What is the Cosumnes Groundwater Authority?

In November 2021, seven Groundwater Sustainability Agencies (GSAs) in the Cosumnes Subbasin formed the Cosumnes Groundwater Authority (CGA). With the responsibility of implementing the Cosumnes Subbasin Groundwater Sustainability Plan, the CGA is the agency guiding groundwater sustainability with the Cosumnes Subbasin.

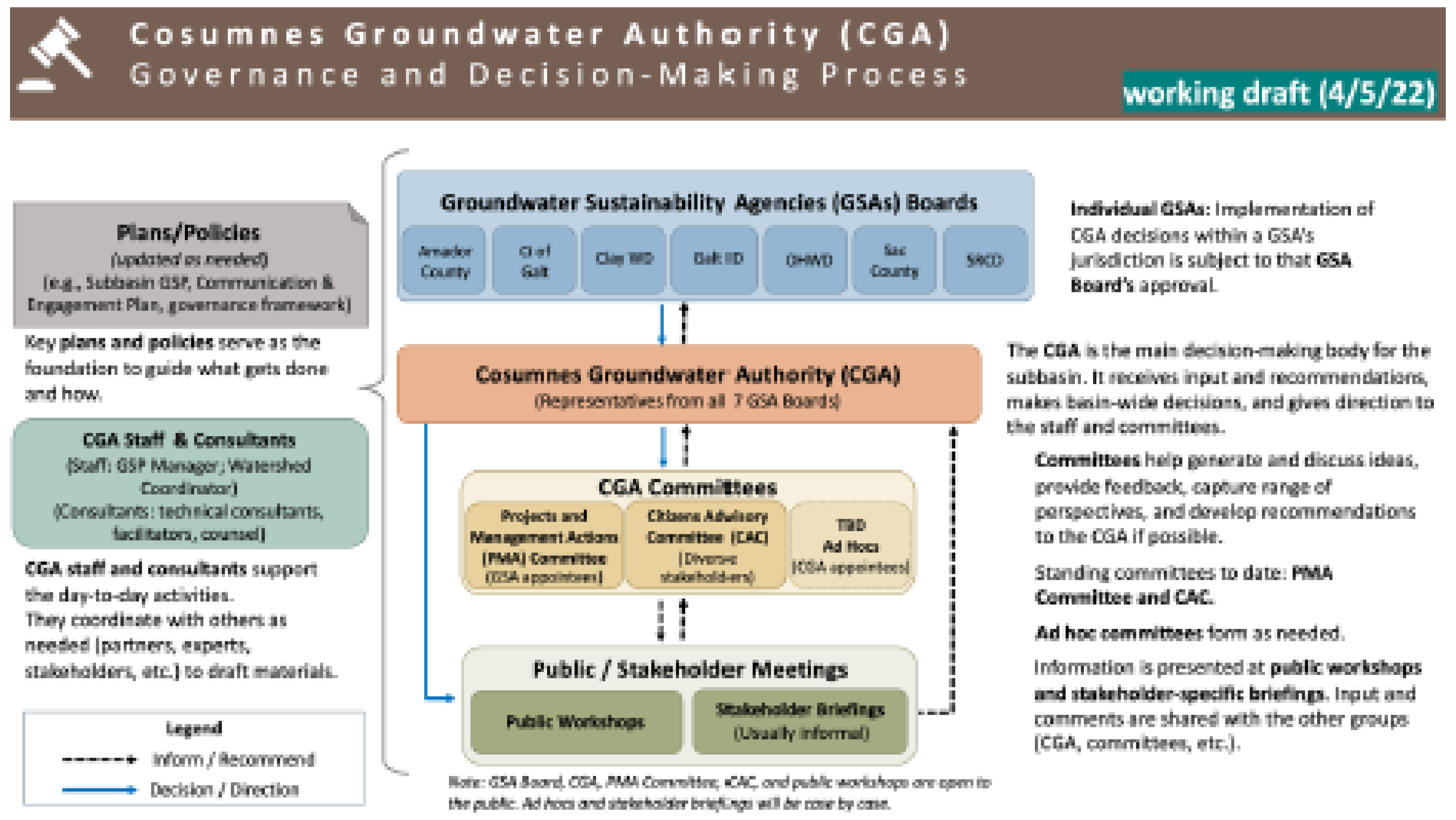
Cosumnes Subbasin Groundwater Sustainability Plan

The seven GSA's, working together, agreed upon the following goal to guide their efforts:

"The Sustainability Goal of the Cosumnes Subbasin (Basin) is to ensure that groundwater in the Basin continues to be a long-term resource for beneficial users and uses including urban, domestic, agricultural, industrial, environmental and others. This goal will be achieved by managing groundwater within the Basin's sustainable yield, as defined by sustainable groundwater conditions and the absence of undesirable results."

The GSP was submitted to the Department of Water Resources in January of 2022. Each year, an Annual Report detailing the current groundwater conditions is produced. Every five years, the GSP will have larger, more substantial updates.

Organization of the Cosumnes Groundwater Authority



Seven Agencies Working Together

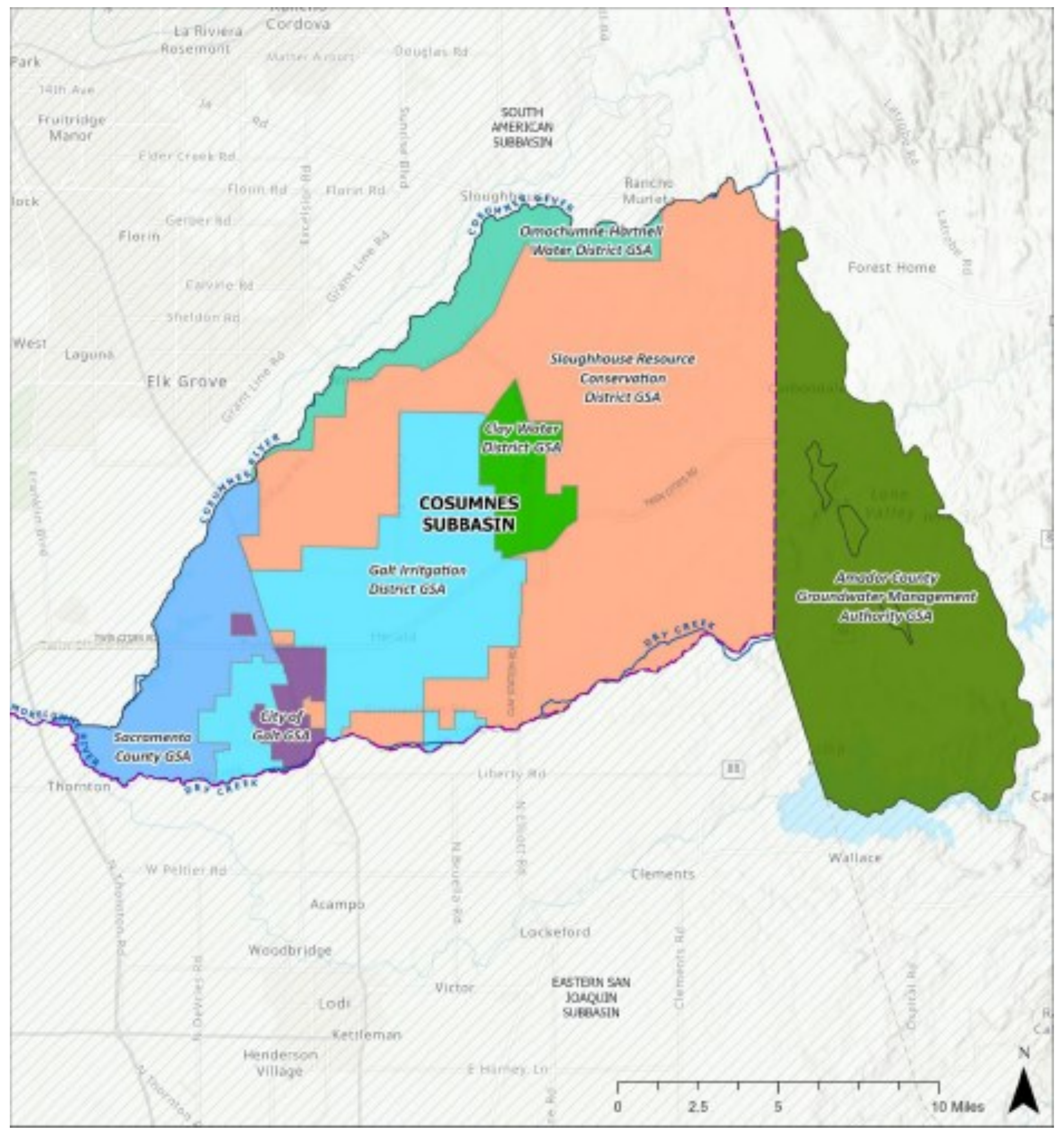
The Sustainable Groundwater Management Act, or SGMA, divided California into Subbasins. Within each Subbasin, Groundwater Sustainability Agencies (GSA) were created. In the Cosumnes Subbasin, those seven agencies which became GSAs are:

- Amador County Groundwater Management Authority GSA
- City of Galt GSA
- Clay Water District GSA
- Galt Irrigation District GSA
- Omochumne Hartnell Water District GSA
- Sacramento County GSA
- Sloughhouse Resource Conservation District GSA

Each Subbasin is required to have one, or more, Groundwater Sustainability Plans (GSP). The plans are large, technical documents that outline the current and expected conditions of the subbasin and a path to achieve groundwater sustainability.

