

SGMA and the Human Right to Water: To what extent do submitted Groundwater Sustainability Plans address drinking water uses and users?

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Executive Summary

In 2012 California passed the Human Right to Water (AB 685) which declares all Californians have the right to safe, clean, affordable and accessible drinking water. Later in 2015, in the midst of a record-breaking drought, California passed another piece of historic legislation known as the Sustainable Groundwater Management Act (SGMA). SGMA aims to prevent undesirable results from groundwater overdraft in high and medium priority groundwater basins through the development and implementation of regional Groundwater Sustainability Plans (GSPs). While only five of the 41 GSPs submitted to the Department of Water Resources for review mention the human right to water, and only one of those affirmed it as a consideration in developing their plan, these two policies are intimately related. Groundwater contamination and overdraft are primary factors standing in the way of achieving universal access to safe water throughout the state.

How might SGMA implementation impact environmental justice priorities at these intersections? In order to further our understanding of this critical policy nexus our UC Davis research team conducted a spatial assessment to understand the distribution and extent of drinking water users in critically overdrafted groundwater basins. Subsequently, we reviewed each of the 41 unique GSPs posted for public comment in early 2020 to determine how the plans reflect engagement with, and consideration of, these drinking water stakeholders.

We found that critically overdrafted groundwater basins in the state cover nearly 250 communities and more than 40,000 drinking water wells, yet the presence or needs of such users is often not fully addressed in submitted GSPs. In some cases, certain drinking water users are not addressed at all. Submitted GSPs vary markedly on how and if they incorporate human right to water considerations such as water access, water quality and water affordability but several key gaps are common across the majority of plans. SGMA clearly establishes a framework for sustainable groundwater planning that must involve and consider all beneficial uses and users. Less than one-third of reviewed plans, however, describe how drinking water stakeholders could be impacted based on the Sustainable Management Criteria set in their plans for water quality and water levels. Even fewer described how drinking water stakeholders were involved in setting these criteria. The lack of discussion of drinking water in many plans is reflected in the included projects and management actions, the vast majority of which do not promote specific drinking water or Disadvantaged Community (DAC) benefits.

Nonetheless, across these plans there are clear examples of best practices for addressing drinking water needs in groundwater management. Examples include aligning Minimum Thresholds for water quality with state drinking water standards; incorporating projects that foster water supply reliability for DACs; assessing the risk of, and developing mitigation plans for, negative impacts to shallow domestic wells; and ensuring the integration of drinking water stakeholder voices in decision-making through voting board representation and stakeholder committees. These examples are a clear starting place for integrating groundwater planning efforts and state environmental justice priorities.

In order to prevent disproportionate impacts and promote human right to water implementation in the state, current and future GSPs need to more fully address drinking water uses and users. While there is a growing arsenal of tools that can and should help address drinking water needs in sustainable groundwater planning, doing so will likely require more support by state agencies, whose structures themselves represent the challenge of this historic policy and management divide. Ongoing attention to the important issue of increasing access and participation in California water resource management is also crucial to narrowing this gap. In the meantime, given the limited discussion and involvement of drinking water stakeholders in many of the submitted plans, there is a clear need for thorough assessments of the potential drinking water impacts of GSPs per AB 685.

Introduction

For decades, small and rural low-income communities have borne a disproportionate share of the burden of groundwater contamination in California, such that groundwater quality remains a primary limiting factor for achieving safe drinking water access in the state.¹ Sixty-eight percent of the 505 small water systems in the state with recent primary drinking water violations rely on groundwater as their primary or only supply source.² In the Tulare Lake Basin, the epicenter of California's drinking water crisis, nearly 90% of the region's 353 Disadvantaged Communities (DACs) rely on groundwater for their water supply needs.³ Given their small size, these communities are generally unable to adapt to changing groundwater conditions. Because groundwater is a shared resource, they are also unable to effectively address the root causes of deteriorating conditions independent of other nearby water users. The Sustainable Groundwater Management Act (SGMA), therefore, represents a landmark opportunity to address these disparities and advance the human right to safe and affordable water (as affirmed in 2012 under AB 685) through collaborative, regional groundwater planning. In mandating the development and implementation of Groundwater Sustainability Plans (GSPs) that must detail a path towards sustainability by 2040, SGMA implementation is a critical tool in mitigating the vulnerability of rural residents, who rely on one or a few shallow groundwater wells, to water shortages due to drought and climate change. We witnessed the fragility of these water sources during the recent historic drought when thousands of private domestic wells went dry and 149 public water systems were drought-impacted. The vast majority of these impacts occurred in low-income San Joaquin Valley communities with critically overdrafted groundwater basins where GSPs were due on January 31, 2020.⁴

