships**

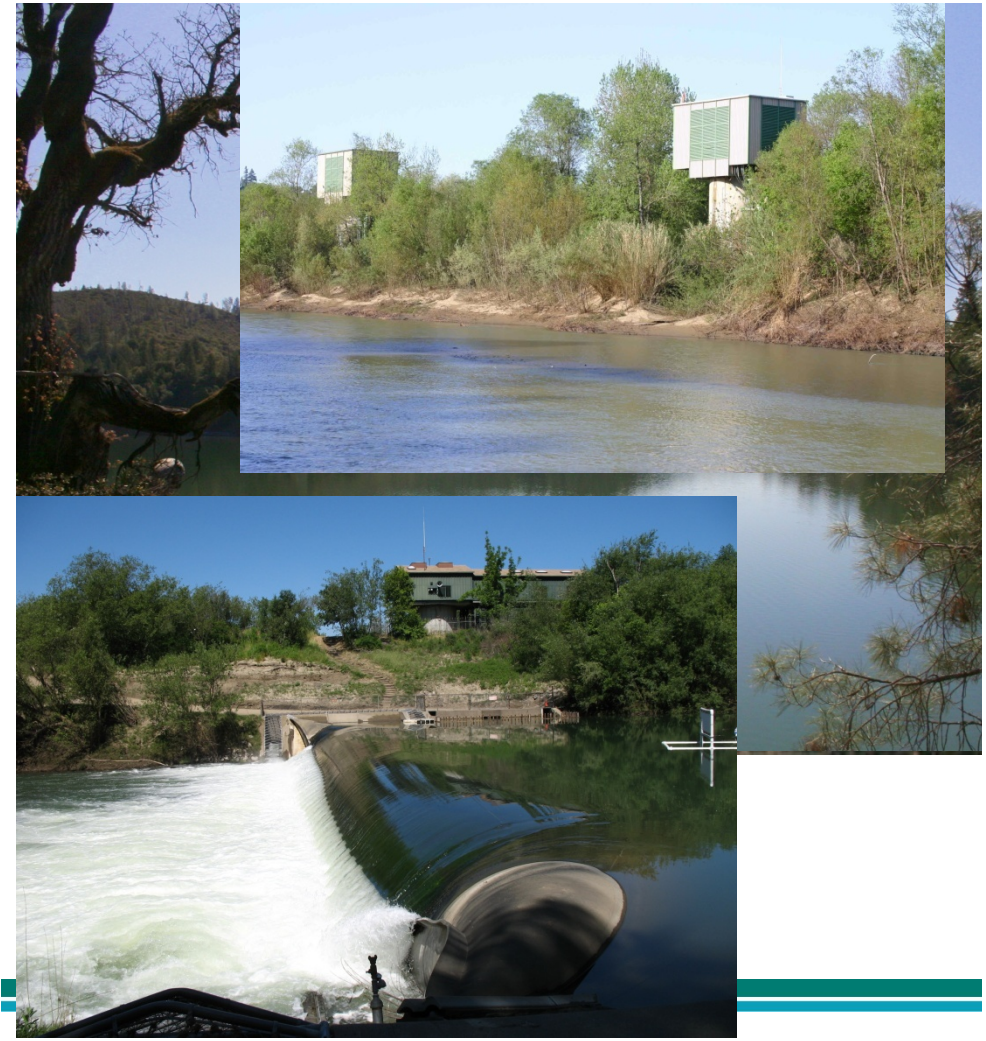
Overview

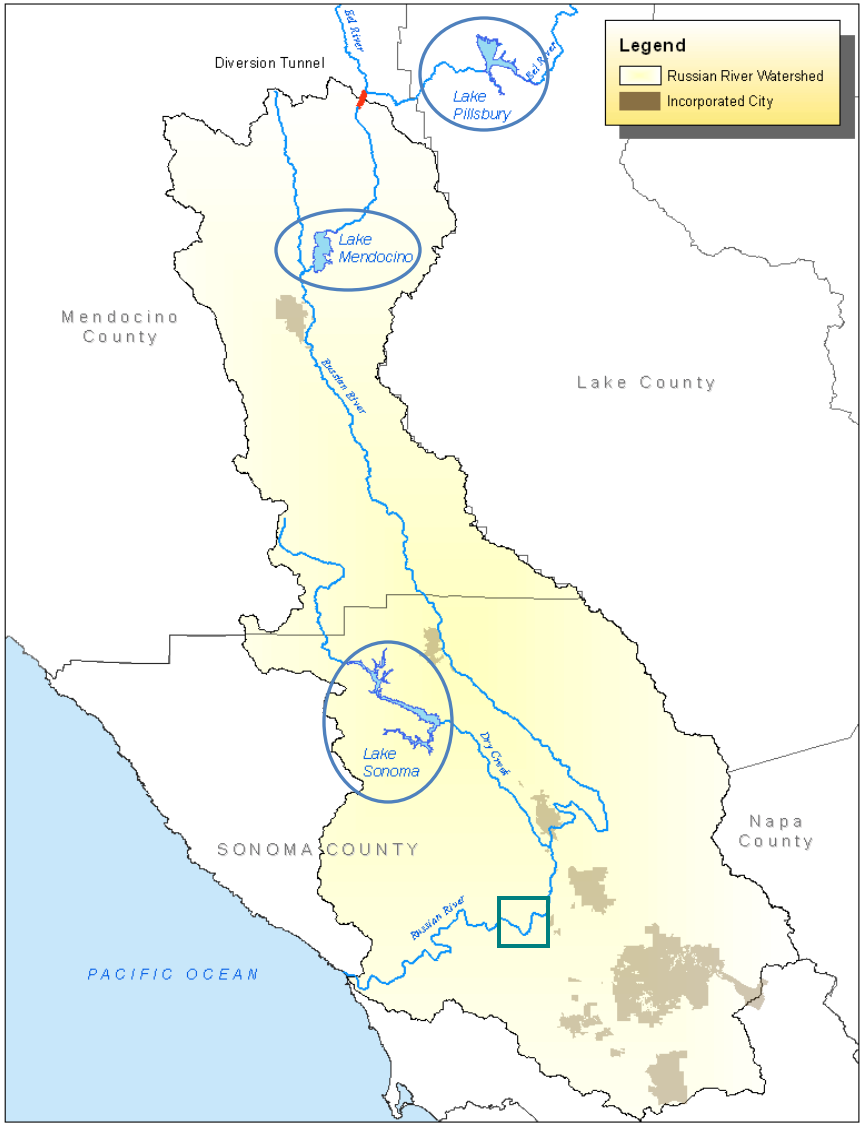
- Background – Setting
  - Russian River Management/Water Supply Facilities
  - Hydrology, Weather & Climate Change
- Water Management Challenges
- Integrated Water Resource Management
- Example Programs
- Partnerships



Russian River Watershed

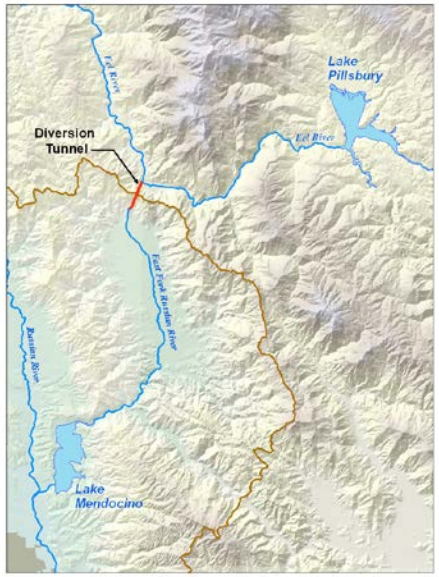
- Facilities
  - Lake Pillsbury
  - Lake Mendocino
  - Lake Sonoma
  - Warm Springs Dam / Lake Sonoma
  - Coyote Valley Dam / Lake Mendocino
  - Wohler / Mirabel

