

Santa Rosa Plain Watershed Groundwater Study and Management Planning

Community Forum
Sebastopol Community Center
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www.scwa.ca.gov/srgroundwater/




Presentation Key Messages

- On average, groundwater pumping has caused an imbalance
- This imbalance can lower groundwater levels, reduce streamflows and affect ecosystems, so we need to act
- Proactive development of a Groundwater Management Plan is in process
- Success relies upon well owner and stakeholder participation

Slide No. 2

Presentation Overview

1. Groundwater Management Plan Introduction
2. Groundwater Basics
3. Santa Rosa Plain Groundwater Study
4. Groundwater Management Planning
5. Santa Rosa Plan Groundwater Management Planning
6. Wrap-up, Questions & Feedback

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GMP Introduction

Groundwater Management Plan Process

A 30-member collaborative Basin Advisory Panel is crafting a groundwater management plan in consultation with the larger community. The plan has four main elements:

1. **Water Resources** – to describe the setting, water demands and available supplies
2. **Goals & Objectives** – to manage the groundwater basin
3. **Management Components** – to realize progress on the goals and objectives
4. **Implementation Plan** – to prioritize recommended actions, schedule activities, and fund the program

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GMP Introduction

Basin Advisory Panel

- Agriculture
- Business / Developers
- Environmental Groups
- General Public
- Government (cities, county, tribe)
- Groundwater Users, including Rural Residential Well Owners
- Natural Resource Management
- Water Supply & Groundwater Professionals

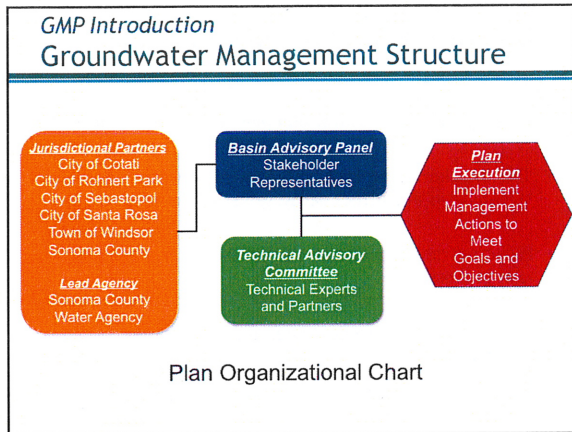
Slide No. 5

GMP Introduction

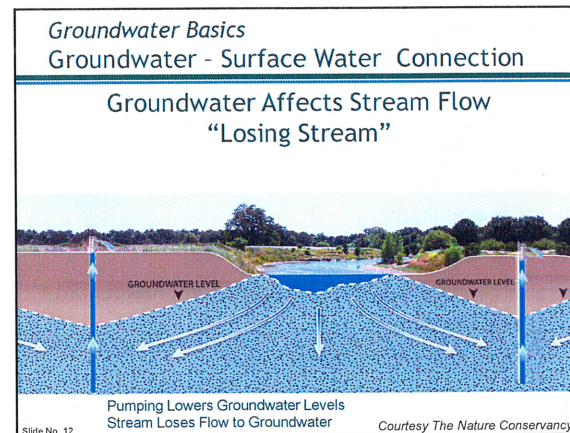
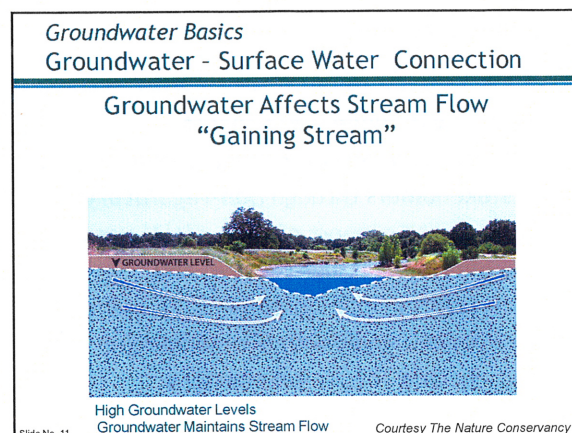
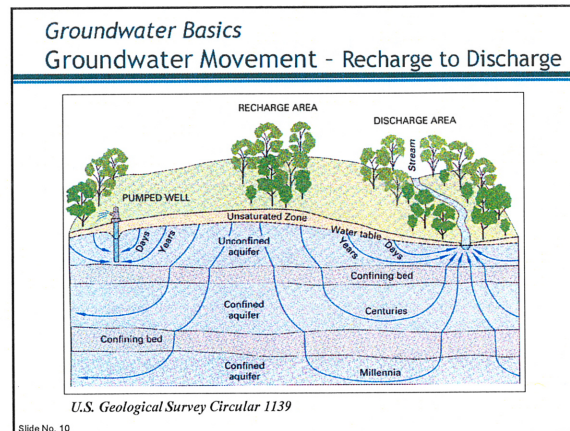
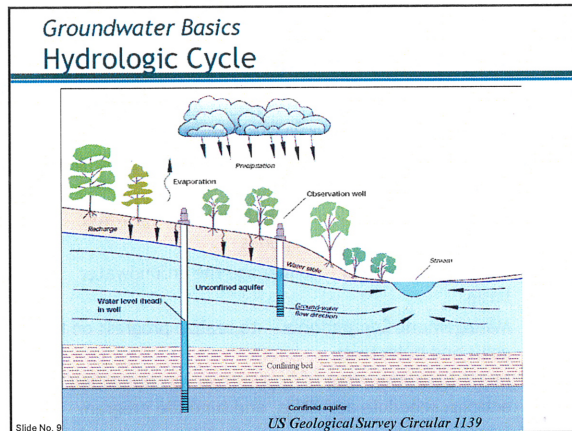
Groundwater Management Plan Goal