Prior research, however, indicates that these communities are generally not represented in Groundwater Sustainability Agencies (GSAs) and faced significant hurdles to participating in the Groundwater Sustainability Plan (GSP) development process.⁵ Even where DAC representatives are actively participating in SGMA implementation, the integration of rural drinking water interests and priorities has not always

been forthcoming. The vast majority of community representatives interviewed in 2019 did not believe that SGMA would protect or advance drinking water needs. In fact, many saw SGMA as a potential threat, citing the possibility of facing both further deteriorating groundwater conditions and increased costs.⁶

How might SGMA implementation impact environmental justice priorities at these intersections? How were drinking water beneficial users engaged in the planning process such as defining locally unacceptable Undesirable Results and setting Sustainable Management Criteria (Minimum Thresholds and Measurable Objectives)? How will these beneficial users be impacted by those decisions? In this report we seek to further our understanding of this critical water management process, and its relationship to the human right to water, by reviewing GSPs submitted to the Department of Water Resources in January 2020.

Methods and Limitations

First, to understand the prevalence and distribution of drinking water stakeholders in critically overdrafted basins (where GSPs were due January 31, 2020), we conducted a spatial analysis of plan boundaries intersected with public data on community, water system and well locations. This analysis was performed in R using cleaned domestic well data from the Online Systems of Well Completion Reports (OSWCR),⁷ public supply wells from the State Water Board's Groundwater Information System (GAMA)⁸ and the Department of Water Resources DAC mapping tool.⁹ One GSP, Graveley Ford in the Madera subbasin, was excluded from this analysis due to incomplete spatial information. Incorporated cities and unincorporated Census Designated Places (CDPs) intersecting a plan by less than 10% of its area were excluded to accommodate mapping discrepancies and potentially insignificant boundary overlaps. While we know many are still in operation, out of an abundance of caution, in order to avoid including non-active wells in the analysis, we also excluded domestic wells constructed on or before 1975. This fact, combined with the fact that the OSWCR system includes only reported wells makes our domestic well tally a conservative minimum estimate.¹⁰

Next, our research team reviewed all 41 of the unique submitted GSPs posted for public comment as of March 2020 using a standardized drinking water review matrix. Informed by the emergency regulations for GSPs adopted by the California Water Commission, the review structure focused on specific GSP elements that relate to the tenants of California’s Human Right to Water law (safe, clean, affordable and accessible drinking water), considerations of active involvement as required by SGMA (Water Code § 10727.8(a)) and fair treatment and meaningful involvement under Public Resources Code Section 30107.3. The review matrix assesses the degree to which specific elements of the plans reflect drinking water and DAC considerations, organized into eight categories: water quality, water access, drinking water as a beneficial use, participation and engagement, affordability, projects and management actions, mitigation and governance/decision-making.

Importantly, we do not consider every aspect of the plans that are relevant to drinking water or DACs (e.g. the full and accurate incorporation of drinking water consumptive uses in water budgets), nor are we able to confirm the validity of plan information or assess the real or potential impact of each plan on drinking water users using these methods. Rather, our drinking water review assesses the degree to which drinking water uses and users were considered in the planning process as indicated by the text of each plan. The extent to which any consideration or lack thereof translates into gains or losses for the human right to water in California, which the Department of Water Resources has a responsibility to consider under AB 685, requires additional analyses. Thus this report is merely a starting point for understanding how drinking water access is currently being integrated into sustainable groundwater planning and ways by which this process can be improved.