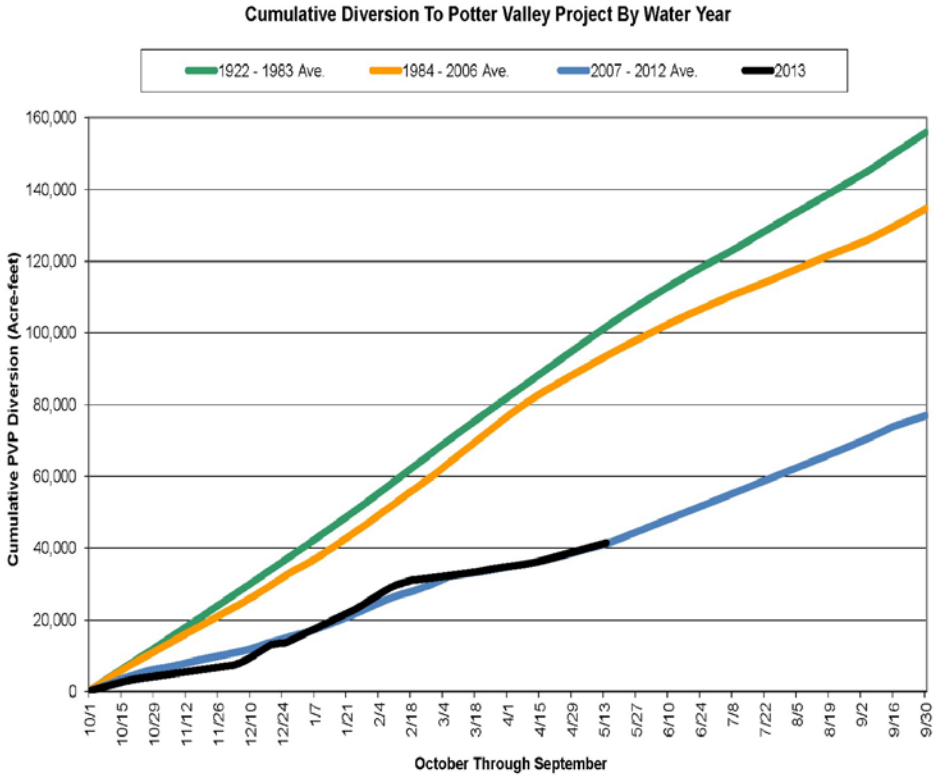




Russian River Water Management Issues

- **Project transfers from Eel to Russian River have declined following 2004 amendment to FERC license**





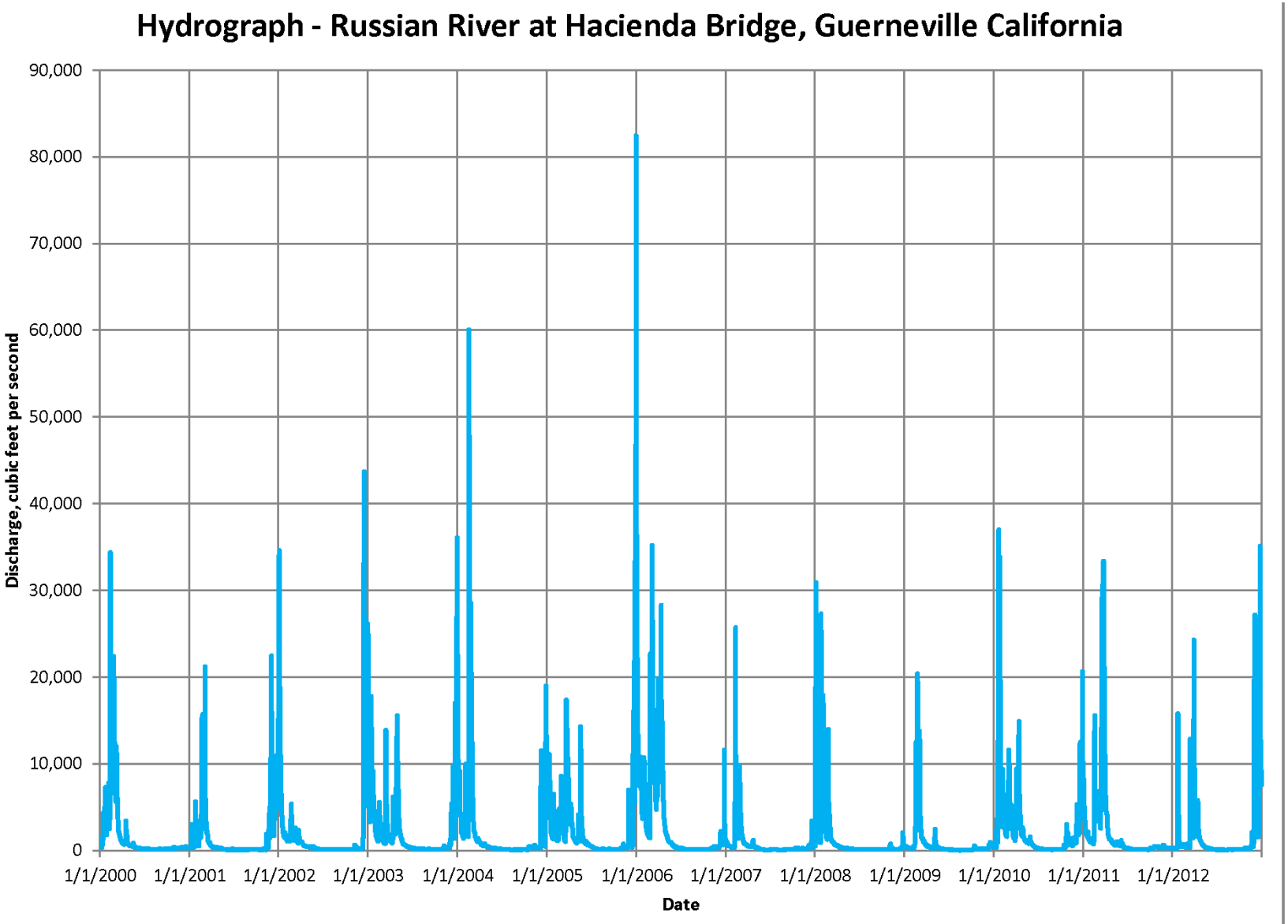
Endangered Species Act Compliance: Biological Opinion – September 2008

- **Why**: Chinook, coho salmon & steelhead fish listed under federal ESA
- **Considers**: Impacts of ***current*** operations on listed fish
- **Timeline**: 15 years to implement
- **Major findings**: River flows too high, jeopardize coho salmon & steelhead
- **Requires**: Decreased Dry Creek & Russian River mainstem summer flows; closed estuary; water supply facility improvements

Hydro-Meteorology

- **Hydrology** – "Flashy" River System
- **Weather** – Dominated by Atmospheric Rivers (AR's). SCWA Supported by NOAA Hydrometeorology Testbed (HMT)
- **Climate Change** – Forecast Impacts By USGS Using Down-Scaled Models

