- GSAs and their respective elected officials, directors, leadership, management, staff and customers
- Beneficial uses and users of groundwater
- Diverse social, cultural and economic segments of the population within the Subbasin
- Public

In addition to the Stakeholder Committee's regional efforts, the 17 GSAs and San Joaquin County No. 2 (Cal Water) are also focused on outreach efforts to their member audiences.

Stakeholder Engagement and Public Outreach

Stakeholder involvement and public outreach is critical to the GSP development because it helps promote the plan development based on input and broad support. The following activities summarize involvement opportunities and outreach methods to inform GSA boards, broader groups of stakeholders and the public.

It is important to note that levels of interest will evolve and shift according to the GSP's development stage. The consulting team will continue to monitor changing interests and customize outreach to meet those interests.

Stakeholder and Public Involvement: Tactical Activities

GWA Board Meetings, Advisory Committee Meetings and Stakeholder Committee Meetings

All interested stakeholders and public members will have the opportunity to attend GWA Board meetings, Advisory Committee meetings and Stakeholder Committee meetings. The website, communications materials and news releases will include that these meetings are open forums where interested parties may attend to learn more about the GSP and planning underway.

Public Meetings

Public meetings on an approximate quarterly basis will provide a forum to engage diverse social, cultural and economic segments of the population within the Subbasin. In an effort to reach disadvantaged communities, the meetings will be held in venues located in these locations to the extent possible. The Stakeholder Committee will provide input about the best locations for the public meetings to occur at their first meeting planned for June 2018. The plan will be updated to reflect these recommendations. The public meetings will provide an opportunity to:

- Provide participants with information about need/requirement to develop and implement a GSP
- Provide comments about the GSP's components, development and implementation
- Address questions in a transparent, proactive manner

Stakeholder and Public Outreach: Tactical Activities

GSA Boards/Stakeholder Outreach

The consulting team will share information and resources with GSA members and Stakeholder Committee members for their use in internal and external communications. The goal is to equip GSA and Stakeholder Committee members with resources to share with their elected officials, boards of directors, management teams, staff, stakeholders and customers. This will reinforce the

GWA's commitment for broader outreach and help the GWA members communicate information to their boards in an easy-to-understand, efficient manner.

Anticipated resources include:

- Branded PowerPoint presentations for customization and sharing on an approximately monthly basis
- Brief website copy with a link to the GWA site to post on their websites
- Brief, easy-to-understand updates and communications
- Social media content

Stakeholder Database/Communications Tracking Tool

A stakeholder database will be created of anticipated persons of interest. The database will include stakeholders that represent the region's broad interests, perspectives and geography. It will be developed by leveraging existing stakeholder lists and databases from prior GWA engagement efforts, referrals from key stakeholders and stakeholder groups and by conducting research of potential stakeholders that may be interested in one or all of the following categories: groundwater users, community/neighborhood, agricultural, environmental, flood management, Native American Tribes, disadvantaged communities, institutional and business.

The consulting team will continue to build on the list by adding additional interested parties including participants at public meetings and members who sign up on the website and removing anyone who requests to be removed. The database will serve as a foundation for targeted outreach and communication with the diverse target audiences in the basin.

Additionally, the database will be used to:

- Provide a single repository to collect, store and organize contact information about basin stakeholders
- Plan meetings and send notices to stakeholders based upon their identified interests and documents those notices
- Identify the interests and concerns of organizations and individual stakeholders
- Allow individuals to self-identify their interests in SGMA when they sign up as an interested stakeholder
- Document all stakeholders invited to GSP development meetings and their participation at those meetings
- Document agendas for the meetings and post the meeting minutes following the meetings
- Produce summary reports of communication and engagement activities to meet SGMA requirements

Key Messages

Throughout the GSP's development, key messages will serve as the foundation to communications materials. Preliminary draft messages include:

- DWR identified Eastern San Joaquin's Subbasin as one of the State's 21 critically over-drafted basins. Per SGMA, GSAs in critically over-drafted Subbasins are required to develop groundwater sustainability plans and submit the GSPs to DWR by January 31, 2020.
- The GWA JPA was formed to work with locally governed groundwater sustainability agencies to develop a single groundwater sustainability plan for the region's Subbasin.

- The GWA will conduct a locally driven planning process in an open, transparent manner to allow for active stakeholder involvement and public information opportunities.
- The GWA encourages and welcomes the involvement of diverse groundwater users to develop a broadly accepted plan to achieve sustainable groundwater management by 2040 and avoid negative regulatory consequences.

Website

The GWA website (esjgroundwater.org) is active and continues to be maintained on a regular basis. It contains an introduction of the Mission, Member Agencies and GWA Board with links and meeting information. There are sections for projects, educational materials and meeting notices with the accompanying minutes.

The purpose of creating accessible information online, there are sections where interested stakeholders or members of the public can access background/planning materials, presentations, meeting information, news releases, newsletters, public notices and other major announcements and accomplishments.

As distribution of public information and interested parties is important, there is also an area to access the complete project reports relative to the JPA and its member agencies. The website also has areas where interested individuals can request to receive frequent updates and information through email communications. Contact information is readily available for interested parties to communicate with GWA Board members and staff.

The GWA website will serve as the central hub for all information about the GWA. It will be continually updated to keep stakeholders and the public informed and engaged.

Announcement Flyers

In conjunction with the public meetings, announcements will be mailed and disseminated through e-blasts, social media, GSAs, the news media and on the website.

- Invite members of the public to attend the public meetings
- Provide periodic updates to stakeholders and members of the public about the GSP planning process

The flyers will also be provided to the GSAs and stakeholder groups with a message to encourage their organizations to share with their customers/members, stakeholders and other target audiences to help extend reach.

Electronic Communications

Outreach will also occur through e-mail communications to alert interested parties about the meeting notices, meeting summaries and updates to share information with interested parties in with accordance with SGMA. The e-blasts will include brief copy that directs recipients to the GWA website to access these materials for their reference and sharing as desired.

Social Media

Although the GWA does not maintain social media platforms, many of the member GSAs have Twitter and Facebook platforms. The GSAs will receive quarterly social media calendars with compelling, consumer-friendly content for use on their platforms. The posts will help inform diverse audiences about the need for the groundwater sustainability plan, updates on the planning process and public meetings with links to the GWA website and applicable materials.

Media Relations

Engaging and informing the local media about the process will reinforce efforts to reach broader audiences. Media relations activities will include news releases to announce the GSP planning launch, other key milestones and public meetings.

Measure and Evaluate

The GWA's stakeholder engagement and public outreach success will be evaluated against several of DWR's guidelines as described in *Guidance Document for Groundwater Sustainability Plan, Communications and Stakeholder Engagement* and *Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation,* a White Paper authored by the Clean Water Fund, Community Water Center and Union of Concerned Scientists. Supporting materials to measure and evaluate stakeholder engagement and public outreach include the following:

- Robust stakeholder list of interested parties that includes representatives from all beneficial uses/users as well as other diverse stakeholders and is continually updated and employed.
- Description of the beneficial uses and users of groundwater in the Subbasin, including the land uses and property interests and other types of parties potentially affected by the GSP and the nature of consultation with those parties.
- Documentation showing local GSAs within the region were informed of and invited to participate in the GSP development effort.
- List of public meetings, planning meetings and stakeholder committee meetings held to discuss the GSP along with meeting notifications and agendas.
- Identification of opportunities for public engagement and discussion of how public input and response will be used.
- Meeting summaries and correspondence to show information-sharing occurred through open, multi-stakeholder dialogues between stakeholder groups for shared understanding of concerns, interests and needs.
- Summary of the advisory and stakeholder committee process to demonstrate the execution of formal mechanisms for the participation of stakeholders in a manner that reasonably addresses their needs.
- Planning documentation showing the flexibility to change and actively revise and/or update the stakeholder engagement plan as the needs of existing stakeholders evolved or as new stakeholders are identified.
- Documentation showing formal procedures exist to solicit and incorporate stakeholder feedback throughout the plan development and implementation.

APPENDIX
Statutory Requirements for Outreach by Phase

The following table summarizes the SGMA's statutory outreach requirements by phase for the GSP development process as provided on the DWR website. The final measurement and outreach report will demonstrate the GWA's achievements to meeting the following activities through a comprehensive stakeholder engagement and public outreach program.

Timeframe	Item
Prior to initiating plan development	Statement of how interested parties may contact the GSA and participate in development and implementation of the plan submitted to DWR. (Sec. 353.6) Post same information on the website
Prior to GSP development	Establish and maintain an interested persons list. (Sec. 10723.4) Prepare a written statement describing the manner in which interested parties may participate in GSP development and implementation. Statement must be provided to: • Legislative body of any city and/or county within the geographic area of the plan • Public Utilities Commission if the geographic area includes a regulated public water system regulated by that Commission • DWR • Interested parties (Sec. 10723.4) • The public
Prior to and with GSP submission	• Record statements of issues and interests of beneficial users of basin groundwater including types of parties representing the interests and consultation process • Lists of public meetings • Inventory of comments and summary of responses • Communication section in GSP (Sec. 354.10) that includes: • Agency decision-making process • Identification of public engagement opportunities and response process • Description of process for inclusion • Method for public information related to progress in implementing the plan (status, projects, actions)

90 days prior to GSP Adoption Hearing(s)	Prior to Public Hearings for adoption or amendment of the GSP, the GWA must notify cities and/or counties of geographic area of the intent to adopt the plan 90 days in advance of adoption. Each GSA will need to individually adopt the GSP. (Sec. 10728.4)
90 days or less prior to GSP Adoption Hearings (Sec. 10728.4)	Prior to Public Hearings for adoption or amendment of the GSP, the GSP entities must: • Consider and review comments • Conduct consultation within 30 days of receipt with cities or counties so requesting
GSP Adoption or Amendment	GSP must be adopted or amended at Public Hearing(s).
60 days after plan submission	60-day comment period for plans under submission to DWR. Comments will be used to evaluate the submission. (Sec. 353.8)
Prior to adoption of fees	Public meeting required prior to adoption of or an increase to fees. Oral or written presentations may be made as part of the meeting. (Sec. 10730). Public notice shall include: • Time and place of meeting • General explanation of matter to be considered • Statement of availability for data required to initiate or amend such fees • Public posting on Agency Website and provision by mail to interested parties of supporting data (at least 20 days in advance) Mailing lists for interested parties are valid for 1 year from date of request and may be renewed by written request of the parties on or before April 1 of each year • Includes procedural requirements per Government Code, Section 6066
Prior to conducting a fee adoption hearing	Must publish notices in a newspaper of general circulation as prescribed • Publication shall be once a week for two successive weeks. Two publications in a newspaper published once a week or more often, with at least five days intervening between the respective publication dates not counting such publication dates, are sufficient • The period of notice begins the first day of publication and terminates at the end of the 14th day, (which includes the first day)

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APPENDIX 1-I.
PUBLIC COMMENTS RECEIVED

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Public Comments Received on the Draft Groundwater Sustainability Plan

- California Department of Fish and Wildlife, North Central Region
- California Poultry Federation
- California Sportfishing Protection Alliance, including comments by Greg Kamman (Kamman Hydrology & Engineering, Inc.)
- Collective comments by The Nature Conservancy, Audubon California, Clean Water Action, Clean Water Fund, American Rivers, and Union of Concerned Scientists
- Collective comments by The League of Women Voters of San Joaquin County; Environmental Justice Coalition for Water; Sierra Club, Delta Sierra Group; Puentes; and Restore the Delta
- Cosumnes Subbasin
- East Bay Municipal Utility District (EBMUD)
- Jane Wagner-Tyack (Communication Consultant)
- Larry Walker Associates, on behalf of agricultural interests
- North San Joaquin Water Conservation District
- Restore the Delta
- Sierra Club, Delta-Sierra Group
- South San Joaquin GSA
- Stockton East Water District
- Terra Land Group, LLC
- The Freshwater Trust, on behalf of Northern Delta GSA and associate member Staten Island-Conservation farms and ranches
- The Nature Conservancy
- The Wine Group
- Tracy Subbasin

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State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
North Central Region
1701 Nimbus Road,
Rancho Cordova, CA 95670
www.wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

August 23, 2019

Brandon Nakagawa
Eastern San Joaquin Groundwater Sustainability Plan Manager
Eastern San Joaquin Groundwater Authority
1810 E. Hazelton Avenue
P.O. Box 1810
Stockton, CA 95201
Email: ESJgroundwater@sjgov.org

Subject: COMMENTS ON THE EASTERN SAN JOAQUIN SUBBASIN DRAFT GROUNDWATER SUSTAINABILITY PLAN

Dear Mr. Nakagawa:

The California Department of Fish and Wildlife (Department) North Central Region is providing comments on the Eastern San Joaquin (ESJ) Subbasin Draft Groundwater Sustainability Plan (GSP) prepared by the Eastern San Joaquin Groundwater Authority (ESJGA)[1] pursuant to the Sustainable Groundwater Management Act (SGMA). As trustee agency for the State's fish and wildlife resources, the Department has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and the habitat necessary for biologically sustainable populations of such species (Fish & Game Code §§ 711.7 and 1802).

Development and implementation of GSPs under SGMA represents a new era of California groundwater management. The Department has an interest in the sustainable management of groundwater, as many sensitive ecosystems and species depend on groundwater and interconnected surface waters, including ecosystems on Department-owned and -managed lands within SGMA-regulated basins. SGMA and its implementing regulations afford ecosystems and species specific statutory and regulatory consideration, including the following as pertinent to Groundwater Sustainability Plans:

[1] The Eastern San Joaquin Groundwater Authority comprises 17 Groundwater Sustainability Agencies (GSAs): Calaveras County Water District / Stanislaus County, California Water Service Company, Central Delta Water Agency, Central San Joaquin Water Conservation District, City of Lathrop, City of Lodi, City of Manteca, City of Stockton, Linden County Water District, Lockeford Community Services District, North San Joaquin Water Conservation District, Oakdale Irrigation District, San Joaquin County, South Delta Water Agency, South San Joaquin Groundwater Sustainability Agency, Stockton East Water District, Woodbridge Irrigation District GSA.

- Groundwater Sustainability Plans must **identify and consider impacts to groundwater dependent ecosystems** [23 CCR § 354.16(g) and Water Code § 10727.4(l)];
- Groundwater Sustainability Agencies must **consider all beneficial uses and users of groundwater**, including environmental users of groundwater [Water Code §10723.2 (e)]; and Groundwater Sustainability Plans must **identify and consider potential effects on all beneficial uses and users of groundwater** [23 CCR §§ 354.10(a), 354.26(b)(3), 354.28(b)(4), 354.34(b)(2), and 354.34(f)(3)];
- Groundwater Sustainability Plans must **establish sustainable management criteria that avoid undesirable results** within 20 years of the applicable statutory deadline, including depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water [23 CCR § 354.22 *et seq.* and Water Code §§ 10721(x)(6) and 10727.2(b)] and describe monitoring networks that can identify adverse impacts to beneficial uses of interconnected surface waters [23 CCR § 354.34(c)(6)(D)]; and
- Groundwater Sustainability Plans must **account for groundwater extraction for all Water Use Sectors** including managed wetlands, managed recharge, and native vegetation [23 CCR §§ 351(al) and 354.18(b)(3)].

Accordingly, the Department values SGMA groundwater planning that carefully considers and protects groundwater dependent ecosystems (GDE), fish and wildlife beneficial uses, and users of groundwater and interconnected surface waters.

COMMENT OVERVIEW

The Department is writing to support ecosystem preservation in compliance with SGMA and its implementing regulations based on Department expertise and best available information and science.

The Department believes the GSP does not adequately demonstrate consideration of environmental beneficial uses and users of groundwater in its sustainability management criteria nor does it adequately characterize or consider surface water-groundwater connectivity. Accordingly, the Department recommends that ESJGA address these deficiencies before submitting the GSP to the Department of Water Resources (DWR).

COMMENTS AND RECOMMENDATIONS

The Department comments are as follows:

1. **Comment #1** (Plan Area, 1.2.1.1 Summary of Jurisdictional Areas and Other Features, pp. 1-18): Department lands are excluded from 'Summary of Jurisdictional Areas' narrative as well as from Figure 1-11, which maps other federal and state lands.

a. *Issue*: The GSP does not identify the jurisdictional boundaries of Department-owned and -managed lands as required by 23 CCR § 354.8(a)(3).
b. *Recommendation*: Include in Figure 1-11 and the accompanying narrative White Slough Wildlife Area, Woodbridge Ecological Reserve, and Vernalis Ecological Reserve Department lands.

2. **Comment #2** (Basin Setting, 2.2.6 Interconnected Surface Water Systems, starting pp 2-97): The narrative describing the basin's interconnected surface water conditions lacks specifics and contains inconsistencies in mapped surface water-groundwater interconnectivity.
    a. *Issue*:
        i. The interconnected surface water conditions narrative lacks estimations of the quantity and timing of streamflow depletions as specified in 23 CCR § 354.16(f).
        ii. Figure 2-65 portrays modeled 'losing,' 'gaining,' and 'mixed' stream reaches, and Figure 2-66 portrays modeled 'interconnected and 'disconnected' streams. Figure 2-66 shows modeled stream reaches as 'disconnected,' whereas Figure 2-65 identifies those same reaches as switching between 'losing,' 'gaining,' and 'mixed.' Accompanying narrative suggests that streams are only mapped as 'interconnected' in Figure 2-66 when they are interconnected at least 75% of the time. This 75% threshold for displaying interconnected surface waters excludes reaches of stream that are intermittently connected to groundwater and that may depend on groundwater contributions to meet the needs of instream or riparian beneficial uses and users of interconnected surface waters.
    b. *Recommendation*:
        i. Identify the estimated quality and timing of streamflow depletions in the ESJ Subbasin. If this information is not available, identify an expeditious path to estimating these values.
        ii. Update Figure 2-66 to show all interconnected stream reaches, even if they are interconnected less than 25% of the time.
3. **Comment #3** (Basin Setting, 2.2.7 Groundwater-Dependent Ecosystems, starting pp 2-100): GDE identification, required by 23 CCR § 354.16(g), is based on methods that risk exclusion of ecosystems that may depend on groundwater.
    a. *Issue*: Methods applied to the Natural Communities Commonly Associated with Groundwater (NCCAG) dataset to eliminate potential GDEs are fallible.

i. Depth to Groundwater: The removal of potential GDEs with a depth to groundwater greater than 30 feet during (an unspecified season) of 2015 relies on a single-point-in-time baseline hydrology. Specifically, this 2015 baseline falls several years into a historic drought when groundwater levels throughout the San Joaquin Valley were trending dramatically lower than usual due to reduced surface water availability. Exclusion of potential GDEs based on a snapshot of groundwater elevations during a historic drought is invalid; because this approach does not consider representative climate conditions or account for GDEs that can survive a finite period of time without groundwater access (Naumburg 2005), but that rely on groundwater table recovery for long term survival.

ii. Adjacent to Alternate Water Supplies: The GSP notes that "to be dependent on groundwater there must not be other available water supplies" (GSP pp 2-104). This statement disregard's a GDE's adaptability and opportunistic approach to accessing water in which vegetation may vary reliance on surface water and groundwater between seasons and water years.[2] Therefore, the removal of potential GDEs that are within 50 feet of irrigated lands, 150 feet of managed wetlands, and 150 feet of perennial surface water does not consider the potential for GDEs shifting reliance between surface and groundwater. Additionally, vegetation near *interconnected* perennial surface waters may depend on sustained groundwater elevations to stabilize the gradient or rate of loss of surface water; meaning ecosystems near interconnected surface waters likely depend on sustainable groundwater elevations and constitute GDEs. Therefore, it is possible that any of these potential GDEs proximate to 'alternate water supplies' rely on groundwater during specific seasons or water years.

b. *Recommendations*:

i. Depth to Groundwater: Develop a hydrologically robust baseline from which to remove 'areas with a depth to groundwater greater than 30 feet' that relies on multiple, climatically representative years of groundwater elevation and that accounts for the inter-seasonal and inter-annual variability of GDE water demand.

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[2] The Department assumes that potential GDEs removed under this step overlie shallow groundwater, otherwise they would have already been removed during the step of excluding potential GDEs that overlie a depth to groundwater of 30+ feet.

ii. Adjacent to Alternate Water Supplies: Reevaluate potential GDEs previously removed due to proximity to irrigated lands, managed wetlands, and perennial surface waters. Err on the side of inclusivity until there is evidence that the overlying ecosystem has no significant dependence on groundwater across seasons and water year types. Ensure that riparian GDE beneficial users of groundwater and interconnected surface water are carefully considered in the analysis of undesirable results and minimum thresholds for depletions of interconnected surface waters.

4. **Comment #4** (Basin Setting, 2.3.5.4 Projected Water Budget, starting pp 2-130): Projected water budget assumptions may risk overestimating surface water availability and sustainable yield by not relying on best available information [23 CCR § 354.18(e)].
    a. *Issue*: Projected surface water budget assumptions may risk overestimating water availability. Overestimation of water availability can result in the overallocation of both surface and groundwater water resources, unnecessarily jeopardizing environmental beneficial users. Two water budget assumptions that do not rely on best available information and that underscore current sustainable yield estimations are as follows: 1) the climate change analysis predicting a net depletion of aquifer storage is not reflected in the projected water budget or estimated sustainable yield, rather it is presented as a separate analysis; and 2) projected surface water deliveries need to be updated to reflect any new regulatory reductions of surface water deliveries such as those that may be codified in the State Water Resources Control Board Water Quality Control Plan for the Bay Delta: San Joaquin River Flows and Southern Delta Water Quality.
    b. *Recommendation*: Amend the water budget and sustainable yield: 1) apply climate change estimates to the projected water budget and scale the sustainable yield accordingly; and 2) adjust surface water delivery estimates to reflect any new regulatory compliance.
5. **Comment #5** (Sustainable Management Criteria, 3.2.1 Groundwater Levels and 3.2.6 Depletions of Interconnected Surface Water, starting pp 3-1): Groundwater Level and Interconnected Surface Water sustainable management criteria do not protect against undesirable results for fish and wildlife beneficial uses and users of groundwater and interconnected surface waters.
    a. *Issues*:
        i. Proxy Metric: Before addressing the individual sustainability criteria for both Groundwater Levels and Depletions of Interconnected

Surface Water, the Department challenges the use of groundwater elevations as a proxy metric for Depletions of Interconnected Surface Water. The GSP does not provide evidence that a "significant correlation exists between groundwater elevations" and Depletions of Interconnected Surface Water [23 CCR § 354.36(b)(1)]. Instead, the GSP backs into the proxy metric by associating the proposed Groundwater Level minimum thresholds with the absence of significant and unreasonable surface water depletions, claiming that historical depletions of interconnected surface water had no associated undesirable results (GSP pp 3-19). The GSP offers few details to substantiate this claim that historical surface water depletions did not lead to undesirable results, and the GSP does not specify the modeling exercise used to determine the insignificance of historical surface water depletions. Provided the status of surface water allocations and aquatic ecosystems on rivers in the ESJ basin, the Department contests that any surface water depletions attributable to groundwater pumping are likely to be significant and unreasonable, particularly in the benchmark year of 2015 when groundwater pumping and surface water temperatures were critically high. Depleted flows in the lower San Joaquin River, many reaches of which are identified as interconnected in the GSP, contribute to increased in-river water temperatures. Groundwater extraction from interconnected aquifers contributes to depletion of instream flow (Barlow and Leake, 2012). Low flows and increased water temperatures in the lower San Joaquin River have been documented to negatively impact Chinook salmon (*Oncorhynchus tshawytscha*) and steelhead (*Oncorhynchus mykiss*) (Hallock 1970, Marston 2012). Acknowledging that fish and wildlife beneficial uses and users of groundwater likely experienced undesirable results during historical pumping regimes, especially during critically dry years, the GSP cannot rely on groundwater elevation as a proxy metric for Depletions of Interconnected Surface Water. If a significant correlation is lacking between groundwater elevations and Depletions of Interconnected Surface Water, particularly at the representative monitoring well locations used to track groundwater elevations in the ESJ Subbasin, then groundwater elevations used as a proxy for surface water depletions may misinform groundwater management activities and poorly predict instream habitat

conditions for fish and wildlife species. Accordingly, the application of Groundwater Level sustainable management criteria to Depletions of Interconnected Surface Water is inappropriate, as it is not grounded in a quantifiable and site-specific understanding of surface water-groundwater connectivity as required by 23 CCR § 354.28 (c)(6)(A).

ii. Undesirable Results: Groundwater Level 'undesirable results' and 'effects of undesirable results' do not specify impacts to environmental beneficial users such as terrestrial GDEs (GSP pp 3-3, 3-4). Additionally, the method used to identify undesirable results for Groundwater Levels (i.e., minimum threshold exceedances in groundwater elevation) is applied to the identification of undesirable results for the Depletions of Interconnected Surface Water without a reasonable justification. The indicator of undesirable results for Groundwater Levels is the measure of 25% of monitoring wells falling below their minimum thresholds for two consecutive (non-dry) years, yet the GSP does not prove a relationship between the Groundwater Level identification of undesirable results and the presence of undesirable results for Depletions of Interconnected Surface Water (see Comment #5.a.i). Effectively, the GSP does not connect identification of undesirable results for Depletions of Interconnected Surface Water to effects on interconnected surface water beneficial users per 23 CCR § 354.26 (b)(3). Finally, the GSP notes that groundwater levels that fall below the minimum threshold during hydrologically dry or critically dry years are not considered to be an indicator of undesirable results (GSP pp 3-3). This means proposed indicators of undesirable results for Groundwater Levels and Depletions of Interconnected Surface Water do not exist for dry water years. This absence of undesirable results indicators for certain water years means beneficial users of groundwater and interconnected surface water may experience significant and unreasonable effects throughout the duration of dry or critical water years before the undesirable results are 'identified' and managed. Accordingly, there is no groundwater management accountability during the most challenging of years for water resource managers and fish and wildlife beneficial users alike.

iii. Minimum Thresholds and Measurable Objectives: Minimum thresholds and measurable objectives for Groundwater Levels, and by proxy, for Depletions of Interconnected Surface Water, are not

protective of environmental beneficial uses and users of groundwater and interconnected surface water. Minimum thresholds allow for a decrease of groundwater elevation from 2015, or a comparable historic low, for all representative monitoring sites (3-7); and measurable objectives are set at historically low groundwater elevations (GSP 3-8). These sustainability criteria suggest that groundwater elevations at all representative wells in the ESJ Subbasin can continue to decrease for the next 20 years, dropping further from historically low groundwater elevations during drought years, without witnessing undesirable results.

The ESJ Subbasin is characterized by DWR as 'Critically Overdrafted,' meaning "continuation of present water management practices [in the basin] would probably result in significant adverse overdraft-related environmental, social, or economic impacts" ("Critically"). However, according to the GSP, there are no areas within the basin that are considered to have 'significant and unreasonable existing issues' (GSP pp 3-4), therefore minimum thresholds allow for continued groundwater depletions.

Conceptually, there is a disconnect between the ESJ's 'Critically Overdrafted' designation and the GSP's claim that the basin has not experienced undesirable results, nor will it if groundwater levels continue to decrease. More specifically, the Department believes historical declines in terrestrial and aquatic groundwater dependent ecosystem viability, exacerbated by recent drought years, are evidence of undesirable results and further groundwater decline will undoubtedly lead to significant and unreasonable effects on fish and wildlife beneficial uses and users of groundwater and interconnected surface waters under the proposed sustainable management criteria. For example, further streamflow depletion attributable to groundwater pumping that lowers groundwater levels to meet minimum thresholds or even measurable objective may further compromise in-stream temperature targets in the lower San Joaquin River, adversely impacting in-stream species (see Comment #5.a.i). Accordingly, the Department does not believe groundwater levels above the proposed minimum thresholds and below the proposed measurable objectives (in the margin of operational flexibility) will allow the basin to achieve sustainability, particularly with respect to avoiding undesirable results for fish and

wildlife beneficial uses and users of groundwater and interconnected surface water.

b. *Recommendation*:
   i. Proxy Metrics: To justify use of groundwater elevations as a proxy metric for Depletions of Interconnected Surface Water, the GSP should either specify how groundwater elevations are significantly correlated to surface water depletions; or define an expeditious path to identifying the location, quantity, and timing of surface water depletions caused by groundwater use, per 23 CCR § 354.28(c)(6)(A), to better inform sustainability criteria for Depletions of Interconnected Surface Water.
   ii. Undesirable Results: Specify Groundwater Level 'undesirable results' and 'effects of undesirable results' for environmental beneficial users of groundwater and interconnected surface water. Specify undesirable result indicators for Depletions of Interconnected Surface Water that are relevant to beneficial users of surface waters. Identify undesirable results indicators for dry and critically dry water years for all sustainability indicators.
   iii. Minimum Thresholds and Measurable Objectives: Reconsider minimum thresholds and measurable objectives, accounting for undesirable results for fish and wildlife beneficial uses and users of groundwater and interconnected surface water. Design sustainable management criteria that reflect a 'Critically Overdrafted' subbasin designation by seeking to improve current groundwater conditions rather than allowing for continued aquifer depletions over the next two decades. For example, historical groundwater pumping has likely contributed to stream disconnection illustrated in figure 2-66 (GSP 2-99); resulting in depleted stream flows and reduced baseflows in ESJ Subbasin tributaries, and exacerbated high water temperatures in the lower San Joaquin River that negatively impact listed species such as the Chinook Salmon. Minimum thresholds and measurable objectives should reflect an effort to prevent further degradation to interconnected surface waters and to avoid undesirable results, rather than risk magnifying historical undesirable results through lowered groundwater elevations.

6. **Comment #6** (Sustainable Management Criteria, 3.6 Degraded Water Quality, starting pp 3-10): The GSP wrongly abdicates responsibility for specific constituents by implying there is no nexus between specific groundwater contaminants and groundwater pumping (GSP pp 3-11).

a. *Issue*: The GSP identifies two primary water quality constituents of concern in the ESJ Subbasin: salinity and arsenic (GSP pp 2-76). The GSP only specifies sustainability management criteria for salinity. The GSP explains that other constituents, including arsenic, are managed through other regulatory programs, and suggests that because GSAs do not have land use authority, they lack an ability to manage for such constituents as arsenic (GSP pp 3-11). Science suggests that over-pumping of aquifers can cause clay layers to compress and release dissolved arsenic, resulting in an increase of arsenic in extracted water ("Groundwater"). Thus, groundwater pumping actions can affect the presence, movement, and concentration of naturally occurring arsenic in groundwater, potentially increasing anthropogenic and ecosystem exposure to arsenic contamination. According to SGMA statue, GSAs have the authority to establish groundwater extraction allocations, among other relevant authorities [WC § 10726.4]. Because arsenic contamination can be impacted by groundwater pumping, and because GSAs have the authority to manage groundwater pumping, the ESJGA has a viable management lever over arsenic contamination in the ESJ Subbasin.
b. *Recommendation*: Draft a plan to investigate the relationship between groundwater pumping and the presence, movement, and concentration of arsenic in the ESJ Subbasin and include the plan in the GSP submitted to DWR by January 2020. Develop sustainability criteria for arsenic accordingly and in partnership with existing regulatory programs by the first 5-year GSP update due in January 2025.

7. **Comment #7** (Monitoring Networks, starting pp 4-1): Number and distribution of groundwater monitoring wells are insufficient for analysis.
   a. *Issue*: The current monitoring network lacks a sufficient number and representative distribution of shallow groundwater monitoring wells to monitor impacts to environmental beneficial uses and users of groundwater and interconnected surface waters [23 CCR § 354.34(2)]. Few wells are near interconnected surface waters or concentrations of GDEs; and therefore, there are few data points on shallow groundwater level trends. These data are critical to understanding groundwater management impacts on fish and wildlife beneficial uses and users of groundwater, including GDEs and interconnected surface water habitats, that are impacted disproportionately by shallow groundwater trends.
   b. *Recommendation*: Install additional shallow groundwater monitoring wells near GDEs and interconnected surface waters, potentially pairing multiple-

completion wells with streamflow gauges for improved understanding of surface water-groundwater interconnectivity.

8. **Comment #8** (Project and Management Actions; 6.1 Projects, Management Actions, and Adaptive Management Strategies; starting pp 6-1): Demand reduction management actions lack emphasis and specificity critical to ESJ Subbasin sustainability goal achievement.
    a. *Issue*: The GSP project and management actions focus on supply augmentation, with only three projects intended to conserve groundwater through metering and systems optimization. Though the GSP reserves the flexibility to implement demand-side management in the future (GSP pp 6-1), there are no specifics as to how the ESJGA would implement demand management. This lack of specificity on how demand will be managed may lead to deprioritization or delayed implementation of demand management actions, which can undermine a basin's ability to achieve sustainability goals. Considering the ESJ Subbasins' current unsustainable rate of groundwater consumption and considering the cost and timing challenges associated with supply augmentation projects, a balanced portfolio approach to achieve groundwater sustainability should include demand-management strategies.
    b. *Recommendation*: Add specific measures for initiating demand reduction on an earlier timeline in the ESJ Subbasin to account for groundwater pumping lag impacts, supply-augmentation project implementation challenges, and a scaled ramping-down of groundwater use that is a necessary ingredient in San Joaquin Valley long-term groundwater sustainability. Be specific about triggers, timing, and expected outcomes of demand-management actions.

CONCLUSION

In conclusion, the ESJ Subbasin Draft GSP does not comply with all aspects of SGMA statutes and regulations. The Department deems the GSP insufficient in its consideration of fish and wildlife beneficial uses and users of groundwater and interconnected surface waters. The Department recommends that ESJGA address the above comments before GSP submission to DWR. If these comments are not integrated, the Department may recommend to DWR an 'incomplete' or 'inadequate' plan determination based on the following regulatory criteria for plan evaluations:

1. The assumptions, criteria, findings, and objectives, including the sustainability goal, undesirable results, minimum thresholds, measurable objectives, and interim milestones are not reasonable and/or not supported by the best available information and best available science. [23 CCR § 355.4(b)(1)] (See Comment #2, 3, 4, 5, 7)

2. The GSP does not identify reasonable measures and schedules to eliminate data gaps. [23 CCR § 355.4(b)(2)] (See Comment #7)
3. The sustainable management criteria and projects and management actions are not commensurate with the level of understanding of the basin setting, based on the level of uncertainty, as reflected in the GSP. [23 CCR § 355.4(b)(3)] (See Comment #5, 6, 8)
4. The interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have not been considered. [23 CCR § 355.4(b)(4)] (See Comment #1, 2, 3, 4, 5, 7)
5. The projects and management actions are not feasible and/or not likely to prevent undesirable results and ensure that the basin is operated within its sustainable yield. [23 CCR § 355.4(b)(5)] (See Comment #8)
6. The GSP does not include a reasonable assessment of overdraft conditions and/or does not include reasonable means to mitigate overdraft, if present. [23 CCR § 355.4(b)(6)] (See Comment #4, 8)

The Department appreciates the opportunity to provide comments on the ESJ Subbasin Draft GSP. Please contact Lauren Mulloy by email at Lauren.Mulloy@wildlife.ca.gov with any questions.

Sincerely,

Kevin Thomas
Regional Manager, North Central Region

Enclosures (Literature Cited)

ec: *California Department of Fish and Wildlife*

Joshua Grover, Branch Chief
Water Branch
Joshua.Grover@wildlife.ca.gov

Robert Holmes, Environmental Program Manager
Statewide Water Planning Program
Robert.Holmes@wildlife.ca.gov

Briana Seapy, Statewide SGMA Coordinator
Groundwater Program
Briana.Seapy@wildlife.ca.gov

MaryLisa Cornell, Water Unit Supervisor
North Central Region
MaryLisa.Cornell@wildlife.ca.gov

Lauren Mulloy, Environmental Scientist
North Central Region
Lauren.Mulloy@wildlife.ca.gov

California Department of Water Resources

Craig Altare, Supervising Engineering Geologist
Sustainable Groundwater Management Program
Craig.Altare@water.ca.gov

Paul Wells, Eastern San Joaquin Subbasin SGMA Point of Contact
North Central Region Office
Paul.Wells@water.ca.gov

National Marine Fisheries Service

Rick Rogers, Fish Biologist
West Coast Region
Rick.Rogers@noaa.gov

Erin Strange, San Joaquin River Branch Lead
West Coast Region
Erin.Strange@noaa.gov

State Water Resources Control Board

James Nachbaur, Director
Office of Research, Planning & Performance
James.Nachbaur@waterboards.ca.gov

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California Poultry FEDERATION
4640 Spyres Way, Suite 4 | Modesto, CA 95356 | Phone: (209) 576-6355 | Fax: (209) 576-6119 | www.cpif.org

August 22, 2019

Eastern San Joaquin Groundwater Authority
1810 E. Hazelton Avenue
P.O. Box 1810
Stockton, California 95201
c/o info@esjgroundwater.org

Ladies and Gentlemen:

The California Poultry Federation ("CPF") is pleased to submit these comments on the Eastern San Joaquin Groundwater Subbasin draft Groundwater Sustainability Plan (hereinafter the "Draft GSP"). CPF represents all parts of the poultry industry, including growers, hatchers, breeders, and processors working with chickens, turkeys, ducks, and game birds. For all those segments, water is essential for nutrition as well as maintaining safe and sanitary conditions. CPF therefore supports effective measures to assure reliable water supplies.

In this regard, CPF commends the Draft GSP for emphasizing projects to augment yield and increase recharge. Such measures are essential for "maintain[ing] an economically-viable groundwater resource for the beneficial use of the people of the Eastern San Joaquin Subbasin." We encourage the Eastern San Joaquin Groundwater Authority to continue identifying and implementing additional measures to increase water supplies.

CPF appreciates your consideration of these comments. Please contact me if you need any additional information.

Very truly yours,

Bill Mattos

BILL MATTOS
President

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Law Offices of
THOMAS N. LIPPE, APC

201 Mission Street
12th Floor
San Francisco, California 94105

Telephone: 415-777-5604
Facsimile: 415-777-5606
Email: Lippelaw@sonic.net

August 21, 2019

Eastern San Joaquin Groundwater Authority
1810 E. Hazelton Avenue
P. O. Box 1810
Stockton, CA 95201
By email to info@esjgroundwater.org

Re: California Sportfishing Protection Alliance Comments on the Eastern San Joaquin Draft Groundwater Sustainability Plan.

Dear Sir of Madam:

This office represents the California Sportfishing Protection Alliance (CSPA) regarding your review and adoption of the Eastern San Joaquin Draft Groundwater Sustainability Plan (Plan).

CSPA objects to your adoption of the Plan because it does not meet the requirements of the Sustainable Groundwater Management Act or the GSP Emergency Regulations at Title 23, Cal. Code Regs. section 350 et seq. (GSP Rules), as more fully explained in comments that will be submitted by geologist Greg Kamman under separate cover by August 25, 2019.

The Plan does not satisfy GSP Rule 355.4(b)(1) because the Plan's description of the sustainability goal, undesirable results, minimum thresholds, measurable objectives, and interim milestones are not reasonable or supported by the best available information and best available science.

The Plan does not satisfy GSP Rule 355.4(b)(3) because the sustainable management criteria and projects and management actions identified in the plan are not commensurate with the level of understanding of the basin setting, based on the level of uncertainty, as reflected in the Plan.

The Plan does not satisfy GSP Rule 355.4(b)(5) because the Plan does not contain or present substantial evidence to conclude that the projects and management actions identified to achieve sustainable yield are effective or feasible or not likely to prevent undesirable results or to ensure that the basin is operated within its sustainable yield.

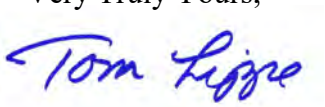
These deficiencies are described in more detail in Mr. Kamman's comments.

CSPA urges the Authority to not adopt the Plan in its current form; to revise the draft Plan

to remedy these informational deficiencies; and to recirculate the revised Plan for public comment.

Thank you for your attention to this matter.

Very Truly Yours,



Thomas N. Lippe

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Eastern San Joaquin Subbasin GSP Public Draft
Summary of Public Comments and Responses

Comment #	Commenter	Commenter Organization	Page Number	Section, Figure, or Table Number	Sentence Starts with, "…	Comment
1	Tom Lippe	California Sportfishing Protection Alliance				CSPA objects to your adoption of the Plan because it does not meet the requirements of the Sustainable Groundwater Management Act or the GSP Emergency Regulations at Title 23, Cal. Code Regs. section 350 et seq. (GSP Rules), as more fully explained in comments that will be submitted by geologist Greg Kamman under separate cover by August 25, 2019
2	Tom Lippe	California Sportfishing Protection Alliance				The Plan does not satisfy GSP Rule 355.4(b)(1) because the Plan's description of the sustainability goal, undesirable results, minimum thresholds, measurable objectives, and interim milestones are not reasonable or supported by the best available information and best available science.
3	Tom Lippe	California Sportfishing Protection Alliance				The Plan does not satisfy GSP Rule 355.4(b)(3) because the sustainable management criteria and projects and management actions identified in the plan are not commensurate with the level of understanding of the basin setting, based on the level of uncertainty, as reflected in the Plan.
4	Tom Lippe	California Sportfishing Protection Alliance				The Plan does not satisfy GSP Rule 355.4(b)(5) because the Plan does not contain or present substantial evidence to conclude that the projects and management actions identified to achieve sustainable yield are effective or feasible or not likely to prevent undesirable results or to ensure that the basin is operated within its sustainable yield.

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Kamman Hydrology & Engineering, Inc.
539 Bret Harte Road, San Rafael, CA 94901
Telephone: (415) 491-9600
Facsimile: (415) 680-1538
E-mail: greg@KHE-Inc.com

August 23, 2019

Eastern San Joaquin Groundwater Authority
1810 E. Hazelton Avenue
P.O. Box 1810
Stockton, CA 95201
Via email: info@esjgroundwater.org

Subject: Review of on Draft Groundwater Sustainability Plan
Eastern San Joaquin Groundwater Subbasin

Dear Sir/Madame:

I am a hydrologist with over thirty years of technical and consulting experience in the fields of geology, hydrology, and hydrogeology. I have been providing professional hydrology and geomorphology services throughout California since 1989 and routinely manage and lead projects in the areas of surface- and groundwater hydrology, water supply, water quality assessments, water resources management, and geomorphology. A copy of my resume is attached.

On behalf of the California Sportfishing Protection Alliance, I have been retained by the Law Offices of Thomas N. Lippe, APC to review and evaluate the Draft Groundwater Sustainability Plan (GSP) for the Eastern San Joaquin Groundwater Subbasin (ESJGB), especially as it pertains to groundwater interaction with the Stanislaus River. Based on my review, it is my opinion that the GSP is deficient in many areas. The rationale for this opinion is based on the findings presented below.

1. Section 2.1.9.2.2 of the GSP (page 2-49) is entitled, Regional Historic Groundwater Flow and Surface Water Interaction. There is no presentation or reference to historic groundwater interaction with surface water in this section of the GSP.

2. Section 354.16 of the GSP Regulations stipulates that each plan describe current and historic groundwater conditions in the basin based on the best available information. With regard to Section 2.2.6 of the GSP (Interconnected Surface Water Systems), I would like you to be aware of a study completed by Kamman Hydrology & Engineering, Inc.[1], which delineates subterranean streams and Potential Stream Depletion Areas (PSDA) along the Stanislaus River bordering the south side of the ESJGB. PSDA's are areas where groundwater pumping

[1] Kamman Hydrology & Engineering, Inc., 2018, Delineating subterranean streams and Potential Stream Depletion Areas, Lower Stanislaus and Tuolumne River Watershed. Draft Technical Memorandum prepared for: Law Offices of Thomas N. Lippe, APC, July 23, 9p. and 15 sheets.

could potentially cause stream depletion. This report and associated maps are attached for reference and integration into Section 2.2.6 of the GSP.

3. Section 2.2.6 of the GSP (page 2-97 to 2-99) also introduces Figure 2-65 (attached as Exhibit A), which shows gaining streams in blue where groundwater discharges to rivers, losing streams in red where streams lose water to the groundwater system, and mixed streams (gaining or losing less than 75 percent of the time) in orange. This analysis was based on modeling results from the historical calibration of the East San Joaquin Water Resources Model (ESJWRM) for approximately 900 stream nodes in the Eastern San Joaquin Subbasin. The historical model calibration period covers the water years 1996-2015. Based on the Cumulative Departure from Mean Precipitation curve presented in Figure 2-71 (pg. 2-109 of GSP), the years 1996-2015 reflect a dry period, as there is a net decrease in approximately 17-inches of precipitation (i.e., change from +7 [1996] to -10 inches [2015] in the cumulative departure curve). This section of the GSP only presents a description of historical (and dry) interconnected surface water conditions. Section 354.16 of the California Code of Regulations (Regulations) stipulates that each Plan shall provide a description of current and historical groundwater conditions in the basin. The GSP fails to describe the current conditions of the interconnected surface water system in the basin.

4. Section 2.2.6 of the GSP (Interconnected Surface Water Systems; page 2-97 to 2-99) also presents Figure 2-66 (attached as Exhibit B), which is entitled, Interconnected and Disconnected Streams. The GSP states that Stream connectivity was analyzed by comparing monthly groundwater elevations from the historical calibration of the ESJWRM to streambed elevations along the streams represented in the ESJWRM. Exhibit B shows the locations where streams are interconnected at least 75 percent of the time (shown in blue) or disconnected (shown in green). Section 351 of the Regulations defines "interconnected surface water" as surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted. The GSP (pg. 2-97) states that interconnected surface waters may be either gaining or losing, wherein the surface water feature itself is either gaining water from the aquifer system or losing water to the aquifer system. Exhibit C (attached) is taken from DWR's water budget BMP guidance document[2] and illustrates the relationship between surface water and groundwater for gaining, losing and disconnected streams. Per this diagram, for a stream to be gaining, it must be hydraulically connected to the aquifer. In many instances, a losing stream may also be in hydraulic connection to the aquifer. Losing streams may become disconnected seasonally or during drought periods in response to a falling water table. There are inconsistencies between the results presented in Exhibits A and B where areas delineated as gaining streams are also identified as being disconnected. A good example of this

[2] California Department of Water Resources, 2016, Best Management Practices for the Sustainable Management of Groundwater, Water Budget BMP. December, 53p.

is the upstream portion of the Stanislaus River located in the southeast corner of the basin. These inconsistencies should be corrected or explained. In addition, the stream connectivity presented in Exhibit B is for historic conditions – the current conditions should also be presented per Regulations.

5. The GSP Regulations define "groundwater dependent ecosystem" (GDE) as ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. Section 354.16 of the Regulations stipulate that Plans identify (current and historic) GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information. As stated on page 2-100, the GSP identifies GDEs within the Subbasin based on determining the areas where vegetation is dependent on groundwater. The GSP presents a methodology where the Natural Communities Commonly Associated with Groundwater (NCCAG) database, developed by DWR, CDFW and The Nature Conservancy (TNC), is used to identify vegetation communities and wetlands that are dependent on groundwater. Figure 2-67 of the GSP (attached as Exhibit D) presents the NCCAG within the basin. The GSP then describes a methodology by which NCCAG's with alternate water supplies are excluded from consideration as GDEs based on the following criteria:

    a. Depth to groundwater greater than 30 feet;
    b. areas within 150 feet of managed wetlands that receive supplemental water;
    c. areas within 50 feet of irrigated agriculture;
    d. areas within 150 feet of perennial surface water bodies, and
    e. areas removed based on stakeholder comment.

    The resulting areas identified as GDEs within the basin based on these criteria are shown in Figure 2-69 of the GSP (attached as Exhibit E).

    There are two major problems with the GSP's method for delineation of GDEs. First, the GSP method only considers the presence of vegetation communities and wetlands in the determination. GSP Regulations stipulate that "species" dependent on groundwater should also be considered. Thus, the analysis should also take into consideration the presence of fish and wildlife species that rely on riparian wetlands and/or flow in rivers influenced by gaining reaches. The Nature Conservancy refers to these species as Environmental Surface Water Beneficial Users and has prepared a list of freshwater species located within each groundwater basin in California. These lists are posted at their website[3] specifically for GSAs and others to better evaluate the impacts of groundwater management on environmental beneficial users of surface water in GSPs. This best available science should be integrated into the determination of GDEs.

[3] https://groundwaterresourcehub.org/sgma-tools/environmental-surface-water-beneficiaries/

The second problem I see in the GSP methodology is the failure to acknowledge that GDEs may depend on shallow groundwater regardless of the presence of alternative water sources. For example, wetlands within or adjacent to irrigated agriculture may not rely on that irrigation for survival; if they did, we would expect to find wetlands growing in all irrigated lands. In addition, the presence and sustainability of perennial surface water in Central Valley Rivers is controlled by many factors (e.g., groundwater inflow, reservoir operations, irrigation drainage, etc.). Modeling results presented in the GSP indicate significant contributions of groundwater flow to "gaining" reaches of the Stanislaus River (see Exhibit A). The riparian and wetland vegetation bordering these gaining reaches are surely sustained to some degree by this groundwater inflow to the river and the shallow groundwater conditions that likely accompany gaining reaches. The interconnected condition is also likely influenced significantly by seasonal and long-term wet and dry cycles. However, the GSP does not quantify the relative spatial or temporal contributions of groundwater supply to riparian habitats. Instead, the GPS simply dismisses these habitats as GDE's under the assumption that perennial flow is sustained through the summer by agricultural deliveries or tailwater. Therefore, it is my opinion that the process of elimination of GDEs as presented in the GSP is seriously flawed and does not correctly recognize or delineate GDEs in the basin.

6. One of the most important outcomes of the GSP is the determination of sustainable yield (sustainability goal) for the basin. Section 2.3.6 (pg. 2-133) of the GSP states that, "The sustainable conditions scenario is based on the projected conditions scenario modified by lowering groundwater production across the model domain." This section of the GSP then provides some qualitative statements about future supplies, demands and uncertainties in water budget assumptions and numerical modeling. Although the sustainable yield of the basin is determined to be 715,000 AF/yr +/- 10 percent, and a 78,000 AF/yr reduction in groundwater use is needed to achieve sustainability, there is no detailed explanation on how these numbers were determined. Per Section 354.24 of the GSP Regulations, "The Plan shall include a description of the sustainability goal, including information from the basin setting used to establish the sustainability goal, etc." As written, the GSP does not provide the reader with a clear and detailed explanation on how the sustainable yield figure was derived and if climate change predictions were factored into the quantification. This omission makes it impossible to review and comment on the reliability of the sustainable yield or required reduction figures for the basin under existing or future conditions. Therefore, the draft GSP should be revised to include this information and recirculated for public comment.

7. Because the Subbasin is in overdraft, the GSP has identified 23 projects to reduce overdraft conditions and meet long-term water demands and sustainability goals. There are some projects focused on conservation and reuse of reclaimed water, but the majority simply reduce local groundwater demand by providing access to surface water supplies. These projects are limited in geographic area and are

intended to provide local solutions. However, from the perspective of a full basin water budget, shifting the reliance from groundwater to surface water supplies may not generate the full benefits anticipated as provided in the project descriptions. This is because diverting and reducing stream flows will lead to reductions in groundwater recharge in other areas within or beyond the basin, via reduced water available for stream infiltration or other uses of stream diversions that contribute to recharge. As required in Section 354.44 of the Regulations, the GSP does not provide a full and comprehensive quantification of demand reduction in response to project implementation – this would require deriving a basin-scale water budget accounting that incorporates project actions. This analysis would also inform the evaluation, as required under Section 355.4 of the GSP Regulations, of Plan/project feasibility and undesireable results (e.g., ecological impacts) associated with increased diversion and use of surface water supplies.

