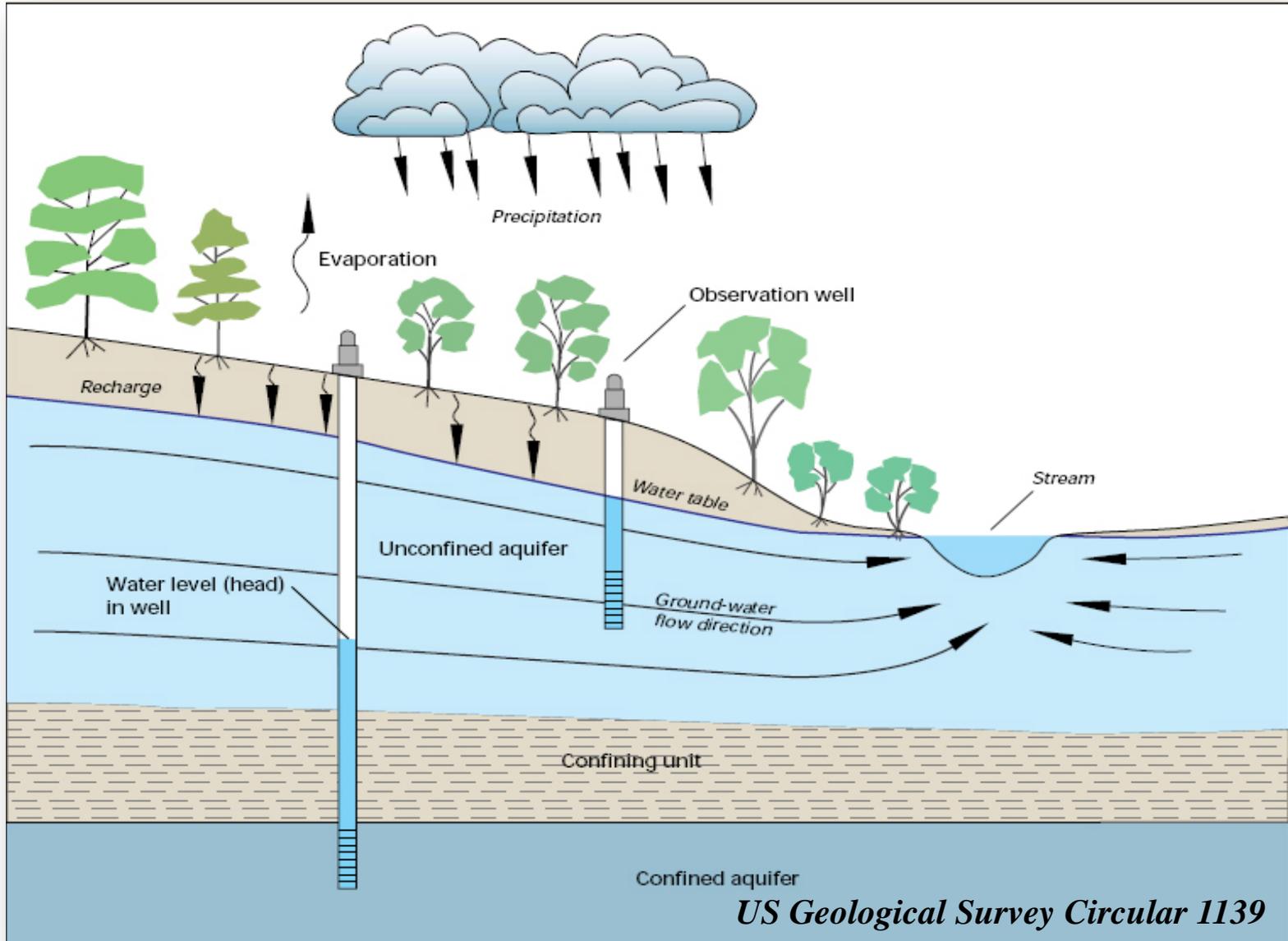


State of Sonoma Valley Water Supplies

Marcus Trotta, PG, CHg,
Hydrogeologist
Sonoma County Water Agency

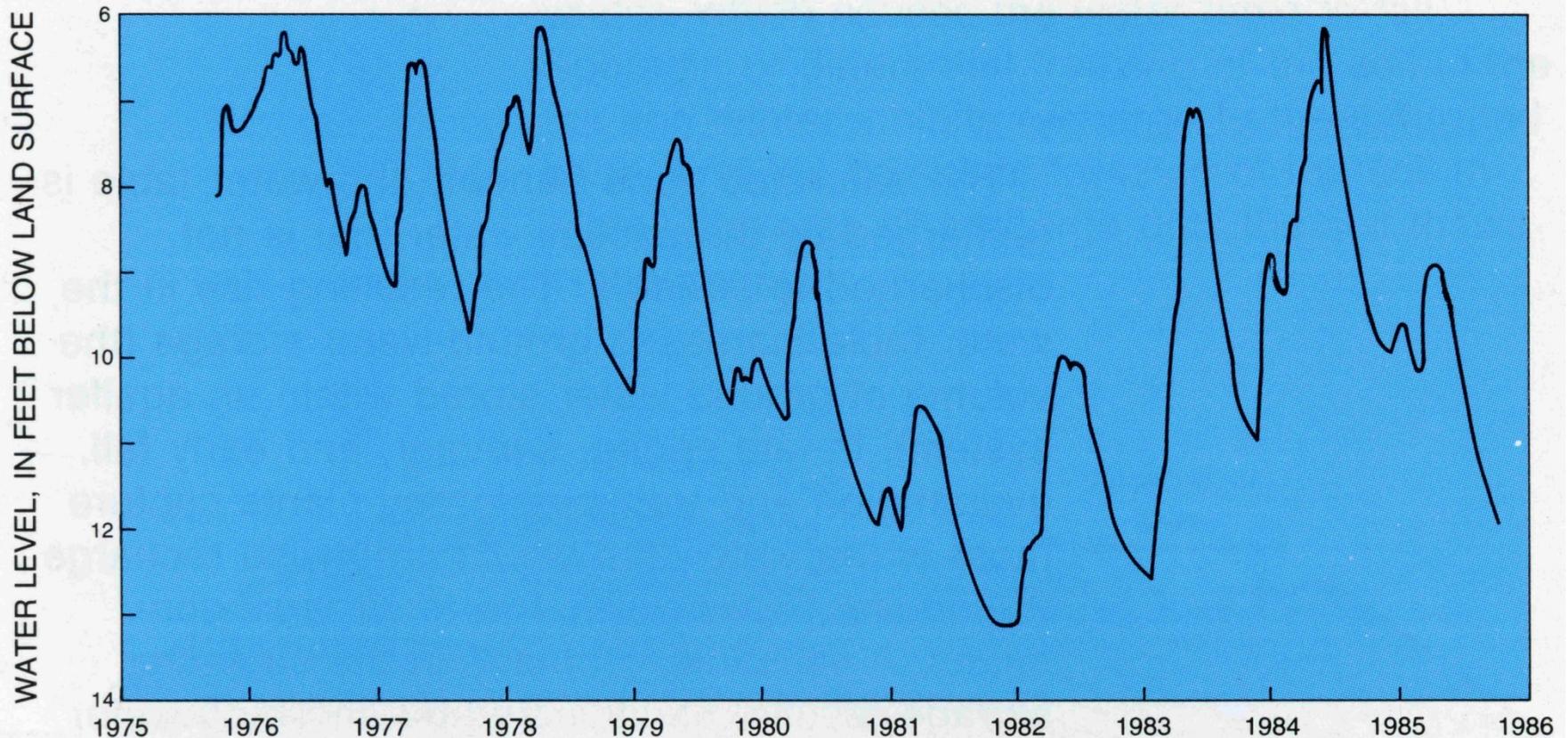
March 31, 2014

Groundwater is Part of the Hydrologic Cycle



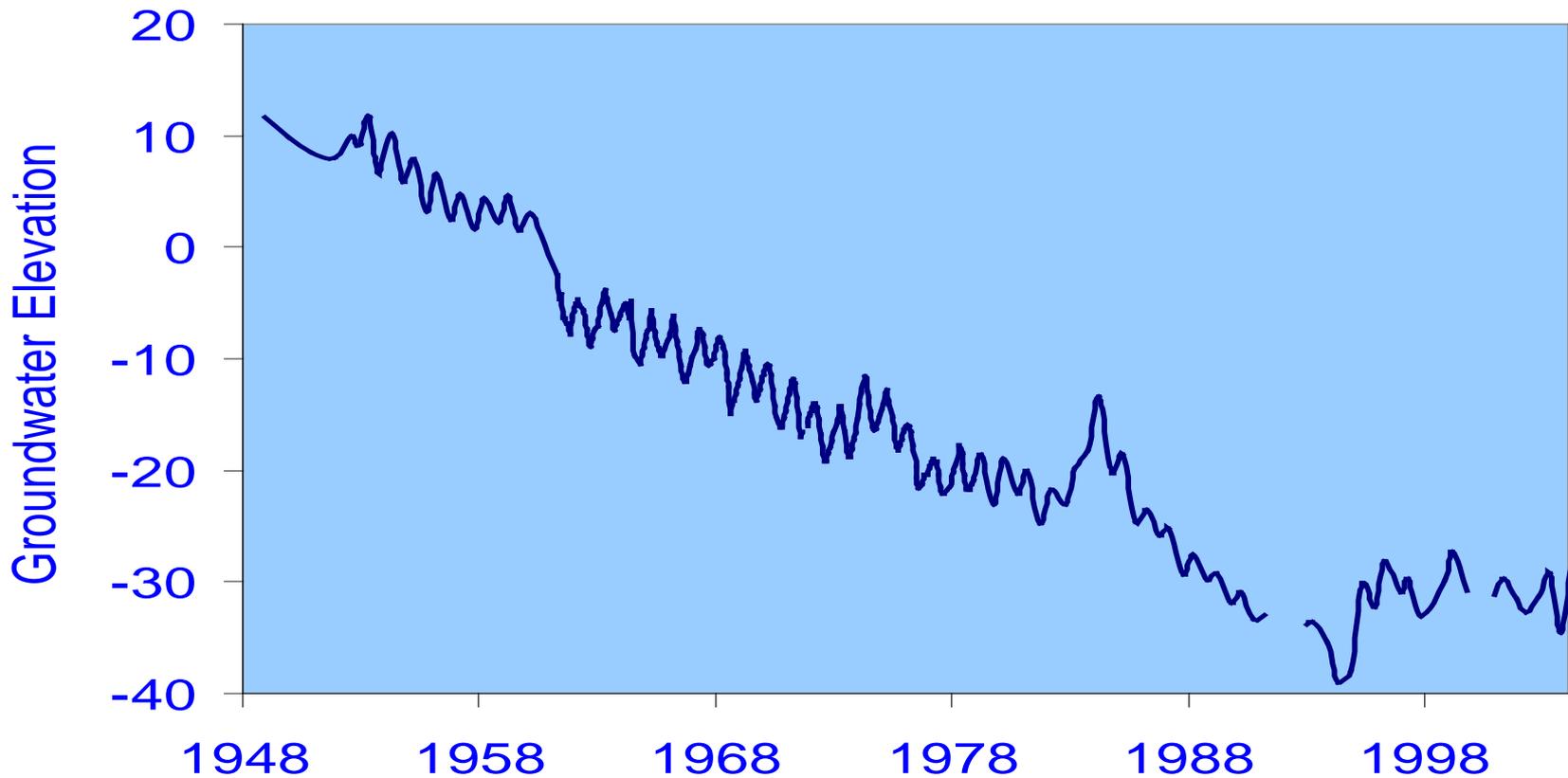
US Geological Survey Circular 1139

Groundwater Levels Change Seasonally and Climatically



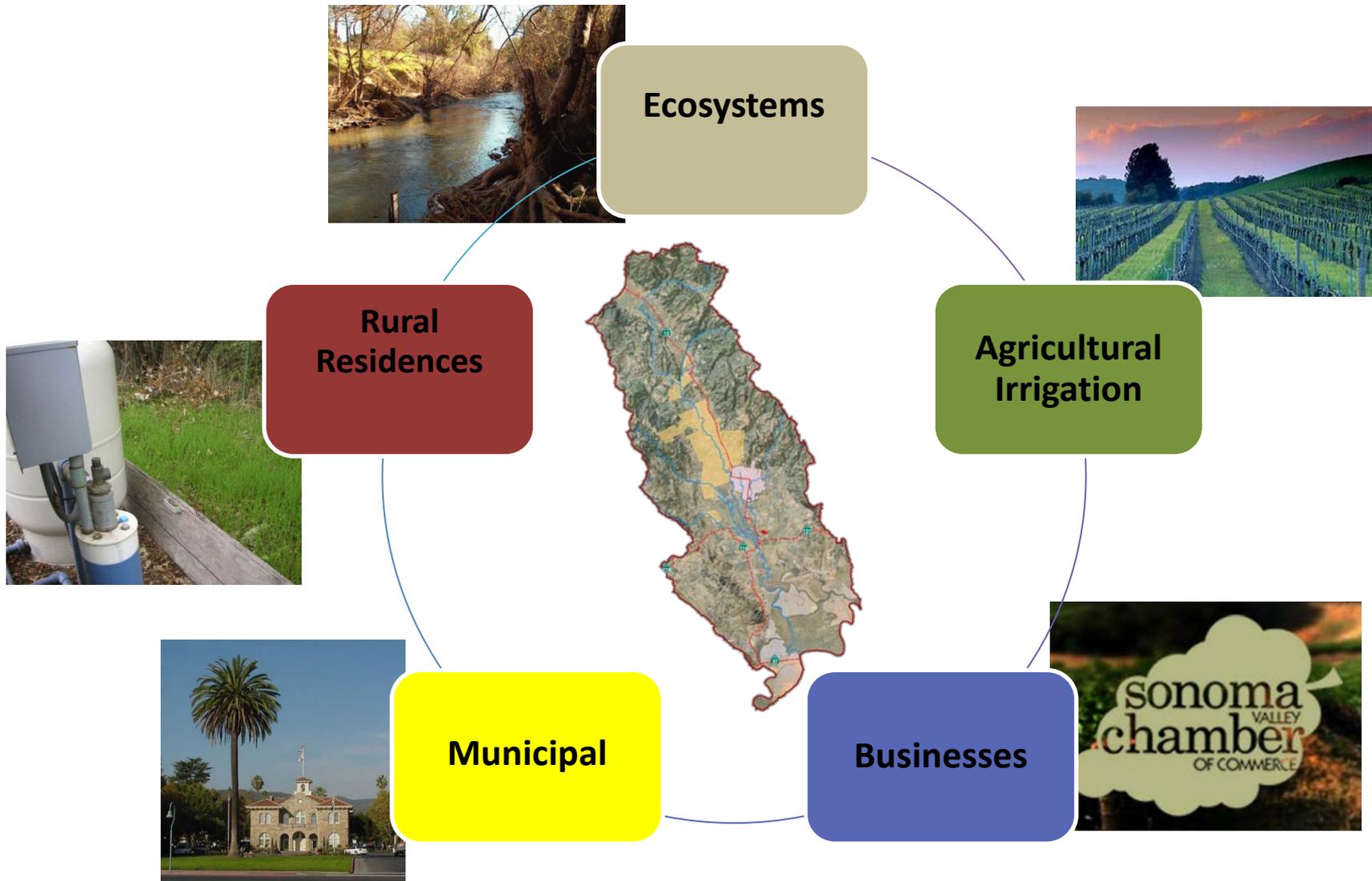
