Sonoma Valley Groundwater Monitoring Programs

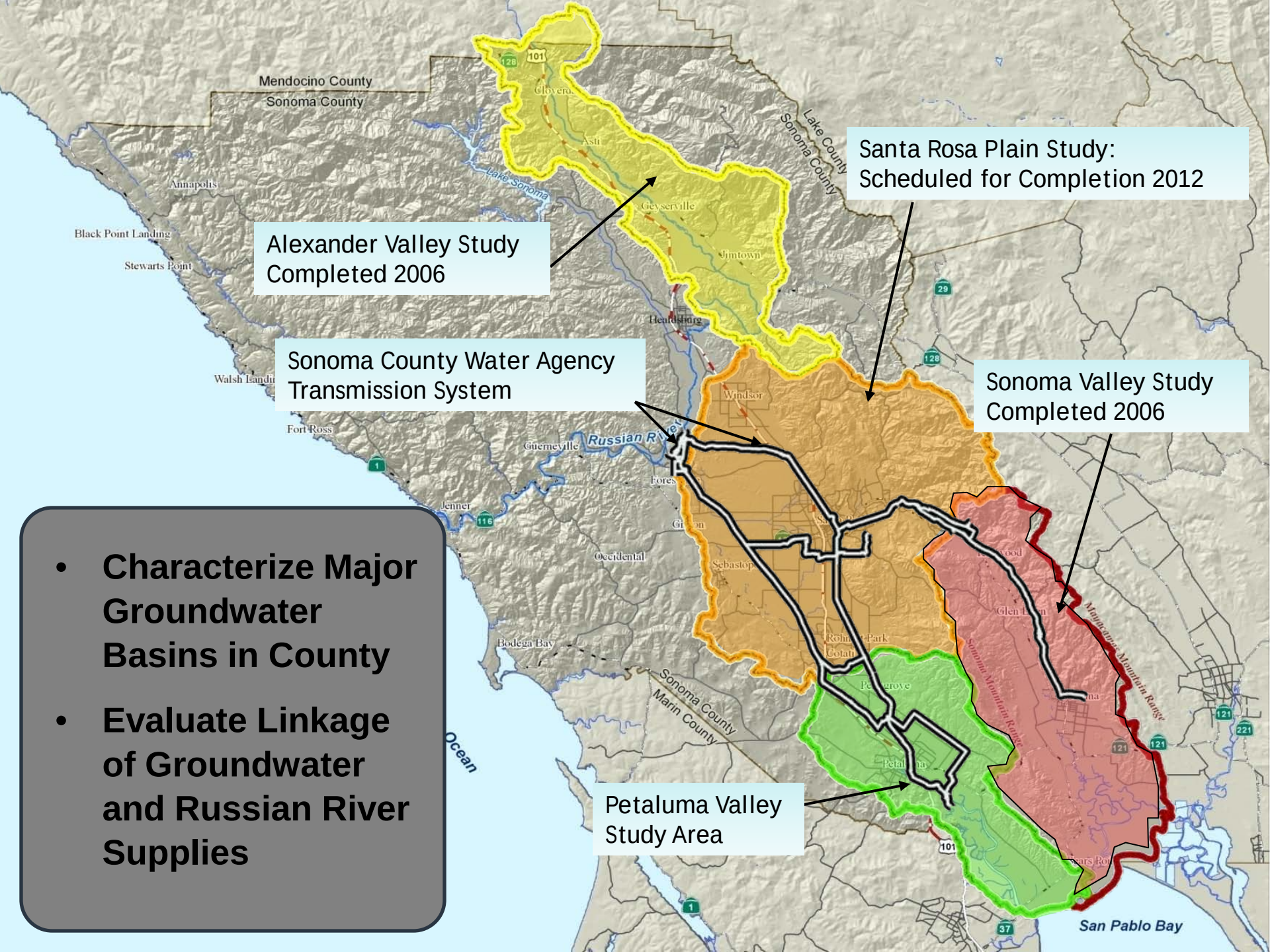
Sonoma Valley Groundwater Management Program

SONOMA COUNTY WATER AGENCY

Presentation to: Napa County Groundwater Resources Advisory Committee
By: Marcus Trotta, Sonoma County Water Agency
February 23, 2012

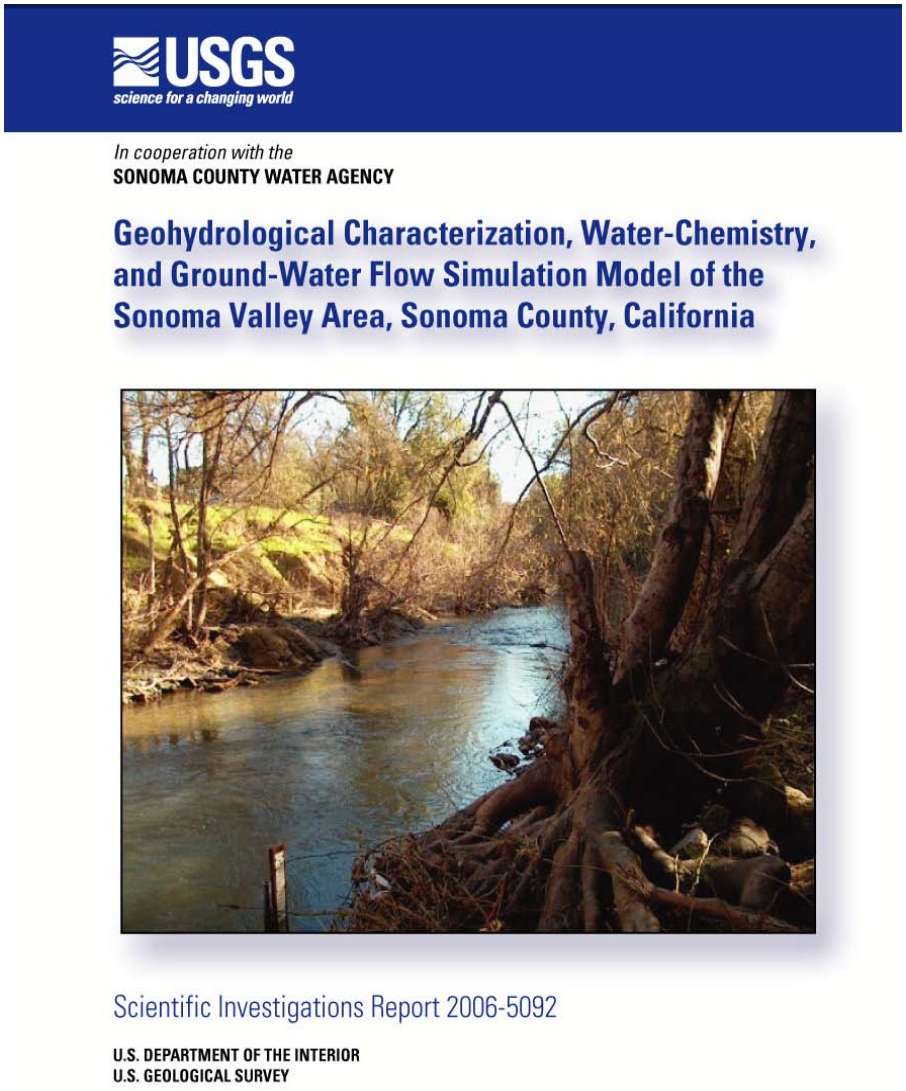
Sonoma County Water Agency Overview

- **Wholesale Water Supplier for ~600,000 people**
  - **Russian River Primary Supply with Supplemental Groundwater**
- **Wastewater Collection and Treatment**
  - **Recycled Water Distribution**
- **Flood Protection Services**
- **Environmental Resources**
  - **Fishery monitoring and enhancement projects**



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

Agency/USGS Sonoma Valley Groundwater Study



Key Findings:

- **Increased pumping between 1975-2000 (6,000 to 8,500 acre-ft/year)**
- **Localized decline of groundwater levels**
- **17,000 acre-ft decline groundwater storage**
- **Salinity issues in southern part of Valley**
- **Numerical Model - Evaluate data gaps & simulate future conditions**

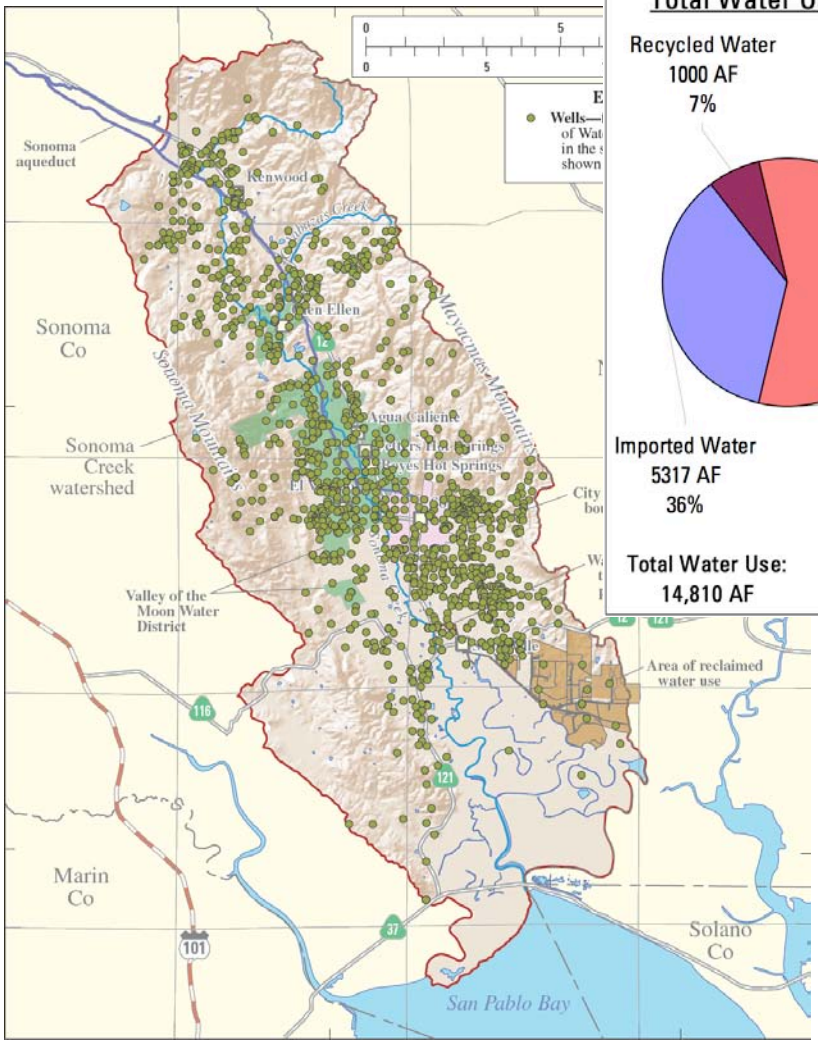
Sonoma Valley Estimated Water Use by Type

