Groundwater in Your Well

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December 2, 2020

What We'll Be Covering Tonight

- Who uses groundwater in the Santa Margarita Basin?
- How do we know how healthy the Basin's groundwater supply is?
- What are the Basin's aquifers and what condition are they in?
- How and where are surface water and groundwater connected?
- What impact does private well pumping have on the Basin?

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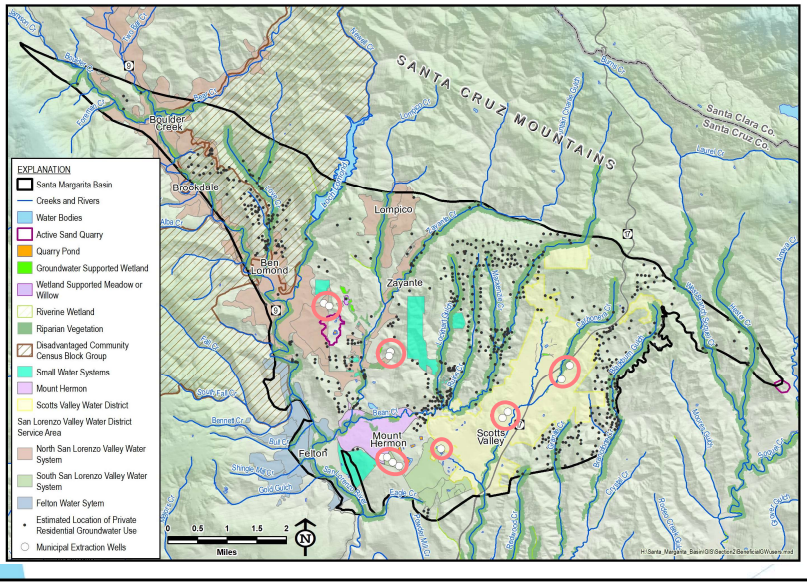
Santa Margarita Basin Basics
Many Users of Groundwater in the Basin



- Municipal: SLVWD & SVWD
- Mount Hermon Assoc.
- Quarries (only Quail Hollow)
- Golf course (now closed)
- Contamination remediation
- Small Water Systems
- Private well owners (black dots on map
- Groundwater Dependent Ecosystems
- Downstream surface water users

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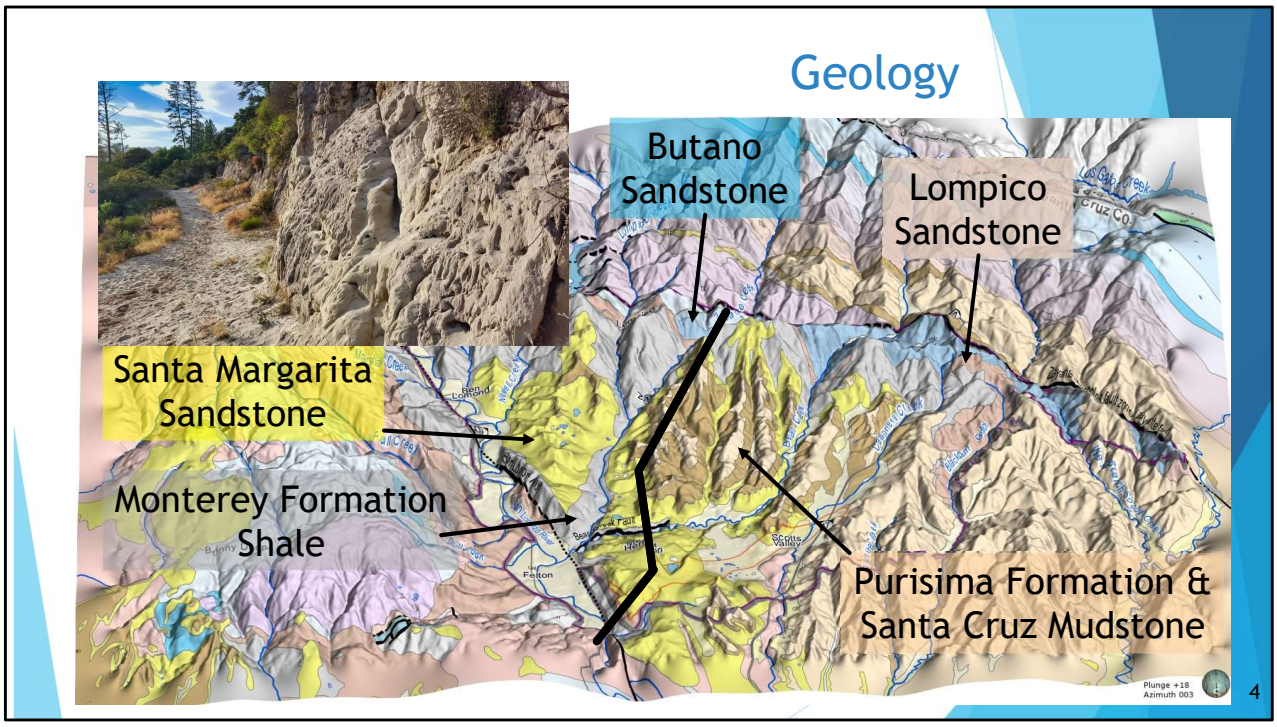
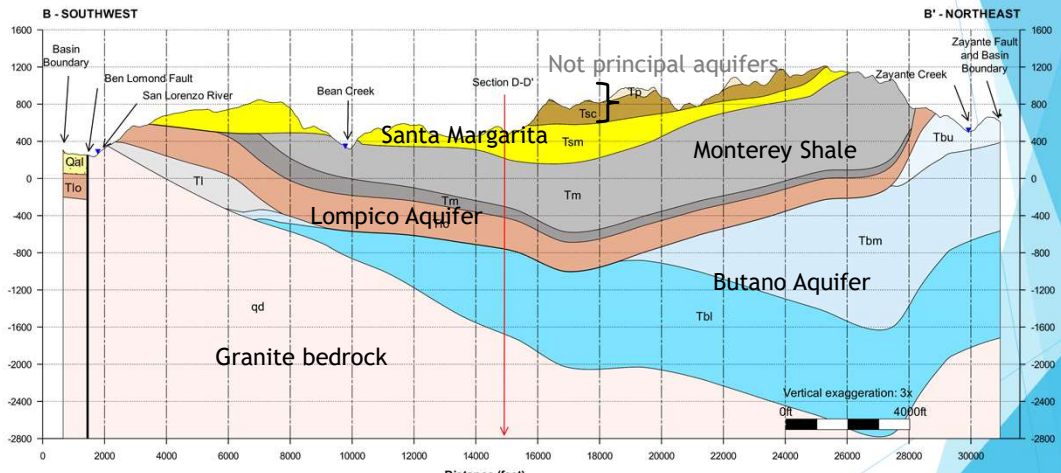