Russian River Hydrology

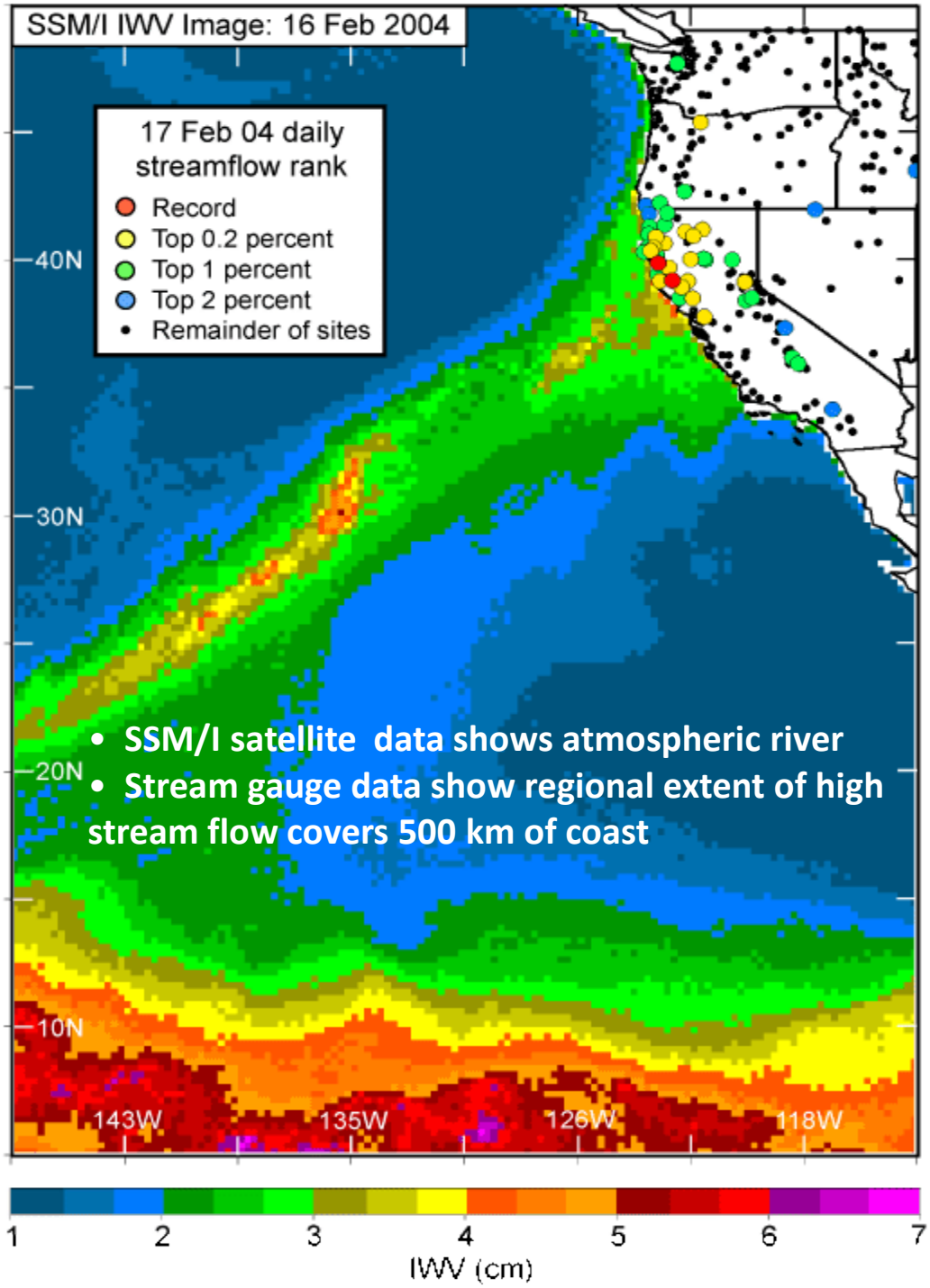


http://hmt.noaa.gov

NOAA's HMT

Focus on extreme precipitation

- NOAA's Hydrometeorology Testbed (HMT)
  - Connects researchers, forecasters and forecast users
  - Has been researching and developing prototypes on extreme precipitation in California since 2003
  - Testing and applying results to the Pacific Northwest
  - Builds on earlier experiments from 1997-2002
- Lessons learned from HMT have been documented in over 50 formal peer-reviewed technical publications
  - http://hmt.noaa.gov/pubs/



Flooding on California's Russian River: Role of atmospheric rivers

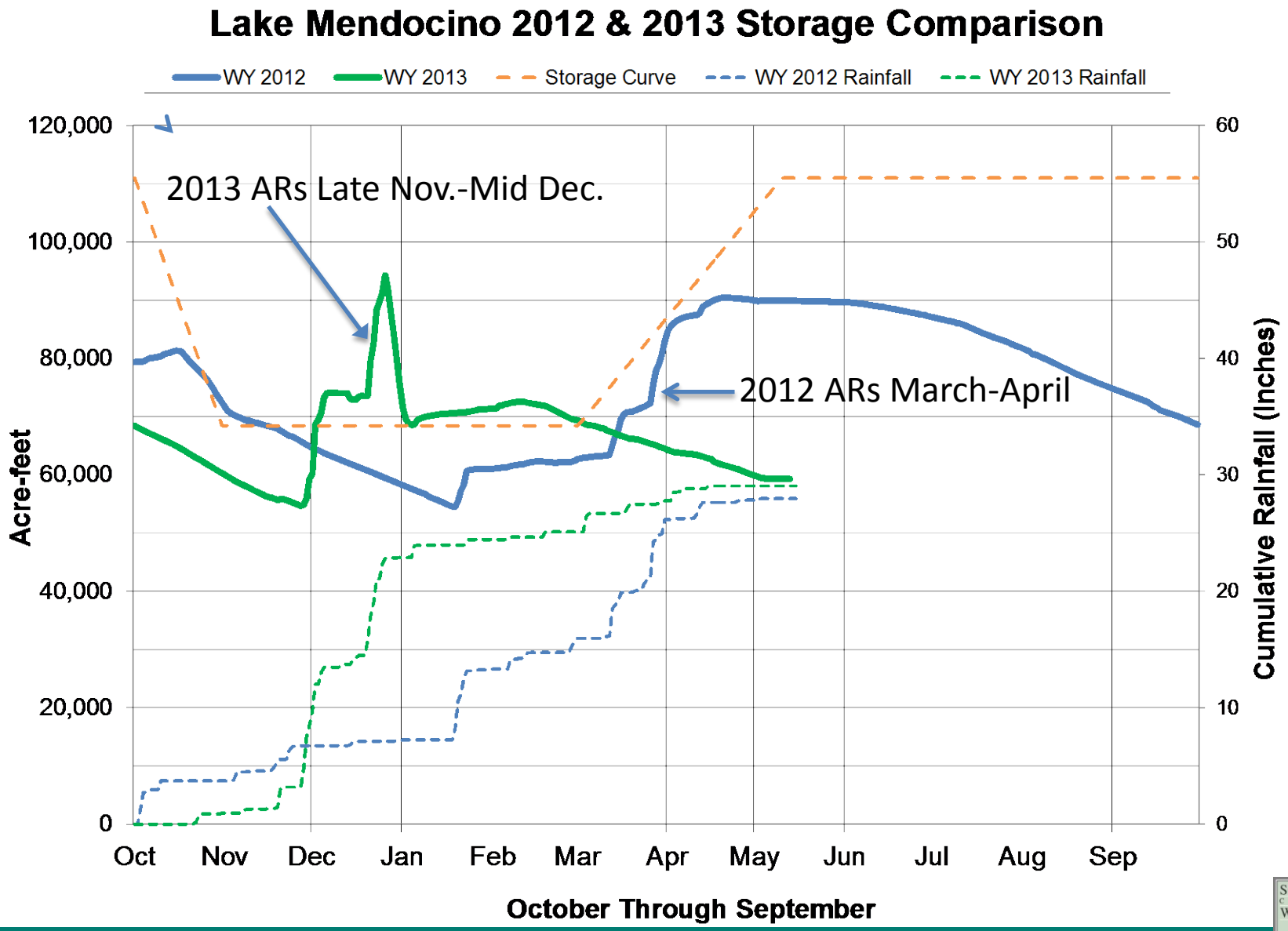
Ralph, F.M., P. J. Neiman, G. A. Wick, S. I. Gutman, M. D. Dettinger, D. R. Cayan, A. White

