Groundwater Management Program Monitoring Components

Santa Rosa Plain Basin Advisory Panel Meeting

September 13, 2012

Presentation Overview

- Development timeframe
- Water Code requirements
- Examples
  - Sonoma Valley
  - Sacramento Groundwater Authority
- Santa Rosa Plain
  - Existing monitoring
  - Possible approaches
- Questions & discussion

Development Timeframe

Sept 2012: BAP Discussion

Oct-Nov 2012: TAC Developing Proposal

Jan 2012: TAC Update for BAP

March 2012: BAP Discussion on Monitoring Proposal

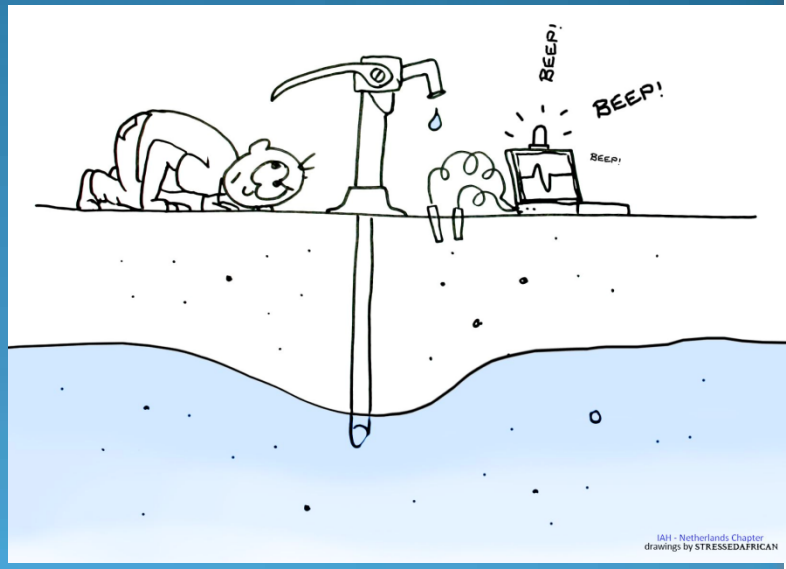
Water Code Requirements

Measure Change

- **Groundwater levels**
- **Groundwater quality**
- **Inelastic surface subsidence**

  for basins for which subsidence has been identified as a potential problem
- **Flow and quality of surface water**

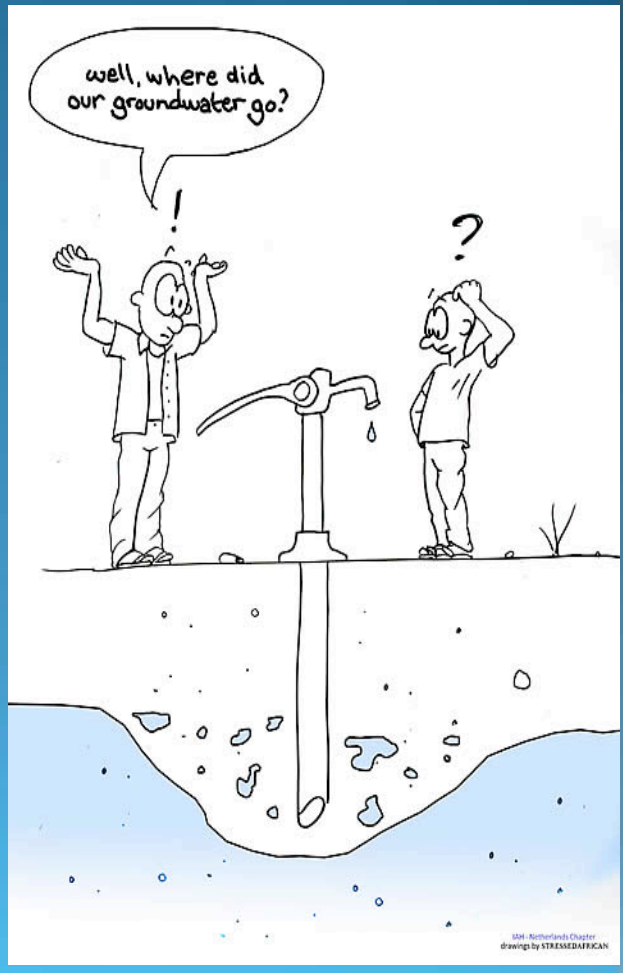
  that directly affect groundwater levels or quality or are caused by groundwater pumping



Monitoring Protocols

Per Water Code

- Local agency shall adopt monitoring protocols
- Designed to generate information that promotes efficient and effective groundwater management
- Metrics to track, measure, and record progress on management objectives



- Developed in 2006-2007
- Adopted in 2007
- Sonoma County Water Agency lead
- Adopted by City of Sonoma and Valley of the Moon Water District
- Basin Advisory Panel
- Technical Advisory Committee

Sonoma Valley Groundwater Management Program

- Science-based information as a foundation for common understanding and planning
- Facilitated collaborative process – stakeholder group
  - Inform stakeholders – connect people with science
- Non-regulatory approach in compliance with groundwater management planning & program implementation (Water Code Sections 10750-10755)
- Locally driven management programs
  - Bottom up approach that emphasizes local control
  - Align local strategies with regional and state policies, constraints and incentives

Sonoma Valley Monitoring All Required Elements

- Groundwater elevation monitoring
- Groundwater quality monitoring
- Land surface elevation monitoring
- Surface water-groundwater interaction monitoring
- Data collection protocols
- Data management and analysis
  - Groundwater model
  - Comprehensive data analysis
  - Data management system

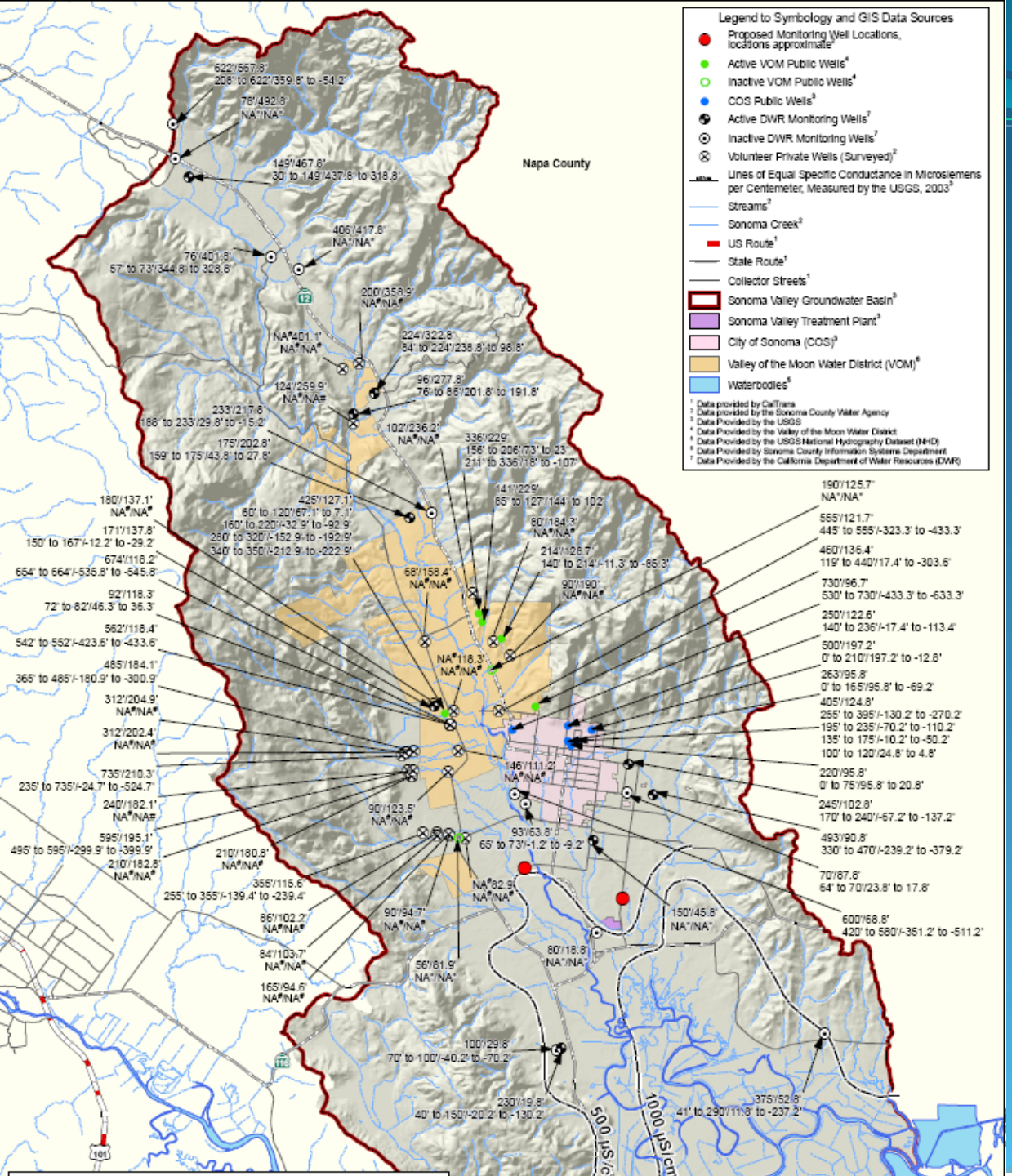
Sonoma Valley GMP Monitoring Components

Component	Program/Study	Lead Entities/Data Sources
Groundwater Levels	Voluntary Monitoring Program	Volunteers/DWR/SCWA
	Dedicated Monitoring Wells	DWR/SCWA
	CASGEM Program	SCWA/DWR
Groundwater Quality	Expand DWR Monitoring	DWR/SCWA
	Public Water Systems	CADPH/USGS (GAMA)
	Dedicated Monitoring Wells	DWR/SCWA
Surface Water/Groundwater Interaction	Additional Streamflow Gauges	SCWA/USGS
	Seepage Runs	USGS/SEC/SCWA
	Stable Isotope Study	LBNL
Land Surface Subsidence	Under Development	Under Development
Precipitation	Under Development	Under Development