Water Quality



Water Access



Drinking Water as a Beneficial Use



Participation and Engagement



Affordability



Projects and Management Actions



Mitigation



Governance/ Decision-making

Results

Understanding the extent and distribution of drinking water beneficial users in critically overdrafted basins

California’s critically overdrafted basins, for which GSPs were due in January 2020, cover an immense number of drinking water beneficial users including 246 communities (at least 148 of which are DACs) and 819 public water systems. The vast majority of these users are supplied by groundwater wells. Our spatial analysis locates 6,175 public supply wells and, at minimum, 35,000 domestic wells, in critically overdrafted basins. Counts of these stakeholders vary significantly between plans (see Appendix A). For example, while four GSPs have no communities or public

water systems within their plan boundaries, the Eastern San Joaquin GSP covers 31 distinct communities and 106 separate public water systems. Perhaps not surprisingly, Eastern San Joaquin GSP also covers the most domestic wells (7,444) and the most public supply wells (1,196) followed by North Kings GSP and Kern River GSP. An average GSP in an overdrafted groundwater basin covers six communities, four DACs, 20 public water systems, 836 domestic wells constructed since 1975 and 147 public supply wells.

Table 1. Distribution of drinking water users among GSPs in critically overdrafted groundwater basins.

	DACs	Total communities (Cities and unincorporated)	Public water systems	Public supply wells	Domestic wells (constructed after 1975)
Mean	4	6	20	147	836
Minimum	0	0	0	0	1
Maximum	20	31	106	1,196	7,444
Total	148	246	819	6,175	35,098

Drinking water assessment of submitted GSPs: Common gaps and omissions

Submitted Groundwater Sustainability Plans (GSPs) vary markedly on how and if they addressed human right to water considerations as well as how they tackled stakeholder engagement. Yet several key gaps are common across the majority of plans.

Many GSPs are missing Minimum Thresholds for key contaminants that impact public health. For those that do set thresholds, those thresholds are often not aligned with drinking water standards and for many the potential impact of these policy decisions on drinking water users goes undiscussed.

- Only 28 (68%) of the plans provided significant details on drinking water quality conditions in relation to safe drinking water standards when describing their basin setting and groundwater conditions.

- Eighteen (44%) of the plans set no Minimum Thresholds for any of the following important drinking water constituents: Nitrates, Arsenic, Uranium, DBCP, 1,2,3-TCP, Chromium-6 or Perchlorate. In another four plans it was unclear how Minimum Thresholds related to specific constituents of concern. On average, plans set Minimum Thresholds for just two of these seven constituents.

- Of the 23 plans that did clearly set Minimum Thresholds for one or more of the above constituents, five plans (22%) did not use MCLs for setting their Minimum Thresholds. Another ten plans (43%) set their thresholds at or below drinking water standards with exceptions, either for certain constituents, or, more often, for specific monitoring wells with existing or near exceedances.
- Even where Minimum Thresholds were set in accordance with state drinking water standards, one or more exceedances of these thresholds across the representative monitoring network was often not considered as constituting an occurrence of Undesirable Results. In some plans Undesirable Results are defined as occurring only when as many as a majority of monitoring sites exceed said thresholds. Such conditions mean that many future violations of drinking water standards could be accommodated under local definitions of sustainability.
- While GSAs are supposed to articulate a local definition of sustainability, in partnership with local beneficial users including DACs, municipal well operators, domestic well owners and public water systems, when it comes to Minimum Thresholds for water quality, 21 plans (51%) provided no information about how that occurred. Thirteen plans (32%) referenced stakeholder involvement generally but did not provide more information.
- Only 11 (27%) plans provided a thorough discussion of impacts of their locally defined Minimum Thresholds for water quality per Water Code Section 354.28 that covered all relevant drinking water beneficial users in their area. Another 24 plans (56%) provided some high level discussion of drinking water impacts related to either Minimum Thresholds or Undesirable Results as defined in their plans but provided little details or omitted discussion of certain relevant drinking water users. Six plans (15%) made no mention of the potential impact of their policy decisions on drinking water users at all.