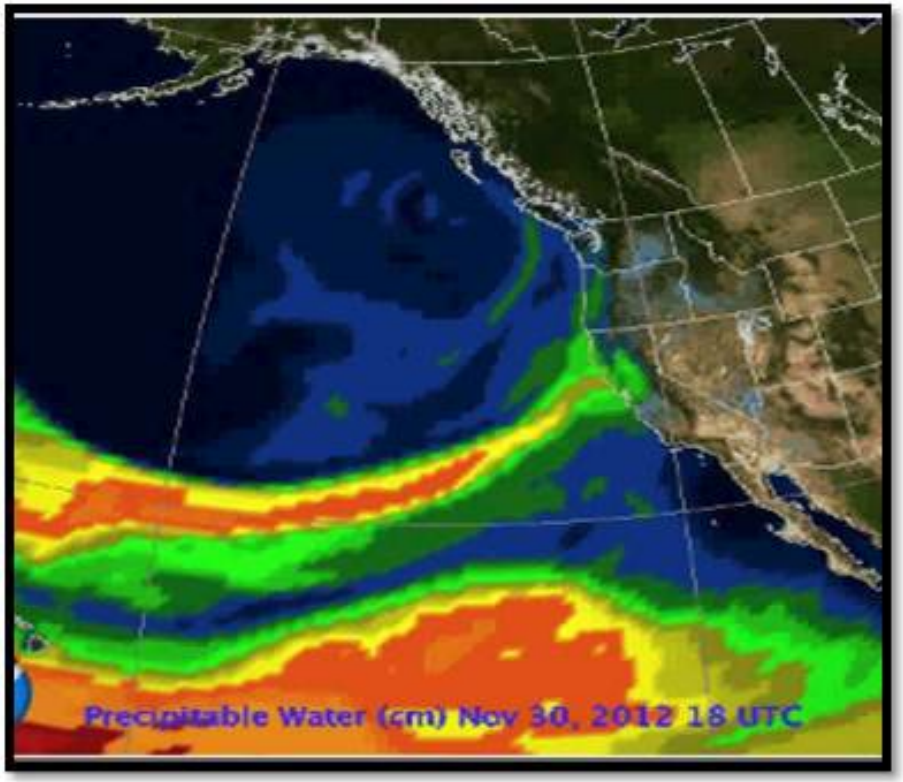
Geophys. Res. Lett., 2006

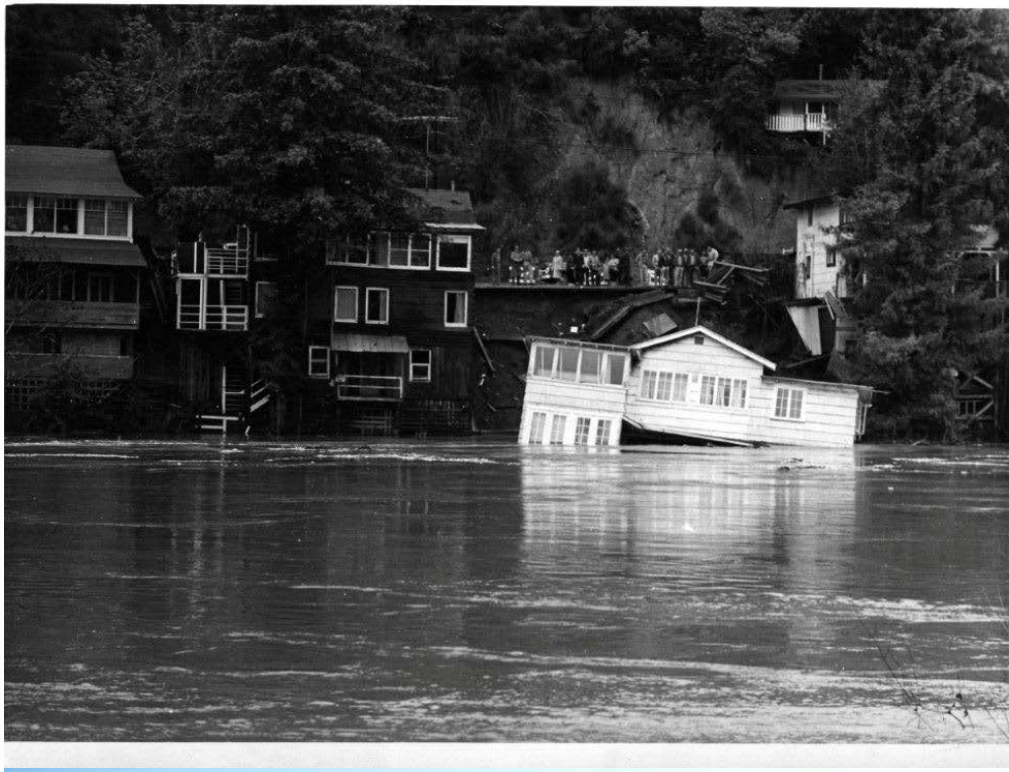
Russian River floods are associated with atmospheric rivers - all 7 floods over 8 years.

35-45% of annual precipitation in California fell in association with atmospheric river events

