

Sustainable Water Management Strategy for Specialty Crop Expansion in the Sacramento Valley

Task 4 Report: Stakeholder Meeting Summary

Prepared for
Sacramento Area Council of Governments



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Prepared by:



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Appendix A: Stakeholder Meeting Attendees

LIST OF ACRONYMS

AB – Assembly Bill

BOR – Bureau of Reclamation

CDFA – California Department of Food and Agriculture

CDFW – California Department of Fish and Wildlife

GSA – Groundwater Sustainability Agency

GSP – Groundwater Sustainability Plan

RD – Reclamation District

Regional SAN – Sacramento County Regional Sanitation District

RUCS – Rural Urban Connections Strategy

RWA – Regional Water Authority

SAGOG – Sacramento Area Council of Governments

SEI – Stockholm Environmental Institute

SGMA – Sustainable Groundwater Management Act

SJV – San Joaquin Valley

UCCE – University of California Cooperative Extension

YCFCWCD – Yolo County Flood Control and Water Conservation District

1 INTRODUCTION

The Sacramento Area Council of Governments (SACOG) is an association of local governments in the six-county Sacramento Region of El Dorado, Placer, Sacramento, Sutter, Yolo, and Yuba counties and the 22 cities therein. SACOG provides planning and funding for the region, and serves as a forum for the study and resolution of regional issues. New agricultural crops and markets coupled with improved irrigation techniques are expected to support new specialty crop acreage in the SACOG area. While new technologies can result in better crop yields and decreased water demands, increases in irrigation efficiency also result in reduced groundwater recharge from irrigation return flows.

1.1 PROJECT BACKGROUND

SACOG received grant funding from the California Department of Food and Agriculture (CDFA) to evaluate the feasibility of recharging groundwater on specialty crop agricultural lands within the SACOG portion of the Sacramento Valley. The first phase of this feasibility study conducted a review of the hydrogeologic setting of the Sacramento Valley portion of the SACOG area to identify the hydrologic and hydrogeologic components important to assessing the feasibility of recharging groundwater on agricultural land.

The primary goal of the project is to bring together a broad range of different factors impacting groundwater recharge and infiltration to identify areas across the region that are most suited for strategic flooding of specialty crop fields; in other words, areas that will most efficiently and effectively facilitate recharge, while minimizing cost to the specialty crop producer. Ultimately, this information will be incorporated into SACOG's existing Rural-Urban Connection Strategy (RUCS) model to provide a tool for evaluating the potential benefits of recharging groundwater on agricultural land.

1.2 TASK 4 PURPOSE

Task 4 work focused on holding stakeholder meetings where the technical work completed in Tasks 1, 2 and 3 was summarized and presented to local growers, water district/provider staff, and local planning entities. The stakeholder meetings were held in three targeted areas where groundwater recharge suitability was dominantly good, relative to other areas in the SACOG region.

The main objective of this work was to get feedback from people with local experience and knowledge of the targeted areas, for two reasons. The first reason was to validate the results of the groundwater suitability recharge index. Because the results were based on modeling with soil survey and other broad inputs, local experience was needed to determine if the results reflected actual conditions. Second, feedback from stakeholders was used to inform scenarios to model. Stakeholder opinions were considered to ensure that plausible scenarios were developed and modeled to obtain meaningful outcomes. Thus, local input on future land and water use scenarios informed SACOG's evaluation of alternative recharge and water management strategies for specialty crop expansion in the lower Sacramento Valley. Ultimately, project results will be available to inform sustainable groundwater management planning.

2 TASK 4 SUMMARY

Stakeholder engagement included seven meetings in total. Project updates were provided to stakeholders at three Northern California Water Association (NCWA) meetings in June 2017, December 2017 and June 2018. The remaining four meetings were held to get feedback from stakeholders on the technical results from Tasks 1, 2 and 3 and perceptions on current and potential future recharge. These four meetings are describe in detail below.

Stakeholder meetings were held in the following target areas for the purpose of informing RUCS scenarios:

- Marysville, representing Yuba, Sutter and Placer counties (February 5, 2018)
- Sacramento, representing South Sacramento County (February 6, 2018)
- Woodland, representing Yolo County (February 7 and March 13, 2018)

Three possible future water management options were discussed with stakeholders at each meeting and their projections were combined with results from local studies to create the following three groundwater management scenarios:

- **Baseline Water Use:** The baseline water use scenario describes groundwater conditions assuming the current level of natural and managed aquifer recharge along with projected changes in water demand as a result of cropping trends and urban growth.
- **SGMA Implementation:** The Sustainable Groundwater Management Act (SGMA) Implementation Scenario describes how implementation of SGMA regulations is expected to affect groundwater pumping and water use in the local area assuming the current level of natural and managed aquifer recharge.
- **Potential Recharge:** The Potential Recharge Scenario describes the recharge options that are most suited and accepted in each area, including specialty crop recharge vs. non-specialty crop recharge, cropland recharge vs. non-cropland recharge, types of non-cropland recharge projects, and permitting challenges.