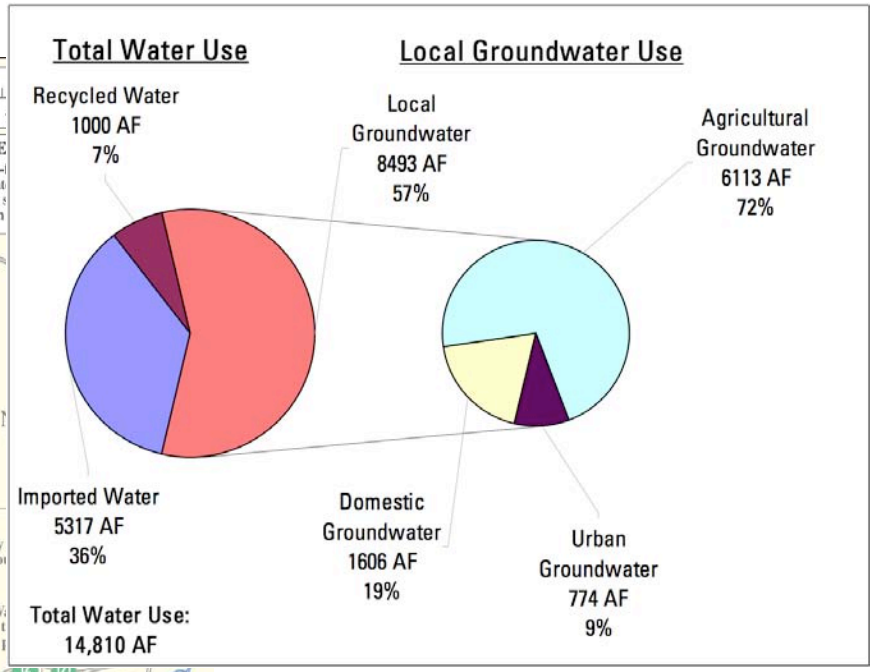
Water Sources

- Groundwater
- Russian River
- Recycled

Uses

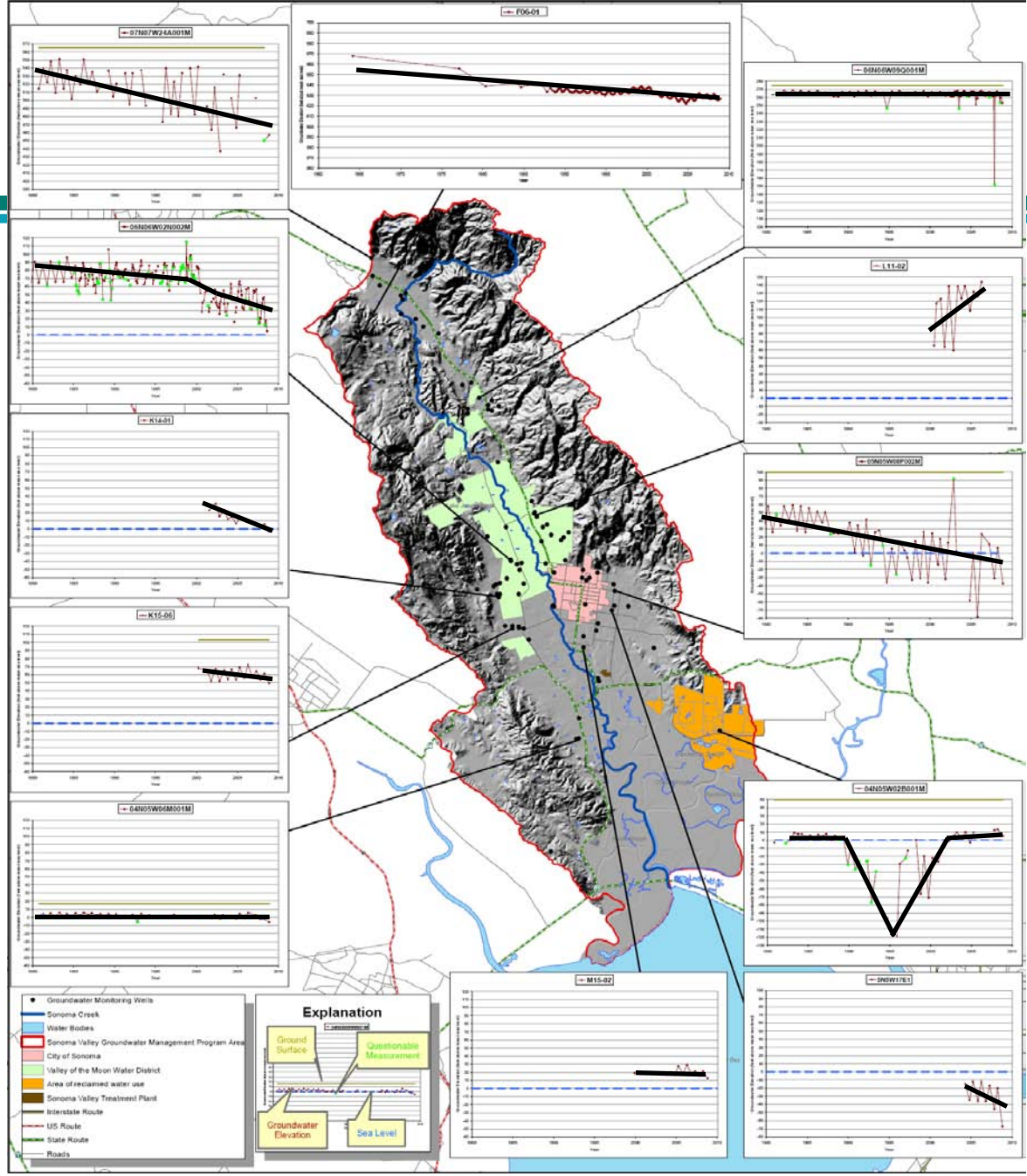
- Agriculture
- Domestic
- Urban





Groundwater Level Trends

- **Long-term data is sparse**
- **Localized areas of declining groundwater levels**
- **Groundwater-levels are locally below sea level**

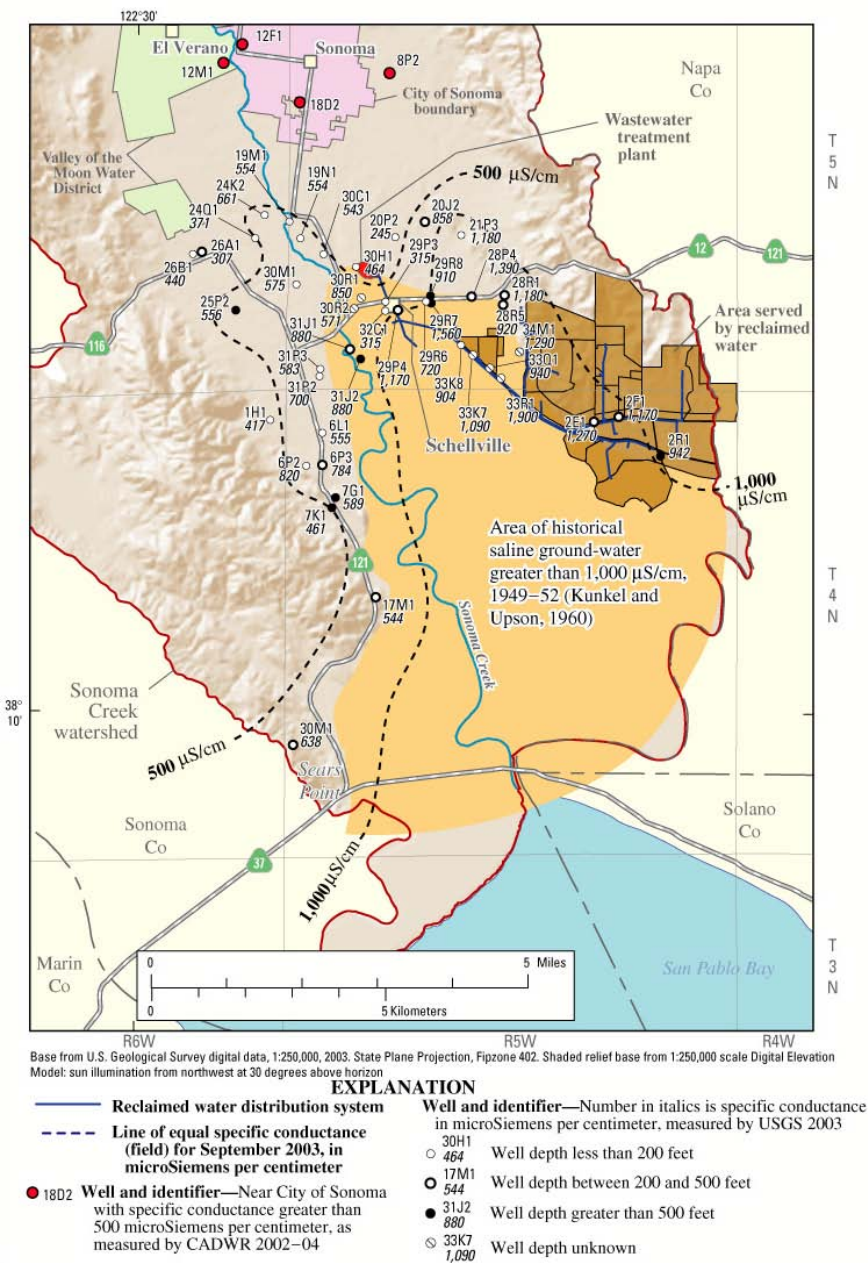


Salinity In Southern End of Sonoma Valley

Groundwater Quality Generally Acceptable

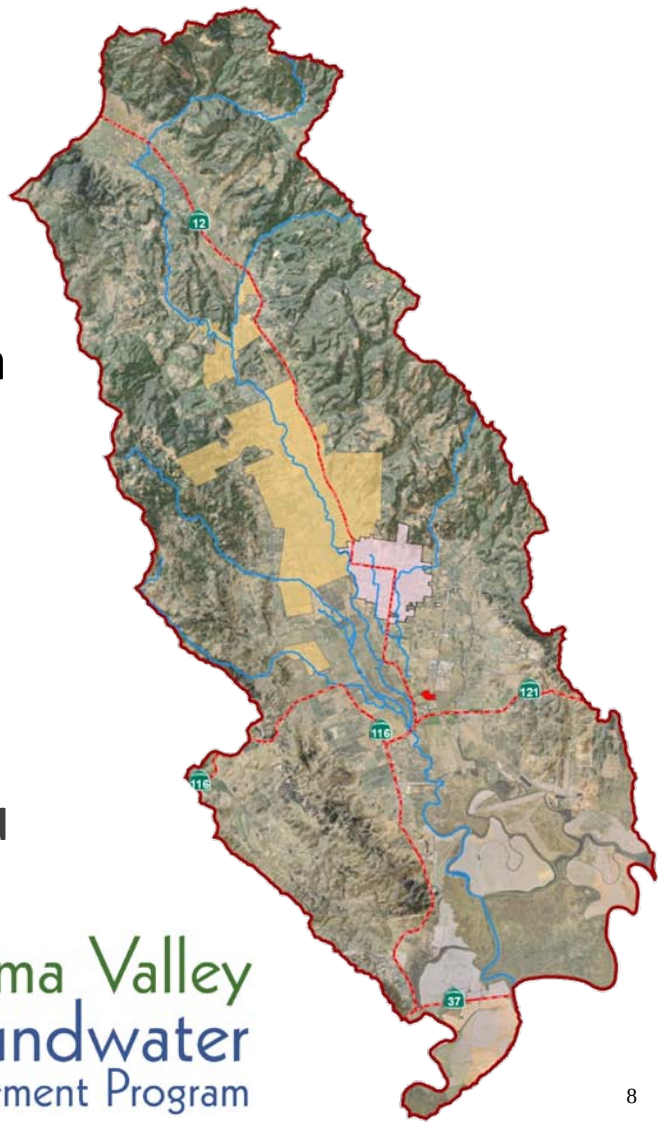
Localized Issues:

- **Salinity**
- **Thermal Water**



Overview of Sonoma Valley Groundwater Management Program (GMP)

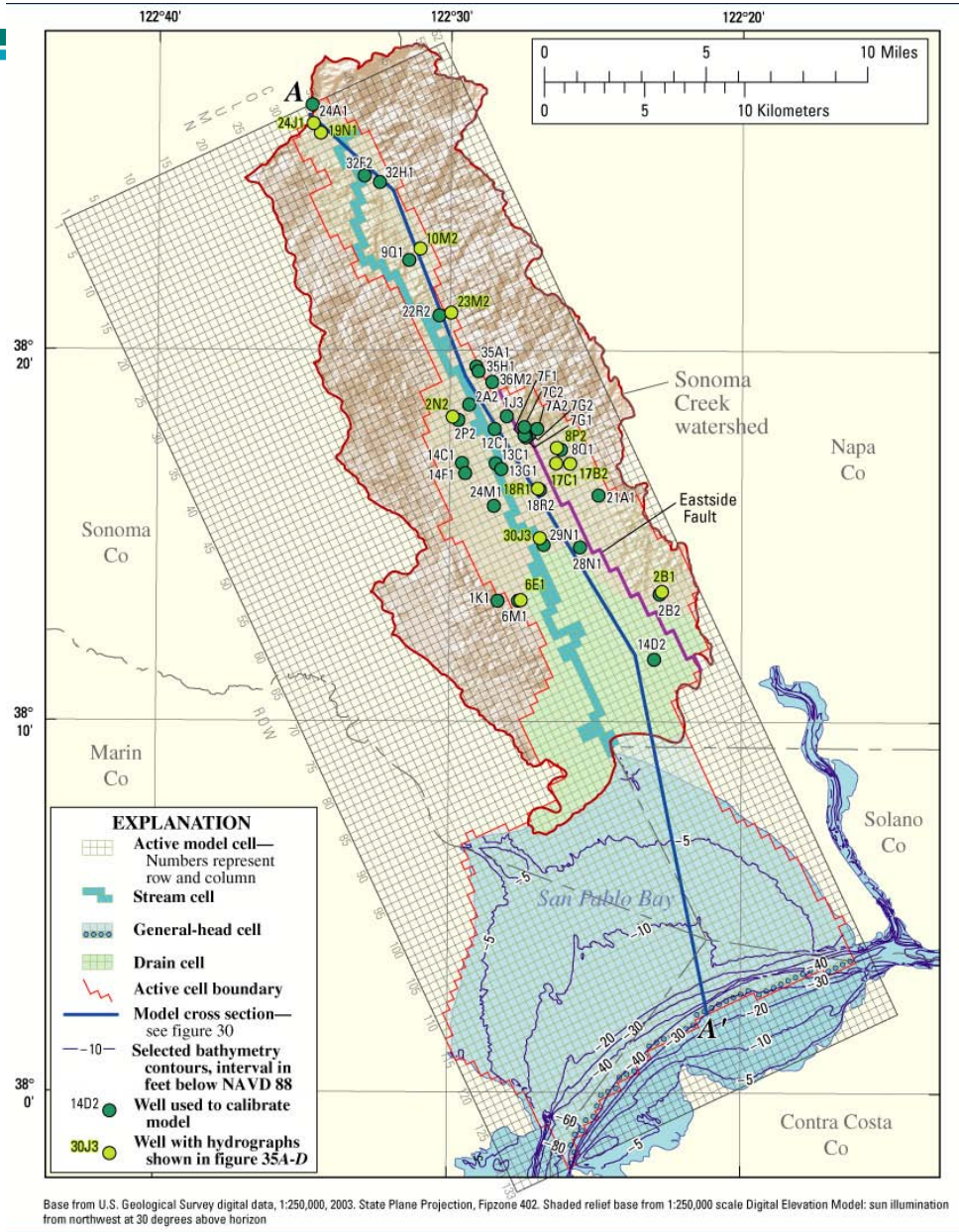
- **Convened Stakeholder Group in June 2006**
  - Agricultural alliances, environmental organizations, water purveyors, and residential groundwater users
- **Groundwater Management Plan Adopted by Sonoma County Water Agency, City of Sonoma & Valley of the Moon Water District in Late 2007**
  - Non-Regulatory and Collaborative Process
  - Letters of Support and Endorsement received from Mission Highlands Mutual Water Company, Sonoma County Water Coalition, Sonoma Ecology Center, and the Sonoma Valley Vintners & Growers Alliance
- **Fifth Year of Implementation**



Sonoma Valley Groundwater Management Program

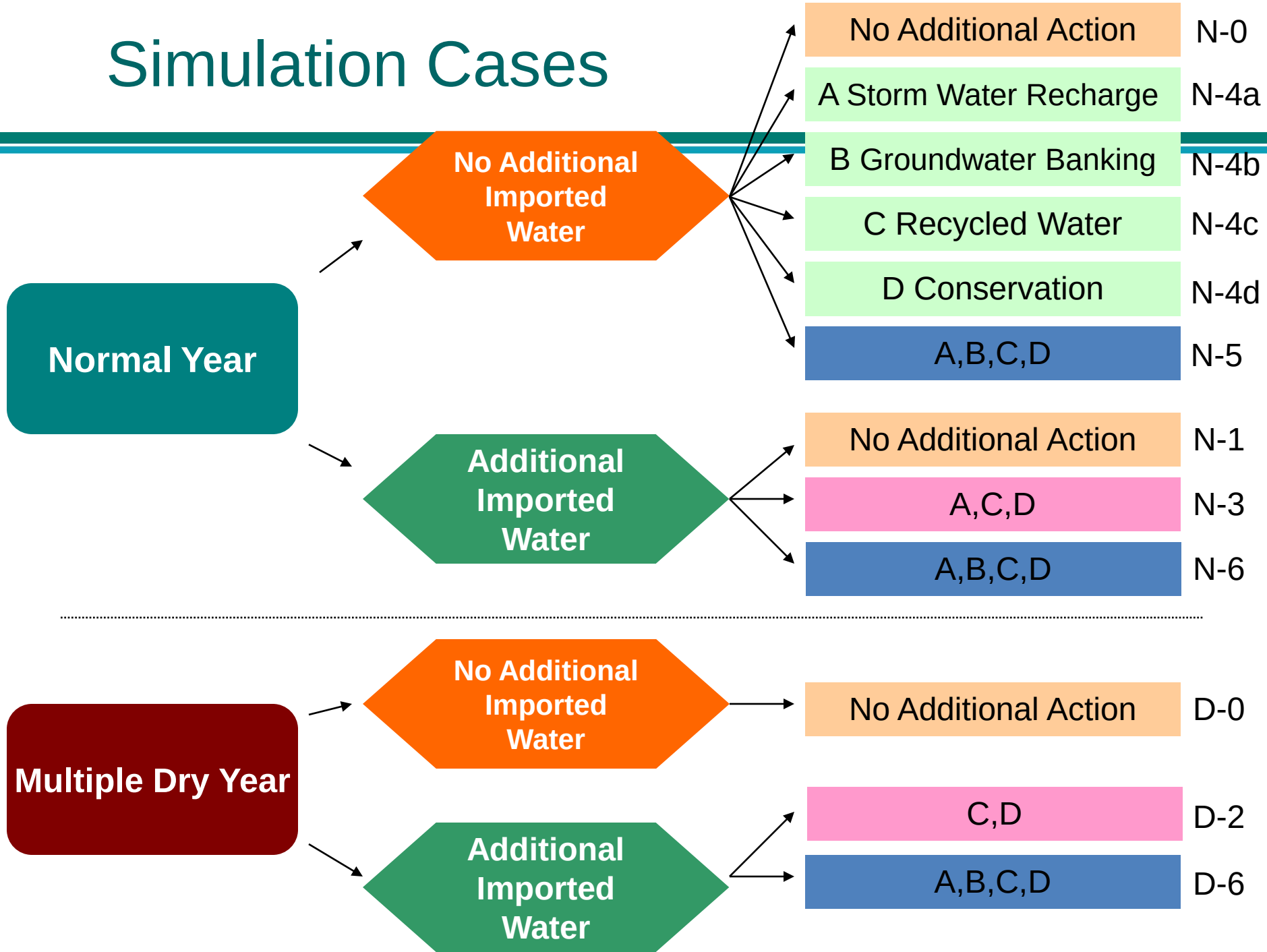
Ground-Water Flow Model

- **Synthesizes Current Data and Understanding of Ground-Water Flow System**
- **Provides Tool to Assess Potential Impacts of Alternative Water Management Scenarios**
- **Identifies Key Data Gaps**