Who makes up the Cosumnes Groundwater Authority?

Each of the seven GSAs have elected a primary and secondary representative to represent their GSA during CGA meetings. Those members selected make up the CGA Board of Directors.



What does the Cosumnes Groundwater Authority do?

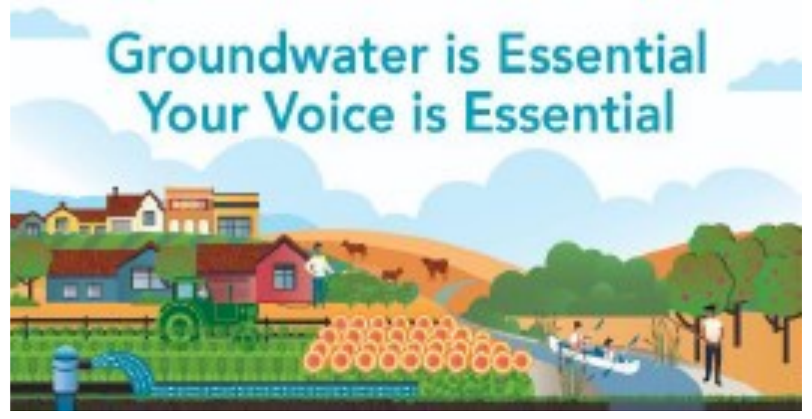
CGA is tasked with the responsibility of implementing the GSP. Each year, groundwater monitoring is conducted. Projects that will help achieve sustainability are identified in the GSP. The CGA is the hub for these projects by working with the GSAs and aiding, or leading, sustainability efforts. Most importantly, the CGA is a central meeting place for all things groundwater. Monthly Board and Committee meetings keep the GSAs and public informed, and public participation in the process is highly encouraged.

How is the Cosumnes Groundwater Authority Funded?

Before the formation of the GSP, the seven GSAs worked together in a "Working Group". A state grant was awarded to the group for the development of the GSP. Following the formation of the GSP, a budget was agreed upon and each GSA contributed an amount of money proportional to their groundwater extraction. The CGA continues to meet and update their budget as needed. However, in accordance with California Water Code section 10730, each GSA retains the ability to assess a fee on groundwater users.

Additionally, the CGA is aggressively pursuing grant funding to offset the cost to land owners. In December of 2022, a $4.2 million dollar grant application was submitted by the CGA to the Department of Water Resources. If awarded, the grant funding would be used to further develop sustainability projects, improve groundwater data collection, and increase stakeholder outreach and education opportunities.

Director	Appointing Organization
Rep: Gary Thomas Alt: Rick Ferriera	Amador County Groundwater Management Authority
Rep: Rick Wohle Alt: Gary Silva	Clay Water District
Rep: Jay Vandenburg Alt: Mike Selling	City of Galt
Rep: Leo VanWarmerdam Alt: John Mulrooney	Galt Irrigation District
Rep: Mark Stretars (Vice Chair) Alt: Kurt Kautz	Omochumne-Hartnell Water District
Rep: Pat Hume Alt: Chris Hunley (Chair)	County of Sacramento
Rep: Herb Garms Alt: Lindsey Carter	Sloughhouse Resource Conservation District



Historic and Current Groundwater Conditions

Introduction

The Cosumnes Groundwater Basin encompasses approximately 210,300 acres in the northern region of the San Joaquin Valley Basin, within Amador and Sacramento Counties. Adjacent subbasins include the South American Subbasin (SASb), which lies to the north and west, and the Eastern San Joaquin (ESJ) Subbasin, which lies to the south. The eastern boundary of the Basin is defined by the Sierra Nevada foothills. The western portion of the Basin extends to the edge of the Delta. Approximately two-thirds of the Basin is covered by native or riparian vegetation and one-quarter by irrigated agriculture. The most abundant agricultural land uses are vineyards, pasture, and grain. Cities, Ag-Res, and aquaculture uses, totaling approximately 18,000 acres, constitute just under 9% of the total Basin area.

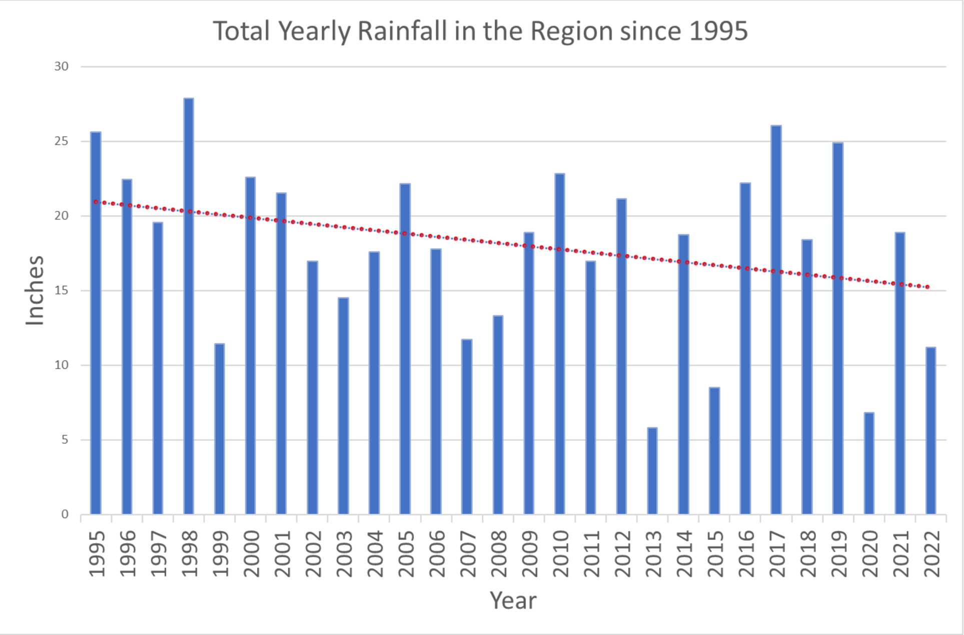
Who Uses How Much Water

The total amount of water pumped in 2021 increased by about 11% over recent years, largely due to the drought. Most of the water in the Cosumnes basin is used for irrigated agriculture. Major crops include grapes, pasture, various types of forage grown for hay, and fruit and nut trees. Fish farms are the second biggest user of water. The most important fish cultivated is the sturgeon, and the caviar produced by these fish. In many cases, waste water from these fish farms is used to irrigate crops or for hydroponic growth of lettuce and other vegetables. Domestic or ag-res users pump a small amount of water relative to the total.

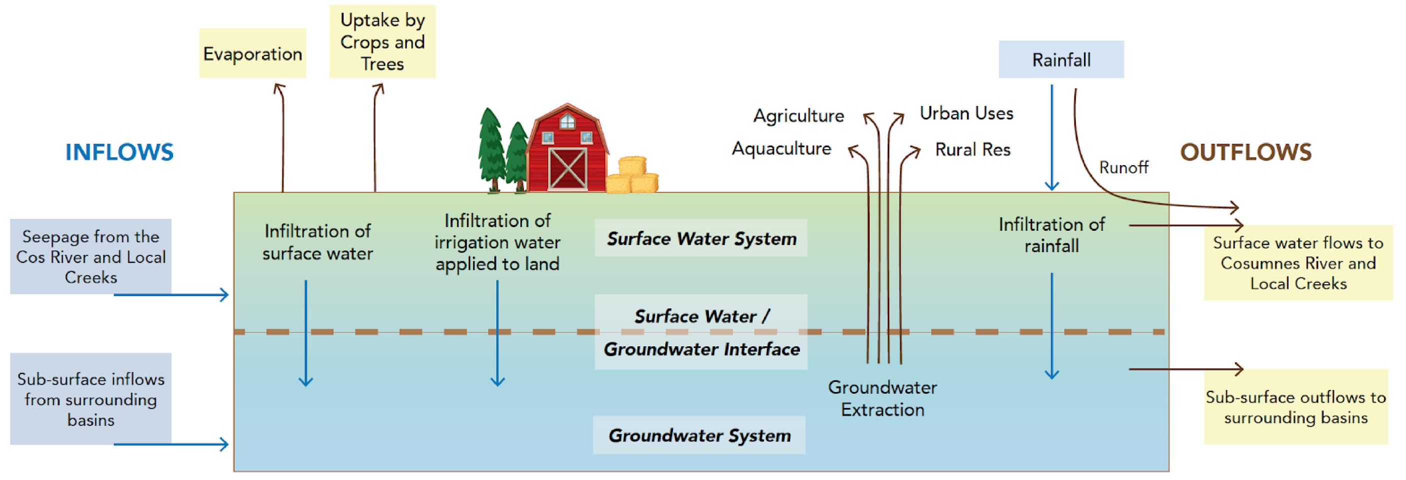
Sector	2021 Water Pumped (AF/yr)	% Used by Each Sector
Ag-Res	8,000	5
Aquaculture	11,000	7
Urban	5,200	4
Ag	125,000	84
TOTAL	148,200	100%

Water Use by Sector
Estimates of water use by sector as calculated from the 2021 Cosumnes Groundwater Authority's Annual Report.
Total use increased by over 15,000 acre feet per year from 2020.