Stated another way, I'm concerned that the GSP has not demonstrated that the Project Actions will be effective in achieving stated reductions in groundwater use and avoiding undesirable results. For example, Project 2, the SEWD Surface Water Implementation Expansion Project (SEWD), would require landowners adjacent to surface water conveyance systems (rivers or pipelines) to utilize surface water as part of the SGMA implementation. This would increase surface water usage by about 18,000 to 20,000 AF/year with in-lieu groundwater recharge benefits. This project relies on water from New Hogan Reservoir (Calaveras River water) and New Melones Reservoir (Stanislaus River water). Although the project could reduce groundwater use, there is no analysis provided on how the project would affect surface and ground water resources downstream of the two reservoirs. If this project reduced downstream flows, it could result in depleted surface water supplies, reduced groundwater recharge from the rivers as well as adverse impacts to riparian vegetation and environmental surface water beneficial users.

Similarly, I'm concerned about the assumed feasibility of some projects achieving the desired goal. For example, the groundwater recharge Projects 11 and 12 are anticipated to each recharge 8,000 AF/yr through the construction and operation of independent 10-acre recharge ponds. This equates to recharging 800 feet of water at each pond site between December 1 and June 30th of each year or 3.78 feet daily for the 212 day period. I am skeptical about achieving this level of recharge given the uncertainties in water availability during dry years, operations that would be required to maintain ponding of sufficient depth and duration, and maintaining basin infiltration rates given the likely accumulation of fine grained material that reduces basin permeability. This example demonstrates how the GSP fails to demonstrate how these project can be accomplished in a successful manner under a variety of rainfall and runoff conditions.

Please feel free to contact me with any questions regarding the material and conclusions contained in this letter.

Sincerely,

Greg Kamman, PG, CHG
Principal Hydrologist

Eastern San Joaquin Subbasin GSP Public Draft

Summary of Public Comments and Responses

Comment #	Commenter	Commenter Organization	Page Number	Section, Figure, or Table Number	Sentence Starts with, "…	Comment
1	Greg Kamman	California Sportfishing Protection Alliance	2-49	Section 2.1.9.2.2		Section 2.1.9.2.2 of the GSP (page 2-49) is entitled, Regional Historic Groundwater Flow and Surface Water Interaction. There is no presentation or reference to historic groundwater interaction with surface water in this section of the GSP.
2	Greg Kamman	California Sportfishing Protection Alliance	2-97	Section 2.2.6		Section 354.16 of the GSP Regulations stipulates that each plan describe current and historic groundwater conditions in the basin based on the best available information. With regard to Section 2.2.6 of the GSP.(Interconnected Surface Water Systems), I would like you to be aware of a study completed by Kamman Hydrology & Engineering, Inc. in 2018 , which delineates subterranean streams and Potential Stream Depletion Areas (PSDA) along the Stanislaus River bordering the south side of the ESJGB. PSDA's are areas where groundwater pumping could potentially cause stream depletion. This report and associated maps are attached for reference and integration into Section 2.2.6 of the GSP. Access KHE's 2018 report at this link: https://www.dropbox.com/s/zzqnn6ifsbahx5p/PSDA-mapping-Tech-Memorandum_v1%2Bquads.pdf?dl=0
3	Greg Kamman	California Sportfishing Protection Alliance	2-97	Section 2.2.6		Section 2.2.6 of the GSP (page 2-97 to 2-99) also introduces Figure 2-65 (attached as Exhibit A), which shows gaining streams in blue where groundwater discharges to rivers, losing streams in red where streams lose water to the groundwater system, and mixed streams (gaining or losing less than 75 percent of the time) in orange. This analysis was based on modeling results from the historical calibration of the East San Joaquin Water Resources Model (ESJWRM) for approximately 900 stream nodes in the Eastern San Joaquin Subbasin. The historical model calibration period covers the water years 1996-2015. Based on the Cumulative Departure from Mean Precipitation curve presented in Figure 2-71 (pg. 2-109 of GSP), the years 1996-2015 reflect a dry period, as there is a net decrease in approximately 17-inches of precipitation (i.e., change from +7 [1996] to -10 inches [2015] in the cumulative departure curve). This section of the GSP only presents a description of historical (and dry) interconnected surface water conditions. Section 354.16 of the California Code of Regulations (Regulations) stipulates that each Plan shall provide a description of current and historical groundwater conditions in the basin. The GSP fails to describe the current conditions of the interconnected surface water system in the basin.

Eastern San Joaquin Subbasin GSP Public Draft

Summary of Public Comments and Responses

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4	Greg Kamman	California Sportfishing Protection Alliance	2-97	Section 2.2.6		Section 2.2.6 of the GSP (Interconnected Surface Water Systems; page 2-97 to 2-99) also presents Figure 2-66 (attached as Exhibit B), which is entitled, Interconnected and Disconnected Streams. The GSP states that Stream connectivity was analyzed by comparing monthly groundwater elevations from the historical calibration of the ESJWRM to streambed elevations along the streams represented in the ESJWRM. Exhibit B shows the locations where streams are interconnected at least 75 percent of the time (shown in blue) or disconnected (shown in green). Section 351 of the Regulations defines "interconnected surface water" as surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted. The GSP (pg. 2-97) states that interconnected surface waters may be either gaining or losing, wherein the surface water feature itself is either gaining water from the aquifer system or losing water to the aquifer system. Exhibit C (attached) is taken from DWR's water budget BMP guidance document and illustrates the relationship between surface water and groundwater for gaining, losing and disconnected streams. Per this diagram, for a stream to be gaining, it must be hydraulically connected to the aquifer. In many instances, a losing stream may also be in hydraulic connection to the aquifer. Losing streams may become disconnected seasonally or during drought periods in response to a falling water table. There are inconsistencies between the results presented in Exhibits A and B where areas delineated as gaining streams are also identified as being disconnected. A good example of this is the upstream portion of the Stanislaus River located in the southeast corner of the basin. These inconsistencies should be corrected or explained. In addition, the stream connectivity presented in Exhibit B is for historic conditions – the current conditions should also be presented per Regulations.
5	Greg Kamman	California Sportfishing Protection Alliance	2-100	Sections 2.2.7, 2.2.8, and 2.2.9		The GSP Regulations define "groundwater dependent ecosystem" (GDE) as ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. Section 354.16 of the Regulations stipulate that Plans identify (current and historic) GDEs within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information. As stated on page 2-100, the GSP identifies GDEs within the Subbasin based on determining the areas where

Comment #	Commenter	Commenter Organization	Page Number	Section, Figure, or Table Number	Sentence Starts with, "…	Comment
						vegetation is dependent on groundwater. The GSP presents a methodology where the Natural Communities Commonly Associated with Groundwater (NCCAG) database, developed by DWR, CDFW and The Nature Conservancy (TNC), is used to identify vegetation communities and wetlands that are dependent on groundwater. Figure 2-67 of the GSP (attached as Exhibit D) presents the NCCAG within the basin. The GSP then describes a methodology by which NCCAG's with alternate water supplies are excluded from consideration as GDEs based on the following criteria: a. Depth to groundwater greater than 30 feet; b. areas within 150 feet of managed wetlands that receive supplemental water; c. areas within 50 feet of irrigated agriculture; d. areas within 150 feet of perennial surface water bodies, and e. areas removed based on stakeholder comment. The resulting areas identified as GDEs within the basin based on these criteria are shown in Figure 2-69 of the GSP (attached as Exhibit E). There are two major problems with the GSP's method for delineation of GDEs. First, the GSP method only considers the presence of vegetation communities and wetlands in the determination. GSP Regulations stipulate that "species" dependent on groundwater should also be considered. Thus, the analysis should also take into consideration the presence of fish and wildlife species that rely on riparian wetlands and/or flow in rivers influenced by gaining reaches. The Nature Conservancy refers to these species as Environmental Surface Water Beneficial Users and has prepared a list of freshwater species located within each groundwater basin in California. These lists are posted at their website specifically for GSAs and others to better evaluate the impacts of groundwater management on environmental beneficial users of surface water in GSPs. This best available science should be integrated into the determination of GDEs. The second problem I see in the GSP methodology is the failure to acknowledge that GDEs may depend on shallow groundwater regardless of the presence of alternative water sources. For example, wetlands within or adjacent to irrigated agriculture may not rely on that irrigation for survival; if they did, we would

Comment #	Commenter	Commenter Organization	Page Number	Section, Figure, or Table Number	Sentence Starts with, "…	Comment
						expect to find wetlands growing in all irrigated lands. In addition, the presence and sustainability of perennial surface water in Central Valley Rivers is controlled by many factors (e.g., groundwater inflow, reservoir operations, irrigation drainage, etc.). Modeling results presented in the GSP indicate significant contributions of groundwater flow to "gaining" reaches of the Stanislaus River (see Exhibit A). The riparian and wetland vegetation bordering these gaining reaches are surely sustained to some degree by this groundwater inflow to the river and the shallow groundwater conditions that likely accompany gaining reaches. The interconnected condition is also likely influenced significantly by seasonal and long-term wet and dry cycles. However, the GSP does not quantify the relative spatial or temporal contributions of groundwater supply to riparian habitats. Instead, the GPS simply dismisses these habitats as GDE's under the assumption that perennial flow is sustained through the summer by agricultural deliveries or tailwater. Therefore, it is my opinion that the process of elimination of GDEs as presented in the GSP is seriously flawed and does not correctly recognize or delineate GDEs in the basin.
6	Greg Kamman	California Sportfishing Protection Alliance	2-133	Section 2.3.6		One of the most important outcomes of the GSP is the determination of sustainable yield (sustainability goal) for the basin. Section 2.3.6 (pg. 2-133) of the GSP states that, "The sustainable conditions scenario is based on the projected conditions scenario modified by lowering groundwater production across the model domain." This section of the GSP then provides some qualitative statements about future supplies, demands and uncertainties in water budget assumptions and numerical modeling. Although the sustainable yield of the basin is determined to be 715,000 AF/yr +/- 10 percent, and a 78,000 AF/yr reduction in groundwater use is needed to achieve sustainability, there is no detailed explanation on how these numbers were determined. Per Section 354.24 of the GSP Regulations, "The Plan shall include a description of the sustainability goal, including information from the basin setting used to establish the sustainability goal, etc." As written, the GSP does not provide the reader with a clear and detailed explanation on how the sustainable yield figure was derived and if climate change predictions were factored into the quantification. This omission makes it impossible to review and comment on the reliability of the sustainable yield or required reduction figures for the basin

Comment #	Commenter	Commenter Organization	Page Number	Section, Figure, or Table Number	Sentence Starts with, "…	Comment
						under existing or future conditions. Therefore, the draft GSP should be revised to include this information and recirculated for public comment.
7	Greg Kamman	California Sportfishing Protection Alliance	6-2	Section 6.2.3		Because the Subbasin is in overdraft, the GSP has identified 23 projects to reduce overdraft conditions and meet long-term water demands and sustainability goals. There are some projects focused on conservation and reuse of reclaimed water, but the majority simply reduce local groundwater demand by providing access to surface water supplies. These projects are limited in geographic area and are intended to provide local solutions. However, from the perspective of a full basin water budget, shifting the reliance from groundwater to surface water supplies may not generate the full benefits anticipated as provided in the project descriptions. This is because diverting and reducing stream flows will lead to reductions in groundwater recharge in other areas within or beyond the basin, via reduced water available for stream infiltration or other uses of stream diversions that contribute to recharge. As required in Section 354.44 of the Regulations, the GSP does not provide a full and comprehensive quantification of demand reduction in response to project implementation – this would require deriving a basin-scale water budget accounting that incorporates project actions. This analysis would also inform the evaluation, as required under Section 355.4 of the GSP Regulations, of Plan/project feasibility and undesireable results (e.g., ecological impacts) associated with increased diversion and use of surface water supplies. Stated another way, I'm concerned that the GSP has not demonstrated that the Project Actions will be effective in achieving stated reductions in groundwater use and avoiding undesirable results. For example, Project 2, the SEWD Surface Water Implementation Expansion Project (SEWD), would require landowners adjacent to surface water conveyance systems (rivers or pipelines) to utilize surface water as part of the SGMA implementation. This would increase surface water usage by about 18,000 to 20,000 AF/year with in-lieu groundwater recharge benefits. This project relies on water from New Hogan Reservoir (Calaveras River water) and New Melones Reservoir (Stanislaus River water). Although the project could reduce groundwater use, there is no analysis provided on how the project would affect surface and ground water resources downstream of the two reservoirs. If this project reduced downstream flows, it

Comment #	Commenter	Commenter Organization	Page Number	Section, Figure, or Table Number	Sentence Starts with, "…	Comment
						could result in depleted surface water supplies, reduced groundwater recharge from the rivers as well as adverse impacts to riparian vegetation and environmental surface water beneficial users. Similarly, I'm concerned about the assumed feasibility of some projects achieving the desired goal. For example, the groundwater recharge Projects 11 and 12 are anticipated to each recharge 8,000 AF/yr through the construction and operation of independent 10-acre recharge ponds. This equates to recharging 800 feet of water at each pond site between December 1 and June 30th of each year or 3.78 feet daily for the 212 day period. I am skeptical about achieving this level of recharge given the uncertainties in water availability during dry years, operations that would be required to maintain ponding of sufficient depth and duration, and maintaining basin infiltration rates given the likely accumulation of fine grained material that reduces basin permeability. This example demonstrates how the GSP fails to demonstrate how these project can be accomplished in a successful manner under a variety of rainfall and runoff conditions.

ATTACHMENTS

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Exhibit A

Figure 2-65: Losing and Gaining Streams

Exhibit B

Figure 2-66: Interconnected and Disconnected Streams

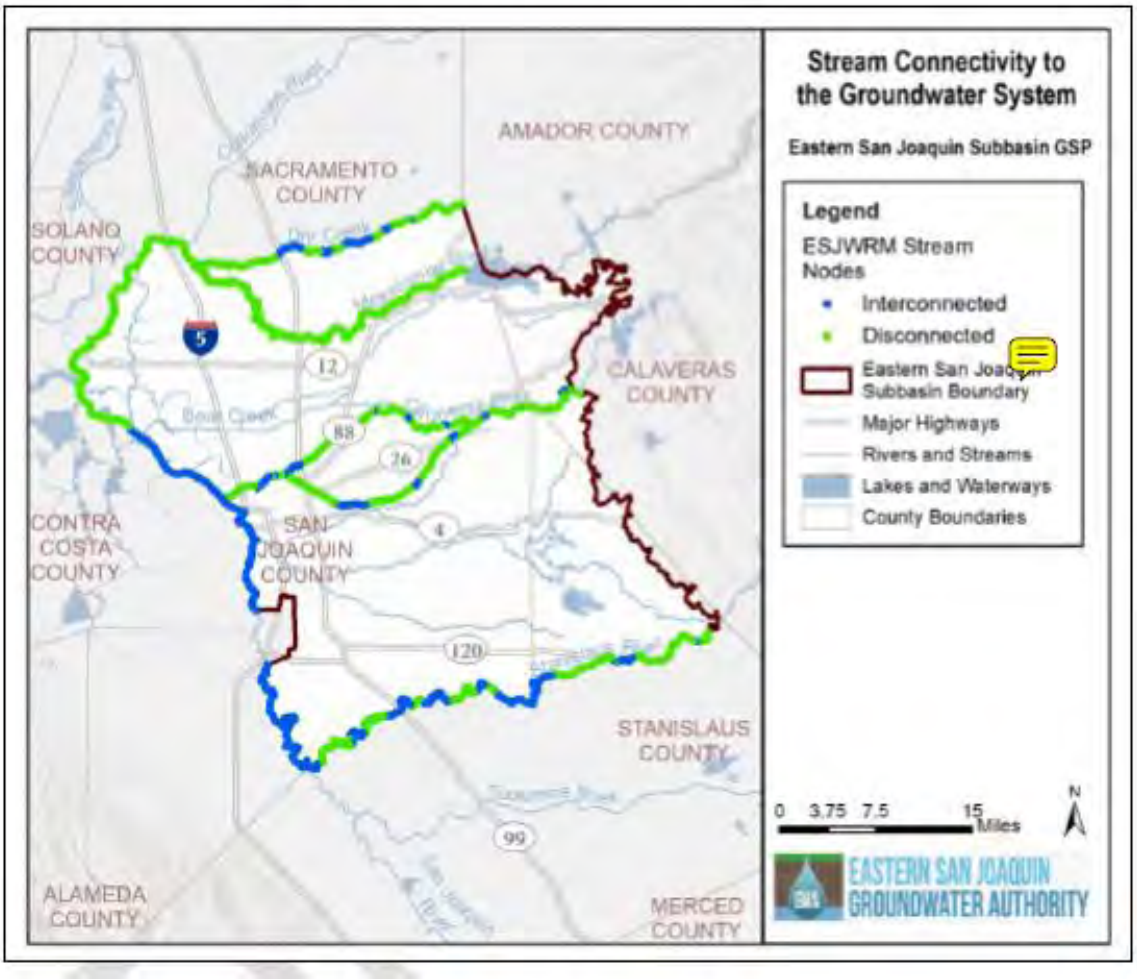


Exhibit C

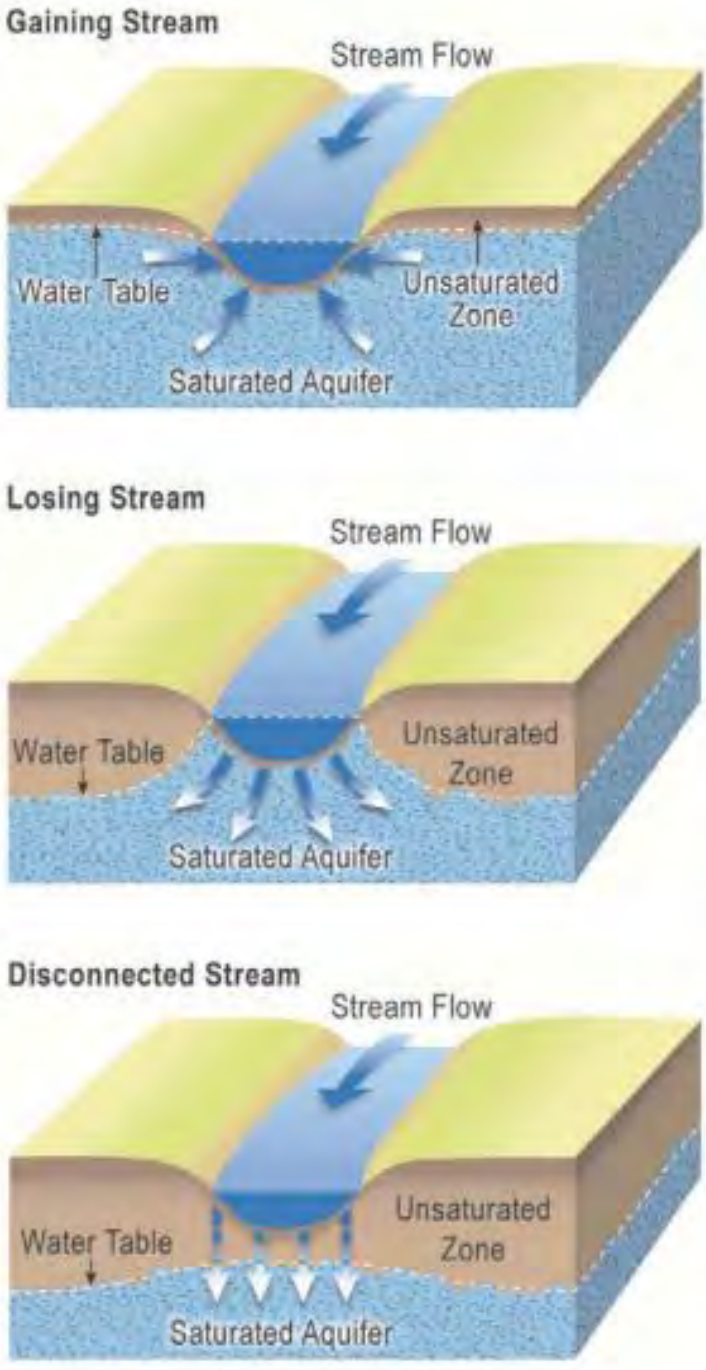


Figure 2 – Gaining, Losing, and Disconnected Streams

Exhibit D

Figure 2-67: Natural Communities Commonly Associated with Groundwater (NCCAG)

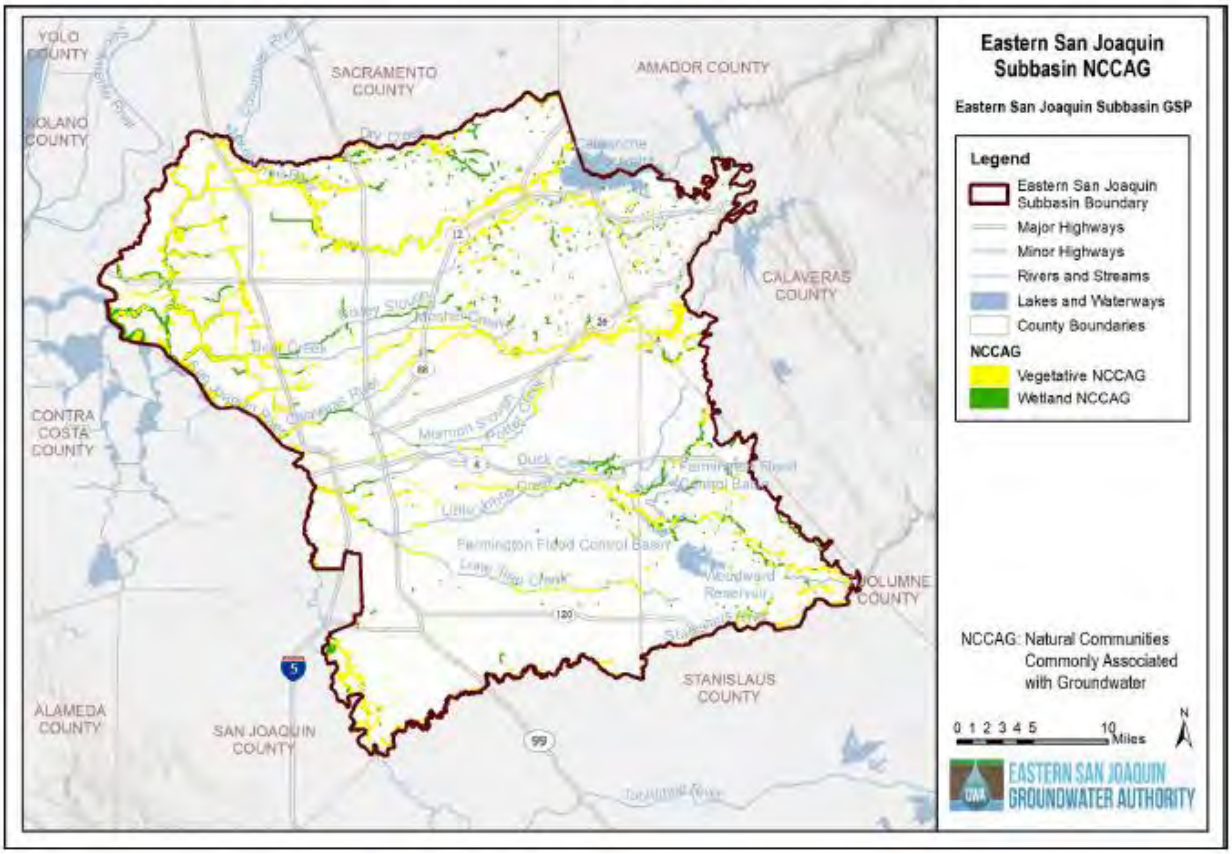
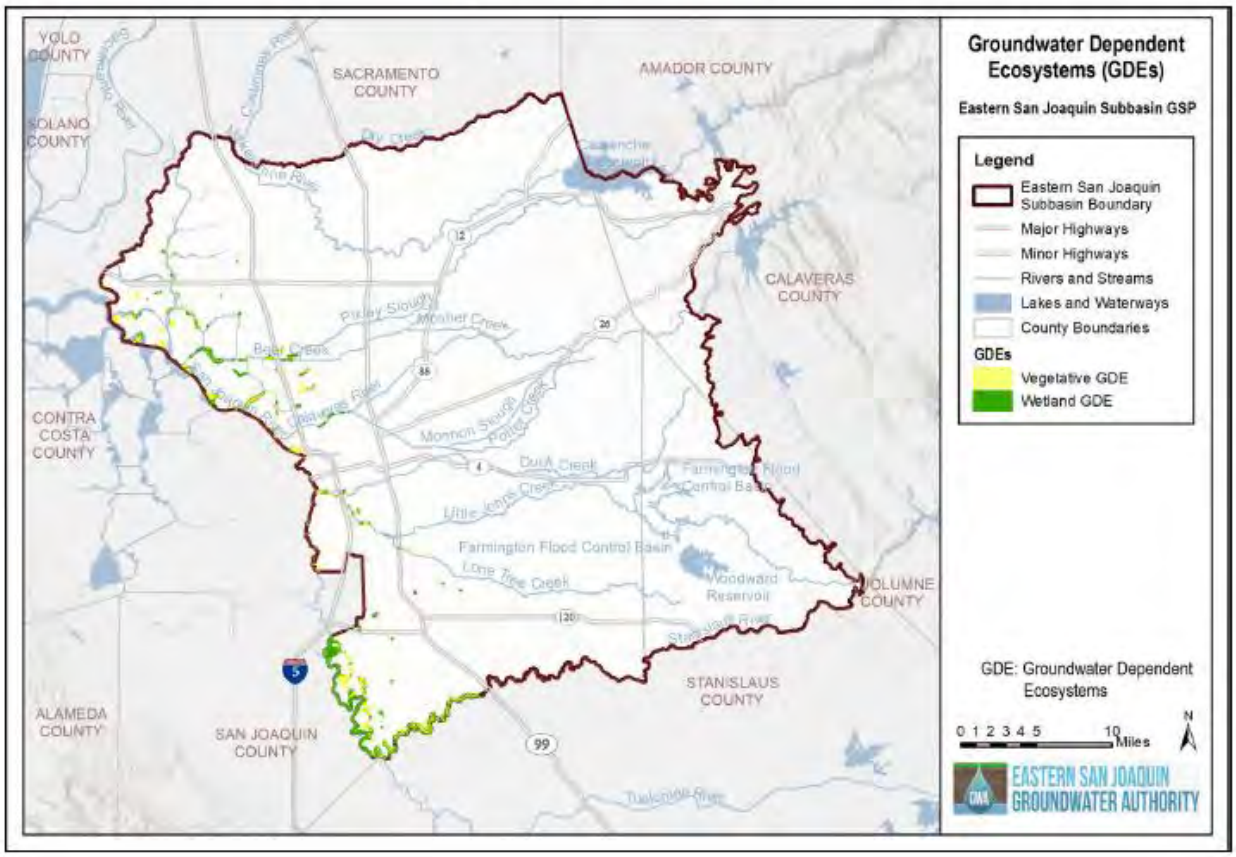


Exhibit E

Figure 2-69: Areas Identified as GDEs



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Kamman Resume

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Greg Kamman, PG, CHG

Principal Hydrologist

EDUCATION	1989	M.S. Geology - Sedimentology and Hydrogeology Miami University, Oxford, OH
	1985	A.B. Geology Miami University, Oxford, OH
REGISTRATION	No. 360 No. 5737	Certified Hydrogeologist (CHG.), CA Professional Geologist (PG), CA
PROFESSIONAL HISTORY	1997 - Present	Principal Hydrologist/Vice President Kamman Hydrology & Engineering, Inc. San Rafael, CA
	1994 - 1997	Senior Hydrologist/Vice President Balance Hydrologics, Inc., Berkeley, CA
	1991 - 1994	Project Geologist/Hydrogeologist Geomatrix Consultants, Inc., San Francisco, CA
	1989 - 1991	Senior Staff Geologist/Hydrogeologist Environ International Corporation, Princeton, NJ
	1986 - 1989	Instructor and Research/Teaching Assistant Miami University, Oxford, OH

SKILLS AND EXPERIENCE

As a Principal Hydrologist with 30 years of technical and consulting experience in the fields of geology, hydrology, and hydrogeology, Mr. Kamman routinely manages projects in the areas of surface- and ground-water hydrology, stream and wetland habitat restoration, water supply, water quality assessments, water resources management, and geomorphology. Areas of expertise include: stream and wetland habitat restoration; characterizing and modeling basin-scale hydrologic and geologic processes; assessing hydraulic and geomorphic responses to land-use changes in watersheds and causes of stream channel instability; evaluating surface- and ground-water resources and their interaction; and designing and implementing field investigations characterizing surface and subsurface conditions; and stream and wetland habitat restoration feasibility assessments and design. In addition, Mr. Kamman commonly works on projects that revolve around sensitive fishery, wetland, wildlife and/or riparian habitat enhancement. Mr. Kamman performs many of these projects in response to local, state (CEQA) and federal statutes (NEPA, ESA), and other regulatory frameworks. Thus, Mr. Kamman is accustomed to working within a multi-disciplined team and maintains close collaborative relationships with biologists, engineers, planners, architects, lawyers, and resource and regulatory agency staff. Mr. Kamman is a prime or contributing author to over 80 technical publications and reports in the discipline of hydrology – the majority pertaining to ecological restoration. Mr. Kamman routinely teaches courses on stream and wetland restoration through U.C. Berkeley Extension and San Francisco State University's Romberg Tiburon Center.

PROFESSIONAL SOCIETIES & AFFILIATIONS	Groundwater Resources Association of California Society for Ecological Restoration International California Native Plant Society

539 Bret Harte Road, San Rafael, CA 94901
Telephone: (415) 491-9600 Fax: (415) 680-1538 Email: greg@khe-inc.com

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2018 Report by KHE

Delineating Subterranean Streams and Potential Stream Depletion Areas,

Lower Stanislaus and Tuolumne River Watershed

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DRAFT TECHNICAL MEMORANDUM

Kamman Hydrology & Engineering, Inc.
7 Mt. Lassen Dr., Suite C122, San Rafael, CA 94903
Telephone: (415) 491-9600
Facsimile: (415) 680-1538
E-mail: greg@khe-inc.com

Date: July 23, 2018

To: Tom Lippe, Law Offices of Thomas N. Lippe, APC

From: Greg Kamman

Subject: Delineating Subterranean Streams and Potential Stream Depletion Areas Lower Stanislaus and Tuolumne River Watersheds

This memorandum presents the results of Kamman Hydrology & Engineering, Inc.'s (KHE) study to delineate and map subterranean streams and PSDAs in the Lower Stanislaus and Tuolumne River Watersheds within Stanislaus County. This work was completed pursuant to the approach and methods described in the February and March 2008 Stetson Engineering Inc. reports (Stetson 2008a and 2008b). Copies of these reports are attached. The mapped area includes: a) the mainstem Stanislaus River watershed between Goodwin Dam and confluence with San Joaquin River; and b) the mainstem Tuolumne River watershed between La Grange Dam/Reservoir and the San Joaquin River (hereafter referred to as Study Area). Mapping was completed on USGS 7.5-minute topographic quadrangle sheets (quad sheets) containing the mainstem river channels. Figure 1 depicts the 15 quad sheets that contain the study/mapping area.

BACKGROUND AND OBJECTIVES

Groundwater pumping can deplete stream flows if there is a hydraulic connection between groundwater aquifer and stream bed. Groundwater diversions that reduce stream flows can have a negative effect on anadromous fish habitat. The following excerpt from Stetson 2008a (pages 1-3) summarizes groundwater extraction that is subject to California laws governing surface water rights.

> *Pursuant to Water Code 1200, the State Water Board has permitting authority over subterranean streams flowing in known and definite channels. Groundwater classified as percolating groundwater is not subject to the State Water Board's permitting authority. Thus, when considering an appropriation of groundwater, the State Water Board may have to evaluate the legal classification of the groundwater and determine whether it is a subterranean stream subject to the State Water Board's permitting authority. In doing so, the State Water Board applies a four-part test, which was uphold by the appellate court in North*

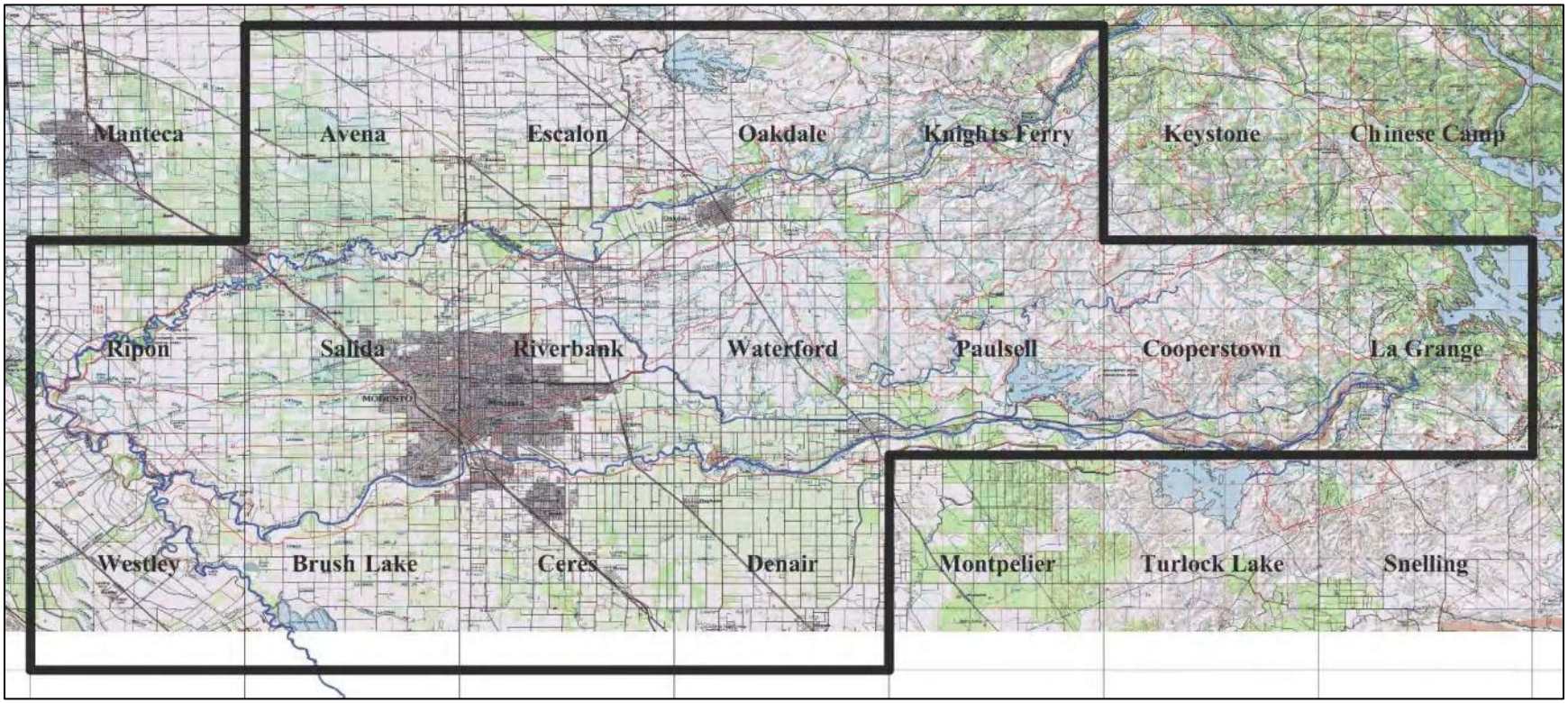

FIGURE 1: Study and mapping area (outlined in black), including: river alignments and USGS 7.5-minute quadrangle sheet boundaries.

Gualala Water Co. v. State Water Resources Control Bd. (North Gualala) (2006) 139 Cal.App.4th 1577 [43 Cal.Rptr.3d 821]. The State Water Board also has continuing authority to protect public trust uses and to prevent the waste, unreasonable use, unreasonable method of use, or unreasonable method of diversion of water, regardless of basis of right.

In determining the legal classification of groundwater, the following physical conditions must exist for the State Water Board to classify groundwater as a subterranean stream flowing through a known and definite channel:

(1) A subsurface channel must be present;

(2) The channel must have a relatively impermeable bed and banks;

(3) The course of the channel must be known or capable of being determined by reasonable inference; and

(4) Groundwater must be flowing in the channel.

Following the methods and guidelines provided by Stetson (2008a and 2008b), the objectives of this study are to: a) delineates subterranean streams within the Study Area in accordance with the State Water Board's four-part test; and b) delineates Potential Stream Depletion Areas (PSDA) where groundwater pumping could potentially cause stream depletion.

METHODOLOGY

To complete this mapping study, KHE obtained and reviewed numerous sources of information including: available topographic maps; geology reports and maps; soil survey maps and reports; and aerial imagery. All information was integrated into GIS work platform for synthesis and review. In many instances, older geologic maps were manually georeferenced[1] in order to import and overlay with other maps in GIS. Based on synthesis and review of this information, estimates of subterranean stream and PSDA boundaries were mapped on the most recent USGS 7.5-minute quadrangle maps identified in Figure 1.

Subterranean stream, channel alluvium and PSDA boundaries were mapped based on geology and soil map data. Sources of geology and soil information reviewed are presented in Tables 1 and 2. Considerable detailed mapping of alluvial deposits within the Study Area has been

[1] Georeferencing means to associate something with locations in physical space. The term is used in the geographic information systems (GIS) field to describe the process of associating a physical map or raster image of a map with spatial locations.

completed within the Study Area. In addition to the sources listed in Tables 1 and 2, studies by Marchand (1976), Marchand and Allwardt (1981), Page and Balding (1973) and Page (1986) were helpful in describing and distinguishing the relative age/position of geologic units as they relate to surface water interaction. Mapped units were identified and defined as follows.

- Subterranean Stream: geologic contract between relatively impermeable bedrock and recent Holocene alluvium (or equivalent deposits) clearly associated with and in reasonable proximity of a stream. Subterranean streams represent areas where groundwater flow is through a known and definite channel and subject to State Water Board permitting authority.

- Potential Stream Depletion Area (PSDA): Alluvial deposits that serve as aquifers that can be hydraulically connected to adjacent stream and where groundwater pumping can deplete stream flow or reduce groundwater flow to the stream[2]. However, PSDAs lack a clear delineation of "bed and banks" (i.e., lack of impermeable deposits hosting stream) and therefore are not subject to State Water Board permitting authority. PSDAs may include one or more of the geologic units identified in Table 3.

- Mapped Channel Alluvium: recently deposited (young) alluvial channel deposits located within the PSDA, including the geologic and soil units identified in Table 3. This unit is associated with alluvial deposits that will display greater or more immediate stream depletion by a pumping well screened within the unit.

Subterranean stream and PSDA boundaries based on mapped geology and soil units were further adjusted based upon topographic expression and aerial imagery (NAIP, 2014). For quadrangles where only soil and regional geologic maps were available (Oakdale, Escalon, Paulsell, Waterford and Riverbank), map unit boundaries relied more on topographic expression. No field inspection of mapped unit boundaries was conducted.

[2] For the stream to be influenced by a pumping well, the well is typically screened within a zone of material that is hydraulically connected to the stream. A well does not have the potential to deplete a stream if the well is sealed throughout the alluvial deposits that are in hydraulic connection with the stream and if the well is pumping water from an aquifer that is hydraulically disconnected from the natural channel or subterranean stream.

TABLE 1: Sources of Geology and Soil Information: Lower Stanislaus River

USGS Quadrangle	Source of Information
Knights Valley	• Preliminary Geologic Map of Copperopolis Quadrangle (Bartow et al., 1981) • Geologic map of the San Francisco-San Jose quadrangle (Wagner et al., 1991) • Soil Survey of Stanislaus County, California, Northern part (USDA NRCS, 2007) • Soil Survey, Eastern Stanislaus Area, California (Arkley, 1964)
Oakdale	• Geologic map of the San Francisco-San Jose quadrangle (Wagner et al., 1991) • Soil Survey of Stanislaus County, California, Northern part (USDA NRCS, 2007) • Soil Survey, Eastern Stanislaus Area, California (Arkley, 1964)
Escalon	• Geologic map of the San Francisco-San Jose quadrangle (Wagner et al., 1991) • Soil Survey of Stanislaus County, California, Northern part (USDA NRCS, 2007) • Soil Survey, Eastern Stanislaus Area, California (Arkley, 1964)
Avena	• Geologic map of the San Francisco-San Jose quadrangle (Wagner et al., 1991) • Soil Survey, Eastern Stanislaus Area, California (Arkley, 1964)
Salida	• Preliminary geologic map showing Quaternary deposits of the lower Tuolumne and Stanislaus alluvial fans and along the lower San Joaquin River (Marchand and Harden, 1978) • Geologic map of the San Francisco-San Jose quadrangle (Wagner et al., 1991) • Soil Survey, Eastern Stanislaus Area, California (Arkley, 1964)
Ripon	• Preliminary geologic map showing Quaternary deposits of the lower Tuolumne and Stanislaus alluvial fans and along the lower San Joaquin River (Marchand and Harden, 1978) • Geologic map of the San Francisco-San Jose quadrangle (Wagner et al., 1991) • Soil Survey, Eastern Stanislaus Area, California (Arkley, 1964)

TABLE 2: Sources of Geology and Soil Information: Lower Tuolumne River

USGS Quadrangle	Source of Information
La Grange	• Preliminary geologic maps showing Cenozoic deposits of the Cooperstown and La Grange quadrangles (Marchand et al., 1981) • Geologic map of the San Francisco-San Jose quadrangle (Wagner et al., 1991) • Soil Survey, Eastern Stanislaus Area, California (Arkley, 1964)
Cooperstown	• Preliminary geologic maps showing Cenozoic deposits of the Cooperstown and La Grange quadrangles (Marchand et al., 1981) • Geologic map of the San Francisco-San Jose quadrangle (Wagner et al., 1991) • Soil Survey, Eastern Stanislaus Area, California (Arkley, 1964)
Paulsell	• Geologic map of the San Francisco-San Jose quadrangle (Wagner et al., 1991) • Soil Survey, Eastern Stanislaus Area, California (Arkley, 1964)
Waterford	• Geologic map of the San Francisco-San Jose quadrangle (Wagner et al., 1991) • Soil Survey, Eastern Stanislaus Area, California (Arkley, 1964)
Riverbank	• Geologic map of the San Francisco-San Jose quadrangle (Wagner et al., 1991) • Soil Survey, Eastern Stanislaus Area, California (Arkley, 1964)
Denair	• Preliminary geologic maps showing Quaternary deposits of the Ceres, Denair and Montpellier 7 ½ quadrangles (Marchand, 1980) • Geologic map of the San Francisco-San Jose quadrangle (Wagner et al., 1991) • Soil Survey, Eastern Stanislaus Area, California (Arkley, 1964)
Ceres	• Preliminary geologic maps showing Quaternary deposits of the Ceres, Denair and Montpellier 7 ½ quadrangles (Marchand, 1980) • Geologic map of the San Francisco-San Jose quadrangle (Wagner et al., 1991) • Soil Survey, Eastern Stanislaus Area, California (Arkley, 1964)
Brush Lake	• Preliminary geologic map showing Quaternary deposits of the lower Tuolumne and Stanislaus alluvial fans and along the lower San Joaquin River (Marchand and Harden, 1978) • Geologic map of the San Francisco-San Jose quadrangle (Wagner et al., 1991) • Soil Survey, Eastern Stanislaus Area, California (Arkley, 1964)

TABLE 2: Sources of Geology and Soil Information: Lower Tuolumne River (continued)

USGS Quadrangle	Source of Information
Westley	• Preliminary geologic map showing Quaternary deposits of the lower Tuolumne and Stanislaus alluvial fans and along the lower San Joaquin River (Marchand and Harden, 1978) • Geologic map of the San Francisco-San Jose quadrangle (Wagner et al., 1991) • Soil Survey, Eastern Stanislaus Area, California (Arkley, 1964)

TABLE 3: Geologic units associated with Potential Stream Depletion Areas (PSDA)

Age		Geologic Map Units			PSDA Map Unit
Holocene	Modern	Post Modesto Formation	pmf	hal – undifferentiated alluvium; af- artificial fill; t – dredge tailings; pm4	Mapped Channel Alluvium
	Historic			pm3	Potential Stream Depletion Area (PSDA)
	Prehistoric			pm2	
	Early Holocene			pm1	
Pleistocene		Modesto Formation	m2 /m2f (upper unit)	m2-4	
				m2-3	
				m2-2	
				m2-1	
			m1 /m1f (lower unit)		
		Riverbank Formation	r3 / r3f (upper unit)		
			r2 /r2f (middle unit)		Not Within PSDA
			r1 /r1f (lower unit)		
		Turlock Lake Formation	t2 (upper unit)	t2u	
				t2l	
			t1 (lower unit)		

RESULTS AND DISCUSSION

The quadrangles with mapped subterranean streams and PSDAs are included at the end of this memorandum. It is important to note that the vast majority of PSDAs are bounded by older alluvial and floodplain deposits which could potentially be in hydraulic connection with adjacent PSDAs. Thus, further analysis of potential streamflow depletion is necessary for wells completed in Holocene or Pleistocene aged material outside of a mapped PSDA and lying within ½-mile of the mainstem Stanislaus and Tuolumne Rivers.

Because the delineation of areas on the accompanying maps were, a) based on information readily available at the time they were developed, and b) only assess potential stream flow depletion from the mainstem Stanislaus and Tuolumne Rivers (i.e., not their tributaries), the maps do not represent all of the subterranean streams or PSDAs that exist in the area. Site specific investigations will be needed to verify the existence (or absence) of subterranean streams and PSDAs.

