

JOINT OVERSIGHT HEARING:
Assembly Water, Parks and Wildlife Committee
Assembly Budget Subcommittee No. 3
Tuesday, March 11, 2014 – 9:00 a.m.
State Capitol, Room 437

**MANAGEMENT OF CALIFORNIA'S GROUNDWATER
RESOURCES**

BACKGROUND

The purpose of this hearing is to add to the growing and collaborative conversation about groundwater management in California – a conversation made more urgent by the Governor's declaration of a drought state of emergency. California uses more groundwater than any other State. And that usage increases in dry years. Yet groundwater is perhaps our most mysterious and least understood water source. Groundwater refers to water located beneath the surface in soil pore spaces and in the fractures of rock formations. It does not exist as one continuous homogenous bathtub-like water body, but can be almost like a layer cake with different levels of varying depths that extend to large areas or are confined to small disconnected pockets.

Bulletin 118-03 – A Snapshot from the Past

As far back as 1952, the predecessor agency to the Department of Water Resources (DWR), the State Department of Public Works, Division of Water Resources, published *Water Quality Investigations Report No. 3* detailing the "more important groundwater basins" as part of a mission to "investigate the condition of the quality of all waters within the State, including saline waters, coastal and inland, as related to all sources of pollution of whatever nature...." These ongoing investigations evolved into a series of reports known as Bulletin 118: *California's Groundwater*. The last update of Bulletin 118 was in 2003 (Bulletin 118-03).¹

Bulletin 118-03 maps out, by name, and with a unique numerical identifier, all of the groundwater basins and subbasins in California. Even in 2003, it was recognized that 11 groundwater basins in California had reached a critical state of overdraft. Overdraft is defined as the condition where the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years under water supply conditions that are considered average. In some basins groundwater recharge occurs uniquely through natural surface water percolation. In other areas it is augmented by artificially constructed water spreading basins or by injecting water through wells.

In the opening foreword of Bulletin 118-03, Michael J. Spear, who was at that time the DWR Interim Director, concluded that "[e]ffective management of groundwater basins is essential because groundwater will play a key role in meeting California's water needs." That statement was true at the time and, in light of climate change and extreme weather events that will cause less snowpack and more rain, it is even more imperative today.

¹ Bulletin 118 (2003) can be accessed at: <http://www.water.ca.gov/groundwater/bulletin118/update2003.cfm>

Over a decade ago, Bulletin 118-03 presented the following seven "Major Findings." Reviewing those Findings is a useful benchmark for assessing what has changed, or not changed, with regard to groundwater management efforts in California:

- 1. Groundwater provides about 30% of the State's water supply in an average year, yet in many basins the amount of groundwater extracted annually is not accurately known.**
 - In some regions, groundwater provides 60% or more of the supply during dry years.
 - Many small- to moderate-sized towns and cities are entirely dependent on groundwater for drinking water supplies.
 - 40% to 50% of Californians rely on groundwater for part of their water supply.
 - In many basins, groundwater use is indirectly estimated by assuming crop evapotranspiration demands and surveying the acreage of each crop type.

- 2. Opportunities for local agencies to manage their groundwater resources have increased significantly since the passage of Assembly Bill 3030 in 1992. (Water Code § 10750 et seq.). In the past several years more agencies have developed [groundwater] management programs [GWMPs] to facilitate conjunctive use, determine the extent of the resource, and protect water quality.**
 - The act provides the authority for many local agencies to manage groundwater.
 - The act has resulted in more than 200 local agencies adopting [GWMPs] to date.
 - The act encourages regional cooperation in basins and allows private water purveyors to participate in groundwater management through memoranda of understanding with public agencies.
 - Many local agencies are recognizing their responsibility and authority to better manage groundwater resources.

- 3. Agencies in some areas have not yet developed [GWMPs].**
 - Concerns about cooperative management, governance, and potential liabilities have kept some agencies from developing [GWMPs].
 - Development of management programs to maintain a sustainable groundwater supply for local use has not been accomplished throughout the State.