Well Hydrograph, Groundwater and the Rural Homeowner, U.S. Geological Survey

Groundwater Levels Change When Discharge Exceeds Recharge

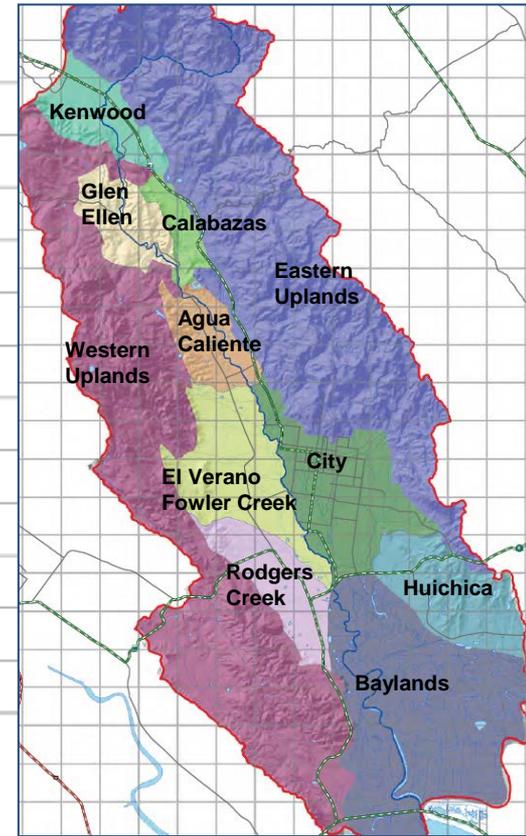
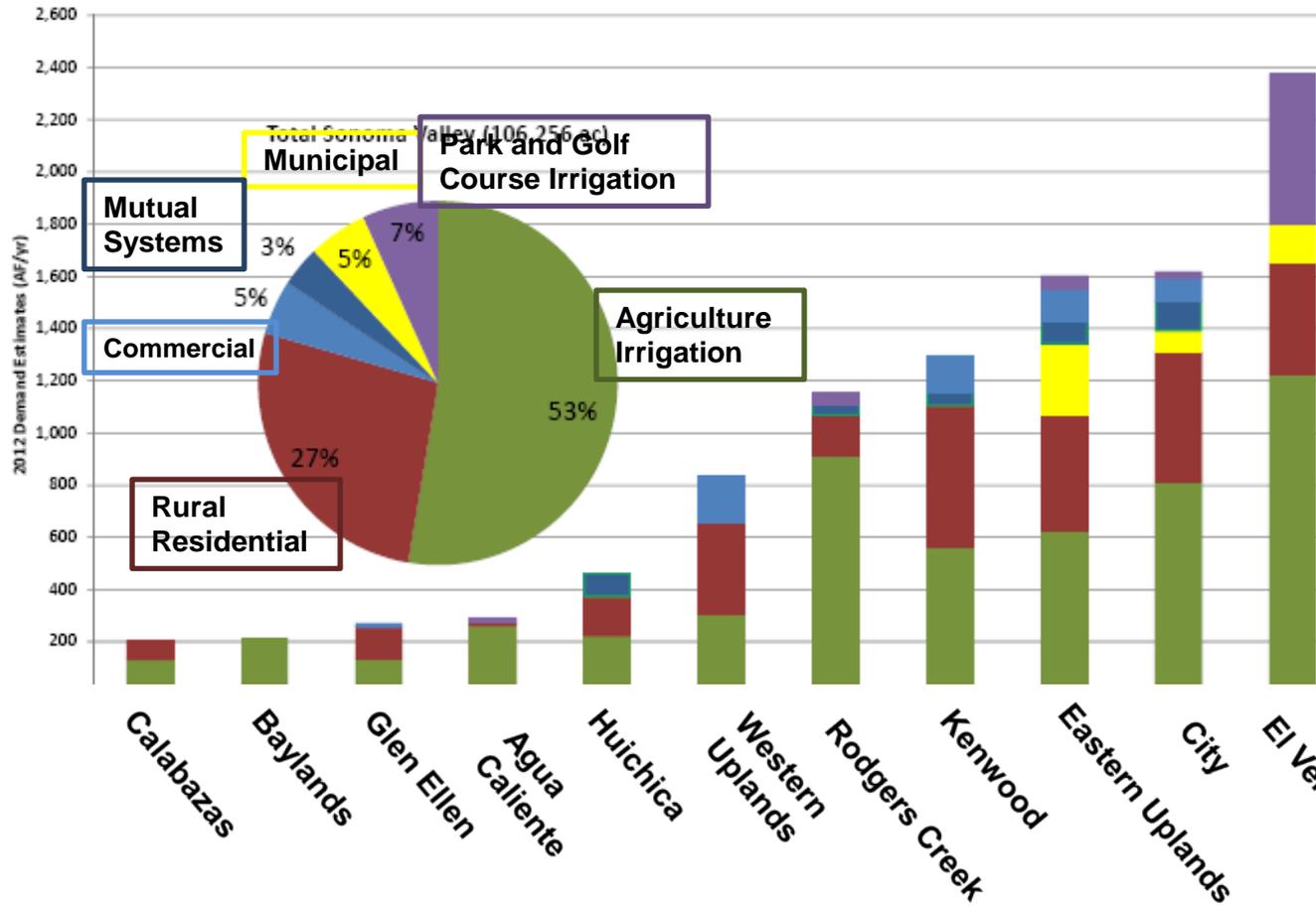


Well Hydrograph, Water Well Database, California Department of Water Resources

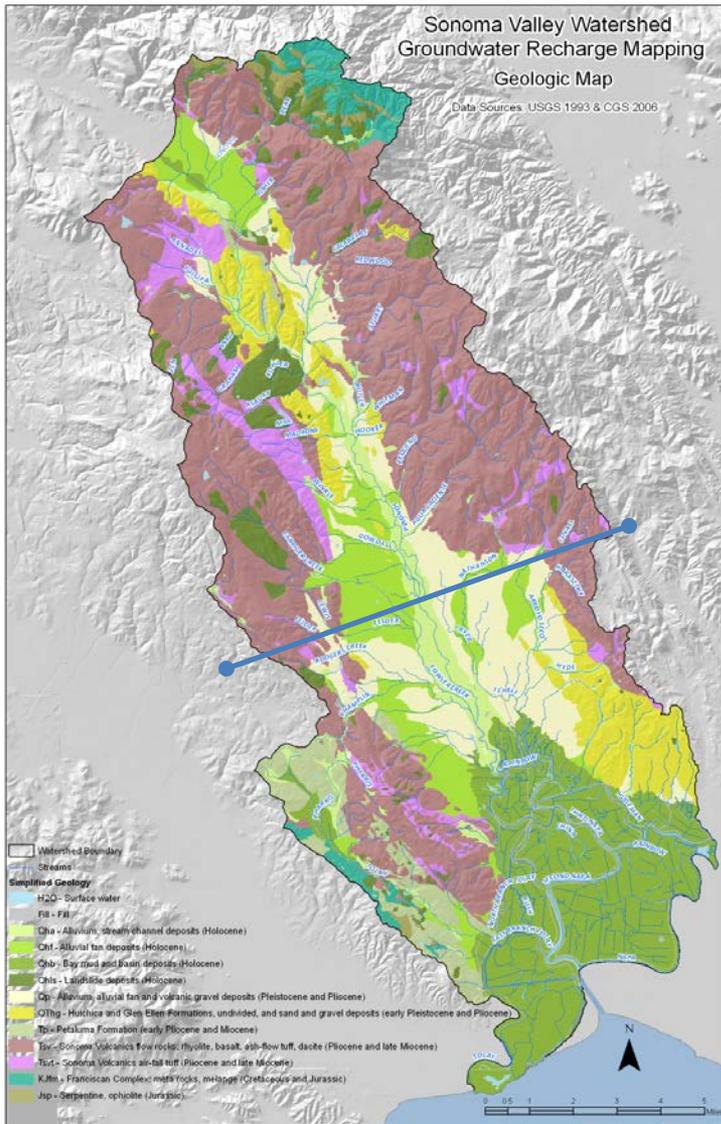
Importance of Groundwater in Sonoma Valley