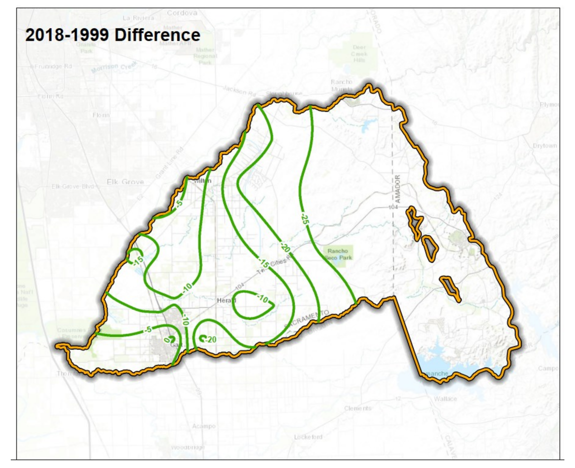
Precipitation Trends
Rainfall amounts have been decreasing in the recent past. This has meant that less water is percolating into the ground than in the past. Over the past 10 years, the average rainfall was 14" compared with the long term average of 18"/year.



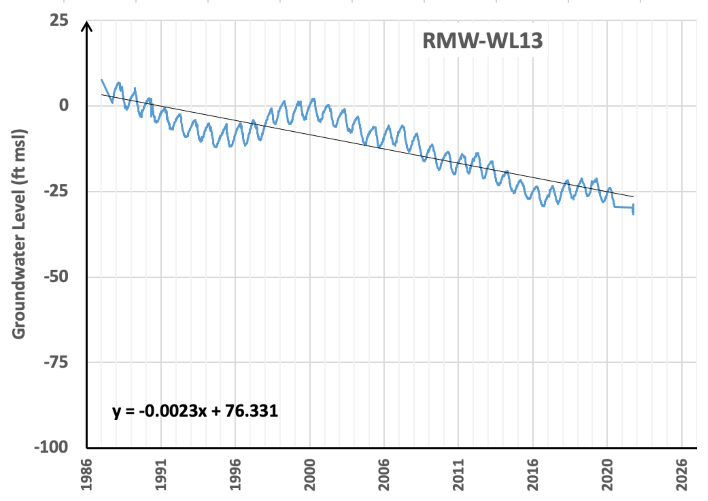
INFLOWS: Rain is the main source of groundwater. Additionally, water seeping into the aquifer from the Cosumnes River and local creeks as well as subsurface flow from surrounding basins also adds to our groundwater.
Lastly, about 25% of water applied for irrigation purposes ends up percolating back into the aquifer.
OUTFLOWS: Groundwater extraction for agriculture, aquaculture, urban, and rural residential uses is the major source of outflow.
Part of the agricultural extraction of groundwater is lost to evaporation and another portion is taken up by crops and trees (transpiration). Trees that surround local creeks and the Cosumnes River also account for a small portion of groundwater loss. In addition, some of the groundwater flows into local waterways as well as surrounding groundwater basins.
The sum total of the inflows and outflows leaves us with approximately -10,000 acre-feet/year deficit.



Changes in GW elevation 1999-2018. This figure illustrates the change in the water table over the last 20 years. The change has been greatest on the eastern side of the valley portion of the basin. The farther west you go, less and less of a decline has been observed.



In 2022, nine domestic wells were reported to DWR's Dry Well Reporting System as having gone dry within the Cosumnes Basin. More wells could have been affected, but never were reported. To learn more, see https://data.cnra.ca.gov/dataset/dry-well-reporting-system-data.



Groundwater levels have been declining at a rate of about 1 foot/year.

Domestic well RWM-WL13 has the most extensive record of readings of the depth of the water table (indicated by water level elevation of WLE in the figure) showing a decline of about 35 feet over the last 40 years. Another domestic well in the monitoring network showed a decline of 4 feet in the past 6 months. This change is likely largely associated with the drought, which was not captured in the data shown in the figure below. There is variability in the rate of decline from well to well, but on average the rate is 1 ft./year.

GWE stands for ground water elevation, measured relative to the mean sea level, not below the surface of the ground. To make this measurement the top of the well is open and a long, weighted tube is dropped into the well. When it beeps, the tip of the tube has hit water, reflecting the water surface elevation or depth of the water table.

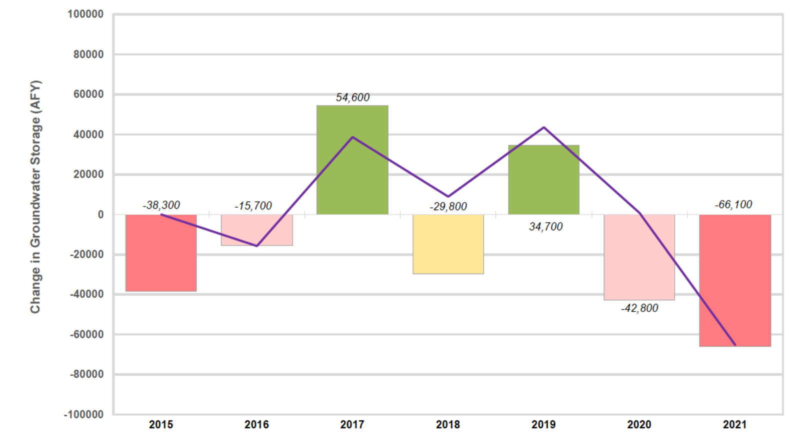
	Inputs into the aquifer (AFY)	Outflows from the aquifer (AFY)
Deep percolation of applied irrigation water and rain water	104,800	
Leakage to groundwater from waterbodies	34,700	
Subsurface flow from adjacent watersheds	4,800	
Seepage from groundwater to water bodies		-16,400
Flow out of the Cosumnes into adjacent basins		-7,300
Pumpage		-131,200
Total	**144,300**	**-154,900**

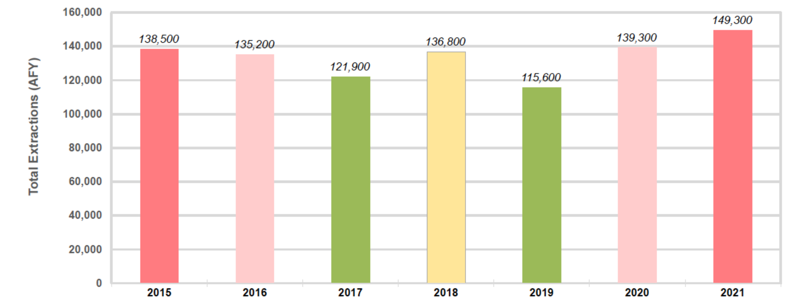
The table above contains a rough water budget for the Cosumnes Basin, showing inputs and removal of groundwater.
The values are based on a 20 year average (1999-2018) identified in the Cosumnes GSP. More recent years show greater losses. Input from water bodies refers to leakage of water from Camanche Reservoir and local streams. The net loss averages about 10,000 AFY (acre-feet/year). We lose over 7,000 AFY to either the South American or Eastern San Joaquin subbasins. This is because groundwater follows a gradient, it does not function like a bathtub. On average, about 5,000 AFY leaves our aquifer and heads north to the South American basin. This suggests that recharge on the north side of the Cosumnes River will slow down the northward migration of groundwater. Recharge projects being conducted by OHWD, one of the GSAs in the Cosumnes and South American basin, will help reduce the amount of groundwater that migrates north.

Total extraction of water has increased in recent years

The upper figure shows the changes in groundwater storage or the volume of the groundwater since 2015. There has been a decrease in the amount of water in the aquifer in recent years. In 2021, for example, there was a decline of over 66,000 AF. The previous year, it declined over 42,000 AF. These recent declines have likely been linked to the drought – less infiltration and more extraction or pumping.

The lower figure illustrates how pumping has increased in recent years and contributed to the decline in storage of water in the aquifer. In 2021, domestic, agricultural, and other pumping resulted in a withdrawal of almost 150,00 AF. The decrease in rainfall, shown in a previous figure, is the other part of the story.

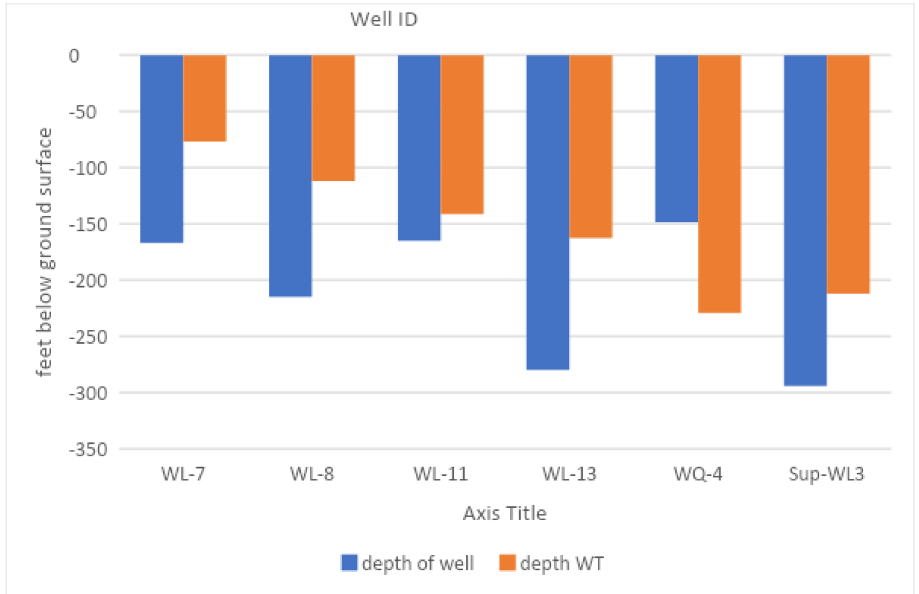




Note: Bars on these two graphs are different colors to reflect the type of water year. Green= wet year, yellow=average, pink=dry year, red=very dry year. The line in the upper graph represents the cumulative storage change since 2015, the year the groundwater law (SGMA) went into effect. We have lost over 60,000 AF water from the aquifer since 2015.