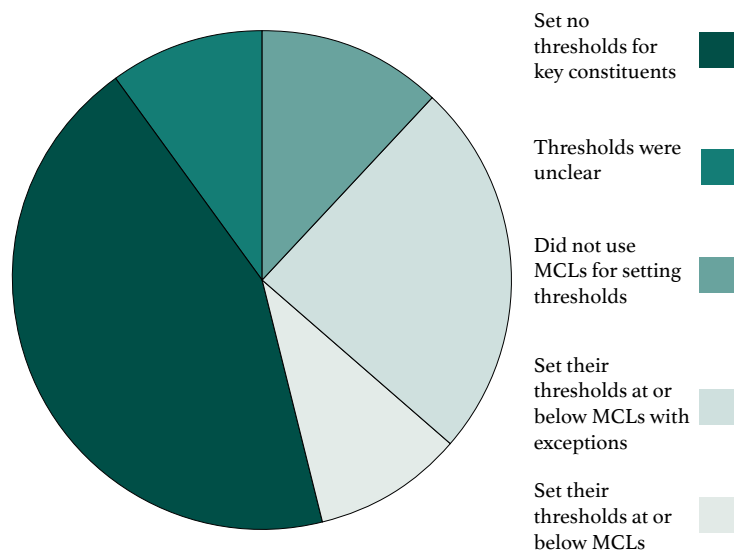


Figure 1. Percent of total plans (41) that set Minimum Thresholds for the seven drinking water constituents and their relationship to Maximum Contaminant Levels (MCLs).

in submitted GSAs, water levels will continue to decline nearly everywhere. The role of drinking water stakeholders in these decisions and their impact on them is unclear in many GSAs.

- Comparing Minimum Thresholds to recent lows for groundwater levels, 32 plans (78%) set minimum standards for sustainability below these conditions, allowing for further declines from the recent drought.
- Twenty-four (59%) of plans include no analysis of how declining groundwater levels could impact drinking water access for those served by shallow domestic wells.
- Thirty-three (80%) plans do not include any discussion of mitigation measures in the event of negative impacts to domestic wells. Four plans included discussion of potential mitigation efforts but did not commit to enacting those plans.
- Twenty plans (49%) made no mention of drinking water stakeholder involvement in setting Minimum Thresholds for groundwater levels. Another 12 (29%) broadly referenced involvement but provided no details. Only nine plans (22%) clearly explained how drinking water stakeholders were involved in decisions about Sustainable Management Criteria for declining groundwater levels.

Based on Minimum Thresholds for groundwater levels set

- Thirty plans (73%) made no reference to drinking water challenges that arose during the recent historic drought. Another eight plans (20%) made high-level references to these challenges in their plan without further elaboration.

When comparing the spatial analysis in part one to discussions of these users in the plans themselves, two findings stand out. First, all types of drinking water users lacked description in at least some plans. Second, information about domestic wells was omitted most often.

- Where applicable, the number, names and locations of DACs were detailed in 76% of plans.
- Where applicable, 53% of plans provided two or more pieces of descriptive information about public water systems/wells such as counts, names, locations, well depths etc.
- Twelve (29%) plans provided no descriptive information about domestic wells at all. Fifteen (37%) plans provided either an estimated total number of domestic wells or a map of these wells by parcel, but not both. Fourteen GSPs (34%) included both pieces of this information.
- Eleven (31%) plans accounted for population growth in their water budgets using local population projections (for six plans this question was considered non-applicable where the GSP covered no incorporated cities or unincorporated census designated places).

Stakeholder engagement and participation was addressed more often than other review components, yet illustration of how feedback was incorporated was often lacking. Few plans addressed stakeholder engagement for plan implementation with any detail.

- In 10 instances the duration or existence of the draft comment period could not be determined from the GSP text, SGMA portal or affiliated GSA websites. For those where this information was available, on average draft GSPs were available for public comment for 71 days, with a minimum of 31 days and maximum of 107 days.