To locally **manage and protect groundwater resources** by a balanced group of stakeholders through **non-regulatory** measures to support **all beneficial uses**, including human, agriculture, and ecosystems in an environmentally sound, economical, and equitable manner **for present and future generations.**

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Groundwater Basics
Groundwater - Surface Water Connection

Groundwater Affects Stream Flow
"Losing Stream"

Groundwater Levels Below Stream Channel

Pumping Lowers Groundwater Levels
Stream Loses Flow to Groundwater

Slide No. 13 *Courtesy The Nature Conservancy*

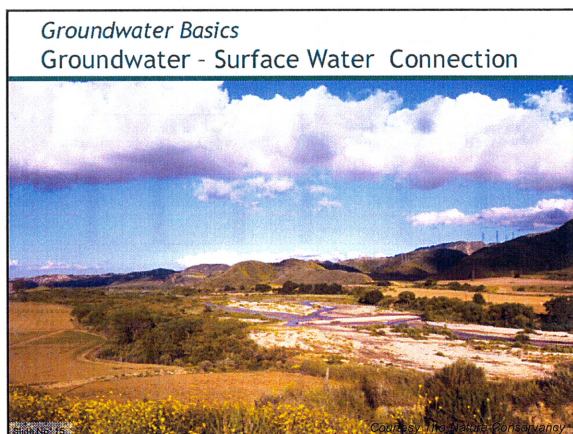
Groundwater Basics
Groundwater - Surface Water Connection

Groundwater Affects Stream Flow
"Dry Stream"

Seepage to Groundwater Exceeds Stream Flow
Dry Stream Channel (Intermittently or Year-round)

Pumping Lowers Groundwater Levels
Stream Loses Flow to Groundwater

Slide No. 14 *Courtesy The Nature Conservancy*



Groundwater Basics
Groundwater - Surface Water Connection

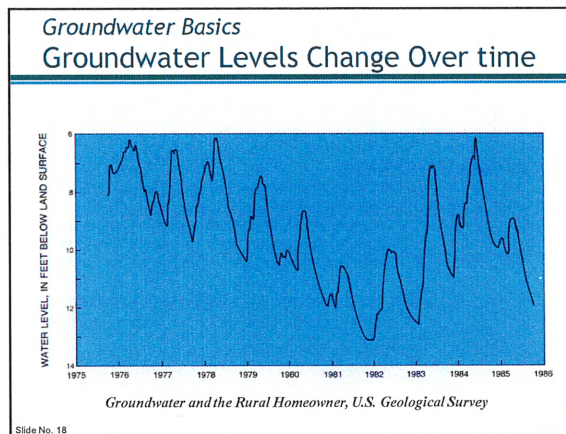
- **Groundwater Conditions Affect All Surface Water Uses**