Santa Margarita, Lompico and Butano are principal aquifers

Santa Margarita Basin Basics
Aquifers



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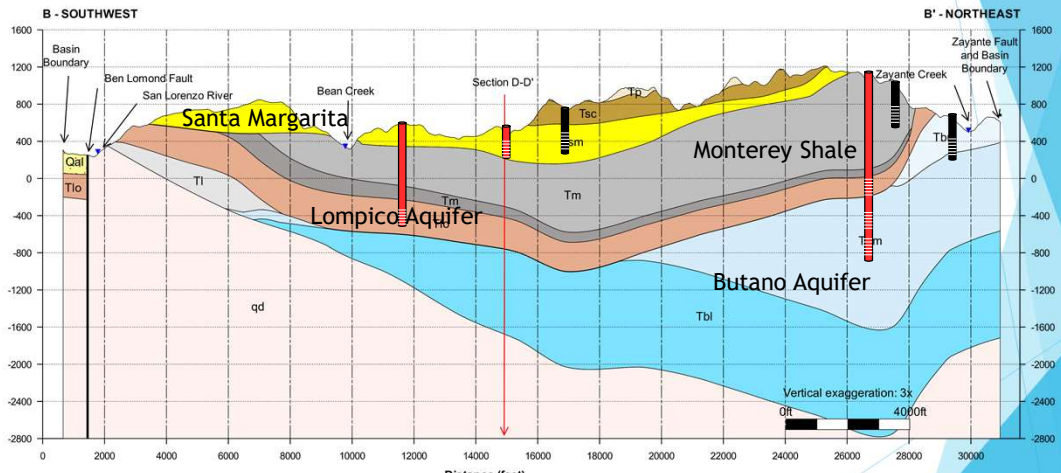
Where Your Wells are Screened in Relation to Municipal Wells

Private wells

Municipal wells



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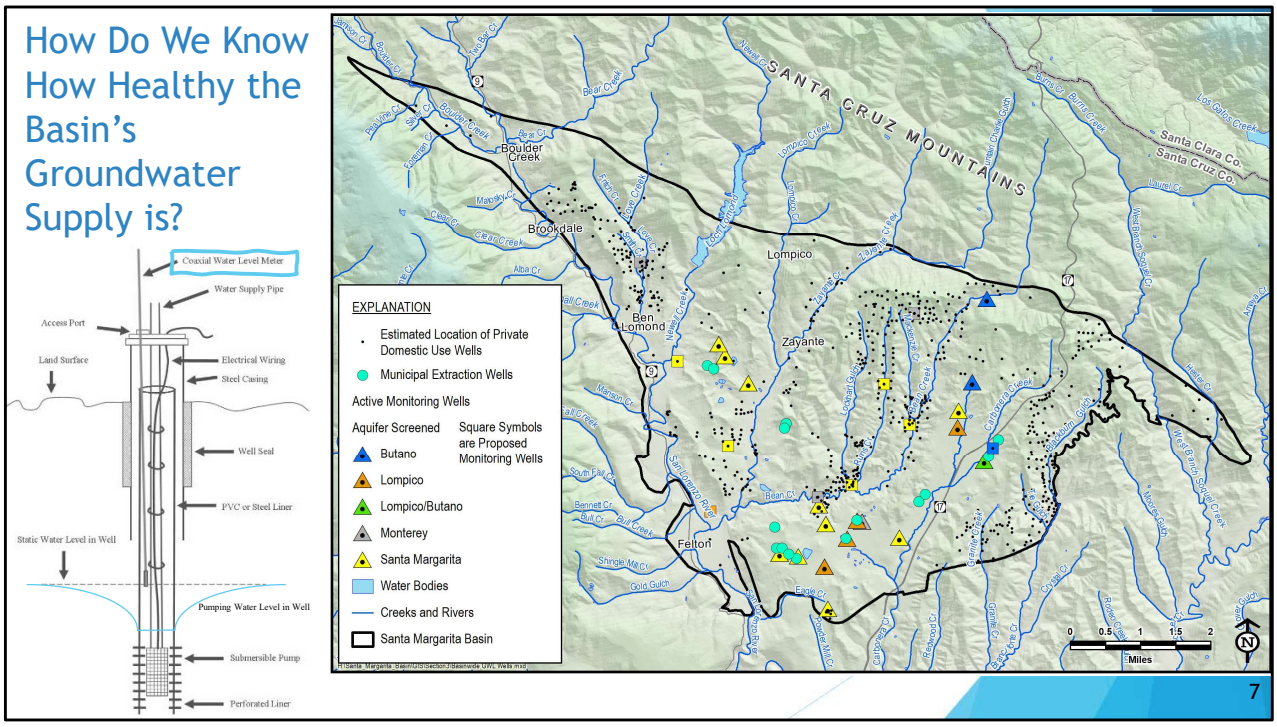