Sonoma Valley Monitoring

- 55 Wells in 2007
- 140 Wells in 2011

- Voluntary
- Coordinated
- Variable Depth
- Geographic distribution

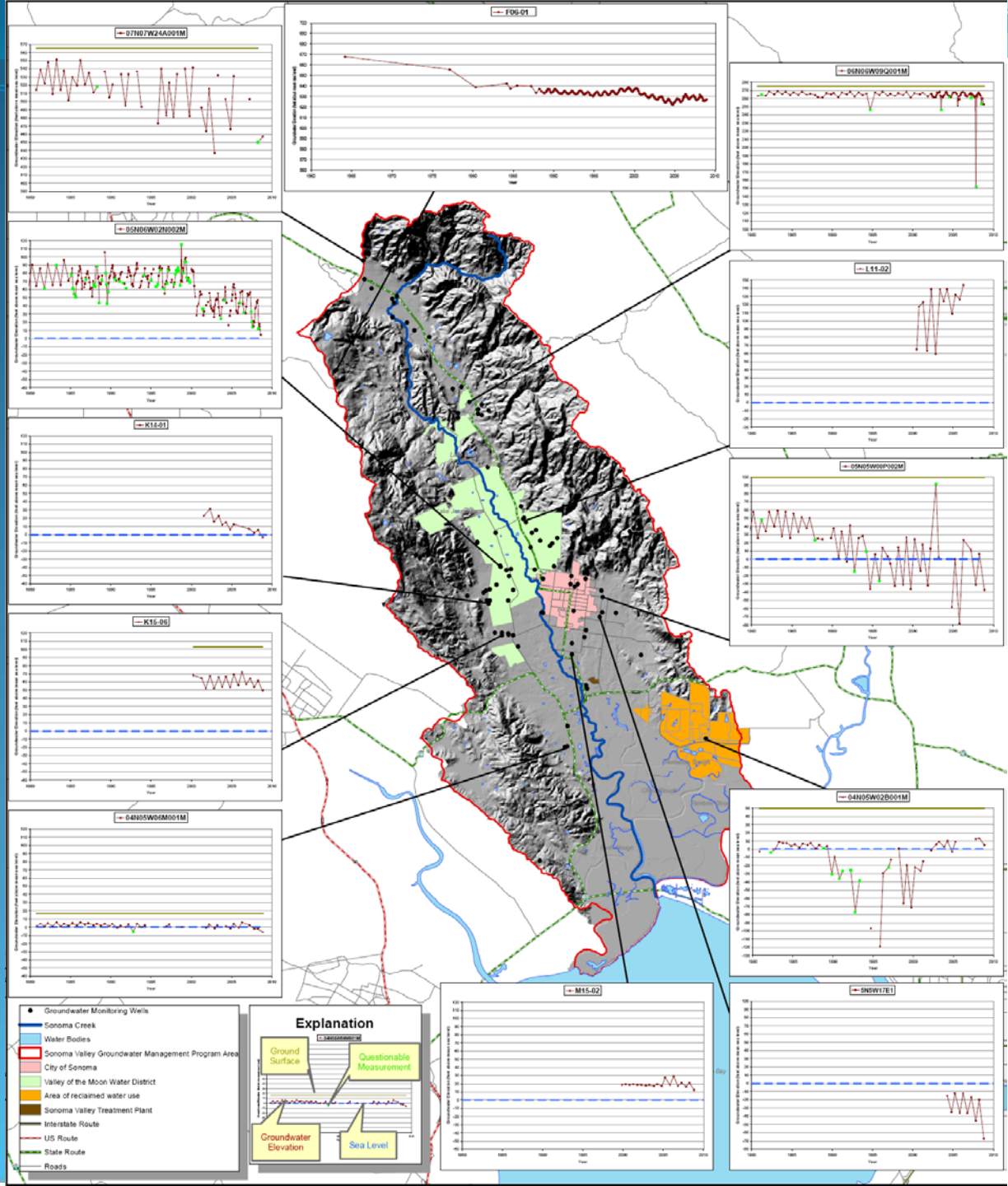


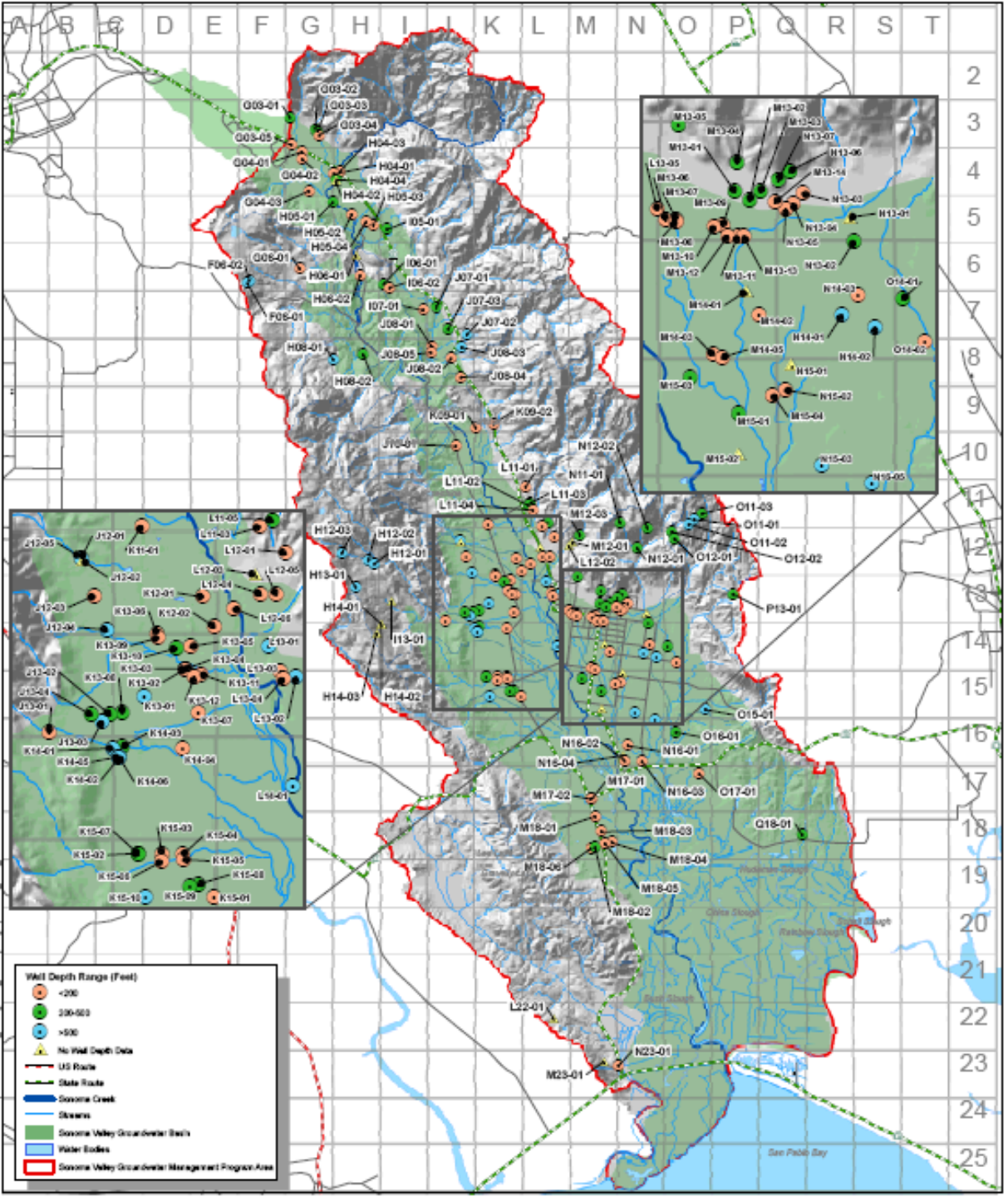
Sonoma Valley Initial Groundwater Level Monitoring

- Initial coordination of timing and method of groundwater level monitoring of 55 wells
  - City of Sonoma
  - Valley of the Moon Water District
  - CA Department of Water Resources
  - Other volunteer wells