- 4. A comprehensive assessment of overdraft in the State's groundwater basins has not been conducted since Bulletin 118-80, but it is estimated that overdraft is between 1 million and 2 million acre-feet annually.**
 - Historical overdraft in many basins is evident in hydrographs that show a steady decline in groundwater levels for a number of years.
 - Other basins may be subject to overdraft in the future if current water management practices are continued.
 - Overdraft can result in increased water production costs, land subsidence, water quality impairment, and environmental degradation.
 - Few basins have detailed water budgets by which to estimate overdraft.
 - While the most extensively developed basins tend to have information, many basins have insufficient data for effective management or the data have not been evaluated.
 - The extent and impacts of overdraft must be fully evaluated to determine whether groundwater will provide a sustainable water supply.

- Modern computer hardware and software enable rapid manipulation of data to determine basin conditions such as groundwater storage changes or groundwater extraction, but a lack of essential data limits the ability to make such calculations.
- Adequate statewide land use data for making groundwater extraction estimates are not available in electronic format.

5. Surface water and groundwater are connected and can be effectively managed as integrated resources.

- Groundwater originates as surface water.
- Groundwater extraction can affect flow in streams.
- Changes in surface water flow can affect groundwater levels.
- Legal systems for surface water and groundwater rights can make coordinated management complex.

6. Groundwater quality and groundwater quantity are interdependent and are increasingly being considered in an integrated manner.

- Groundwater quantity and groundwater quality are inseparable.
- Groundwater in some aquifers may not be usable because of contamination with chemicals, either from natural or human sources.
- Unmanaged groundwater extraction may cause migration of poor quality water.
- Monitoring and evaluating groundwater quality provides managers with the necessary data to make sound decisions regarding storage of water in the groundwater basin.
- State agencies conduct several legislatively mandated programs to monitor different aspects of groundwater quality.
- DWR monitors general groundwater quality in many basins throughout the State for regional evaluation.

7. Land use decisions affecting recharge areas can reduce the amount of groundwater in storage and degrade the quality of that groundwater.

- In many basins, little is known about the location of recharge areas and their effectiveness.
- Protection and preservation of recharge areas are seldom considered in land use decisions.
- If recharge areas are altered by paving, channel lining, or other land use changes, available groundwater will be reduced.
- Potentially contaminating activities can degrade the quality of groundwater and require wellhead treatment or aquifer remediation before use.
- There is no coordinated effort to inform the public that recharge areas should be protected against contamination and preserved so that they function effectively.

Where Are We Now? And What Should We Do Next?

On January 17, 2014 Governor Brown declared a drought state of emergency in California. The Governor's declaration comes on the heels of three dry years in a row and is the second time in five years that a California Governor has declared a drought state of emergency. In December 2009, following the state's last prolonged drought, data from the National Aeronautics and Space Administration (NASA)/German Aerospace Center Gravity Recovery and Climate Experiment (GRACE) satellites revealed that between 2003 and 2009 the groundwater aquifers for the Central Valley and its major mountain water source, **the Sierra Nevadas, had lost almost 26**

million acre-feet of water² – which is nearly enough water combined to fill Lake Mead, America's largest reservoir. The findings reflected the effects of California's extended drought and the resulting increased rates of groundwater being pumped for human uses, such as irrigation.

Overdraft in California today is estimated to occur in parts of the Central Valley, especially the Tulare Lake Basin, but also in some coastal and southern California basins with limited surface water supplies and intensive agriculture. While some overdraft reverses temporarily during wet periods, DWR estimates that California is overdrafting its groundwater at a rate of 1.5 million acre-feet per year. **However, NASA estimates groundwater overdraft in California may be close to 4.4 million acre-feet per year statewide.**

Groundwater Management and Monitoring of Supply

There are three basic methods available for managing groundwater resources in California: management by local agencies under authority granted in the California Water Code or other applicable State statutes; local government groundwater ordinances or joint powers agreements; and, court adjudications.