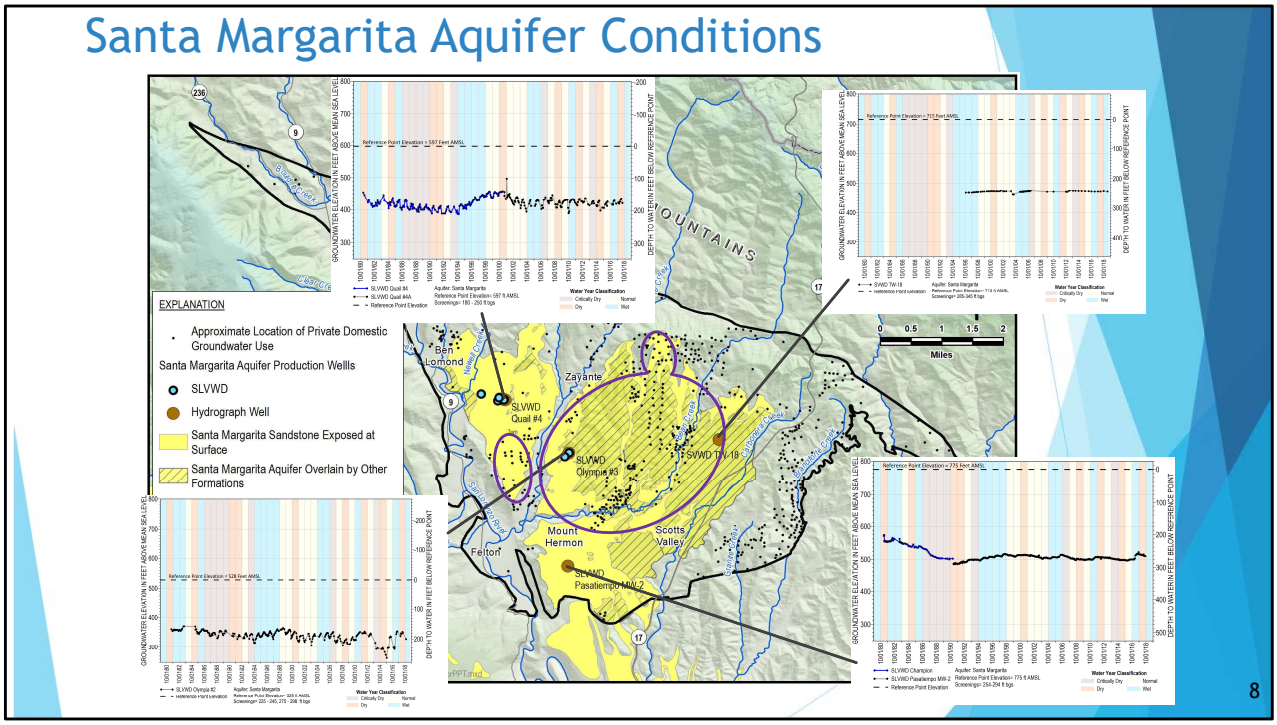
Map of where there are wells monitoring groundwater levels in the Basin. They are either public water supply wells themselves or monitoring wells that SLVWD and SVWD have installed to better manage the groundwater resources. The different colors indicate which aquifer the well monitors.

To get a groundwater level, a disinfected electric sounder is lowered on a graduated cable into the well and once it touches the water surface the circuit is closed and a beep sounds. Sonic or radar readers can also be used in some wells if the wellhead allows it – this is a no contact method where nothing is put into the well as the reading is taken from the surface.

Dangers of falling groundwater levels – your pump will start pumping air which may permanently damage it
Shallow wells screened in the aquifer exposed at the surface usually recover quickly when there is rainfall, for example Santa Margarita sandstone
Well screened in aquifers below other layers tend to recover slower because they don't have the benefit of recharging immediately from rainfall, for example Lompico aquifer
We need a regular long-term record of groundwater levels to understand the climate and human impacts on groundwater in the Basin. This map shows the uneven distribution of monitoring across the Basin. Even with some new monitoring wells to be added to the network there are still large areas where private well owners are pumping groundwater

and we don’t have any information on depth to water other than the day when the well was drilled. You will hear more about this towards the end of our program tonight.

Santa Margarita Aquifer Conditions

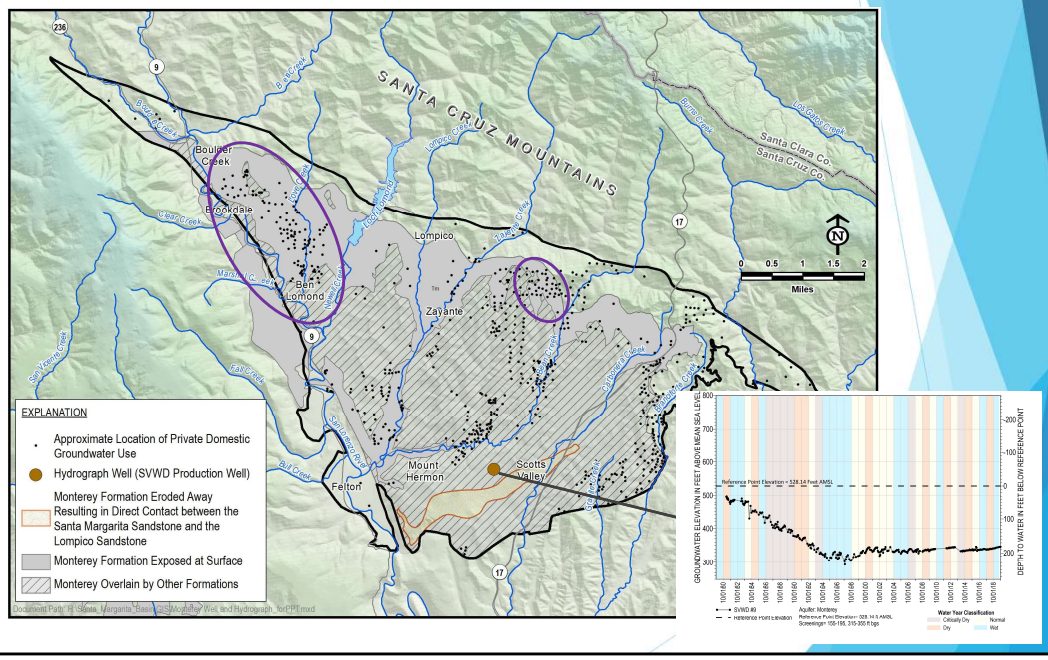


Yellow areas are where the Santa Margarita aquifer is exposed at the surface; hatched area is where it is overlain by other geologic formations.

Purple circles are areas where private wells are most likely to be pumping from the Santa Margarita aquifer.