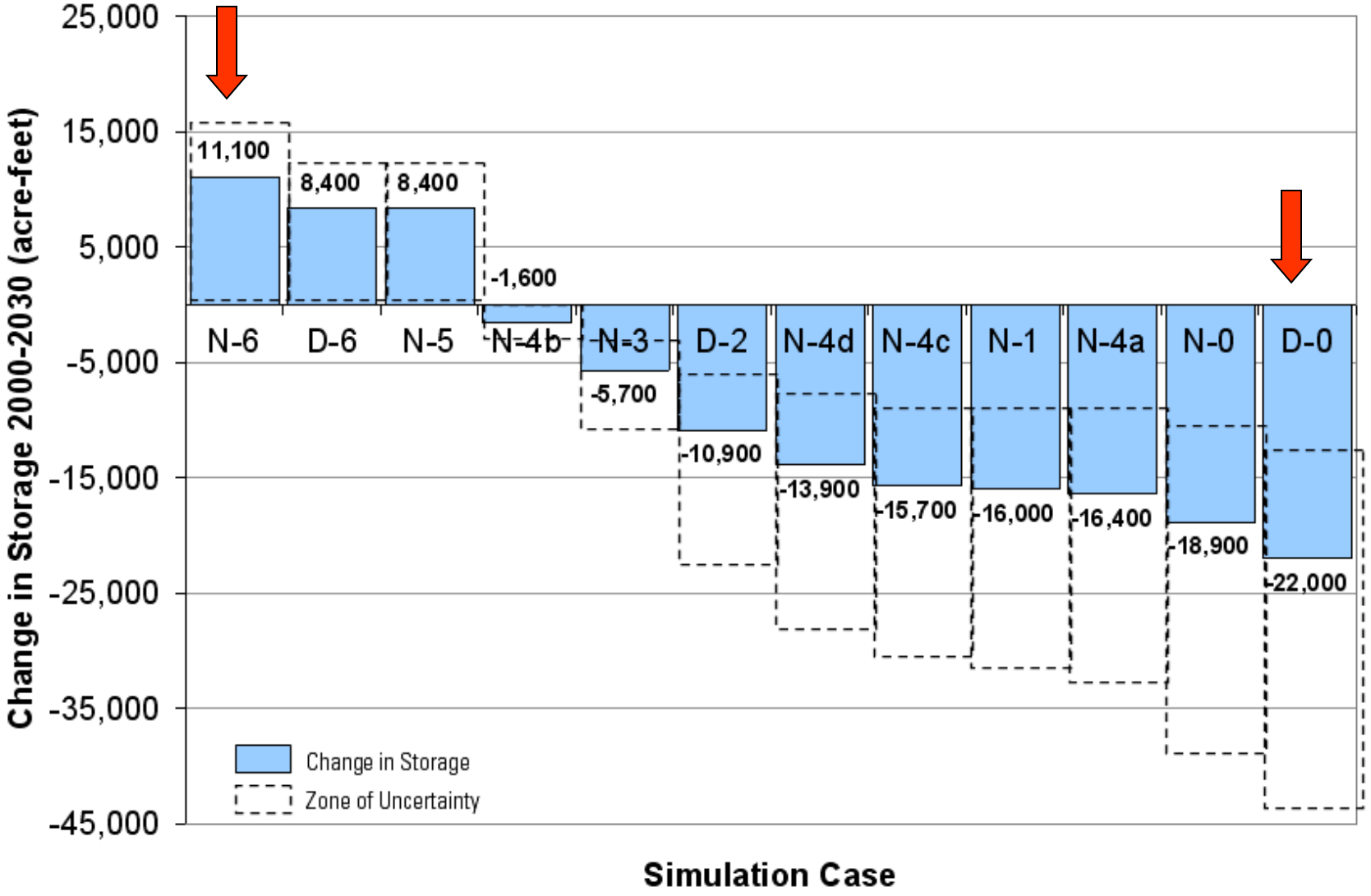


USGS science for a changing world

Simulation Cases



What Did We Learn?



Management Strategies

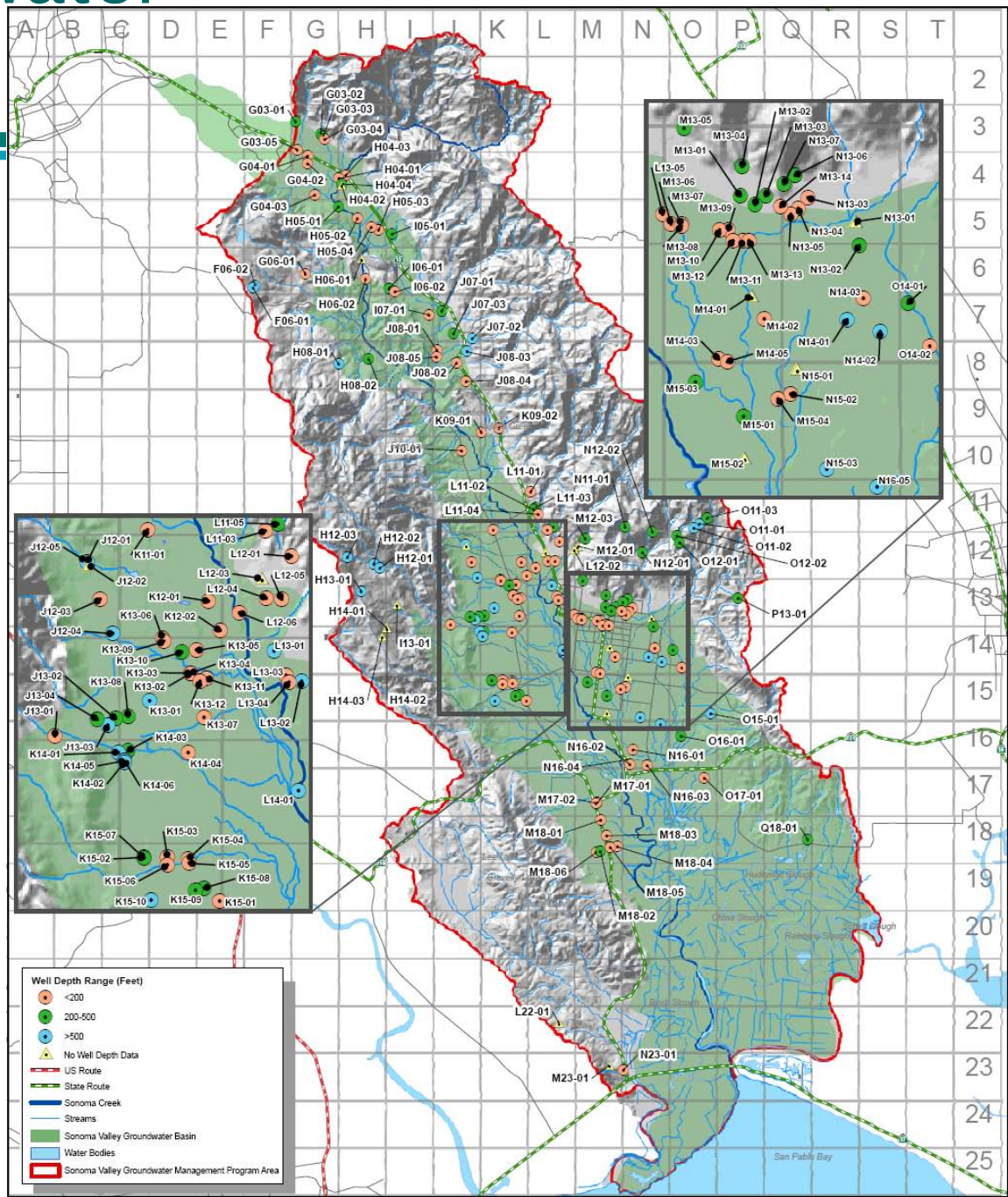
- **CONSERVATION** of Urban, Non-Urban, & Agriculture
- **RECYCLED WATER** use to offset groundwater pumping
- **STORMWATER** to recharge of groundwater
- **BANKING** Russian River water to recharge groundwater basin

Monitoring Components of GMP

Component	Program/Study	Lead Entities/Data Sources
Groundwater Levels	Voluntary Groundwater-Level Monitoring Program	Volunteers/DWR/SCWA
	Construct Dedicated Monitoring Wells	DWR/SCWA
	CASGEM Program	SCWA/DWR
Groundwater Quality	Expand DWR Water Quality Monitoring	DWR/SCWA
	Public Water System Monitoring	CADPH/USGS (GAMA)
	Dedicated Monitoring Wells	DWR/SCWA
Surface Water/Groundwater Interaction	Construct Additional Streamflow Gauges	SCWA/USGS
	Seepage Runs	USGS/Sonoma Ecology Center/SCWA
	Stable Isotope Study	Lawrence Berkeley National Laboratory
Land Surface Subsidence	Under Development	Under Development
Precipitation	Under Development	Under Development

Voluntary Groundwater-Level Monitoring

- **80 – New Wells since 2007**
- **140 - Wells with Synchronized Monitoring**
- **Groundwater Levels Only**
- **Track and Assess Seasonal and Long-term Trends**
- **Incorporated subset of wells into CASGEM Program (33)**
- **Majority of monitoring conducted by volunteers**



Program Outreach Materials

VOLUNTEER WATER-TABLE LEVEL MONITORING PROGRAM OVERVIEW

Do you have a well on your property?

If so, please consider participating in the Volunteer Groundwater Level Program.

The purpose of the program is to incorporate privately-owned wells to augment the existing network of monitoring stations to track water-table elevations throughout Sonoma Valley. The goal of tracking water-levels is to assess the overall status of the aquifer and to help identify locations targeted for future recharge and conservation projects as part of the Sonoma Valley Groundwater Program.

Well monitoring is quickly completed by trained volunteers.

Intended Use of Collected Water Well Level Data

- Monitor groundwater level elevations;
- Understand the relationship and interaction between surface water and groundwater along Sonoma Creek;
- Maintain a central data management system of monitoring information; and
- Improve predictive computer models.

Monitoring will not include how much water you pump. All collected data will be managed by the Sonoma County Water Agency and will be confidential; there will be no public presentation of individual well data.

Benefits of Participating in Program

- You will be provided with accurate groundwater level data for your property.
- You will be helping to shape the future of Sonoma Valley's groundwater management.
- There will be no cost to the landowner.

Spearheaded by the work of the *Basin Advisory Panel*, consisting of 20 individuals who represent agriculture, land use, business, the environment, residents, water suppliers and agencies, including the Sonoma County Water Agency, the Valley of the Moon Water District, the City of Sonoma, the Sonoma Valley County Sanitation District and the County of Sonoma, this effort is a critical component of a recently adopted *Groundwater Management Plan*. The Plan is intended to protect groundwater quality, create groundwater sustainability, and increase groundwater recharge.

To volunteer your well for possible inclusion in this important program, PLEASE contact Tim Parker at (707) 935-0235 or tparker2@slb.com.

www.sonomacountywater.org/svgroundwater/

Version: 6-8-08

VOLUNTEER WATER-TABLE LEVEL MONITORING PROGRAM

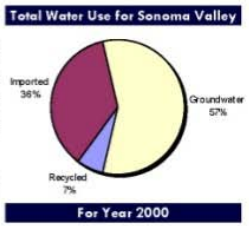
FREQUENTLY ASKED QUESTIONS

Sonoma Valley Groundwater

What is groundwater and why is it important to Sonoma Valley?

