ASSEMBLY COMMITTEES ON AGRICULTURE and

WATER, PARKS, AND WILDLIFE

ASSEMBLYMEMBERS SORIA AND PAPAN, CHAIRS

INFORMATIONAL HEARING
Tuesday, September 17, 2024
10:00 a.m. – 1:00 p.m.
County of Merced, Board of Supervisors Chambers, 3rd Floor
2222 M Street; Merced, CA

Groundwater Recharge

Introduction. Groundwater is an important source of supply for California's communities, economy, and diverse natural resources. Unfortunately, many areas of the state have been pumping and using more groundwater than is naturally replenished. As a result, these same areas are now working diligently to bring groundwater use into balance with supply. This is not an easy undertaking. Many groundwater management agencies are looking to increase supplies through groundwater recharge, a strategy that is widely supported and will not only help bring use into balance, but put the state in a better position to respond to the impacts of climate change.

The Assembly Committees on Agriculture and Water, Parks, and Wildlife are holding this hearing to learn more about groundwater recharge and to explore ways in which the Legislature can facilitate this practice while avoiding any potential adverse impacts.

Background. Groundwater refers to water stored beneath the land surface; it "fills the pores and fractures in underground materials such as sand, gravel, and other rock, much in the same way that water fills a sponge."[1] While groundwater may be out of sight and sometimes out of mind, it is, nonetheless, a vital source of water for California's communities, economy, and environment. Per Department of Water Resources (DWR), groundwater represents 30% to 40% of California's water supply in "normal" and wet years and nearly 60% in dry years.[2]

For many decades, many regions of the state have been using or pumping out more groundwater on an annual basis than is replenished (or recharged). This is referred to as "overdraft," a condition when "more groundwater is pumped out compared to what natural or human efforts, called recharge, can do to put water back into the aquifer."[3] Overdrafting of groundwater can lead to adverse impacts including diminished water quality, land subsidence, reduced water storage, and reduced water supply. Due to the combination of these adverse impacts and

[1] U.S. Geological Survey, "What is groundwater?" Accessed September 11, 2024, https://www.usgs.gov/faqs/what-groundwater.
[2] DWR, *California's Groundwater, Update 2020* ("Bulletin 118") (Sacramento, 2020), 1-1.
[3] DWR, "Groundwater: Understanding and Managing this Vital Resource," Accessed September 11, 2024, https://data.cnra.ca.gov/dataset/calgw_update2020/resource/1a04ec16-4473-4f31-be10-ba46aac752d2.

drought, the State Legislature, Governor, and myriad stakeholders worked to pass the Sustainable Groundwater Management Act (SGMA) in 2014.

SGMA represents the first time the state adopted a comprehensive approach to managing groundwater resources and it requires local agencies [i.e., groundwater sustainability agencies (GSA)] to develop groundwater sustainability plans (GSP) to sustainably manage groundwater resources in their groundwater basins. SGMA defines sustainable groundwater management as the avoidance of "undesirable results" (i.e., chronic lowering of groundwater levels, reduction of groundwater storage, seawater intrusion, degraded water quality, land subsidence, and depletions of interconnected surface waters). SGMA's explicit intent is to keep management of groundwater resources at the local level while allowing for state intervention if local agencies are unsuccessful or get off track in meeting their sustainability goals. SGMA also intends for GSAs to have flexibility to address conditions unique to their particular basin and states that it does not alter groundwater rights.

What is Groundwater Recharge? Groundwater recharge occurs when water on the land surface or a water body percolates down through layers of soil and earth into aquifers. Recharge occurs naturally when it rains and when water moves through rivers, streams, and creeks. It can also occur through active management when individuals or agencies divert water from a waterway to farmland or a settling basin where the water can gradually percolate down into the aquifer. Rates of recharge vary by soil type and conditions, but it is generally not a rapid process. Active groundwater recharge requires advance planning and infrastructure to be successful.

The GSPs developed under SGMA must include a groundwater budget and identify actions to reverse groundwater overdraft and avoid undesirable results over a 20-year period. The management actions GSAs can implement to achieve this basically fall into either demand management or supply augmentation buckets. Due to the harmful economic impacts of reducing groundwater use, many GSAs are keenly interested in supply augmentation and, therefore, intend to increase groundwater recharge in their respective basins.