Santa Margarita aquifer if exposed at surface, responds quickly to rainfall.

Monterey Shale Formation Conditions



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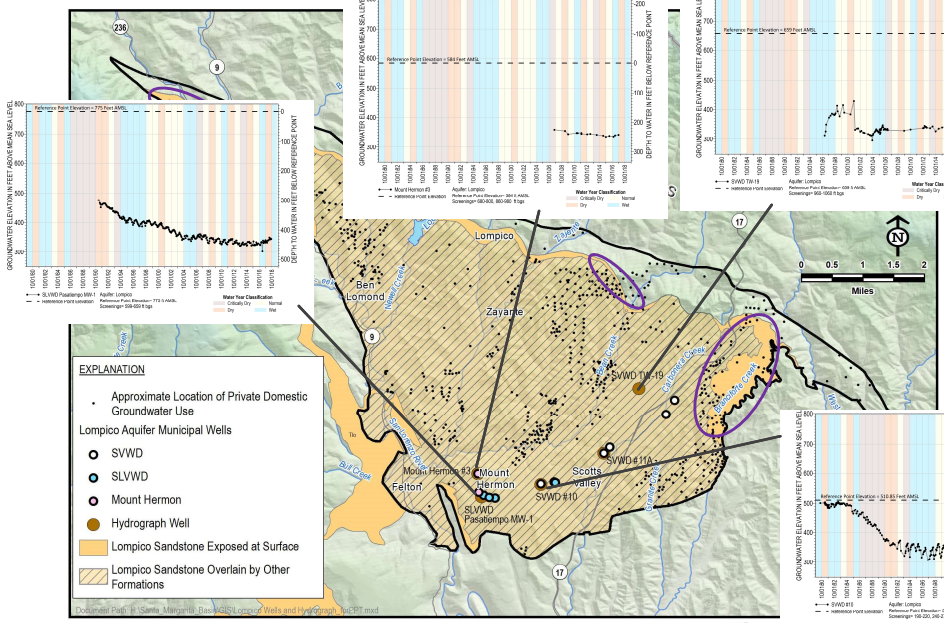
Grey areas are where the Monterey Formation shale is exposed at the surface; hatched area is where it is overlain by other geologic formations.
Purple circles are areas where private wells are most likely to be pumping from the Monterey Formation shale.

Lompico Aquifer Conditions



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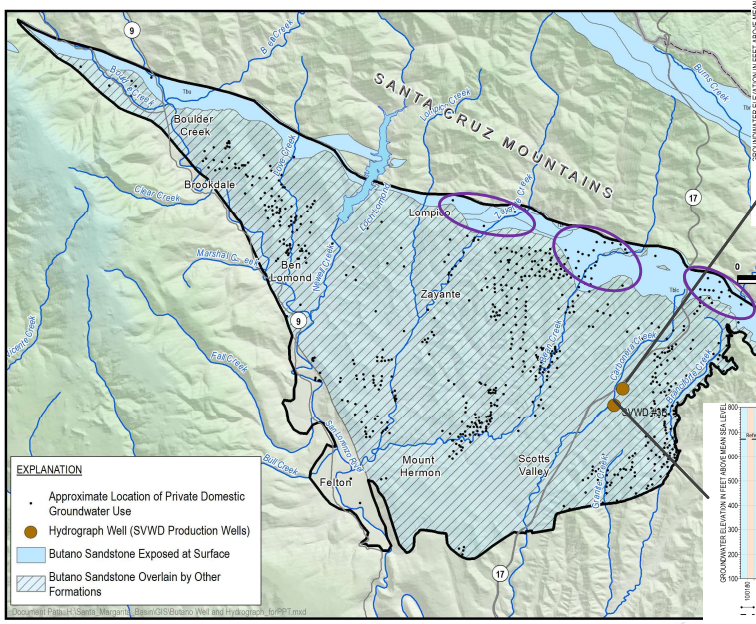
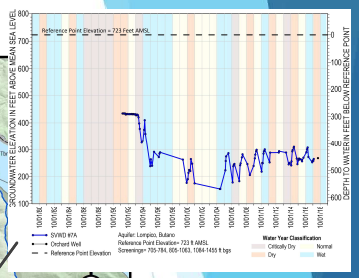
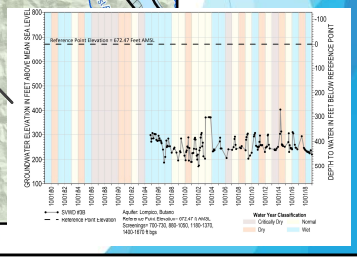
Orange areas are where the Lompico aquifer is exposed at the surface; hatched area is where it is overlain by other geologic formations.

Purple circles are areas where private wells are most likely to be pumping from the Lompico aquifer.