AR Timing & Occurrence: Impacts to Water Supply



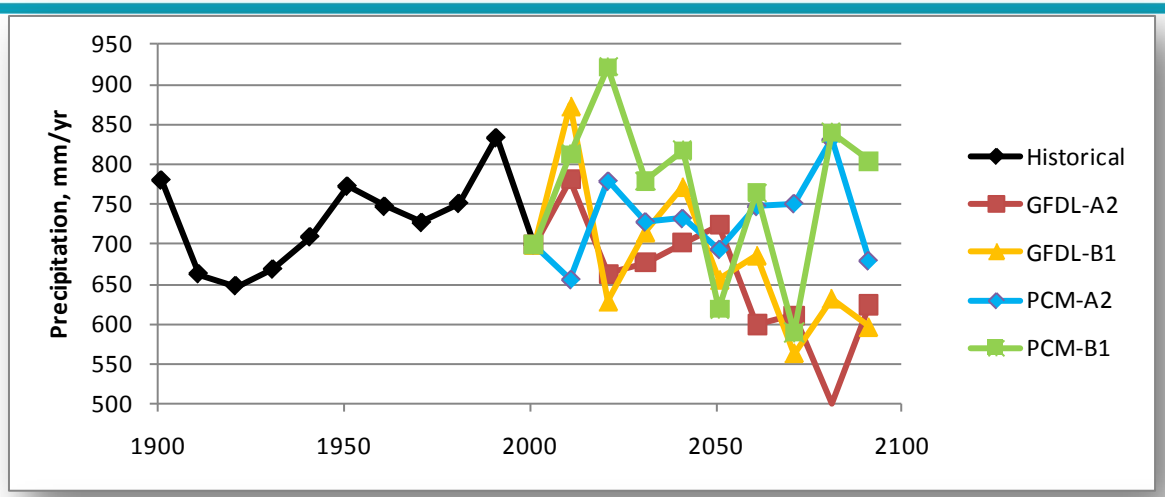


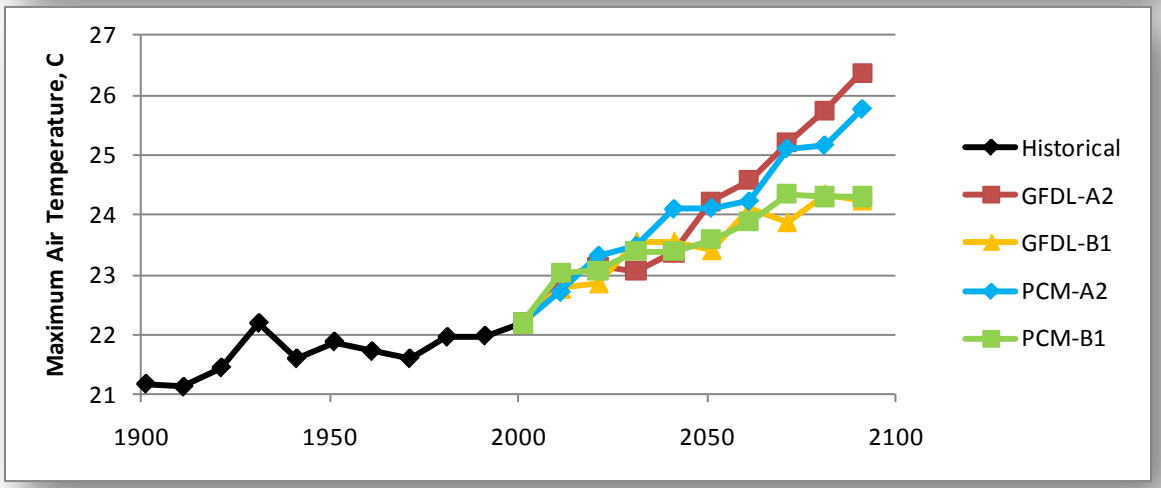


It’s All or Nothing!

USGS-SCWA Climate Change Study

- **Downscale future climate change scenarios**
  - Spatially – 270 m
  - Temporally – 1 day timestep
- **2 Global Climate Models**
  1. Parallel Climate Model
  2. NOAA GFDL
- **2 Scenarios**
  1. A2 – medium high emissions
  2. B1 – low emissions
- **Evaluate Impacts to:**
  - Hydrology of the Russian River using the USGS Basin Characterization Model
  - Water Supply of the Russian River System
  - Santa Rosa Plain Groundwater Aquifer





USGS
science for a changing world

Our Key Water Supply Challenges…

Ensure Water Supply Reliability

Changing Regulations, Drought, Growth

Maintain Operational Reliability

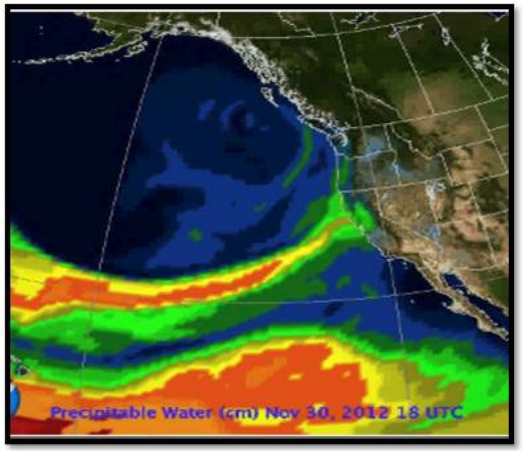
Water Quality, Aging Infrastructure

Improve Resilience Against Natural Hazards

Seismic Hazards, Extreme Weather Events

Adapt to Climate Change

Climate Variability, Sea Level Rise, Habitat Changes, Increased Water Demand (ET, soil moisture)



Ensure Affordability & Stable Funding

Conservation vs. Rates, Increased Regulations

Adapting To Meet These Challenges

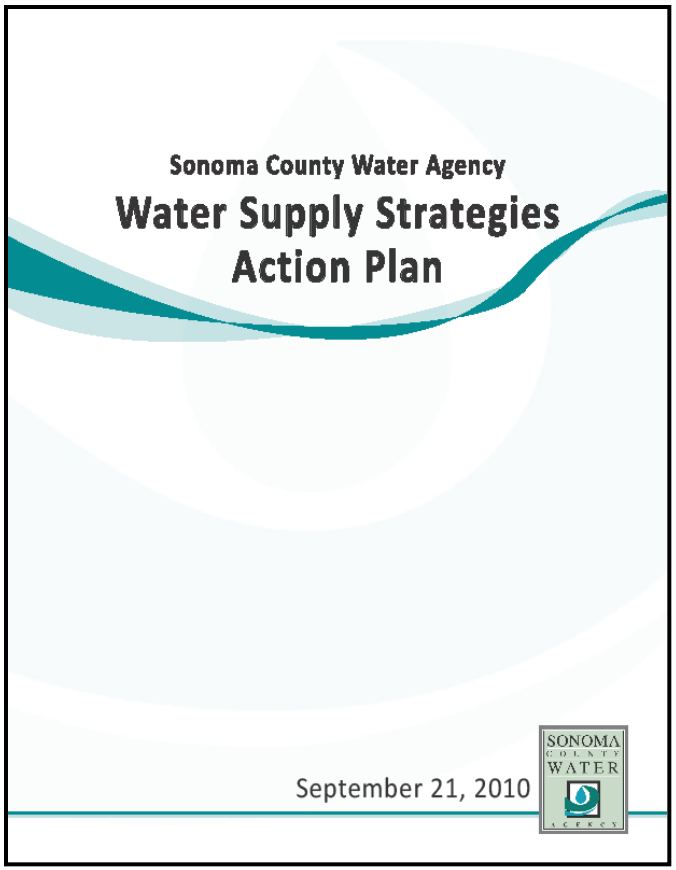
- **Reduced Potter Valley Diversions (2005-06)**
- **Biological Opinion (Sept. 2008)**
- **Economic Downturn Beginning 2008**

<u>SCWA's Response</u>

- **2009 Workshops Providing Comprehensive Review: Water Resources, Facilities & Management**
- **Termination of 1990's "Water Project" (Sept. 2009)**
- **Pursue alternative approach: Integrative water management to achieve improved resiliency**

