Appendix 1A

Glossary of Terms

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GLOSSARY

This Glossary includes terms from a variety of legal and administrative sources relevant to SGMA and GSP development. These sources include:

- California Water Code Section 10721, Sustainable Groundwater Management Definitions (CWC Section 10721)
- California Code of Regulations Title 23 Section 341, Groundwater Basin Boundaries Definitions (23 CCR Section 341)
- California Code of Regulations Title 23 Section 351, Groundwater Sustainability Plan Definitions (23 CCR Section 351)
- DWR Bulletin 118 Definitions, updated 2003 (B118, 2003)
- Locally defined terms used in the GSP

The source of each term is provided in the citation following that term. Page numbers are included when a definition is not found in the referenced document's definitions or glossary. Additional information regarding each source are summarized at the end of this glossary.

Adjudication Action	The action filed in the superior or federal district court to determine the rights to extract groundwater from a basin or store water within a basin, including, but not limited to, actions to quiet title respecting rights to extract or store groundwater or an action brought to impose a physical solution on a basin. **(CWC Section 10721)**
Administrative Adjustment	The basin or subbasin boundary adjustment by the Department that either (1) amends existing basin or subbasin boundary data files to accurately reflect an unambiguous written basin or subbasin boundary description as defined in Bulletin 118 or amended pursuant to this Part, or (2) restates the description of a basin or subbasin boundary to more precisely reflect a mapped basin or subbasin boundary consistent with the original description. **(B118, 2003)**
Agency	The groundwater sustainability agency as defined in the Act. **(23 CCR Section 351)**
Agricultural Water Management Plan	The plan adopted pursuant to the Agricultural Water Management Planning Act as described in Part 2.8 of Division 6 of the Water Code, commencing with Section 10800 et seq. **(23 CCR Section 351)**
Alternative	The alternative to a Plan described in Water Code Section 10733.6. **(23 CCR Section 351)**
Annual Report	The report required by Water Code §10728. **(23 CCR Section 351)**
Aquifer	The three-dimensional body of porous and permeable sediment or sedimentary rock that contains sufficient saturated material to yield significant quantities of groundwater to wells and springs, as further defined or characterized in Bulletin 118. **(B118, 2003)**
Baseline or Baseline Conditions	The historical information used to project future conditions for hydrology, water demand, and availability of surface water and to evaluate potential sustainable management practices of a basin. **(23 CCR Section 351)**

Basin	Defined in the Sustainable Groundwater Management Act as a groundwater basin or subbasin identified and defined in Bulletin 118. Unless the context indicates otherwise, those terms are further defined as follows: (1) The term ***basin*** shall refer to an area specifically defined as a basin or ***groundwater basin*** in Bulletin 118, and shall refer generally to an aquifer or stacked series of aquifers with reasonably well-defined boundaries in a lateral direction, based on features that significantly impede groundwater flow, and a definable bottom, as further defined or characterized in Bulletin 118. (2) The term ***subbasin*** shall refer to an area specifically defined as a subbasin or ***groundwater subbasin*** in Bulletin 118 and shall refer generally to any subdivision of a basin based on geologic and hydrologic barriers or institutional boundaries, as further described or defined in Bulletin 118. **(B118, 2003)**
Basin Setting	The information about the physical setting, characteristics, and current conditions of the basin as described by the Agency in the hydrogeologic conceptual model, the groundwater conditions, and the water budget, pursuant to Sub article 2 of Article 5. **(23 CCR Section 351)**
Beneficial Use	Water in Bulletin 118 references 23 categories of water uses identified by the State Water Resource Control Board and are listed and briefly described in Appendix E. **(B118, 2003)**
Best Available Science	The use of sufficient and credible information and data, specific to the decision being made and the time frame available for making that decision, that is consistent with scientific and engineering professional standards of practice. **(23 CCR Section 351)**
Best Management Practice	The practice, or combination of practices, that are designed to achieve sustainable groundwater management and have been determined to be technologically and economically effective, practicable, and based on best available science. §351. **(23 CCR Section 351)**
Board	The State Water Resources Control Board. **(23 CCR Section 351)**
Bulletin 118	The department's report entitled "California's Groundwater: Bulletin 118" updated in 2003, as it may be subsequently updated or revised in accordance with § 12924. **(CWC Section 10721)**
CASGEM	The California Statewide Groundwater Elevation Monitoring Program developed by the Department pursuant to Water Code Section 10920 et seq., or as amended. **(23 CCR Section 351)**
Condition of Long-Term Overdraft	The condition of a groundwater basin where the average annual amount of water extracted for a long-term period, generally 10 years or more, exceeds the long-term average annual supply of water to the basin, plus any temporary surplus. Overdraft during a period of drought is not sufficient to establish a condition of long-term overdraft if extractions and recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods. **(CWC Section 10721)**
Coordination Agreement	The legal agreement adopted between two or more groundwater sustainability agencies that provides the basis for coordinating multiple agencies or groundwater sustainability plans within a basin pursuant to this part. **(CWC Section 10721)**
Data Gap	The lack of information that significantly affects the understanding of the basin setting or evaluation of the efficacy of Plan implementation and could limit the ability to assess whether a basin is being sustainably managed. **(23 CCR Section 351)**