AB 3030 (Costa), the California Groundwater Management Act, was passed by the Legislature in 1992.³ It was a significant addition to the groundwater management authorities granted under the Water Code in that it greatly increased the number of local agencies authorized to develop GWMPs and set forth a common framework for management by local agencies throughout California. Though adoption of a GWMP is encouraged under AB 3030 and not required, subsequent bond initiatives and statutes have made an adopted GWMP an eligibility criterion for receiving groundwater project and program funds. Since its passage, 149 agencies have adopted GWMPs in accordance with AB 3030. Other agencies have begun the process. As mentioned above, in some basins, groundwater is managed under other statutory or judicial authority.

The California Groundwater Management Act, as amended, provides a systematic procedure to develop a GWMP and requires the inclusion of certain minimum components. These include basin management objectives and monitoring and management of groundwater levels, inelastic surface subsidence, and changes in surface flow and surface quality that directly affect groundwater levels or quality or are caused by groundwater pumping. The Act also requires a description of how recharge areas identified in the plan substantially contribute to the replenishment of the groundwater basin. In addition, suggested optional components that might be relevant for a particular groundwater basin are listed.

In 2009 groundwater monitoring took a step forward in the historic five-bill package of water legislation adopted during the Seventh Extraordinary Session on water in 2009. That package included SBX7 6 (Steinberg).⁴ SBX7 6 recognized that the statewide collection and evaluation of seasonal and long-term trends in groundwater elevations in California's groundwater basins is an important fundamental step toward improving management of California's groundwater

² An acre-foot is a standard measurement of water volume. It is enough water to cover an acre of land a foot deep or about 325,900 gallons.

³Water Code §§ 10750 and sequence

⁴ For a description of all of the bills in the package go to: <http://awpw.assembly.ca.gov/waterfaq>

resources. To achieve that goal, SBX7 6 incentivizes local monitoring entities to collect groundwater elevation data or mandates that it must be done by DWR. In accordance with SBX7 6, DWR developed the California Statewide Groundwater Elevation Monitoring (CASGEM) program. DWR states that the "intent of the CASGEM program is to establish a permanent, locally-managed program of regular and systematic monitoring in all of California's alluvial groundwater basins." DWR adds that the CASGEM program will rely and build on the many, established local long-term groundwater monitoring and management programs" and that its "role is to coordinate the CASGEM program, to work cooperatively with local entities, and to maintain the collected elevation data in a readily and widely available public database."

Groundwater Contamination

Groundwater contamination is a widespread problem in California affecting many different types of communities from Maywood in southern California to Seville in the Central Valley. In 2000 the State Water Resources Control Board (State Water Board) created the Groundwater Ambient Monitoring and Assessment (GAMA) program to better understand California's groundwater quality issues. AB 599 (Lui, Chapter 522, Statutes of 2001), the Groundwater Quality Monitoring Act, expanded that program resulting in a publicly accepted plan to monitor and assess groundwater quality in basins that account for over 95% of the state's groundwater use. According to the State Water Board, "GAMA Program projects have analyzed thousands of water samples for hundreds of chemicals – many of the chemicals at ultra-low detection limits requiring state-of-the-art facilities and methods."

One effort under the GAMA Program is the Priority Basin Project. That Project focuses its assessments on the groundwater basins that account for over 95 percent of all groundwater used for public drinking. Monitoring and assessments under the Project are on a ten-year cycle, with trend monitoring every three years. Among those constituents tested are common contaminants regulated by the California Department of Public Health (CDPH) and unregulated chemicals such as pharmaceuticals, chemicals of emerging concern, isotopes, and others. As of June 2013 the U.S. Geological Survey (USGS), under the auspices of GAMA, had sampled over 2,300 public supply wells and "developed a statistically unbiased assessment of the quality of California's drinking water aquifers." GAMA states that starting in 2012 the Priority Basin Project also began to assess both deeper and shallow aquifers with the USGS as the project technical lead and analytical support from Lawrence Livermore National Laboratory.

In 2008 two pieces of legislation brought greater focus on groundwater contamination issues and efforts to find solutions. AB 2222 (Caballero, Chapter 670, Statutes of 2008) required the State Water Board to submit a report to the Legislature identifying California communities that rely on contaminated groundwater as a primary source of drinking water. The report was also required to set out principal contaminants and other constituents of concern and potential solutions and funding sources to clean up or treat groundwater or provide alternative water supplies.