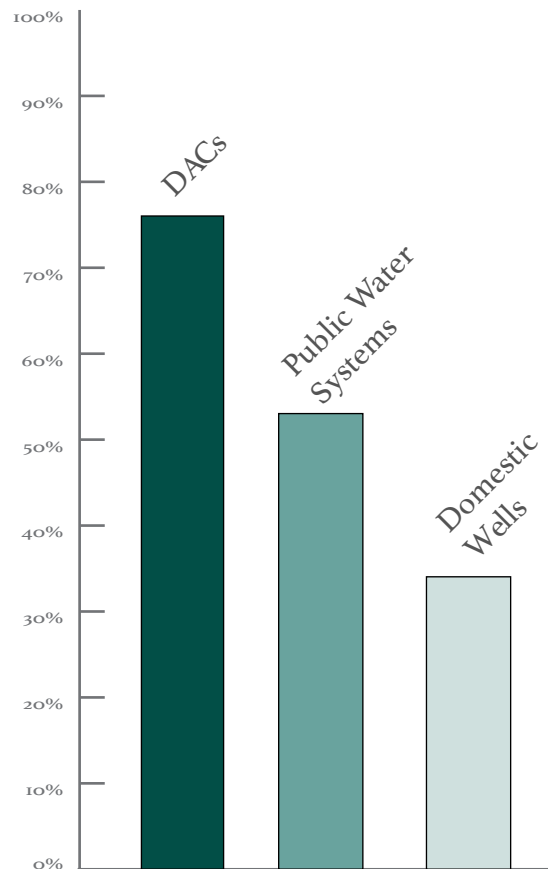


Figure 2. Percent of plans that provided descriptive information about the following DW stakeholders: DACs, Public Water Systems and domestic wells.

- Nine (22%) of the plans provided no documentation of incorporating public comments received on their draft into their final plan whereas 24 (59%) provided detailed information about how comments were addressed.
- Of the 36 plans where dates could be determined for both the end of the public comment period and formal adoption of the final plan, nine (25%) had less than 30 days between these two events. In two of these instances the draft comment period ended and the final plan was adopted on the same day.
- Eleven (27%) plans outlined concrete steps for stakeholder engagement in implementation. Sixteen (39%) made high-level reference to such plans without providing details. Fourteen (34%) plans did not discuss stakeholder participation for implementation in their plans at all. Those that did discuss stakeholder engagement did not always include all relevant drinking water stakeholders, particularly domestic well owners and DACs.

Very few plans mentioned affordability, a central tenant to California's human right to water.

- Six of 41 (15%) plans mentioned drinking water affordability explicitly in their plan.
- Only one GSP, Santa Cruz Mid-County, explicitly evaluated funding mechanisms with consideration of affordability.

Most plans do not include projects or management actions with drinking water or DAC benefits.

Examples of best practices and further opportunities for integrating drinking water into Groundwater Sustainability Plans

Despite the common limitations discussed above, the 41 submitted plans also provide examples of integrating drinking water into groundwater planning and highlight important opportunities for improvement to these trends statewide.

Many plans made efforts to increase public participation in the groundwater planning process including employing diverse and creative stakeholder engagement strategies.

- More than two-thirds of plans (80%) include a Communication and Engagement Plan similar to recommendations from the Department of Water Resources guidance document on stakeholder engagement.
- Nearly half of the 41 GPSs (49%) discussed employing several different avenues for stakeholder engagement including everything from producing YouTube videos, hosting field trips and site visits, door-to-door outreach in vulnerable domestic well communities and stakeholder surveys distributed via mail or social media.
- As many as 24 plans (59%) reported at least one instance of providing Spanish-language interpretation, often at public workshops, or Spanish-language materials. Some built upon these efforts to increase public access by providing Spanish-language executive summaries of their GSPs, informational mailers or surveys.

- Twenty-seven of the 41 plans (66%) did not include any projects or management actions with specific drinking water benefits such as drought contingency planning, installing treatment, rehabbing drinking water wells or increasing urban water use efficiency.
- Of the 33 plans that cover one or more DAC, 22 (67%) did not include projects that benefit any DAC in their area.

Several plans assessed the potential for disproportionate impacts to shallow domestic wells and included mitigation measures.

- Eleven plans (27%) included an analysis of potential dry wells at minimum thresholds for their entire plan area. For example, Greater Kaweah created a catalog of information from wells in their jurisdiction to determine depth and screen intervals of wells with available data and then used this information to assess impacts plan-wide. The Buena Vista GSP used a similar analysis to revise their initial Minimal Thresholds in order to minimize loss of production from existing domestic and municipal wells.