Groundwater is water below the ground surface stored in the cracks and spaces in soil, sand, and rock. Groundwater is contained in formations known as aquifers, which consist of materials such as sand and gravel that are permeable (having large connected spaces between the materials that allow water to flow through). The area where water fills the aquifer is known as the saturated zone, and the top of this zone is known as the water table.

Groundwater resources have long played a significant role in the development, growth and sustainability of Sonoma Valley, with nearly 60% of the annual water demand met by local groundwater resources.



What is the Volunteer Water-Table Level Monitoring Program and why is it being undertaken?

The Volunteer Water-Table Level Monitoring Program will improve understanding of the groundwater depletion and recharge. Privately-owned volunteer wells augment the network of stations tracking water-table elevations throughout Sonoma Valley. Tracking water-table elevations will help to assess the overall status of the aquifer and identify locations for future recharge. Open space and agricultural areas provide valuable recharge areas.

Why is water-level measurement needed?

Data are insufficient to understand trends in groundwater levels basin-wide. Increasing monitoring across Sonoma Valley, including wells of varying depths, will greatly improve understanding of the aquifer. The long-term goal is to help prevent drops in water table elevations that would require drilling wells deeper at great expense to local landowners.

Will the monitors be measuring how much groundwater I use?

No measurement of the amount of groundwater pumped will be taken. The measurement will document the depth to groundwater in the well only.

Will someone try to curtail my groundwater use if I participate in the program?

No. The water level monitoring is a non-regulatory, voluntary program to measure groundwater levels in the Sonoma Valley. Groundwater use is not being measured as part of this program.

What are the benefits of monitoring groundwater levels?

There are many benefits to monitoring water-table levels, including:

- Assessing annual and long-term changes of groundwater in storage;
- Estimating recharge rates and where recharge occurs;
- Determining direction and gradient of groundwater flow;
- Understanding how aquifer systems work;
- Gaining insight for new well construction; and
- Providing well owners information regarding trends that influence their well's function and how to increase recharge.

How long is the monitoring program anticipated to last?

The monitoring program will last indefinitely into the future. As groundwater-level trends in the Sonoma Valley become better understood, the monitoring program may change the number and locations of monitoring wells.

Who is eligible to participate?

Anyone who owns a well in the Sonoma Valley is encouraged to contact Tim Parker at 707/935-0235 or tparker2@slb.com to discuss whether or not their well is suitable for monitoring as part of this program. The well owner will be asked to provide information regarding the year the well was constructed.

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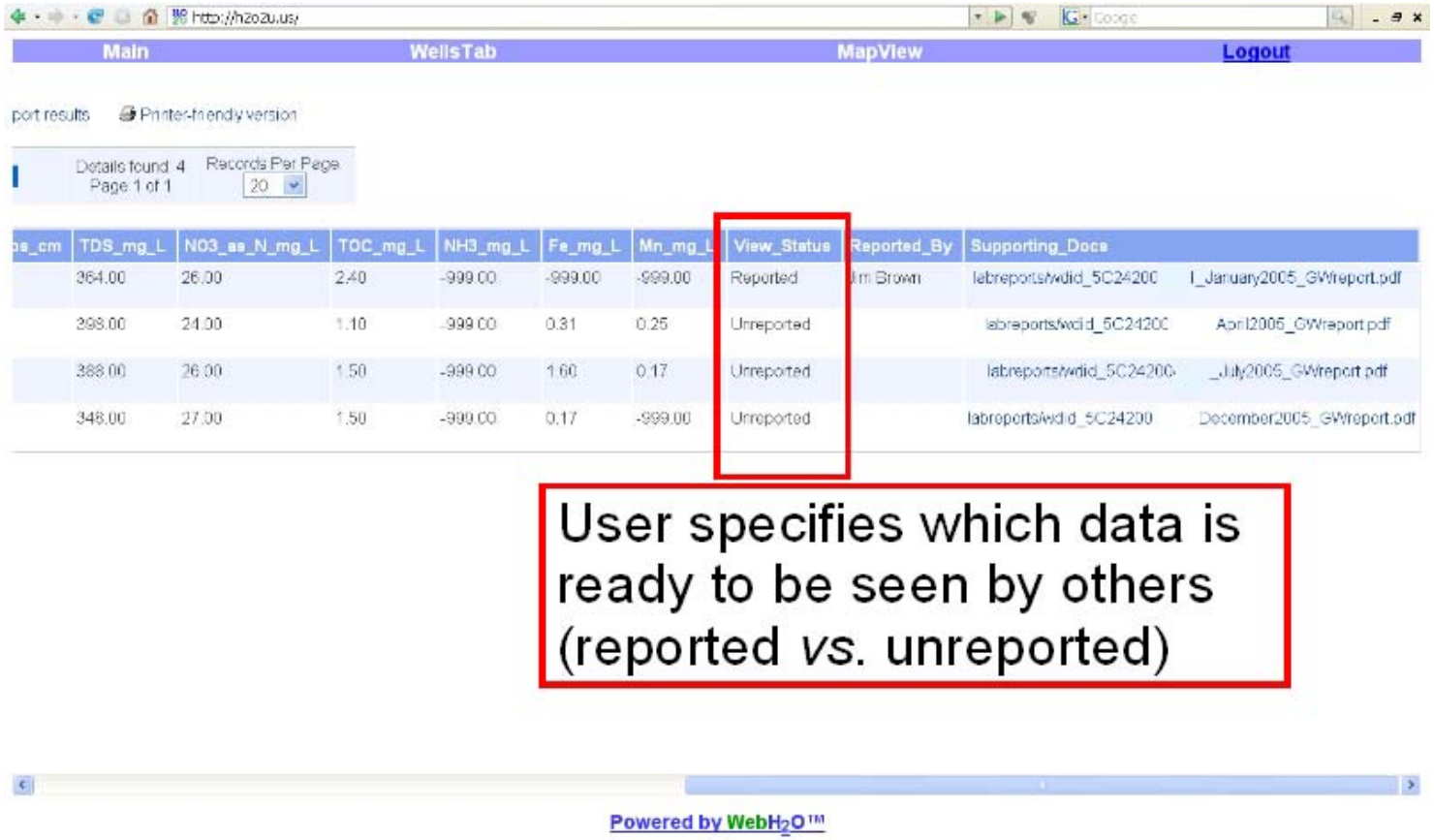
Data Sharing



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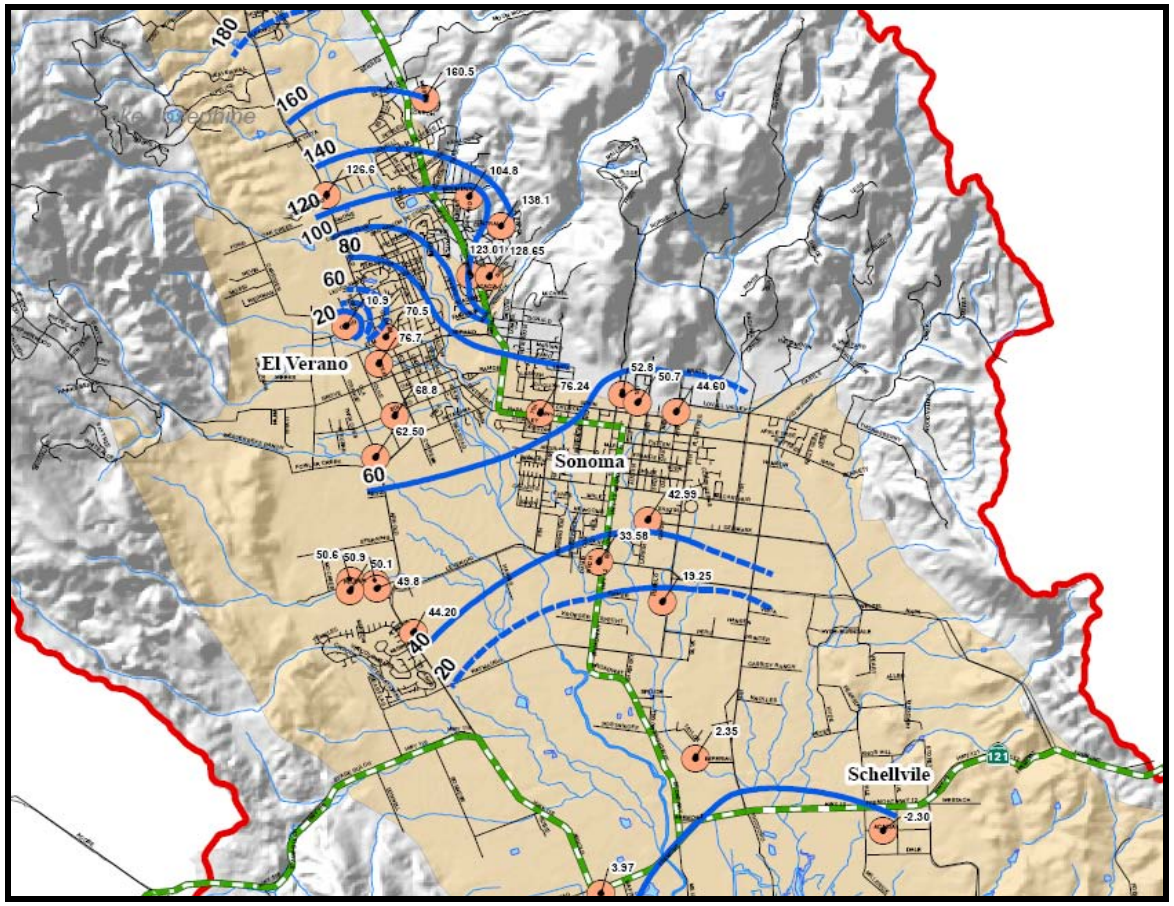
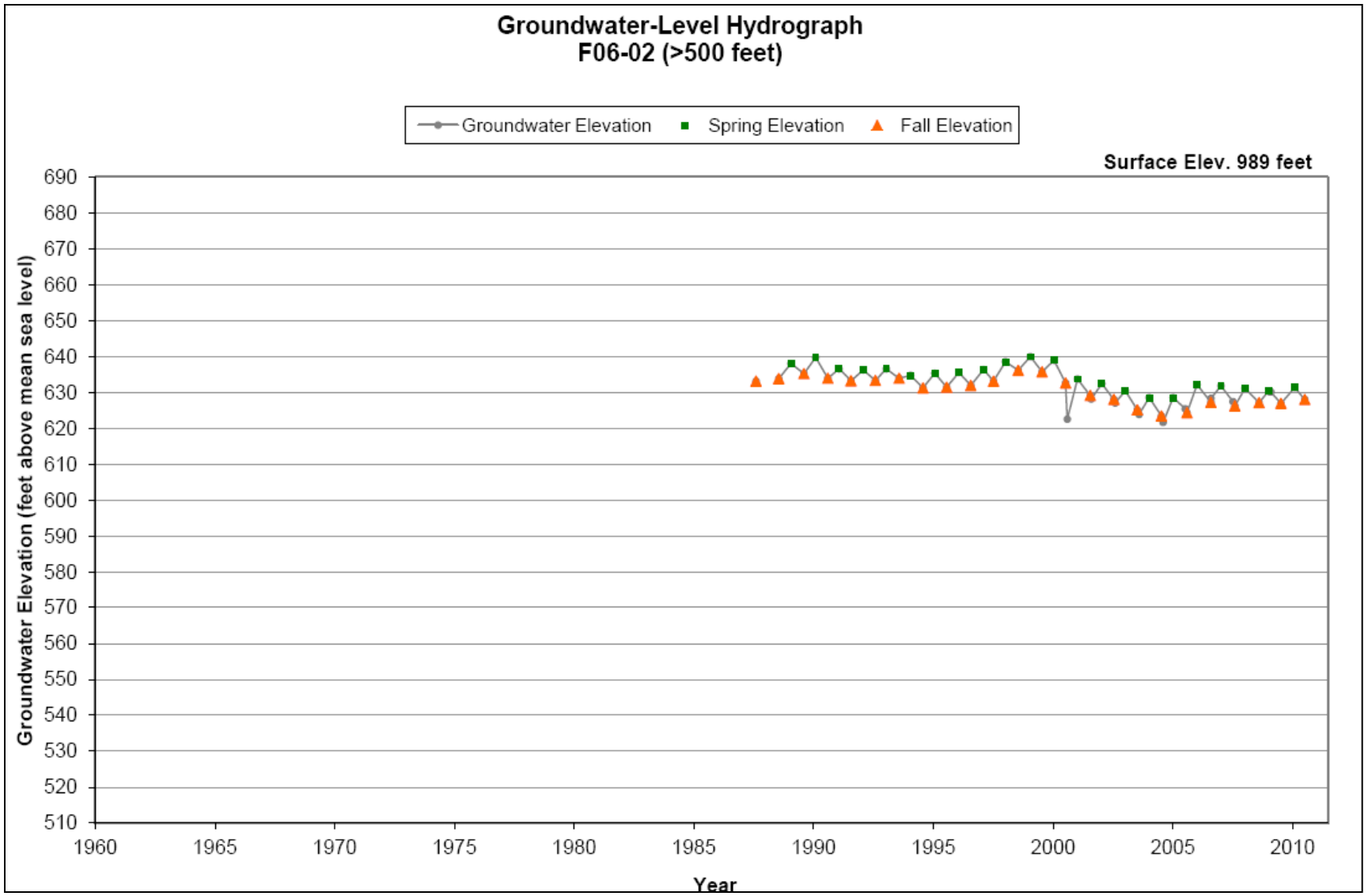
Groundwater Conditions