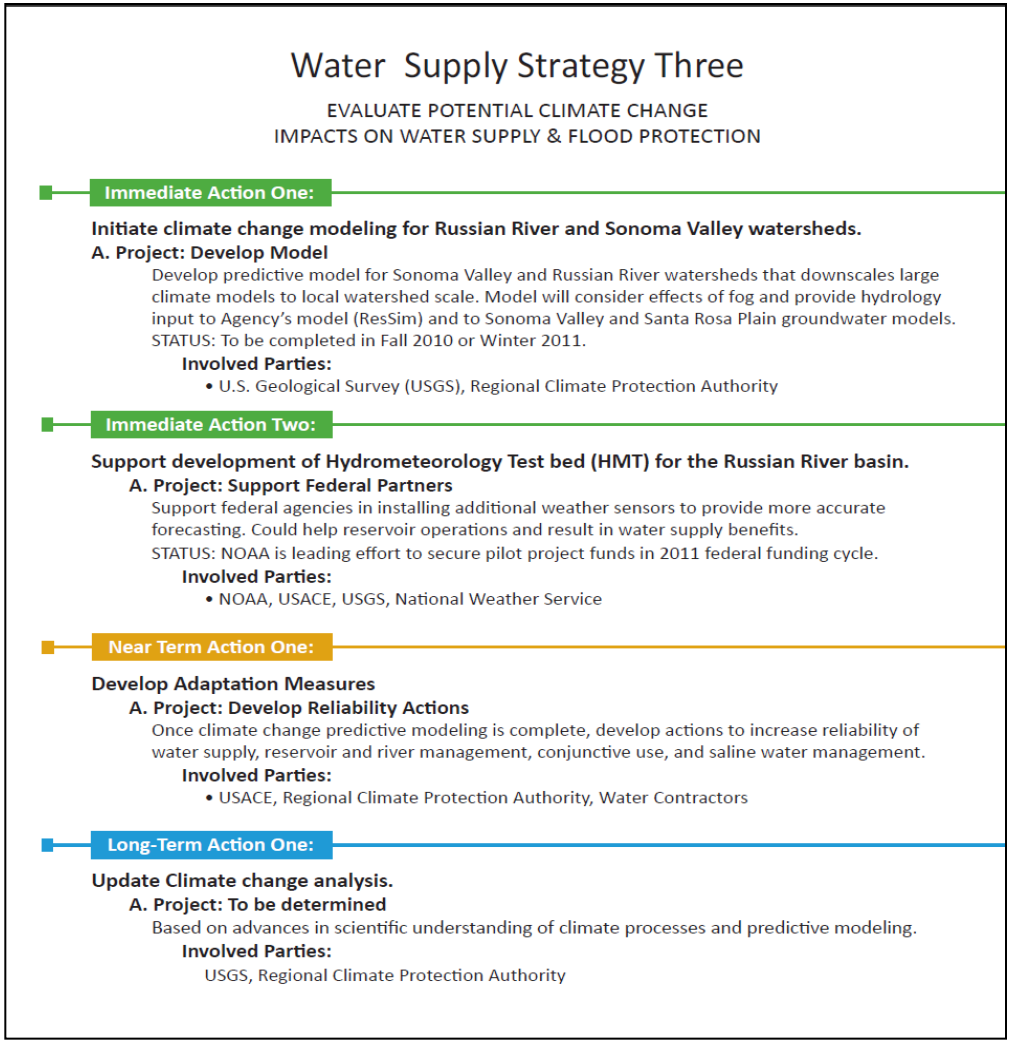
Water Supply Strategy Action Plan

- Plan adopted September 2010
- 16 months outreach
- Dozens of meetings, hundreds of comments
- Updated 2011 & 2013



Water Supply Strategies Action Plan: Framework for Regional Integrated Planning

- Nine strategies with prioritized actions
  - ✧ Immediate Actions
  - ✧ Near-term Actions
  - ✧ Long-term Actions
- Each Action: 1 or more projects. Status & involved parties described
- A living document



Water Supply Strategy Three

EVALUATE POTENTIAL CLIMATE CHANGE
IMPACTS ON WATER SUPPLY & FLOOD PROTECTION

Immediate Action One:

Initiate climate change modeling for Russian River and Sonoma Valley watersheds.

A. Project: Develop Model

Develop predictive model for Sonoma Valley and Russian River watersheds that downscales large climate models to local watershed scale. Model will consider effects of fog and provide hydrology input to Agency's model (ResSim) and to Sonoma Valley and Santa Rosa Plain groundwater models.

STATUS: To be completed in Fall 2010 or Winter 2011.

Involved Parties:

- U.S. Geological Survey (USGS), Regional Climate Protection Authority

Immediate Action Two:

Support development of Hydrometeorology Test bed (HMT) for the Russian River basin.

A. Project: Support Federal Partners

Support federal agencies in installing additional weather sensors to provide more accurate forecasting. Could help reservoir operations and result in water supply benefits.

STATUS: NOAA is leading effort to secure pilot project funds in 2011 federal funding cycle.

Involved Parties:

- NOAA, USACE, USGS, National Weather Service

Near Term Action One:

Develop Adaptation Measures

A. Project: Develop Reliability Actions

Once climate change predictive modeling is complete, develop actions to increase reliability of water supply, reservoir and river management, conjunctive use, and saline water management.

Involved Parties:

- USACE, Regional Climate Protection Authority, Water Contractors

Long-Term Action One:

Update Climate change analysis.

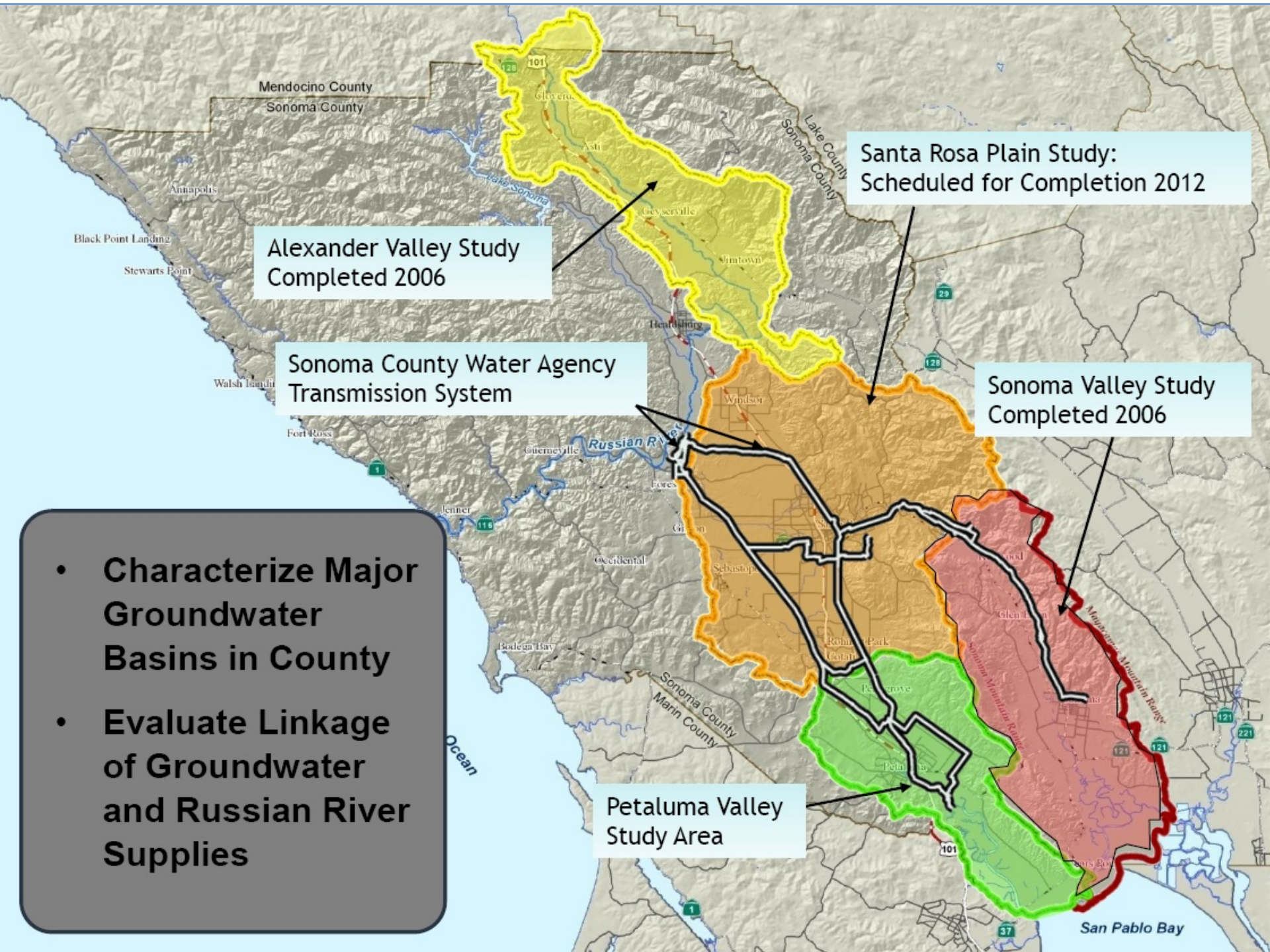
A. Project: To be determined

Based on advances in scientific understanding of climate processes and predictive modeling.