The report required by AB 2222, *Communities That Rely on a Contaminated Source for Drinking Water*,⁵ was issued January 2013. It found that many groundwater basins throughout California are contaminated with either naturally-occurring constituents, ones introduced by human activities, or both and, as a result, many community water systems in the state incur

⁵ The full report can be found at <http://www.waterboards.ca.gov/gama/ab2222/docs/ab2222.pdf>

significant costs to remove contaminants from groundwater before serving it to their customers as drinking water. While the report concluded that over 98 percent of Californians using a public water supply receive safe drinking water that meets all public health standards, even some of those groundwater sources may contain elevated concentrations of contaminants.

For small community water systems the picture was even worse. Since treatment of groundwater is costly, many small community water systems are vulnerable to contaminated water because they lack the infrastructure and economies of scale of larger water systems and may not be able to afford groundwater treatment or alternative supplies.

In addition, the report acknowledged there are gaps in our knowledge about groundwater contamination. Approximately 2 million people rely on groundwater from either private domestic wells or other groundwater-reliant systems and the quality of their groundwater may be unknown because they are not regulated by the state and the state does not require them to test their water quality.

The report concluded that contamination of the state's groundwater resources results in higher costs for ratepayers and consumers due to the necessity of additional treatment and can pose a threat to public health for community water systems that cannot afford the necessary treatment systems.

The second piece of groundwater contamination related legislation in 2008 was SB 1 (Perata, Chapter 1, Statutes of 2008 Second Extraordinary Session) (SBX2 1). SBX2 1 directed the State Water Board to develop pilot projects focusing on nitrate in groundwater in the Tulare Lake Basin and Salinas Valley and to submit a report to the Legislature on the scope and findings of the pilot projects, including recommendations, within two years of receiving funding. The purpose of the pilot projects was to improve understanding of the causes of groundwater contamination, identify potential remediation solutions and funding sources to recover state costs to clean up or treat groundwater, and ensure the provision of safe drinking water to all communities.

SBX2 1 focused on nitrate because it is one of the most frequently occurring groundwater contaminants from human activities. It can occur as dissolved nitrate, nitrite, or ammonia. Nitrate pollution can pose serious health risks to pregnant women and infants if consumed at concentrations above the Maximum Contaminant Level (MCL) of 45 milligrams per liter set by CDPH. Nitrate contaminated groundwater is a particularly significant problem in the Tulare Lake Basin and Salinas Valley areas, where about 2.6 million people, including many of the poorest communities in California, rely on groundwater for their drinking water. Many other areas of the State, however, also have nitrate contaminated groundwater making it the most frequently detected anthropogenic chemical above an MCL in drinking water sources.

On February 20, 2013 the State Water Board submitted *Recommendations Addressing Nitrate in Groundwater* to the Legislature. One of the State Water Board's first steps in developing that report was to contract with the University of California, Davis (UC Davis) in 2010 to conduct an independent study. Some of the findings of the UC Davis Nitrate Report were:

- Nitrate problems will likely worsen for decades. For more than half a century, nitrate from fertilizer and animal waste has infiltrated into Tulare Lake Basin and Salinas Valley

aquifers. Most nitrate detected in drinking water wells today was originally applied to the surface decades ago.

- Agricultural fertilizers and animal wastes applied to cropland are by far the largest regional sources of nitrate in groundwater. Other sources can be locally important.
- Nitrate loading reductions are possible, some at modest cost. Large reductions of nitrate loads to groundwater can have substantial economic cost.

