

CALIFORNIA STATE BOARD OF FOOD AND AGRICULTURE

Managed Groundwater Recharge to Support Sustainable Water Management

Groundwater recharge is an important topic for California as the state continues to recover from an historic drought that caused increased reliance on groundwater and its associated basins – resulting in groundwater overdraft, failed private domestic wells, and impacts to environmental quality. Managed groundwater recharge (GWR) provides an opportunity to adapt to climate change by securing sustainable levels of groundwater for agricultural, domestic, and environmental uses. CDFA, alongside several partner state agencies, hosted a day-long forum on November 8, 2017 to better explore and understand GWR opportunities in the state. The forum brought together a variety of speakers and over 100 participants to discuss recharge opportunities, issues, and resources.

Major takeaways from the conference included:

- **Recognizing threats:** *As the effects of climate change worsen, so will the frequency of extreme weather events. All stakeholders involved in GWR must be cognizant of this eventuality.*
- **Reducing bureaucracy:** *To successfully adopt GWR statewide, federal, state and local agencies must work to increase cooperation, share definitions and harmonize/improve the permitting process.*
- **Developing knowledge:** *Better data is needed to maximize GWR potential, including better information on aquifer properties and precipitation/runoff data to better identify when river flow conditions are optimal for diversion to storage. This information includes hydrological data, aquifer levels, risk quantification, and weather forecasting.*
- **Improving infrastructure:** *California must improve storage and conveyance infrastructure to adapt to a changing climate, specifically to prepare for anticipated changes in precipitation.*
- **Look for innovation:** *Conjunctive use and providing environmental services are examples of innovative approaches to improving water reliability and quality, along with incentives to growers and GSA to drive adaptation.*
- **Focus on floodwater:** *Many speakers thought the easiest area of opportunity to maximize GWR was to capture excess floodwater, which may reduce flood risk in downstream areas, while increasing aquifer recharge.*
- **Achieving Multiple Benefits:** *GWR works best when it achieves multiple benefits for the local community and state interests, including wildlife habitat, harmonizing with farming practices, water quality, flood risk reduction, recreation, conjunctive uses, or other benefits.*
- **Building partnerships:** *Building trust between stakeholders is key to adoption of GWR. To do this, we must improve communication, provide incentives for growers choosing to invest in GWR and include local partners in planning. The participation of growers will be critical in developing large-scale on-farm recharge efforts.*

Recommendations:

ADMINISTRATIVE

State Government Should Ensure that Definitions, Statute, and Grant Programs do not Inadvertently Limit the Ability of GWR Projects to Receive Funding

Timeline: 6-12 months

State government has an interest in healthy and sustainable aquifers and therefore, should recognize aquifers as green infrastructure (an environmental asset). State government should make sure that definitions, statute, regulations, and grant programs are set up to help GWR efforts promote healthy aquifers. The Water Quality, Supply, and Infrastructure Improvement Act of 2014 found that “Sustainable water management in California depends upon reducing and reversing overdraft and water quality impairment of groundwater basins. Investments to expand groundwater storage and reduce and reverse overdraft and water quality impairment of groundwater basins provide extraordinary public benefit and are in the public interest” (CWC Section 79701(h)). Some grant program guidelines and statute may have inadvertently limited public funding for groundwater recharge projects. The State should carefully evaluate its existing funding programs and identify where statute or regulations may inadvertently limit the scope or ability to obtain state financial assistance and grant funding for GWR projects. Future financial assistance and grant funding should provide State cost share for actions that expand groundwater storage and reduce and reverse overdraft or water quality impairment of groundwater basins. This will in turn enhance the successful implementation of SGMA and support sustainable management of California’s water resources.

Responds to Forum issue of groundwater recharge not receiving State incentives and funding.

Establish a Flood-MAR Program in State Government (\$5 million annually)

Timeline: 5-10 years

Flood MAR – using flood water for managed aquifer recharge to support sustainable water resources is a key step in expanding managed aquifer recharge projects in the state. By establishing a Flood-MAR Program within the State Government (lead by DWR, in partnership with other State agencies), the program will establish and align a statewide system related to flood water recharge that develops local partnerships and studies opportunities to better integrate aquifer recharge projects on a statewide basis.

Responds to Forum issues related to innovation in technology, planning, management and government to better lead and manage overall recharge efforts.