Involved Parties:

USGS, Regional Climate Protection Authority

Integrated Water Management:
4 Ways to Meet Water Supply Demands



- **Characterize Major Groundwater Basins in County**
- **Evaluate Linkage of Groundwater and Russian River Supplies**

Groundwater Management Planning

Sonoma Valley Groundwater Management Program

Sonoma Valley Basin:

- **Management Plan implemented by Basin Advisory Panel (BAP) since 2007**

Santa Rosa Plain Basin:

- **BAP formed and developing management plan (anticipate completion by winter 2014)**

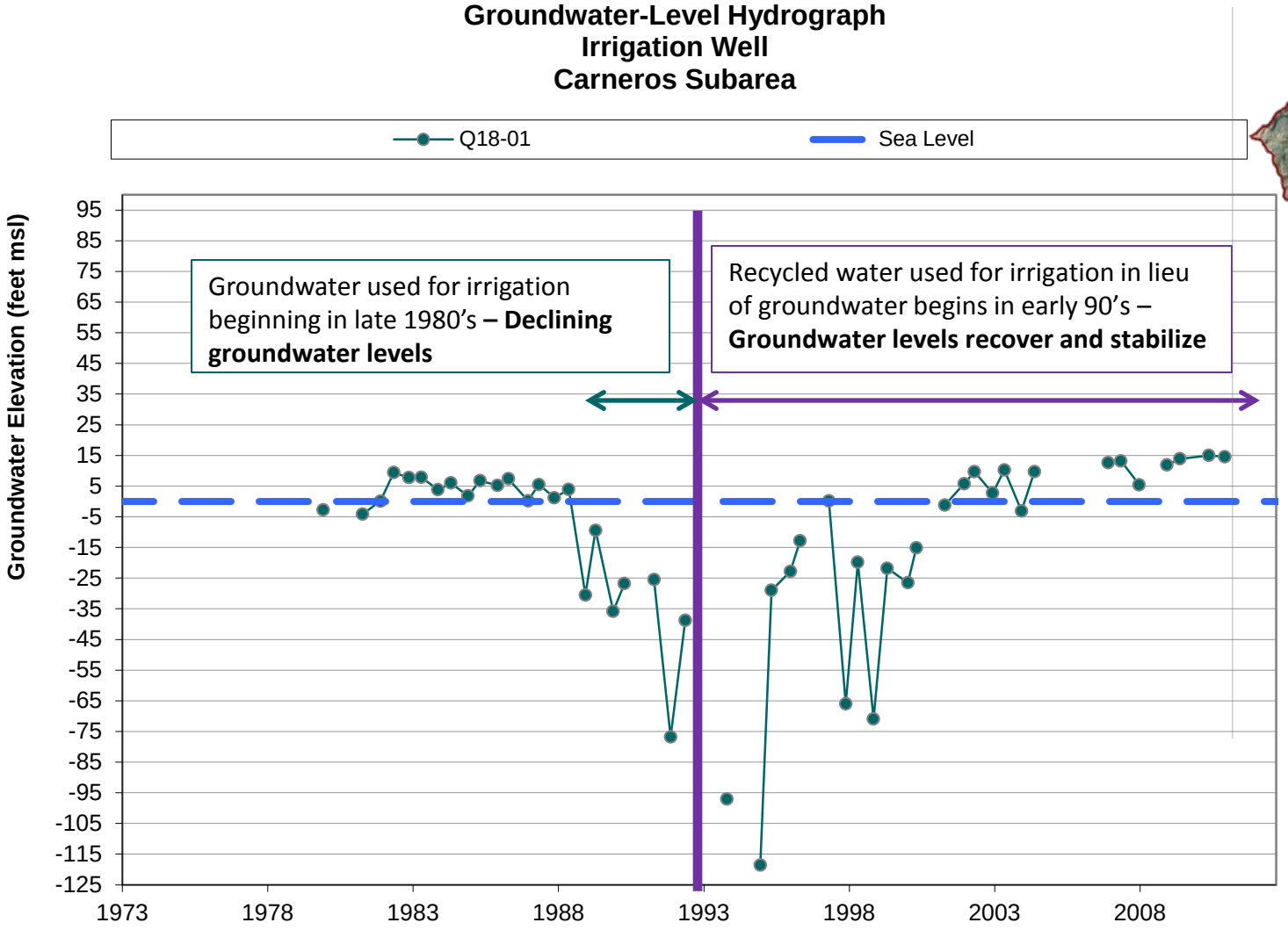
- **BAPs comprised of major constituencies within community**

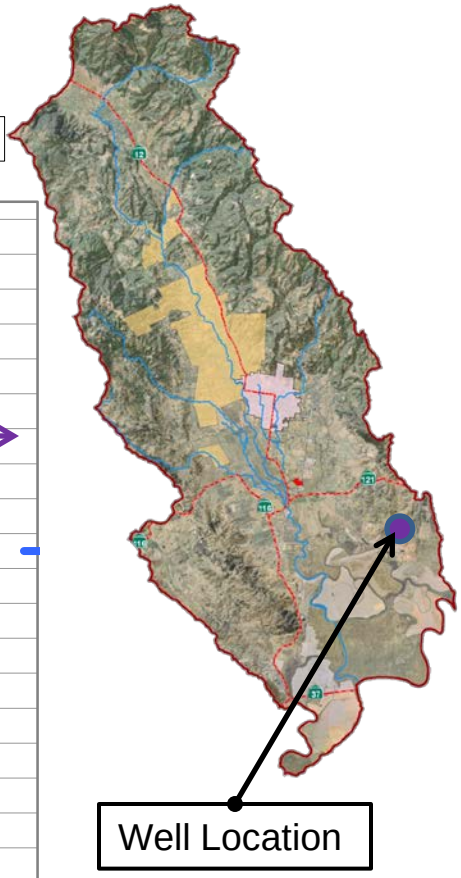
- **Both programs promote integrated water management emphasizing collaboration & local control**

Sonoma-Marin Saving Water Partnership

- Regional Coordination for Implementation of Water Conservation Programs
- Allocates annual funding levels for Partners
- Provides mechanism for Regional Alliance to comply with State 20 x 2020 legislation
- Programs include: Public Awareness Campaigns, Green Business Program, the Qualified Water Efficient Landscaper Programs, Water Education Program, and Garden Sense