Groundwater conditions, current recharge activities, potential recharge preferences, and challenges with recharge differed in all three areas. Table 1 is a comparison of these factors in the three target areas.

2.1 YUBA/SUTTER/PLACER COUNTIES

In the Yuba/Sutter/Placer counties locale, additional recharge is not needed in many areas where groundwater levels are high and quickly recover even after drought periods. Low lying rice ground (flooded in winter) already provides recharge benefits along with natural infiltration from sandy river bottoms. However, increased groundwater overdraft is occurring in western Placer County, where 4,000 acres of new orchards (mostly walnuts) were recently planted by developers who eventually plan to construct homes.

The increase in walnut acreage in all three counties is related to declines in wheat, tomatoes and irrigated pasture land. Though there is sufficient surface water available to be used for recharge throughout the locale, the agricultural community does not see this as an urgent need

and prefers the option to sell unused surface water out of the area at this time. County planners and Groundwater Sustainability Agencies (GSAs), on the other hand, recognize the potential for groundwater banking, both for local demand and as an asset for future trading with other parts of the state.

There may be options for increased on-farm groundwater recharge, especially in western Placer County, but if these areas are converted to development over the next decade, these new communities will require a different form of investment in recharge during wet years. Developers could contract with remaining agricultural land owners to provide recharge to meet the hardened water demand of the new communities though recharge is more likely to occur on non-agricultural lands (e.g. open space, district spreading basins, injection wells) and in conjunction with urban recycled water.

2.2 SOUTH SACRAMENTO COUNTY

In the south Sacramento County area, surface water delivery infrastructure for recharge is limited. Activation of the Folsom South Canal offers the most significant opportunity to capture winter runoff from the American River, which could be recharged in old gravel pits and/or released into local streams from which it could be captured by local farmers for recharge on winter fallow ground or permanent grape vineyards. To achieve groundwater balance in the region, investment in new infrastructure for diversion of winter river water onto adjacent land or expansion of Folsom South Canal water delivery will need to be made to move water out onto enough land.

The most suitable specialty crop lands for recharge are vineyards which can take excess water from January through March, but some annual non-specialty crop growers may be willing to have their crop (wheat, oats, pasture) bought out for winter recharge. In the absence of significant investment in water diversion and/or expanded conveyance, the only other option to achieve groundwater sustainability in the region is reduced pumping. Pumping restrictions would lead to fallowing of lowest income-generating lands such as annual, non-specialty crops which will make those lands even more available for winter recharge (or development). Specialty crop acreage will likely not be affected by SGMA if the GSA agreements can provide incentives for landowners with annual crops to conduct recharge (or trade their pumping credits) to benefit higher value (specialty) crop producers that rely on the groundwater basin.

2.3 YOLO COUNTY

In Yolo County, expansion of permanent crops onto rangeland is increasing groundwater demand and will require supply augmentation through increased winter recharge. Since peak water availability is concentrated in the January-February time period, there are sufficient annual and dormant permanent crop acres to practice on-farm recharge. In addition, delivery of these new supplies will also increase canal leakage for recharge over baseline amounts that occur during the irrigation season.

Without increasing recharge, SGMA could result in pumping restrictions and lower value annual commodity crop land would be the first to be fallowed, as already occurs during droughts. These lands offer the greatest flexibility for timing of recharge if there are sufficient acres located on suitable recharge lands. If more annual crop land is converted to permanent specialty crops, a

combination of annual commodity crops and permanent specialty crops will need to be used to capture available peak flows in wet years. The major challenge to increasing recharge is obtaining the necessary permits from the State Water Resources Control Board. Proposed recharge permitting costs and subsequent required monitoring of pumping could make on-farm recharge economically unattractive to the water district and grower members. However, under SGMA, these higher permitting costs may become more economically attractive than the foregone revenue of retiring productive farmland.

Table 1. Comparison of Groundwater Recharge Considerations in SACOG Region Areas with Good Recharge Potential