Long-Term Groundwater Level Trends

- Sparse long-term data
- Localized areas of decline
- Locally levels below sea level

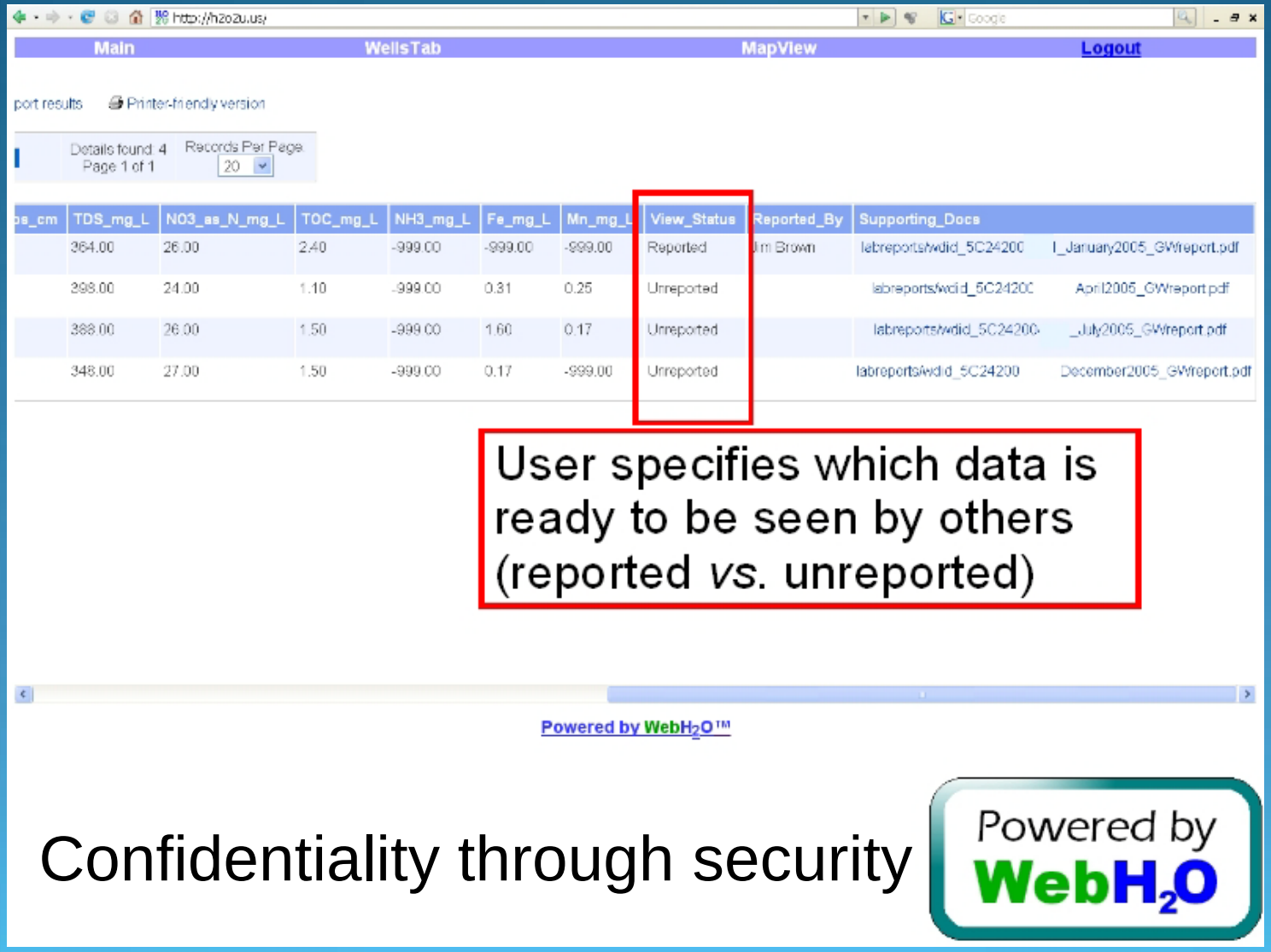




Sonoma Valley
Volunteer Groundwater Level Monitoring

- Developed volunteer program outreach materials
- Local stakeholders pursued additional monitoring wells
- Added 85 volunteer wells since 2007
- Semi annual synchronized monitoring (140 wells)
- Prioritized data gaps

Data Management / Sharing

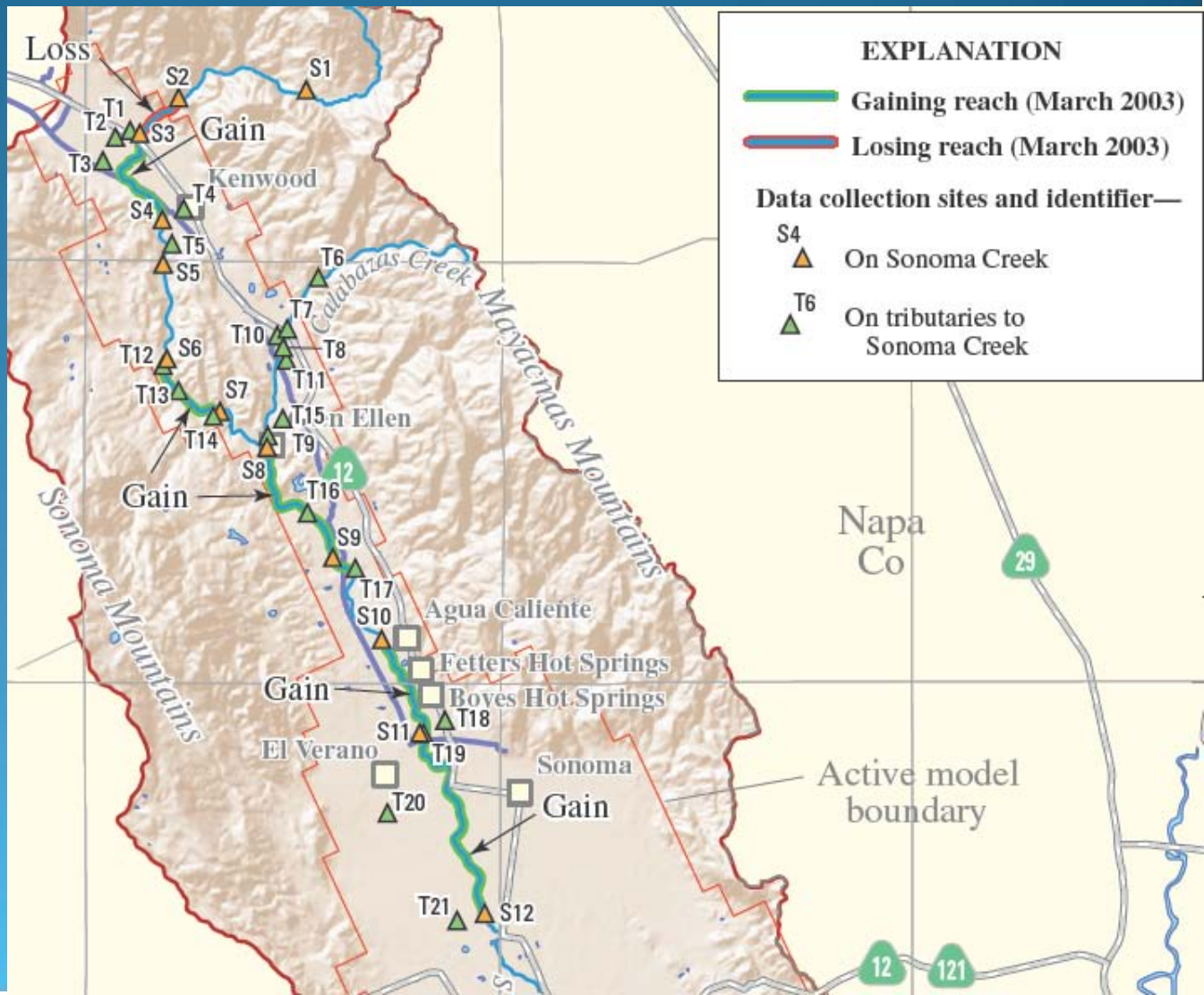


Confidentiality through security

Powered by WebH2O

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)