Current status of domestic wells in our monitoring network

Many people are concerned about domestic wells going dry because they are generally shallower than agricultural wells. This figure illustrates the depth of the domestic wells (blue) as well as the depth of the water table (orange). In four of the six cases, the well is at 25% deeper than the water table; currently a stable situation. However, in two cases, WL-11 and WQ-4, either the water table is below the well casing or very close to it. These wells were either deepened or replaced. Shallower wells are more susceptible to the impacts of drought and groundwater overdraft.



Conclusion
Groundwater has been declining for decades in the Cosumnes basin. In recent years, the condition has been exacerbated by the drought, which resulted in increased groundwater pumping. Shallow domestic wells are impacted by this situation more than deeper production wells. On average, a decline in the water table of about 1 foot/year has occurred over recent decades, with greater levels of decline in recent years. The Cosumnes Groundwater Authority has applied for millions of dollars of grants to test various methods and approaches to turn the situation around. See other posters for details on these plans.

Options Being Considered for Managing Groundwater Use

Introduction
During the next 4-5 years, implementation of the Cosumnes Groundwater Sustainability Plan (GSP) will involve evaluating various approaches to conserving farmland while actually reducing the amount of groundwater pumping that is needed to sustain the productivity of this land. This focus on demand reduction will complement efforts to pursue recharge projects aimed at increasing groundwater supplies. Recharge projects usually involve building infrastructure and obtaining necessary permits, a process that could take many years to bear fruit. In the meantime, conservation efforts could allow us to take the first steps toward slowing the Cosumnes groundwater basin's ongoing decline. The GSP has set a target of reducing groundwater pumping for farmland irrigation by about 3 percent over the next few years.

CGA has submitted multiple large grants to fund conservation and recharge demonstration projects. We have been led to believe we have an excellent chance of receiving funding. On the conservation side, three main categories of programs are envisioned in the basin:

- **Land repurposing** – converting agricultural land currently using large amounts of groundwater to other purposes that use less water. Examples include growing crops with low water needs and dryland farming for winter wheat, triticale, or other crops.
- **Conservation** – involves continuing to grow the same crops but using different irrigation techniques or schedules. Examples include deficit irrigation, where the irrigation volume is reduced by about 10%, or installing more efficient water delivery systems.
- **Rotational fallowing** – involves periodically resting the land so no/little water is applied. Examples include fallowing a portion of a field for a year or permanently fallowing a whole field by replacing crops with solar arrays.

It is important to note that ALL of these efforts are 100% voluntary. We are exploring ways to incentivize farmers to participate.

Weather station used to measure ET. *Source: Land IQ*

Quantifying Water Savings
For any type of conservation program to work, we need to be able to quantify water savings. Most farmers do not want to use meters so we have identified an alternative method of quantification – field based measurement of evapotranspiration. Evapotranspiration or ET is that portion of the water that is applied to a crop that is either lost to the atmosphere or absorbed by the plant. In our basin, that amounts to about 75% of applied water. The remaining 25% percolates back into the aquifer.

To quantify savings, weather stations will be installed at various locations that collect information on precipitation, humidity, and other factors. When combined with satellite imagery on crop type and area, companies like Land IQ, can estimate the amount of applied water with a precision of about 5%. That means if a farmer reduces water use by 10%, we should be able to quantify this savings.

Land Repurposing
We will identify a handful of interested farms who grow high water use crops who are open to trying to grow alternative crops with low water use. A portion or all of the land on these farms will be repurposed for dryland farming or low water use crops or no-till farming or other alternatives of interest to the farmer. Changes in water use will be assessed. This information will lay the basis for estimating basin-wide savings that might be achieved through land repurposing. A manual will be prepared summarizing the findings.

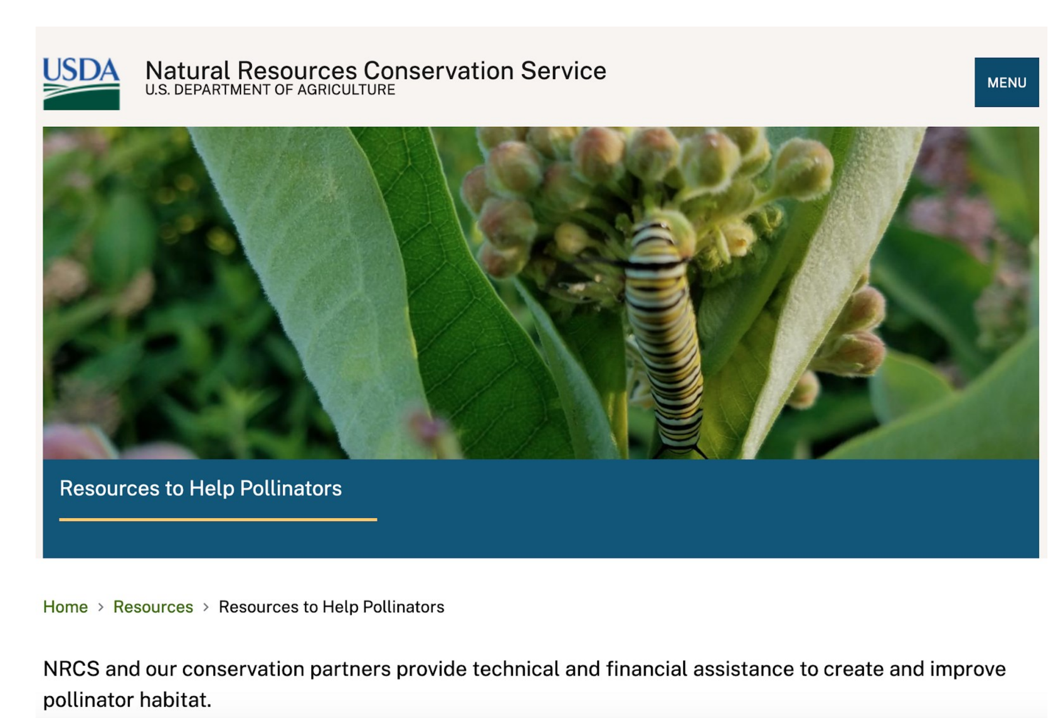
Conservation
There are multiple water conservation practices that will be evaluated in the coming years. They include measuring groundwater production and water application, irrigation scheduling strategies, and conservation methods for high water use crops (e.g., pasture). The specifics will be determined by the interests of the farmers. Although the majority of groundwater in the basin is used by farmers, rural residential land owners can also contribute to groundwater conservation. This can be done by minimizing the size of turf or lawns to a minimum and using drip irrigation.

One project we have applied for grant funds to implement is a pilot study, conducted under the directions of UC Ag Extension, to assess the effects of deficit irrigation on pastureland. Three sets of two fields, side by side, will be irrigated either in the normal fashion or with one less application of water, about a 10% overall reduction. Samples of forage will be collected and analyzed for weight, nutritional content, and variety. After two years, we should have a good estimate of the impacts of deficit irrigation, given the growing conditions in the basin, on forage productivity. This information will help us determine appropriate compensation for farmers willing to reduce water use on pastureland.

Alfalfa field along the Cosumnes River

Pasture along the Cosumnes River

Rotational Fallowing
Allowing irrigated cropland to rest for a year or more has the potential to immediately save water and help reduce groundwater overdraft. Based on the response of a farmer's survey, we will determine if there is an interest among some farmers to participate in such a program. Similar programs are currently being implemented in the southern San Joaquin Valley and in the Delta. Alternatives to irrigating a field could involve building solar arrays, 'rewilding' for wildlife, or using it for pollinator habitat, which would likely require only a small amount of irrigation in the driest periods of the year.



Conclusion
It is the view of some Ag Extension Specialists at UC Cooperative Extension that implementing various conservation practices could save up to 10% of the groundwater currently being used. They base this opinion on their experiences working with farmers in other groundwater basins. If we could achieve cooperation among the vast majority of farmers, such a reduction in pumping would be a major contributor to our efforts to reach our sustainability goal – the amount of water withdrawn from the basin equals the amount replenished. However, at this time, it is unclear if this path will be fruitful or if supply augmentation might be a more worthwhile path forward. Our strategy for the next 5 years is to EXPLORE ALL OPTIONS, and determine which projects and management actions will be supported by farmers and achieve the water savings needed to get the water budget into balance by 2042, as required by law.