Butano Aquifer Conditions







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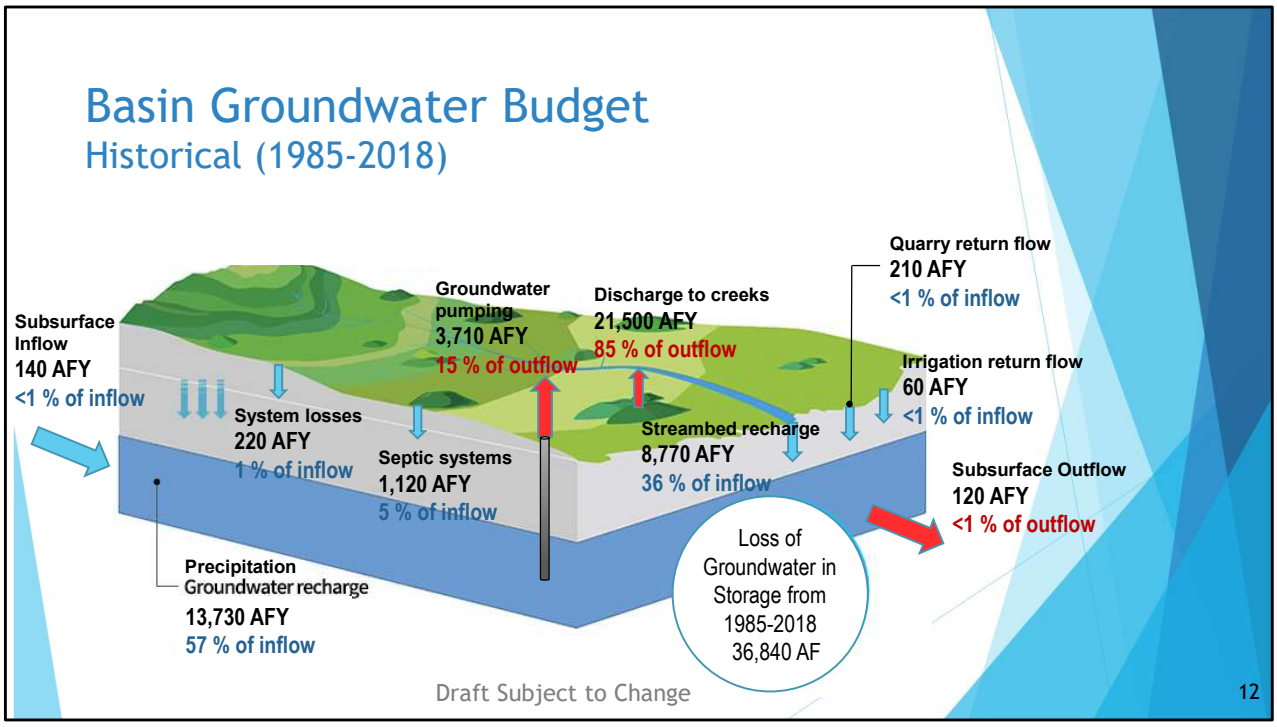
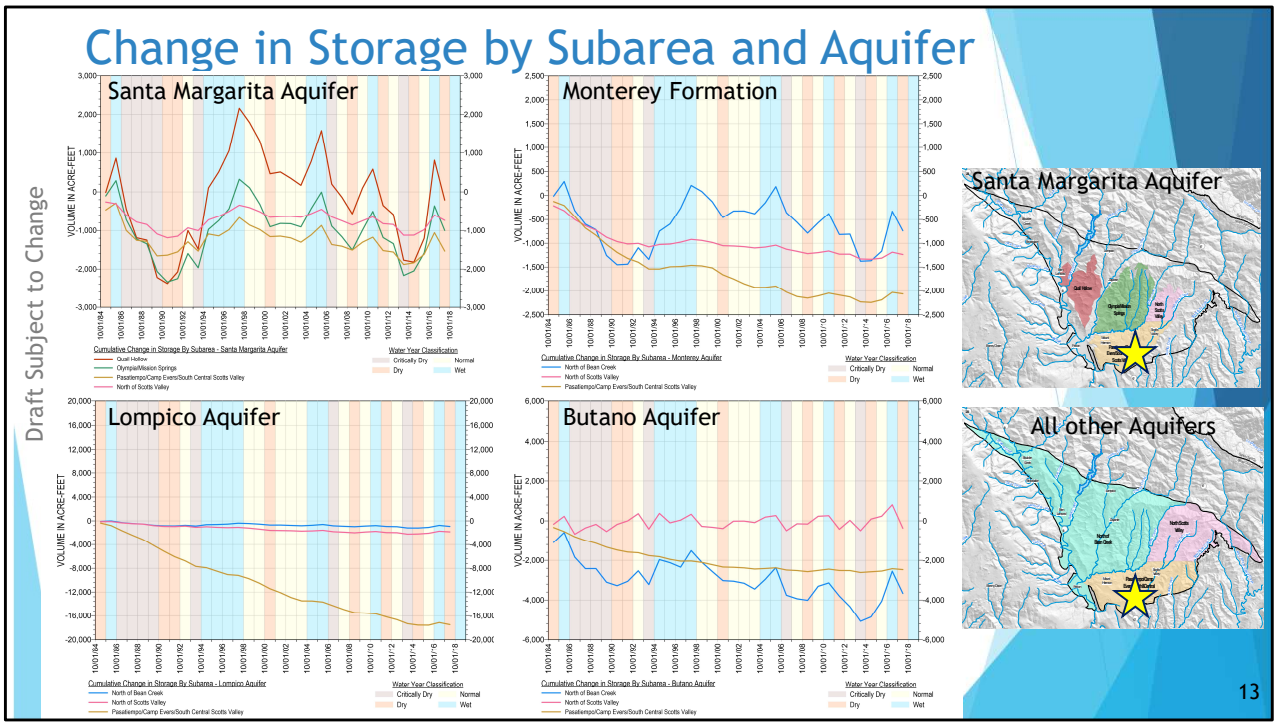
Blue areas are whenre the Butano aquifer is exposed at the surface; hatched area is where it is overlain by other geologic formations.
Purple circles are areas where private wells are most likely to be pumping from the Butano aquifer.



The average annual groundwater budget from 1985-2018 is displayed on the graphic with all the inflow and outflow components. The majority of groundwater outflows are to creeks and streams (85%) with only 15% due to groundwater pumping. All return flow components contribute ~7% in groundwater inflows. Most recharge to groundwater is from precipitation and streambed recharge. There has be a cumulative loss of groundwater in storage of 36,840 acre-feet from 1985-2018.



Each of these charts shows the cumulative change in groundwater in storage for each aquifer by subarea as calculated by the groundwater model. I shared these subareas with you last week and the thought behind them was to be able to look at the water budgets in each of these areas separately as groundwater levels in each are typically unique to those subareas. Except for the Quail Hollow SM aquifer subarea that appears to be fairly isolated from the other subareas, the rest do all interact with each other.

The charts show that apart from the Quail Hollow subarea, there is an overall loss of groundwater in storage in the Santa Margarita aquifer. This includes the Olympia subarea where there appears to be a roughly 20-year cumulative decline of 1000 AF. The Monterey Formation, although not a productive aquifer, is included since it occurs between two principal aquifers and is impacted by changes in their groundwater in storage. The subareas south of Bean Creek have experienced an overall loss of groundwater in storage, while north of Bean Creek changes in storage correspond with precipitation recharge since it is exposed at the surface.