The State Water Board/UC Davis reports raise many issues, including the need to adequately fund projects and programs to address the needs of communities with nitrate-contaminated groundwater, many of which are economically disadvantaged or severely economically disadvantaged.⁶

State Water Resources Control Board Groundwater Workplan Concept Paper

On October 4, 2013 the groundwater discussion in California took another major step forward with the State Water Board's release of a "Discussion Draft Groundwater Workplan Concept Paper." That paper called for five key elements "whether at the local, regional, or state level" to effectively manage groundwater. The five points are:

- 1. **Sustainable thresholds** for water level drawdown and water quality for impacted, vulnerable, and high-use basins;*
- 2. Water quality and water level **monitoring and assessment**, and data management systems, capable of determining if thresholds are being met and evaluating trends;*
- 3. **Governance** structures with the **management** mechanisms needed to prevent impacts before they occur, clean up contamination where it has occurred, provide adequate treatment of contaminated drinking water sources, and ensure that meeting groundwater level and quality thresholds are managed over the long term;*
- 4. **Funding** to support monitoring and governance/management actions; and*
- 5. **Oversight and enforcement** in basins where ongoing management efforts are not protecting groundwater.*

The Groundwater Workplan Concept Paper also advised that the Water Board would be focusing "attention and assistance on high-use basins where thresholds are being exceeded."

Following release of that Concept Paper the State Water Board engaged in stakeholder discussion to receive feedback and held a highly-attended all day public workshop on January 22, 2014 "to consider public input."⁷

⁶ The full State Water Board Report, which includes the UC Davis Report as an appendix, can be found at: http://www.waterboards.ca.gov/water_issues/programs/nitrate_project/index.shtml

⁷ The Groundwater Workplan Concept Paper and information on that process can be found at: http://www.waterboards.ca.gov/water_issues/programs/groundwater/workplan.shtml

California Water Action Plan and Governor's Budget 2014-15

January 22, 2014 also saw the release of the final version of the Governor's California Water Action Plan.⁸ Responding to "one of the driest winters on record," the Governor tasked the California Natural Resources Agency, the California Environmental Protection Agency, and the California Department of Food and Agriculture in late 2013 to work together on a plan that would guide state efforts to enhance water supply reliability, restore damaged and destroyed ecosystems, and improve the resilience of our infrastructure over the next five years. The Plan focuses on eight "challenges for managing California's water supplies," which are: uncertain water supplies; water scarcity/drought; declining groundwater supplies; poor water quality; declining native fish species and loss of wildlife habitat; floods; supply disruptions; and, population growth and climate change further increasing the severity of risks.

The Action Plan sets forth the following ten actions:

1. Make conservation a California way of life;
2. Increase regional self-reliance and integrated water management across all levels of government;
3. Achieve the co-equal goals for the Delta;
4. Protect and restore important ecosystems;
5. Manage and prepare for dry periods;
6. Expand water storage capacity and improve groundwater management;
7. Provide safe water for all communities;
8. Increase flood protection;
9. Increase operational and regulatory efficiency;
10. Identify sustainable and integrated financing opportunities.

Regarding declining groundwater supplies, the Action Plan acknowledges that some of California's groundwater basins are sustainably managed, but unfortunately, many are not. The report finds that "inconsistent and inadequate tools, resources and authorities make managing groundwater difficult in California and impede our ability to address problems such as overdraft, seawater intrusion, land subsidence, and water quality degradation." But it also acknowledged that, conversely, properly managed groundwater resources could "help protect communities, farms and the environment against the impacts of prolonged dry periods and climate change" and that the "strategies identified in this action plan will move California toward more sustainable management of our groundwater resources."

With respect to expanding water storage capacity and improving groundwater management, the Action Plan focuses on the increased flexibility that could be created in California's water management system if some increment of flows in high water years could be banked for later in surface water reservoirs and groundwater basins. The Action Plan also acknowledged the need to "better manage our groundwater basins to reverse alarming declines in groundwater levels" and that continued "declines in groundwater levels could lead to irreversible land subsidence, poor water quality, reduced surface flows, ecosystem impacts, and the permanent loss of capacity to store water as groundwater." Among the programs identified for support to achieve the Action

⁸ http://resources.ca.gov/california_water_action_plan/docs/Final_California_Water_Action_Plan.pdf

Plan goals were CASGEMS and GAMA. The Action Plan also called for an update of Bulletin 118 and efforts to improve sustainable groundwater management, support distributed groundwater storage, increase statewide groundwater recharge, and accelerate cleanup of contaminated groundwater and prevent future contamination.