Simplified Evaluation of Water Availability for Permits to Capture Infrequent Flows

The SWRCB through a series of actions could simplify permit issuance for some projects targeting flood-level flows. For example, SWRCB working with other agencies and stakeholders could explore whether a specific “high flow” can be defined on a watershed-by-watershed basis

to allow streamlined water availability and environmental impact analysis for applications to divert above defined flows. Further, the SWRCB could revise its order declaring fully appropriated streams to allow appropriation of infrequent flows under conditions that would fully protect senior right holders and not have unreasonable effect upon fish, wildlife or other instream beneficial uses. These actions and approaches may not be appropriate in complex watersheds with high levels of existing demand or instream concerns.

Responds to Forum issues related to the complexity of permitting processes and determining water available for GWR.

Accounting for Water Storage, Use, and Natural Storage Losses

Accurate, clear and relatively simple accounting and reporting methodology and guidance to measure water diverted, stored, and used under a water right should be developed and is necessary to ensure water is put to a beneficial use, prevent injury to other users of water, and avoid undesirable results as defined by the Sustainable Groundwater Management Act.

Accounting for groundwater storage projects with multiple third-party wells can complicate permitting requirements for underground storage projects where water is supplied to many third-party wells. Projects that are in basins where a groundwater sustainability plan will be developed may be able to rely on the accounting methods included in the plan, including regional approaches that may not require a well-by-well analysis if those approaches are supported by the groundwater sustainability plan. The use of an accounting plan developed by the GSA in compliance with SWRCB provisions could simplify accounting for purposes of permit compliance.

Responds to Forum issues related to water accounting and developing methods to improve water accounting, particularly for aquifers.

Umbrella Permitting for Multiple Points of Diversion

The adoption of “Umbrella Permits” may allow for diversion and infiltration at multiple points along a stream system to efficiently permit smaller “on-farm” recharge projects (e.g. flooding farmland with high flows) by individual land owners, where land owners are not within a water district with existing water rights. Currently such farmers would need to apply for an individual permit. Under the “Umbrella Permit” system, a GSA or other local agency could apply for a larger scale permit that authorizes diversion and recharge at many different points within an agency’s boundaries. These collective permits would consolidate reporting and compliance monitoring and would allow flexibility in locations (e.g. fallowed fields in a particular year or season). The SWRCB currently issues similar large-scale water rights to water purveyors, including irrigation districts and municipal water suppliers. Such an approach is already with the SWRCB permitting authority.

Responds to Forum issues related to the complexity of permitting processes, specifically the creation of umbrella permits as discussed in the policy and regulatory panel.

INCENTIVES:

Groundwater Recharge Incentives to Farmers (\$1.5 million annually)

Timeline: 1 year

Provide financial incentives to GSAs that can be passed on to farmers to encourage adoption of groundwater recharge practices. Currently no existing state funded groundwater recharge incentive programs are available. The Pajaro Valley Groundwater Recharge Project in Santa Cruz is a good example of a project underway to recharge groundwater and provide additional benefits of mitigating saltwater intrusion. The State should encourage federal partners to also provide funding to encourage adoption.

Responds to Forum recommendation to provide incentives to farmers to collect data on groundwater levels and reimbursement of pumping fee if completed by a grower.

System Integration and Aquifer Recharge Investment Fund (\$20 million annually)

Timeline: 20-25 years

State government should establish a new investment program to fund projects that increase aquifer recharge and better integrate, and co-manage, surface and groundwater systems (e.g., flood and water supply programs and infrastructure) for multiple benefits. Funding would be prioritized to reduce and reverse overdraft and water quality impairment of groundwater basins. State government should work with regional and local entities to assess water resource management systems for opportunities to expand managed aquifer recharge and better integrate surface and groundwater management at all scales, while at the same time addressing critical deficiencies, flood risk, climate resiliency, and ecosystem restoration and enhancement needs, as appropriate. The fund would help State, regional, and local entities modernize infrastructure and promote system integration. Rehabilitation of existing facilities and the construction of new facilities should be cost-shared to increase public benefits, including flood risk reduction, drought preparedness, aquifer replenishment, ecosystem enhancement, subsidence mitigation, water quality improvement, working landscape preservation and stewardship, climate change adaptation, recreation, and aesthetics.