To wit, in a 2020 study reviewing the GSPs submitted for critically overdrafted basins in the San Joaquin Valley, the Public Policy Institute of California (PPIC) shows that, collectively, the GSPs intend to recharge nearly 1 million acre-feet (MAF) of water annually to address groundwater overdraft.[4] This is significant given that PPIC estimates that groundwater overdraft in the region for the 1987-2017 period was nearly 2 MAF annually.[5] PPIC notes there are challenges to realizing the goal of recharging this amount of water on an annual basis, but the analysis does show the strong interest in recharge to address groundwater overdraft.

In addition, the importance of groundwater recharge has been recognized in numerous state plans and strategies:

- The California Water Plan: Update 2023 – see Recommendations (and associated sub-actions) 2.1, 3.1, 3.3, 4.2, and 6.2.

[4] Ellen Hanak, Jelena Jezdimirovic, Alvar Escriva-Bou, Andrew Ayres, *A Review of Groundwater Sustainability Plans in the San Joaquin Valley*, (San Francisco: PPIC, 2020), 6.
[5] Ibid, 1.

- Governor Newsom's "California's Water Supply Strategy: Adapting to a Hotter, Drier Future" (August 2022) – see Action 2.1 that calls for an increase in annual groundwater recharge of 500,000 AF.
- Water Resilience Portfolio (2020) – see Actions 3, 5, 11, and 16.
- The California Water Action Plan (2014) – see Actions 2, 4, and 6.

Despite the many benefits of recharge, there are also potential adverse impacts from groundwater recharge. These include degradation of groundwater quality (if source water is contaminated[6] and/or recharge moves contaminants in the soil into groundwater aquifers), infringement on the water rights of others, adverse impacts to fish and other aquatic species, exacerbating flood risk if water is diverted in areas that are inappropriate, and adverse impacts on vines and orchards due to root inundation (though this concern appears to be diminishing as this practice is studied[7] and more landowners flood their orchards to allow for groundwater recharge).

Flood-MAR ("managed aquifer recharge"). A compelling multiple benefit approach that can provide flood protection while recharging groundwater is "Flood-MAR." Under this approach, high surface water flows (or floodflows) are diverted during periods of abundant precipitation or atmospheric rivers. The state is actively involved in attempting to expand these efforts due to the public safety and water supply benefits it can provide during wet winters such as 2017 and 2023.

According to DWR, Flood-Mar is:

> An integrated and voluntary resource management strategy that uses flood water resulting from, or in anticipation of, rainfall or snowmelt for groundwater recharge on agricultural lands and working landscapes, including but not limited to refuges, floodplains, and flood bypasses. Large-scale implementation of Flood-MAR will fundamentally change how flood and groundwater management are managed. Flood-MAR can be implemented at multiple scales, from individual landowners diverting flood water with existing infrastructure, to using extensive detention/recharge areas and modernizing flood protection infrastructure/operations. Flood-MAR's potential and value for California is achieved by integrating Flood-MAR with other regional recharge efforts, changing management of California's water system to better integrate surface water and groundwater, upgrading conveyance, storage, and operations….[8]

Flood-MAR can provide multiple benefits including: Flood risk reduction, drought preparedness, aquifer replenishment, ecosystem enhancement, subsidence mitigation, water

[6] U.S. Environmental Protection Agency, "Enhanced Aquifer Recharge Research," Accessed September 12, 2024, https://www.epa.gov/water-research/enhanced-aquifer-recharge-research.
[7] Xiaochi Ma, Helen Dahlke, Roger Duncan, David Doll, Paul Martinez, Bruce Lampinen, and Astrid Volder, "Winter flooding recharges groundwater in almond orchards with limited effects on root dynamics and yield," *California Agriculture* 76, no. 2-3 (2022), 8.
[8] DWR, *Flood-MAR: Using Flood Water for Managed Aquifer Recharge to Support Sustainable Water Resources (White Paper)*, (Sacramento: 2018), 7.

quality improvement, working landscape preservation and stewardship, climate change adaptation, and recreation and aesthetics.