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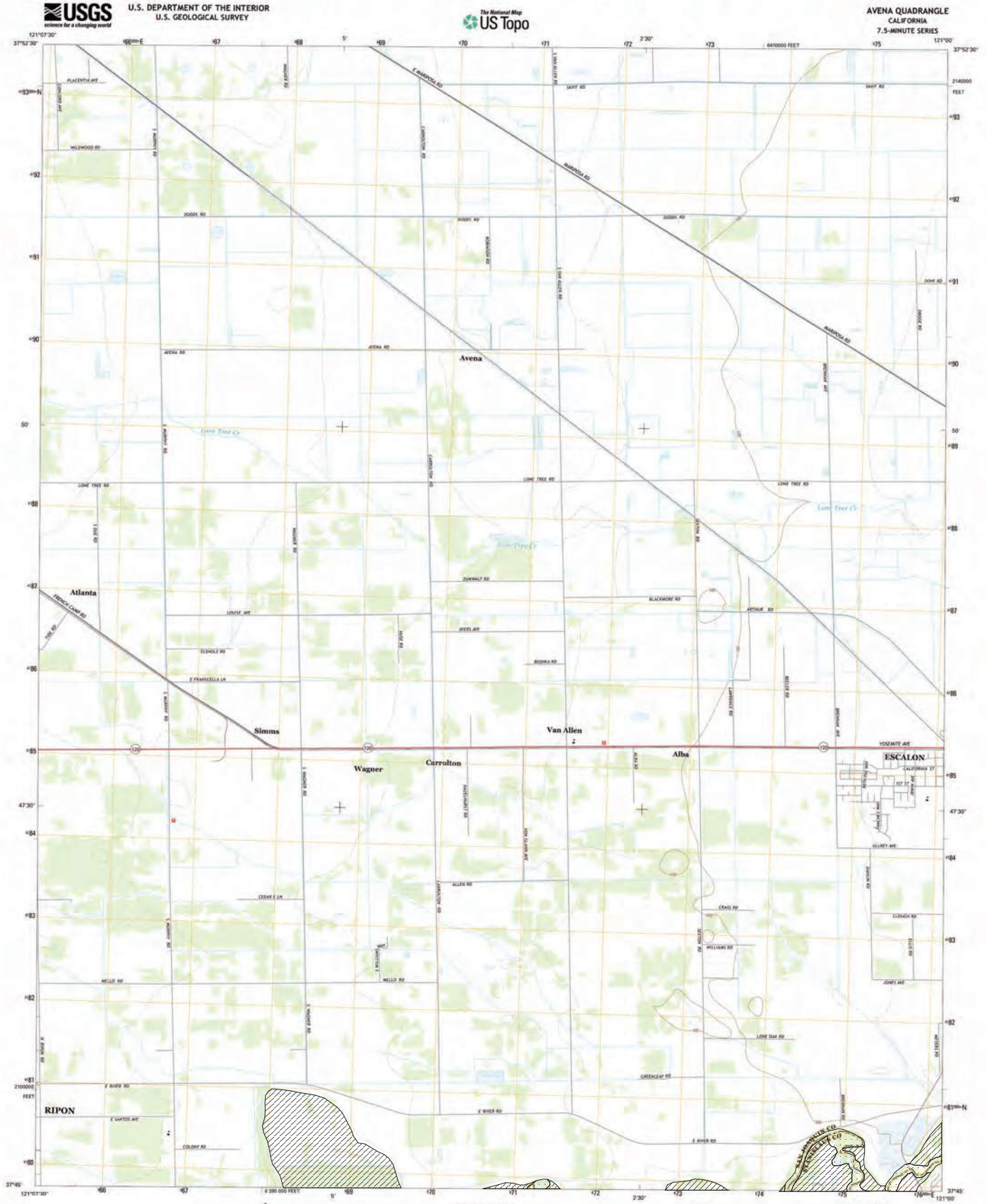
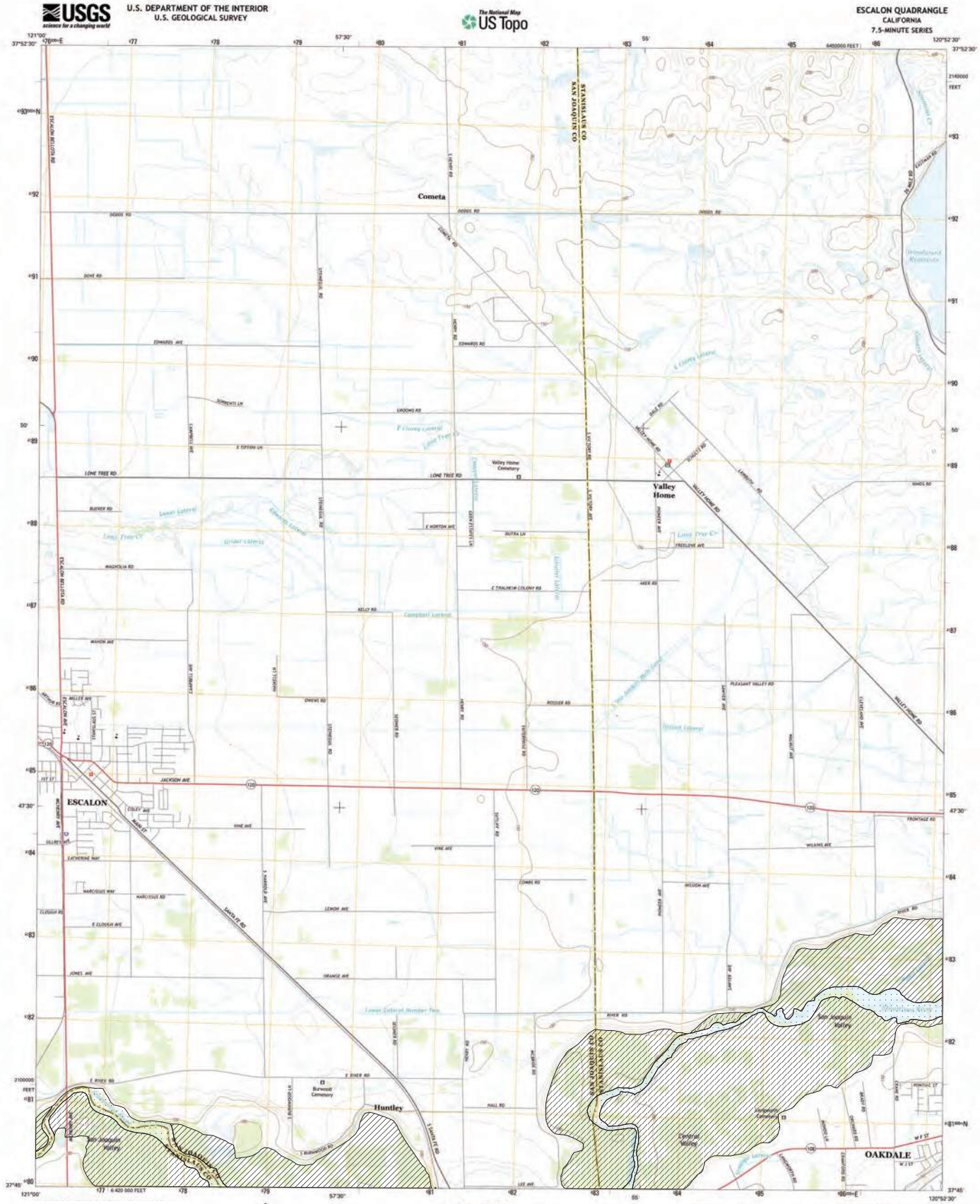


DELINEATION OF SUBTERRANEAN STREAMS AND POTENTIAL STREAM DEPLETION AREAS WITHIN AND ADJACENT TO THE STANISLAUS AND TUOLUMNE RIVERS

Avena Quadrangle Legend

- Mapped Channel Alluvium
- Potential Stream Depletion Area



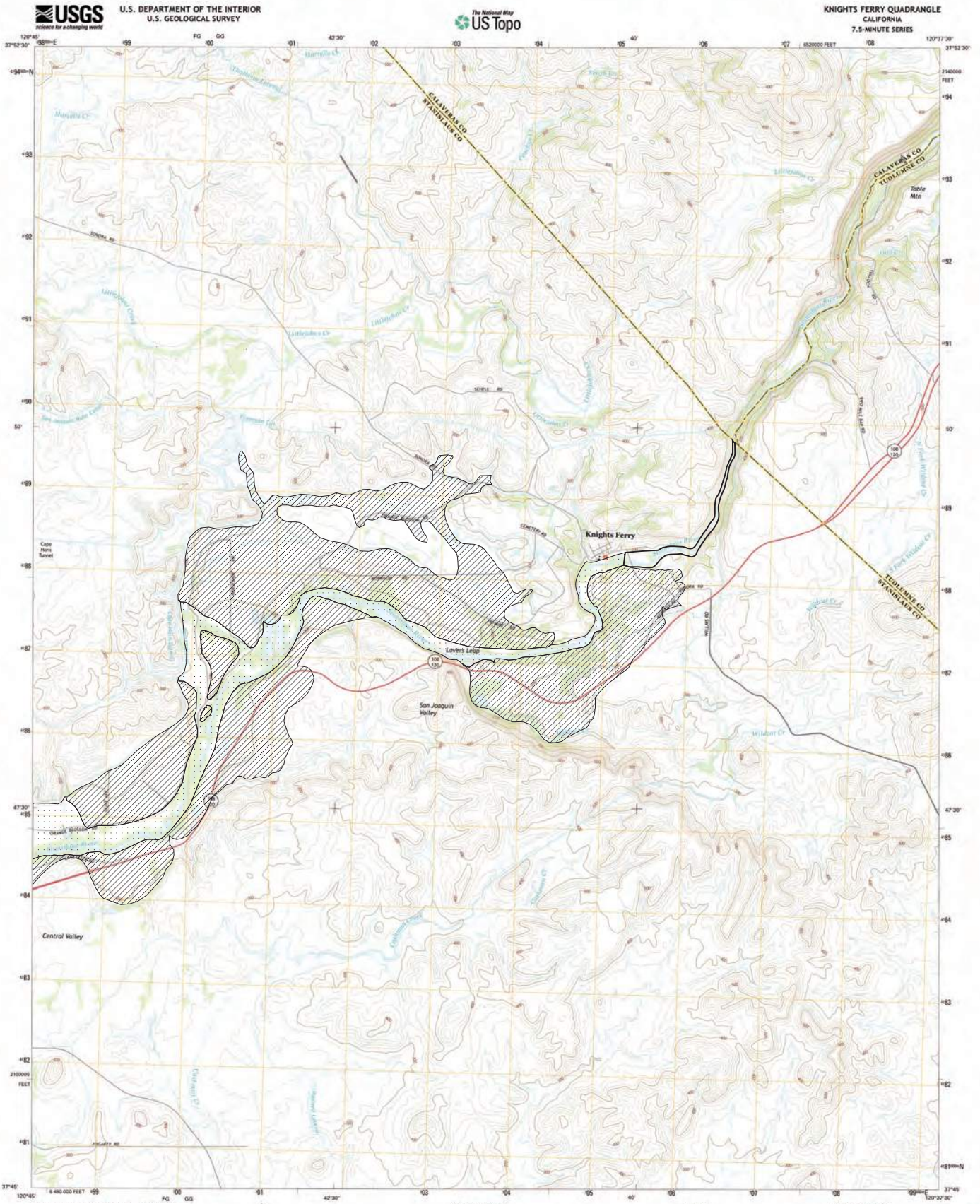
DELINEATION OF SUBTERRANEAN STREAMS AND POTENTIAL STREAM DEPLETION AREAS WITHIN AND ADJACENT TO THE STANISLAUS AND TUOLUMNE RIVERS

Escalon Quadrangle Legend

- Mapped Channel Alluvium
- Potential Stream Depletion Area

DELINEATION OF SUBTERRANEAN STREAMS AND POTENTIAL STREAM DEPLETION AREAS WITHIN AND ADJACENT TO THE STANISLAUS AND TUOLUMNE RIVERS

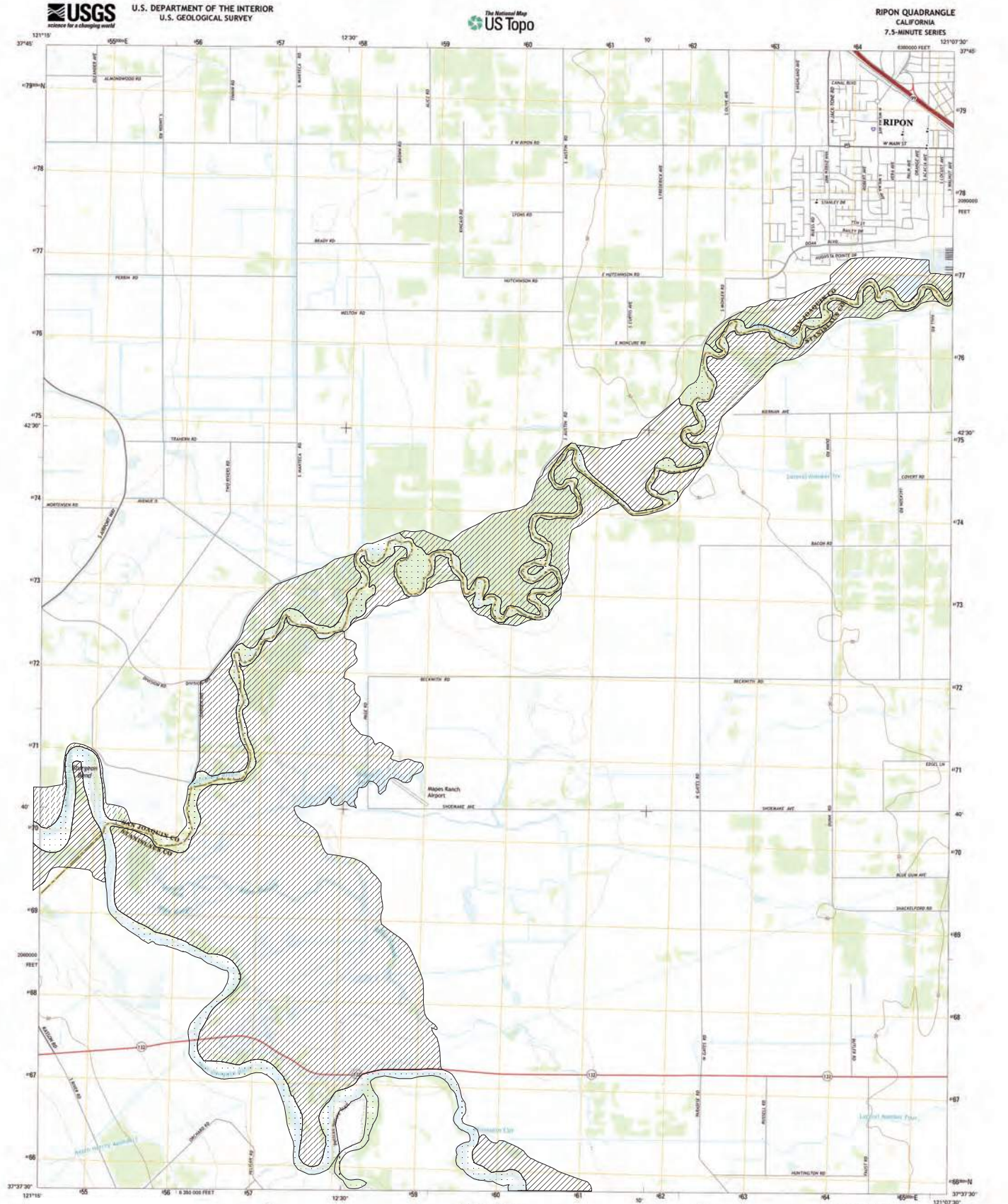
Oakdale Quadrangle Legend
- Mapped Channel Alluvium
- Potential Stream Depletion Area



DELINEATION OF SUBTERRANEAN STREAMS AND POTENTIAL STREAM DEPLETION AREAS WITHIN AND ADJACENT TO THE STANISLAUS AND TUOLUMNE RIVERS

Knights Ferry Quadrangle Legend

- Subterranean Flow
- Mapped Channel Alluvium
- Potential Stream Depletion Area



DELINEATION OF SUBTERRANEAN STREAMS AND POTENTIAL STREAM DEPLETION AREAS WITHIN AND ADJACENT TO THE STANISLAUS AND TUOLUMNE RIVERS

Ripon Quadrangle Legend

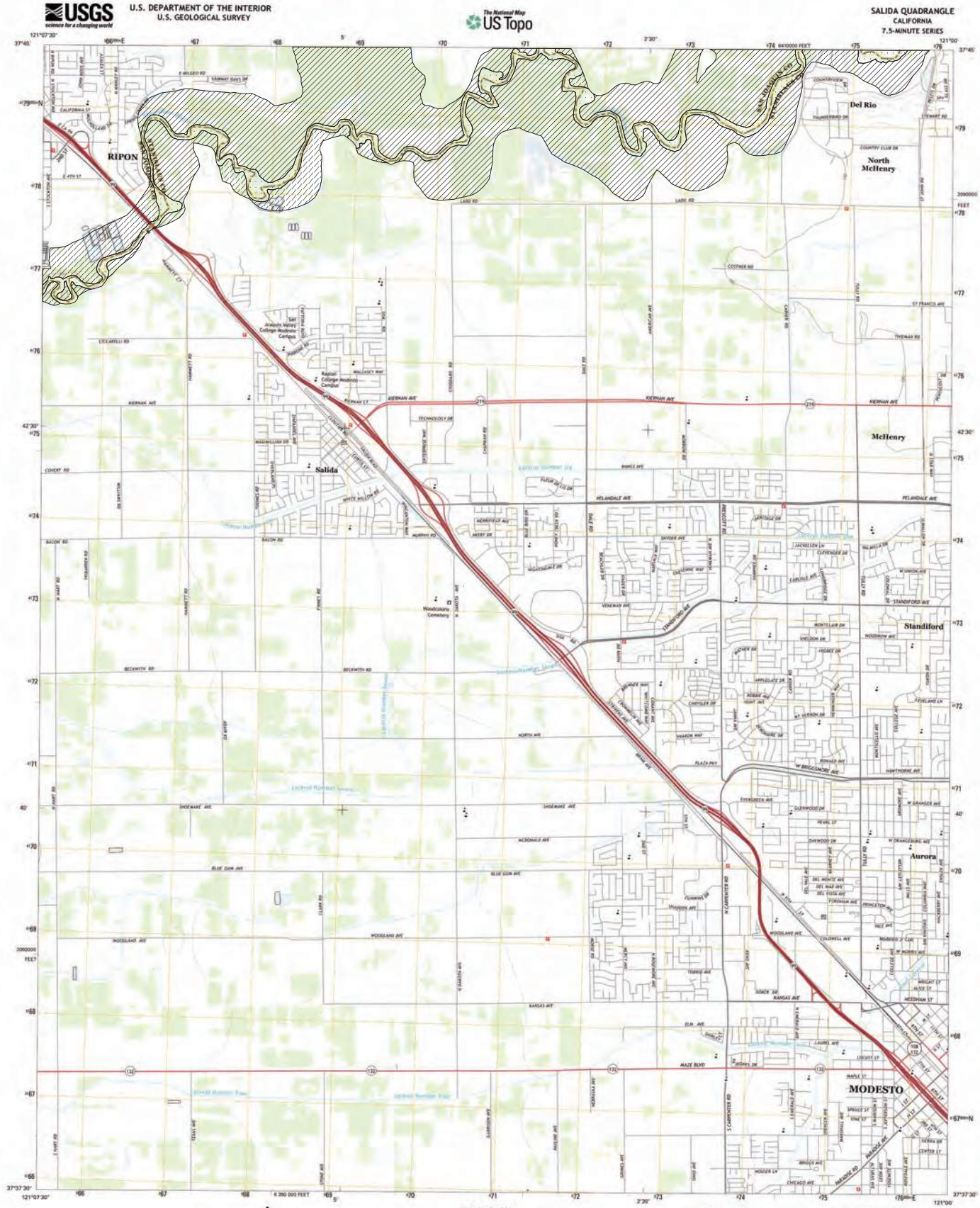
- Mapped Channel Alluvium
- Potential Stream Depletion Area

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011. A metadata file associated with this product is draft version 0.6.18

MELOMING QUADRANGLES

1 Lathrop
2 Manteca
3 Avena
4 Vernalis
5 Salida
6 Solyo
7 Newman
8 Brush Lake

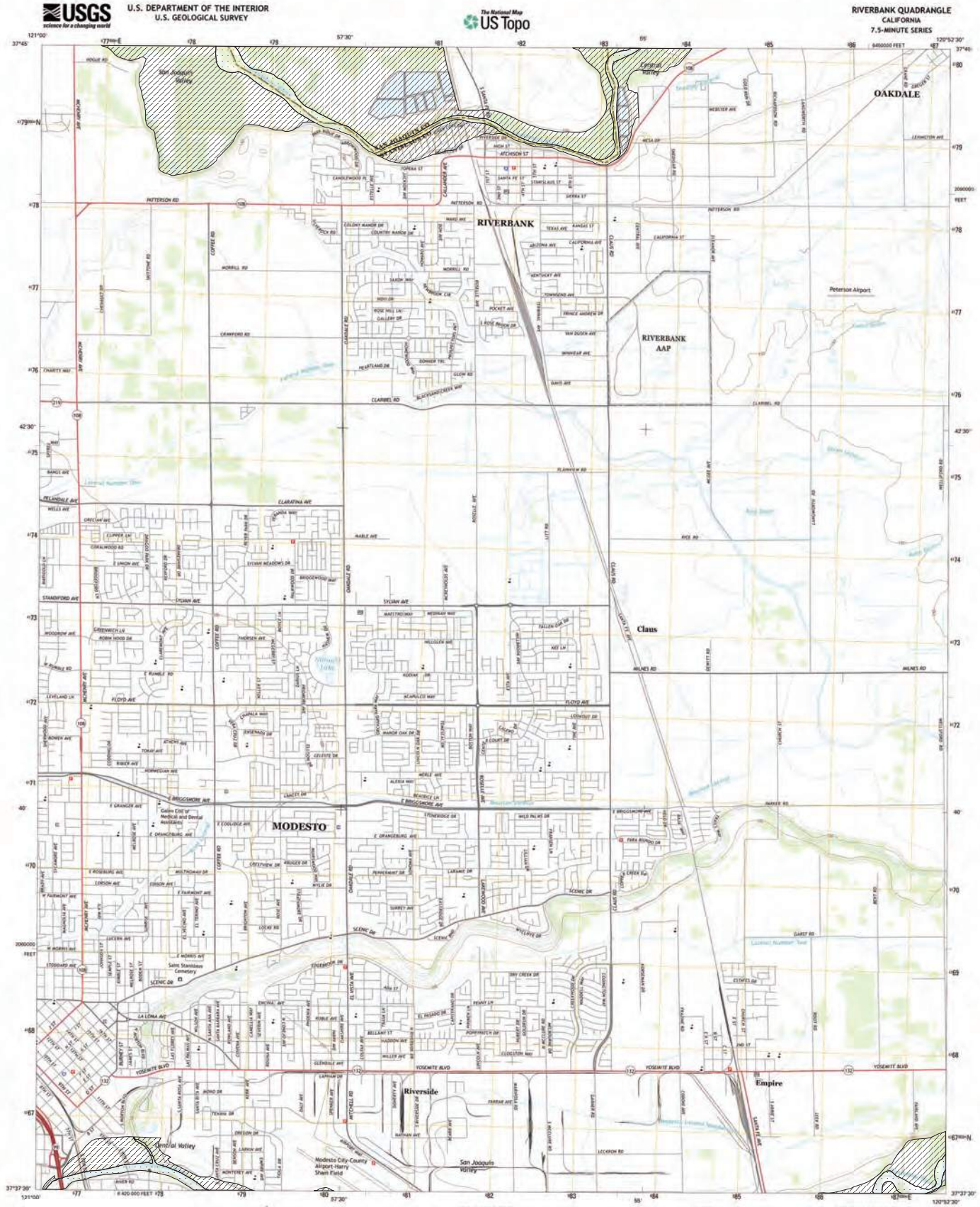
MRA REF NO. USGS X24K37999



DELINEATION OF SUBTERRANEAN STREAMS AND POTENTIAL STREAM DEPLETION AREAS WITHIN AND ADJACENT TO THE STANISLAUS AND TUOLUMNE RIVERS

Salida Quadrangle Legend

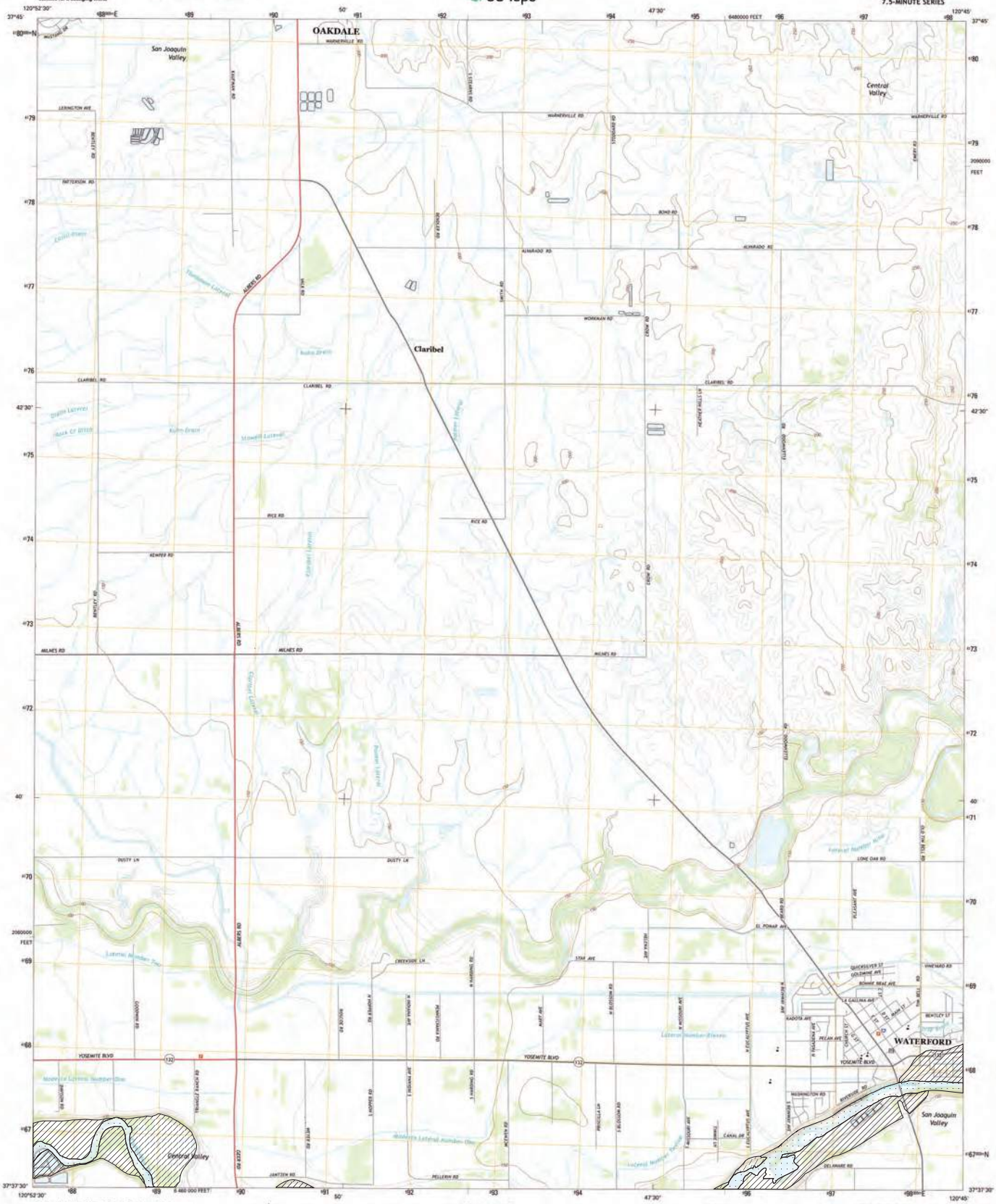
- Mapped Channel Alluvium
- Potential Stream Depletion Area



DELINEATION OF SUBTERRANEAN STREAMS AND POTENTIAL STREAM DEPLETION AREAS WITHIN AND ADJACENT TO THE STANISLAUS AND TUOLUMNE RIVERS

Riverbank Quadrangle Legend

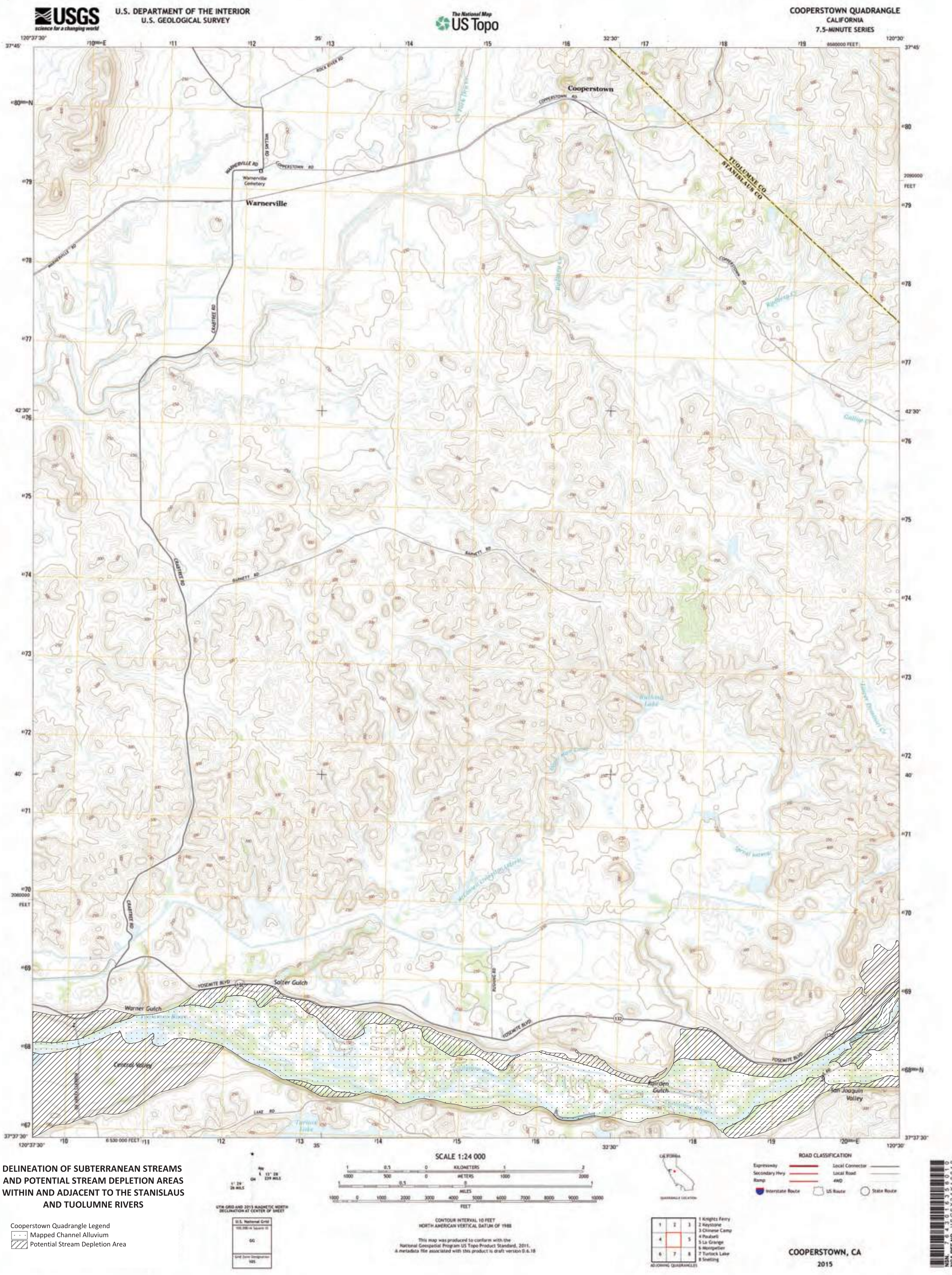
- Mapped Channel Alluvium
- Potential Stream Depletion Area


U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
The National Map US Topo
WATERFORD QUADRANGLE
CALIFORNIA-STANISLAUS CO.
7.5-MINUTE SERIES
OAKDALE
Claribel
WATERFORD
San Joaquin Valley
Central Valley
SCALE 1:24 000
DELINEATION OF SUBTERRANEAN STREAMS AND POTENTIAL STREAM DEPLETION AREAS WITHIN AND ADJACENT TO THE STANISLAUS AND TUOLUMNE RIVERS
Waterford Quadrangle Legend
Mapped Channel Alluvium
Potential Stream Depletion Area
ROAD CLASSIFICATION
CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988
WATERFORD, CA
2015

DELINEATION OF SUBTERRANEAN STREAMS AND POTENTIAL STREAM DEPLETION AREAS WITHIN AND ADJACENT TO THE STANISLAUS AND TUOLUMNE RIVERS

Paulsell Quadrangle Legend

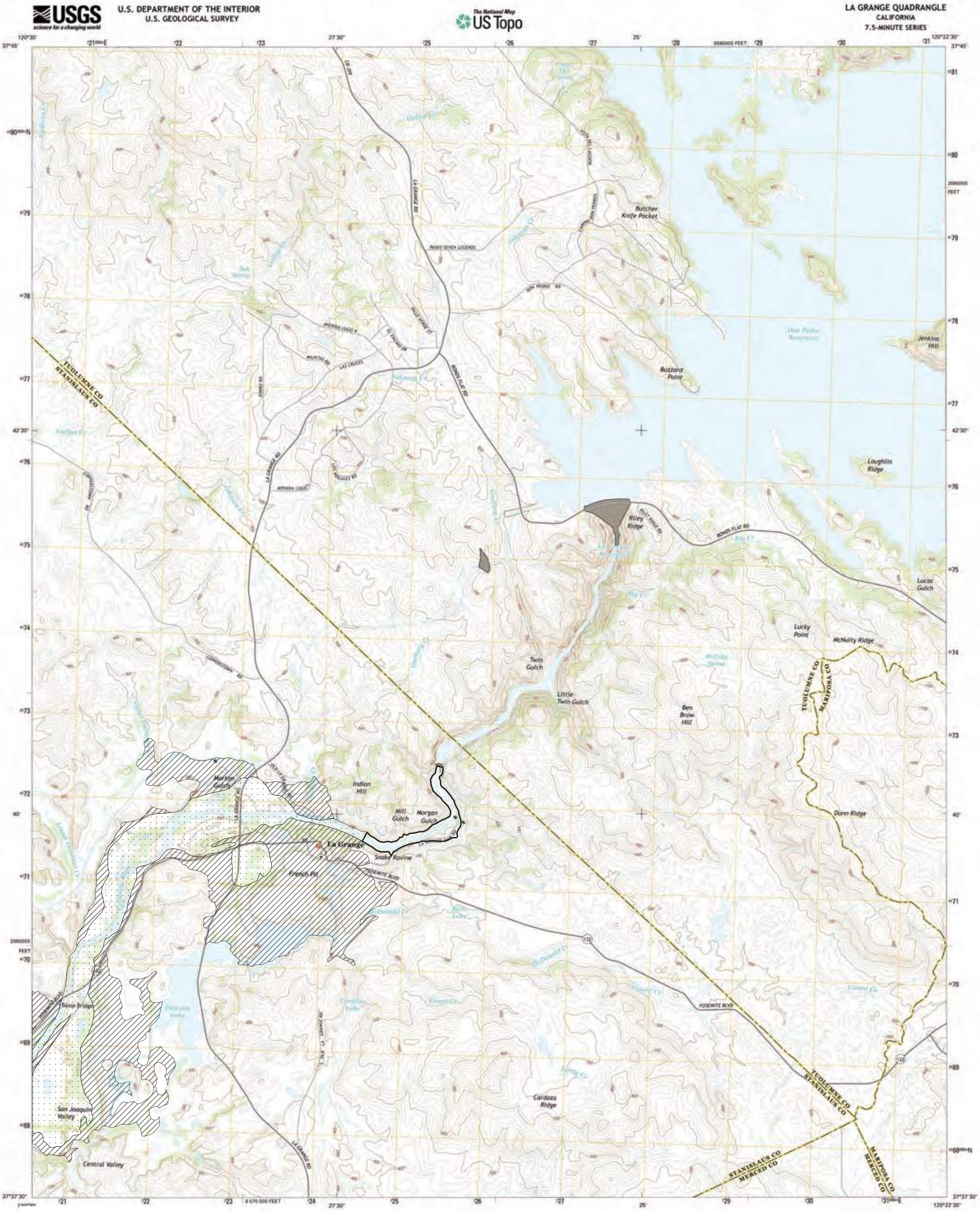
- Mapped Channel Alluvium
- Potential Stream Depletion Area



DELINEATION OF SUBTERRANEAN STREAMS AND POTENTIAL STREAM DEPLETION AREAS WITHIN AND ADJACENT TO THE STANISLAUS AND TUOLUMNE RIVERS

Cooperstown Quadrangle Legend

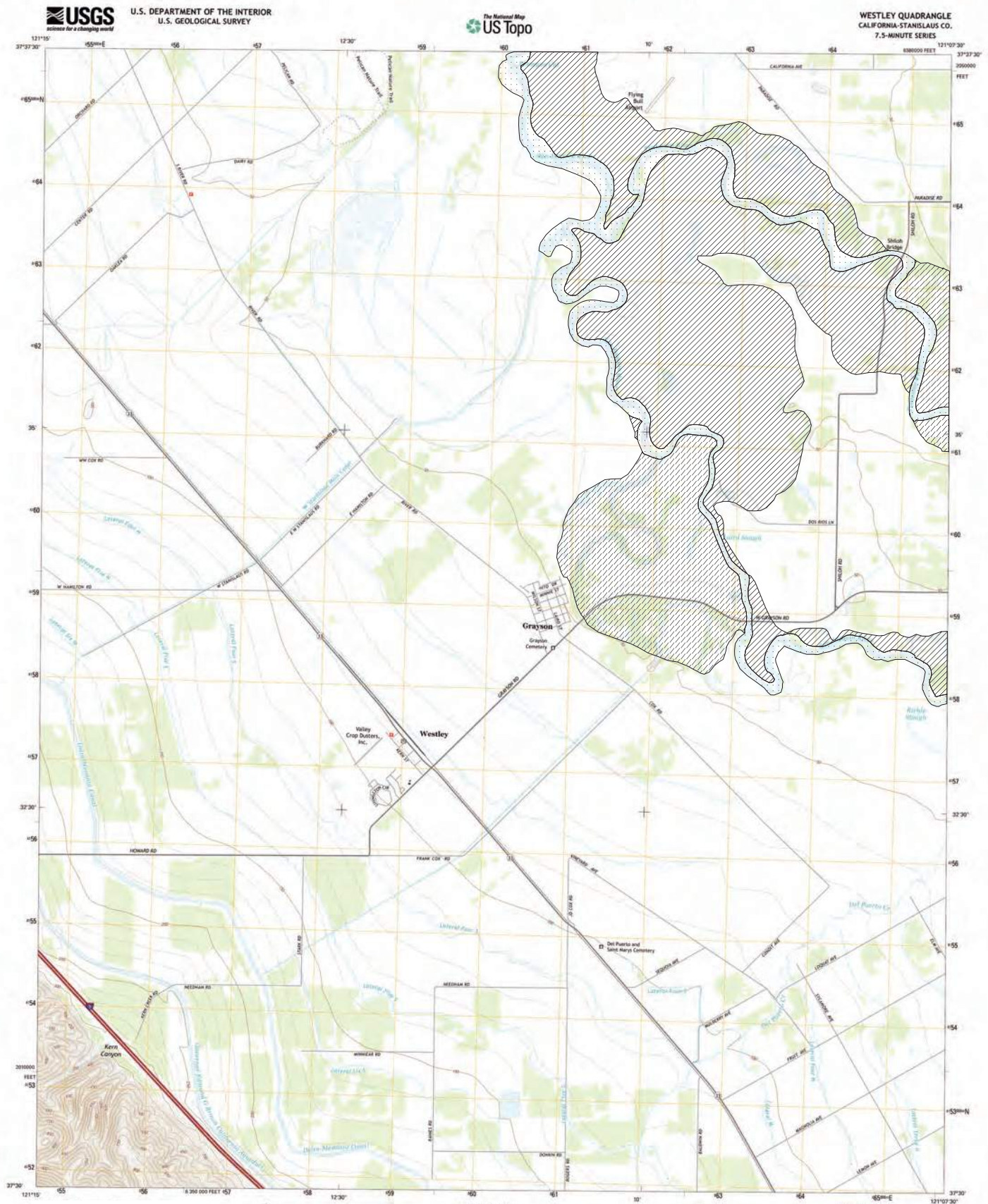
- Mapped Channel Alluvium
- Potential Stream Depletion Area



DELINEATION OF SUBTERRANEAN STREAMS AND POTENTIAL STREAM DEPLETION AREAS WITHIN AND ADJACENT TO THE STANISLAUS AND TUOLUMNE RIVERS

La Grange Quadrangle Legend

- Subterranean Flow
- Mapped Channel Alluvium
- Potential Stream Depletion Area



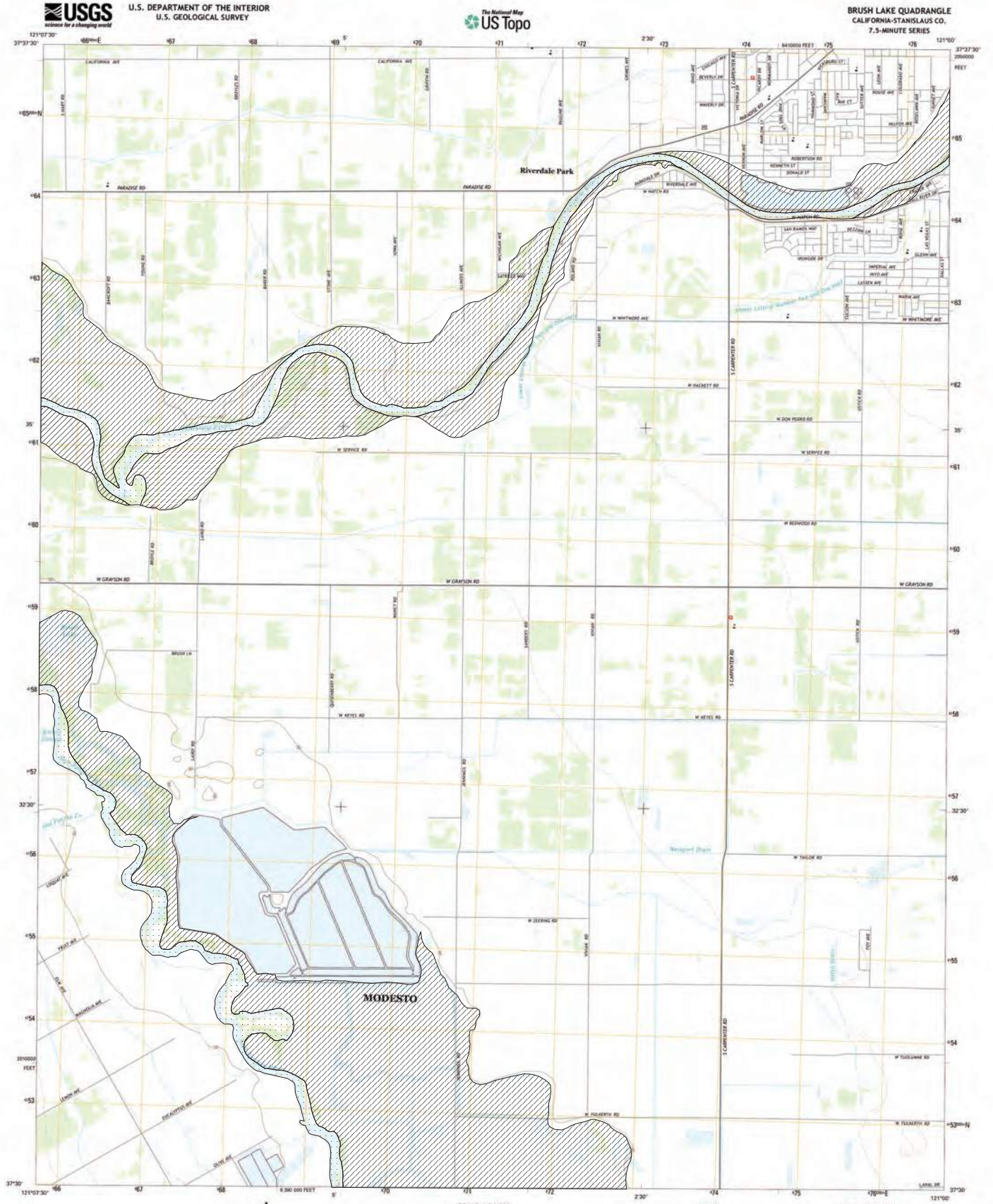
DELINEATION OF SUBTERRANEAN STREAMS AND POTENTIAL STREAM DEPLETION AREAS WITHIN AND ADJACENT TO THE STANISLAUS AND TUOLUMNE RIVERS

Westley Quadrangle Legend

- Mapped Channel Alluvium
- Potential Stream Depletion Area

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011. A metadata file associated with this product is draft version 0.6.18

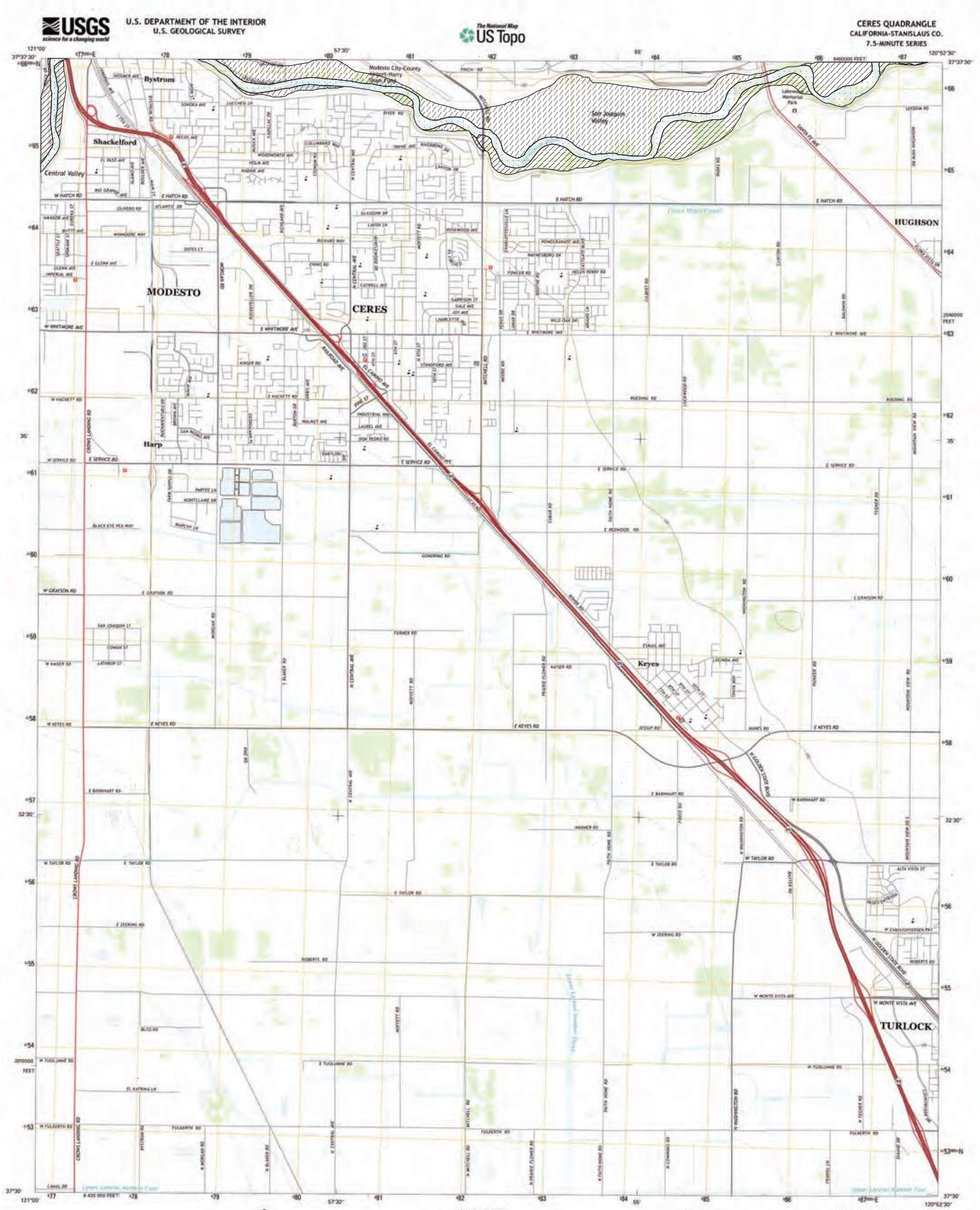
USGS NGA REF NO. USGSX24K48422



DELINEATION OF SUBTERRANEAN STREAMS AND POTENTIAL STREAM DEPLETION AREAS WITHIN AND ADJACENT TO THE STANISLAUS AND TUOLUMNE RIVERS

Brush Lake Quadrangle Legend

- Mapped Channel Alluvium
- Potential Stream Depletion Area



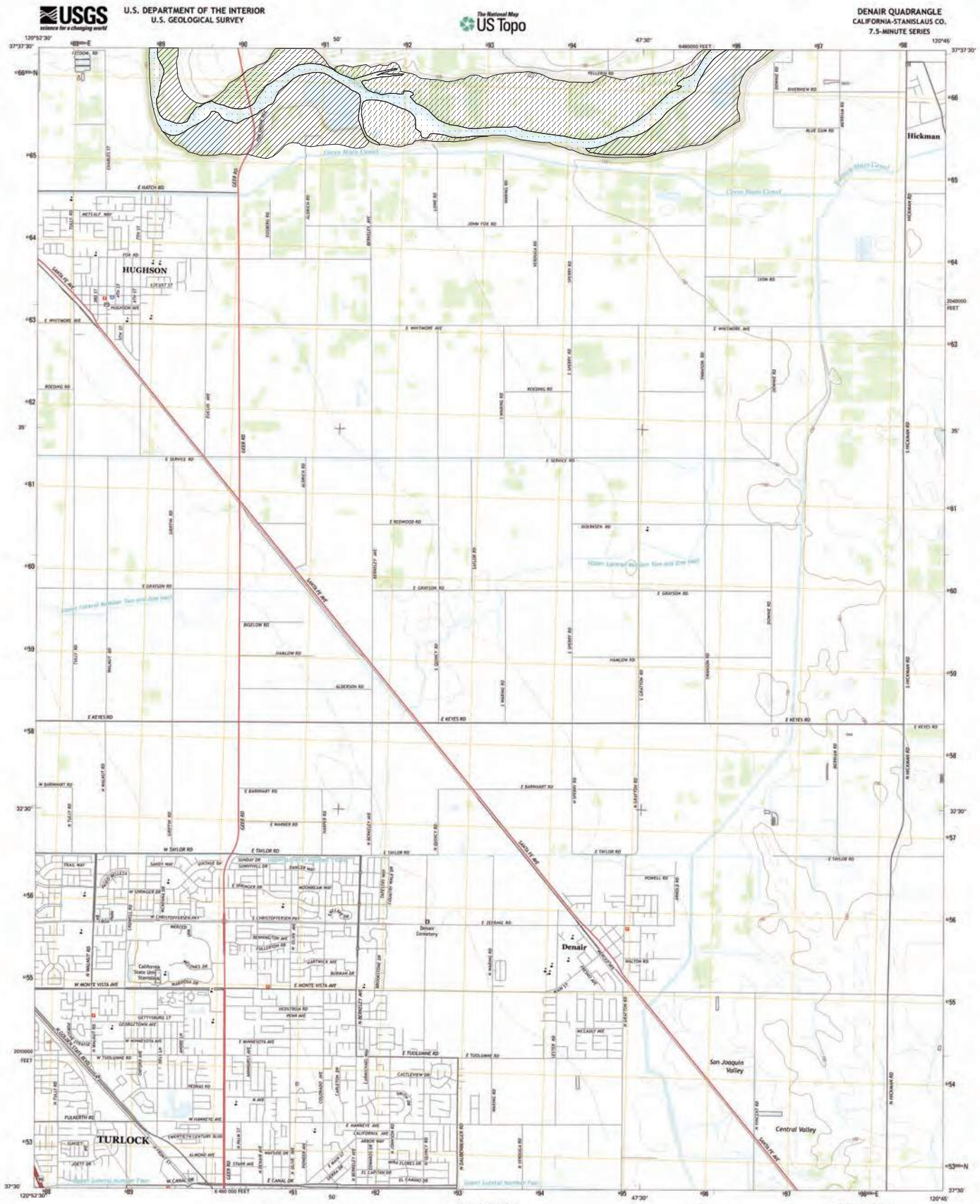
DELINEATION OF SUBTERRANEAN STREAMS AND POTENTIAL STREAM DEPLETION AREAS WITHIN AND ADJACENT TO THE STANISLAUS AND TUOLUMNE RIVERS

Ceres Quadrangle Legend

- Mapped Channel Alluvium
- Potential Stream Depletion Area

CERES, CA
2015

NSN 7643013823598
NGA REF NO. USGSX2467998



DELINEATION OF SUBTERRANEAN STREAMS AND POTENTIAL STREAM DEPLETION AREAS WITHIN AND ADJACENT TO THE STANISLAUS AND TUOLUMNE RIVERS

Denair Quadrangle Legend

- Mapped Channel Alluvium
- Potential Stream Depletion Area

August 25, 2019

Sent via email to info@esjgroundwater.org

Re: Comments on Draft Groundwater Sustainability Plan for Eastern San Joaquin Subbasin

To whom it may concern,

On behalf of the above-listed organizations, we would like to offer the attached comments on the draft Groundwater Sustainability Plan for the Eastern San Joaquin Subbasin. Our organizations are deeply engaged in and committed to the successful implementation of the Sustainable Groundwater Management Act (SGMA) because we understand that groundwater is a critical piece of a resilient California water portfolio, particularly in light of our changing climate. Because California's water and economy are interconnected, the sustainable management of each basin is of interest to both local communities and the state as a whole.

Our organizations have significant expertise in the environmental needs of groundwater and the needs of disadvantaged communities.

- The Nature Conservancy, in collaboration with state agencies, has developed several tools[1] for identifying groundwater dependent ecosystems in every SGMA groundwater basin and has made that tool available to each Groundwater Sustainability Agency.
- Audubon California is an expert in understanding wetlands and their role in groundwater recharge and applying conservation science to develop multiple-benefit solutions for sustainable groundwater management.
- Clean Water Action and Clean Water Fund are sister organizations that have deep expertise in the provision of safe drinking water, particularly in California's small disadvantaged communities, and co-authored a report on public and stakeholder engagement in SGMA[2].

[1] https://groundwaterresourcehub.org/

[2] https://www.cleanwater.org/publications/collaborating-success-stakeholder-engagement-sustainable-groundwater-management-act

- The Union of Concerned Scientists has been working to ensure that future water supply meets demand and withstands climate change impacts by supporting stakeholder education and integration, and the creation and implementation of science-based Groundwater Sustainability Plans.
- American Rivers is committed to restoring damaged rivers and conserving clean water for people and nature.

Because of the number of draft plans being released and our interest in reviewing every plan, we have identified key plan elements that are necessary to ensure that each plan adequately addresses essential requirements of SGMA. A summary review of your plan using our evaluation framework is attached to this letter as Appendix A. Appendix B provides a more detailed evaluation of the water quality and drinking water elements of the Plan. Our hope is that you can use our feedback to improve your plan before it is submitted in January 2020.

This review does not look at data quality but instead looks at how data was presented and used to identify and address the needs of disadvantaged communities (DACs), drinking water and the environment. In addition to informing individual groundwater sustainability agencies of our analysis, we plan to aggregate the results of our reviews to identify trends in GSP development, compare plans and determine which basins may require greater attention from our organizations.

Key Indicators

Appendix A provides a list of the questions we posed, how the draft plan responds to those questions and an evaluation by element of major issues with the plan. Below is a summary by element of the questions used to evaluate the plan.

1. Identification of Beneficial Users. This element is meant to ascertain whether and how DACs and groundwater-dependent ecosystems (GDEs) were identified, what standards and guidance were used to determine groundwater quality conditions and establish minimum thresholds for groundwater quality, and how environmental beneficial users and stakeholders were engaged through the development of the draft plan.
2. Communications plan. This element looks at the sufficiency of the communications plan in identifying ongoing stakeholder engagement during plan implementation, explicit information about how DACs were engaged in the planning process and how stakeholder input was incorporated into the GSP process and decision-making.
3. Maps related to Key Beneficial Uses. This element looks for maps related to drinking water users, including the density, location and depths of public supply and domestic wells; maps of GDE and interconnected surface waters with gaining and losing reaches; and monitoring networks.
4. Water Budgets. This element looks at how climate change is explicitly incorporated into current and future water budgets; how demands from urban and domestic water users were incorporated; and whether the historic, current and future water demands of native vegetation and wetlands are included in the budget.
5. Management areas and Monitoring Network. This element looks at where, why and how management areas are established, as well what data gaps have been identified and how the plan addresses those gaps.
6. Measurable Objectives and Undesirable Results. This element evaluates whether the plan explicitly considers the impacts on DACs, GDEs and environmental beneficial users in the

development of Undesirable Results and Measurable Objectives. In addition, it examines whether stakeholder input was solicited from these beneficial users during the development of those metrics.