Target Area	Groundwater Conditions	Current Recharge	Potential Recharge	Concerns & Barriers	Opportunities
Yuba/Sutter/Placer Counties Corner	Generally good because of high natural recharge and recharge on rice fields. Limited aquifer capacity to store additional water except in western Placer county.	Little active recharge other than winter flooding of rice fields	Possibly on orchards in western Placer county, which have increased in acreage and have also increased water demand	Growers and irrigation districts do not perceive urgent need for recharge because of relatively good groundwater conditions locally and preference for selling available surface water out of the area.	Local groundwater agencies are involved in broader region-wide effort to sustain groundwater levels, capture available surface water, and establish groundwater banking program to meet water needs of other parts of the state.
South Sacramento County	High incidence of overdraft in aquifer overall and cones of depressions in specific areas	No active recharge but pilot studies are beginning because growers see need	Grape vineyards have the highest potential, and are currently being studied	Infrastructure to convey surface water is lacking because area is reliant on groundwater and new infrastructure will be expensive.	Growers see need for recharge and are taking the lead because there is no broader organization to lead; vineyards have high potential for recharge. GSAs will ultimately be able to negotiate incentives to maximize recharge at lowest cost.
Yolo County	Generally good with some cones of depressions in urban areas that are being corrected.	Some active recharge using winter diversion through unlined canals	Various non-crop land sites and farmland have potential to expand total recharge quantities if water can be obtained.	Cost of regulatory permitting for new diversions; expansion of permanent crops is “hardening” water demand	Water supplies are available and several cropland and non-cropland opportunities exist in the area

3 STAKEHOLDER MEETINGS

Stakeholder engagement began with a presentation about the purpose and intent of this project that was given at the quarterly groundwater meeting held by the Northern California Water Association (NCWA) in Sacramento, CA in June 2017. Another presentation was given to NCWA groundwater meeting attendees in Willows, CA on December 2017 to update stakeholders on the results of the first three technical tasks of the project. At this meeting, stakeholders were also invited to take part in the upcoming meetings in January through March 2018 that are discussed below. Finally, an update on the conclusions from these meetings and RUCS model run draft results were presented at the NCWA groundwater meeting held in Marysville, CA in June 2018.

Stakeholder meetings were held in the following target areas for the purpose of information RUCS model scenarios:

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- **SGMA Implementation:** The SGMA Implementation Scenario describes how implementation of SGMA regulations is expected to affect groundwater pumping and water use in the local area assuming the current level of natural and managed aquifer recharge.
- **Potential Recharge Strategy:** The Potential Recharge Strategy Scenarios describe the recharge options that are most suited and accepted in each area, including specialty crop recharge vs. non-specialty crop recharge, cropland recharge vs. non-cropland recharge, types of non-cropland recharge projects, and permitting challenges.

3.1 YUBA/SUTTER/PLACER COUNTIES STAKEHOLDER MEETING

A stakeholder meeting was held in Marysville on Feb 5, 2018. Meeting attendees were predominantly growers and water providers. A specific list of attendees is provided in Appendix A. The notes and comments summarized below also include information from a telephone conversation with Brett Story, West Placer GSA.

SCENARIO DISCUSSION

BASELINE WATER USE SCENARIO

Groundwater Conditions. Groundwater conditions are relatively good in this area; the groundwater basin is not critically overdrafted, and regional groundwater levels typically return to normal levels after drought. The southern part of Sutter County has had aquifer declines of roughly 15 feet/year, but has recovered during wet years. Some wells in the southern part of Yuba County near Tudor collapsed and had salt problems.

Current Recharge. Recharge in most areas is naturally occurring and does not require proactive projects. In dry years, surface water supplies are limited: during droughts or restrictions on reservoir releases, less water is available to replenish groundwater through river channels. There are many potential sources of water in wet years that could be used for recharge, including the Bear, Feather and American rivers, though the latter would be more expensive because it would have to be pumped.

Potential for Recharge. Most of the orchards in Western Placer that have potential for recharge (as identified in the West Placer Evaluation of Potential Recharge Areas, GEI 2017 – some 4,000 acres) are new and not historically important crops in the area. They were planted by developers who couldn't build on their land as a result of the last recession, so they planted orchards to get some return on investment until prices reach a point where it is profitable to build houses. These orchards may not be there in the long term.

There was concern among this group that if Water Fix tunnels are built, more northern California water will be taken south leaving less to recharge, and ground water levels will decline as a result. It is anticipated that Folsom Lake will go dry more often, cities will become more dependent on groundwater, and agriculture-related jobs will be lost.

SGMA IMPLEMENTATION SCENARIO

In general, growers typically perceived groundwater management via recharge negatively as more government intervention.

In Placer County, stakeholders indicated that balance can be achieved if excess surface flows are captured for in-lieu or recharge (but not if tunnels are built). The West Placer region, geologically, is one of the best places to do recharge, and there is potential and willingness for recharge in this area. The region always has enough water for recharge, assuming water rights are maintained. Most of their water now goes to the Delta. Nevada ID and Placer County Water Agency would be involved in providing water for recharge, and potentially Sacramento Suburban Water District (but less likely).

The GSA/County anticipates that these water sources will ultimately be used for recharge. The GSAs are on a forward track as part of the larger Sacramento Valley effort to form a federal groundwater bank. This idea of a broader shared groundwater resource may not yet have surfaced in current water management plans of water/irrigation districts, but will likely be part of the next updates. Cities will likely need to do more water recycling. Recycled water can also be used for recharge through injection but is very expensive (costing about \$1M/well).