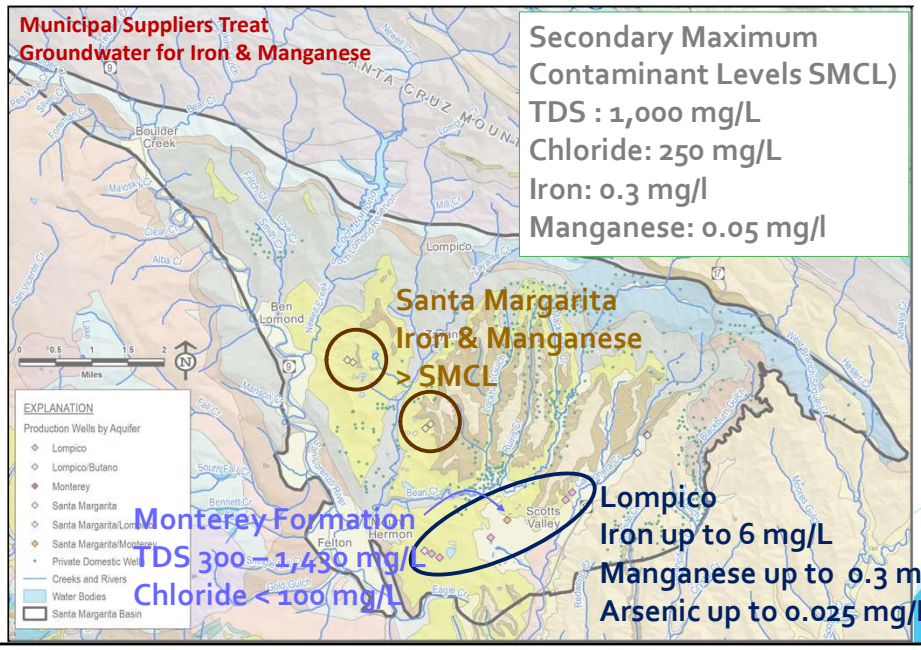
The Lompico aquifer has the greatest loss of storage over time in the Pasatiempo/Camp Evers/South & Central Scotts Valley subarea as expected because of declining groundwater levels in this area. The other subareas in comparison have had little change in storage over time.

The Butano aquifer has also had a loss of groundwater in storage. It is surprising that the subarea north of Bean Creek (blue line) has an overall loss since there are no wells

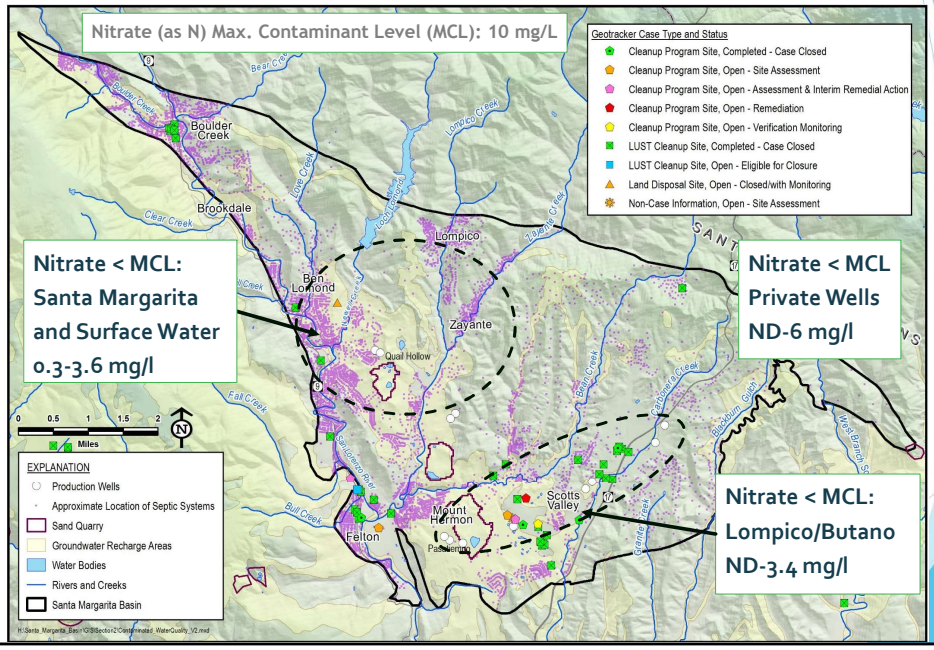
pumping that deep. The fluctuations correspond to changes in storage in response to precipitation recharge since there are surface exposures of Butano aquifer along the Basin's northern boundary at the Zayante-Vergeles fault.

These charts show that the subarea with the greatest decline in groundwater in storage is the Pasatiempo/Camp Evers/South & Central Scotts Valley. The next set of slides will focus on the groundwater budget for just this subarea.

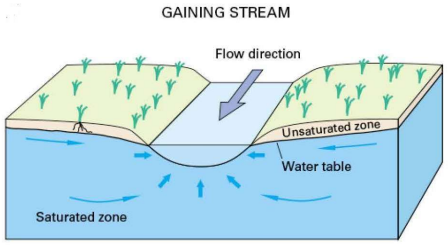
Basin has Good Natural Groundwater Quality