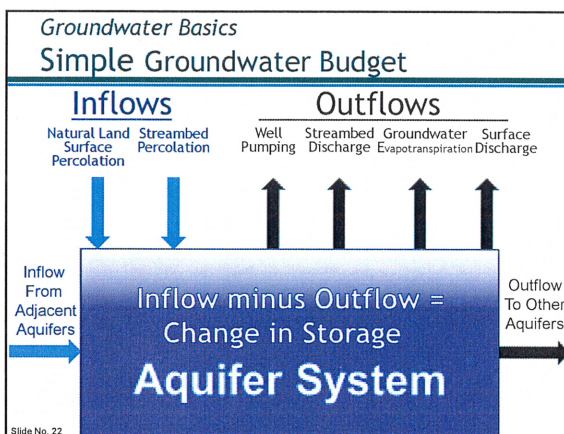
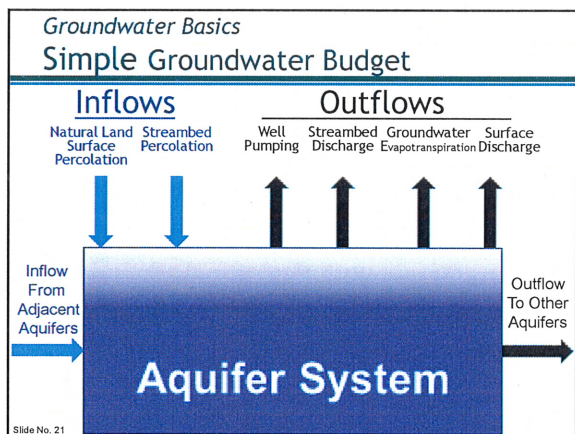
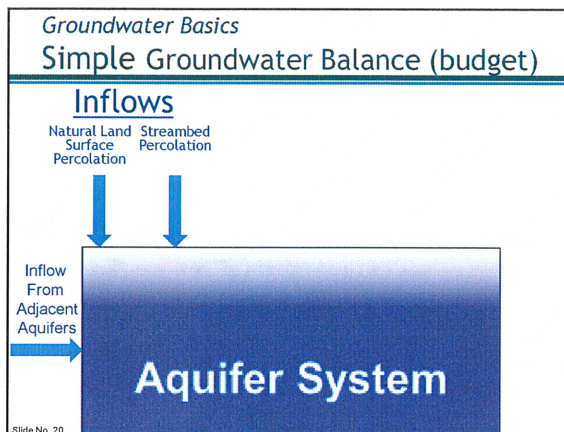
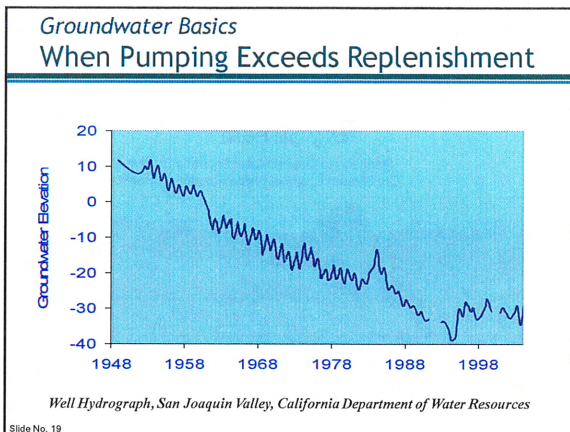
Slide No. 16 *Courtesy The Nature Conservancy*

Groundwater Basics
Groundwater - Surface Water Connection

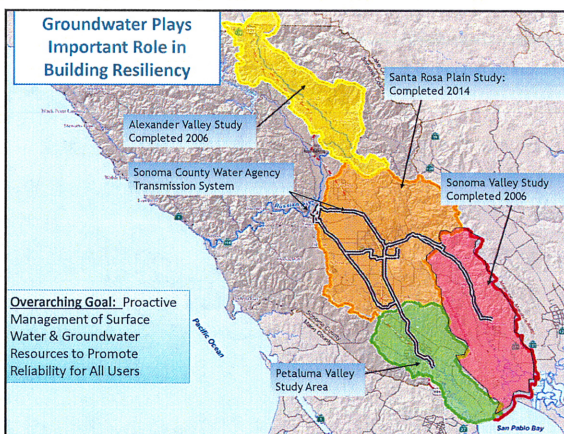
- **Groundwater Conditions Affect All Surface Water Uses**

Slide No. 17 *Courtesy The Nature Conservancy*





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USGS Santa Rosa Plain Groundwater Study Introduction