- **Shallow-Zone wells generally stable and above sea level**
- **Localized areas of declining groundwater levels mainly observed in Deeper-Zone wells**
  - **El Verano Area**
  - **Southeast of City of Sonoma**
- **Groundwater-levels are locally below sea level**



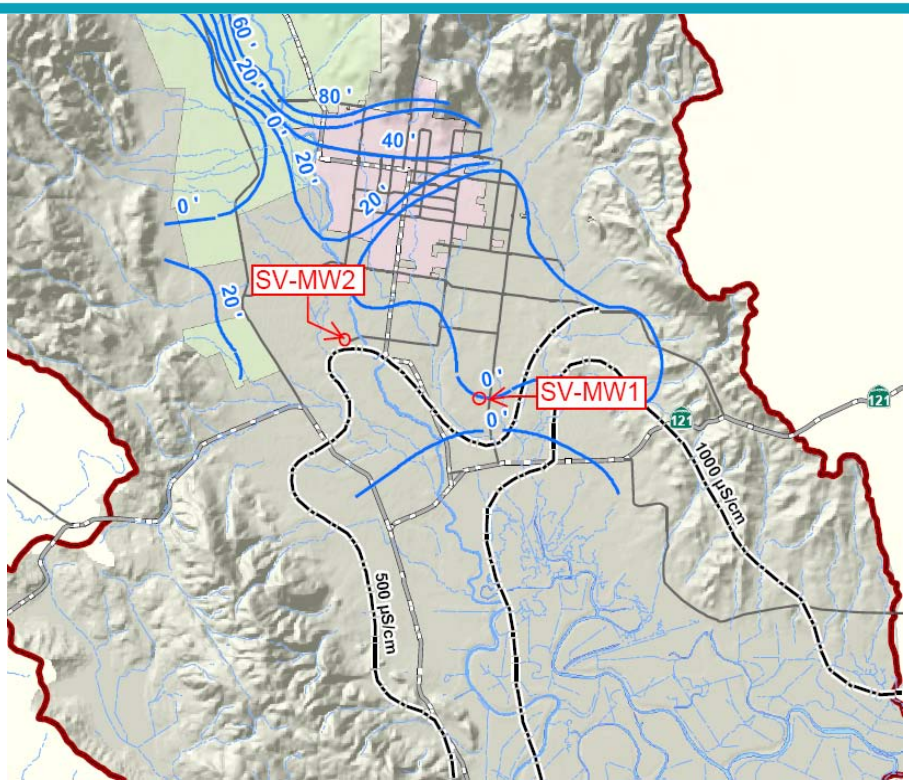
Data Evaluation/Display - Hydrograph



Installation of Nested Groundwater Monitoring Wells

Sonoma Valley Groundwater Management Program

Project completed under $250,000 California Department of Water Resources Local Groundwater Assistance Grant



- **At margins of groundwater-level pumping depression and region of elevated salinity concentrations**
- **SV-MW1 located along 8th St East just north of wastewater treatment plant**
- **SV-MW2 located along Watmaugh Rd within 400 feet of Sonoma Creek**

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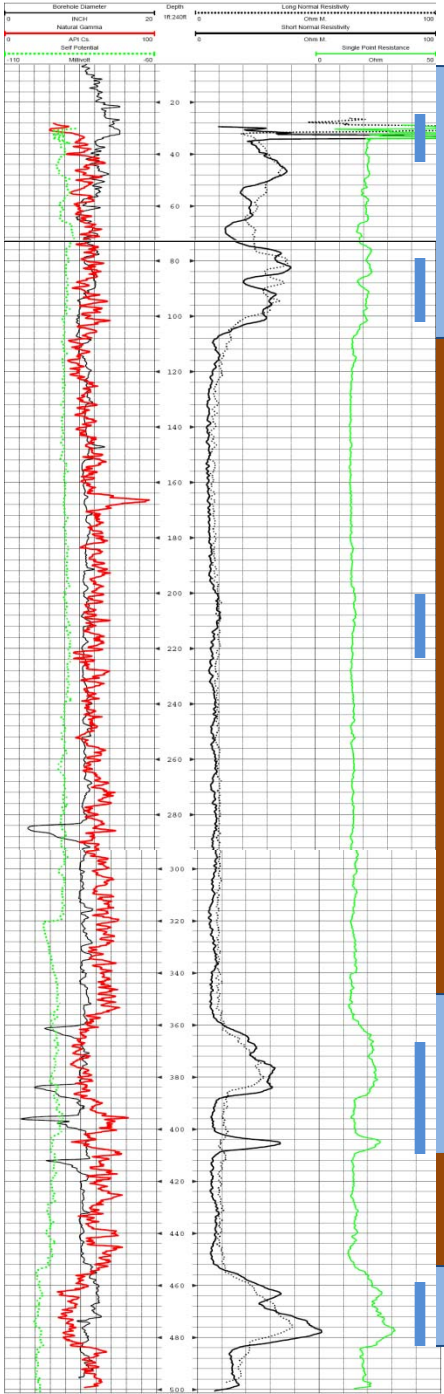
Geologic Findings

- Permeable Sand and Gravel dominates shallow aquifer (less than 100 feet deep).
- Lots of Clay and relatively thin Sand/Gravel zones beneath 100 feet.
- Sand and Gravel aquifer zones and Clay aquitard zones correlate reasonably well between two locations and may be continuous.

SV-MW2 (Watmaugh Rd.)



0 to 100 feet: Sand and Gravel

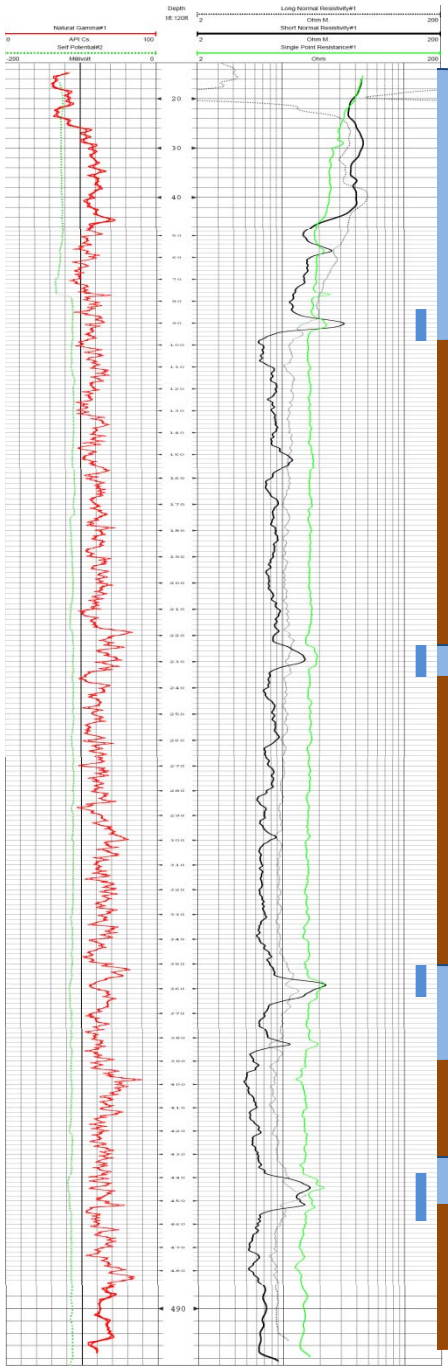
100 to 360 feet: Lots of Clay

360 to 410 feet: Sand/Gravel zones with Clay interbed

410 to 450 feet: Clay

450 to 485 feet: Sand/Gravel

SV-MW1 (8th St. E)