Existing Stored Groundwater	Groundwater that is already underground from centuries of accumulated native groundwater. Historic pumping has been diminishing the existing stored groundwater at rates greater than the native groundwater can sustain, causing overdraft and unsustainable conditions. If more water is pumped from a basin than what is added from Native Groundwater and Introduced Groundwater, this water comes from the Existing Stored Groundwater. Continuing to use this previously stored groundwater will continue to exacerbate overdraft conditions. Temporarily using some of this water during the transition to sustainability will likely continue to cause lowering of groundwater levels.
Groundwater	Water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water but does not include water that flows in known and definite channels. **(CWC Section 10721)**
Groundwater Basin	The groundwater basin or subbasin identified and defined in Bulletin 118 or as modified pursuant to Water Code 10722 et seq. **(23 CCR Section 351)**
Groundwater Dependent Ecosystem	The ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. **(23 CCR Section 351)**
Groundwater Flow	The volume and direction of groundwater movement into, out of, or throughout a basin. **(23 CCR Section 351)**
Groundwater in Storage	The quantity of water in the zone of saturation. **(B118, 2003)**
Groundwater Overdraft	The condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years during which water supply conditions approximate average conditions. **(B118, 2003)**
Groundwater Recharge or Recharge	The augmentation of groundwater by natural or artificial means. **(CWC Section 10721)**
Groundwater Storage Capacity	The volume of void space that can be occupied by water in a given volume of a formation, aquifer, or groundwater basin. **(B118, 2003)**
Groundwater Sustainability Agency	One or more local agencies that implement the provisions of this part. For purposes of imposing fees pursuant to Chapter 8 (commencing with Section 10730) or taking action to enforce a groundwater sustainability plan, ***Groundwater Sustainability Agency*** also means each local agency comprising the groundwater sustainability agency if the plan authorizes separate agency action. **(CWC Section 10721)**
Hydrogeologic Conceptual Model	The description of the geologic and hydrologic framework governing the occurrence of groundwater and its flow through and across the boundaries of a basin and the general groundwater conditions in a basin or subbasin. **(23 CCR Section 341)**
Interconnected Surface Water	The 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. **(23 CCR Section 351)**
Interested Parties	The persons and entities on the list of interested persons established by the Agency pursuant to Water Code Section 10723.4. **(23 CCR Section 351)**
Interim Milestone	The target value representing measurable groundwater conditions, in increments of five years, set by an Agency as part of a Plan. **(23 CCR Section 351)**
Introduced Groundwater	Water that is added to the sustainable yield of groundwater supply derived from percolation of imported surface water. This can be the directly through groundwater replenishment projects or groundwater banking or can be indirectly through percolation from irrigation and unlined canals.

Management Area	The area within a basin for which the Plan may identify different minimum thresholds, measurable objectives, monitoring, or projects and management actions based on differences in water use sector, water source type, geology, aquifer characteristics, or other factors. **(23 CCR Section 351)**
Measurable Objectives	The specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions that have been included in an adopted Plan to achieve the sustainability goal for the basin. **(23 CCR Section 351)**
Minimum Threshold	The numeric value for each sustainability indicator used to define undesirable results. **(23 CCR Section 351)**
Monitoring Protocols	Designed to detect changes in groundwater levels, groundwater quality, inelastic surface subsidence for basins for which subsidence has been identified as a potential problem, and flow and quality of surface water that directly affect groundwater levels or quality or are caused by groundwater extraction in the basin. The monitoring protocols shall be designed to generate information that promotes efficient and effective groundwater management. §10727.2. Required Plan Elements. **(CWC Section 10721)**
NAD83	The North American Datum of 1983 computed by the National Geodetic Survey, or as modified.
Native Groundwater	Water naturally infiltrating into the groundwater from precipitation and runoff. This is the average quantity of water annually added to the groundwater budget from rain, rivers, and streams, and reflects the portion of estimated sustainable yield of the groundwater supply that is not derived from imported surface water.
NAVD88	The North American Vertical Datum of 1988 computed by the National Geodetic Survey, or as modified. **(23 CCR Section 351)**
Plain Language	The language that the intended audience can readily understand and use because that language is concise, well-organized, uses simple vocabulary, avoids excessive acronyms and technical language, and follows other best practices of plain language writing. **(23 CCR Section 351)**
Plan	The groundwater sustainability plan as defined in the Act. **(23 CCR Section 351)**
Plan Implementation	The Agency's exercise of the powers and authorities described in the Act, which commences after an Agency adopts and submits a Plan or Alternative to the Department and begins exercising such powers and authorities. **(23 CCR Section 351)**
Plan Manager	An employee or authorized representative of an Agency, or Agencies, appointed through a coordination agreement or other agreement, who has been delegated management authority for submitting the Plan and serving as the point of contact between the Agency and the Department. **(23 CCR Section 351)**
Planning and Implementation Horizon	The 50-year time period over which a groundwater sustainability agency determines that plans and measures will be implemented in a basin to ensure that the basin is operated within its sustainable yield. **(CWC Section 10721)**
Principal Aquifers	The aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems. **(23 CCR Section 351)**
Qualified Map	The geologic map of a scale no smaller than 1:250,000 that is published by the U. S. Geological Survey or the California Geological Survey, or is a map published as part of a geologic investigation conducted by a state or federal agency, or is a geologic map prepared and signed by a Professional Geologist that is acceptable to the Department. **(23 CCR Section 341)**
Recharge Area	The area that supplies water to an aquifer in a groundwater basin. **(CWC Section 10721)**

Reference Point	The permanent, stationary and readily identifiable mark or point on a well, such as the top of casing, from which groundwater level measurements are taken, or other monitoring site. **(23 CCR Section 351)**
Representative Monitoring	The monitoring site within a broader network of sites that typifies one or more conditions within the basin or an area of the basin. **(23 CCR Section 351)**
Safe Yield	The maximum quantity of water that can be continuously withdrawn from a groundwater basin without adverse effect. **(B118, 2003)**
Saturated Zone	The zone in which all interconnected openings are filled with water, usually underlying the unsaturated zone. **(B118, 2003)**
Seasonal High	The highest annual static groundwater elevation that is typically measured in the Spring and associated with stable aquifer conditions following a period of lowest annual groundwater demand. **(23 CCR Section 351)**
Seasonal Low	The lowest annual static groundwater elevation that is typically measured in the Summer or Fall and associated with a period of stable aquifer conditions following a period of highest annual groundwater demand. **(23 CCR Section 351)**
Seawater Intrusion	The advancement of seawater into a groundwater supply that results in degradation of water quality in the basin and includes seawater from any source. **(23 CCR Section 351)**
Statutory Deadline	The date by which an Agency must be managing a basin pursuant to an adopted Plan, as described in Water Code Sections 10720.7 or 10722.4. **(23 CCR Section 351)**
Sustainability Goal	The existence and implementation of one or more groundwater sustainability plans that achieve sustainable groundwater management by identifying and causing the implementation of measures targeted to ensure that the applicable basin is operated within its sustainable yield. **(CWC Section 10721)**
Sustainability Indicator	The effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results, as described in Water Code §10721(x). **(23 CCR Section 351)**
Sustainable Groundwater Management	The management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results. **(CWC Section 10721)**
Sustainable Yield	The maximum quantity of water calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually from a groundwater supply without causing an undesirable result. **(CWC Section 10721)**
Technical Study	The geologic or hydrologic report prepared and published by a state or federal agency, or a study published in a peer-reviewed scientific journal, or a report prepared and signed by a Professional Geologist or by a Professional Engineer. **(23 CCR Section 341)**
Uncertainty	The lack of understanding of the basin setting that significantly affects an Agency's ability to develop sustainable management criteria and appropriate projects and management actions in a Plan, or to evaluate the efficacy of Plan implementation, and therefore may limit the ability to assess whether a basin is being sustainably managed. **(23 CCR Section 351)**