In Yuba County, there is currently enough water in the area. Conversion of agricultural land to urban land is the biggest future water demand. Because of this increase in urban water usage, it is thought that the area will need to use treated sewage water and recharge in sandy river beds.

POTENTIAL RECHARGE STRATEGY SCENARIOS

Currently, Yuba County floods 30,000 to 40,000 acres of rice ground, which provides recharge and wildlife benefits. The University of California Cooperative Extension (UCCE) has shown interest in improved watershed forest management to improve, in turn, surface water yield to downstream region (personal communication with Kate Wilkin, Forestry, Fire, and Natural Resource Advisor Sutter, Yuba, Butte, and Nevada Counties UCCE, May 2017).

In Yuba County where groundwater is not overdrafted and recovers quickly, the Proposed Yuba County Recharged Groundwater Revenue Distribution Initiative 2016 suggests selling available surface water to out-of-county water users where aquifers are depleted to use for groundwater substitution (in-lieu recharge). There are no plans for intentional recharge within the county. Similarly, the Sutter County 2012 Groundwater Management Plan recognizes the sufficiency of natural recharge processes and does not include any desire or description of planned recharge projects. However, since much of the shallow groundwater is of poor quality, some level of recharge using clean surface water could be considered to help dilute undesirable groundwater concentrations.

In Western Placer county, the 2017 GEI evaluation, mentioned earlier identified additional recharge opportunities using detention basis, water features on golf courses, existing ponds, open space and preserves, aquifer storage recovery (ASR) wells, as well as the 4,000 acres of walnut orchards that will likely be developed in the near future.

Several potential non-farmland recharge options were discussed, including the following:

- Use conservation lands such as rangeland or pasture
- Use Williamson Act land
- Use injection wells
- Expand surface storage or re-operate existing surface storage
- Recycle urban water

Recharge potential on specialty cropland was also discussed. One concern was that late fall irrigation for recharge, when followed by warm weather, can cause fall bloom on some tree crops. Also, the canal network does not reach suitable lands for recharge; rather, it mostly serves heavy (clayey) low lying ground.

WORKSHOP SUMMARY COMMENTS

- Stakeholder participation primarily comprised water managers and farmers from the Yuba/Sutter area who attended out of concern that additional recharge efforts might reduce the amount of surplus surface water available for export.
- Additional recharge is not needed in many parts of this region. Water is currently plentiful but could be threatened by Delta exports. Low lying rice ground already provides some

recharge benefits along with natural infiltration from sandy river bottoms. During droughts they have seen some groundwater declines but have always recovered in wet years. This region is not a critically overdrafted basin.

- There is sufficient surface water available to be used for recharge but the agricultural community does not see the urgency. County planners and GSAs on the other hand are recognizing the potential for groundwater banking both for local demand and as an asset for future trading with other parts of the state.
- Increased groundwater overdraft is occurring in western Placer County where 4,000 acres of new orchards (mostly walnuts) were recently planted by developers who eventually plan to construct homes. The increase in walnut acreage in all three counties is accompanied by related declines in wheat, tomatoes and irrigated pasture. To the degree that the developers of these new orchards are willing to invest in future groundwater supply there may be options for increased on-farm groundwater recharge on these acres to meet the hardening of demand. This is one scenario that should be explored. The other scenario is that much of these newly developed orchards will be converted to development over the next decade. Ensuring a reliable water supply for these new communities will require a different form of investment in recharge during wet years and this is more likely to occur on non-agricultural lands (open space, district spreading basins, injection wells) and in conjunction with urban recycled water.

3.2 SOUTH SACRAMENTO COUNTY STAKEHOLDER MEETING

A stakeholder meeting was held in Sacramento on February 6, 2018. A specific list of attendees is provided in Appendix A. The notes and comments summarized below also include information from telephone conversations with Rob Swartz (Regional Water Authority) and Mike Wackman (South Sacramento Agricultural Water Authority).

SCENARIO DISCUSSION NOTES

BASELINE WATER USE SCENARIO

The baseline water use scenario assumes the current level of natural and managed aquifer recharge.

Groundwater Conditions. The Rancho Murietta aquifer is small. The combination of this relatively small source of groundwater and heavy use has resulted in cones of depression in Galt and Elk Grove, the Cosumnes River losing to surrounding groundwater, and a general decline in groundwater levels throughout the area. However, there has not yet been a need to drill deeper wells. Water quality is also a concern because salt water intrusion is occurring as a result of brackish groundwater being pulled in from the Delta. Another water quality concern has been the Aerojet aquifer contaminant plume, but it is being controlled and is currently not spreading.

There is great need for increased water management in this area because of aquifer depletion. It is anticipated that shallower domestic wells will show scarcity first along with declining flows in the Cosumnes River.

Current Recharge. The Consumnes River is the only current source of surface water in South Sacramento County and is naturally helping recharge; but surface flows for aquatic benefits will be impaired over time if current groundwater pumping continues to draw down the aquifer.