“Development of a GSP should therefore consider, as a minimum, the need to supply water for the health and safety of all residents and businesses along with (as stated in CWC Section 106.3) the human right to safe, clean, affordable, and accessible water for human consumption, cooking, and sanitary purposes” (Indian Wells Valley GSP p. 1-2).

- Four plans included mitigation programs for potential impacts to shallow domestic wells such as funding for technical assistance, well repair/replacement/deepening, consolidation of private wells into public water systems and water treatment.

In some plans human right to water related considerations directly shaped GSPs policies.

- The Santa Cruz Mid-County GSP includes an evaluation of funding mechanisms and fee criteria to recover the costs of their groundwater sustainability program. The commissioned study employs both affordability and equity as policy objectives in considering funding options so that a fair and appropriate fee structure is created that supports affordability for essential uses (e.g. health and safety).
- The Indian Wells Valley GSP explicitly affirms the human right to water in its plan objectives stating that, “Development of a GSP should therefore consider, as a minimum, the need to supply water for the health and safety of all residents and businesses along with (as stated in CWC Section 106.3) the human right to safe, clean, affordable, and accessible water for human consumption, cooking, and sanitary purposes” (p. 1-2).
- Four plans set all of their established Minimum Thresholds for water quality at or below state drinking water standards (MCLs). These plans include the Mid-Kaweah, Santa Cruz Mid-County, Greater Kaweah and 180/400 ft. aquifer GSPs.

Some GSPs included projects and management actions to help to advance drinking water access.

- Fourteen plans included projects or management actions with specific drinking water benefits. Another 11 plans included projects or management actions with specific DAC benefits. Such projects include: drinking water system consolidations, targeted recharge, wellhead treatment, water conservation programs and the installation of water meters.

Several GSAs involved with authoring GSPs provided for voting representation of drinking water users including domestic well owners and small water systems. While relatively few GSAs leveraged stakeholder/advisory committees to integrate stakeholder voices into the GSP development process, those that did generally provide for both drinking water and DAC representation.

- Twenty-nine of the GSPs were written by a single GSA. Of the other 12 that were authored collaboratively between multiple GSAs, four had an advisory or stakeholder committee coordinated at the plan level for GSP development. In all four of those instances, however, such committees had representation for both drinking water stakeholders and DACs.
- Overall 97 GSAs contributed to writing the 41 submitted GSPs assessed. Twenty-one of the 97 (22%) reported having stakeholder/advisory committees. Thirteen of which had drinking water representation on their committee and 12 had DAC representation. In another six cases, membership could not be determined in the plan or on their respective websites.

“Domestic water users in these areas are experiencing water supply reliability challenges, and in the 2012-2016 drought experienced well failures. While the following actions would not affect the water budget in the Basin, they are intended to address ongoing water supply reliability issues affecting these communities. CCSD only has a single well to serve its customers, and no redundancy in its system. This management action would include consideration of opportunities to improve water supply reliability for Ventucopa and within the CCSD service area.” (Cuyama Basin GSP, p. 7-19).

Recommendations and Conclusion

Groundwater sustainability planning holds great promise for advancing safe and affordable drinking water access in California. Improving drinking water supply reliability and drought resilience will also ease groundwater management challenges and increase operational flexibility long term. Yet it is clear that integrating these two efforts, in policy and in practice, requires additional and ongoing work. This report highlights several clear first steps for moving in that direction.

First, submitted plans need to be revised to more fully reflect drinking water users and uses in their areas and incorporate drinking water considerations with the full involvement of those same users. For example, the number and distributions of DACs, public water systems, public supply wells and domestic wells should be thoroughly described in every plan without exceptions including details on their vulnerabilities such as well depth. This information is necessary to assess potential impacts as required throughout the rest of the plan. Further, where drinking water constituents of concern are found, current conditions and historical Safe Drinking Water Act violations need to be thoroughly described with relevant Minimum Thresholds set. Forthcoming 2022 plans can learn from the diverse 2020 plans as to how to better leverage public drinking water data and stakeholder engagement to this effect. GSAs should also employ newly developed tools for integrating drinking water and groundwater planning such as the [Framework for Drinking Water Well Impact Mitigation Program](#) by Self-Help Enterprises, Leadership Counsel for Justice and Accountability and Community Water Center or a [Guide to Water Quality Requirements Under the Sustainable](#)

[Groundwater Management Act](#) by Stanford's Water in the West.