7. Management Actions and Costs. This element looks at how identified management actions impact DACs, GDEs and interconnected surface water bodies; whether mitigation for impacts to DACs is discussed or funded; and what efforts will be made to fill identified data gaps in the first five years of the plan. Additionally, this element asks whether any changes to local ordinances or land use plans are included as management actions.

Conclusion

We know that SGMA plan development and implementation is a major undertaking, and we want every basin to be successful. We would be happy to meet with you to discuss our evaluation as you finalize your Plan for submittal to DWR. Feel free to contact Suzannah Sosman at suzannah@aginnovations.org for more information or to schedule a conversation.

Sincerely,

Jennifer Clary
Water Program Manager
Clean Water Action/Clean Water Fund

Lisa Hunt, Ph.D.
Director of California River Restoration Science
American Rivers

Samantha Arthur
Working Lands Program Director
Audubon California

J. Pablo Ortiz-Partida, Ph.D.
Western States Climate and Water Scientist
Union of Concerned Scientists

Sandi Matsumoto
Associate Director, California Water Program
The Nature Conservancy

Groundwater Basin/Subbasin: Eastern San Joaquin Groundwater Subbasin (DWR #5-022.01)
GSA: Eastern San Joaquin Groundwater Authority (Comprising 15 GSAs)
GSP Date: July 2019 Public Review Draft

1. Identification of Beneficial Users

Were key beneficial users identified and engaged?

Selected relevant requirements and guidance:
GSP Element 2.1.5, "Notice & Communication" (§354.10):
(a) A description of the beneficial uses and users of groundwater in the basin, including the land uses and property interests potentially affected by the use of groundwater in the basin, the types of parties representing those interests, and the nature of consultation with those parties.
GSP Element 2.2.2, "Groundwater Conditions" (§354.16):
(d) Groundwater quality issues that may affect the supply and beneficial uses of groundwater, including a description and map of the location of known groundwater contamination sites and plumes.
(f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information.
(g) Identification of groundwater dependent ecosystems within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information.
GSP Element 3.3, "Minimum Thresholds" (§354.28):
(4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.

Review Criteria		Yes	No	N/A	Relevant Info per GSP	Location (Section, Page[1])
1. Do identified beneficial users (BUs) include:	a. Disadvantaged Communities (DACs)	X			"DACs and SDACs are mapped in Figure 1-8: Disadvantaged Communities (DACs)Figure 1-8 and are primarily in the western portions of the Subbasin. Approximately 33 percent of the Subbasin area is considered Disadvantaged and 7 percent is considered severely disadvantaged. Disadvantaged communities include the following census designated places (CDPs): Stockton City CDP, Collierville CDP, Lockeford CDP, Terminous CDP, and Valley Home CDP. Severely disadvantaged communities include: Kennedy CDP, August CDP, French Camp CDP, Taft Mosswood CDP, and Thornton CDP." GSP does not clearly identify and discuss what sources are used for drinking water supplies by DACs (e.g., primarily domestic wells, small community water systems depend on only groundwater, etc.).	Section 1.2.1, Page 42 Section 1.3.1, Page 67
	b. Tribes		X		"Of the potential beneficial uses and users of groundwater in the Subbasin listed in CWC Section 10723.2, those not included are the following: • California Native American tribes"	Section 1.3.1, Page 68
	c. Small community public water systems (<3,300 connections)		X			

[1] Page numbers refer to the page of the PDF.

2.	What data were used to identify presence or absence of DACs?	a. DWR DAC Mapping Tool[2]	X			"For this GSP, the 2012-2016 ACS dataset was used, establishing statewide MHI as $63,783 (CA DWR, Mapping Tools)."	Section 1.2.1, Page 42
		i. Census Places	X				
		ii. Census Block Groups		X			
		iii. Census Tracts		X			
		b. Other data source		X			
3.	Groundwater Conditions section includes discussion of:	a. Drinking Water Quality	X			Information on the historical and current groundwater quality conditions for salinity, nitrate, arsenic, and point-source contamination is provided. "Water quality is not known to have adversely affected beneficial [drinking water] uses of groundwater in the Eastern San Joaquin Subbasin, generally."	Section 2.2.4, Page 154-174
		b. California Maximum Contaminant Levels (CA MCLs)[3] (or Public Health Goals where MCL does not exist, e.g. Chromium VI)	X			"For the purposes of this GSP, comparing parameter concentrations to their MCL or SMCL is used as the basis for describing groundwater quality concerns in the Eastern San Joaquin Subbasin. Comparisons to the MCL or SMCL must be considered in context as the measured concentrations represent raw water, which may be treated or blended prior to delivery to meet the standard or may not be used for potable uses. Water quality is not known to have adversely affected beneficial uses of groundwater in the Eastern San Joaquin Subbasin, generally." "The EPA's MCL of 10 mg/L for Nitrate as N delimits high levels of nitrate for drinking water use. Many measured concentrations are above this value, both historically and recently. Comparisons to the MCL must be considered in context as the measured concentrations represent raw water, which may be treated or blended prior to delivery to meet the standard or may not be used for potable uses." "Public health concerns about arsenic in drinking water related to its potential to cause adverse health effects are addressed through EPA's MCL, established at 10 micrograms per liter (µg/L). Figure 2-60 shows the spatial distribution of arsenic concentrations contained in the GAMA database. From the 1970s to present, the total number and percentage of arsenic values above 10 µg/L has increased (see Table 2-9)."	Section 2.2.4, Page 154-174 Section 2.2.4.2 Page 165 Section 2.2.4.3, Page 167
4.	What local, state, and federal standards or plans were used to assess drinking water BUs in the development of Minimum Thresholds (MTs)?	a. Office of Environmental Health Hazard Assessment Public Health Goal (OEHHA PHGs)[4]		X			
		b. CA MCLs[3]	X			"In the development of minimum thresholds, beneficial uses of groundwater as a drinking water supply and as an agricultural supply were considered. For drinking water, the TDS secondary maximum contaminant level (SMCL) was considered. As noted in the Current and Historical Conditions section of this GSP (Section 2.2), the SWRCB Division of Drinking Water (DDW) has	Section 3.2.3, Page 240-242

[2] DWR DAC Mapping Tool: https://gis.water.ca.gov/app/dacs/

[3] CA MCLs: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/MCLsandPHGs.html

[4] OEHHA PHGs: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/MCLsandPHGs.html

					established SMCLs for TDS in drinking water supplies. SMCLs are established for aesthetic reasons such as taste, odor, and color and are not based on public health concerns. For TDS, the SMCL is 500 mg/L (recommended) and the upper SMCL is 1,000 mg/L (SWRCB, 2017). The SWRCB has set a short-term standard of 1,500 mg/L, which is a temporary concentration generally allowed only under rare circumstances (SWRCB, 2017)." "Salinity is the only water quality constituent for which minimum thresholds are established in the Eastern San Joaquin Subbasin. Although other constituents, including arsenic, nitrogen, and sulfate, are evaluated in the Current and Historical Groundwater Conditions section of this GSP (Section 2.2), these constituents are managed through existing management and regulatory programs within the Subbasin."	
	c. Data Quality Objectives (DQOs) in Regional Water Quality Control Plans		X			
	d. Sustainable Communities Strategies/ Regional Transportation Plans[5]		X			
	e. County and/or City General Plans, Zoning Codes and Ordinances[6]		X			
5. Does the GSP identify how environmental BUs and environmental stakeholders were engaged throughout the development of the GSP?			X		Caswell Memorial State Park is incorrectly referred to as being located outside the Eastern San Joaquin Subbasin. The following additional protected lands are located near surface waters within the Subbasin that may be interconnected with groundwater, and/or may rely at least partly on groundwater to support vegetation and sensitive natural communities. These protected lands represent potential beneficial users of groundwater: Durham Ferry State Recreational Area, a small portion (approximately 200 acres) of San Joaquin River National Wildlife Refuge, Army Corps Park, Vernalis Riparian Habitat (Public Conservation Lands), Seegers Preserve, Cabral Island Preserve, Machado Preserve, Hansen Preserve, Micke Grove Park and Zoo, Oak Grove Regional Park, Nakagawa Preserve, El Rio Farms Preserve, Lodi Lake Nature Area, Woodbridge Regional Park, Woodbridge Ecological Preserve, White Slough WA, Nuss Farms, Beck Preserve, Hilder Preserve, Staten Island Ranch, Burchel Preserve, and Ishizuka Preserve. The authors referred to the San Joaquin County General Plan documents, including background reports, for information regarding these important resources. Section 2.2.8 includes a geospatial analysis that removes managed wetlands from consideration as GDEs.	Section 1.3.1, Page 67 Section 2.2.8, Page 178-184

[5] CARB: https://ww2.arb.ca.gov/resources/documents/scs-evaluation-resources

[6] OPR General Plan Guidelines: http://www.opr.ca.gov/planning/general-plan/

Summary / Comments

The GSP does not currently provide clear information on how and to what extent DAC members rely on groundwater. For example: how much of the population relies on private domestic wells for drinking water? How much of the population relies on small community water systems and where are those systems located? Are those community water systems solely depending on groundwater? How many connections do the small water systems serve? This information is valuable for the reader to understand the scale of the vulnerable population dependent on groundwater for drinking water.

Although the GSP identifies declining water quality trends for arsenic and nitrate in the basin, which meet the GSP's definition of undesirable results for water quality, no MOs or MTs are set for these constituents. The concentration of these constituents can be impacted by management actions.

The GSP notes plans to coordinate and share data with other regulatory monitoring programs, but does not explain how this coordination will improve sustainability with respect to water quality within the basin. The GSP should identify a clear plan for addressing all groundwater constituents that are contributing to the undesirable results of degraded groundwater quality, including those for drinking water users.

Caswell Memorial State Park is incorrectly referred to as being located outside the Eastern San Joaquin Subbasin.

The authors referred to the San Joaquin County General Plan documents, including background reports, for information regarding these important resources. These potential beneficial groundwater users should be described in the text on pp. 1-18 and shown in Figure 1-11. Please include a description recognizing all of the protected areas in the Subbasin and their beneficial groundwater uses.

Section 2.2.8 includes a geospatial analysis that removes managed wetlands from consideration as GDEs. The managed wetlands in the Subbasin should be identified in this section.

2. Communications Plan

How were key beneficial users engaged, and how was their input incorporated into the GSP process and decisions?

Selected relevant requirements and guidance:
GSP Element 2.1.5, "Notice & Communication" (§354.10):

Each Plan shall include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following:

(c) Comments regarding the Plan received by the Agency and a summary of any responses by the Agency.

(d) A communication section of the Plan that includes the following:

(1) An explanation of the Agency's decision-making process.

(2) Identification of opportunities for public engagement and a discussion of how public input and response will be used.

(3) A description of how the Agency encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin.

(4) The method the Agency shall follow to inform the public about progress implementing the Plan, including the status of projects and actions.

DWR Guidance Document for GSP Stakeholder Communication and Engagement[7]

Review Criteria	Yes	No	N/A	Relevant Info per GSP	Location (Section, Page)
1. Is a Stakeholder Communication and Engagement Plan (SCEP) included?	X			Stakeholder Engagement & Public Outreach Plan, dated June 25, 2018	App. 1-G, Page 138
2. Does the SCEP identify that ongoing engagement will be conducted during GSP implementation?	X			"The GSAs intend to continue public outreach and provide opportunities for engagement during GSP implementation. This will include providing opportunities for public participation, at public meetings, providing access to GSP information online, and continued coordination with entities conducting outreach to diverse communities in the Subbasin. Announcements will continue to be distributed via email prior to public meetings. Emails will also be distributed as specific deliverables are finalized, when opportunities are available for stakeholder input and when this input is requested, or when items of interest to the stakeholder group arise, such as relevant funding opportunities. The Eastern San Joaquin SGMA website, managed as part of GSP administration, will be updated a minimum of monthly, and will house meeting agendas and materials, reports, and other program information. The website may be updated to add new pages as the program continues and additional activities are implemented. Additionally, public workshops will be held semi-annually to provide an opportunity for stakeholders and members of the public to learn about, discuss, and provide input on GSP activities, progress toward meeting the sustainability goal of this GSP, and the SGMA program."	Section 7.7, Page 318

[7] DWR Guidance Document for GSP Stakeholder Communication and Engagement https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Document-for-Groundwater-Sustainability-Plan---Stakeholder-Communication-and-Engagement.pdf

3. Does the SCEP specifically identify how DAC beneficial users were engaged in the planning process?	X			Workgroup members identified as representing DAC interests: Agricultural Business – Farmer Representative, Calaveras County Resource Conservation District, Catholic Charities of the Diocese of Stockton, Environmental Justice Coalition for Water, Restore the Delta, Sierra Club - Delta-Sierra Group "Spanish translation was provided at informational open house events, creating an opportunity for local Spanish-speaking individuals to engage in the GSP development process."	Section 1.3.4, Page 70-73 Section ES, Page 17
4. Does the GSP explicitly describe how stakeholder input was incorporated into the GSP process and decisions?	X			"Ideas generated at the Workgroup meetings were directed to decision makers at the GWA Board meetings. Input was captured in monthly meeting summaries, which were reviewed by Workgroup members prior to being presented to the GWA Board in meeting agenda packets and posted to the GWA website. In addition, summaries of prior month Workgroup meetings, as well as highlights and key takeaways from those meetings, were presented regularly as a standing agenda item at GWA Board meetings. In addition to influencing GSP development and decisions related to groundwater management, feedback from stakeholders played a key role in enhancing education and outreach efforts, and the stakeholder involvement process more broadly. Changes were made to the Open House format following stakeholder comment, and outreach events with community groups (as referenced in Section 1.3.4.5 above) were added based on feedback to further spread the word about SGMA and local GSP development efforts. Additionally, changes to the Workgroup meeting structure and process were made based on findings of the Situation Assessment." Workgroup recommendations are cited throughout the sustainable management criteria sections.	Section 1.3.4, Page 78

Summary / Comments

Ongoing stakeholder engagement and inclusion throughout the GSP implementation process will be crucial to ensuring that the needs of the most vulnerable beneficial users in the basin are met.

The Communications plan does not specify how the DACs identified in Figure 1-8 were specifically engaged. The failure to identify small community water systems calls into question how and whether adequate outreach to DACs was conducted.

The "stakeholder feedback" mechanism for removal of NCCAGs from consideration as GDEs is not explained or documented in the GSP. Please provide details that support removing potential GDEs based on stakeholder feedback.

3. Maps Related to Key Beneficial Uses

Were best available data sources used for information related to key beneficial users?

Selected relevant requirements and guidance:

GSP Element 2.1.4 "Additional GSP Elements" (§354.8):

Each Plan shall include a description of the geographic areas covered, including the following information:

(a) One or more maps of the basin that depict the following, as applicable:

(5) The density of wells per square mile, by dasymetric or similar mapping techniques, showing the general distribution of agricultural, industrial, and domestic water supply wells in the basin, including de minimis extractors, and the location and extent of communities dependent upon groundwater, utilizing data provided by the Department, as specified in Section 353.2, or the best available information.

GSP Element 3.5 Monitoring Network (§354.34)

(b) Each Plan shall include a description of the monitoring network objectives for the basin, including an explanation of how the network will be developed and implemented to monitor
groundwater and related surface conditions, and the interconnection of surface water and groundwater, with sufficient temporal frequency and spatial density to evaluate the affects and effectiveness of Plan implementation. The monitoring network objectives shall be implemented to accomplish the following:

(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator:

(1) Chronic Lowering of Groundwater Levels. Demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features by the following methods:

(A) A sufficient density of monitoring wells to collect representative measurements through depth-discrete perforated intervals to characterize the groundwater table or potentiometric surface for each principal aquifer.

(4) Degraded Water Quality. Collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues.

(6) Depletions of Interconnected Surface Water. Monitor surface water and groundwater, where interconnected surface water conditions exist, to characterize the spatial and temporal exchanges between surface water and groundwater, and to calibrate and apply the tools and methods necessary to calculate depletions of surface water caused by groundwater extractions. The monitoring network shall be able to characterize the following:

(A) Flow conditions including surface water discharge, surface water head, and baseflow contribution.

(B) Identifying the approximate date and location where ephemeral or intermittent flowing streams and rivers cease to flow, if applicable.

(C) Temporal change in conditions due to variations in stream discharge and regional groundwater extraction.

(D) Other factors that may be necessary to identify adverse impacts on beneficial uses of the surface water.

(f) The Agency shall determine the density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends based upon the following factors:

(3) Impacts to beneficial uses and users of groundwater and land uses and property interests affected by groundwater production, and adjacent basins that could affect the ability of that basin to meet the sustainability goal.

Review Criteria		Yes	No	N/A	Relevant Info per GSP	Location (Section, Page)
1. Does the GSP Include Maps Related to Drinking Water Users?	a. Well Density	X			Maps provided.	Section 1.2.1, Page 46-48
	b. Domestic and Public Supply Well Locations & Depths		X		No map provided, other than density maps. Domestic and public supply well depths are not clearly identified and presented, although they are reportedly used as a basis for determining water level MTs. "There are as many as 2 million domestic, irrigation, and monitoring water	Section 1.2.2, Page 52

					wells in California included in this dataset, including approximately 10,000 domestic wells located in the Eastern San Joaquin Subbasin."	
	i. Based on DWR Well Completion Report Map Application[8]?	X			"OSWCR is used as a data source for wells identified for monitoring. In this GSP, the OSWCR database was used to evaluate Plan Area and identify sustainable management criteria." "Domestic well data was retrieved from Online System for Well Completion Reports (OSCWR), and information on casing, screening, and age of well is not available in most locations."	Section 1.2.2, Page 52 Section 3.2.1, Page 234
	ii. Based on Other Source(s)?		X			
2. Does the GSP include maps related to Groundwater Dependent Ecosystem (GDE) locations?	a. Map of GDE Locations	X			The GSP takes the approach of removing NCCAGs with "access to alternate water supplies" from consideration as GDEs, and states that in order to be considered GDEs, "there must not be alternate water supplies". Alternate water supplies are assumed to include various potential sources of surface water including managed wetlands, irrigated agricultural fields, perennial surface water sources, and other unspecified sources determined by stakeholders on a case-specific basis. Ecosystems often rely both on groundwater and surface water to meet their water needs. The availability of alternate water supplies to provide some portion of a GDE's or wetland's water demand does not necessarily mean all of its water needs can be met through alternate supplies (i.e., without reliance on groundwater). Groundwater pumping depletes ISWs under both gaining or losing conditions, and GDEs may rely on the interactions of surface water to meet their water requirements. A strictly binary approach, designating all NCCAGs as either 100 percent reliant on groundwater or 100 percent reliant on alternate water supplies is therefore inconsistent with the available science. Very little description is provided regarding the nature and function of the identified GDEs, their potential sensitivity to groundwater and surface water supply changes, their relative habitat value, or the current and historical groundwater conditions and variability near the GDEs. Given that monitoring of groundwater levels near ISWs has been identified as a data gap and limited resources are available to expand monitoring efforts in these areas, additional assessment would be helpful to identify and prioritize potential data gaps.	Section 2.2.9, Page 183
	b. Map of Interconnected Surface Waters (ISWs)	X			In Section 2.2.6, please describe the technical basis for selecting a 25 percent interconnection threshold, and how it will adequately protect the environmental beneficial uses of surface water in potentially interconnected surface waters from significant and unreasonable impacts related to groundwater extraction. Shallow groundwater monitoring data near surface waters and NCCAGs are identified as a data gap in Section 2.1.10, and the use of the Eastern San Joaquin Water Resources Model (ESJWRM) to determine the percentage of time that stream reaches are groundwater connected entails inherent	Section 2.2.6, Page 175-177
	i. Does it identify which reaches are gaining and which are losing?	X				Section 2.2.6, Page 176-177
	ii. Depletions to ISWs are quantified by stream segments.		X			
	iii. Depletions to ISWs are quantified seasonally.		X			

[8] DWR Well Completion Report Map Application: https://www.arcgis.com/apps/webappviewer/index.html?id=181078580a214c0986e2da28f8623b37

					uncertainty. The potential presence of shallow or perched aquifers near the rivers is not assessed or discussed in the GSP. Groundwater modeling conducted by the United States Geological Survey (USGS), DWR and others (e.g., JJ&A, 2018) has considered some river reaches shown as disconnected in Figure 2-66 (pp. 2-99) to be groundwater-connected. No data or discussion is presented regarding the potential groundwater connection of other streams associated with significant wetland and riparian resources, including Pixley Slough, Mormon Slough, Littlejohns Creek, Bear Creek, Potter Creek, Duck Creek and Lone Tree Creek. As such, there is considerable uncertainty regarding the designation of interconnected and disconnected surface water resources in Figure 2-66. The uncertainty regarding the groundwater interconnection of streams in the Subbasin should be identified as a data gap. Section 2.1.4.2 Major Hydraulic Features should discuss (or reference the sections discussing) the following: Specific ISWs, including the extent of both gaining and losing reaches; In-stream flow requirements in each of the interconnected rivers/streams including the amount, time of year when the flow minimum is specified, the duration, the freshwater fish species for which it applies, associated permits that set forth the requirements, and the regulating agency setting forth the compliance requirements; Areas of critical habitat that exist within rivers and streams. Section 2.1.5 Geologic Formations and Stratigraphy Table 2-2 states that Holocene Stream Channel Deposits are generally not saturated except by the San Joaquin River. Based on the available data, it would be expected that the stream channel deposits associated with the other ISWs in the Subbasin would be saturated near those streams and rivers. Section 2.1.9.2.2 Regional Historic Groundwater Flow and Surface Water Interaction should include a discussion of historic groundwater-surface water interaction.	
3. Does the GSP include maps of monitoring networks?	a. Existing Monitoring Wells	**X**			Maps provided.	Section 2.1.1, Page 80, 83 Section 3.2, Page 235, 242
	b. Data sources:					
	i. California Statewide Groundwater Elevation Monitoring (CASGEM)	**X**			"The California Statewide Groundwater Elevation Monitoring (CASGEM) and San Joaquin County (SJC) monitoring well networks provide the basis for determining groundwater levels across the Eastern San Joaquin Subbasin."	Section 2.1.1, Page 79
	ii. Water Board Regulated monitoring sites	**X**			"GAMA data for the Eastern San Joaquin Subbasin contains water quality results collected by the SWRCB-DDW (formerly DHS-DDW), DPR, DWR, LLNL, and USGS from the 1940s to present."	Section 1.2.2, Page 52
	iii. Department of Pesticide Regulation (DPR) monitoring wells	**X**			"GAMA data for the Eastern San Joaquin Subbasin contains water quality results collected by the SWRCB-DDW (formerly DHS-DDW), DPR, DWR, LLNL, and USGS from the 1940s to present."	Section 1.2.2, Page 52
	c. Future SGMA Monitoring Well Network	**X**			Maps provided.	Section 4, Page

Groundwater Basin/Subbasin: Eastern San Joaquin Groundwater Subbasin (DWR #5-022.01)
GSA: Eastern San Joaquin Groundwater Authority (Comprising 15 GSAs)
GSP Date: July 2019 Public Review Draft

1. Identification of Beneficial Users

Were key beneficial users identified and engaged?

Selected relevant requirements and guidance:
GSP Element 2.1.5, "Notice & Communication" (§354.10):
(a) A description of the beneficial uses and users of groundwater in the basin, including the land uses and property interests potentially affected by the use of groundwater in the basin, the types of parties representing those interests, and the nature of consultation with those parties.
GSP Element 2.2.2, "Groundwater Conditions" (§354.16):
(d) Groundwater quality issues that may affect the supply and beneficial uses of groundwater, including a description and map of the location of known groundwater contamination sites and plumes.
(f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information.
(g) Identification of groundwater dependent ecosystems within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information.
GSP Element 3.3, "Minimum Thresholds" (§354.28):
(4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.

Review Criteria		Yes	No	N/A	Relevant Info per GSP	Location (Section, Page[1])
1. Do identified beneficial users (BUs) include:	a. Disadvantaged Communities (DACs)	X			"DACs and SDACs are mapped in Figure 1-8: Disadvantaged Communities (DACs)Figure 1-8 and are primarily in the western portions of the Subbasin. Approximately 33 percent of the Subbasin area is considered Disadvantaged and 7 percent is considered severely disadvantaged. Disadvantaged communities include the following census designated places (CDPs): Stockton City CDP, Collierville CDP, Lockeford CDP, Terminous CDP, and Valley Home CDP. Severely disadvantaged communities include: Kennedy CDP, August CDP, French Camp CDP, Taft Mosswood CDP, and Thornton CDP." GSP does not clearly identify and discuss what sources are used for drinking water supplies by DACs (e.g., primarily domestic wells, small community water systems depend on only groundwater, etc.).	Section 1.2.1, Page 42 Section 1.3.1, Page 67
	b. Tribes		X		"Of the potential beneficial uses and users of groundwater in the Subbasin listed in CWC Section 10723.2, those not included are the following: • California Native American tribes"	Section 1.3.1, Page 68
	c. Small community public water systems (<3,300 connections)		X			

[1] Page numbers refer to the page of the PDF.

2.	What data were used to identify presence or absence of DACs?	a. DWR DAC Mapping Tool[2]	X			"For this GSP, the 2012-2016 ACS dataset was used, establishing statewide MHI as $63,783 (CA DWR, Mapping Tools)."	Section 1.2.1, Page 42
		i. Census Places	X				
		ii. Census Block Groups		X			
		iii. Census Tracts		X			
		b. Other data source		X			
3.	Groundwater Conditions section includes discussion of:	a. Drinking Water Quality	X			Information on the historical and current groundwater quality conditions for salinity, nitrate, arsenic, and point-source contamination is provided. "Water quality is not known to have adversely affected beneficial [drinking water] uses of groundwater in the Eastern San Joaquin Subbasin, generally."	Section 2.2.4, Page 154-174
		b. California Maximum Contaminant Levels (CA MCLs)[3] (or Public Health Goals where MCL does not exist, e.g. Chromium VI)	X			"For the purposes of this GSP, comparing parameter concentrations to their MCL or SMCL is used as the basis for describing groundwater quality concerns in the Eastern San Joaquin Subbasin. Comparisons to the MCL or SMCL must be considered in context as the measured concentrations represent raw water, which may be treated or blended prior to delivery to meet the standard or may not be used for potable uses. Water quality is not known to have adversely affected beneficial uses of groundwater in the Eastern San Joaquin Subbasin, generally." "The EPA's MCL of 10 mg/L for Nitrate as N delimits high levels of nitrate for drinking water use. Many measured concentrations are above this value, both historically and recently. Comparisons to the MCL must be considered in context as the measured concentrations represent raw water, which may be treated or blended prior to delivery to meet the standard or may not be used for potable uses." "Public health concerns about arsenic in drinking water related to its potential to cause adverse health effects are addressed through EPA's MCL, established at 10 micrograms per liter (µg/L). Figure 2-60 shows the spatial distribution of arsenic concentrations contained in the GAMA database. From the 1970s to present, the total number and percentage of arsenic values above 10 µg/L has increased (see Table 2-9)."	Section 2.2.4, Page 154-174 Section 2.2.4.2 Page 165 Section 2.2.4.3, Page 167
4.	What local, state, and federal standards or plans were used to assess drinking water BUs in the development of Minimum Thresholds (MTs)?	a. Office of Environmental Health Hazard Assessment Public Health Goal (OEHHA PHGs)[4]		X			
		b. CA MCLs[3]	X			"In the development of minimum thresholds, beneficial uses of groundwater as a drinking water supply and as an agricultural supply were considered. For drinking water, the TDS secondary maximum contaminant level (SMCL) was considered. As noted in the Current and Historical Conditions section of this GSP (Section 2.2), the SWRCB Division of Drinking Water (DDW) has	Section 3.2.3, Page 240-242

[2] DWR DAC Mapping Tool: https://gis.water.ca.gov/app/dacs/

[3] CA MCLs: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/MCLsandPHGs.html

[4] OEHHA PHGs: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/MCLsandPHGs.html

					established SMCLs for TDS in drinking water supplies. SMCLs are established for aesthetic reasons such as taste, odor, and color and are not based on public health concerns. For TDS, the SMCL is 500 mg/L (recommended) and the upper SMCL is 1,000 mg/L (SWRCB, 2017). The SWRCB has set a short-term standard of 1,500 mg/L, which is a temporary concentration generally allowed only under rare circumstances (SWRCB, 2017)." "Salinity is the only water quality constituent for which minimum thresholds are established in the Eastern San Joaquin Subbasin. Although other constituents, including arsenic, nitrogen, and sulfate, are evaluated in the Current and Historical Groundwater Conditions section of this GSP (Section 2.2), these constituents are managed through existing management and regulatory programs within the Subbasin."	
	c. Data Quality Objectives (DQOs) in Regional Water Quality Control Plans		X			
	d. Sustainable Communities Strategies/ Regional Transportation Plans[5]		X			
	e. County and/or City General Plans, Zoning Codes and Ordinances[6]		X			
5. Does the GSP identify how environmental BUs and environmental stakeholders were engaged throughout the development of the GSP?			X		Caswell Memorial State Park is incorrectly referred to as being located outside the Eastern San Joaquin Subbasin. The following additional protected lands are located near surface waters within the Subbasin that may be interconnected with groundwater, and/or may rely at least partly on groundwater to support vegetation and sensitive natural communities. These protected lands represent potential beneficial users of groundwater: Durham Ferry State Recreational Area, a small portion (approximately 200 acres) of San Joaquin River National Wildlife Refuge, Army Corps Park, Vernalis Riparian Habitat (Public Conservation Lands), Seegers Preserve, Cabral Island Preserve, Machado Preserve, Hansen Preserve, Micke Grove Park and Zoo, Oak Grove Regional Park, Nakagawa Preserve, El Rio Farms Preserve, Lodi Lake Nature Area, Woodbridge Regional Park, Woodbridge Ecological Preserve, White Slough WA, Nuss Farms, Beck Preserve, Hilder Preserve, Staten Island Ranch, Burchel Preserve, and Ishizuka Preserve. The authors referred to the San Joaquin County General Plan documents, including background reports, for information regarding these important resources. Section 2.2.8 includes a geospatial analysis that removes managed wetlands from consideration as GDEs.	Section 1.3.1, Page 67 Section 2.2.8, Page 178-184

[5] CARB: https://ww2.arb.ca.gov/resources/documents/scs-evaluation-resources

[6] OPR General Plan Guidelines: http://www.opr.ca.gov/planning/general-plan/

Summary / Comments

The GSP does not currently provide clear information on how and to what extent DAC members rely on groundwater. For example: how much of the population relies on private domestic wells for drinking water? How much of the population relies on small community water systems and where are those systems located? Are those community water systems solely depending on groundwater? How many connections do the small water systems serve? This information is valuable for the reader to understand the scale of the vulnerable population dependent on groundwater for drinking water.

Although the GSP identifies declining water quality trends for arsenic and nitrate in the basin, which meet the GSP's definition of undesirable results for water quality, no MOs or MTs are set for these constituents. The concentration of these constituents can be impacted by management actions.

The GSP notes plans to coordinate and share data with other regulatory monitoring programs, but does not explain how this coordination will improve sustainability with respect to water quality within the basin. The GSP should identify a clear plan for addressing all groundwater constituents that are contributing to the undesirable results of degraded groundwater quality, including those for drinking water users.

Caswell Memorial State Park is incorrectly referred to as being located outside the Eastern San Joaquin Subbasin.

The authors referred to the San Joaquin County General Plan documents, including background reports, for information regarding these important resources. These potential beneficial groundwater users should be described in the text on pp. 1-18 and shown in Figure 1-11. Please include a description recognizing all of the protected areas in the Subbasin and their beneficial groundwater uses.

Section 2.2.8 includes a geospatial analysis that removes managed wetlands from consideration as GDEs. The managed wetlands in the Subbasin should be identified in this section.

2. Communications Plan

How were key beneficial users engaged, and how was their input incorporated into the GSP process and decisions?

Selected relevant requirements and guidance:
GSP Element 2.1.5, "Notice & Communication" (§354.10):

Each Plan shall include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following:

(c) Comments regarding the Plan received by the Agency and a summary of any responses by the Agency.

(d) A communication section of the Plan that includes the following:

(1) An explanation of the Agency's decision-making process.

(2) Identification of opportunities for public engagement and a discussion of how public input and response will be used.

(3) A description of how the Agency encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin.

(4) The method the Agency shall follow to inform the public about progress implementing the Plan, including the status of projects and actions.

DWR Guidance Document for GSP Stakeholder Communication and Engagement[7]

Review Criteria	Yes	No	N/A	Relevant Info per GSP	Location (Section, Page)
1. Is a Stakeholder Communication and Engagement Plan (SCEP) included?	X			Stakeholder Engagement & Public Outreach Plan, dated June 25, 2018	App. 1-G, Page 138
2. Does the SCEP identify that ongoing engagement will be conducted during GSP implementation?	X			"The GSAs intend to continue public outreach and provide opportunities for engagement during GSP implementation. This will include providing opportunities for public participation, at public meetings, providing access to GSP information online, and continued coordination with entities conducting outreach to diverse communities in the Subbasin. Announcements will continue to be distributed via email prior to public meetings. Emails will also be distributed as specific deliverables are finalized, when opportunities are available for stakeholder input and when this input is requested, or when items of interest to the stakeholder group arise, such as relevant funding opportunities. The Eastern San Joaquin SGMA website, managed as part of GSP administration, will be updated a minimum of monthly, and will house meeting agendas and materials, reports, and other program information. The website may be updated to add new pages as the program continues and additional activities are implemented. Additionally, public workshops will be held semi-annually to provide an opportunity for stakeholders and members of the public to learn about, discuss, and provide input on GSP activities, progress toward meeting the sustainability goal of this GSP, and the SGMA program."	Section 7.7, Page 318

[7] DWR Guidance Document for GSP Stakeholder Communication and Engagement https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Document-for-Groundwater-Sustainability-Plan---Stakeholder-Communication-and-Engagement.pdf

3. Does the SCEP specifically identify how DAC beneficial users were engaged in the planning process?	X			Workgroup members identified as representing DAC interests: Agricultural Business – Farmer Representative, Calaveras County Resource Conservation District, Catholic Charities of the Diocese of Stockton, Environmental Justice Coalition for Water, Restore the Delta, Sierra Club - Delta-Sierra Group "Spanish translation was provided at informational open house events, creating an opportunity for local Spanish-speaking individuals to engage in the GSP development process."	Section 1.3.4, Page 70-73 Section ES, Page 17
4. Does the GSP explicitly describe how stakeholder input was incorporated into the GSP process and decisions?	X			"Ideas generated at the Workgroup meetings were directed to decision makers at the GWA Board meetings. Input was captured in monthly meeting summaries, which were reviewed by Workgroup members prior to being presented to the GWA Board in meeting agenda packets and posted to the GWA website. In addition, summaries of prior month Workgroup meetings, as well as highlights and key takeaways from those meetings, were presented regularly as a standing agenda item at GWA Board meetings. In addition to influencing GSP development and decisions related to groundwater management, feedback from stakeholders played a key role in enhancing education and outreach efforts, and the stakeholder involvement process more broadly. Changes were made to the Open House format following stakeholder comment, and outreach events with community groups (as referenced in Section 1.3.4.5 above) were added based on feedback to further spread the word about SGMA and local GSP development efforts. Additionally, changes to the Workgroup meeting structure and process were made based on findings of the Situation Assessment." Workgroup recommendations are cited throughout the sustainable management criteria sections.	Section 1.3.4, Page 78

Summary / Comments

Ongoing stakeholder engagement and inclusion throughout the GSP implementation process will be crucial to ensuring that the needs of the most vulnerable beneficial users in the basin are met.

The Communications plan does not specify how the DACs identified in Figure 1-8 were specifically engaged. The failure to identify small community water systems calls into question how and whether adequate outreach to DACs was conducted.

The "stakeholder feedback" mechanism for removal of NCCAGs from consideration as GDEs is not explained or documented in the GSP. Please provide details that support removing potential GDEs based on stakeholder feedback.

3. Maps Related to Key Beneficial Uses

Were best available data sources used for information related to key beneficial users?

Selected relevant requirements and guidance:

GSP Element 2.1.4 "Additional GSP Elements" (§354.8):

Each Plan shall include a description of the geographic areas covered, including the following information:

(a) One or more maps of the basin that depict the following, as applicable:

(5) The density of wells per square mile, by dasymetric or similar mapping techniques, showing the general distribution of agricultural, industrial, and domestic water supply wells in the basin, including de minimis extractors, and the location and extent of communities dependent upon groundwater, utilizing data provided by the Department, as specified in Section 353.2, or the best available information.

GSP Element 3.5 Monitoring Network (§354.34)

(b) Each Plan shall include a description of the monitoring network objectives for the basin, including an explanation of how the network will be developed and implemented to monitor
groundwater and related surface conditions, and the interconnection of surface water and groundwater, with sufficient temporal frequency and spatial density to evaluate the affects and effectiveness of Plan implementation. The monitoring network objectives shall be implemented to accomplish the following:

(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator:

(1) Chronic Lowering of Groundwater Levels. Demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features by the following methods:

(A) A sufficient density of monitoring wells to collect representative measurements through depth-discrete perforated intervals to characterize the groundwater table or potentiometric surface for each principal aquifer.

(4) Degraded Water Quality. Collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues.

(6) Depletions of Interconnected Surface Water. Monitor surface water and groundwater, where interconnected surface water conditions exist, to characterize the spatial and temporal exchanges between surface water and groundwater, and to calibrate and apply the tools and methods necessary to calculate depletions of surface water caused by groundwater extractions. The monitoring network shall be able to characterize the following:

(A) Flow conditions including surface water discharge, surface water head, and baseflow contribution.

(B) Identifying the approximate date and location where ephemeral or intermittent flowing streams and rivers cease to flow, if applicable.

(C) Temporal change in conditions due to variations in stream discharge and regional groundwater extraction.

(D) Other factors that may be necessary to identify adverse impacts on beneficial uses of the surface water.

(f) The Agency shall determine the density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends based upon the following factors:

(3) Impacts to beneficial uses and users of groundwater and land uses and property interests affected by groundwater production, and adjacent basins that could affect the ability of that basin to meet the sustainability goal.

Review Criteria		Yes	No	N/A	Relevant Info per GSP	Location (Section, Page)
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					wells in California included in this dataset, including approximately 10,000 domestic wells located in the Eastern San Joaquin Subbasin."	
	i. Based on DWR Well Completion Report Map Application[8]?	X			"OSWCR is used as a data source for wells identified for monitoring. In this GSP, the OSWCR database was used to evaluate Plan Area and identify sustainable management criteria." "Domestic well data was retrieved from Online System for Well Completion Reports (OSCWR), and information on casing, screening, and age of well is not available in most locations."	Section 1.2.2, Page 52 Section 3.2.1, Page 234
	ii. Based on Other Source(s)?		X			
2. Does the GSP include maps related to Groundwater Dependent Ecosystem (GDE) locations?	a. Map of GDE Locations	X			The GSP takes the approach of removing NCCAGs with "access to alternate water supplies" from consideration as GDEs, and states that in order to be considered GDEs, "there must not be alternate water supplies". Alternate water supplies are assumed to include various potential sources of surface water including managed wetlands, irrigated agricultural fields, perennial surface water sources, and other unspecified sources determined by stakeholders on a case-specific basis. Ecosystems often rely both on groundwater and surface water to meet their water needs. The availability of alternate water supplies to provide some portion of a GDE's or wetland's water demand does not necessarily mean all of its water needs can be met through alternate supplies (i.e., without reliance on groundwater). Groundwater pumping depletes ISWs under both gaining or losing conditions, and GDEs may rely on the interactions of surface water to meet their water requirements. A strictly binary approach, designating all NCCAGs as either 100 percent reliant on groundwater or 100 percent reliant on alternate water supplies is therefore inconsistent with the available science. Very little description is provided regarding the nature and function of the identified GDEs, their potential sensitivity to groundwater and surface water supply changes, their relative habitat value, or the current and historical groundwater conditions and variability near the GDEs. Given that monitoring of groundwater levels near ISWs has been identified as a data gap and limited resources are available to expand monitoring efforts in these areas, additional assessment would be helpful to identify and prioritize potential data gaps.	Section 2.2.9, Page 183
	b. Map of Interconnected Surface Waters (ISWs)	X			In Section 2.2.6, please describe the technical basis for selecting a 25 percent interconnection threshold, and how it will adequately protect the environmental beneficial uses of surface water in potentially interconnected surface waters from significant and unreasonable impacts related to groundwater extraction. Shallow groundwater monitoring data near surface waters and NCCAGs are identified as a data gap in Section 2.1.10, and the use of the Eastern San Joaquin Water Resources Model (ESJWRM) to determine the percentage of time that stream reaches are groundwater connected entails inherent	Section 2.2.6, Page 175-177
	i. Does it identify which reaches are gaining and which are losing?	X				Section 2.2.6, Page 176-177
	ii. Depletions to ISWs are quantified by stream segments.		X			
	iii. Depletions to ISWs are quantified seasonally.		X			

[8] DWR Well Completion Report Map Application: https://www.arcgis.com/apps/webappviewer/index.html?id=181078580a214c0986e2da28f8623b37

					uncertainty. The potential presence of shallow or perched aquifers near the rivers is not assessed or discussed in the GSP. Groundwater modeling conducted by the United States Geological Survey (USGS), DWR and others (e.g., JJ&A, 2018) has considered some river reaches shown as disconnected in Figure 2-66 (pp. 2-99) to be groundwater-connected. No data or discussion is presented regarding the potential groundwater connection of other streams associated with significant wetland and riparian resources, including Pixley Slough, Mormon Slough, Littlejohns Creek, Bear Creek, Potter Creek, Duck Creek and Lone Tree Creek. As such, there is considerable uncertainty regarding the designation of interconnected and disconnected surface water resources in Figure 2-66. The uncertainty regarding the groundwater interconnection of streams in the Subbasin should be identified as a data gap. Section 2.1.4.2 Major Hydraulic Features should discuss (or reference the sections discussing) the following: Specific ISWs, including the extent of both gaining and losing reaches; In-stream flow requirements in each of the interconnected rivers/streams including the amount, time of year when the flow minimum is specified, the duration, the freshwater fish species for which it applies, associated permits that set forth the requirements, and the regulating agency setting forth the compliance requirements; Areas of critical habitat that exist within rivers and streams. Section 2.1.5 Geologic Formations and Stratigraphy Table 2-2 states that Holocene Stream Channel Deposits are generally not saturated except by the San Joaquin River. Based on the available data, it would be expected that the stream channel deposits associated with the other ISWs in the Subbasin would be saturated near those streams and rivers. Section 2.1.9.2.2 Regional Historic Groundwater Flow and Surface Water Interaction should include a discussion of historic groundwater-surface water interaction.	
3. Does the GSP include maps of monitoring networks?	a. Existing Monitoring Wells	**X**			Maps provided.	Section 2.1.1, Page 80, 83 Section 3.2, Page 235, 242
	b. Data sources:					
	i. California Statewide Groundwater Elevation Monitoring (CASGEM)	**X**			"The California Statewide Groundwater Elevation Monitoring (CASGEM) and San Joaquin County (SJC) monitoring well networks provide the basis for determining groundwater levels across the Eastern San Joaquin Subbasin."	Section 2.1.1, Page 79
	ii. Water Board Regulated monitoring sites	**X**			"GAMA data for the Eastern San Joaquin Subbasin contains water quality results collected by the SWRCB-DDW (formerly DHS-DDW), DPR, DWR, LLNL, and USGS from the 1940s to present."	Section 1.2.2, Page 52
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	c. Future SGMA Monitoring Well Network	**X**			Maps provided.	Section 4, Page

						265
	i. SGMA Monitoring Well Network map includes identified DACs?		X			
	ii. SGMA Monitoring Well Network map includes identified GDEs?		X			

Summary / Comments

The GSP uses domestic well depths as a basis for determining water level MTs, but does not present the domestic well depth data in the document. A map or maps showing domestic and public supply well depths would provide more transparency.

The GSP identifies that information on domestic well construction including screen interval depths, are not available. However, the GSP does not identify a plan to fill this data gap, even though this information is critical to the GSA's establishment of their water level MTs.

Providing maps of the monitoring network overlaid with location of DACs, GDEs, and any other sensitive beneficial users will allow the reader to evaluate the adequacy of the network to monitor conditions near these beneficial users.

The scientific rationale for removing areas with access to alternate water sources from the identified GDEs should be better explained. Specifically, the results of any supporting habitat assessments should be provided. If no habitat assessments were conducted or reviewed, this should be identified as a data gap.

In the case of managed wetlands, the water sources used by the managed wetlands, the type of managed wetlands, the relationship of the wetlands to groundwater, and the wetland manager should be specified. In addition, these managed wetlands should be identified in Section 1.3.1.

The approach used to identify and exclude GDEs should be supported by actual hydrologic and habitat assessment data. If such data and assessments are not available, the need for supporting studies to validate the approach should be identified as a data gap.

Shallow groundwater data near streams are identified as a significant data gap, and the application of a 30-foot depth to water criterion in light of the identified data gaps needs to be explained and supported.

We recommend that depth to groundwater contour maps are used to verify whether a connection to groundwater exists for polygons in the NC Dataset, instead of relying on inferences based on the presence of surface water features in the Basin.

It is highly advised that seasonal and interannual fluctuations in the groundwater regime are taken into consideration in the evaluation of root zones, particularly for oak trees. Utilizing groundwater data from one point in time or contoured with too few shallow monitoring wells can misrepresent groundwater levels required by GDEs, and inadvertently result in adverse impacts to the GDEs.

We recommend that a discussion regarding the nature and characteristics of the identified GDEs be included.

4. Water Budgets

How were climate change projections incorporated into projected/future water budget and how were key beneficial users addressed?

						265
	i. SGMA Monitoring Well Network map includes identified DACs?		X			
	ii. SGMA Monitoring Well Network map includes identified GDEs?		X			

Summary / Comments

The GSP uses domestic well depths as a basis for determining water level MTs, but does not present the domestic well depth data in the document. A map or maps showing domestic and public supply well depths would provide more transparency.

The GSP identifies that information on domestic well construction including screen interval depths, are not available. However, the GSP does not identify a plan to fill this data gap, even though this information is critical to the GSA's establishment of their water level MTs.

Providing maps of the monitoring network overlaid with location of DACs, GDEs, and any other sensitive beneficial users will allow the reader to evaluate the adequacy of the network to monitor conditions near these beneficial users.

The scientific rationale for removing areas with access to alternate water sources from the identified GDEs should be better explained. Specifically, the results of any supporting habitat assessments should be provided. If no habitat assessments were conducted or reviewed, this should be identified as a data gap.

In the case of managed wetlands, the water sources used by the managed wetlands, the type of managed wetlands, the relationship of the wetlands to groundwater, and the wetland manager should be specified. In addition, these managed wetlands should be identified in Section 1.3.1.

The approach used to identify and exclude GDEs should be supported by actual hydrologic and habitat assessment data. If such data and assessments are not available, the need for supporting studies to validate the approach should be identified as a data gap.

Shallow groundwater data near streams are identified as a significant data gap, and the application of a 30-foot depth to water criterion in light of the identified data gaps needs to be explained and supported.

We recommend that depth to groundwater contour maps are used to verify whether a connection to groundwater exists for polygons in the NC Dataset, instead of relying on inferences based on the presence of surface water features in the Basin.

It is highly advised that seasonal and interannual fluctuations in the groundwater regime are taken into consideration in the evaluation of root zones, particularly for oak trees. Utilizing groundwater data from one point in time or contoured with too few shallow monitoring wells can misrepresent groundwater levels required by GDEs, and inadvertently result in adverse impacts to the GDEs.

We recommend that a discussion regarding the nature and characteristics of the identified GDEs be included.

4. Water Budgets

How were climate change projections incorporated into projected/future water budget and how were key beneficial users addressed?

Selected relevant requirements and guidance:

GSP Element 2.2.3 "Water Budget Information" (Reg. § 354.18)

Each Plan shall include a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical, current and projected water budget conditions, and the change in the volume of water stored. Water budget information shall be reported in tabular and graphical form.

*Projected water budgets shall be used to estimate future baseline conditions of supply, **demand**, and aquifer response to Plan implementation, and to identify the uncertainties of these projected water budget components. The projected water budget shall utilize the following methodologies and assumptions to estimate future baseline conditions concerning hydrology, water demand and surface water supply availability or reliability over the planning and implementation horizon:*

(b) The water budget shall quantify the following, either through direct measurements or estimates based on data:

(5) If overdraft conditions occur, as defined in Bulletin 118, the water budget shall include a quantification of overdraft over a period of years during which water year and water supply conditions approximate average conditions.

(6) The water year type associated with the annual supply, demand, and change in groundwater stored.