Response to Forum issue of overall lack of funding for infrastructure and groundwater system management needs.

Early funding from this program (\$6-\$12 million) should go to modifying existing irrigation distribution infrastructure and operations so growers can reduce or stop groundwater pumping. This early funding would geographically expand current efforts by CDFR and DWR to provide funds to upgrade on-farm irrigation systems if growers stop operating groundwater pumps.

Responds to Forum recommendation to direct climate change and infrastructure investments into management infrastructure, addresses the need to line canals to direct more water to recharge and allows districts to respond in real time to infrastructure operational challenges.

RESEARCH

Crop Root Resiliency and Groundwater Recharge (\$500,000 annually)

Timeline: 2-6 years

Research is needed to reduce risk of crop loss on flooded fields, used as part of on-farm recharge projects. This multi-year research will provide field trial data on crop root resiliency, including new root cultivars, to maximize duration for flooded perennial crops which account for two million acres in California.

Responds to Forum need to better understand on-farm groundwater recharge opportunities and impact to crops.

Flood-MAR Research and Data Development Program (\$1 million annually)

Timeline: 2 years

Research and data development to support Flood-MAR implementation is necessary. DWR has developed a draft Research and Data Development Framework describing research and data needs for implementing managed aquifer recharge projects. The Framework recommends studies and pilot projects to be conducted by State, regional, and local entities and academia to progress knowledge in key areas; and convening a research advisory committee. The advisory committee will identify priority research and data needs, a centralized repository for technical research and data related to flood-MAR, integrated training and education programs, and technical/scientific information and tools.

Responds to Forum issue related to lack of data and technical studies and lack of hydrological knowledge related to groundwater recharge.

Improving Hydrology Observation and Prediction (\$5 million annually)

Timeline: 2-6 years

Improving hydrology observation and prediction will advance California's ability to manage water while considering the effects of climate change and extreme events (i.e., floods and droughts). New monitoring capabilities and predictive models and tools are needed to allow continuous, precise measurements of data inventories and fluxes of water, including precipitation, groundwater, soil moisture, snow, evapotranspiration, and stream flow. Improved regional scale projections of changes in precipitation, soil moisture, runoff, and groundwater availability on seasonal to multi-decadal time scales is needed to better inform water management and planning decisions. This action will improve hydrological and hydraulic knowledge, forecasting abilities, and understanding of climate change effects on water supply reliability and public benefits of California's water system.

Responds to Forum issues related to lack of data/hydrological knowledge and more data/weather services that can inform water management operations.

INFORMATION RESOURCES:

Groundwater Management Website/Database (\$150,000 annually)

Timeline: 6-12 months

Establish a centralized online resources site and database that includes management practices, information on groundwater recharge benefits for growers and GSAs, including multiple benefits. Currently, a centralized online website/database for this information is not available.

Responds to Forum issue of bringing body of information (studies/reports/practices) into a centralized site/source.

Groundwater Recharge Assessment Tools (\$500,000 – \$750,000)

Timeline: 1-2 years

State should provide technical and financial assistance to GSAs, irrigation districts, and growers to develop customized groundwater recharge assessment tools, and implement the tools to identify the best locations for groundwater recharge and to estimate cost of recharge projects. DWR currently has a ‘Land Use Viewer’ tool that allows users to evaluate crop and soil types to identify good locations for recharge. The tool does not include economic data, but could be supplemented with additional research data layers such as geologic suitability maps for different recharge objectives (e.g. groundwater dependent ecosystems, deep aquifer water supply, subsidence targeting and water quality for communities).

Responds to Forum issue of developing a groundwater recharge assessment tool, where you can apply crops and estimate cost per acre.

Ongoing State Engagement with Growers & GSAs (\$150,000 annually)

Timeline: 1-3 months

As the development of GSAs continue and the desire by entities to expand groundwater recharge activities accelerates - regular meetings/outreach with growers and GSAs is needed to better understand local basin/sub-basin needs. Funding would support ongoing regular stakeholder meetings by agencies with growers, GSAs, and irrigation districts.

Responds to Forum issue of better understanding grower risks related to groundwater recharge and grower/stakeholder involvement in research/accounting priorities. Also provides opportunities to promote direct farmer engagement and highlighting investments already made by farmers.