Options Being Considered for Taking Advantage of Floodwater to Recharge the Aquifer

The Cosumnes Groundwater Sustainability Plan emphasized aquifer recharge as the key way we plan to address the groundwater deficit. The complementary approach to this is groundwater conservation and land repurposing, addressed at another station.

Background

As our climate changes, winter rainfall patterns in the Cosumnes basin are also changing. We are experiencing more prolonged dry periods and more intense rainfall events like the recent one we just experienced in late December-January, 2023. These changes affect groundwater supplies. In dry years, more pumping is needed to sustain crops. Winter rainfall helps restore groundwater levels, but this impact is lessened if the rainfall comes in a series of extreme events. When the soil gets saturated, much of the rain runs off into creeks, floods our roads and property, and less and less of it recharges the aquifer.

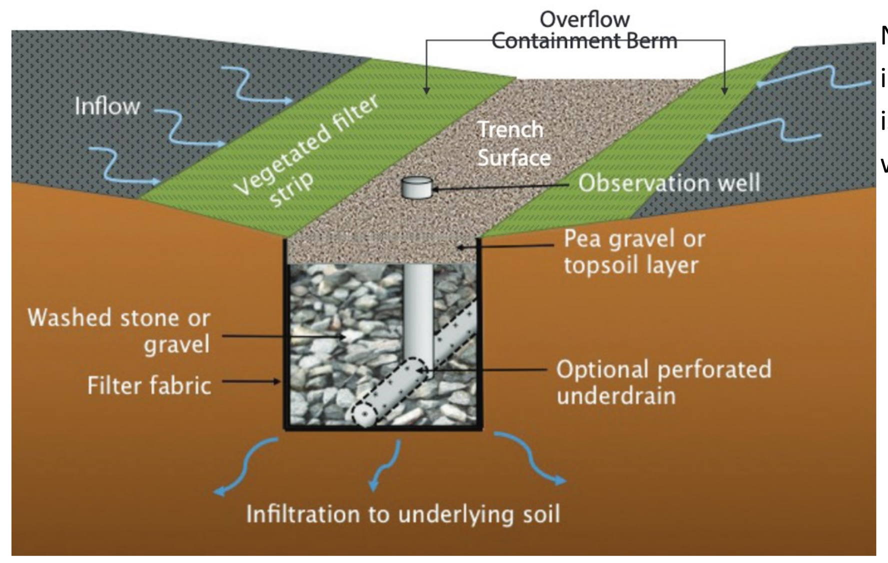
To address this issue, CGA has applied for a grant to evaluate different strategies for better capturing winter rainfall for groundwater recharge. They are:

- Capturing high flows from interior creeks such as Laguna and Dry Creeks, and infiltrate it either through dry wells or spreading across farm fields (pic)
- Capturing rainwater and runoff from fields and ditches along roadways and infiltrate it (PIC)
- Importing winter flood water from the American River via the Folsom South Canal and infiltrate it in dry wells or in spreading it on fields.

Capturing flows from interior creeks

This approach involves figuring out how to move winter runoff from local creeks such as Laguna and Dry Creeks, to adjoining floodplains and agricultural lands to increase the amount of runoff that infiltrates into the aquifer. This could be accomplished with engineered weir structures, pumps, pipes, landscape modifications, and strategically placed infiltration wells. Preliminary estimates suggest there might be as much as 20,000 AFY available for this purpose.

CGA has applied for a grant to test these ideas. We plan to first determine the best locations for diversions from the creek and associated modifications to increase recharge potential. We will then test the capacity for infiltration, initially using groundwater pumped from ag wells. Based on these findings, we plan to then divert water from the creeks onto fields and/or into infiltration wells. This step involves getting many permits and having appropriate weather.



Note on graphic: Example of an Infiltration trench. While a dry well is deep, an infiltration trench is long and shallow. It is possible they could be built in existing ditches in order to promote infiltration of stormwater along flooded roadways.

Local or on-farm recharge

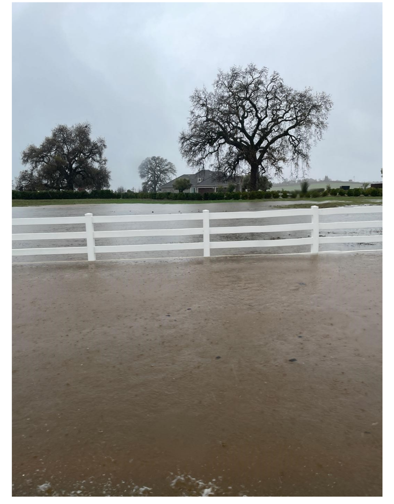
This strategy involves identifying site-specific opportunities for recharge where winter rainfall is already producing measurable amounts of standing water. These areas could include lower elevation areas on farmland where water tends to pool and areas along roadways that collect water. During the December-January storms, many roadways flooded, resulting in temporary closures. These locations could be modified through landscaping and installation of infiltration wells and trenches or other similar devices to increase the rate at which the standing waters are drawn down. Not only would such facilities promote aquifer recharge, but they would also mitigate public health and safety risk created by road closures and reduce damages and inconveniences associated with standing water.

Import water from the American (winter flood water)

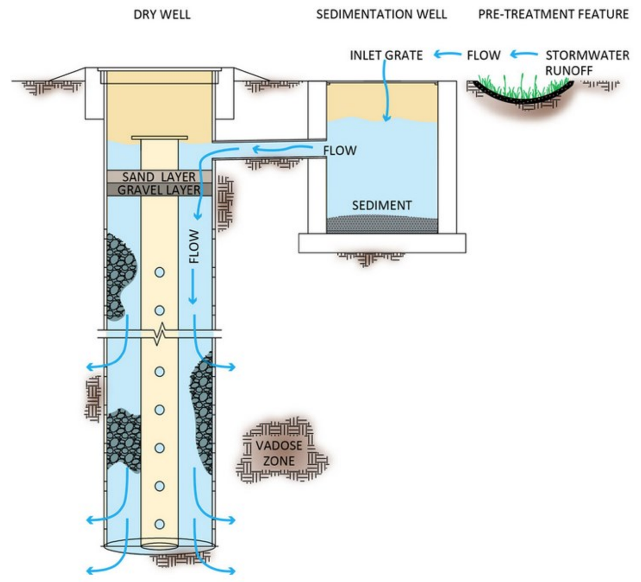
This approach takes advantage of existing infrastructure to capture winter runoff in the American River watershed and convey it down the Folsom South Canal (FSC) to the Cosumnes Basin, as outlined in our Groundwater Sustainability Plan. These plans are still in their infancy, since there are many unknowns at this time. But the basic idea is that water would then be pumped out of the canal and delivered to either a) infiltration wells installed in the right of way along the FSC and/or b) managed flooding of agricultural lands in areas of the basin near the FSC.

Preliminary calculations suggest as much as 16,000 AFY on average might be available to deliver to our basin. For this to occur, we will need to develop institutional relationships with many other regional water agencies, obtain water rights to the winter flood water, and get approval to use the FSC to convey the water. None of this will be easy or simple. But one of the distinct benefits of this water is that it would be relatively inexpensive.

But first, we need to ensure that IF we do get this water that we can efficiently get it in the ground via field spreading and/or infiltration wells. We plan to use funds from the Dept. of Water Resources grant (if funded) to evaluate infiltration capacity.



Below: one example of a dry well. Water from roadside ditches flows into a sedimentation chamber which captures particles and associated pollutants, then the water flows into a dry well which penetrates clay layers, releasing the water into a layer of gravel and stones. Many other designs are possible. This is one factor we plan to explore over the next few years.



Conclusion

There are both great opportunities as well as challenges to conducting aquifer recharge in the Cosumnes Basin.

Opportunities for recharge in Cosumnes include:

- We have a large capacity in the aquifer to store more water
- Our local creeks receive substantial uncontrolled run-off in rain storms
- There is existing infrastructure connecting the basin to reservoir storage facilities on the American River: Folsom South Canal
- Many farms with crops that could tolerate winter inundation with water

However, there are also some challenges to performing recharge, including:

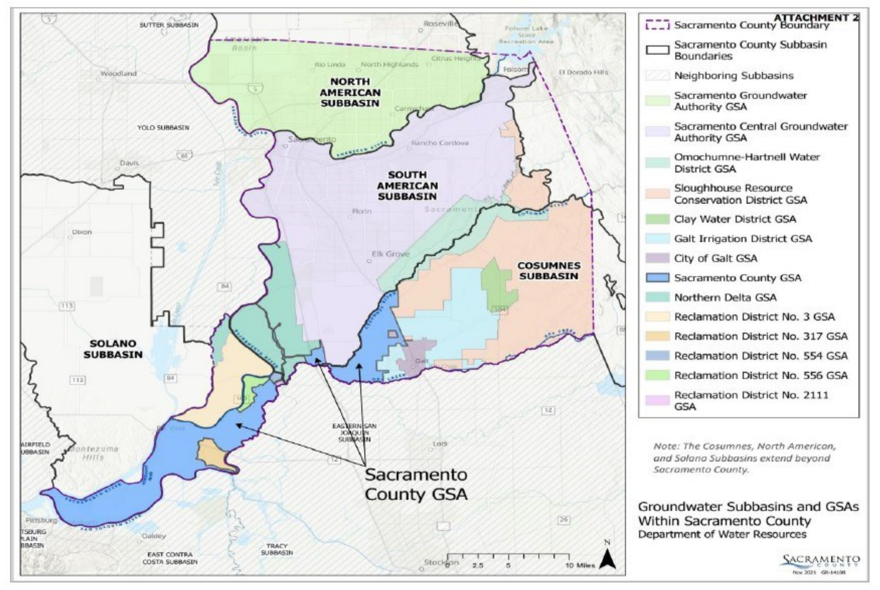
- The soils in our basin are generally poor for infiltrating water so unclear if field spreading will work
- We will need additional infrastructure such as dry wells, pipes, pumps to realize our goals
- We will need to engage in complex negotiations to achieve institutional alignment and obtain water rights to American River water.