Groundwater Use in Sonoma Valley

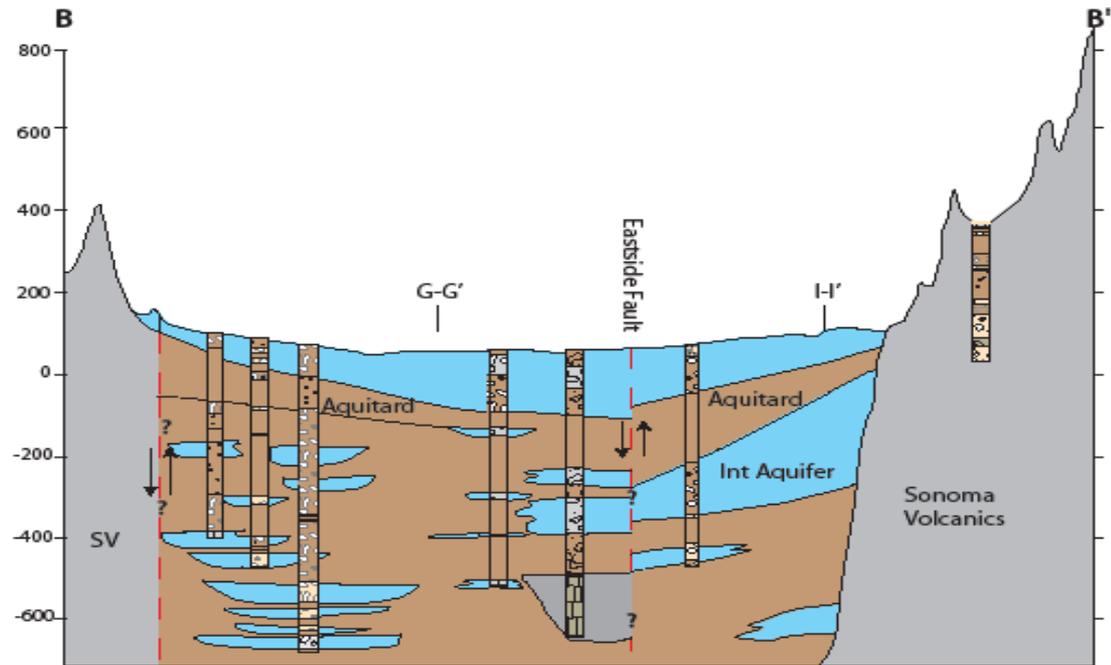


Sonoma Valley Hydrogeologic Setting

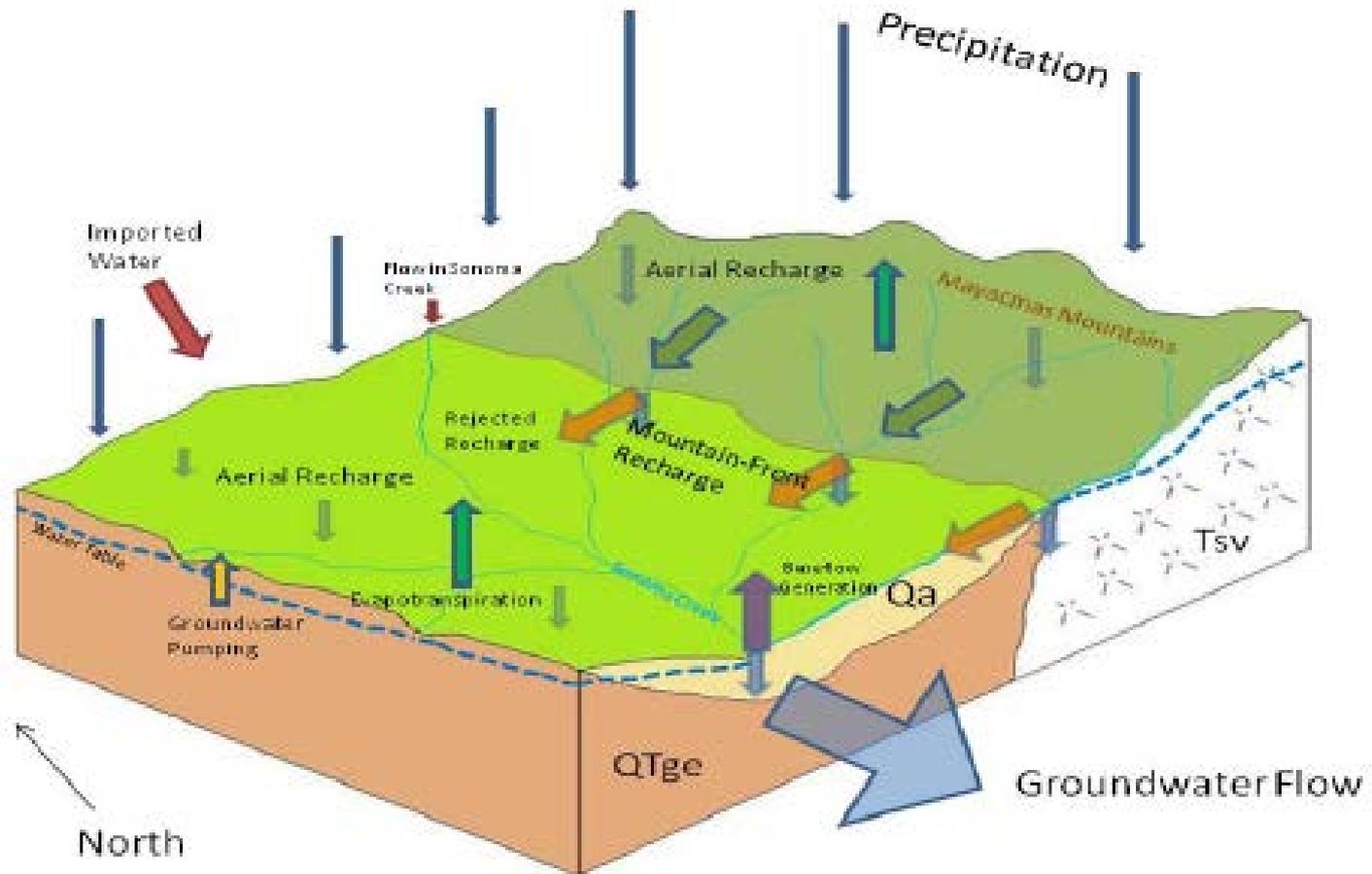


Complex Geology:

- Intermixed sedimentary and volcanic deposits
- Layers have been uplifted, tilted and faulted



How Groundwater Moves through Sonoma Valley - Conceptual Model

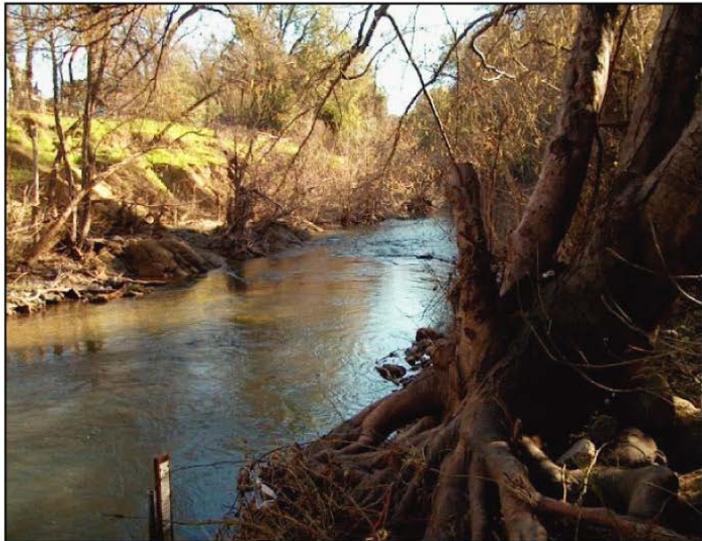


Water Agency/USGS Sonoma Valley Groundwater Study



In cooperation with the
SONOMA COUNTY WATER AGENCY

**Geohydrological Characterization, Water-Chemistry,
and Ground-Water Flow Simulation Model of the
Sonoma Valley Area, Sonoma County, California**



Key Findings:

- **Increased pumping between 1975-2000**
- **Localized decline of groundwater levels**
- **Estimated storage decline of between 680 – 1,420 acre-ft per year**
- **Numerical Model - Evaluate data gaps & simulate future conditions**

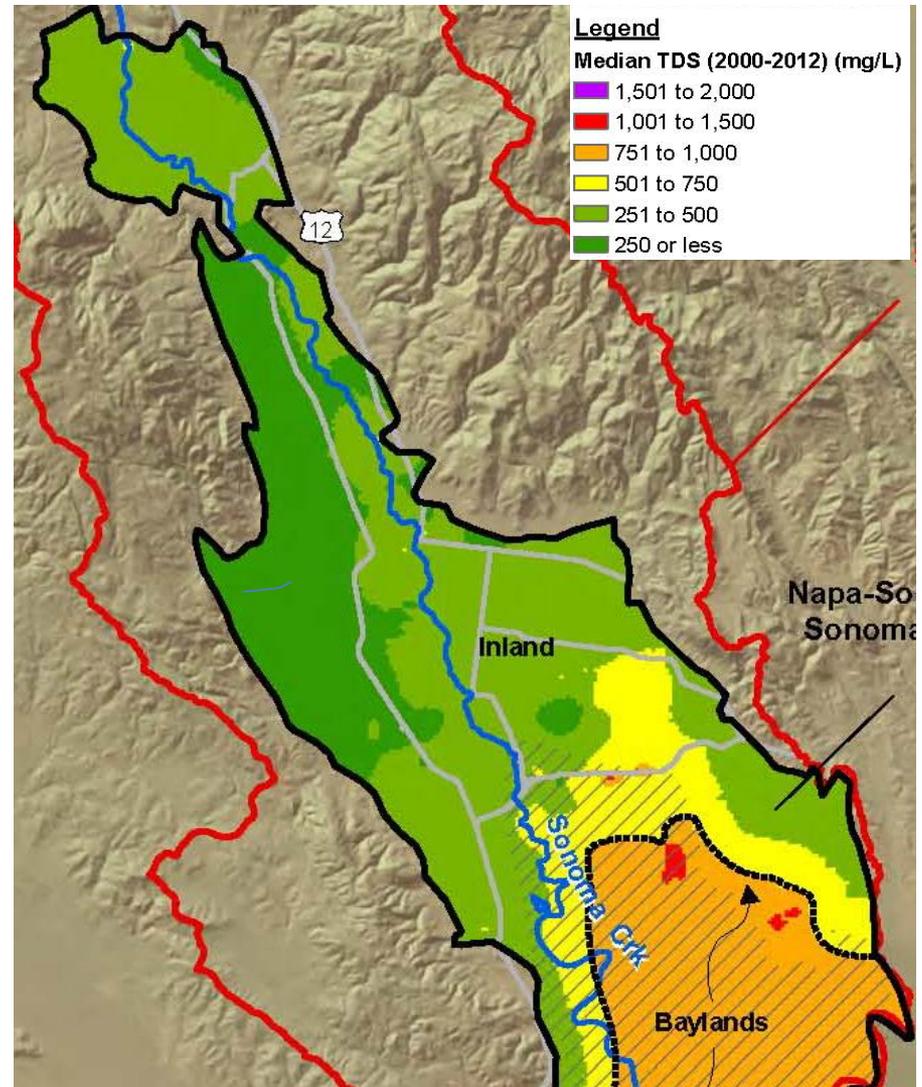
Scientific Investigations Report 2006-5092

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Salinity In Groundwater is a Concern