Undesirable Result	One or more of the following effects caused by groundwater conditions occurring throughout the basin: (1) Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods. (2) Significant and unreasonable reduction of groundwater storage. (3) Significant and unreasonable seawater intrusion. (4) Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies. (5) Significant and unreasonable land subsidence that substantially interferes with surface land uses. (6) Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water. **(CWC Section 10721**
Urban Water Management Plan	The plan adopted pursuant to the Urban Water Management Planning Act as described in Part 2.6 of Division 6 of the Water Code, commencing with Section 10610 et seq. **(23 CCR Section 351)**
Water Budget	The accounting of the total groundwater and surface water entering and leaving a basin including the changes in the amount of water stored. **(CWC Section 10721)**
Water Source Type	The source from which water is derived to meet the applied beneficial uses, including groundwater, recycled water, reused water, and surface water sources identified as Central Valley Project, the State Water Project, the Colorado River Project, local supplies, and local imported supplies. **(23 CCR Section 351)**
Water Use Sector	The categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation. **(23 CCR Section 351)**
Water Year	The period from October 1 through the following September 30, inclusive. **(CWC Section 10721)** or the period from October 1 through the following September 30, inclusive, as defined in the Act. **(23 CCR Section 351)**
Water Year Type	The classification provided by the Department to assess the amount of annual precipitation in a basin. **(23 CCR Section 351)**
Wellhead Protection Area	The surface and subsurface area surrounding a water well or well field that supplies a public water system through which contaminants are reasonably likely to migrate toward the water well or well field. **(CWC Section 10721)**

REFERENCES

California Code of Regulations. Title 23, Section 341.

California Code of Regulations. Title 23, Section 351.

California Department of Water Resources (DWR). 2003. Bulletin 118: California's Groundwater.

California Water Code. Division 6. Part 2.74. Section 10721. Chapter 2. Definitions. (Amended by Stats. 2018, Ch. 255, Sec. 1. (AB 1944) Effective January 1, 2019.)

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Appendix 2A

Selected General Plan Goals and Policies

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Table 1. Selected Colusa County General Plan Goals and Policies

Goal or Objective	Policy or Action
Agriculture Element	
Goal AG-2: Maintain and enhance agriculture as the County's most critical land use, economic sector, and resource.	**Policy AG 2-1:** Agricultural-related industrial support operations shall be permitted on agricultural lands. Such uses may include, but are not limited to, processing, assembly, distribution and warehousing of agricultural materials and commodities and alternative energy systems that provide energy for on-site uses. These uses should be permitted on agricultural lands as principal permitted uses subject to the standards of the Zoning Ordinance provided the following findings are made: *d. The operational or physical characteristics of the use will not have a significant adverse impact on water resources or the use or management of surrounding agricultural properties within at least a one-quarter (1/4) mile radius.*
Objective AG 2-C: Preserve and Protect Water, Soil, and Natural Resources Necessary for Agricultural Operations	**Policy AG 2-8:** Support and promote water development projects which provide additional sources of water for agricultural uses. Policy AG 2-9: Support the procurement of expanded and additional water rights which provide for contractual supply reliability for agricultural use. **Policy AG 2-10:** Seek to increase the County's influence regarding water rights and distribution legislation at the state and federal level, to the greatest degree feasible for both surface water and ground water sources. This may occur through County support for local farm interest groups seeking to influence water-related legislation at the state and federal levels. **Policy AG 2-11:** Assist landowners in resolving water rights, water delivery, and water supply issues with other agencies such as the California Department of Fish and Game, the U.S. Army Corps of Engineers, the U.S. Bureau of Reclamation, and the California Department of Water Resources. Policy AG 2-12: Within conservation easements and habitat conservation lands, preclude the practice of fallowing fields for the purpose of water export. **Policy AG 2-13:** Encourage the reuse of treated wastewater for agricultural purposes. **Policy AG 2-14:** Preserve water resources for agriculture, both in quantity and quality, from competition with development, non-agricultural uses, mitigation banks, and/or interests from outside of the County. **Policy AG 2-15:** Promote best management practices in agricultural operations (including animal operations) to reduce emissions, conserve energy and water, and utilize alternative energy sources. **Policy AG 2-16:** Promote wildlife-friendly farm practices, such as tailwater ponds, native species/grasslands restoration in field margins, hedgerows, ditch management for riparian habitat, and restoration of riparian areas in a manner consistent with ongoing agricultural activities, water delivery systems, reduction of pesticides, and other appropriate measures.
	Action AG 2-F: Coordinate with irrigation districts to identify cost-effective and feasible Best Management Practices for the application and use of water resources that address the range of agricultural activities in Colusa County. Work with entities such as the irrigation districts, Agricultural Commissioner, UC Extension Office, the Colusa County Resource Conservation District, and the Natural Resources Conservation Service to distribute Best Management Practices information to agricultural operations in the County. **Action AG 2-G**: Collaborate with water suppliers and wastewater treatment plant operators to increase the availability of treated or recycled water for agricultural purposes.
Community Character	
GOAL CC-2: Ensure that New Growth Addresses the Needs, Challenges and Opportunities Unique to Each Community	**Policy CC 2-6:** Require new residential development to connect to municipal water and sewer services. **Policy CC 2-19:** Prohibit lot splits or subdivision of land into new parcels smaller than two acres until centralized water and wastewater services are available. **Policy CC 2-24:** The use, expansion and development of private or mutually owned water and wastewater systems serving large-scale commercial and industrial land uses or multiple users shall be supported within the Sphere of Influence, provided that the systems meet the requirements outlined in Policy PSF 1-26 and all applicable State regulations. **Policy CC 2-25:** Encourage urban residential development within the City's Sphere of Influence to connect to municipal sewer and wastewater service and discourage the use, expansion and development of private or mutually owned water and wastewater systems serving residential uses within the Sphere of Influence. **Policy CC 2-42:** Require new urban development in Maxwell to connect to the municipal water and wastewater systems. **Policy CC 2-47:** Require new residential development in Princeton to connect to the municipal water and wastewater systems. **Policy CC 2-57:** Require applicants requesting land subdivisions or parcel splits in the Stonyford Lodge area to provide proof of adequate water supply for domestic use and fire protection. Additionally, sewage disposal meeting the County's standards and frontage for each parcel on a road built to County standards shall be ensured. **Policy CC 2-60:** Allow the subdivision of land designated Agriculture Transition (AT) and zoned Upland Conservation, 10 acre minimum (UC-10) into 10 acre parcels, provided that the project can demonstrate sufficient roadway access, water supply, septic capacity, no significant aesthetic impacts, and that no significant risk associated with wildland fires or slope stability would occur. **Policy CC 2-67:** Encourage urban residential development within the City's (Williams) Sphere of Influence to connect to municipal water and wastewater service. **Policy CC 2-69:** Discourage the use, expansion and development of private or mutually owned water and wastewater systems serving residential uses within the Sphere of Influence (Williams)