What is SGMA and why does it matter to me?

The **Sustainable Groundwater Management Act** (**SGMA**) is a three-bill package that passed the California state legislature and was signed into California state law by Governor Jerry Brown in September 2014. Its purpose is to ensure better local and regional management of groundwater use and it seeks to have a sustainable groundwater management in California by 2042. It emphasizes local management and formed groundwater sustainability agencies (GSAs) from local and regional authorities.

Key Provisions of SGMA

- **Protection of water rights**: Existing water rights are protected, SGMA does nothing to "determine or alter surface water rights or groundwater rights under common law or any provisions of law that determines or grants surface water rights".
- **Consideration of multiple stakeholder interests**: Groundwater Sustainability Agencies must consider and conduct outreach to a broad range of stakeholders, such as beneficial users of water, environmental interests, disadvantaged communities, tribes, and others.
  Provides new authorities to Groundwater Sustainability Agencies to manage groundwater: Groundwater Sustainability Agencies are granted authority for Groundwater Sustainability Agencies to conduct investigations, determine the sustainable yield of a basin, measure and limit groundwater extractions, impose fees for groundwater management, and enforce the terms of a groundwater sustainability plan (GSP).
- **Increases coordination between land use planning agencies and Groundwater Sustainability Agencies:** Planning and zoning laws are amended to require increased coordination between land use planning agencies and groundwater sustainability agencies regarding groundwater plans and updates and modifications of General Plans.
- **Increases availability of information while ensuring privacy protection:** The legislation requires access to groundwater information for a groundwater basin be provided to the Department of Water Resources; however, information related to individual groundwater pumpers is limited.
- **State oversight and involvement:** The legislation allows for intervention by the State Water Board if a Groundwater Sustainability Agency does not complete a groundwater sustainability plan by the mandated deadline (2020 or 2022); the Groundwater Sustainability Plan is deemed inadequate by the Department of Water Resources and the deficiencies remain inadequately addressed; or the groundwater sustainability plan is being implemented and simply does not work. In these cases, the State Water Board is authorized to create an interim plan that will remain in place until the GSA is able to reassume responsibility.



Who is responsible for implementing SGMA locally?

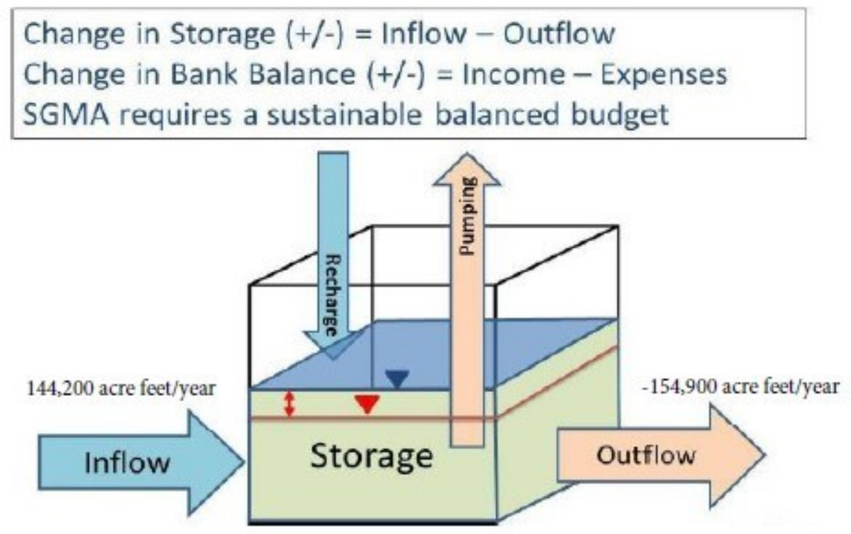
• SGMA requires that all groundwater basins designated as high or medium priority establish Groundwater Sustainability Agencies to manage their groundwater basin.
• Any public agency with water or land use responsibilities can be a Groundwater Sustainability Agency; these include cities, counties, municipal water districts, irrigation districts, community services districts, resource conservation districts, and water conservation districts.
• In its simplest form, a groundwater basin can be managed by a single Groundwater Sustainability Agency that develops a single Groundwater Sustainability Plan. However, some groundwater basins have more than one

What does SGMA Regulation require?

• January 31, 2020: Groundwater Sustainability Plans must be adopted for those basins designated as critically over drafted, and January 31, 2022 for all other remaining groundwater basins designated as high and medium priority.
• 2040/2042: All groundwater basins designated as high or medium priority must attain sustainability.

Do Domestic and Ag/Res Wells fall under SGMA?

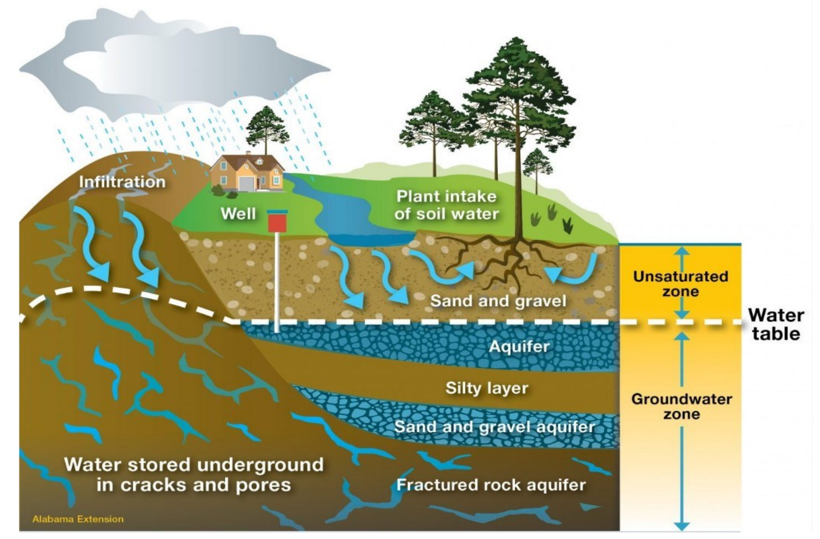
• Generally, domestic well users meet the SGMA definition of a de minimis extractor, defined as "a person who extracts, for domestic purposes, two acre-feet or less (of groundwater) per year." Most households with a domestic well that are not watering crops or large areas of landscape are likely de minimis extractors; however, under certain circumstances, SGMA may apply.
• Whether or not SGMA applies to a domestic well owner, the implementation of a Groundwater Sustainability Plan will mean changes in the management of groundwater with potentially wide-ranging effects. All stakeholders in a groundwater basin subject to SGMA are encouraged to participate.



Results in the graphic above represent an annual overdraft of approximately 10,000 acre feet per year

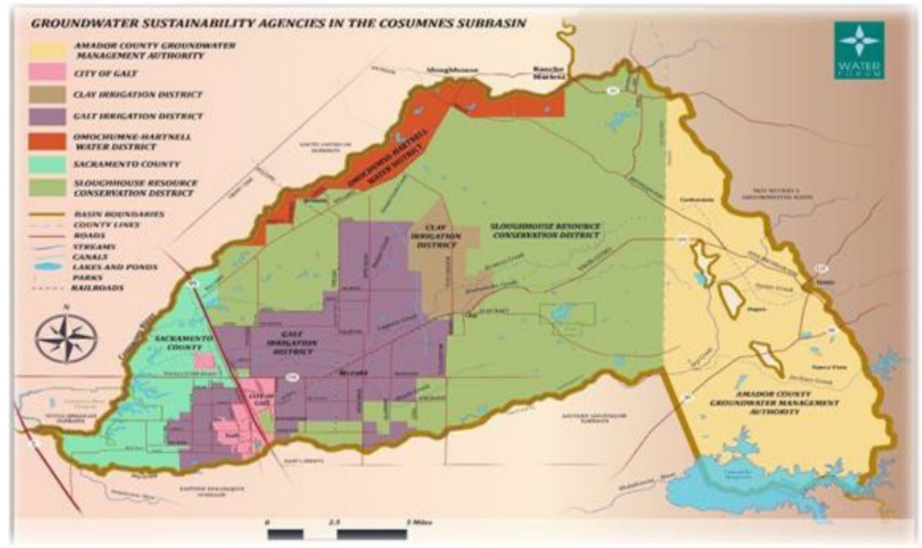
Why is it important SGMA regulates Groundwater?