In March 2024, DWR completed a three-year study on the potential benefits of implementing Flood-MAR in the Merced River watershed. The analysis looks at four scenarios – status quo plus three scenarios using various levels of Flood-MAR that incorporate recharge, reservoir reoperation, and infrastructure enhancement – and finds that all three scenarios implementing various levels of Flood-MAR will provide water supply, environmental, and/or flood protection benefits while making the region more resilient to climate change. The study concludes that the "outcome demonstrates that Flood-MAR can play an important role in adapting water management in California and illustrates the value of project planning and implementation at the watershed scale."[9] The Merced Irrigation District (MID) collaborated with DWR on this study and the Committees look forward to hearing DWR's and MID's thoughts on the potential to implement Flood-MAR in the Merced River watershed.

Legal framework for groundwater in California. Unlike surface water rights, in the vast majority of cases, a groundwater pumper does not need to obtain a permit or license from the State Water Resources Control Board (State Water Board) in order to use groundwater. Rights to groundwater are correlative to landownership and landowners overlying a groundwater aquifer possess an inherent right to use the groundwater beneath the surface of their land. These rights are also referred to as "overlying" rights. Pumpers must still put the groundwater to beneficial use and are subject to the "reasonable use doctrine," otherwise, the right is not well defined and oftentimes not quantified. In several basins pumpers have gone to court to resolve disputes over groundwater use. This process is referred to as an "adjudication" and the court typically establishes a "safe yield" and apportions pumping rights to water in the basin. Adjudicated basins are managed pursuant to the court order or settlement and are not subject to SGMA.

In non-adjudicated basins, there is uncertainty about whether water that is proactively recharged by one landowner will not be pumped out by an adjacent landowner (and there is generally no prohibition on such activity). As such, accounting for who gets to use any water that is recharged remains an ongoing challenge. Fortunately, SGMA has significantly improved the accounting of groundwater resources[10] so that landowners that desire to recharge groundwater for later use can have a higher degree of confidence that water they recharge will be there at a later date for their use.

Permitting of groundwater recharge projects. Capturing water during high-flow or flood events can be challenging if a potential diverter has not obtained the necessary permits to do so. This is because a water right or permit is required if a groundwater recharge project involves diverting surface water from a river or stream to a recharge area. Obtaining a permanent water right can take a long time so, several projects in recent years have opted to seek a temporary urgency (180-day) permit to divert flood flows to groundwater recharge. The State Water Board can also issue a five-year temporary permit for groundwater recharge.

[9] DWR, *Merced River Watershed Flood-MAR Reconnaissance Study*, (Sacramento: 2024), ES-5.
[10] Caitlin Peterson, Ellen Hanak, Zaire Joaquín Morales, *Replenishing Groundwater in the San Joaquin Valley: 2024 Update*, (San Francisco: PPIC, 2024), 16.

Both 180-day and five-year temporary permits are a conditional approval to divert and use available water that has not been claimed by a water right holder. Permits are junior to all water rights and include terms and conditions that prohibit diversions in times of water shortage when the demands of other right holders may not be met. Temporary permits are typically processed more quickly than standard permits and may be renewed, but are subject to change or revocation at any time. Applicants must complete a water availability analysis to determine excess water is available and obtain a Lake and Streambed Alteration Agreement (LSAA) from the Department of Fish and Wildlife (DFW).

There has been some frustration with the permitting process for groundwater recharge. In PPIC's 2023 survey on groundwater recharge in the San Joaquin Valley, 32% of respondents report a "permitting or regulatory barrier" to implementing groundwater recharge projects (contrast with 49% of respondents that report an "infrastructure" barrier and 23% that report a "cost or funding barrier").[11]

In the past decade, both state agencies and the Legislature have tried to find ways to expedite the permitting process for groundwater recharge efforts given the high priority placed on this action. In the 2023-24 Legislative Session, AB 2060 (Soria) and SB 1390 (Caballero) were introduced and attempted to facilitate groundwater recharge efforts; however, neither made it all the way through the process before the Legislature adjourned on August 31, 2024. The Governor's Executive Orders (EO) during Winter 2023 and SB 122 (Committee on Budget and Fiscal Review), Chapter 51, Statutes of 2023, have been implemented and helped increase groundwater recharge in 2023 (see next section).