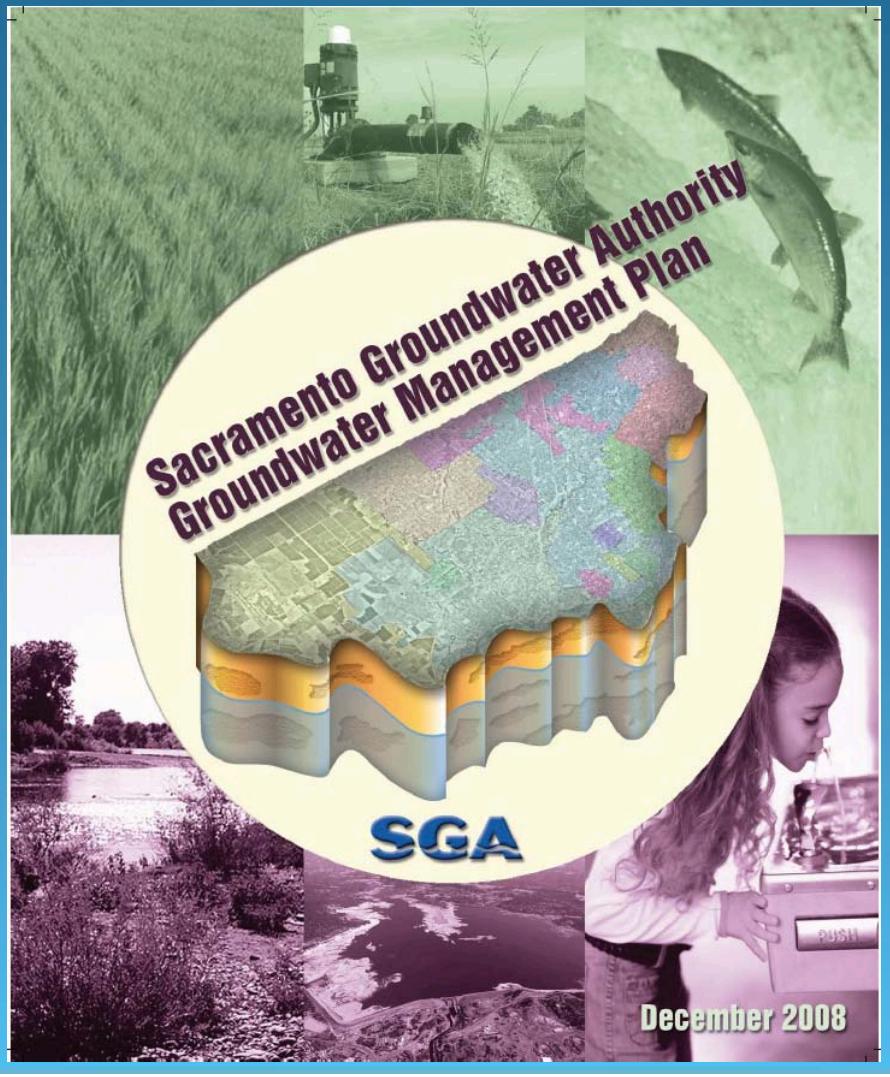
Utilization of Monitoring Data

- Periodic trend analysis and progress on meeting objectives
- Upgrade Groundwater Flow Model to Fully Couple with Surface Water Model (GSFLOW)
- Salt and Nutrient Management Plan
- Groundwater Banking Feasibility Study
- Stormwater Capture/Groundwater Recharge Scoping Study

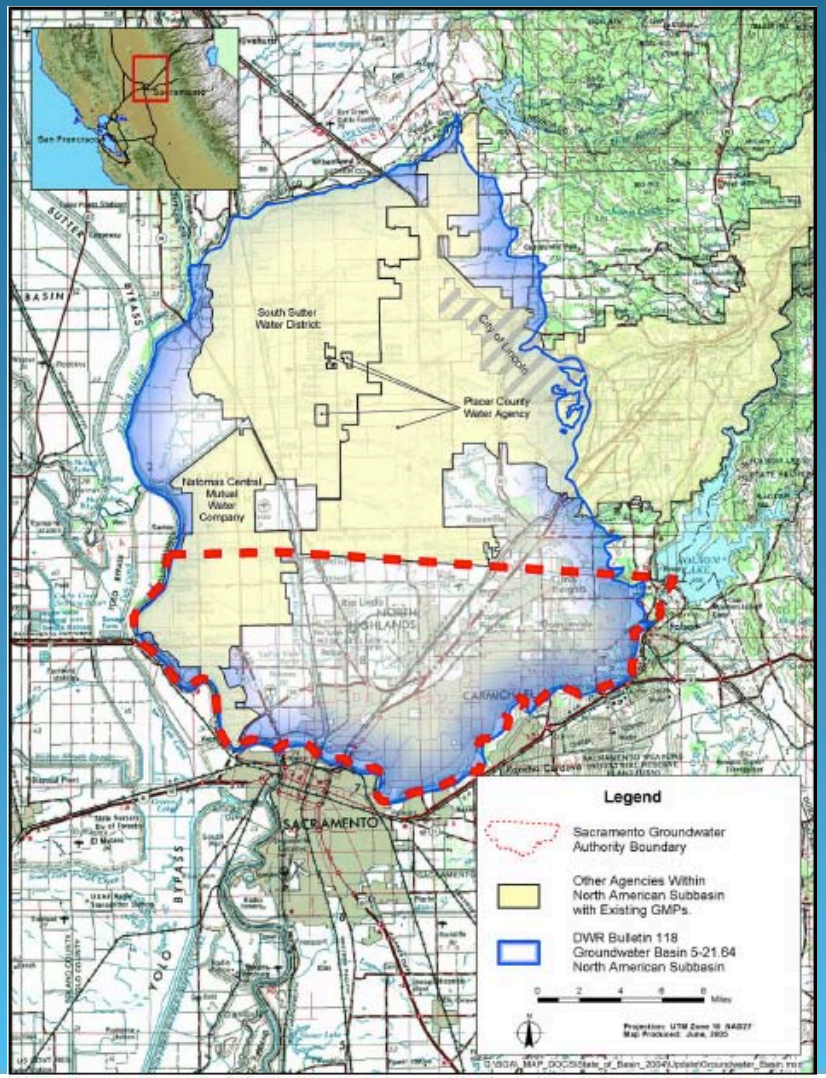
Sonoma Valley Monitoring Program

- Land surface elevation monitoring
  - Spot data collection
  - Draft plan for periodic surveying
- Groundwater quality
  - Incorporated public supply well data and conducting periodic trend analysis and reporting
- Surface water–groundwater interaction monitoring
  - Added stream gage
  - Conducting periodic seepage run monitoring, evaluation and reporting
  - Integrating with recharge mapping

Sacramento Groundwater Authority Monitoring Program

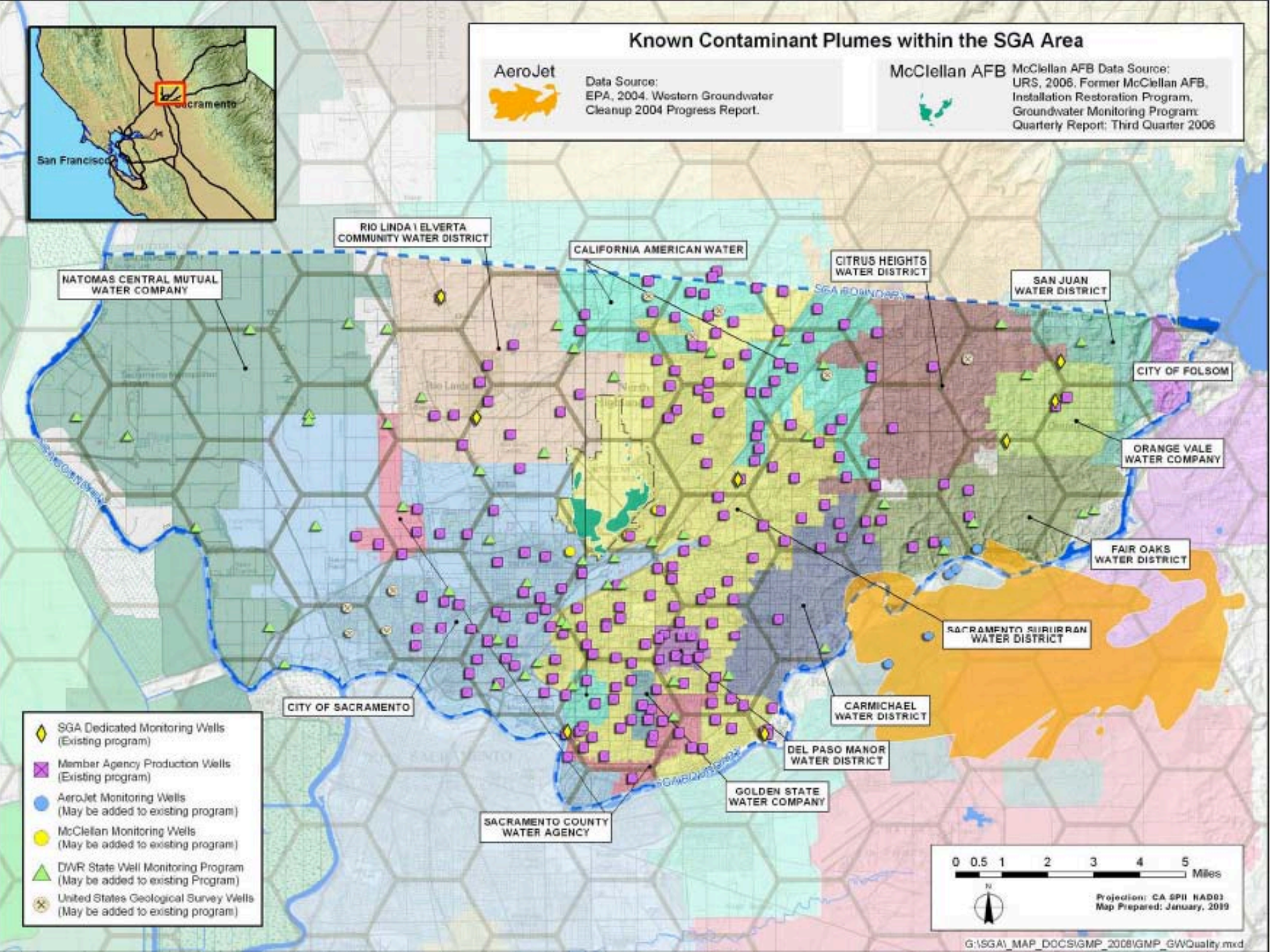


Sacramento Groundwater Authority Monitoring Program



Sacramento Groundwater Authority Monitoring Program

- Groundwater elevation monitoring
- Groundwater quality monitoring
- Land surface elevation monitoring
- Surface water-groundwater interaction monitoring
- Data collection protocols
- Data management and analysis
  - Groundwater model
  - Comprehensive data analysis
  - Data management system