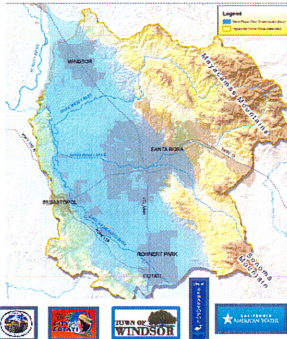
Santa Rosa Plain Groundwater Study
Part 1 - Completed July 2013




- Hydrology, Hydrogeology and Groundwater Quality

Part 2 - Completed April 2014

- Fully Coupled Surface Water-Groundwater Model
- Evaluate Potential Future Conditions and Alternative Water Management Strategies

Serves as scientific foundation for management planning



Slide No. 25

USGS Santa Rosa Plain Groundwater Study Geology and Hydrogeology


- Alluvium/Glen Ellen
- Petaluma
- Wilson Grove
- Sonoma Volcanics

Sedimentary and Volcanic Units

- Quaternary Alluvium
- Glen Ellen Formation
- Petaluma Formation
- Wilson Grove Formation
- Sonoma Volcanics

Bedrock Units

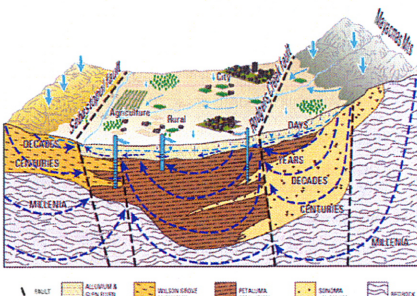
- Franciscan Complex
- Ultramafic rocks



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USGS Santa Rosa Plain Groundwater Study Groundwater Conceptual Model

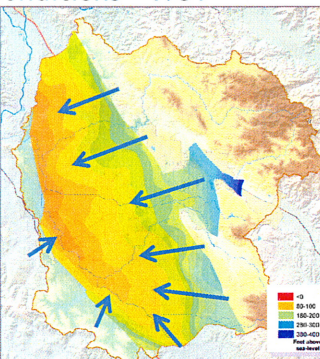
- Groundwater occurs in all four primary formations
- Precipitation and streambed infiltration primary source of recharge
- Primary discharge:
 - Pumping by 12,000 wells
 - Evapotranspiration
 - Baseflow
- Dominantly flows east to west
- Creeks gain water



Slide No. 27

USGS Santa Rosa Plain Groundwater Study Groundwater Conditions - 1951

- Groundwater shallower
- Less groundwater pumping
- Groundwater flowing mainly east to west
- Discharging to Laguna de Santa Rosa

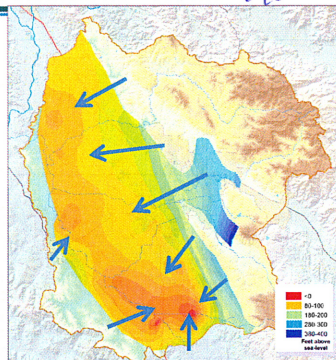


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USGS Santa Rosa Plain Groundwater Study Groundwater Conditions - 2001

1990

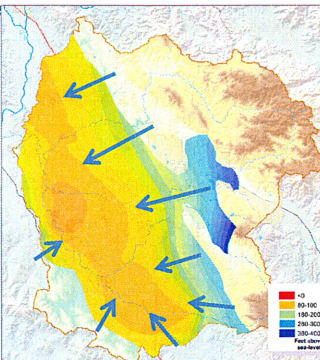
- Groundwater deeper
- Increases in groundwater pumping through 1980s and 1990s
- Pumping depressions developed in southern and western areas