(c) Each Plan shall quantify the current, historical, and projected water budget for the basin as follows:

*(1) Current water budget information shall quantify current inflows and outflows for the basin using the most recent hydrology, water supply, **water demand**, and land use information.*

DWR Water Budget BMP[9]
DWR Guidance for Climate Change Data Use During GSP Development and Resource Guide[10]

Review Criteria	Yes	No	N/A	Relevant Info per GSP	Location (Section, Page)
1. Are climate change projections explicitly incorporated in future/ projected water budget scenario(s)?	X			"Consistent with Section 354.18(d)(3) and Section 354.18(e) of the GSP Regulations, analyses for the Eastern San Joaquin Subbasin GSP evaluated the projected water budget with and without climate change conditions."	Section 2.3.7, Page 212-229
2. Is there a description of the methodology used to include climate change?	X			"Accepted methods for estimating climate change impacts on groundwater are based on the assessment of impacts on the individual water resource system elements that directly link to groundwater. These elements include precipitation, streamflow, evapotranspiration and, for coastal aquifers, sea level rise as a boundary condition. For the Eastern San Joaquin Subbasin, sea level rise was not included. The method for perturbing the streamflow, precipitation, and evapotranspiration input files is described in the following sections. A future scenario of 2070 climate forecasts was evaluated in this analysis, consistent with DWR guidance (CA DWR, 2018b). DWR combined 10 global climate models (GCMs) for two different representative climate pathways (RCPs) to generate the central tendency scenarios in the datasets used in this analysis. The "local analogs" method (LOCA) was used to downscale these 20 different climate projections to a scale usable for California (CA	Section 2.3.7, Page 214

[9] DWR BMP for the Sustainable <management of Groundwater Water Budget: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-4-Water-Budget.pdf

[10] DWR Guidance Document for the Sustainable Management of Groundwater Guidance for Climate Change Data Use During GSP Development: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Climate-Change-Guidance_Final.pdf

						DWR, 2018b). The 2070 central tendency among these projections serves to assess impacts of climate change over the long-term planning and implementation period."	
3. What is used as the basis for climate change assumptions?	a. DWR-Provided Climate Change Data and Guidance[11]		X			"The approach developed for this GSP is based on the methodology in DWR's guidance document (CA DWR, 2018b)."	Section 2.3.7, Page 213
	b. Other		X			"The following resources from DWR were used in the climate change analysis: • SGMA Data Viewer • Guidance for Climate Change Data Use During Sustainability Plan Development and Appendices (Guidance Document) • Water Budget BMP • Climate Change Desktop IWFM Tools. The SGMA Data Viewer is where the climate change forecast datasets are available for download (CA DWR, 2018c). The guidance document details the approach, development, applications, and limitations of the datasets available from the SGMA Data Viewer (CA DWR, 2018c). The Water Budget BMP describes in greater detail how DWR recommends projected water budgets be computed (CA DWR, 2016). The Desktop IWFM Tools are available to calculate the projected precipitation and evapotranspiration inputs under climate change conditions (CA DWR, 2018b)."	Section 2.3.7, Page 213
4. Does the GSP use multiple climate scenarios?				X		Includes a baseline and a 2070 climate conditions scenario.	
5. Does the GSP quantitatively incorporate climate change projections?			X			"Under the climate change scenario, the average annual precipitation is 11 percent higher than the projected conditions scenario, increasing from 984,000 AF/year to 1,090,000 AF/year. Similarly, the average annual volume of evapotranspiration is 6 percent higher than the projected conditions scenario, increasing to 1,476,000 AF/year from 1,394,000 AF/year. Despite there being higher flows in streams, the monthly timing of the flows meant that surface water diversions were not expected to change due to both availability of water in the stream and water rights agreements limiting diversion months. With a similar surface water supply and increased water demands under the climate change scenario, private groundwater production is simulated to increase approximately 11 percent, from 801,000 AF/year to 887,000 AF/year. Under climate change conditions, the depletion in aquifer storage is expected to increase by about 68 percent to an average annual storage change of 57,000 AF/year, from 34,000 AF/year in the projected conditions scenario."	Section 2.3.7, Page 226
6. Does the GSP explicitly account for climate change in the following elements of the water budget?	a. Inflows:	i. Precipitation	X			"2.3.7.3.2 Precipitation and Evapotranspiration under Climate Change"	Section 2.3.7, Page 222-226
		ii. Surface Water	X			"2.3.7.3.1 Streamflow under Climate Change"	Section 2.3.7, Page 214-221
		iii. Imported Water			X	No imported supplies in the basin.	
		iv. Subsurface Inflow	X			Included in Figure 2-102.	Section 2.3.7, Page 229

[11] DWR Guidance Document for the Sustainable Management of Groundwater Guidance for Climate Change Data Use During GSP Development: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Climate-Change-Guidance_Final.pdf
DWR Resource Guide DWR-Provided Climate Change Data and Guidance for Use During GSP Development: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Resource-Guide-Climate-Change-Guidance_v8.pdf

	b. Outflows:	i. Evapotranspiration	X			"2.3.7.3.2 Precipitation and Evapotranspiration under Climate Change"	Section 2.3.7, Page 222-226
		ii. Surface Water Outflows (incl. Exports)	X			"2.3.7.3.1 Streamflow under Climate Change"	Section 2.3.7, Page 214-221
		iii. Groundwater Outflows (incl. Exports)	X			"With a similar surface water supply and increased water demands under the climate change scenario, private groundwater production is simulated to increase approximately 11 percent, from 801,000 AF/year to 887,000 AF/year. Under climate change conditions, the depletion in aquifer storage is expected to increase by about 68 percent to an average annual storage change of 57,000 AF/year, from 34,000 AF/year in the projected conditions scenario. A graphical representation of simulated changes to precipitation, evapotranspiration, and groundwater pumping are presented in Figure 2-98 though Figure 2-100, and complete water budgets for the climate change scenario are shown in Figure 2-101 and Figure 2-102."	Section 2.3.7, Page 226
7. Are demands by these sectors explicitly included in the future/projected water budget?	a. Domestic Well users (<5 connections)			X			Expected to be in Section 2.3.5, Page 208
	b. State Small Water systems (5-14 connections)			X			
	c. Small community water systems (<3,300 connections)			X			
	d. Medium and Large community water systems (> 3,300 connections)			X			
	e. Non-community water systems			X			
8. Are water uses for native vegetation and/or wetlands explicitly included in the current and historical water budgets?				X		The following items related to GDEs, wetlands and riparian areas should be clarified or considered: "Riparian intake from streams" is identified as a stream system water budget component and is defined as the portion of riparian evapotranspiration (ET) met by streamflows. Please include an explanation of the approach to determining the amount of riparian ET demand met by streamflow vs. groundwater evapotranspiration. Groundwater outflow to ET does not appear to be identified as a groundwater budget component (for example see Figure 2-74, p. 2-125). In addition, the ET demand of natural vegetation does not appear to be considered in water supply and demand calculations (for example see Table 2-16, p. 2-126). Since wetlands, GDEs and riparian vegetation are recognized as beneficial users of groundwater in the Subbasin, it is appropriate to include them in these calculations.	Section 2.3.5, Page 193-211
9. Are water uses for native vegetation and/or wetlands explicitly included in the projected/future water budget?				X			Expected to be in Section 2.3.5, Page 208

Summary / Comments

It is not clear how climate change is anticipated to change the demands of domestic users and small public water systems or how these demands were accounted for in the projected water budget.

Please include an explanation of the approach to determining the amount of riparian ET demand met by streamflow vs. groundwater evapotranspiration.

Groundwater outflow to ET does not appear to be identified as a groundwater budget component. In addition, the ET demand of natural vegetation does not appear to be considered in water supply and demand calculations. Since wetlands, GDEs and riparian vegetation are recognized as beneficial users of groundwater in the Subbasin, it is appropriate to include them in these calculations.

5. Management Areas and Monitoring Network

How were key beneficial users considered in the selection and monitoring of Management Areas and was the monitoring network designed appropriately to identify impacts on DACs and GDEs?

Selected relevant requirements and guidance:
GSP Element 3.3, "Management Areas" (§354.20):

(b) A basin that includes one or more management areas shall describe the following in the Plan:

(2) The minimum thresholds and measurable objectives established for each management area, and an explanation of the rationale for selecting those values, if different from the basin at large.

(3) The level of monitoring and analysis appropriate for each management area.

(4) An explanation of how the management area can operate under different minimum thresholds and measurable objectives without causing undesirable results outside the management area, if applicable.

(c) If a Plan includes one or more management areas, the Plan shall include descriptions, maps, and other information required by this Subarticle sufficient to describe conditions in those areas.

CWC Guide to Protecting Drinking Water Quality under the SGMA[12]
TNC's Groundwater Dependent Ecosystems under the SGMA, Guidance for Preparing GSPs[13]

Review Criteria	Yes	No	N/A	Relevant Info per GSP	Location (Section, Page)
1. Does the GSP define one or more Management Area?		X		The GWA encompasses 15 GSAs, without designated management areas.	Section 1.1.4, Page 31
2. Were the management areas defined specifically to manage GDEs?			X		
3. Were the management areas defined specifically to manage DACs?			X		
a. If yes, are the Measurable Objectives (MOs) and MTs for GDE/DAC management areas more restrictive than for the basin as a whole?			X		
b. If yes, are the proposed management actions for GDE/DAC management areas more restrictive/ aggressive than for the basin as a whole?			X		
4. Does the GSP include maps or descriptions indicating what DACs are located in each Management Area(s)?			X		
5. Does the GSP include maps or descriptions indicating what GDEs are located in each Management Area(s)?			X		

[12] CWC Guide to Protecting Drinking Water Quality under the SGMA: https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858

[13] TNC's Groundwater Dependent Ecosystems under the SGMA, Guidance for Preparing GSPs: https://www.scienceforconservation.org/assets/downloads/GDEsUnderSGMA.pdf

6. Does the plan identify gaps in the monitoring network for DACs and/or GDEs?	X			"Groundwater level monitoring data gaps exist in areas where data is limited. Specifically, areas of high data needs include monitoring near streams, Subbasin boundaries, and the central area of groundwater depression." Groundwater quality monitoring data gaps have three components: **1. Spatial Distribution:** Monitoring wells are mainly focused in the western portion of the Subbasin, as this area has historically had the highest concentrations of TDS. Additional sampling performed within these identified areas will provide more information about salinity in the indicated locations. 2. **Well construction data:** The majority of groundwater quality monitoring wells are screened in intervals between 100 to 300 feet bgs. Only one well is screened below this interval, to a depth of 467 feet bgs. Both deeper and shallower groundwater quality monitoring wells are needed to better understand the spatial distribution of salinity concentrations in the Subbasin. 3. **Monitoring Frequency:** Temporally, groundwater quality monitoring occurs at different frequencies across the Subbasin, dependent on the monitoring agency responsible (summarized in Table 4-7). The groundwater quality monitoring network under the GSP will utilize a standardized, quarterly monitoring schedule to ensure all wells are sampled regularly."	Section 4.7 Pages 263-264
a. If yes, are plans included to address the identified deficiencies?	X			**"**Data gaps will be filled by leveraging existing wells and by constructing new wells through Technical Support Services (TSS) funding, future grant funding, and GSA funding. In total, there are 12 proposed new monitoring well sites (shown in Figure 4-3 in orange); these wells will also be measured for groundwater levels and groundwater quality." "The new wells are distributed throughout the Subbasin and increase coverage near streams, Subbasin boundaries, and in the central area of groundwater depression. Two recommended monitoring locations are adjacent to Dry Creek, to provide data relevant to potential surface water depletions and subsurface flows across the Subbasin boundary to the Cosumnes Subbasin to the north. Relevant data from these and other wells will be shared with Cosumnes Subbasin GSAs and parallel efforts will be coordinated." The areas identified as potential GDEs in the GSP are located near the western boundary of the Subbasin. Only one of the representative monitoring wells appears to be located near those areas (Figure 4-1 on p. 4-5). Very few of the remaining monitoring wells are located near potential ISWs and GDEs. Per the GSP Regulations (23 CCR §354.34 (a) and (b)), monitoring must address trends in groundwater and related surface conditions. Groundwater level monitoring alone may be insufficient to establish a linkage between	Section 4.7.1 Page 264

				groundwater extraction and potentially resulting impacts to environmental resources associated with GDEs and ISWs. The cause-effect relationship between groundwater levels and the biological responses that could result in significant and unreasonable impacts to ISWs and GDEs depends on a number of complicated factors, and this relationship is not characterized or discussed. As such, it is not possible to determine whether the proposed monitoring, minimum thresholds and measurable objectives are sufficiently protective to ensure significant and unreasonable impacts to GDEs and ISWs will be prevented. Well sites near ISWs should be selected at varying distances from streams and completed as vertically-nested clusters to capture the lateral and vertical gradients between the pumped depths in the aquifer system and the shallow groundwater aquifers that are in communication with ISWs or GDEs. There is a need to enhance monitoring of stream flow and vertical groundwater gradients by installing more stream gauges and clustered/nested wells near streams, rivers or wetlands. Ideally, co-locating stream gauges with clustered wells would enhance understanding about where ISWs exist in the basin and whether pumping is causing depletions of surface water or impacts on beneficial users of surface water and groundwater. Section 5.3 Table 5.3 indicates that data regarding streamflow and GDEs is not currently included in the proposed Data Management System.	

Summary / Comments

The GSP clearly identifies plans to address data gaps in the monitoring network near streams, but does not clearly identify whether data gaps exist near DACs/drinking water users. A map illustrating the location of current and proposed monitoring well locations and depths relative to domestic and small public water systems wells and depths would allow the reader to assess the adequacy of the proposed network for monitoring impacts to these beneficial users.

Very few of the remaining monitoring wells are located near potential ISWs and GDEs. Specific monitoring of GDEs and ISWs should be described to further evaluate, monitor, manage and protect these areas.

It is not possible to determine whether the proposed monitoring, minimum thresholds and measurable objectives are sufficiently protective to ensure significant and unreasonable impacts to GDEs and ISWs will be prevented. The GDE Pulse interactive mapping application[14] provides an example of a linkage between groundwater level data and GDE health that could be used to incorporate remote sensing into an efficient and incisive monitoring program. Please provide an explanation how groundwater levels will specifically be used to assess adverse impacts to GDEs and ISWs, and identify any data gaps and how they will be addressed.

Monitoring well locations should be prioritized near high value or sensitive resources (GDEs) that are vulnerable to significant and unreasonable impacts, such as near the protected lands identified in our comments on Section 1.3.1 or the GDEs identified in the Subbasin. In addition to the major streams and rivers in the subbasin, impacts to smaller creeks and wetland areas should be considered, as these may be the most vulnerable resources. Please discuss the results of a resource assessment or consultations

[14] **GDE Pulse can be accessed here: https://groundwaterresourcehub.org/sgma-tools/gde-pulse/**

with resource managers that demonstrates a sufficient number of wells is proposed to address data gaps near GDEs and ISWs, and that they are being sited where they will provide the most benefit. Alternatively, please outline the process by which this will be accomplished.

Please address how the need to link and correlate groundwater level declines to biological responses, and significant and adverse impacts to GDEs and ISWs will be addressed.

Addressing data gaps is typically iterative and it is not reasonable to expect it will be a one-time process. Please describe the process by which data gaps will be identified and addressed on an ongoing basis.

Section 5.3 Table 5.3 indicates that data regarding streamflow and GDEs is not currently included in the proposed Data Management System. Please discuss which monitoring data for "related surface conditions" will be gathered and incorporated in the DMS to assess potential significant and unreasonable impacts to environmental beneficial uses and users.

In Section 7.3.1, please clarify the potential use of imagery as a monitoring tool, and expand it to monitoring surface indicators of ISW and GDE ecosystem health.

In Section 7.3.2.2, please specifically address ecosystem health of GDEs and ISWs as a surface indicator to subsurface conditions. This can be done using GDEPulse, remote sensing, imagery or other feasible methods.

6. Measurable Objectives and Undesirable Results

How were DAC and GDE beneficial uses and users considered in the establishment of Sustainable Management Criteria?

Selected relevant requirements and guidance:

GSP Element 3.4 "Undesirable Results" (§ 354.26):

(b) The description of undesirable results shall include the following:

(3) Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results

GSP Element 3.2 "Measurable Objectives" (§ 354.30)

(a) Each Agency shall establish measurable objectives, including interim milestones in increments of five years, to achieve the sustainability goal for the basin within 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon.

Review Criteria	Yes	No	N/A	Relevant Info per GSP	Location (Section, Page)
1. Are DAC impacts considered in the development of Undesirable Results (URs) and MOs for groundwater levels and groundwater quality?		X		DACs are not explicitly addressed, but domestic well users are considered under URs. WL URs: "If groundwater levels were to cause undesirable results, effects could include de-watering of a subset of the existing groundwater infrastructure, starting with the shallowest wells, which are generally domestic wells; and adverse effects on groundwater-dependent ecosystems, to the extent connected with the production aquifer." WQ URs: "If groundwater quality were degraded resulting in undesirable results, the effect would potentially include: reduction in usable supply of groundwater, domestic wells being dewatered, increased treatment costs, and required access to alternate supplies can be unaffordable for small users. Some water quality issues could potentially cause more impact to agricultural uses than municipal or domestic uses, depending on the impact of the contaminant to these water use sectors." WL MTs: "The minimum thresholds for chronic lowering of groundwater levels are the shallower of 1992 and 2015-2016 historical groundwater levels with a buffer of 100 percent of historical range applied, *or* the 10th percentile domestic well total depth of wells within a 3-mile radius of the monitoring well, whichever is shallower at each representative monitoring well site." WQ MTs: "The minimum threshold of 1,000 mg/L was defined by considering two primary beneficial uses as risk of undesirable results related to salinity: drinking water quality and agriculture uses. The minimum threshold was defined by the GWA Board and reflects input from agricultural and municipal stakeholders, including local drinking water purveyors and the	Section 3.2.1, Page 232 Section 3.2.3, Page 241

				local agricultural community."	
2. Does the GSP explicitly discuss how stakeholder input from DAC community members was considered in the development of URs and MOs?		X		"Potential impacts and the extent to which they are considered significant and unreasonable are determined by the GWA Board and with input by the Advisory Committee, Workgroup, and members of the public. During development of the GSP, potential undesirable results identified by stakeholders included a significant and unreasonable: • Number of wells going dry • Reduction of in the pumping capacity of existing wells • Increase in pumping costs due to greater lift • Need for deeper well installations or lowering of pumps" "Salinity is the only water quality constituent for which minimum thresholds are established in the Eastern San Joaquin Subbasin. Although other constituents, including arsenic, nitrogen, and sulfate, are evaluated in the Current and Historical Groundwater Conditions section of this GSP (Section 2.2), these constituents are managed through existing management and regulatory programs within the Subbasin…. TDS was selected for the evaluation of sustainable management criteria for salinity under this sustainability indicator, as historical data for TDS are more widely available in the Eastern San Joaquin Subbasin than other constituents used to measure salinity, such as electrical conductivity (EC) or chloride. This decision was made by the GWA Board based on the greater availability of TDS data in the Subbasin." Stakeholder input from DAC community members does not appear to have been considered in establishment of water quality URs, based on the information presented in the GSP.	Section 3.2.1.1.1 Page 232 Section 3.2.3.1.1 Pages 240-241
3. Does the GSP explicitly consider impacts to GDEs and environmental BUs of surface water in the development of MOs for groundwater levels and depletions of ISWs?		X		Section 2.2.7 includes the incorrect statement that SGMA does not require sustainable management criteria to be established for the management of GDEs. Section 1.3.1 of the GSP states that beneficial users of groundwater and ISWs include "environmental users of groundwater, including species and habitat reliant on instream flows, as well as wetlands and GDEs." Undesirable results under SGMA include chronic lowering of groundwater levels resulting in significant and unreasonable depletion of supply for beneficial groundwater users, including GDEs. Undesirable results also include depletion of ISWs resulting in significant and unreasonable adverse impacts on beneficial users of surface water, including wetlands and GDEs. The incorrect statement that SGMA does not require the establishment of sustainable management criteria for GDEs should be removed. Per the GSP Regulations (23 CCR §354.34 (a) and (b)), monitoring must address trends in groundwater and related surface conditions (emphasis added). Groundwater level monitoring alone may be insufficient to establish a linkage between groundwater extraction and potentially resulting impacts to environmental resources associated with GDEs and ISWs. The cause-effect	

				relationship between groundwater levels and the biological responses that could result in significant and unreasonable impacts to ISWs and GDEs depends on a number of complicated factors, and this relationship is not characterized or discussed. As such, it is not possible to determine whether the proposed monitoring, minimum thresholds and measurable objectives are sufficiently protective to ensure significant and unreasonable impacts to GDEs and ISWs will be prevented. The GDEpulse interactive mapping application provides an example of a linkage between groundwater level data and GDE health that could be used to incorporate remote sensing into an efficient and incisive monitoring program. Please provide an explanation how groundwater levels will specifically be used to assess adverse impacts to GDEs and ISWs, and identify any data gaps and how they will be addressed.	
4. Does the GSP explicitly consider impacts GDEs and environmental BUs of surface water and recreational lands in the discussion and development of Undesirable Results?		X		Section 3.2.1.1.1 Description of Undesirable Results (for chronic lowering of groundwater levels only describes undesirable results relating to human beneficial uses of groundwater and neglects environmental beneficial uses that could be adversely affected by chronic groundwater level decline. Section 3.2.6.1.1 Description of Undesirable Results (for ISWs) states that undesirable results related to surface water depletion were defined and evaluated only for major streams and rivers including the Calaveras River, Dry Creek, Mokelumne River, San Joaquin River, and Stanislaus River. The section goes on to state that many of the smaller creeks and streams are solely used for the conveyance of irrigation water and these systems have not been considered in the analysis of depletions. Contrary to these statements, surface water resources in these creeks County support significant recognized aquatic habitat, wetlands and riparian zones that represent potential environmental beneficial uses and users of groundwater. A number of these streams are associated with designated protected lands. The analysis for potential depletion of ISWs in Section 3.2.6 does not include all beneficial users of surface water that could be affected by groundwater withdrawals, including environmental beneficial users along creeks. Section 3.2.6.1.2 Identification of Undesirable Results (for ISWs) states that "undesirable results would occur if groundwater extractions depleted interconnected streams and there was not sufficient surface water to supply … fish and wildlife demands." This definition of undesirable results is overly narrow and recognizes only a limited subset of the environmental beneficial users of ISWs. In Section 3.2.6.1.3 Potential Effects of Undesirable Results (for ISWs), the potential effects of undesirable results on environmental beneficial users are not described.	

Summary / Comments

Stakeholder input from DAC community members does not appear to have been considered in establishment of water quality URs, based on the information presented in the GSP.

Based on the presented information, domestic well uses are considered under URs and for the development of water level MOS and MTs, but DAC members are not explicitly considered. More detail and specifics regarding DAC members, including those that rely on smaller community drinking water systems, not only domestic wells, is necessary to demonstrate that these beneficial users were adequately considered.

The incorrect statement that SGMA does not require the establishment of sustainable management criteria for GDEs should be removed.

Please add "potential adverse impacts to GDEs" to the list of potential undesirable results presented in Section 3.2.1.1.1.

The analysis for potential depletion of ISWs in Section 3.2.6 should include all beneficial users of surface water that could be affected by groundwater withdrawals, including environmental beneficial users along creeks, even if the creeks are interconnected less than 75% of the time.

The definition of undesirable results for ISWs is overly narrow and recognizes only a limited subset of the environmental beneficial users of ISWs. A more complete definition would be that undesirable results would occur if groundwater extraction resulted in a depletion of surface water that caused significant impacts to aquatic species or wildlife, or degradation of wetlands, riparian habitats and GDEs. Please expand the definition of undesirable results to include all of the environmental beneficial uses and users of ISWs, and expand the analysis in Section 3.2.6, as appropriate.

Please expand Section 3.2.6.1.3 to describe the potential effects of undesirable results on all beneficial uses and users of ISWs, including environmental uses and users.

7. Management Actions and Costs

What does the GSP identify as specific actions to achieve the MOs, particularly those that affect the key BUs, including actions triggered by failure to meet MOs? What funding mechanisms and processes are identified that will ensure that the proposed projects and management actions are achievable and implementable?

Selected relevant requirements and guidance

GSP Element 4.0 Projects and Management Actions to Achieve Sustainability Goal (§ 354.44)

(a) Each Plan shall include a description of the projects and management actions the Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(1) A list of projects and management actions proposed in the Plan with a description of the measurable objective that is expected to benefit from the project or management action.

Review Criteria	Yes	No	N/A	Relevant Info per GSP	Location (Section, Page)
1. Does the GSP identify benefits or impacts to DACs as a result of identified management actions?		X		"Project addresses Disadvantaged Communities (DACs) and/or Severely Disadvantaged Communities (SDACs)" was a criterion for project prioritization, but, project benefits and impacts are not explicitly discussed in terms of DACs.	Section 6.2.1, Page 275
2. If yes: b. Is a plan to mitigate impacts on DAC drinking water users included in the proposed Projects and Management Actions?		X			
c. Does the GSP identify costs to fund a mitigation program?		X			
d. Does the GSP include a funding mechanism to support the mitigation program?		X			
2. Does the GSP identify specific management actions and funding mechanisms to meet the identified MOs for groundwater quality and groundwater levels?	X			23 projects that are expected to benefit groundwater levels are summarized in Tables 6-1 (benefits and costs) and 7-3 (funding mechanisms). Table 6-1 lists potential projects and the Measurable Objective that is expected to benefit. Only water level benefits are listed, but maintenance or recovery of groundwater levels, or construction of recharge facilities, also will have environmental benefits in many cases. From the table, it is not possible to distinguish the full range of project benefits or how the projects will be prioritized. It would be advantageous to demonstrate multiple benefits from a funding and prioritization perspective.	Section 6.2.3, Page 277 Section 7.8, Page 319
3. Does the GSP include plans to fill identified data gaps by the first five-year report?	X			"A description of the monitoring network will be provided in the 5-year report. Data gaps, or areas of the Subbasin that are not monitored in a manner consistent with the requirements of the regulations, will be identified or re-assessed if previously identified. An assessment of the monitoring networks' function will be provided, along with an analysis of data collected to-date. If data gaps are identified, the GSP will be revised to include a program for addressing these data gaps, along with an implemented schedule for addressing data gaps and how the GSAs will incorporate updated data into	Section 7.6.4, Page 317

					the GSP."	
4. Do proposed management actions include any changes to local ordinances or land use planning?			X			
5. Does the GSP identify additional/contingent actions and funding mechanisms in the event that MOs are not met by the identified actions?			X			Expected in Section 6 or 7
6. Does the GSP provide a plan to study the interconnectedness of surface water bodies?			X		"In the Eastern San Joaquin Subbasin, groundwater discharge from the aquifer is primarily through groundwater pumping. However, groundwater also discharges to streams where groundwater elevations are higher than the streambed. Figure 2-65 shows gaining streams in blue where groundwater discharges to rivers, losing streams in red where streams lose water to the groundwater system, and mixed streams (gaining or losing less than 75 percent of the time) in orange. This analysis was based on modeling results from the historical calibration of the ESJWRM for approximately 900 stream nodes in the Eastern San Joaquin Subbasin." No plan for further study.	Section 2, Page 175-177
7. If yes:	a. Does the GSP identify costs to study the interconnectedness of surface water bodies?			X		
	b. Does the GSP include a funding mechanism to support the study of interconnectedness surface water bodies?			X		
8. Does the GSP explicitly evaluate potential impacts of projects and management actions on groundwater levels near surface water bodies?			X		Potential impacts of projects and management actions on groundwater levels near surface water bodies are not evaluated.	

Summary / Comments

The likely benefits and impacts to DAC members by the proposed projects and management actions are not clearly identified in the GSP. A discussion should be added for each project or management action to clearly identify the benefits to DAC drinking water users and potential impacts to the water supply. For all potential impacts, the project/management action should include a clear plan to monitor for, prevent, and/or mitigate against such impacts.

The GSP does not appear to include any plans to address impacts to domestic well users if domestic wells do go dry in the future. Based on the water level MTs, at least 10% of domestic wells would be expected to be dewatered if MT levels are reached. While the identified projects are intended to keep water levels above the MTs, no program is provided as a contingency in case 1) groundwater conditions decline before the projects are fully implemented, or 2) implementation of such projects does not have the desired effects. A plan to mitigate impacts to DAC drinking water users could include a program to replace wells, connect well users to a public water system, establishment of a tanked water program, etc. The GSP should also identify a mechanism to fund such a program.

From Table 6-1 it is not possible to distinguish the full range of project benefits or how the projects will be prioritized. It would be advantageous to demonstrate multiple benefits from a funding and prioritization perspective.

Potential impacts of projects and management actions on groundwater levels near surface water bodies should be evaluated as part of the GSP.

Focused Technical Review:
July 2019 Eastern San Joaquin Subbasin Public Draft Groundwater Sustainability Plan (GSP)

Water Levels

The draft GSP sets the minimum thresholds (MTs) for groundwater levels at representative monitoring well sites as the shallower of either: (1) the shallower of 1992 or 2015-2016 historical groundwater levels with a buffer of 100 percent of historical range applied, or (2) the 10th percentile of total depth of domestic wells within a 3-mile radius of a representative monitoring well site[1]. This approach to setting water level MTs and the selected representative monitoring network leaves key beneficial users in the subbasin, specifically domestic well users and in particular members of disadvantaged communities (DACs), potentially vulnerable to impacts.

- The draft GSP specifies that the total depth of domestic wells were used as a basis for determining water level undesirable results and MTs. However, a water supply well becomes unusable or subject to decreased performance and longevity as water levels fall within the screened interval, which will occur before water levels reach the bottom of the well. Given this consideration, **the draft GSP should consider that using the total well depth or bottom of the screen interval would result in more wells being impacted than assumed by the 10th percentile calculation.**

- According to the draft GSP, "an average of 400 domestic wells were captured within a 3-mile radius of each representative monitoring well, covering approximately 76 percent [%] of the domestic wells in the Subbasin" (Section 3.2.1.2). **Figure 1** shows the location of the representative monitoring network wells (RMWs) for water levels and the domestic wells within the subbasin, based on research conducted for development of the Community Water Center (CWC) Vulnerability Tool.[2] Each dot is scaled to represent the number of wells located within a given PLSS Section (i.e., approximately a 1-square mile grid cell). The CWC Vulnerability Tool uses domestic well data from the Online System for Well Completion Reports (OSCWR), which was then processed to remove wells identified as abandoned or destroyed. Therefore, the assessment shown in **Figure 1** uses the same dataset that is cited in the draft GSP for this analysis. However, based on the assessment presented in **Figure 1**, approximately 4,800 domestic wells out of approximately 9,600 domestic wells located in the subbasin are located within the buffer radius. **This represents one-half of the domestic wells in the subbasin, rather than the approximately 76%, as described in the draft GSP (Section 3.2.1.2).** Therefore, based on the available data, it appears that substantially fewer domestic wells were considered for the purposes of developing water level MTs than is described by the draft GSP. **It is therefore recommended that the data and methodology used to develop water level MTs in the draft GSP be made more clear and transparent, and include a clear set of figures and tables illustrating the process and results of this analysis.**

- As illustrated on **Figure 1**, the water level RMW network included in the draft GSP provides a high density of coverage in the center and southern parts of the subbasin, but does not provide adequate coverage to allow for monitoring and protection of domestic well users (through establishment of and compliance with Measurable Objectives [MOs] and MTs) that are located

[1] For well 03N07E21L003 a two-mile radius is used.

[2] The domestic well data layer used for this analysis was developed by the Water Equity Science Shop (WESS) as part of Community Water Center's Drinking Water Vulnerability Tool, which will be publicly released in winter 2019.

outside of these areas. Based on the assessment described above, this amounts to approximately 50% of the domestic wells within the subbasin, including domestic well users: (1) in and around the DACs of Terminous and Thorton, (2) immediately south of the DAC of Stockton, and (3) in the northwestern portion of the subbasin near Valley Springs. The draft GSP's discussion of representative groundwater level site selection (Section 4.1.1) does not describe how the selected wells were demonstrated to be "representative", nor is there an explanation as to why certain portions of the subbasin were left out of the RMW network. Based on the broad monitoring network shown in Figure 4-1, existing wells that could serve as RMWs are available in these areas. **It is therefore recommended, that in order to improve the water level monitoring network, that additional *RMWs* (with MOs/MTs) be established to be protective of domestic water users in the areas identified above.**

- **Figure 1** also shows the location of community water systems in the subbasin. As identified above, the limited spatial distribution of the water level monitoring network does not provide equal coverage across the subbasin. In particular, the RMW network does not provide coverage: (1) in the northwestern portion of the subbasin, which includes the community water systems of the Kings Island Trailer Park Water System, Little Potato Slough Mutual, the Riverside Mobile Home Park, and the San Joaquin County Thornton water system, which collectively serve over 2,000 people; (2) the northeastern portion of the subbasin which includes the Wallace and Jenny Lind areas of the Calaveras County Water District, which serve nearly 10,000 people; or (3) in the southeast portion of the subbasin, which includes the Knights Ferry Community Services District and the Twin Cypress Mobile Home Park systems, which serve approximately 280 people. **It is therefore recommended, that in order to improve the water level monitoring network, that additional *RMWs* (with MOs/MTs) be established to be protective of community water systems in these areas.**

- **Figure 2** shows the approximate elevations of the domestic well depths (as feet below ground surface; ft bgs) along with the proposed water level MTs from the draft GSP. MTs and domestic well depths are shown with red representing the shallowest wells/water levels and blue representing the deepest wells/water levels. Based on this assessment, it appears that many domestic wells are completed to deeper depths than the proximate water level MTs. However, the domestic wells that are located farther from the current monitoring locations tend to be among the shallowest wells in the subbasin. In particular, wells surrounding the DACs of Terminous and Thorton, as well as those in the central and southern portions of the DAC of Stockton appear to be particularly shallow and thus more vulnerable to decreasing water levels. As described above, it is recommended that the monitoring well network be expanded to include consideration of these vulnerable communities. However even if the RMW network is not expanded, **it is recommended that contours of water levels across the subbasin be provided for two scenarios: 1) if MOs are reached at each RMW, and 2) if MTs are reached at each RMW. In order to evaluate the potential impacts to domestic well users located further than 3 miles from a RMW, it is recommended that the domestic well depths across the subbasin be compared to the contoured scenarios, and that the results be presented in the GSP. Per 23 CCR § 354.28, these assessments should be included in the GSP in order for the public and DWR to able to fully evaluate the ability of the proposed sustainable management criteria and monitoring program to protect beneficial users within the subbasin.**

- As illustrated in **Figure 2**, there appear to be quite a few domestic wells located near RMWs 04N07E20H003M, 02N07E03D001, 02N07E29B001, and Lodi City Well #2 that are significantly more shallow than the MTs. **It is recommended that a more detailed assessment be provided in the GSP to provide a more transparent assessment of the number and locations of domestic wells expected to go dry at the proposed MTs.**

Water Quality

The draft GSP includes limited analysis of water quality constituents and defines undesirable results (URs) for water quality relative to "impacts to the long-term viability of domestic, agricultural, municipal, environmental, or other beneficial uses over the planning and implementation horizon of this GSP" (Section 3.2.1.1). For the reasons identified below, the water quality monitoring network and analysis presented in the draft GSP does not clearly illustrate how the sustainable management criteria will be sufficient to ensure that the stated water quality UR of impacting the long-term viability of the groundwater resource, particularly for domestic water users including DACs, will be avoided.

- The draft GSP states that "An undesirable result for degraded water quality in the Eastern San Joaquin Subbasin is experienced if groundwater management activities cause significant and unreasonable impacts to the long-term viability of domestic, agricultural, municipal, environmental, or other beneficial uses over the planning and implementation horizon of this GSP" (Section 3.2.3.1.1). However, the draft GSP only defines MOs/MTs for salinity, and states that "Although other constituents, including arsenic, nitrogen, and sulfate, are evaluated in the Current and Historical Groundwater Conditions section of this GSP (Section 2.2), these constituents are managed through existing management and regulatory programs within the Subbasin. … Through monitoring, the GSP will document these constituents and identify opportunities for coordination with existing programs" (Section 3.2.3.1.1). Per 23 CCR § 354.28, **the draft GSP should provide a detailed explanation as to how this approach will result in protection of groundwater for DACs and other drinking water beneficial users in the subbasin.**

- The draft GSP sets MOs/MTs for groundwater quality for ten RMWs within the subbasin; however, given that several wells are located very near each other, based on the spatial distribution, the network effectively consists of only eight locations within the subbasin.[3] This represents only one well for approximately 150 square miles of groundwater subbasin, or 0.67 wells per 100 square miles. This monitoring well density is just barely within the established DWR guidance for monitoring well densities of between 0.2 and 10 wells per 100 square miles.[4] Further, the DWR guidance provides a range of recommended monitoring density and notes that the frequency of monitoring wells depends on local geology, extent of groundwater use, and how the GSP defines undesirable results. The draft GSP notes that "Historically, high TDS concentrations have occurred in the western portion of the Subbasin, near the San Joaquin River and urban areas; as such, the majority of representative monitoring wells are located in the western half of the Subbasin. Monitoring wells are located both within areas of high TDS concentrations, to observe and monitor TDS trends, and adjacent to high TDS areas, to observe potential TDS movement" (Section 4.3.1). However, the goal of measuring avoiding the degradation of water quality in the

[3] It is noted that the GSP acknowledges that water quality data from additional wells will be included for annual reporting purposes, but not compliance purposes under SGMA.
[4] DWR, 2016. *Best Management Practices for the Sustainable Management of Groundwater, Monitoring Networks and Identification of Data Gaps (BMP #2),* December 2018.

subbasin should not be limited to areas where this impact has already occurred. **Given the complexity of this subbasin and the geographic distribution of sensitive beneficial users, this proposed network of water quality RMWs appears to be insufficient to monitor impacts to groundwater for drinking water beneficial users, particularly domestic well users and DACs.**

- **Figure 3** shows the location of domestic wells within the subbasin. Each dot is scaled to represent the number of wells located within a given PLSS Section (i.e., approximately a 1-square mile grid cell). **Figure 3** also shows the location of the ten water quality RMWs. All water quality RMWs are located in the western one-third of the subbasin. However, **roughly 80% of the domestic wells in the subbasin are located east of the area being monitored for water quality pursuant to the draft GSP**. In addition, numerous community water systems, including those serving schools, mobile home communities, and small mutual water company and community service districts are located north and east of the RWM network. **A substantial portion of domestic well users and those that rely on small community water systems are located in areas far outside of the water quality RMW network, including those in the DACs of Thornton, Collierville, Lockeford, and Valley Home. The draft GSP should describe how the proposed RMWs will ensure that the groundwater used by these domestic well users and community water systems will be managed to avoid significant and unreasonable negative water quality impacts to these beneficial users.**

- According to the draft GSP, the current proposed RMW network is limited to locations on the west side of the subbasin in and near areas that have had historically high concentrations of TDS. However, as identified above, a significant proportion of drinking water users are located outside of this area. In order to improve the monitoring network for water quality, we recommend that additional *representative* monitoring wells (with MTs) be established to be protective of the DACs of **Thornton, Collierville, Lockeford, and Valley Home**, and throughout the eastern portion of the subbasin.

- The draft GSP states that "increased arsenic concentrations have not been found to be related to groundwater management activities in the Subbasin" (Section 2.2.4.3). However, the draft GSP does not provide any additional information or to support this statement. Arsenic concentrations have been shown in some areas of the Central Valley to have a relationship to the dewatering of the Corcoran Clay.[5] **The spatial relationship between the presence of the Corcoran Clay and arsenic concentrations should be evaluated and presented in the GSP.** [5,6]

- The draft GSP does not include an analysis of the change in water quality constituents relative to the change in water levels. Such an analysis would further support or disprove the statement that "increased arsenic concentrations have not been found to be related to groundwater management activities in the Subbasin" (Section 2.2.4.3).[7] **Therefore, change in water quality constituent concentrations should be analyzed relative to change in water levels, particularly over drought periods, to evaluate the potential relationship between water quality and groundwater management activities for arsenic and other constituents.**

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[5] Smith, Ryan et al. "Overpumping leads to California groundwater arsenic threat." *Nature communications* vol. 9,1 2089. 5 Jun. 2018, doi:10.1038/s41467-018-04475-3. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5988660/

[6] DWR, 2017. *Best Management Practices for the Sustainable Management of Groundwater, Sustainable Management Criteria (BMP #6),* Draft November 2017.

[7] Stanford, 2019. *A Guide to Water Quality Requirements Under the Sustainable Groundwater Management Act,* Spring 2019.

Water Budget

- The draft GSP estimates conditions using 2070 climate forecast. Based on this, the draft GSP estimates that "Under climate change conditions, the depletion in aquifer storage is expected to increase by about 68 percent to an average annual storage change of 57,000 AF/year, from 34,000 AF/year in the projected conditions scenario" (Section 2.3.7.4). However, the results of the climate change scenario modeling were not used as the basis for development of Project and Management Actions. Therefore, while climate change is evaluated in terms of future water budget conditions, the draft GSP does not actually include a substantive plan to address the increased deficit anticipated to result from climate change.
- The draft GSP notes that because there are no available data on local private groundwater pumping, "groundwater pumping to meet agricultural and rural residential needs is calculated by the model based on meeting remaining demands after appropriate surface water delivery is made to respective areas. Demand in areas with no access to surface water is completely met by groundwater pumping" (Section 2.3.4.2). However, based on our review of the draft GSP the model-calculated rural residential demands are not presented in the document. **This water demand information should be transparently presented for the historical, current, and future water budgets so that the public can review the drinking water demand estimates for domestic users and community water systems, and make an assessment as to the appropriateness of the demands considered in the historical, current, or future water budgets.**
- The draft GSP notes that the future water budget demands for domestic areas outside of those covered by Urban Water Management Plans "are estimated based on rural population" and that "To estimate the urban water demand of rural domestic water areas, the average major urban area GPCD was combined with estimated rural population" (Section 3.2 of Appendix 2-1). However, the draft GSP does not present the population values associated with the rural population or a clear presentation of the results of this method. **In order for the public to be able to evaluate the appropriateness of these assumptions, the applied values and resultant demands should be clearly identified in the document.**

Projects and Management Actions

- The proposed projects and management actions include twenty separate direct and in-lieu recharge projects. Recharge projects have the potential to mobilize contaminants, including by mobilizing surface and shallow soil contaminants through percolation, spreading existing contaminant plumes by altering the groundwater flow gradient, and mobilizing naturally occurring compounds through changes in geochemistry due to the introduction of a different water type, among other mechanisms. As recommended in the 2019 Stanford *A Guide to Water Quality Requirements Under the Sustainable Groundwater Management Act,* "In addition to complying with any regulatory requirements, GSAs undertaking recharge or other active management actions should consider developing a sufficient understanding of the interactions between subsurface geology, geochemistry and GSP projects in their basin. The development of sufficient monitoring networks, capable of detecting changes in groundwater quality conditions related to active management, will be critical to understanding these interactions."[7] **Therefore, the GSP should explicitly describe how such risks will be evaluated and monitored as a part of each identified project.**

Well Mitigation Program

Based on our assessment of the water levels, a significant proportion of domestic wells have the potential to be partially or fully dewatered if water levels reach the proposed MT levels. However, the draft GSP does not include or describe any plans to develop a well impact mitigation program. Such a program could include a combination of replacing impacted wells with new, deeper wells and/or connecting domestic users to a public water system. A plan to establish an emergency tanked water program, as was done in some areas of California during the last drought, may be an appropriate short-term solution, but would not be a good long-term solution for community members. Key considerations for establishing such a program should include:

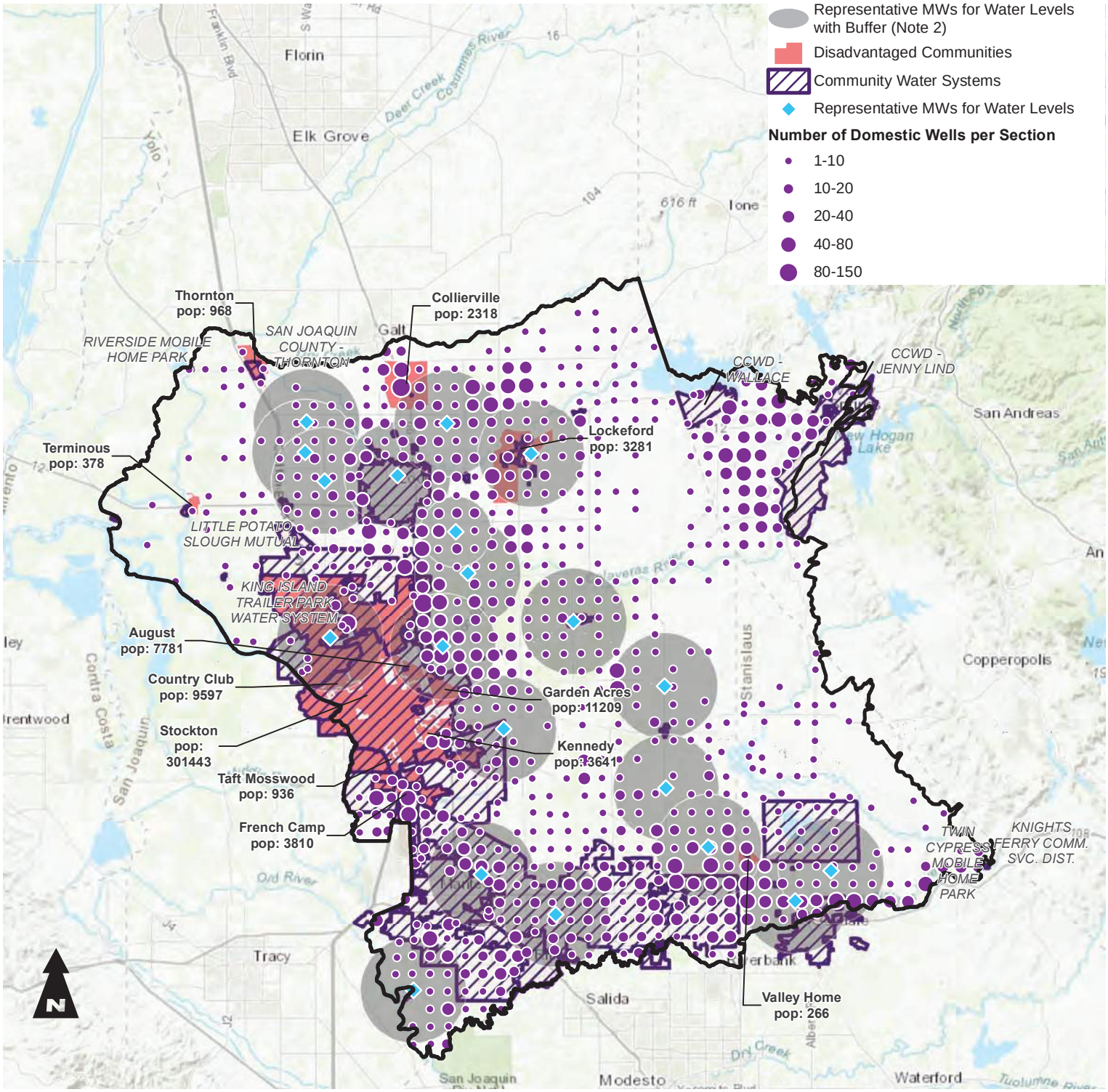
- A strong preference for connecting current domestic well users to a public water system, whenever possible. Public water systems have an obligation to test water quality for water served, and although the public water systems in this area typically have limited resources, they do have a greater ability to install treatment systems to address water quality impacts, recoup funds for litigated contamination such as 1,2,3-TCP, and apply for and receive grant funding for beneficial projects. Because of this, public water systems, including small community water systems, provide a more reliable drinking water source than privately-owned domestic wells.
- A secure and reliable funding source and mechanism for implementation of such a mitigation program needs to be identified. While grant or emergency funding could potentially be available for such a program when needed, the availability of these funds is not certain. A more secure funding mechanism could be the establishment of a reserve fund that is paid into on an annual basis and accrues funds that would then available as water levels drop in the future.
- The implementation of a mitigation program should be triggered before wells begin to become unusable, so that funding will be available, and the necessary planning and contracting will be completed such that the necessary construction will be implemented without unnecessarily leaving community members without access to drinking water. Thus, the program should be designed to be proactive, rather than reactive.
- A well mitigation program should not be established only in case of emergency. Droughts are said to be becoming more and more frequent and severe, and as such should be included as part of the long-term sustainability planning for the subbasin.

Attachments

Figure 1 - Representative Monitoring Network for GW Levels Relative to Domestic Wells, DACs, and Community Water Systems
Figure 2 - Water Level MTs and Domestic Wells
Figure 3 - Representative Monitoring Network for Water Quality Relative to Domestic Wells, DACs, and Community Water Systems

Figure 1 - Representative Monitoring Network for GW Levels Relative to Domestic Wells, DACs, and Community Water Systems

Eastern San Joaquin Subbasin



Notes

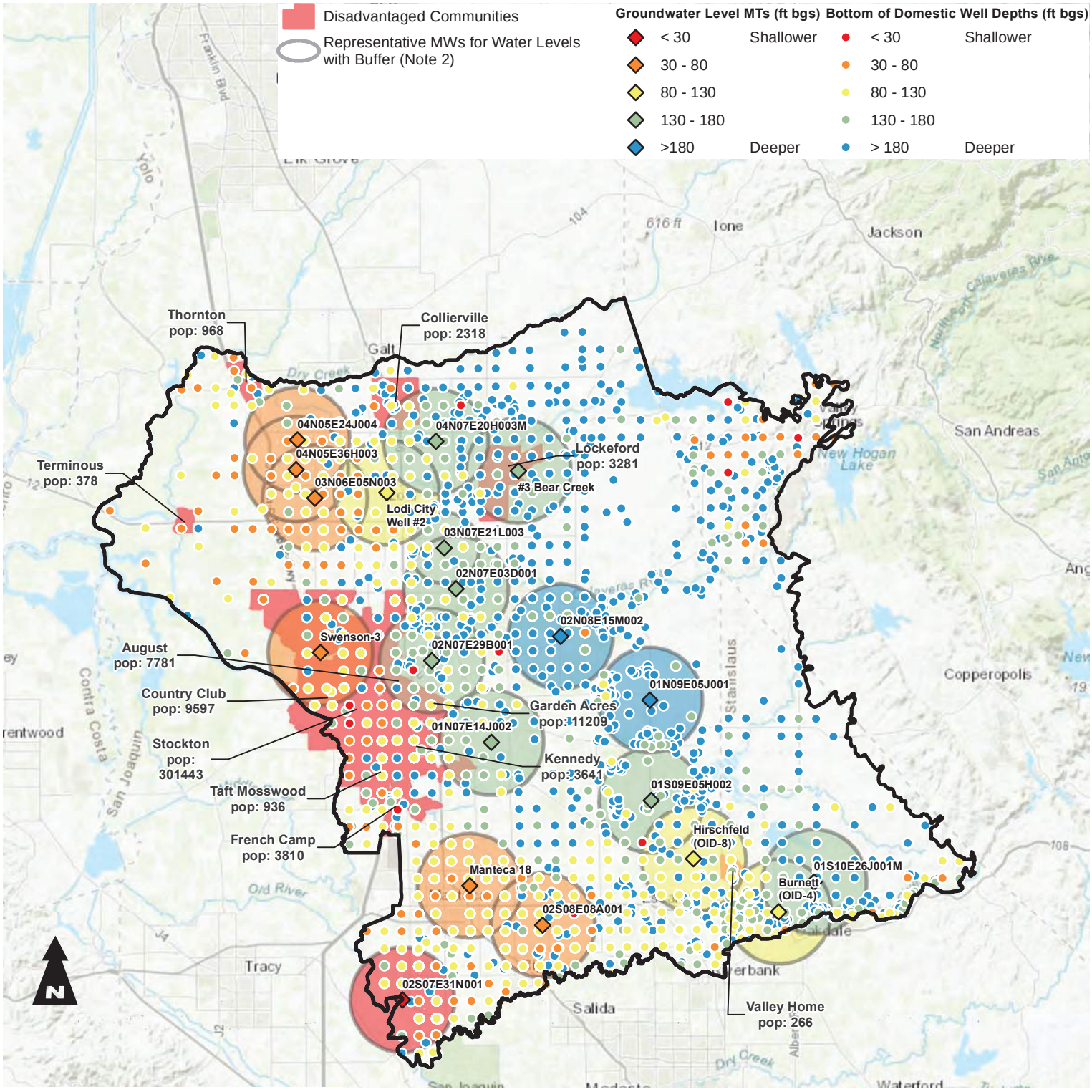
1. All locations are approximate.
2. For purposes of this assessment, buffer with a radius of 3 miles is created around the representative monitoring wells except for well 03N07E21L003 with a 2-mile radius buffer "due to variations in local well depth due to proximity to the Mokelumne River".

References

1. Domestic Well Densities: Research to develop the CWC Vulnerability Tool draft as of August 6, 2019.
2. Disadvantaged community data: downloaded on August 6, 2019 from the DAC Mapping Tool: https://gis.water.ca.gov/app/dacs/.
3. Community Water System data: downloaded on August 6, 2019 from Tracking California: https://trackingcalifornia.org/water/map-viewer.
3. Groundwater level monitoring well information are from Draft Eastern San Joaquin Groundwater Subbasin GSP dated July 2019.