Known Contaminant Plumes within the SGA Area
AeroJet
Data Source:
EPA, 2004. Western Groundwater Cleanup 2004 Progress Report.
McClellan AFB
McClellan AFB Data Source:
URS, 2006. Former McClellan AFB, Installation Restoration Program, Groundwater Monitoring Program: Quarterly Report: Third Quarter 2006
Sacramento
San Francisco
RIO LINDA \ ELVERTA COMMUNITY WATER DISTRICT
CALIFORNIA AMERICAN WATER
CITRUS HEIGHTS WATER DISTRICT
SAN JUAN WATER DISTRICT
NATOMAS CENTRAL MUTUAL WATER COMPANY
CITY OF FOLSOM
ORANGE VALE WATER COMPANY
FAIR OAKS WATER DISTRICT
SACRAMENTO SUBURBAN WATER DISTRICT
CITY OF SACRAMENTO
CARMICHAEL WATER DISTRICT
DEL PASO MANOR WATER DISTRICT
GOLDEN STATE WATER COMPANY
SACRAMENTO COUNTY WATER AGENCY
SGA Dedicated Monitoring Wells (Existing program)
Member Agency Production Wells (Existing program)
AeroJet Monitoring Wells (May be added to existing program)
McClellan Monitoring Wells (May be added to existing program)
DWR State Well Monitoring Program (May be added to existing Program)
United States Geological Survey Wells (May be added to existing program)
0 0.5 1 2 3 4 5 Miles
N
Projection: CA SPII NAD83
Map Prepared: January, 2019
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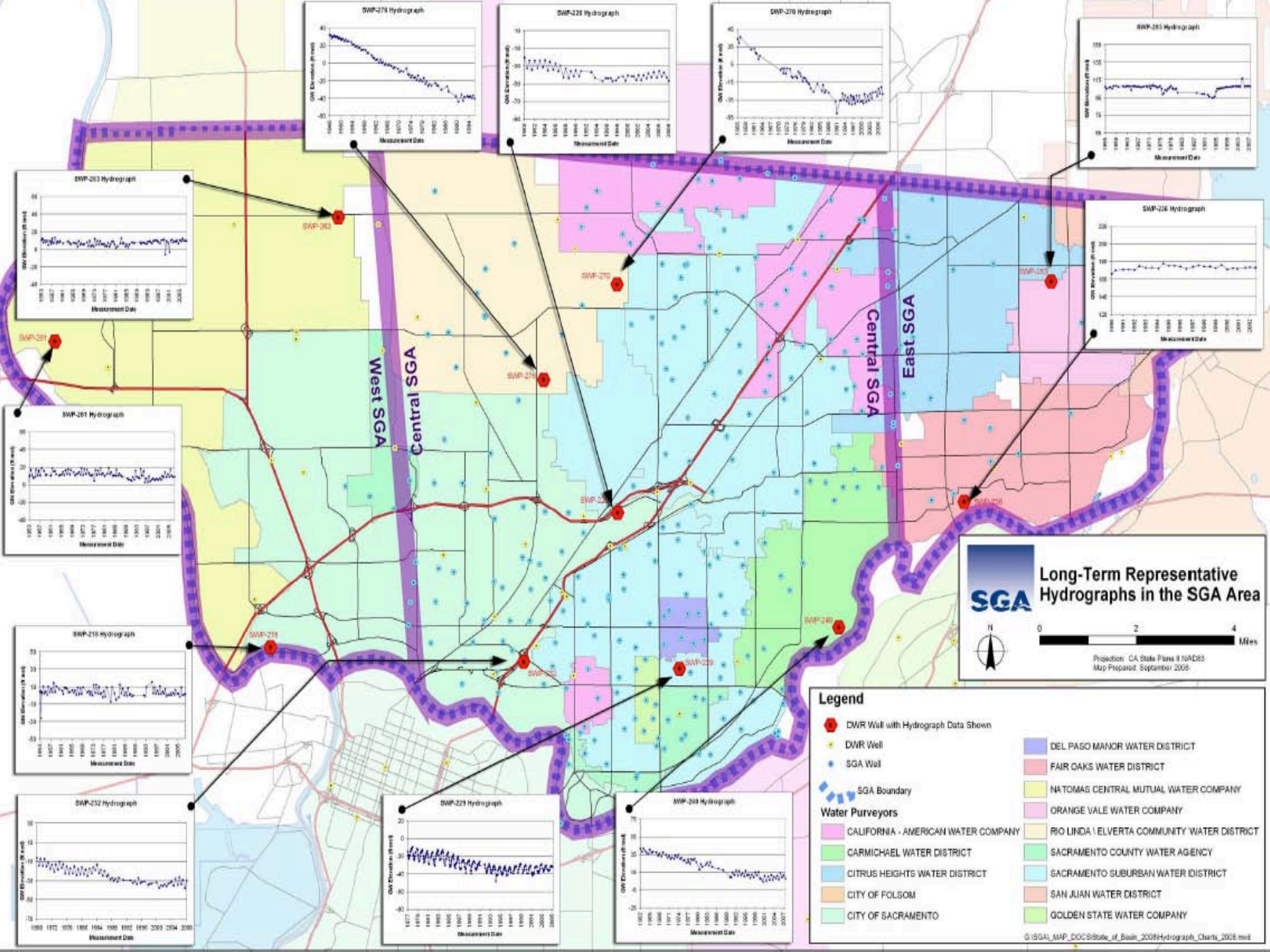
SWP-276 Hydrograph
SWP-228 Hydrograph
SWP-270 Hydrograph
SWP-265 Hydrograph
SWP-263 Hydrograph
SWP-236 Hydrograph
SWP-261 Hydrograph
SWP-216 Hydrograph
SWP-252 Hydrograph
SWP-229 Hydrograph
SWP-269 Hydrograph
West SGA
Central SGA
Central SGA
East SGA
SWP-263
SWP-270
SWP-265
SWP-261
SWP-276
SWP-236
SWP-228
SWP-216
SWP-229