Projected Changes. 1000 acres of walnuts have been planted since 2014 (some converted pasture and alfalfa) and more grapes have been planted East of Galt ID. Nut crops are popular now due to low labor demand compared to prunes or grapes. Aquaculture farms are drawing more water from aquifer. If aquifer depletion continues, irrigated pasture will be the first land use to be abandoned which will affect livestock production capacity. Then annual crops will be fallowed. The water supply for permanent crops will be protected as long as possible. As perennial crops reach the end of their productivity, farmers may hold off on replanting.

SGMA IMPLEMENTATION SCENARIO

In the South American Subbasin (between the American River and the Consumnes River), the Sacramento Central Groundwater Authority has already submitted an Alternative Groundwater Sustainability Plan (2016) based on sustainable yields identified through a Groundwater Management Plan consensus process facilitated by the Water Forum in 2006. The plan calls for a combination of pumping reductions and imported water supplies for conjunctive use. Increased water demand resulting from increased permanent specialty crops will be protected as long as possible, but more urban growth is also slated for area. Prolonged drought would affect Sacramento County growth plans, and the county economic stability is dependent on development moving forward if they can show sufficient water supply. Under the local plan, pumping restrictions on individual landowners will be avoided by granting the GSA authority to collect assessments to be used to pay for district recharge projects. The Folsom South canal from the American River and running south to Galt ID in the Consumnes subbasin is a potential asset for conveyance of surface water to suitable recharge land in the subbasins if water supplies can be obtained.

Stakeholders noted that banks require proof of water supply for agriculture related loans. The risk on investment will go up if SGMA pumping restrictions are implemented, which is likely if recharge cannot keep up with future pumping demand.

In the Consumnes subbasin (south of the Consumnes River), there are seven GSAs working toward one common GSP. Recharge projects are threatening to other riparian rights holders due to the amount of diversion that is required for recharge. Stakeholders noted that shared prosperity is easier than shared hardship, and conjunctive use is possible if assets are managed. However, the local irrigation districts are not set up for recharge management and don't have budgets to implement infrastructure needed to transport water to suitable areas.

POTENTIAL RECHARGE STRATEGY SCENARIOS

Folsom South canal offers a great opportunity to deliver surface water for recharge to most of the over-drafted regions of South Sacramento County where irrigation is groundwater dependent. Omuchumne-Hartnell, Galt and Clay Irrigation Districts were formed to take Reclamation water in years of excess to recharge groundwater, but that has not occurred since 2010, even though they are permitted water rights holders. Considerations related to this option include the following:

- The only water that has been conveyed in the canal is Section 215 flood water (Bureau of Reclamation (BOR) project water that exceeds the capacity of Folsom Lake and the demand of all other senior water rights holders).
- Canal water can be turned out into local creeks for natural recharge or capture by landowners downstream
- Usage would require the need to coordinate with the Bureau of Reclamation (BOR) about carriage costs
- BOR will have to balance local recharge benefits with how much water Los Angeles Metropolitan Water District wants delivered through the delta.
- Old aggregate excavation pits along Folsom South Canal can serve as recharge basins
- It may be more economical to use dry wells along Folsom canal than buying lands for basins (even old aggregate pits)

Another option that was considered as a potential recharge strategy is using Sacramento County Regional Sanitation District (Regional SAN) recycled water. Regional SAN can recharge with recycled water at SAN-operated recharge basins for \$200/ac-ft but is subsidized at \$20-30/ac-ft. Regional SAN water transfer exchange can allow Folsom canal to pull spring runoff water from the American River for recharge along canal in exchange for farmers using Regional SAN recycled water.

The South American subbasin groundwater management plan also encourages Sacramento urban water utilities to tap into American River surface water when it is available in-lieu of groundwater pumping to meet their needs.

There was interest among stakeholders to consider the cost effectiveness of recharge potential on non-specialty crops for the benefit of securing groundwater reliability for specialty cropping into the future. The idea is that farmers could offer their land for recharging water as an income 'crop' with payment coming from other groundwater users through the GSA, and that buying out wheat and oats for more intensive recharge in winter is more cost-effective compared to less intensive recharge on perennial specialty crops. Folsom Canal water is only available during winter months, because summer water is fully contracted by south of Delta water contractors. Silage and corn rotations are sometimes double-cropped and could be bought out if farmer was willing to use the field for recharge instead of growing the annual crop.

Many concerns and considerations related to recharge potential on specialty cropland were also discussed, the first and foremost being that no infrastructure exists to convey water across crop land except for Folsom South Canal and local stream channels. Additionally, landowners along rivers would need to apply for permits from SWRCB to divert excess stormwater; however, they could use their summer riparian rights irrigation infrastructure for this purpose. However, many flood irrigation diversion systems were abandoned over the past 15 years as reliance on groundwater increased for micro-irrigation systems. Therefore, new pipes and pumps would be need for infrastructure. Another consideration is that pumping after February 15 would require fish screens to avoid intake of juvenile fish.