Groundwater is an important source of water stored in the earth beneath our feet, in spaces between sand, soils, and fractured rock known as an aquifer. Layers of aquifers make up a groundwater basin. During an average year, California's 515 alluvial groundwater basins and subbasins contribute approximately 38 percent toward the State's total water supply. During dry years, groundwater contributes up to 46 percent (or more) of the statewide annual supply, and serves as a critical buffer against the impacts of drought and climate change. Many municipal, agricultural, and disadvantaged communities rely on groundwater for up to 100 percent of their water supply needs. We mostly access groundwater through wells and pumps, and it is a crucial buffer against drought when surface water levels, like that in lakes and reservoirs, are running low.
• When groundwater is extracted in excess of what nature recharge efforts can replenish, groundwater elevations drop. Drops in groundwater levels can cause wells to go "dry", creating a need to deepen a well, or the drilling of a new well. Over-pumping of our aquifer on a continued basis has several negative consequences such as groundwater level declines, land subsidence, reduction of groundwater storage, and water quality issues. Additionally, seawater intrusion and disruption of interconnect surface-water can impact a Basin.
• Between 1999 and 2018, Groundwater levels in the Cosumnes Subbasin have dropped as much as 25 feet in some areas.



The Cosumnes Subbasin

• Designated as a Medium Priority Basin by the Department of Water Resources based on population size.
• Our Local Groundwater Agency is the **Cosumnes Groundwater Authority (CGA)** . The CGA is the lead agency for the entire Subbasin, and coordinates with the 7 Groundwater Sustainability Agencies (GSA's) in the Basin
• Each GSA has 1 appointed, and 1 alternate member that make up the 14 member **Cosumnes Groundwater Authority Board**



What is the Cosumnes Subbasin doing to protect our Groundwater?

• **Conservation Efforts** – continued efforts to conserve water to maintain aquifer "balance" between inflows and withdrawals
• **Projects and Partnerships** – determine the best options for future implementation of aquifer recharge projects, explore the potential of delivery of water from outside the Basin
• **Active Basin wide Monitoring** – full and active monitoring of volunteer groundwater wells, test wells, local rivers, creeks and streams will tell us our current aquifer conditions

Laguna Del Sol Test Dry Well, Omochumnes-Hartnell Water District PMA

What can I do and were can I find more information?

All GSAs are legally required to consider all beneficial uses and users of groundwater, including domestic, agricultural, municipal, environmental, tribes, and disadvantaged communities; it is critical that local water users participate in the process to ensure the management changes address the diverse needs and priorities of the region. A Groundwater Sustainability Plan developed through robust involvement with all stakeholders within the basin will ensure the Plan's success.

- Sign up for CGA Meeting notifications at www.cosumnesgrounwater.org
- Join the Citizens Advisory Council (CAC), find the application at www.cosumnesgroundwater.org
- Attend your GSA (Groundwater Sustainability Agency) meetings, find your GSA on the map link at www.cosumnesgroundwater.org
- SGMA resources and learning materials are available through the Department of Water Resources at www.water.ca.gov
- Visit **drought.ca.gov** for water shortage assistance information that may be available in your area.
- Complete your mailed Farmers Survey, link found at www.cosumnesgroundwater.org

Groundwater Sustainability Funding

Intro?

SGMA Implementation Funding in the Cosumnes Subbasin

GSP Development (2017-2021):

- State Grants: $1,656,000
- Local GSA and Partner Contributions: $1,662,000+
- Sacramento County and Other Partners:
- Local GSAs: sum of all 7:
- Note about in kind
- Try to identify other partners in name
- Local Groundwater Sustainability Fee: $0

Insert Pie Chart

GSP Implementation (2022-present):

- Local Groundwater Sustainability Fees: $900k ($450k yearly for 2 years)
- $10/irrigated acre
- Current Grants Applications in development/submitted: $6mil

Cosumnes Groundwater Authority Regulatory and Operational Expenses

Expense Item	FY 21-22 Budget
Establish Organization	$10,000
Funding Exploration	$35,000
Monitoring	$30,000
Data Management System	$10,000
Public Outreach	$20,000
Legal	$30,000
Financial Audit	$15,000
Personnel	$90,000
Miscellaneous	$3,000
Data Gaps	$25,000
Annual Report	$48,000
Post-GSP Fee Establishment	$100,000
Other PMAs	$20,000
Contingency	$8,185
Sub Totals	$444,185

Cosumnes Groundwater Authority Projects and Management Actions Expenses

Estimates, CGA has not yet determined its full suite of PMAs that it will undertake in the first 5 years.

Cosumnes Groundwater Sustainability Fee (2020—present)

- $10/irrigated acre (~42,500 acres in Southeast Sacramento County)
- 5 agencies implemented the fee to fund the initial years of the Cosumnes Groundwater Authority (established November 2021) and the implementation of the Cosumnes Groundwater Sustainability Plan (adopted January 2022).
- Amador County and City of Galt contributed a proportional amount to the effort based on their groundwater use in the Subbasin.

Cosumnes Groundwater Sustainability Fee (2023—2027)

- Funding study currently in development by the CGA Board.
- Public workshops on the CGA budgets, funding methodology, and groundwater sustainability fee rates will be held between now and April 2023 to inform the final consideration of the new study by the GSAs in the summer of 2023.
- Funding Workshop Date: March ?, 2023
- For more information, go to CosumnesGroundwater.org/funding

Graphic drawing attention to upcoming workshop dates and website for more information.

Upcoming Workshops/Outreach

- March (early): TBD
- Conservation/Land Repurposing (Delta example, DOC MLRP app.)
- March (early): Galt, 6-8
- Funding study
- March (mid/late): Wilton/Herald, 6-8
- Funding study

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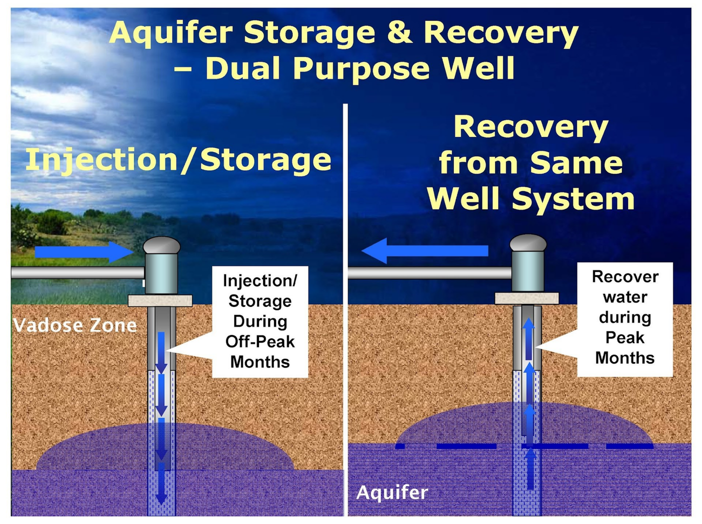
Laguna Del Sol

Intro—Purpose and why



Aquifer Storage and Recovery Example

Increasing Aquifer Capacity

Passive Infiltration

- field flooding
- recharge basins
- dry wells

Active Infiltration

- Aquifer Storage and Recovery

Demand Management

- Water Conservation


Recharge Basin located in Tucson, AZ


Field flooding in a vineyard

Managed Aquifer Recharge

What has worked elsewhere?

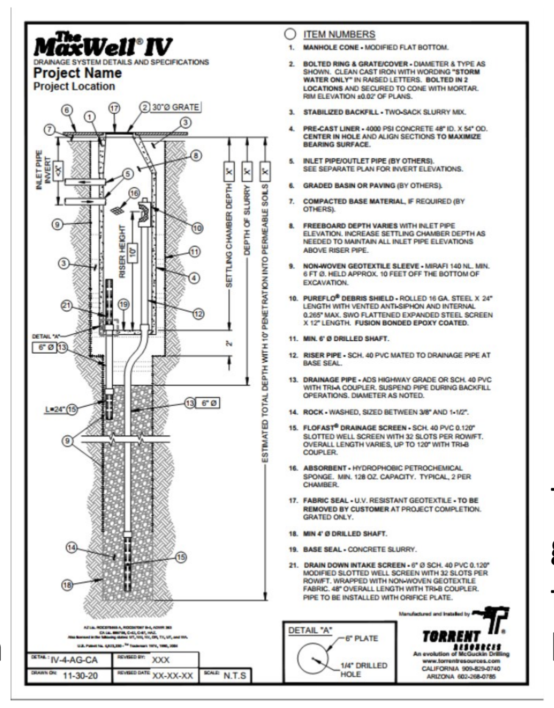
- Basin Flooding
- Field Flooding
- Aquifer Storage and Recovery Wells
- Dry wells for stormwater capture

How this could help address our problem?

- Shallow clay layers and other lithologic constraints restrict the effectiveness of field or basin flooding.
- Dry wells provide a cost-effective way to get water into the aquifer under the geologic conditions in the Cosumnes Subbasin

What is a dry well?

Dry well use at Laguna Del Sol was torrent MaxWell 4 which contained an interior sedimentation chamber. The function of these chambers is to trap particles and associated pollutants. The dry wells were approximately 3 feet wide and 50 feet deep. When the sedimentation chamber fills up, water passes through a tube that extends deep into the ground. They passed through multiple layers of clay to get to sand and gravel layers that will receive a large volume of water.