Table 1. Selected Colusa County General Plan Goals and Policies	
Goal or Objective	Policy or Action
Conservation Element	
Goal CON-1: Conserve and protect Colusa County's ecosystem.	**Policy CON 1-4:** Encourage conservation, rather than preservation, through the active management of natural resources, including wildlife, water, air, minerals, forests, and land. Conservation and management techniques include replacing trees, crops, and other renewable resources at a pace that ensures they are not consumed more quickly than they can be replaced; use of non-renewable resources in a manner that ensures the resources are not depleted but available to future generations for use; strategic forest thinning and fuels management to prevent wildfires; making resource areas accessible to the public while protecting resources from being diminished to non-recoverable levels; reducing incompatible wildlife/agricultural interface; and increasing public understanding and responsible use of resource conservation areas.
	Policy CON 1-7: Conserve and enhance those biological communities that contribute to the County's rich biodiversity including, but not limited to, blue oak woodlands, annual grasslands, mixed chaparral, pine woodlands, wetlands, riparian areas, aquatic habitat, and agricultural lands.
Objective CON-1B: Protect Endangered, Threatened and Special-Status Plant and Animal Species, their Habitats, and Other Sensitive Habitats	**Policy CON 1-13:** Sensitive habitats include oak woodlands, wetlands, vernal pools, riparian areas, wildlife and fish migration corridors, native plant nursery sites, waters of the U.S., and other habitats designated by state and federal agencies and laws. **Policy CON 1-14:** Require any proposed project that may affect special-status species, their habitat, or other sensitive habitat to submit a biological resources evaluation as part of the development review process. Evaluations shall be carried out under the direction of the Colusa County Department of Planning and Building and consistent with applicable state and federal guidelines. Additional focused surveys shall be conducted during the appropriate season (e.g., nesting season, flowering season, etc.), if necessary. **Policy CON 1-15:** Require that impacts to wetlands and riparian habitat protected by State or Federal regulations be avoided to the greatest extent feasible. If avoidance is not possible, fully mitigate impacts consistent with applicable local, State and Federal requirements. **Policy CON 1-16:** Require new development projects to incorporate measures that eliminate or avoid direct impacts to lakes, reservoirs, rivers, creeks, streams, wetlands, and other waterways to the greatest extent feasible. Measures may include, but are not limited to, appropriate setbacks or the implementation of best management practices approved by the Department of Planning and Building. **Policy CON 1-17:** All discretionary public and private projects that identify special-status species or sensitive habitats in a biological resources evaluation shall avoid impacts to special-status species and their habitat to the maximum extent feasible. Where impacts cannot be avoided, projects shall include the implementation of site-specific or project-specific effective mitigation strategies developed by a qualified professional in consultation with state or federal resource agencies with jurisdiction (if applicable) including, but not limited to, the following strategies: a. *Preservation of habitat and connectivity of adequate size, quality, and configuration to support the special-status species. Connectivity shall be determined based on the specifics of the species' needs.* b. *Project design measures, such as clustering of structures or locating project features to avoid known locations of special-status species and/or sensitive habitats.* c. *Provision of supplemental planting and maintenance of grasses, shrubs, and trees of similar quality and quantity to provide adequate vegetation cover to enhance water quality, minimize sedimentation and soil transport, and provide adequate shelter and food for wildlife.* d. *Protection for habitat and the known locations of special-status species through adequate buffering or other means.* e. *Provision of replacement habitat of like quantity and quality on- or off-site for special status species.* f. *Enhancement of existing special-status species habitat values through restoration and replanting of native plant species.* g. *Provision of temporary or permanent buffers of adequate size (based on the specifics of the special-status species) to avoid nest abandonment by nesting migratory birds and raptors associated with construction and site development activities.* h. *Incorporation of the provisions or demonstration of compliance with applicable recovery plans for federally listed species.* i. *Monitoring of construction activities by a qualified biologist to avoid impacts to on-site special status species.*
	Action CON 1-C: Review development project proposals, infrastructure projects, long range planning projects, and other projects that may potentially impact special-status species and sensitive resources to determine whether significant adverse impacts will occur. Where adverse impacts are identified, develop appropriate mitigation measures, in conformance with General Plan policies and relevant state and federal laws, to reduce or avoid impacts to the maximum extent feasible and practical. **Action CON 1-D**: Update the Zoning Ordinance to include standards to address significant impacts to special-status species and sensitive habitats consistent with Policies CON 1-13 through 1-18.
Objective CON-1C: Protect and Enhance Local Fisheries and Riparian and Aquatic Habitat	**Policy CON 1-21:** Protect riparian habitat along the Sacramento River in order to maintain suitable habitat for anadromous fish species, including salmon and steelhead trout, and for native sportfishing species
	Action CON 1-E: Coordinate with the California Department of Fish and Game to identify adversely impacted aquatic habitat within the County and to develop riparian management guidelines to be implemented by development, recreation, and other projects adjacent to rivers, lakes, reservoirs, and streams.