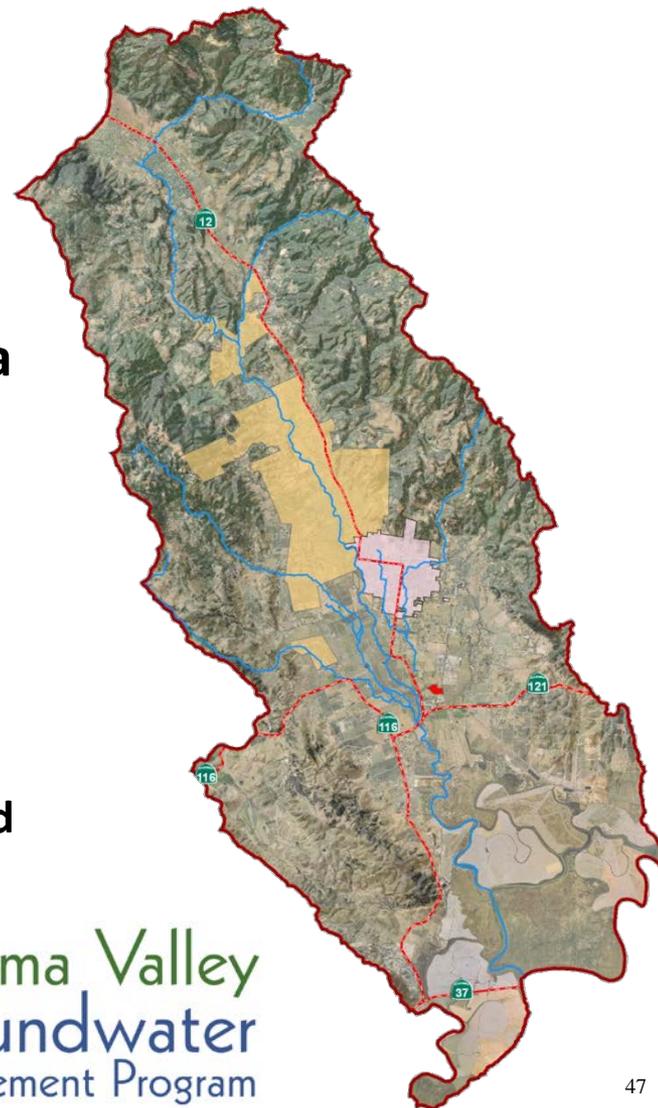
Salinity Sources:

- Historical Brackish Water Beneath Tidal Marshlands
- Thermal Water
- Deep Groundwater from Older Formations



Overview of Sonoma Valley Groundwater Management Program

- **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
- **Sixth Year of Implementation**



Basin Advisory Panel Composition

- **Agriculture**

- Grape Growers
- Dairy

- **Business / Developers**

- Business Owners
- North Bay Association of Realtors

- **Environmental**

- Valley of the Moon Alliance

- **Natural Resource Management**

- Sonoma Ecology Center
- Sonoma Resource Conservation District

- **Governmental**

- County of Sonoma – Permit and Resource Management Department
- Valley of the Moon Water District
- City of Sonoma
- Sonoma County Water Agency
- Sonoma County Agricultural Preservation & Open Space District

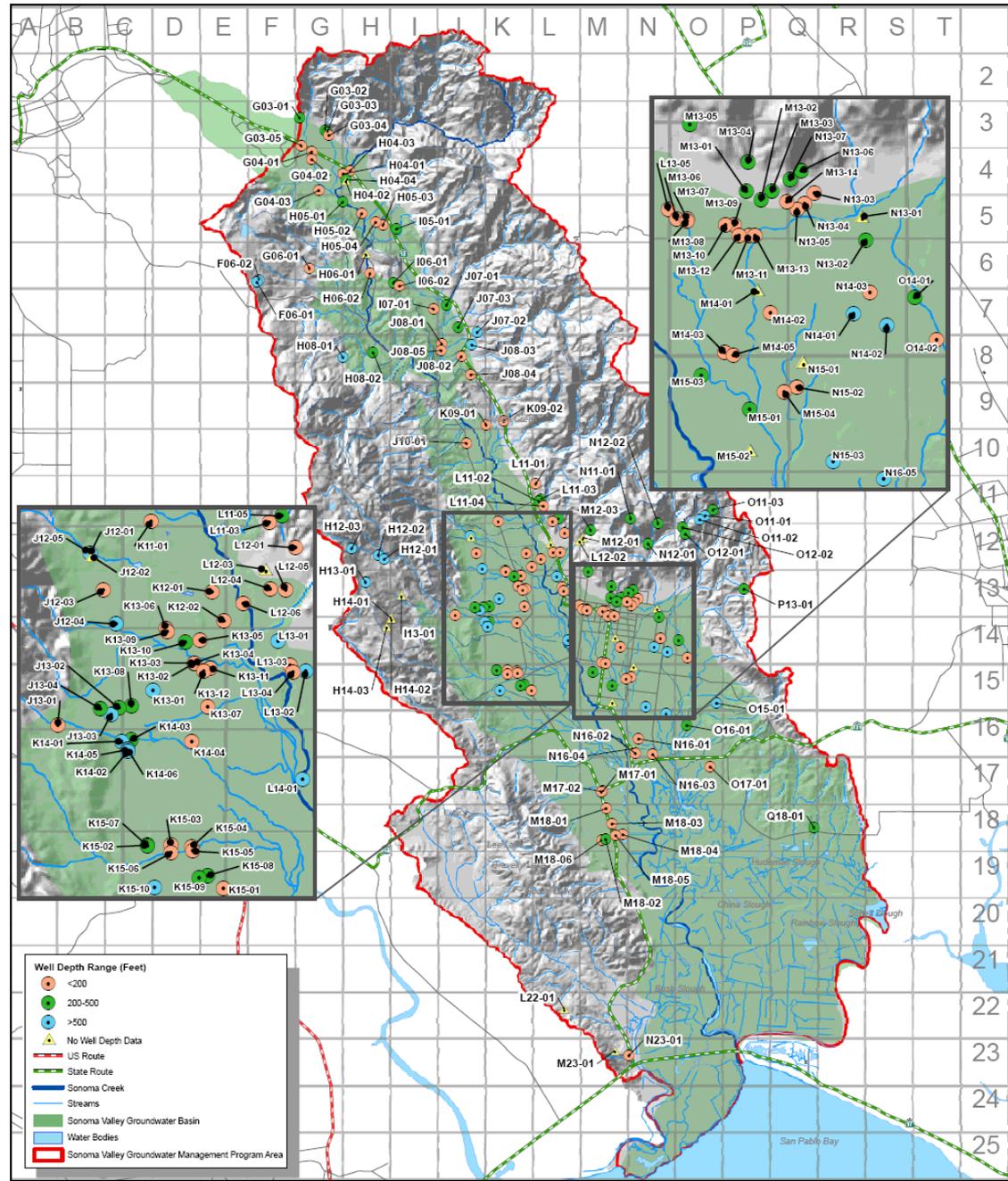
- **Rural Well Owners and Users**

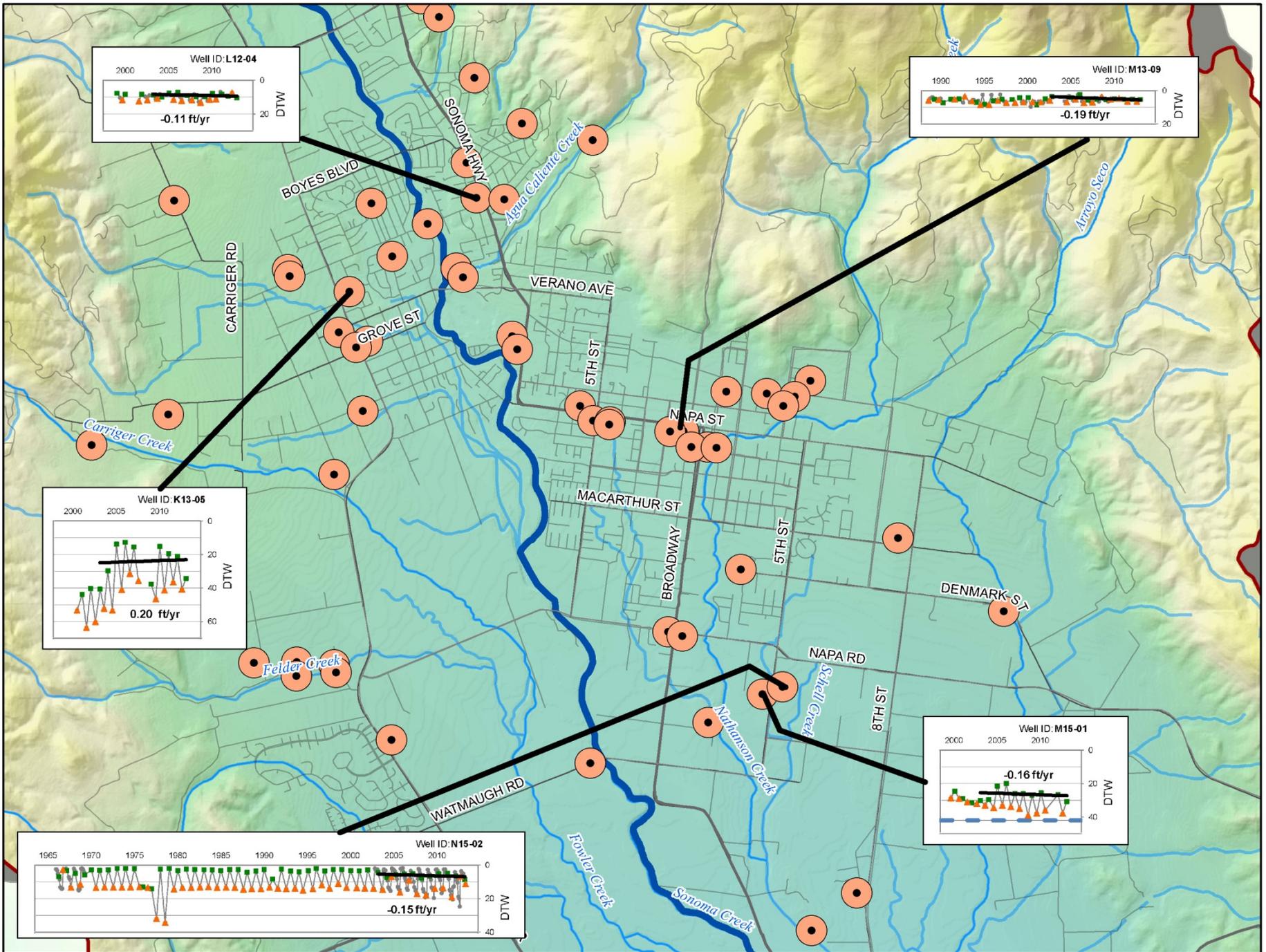
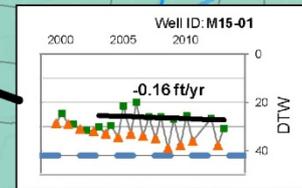
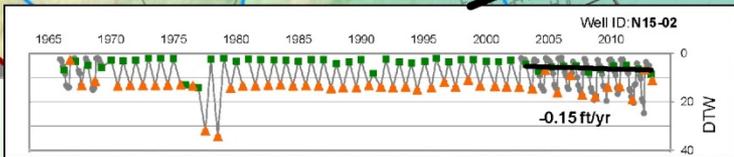
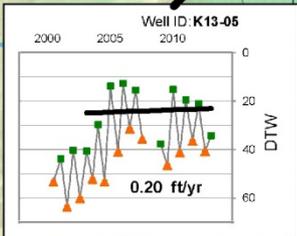
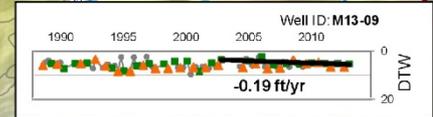
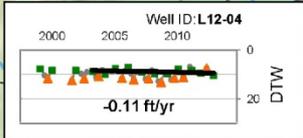
- Mission Highlands Mutual Water Company
- Individual Well Owners