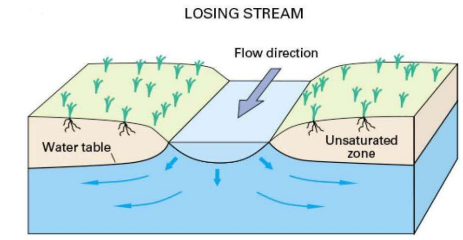


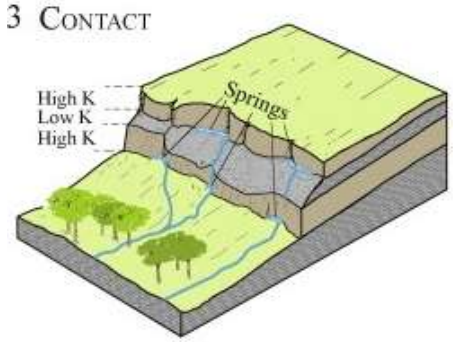
Nitrate in Groundwater



Surface Water and Groundwater Interactions







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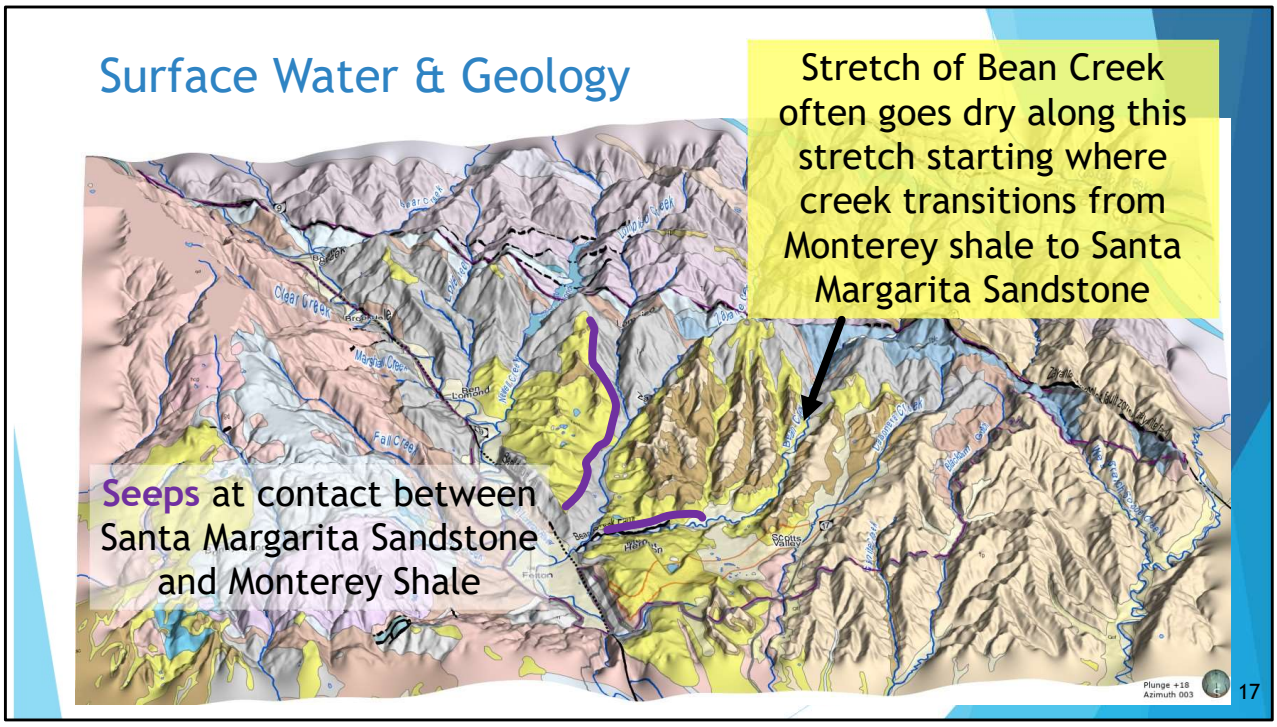
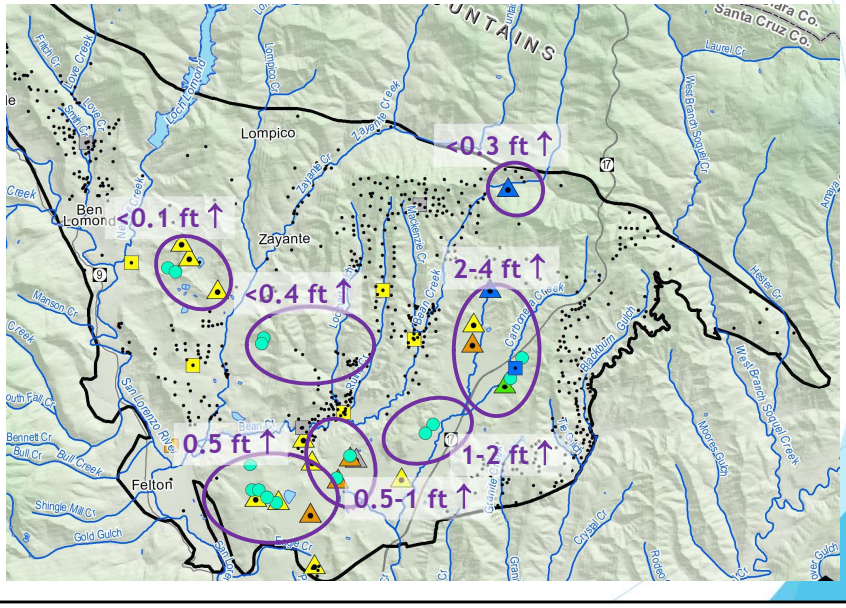


Generally most the creeks are gaining water from groundwater but there are times and locations they loose flow to groundwater.

Impacts of Private Pumping on the Basin

Groundwater Level Changes if Private Pumping Hypothetically Removed



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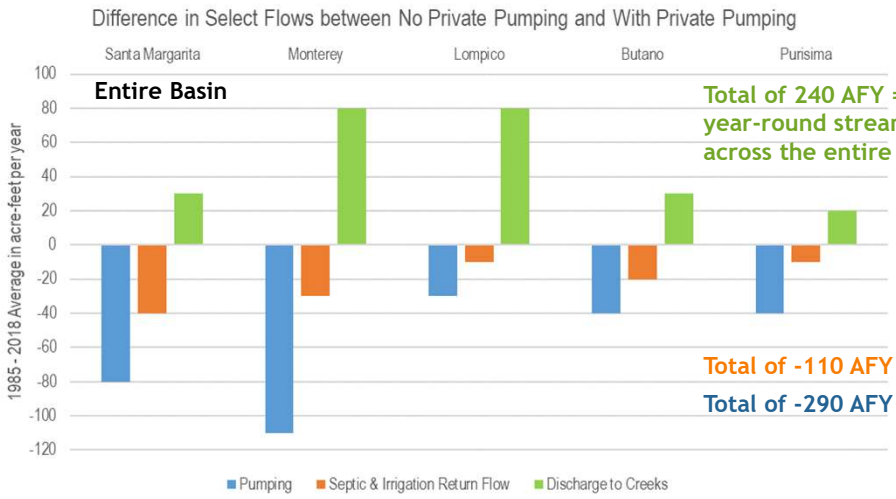
Model run removes private well pumping and return flows