Table 1. Selected Colusa County General Plan Goals and Policies	
Goal or Objective	Policy or Action
Objective CON-1D: Protect Surface Water Quality in the County's Lakes, Streams, Creeks and Rivers	**Policy CON 1-22:** Maintain lakes, rivers, streams, creeks, and waterways in a natural state whenever possible. These water features may be actively managed and/or improved or modified in order to function as natural flood protection and storm water management features during storms and flooding events. **Policy CON 1-23:** Protect and enhance streams, channels, seasonal and permanent marshland, wetlands, sloughs, riparian habitat and vernal pools through sound land use planning, community design, and site planning. **Policy CON 1-24**: If a proposed project may result in impacts to wetlands or other Waters of the U.S., require the project proponent to consult with the appropriate regulatory agency and implement all applicable permit requirements as a condition of project approval. **Policy CON 1-25:** Balance the needs of aquatic and riparian ecosystem enhancement efforts with flood management objectives. Policy CON 1-26: Discourage development within 50 feet from the top of banks for all lakes, perennial ponds, rivers, creeks, sloughs, and perennial streams unless County-approved best management practices have been incorporated into the project's design in order to protect water quality and shoreline resources. Appropriate uses within the setback areas may include, but are not necessarily limited to: a. Fire and flood protection areas b. Maintenance of riparian habitat c. Recreational trails d. Vegetated landscaping e. Boat launch facilities Levees g. Docks h. Irrigation pumps **Policy CON 1-27:** Encourage agricultural land owners to improve on-site storm water retention features and implement feasible Best Management Practices (BMPs) to reduce site runoff and provide for natural removal of water pollutants. **Policy CON 1-28:** Support non-regulatory programs for protection of streams and riparian habitat, including education, technical assistance, tax incentives, and voluntary efforts to protect riparian resources. **Action CON 1-F:** Continue to require implementation of the County's Grading Ordinance. Review projects to ensure that BMPs are implemented during construction and site grading activities as well as in project design to reduce pollutant runoff into water bodies.
Objective CON-1E: Ensure a Sustainable and Long-Term Supply of Safe and Reliable Water to Support the Needs of County Residents, Businesses, and Agricultural Operations	**Policy CON 1-29:** Support water development, treatment, and storage projects that are needed to meet existing and future local and regional demand. **Policy CON 1-30:** Ensure that regional, state, and federal water projects, including proposed Sites Reservoir, protect local water rights and areas of origin. **Policy CON 1-31:** Encourage municipal water purveyors to install water meters and abandon flat-fee water use rate structures where feasible. **Policy CON 1-32:** Demonstrate leadership in water conservation by including water-efficient plumbing and landscaping at all new County facilities, and by reducing the County's own water use to the extent possible. **Policy CON 1-33:** Require new development and expansion of existing uses to incorporate best management practices for water use and include water conservation measures. **Policy CON 1-34:** Encourage the use of water conservation measures for agriculture and in existing residences and businesses. **Policy CON 1-35:** Encourage the use of water conservation measures, including low flow plumbing; reclaimed wastewater for non-potable uses; dual plumbing that allows grey water from showers, sinks, and washers to be reused for landscape irrigation in new developments; and native and drought-tolerant landscaping. **Action CON 1-G:** Adopt a Water Efficient Landscaping Ordinance for residential, park, recreational, and commercial uses, based on the state model ordinance as amended to address local concerns. The ordinance should address: 1. Water-efficient landscape designs using low water-use plants. 2. Efficient irrigation systems. 3. Minimized turf areas. 4. Soil improvements and mulch. 5. Regular maintenance and adjustment of irrigation systems. 6. Scheduling irrigation during early or late hours. 7. Water budgeting, when necessary. 8. Education of residents, customers and employees regarding the importance of efficient water use. **Action CON 1-H:** Continue to implement the policies, actions, and Basin Management Objectives (BMOs) contained in the Colusa County Groundwater Management Plan. Action CON 1-I: Continue to cooperate with Butte, Glenn, Tehama, Shasta and Sutter Counties through the Northern Sacramento Valley Integrated Regional Water Management Group, and continue to foster regional cooperation with other counties and water purveyors.

Table 1. Selected Colusa County General Plan Goals and Policies	
Goal or Objective	**Policy or Action**
Housing Element	
Goal HO-2: Provide Adequate Sites and Infrastructure to Accommodate the County's Housing Needs	**Policy HO-11:** Implement all policies and programs of the Housing Element with adequate consideration given to the protection of the County's agricultural and groundwater resources, and maintaining consistency with the County's Conservation Element of the General Plan.
	Program HO 2-5 Provision of Public Services The County will make every effort to ensure that infrastructure is available in a timely manner to accommodate development of its fair share of regional housing needs. Particular effort will be made to provide adequate infrastructure to accommodate the R-2, R-3, and R-4 sites in Arbuckle, Maxwell, Princeton, and the unincorporated area of Colusa. The County will coordinate with the local water and sewer agencies to assist in planning for adequate water and sewer service. The County will take the following actions, as needed, to provide service to developing areas: <u>All Service Providers</u> • Each water and sewer provider will be mailed a copy of the Housing Element, upon its adoption, along with a letter that includes: 1) the text of Government Code Section 65589.7 requiring water and sewer providers to grant priority for service allocations to proposed developments that include housing units affordable to lower (including very low and extremely low) income households; 2) a summary of the County's regional housing needs allocation; and 3) specific actions the provider should take to ensure adequate service (see below for actions specific to each district/area in the County). <u>Rural Areas</u> • Review potential treatment technologies that could be developed to provide water and sewer service for rural market-rate and affordable housing; develop performance standards for potential treatment technologies to assist public and/or private sewer and water providers in determining which will be most feasible in their locations within the County. • Allow a wide range of feasible alternative system sizes and treatment technologies to provide water and sewer service for rural market-rate and affordable housing. Program HO 2-6 Adequate Water and Wastewater Service for Subdivisions Revise the Zoning Ordinance to ensure parcel map or subdivision map approval is dependent on demonstrated ability to provide potable water and meet septic capacity requirements.
	Policy HO-18: Give priority for water service connections to extremely low, very low, and low income housing units in areas receiving water service from the County. Encourage local water and sewer providers to give priority to these lower income developments pursuant to Government Code Section 65589.7. Provide a copy of the Housing Element Update to local water and sewer providers upon its adoption.
Land Use Element	
Goal LU-1: Maintain the efficient and harmonious use of land in the county, promoting a well organized and orderly development pattern, avoiding random, haphazard growth, protecting public health and safety, and accommodating the orderly and sustainable growth of employment and population.	**Policy LU 1-4**: Locate lands designated for future development based on constraints associated with natural features, such as soil, slope, and drainage, preservation of the County's resources, including agriculture, open space, and scenic views, and by public service availability, such as sewer and water capability; policies and actions related to these requirements are set forth in more detail in the Safety, Conservation, and Public Facilities and Services Elements.
	Action LU 1-D: Review development projects, consistent with the requirements of the California Environmental Quality Act and other applicable laws, to identify potential impacts associated with aesthetics, agriculture, air quality, circulation, community character, natural and cultural resources, greenhouse gases, public health and safety, water quality and supply, public services and facilities, and utilities and to mitigate of adverse impacts to the maximum extent that is feasible and practical.
Objective LU-1C: Ensure a Streamlined and Equitable Process for Project Permitting and Outside Agency Coordination without Compromising the Enforcement of Local Land Use Regulations	**Policy LU 1-27:** Participate in countywide, regional and other multi-agency planning efforts related to agriculture, water supply, tourism, open space, air quality, housing, green infrastructure, recreation, habitat conservation, energy, emergency preparedness and flood protection to ensure that the needs of the County's residents and businesses are not overlooked.
Goal LU-3: Ensure that Future Development Achieves the County's Goals of Agricultural Conservation, Rural Character, Growth Focused Around Existing Communities and Uses Sustainable Practices through Application of Development Requirements	**Policy LU 3-1:** Require proposed urban and rural residential development to be consistent with the following: <u>Rural Residential</u> • The soil is determined to be suitable for septic tank use by the Environmental Health Department • Groundwater is determined to be sufficient to support a well by the Environmental Health Department • The parcel can be made accessible from a public street • It can be demonstrated that the development is compatible with surrounding uses and will not have a significant, adverse effect on adjoining properties. • The area is accessible for fire protection and can meet fire resistance guidelines if located in a high hazard area. • It can be demonstrated that potable water is available. <u>Urban Residential</u> • The community utility systems, including water, drainage, and sewer, if available, can accommodate the additional demand. • The area has access to a major transportation route. • The impact of the development on local streets can be mitigated to acceptable levels. • Adequate fire protection measures are provided. • The site adjoins existing urban (residential, commercial, public facility, etc.) development. • The project avoids the repetition of residential facades/designs within subdivisions. • The development is compact, is sensitive to natural resources, public safety, efficiently uses water and energy, maximizes bicycle and pedestrian opportunities, provides multimodal connections to nearby neighborhoods, bike/pedestrian routes and trails, and provides direct, safe routes to services, schools, and shopping.