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**





Groundwater Important Provider of Flow to Streams

May 2010

Discharge Segments

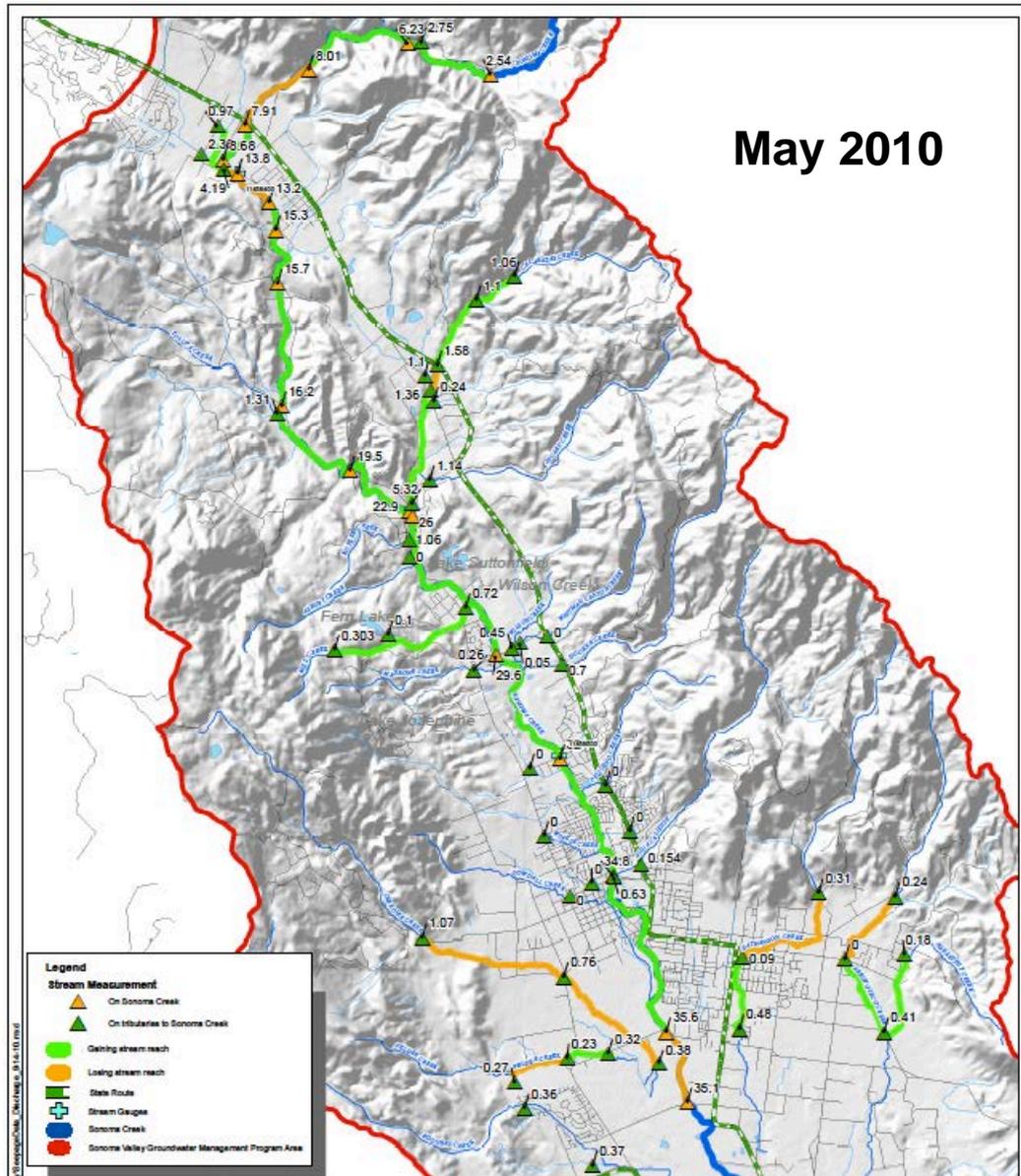
(Groundwater flows into Stream)

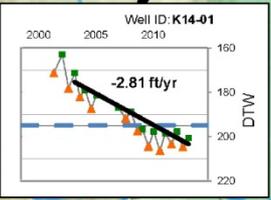
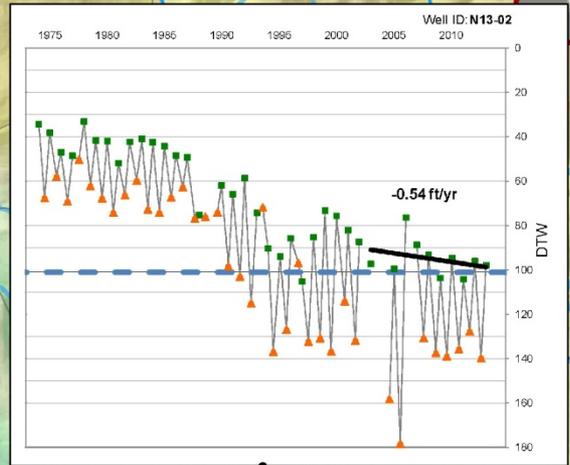
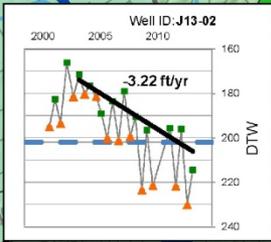
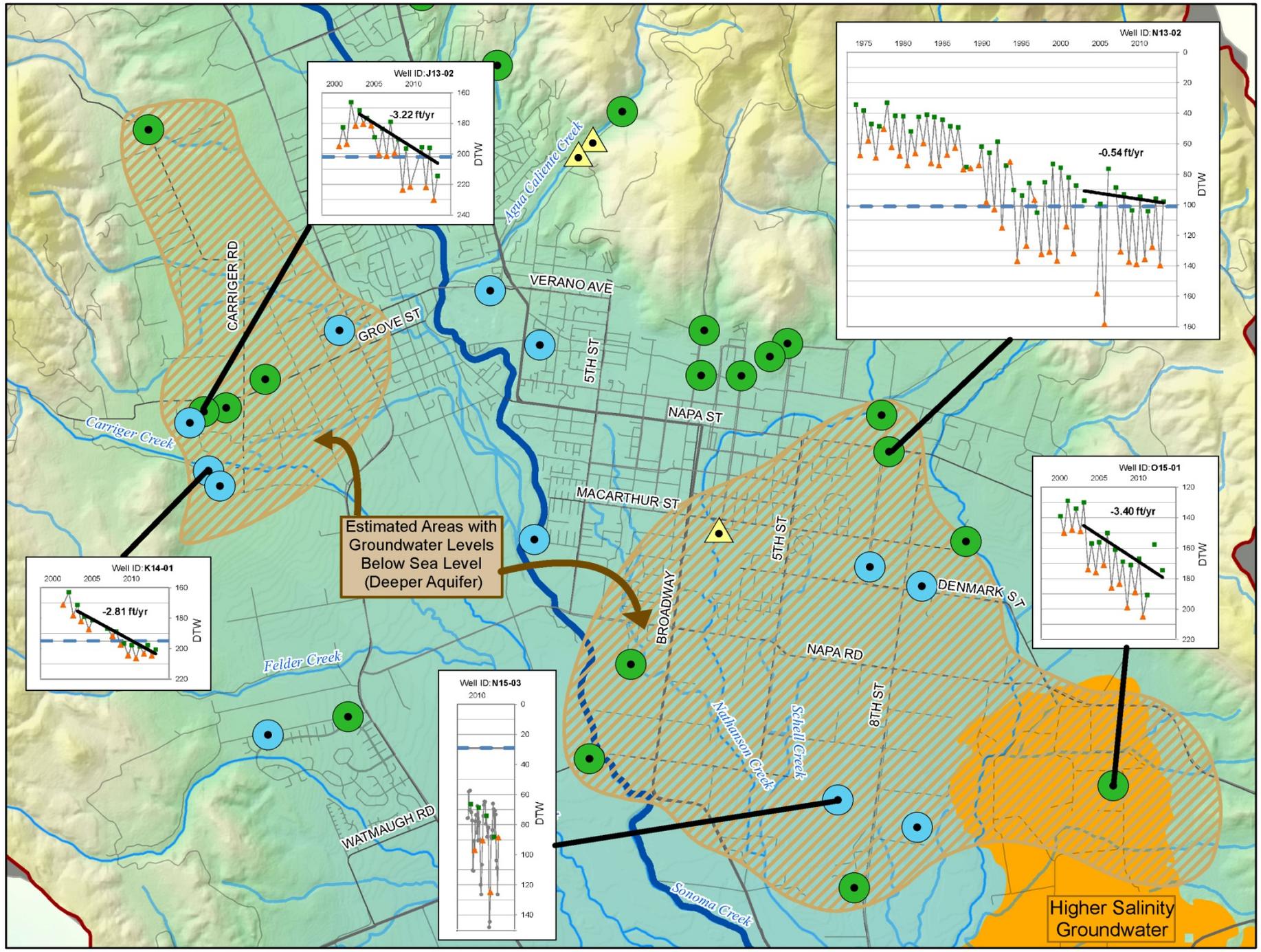
- Most of Sonoma Creek
- Most of Calabazas
- Lower reaches of Fryer and Nathanson

Recharge Segments

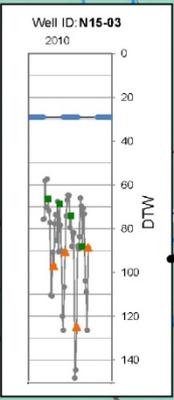
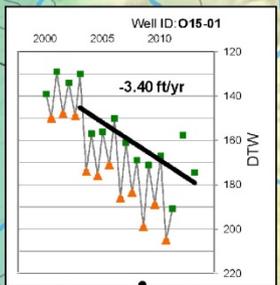
(Stream recharges Groundwater)

- Sonoma Creek near Kenwood
- Carriger
- Upper reaches of Fryer and Nathanson
- Portion of Felder Creek



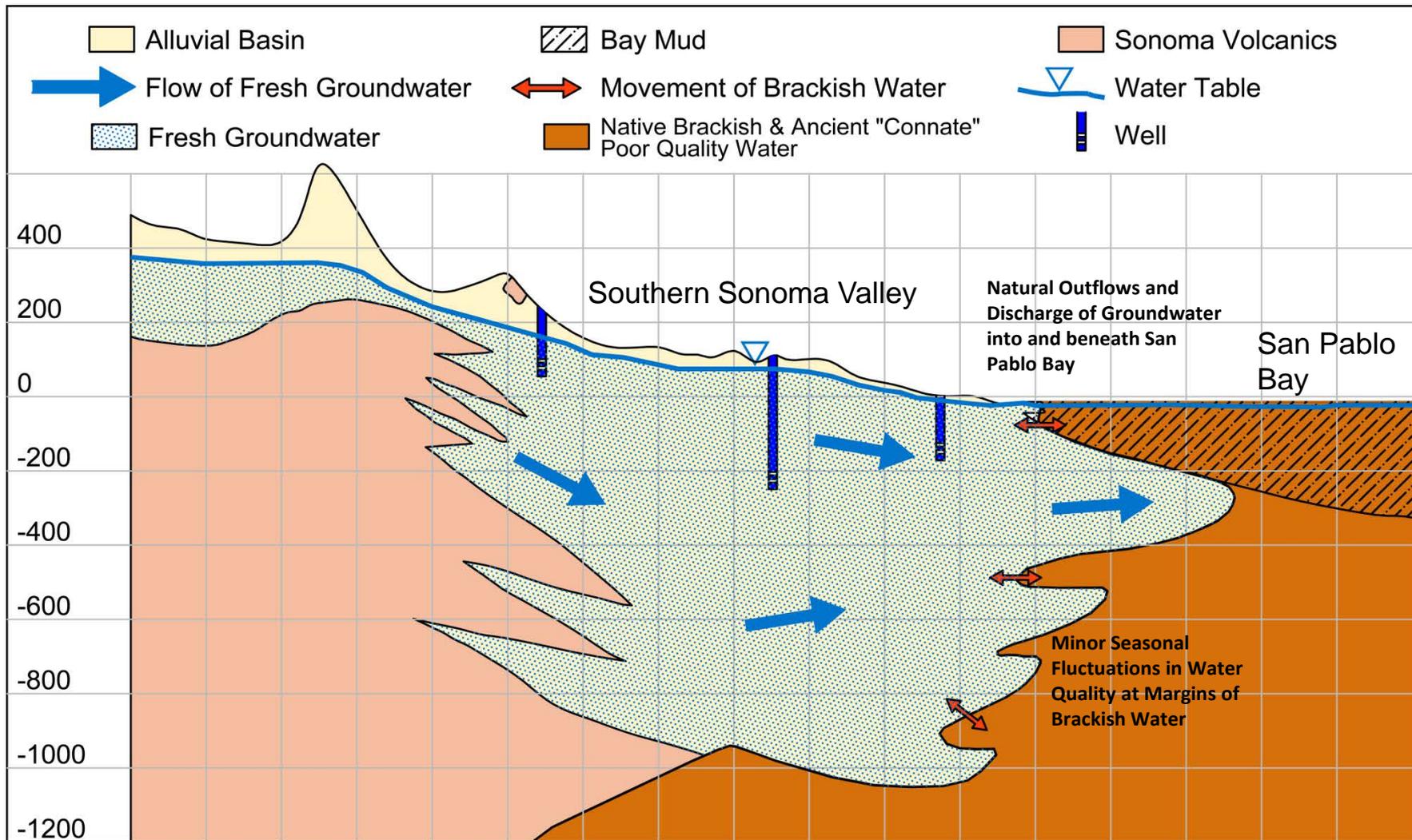


Estimated Areas with Groundwater Levels Below Sea Level (Deeper Aquifer)