Grapes, tree nuts, and tomatoes were discussed for potential recharge. Grapes are regarded as good crops for recharge during dormancy (January through March). Kouts Farms, a large grower and precedent setter for others, initiated a recharge pilot study on grapes with other stakeholders because there is a need to recharge in their area and because the geology is suitable. This project includes irrigation for recharge on grapes along the Cosumnes River (3,000 to 4,000 acres) with winter water. Tree nut growers would be most concerned with recharge on orchards since most are grown on clay loams and not on more sandy soils suited for recharge; however, cultural practices and milder spraying requirements make them more suited to recharge than some crops. Tomato crop land along Cosumnes River could be winter flooded but not if bedded up in the fall. This would also require well drained soils to be able to prepare for planting quickly after winter recharge. Most tomatoes are grown in river bottoms with heavier soils.

INCENTIVES

Growers are already motivated to take water to recharge on their own operations, because they perceive that a full soil profile reduces groundwater pumping costs during the first month of irrigation early in the growing season. In this area, individual land owners are most likely to lead recharge efforts because there is no broad organization (other than emerging GSAs) to fulfil that role. GSA incentives for farmers not to grow winter annual crops could open up additional land for recharge that would ultimately benefit specialty crops of higher value.

Stakeholders also felt that GSAs need to demonstrate benefit of recharge to the whole basin for incentives to be successful. GSAs also need to work out benefits between urban and rural water users (a SGMA basin plan costs \$2-3M). Also, if more water is available from the American River through Folsom South canal, more costly recharge projects can be implemented with urban collaboration. With enough recharge, pumping won't need to be restricted unless new crop land comes on line.

WORKSHOP SUMMARY COMMENTS

- Surface water delivery infrastructure for recharge is limited in this region. Some riparian diversions are still in use to irrigate adjacent croplands and these landowners can apply for temporary winter stormwater permits to recharge on their lands. Activation of the Folsom South Canal offers the most significant opportunity to capture winter runoff from the American River, which could be recharged in old gravel pits and/or released into local streams from which it could be captured by local farmers for recharge on winter fallow ground or permanent grape vineyards.
- To achieve groundwater balance in the region, investment in new infrastructure for diversion of winter river water onto adjacent land or expansion of Folsom South Canal water delivery will need to be made to move water out onto enough land. The most suitable specialty crop lands for recharge are vineyards which can take excess water from January through March, but some annual non-specialty crop growers may be willing to have their crop (wheat, oats, pasture) bought out for winter recharge. Fallow land typically yields higher recharge returns on investment in new conveyance infrastructure since there are no agronomic limitations on the amount of water that can be applied on fallow land.

- In the absence of significant investment in water diversion and/or expanded conveyance, the only other option to achieve groundwater sustainability in the region is reduced pumping. Pumping restrictions would lead to fallowing of lowest income-generating lands such as annual, non-specialty crops which will make those lands even more available for winter recharge (or development). Specialty crop acreage will likely not be affected by SGMA if the GSA agreements can provide incentives for landowners with annual crops to conduct recharge (or trade their pumping credits) to benefit higher value (specialty) crop producers that rely on the groundwater basin.

3.3 YOLO COUNTY STAKEHOLDER MEETING

Two stakeholder meetings were held in Woodland: an initial presentation to the Yolo GSA on February 7, 2018 followed by a workshop with interested individuals on March 13, 2018. A specific list of attendees is provided in Appendix A.

SCENARIO DISCUSSION

BASELINE WATER USE SCENARIO

Groundwater Conditions. Urban area cones of depression near Davis and Woodland have been recovering with new municipal surface water supply from Sacramento River/Yolo bypass. Groundwater levels east of Woodland and Davis are also replenished by Yolo bypass seepage. Subsidence has occurred in multiple areas, including between Zamora and Knights Landing (nearly 5 feet) and in the vicinity of Davis and Woodland. Groundwater levels in the Yolo-Zamora area have reached equilibrium, partly because they gain from surrounding areas that have better recharge from Sacramento River to the east and Reclamation districts nearby. Some shallower rural domestic wells have gone dry during drought periods. This has been blamed on almonds but rural homes in non-agricultural areas have the same problems during droughts.

Current Recharge: Yolo County Flood Control and Water Conservation District (YCFCWCD) has obtained emergency diversion permits to divert water from Cache Creek during flood flows to fill district canals for recharge. This water has also been offered to landowners to apply on farmland but no significant farmland recharge has yet occurred. Natural recharge from the Sacramento River, Reclamation District (RD) 108 and the Yolo Bypass have prevented further groundwater depletion. The Yolo-Zamora and Dunnigan areas appear to have potential for groundwater level enhancement and have improved groundwater conditions through in-lieu irrigation using surface water through a secondary Central Valley Project contract (not as reliable a source as RD 108) but have obtained RD 108 water for in-lieu irrigation to offset shortages.