0 to 100 feet: Sand and Gravel

100 to 220 feet: Mostly Clay

220 to 230 feet: Thin Sand/Gravel Zone

220 to 355 feet: Mostly Clay

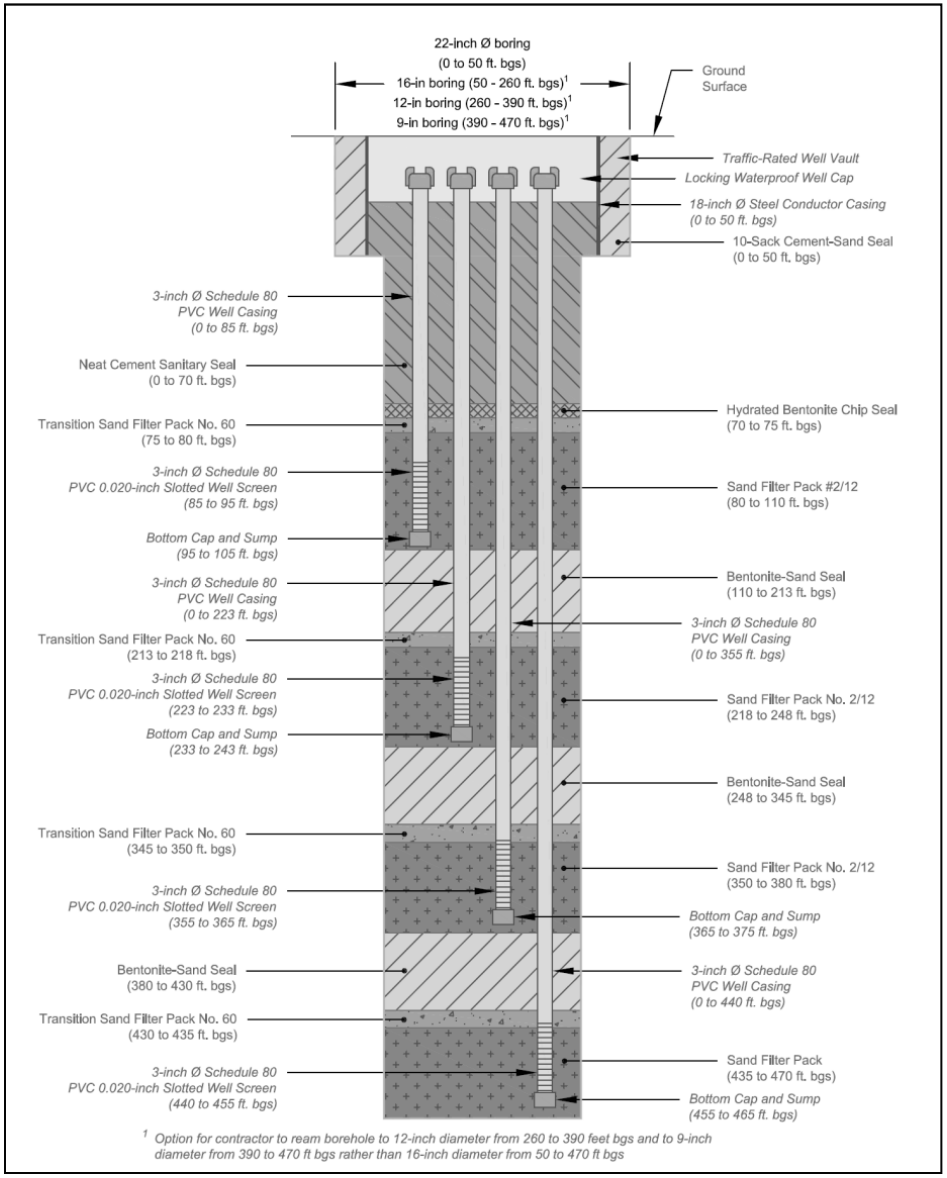
355 to 385 feet: Sand and Gravel

385 to 440 feet: Mostly Clay

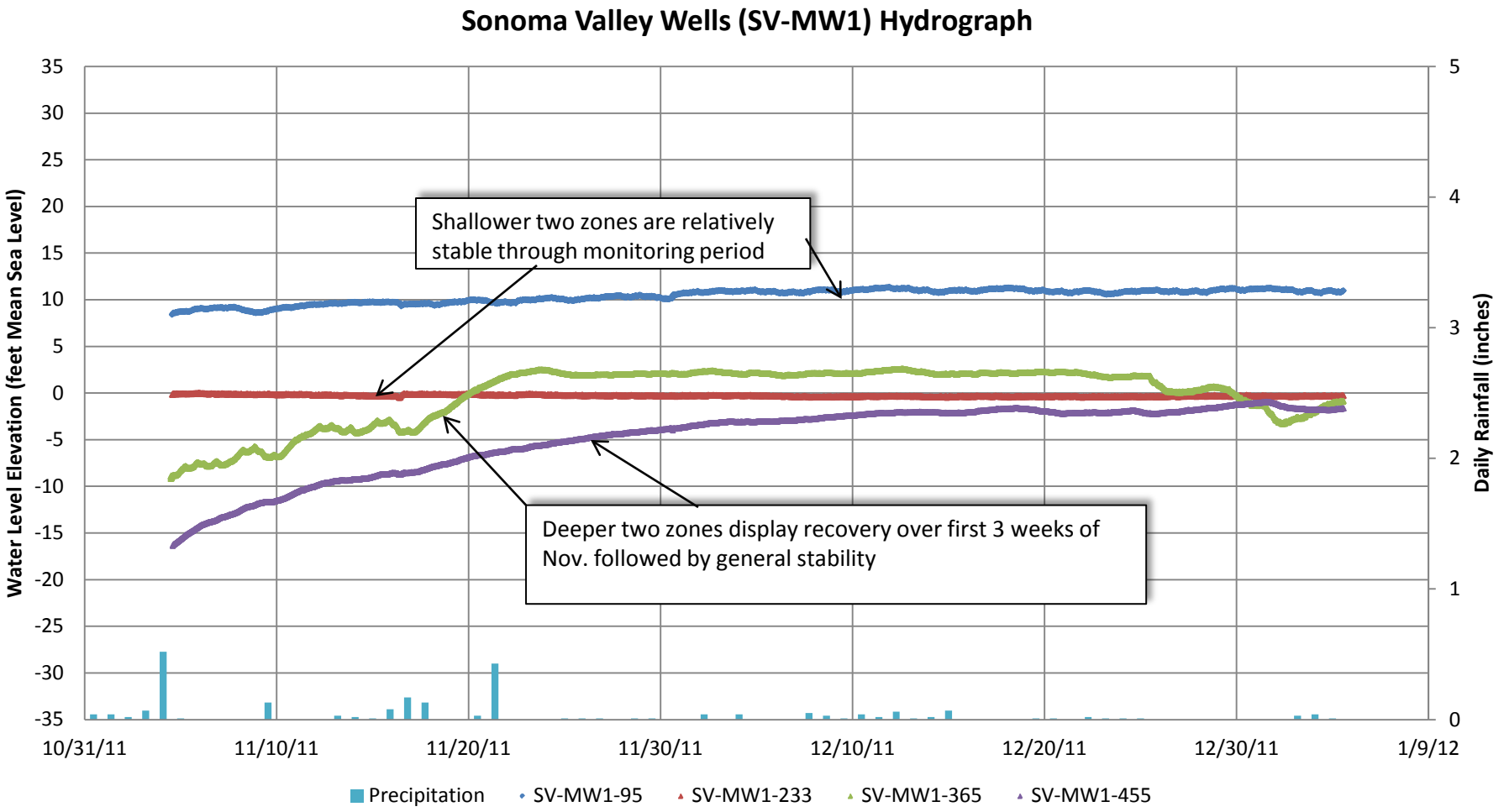
440 to 455 feet: Sand and Gravel

455 to 500 feet: Mostly Clay

Well Construction and Data Collection



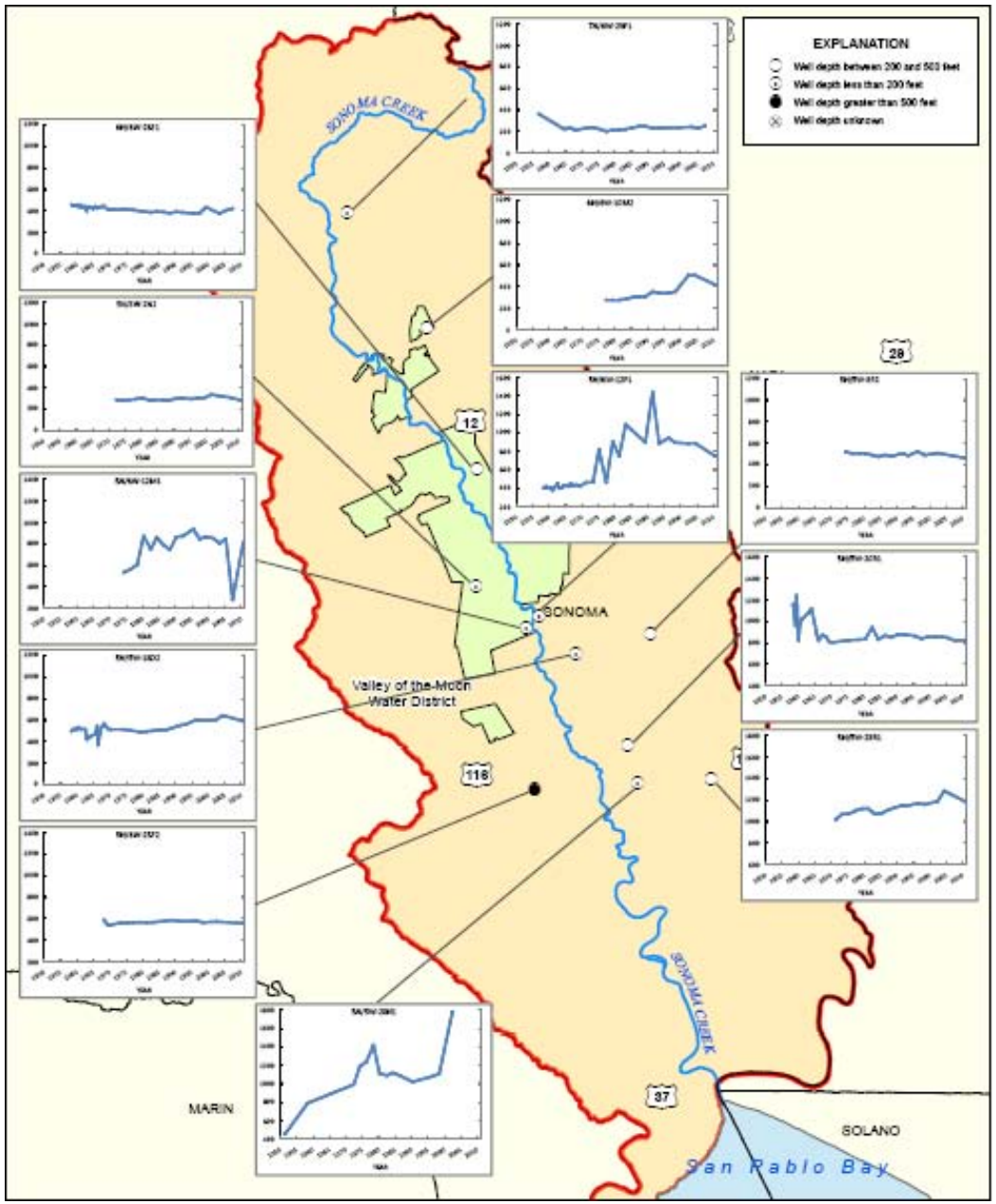
- **Collection of Water Quality Samples to evaluate salinity distribution.**
- **Instrumentation of wells with pressure transducers, temperature probes and water quality sensors.**
- **Instrument and collect data from surface water in Sonoma Creek to assess surface water & groundwater interaction.**
- **Incorporate detailed lithologic data into Hydrostratigraphic Framework update.**
- **Incorporate data into update of Groundwater Flow Model.**