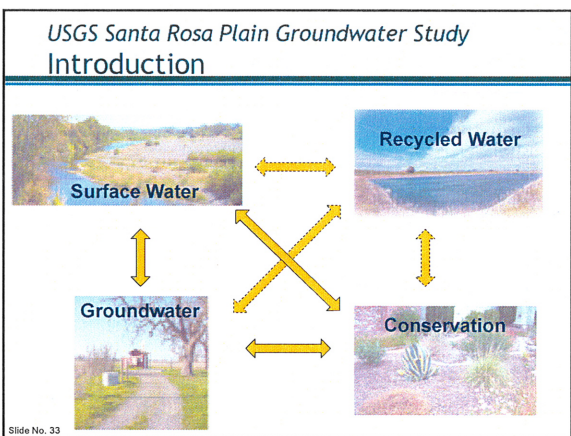
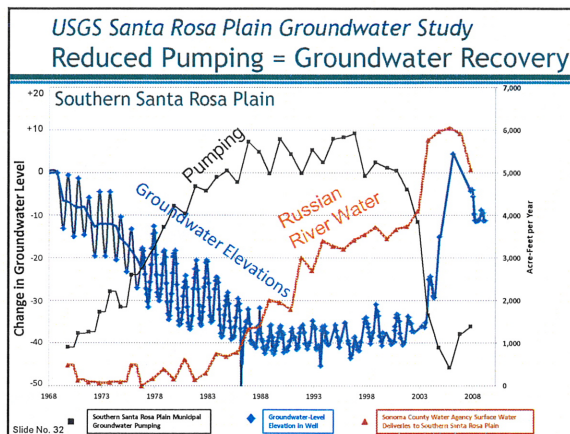
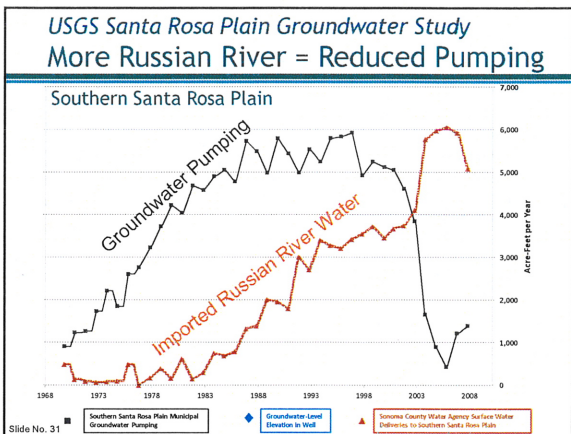
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USGS Santa Rosa Plain Groundwater Study Groundwater Conditions - 2007

- Groundwater levels recovering
- Reduction in groundwater pumping within southern area
- Southern area pumping depression has predominantly recovered



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USGS Santa Rosa Plain Groundwater Study Groundwater Quality Sampling

Over 160 Wells

- Many wells in the Santa Rosa Plain produce high quality water
- Large variability: some areas of naturally occurring iron, manganese, arsenic
- Localized impacts of nitrates and organic contaminants
- Higher salinity water with depth
- Chloride and mineral content increasing in southern Santa Rosa Plain

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USGS Santa Rosa Plain Groundwater Study GSFLOW - Surface Water-Groundwater Model