Figure 2 - Water Level Minimum Thresholds and Domestic Wells

Eastern San Joaquin Subbasin



Notes

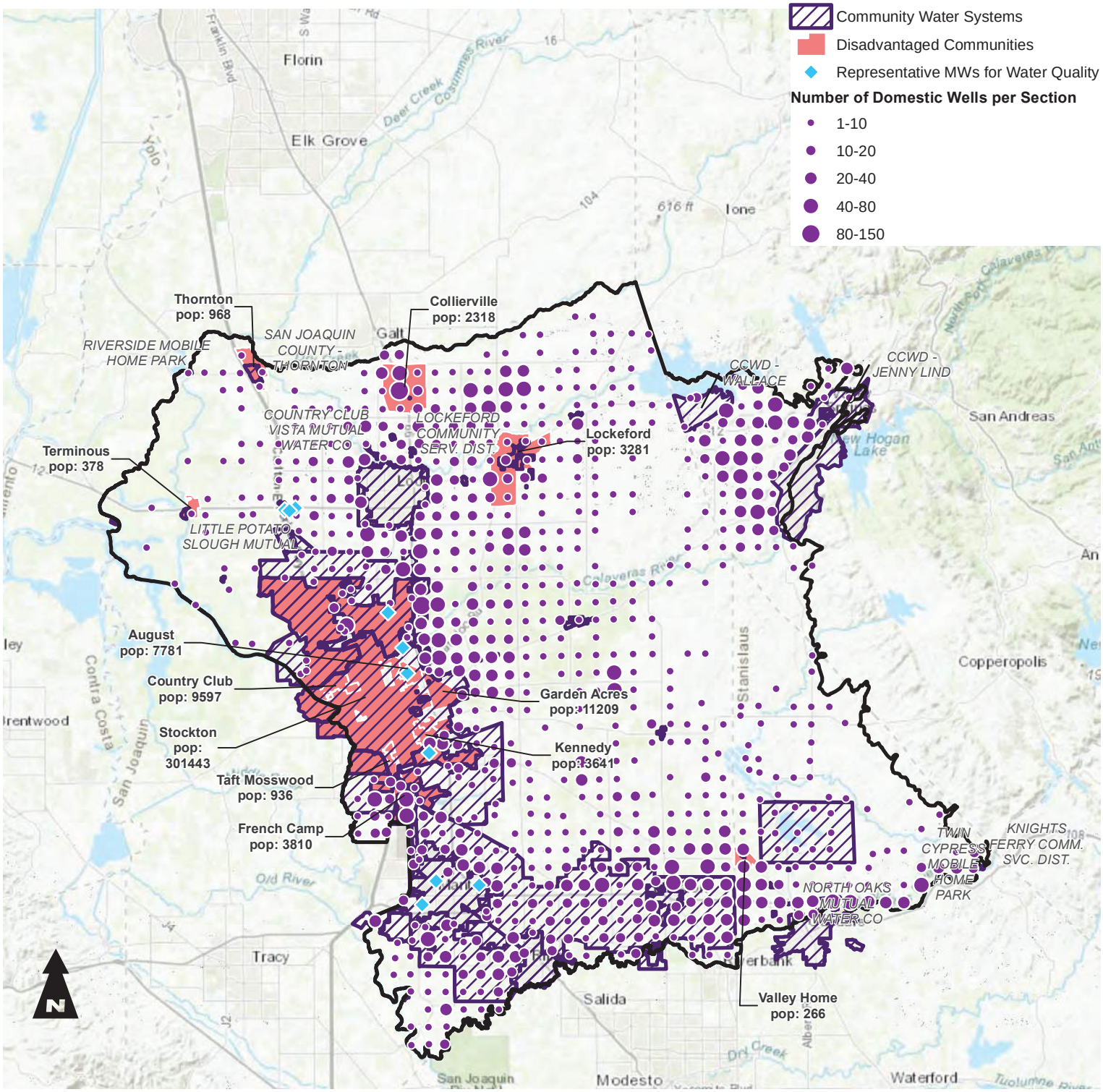
1. All locations are approximate.
2. Buffer with a radius of 3 miles is shown around all representative monitoring wells, except for well 03N07E21L003 for which a 2-mile radius buffer is used "due to variations in local well depth due to proximity to the Mokelumne River", per the draft GSP.
3. For this assessment, the proposed MTs in ft above sea level presented in APPENDIX 3-A of the draft GSP were converted to depth below ground surface values, based on the historical water levels presented in the same table. Where available, bottom of screen interval of a domestic well was used for this assessment, and bottom of well depth was used for the remaining domestic wells.

References

1. Domestic Well Densities: Research to develop the CWC Vulnerability Tool draft as of May 16, 2019.
2. Disadvantaged community data: downloaded on August 6, 2019 from the DAC Mapping Tool: https://gis.water.ca.gov/app/dacs/. Last updated in 2016.
3. Groundwater level monitoring well information are collected from the Draft Eastern San Joaquin GSP, dated July 2019. MT values are from APPENDIX 3-A Table of the Draft GSP.

Figure 3 - Representative Monitoring Network for GW Quality Relative to Domestic Wells, DACs, and Community Water Systems

Eastern San Joaquin Subbasin



Notes

1. All locations are approximate.

References

1. Domestic Well Densities: Research to develop the CWC Vulnerability Tool draft as of August 6, 2019.
2. Disadvantaged community data: downloaded on August 6, 2019 from the DAC Mapping Tool: https://gis.water.ca.gov/app/dacs/.
3. Community Water System data: downloaded on August 6, 2019 from Tracking California: https://trackingcalifornia.org/water/map-viewer.
3. Groundwater quality monitoring well information are from Figure 3-3, Draft Eastern San Joaquin Groundwater Subbasin GSP dated July 2019.

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July 17, 2019

Eastern San Joaquin Groundwater Authority
P. O. Box 1810
Stockton, CA 95201
Via email: info@esjgroundwater.org

Re: Public Outreach within the Eastern San Joaquin Subbasin

We are writing this letter to comment on public outreach related to the development of the Groundwater Sustainability Plan (GSP) for the Eastern San Joaquin Subbasin by the Eastern San Joaquin Groundwater Authority (ESJGA) and Groundwater Sustainability Agencies (GSAs) and to suggest changes to increase involvement of the diverse stakeholders that reside in the Subbasin.

The following general observations are explored in further detail below.

- Public outreach has not been well-coordinated or effective because of the nature of GSAs formed in this Subbasin, because of assumptions underlying Sustainable Groundwater Management Act (SGMA) outreach guidelines, and because technical issues and funding challenges have not been widely discussed nor presented in language that will engage those impacted.
- Outreach summaries produced and distributed by the GSP consultant team (see Appendix A) do not provide useful information because they allow for reporting on only certain kinds of outreach, and because even GSAs that do perform outreach are not always reporting it.
- Focusing outreach requirements on individual GSAs has created a situation in which it appears that no outreach has been done to an important and impacted category of users: people on domestic wells.

We conclude with recommendations for improving outreach and increasing transparency as the GSP process moves from planning into implementation.

Background

The Water Code includes these directions with reference to public outreach for SGMA required of GSAs:

> 10727.8 (a) [. . .] The groundwater sustainability agency shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the groundwater basin prior to and during the development and implementation of the groundwater sustainability plan. [. . .].

Submitting public notices to the newspaper, notices of items on an isolated agenda, or a notice on a website fulfills a minimum outreach requirement for some governmental actions but not for SGMA. Groundwater sustainability plan regulations require that GSAs document in a communication section of the GSP the opportunities for public engagement and active involvement of diverse social, cultural, and economic elements of the population within the basin[1] These types of public notices do not encourage active involvement of diverse members of our Eastern San Joaquin Subbasin. These minimum public noticing techniques were used when the GSAs were formed and are documented on the SGMA Portal website: https://sgma.water.ca.gov/portal/gsa/all (search for GSA of interest). A single initial notification of GSP preparation was made on behalf of all the GSAs within the Eastern San Joaquin Subbasin and can be found here: https://sgma.water.ca.gov/portal/gsp/init/preview/82. Since the initial notification dated March 16, 2018, development of the GSP has been ongoing, but consistent public outreach has not.

A 2017 Department of Water Resources (DWR) grant for Facilitation and Support Services included a stakeholder identification and engagement component, but stakeholder engagement efforts trailed facilitation activities under that agreement by about six months. A situation assessment produced by consultants in December 2018, after the end of the contract period, summarized feedback from one group of stakeholders. That assessment references a separate document with recommendations for adjustment to the stakeholder process, but the separate document is not available online.

Public outreach has not been well-coordinated or effective because of the nature of GSAs formed in this Subbasin, because of assumptions underlying SGMA outreach guidelines, and because technical issues and funding challenges have not been widely discussed nor presented in language that will engage those impacted.

Agencies in the Eastern San Joaquin Subbasin formed GSAs primarily to protect their autonomy, not necessarily because they were considering the effect of the GSP on the users they serve or residents within the GSA boundaries. Some GSAs have names that would not be recognized even by water users that they serve. Examples include the Eastside GSA (Calaveras County Water District, Rock Creek Water District, and Stanislaus County), and South San Joaquin GSA (South San Joaquin Irrigation District). Nevertheless, SGMA assigns GSAs outreach responsibilities.

[1] DWR Guidance Document of Groundwater Sustainability Plan, Stakeholder Communication and Engagement; California Code of Regulations, Title 23 Waters, Division 2 Department of Water Resources; Chapter 1.5 Groundwater Management; Subchapter 2 Groundwater Sustainability Plan; Article 5 Plan Contents; §354.10

SGMA defines stakeholders broadly and beneficial users specifically including:

> (a) Holders of overlying groundwater rights, including: (1) Agricultural users. (2) Domestic well owners. (b) Municipal well operators. (c) Public water systems. (d) Local land use planning agencies. (e) Environmental users of groundwater. (f) Surface water users, if there is a hydrologic connection between surface and groundwater bodies. (g) The federal government, including, but not limited to, the military and managers of federal lands. (h) California Native American Tribes. (i) disadvantaged communities (DAC), including, but not limited to, those served by private domestic wells or small community water systems. (j) Entities listed in Section 10927 that are monitoring and reporting groundwater elevations in all or a part of a groundwater basin managed by the groundwater sustainability agency.[2]

Not all of the 15 GSAs in the Eastern San Joaquin Subbasin represent the full range of stakeholders identified in the legislation. Specifically, municipal water purveyor GSAs will contain few of the types of stakeholders that were likely intended to be reached, such as people on domestic wells or small community water systems.

An example of the variability of circumstances with respect to one stakeholder group, DACs, is shown in the following table.

Table 1. Distribution of DACs within the Eastern San Joaquin Subbasin[3]

Groundwater Sustainability Agency	Percent DAC	Percent not DAC
City of Lodi	75%	25%
Lockeford Community Service District	67%	33%
San Joaquin County No. 2 (Calwater)	60%	40%
City of Stockton	58%	42%
Central Delta Water Agency	50%	50%
Central San Joaquin Water Conservation District	50%	50%
Linden County Water District	50%	50%
Stockton East Water District	45%	55%
San Joaquin County No. 1	43%	57%
North San Joaquin Water Conservation District	40%	60%
City of Manteca	33%	67%
Oakdale Irrigation District	33%	67%
South Delta Water Agency	33%	67%
South San Joaquin GSA	30%	70%
Eastside San Joaquin GSA	17%	83%

Seventy-five percent of the City of Lodi falls into the disadvantaged communities (DAC) or severely disadvantaged communities (SDAC) categories. However, a single public water system serves all Lodi residents regardless of income level. It integrates groundwater and surface water using a system in which the city invested millions of dollars and which it operates on a not-for-profit basis.

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[2] Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation, https://www.cleanwateraction.org/files/publications/ca/SGMA_Stakeholder_Engagement_White_Paper.pdf

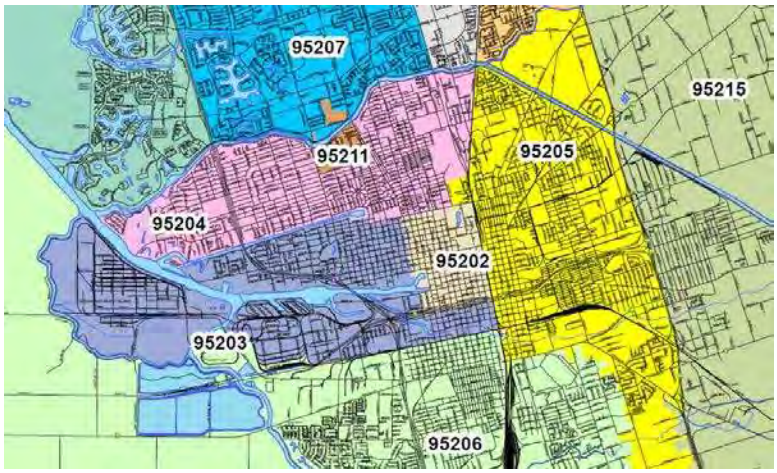
[3] http://www.esjgroundwater.org/Portals/0/assets/docs/agendas/2018/ESJ-GSP-GS-Workgroup-Slides-13Nov2018.pdf downloaded 06.21.19

By contrast, two different urban water purveyors operate within the geographical boundaries of the City of Stockton's GSA: the City of Stockton Municipal Utilities Department, and California Water Service Company (Calwater). Calwater has a separate agreement with San Joaquin County to form San Joaquin County GSA No. 2, which consists of boundary areas outside of the City of Stockton limits which are served by Calwater. The City of Stockton GSA encompasses all areas within the City of Stockton limits regardless of whether or not the City of Stockton is the water purveyor. This situation increases the possibility of customer confusion and of outreach inequities. Calwater has held one public outreach meeting which was not noticed to Calwater customers other than the posting on the Eastern San Joaquin Groundwater Authority website. The City of Stockton has not notified all customers of the City of Stockton Municipal Utilities Department or those within city limits that are served by Calwater. The City of Stockton representative recently announced that it is illegal to drill or operate a private well in Stockton (June 13, 2019 and July 3, 2019), and the City's position is that if there is a problem with an existing well, the well user should hook up to City services. Neither urban customers nor domestic and irrigation well owners have been notified specifically.

There is a greater distribution of DACs within the City of Stockton GSA boundary that are served by the for-profit Calwater and whose water rates are significantly higher than rates paid by the other residents of the City of Stockton GSA. An analysis published by CalMatters, an independent news organization, shows the income disparities within the city. (See Table 2.)

Calwater Stockton Service Boundary -

https://www.calwater.com/docs/rates/maps/STK_SAM_2016.pdf



City of Stockton ZipCode Map http://www.stocktongov.com/files/ZipcodeMap.pdf

Table 2. CalMatters Taxes and Income by Zip Code in Areas Served by Calwater

District	Zip Code	Number of Tax Returns	Average Tax Liability	Average Income	Calwater Only or Partially
Stockton	95207	20234	1357	46353	Partially
	95206	26837	638	38537	Mostly(urban)
	95205	14584	367	31969	Mostly(urban)
	95215	8722	1111	43779	Partially
	95204	12662	1646	51250	Partially
	95203	5999	866	38193	Only
	95202	1715	724	30928	Only
	https://calmatters.org/articles/how-much-do-you-neighbors-pay-california-state-taxes/				

An outreach challenge arises from the fact that for purposes of the SGMA process, DACs and SDACs are identified only in terms of income relative to the state median household income (MHI). However, not everyone who is economically disadvantaged will be impacted by changes in groundwater management in this Subbasin, and not everyone who will be impacted is economically disadvantaged. Lodi, which has the highest DAC percentage (75 percent) of any GSA in the Subbasin, also has the highest MHI of any community place in the Subbasin.[4] There are 358 small public water systems in San Joaquin County[5] in areas that do not necessarily have less than MHIs but have difficulties with affordability.

Other indexes for measuring disadvantage or vulnerability include the ICARP (Integrated Climate Adaptation and Resiliency Program) of the California Office of Planning and Research; the ROI (Regional Opportunity Index) developed by UC Davis; CalBRACE (California Building Resilience Against Climate Effects) developed by the California Department of Public Health; and CalEnviroScreen, developed by the California Office of Environmental Health and Hazard Assessment. Indexes that define disadvantaged communities in terms of socioeconomic, public health, and environmental hazard as well as in terms of income may provide a more nuanced picture of whether members of a community are likely to have access to the information and political influence they need in order to be fairly represented.

Another outreach challenge arises from the fact that for social justice groups organized around issues not directly related to water, SGMA-related issues may not seem urgent, and may not at this point be urgent absent specific information relating to quality, or cost impacts.

Engagement of DACs requires an emphasis on plain language and multiple opportunities to engage during times convenient to these residents that struggle to make a living. The three evening meetings that have occurred were not widely publicized. Broader outreach could be achieved using factsheets, which lend themselves to focused information conveyance and can be tailored to reach this population and distributed in mailed bills or linked to billing information sent by email. Factsheets have not been released for characterizations of each GSA within the Subbasin or to describe specific aspects of the GSP during its development.

Furthermore, according to the US Census[6], 41.2% of persons age 5 years+, 2013-2017 have languages spoken at home other than English. The only outreach material that has been translated into Spanish are flyers about public outreach meetings. An example of the timing of availability to distribute information is given for the ESJGA July 18, 2019 Public Informational Meeting: On July 5, 2019 the Spanish version was sent out to the email list while on June 26, 2019 the English version was sent out. Problems with timing here: 1) the flyers were available less than a month before the event and 2) the lag between the distribution of the flyers created added work for organizations to get that second Spanish flyer out.

Funding discussions have not widely occurred in the Eastern San Joaquin Subbasin. At the June 12, 2019 Sustainability Workgroup meeting the issue of funding was brought up and a member also following another basin's GSP process stated that discussions there have been primarily

[4] https://water.ca.gov/LegacyFiles/irwm/grants/sgwp/sgwp_docs/2017_Solicitation/Applications/Eastern San Joaquin Groundwater Authority/Att7_2017SGWPC2_DAC_1of2.pdf accessed 7.9.19.
[5] https://www.sjgov.org/department/envhealth/programs/default?id=26243 accessed 7.8.19.
[6] https://www.census.gov/quickfacts/fact/table/sanjoaquincountycalifornia/PST045218 accessed 7.8.19

about funding. Until parties to this process know how much implementation will cost, obligation levels cannot be determined. At the June 12, 2019 Groundwater Authority meeting, the Board members voted to adopt the 2019-2020 Annual budget which included no funding sources identified for any implementation other than plan submittal to DWR.

Outreach summaries produced and distributed by the GSP consultant team do not provide useful information because they allow for reporting on only certain kinds of outreach, and because even GSAs that perform outreach are not always reporting it.

According to the ESJGA GSA Outreach Activities summary (Appendix A), some GSAs have reported no outreach activities at all. This may indicate that no outreach activity occurred or that GSA staff is unwilling or unable to report GSA outreach activities, or that the summary provides data only on electronic outreach. A major theme raised by a member of the ESJ Groundwater Advisory Committee at its June 12, 2019 meeting is that there must be balance between autonomy and accountability. This documentation of SGMA-required outreach activities to encourage active involvement suggests that perhaps too much autonomy has been applied without clearly needed accountability. Also, not all agencies that want autonomy have the capacity or resources to do the required outreach for which they may be held accountable.

These updates on GSA Outreach Activities summarize communication media without describing specifics of face-to-face contact efforts, much less the likely effectiveness of outreach, or even numbers of people reached.

For example, all the GSAs are credited with outreach for the February 12, 2019 informational meeting in Lockeford, but as was noted at the June 12, 2019 ESJ Sustainability Workgroup meeting, Lockeford itself promoted that meeting vigorously with individual notices sent to each ratepayer, and the February 12, 2019 was by far the best attended of the informational meetings so far. However, it is unlikely, that it was attended by members of the public throughout the Subbasin, as this Outreach Activities summary suggests.

The GSA Outreach Activities summary shows no outreach by the Central Delta Water Agency or the South Delta Water Agency. However, neither of these GSAs has a website or uses social media. That does not necessarily mean that water users within those GSAs are uninformed about SGMA. Recently, a farmer with land in both the Central Delta Water Agency area and North San Joaquin Water Conservation District was asked whether he was planning to take a look at the GSP draft (which he did know about), and he said that he was leaving that to the attorneys that represent property owners within the GSAs.

On the GSA Outreach Activities summary, the City of Lodi notes that its website is “still current” with regard to SGMA. Appendix B summarizes the challenge of finding SGMA information on Lodi’s website. Is this outreach adequate? Perhaps it is, given the fact that the great majority of Lodi’s residents are not currently affected by what is happening with SGMA. On the other hand, not all outreach done in Lodi appears on the GSA Outreach Activities summary. In March, a representative of the League of Women Voters of San Joaquin County made a presentation as part of a special meeting in Lodi that was attended by about a dozen members of the public. That meeting is not on the summary list.

On the GSA Outreach Activities summary, the City of Stockton does not have any outreach listed. The following request to the City of Stockton was made on June 13, 2019 and again on July 5, 2019 to increase visibility of the next public outreach and the draft GSP comment period. Yet, as of July 8, 2019 there was no reply from City representatives regarding the request nor has there been any posting made on the City of Stockton website of community events.

- The draft Groundwater Sustainability Plan will be out for Public Review July 10 – August 25.
- The next Groundwater Authority Public Outreach event is July 18, 2019 from 5-8 pm at the Agricultural Commissioner's Office Assembly Room #1 located at 2101 E Earhart Ave Ste 100, Stockton, CA 95206.
- Please post notice on the City of Stockton community events website and send out information about the public review of the Groundwater Sustainability Plan in utilities bills between June and August to notify the residents located within the boundary of the City of Stockton Groundwater Sustainability Agency.

Yet, as of July 17, 2019 there was no reply from City representatives regarding the request nor has there been any posting made on the City of Stockton website of community events.

Outreach that relies heavily on websites, email, and social media risks missing members of the public who prefer not to use or do not have reliable access to electronic media. San Joaquin County Census Data[7] estimates from 2017 show that while 86.4% of households report having a computer only 77.5% have an internet subscription. In addition, internet connectivity can be unreliable in rural areas. Residents of the Sacramento-San Joaquin Delta face major challenges with broadband access.

The consultants have periodically provided outreach material posted on the Eastern San Joaquin Groundwater Authority website: http://www.esjgroundwater.org/Agendas . The use of this outreach material is not documented.

An evaluation of GSA websites as a minimum means to perform outreach was performed in late June and early July, 2019 and is summarized in Appendix B. This evaluation illustrated variability in ease to find information and breadth of information provided with a specific emphasis on whether or not the July 18, 2019 Public Outreach event was included.

Focusing outreach requirements on individual GSAs has created a situation in which it appears that no outreach has been done to an important and impacted category of users: people on domestic wells.

It appears that landowners with agricultural wells are being reached with information about SGMA, probably through the Farm Bureau. Many municipal water customers may not be as affected as those residents on small water systems. The big gap in outreach is with people relying on individual domestic wells, which DWR and the GSP consultant team estimates to include over 10,000 property owners with domestic wells. Those individuals, who are likely

[7] https://www.census.gov/quickfacts/fact/table/sanjoaquincountycalifornia/PST045218

very vulnerable to impacts of the GSP, are not being directly noticed. Of most concern are the residents with wells less than 200 feet below ground surface[8]

Table 3. Characterization of Residents with Domestic Wells

DAC Characteristics	Average Domestic Well Depth (ft)	Domestic well count
Basin-wide	230.2	10034
Outside of DAC areas	235.4	7829
Within DAC areas	211.6	2205

With the exception of San Joaquin County GSA No.1, GSAs in this Subbasin are either public agencies or a private agency (San Joaquin County GSA No.2 – Calwater) created to provide surface and/or groundwater. These GSAs therefore have some kind of constituency or customer base. People on domestic wells are not part of that base, and responsibility for SGMA outreach to them has not been addressed.

RECOMMENDATIONS

- GSAs in the Eastern San Joaquin Subbasin should increase outreach by print with informational inserts in utility bills, property tax bills, and any other regular correspondence that is sent to households. Notices of the plan commenting period should be posted at each GSA headquarters, along with information about where to find GSA specific information.
- Principal and sub-contract consultants who are developing the GSP can develop posters that can be widely distributed, and can provide flyers to the Agricultural Commissioner's Office, Environmental Health Department, and Community Development Department within Calaveras, San Joaquin, and Stanislaus Counties.
- The Eastern San Joaquin Groundwater Authority (ESJGA) website, esjgroundwater.org , should provide GSA website addresses where stakeholders can find GSA and ESJGA level information, GSA contact email addresses, telephone numbers, and GSA staff contact names. Currently only mailing addresses are available for contacting GSAs. A number of non-governmental organizations (NGOs) representatives including the Sierra Club, League of Woman Voters, and Catholic Charities requested back in November 2018 that this information be updated, but that has not been done[9].
- The ESJGA website should provide information about how people can determine the GSA jurisdiction within which they live.
- Email inquiries to "Contact Us" on the ESJGA website currently go through a San Joaquin County government subcontractor, who redirects them. Responses to email inquiries, tabulating, and documenting of contacts and responses, should be included on regular outreach summaries.

[8] http://www.esjgroundwater.org/Portals/0/assets/docs/agendas/2018/ESJ-GSP-GS-Workgroup-Slides-13Nov2018.pdf downloaded 06.21.19

[9] http://www.esjgroundwater.org/About-Us/Members accessed 7.8.19.

- As part of GSP implementation, the ESJGA governance body should consider assessing GSAs a fee to provide funding for an outreach coordinator to perform tasks that GSAs do not have the staff or expertise to perform.
- As recommended by the Facilitation and Support Services consultants, a stakeholder or advisory board should be convened when the GSP is submitted, to review and inform implementation.

Each GSA should provide a written explanation of why the outreach they have done so far is adequate to meet the intent of SGMA outreach, and if it has not been adequate, what strategies each GSA proposes for doing adequate outreach during implementation of the plan. This information should be included in the GSP.

A preliminary list of GSP implementation elements includes a task called "Public Outreach and Website Maintenance." Providing for public outreach and website maintenance only at the level of the Eastern San Joaquin Groundwater Authority website will not be adequate to cover the outreach obligations of all the GSAs.

Sincerely,

Kathy Casenave
President
League of Women Voters of San Joaquin County

Mary Elizabeth
Conservation Chair
Delta-Sierra Group, Sierra Club

Barbara Barrigan-Parrilla
Executive Director
Restore the Delta

Esperanza Vielma
Board Chair
Environmental Justice Coalition for Water

Kenda Templeton
Executive Director
P.U.E.N.T.E.S.

Attachments: Appendix A. Groundwater Sustainability Agency Outreach
Appendix B. Finding SGMA References on GSA Websites

cc: DWR SGMA Portal for individual GSA distribution

San Joaquin County No. 1 and No.2
City of Lodi
Lockeford Community Service District
City of Stockton
Central Delta Water Agency
Central San Joaquin Water Conservation District
Linden County Water District
Stockton East Water District
North San Joaquin Water Conservation District
City of Manteca
Oakdale Irrigation District
South Delta Water Agency
South San Joaquin GSA
Eastside San Joaquin GS

Eastern San Joaquin Groundwater Authroity
GSA Outreach Activities - October 2018

Agency Name	Update Website	Use Outreach Slides	Post to Social Media	Other
Cal Water	Post Notice of SGMA Public Outreach Meeting 11/14			
Central Delta Water Agency				
Central San Joaquin Water Conservation District				
City of Lathrop	Post Notice of ESJ Outreach Meeting in Manteca on 11/7/18			
City of Lodi				
City of Manteca			Facebook Posts on Informational Meeting, 10/19, 10/24, 10/30	
City of Stockton				
Eastside San Joaquin GSA		California Board of Realtors Marketing Meeting, Oakdale, CA		
Linden County Water District		Public meeting, 7pm Oct. 25 - at Linden County Water District Offices		
Lockeford Community Services District				Advertized Public Hearing on Oct.24 Via Local Newspaper
North San Joaquin Water Conservation District				
Oakdale Irrigation District				Posted ESJ Info Mtg Flyers in front office & incorporated them into OID's 10/16/18 Board agenda packet
San Joaquin County				
South Delta Water Agency				
South San Joaquin GSA				
Stockton East Water District				
Woodbridge Irrigation District GSA				Standing Agenda Item at the Monthly WID Board Meeting

Please indicate which of the above outreach activities your GSA has planned for the upcoming month. Please approximate date of completion.

Eastern San Joaquin Groundwater Authroity
GSA Outreach Activities - November 2018

Agency Name	Update Website	Use Outreach Slides	Post to Social Media	Other
Cal Water				SGMA Outreach Meeting 11/14
Central Delta Water Agency				
Central San Joaquin Water Conservation District				
City of Lathrop	Post Notice of ESJ Outreach Meeting in Manteca on 11/7/18			Attend ESJ Outreach Mtg. in Manteca on 11/7
City of Lodi				
City of Manteca			Facebook Post on Informational Meeting, 11/7	Manteca Council Agenda Item 11/20
City of Stockton				
Eastside San Joaquin GSA				
Linden County Water District				
Lockeford Community Services District				
North San Joaquin Water Conservation District				
Oakdale Irrigation District	Updated 11/1/18	Added to OID's Website 11/1/18		Posted ESJ Info Mtg Flyers in front office
San Joaquin County				Ag Commission Pesticide Application Meetings
South Delta Water Agency				
South San Joaquin GSA				
Stockton East Water District				
Woodbridge Irrigation District GSA				

Please indicate which of the above outreach activities your GSA has planned for the upcoming month. Please approximate date of completion.

Eastern San Joaquin Groundwater Authority
GSA Outreach Activities - December 2018

Agency Name	Update Website	Use Outreach Slides	Post to Social Media	Other
Cal Water				
Central Delta Water Agency				
Central San Joaquin Water Conservation District				
City of Lathrop				
City of Lodi				
City of Manteca				
City of Stockton				
Eastside San Joaquin GSA				
Linden County Water District				
Lockeford Community Services District				
North San Joaquin Water Conservation District				12/17 SGMA JPA Standing agenda item
Oakdale Irrigation District				
San Joaquin County				
South Delta Water Agency				
South San Joaquin GSA				
Stockton East Water District				
Woodbridge Irrigation District GSA				

Please indicate which of the above outreach activities your GSA has planned for the upcoming month. Please approximate date of completion.

Eastern San Joaquin Groundwater Authority GSA Outreach Activities - January 2019

Agency Name	Update Website	Use Outreach Slides	Post to Social Media	Other
Cal Water				
Central Delta Water Agency				
Central San Joaquin Water Conservation District				
City of Lathrop				
City of Lodi	1/17/2019 added flyers			
City of Manteca			Posted Information Meeting date/time/location on City's Facebook Page	
City of Stockton				
Eastside San Joaquin GSA				
Linden County Water District				
Lockeford Community Services District				
North San Joaquin Water Conservation District	1/29 Posted February 12 ESJ Info Mtg Flyers on the NSJWCD website, and emailed to monthly agenda recipients			1/28 SGMA JPA Standing agenda item
Oakdale Irrigation District	Posted February 12th ESJ Info Mtg Flyers on the OID website			Posted February 12th ESJ Info Mtg Flyers in front office and incorporated it into the 2/5/19 board agenda packet
San Joaquin County				SJ County Advisory Water Commission SGMA standing agenda item 1/16/19
South Delta Water Agency				
South San Joaquin Groundwater Sustainability Agency				
Stockton East Water District		Added to website		
Woodbridge Irrigation District GSA				

Please indicate which of the above outreach activities your GSA has planned for the upcoming month. Please approximate date of completion.

Eastern San Joaquin Groundwater Authority GSA Outreach Activities - February 2019

Agency Name	Update Website	Use Outreach Slides	Post to Social Media	Other
Cal Water				Public informational meeting 2/12/19
Central Delta Water Agency				Public informational meeting 2/12/19
Central San Joaquin Water Conservation District				Public informational meeting 2/12/19
City of Lathrop				Public informational meeting 2/12/19
City of Lodi				Public informational meeting 2/12/19
City of Manteca				Public informational meeting 2/12/19
City of Stockton				Public informational meeting 2/12/19
Eastside San Joaquin GSA				Public informational meeting 2/12/19
Linden County Water District		Joint outreach with Stockton East Water District 2/18/19		Public informational meeting 2/12/19
Lockeford Community Services District				Public informational meeting 2/12/19
North San Joaquin Water Conservation District				Public informational meeting 2/12/19
Oakdale Irrigation District				Public informational meeting 2/12/19
San Joaquin County				SJ County Advisory Water Commission SGMA standing agenda item 2/20/19; Public informational meeting 2/12/19
South Delta Water Agency				Public informational meeting 2/12/19
South San Joaquin Groundwater Sustainability Agency				Public informational meeting 2/12/19
Stockton East Water District				Joint outreach with Linden County Water District 2/18/19; Public informational meeting 2/12/19
Woodbridge Irrigation District GSA				Public informational meeting 2/12/19

Please indicate which of the above outreach activities your GSA has planned for the upcoming month. Please approximate date of completion.

Eastern San Joaquin Groundwater AuthorityGSA Outreach Activities - March 2019

Agency Name	Update Website	Use Outreach Slides	Post to Social Media	Other
Cal Water				
Central Delta Water Agency				
Central San Joaquin Water Conservation District				
City of Lathrop				
City of Lodi				
City of Manteca				
City of Stockton				
Eastside San Joaquin GSA				
Linden County Water District				
Lockeford Community Services District				Monthly bill and SGMA info
North San Joaquin Water Conservation District				
Oakdale Irrigation District	Updated for March	Added to website		
San Joaquin County				
South Delta Water Agency				
South San Joaquin Groundwater Sustainability Agency				
Stockton East Water District				
Woodbridge Irrigation District GSA				

Please indicate which of the above outreach activities your GSA has planned for the upcoming month. Please approximate date of completion.

Eastern San Joaquin Groundwater AuthorityGSA Outreach Activities - April 2019

Agency Name	Update Website	Use Outreach Slides	Post to Social Media	Other
Cal Water				
Central Delta Water Agency				
Central San Joaquin Water Conservation District				
City of Lathrop				
City of Lodi				
City of Manteca				
City of Stockton				
Eastside San Joaquin GSA				
Linden County Water District				
Lockeford Community Services District				Monthly bill and SGMA info
North San Joaquin Water Conservation District				
Oakdale Irrigation District				
San Joaquin County				Advisory Water Commission meeting 4/17/19
South Delta Water Agency				
South San Joaquin Groundwater Sustainability Agency				
Stockton East Water District				
Woodbridge Irrigation District GSA				

Please indicate which of the above outreach activities your GSA has planned for the upcoming month. Please approximate date of completion.

From June 12 , 2019 GWA Agenda Packet

Eastern San Joaquin Groundwater Authority
GSA Outreach Activities - May 2019

Agency Name	Update Website	Use Outreach Slides	Post to Social Media	Other
Cal Water				
Central Delta Water Agency				
Central San Joaquin Water Conservation District				
City of Lathrop				
City of Lodi	Still current			
City of Manteca				
City of Stockton				
Eastside San Joaquin GSA		CCWD Board Meeting - 5/29		
Linden County Water District				
Lockeford Community Services District				Monthly billing statement & info
North San Joaquin Water Conservation District		Updated to website		5/5/19 - Outreach call with: Jennifer Rohde, Groundwater Scientist, The Nature Conservancy
Oakdale Irrigation District	Updated for May	Added to website		
San Joaquin County				SJ County Advisory Water Commission SGMA standing agenda item
South Delta Water Agency				
South San Joaquin Groundwater Sustainability Agency		SSJGSA Special Board Meeting - 5/22		
Stockton East Water District				
Woodbridge Irrigation District GSA				

Please indicate which of the above outreach activities your GSA has planned for the upcoming month. Please approximate date of completion.

From June 12 , 2019 GWA Agenda Packet

Eastern San Joaquin Groundwater Authority
GSA Outreach Activities - June 2019

Agency Name	Update Website	Use Outreach Slides	Post to Social Media	Other
Cal Water				
Central Delta Water Agency				
Central San Joaquin Water Conservation District				
City of Lathrop				
City of Lodi	Still current			
City of Manteca				
City of Stockton				
Eastside San Joaquin GSA	CCWD Website Update	CCWD Board Meeting 6/26		
Linden County Water District				
Lockeford Community Services District				
North San Joaquin Water Conservation District				
Oakdale Irrigation District	Updated for June	Added to website		
San Joaquin County				
South Delta Water Agency				GSA Public Meeting - 6/13
South San Joaquin Groundwater Sustainability Agency		SSJGSA Board Meeting - 6/19		
Stockton East Water District				
Woodbridge Irrigation District GSA				

Please indicate which of the above outreach activities your GSA has planned for the upcoming month. Please approximate date of completion.

Appendix B. Finding SGMA References on GSA Websites: Easy, challenging, or impossible?

GSA	Difficulty	Details	Outreach material ?
San Joaquin County No. 2 (CalWater) https://www.calwater.com/about/district-information/stk/	Challenging	From the Cal Water main page, the searcher must select "Stockton District." Once there, the only SGMA posting is for the 11/14/18 SGMA public outreach meeting that CalWater itself held	No
Central Delta Water Agency	Impossible	CDWA doesn't have a website.	
Central San Joaquin Water Conservation District http://csjwcd.com/district-services/surface-water/groundwater-sustainabilty-act/	Challenging	From the home page, there is a drop-down menu for "Groundwater Sustainability Act." There is some information about the formation of the GSA; the most recent posting is the JPA agreement.	No
City of Lodi http://www.lodi.gov/525/Water	Challenging	Under Your Government, the searcher must click Public Works then click Water. The first item is a link to the ESJGA website, and there is a link to the flyer for the July 18 informational meeting in English.	No
City of Manteca https://www.ci.manteca.ca.us/PublicWorks/Pages/Utility-Services.aspx	Impossible	If the searcher goes to Department/Public Works/Water Division, she/he will find no drop-down reference to SGMA.	No
City of Stockton http://www.stocktongov.com/government/departments/municipalUtilities/utilWater.html	Challenging	Departments/Public Works—Water is not here. It is under Municipal Utilities Department. But there is no reference to SGMA there; instead the searcher must click Utility Services, then click Water to find only the Resolution forming the JPA and a link to the Eastern San Joaquin Groundwater Authority website: http://www.esjgroundwater.org/	No
Eastside San Joaquin GSA https://ccwd.org/water-resources/sgma/#eastside	Easy	The searcher must know to look for the Calaveras County Water District. Under Departments/Water Resources there are entries for both SGMA and Eastside GSA. There is a 30-minute YouTube video in which Peter Martin, CCWD Water Resources Manager, discusses CCWD's Role in SGMA. The page includes an explanation of the area covered by the Eastside GSA, a partnership of CCWD and Stanislaus County, Calaveras County and Rock Creek Water District.	Yes
Linden County Water District http://www.lindencwd.com/	Impossible	No mention of SGMA, but see Stockton East Water District. There is no mention here of a reported public meeting on 10/25/18.	No
Lockeford Community Services District https://www.facebook.com/LockefordCommunityServicesDistrict/	Easy	The home page is a Facebook page. The searcher can click on the flyer for the February 12, 2019 meeting. There is nothing more recent.	No
North San Joaquin Water Conservation District https://nsjgroundwater.org/sgma/	Easy	There is a SGMA drop-down item on the home page. April and May 2019 ESJGA PowerPoint slides are posted for outreach, and there are links to the SGMA portal, SGMA legislation, the timeline, State Intervention, and a link to a flyer specifically targeting domestic well users.	Yes
Oakdale Irrigation District https://www.oakdaleirrigation.com	Challenging	The menu does not mention SGMA. There is a menu entry for General Manager Newsletters, and the newsletter for March 2018 includes an article about SGMA in connection with a crop report.	No
San Joaquin County https://www.sjgov.org/department/pwk/aboutus?category=divisions&division=Water%20Resources	Impossible	If the searcher knows to go to the Public Works page, she/he can click on "What divisions are in the Department of Public Works" to find Water Resources. There, the contact information still directs to Brandon Nakagawa, who is no longer with the County. Documents posted are from the early 2000s, and SGMA is not mentioned.	No
South Delta Water Agency	Impossible	SDWA doesn't have a website.	
South San Joaquin GSA https://www.ssjid.com	Easy	The searcher must know to go to the SSJID webpage. There, two relevant postings are obvious immediately: the flyer for the July 18, 2019 informational meeting, and a California Farm Bureau Federation brochure on SGMA with SSJID contact information.	Yes
Stockton East Water District https://sewd.net/	Easy	The opening page has a link to January 3, 2019 ESJGA outreach materials along with other SGMA materials and a flyer about a joint presentation with Linden County Water District to the Linden-Peters Chamber of Commerce held February 18, 2019.	Yes

Data as of 7/1/19

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Eastern San Joaquin Subbasin GSP Public Draft July 2019
Cosumnes Subbasin Public Comments submitted via e-mail to info@esjgroundwater.org

Comment #	Commenter	Commenter Organization	Section & Page Number	Section, Figure, or Table Number or Topic	Sentence Starts with, "…	Comment
1	John Fio jfio@ekicons ult.com 650-292-9110	EKI on behalf of Cosumnes Subbasin GSA Working Group	1- 36	1.2.3.3 Land Use Plans Outside the Plan Area	"The City of Galt, located in Sacramento County, is on the southern edge…"	The section heading indicates it will discuss land use plans outside the ESJ Subbasin, but no specific land use planning information is provided for the adjacent Cosumnes Subbasin aside from referencing the existence of the City of Galt General Plan (2009).
2	Linda Dorn dornl@sacco unty.net 916-874-1085	Sacramento County Groundwater Sustainability Agency (GSA) - Cosumnes Subbasin	1- 36	1.2.3.4 Well Permitting	N/A	As an adjacent basin please add Sacramento County well permitting. For well standards visit: http://www.emd.saccounty.net/EC/Pages/Wells.aspx
3	John Fio	EKI on behalf of Cosumnes Subbasin GSA Working Group	1- 51	1.3.5 Inter-basin Coordination	"As part of the SGMA process, stakeholder outreach…"	Only provides date of inter-basin meeting. No explanation of topics discussed or outcome from effort.
4	John Fio	EKI on behalf of Cosumnes Subbasin GSA Working Group	2- 39	2.1.9 Principal Aquifer	"The Eastern San Joaquin Subbasin HCM has one Principal Aquifer that provides…"	The northern boundary of the ESJ Subbasin is shared with the Cosumnes Subbasin, however, there seems to be very little information described in writing about subsurface conditions and groundwater flow conditions at that boundary. This appears to be a deficit in the HCM.
5	Linda Dorn	Sacramento County Groundwater Sustainability Agency (GSA) - Cosumnes Subbasin	2- 57	2.1.10 HCM Data Gaps	"Groundwater Level Data	Sacramento County GSA is adjacent to the northwest data gap area and we encourage coordination with Sacramento County GSA for filling this data gap.
6	Linda Dorn	Sacramento County Groundwater Sustainability Agency (GSA) - Cosumnes Subbasin	2- 59	2.2.1.1 Historical Groundwater Elevations	"The northeast corner of the subbasin...	Amador County Groundwater Sustainability Authority may have information to help fill this data gap in the northeast corner of the subbasin. https://amadorwater.org/tag/amador-county-groundwater-management-authority/
7	John Fio	EKI on behalf of Cosumnes Subbasin GSA Working Group	2- 66	Figure 2-38		It would be helpful for neighboring basins if the groundwater elevation map displayed data points and posted values, especially at the basin boundaries where the contours help assess cross boundary flows.
8	Linda Dorn	Sacramento County Groundwater Sustainability Agency (GSA) - Cosumnes Subbasin	2- 108	2.3.1 Water Budget Background Information	"Because this process in new….	Since the Eastern San Joaquin subbasins water budget relies on adjacent subbasins inflow, the water budget inflow information for the Cosumnes subbasin maybe different than what has been calculated. A sentence should be added that reflects how the water budget will handle discrepancies between adjacent subbasins water budgets .
9	Linda Dorn	Sacramento County Groundwater Sustainability Agency (GSA) - Cosumnes Subbasin	2- 111	2.3.4.1 Assumptions Used in the Historical Water Budget	"The historical calibration includes the following: second bullet, first sub bullet Dry Creek	Sacramento County flood gauge information may provide data on flows in Dry Creek that would be more accurate than extracting Dry Creek flow from CalSIMII. Please see the website below for more information on flow for Dry Creek. https://www.sacflood.org/level.php?view=253d63a6-69ea-4c28-bd90-539059aa5fd8&view_group=99a123be-5de5-3678-7140-d7bb445af1b3&group=7c53d59d-d00d-707c-d514-fc1327f3c4e9 Also Amador County produced a 2006 Dry Creek Watershed Management Plan **(attached)** that is attached to the e-mail submitting these comments. Amador County has additional information on Cosumnes River flows too.

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10	John Fio	EKI on behalf of Cosumnes Subbasin GSA Working Group	2- 121	Table 2-15		Historical conditions indicate that, on average, net groundwater flow is from the Cosumnes Subbasin into the ESJ Subbasin at a rate of 14,000 acre-feet per year (AF/year). However, inflows from the Cosumnes Subbasin to the ESJ Subbasin increase to 23,000 AF/yr under current conditions (more than 60%) and will be 19,000 AF/yr under projected conditions (more than 30%). These changes in cross-boundary flows are potentially significant, and groundwater level monitoring and protective SMCs are needed near the subbasin boundary to ensure that: (1) undesirable results do not occur across the shared subbasin boundary , and (2) these projected increased levels of inflow to the ESJ subbasin from the Cosumnes Subbasin do not impact the ability of the Cosumnes Subbasin to achieve sustainability.
11	Linda Dorn	Sacramento County Groundwater Sustainability Agency (GSA) - Cosumnes Subbasin	2- 134	2.3.6 Sustainable Yield Estimate	"Under sustainable conditions….	Assuming groundwater pumping under sustainable conditions will not create changes in groundwater inflow from neighboring basins should include a caveat referencing future GSPs of the neighboring basins will help determine if pumping under sustainable conditions will affect inflows at the basin boundaries.
12	John Fio	EKI on behalf of Cosumnes Subbasin GSA Working Group	2- 134	2.3.6 Sustainable Yield Estimate	"In order to achieve a net-zero change in groundwater storage…"	The projected water budget shows greater outflows than inflows, resulting in an average annual deficit in groundwater storage of 34,000 AF/year in the ESJ Subbasin. To achieve sustainability, approximately 78,000 AF/year of direct or in lieu groundwater recharge and/or reduction in agricultural and urban groundwater pumping is reportedly needed in the ESJ Subbasin. However, there is no explanation or discussion for how and where these reductions will be achieved. Moreover, the lack of certainty in implementing projects and/or management actions to achieve sustainability create uncertainty in their potential effects on the Cosumnes Subbasin.
13	John Fio	EKI on behalf of Cosumnes Subbasin GSA Working Group	2- 148	2.3.7.4 Eastern San Joaquin Water Budget Under Climate Change	"A climate change scenario was developed for the ESJWRM to evaluate the hydrological impacts under these climate change conditions."	Tabulated water budget results like those in Table 2-15 need to be included for the climate change scenario results.
14	John Fio	EKI on behalf of Cosumnes Subbasin GSA Working Group	3- 4	3.2.1.2 Minimum Thresholds	"The minimum thresholds for chronic lowering of groundwater levels…"	The Minimum Thresholds(MT) for groundwater levels protect against Undesirable Results in the ESJ Subbasin and were specified for 19 wells based on minimum water levels measured in 1992 or 2015-2016, whichever are lowest, plus an operational buffer. These groundwater level MTs are utilized as proxy for groundwater storage, subsidence, and interconnected surface water sustainability indicators for the ESJ Subbasin. The MTs for the ESJ Subbasin should also ensure that they are not creating changes in groundwater inflow that could impede sustainability plans and implementation in the Cosumnes Subbasin. This includes groundwater level monitoring near the subbasin boundary and projected changes under historical, current, projected, and climate change.
15	John Fio	EKI on behalf of Cosumnes Subbasin GSA Working Group	3- 18	3.2.6 Depletion of Interconnected Surface Water	"Depletion of interconnected surface water is a reduction…"	"Depletion of Interconnected Surface Water" states that depletions are considered an Undesirable Result (UR) if the depletions significantly and unreasonably reduce surface water flow or levels and adversely impact beneficial uses of the surface water within the ESJ Subbasin. However, the contribution of these reductions to the cumulative depletion in downstream flows and potential impacts to Cosumnes Subbasin recharge should also be considered, given the important nature of this boundary condition.

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16	Rodney Frickerfricke @geiconsultants.com 916-341-9138	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	1- 10	1.2.1.1	2nd to last line in 1st paragraph	~~Sacramento~~ Solano Subbasin (Bulletin 118 Basin Number 5-021.66)
17	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	1- 14		Sentence does not seem correct.	…, while ~~eastern~~ western portions of San Joaquin County and City of Stockton, and ~~western portions of Calaveras and~~ much of Stanislaus County ~~ies,~~ lie in neighboring subbasins.
18	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	1- 19	Well Density	"DWR recommends a suggested well density of 0.2 to 10 monitoring wells per 100 square miles."	Statement is out of context. Paragraph is talking about density of supply wells and the DWR criteria is not applicable to locations chosen by well owners. Monitoring wells are subject to the DWR criteria, which is a different topic.
19	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	1- 19	Figure 1-12 to -14	Density of … Wells per Square Mile	The download of data for these maps should have included data tables, including number of wells per section, depths, and other information. How were these data addressed in the GSP?
20	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	1- 22	1.2.2 Water Resources Monitoring and Management Programs	Eighth primary bullet	Online System for Well Completion Reports (OSWCR) seems to be oriented to licensed well drillers but has a link to: *Well Completion Report Map Application* which provides links to PDFs. In addition, the *SGMA Data Viewer* application provides links to PDFs of well completion reports.
21	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	1- 25	1.2.2.1.5	Data Received Directly from GSAs	See above.
22	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	1- 27	1.2.2.4 Land Subsidence Monitoring	1st paragraph	The paragraph should acknowledge that DWR (2014) listed the Eastern San Joaquin Subbasin as having a medium to high potential for subsidence due to long-term declining groundwater levels. (*Summary of Recent, Historical, and Estimated Potential for Future Land Subsidence in California*)
23	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	1- 27	1.2.2.4 Land Subsidence Monitoring	**United State Geological Survey**	The paragraph starts with a USGS heading, which only applies to the subsequent paragraph. The paragraph refers to Plate Boundary Observatory (PBO) GPS stations, which are operated by UNAVCO, and refers to station (P781), which was removed from the program in 2014. The text does not acknowledge other PBO stations in the vicinity of the subbasin, including P256 – Brentwood, P257 – Tracy, P273 – Lodi, P274 – Elk Grove, P275 – Galt, and P309 – Linden. The USGS study area may have utilized the PBO stations but the study addressed much of the San Joaquin Valley further south.
24	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	1- 27	1.2.2.4 Land Subsidence Monitoring	**Other** - last sentence	The NASA JPL processed dataset spans from May ~~Spring of~~ 2015 to April ~~Summer of~~ 2017 (CA, DWR, 2019).

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25	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	1- 40	1.3.1 Beneficial Uses and Users in the Basin	First bullet	Text says "…. approximately 1,000 unique domestic, public, and production wells in the Subbasin." but Figure 2-4 shows 6,800 GAMA sites and DWR (2014) says 19,176 wells total.
26	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	1- 51	1.3.5 Inter-basin Coordination	First paragraph	To date, there has been at least one meeting between representatives of the GWA and the neighboring ~~basins of~~ Cosumnes, Modesto, ~~Subbasin~~ and Tracy Subbasins to initiate this process.
27	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 8	2.1.2 Regional Geologic and Structural Setting		The Sierra Nevada Mountain Range, east of the Central Valley, is comprised of pre-Tertiary igneous and metamorphic ~~continental~~ rocks.
28	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 9	2.1.3 Geologic History	Marine conditions persisted through the middle to late Tertiary period (~3-30 million years ago) …	Middle to late Tertiary would be more like 23 to 60 or 65 million years
29	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 12	2.1.4.2 Major Hydraulic Features	Four paragraphs	Acre-feet per day and cubic feet per second are flow rates, not volumes
30	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 23	2.1.5 Geologic Formation and Stratigraphy		Generally, eastside formation material originates as ~~from~~ continental deposits from the Sierra Nevada and westside formation material originates as ~~from the~~ continental deposits from the Coastal Ranges (marine).
31	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 25	Figure 2-16 Geologic Map		The Tulare Formation is listed in the legend but is not present on the map. The Sacramento Regional Geology Map (RGM) does not include the Tulare Formation in its Explanation and the dark orange shading on the San Francisco-San Jose RGM is labeled Tvs for the Valley Springs Formation. The Tulare Formation originates from the Coast Range and would not crop out within the ESJ Subbasin.
32	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 26	Table 2-2 Generalized Stratigraphic Column	Fourth row of information: Turlock Lake is listed in the Formation column (4th) but the Rock column (6th) references Laguna, Tulare and younger formations.	See comment above. The explanation summary for the San Francisco-San Jose RGM shows that the Tulare Formation is older than the Turlock Lake Formation. The Geologic Map Explanation indicates the upper Tulare Formation and lower Turlock Lake Formation could be interbedded at depth within the center of the Central Valley.
33	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 27	2.1.5.1.2 Ione Formation	Last sentence, first paragraph: "This ~~kaolinite~~ sand is commonly called Ione sand."	The Ione Formation is an important source of both sand and clay but these products are separate. "Kaolinite sand" is not possibly since kaolinite is a clay mineral and not durable enough to be sand.
34	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 29	2.1.5.1.5 Laguna Formation	Last paragraph: "Some studies suggest that an extensive aquitard, namely the Corcoran Clay member of the Tulare Formation, extends into the Laguna Formation or separates the Laguna and Mehrten Formations."	Which studies suggest that the Pliocene-Pleistocene Tulare Formation (younger) could be part of the middle Pliocene Laguna Formation (older) or occur between the Laguna Formation and the Miocene-early Pliocene Mehrten Formation (older still)?