SWP-269
SGA
Long-Term Representative Hydrographs in the SGA Area
N
0
2
4
Miles
Projection: CA State Plane II NAD83
Map Prepared: September 2008
Legend
DWR Well with Hydrograph Data Shown
DWR Well
SGA Well
SGA Boundary
Water Purveyors
CALIFORNIA - AMERICAN WATER COMPANY
CARMICHAEL WATER DISTRICT
CITRUS HEIGHTS WATER DISTRICT
CITY OF FOLSOM
CITY OF SACRAMENTO
DEL PASO MANOR WATER DISTRICT
FAIR OAKS WATER DISTRICT
NATOMAS CENTRAL MUTUAL WATER COMPANY
ORANGE VALE WATER COMPANY
RIO LINDA \ ELVERTA COMMUNITY WATER DISTRICT
SACRAMENTO COUNTY WATER AGENCY
SACRAMENTO SUBURBAN WATER DISTRICT
SAN JUAN WATER DISTRICT
GOLDEN STATE WATER COMPANY
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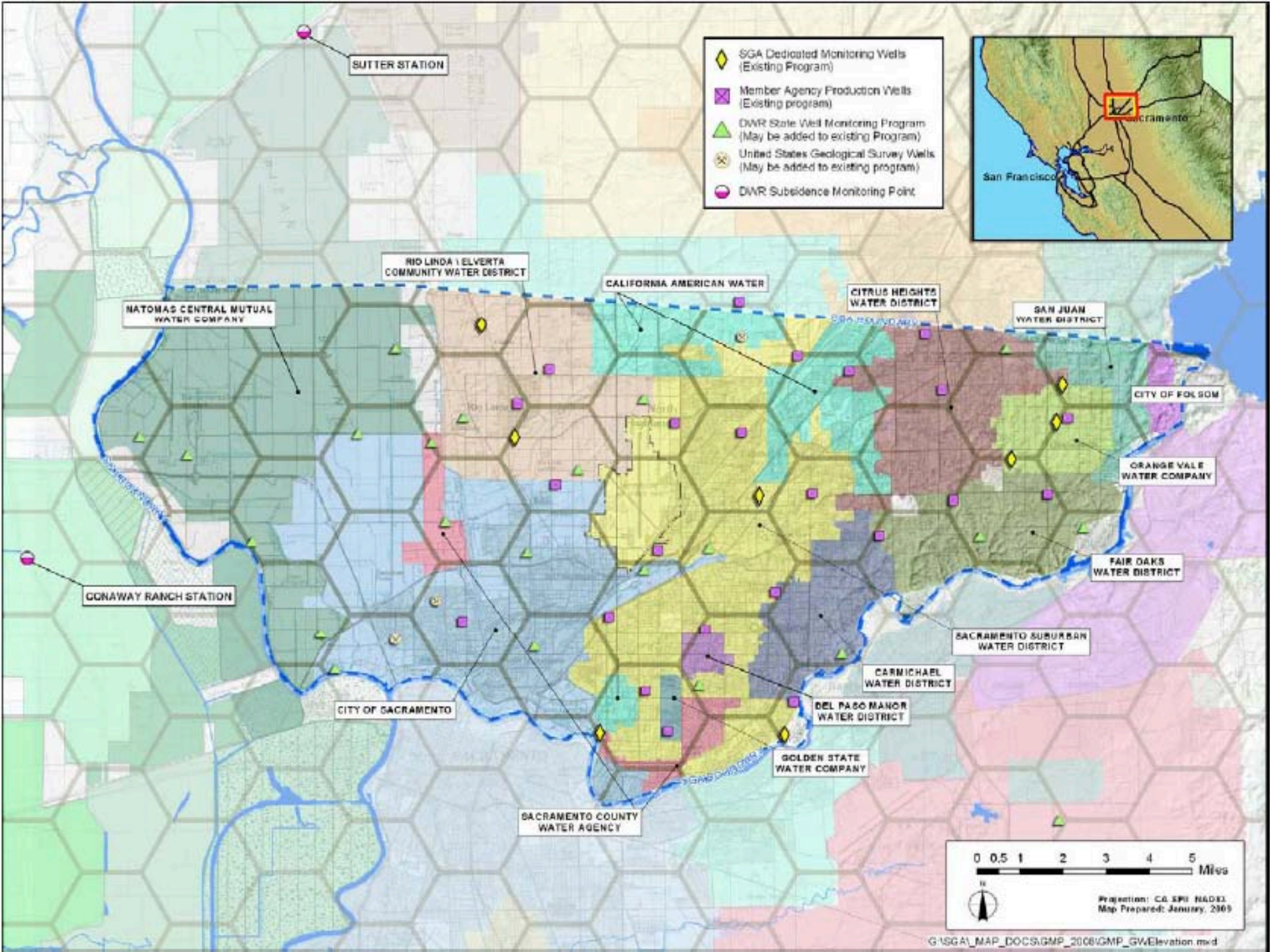
SUTTER STATION
SGA Dedicated Monitoring Wells (Existing Program)
Member Agency Production Wells (Existing program)
DWR State Well Monitoring Program (May be added to existing Program)
United States Geological Survey Wells (May be added to existing program)
DWR Subsidence Monitoring Point
San Francisco
RIO LINDA \ ELVERTA COMMUNITY WATER DISTRICT
CALIFORNIA AMERICAN WATER
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SACRAMENTO SUBURBAN WATER DISTRICT
CARMICHAEL WATER DISTRICT
CITY OF SACRAMENTO
DEL PASO MANOR WATER DISTRICT
GOLDEN STATE WATER COMPANY
SACRAMENTO COUNTY WATER AGENCY
0 0.5 1 2 3 4 5 Miles
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Projection: CA SPII NAD83
Map Prepared: January, 2009
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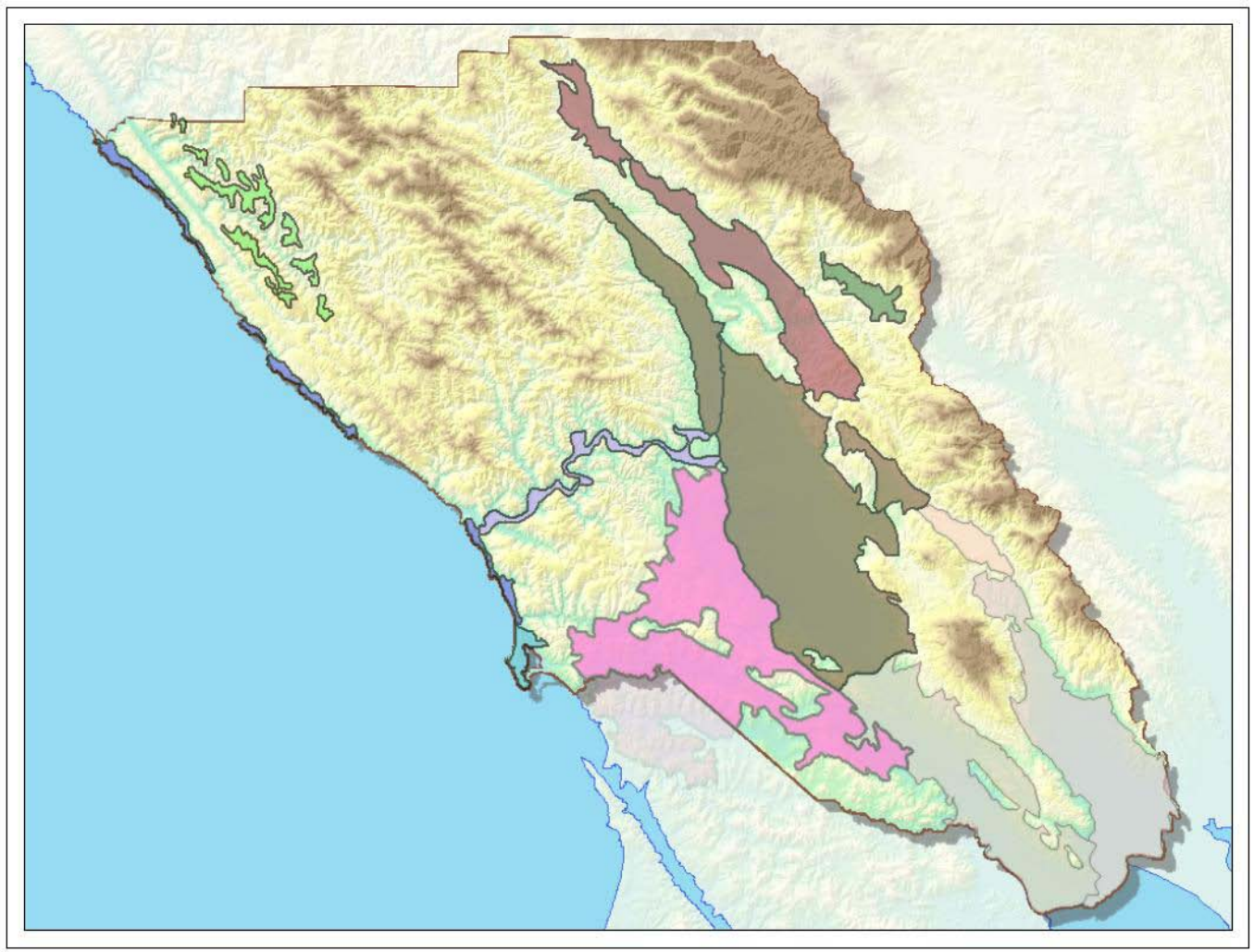
Key Insights for Santa Rosa