Second, the Department of Water Resources and State Water Resources Control Board should work collaboratively to provide all GSAs with more guidance and support for navigating the intersection of drinking water and groundwater which have historically been dealt with separately. Both agencies have clear responsibilities under AB 685 and SGMA to consider drinking water access and ensure that beneficial users are not subject to significant and unreasonable impacts as they carry out their responsibilities for SGMA implementation. As a starting place, all GSPs submitted for state review should be assessed for impacts to drinking water sources as part of the plan review process. This is particularly important given the limited attention to drinking water in many of the plans.

Finally, there is a clear need to attend to the connection between decision-makers and decision outcomes when it comes to water management in the state. Selecting Sustainable Management Criteria and developing projects inclusive of drinking water users is clearly less likely where such users are not involved. California needs to continue to improve upon our existing water governance landscape to increase access, participation and, ultimately, democracy in the management of this vital public resource. Robust GSPs that are fully reflective of the beneficial uses and users in their areas are unlikely to be produced without careful attention to meaningful and equitable stakeholder involvement.

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For more information about the methods or findings of this report, or with any questions, contact Kristin Dobbin at kdbobbin@ucdavis.edu.



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Appendix A - Drinking water beneficial users by GSP

Groundwater Sustainability Plan	Domestic wells (Constructed since 1975)	Public supply wells*	Number of DACs**	Total number of Communities	Number of Public Water Systems
180/400 ft. aquifer - Salinas	334	199	2	9	42
Aliso WD	3	3	0	0	0
Alpaugh	3	8	1	1	1
Buena Vista	21	11	1	1	2
Central Kings	1745	200	6	8	51
Chowchilla	380	48	2	2	3
Cuyama	81	27	2	2	2
Delano-Earlimart	35	36	2	3	6
East Kaweah	587	68	7	8	8
Eastern San Joaquin	7444	1196	12	31	106
Eastern Tule	690	202	6	6	20
Farmers WD	2	0	0	0	0
Fresno County - Delta Mendota	27	7	0	0	1
Grasslands	78	5	0	0	1
Greater Kaweah	1370	183	9	10	15
Henry Miller	4	2	0	0	0
Indian Wells	882	127	1	4	11
James	50	10	1	1	1
Kern Groundwater Authority	686	407	20	26	66
Kern River	378	478	5	7	32
Kings River East	1649	231	11	15	43
Lower Tule River ID	192	59	3	3	7
Madera	4470	213	5	9	21
McMullin Area	331	33	0	1	9
Merced	3010	319	8	14	65
Mid-Kaweah	464	243	2	4	10
New Stone	1	0	0	0	0
North Fork Kings	697	65	2	3	16
North Kings	5946	863	7	15	102
Northern Central Delta Mendota	599	116	5	6	42
Olcese	2	1	0	0	1
Oxnard	31	158	0	5	25
Paso Robles	82	102	1	5	11
Pixley ID	108	23	2	2	3
Pleasant Valley	10	30	0	1	3
Root Creek	16	5	0	0	1
Santa Cruz Mid-County	585	86	0	12	17
San Joaquin River Exchange Contractors	840	124	9	11	20
South Kings	52	67	4	5	9
Tri-County Water Authority - Tule	7	6	1	1	1
Tulare	1162	179	5	9	11
Westlands	44	35	6	6	34
Total	35,098	6,175	148	246	819

* The GAMA dataset used here includes all public supply wells. This is a different data source than used in comments submitted to the Department of Water Resources by the authors which employed cleaned well logs from Pauloo (2018).

** Some Census Designated Places (CDPs) are missing household income data in the DWR DAC mapping tool and are excluded here although many are DACs.