Table 1. Selected Colusa County General Plan Goals and Policies	
Goal or Objective	Policy or Action
Objective LU-3B: Ensure that Reasonable Development Standards and the County's Rural Character and Quality of Life are Not Compromised in Efforts to Attract Commercial and Industrial Growth	**Policy LU 3-24:** Require proposed industrial development to be consistent with the following: • The area can be readily hooked up to public sewer and water facilities where these facilities are available, or to private sewer and water facilities where utilities do not yet exist. • If the industry uses community utilities, that community systems can accommodate the added demand without additional costs to the existing community. • If the project is to be served by groundwater wells, that reliable, scientific data be provided in the project development application that demonstrates that groundwater will be available under all conditions, including drought, that surrounding the wells will not have appreciable adverse effects on the quality and quantity of existing domestic and agricultural water supplies, and that private sewage disposal systems can comply with Environmental Health Department standards. • The project will not significantly contribute to air, water, light, and noise pollution.
Open Space Element	
Objective OSR 1-B: Balance Open Space Preservation with Economic Development Needs	**Policy OSR 1-9:** Maintain open space for future water and drainage projects.
Public Services and Facilities Element	
Objective PSF-1A: Provide Safe, Reliable, and Environmentally Sound Water Services to Existing County Land Uses and Areas of Planned Growth	**Policy PSF 1-3:** Coordinate with water providers throughout the County to manage water supplies in a way that ensures adequate supplies for existing residents, agricultural uses, and businesses, and for projected growth, and avoids groundwater overdraft, water quality degradation and other adverse environmental impacts. **Policy PSF 1-5:** Facilitate, and to the extent feasible, assist with the development of new and reliable sources of water, consistent with County land use plans and regional water needs. **Policy PSF 1-7:** Priority is given to serving existing water uses over new water uses. **Policy PSF 1-8:** Require proof of an adequate (as defined by the County Environmental Health Division) potable water supply to serve the entire project prior to approval of any division of land or use permit. **Policy PSF 1-11:** New residential development on parcels two acres in size or smaller shall be required to connect to a public water system, with the exception of existing Rural Residential and Rural Service Center parcels which may be allowed to have an on-site well if approved by the County Department of Environmental Health.
Safety Element	
Objective SA 1-D: Take Appropriate Steps to Reduce the Risks to Life, Property, and Public Services Associated with Flooding.	**Policy SA 1-27:** Maintain adequate lands that can be used for groundwater recharge and storm water management. These lands may include parcels designated Agriculture General (AG), Designated Floodway (DF), and Resource Conservation (RC). **Policy SA 1-35:** Encourage and accommodate multi-benefit flood control projects that incorporate recreation, resource conservation, preservation of natural riparian habitat, and scenic values of the County's streams, creeks and lakes. Where appropriate and feasible, the County shall also encourage the use of flood and/or stormwater retention facilities for use as groundwater recharge facilities.