- Adding wells with priority on data gaps
  - Geographic
  - Variable depth
  - Specific concerns
- Outreach for voluntary monitoring
  - Fact sheets and program overview
  - Clear about levels and not pumping volume
  - Data transparency and privacy
- Technical challenges
  - Well construction information
  - Potential issues with access or obstructions
  - Standardized data collection and quality control
  - Need for depth specific monitoring wells and lithologic data


Questions

Santa Rosa Plain
Existing Monitoring Program

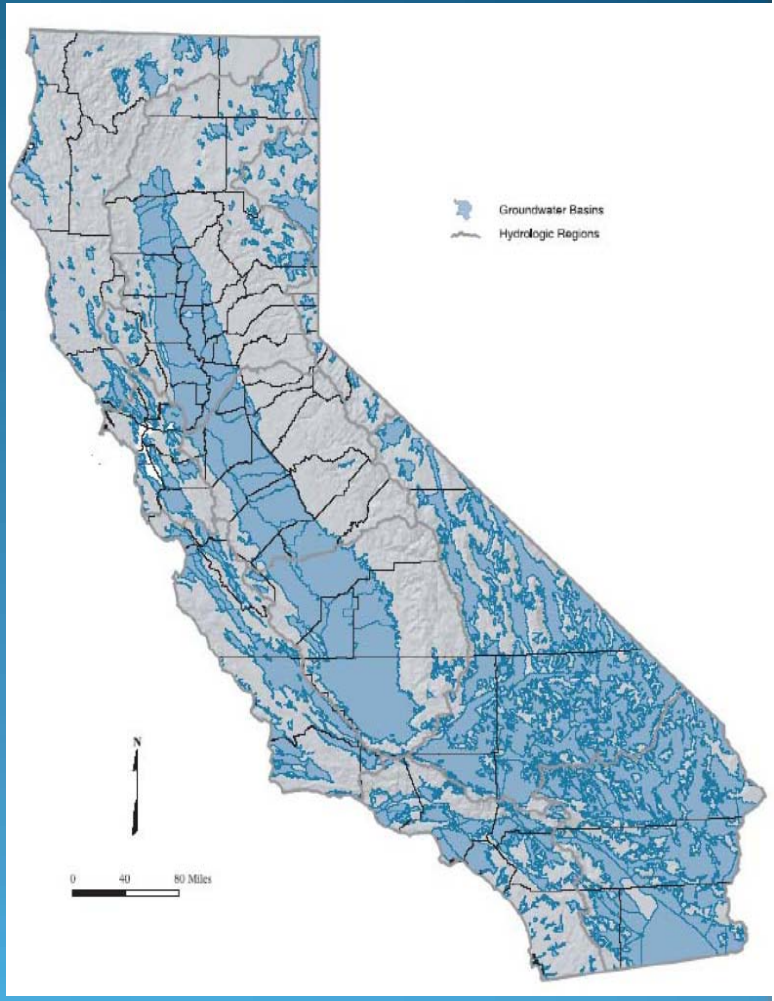


Santa Rosa Plain
Existing/Planned Monitoring Efforts

- Groundwater-Level Monitoring
  - DWR monitoring of private wells
  - CASGEM Program
  - Municipal supply wells and dedicated monitoring wells
  - Required monitoring for PRMD use permits (since 2004)
  - Volunteer, citizen-based monitoring
- Groundwater Quality
  - Public Water Supply Wells
  - DWR sampling program
  - Contaminant release sites
  - Special studies (eg, GAMA program)
  - Salt & Nutrient Management Plan Monitoring

Overview of CASGEM Program

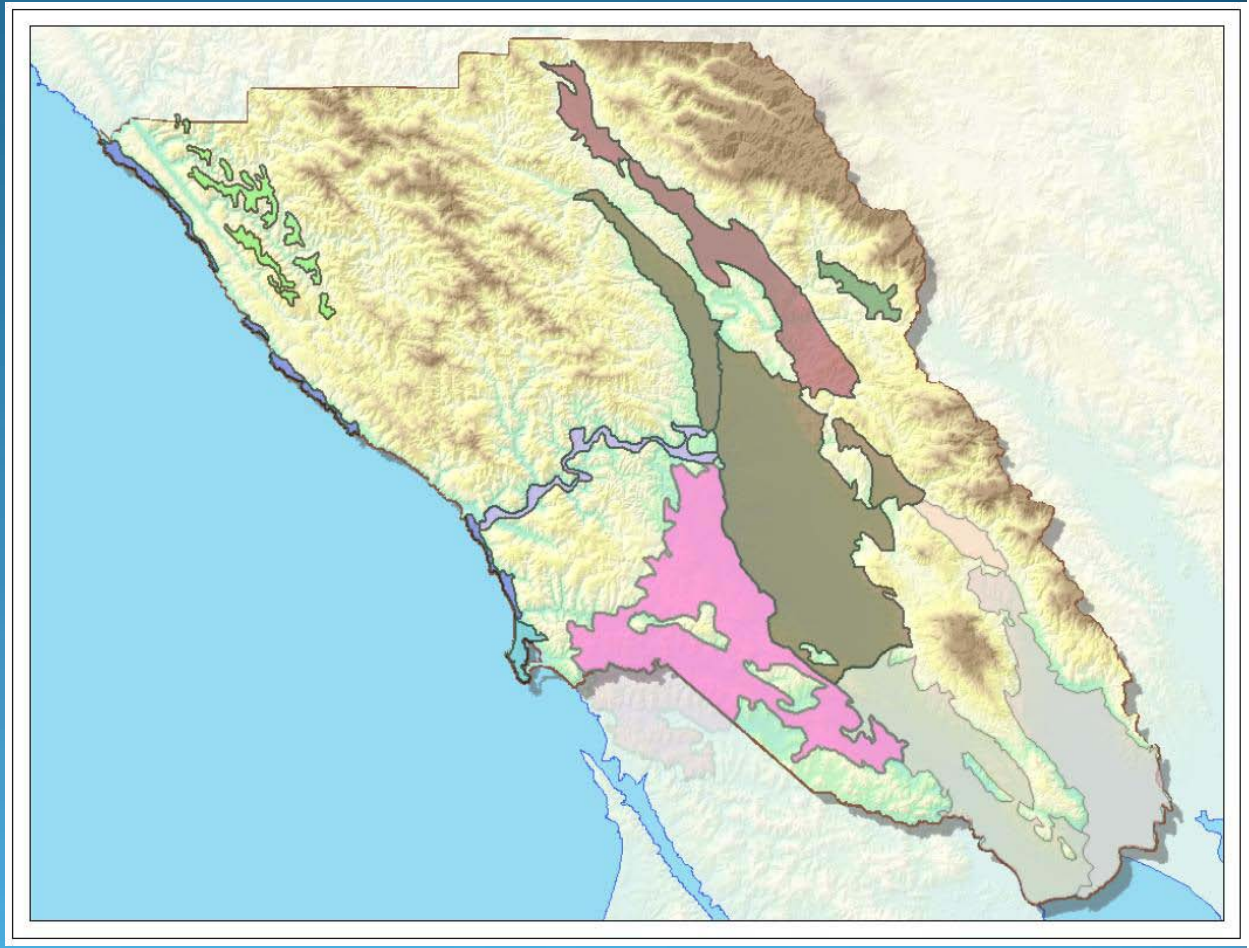
- Created when California Legislature passed SBx7-6 in 2009
- Requires groundwater elevation monitoring for all 515 Basins and Subasins in the state
- Monitoring Entities coordinate data collection and submit data to DWR
- DWR makes groundwater elevation data available to the public
- VOLUNTARY program, but if no Monitoring Entity steps forward DWR must assume monitoring responsibilities and local entities would become ineligible for State water grants and loans



Sonoma County Approach for Addressing CASGEM Requirements

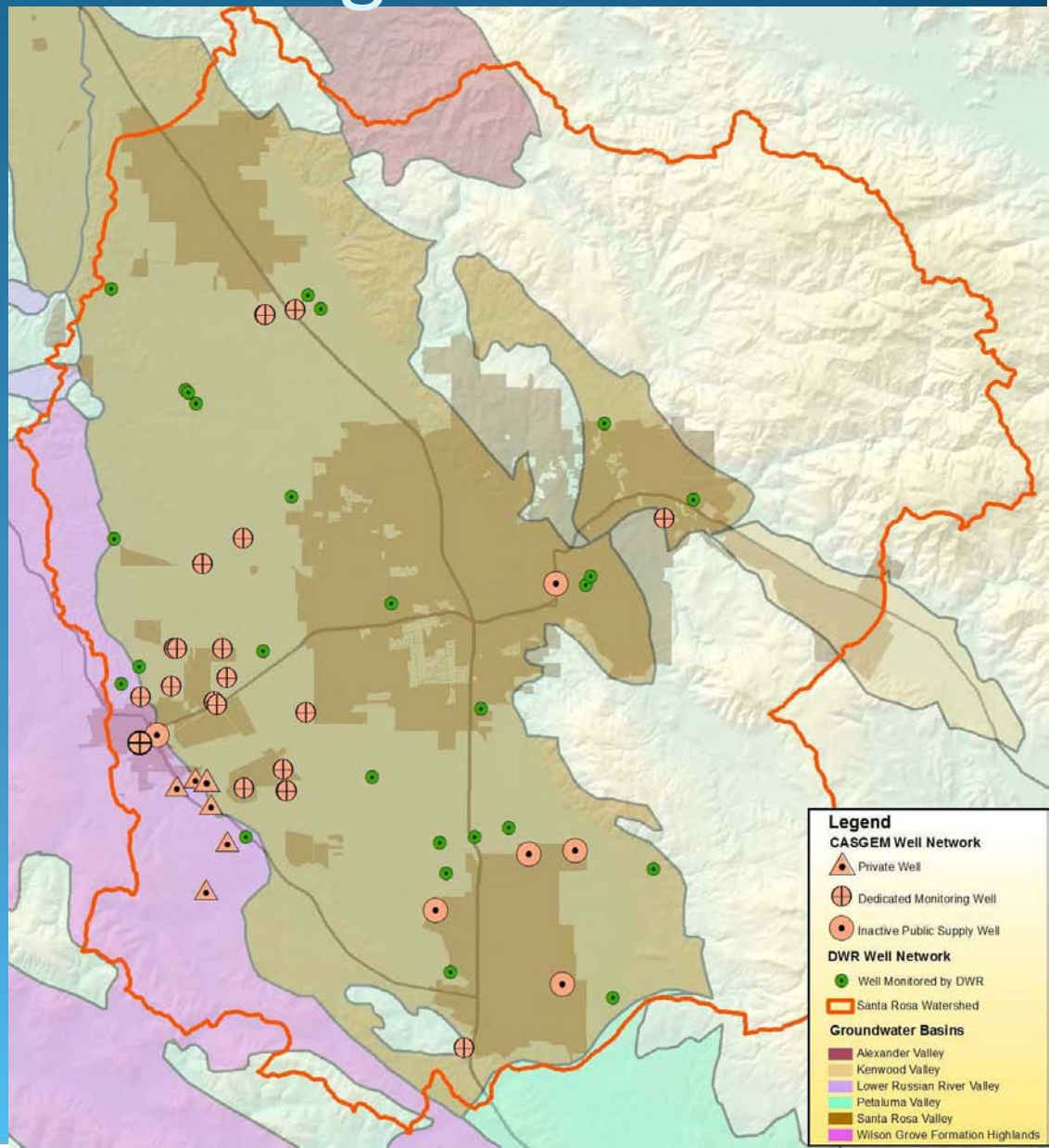
Monitoring Entity: Sonoma County PRMD (with technical support from Water Agency)