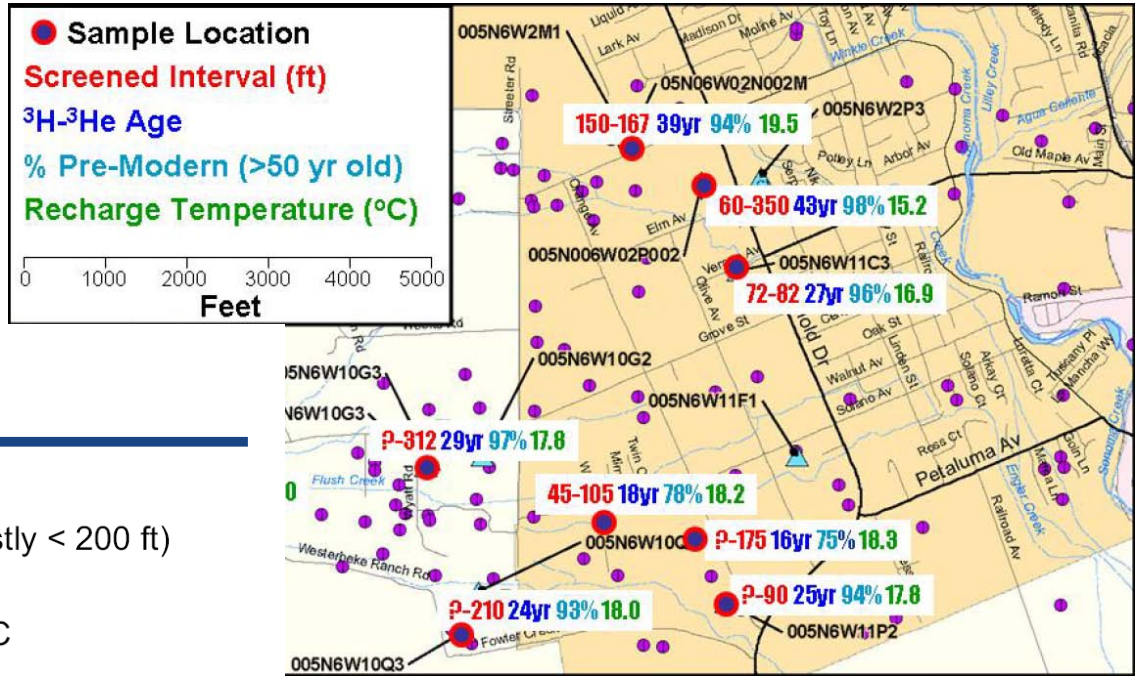
- Overall downward vertical gradient (except between 233 and 365 foot zones at times)
- Pumping influences appear most prominent in 365 foot zone and minor in 95 and 365 foot zones

Groundwater Quality Monitoring

- **Expand Historical DWR Groundwater Quality Monitoring**
- **Incorporate Data from USGS GAMA Program**
- **Incorporate Data from Public Water Supply Systems**
- **Dedicated Monitoring Wells**



Surface Water/Groundwater Interaction: Stable Isotope Sampling - LBNL



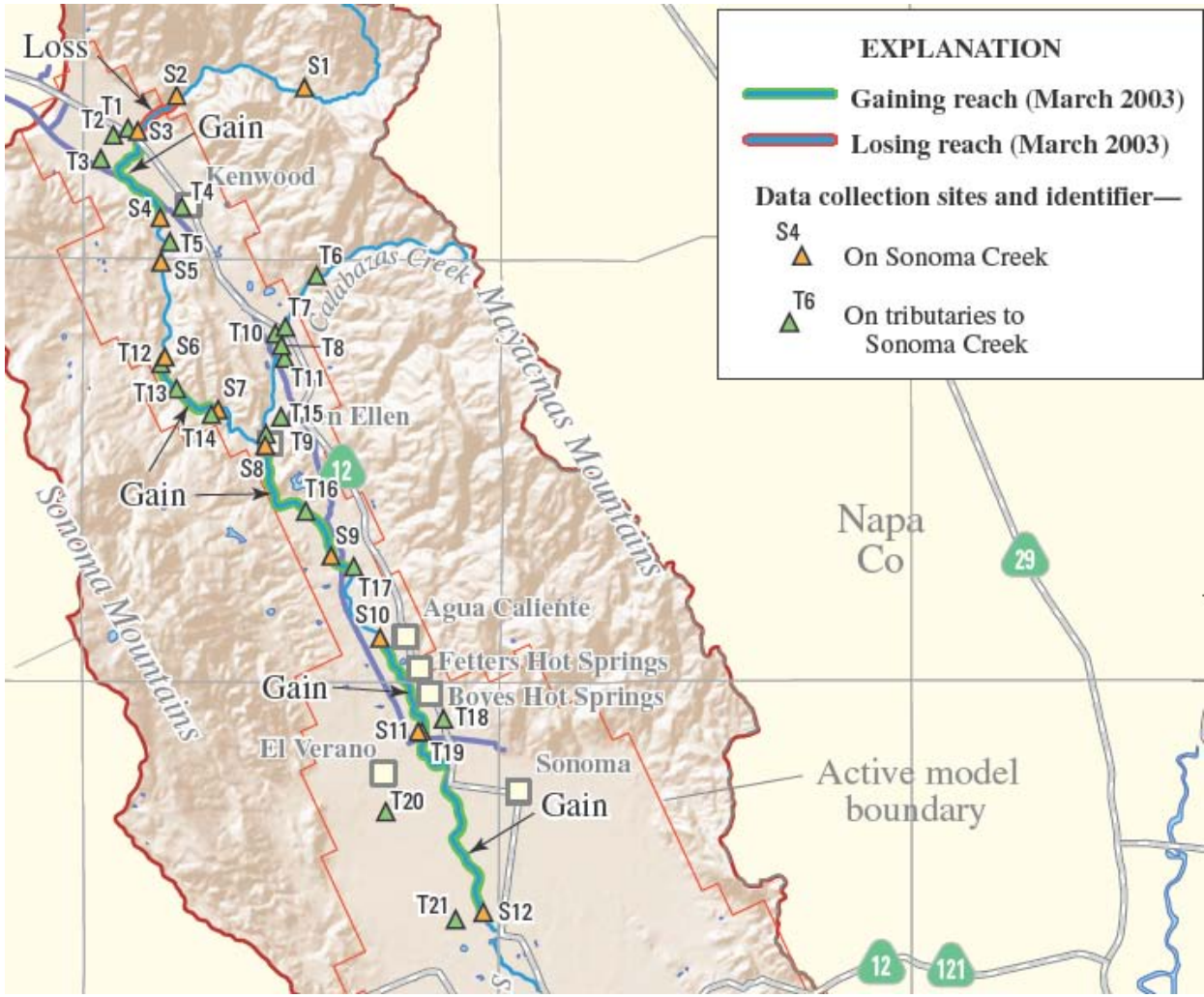
El Verano Area Groundwater Age Study Overall Results:

- Well depths — 82-350 (mostly < 200 ft)
- Recharge Temperatures — 15.2-19.5 °C
- ^{3}H-He ages — 16-43 years
- % Pre-Modern — 75-98%
- What causes these deep groundwater signatures in relatively shallow wells?

- **Groundwater decreases with age closer to stream (indicating it is a source of recharge)**
- **Most wells combination of groundwater ages, 16 to 43 years mixed with pre-modern groundwater (>50 years old)**
- **Relatively old age of groundwater indicates slow recharge/replenishment rates**

Surface Water/Groundwater Interaction: Seepage Runs

- **Contemporaneous Streamflow Measurements in Sonoma Creek and Tributaries**
- **Characterize exchanges between surface water and groundwater (Recharge and Discharge Areas)**
- **Most of Sonoma Creek is a Discharge Area (i.e., Groundwater supports Baseflow of the Creek)**



Monitoring Data Utilized to Support Ongoing and Planned Activities

- **Upgrade Groundwater Flow Model to Fully Couple with Surface Water Model (GSFLOW)**
- **Salt and Nutrient Management Plan**
- **Groundwater Banking Feasibility Study initiated in 2010 for banking excess winter water from the Russian River in the Sonoma Valley groundwater basin for storage and use in the summer or during drought periods**
  - **Coordination with the City of Sonoma and Valley of the Moon Water District and other stakeholders**
- **Initiate Watershed Planning Study to assess projects that detain excess stormwater from the Sonoma Creek Watershed to both Mitigate Flood Hazards and Enhance Groundwater Recharge**

Challenges/Lessons Learned

Outreach for Voluntary Groundwater Level Monitoring Program – FAQs/Fact Sheet

- **Important to emphasize that data collected is groundwater-levels (not pumping volume)**
- **Be clear regarding how data will be displayed and maintained**

Technical Challenges for Voluntary Groundwater Level Monitoring Program

- **Availability of well construction information limits utility of data from many wells**
- **Absence of appropriate water-level access/obstructions within wells**
- **Ensuring that data is collected in a standardized manner with adequate data quality**
- **Many wells perforated across multiple aquifers**
  - **Need for dedicated monitoring wells/funding**

Data Management – Plan Early in Process

- **Standardized method for reporting data**
- **Flexible data management system needed for multiple sources and types of data**
- **Feedback of data/information to well owners**

Groundwater Management Program Funding

- Local Cooperative Funding Agreement
  - SCWA, City of Sonoma, Sonoma County Agricultural Preservation and Open Space District, VOMWD, SVCSD and County
- DWR Memorandum of Understanding
  - Facilitation Services For Plan Development
  - Continuing Technical Assistance for Program Implementation

SONOMA COUNTY AGRICULTURAL PRESERVATION AND OPEN SPACE DISTRICT

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