Graphic displaying the intricacies of a dry well, similar to what was installed at Laguna Del Sol Resort.

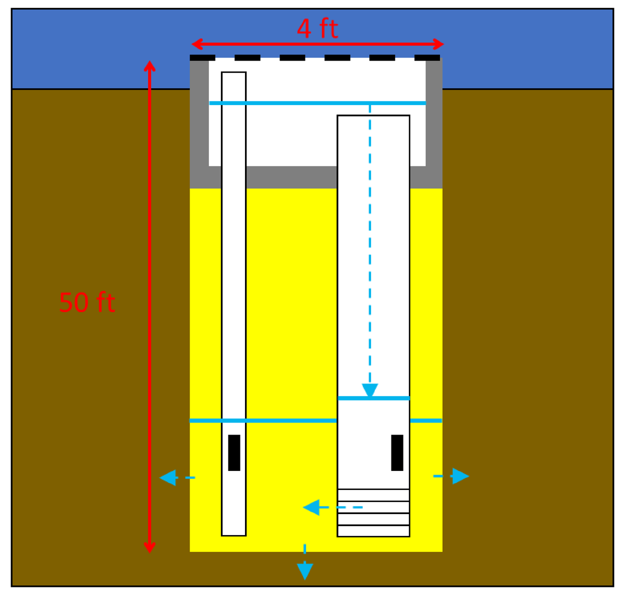
Source: Torrent Resources, Inc.

Simplified illustration of a dry well installed at Laguna Del Sol Resort.

Yellow: Gravel backfill

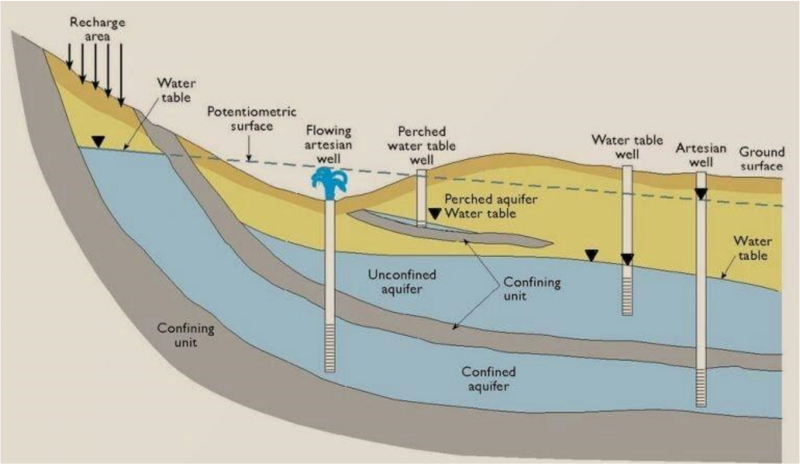
Black boxes: monitoring instruments

Blue lines/arrows: water flow

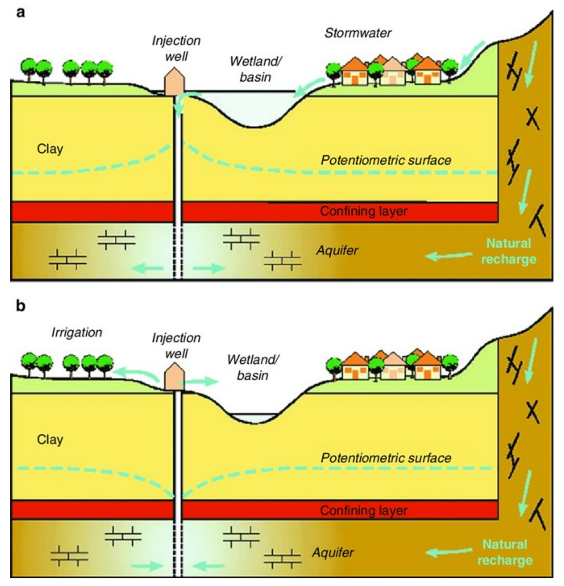


Why use this method?

This aquifer recharge method is capable of getting water past shallow confining soil layers, like the clay layers in the Cosumnes Subbasin. Their relatively simple construction keeps installation and maintenance costs low.



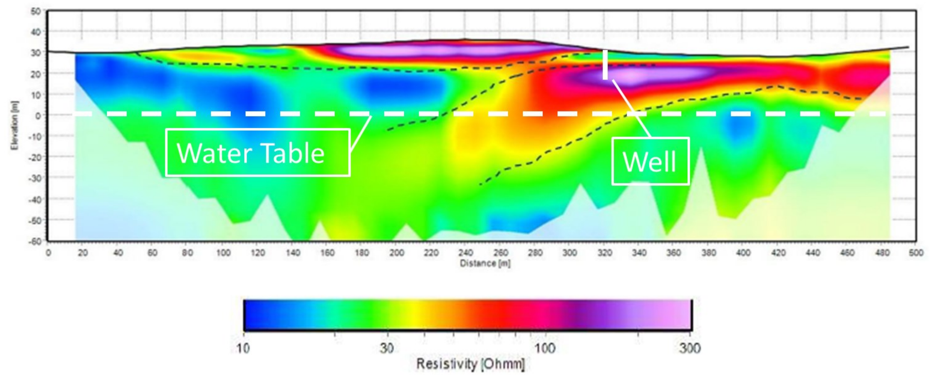
Aquifer illustration example: Perched Aquifer and Confining Layers



Barnett, Steve & Harrington, Nikki & Cook, Peter & Simmons, Craig. (2020). Groundwater in Australia: Occurrence and Management Issues.

Location

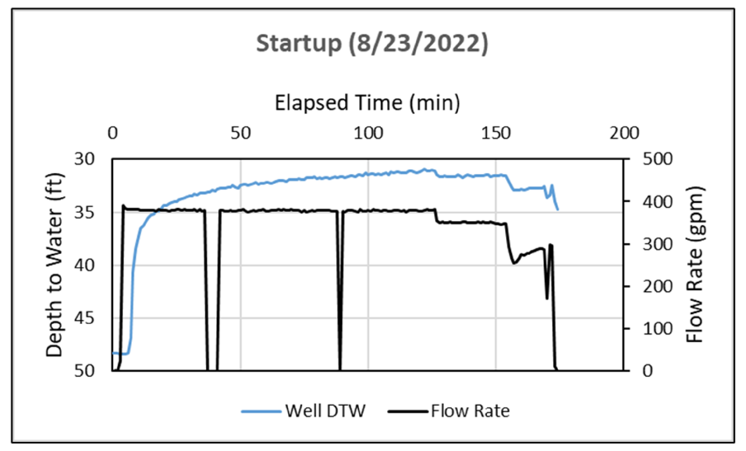
Insert Map of LDS***



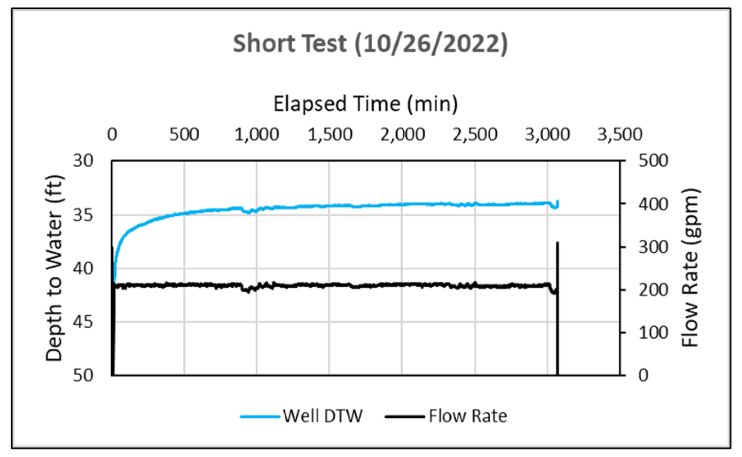
Electrical Resitivity Tomography graph of the Laguna Del Sol project location. Note: higher resistivity (purple) indicates higher infiltration capabilities of the soil

Feasibility Testing

- Maximum flow rate supplied to well: 380 gpm; Sustained flow rate to well: 225 gpm
- Infiltration Rate has equaled supplied water rate during testing periods
- 30-day test begins on March 1, 2023



Flow Rate: water supplied to dry well



Depth to Water: depth to water inside dry well

Project Future (1—3 years)

- Various dry well construction designs will be installed and tested
- Dry well design will be evaluated on a cost-benefit ratio (cost of well installation vs. infiltration rates)
- Additional project sites will be explored and evaluated for recharge potential
- Work with landowners to secure access and design 1-3 additional recharge projects along the Folsom South Canal and/or Laguna Creek corridor

Hurdles to Overcome

Regulatory

- Water rights
- Permitting

Financial

- Initial capitol
- Yearly operation and maintenance

Willing Landowners

Water Sources

Timing of water

- Winter flood waters
- Need to capture and store water quickly


Approximately 4-ft Auger

Long Term Future

One possible outcome of this project is a dry well aquifer recharge network. Hundreds of wells could be installed along waterways, such as the Folsom South Canal, Cosumnes River, Laguna Creek, Dry Creek, and others. Water rights would be secured allowing for diversions during high flow, winter rain events. Approximately 20,000 acre-feet/year of aquifer recharge is needed reach sustainability by 2042.