Importantly, the Administration's commitment to improve sustainable groundwater management advised:

Groundwater is a critical buffer to the impacts of prolonged dry periods and climate change on our water system. The administration will work with the Legislature to ensure that local and regional agencies have the incentives, tools, authority and guidance to develop and enforce local and regional management plans that protect groundwater elevations, quality, and surface water-groundwater interactions. The administration will take steps, including sponsoring legislation, if necessary, to define local and regional responsibilities and to give local and regional agencies the authority to manage groundwater sustainably and ensure no groundwater basin is in danger of being permanently damaged by over drafting. When a basin is at risk of permanent damage, and local and regional entities have not made sufficient progress to correct the problem, the state should protect the basin and its users until an adequate local program is in place.

(California Water Action Plan, pages 13-15.)

On January 9, 2014, the Governor proposed his 2014-15 budget, which includes \$619 million to advance the Action Plan. The budget takes bold steps on groundwater under the title "Expand Water Storage Capacity" by providing \$1.9 million to the State Water Board for "10 positions to act as a backstop when local or regional agencies are unable or unwilling to sustainably manage groundwater basins." The proposed budget advises that the State Water Board "will protect groundwater basins at risk of permanent damage until local or regional agencies are able to do so."

In addition to funds for the State Water Board groundwater management backstop, the budget included \$3 million for continued support of GAMA's priority basin project and \$2.9 million to DWR to continue CASGEM with an additional directive for "more effective and timely access to hydrogeologic and well construction data."

Emergency Drought Legislation

By the beginning of February it became clear to the Governor and the Legislature that California was experiencing one of the driest twelve month periods since 1895 when records first started to be kept. As the State and Federal Water Projects reeled from zero percent allocations to many of their water agencies there was a growing consensus that actions under the Water Action Plan could not wait. As a result, on March 1, 2014 the Governor signed two bipartisan measures SB 103 and SB 104 that accelerated some funding in the budget as well as making new funding available for drought-related projects and programs. Included in that package are funds to aid in groundwater management across the state, including assistance to disadvantaged communities with groundwater contamination exacerbated by the drought. There is also \$1.2 million to the State Water Board for the GAMA program; \$1 million to DWR to improve groundwater

monitoring and reporting efforts, including, but not limited to a new well completion report system; and, \$800 thousand to the State Water Board to begin its groundwater management efforts.

Governor's Office Draft Framework for Soliciting Stakeholder Input on Groundwater Management

On March 7, 2014 the Governor's Office released a draft framework for "soliciting input on actions that can be taken to assure that local groundwater managers have the tools and authority to sustainably manage groundwater consistent with the California Water Action Plan." In particular the Draft Framework advises that in developing ideas it may be helpful to consider whether local agencies need **enhanced local agency authority** and how the State should structure **state backstop authority when local action has not occurred or has been insufficient**.

The Draft Framework emphasizes that local agencies are the most familiar with the condition of their groundwater basins and are in the best position to manage those resources locally. But it acknowledges that local agencies may need new or modified statutory authorities to manage groundwater more effectively. The framework submits for consideration whether such tools would need to address:

- allocation of groundwater
- ability to control pumping
- ability to assess fees for replenishment or other groundwater activities
- groundwater measurement and reporting

Additional questions regarding local authority include, but are not limited to: whether local agencies need help overcoming barriers to funding for conservation, projects, and programs (i.e., Proposition 218); whether existing GWMPs should play a role; and, if so, whether their content needs to change.

With regard to a "State Backstop Authority" the Draft Framework asks how the authority should be structured and what efforts should be taken to assist and encourage local authorities to act. Questions for consideration regarding the "state backstop" include:

- What metrics can be used to reflect sustainable management?
- What criteria or conditions should be present in determining whether a local groundwater management authority is unable to effectively manage the resource?
- What aspects of local groundwater management should the State Water Board assume responsibility for when taking over local groundwater management?
- What criteria, conditions and processes are needed for local agencies to resume responsibility of the GWMP?

The Draft Framework does not provide a time frame for submitting comments but, given that the Administration may want to consider the scope of any new groundwater authorities when it revises its budget projections in May, it is likely substantive feedback would need to be received by mid-April.