Table 2. Selected Glenn County General Plan Goals and Policies	
Goal or Objective	**Policy or Action**
Natural Resources	
Agriculture/Soils	
NRG-1 Preservation of agricultural land	**NRP-3:** Recognize the value of ricelands for waterfowl habitat, watershed management, and for groundwater recharge in an effort to preserve such lands and to maintain necessary water supplies in Glenn County. **NRP-4:** Support efforts underway to explore the potential to utilize ricelands as temporary storage reservoirs in the winter months, thus increasing groundwater recharge and supplies of surface water for both agriculture and wildlife, and potentially providing an alternative to rice straw burning. **NRP-19:** Support the erosion control programs, resource management programs, and agricultural conservation efforts of the Glenn County Resource Conservation District that benefit the county as a whole. Implementation Strategies, Programs and Priorities **NRI-3:** Encourage rice growers as well as other agricultural crop growers and cooperative to emphasize the value of rice land for waterfowl habitat, air quality enhancement, and groundwater recharge through promotions and advertisement. **NRI-4:** Monitor and participate in efforts of State and federal agencies and private conservation groups to find alternatives to rice straw burning, including winter flooding of fields. **NRI-16:** Establish a County notification process for requests to convert land from agricultural and grazing use to wetlands.
Water Resources	
NRG-2 Protection and management of local water resources	**NRP-22:** Oppose the exportation of groundwater resources outside the county. **NRP-23:** Support legislation which will provide for a locally controlled Glenn County groundwater management district. **NRP-24:** Recognize the following local priorities when dealing with questions of ground and surface water use: • Highest: 1) Household/Domestic, 2) Agriculture, 3: Industrial/Commercial, 4) Wildlife/Conservation Lowest: 5) Exportation **NRP-25:** Protect groundwater recharge areas in the county from overcovering and contamination by carefully regulating the type of development which occurs within these areas. **NRP-26:** Discourage onsite sewage disposal systems in areas with high groundwater recharge potential and eliminate existing concentrations of septic tanks in such areas through construction of community sewage treatment and disposal systems. **NRP-27:** Prohibit uses with the potential to accidentally discharge harmful groundwater pollutants in areas of high groundwater recharge, unless appropriate mitigation measures have been incorporated into the operation of such uses. **NRP-28:** Identify and monitor potential sources of groundwater pollution, including harmful agricultural practices. **NRP-29:** Limit structural coverage and impervious surfaces within areas of high groundwater recharge through application of zoning that recognizes the importance of this feature. **NRP-30:** Protect important watershed areas from poor development practices and potential degradation. **NRP-31:** Monitor actions taken at the State and federal level which impact water resources in order to evaluate the effects of these actions on the county's resources. **NRP-33:** Carefully study the potential impact that any future reservoir construction may have on groundwater recharge areas in Glenn County. **NRP-34:** Recognize the value of irrigation system infrastructure by discouraging development within established irrigation district boundaries which would prematurely reduce the utility of such systems. **NRP-35:** Encourage the development of water conservation programs by water purveyors for both agricultural and urban uses. **NRP-36:** Encourage development of educational programs to increase public awareness of water conservation opportunities and the potential benefits of implementing conservation measures and programs. **NRP-37:** Recognize that efforts to reserve water in Glenn County for wildlife may also bring long-term benefits to the effort to retain water resources locally. **NRP-38:** Recognize the impacts of gravel extraction on groundwater quantity and quality and encourage extraction methods that preserve and enhance groundwater resources. Implementation Strategies, Programs and Priorities **NRI-18:** Establish a local groundwater management program including strategies for advancing State legislation supportive of a locally controlled groundwater management district. **NRI-19:** Apply the priorities for water consumption included in this General Plan when reviewing discretionary actions. **NRI-20:** Establish an overlay designation to provide appropriate protections for areas of the county where groundwater recharge occurs, such as limitations on overcovering of soils with impervious surfaces. To provide for appropriate groundwater protection, new zoning proposals that could result in residential lots less than one acre should not be approved until a sewer system is available. Consult with the State Department of Water Resources, the Glenn County Health Department and the Glenn County Planning Department, and incorporate protective measures into the *Glenn County Zoning Code.* **NRI-22:** Work with State and federal agencies to improve local groundwater pollution detection and monitoring. **NRI-23:** Amend County ordinances to include development standards, as contained in this *General Plan,* which protect watershed areas, and coordinate application of the standards with the U.S. Forest Service and other agencies. **NRI-24:** Monitor and participate in efforts of the Bureau of Reclamation and Army Corps of Engineers to study the impacts of additional reservoir construction and of reservoir siltation. **NRI-25:** Develop and actively seek funding to develop water conservation and educational programs.

Table 2. Selected Glenn County General Plan Goals and Policies

Goal or Objective	Policy or Action
Biological Resources	
NRG-3 Preservation and enhancement of the county's biological resources in a manner compatible with a sound local economy.	**NRP-39:** Approach the retention and enhancement of important habitat by preserving areas or systems which will benefit a variety of species or resources rather than focusing on individual species, resources or properties. **NRP-41:** Preserve natural riparian habitat, especially along Stony Creek and the Sacramento River and Butte Creek. **NRP-42:** Eliminate the E-M (Extractive Industrial) Zone from areas containing natural riparian vegetation/habitat and replace it with a category affording greater protection to stream courses and riparian habitats. **NRP-46:** Promote protection of native biological habitats of local importance such as riparian forests, foothill oak woodlands, Stony Gorge and Black Butte Reservoirs. **NRP-50:** Recognize the Sacramento River corridor, the Sacramento National Wildlife Refuge, migratory deer herd areas, naturally occurring wetlands, and stream courses such as Butte and Stony Creeks as areas of significant biological importance. **NRP-53:** Direct development away from naturally occurring wetlands to the extent such policy is consistent with the concept of compact and contiguous development. **NRP-61:** Support efforts to improve water availability and management when the potential exists to benefit fish and wildlife in cooperation with Glenn County agricultural water users. Implementation Strategies, Programs and Priorities **NRI-27:** Amend the *Glenn County Zoning Code* to include a Streamside Protection Zone and rezone those areas along stream courses currently zoned E-M (Extractive industrial Zone) in accordance with a locally prepared riparian zone management plan. **NRI-32:** Meet with the U.S. Fish and Wildlife Service to determine if there is interest in establishing buffer areas around the Sacramento National Wildlife Refuge and other areas of biological importance, and how the federal government would participate in their formation. **NRI-34:** Identify biologically important areas, such as the Sacramento River Corridor, Sacramento National Wildlife Refuge, deer herd ranges, naturally occurring wetlands, and stream courses such as Butte and Stony Creeks, and show them as constraints to development in this *General Plan* (Reference Biological Importance Overlay and Restorable Wetlands Overlay).
Public Safety	
Water Quality	
PSG-6 Protection and enhancement of water quality.	**PSP-43:** Support ongoing regulatory and compliance efforts at the federal and State level for the protection of water quality. **PSP-45:** Zone floodways and stream channels in a manner that promotes protection of water quality. **PSP-47:** Support the preparation of area groundwater studies to the protection of groundwater and to ensure that the holding capacity of the area is not exceeded. Implementation Strategies, Programs and Priorities **PSI-42:** Sponsor and assist with educational efforts which have as a goal greater public awareness and compliance with established water quality standards.
Community Development	
Land Use/Growth	
CDG-2 Avoidance of land use conflicts in agricultural areas.	**P-45:** Discourage urban growth in floodplains, aquifer recharge areas, scenic and historic sites, or other sensitive areas as specified in this General Plan. **CDP-17:** Encourage agricultural water suppliers to make changes in their service requirements to increase the minimum sized parcel to be served in agricultural areas to ten (10) acres, and recommend that new parcels created within water supply district boundaries which are less than ten (10) acres in size be detached from the district(s), except for the Orland Unit Water Users' Association, for which the minimum size shall be 5.01 acres. **CDP-18:** Within the Orland-Artois Water District, approve no zone changes allowing parcels smaller than twenty (20) acres in size, and approve no tentative maps for parcels less than twenty (20) acres in size. Implementation Strategies, Programs and Priorities **CDI-10:** Contact agricultural water suppliers and formally request establishment of a ten (10) acre minimum parcel size for agricultural water service. **CDI-11:** Apply zoning to properties located within the Orland-Artois Water District that reflects a minimum parcel size of twenty (20) acres or larger.
Public Services and Facilities	
CDG-17 Provision of adequate and cost-effective public services.	**CDP-129:** Maintain coordination and cooperation between the County and water purveyors, and encourage special districts to comply with State law by referring capital projects to the County for review and evaluation for consistency with the General Plan. Implementation Strategies, Programs and Priorities **CDI-83:** Convene a task force composed of representatives of Glenn County and the cities of Willows and Orland to formulate a memorandum of understanding which establishes uniform polities and standards for building construction, public utility connections, sewer and water service, and other matters related to cost-effective development of unincorporated areas within city urban limit lines. **CDI-88:** Request LAFCO to initiate and undertake studies of existing special districts and cities which include inventorying those agencies and determining their maximum service area and service capacities. **CDI-89:** Request LAFCO to adopt standards and procedures for the evaluation of service plans submitted by cities and special districts with annexation/reorganization applications. **CDI-94:** Request the Environmental Health Department to review minimum parcel size standards for areas without public or community water service for adequacy as new information becomes available e.g. soil surveys, new regulations.