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35	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 29	2.1.5.1.6 Turlock Lake Formation	Second paragraph: "The Turlock Lake Formation is differentiated from the west to east by its Corcoran Clay member that is present in the southwest corner of the Subbasin ..."	According to the USGS (Faunt, 2009), "… the western San Joaquin Valley generally is finer-grained and is underlain by the **Corcoran Clay Member of the Tulare Formation** (hereafter referred to as the Corcoran Clay)." and "This confining unit is a stratigraphic unit, the **Corcoran Clay Member of the Tulare Formation** (referred to in this report as the Corcoran Clay." Bold added for emphasis. A search of the report (Faunt, 2009) did not find any reference to the Turlock Lake Formation.
36	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 32	Figure 2-18: Base of Fresh Groundwater ~~Elevation~~ Contours and Stockton Fault		Only a single sentence for the figure. Additional text should be added to explain the significance of the information.
37	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 35	Figure 2-20: Hydrogeologic Cross-sections A-A' and B-B'		Cross sections are too small, even printed on 11 x 17" paper, as the well labels are not legible. Scale of 0.36 to 0.45 inch per 1000 feet is not reasonable. The Stockton Fault is not depicted or located on Sections D-D' and E-E'. Page 2-38, first paragraph refers to "well screen interval (shown in red)." but the interval is not shown and likely could not be seen due to the small size of the cross section. Cross sections don't show the three zones within the principal aquifer, except by association with the formations. Model Section D-D' is equivalent to GSP Section C-C' and D-D' shows the Corcoran Clay. The Corcoran Clay is shown on southern end (7 miles) of Section E-E' but not at the southern end of Section D-D'. According to DWR (1981/2008), the top of the Corcoran Clay cannot be delineated to the east of Highway 99 at Manteca, but Section E-E' is located further east of Highway 99 and would not encounter the clay until several miles further south of the subbasin boundary. Moreover, the depth to the top might be 200 feet on the west side of Manteca, south of Highway 120, which is within the southernmost alignment of Section D-D'. The presence of the Corcoran Clay appears to be more related to the DWR model of the Central Valley than to well logs.
38	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 36	Figure 2-21: Hydrogeologic Cross-sections C-C' and D-D'		
39	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 37	Figure 2-22: Hydrogeologic Cross-section E-E'		
40	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 35	Figure 2-20: Hydrogeologic Cross-section B-B'		The eastern side of the sections show 1,500 feet and nearly 2,100 feet, respectively, of sedimentary formations without presenting an explanation. Section A-A' shows these formations thinning eastward on top of bedrock. Sections B-B' and C-C' suggest a substantial aquifer further east and the model sections show similar conditions. This thick eastern boundary is not discussed in the text and will produce a high-end bias for the estimate of groundwater storage which could lead to the false sense of sustainability.
41	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 36	Figure 2-21: Hydrogeologic Cross-section C-C'		
42	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 39	2.1.9.1 Zones within Principal Aquifer	Stratigraphy of the Deep Zone aquifer materials	What about the stratigraphy of the Shallow and Intermediate Zones? Why are is the stratigraphy of the deeper than Deep Zone referenced when few wells are deeper than 500 feet?
43	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 41	2.1.9.1.1 Shallow Zone	The cross-sections also depict the aquifer thickness from 30 feet to greater than 300 feet.	For the 11 x 17" print, that's 0.01 to 0.12 inches,

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44	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 42	2.1.9.1.3 Deep Zone	As depicted on the hydrogeologic cross-sections A-A' through E-E' (refer to Figure 2-20, Figure 2-21, and Figure 2-22), boring logs indicate a significant 30-foot thick gravel encountered at a depth from 140 to 170 feet.	and 0.01 inches at 0.06 to 0.07 inches below the land surface, and is not shown on the sections. What about a bullet for hydraulic conductivity values for each zone to match the other aquifer parameters?
45	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 43	2.1.9.1.4 Limited Aquitards	The Corcoran Clay member of the ~~Turlock Lake~~ Tulare Formation and other interbedded clay/silts are aquitards that inhibit groundwater flow. The Corcoran Clay ~~(found at the base of the upper unit of the Turlock Formation)~~ is present at a depth of about 200 feet bgs.	See comments above. Text on page 2-29 says Corcoran Clay is associated with the Laguna Formation and/or occurs between the Laguna and Mehrten Formations. As shown on Section E-E', the top of Corcoran Clay is ~140 feet and the thickness is ~70 feet at the basin boundary.
46	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 43	2.1.9.1.4 Limited Aquitards	The cross-sections (Figure 2-20, Figure 2-21, and Figure 2-22) show both the clay and silt horizons range in thickness from less than 10 feet to over 150 feet.	For the 11 x 17" print, that's 0.004 to 0.06 inches
47	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 45	2.1.9.2 Aquifer Characteristics and Groundwater Quality	The thickest sand and gravel sequences ranged from 500 to 700 feet in the foothills located near the Stanislaus River ~~Dry Creek~~, south of Woodward ~~Camanche~~ Reservoir and Northeast of Oakdale.	Camanche Reservoir is located at the northeastern corner of the subbasin and Oakdale is located at the southeastern corner, ~30 miles apart.
48	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 45	2.1.9.2.1 Aquifer Parameters and Production Zone Well Capacities		Production Zone is new subdivision to the Principal Aquifer. How does it relate to the Shallow, Intermediate and Deep Zones?
49	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 48		SY values range from 4 to 10 percent.	Page 2-42 said "Storage coefficients up to 17 percent" for the shallow zone, which should have referred to the specific yield.
50	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 48	Table 2-4 Wells within Water-Bearing Zones		Why was Intermediate and Deep Zones combined?
51	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 50	2.1.9.2.3.1 Geologic Formation Water Quality	The Ione formation, for instance, is known to have high sulfate levels in groundwater related to the pH influence on pyrite-sulfide rich coal deposits..	The oxidation of pyrite and other sulfide minerals would produce sulfuric acid which would manifest as a lower pH.
52	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 50		Sources of arsenic include weathering of minerals containing arsenic, desorption of arsenic under certain pH values, and release of arsenic in redox conditions	What type of conditions since redox is an abbreviation for reduced versus oxidized conditions - oxygen absent versus oxygen present?

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53	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 50		Another element of great importance is nitrogen, as it is included in many compounds that are by-products of agriculture …	The focus of this paragraph is odd. The atmosphere is comprised of 78% nitrogen and the soils and underlying rock in the upland watersheds appears to absorb and store nitrogen. The real important issue is the occurrence of nitrate in the subbasin. How much nitrate occurs in the Mokelumne River (and other rivers) as that surface water enters the subbasin? Why is nitrate omitted from the list of anions in the next paragraph? Why wasn't a box-and-whisker diagram prepared for nitrate to show its variations between 2005 and 2017?
54	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 56	2.1.10 HCM Data Gaps	• Water quality of three zones in principal aquifer~~s~~	
55	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 57	Groundwater Level Data	• Additional groundwater level data near major creeks and rivers such as the Mokelumne River to improve quantification and understanding of subsurface flows between subbasins and for surface water-groundwater interactions	
56	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 57	Subsurface Conditions	• Further definition of aquifer characteristics (e.g., hydraulic conductivity, transmissivity, and storage parameters) within and near Subbasin boundary areas to the east, southeast, north and northwest, including aquifer tests	Why east side of basin, which is bedrock in the foothills of the Sierra Nevada mountains? More attention is needed along the boundary with the Cosumnes and South American Subbasins to the north.
57	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 60	Figure 2-34: Hydrographs of Selected Wells		SGMA requires the same datum and scaling for hydrographs (to the extent possible). The 10 hydrographs use different horizontal and vertical scales. The horizontal scales varied from starting years between 1950 and 1973 and the ending years between 2014 and 2017 which produced a span of 43 to 67 years. The span of the vertical scales varied between 18 and 180 years. What are the depths of these 10 wells? What zones do these wells represent? Why weren't wells 04N08E06C002 and 04N05E10K001 identified as representative monitoring wells, given their proximal location to the northern boundary of the subbasin?
58	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 62	Figure 2-35: Groundwater Elevations 1940-2018, (a) Box-and Whisker Plot with Precipitation		Difficult plot due to overlapping lines. Change to scale of the second vertical axis to shift the precipitation line above the box-and-whiskers. Average annual precipitation line is not provided, as stated in third note. What about showing the water year type?
59	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 64	2.2.1.2 Current Groundwater Elevations		Why are 2016 data omitted from current conditions? Historical data are 1996 to 2015. Current data are only 2017?
60	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 67	2.2.1.2.1 Vertical Gradients	A downward gradient is one where groundwater ~~is moving downward~~ could move deeper through the subsurface if the vertical hydraulic conductivity allows the movement.	Vertical gradients only show potential for groundwater flow. An aquitard would prevent that vertical flow

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61	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 67		At present, USGS nested monitoring wells confirm downward vertical ~~flows~~ gradient (Williamson, 1989).	vertical flow.
62	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 69	Figures 2-40 to 2-49: Nested Well Hydrographs		SGMA requires the same datum and scaling for hydrographs (to the extent possible). The 10 hydrographs use different horizontal and vertical scales. Use of the scales would allow the magnitude of the gradients to be evident between locations and allow comparison of the record of data.
63	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 74	2.2.2 Groundwater Storage	In 2015, the total fresh groundwater storage was estimated as 53.0 MAF and the cumulative change in storage over 1995-2015 was estimated as -0.91 MAF (-0.09%), or -0.05 MAF/yr.	Figure 2-50 is not effective at showing anything - just a big blue rectangle with a slightly irregularly top '-0.91 / 53 *100 = -1.7% Reduction in storage really only began in 2008 when the value became negative and stay negative thereafter. The average change in storage would be -0.11 MAF/yr for that 8-year period.
64	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 80	Table 2-5: Summary of Chloride Data by Decade	Table 2-5 shows occurrence of chloride measurements ~~greater than 250 mg/L~~ by decade.	The table shows that minimum, average, and median values are all less than 250 mg/L.
65	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 80	Table 2-6: Summary of Chloride Data by Depth (1940s-2010s)	Table 2-6 shows occurrence of chloride measurements ~~greater than 250 mg/L~~ by well depth.	How do the depth intervals relate to the zones in the principal aquifer?
66	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 82	Chloride data	Approximately 4,600 of the almost 13,000 chloride measurements in the Eastern San Joaquin Subbasin are from wells lacking any construction or screen depth information. Roughly half of the measurements ~~above 250 mg/L~~ occur in the wells lacking depth data, which also show the highest range in values occurring above 250 mg/L.	Table 2.6 shows that 3,566 samples out of a total of 6,931 samples lack depth data but these data are not limited to only concentrations greater than 250 mg/L. The no-depth well group does have the highest range but the 100-foot well group has a much higher median value, a higher minimum, and a comparable average relative to the no-depth well group.
67	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 82	2.2.4.1.2 Total Dissolved Solids	TDS, which is a measure of all inorganic ~~and organic~~ substances present in a liquid in molecular, ionized, or colloidal suspended form, is commonly used to measure salinity.	According to the USGS (Hem, 1985), "Organic matter, if present, may be partly volatile, but it is not completely removed unless the residue is strongly ignited."
68	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 85	Figure 2-57: Maximum TDS Concentrations in Shallow Wells 2015-2018		Figure explanation says shallow wells are less than 200 feet but Table 2.7 show depth ranges of 0-100', 100-250', 250-500', and >500', which is not consistent. How do the depth intervals relate to the zones in the principal aquifer?
69	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 85	Figure 2-58: Maximum TDS Concentrations in Deep Wells 2015-2018		Figure explanation says deep wells are greater than 200 feet. What about intermediate wells?

Comment #	Commenter	Commenter Organization	Section & Page Number	Section, Figure, or Table Number or Topic	Sentence Starts with, "…	Comment
70	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 95	Table 2-10: MCLs for Common Petroleum Hydrocarbons and MTBE		Why are the units for xylene mg/L when the other organics are ug/L? The change seems disingenuous.
71	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 96	Table 2-11: MCLs for Common Synthetic Organic Constituents	**TCE**: Used as a solvent in manufacturing facilities and dry cleaners **PCE**: Used as a solvent ~~in~~ at dry cleaners, manufacturing facilities, printing shops, and auto repair facilities	TCE may have been used early in the dry cleaning industry but dry cleaners seem to be the dominant source for PCE plumes.
72	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 101	Figure 2-67: Natural Communities Commonly Associated with Groundwater (NCCAG)		Dark subbasin boundary line obscures the color-coded lines
73	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 109	2.3.3 Use of the ESJWRM and Associated Data in Water Budget Development		Historical Water Budget was established for 20 years (WY 1996 to 2015). Projected Water Budget was produced for the implementation period, starting in 2020, based on a 50-year previous hydrology (1969 to 2018). Why is Current Water Budget based on a 50-year period (1969 to 2018) when SGMA requires the use of "the most recent hydrology, water supply, water demand, and land use information."? I'm thinking a Current Water Budget would be for 2016 and 2017 (maybe 2018) to be consistent with Section 2.2.1.2 - Current Groundwater Elevations.
74	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 110	Table 2-12: Summary of Water Budget Assumptions (Historical, Current, and Projected Periods)		Hydrologic Years: 50-year period for Current Water Budget is not consistent with SGMA requirement. All other entries say current and refer to recent information - no the past 50 years. Note 3 refers to "pre-drought level (assumed water year 2013)". WY 2013 was a critical WY.
75	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 112	2.3.4.2 Assumptions Used in the Current Water Budget		The 50-year period is not consistent with SGMA requirement.
76	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 115	2.3.5 Water Budget Estimates	Land Surface System, Inflows: Riparian intake from streams	Riparian intake from streams is evapotranspiration outflow from the stream system. How can it also be an inflow?
77	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 121	Table 2-15: Average Annual Water Budget – Groundwater System		The proportions of water in the budgets don't vary more than a few percentage point which is likely due to the long-term overlapping periods of data. See previous comments on the use of a 50-year period for current conditions. Totals for main categories of inflow and outflow don't match table totals (due to rounding [?]). Tables 2-13 and 2-14 may exhibit similar discrepancies.
78	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin		Figures 2-72 to 2-80		Magnitude of average annual volumes would be more easily perceived if the vertical scale was the same for each plot.

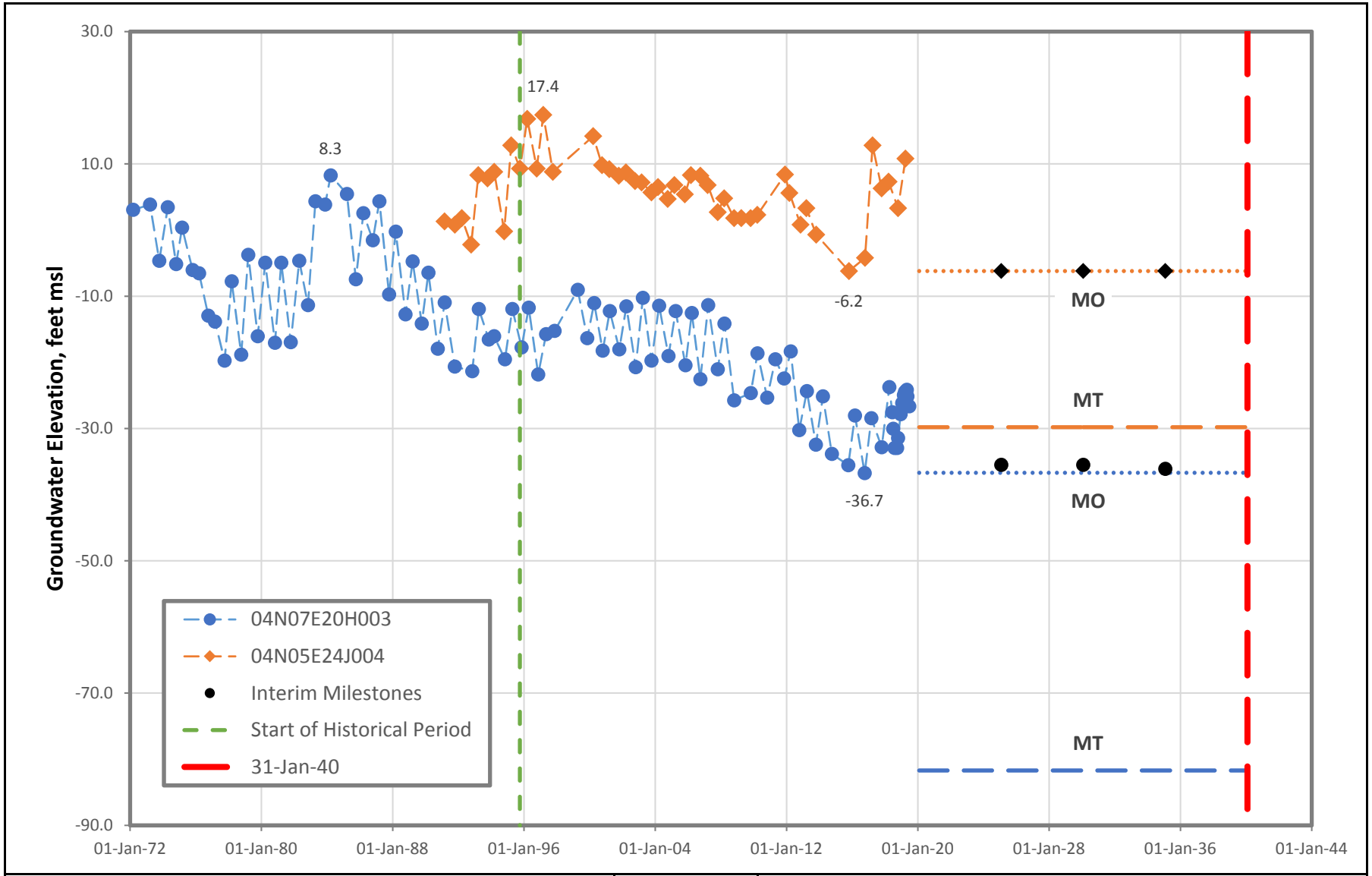
Comment #	Commenter	Commenter Organization	Section & Page Number	Section, Figure, or Table Number or Topic	Sentence Starts with, "...	Comment
79	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 126	Table 2-16: Average Annual Values for Key Components of Historical Water Budget by Year Type	Above Normal (AN) and Below Normal (BN) columns	How can the average of three AN years be less than one BN year? Is math correct?
80	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 130	2.3.5.4 Projected Water Budget Estimates		Section needs a figure for projected groundwater budget similar to the historical conditions of 1996 to 2015 (Figure 2-51) and for climate change (Figure 2-102). What about groundwater budget information for Wys 2016, 2017, and 2018?
81	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 133	2.3.6 Sustainable Yield Estimate	In order to account for the challenges of implementing the GSP, this Plan assumes future operations would remain consistent for a 25-year period and groundwater levels would continue to decline until 2040.	This statement actually implies that groundwater levels will decline until 2045 (2020 + 25 = 2045), which would not be consistent with SGMA's prohibition of "chronic lowering of groundwater levels" which would continue to cause groundwater to flow from the adjacent subbasins and limit their ability to achieve sustainable management, unless ESJ successfully implements all of their projects and management actions.
82	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 134		The sustainable conditions scenario results in groundwater outflows almost equal to groundwater inflows, bringing the long-term (50-year) average change in groundwater storage to close to zero. Based on this analysis, the sustainable yield of the basin is **715,000 AF/year** ± 10 percent.	Does this 50-year average approach really support operations within this sustainable yield within the 20-year planning and implementation horizon? The sustainable yield would appear to range from 643,000 AF/yr to **715,000 AF/yr** to 787,000 AF/yr. Table 2-17 says the 50-year total groundwater supply is 801,000 AF/yr, which is 86,000 AF/yr greater than the sustainable yield. Text on page 2-148 also refers to 801,000 AF/yr as private groundwater production.
83	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 134		In order to achieve a net-zero change in groundwater storage over a 50-year planning period, approximately 78,000 AF/year of direct or in lieu groundwater recharge and/or reduction in agricultural and urban groundwater pumping would need to be implemented in the Eastern San Joaquin Subbasin.	
84	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 138	Figure 2-82: Dry Creek Hydrograph		Why is a 54-year period (1964 to 2018) used in the projection when the previous text referred to a 50-year period (1696 to 2018)? Shouldn't the time scale be 2020 to 2070 or Year 1 to 50, beginning in 2020? Same questions for Figures 2-84, 2-86, 2-88, and 2-90.
85	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 148	2.3.7.4 Eastern San Joaquin Water Budget Under Climate Change	With a similar surface water supply and increased water demands under the climate change scenario, private groundwater production is simulated to increase approximately 11 percent, from 801,000 AF/year to 887,000 AF/year.	Does municipal groundwater pumping increase to total?

Comment #	Commenter	Commenter Organization	Section & Page Number	Section, Figure, or Table Number or Topic	Sentence Starts with, "…	Comment
86	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	2- 151	Figure 2-102: Groundwater Budget – Climate Change Scenario		Cumulative change in groundwater storage continues to decline for the 50-year period which is not consistent with the SGMA prohibition of reduction in groundwater storage.
87	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	3- 6	Figure 3-2: Location of Representative Monitoring Wells for Groundwater Levels		Groundwater along the northern boundary are monitored by two shallow CASGEM wells (Wells 04N07E20H003 and 04N05E24J003) that are 3.3 to 4.2 miles south of the Cosumnes Subbasin. These wells are located ~8 miles apart along the 26-mile E-W subbasin boundary (excludes 4-mile N-S boundary with Amador County). Additional monitoring wells should be installed along to the boundary to cover the entire length, including deeper wells, to better define cross boundary flow, vertical gradients, and the surface water-groundwater interaction.
88	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	3- 7	Table 3-1: Minimum Thresholds for Chronic Lowering of Groundwater Levels		The MT for well 04N07E20H003 was confirmed at -81.7 feet MSL by the GSP methodology, but the MT (-31.2 feet MSL) for well 04N05E24J003 was found to be lower by 1.4 feet or -29.8 feet MSL. Appendix 3-A shows a 25-foot buffer compared to the 23.6-foot buffer derived from the difference between the highest and lowest values. The MOs were confirmed for the two wells (Table 3-2). Use of these management criteria will further reduce groundwater levels and storage along the northern boundary of the subbasin and cause groundwater from the Cosumnes Subbasin to flow into the ESJ Subbasin due to this generous management criteria. Recent groundwater levels (Mar/Apr-19) are 13 and 17 feet above their respective MOs and 58 and 41 feet above their respective MTs (Wells 04N07E20H003 and 04N05E24J003). Use of this criteria will allow the further lowering of groundwater levels and the reduction in storage, which will cause additional groundwater flow from the Cosumnes Subbasin, especially during a long-term period of drought. Note that the method for establishing the MT buffer is somewhat different for each well, which adds a bias to values. For well 04N07E20H003, the buffer was based on the difference between the highest groundwater level (WL), which occurred during Mar-84 (during an above normal [AN] WY, following the wettest WY on record and a wetter AN WY), and the lowest WL during Oct-16. For well 04N05E24J004, the highest and lowest WLs occurred during Mar-97 and Oct-15, respectively. The historical water budget period was established for 1996 to 2015, so the highest and lowest WLs should be restricted to that period (**See attached Figures 1 & 2)**. In addition, Appendix 3-B provides hydrographs with MT and MO lines for a date range beginning in 1990. This uniform criteria should be applied to all representative WL monitoring wells.
89						

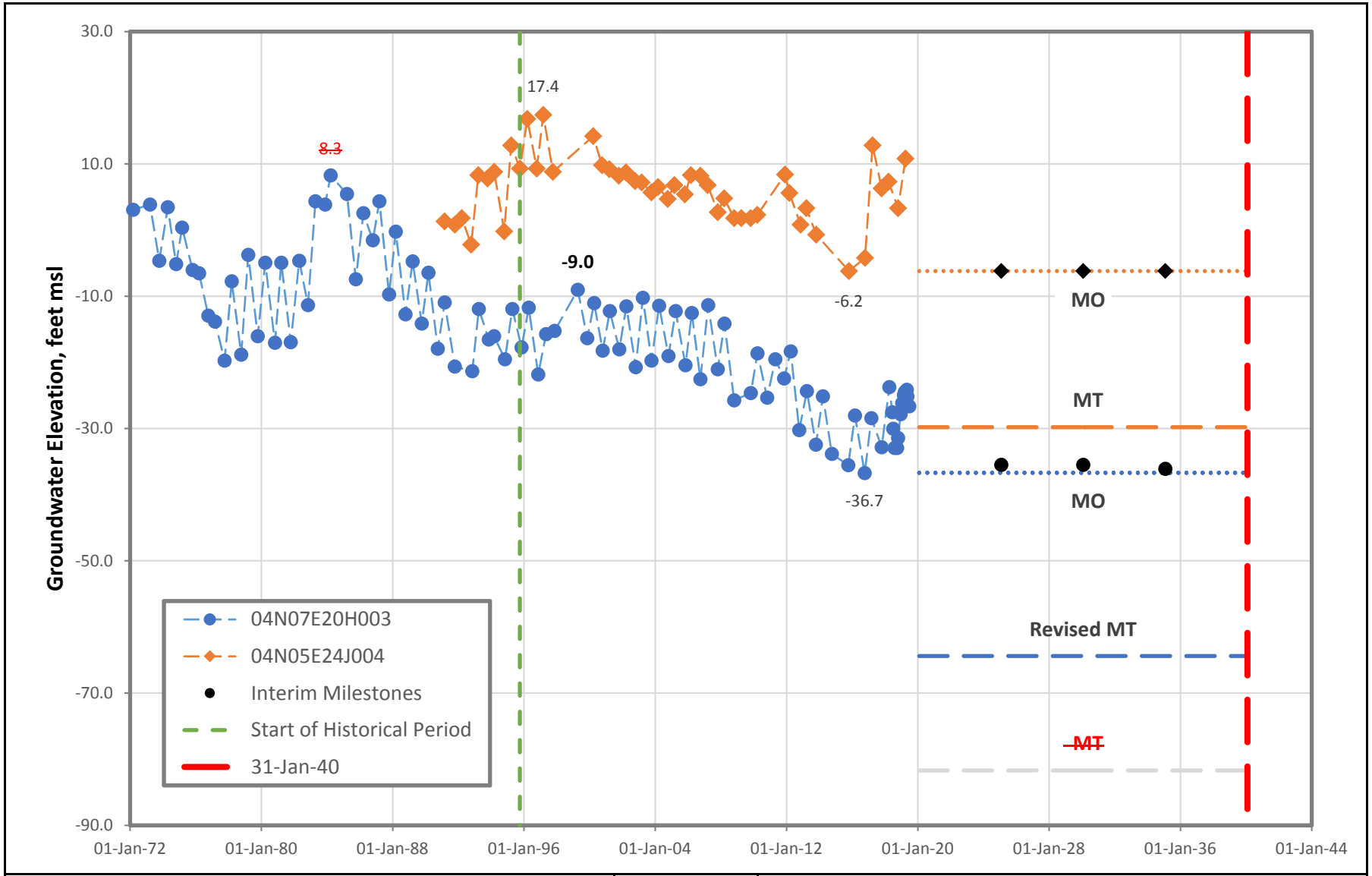
Comment #	Commenter	Commenter Organization	Section & Page Number	Section, Figure, or Table Number or Topic	Sentence Starts with, "…	Comment
90	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	3- 9	Table 3-3: Interim Milestones for Chronic Lowering of Groundwater Levels		Current groundwater levels (WL) are set at values for Fall 2015. For well 04N05E24J004, the "current" WL, MO, and all interim milestones are -6.2 feet MSL. The WL declined further in fall 2016 to -4.2 feet MSL and then varied from 6.3 feet MSL in fall 2017 and 3.3 feet MSL in fall 2018. For well 04N07E20H003, the "current" WL was -35.5 feet MSL, just above the MO of -36.7 feet MSL, and the first two interim milestones equal -35.5 feet MSL ("current WL") and the third milestone allowed a WL decline to -36.1 feet MSL. The WLs declined during the fall 2016 to -36.7 feet MSL (MO) and then rose thereafter to -32.8 feet MSL during fall 2017 and -31.4 feet MSL during fall 2018.
91	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	3- 10	3.2.2 Reduction in Groundwater Storage	3.2.2.1.1 Description of Undesirable Results	DWR has classified the ESJ Subbasin as overdrafted. The text does not provide a direct rebuttal to this classification or address the contributions of groundwater from the adjacent subbasins which should be an undesirable result of overpumping.
92	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	3- 11		3.2.2.2 Minimum Thresholds	The text does not address the contributions of groundwater from the adjacent subbasins which should be an undesirable result of overpumping. How much groundwater would move into the ESJ Subbasin from adjacent subbasins if the storage were reduced by 1.2 MAF to down to 30 MAF?
93	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	3- 14	Table 3-4: Interim Milestones for Degraded Water Quality		The measurable objective for TDS is 600 mg/L - the recommended secondary MCL plus a 100-mg/L buffer. TDS currently ranges from 280 to 510 mg/L (average: 370 mg/L) at the 10 representative monitoring wells. The interim milestones allow incremental increases of TDS over the 20-year period, ranging from 5 to 29 percent (average: 15%), where lower-TDS wells have greater increments and higher-TDS wells have lower increments. This approach appears to encourage the degradation of water quality as an objective.
94	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	3- 18	3.2.5 Land Subsidence	3.2.5.2 Minimum Thresholds Further, the use of groundwater levels as a proxy is necessary, given the lack of direct monitoring for land subsidence in the Subbasin.	The text fails to acknowledge the continuous GPS station (P309 - Linden) in the subbasin and the 5 other stations in adjacent subbasins, which be used to interpolate subsidence within the subbasin. Additional GSP stations could be installed in the subbasin.
95	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	4- 8	4.3 MONITORING NETWORKS FOR DEGRADED WATER QUALITY	Monitoring networks monitoring for water quality will test for total dissolved solids (TDS), cations and anions, arsenic, and field parameters including pH, electrical conductivity (EC), and temperature.	Anions should include nitrate as well as bicarbonate & carbonate, chloride, and sulfate.
96	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	4- 14	4.3.5 Spatial Density of Groundwater Quality Monitoring Wells	DWR's Monitoring Networks and Identification of Data Gaps BMP states "The spatial distribution must be adequate to map or supplement mapping of known contaminants" (CA DWR, 20161~~0b~~).	Make appropriate revision in Section 8, page 8-6
97	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	6- 1	6.2.1 Project Identification	• Project is affordable and cost~~e~~-effective (~~highest~~ lowest unit cost per volume water savings)	

Comment #	Commenter	Commenter Organization	Section & Page Number	Section, Figure, or Table Number or Topic	Sentence Starts with, "…	Comment
98	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	6- 34	6.3 MANAGEMENT ACTIONS	Additional management activities are discussed in Chapter 7: Plan Implementation, including:	All of these activities are required by SGMA so they aren't really management actions (reduced pumping, fallowing, …) as intended by SGMA
99	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	7- 4	Table 7-2: Costs to GSAs and GSP Implementation Costs	Developing 5-Year Evaluation Reports: $800,000 - $2,000,000 every 5 years	$0.8M to $2.0M is quite excessive, as if the GSP will be done over. Annual reports will provide a significant foundation for the 5-year evaluation and the cost might be only $200K to $300K - hopefully a lot less. Other costs should be reviewed closely to ensure reasonableness.
100	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	7- 7	7.6 DEVELOPING 5-YEAR EVALUATION REPORTS		
101	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	7- 5	7.3.1 Monitoring	Components of the annual monitoring program costs include:	Won't the field crew and their equipment be used for sampling ($57K to $60K) and ~~sampling~~ costs are really laboratory costs ($24K to $30K)? Will CASGEM continue to exist after full implementation of SGMA?
102	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	7- 8	7.6.3 Reconsideration of GSP Elements	The water year types from the San Joaquin Valley Water Year Hydrologic Classification used in this Plan are based on stream inflows from a variety of streams in the San Joaquin Valley. In the future, a more locally-relevant index may be developed that would be more representative of conditions specific to the Subbasin.	Why waste resources on a new index when a 118-year index is already available for the San Joaquin Valley? (Sacramento Valley index is 113 years long and is mostly consistent with the San Joaquin Valley index.)
103	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	ES- 3	ES-5. EXISTING GROUNDWATER CONDITIONS	California has three secondary maximum contaminant level (SMCL) standards for TDS, all based on aesthetic considerations such as taste and odor, not public health concerns. These are 500 mg/L (recommended limit), 1,000 mg/L (upper limit), and 1,500 ~~2,500~~ mg/L (short-term limit).	
104	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	ES- 3	ES-5. EXISTING GROUNDWATER CONDITIONS	Interconnected surface waters are surface water features that are hydraulically connected by a saturated zone to the groundwater system. If the water table adjacent to a river or stream goes down as a result of groundwater pumping, the river or stream may "lose" water to the underlying aquifer.	Replace with: Surface waters can be hydraulically interconnected to the groundwater system, where the baseflow is derived from the aquifer (gaining stream) or the stream can lose surface water to the aquifer. If the water table beneath the stream goes down excessively as a result of groundwater pumping, the stream may disconnect from the underlying aquifer.
105	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	ES- 9	ES-10. PROJECTS AND MANAGEMENT ACTIONS	Additional management activities included in the Draft GSP include the following:	All of these activities are required by SGMA so they aren't really management actions (reduced pumping, fallowing, …) as intended by SGMA

Comment #	Commenter	Commenter Organization	Section & Page Number	Section, Figure, or Table Number or Topic	Sentence Starts with, "...	Comment
106	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	ES- 11	ES-11. GSP IMPLEMENTATION	The GWA Board adopted a preliminary schedule for project implementation. Project implementation is scheduled to begin in 2020, with full sustainability ~~implementation~~ by 2040.	
107	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	ES- 12	ES-12. FUNDING		Some costs need a closer look, especially the 5-year updates.
108	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	Model ES-4	Cross Section B-B'		Elevation scale is shown to vary from 2500' to 0' [msl]. The correct elevation range should be 900' msl, based on Figure 22, to a deep negative elevation.
109	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	Model Report	Figures 29a to 29f: Cross Sections		The upper limits of the elevation scale vary from 1800' to 3000'. The correct elevation range should be 900' msl, based on Figure 22, to a deep negative elevation.
110	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	Model Report	Figures 29a: Cross Section		Section A-A' is located somewhat north of GSP Section A-A'. The GSP section shows the sedimentary formations thinning eastward on top of bedrock. Whereas, the model section shows over 1000 feet of sediments along the eastern boundary of the model. This extra thickness in the model provides additional groundwater storage which could contribute to a false sense of sustainability.
111	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	Model Report 2-12	2.9 Model Layering		Layer 1 thickness ranges from 34 to 966 feet and Layer 2 thickness ranges from 50 to 540 feet. Layer 1 is thickest within the north-central and along the eastern boundary, and the latter condition seems unusual and is not explained by the report. Layer 2 is thickest within the south-central area and this condition seems reasonable.
112	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	Model Report	Figure 23: Layer 1 Thickness & Figure 24: Layer 2 Thickness		The thickness of Layer 1 is divided into five categories but the range of the first and last categories are significantly different from the middle 3 categories. The span of the first category is 196 feet and the last category is 520 feet, compared to the 60-foot spans of the middle categories. For comparison, the thickness of Layer 2 is divided into six categories with spans between 60 and 90 feet (average: 73 feet). These large differences within Layer 1 contribute to the uncertainty in the model output.
113	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	Model Report 3-6	3.3.2 Groundwater Pumping	Table 8: Summary of ESJWRM Well Pumping	City of Galt is located along the northern boundary of the subbasin and produces groundwater for its customers. The model should acknowledge and include the City's groundwater production.
114	Rodney Fricke	GEI on behalf of Sacramento County GSA - Cosumnes Subbasin	Model Report 4-6	4.7 Final Calibration Parameters	Table 10: Range of Aquifer Parameter Values	Why does the Corcoran Clay vertical K values apply to Layers 3 and 4 when the aquitard is situated between Layers 1 and 2?



Comments on ESJ Draft GSP	GEI Consultants	Sustainable Management Criteria for Groundwater Levels along the Northern Boundary of the Eastern San Joaquin Subbasin
Sacramento County GSA in the Cosumnes Subbasin		Aug-19 Figure 1



Comments on ESJ Draft GSP	GEI Consultants	Sustainable Management Criteria for Groundwater Levels along the Northern Boundary of the Eastern San Joaquin Subbasin
Sacramento County GSA in the Cosumnes Subbasin		Aug-19 Figure 2

ROD

DRY CREEK WATERSHED MANAGEMENT PLAN

A CASE STUDY EXERCISE: WATERSHED PARTNERSHIPS SEMINAR
February 27 – March 9, 2006
Folsom, CA

Prepared By:

TEAM #1

John Brodie
Jeannie Habben
Jan Lopez
Sara Martin
Leandro Ramos
Pam Sturner
Diane Zarate

Section 1

Mission Statement and Watershed Background

Mission Statement

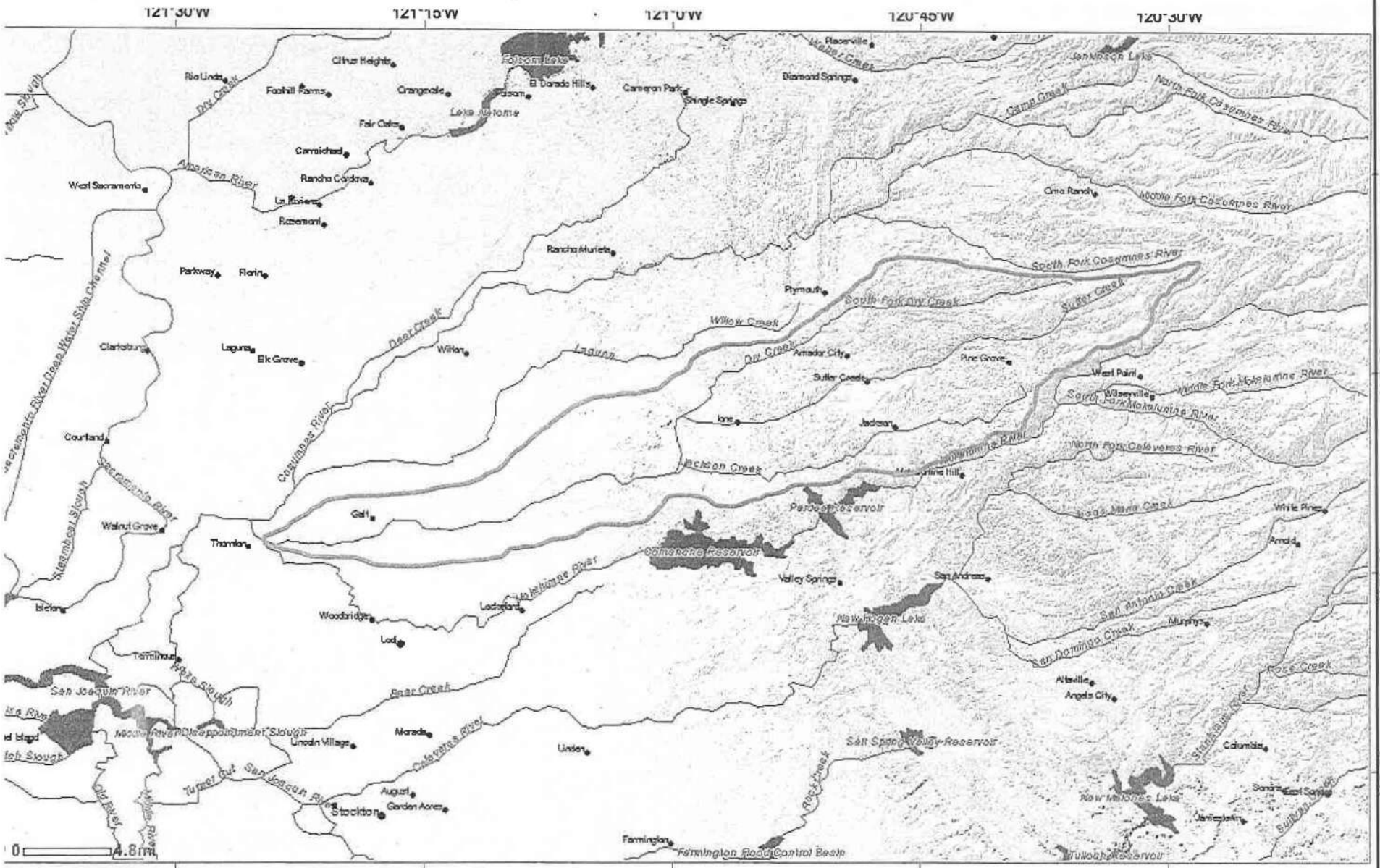
The mission of the Amador Dry Creek Watershed Council (ADCWC) is to preserve the quality of life in our watershed by engaging stakeholders and the community, managing growth and fire hazards, and protecting natural resources, while respecting private property rights.

Background Information

The Dry Creek watershed is located in central California, and drains the portion of the Sierra Nevada foothills between the Cosumnes River and the Mokelumne River. As shown in Figure 1, the creek flows west/southwest through the western slope of the foothills, joining with its two major tributaries, Sutter Creek and Jackson Creek, on the way. It then flows to the floor of the Central Valley, where it empties into the Cosumnes River. The Cosumnes River empties into the Mokelumne River, which then enters the complex network of tidally-influenced rivers and sloughs of the Sacramento-San Joaquin Delta. The delta waters eventually empty into the San Francisco Bay.

The watershed area encompasses approximately 388 square miles, with over 150 miles of streams and over 900 miles of roads. The majority of the watershed is located in Amador County, but the lower-elevation, western end of the watershed is split between Sacramento County in the north and San Joaquin County in the south. Incorporated cities within the watershed include Jackson, Sutter Creek, Amador City and Ione in Amador county, and Galt in Sacramento County. State Route 49, which connects Sierra Nevada foothill towns, is the major north/south transportation corridor in the watershed, and State Route 88 is the main east/west transportation corridor (see Figure 2).

Streams in the Dry Creek watershed are almost completely unregulated. Lake Amador, located on Jackson Creek near Ione, is the only dammed reservoir in the watershed.

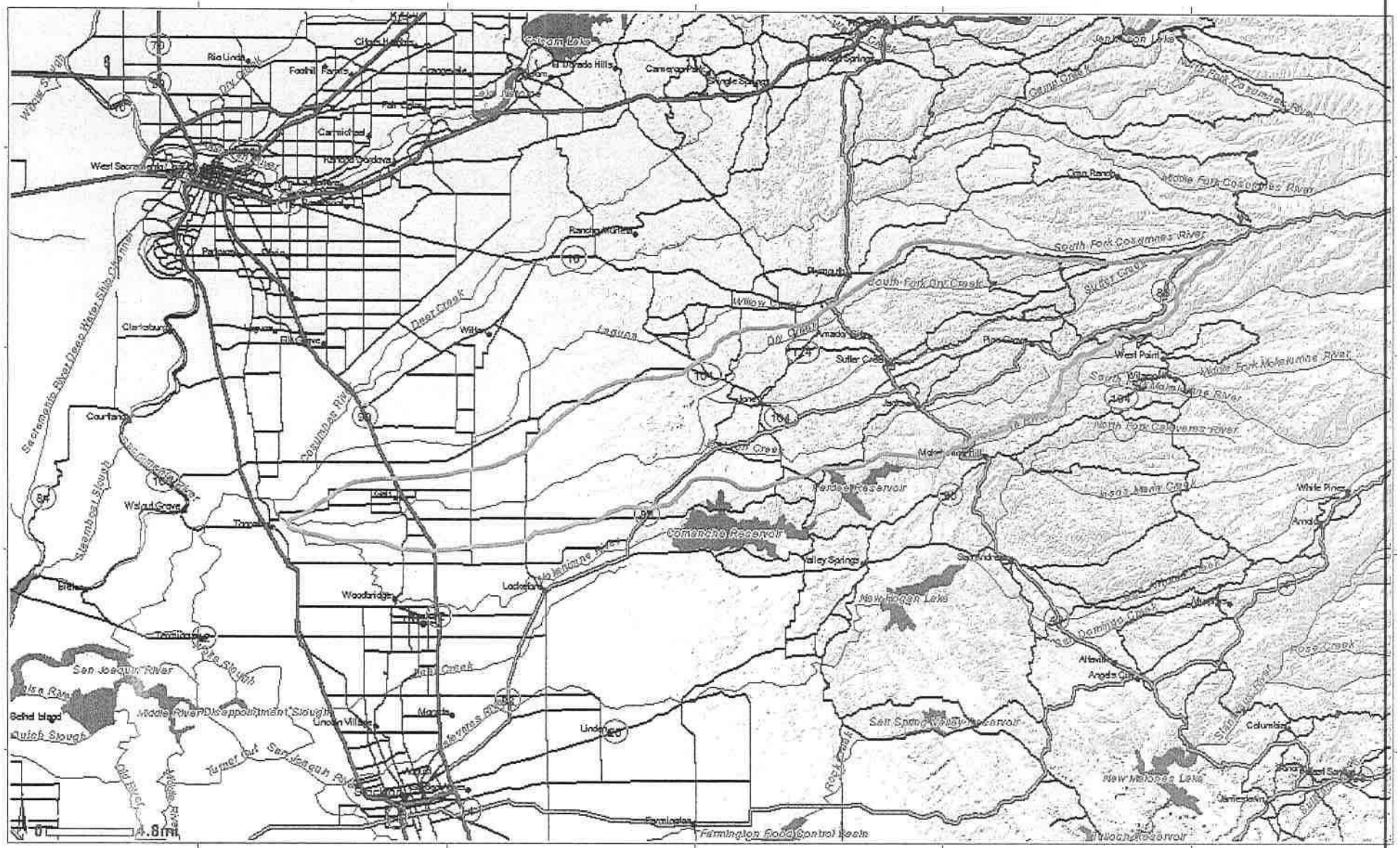


USGS
science for a changing world

The National Map
http://nationalmap.gov/

Geographic Coordinate System (WGS84)

Figure 1—Dry Creek Watershed



121°30'W 121°15'W 121°0'W 120°45'W 120°30'W

38°44'26"N

121°41'23"W Map Extent 120°17'59"W

37°54'49"N

USGS science for a changing world

The National Map http://nationalmap.gov/

Geographic Coordinate System (WGS84)

Figure 2—Major Roads in the Dry Creek Watershed

Hydrology

Elevations within the Dry Creek watershed range between 4,000 feet at the upper end of the watershed to approximately 7 feet at the confluence of Dry Creek with the Cosumnes River. The main stem Dry Creek channel has a length of 112 miles with an elevation drop of approximately 950 feet. By comparison, the main stem of the neighboring Cosumnes River channel travels a length of 133 miles with an elevation drop of 625 feet. The downstream end of the watershed is tidally influenced—the daily tide range at Dry Creek's confluence with the Cosumnes River is approximately 1.5 to 2 feet.

As mentioned above, streams in the Dry Creek Watershed are largely unregulated. The unregulated nature of the streams, as well as the relatively steep channel profile, mean that Dry Creek is a relatively "flashy" system, with floods peaking over a few hours and lasting just a few days.

The climate of the watershed is Mediterranean, where summers are hot and dry, and the bulk of the rainfall occurs in the winter, mostly during the months of December through mid-March. Thus, winter rain events are the primary source of annual peak flows in the watershed. Estimated peak flows in Dry Creek are shown below in Table 1.

Table 1. Peak Flows for Dry Creek at Galt

Storm Event (Recurrence Interval)	Peak Flow Discharge (cfs)
2-Year	4,230
5-Year	11,200
10-Year	17,800
20-Year	25,400
50-Year	37,000
100-Year	46,900

Source: David Ford Consulting Engineers 2004

Dry Creek is no longer a perennial stream. Flows typically cease in the lower watershed during the late summer and fall due to upstream water use and groundwater overdraft in the lower watershed. Additionally, manipulation of the landscape by humans over the past 200 years has disconnected Dry Creek from many of its historical floodplains around Galt. Because of this, farms and pastures in the lower watershed are often flooded during high flow events.

Geology

Amador County lies almost entirely in the Sierra Nevada geomorphic province; only the extreme portion lies in the Central Valley. From the Central Valley

eastward, the range gradually rises to the glaciated crest in the vicinity of Mokelumne and Thimble Peaks, both of which lie above 9000 feet.

The older rocks of the Sierra Nevada, commonly called the "Bedrock series" consist of isoclinally folded complexly faulted metamorphic rocks of Paleozic and Mesozoic ages, intruded by several types of igneous rocks, chiefly granites. Unconformably overlying these rocks in the Western portion of Amador County are much younger, nearly flat-lying Tertiary sediments. These nearly flat-lying sediments are commonly called "superadjacent series"

The older metamorphic rocks are divided into the Calaveras and Amador groups and Mariposa formation. The Calaveras group includes all of the pre-Mesozoic rocks in this country while the Amador group and Mariposa formation are Jurassic.

Biological Resources

More information is needed to make a thorough characterization of the biological resources in the Dry Creek watershed. As shown in Figure 3, the upper third of the watershed is primarily vegetated with evergreen forest, the central third of the watershed is comprised of mixed coniferous/deciduous forest and grassland, and the lower third of the watershed is mainly grasslands.

Natural communities, as designated by the California Department of Fish and Game, that are present in watershed include Ione Chaparral in the upper portion of the watershed and Coastal and Valley Freshwater Marsh, Great Valley Mixed Riparian Forest, Great Valley Valley Oak Riparian Forest, Ione Chaparral, Northern Hardpan Vernal Pool, and Valley Oak Woodland in the lower portion of the watershed. Lists of special-status species in the upper and lower watersheds from the California Natural Diversity Database are included as Attachments A and B.

A number of species have attracted stakeholders' attention, many because of their implications for land management issues. Manzanita in the understory of the upper watershed forest has been known to fuel wildfires. Several invasive species have become established, among them Arundo donax, Himalayan blackberry, yellow star thistle, knapweed, skeleton weed, tree of heaven, and pepperweed. The federally listed and protected valley elderberry longhorn beetle has also been observed in the lower watershed.