Projected Changes: Almonds are increasing in acreage the most quickly of all crops; there are approximately 10,000 acres of new almonds in the county. Where almonds are replacing alfalfa, there is no difference in water demand. Where almonds are replacing non-irrigated range land, such as near Dunnigan Hills, there is a significant increase in groundwater use. Because of this new acreage, there is estimated to be 40,000 AF of new demand which YCFCWCD feels can be absorbed by Yolo sub-basin. San Joaquin Valley (SJV) growers are buying land in Yolo County because of good water supply compared to southern part of the SJV. Some walnuts are being removed, as seen in Winters, but this may be due to fungal disease on crop, not water scarcity.

Yolo County Agricultural Commissioner data shows the greatest declines in wheat, followed by some decline in processing tomatoes and corn. Walnuts and grapes are also increasing gradually. This trend from annual to perennial crops is “hardening” the area’s water demand.

SGMA IMPLEMENTATION SCENARIO

Stakeholders were asked if there are sufficient surface flood waters available for recharge, or if more can be purchased? YFCWCWCD has existing surface water rights for irrigation as follows:

- Clear Lake pre-1914 rights are for 150,000 AF + Indian Valley Reservoir (not-pre 1914) limited to 600 cfs pipe delivery.
- Supply enhancement: 72,000 AF of storm water off Cache Creek requested in SWRCB permit: 2,000 cfs release during normal storm events can be used for recharge in YFCWCWCD canals.

Stormwater supply could provide an annual average of 25,000 AF; however, 1 million AF went by through the district without being captured in 2017 because the flow rate during 2017 storms was too high to capture with existing capacity.

Barriers to capturing more surface water storm flows from Clear Lake include the cost of obtaining a permit, and the need to defer winter maintenance of canals in years when water is available. Stakeholders felt that permitting should be subsidized by the State along with other eligible water storage costs. They acknowledged that recharge diversions need to avoid impact on existing water rights holders and environmental benefit of unobstructed flow.

Zamora doesn’t currently receive any surface water but Clear Lake water could be delivered off Yolo canal system via China Slough. YFCWCWCD has studies evaluating the feasibility of this option.

Stakeholders were also asked what land would go out of production if pumping was restricted. Based on experience during droughts, rice and alfalfa are first to go out of production, followed by old orchards.

POTENTIAL RECHARGE STRATEGY SCENARIOS

Non-farmland recharge options that were discussed included the following:

- 160 miles of unlined canals and then into sloughs (California Department of Fish and Wildlife [CDFW] jurisdiction) but State Water Board does not allow putting into sloughs due to runoff increase
- Retention ponds (5,000 – 10,000 AF possible)
- Small basins on private lands: land is generally too valuable to give up crop acreage but could be discussed as alternative to demand reduction
- Retired sand & gravel quarries : generally too close to river and may not contribute significantly to recharge
- All of the above to be considered as long as environmental concerns such as high residual soil N, salts or other constituents of concern are considered.

- Obtain new water supply/diversion for recharge: 25% of conveyed water is typically lost to recharge through canal leakage with remaining 75% going to recharge facilities.

There has been interest from growers in receiving flood water for recharge on their lands if it can improve their groundwater reliability, but this has not yet been practiced. YCFCWCD would need to decide who would get priority to use water for recharge; however, land suitability would likely be a part of that decision. The flood hydrograph peak is February when land is already saturated from the heaviest rains. Only the best soils (those with highest infiltration rates) can take flood water at that time.

Most of the gravity fed flood irrigation systems are on alfalfa and rice lands; permanent crops are mostly on drip or micro-sprinkler irrigation systems that are not as well suited to recharge applications. A Willow Slough study conducted by Jones and Stokes in 1995 showed distributed recharge has potential across many acres of fallow annual crop ground. Another study by the Stockholm Environmental Institute (SEI) on 30 years of rainfall data showed that an average of 20,000 AF per year of recharge is possible on twice as many suitable acres as indicated in the analysis done for this SACOG project (Mehta et al., 2018). Considering this, lowest value cropland could be used to capture available peak flows, which is the same land that would go out of production during droughts or with pumping restrictions.

Recharge potential on specialty cropland was discussed. Permanent crop growers with adequate recharge suitability (suitable crops and lands) would do this during dormancy when the plants have the highest tolerance for extended amounts of soil moisture, which is also time period of peak hydroflows. Recharge will be easiest for growers that are interested in conjunctive water use and have maintained legacy flood pipelines after installing drip/micro sprinklers, and have also installed filters and booster pumps to utilize surface water through these pressurized irrigation systems. Recharge should also be encouraged on crops with lower N demands to avoid N leaching. The potential to focus recharge on portion of fields/parcels with higher recharge suitability instead of flooding entire fields should also be recognized.