Governor's EOs N-4-23/N-7-23 and SB 122 (Committee on Budget and Fiscal Review). To take advantage of the unexpected wet winter last year and capture high water flows for groundwater recharge, Governor Newsom issued EO N-4-23 which, among other provisions, authorized diverters to temporarily take "floodflows" off of streams and rivers for groundwater recharge without obtaining a water right, complying with the California Environmental Quality Act, and obtaining an LSAA. The authority in EO N-4-23 was modified and extended through EO N-7-23 and then codified into law with the passage of SB 122 last year. SB 122 makes various changes to the EOs, including adding a requirement that a local or regional agency must rely upon a local plan of flood control or a county general plan that considers flood risk in order for an unpermitted diversion of floodflows to occur within the agency's territory. Further, the diverted water cannot be applied to certain types of land (e.g., where manure has been applied in the previous 45 days) and the diversion must meet the following criteria:

- Use existing diversion infrastructure or temporary pumps;
- Use existing groundwater recharge locations;
- Cannot use new permanent infrastructure or permanent construction; and
- Use protective screens on temporary pumps to protect fish and other aquatic life when water is diverted directly from a river or stream. The protective screens must be constructed of any rigid material, perforated, woven, or slotted that allows water to pass

[11] Ibid, 21.

while physically excluding fish. In addition, a protective screen must be parallel to the flow of water and adjacent to the water's edge and meet other specified criteria.

The State Water Board received and posted 78 reports of temporary diversion of floodflows for groundwater recharge under the authority granted by the EOs (see https://www.waterboards.ca.gov/waterrights/water_issues/programs/groundwater-recharge/). The majority of these reports indicate that diversions began the same day or within days of, the issuance of the first EO, N-4-23, on March 10, 2023 and, in many cases continued through August and even September 2023. EO N-4-23 provides in paragraph 3c that "diversions cease when the flood conditions have abated to the point there is no longer a risk of flooding and inundation of land, roads, or structures downstream of the point of diversion" (EO N-7-23 extended the authority to divert but also this restriction). Despite this requirement, it appears that many diversions under the authority granted by the EOs continued long after flood conditions had abated.

Progress in efforts to expand groundwater recharge. Despite some of the challenges with implementing groundwater recharge projects, it appears that significant progress has been made. Respondents to a PPIC survey covering 2023 recharge efforts in the San Joaquin Valley report recharging 5.3 MAF of water in 2023 and PPIC estimates the actual amount of water recharged is higher, 7.6 MAF (one reason the estimate is higher than what survey respondents reported is that respondents did not report "passive," or naturally, occurring recharge).[12]

Likewise, DWR released its Semi-Annual Groundwater Conditions report in May of this year that indicates that groundwater storage in California improved for the first time since 2019. Per the report, the state achieved 4.1 MAF of managed aquifer recharge water in 2023;[13] 1.2 MAF of this was permitted by state agencies and approximately 453,000 acre-feet occurred under the authority for the temporary diversion of floodflows for groundwater recharge authorized by EO N-4-23 and EO N-7-23 (see discussion below). The remaining recharge occurred as a result of the wet conditions.

Key legal and policy questions for groundwater recharge and Flood-MAR. The Committees hope to shed light on the following questions through this hearing:

- Where will the surface water come from?
- How much surface water is available?
- How will recharged water be accounted and recovered or otherwise used?
- What (if any) permits are required? What is the cost of these permits and any associated analysis and/or environmental review?
- Is recharge or "groundwater storage" a beneficial use?
- How can groundwater recharge and Flood-MAR projects be implemented more broadly and expeditiously?

[12] Ibid, 9-10.

[13] According to PPIC, DWR's recharge number differs than PPIC's due a difference in reporting period [Water year (October through September) versus calendar year], DWR did not include Tulare Lake basin in its estimate, and DWR may not have accounted for all of the passive recharge that occurred.

References

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