Irrigation with Recycled Water to Offset Groundwater Pumping





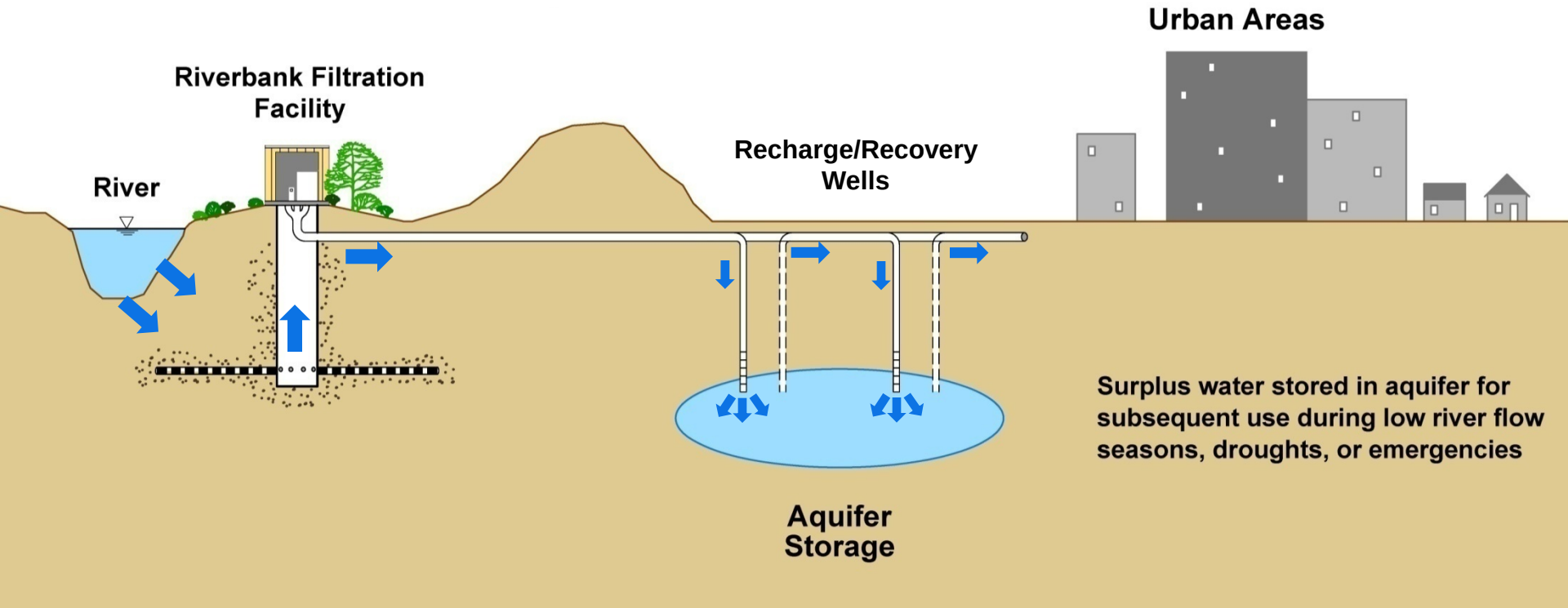
Conjunctive Management of Groundwater & Surface Water

Regional Programs Across Several Watersheds/Basins

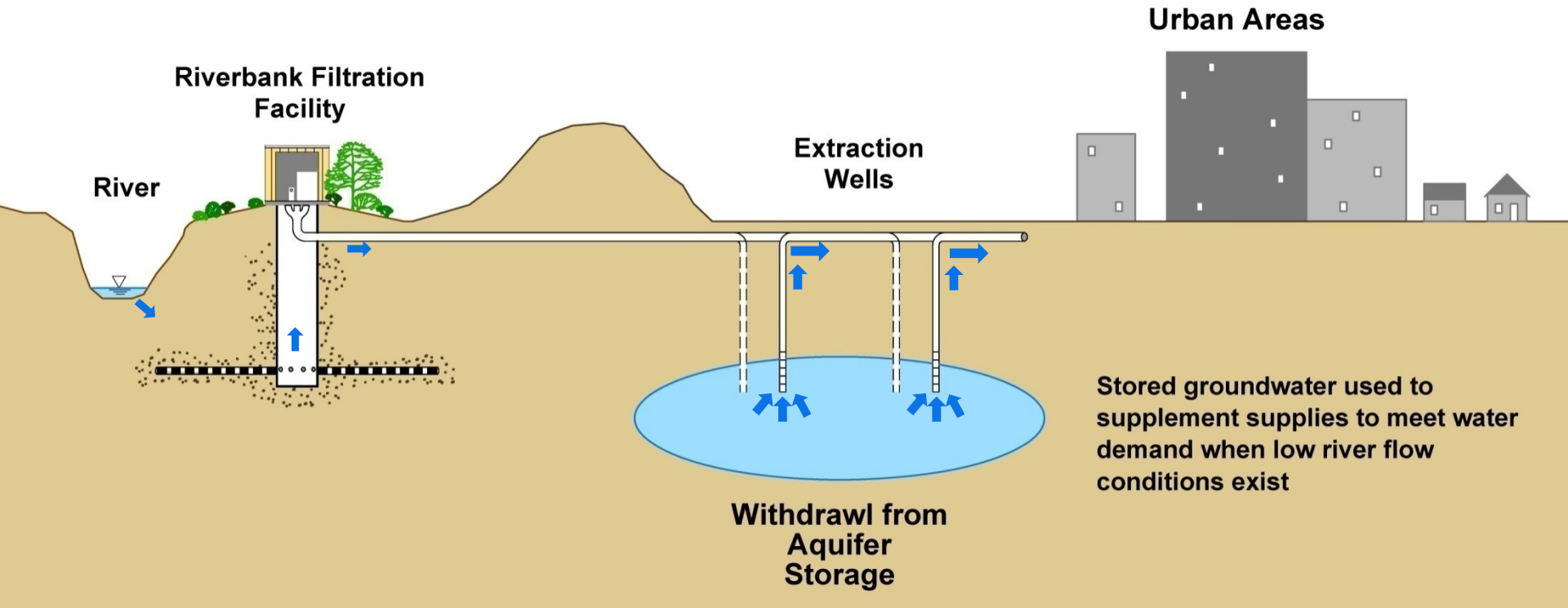
- **Groundwater Banking of Winter/Spring Russian River Water**
- **Integrated Flood Control & Groundwater Recharge**

Conceptual Groundwater Banking Schematic
Aquifer Storage and Recovery

- Proceeding with Aquifer Storage and Recovery Feasibility Study
- Geochemical compatibility assessment
  - Groundwater quality sampling and geochemical modeling
- Developing Work Plans for Pilot-Scale Demonstration Project(s)
- Explore funding options



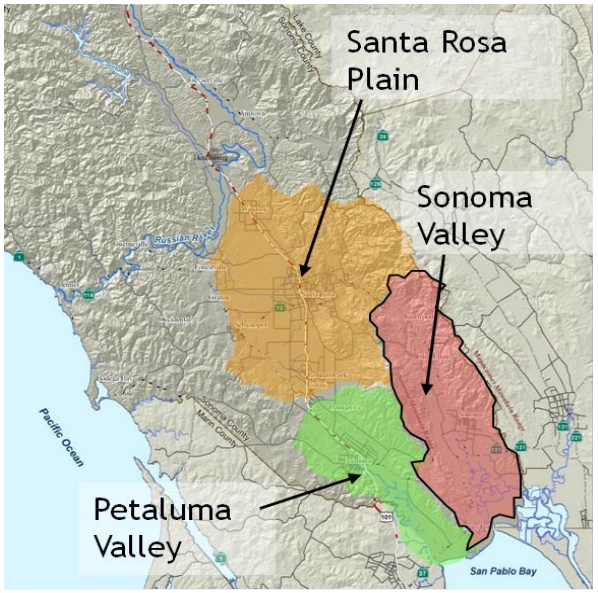
Low River Flow Conditions



Combining Stormwater Management & Groundwater Recharge – Watershed Studies

Goals and Objectives of Scoping Studies:

- 3 Watersheds – Simultaneous Studies
- Strategically managing surface & groundwater improving flood protection & groundwater recharge
- Develop design strategies
- Grant funding opportunities
- Stakeholder Input



Partnerships Are Essential: You Can't Do It Alone!

US Army Corps
of Engineers ®
San Francisco District

Summary: Water Management

- Extreme events pose specific challenges that managers must address while simultaneously grappling with a wide array of other challenges
- Managers must identify opportunities to respond to multiple challenges through integrated programs
- Developing & effectively communicating science to stakeholders & policy makers
- Developing partnerships is a key strategy
  - Leverage resources & coordinate activities
  - Overcome organizational fragmentation