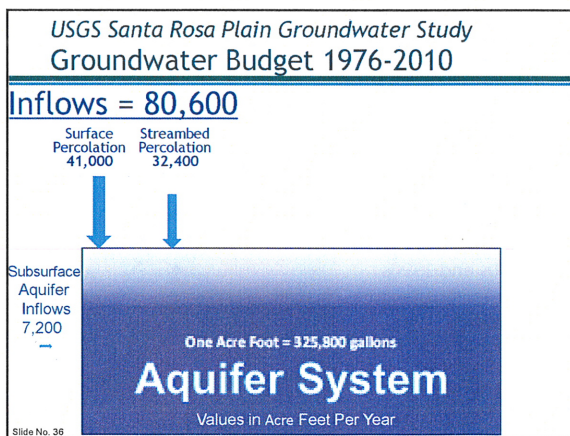
EXAMPLE MODEL INPUTS

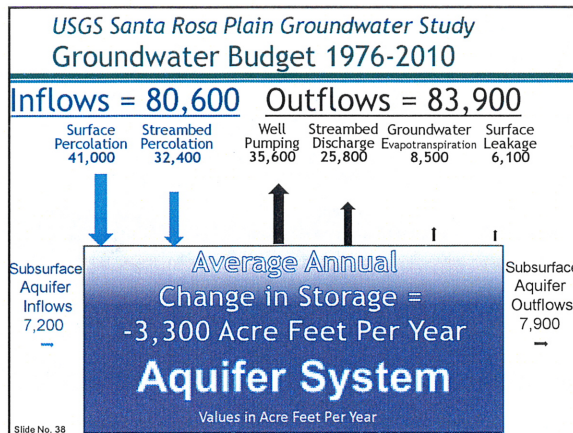
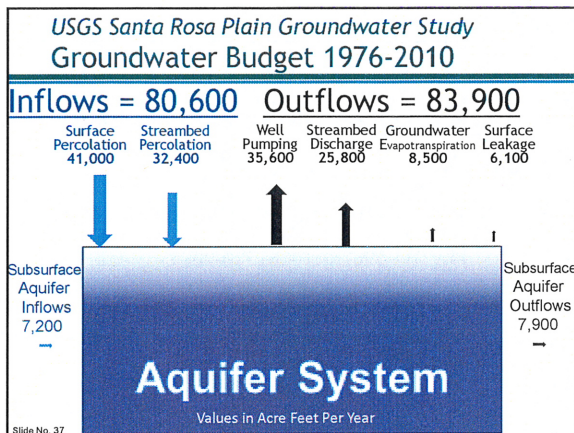
- Precipitation
- Temperature
- Stream segments & conductivity
- Imperviousness
- Soil moisture
- Geology
- Hydraulic conductivity
- Groundwater wells

EXAMPLE MODEL USES

- Estimate hydrologic budget
- Identify recharge areas
- Evaluate water-resource management strategies
- Evaluate climate-change impacts
- Evaluate effects of changes in land-use

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- USGS Santa Rosa Plain Groundwater Study*
Predictions of Climate Change Scenarios
- Increased pumpage due to:
 - Rural - Higher temperatures
 - Municipal – Planning based
 - Overall lowering of groundwater levels
 - Reduced
 - Groundwater flows to streams (baseflow), wetlands and springs
 - Groundwater evapotranspiration (loss of riparian habitat)
 - More losing stream reaches with greater stream-water infiltration, and corresponding loss of streamflow
- Slide No. 39

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- Presentation Overview**
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 4. **Groundwater Management Planning**
 5. Santa Rosa Plan Groundwater Management Planning
 6. Wrap-up, Questions & Feedback
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Groundwater Management Planning
Why Is Local Groundwater Management Important?

With	Without
<ul style="list-style-type: none"> • Maintain water quality • Stabilize groundwater levels • Meet existing and future water demands • Diversify supply • Funding opportunities • Maintain local management 	<ul style="list-style-type: none"> • Damaged aquifer • Poor groundwater quality • Drilling deeper wells at greater expense • Potential land subsidence • Potential legal battles or adjudication for management control • State intervention

Slide No. 42

Groundwater Basics
Groundwater - Surface Water Connection

**Groundwater Affects Stream Flow
 "Dry Stream"**

Seepage to Groundwater Exceeds Stream Flow
 Dry Stream Channel (Intermittently or Year-round)

The diagram illustrates a cross-section of a stream channel and the underlying groundwater table. Two blue vertical arrows on either side of the stream represent pumps that are lowering the groundwater level. The groundwater table is shown as a blue shaded area with a downward-sloping center. Arrows point from the stream bed into the groundwater, indicating seepage. The stream channel is shown as a dry, sandy bed.

Pumping Lowers Groundwater Levels
 Stream Loses Flow to Groundwater

Slide No. 43 Courtesy The Nature Conservancy

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Santa Rosa Plain Groundwater Management Planning
Management Components

1. Stakeholder Involvement
2. Monitoring Program and Modeling
3. Groundwater Protection
4. Increase Conservation and Efficiency
5. Increase Groundwater Recharge
6. Increase Water Reuse
7. Integrated Groundwater Management

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Santa Rosa Plain Groundwater Management Planning
Management Components

Monitoring

- Groundwater Levels
- Groundwater Quality
- Inelastic Land Surface Subsidence
- Surface Water- Groundwater Interaction
- Weather

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Santa Rosa Plain Groundwater Management Planning
Basin Advisory Panel Future Meetings

- Finalize Plan (always a living document)
 - Incorporating feedback from community forums
- Finalize 2-Year Core Funding
- Constituent Briefings
- Public Outreach
- Prepare and Recommend Plan for Adoption
 - Summer 2014
- **Begin Plan Implementation Fall 2014**

The photograph shows a group of people sitting around a long conference table in a meeting room. They appear to be engaged in a discussion or meeting.

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Santa Rosa Plain Groundwater Management Planning How Can You Get Involved?

- Stay Informed
- Attend Meeting and Provide Input
- Request a Briefing for Your Organization
- Monitor, Manage and Protect Groundwater Resources



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Questions and Feedback



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

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