Impacts of Private Pumping on the Basin
Discharge to Creeks



Total of 240 AFY = 0.3 cfs year-round streamflow depletion across the entire Basin

Total of -110 AFY

Total of -290 AFY

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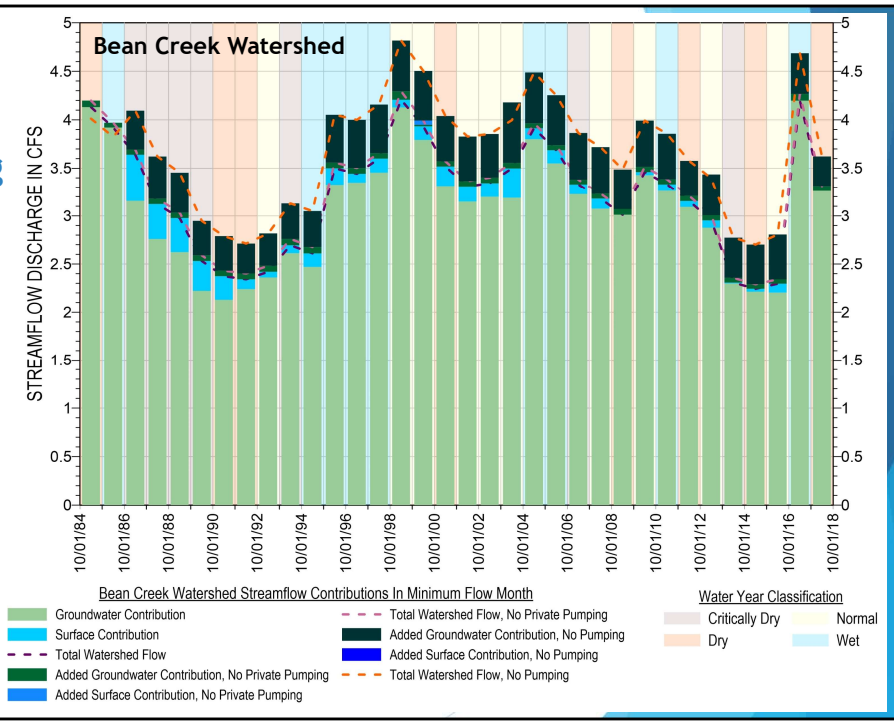
Results of model sensitivity run taking out all private pumping and return flows.
A combined average year-round depletion of streamflow of 0.3 cfs across all the creeks and SLR is a very small amount for each creek. More analysis is being done to estimate the amount per watershed

Bean Creek Watershed Groundwater Contribution During Low Flows

- Private well pumping causes groundwater contributions to Bean Creek in the lowest flow months to be reduced by about 0.06 cfs (1.8%)
- All wells in the Basin pumping reduces groundwater contributions to Bean Creek by 0.46 cfs (15%)



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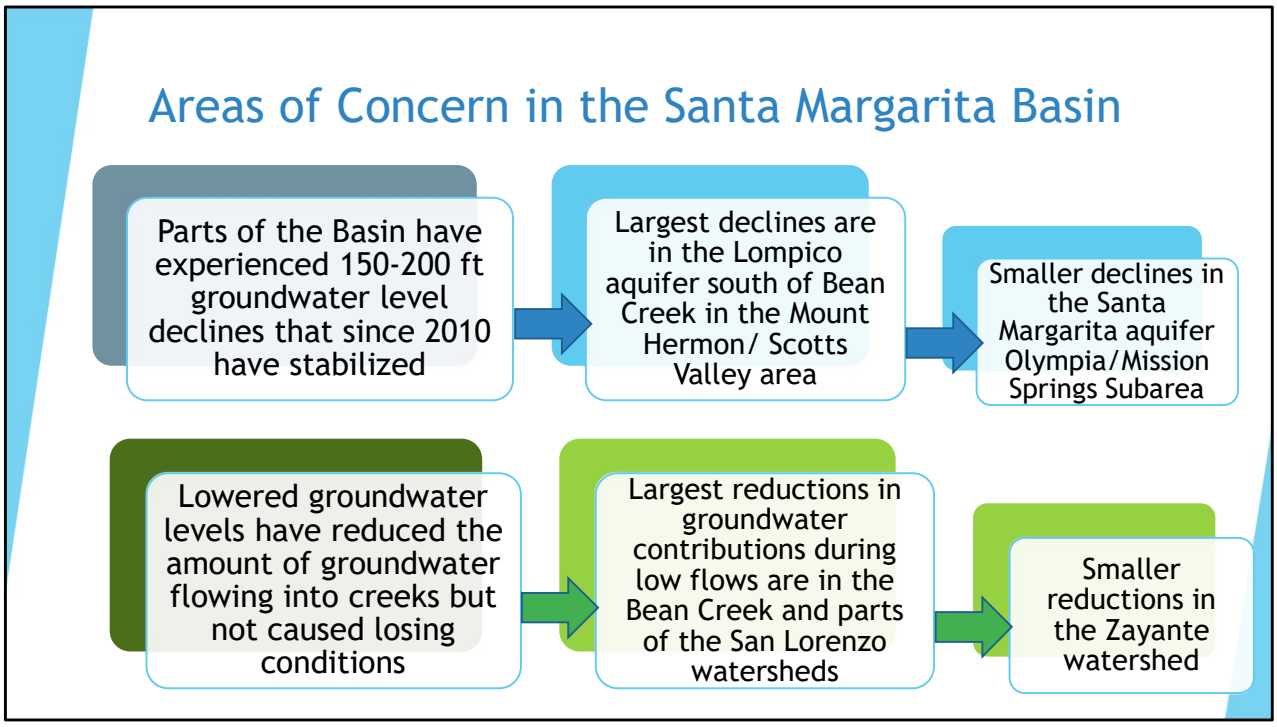

Focus on in areas with biggest changes

Thank you for your participation!