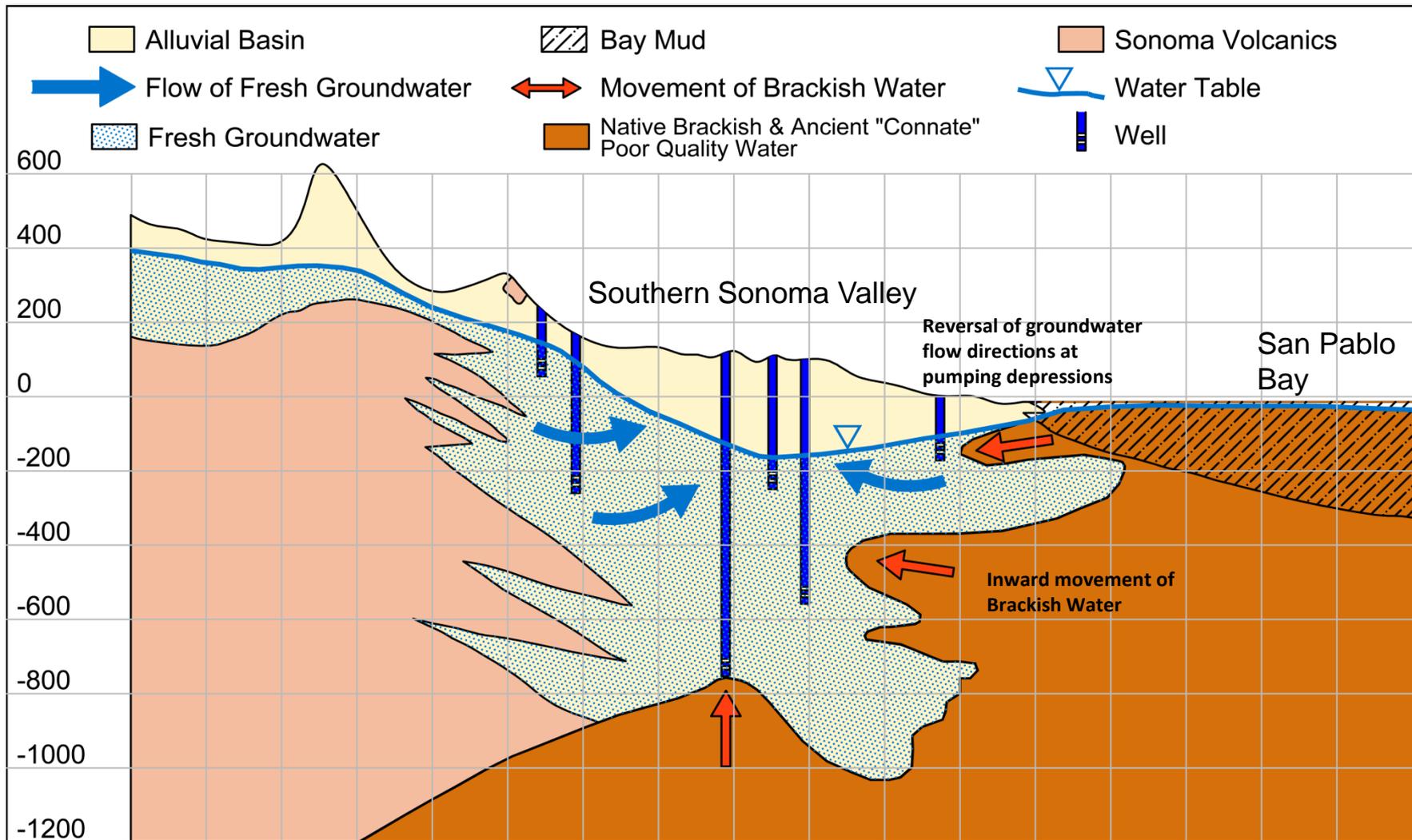


Higher Salinity Groundwater

1950: Shallow Groundwater Levels Prior to Extensive Pumping



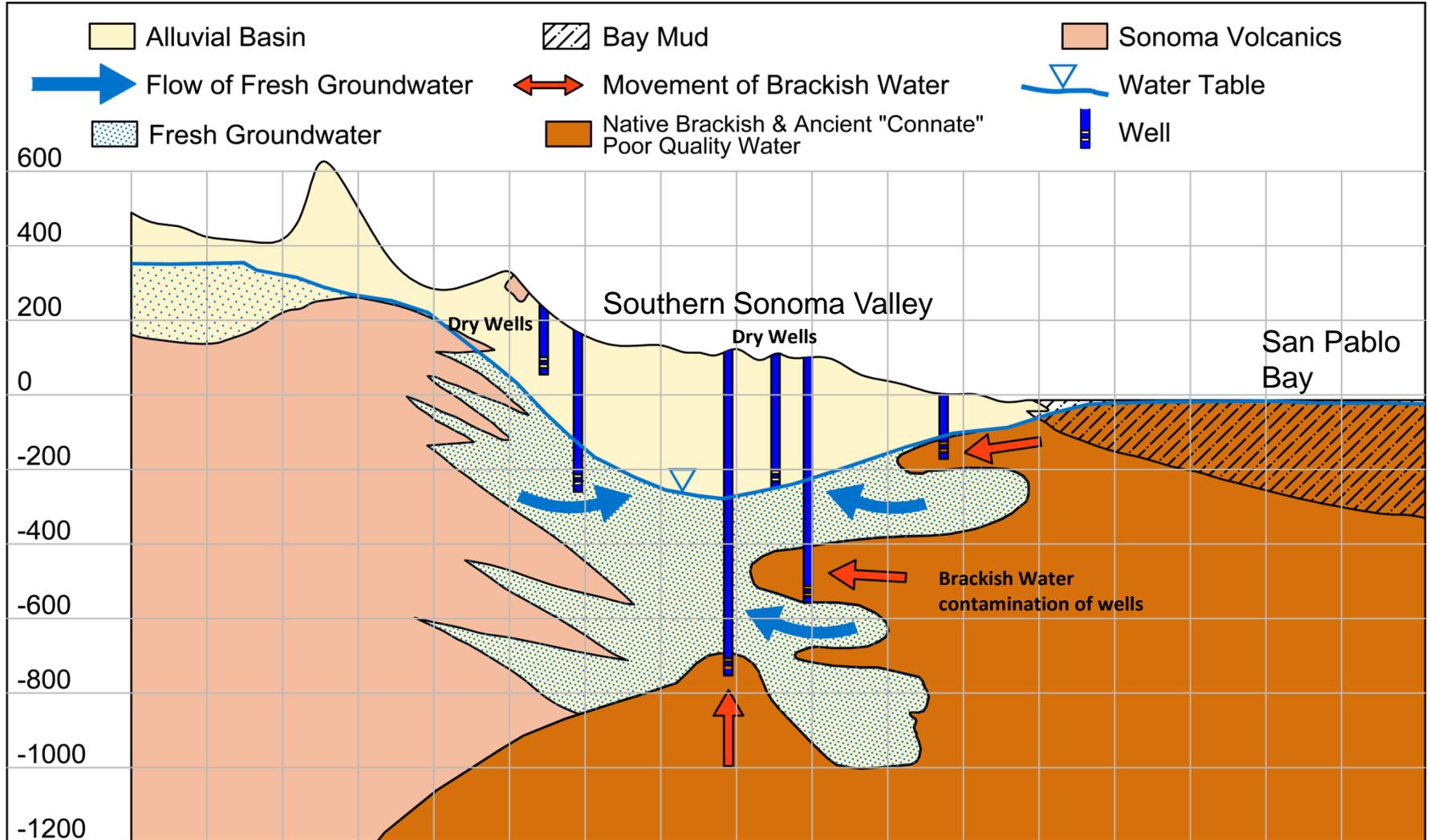
Today: Groundwater Levels Lowered over 100 Feet in Southern Sonoma Valley



Future Continued Depletion of Groundwater?

* Dry Wells

* Brackish Water Contamination of Wells



So What Can Be Done to Improve
Water Supply Conditions in the
Sonoma Valley?

Basin Advisory Panel Recommended Management Strategies



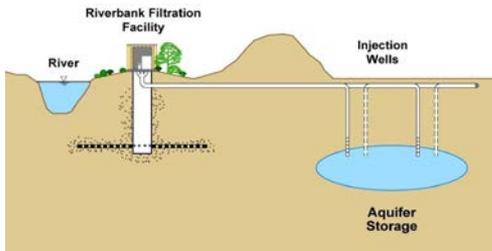
CONSERVATION
of Urban, Non-
Urban, &
Agriculture



RECYCLED WATER
use to offset
groundwater
pumping



GROUNDWATER BANKING
Russian River
winter-time water
to recharge
groundwater basin



STORMWATER
to recharge
groundwater



Sonoma Valley Water Conservation Awards

We're watering with rain

The Maloney Family Garden and Waterwise Demonstration Project

CISTERN
Over the course of a year, this 7900-gallon tank will store tens of thousands of gallons of rainwater—a lot of what we need for our 4000-square-foot front garden.
(A foot of water in the tank is 375 gallons. The water-level indicator moves down as the tank fills.)

ROOF
We're catching the rain from 2000 square feet of our roof. That's about 1200 gallons for every inch of rain.
(A good rule of thumb is 600 gallons per 1000 square feet of catchment per inch of rain.)

ET CONTROLLER
Our smart irrigation system monitors evapotranspiration (ET) and tracks the weather to figure out how much and when to water.

BERMS
Our berms serve as planting mounds, and they give the garden some topography, but berms can also direct water flows and help manage stormwater runoff.

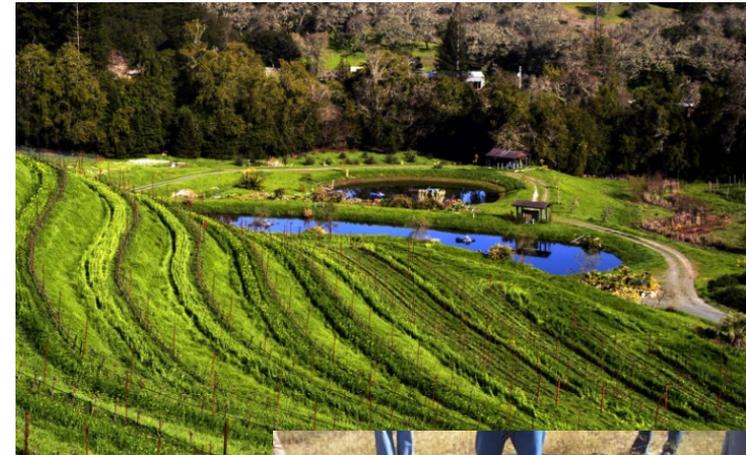
MULCH
Applying a layer of mulch is easy and provides lots of benefits. Mulch cuts evaporation, slows runoff, keeps weeds down, conserves soil moisture and moderates soil temperature.

APPROPRIATE PLANTS
Native and drought-tolerant plants are adapted to local conditions and require less water. They also attract birds, bees and butterflies.