Alexander Area
Annapolis
Bodega Bay Area
Cloverdale Area
Fort Ross Terrace Deposits
Healdsburg Area
Knights Valley
Lower Russian River Valley
Rincon Valley
Santa Rosa Plain
Wilson Grove Formation Highlands



Santa Rosa Plain CASGEM Monitoring Network

- Santa Rosa Plain Watershed
  - Includes portions of 5 DWR-defined groundwater basins/sub-basins
- Total of approximately 60 wells incorporated into CASGEM/DWR Monitoring Network in area
  - Private water wells monitored by DWR
  - Dedicated Monitoring Wells
  - Inactive Public Supply Wells
- Groundwater-Levels monitored semiannually and reported to DWR



Santa Rosa Plain Potential Elements for Required Monitoring Components

- Groundwater elevation and quality monitoring
  - Coordinate existing monitoring
  - Develop plan to fill in data gaps
- Land surface elevation monitoring
  - Compile /evaluate existing information
  - Develop a plan
- Surface water-groundwater interaction monitoring
  - Compile existing information (stream gauges, shallow monitoring wells etc)
  - Develop a plan

Santa Rosa Plain
Data Collection, Management & Reporting

- Data collection protocols
  - Identify appropriate protocols
  - Develop plan
- Data management and analysis develop approach for periodic evaluation and reporting
  - Comprehensive data analysis
  - Data management system
  - Reporting and evaluation of monitoring/prioritization of monitoring needs

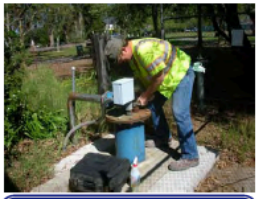
Questions & Discussion

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/

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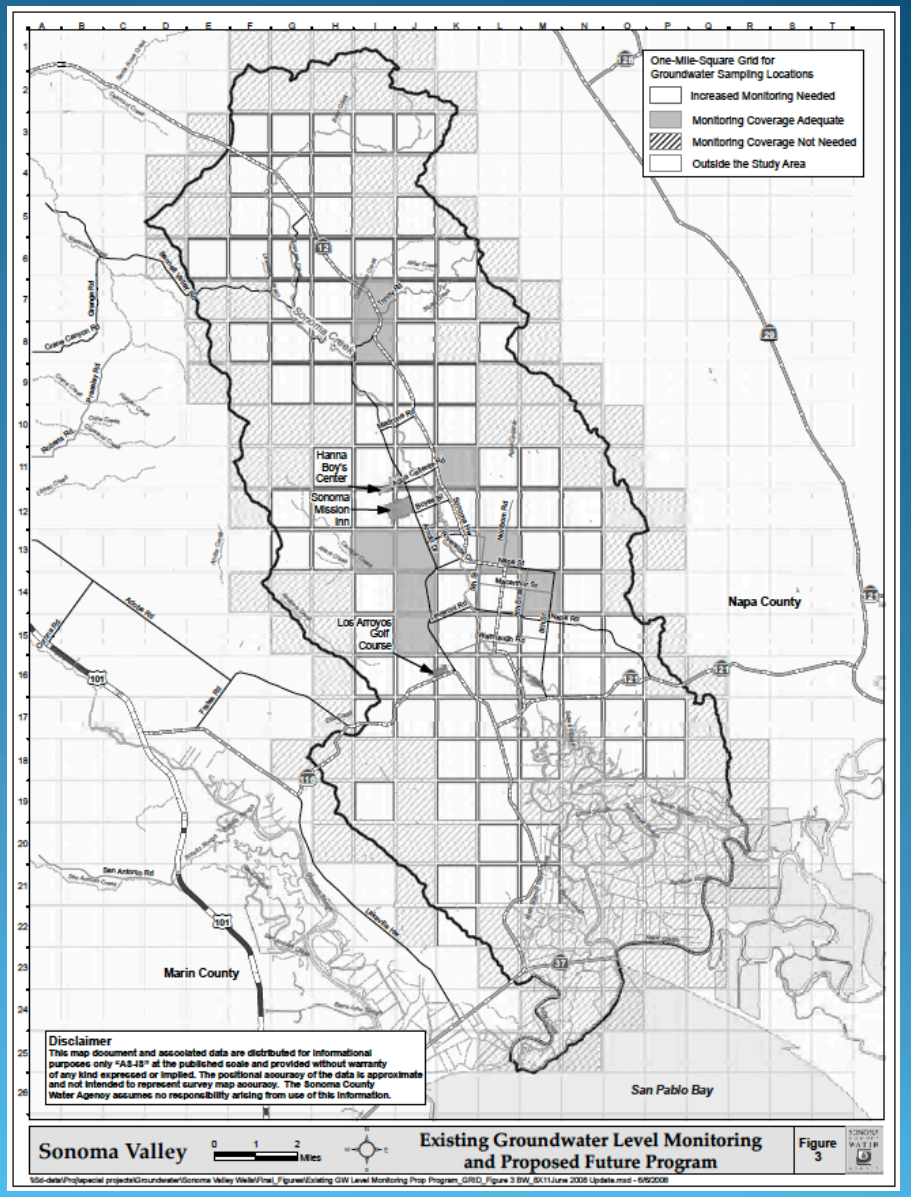


VOLUNTEER WATER-TABLE LEVEL MONITORING PROGRAM

FREQUENTLY ASKED QUESTIONS

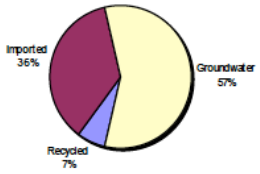
Sonoma Valley Groundwater

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.

Total Water Use for Sonoma Valley



For Year 2000

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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SONOMA VALLEY GROUNDWATER MANAGEMENT PROGRAM

FREQUENTLY ASKED QUESTIONS

What is required from me if I want to participate?

Willingness to allow a trained volunteer monitor to visit the well a couple times each year. Participating well owners will sign a permit to enter letter indicating the frequency of the visits and other details.

If I agree to participate, what is the frequency and duration of visits?

The trained well monitor will visit the well in the spring and fall. The volunteer will be on the property about 30 minutes for each visit to take measurements of the water depth. The well owner will be contacted at least 48 hours in advance of each visit to make final arrangements.

Who will be taking the water-level measurements?

Measurements require special equipment and training. The current local volunteer monitors are Ed Nelson, John Robb, and Al Bandur. Also, the California Department of Water Resources has been monitoring a number of wells over the past 40 years and will continue to do so.

How are well measurements taken?

Measuring groundwater levels is quite simple, but needs to be done in a consistent and objective manner to ensure results that can be tracked over time. Three types of devices measure groundwater levels: a metal tape, an electrical well sounding device, and a pressure transducer.

What if a well owner wants to take the water-level measurements? Will this be allowed?

If individual well owners want to measure their well, they will be encouraged to work with a trained monitor as the tools and methods required are specialized. However, training for interested parties may be made available sometime in the future – assuming funding can be secured to allow this.

How will the information collected be used?

Groundwater accounts for nearly 60% of all water used in Sonoma Valley and is the sole source of drinking water for rural domestic and other unincorporated areas not being served by urban suppliers. As such, data can improve understanding of the basin's response to future action or inaction. Collected data will be used to:

- 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 the reliability and accuracy of relevant computer models.

Will my privacy be protected?

Yes. The Sonoma County Water Agency will securely manage all collected information and the public will not have access to specific well information. Data will be used to create maps indicating groundwater levels, but specific well locations will not be shown or publicly available.

Will measurements affect my well or my water quality?

No.

What if a well owner decides to quit the program?

Volunteers can leave the program any time. However, gathering data over long periods of time is critical to understanding groundwater level trends. Volunteers are encouraged to participate in the program for the duration.

Will participating cost me anything?

No. There will not be any fees or costs for participating in this program.

How do I get more information or talk about participating in the program?

Please contact Tim Parker at 707/935-0235 or tparker2@slb.com for more information or visit the website:

www.sonomacountywater.org/svgroundwater/

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