WORKSHOP SUMMARY COMMENTS

- District water availability varies each year in this region but drought and wet years balance out to create a relatively balanced groundwater condition. Expansion of permanent crops onto rangeland are increasing water demand and will require supply augmentation through increased winter recharge. Since peak water availability is concentrated in Jan-Feb time period (unlike locations on the east side of the Sacramento Valley that receive later snow melt runoff), there are sufficient annual and dormant permanent crop acres to practice on-farm recharge. In addition, delivery of these new supplies to cropland for recharge will also increase incidental canal leakage over baseline amounts that already occur during the irrigation season.
- Without increasing recharge, SGMA could result in pumping restrictions and lower value annual commodity crop land would be the first to be retired, as occurs during droughts. These lands offer the greatest flexibility for timing of recharge if there are sufficient acres located on suitable recharge lands. If more annual crop land is converted to permanent crops, a combination of annual commodity crops and permanent specialty crops will need to be used to capture available peak flows in wet years.

- The major challenge to increasing recharge is obtaining the necessary permits from the State Water Resources Control Board. Proposed recharge permitting costs and subsequent required monitoring of pumping could make on-farm recharge economically unattractive to the water district and grower members. However, under SGMA these higher permitting costs may be more economically attractive than retiring productive farm land. There are currently legislative efforts (AB 2649) to simplify the permitting process for diversion of water for recharge to comply with SGMA.
- Next steps
 - Evaluate infiltration rates on annual cropland for January through March
 - Consider how much annual cropland acreage would be needed to offset the increase in hardened crop water demand by permanent crops
 - Use decline in annual cropland as input to RUCS along with sustained or projected growth of specialty crops
- Comments on Land IQ/Todd Groundwater analysis:
 - Flood control district stated that the canal map used didn't include new canals on the North end of their district. 10,000 acres were annexed five years ago.
 - It was noted that Figure 32 didn't seem representative of "good recharge areas". This may be because indexes were condensed from six criteria to three criteria (Good, Fair, Poor) to simplify the study. This probably isn't a concern since not much recharge is needed in this area, therefore just the best recharge suitability lands would be used.
 - Flood control district expressed concern of the high amount of idle cropland on the SACOG figure. It was determined this was an issue because the crop survey used was from 2014, during the drought when surface water allocations were minimal, therefore increasing amount of fallow land.

4 REFERENCES

Jones and Stokes Associates, Inc. (1996) Willow Slough watershed integrated resources management plan. Prepared for Yolo County Resource Conservation District, Woodland, CA.

Mehta V.K., Young C., Bresney S.R., Spivak D.S., Winter J.M. 2018. How can we support the development of robust groundwater sustainability plans? California Agriculture. 71(1):54-64. <http://calag.ucanr.edu/archive/?article=ca.2018a0005>

APPENDIX A

STAKEHOLDER MEETING ATTENDEES

Yuba/Sutter/Placer Stakeholder Meeting Attendees	
Name	Organization
Al Lassaga	Brophy Water District
Ryan McNally	Browns Valley Irrigation District
Mike Filice	Hallwood Irrigation Company
Stephen Waltz	Wheatland Water District
Dan Bill	Ramirez Water District
Keith Davis	Cordua Irrigation District
Bob Stineman	Dry Creek Mutual Water Company
Michael Rice	South Yuba Water District
Elisa Noble	Placer Resource Conservation District
Brett Storey	Placer County
Robert Thompson	Cal Water
Janine Hasey	UCCE Sutter/Yuba
Lisa Herbert	Sutter County Agricultural Department
Scott Matyac	Yuba County Water Agency
David Shabazian	SACOG
Daniel Mountjoy	Sustainable Conservation
Joe Choperena	Sustainable Conservation

South Sacramento County Stakeholder Meeting Attendees	
Contact	Agency
Melinda Fusor-Hurzel	Consumnes Coalition
Tim Washburn	SAFCA
Rob Gailey	UCD
Gary Bardini	SAFCA
Julie Jensen	Sac County Ag Commissioner
Mike Wackman	OHWD & SSCAWA
Darrell Eck	Sacramento County Groundwater Authority
Graham Fogg	UC Davis/UC Water
David Shabazian	SACOG
Daniel Mountjoy	Sustainable Conservation
Joe Choperena	Sustainable Conservation

Yolo County Stakeholder Meetings Attendees	
Name	Agency
Carol Scianna	City of Winters
Vishal Mehta	Stockholm Environmental Institute
Tim O'Halloran	YCFCWCD
Max Stevenson	YCFCWCD
Kristin Sicke	YCFCWCD
Cody Fink	Land IQ
Stephanie Tillman	Land IQ
David Shabazian	SACOG
Daniel Mountjoy	Sustainable Conservation
Joe Choperena	Sustainable Conservation