Community Information

Census data for the exact area of the watershed are not readily available, as watershed overlays do not yet figure among the data sets of the U.S. Census Bureau. However, data from the 2000 census do exist for the five cities of the watershed. Those figures indicate that while most of the watershed's communities lie in Amador County, its largest population center is the city of

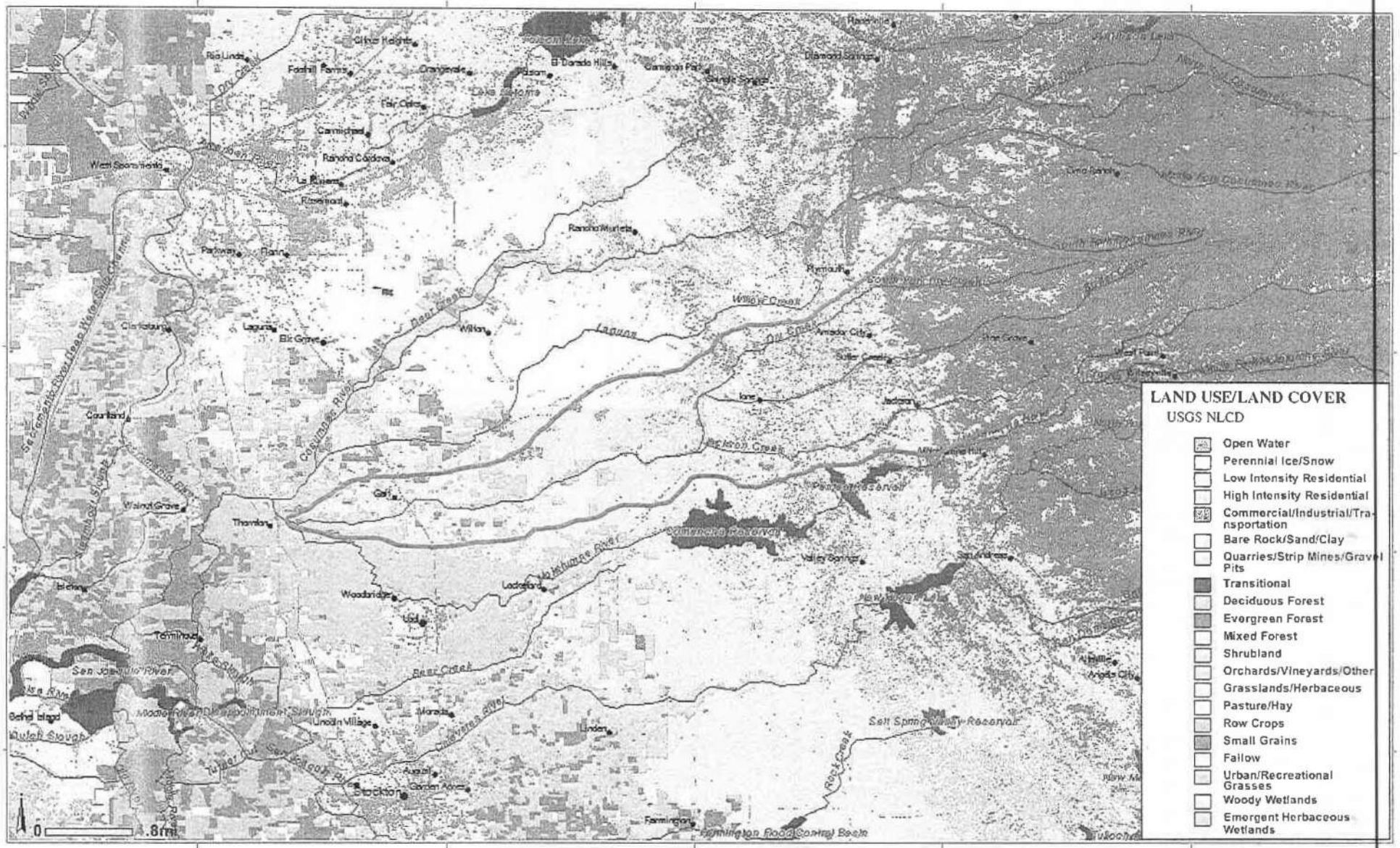


Figure 3—Land Cover in the Dry Creek Watershed

Galt, which lies in Sacramento County. In 2000 Galt had a population of 19,472. The second-largest city was Ione, which houses the Mule Creek State Prison and had a population of 7,129; Jackson was the third-largest, with 3,989 residents; Sutter Creek, the fourth-largest, with 2,303, and Amador City the smallest, with 196. Together, the cities in Amador County – Amador City, Ione, Jackson, and Sutter Creek – account for approximately 39% of the county's population of 35,100. An unknown number of people live in the unincorporated areas. On the whole, Amador County's population is older than that of California, with 18.0% being older than 65, as opposed to 10.6% for the state. A table with the census data is attached (Attachment C).

Given the amount of development that has taken place since the 2000 census, the numbers and relationships described above may have changed.

There are a number of other community institutions and characteristics that the Amador Dry Creek Watershed Council may wish to take into account as it plans for its future. One is the presence of groups with varying experience on the land. Members of an indigenous Native American tribe, the Miwok, continue to practice the old ways; traditional ceremonies are held in the round-house at Chaw'se State Park, and tribal elders practice traditional crafts, among them basketry using local natural materials. Families of some of the county's farmers, ranchers, and vintners have worked the same ground for several generations. Others who may have ongoing direct experience of the resource include hunters, agricultural workers, skiers, and hikers.

Over the past several years, development and land management have appeared prominently in community interactions. Several collaborative efforts have been undertaken. Homeowners in the KC Ranchettes subdivision, the Amador Fire Safe Council, and the Jackson Rancheria Casino worked together to fund and implement a brush-clearing project to create a fire break. The Sonoma Ecology Center, which has worked with the Amador County Wine Grape Growers Association, held watershed education workshops for local elementary school students and residents of Amador County. The Sutter Creek City Council is studying possibilities for adaptive reuse of Knight Foundry and the Central Eureka Mine; one proposal involves preserving the stamp mill and adding trails with a self-guided interpretive tour. In January 2006 Amador County announced interest in attracting the headquarters of the state Sierra Nevada Conservancy to a property in Martell formerly owned by Georgia-Pacific. Other interactions on land management include several recent lawsuits: one by the group Protect the Historic Amador Waterways to halt construction of a cross-county pipeline that would dry up the Amador Canal; one by the Earth Island Institute and the Center for Biological Diversity to halt timber harvesting near the Bear Creek Reservoir; and one by Amador County to halt the construction of a casino by the Buena Vista Band.

Known civic organizations operating in the watershed include the Lyons Club, which runs an Adopt-a-Highway project; the Rotary Club; Sons in Retirement (SIRS), the League of Women Voters of Amador County, and the Amador County Community Foundation.

Given the initial survey of community information, a list of stakeholders in the watershed could include the following:

Landowners

- Ranchers
- Farmers
- Homeowners – new and existing

Native American Tribes

State, Federal, and Regulatory Agencies

- CA Department of Fish & Game
- CA State Water Resources Control Board
- Central Valley Regional Water Quality Control Board
- CA Department of Water Resources
- CA Bay-Delta Authority
- CA Department of Conservation
- CA Department of Health Services
- CA State Parks
- National Oceanic and Atmospheric Administration – Fisheries
- United States Fish & Wildlife Service
- US Department of Agriculture/Natural Resources Conservation Services
- Bureau of Land Management
- US Army Corps of Engineers
- US Bureau of Indian Affairs
- US Geological Survey
- US Environmental Protection Agency

Business and Manufacturing

- Golf Course owner/operator
- Developers
- Tourism
- Casino Owner/operators
- Commercial manufacturing
- Timber Industry
- Mining

Utilities

- Pacific Gas & Electric
- Amador Water Agency
- Jackson Irrigation District
- Municipal wastewater agencies

Non-Governmental Organizations

- Amador/Dry Creek Watershed Council
- Amador Fire Safe Council
- Dry Creek Conservation
- PHAW – Protect the Historic Amador Waterways group
- Foothill Conservancy
- Amador County
- Sacramento County
- San Joaquin County
- Local cities (incorporated or unincorporated)

Water and Wastewater Management

Water use in the watershed includes municipal, domestic and industrial water supply; agricultural irrigation; stock watering, recreation, warm water fish habitat and wildlife habitat.

A significant portion of the watershed is not served by municipal water or wastewater treatment facilities, and septic systems and wells dominate, particularly in the upper reaches. The upper watershed, located in Amador County, has characteristics distinctly different from the lower watershed. Information for the lower watershed is limited to the City of Galt in this report.

Amador County

In 1959, the Amador Water Agency was formed for the purpose of providing water and wastewater services to the residents of Amador County. The Agency is governed by a board of five directors who are elected to four year terms. The Agency offices are located in Sutter Creek, California.

Water Sources

The North Fork of the Mokelumne River, located on the California Sierra Nevada Mountains, is the primary source for the Central Amador Water Project system, the Amador Water System and the PG&E Tiger Creek Powerhouse system. Water supplied from rainfall and snowmelt is stored in the Tiger Creek After bay and gravity feeds to the PG&E Powerhouse Memcor Plant where it is treated. Water from the Tiger Creek After bay is also pumped to the Buckhorn Water Treatment Plant where it is treated and ready for use by customers of Pine Grove, Pioneer, and several smaller communities. Water from the Mokelumne River is also stored in Lake Tabeaud and conveyed by the Amador Canal to the Tanner Water Treatment Plant where it is treated for use by the customers of Jackson, Sutter Creek, Amador City and Drytown. The Ione Pipeline transports raw water from the Tanner Reservoir to the Ione Water Treatment Plant where customers are served ~~by well water~~.

The Amador Canal is a flume-like ditch that runs 23 miles from Lake Tabeaud to Tanner Reservoir. It was built in the Gold Rush era and the first water flowed through the canal as motive power for the mills and mines of the county. Later it supplied water for agricultural and domestic purposes to Sutter Creek, Jackson and Amador City (and still does today). It also helps to power Knight Foundry in Sutter Creek, the only remaining and longest continuously operated water-powered iron works in the United States.

Over many years, leaks in the canal have existed and have been allowed to continue; a valuable ecosystem of plant and animal life has become dependent on the water, as have Amador County citizens through their ground water wells, businesses along the creeks and tourism. The seepage also provides valuable fire protection and helps to cool the air in surrounding areas.

Wastewater Treatment/Disposal

There are six small wastewater treatment plants located in the watershed: Amador City, Sutter Creek, Martell, Ione, and Jackson. Amador City, Sutter Creek and Martell have secondary treatment and pump their effluent to Ione. Ione has settling ponds and percolation ponds to process much of what it receives. A portion of the effluent is advanced treated and pumped for land

application and golf course irrigation. The plant at Jackson also provides secondary treatment of its influent and then discharges its effluent into Lake Amador. Lake Amador provides water for domestic supply downstream and the Health Department would prefer that the Jackson Plant cease discharging to the lake because of water quality concerns.

Most of the population is on septic systems, which are located throughout the watershed. Many systems are very old and there is concern about the potential for failure. It is unknown if the leach fields from existing septic systems are impacting groundwater or stream water quality.

City of Galt

The City of Galt Public Works Department is responsible for the production of potable water and the operation and maintenance of the wastewater treatment plant for the residents of Galt.

Water Sources

The City of Galt relies upon groundwater from the Cosumnes Sub basin of the San Joaquin Valley Groundwater Basin as its sole source of domestic potable water. The Cosumnes Sub basin is an unadjudicated basin that supports both municipal and agricultural users. Basin inflows include natural and applied water recharge. Subsurface inflow and outflow are not known specifically. Based upon a water balance provided in a 2003 Department of Water Resources Bulletin, groundwater outflows exceed groundwater inflows by approximately 4300 acre-feet per year, suggesting a basin overdraft situation may exist.

The current system is comprised of two three-million gallon storage tanks with pump stations, seven wells, 62 miles of piping and valves and 5,800 lateral connections. The City currently averages production of over four million gallons per day of domestic water.

Treated Surface Water

Treated surface water is only viable as a future water supply if the City is successful in negotiating the purchase of imported water supply. The City has researched the availability of surface water rights for the Cosumnes River as well as from the intermittent creeks in the vicinity of the City.

Wastewater Treatment/Disposal

The City operates and maintains the wastewater treatment plant and is currently processing approximately 2.0-2.2 MGD with a plant capacity of 3.0 MGD. In 1991, Galt's Wastewater Treatment Plant was upgraded to full secondary treatment and treatment capacity was increased to 3.0 million gallons per day (MGD). At the time of the expansion, the City did not have sufficient disposal capacity during the summer to handle 3.0 MGD. At the present, the City has disposal capacity for approximately 2.2 MGD with an additional 0.3 MGD

capacity available in 2006. The City owns 180 acres of land and leases an additional 180 acres for disposal of effluent by irrigation and injection of solids.

Land Use

Historically, land use and development in Amador County has been shaped by mining, timber, agriculture, and grazing. Current land use and development is still shaped by those same forces, with the addition of tourism, manufacturing, and the in-migration of retired residents and residents who commute to the relatively distant economic centers of Sacramento and the Bay Area.

The major development trend is toward greater densities of homes where development is permitted. Amador County remained almost untouched as neighboring El Dorado, Sacramento, and San Joaquin Counties experienced explosive population growth and residential development through the late 1990s. However, rising real estate prices in neighboring counties and Amador County's desirable climate, rural ambiance, and proximity to major job markets are starting to attract unheard-of amounts of development pressure.

Table 2. General Land Use Categories in Amador County

Land Use	Acres	Percent of County
Urban and Suburban (Residential, Commercial, and Manufacturing)	108,619	29%
Federal Lands (USFS, BLM & Mokelumne Wilderness)	100,328	27%
General Agriculture (Williamson Act)	94,028	25%
Other Agriculture (EBMUD, JVID, Non-Williamson Act)	43,582	11%
Timber Production (Non-USFS/BLM)	29,524	8%
Total County	**376,081**	**100%**

Source: Amador County Fire Hazard Reduction Plan, 2004

Urban and suburban land uses continues to be the highest use of land in Amador County. As shown in the previous table, approximately 25% of agricultural lands remain under Williamson Act conservation contracts, limiting non-agricultural development in the future (Attachment D). Non-renewal of these contracts requires a ten year restricted withdrawal period, with penalties for non-compliance. However, non-irrigated lands currently reflect the fastest growing conversion of land use in an attempt to meet perceived residential needs. Unincorporated communities developing within the county (and watershed) include Jackson Valley, Martell, and Volcano.

Planning Efforts

Amador County adopted its first general plan in 1973, and has conducted updates as needed, on a 10-year review schedule. In November, 2005, the Amador County Board of Supervisors implemented a moratorium on all developments requesting general plan or zoning changes, and began steps to complete an update of its General Plan.

Amador County, and the Dry Creek Watershed area in particular, has experienced significant growth over the past 10 years. The Amador County Development Policy states that future residential development will be encouraged to take place in the form of farms, ranches, and estates throughout the county or through expansion of existing towns and villages. The increasing density of residences in the intermix zone is particularly important due to the extreme wildfire hazard in this area.

These intermix zones, otherwise know as the Wildland Urban Interface (WUI) zones, have been identified to help local agencies, organizations, and landowners focus on management of the inherent fire hazards occurring when populations encroach upon wildland areas.

The following four communities in the Dry Creek watershed are identified in the CERES database as having general plans and zoning ordinances. Table 3 shows population density for those communities.

Table 3. Amador County, California Census Subdivisions (CERES)

			Area in square miles			Density per square mile of Land Area	
Community Name Type	**Population**	**Housing Units**	**Land**	**Water**	**Total**	**Population**	**Housing Units**
Ione CCD	10,391	2,573	127.24	6.25	133.49	81.66	20.22
Jackson CCD	6,997	3,211	75.96	2.28	78.23	92.12	42.27
Pine Grove-Silver Lake CCD	9,784	5,548	218.86	3.10	221.96	44.70	25.35
Sutter Creek-Plymouth CCD	7,928	3,703	170.91	0.10	171.01	46.39	21.67

No information was immediately available for subdivision development within the cities of the watershed. Within the unincorporated areas of the watershed areas, the following subdivision maps were processed as noted in 2006:

Table 4. Processed Subdivision Maps in the Dry Creek Watershed (Amador County)

Community	Subdivision Name	No. of Units	Acres	Approved	Application
Ione	Vintage Estates	9	371	X	
Jackson Area	Clinton Oaks	4	20.6		X
Pine Grove	Petersen Ranch	58	141.22	X	
"	Pine Grove Bluffs—Phase 1	109	23.87	X	
"	Quail Ridge	81	82	X	
"	Mokelumne Bluffs	95	137.86		X
"	Pine Acres North	106	44.2		X
Sutter Creek Area	Sherrill	4	97	X	
"	LaMel Grand Estates	7	38	X	
"	Aparicio	4	31.03		X
	Total	**477**	**986.66**	**6**	**4**

Source: Amador County Subdivision records

The Amador Fire Safe Council has written the Amador County Fire Hazard Reduction Plan, finalized in May 2004. The objective of this plan is to provide the Amador Fire Safe Council a foundation to identify, prioritize, and link fuel modification treatment areas in order to create a fire safe community.

Other area plans include the Fire Resource Assessment Program of 2003 by the California Department of Forestry and Fire Protection, Lower Mokelumne River Watershed Stewardship Plan by San Joaquin County Resource Conservation District and The Lower Mokelumne River Watershed Stewardship Planning Committee.

Since the lower watershed is located in both Sacramento and San Joaquin counties, there are also references in code in the 1993 County of Sacramento General Plan Adopted on December 15, 1993 and the San Joaquin County General Plan 2010 (San Joaquin County Community Development Department, 1992. The Foothill Conservancy developed the Foothill Conservancy Land Use and Development Principles, which were developed in 2003 and adopted by the Amador Association of Realtors and the West Point Business Council in 2005.

Section 2
Issue Identification

Based on the information gathered to date, the following issues of concern were prioritized for the watershed.

Stakeholder Development and Engagement—The ADCWC is a fledgling watershed group and its first priorities should be to engage as many stakeholders as possible in its process and to raise awareness of the relevance of watershed issues to the everyday life of the residents. Building local capacity will allow the ADCWC to leverage the substantial amount of historical knowledge of the watershed among residents, foster support for its actions, and draw from a large pool for volunteer efforts.

Watershed Assessment/Monitoring Efforts—Relatively little is known about the Dry Creek watershed and its resources. In order to provide a starting point for strategic watershed planning and management, baseline information about the watershed and reliable monitoring efforts are needed. This information will allow stakeholders to create an inventory of important issues and goals based on good science, as well as allow the ADCWC to assess the success of its future efforts and adaptively manage those efforts in light of any changes that may occur.

Growth Management—As described in the Land Use section above, lands in the Dry Creek watershed are experiencing tremendous development pressure. Effects of unregulated growth on quality of life, water quality, water supply, and natural resources in the watershed were the most often articulated concern of members of the ADCWC and other stakeholders. A key role of the ADCWC over the coming years will be to form partnerships with local agencies and developers to ensure that the development occurs in a manner complementary to the current quality of life, and in harmony with existing natural resources. Additionally, Amador County is currently in the process of updating its general plan, which presents the ADCWC with a real opportunity to influence development policy in a positive way.

Protect Natural Resources—Sustainability of human life, agricultural production, quality of life, healthy ecosystems, and species diversity in and downstream of the Dry Creek Watershed all depend upon the protection and careful stewardship of natural resources in the watershed. One of the chief roles of a watershed group is to allow community stakeholders to drive the decision-making process about how to approach stewardship of these resources.

Manage Fire Hazards—Fire hazard in the eastern portion of the watershed was also expressed as a main concern of stakeholders in the Dry Creek watershed. A Fire Safe Council has already been established in Amador County to address these concerns. Partnering with the Amador Fire Safe Council would be a great opportunity for information sharing, as well as for the ADCWC to introduce themselves and their mission to a large group of potential stakeholders.

Respect Private Property Rights—Because most of the watershed is privately owned, the cooperation and goodwill of private landowners is necessary for the success of Watershed Plan implementation. Respecting private property rights is the key to receiving that cooperation and is incorporated into the goals and objectives of other priority issues.

Section 3

Goals and Objectives for Priority Issues

3.2 Stakeholder Development and Engagement

The Amador Dry Creek Watershed Council is a new organization within the community. Composition of the Council should reflect as many interests in the watershed, especially those of private landowners. Members should develop a broad understanding of all conditions and issues in the watershed that impact the quality of life.

3.2.1 Goal: Expand Participation in the ADC Watershed Council

Objective: Include as many stakeholders as possible in the development of the watershed management plan.

Action Steps (to be completed within 1 year of initiation):

- Survey stakeholders with pre-paid postcard response for meeting dates, times, etc.
- Establish a "neutral" site for meetings or rotate sites and/or locations.
- Get already established groups involved and ask for participation from their members (i.e., Fire Safe Council, RCD Boards, Tribal leaders, Cattlemen's Association, Farm Bureau, PHAW, other NGOs, local/state/federal governments.
- Identify education and outreach needs and opportunities.
- Identify key issues and develop strategies to address them.
- Identify activities to actively engage Council members and others in the community

Performance Measure: Encourage stakeholders participation regularly in plan formulation; completion of a watershed action plan.

Funding Strategies:

- In-kind donations (paper, printing, postage, meeting space, etc.)

- Community foundation capacity building grants (i.e. Chico database)

Goal: Educate the community on watershed issues

Objective: Develop and implement an education and outreach program.

Action Steps:

- Gather available stakeholder education materials already completed by local agencies
- Collaborate with private, state and government stakeholders to compile existing resource materials on resource concerns, policy items, and best management practices.
- Work closely with governmental agencies to eliminate duplication of watershed education efforts.
- Develop ways in which research data and information materials are understandable and available for direct use in decision making and implementation by as many stakeholders as possible
- Partner with local volunteer organizations to assist with education and management efforts
- Host public workshops to demonstrate watershed improvements due to activities implemented by watershed projects
- Develop a school classroom outreach presentation

Performance Measure: Variety of materials available; number of workshops and presentations given; partnerships with schools for watershed education

Funding Strategies:

- Identify grants and other funding opportunities for planning, implementation, and monitoring project. (Refer to Additional Resources at the end of this report)
- Funding from DFG, USFWS, NOAA Fisheries, National Fish and Wildlife Foundation, CALFED.
- Funding from community foundations, Jackson Rancheria Casino, and School Districts

Watershed Assessment/Monitoring Efforts

Relatively little is known about the Dry Creek Watershed and its resources. In order to provide a starting point for strategic watershed planning and management, baseline information about the watershed and reliable monitoring efforts should be established. This information will allow stakeholders to create an inventory of important issues and goals reinforced by data, as well as allow

the Council to assess the success of its efforts and adaptively manage those efforts in light of any changes that may occur.

3.3.1 **Goal: Establish reliable baseline information about the watershed.**

a) **Objective: Identify data gaps and strategies for gathering needed data**

b) **Objective: Perform a comprehensive watershed assessment and update it every five years.** The assessment should incorporate information on biological resources, invasive species, stream morphology, water management, land use, demographics, economics, and potential partners.

Action Steps:

- Assemble existing available resource materials, including:
- County Soil map (NRCS)
- Vegetation species inventory (CNPS, RHJV, EBMUD, PG&E)
- Mammalian species inventory (DFG, Sierra Club, USFWS, EBMUD, PG&E)
- Avian species inventory (Audubon, Sierra Club, PRBO, EBMUD, PG&E)
- Fish species inventory (NOAA Fisheries, DFG, USFWS, Amador Water Agency, EBMUD, PG&E
- Baseline Water Quality data (RWQCB, water agencies)
- Map of land uses (County Planning)
- Maps of Williamson act land (DOC, NRCS)
- Conduct riparian habitat assessment
- Identify education and outreach needs and opportunities

Performance Measures: maps of each condition (perhaps as GIS layers); ranking of species for preservation, ranking of areas for preservation, ranking target areas for restoration, enhancement, and protection.

Funding Strategy: Funding from DFG, USFWS, NOAA Fisheries, National Fish and Wildlife Foundation, CALFED. In-kind help from other agencies, especially stakeholder agencies.

c) **Objective: Establish a credible water flow and velocity gauging system on Dry Creek and its tributaries.**

The most useful distribution of gauges would require installing eight gauges. However, with limited funding, installing gauges below each major tributary

confluence could provide useful data, as could reactivating the gauge on Dry Creek at Galt.

Action Steps:

- Install an 8-gauge configuration, including the following:
- North Fork Dry Creek above confluence with South Fork Dry Creek,
- South Fork Dry Creek above confluence with North Fork Dry Creek,
- Below confluence of North and South Fork Dry Creeks,
- Sutter Creek above confluence with Dry Creek,
- Below confluence of Sutter Creek and Dry Creek,
- Jackson Creek above confluence with Dry Creek,
- Below confluence of Jackson Creek and Dry Creek, and
- Dry Creek at Galt.

Performance Measure:

- Produce baseline flow report
- Establish maintenance plan
- Respect private property rights in producing data

Funding Strategy:

- Respect private property rights and produce measures to ensure interests are comfortable with funding source, perhaps pursue private support for this effort
- Homeland Security grants

Objective: Develop a stakeholder water quality monitoring program.

This effort will function to collect valuable data that can be used in ranking priorities and measuring success of actions, as well as to engage local residents in an activity that will put them on the ground in their watershed, learning how their watershed works and how certain activities affect their watershed, and fostering a personal connection with their local streams.

Action Steps:

- Identify sites for monitoring activities
- Recruit volunteers interested and available for monitoring activities
- Develop or sampling protocol
- Provide training for volunteers on sampling protocol

Performance Measure:

- Basline report is produced

- Sampling protocol in compliance with EPA standards and/or State Regulation standards.
- Monitoring schedule is established

Funding Strategy:
- Collaborate with established watershed groups and local governments to identify and promote integration among watershed efforts
- Pursue funding fro private sources to assist in the assurance that private property rights and concerns can be respected.

3.4 Growth Management

Amador County is experiencing accelerated growth, which may adversely impact the availability of water, water quality, traffic and the rural character of the watershed. An effort to update the County General Plan has begun and will take approximately 3-4 years to complete.

3.4.1

Goal: Encourage water use efficiency to ensure an adequate supply for current and projected domestic and agricultural uses, and to support the needs of natural habitats.

Objective: Participate in outreach and education efforts to increase public understanding of the current sources, uses and limitations of water supply in the watershed.

Action Steps:
- Plan approach in collaboration with AWA
- Convene meetings with community groups
- Distribute literature and BMPs for water use efficiency strategies

Performance Measure: Pre and post campaign surveys of public understanding of water issues and conservation practices; increased level of understanding and use of conservation measures

Funding Strategy: Partner with local public agencies that might be able to leverage statewide funding sources for water use efficiency.

b) **Objective: Initiate collaborative among wastewater management agencies, agricultural producers and interested stakeholders to develop a plan for reuse of secondary and advanced secondary treated wastewater for additional farm and vineyard irrigation.**

Action Steps:

- Plan with AWA and convene meeting of key stakeholders.
- Gather and provide information of similar efforts in other communities.
- Educate the community and farmers on current sources and uses of water, including the viability of using recycled water for additional farm and vineyard irrigation.

Performance Measure: Completed plan for increased agricultural reuse of wastewater; zero discharge to Lake Amador

Funding Strategy: In-kind services; SWRCB loans/grants

7.4.2 **Goal: Balance land use decisions with the need to maintain a healthy environment and to protect natural resources**

a) **Objective: Integrate Watershed Plan priorities into the revised Amador County General Plan.**

Action Steps:

- Participate in the General Plan update meetings (Task Force?) to represent the interests of the watershed in proposed GP amendments.
- Propose language for integration into the General Plan update, which reflects the values and priorities of the community and the health of the watershed.

Performance Measure: Updated Amador County General Plan is consistent with the values and priorities of the community and the health of the watershed.

Funding Strategy: In-kind services

b) **Objective: Assist in establishing guidelines for "Smart Growth" in the counties, the cities, and/or the towns in the watershed, including in the Amador County General Plan, which is currently being updated.**

Action Steps:

- Complete a watershed assessment including water use, well clustering, water draw down, and recharge and riparian areas to address the reduction of corridor habitat as a result of development in the watershed.

- Assess any established water systems in the watershed checking for water supplies, wastewater disposal, and water quality
- Attend and participate any Board of Supervisor's meetings addressing growth and land use
- Form a sub-committee of the watershed to assist in the Area Plan to include water issues, building locations in respect to riparian areas of the creek, and smart growth policy
- Address as an issue of growth the reduction and prevention of sedimentation from entering the creek.

Performance Measure: Completed assessment; Smart Growth guidelines established

Funding Strategy: In-kind services; local agency funding/partnership

3.5 Protect Natural Resources

The many rich natural resources in the Dry Creek Watershed need care and protection to maintain the current quality of life. Efforts to improve and sustain these resources will help ensure adequate supplies of drinking water, wildlife to observe and enjoy, healthy ecosystems with native plants, fire safe communities, and an appreciation for both public land and personal property.

3.5.1 Goal: Preserve Natural Resources of Amador Dry Creek Watershed

a) Objective: Identify areas for habitat protection, enhancement, and restoration

Action Steps:
- Conduct an analysis of baseline assessment information, as detailed above
- Identify data gaps
- Identify current land protections (Williamson act, easements, encoded setbacks, etc.)
- Identify funding sources for protection/enhancement/restoration (p/e/r)
- Identify companies/NGO's, or non-profits that perform p/e/r design and construction
- Identify permitting needs and problems
- Identify Education and Outreach needs and opportunities

Performance Measures:
- Map of T/E species habitat protection areas (not specific properties)
- Safe harbor agreement for landowners w t/e species concerns

- Completed list of alternatives for watershed-wide p/e/r actions.
- Agreement from stakeholders on target areas for p/e/r actions
- Protection and p/e/r priorities are included in the updated county general plan

Funding Strategy: CALFED ERP, DFG, USFWS, EPA, RWQCB.

3.5.2 **Goal: Reduce and prevent contaminants from entering the watershed (improve and protect water quality).**

a) **Objective: Implement clean water programs to improve identified problem areas.**

Some specific examples include: replace failing septic systems, remove old mine tailings, improve and or install new storm drainage, replace undersized culverts, develop ways to reduce and prevent contaminants from entering the streams.

Action Steps:

- Seek grant funding to support a monitoring program of the Dry Creek watershed to determine the type of pollutants and their effect on water quality.
- Determine the major drainage problems, including those from old mines, old logging camps/mills, housing developments, commercial operations, vineyards, and septic system runoff that are entering the watershed.
- Evaluate old mine and old logging residue to determine constituents and assess water quality impacts.
- Develop a monitoring program
- Develop restoration plans, including best management practices for implementation.

Performance Measures: List of priority pollutants; completed water quality impact report; Monitoring program in place; BMPS developed or under development

Funding Strategy: CALFED ERP, DFG, USFWS, EPA, RWQCB.

3.5.3 **Goal: Educate and involve the community in reducing the impacts of invasive plants**

a) **Objective: Eliminate all noxious weeds or invasive plant species in the watershed.**

Action Steps:

- Complete a Noxious Weed/Invasive species assessment in the Dry Creek Watershed
- Educate Stakeholders utilizing materials already completed by local agencies

- Create brochures and hand-outs specific to the invasive species in the Dry Creek Watershed
- Develop methods to eliminate Noxious Weeds/Invasive species in a manner that does not degrade the watershed
- Reestablish native plant species to enhance riparian corridors and to sustain threatened and endangered species
- Host public workshops and tours to demonstrate watershed improvements due to activities implemented by watershed projects
- Recruit volunteers to identify areas of concern and eradicate those areas

Performance Measures: Completed assessment and map of priority areas; acres reestablished with native plant species; number of workshops/tours and attendance at those event; number of volunteers/volunteer work days

Funding Strategy: CALFED ERP, DFG, USFWS, EPA, RWQCB.

3.6 # Manage Fire Hazards

According to the California, Fire Plan, the risk of wild fires is increasing, area population is increasing, and the topography of the area adds to the potential for wildfire. These factors, when combined, place the watershed and its assets at high risk. The threat of a large, damaging wildfire is high, as is the potential for loss of valuable natural resources, personal property and human life.

3.6.1 ## Goal: Protect the watershed through support for and implementation of additional fire safety strategies.

a) ### Objective: In cooperation with the Fire Safe Council and the community, survey the properties east of Hwy 49 to determine areas of high fire risk.

Action Steps:
- Map areas to be surveyed
- Recruit volunteers and landowners to complete assessment
- Develop strategies for reducing fire risk.

Performance Measures: Completed assessment and map of priority areas; Number of volunteers/landowners participating; completed list of strategies and plan for implementation

Funding Strategy: In-kind services

b) **Objective: Reduce excessive fuel loads on public and private lands and increase public safety**

Action Steps:

- Recruit public agencies and volunteers to support efforts
- Construct defensible fuel breaks in most vulnerable areas;
- Evaluating fire-fighting access; and
- Develop evacuation plan for the watershed

Performance Measures: Number of public agencies and volunteers participating in effort; Completed defensible fuel breaks; completed evacuation plan.

Funding Strategy: In-kind services; CDF; local fire agencies

3.6.2 **Goal: Educate and involve landowners in the watershed to keep their property fire safe**

a) **Objective: Provide fire safety guidelines to prevent the threat of a large damaging wildfire or the potential loss of valuable natural resources, personal property, and human life.**

Action Steps:

- Educate property owners on the "Lean, Clean, and Green" approach
- Reduce excessive fuel loads on public and private lands.
- Identify areas with excessive fuel loads
- Assist landowners in constructing defensible fuel breaks, evaluating fire-fighting access, and developing an evacuation plan.

Performance Measures: Number of landowners participating in educational efforts; vulnerable areas identified; completed defensible fuel breaks; completed evacuation plans.

Funding Strategy: In-kind services; CDF; local fire agencies.

Section 4

Additional Resources

Mokelumne River Watershed Owner's Manual: Based on the Home*A*Syst model, the Mokelumne River Watershed Owner's Manual is a voluntary, stewardship-based workbook to guide homeowners in reducing non-point source pollution. The workbook was prepared by the San Joaquin County Resource Conservation District in partnership with the Lower Mokelumne River Watershed Stewardship Planning Committee. The manual provides guidelines for evaluating property and formulating action plans to reduce or eliminate non-point source pollution for homeowners and other residents of the watershed. Topics addressed include: storm water management, reducing pollutants in runoff, landscaping and property management to reduce runoff, drinking water well management, well location and maintenance, household wastewater and septic/sewer systems, managing hazardous household products, product disposal, managing swimming pools and similar topics.

Central Valley Waste Services: CVWS offers educational programs promoting a clean environment. Specifically, CVWS emphasizes educational programs for: a) second graders regarding how recycling preserves natural resources and b) fourth graders discussing source reduction of trash. Thousands of children benefit from these programs annually.

U.C. Cooperative Extension: This agency provides extensive education program addressing watershed management. A few of the most recently developed programs include homeowner education programs targeting the use of residential pesticides (currently funded by CALFED and targeting Diazinon and Dursban) and a new curriculum targeting grades 3-6 emphasizing water and pesticide education. The agency also holds regular farm commodity meetings (e.g., tomato, corn, asparagus, etc.) which emphasize best management practices related to water use and pollution.

Leadership Institute's Adopt-A-Watershed: Adopt-A-Watershed is a K-12 school-community learning experience which uses local watersheds as living

laboratories where students engage in hands-on activities. The program is sponsored by the Leadership Institute. Five primary elements are emphasized: 1) applying science concepts directly to the local watershed, 2) monitoring local watersheds through field study, 3) restoring watersheds through community need-based projects, 4) educating through community action projects and 5) reflecting upon concepts learned while making contributions to the community. The program addresses plants, wildlife, aquatics, ecosystems, soils, geology, vegetation management, and cultures with a curriculum consistent with state requirements. Training for teachers is included in the program. Approximately 120 teachers in San Joaquin County are currently involved in the program.

Learning Under Creative Concepts (LUCC): This organization provides stewardship-related programs for young first-offenders and other at-risk youths which help to foster responsibility and self-esteem. Undertaken primarily on LUCC-owned property, these stewardship-based programs include agriculture, riparian restoration, horse rehabilitation, and similar programs.

Lodi-Woodbridge Winegrape Commission (LWWC): LWWC has produced the Lodi Winegrowers Workbook . This self-assessment guide to integrated farming practices addresses viticulture, soil management, water management, pest management, habitat management, management of human resources and evaluation of wine quality.

CA Dairy Quality Assurance Program (CDQAP): The San Joaquin County U.C. Cooperative Extension office assists in implementation of this voluntary program to encourage management practices promoting resource conservation in dairy operations. Additional program details may be found at CDQA.org.

California Cattleman's Association (CCA) CA Rangeland Water Quality Management Plan Riparian Grazing Project, Beef Quality Assurance Program: The California Rangeland Water Quality Management Program (CRWQMP) was developed by the CCA, U.S. Cooperative Extension, environmental agencies and interest groups to improve water quality on private rangeland under a voluntary program officially adopted in 1995 and including rangeland water quality management strategies, policies and coordination mechanisms as well as sample plants and sources of assistance.

The Riparian Grazing Projects is a joint effort of the CCA and U.S. Cooperative Extension to determine correct and incorrect methods for grazing to ensure riparian success. The project is a statewide study of rangeland riparian areas in which riparian area health, specific site watershed conditions and site specific management are simultaneously examined and address both past and present grazing methods. Program assistance is being provided by the CA Department of Forestry and fire Protection, the U.S. EPA, the CA Department of Fish and Game, the U.S. Department of Forestry, the U.S. Bureau of Land Management, UC Davis and others.

Much like the CA Dairy Quality Assurance Program, this program was begun in 1986 as an industry effort to encourage cattlemen to follow certain quality control measures exceeding those of the U.S. Department of Agriculture and the Food and Drug Administration. The California Cattleman's Association Quality

Assurance Program grew from this effort in 1992 and emphasizes a partnership with the U.C. Cooperative Extension. Surveys and workshops are used to evaluate multiple activities, including animal handling and sanitation activities that may affect the watershed.

Biologically Integrated Orchard Systems (BIOS): Founded in 1993 by the Community Alliance with Family Farmers (CAFF), BIOS is a technical assistance program whose primary purpose is to "build a community of farmers, other agricultural professionals, and public institutions dedicated to the voluntary adoption of whole-systems approaches to farm management that are flexible, maintain long-term profitability, and rely less on chemical inputs."

The BIOS program for almonds and walnuts has been underway for nearly seven years in the Central Valley where a small, but growing number of farmers have successfully reduced their insecticide, herbicide and fertilizer inputs without affecting yield or quality. The BIOS program is actively working to refine these techniques and extend them to other nut growers using the experiences of the participating growers, their independent pest control advisors and UC researchers.

BIOS programs are active in Merced, Stanislaus, Madera, San Joaquin Colusa, Yolo, Solano and Merced counties. Program cooperators include the University of California Sustainable Agriculture Research and Education Program, UC Statewide Integrated Pest Management Program, UC Cooperative Extension, the USDA's Farm Service Agency, and the USDA's Natural Resources Conservation Service (NRCS).

Biologically Integrated Farming Systems (BIFS): As a result of the success of the BIOS program (see above), the California Legislature created BIFS to extend the BIOS project to include crops and other farming systems. The University of California Sustainable Agriculture Research and Education Program (SAREP), and the U.S. Environmental Protection Agency support this competitive grant program. The goal of BIFS is to demonstrate and expand the use of integrated farming systems that have been proven to economically reduce the use of farm chemicals. Farmers involved in the BIFS project are:

- Integrating biological and cultural control of pests into their production systems;
- Using pest monitoring and economic action thresholds to advise the timing of chemical applications;
- Emphasizing soil-building practices such as the use of cover crops to provide all or part of the nitrogen needed by crops, increase water infiltration of the soil and decrease erosion and flooding;
- Using manure to provide nutrients for cover crops;
- Creating an on-farm habitat and restoring riparian areas to encourage beneficial insect populations and improve habitat for fish, migrant birds and game species; and
- Improving livestock management while protecting natural resources.

Central Valley Project Improvement Act/Anadromous Fish Restoration Plan: The Central Valley Project Improvement Act (CVPIA) of 1992 [Section 3405(b)(1)] directed the Secretary of the Interior to develop and implement a program which makes all reasonable efforts to double natural production of anadromous fish in Central Valley rivers and streams by 2002. In response, the U.S. Fish and Wildlife Service prepared the Anadromous Fish Restoration Program Plan (AFRP). The plan identifies multiple anadromous fish habitat deficiencies in each tributary of the Central Valley of California.

Alternative Roofing plans: www.roofmeadow.com

California Conservation Dept.-Recycling Division (916)-323-3836 www.consrv.ca.gov

California EPA-Toxics Help Desk (916)-327-1848 www.calepa.ca.gov

California Health Services Dept.-Drinking Water and Environmental Management

(916)-322-2308 www.dhs.ca.gov/ps/ddwem/

California Pesticide Regulation Department-Environmental Monitoring and Pest Management (916)-324-4100 www.cdpr.ca.gov

California Toxic Substances Control-Public Assistance (916)-322-0476 www.dtsc.ca.gov

California Water Resources Control Board (SWRCB) (916)-341-5250 www.swrcb.ca.gov

SWRCB-Nonpoint Section (916)-341-5494 www.swrcb.ca.gov

SWRCB-Stormwater Programs (916)-341-5529 www.swrcb.ca.gov

California Native Grass Association www.cgna.org

California Native Plant Society (916)-447-2677 www.cnps.org

Motor oil and filter recycling (800)-253-2687

United States Department of Agriculture-Natural Resource Conservation Service www.nrcs.usda.gov

A few of the potential funding sources for some of the LMSP programs include:

American Sport fishing Association Fish American Foundation (FAF) and the

National Oceanic and Atmospheric Administration (NOAA) – offers funding for community based restoration programs for on-the-ground habitat restoration in marine, estuarine and anadromous fish habitats. $5,000-$30,000. NOAA

Fisheries Restoration Center, HC-3, RM 15322; 1315 East West Highway; Silver Spring, MD 20910 (301) 713-0174 Ext. 200. www.nmfs.noaa.gov/habitat/restoration/community/index.htm.

California Resources Agency - California Department of Parks and Recreation , Planning and Local Services Section - Habitat Conservation Fund. P.O. Box 942896; 1416 Ninth St., Sacramento, CA 94296-0001; (916) 653-7423 or visit http://parks.ca.gov/grants/hcf/hcf.htm

California Resources Agency - California Department of Parks and Recreation Recreational Trails Program Grants. Contact (916) 651-8572 or http://parks.ca.gov/grants/rtp/rtp00.htm

California Resources Agency – Environmental Enhancement and Mitigation Fund Program (EEM) Grants for acq1uisition, restoration or enhancement of watersheds, wildlife habitat, wetlands and forests. Grants generally limited to $250,000. Contact (916) 653-5656 or http://ceres.ca.gov/cra/eemp_new.html

California Department of Conservation Division of Land Resource Protection - California Farmland Conservancy Program (CFCP). Contact (916) 322-9721 or be e-mail at CFCP@consrv.ca.gov.

California Department of Conservation Resource Conservation District Assistance Grant Program. Contact the Division of Land Resource Protection. (916) 324-0774

CALFED – Various, including the CALFED Ecosystem Restoration Program and Watershed Program. See www.calfed.ca.gov for details and deadlines.

National Association of Conservation Districts – Conservation Incentives Program (CIP) – visit www.nacd.org

National Fish and Wildlife Foundation – extensive list of grants for resource conservation activities. Contact (415) 778-0999 or visit www.nfwf.org/programs/guidelines.htm

Northwest Water Law and Policy Project. Video to assist communities in securing funding for restoration projects in local streams and watersheds. Call (503) 768-6761 or e-mail water@lclark.edu

United States Department of Agriculture Natural Resources Conservation Service – Conservation Programs. Extensive list of funding sources and assistance programs: Conservation Technical Assistance, Environmental Quality Incentives Program (EQIP), Wetlands Reserve Program (WRP), Wildlife Habitat Incentives Program (WHIP), Forestry Incentives Program (FIP), Farmland Protection Program (FPP), and many more. www.nhq.nrcs.usda.gov/PROGRMAS/cpindex.htm

United States Fish and Wildlife Service Small Wetlands Grants, under $50,000. Contact (703) 358-1784 or visit
http://northamerican.fws.gov/NAWCA/smgrants.htrml

National Resource Projects Inventory – NRPI – www.ice.ucdavis.edu/nrpi

California Watershed Funding Database – www.calwatershedfunds.org

California Watershed Network – www.watershednetwork.org

Section 5
References

David Ford Consulting Engineers, 2004. *Cosumnes and Mokelumne River watersheds – Design storm runoff analysis*, prepared for Sacramento County Department of Water Resources, February.

City of Galt Urban Water Management Plan, 2005.

City of Galt website.

CALFED Watershed Partnership Seminar Dry Creek Watershed handout.

Attachment A. Special-Status Species in the Upper Dry Creek Watershed[a]

Common Name	Scientific Name	Federal Status		California Status		DFG Species of Concern	CNPS Listing[b]
		Threatened	Endangered	Threatened	Endangered		
Natural Communities							
Ione Chaparral							
Birds							
Tricolored blackbird	*Agelaius tricolor*					✓	
Reptiles/Amphibians							
Northwestern pond turtle	*Emys (=Clemmys) marmorata marmorata*					✓	
Invertebrates							
Grady's Cave amphipod	*Stygobromus gradyi*						
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	✓					
Plants							
Bisbee Peak rush-rose	*Helianthemum suffrutescens*						3
Ione buckwheat	*Eriogonum apricum var. apricum*		✓		✓		1B
Ione manzanita	*Arctostaphylos myrtifolia*	✓					1B
Irish Hill buckwheat	*Eriogonum apricum var. prostratum*		✓		✓		1B
Parry's horkelia	*Horkelia parryi*						1B
Pincushion navarretia	*Navarretia myersii ssp. myersii*						1B
Prairie wedge grass	*Sphenopholis obtusata*						2
Red Hills soaproot	*Chlorogalum grandiflorum*						1B
Tuolumne button-celery	*Eryngium pinnatisectum*						1B

[a]Data gathered using the California Department of Fish and Game's California Natural Diversity Database Quick Viewer for the following USGS quadrangles: Amador City, Aukum, Fiddletown, Irish Hill, Ione, Jackson, Pine Grove, and West Point. This is not an official CNDDB report.

[b] California Native Plant Society (CNPS) "1B" Listing—Rare or Endangered in California and elsewhere
CNPS "2" Listing—Rare and Endangered in California, more common elsewhere
CNPS "3" Listing—Need more information

Attachment B. Special-Status Species in the Lower Dry Creek Watershed[a]

Common Name	Scientific Name	Federal Status		California Status		DFG Species of Concern	CNPS Listing[b]
		Threatened	Endangered	Threatened	Endangered		
Natural Communities							
Coastal and Valley Freshwater Marsh							
Great Valley Mixed Riparian Forest							
Great Valley Valley Oak Riparian Forest							
Ione Chaparral							
Northern Hardpan Vernal Pool							
Valley Oak Woodland							
Mammals							
American badger	*Taxidea taxus*					✓	
Birds							
Bank swallow	*Riparia riparia*			✓			
Burrowing owl	*Athene cunicularia*					✓	
Golden eagle	*Aquila chrysaetos*					✓	
Great blue heron	*Ardea herodias*						
Great egret	*Ardea alba*						
Swainson's hawk	*Buteo swainsoni*			✓			
Tricolored blackbird	*Agelaius tricolor*					✓	
White-tailed kite	*Elanus leucurus*						
Reptiles/Amphibians							
California tiger salamander	*Ambystoma californiense*	✓				✓	
Foothill yellow-legged frog	*Rana boylii*					✓	
Giant garter snake	*Thamnophis gigas*	✓		✓			
Northwestern pond turtle	*Emys (=Clemmys) marmorata marmorata*					✓	
Western pond turtle	*Emys (=Clemmys) marmorata*					✓	
Western spadefoot	*Spea (=Scaphiopus) hammondii*					✓	
Fish							
Sacramento splittail	*Pogonichthys macrolepidotus*					✓	
Invertebrates							
Midvalley fairy shrimp	*Branchinecta mesovallensis*						
Ricksecker's water scavenger beetle	*Hydrochara rickseckeri*						
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	✓					
Vernal pool fairy shrimp	*Branchinecta lynchi*	✓					

Common Name	Scientific Name	Federal Status		California Status		DFG Species of Concern	CNPS Listing[b]
		Threatened	Endangered	Threatened	Endangered		
Vernal pool tadpole shrimp	*Lepidurus packardi*		✓				
Plants							
Bisbee Peak rush-rose	*Helianthemum suffrutescens*						3
Blue skullcap	*Scutellaria lateriflora*						2
Boggs Lake hedge-hyssop	*Gratiola heterosepala*				✓		1B
California linderiella	*Linderiella occidentalis*						
Delta mudwort	*Limosella subulata*						2
Delta tule pea	*Lathyrus jepsonii var. jepsonii*						1B
Dwarf downingia	*Downingia pusilla*						2
Ione buckwheat	*Eriogonum apricum var. apricum*		✓		✓		1B
Ione manzanita	*Arctostaphylos myrtifolia*	✓					1B
Irish Hill buckwheat	*Eriogonum apricum var. prostratum*		✓		✓		1B
Legenere	*Legenere limosa*						1B
Mason's lilaeopsis	*Lilaeopsis masonii*						1B
Parry's horkelia	*Horkelia parryi*						1B
Pincushion navarretia	*Navarretia myersii ssp. myersii*						1B
Rose-mallow	*Hibiscus lasiocarpus*						2
Sacramento orcutt grass	*Orcuttia viscida*		✓		✓		1B
Sanford's arrowhead	*Sagittaria sanfordii*						1B
Tuolumne button-celery	*Eryngium pinnatisectum*						1B

[a]Data gathered using the California Department of Fish and Game's California Natural Diversity Database Quick Viewer for the following USGS quadrangles: Bruceville, Carbondale, Clay, Galt, Goose Creek, Lodi North, and Thornton. This is not an official CNDDB report.

[b]California Native Plant Society (CNPS) "1B" Listing—Rare or Endangered in California and elsewhere
CNPS "2" Listing—Rare and Endangered in California, more common elsewhere
CNPS "3" Listing—Need more information

Attachment C. 2000 census data for Amador County and Dry Creek watershed communities

Geographic area	% of Amador County population	Total population	White	Black or African-American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific	Other race	Two or more races	Hispanic or Latino (of any race)
I. Census count: members of ethnic groups										
Amador City	0.56%	196	178	0	2	0	0	8	8	18
Galt, Sacramento County	NA	19,472	13,726	225	204	553	31	3616	1117	6485
Ione city, Amador County	20.31%	7,129	4,128	1,271	164	120	12	1,292	142	1,437
Jackson city, Amador County	11.36%	3,989	3,731	20	55	23	3	74	83	259
Sutter Creek city, Amador County	6.56%	2,303	2,106	5	30	24	7	49	82	134
Amador County	**100.00%**	**35,100**	**30,113**	**1,359**	**626**	**350**	**36**	**1,769**	**847**	**3,126**
II. Ethnic groups as % of total										
Amador City		100.0%	90.8%	0.0%	1.0%	0.0%	0.0%	4.1%	4.1%	9.2%
Galt		100.0%	70.5%	1.2%	1.0%	2.8%	0.2%	18.6%	5.7%	33.2%
Ione city, Amador County		100.0%	57.9%	17.8%	2.3%	1.7%	0.2%	18.1%	2.0%	20.2%
Jackson city, Amador County		100.0%	93.5%	0.5%	1.4%	0.6%	0.1%	1.9%	2.1%	6.5%
Sutter Creek city, Amador County		100.0%	91.4%	0.2%	1.3%	1.0%	0.3%	2.1%	3.6%	5.8%
Amador County		**100.0%**	**85.8%**	**3.9%**	**1.8%**	**1.0%**	**0.1%**	**5.0%**	**2.4%**	**8.9%**