PERMEABLE WALKWAYS
Asphalt and concrete create runoff; permeable materials such as decomposed granite allow rain to soak into the ground instead.

RAIN GARDEN
(Coming soon)
Contoured to retain runoff and let it soak into the ground, planted with wet- and dry-adapted species that filter pollutants.

WATERWISE IRRIGATION
Drip irrigation helps keep water use low by delivering just enough to just the right place.



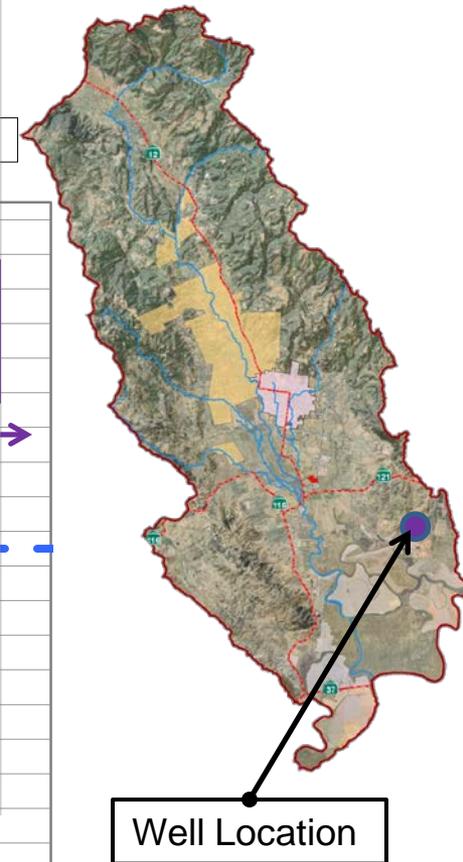
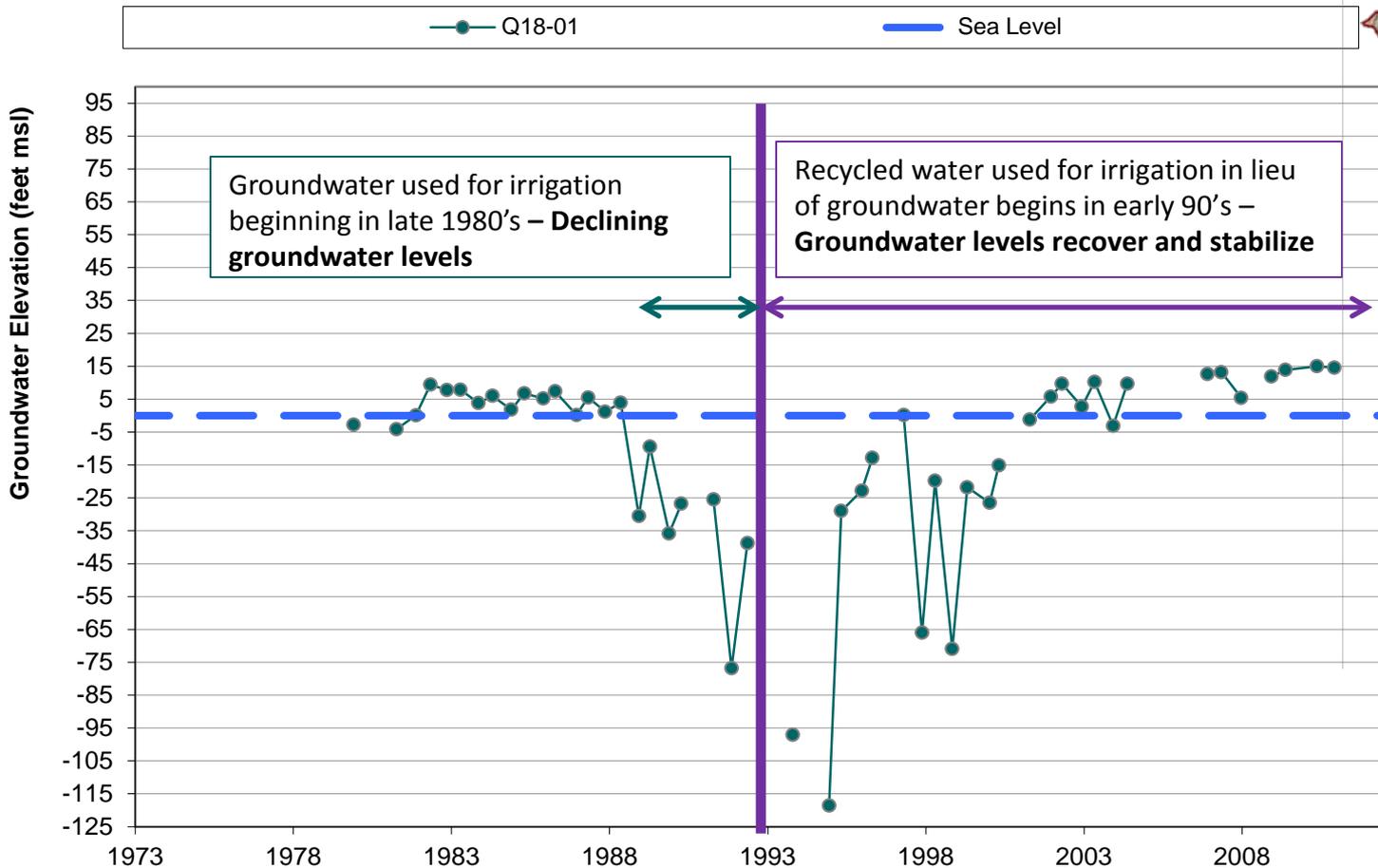
a project of
The Center for Sustainable Living

Thanks to our project funders and partners



Irrigation with Recycled Water to Offset Groundwater Pumping

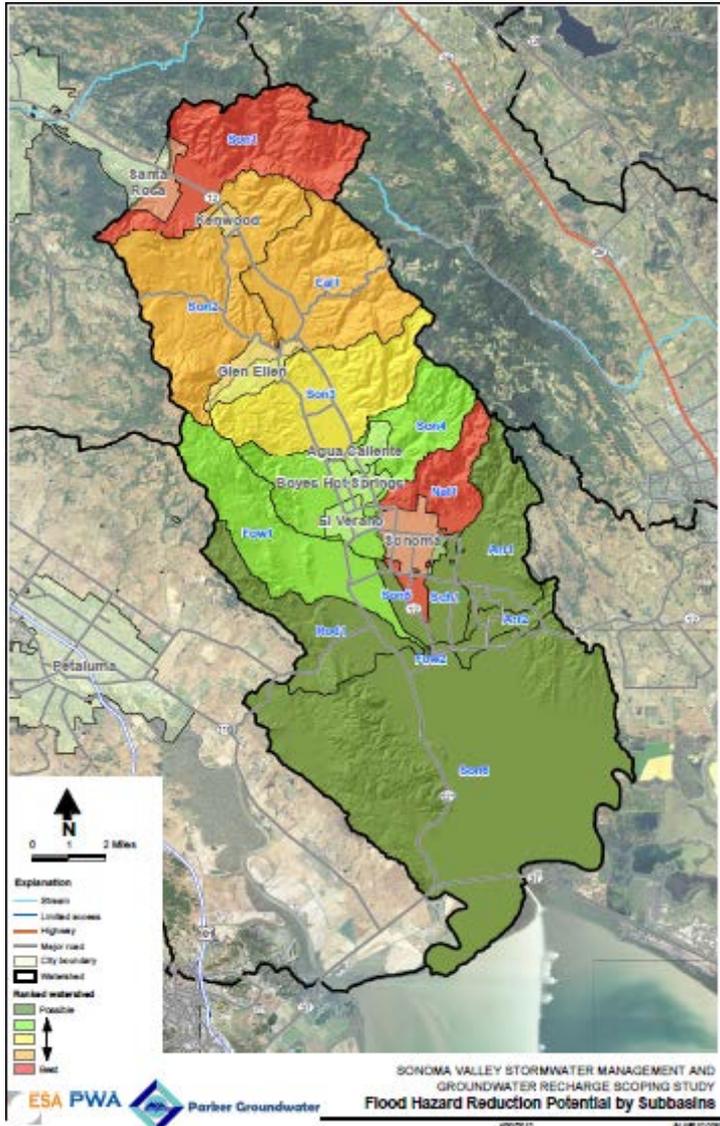
Groundwater-Level Hydrograph
Irrigation Well
Carneros Subarea



Combining Stormwater Management & Groundwater Recharge - Multi-Benefit Approach



Combining Stormwater Management & Groundwater Recharge -Studies



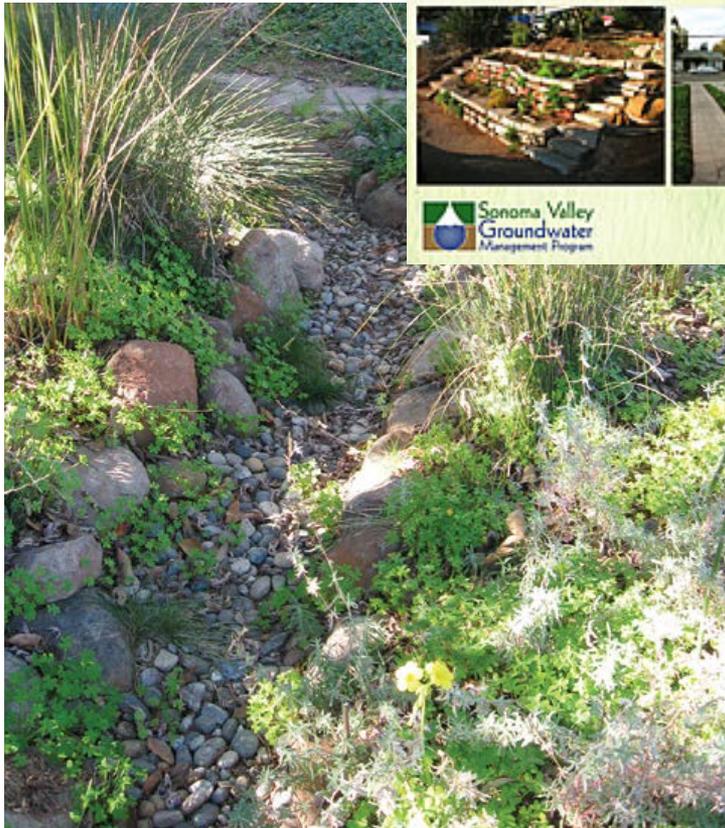
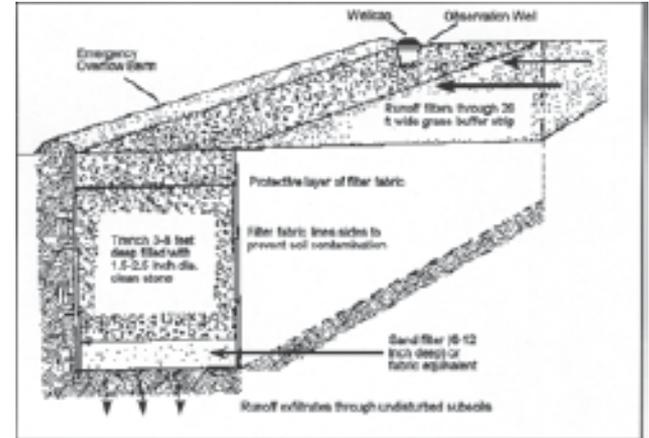
- Identify opportunities to implement integrated, multi-benefit projects
- Help build a more resilient water supply by mimicking natural environment
- General areas most favorable for projects identified
- City Watersheds Project – received \$1.9M Grant
 - Fryer Creek (Phase 1)
 - Nathanson (Phase 2)
- Planning for Feasibility-Level evaluation of other locations in Sonoma Valley

Sonoma County RCD

Slow it. Spread it. Sink it.



A Homeowner's & Landowner's Guide to Beneficial Stormwater Management



POTENTIAL PROBLEMS	BMP SOLUTIONS
<p>A The downspout is directed toward an impervious (concrete) driveway that drains to the street. The resultant runoff may damage roads, exacerbate downstream flooding, or carry pollutants to nearby waterways.</p>	<p>A See Guttered Roofs on page 25.</p>
<p>B This driveway slopes toward the street and creates runoff potentially contributing to flooding, erosion, and pollutants in nearby storm drains and streams.</p>	<p>B A small speed bump known as a waterbar can be added to existing driveways to SLOW and SPREAD runoff to vegetated or rocked infiltration areas (page 43).</p>
<p>C This driveway is constructed of impervious materials (concrete), and all of the runoff is directed toward the street. The resultant runoff may damage roads, exacerbate downstream flooding, or carry pollutants to nearby waterways.</p>	<p>C Pervious concrete (pictured) or other materials such as paver stones or turf block, allow water to SINK into the soil decreasing runoff (pages 38-39).</p>
<p>D Driveways that do direct water runoff away from the street can still contribute to erosion if the area collecting the runoff is not properly protected or maintained.</p>	<p>D A rocked or vegetated swale lining the edge of a road or driveway reduces erosion potential by SLOWING runoff and then SINKING it back into the soil or directing it to a safer outlet (pages 34-35).</p>



Driveways can act as conduits for excess amounts of runoff that can damage roads.

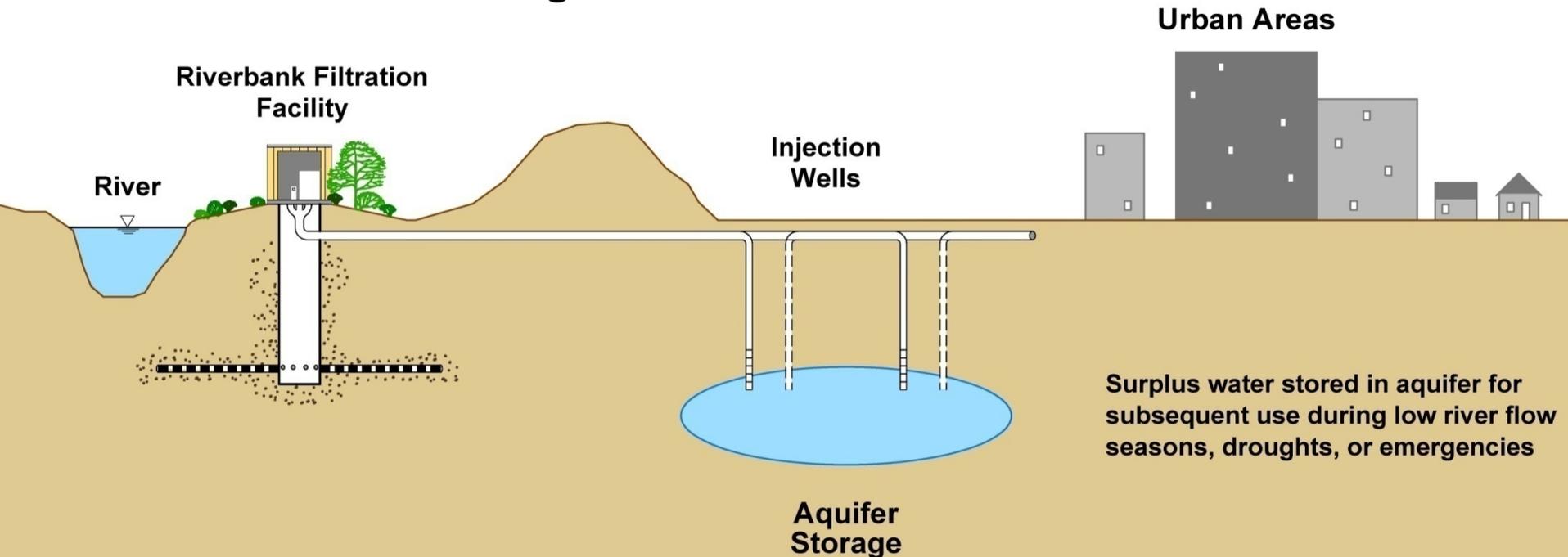


Groundwater Banking Can Be Instrumental in Improving Groundwater Conditions

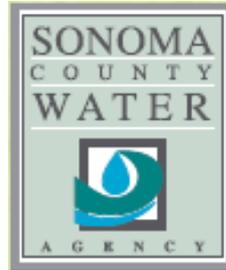
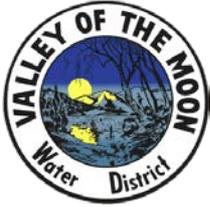
Advantages/Benefits

- Increased drought and natural hazard reliability
- Improve adaptability to climate variations/change
- Fewer large expensive water supply & transmission facilities needed
- Decrease competition for local groundwater
- Decreased summer flows in Dry Creek - protective of salmonids

High River Flow Conditions



Findings of Groundwater Banking Feasibility Study



Availability of
Wintertime
Russian River
Water

Source Water is
Very High Quality

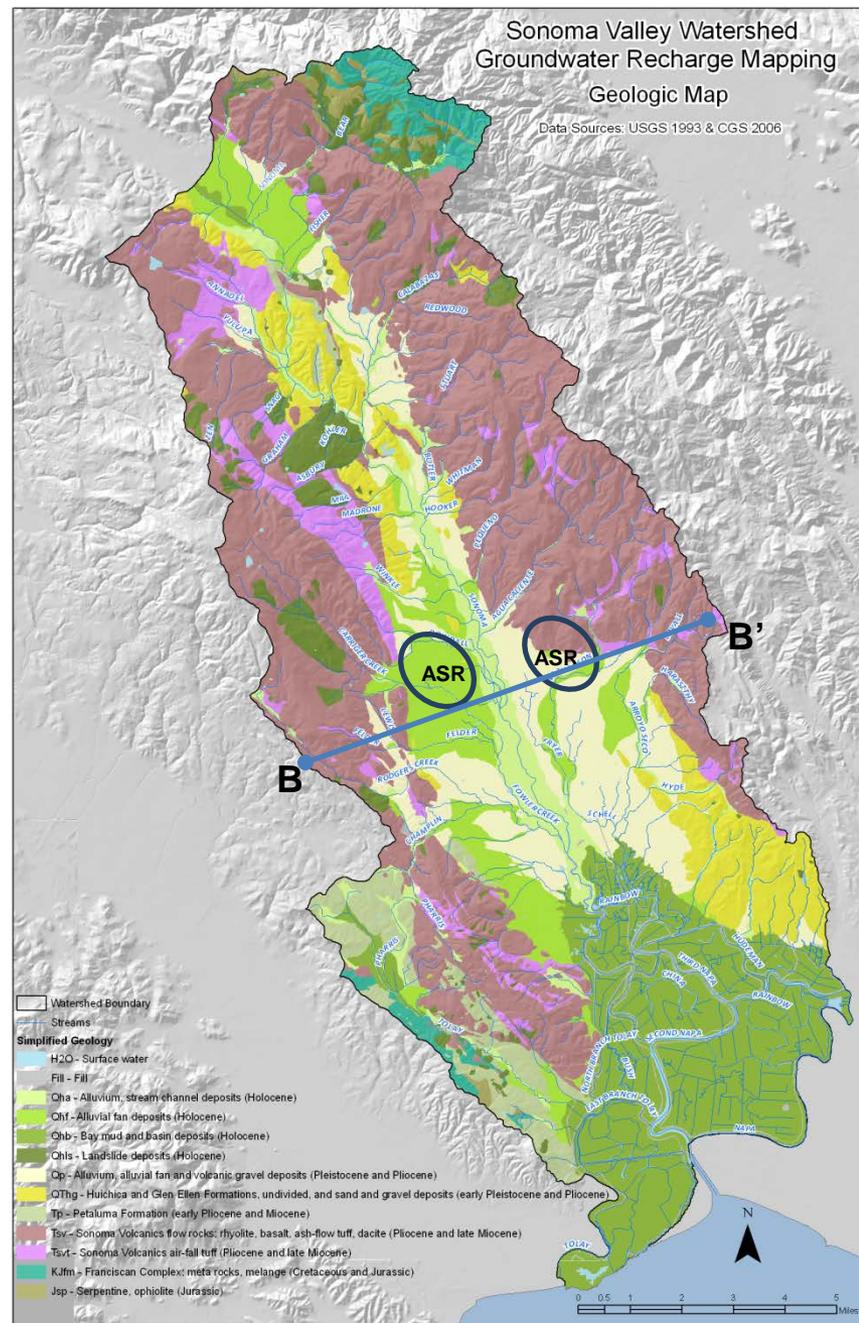
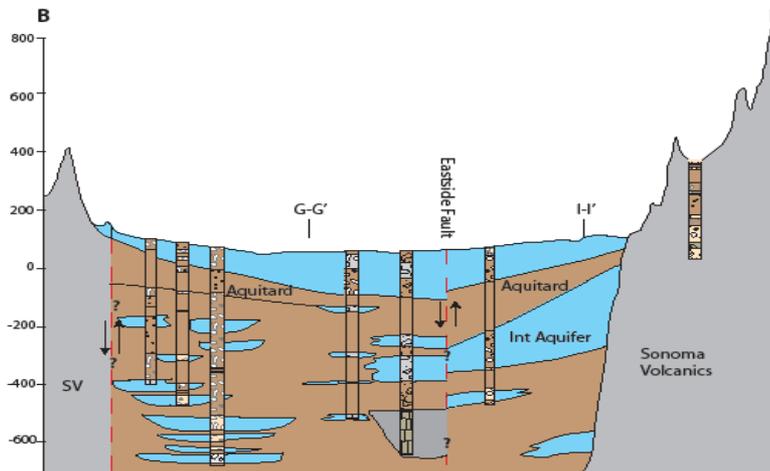
Existing Wells and
Infrastructure
Available for Pilot
Testing

Storage Space is
Available in
Sonoma Valley
Aquifers

Proceed with
Incremental Pilot
Testing

Where Could Groundwater Banking Be Done in Sonoma Valley?

- **Aquifer Characteristics**
 - Ability to move water in and out efficiently
 - Compatible water quality
 - Confined aquifers with hydraulic gradients compatible for storage
- Available storage volume
- Proximity to conveyance of Russian River water



Partnerships: Recent State & Federal Funding

Recent Grants and Direct Funding for Sonoma Valley

- Recycled Water >\$5M
- Conservation >\$0.2M
- Groundwater >\$1.3M
- Stormwater ~\$2M

Funding of Groundwater Studies & Management

- SCWA & SVCSD \$1.215M
- Federal \$0.5M
- State \$0.425M
- City & VOMWD \$0.26M
- County & Open Space \$0.15M

Summary – Groundwater Depletion & Salinity

- Groundwater depletion areas exhibit declining water levels over several years/decades – Many years in the making - 2012-2014 drought exacerbates but did not cause depletion areas
- Groundwater depletion areas require additional measures to address declining water levels & salinity issues
- Primary water users (e.g., Rural Residential & Agriculture) in depletion areas must participate in developing & funding solutions to address this problem

What's Next? Alternatives Analysis

- Identify potential technical, regulatory, land use & institutional response actions to mitigate declining groundwater levels.
- Prioritize response actions (or groups of actions) & evaluate effectiveness in addressing groundwater depletion areas using groundwater model.
- Scenario-based planning by stakeholder group to develop scenarios & consider results. BAP to approve & make recommendations regarding solutions.
- **It is essential that Local Stakeholders are actively involved in selecting the correct mix of solutions that is right for the Community**

Schedule and Next Steps

- **February 20, 2014**
 - Panel approves 5-Year Review Report
- **March/April 2014**
 - Public Forums on Sonoma Valley Groundwater Issues
- **April 2014**
 - Water Agency Board considers approving 5-Year Review Report and recommendation for Alternatives Analysis
- **April – December 2014**
 - TAC and Panel identify and analyze alternative actions through scenario-based planning

Participation by all stakeholders will be critical during this process.

For more information or to participate contact Marcus Trotta 707.547.1978

Marcus.Trotta@scwa.ca.gov

<http://www.scwa.ca.gov/svgroundwater/>