Table 3. Selected City of Colusa General Plan Goals and Policies	
Goal or Objective	**Policy or Action**
Land Use Elements	
Comprehensive Planning	
Goal LU-6: To provide a comprehensive, logical land use planning process rather than an incremental, piecemeal approach.	**Policy LU-6.3:** Growth shall be managed to ensure that adequate public facilities and services are planned for and provided in a manner that protects the public's health, safety, and welfare.
	Implementing Actions Implementing Action LU-6.3.e: Water Master Plan The City will adopt and implement a Water Master Plan. Development projects will be evaluated for consistency with this plan. The plan will provide a framework for timed capital improvements and facility expansion projects and will aid the City in identifying and establishing funding sources beyond monthly service charges to finance improvements related to water quality, supply, recycling, distribution, and water conservation. Municipal water is discussed is discussed in detail in the Municipal Facilities and Services Element. Implementing Action LU-6.3.f: Wastewater Master Plan The City will adopt and implement a Wastewater Master Plan. Development projects will be evaluated for consistency with this plan. The plan will provide the framework for timed capital improvements and facility expansion projects and will identify funding sources beyond monthly service charges to finance improvements related to expansion and upgrades to wastewater capacity, flow, treatment, and reclamation. The City will refer to this plan when constructing improvements and upgrades to the Wastewater Treatment Plant as needed to accommodate existing customers and any approved development. Wastewater is discussed in detail in the Municipal Facilities and Services Element. Implementing Action LU-6.3.g: Storm Drainage Master Plan The City will adopt and implement a Storm Drainage Master Plan. Development projects will be evaluated for consistency with this plan. The plan will identify drainage facilities that will be constructed to eliminate drainage problems in the City and will describe the means for financing the improvements. The Storm Drainage Master Plan will address Regional Water Quality Control Board water quality standards, including Best Management Practices for storm drainage management. Storm drainage is discussed in detail in the Municipal Facilities and Services Element.
Community Character and Design	
Environmental Sustainability	
Goal CCD-2: To ensure that new development respects the natural environment.	**Policy CCD-2.2:** New development shall respect the contours of drainage ways as important recognizable features of the City.
	Implementing Actions Implementing Action CCD-2.2.c: Improvement Standards The City will update and adopt improvement standards to be applied to improvements and private works to be dedicated to the public and accepted by the City for maintenance or operation, as well as improvements to be installed within existing rights of-way and easements. These standards shall serve to regulate and guide the design and preparation of plans for street construction, alleys, drainage, sewer, street lighting water supply facilities, and related public improvements.
	Policy CCD-2.5: The City shall ensure that infrastructure improvements demonstrate sensitivity to any natural systems affecting a project site.
	Policy CCD-2.5: The City shall ensure that infrastructure improvements demonstrate sensitivity to any natural systems affecting a project site.
	Implementation Actions Implementing Action CCD-2.5.b: Development Review Impacts of proposed new development will be evaluated with each proposal. Mitigation of significant impacts to the natural environment, including biological resources, water quality and air quality, will be required as part of the development review process. Mitigation measures to minimize impacts on these natural resources will be implemented as appropriate.
Safety Element	
Goal SAF-2: To minimize the potential for loss of life and damage to property due to flooding.	**Policy SAF-2.2:** The City shall minimize the potential for flood damage to buildings and other structures, particularly from storm water runoff.
	Implementing Actions Implementing Action SAF-2.2.a: Storm Drainage Master Plan The City will adopt a Storm Drainage Master Plan for Colusa. The Master Plan will identify drainage facilities that will be constructed to eliminate or mitigate drainage problems in the City, and describe the means for financing the proposed improvements. The Storm Drainage Master Plan will be consistent with any Capital Improvements Plan prepared by the City and will address Regional Water Quality Control Board water quality standards, including Best Management Practices for storm drainage. Implementing Action SAF-2.2.b: Development Review The City will require new development to ensure that the cumulative rate of peak runoff does not exceed pre-development levels. New development and redevelopment of existing sites will provide storm water detention or retention facilities (on- or offsite), if necessary, to prevent flooding due to runoff or where existing storm drainage facilities are unable to accommodate increased storm water drainage. Implementing Action SAF-2.2.c: Ordinance and Regulation Review and Update The City will review and revise its Subdivision Ordinance as needed to incorporate specific data and design requirements related to storm water drainage that are contained in this General Plan update.

Table 3. Selected City of Colusa General Plan Goals and Policies	
Goal or Objective	**Policy or Action**
Parks, Recreation and Resource Conservation	
Water Quality and Water Conservation	
Goal PRC- 9: To manage and protect the City's water resources.	**Policy PRC – 9.1:** The City shall require natural drainage flows be maintained in new development projects to the greatest extent feasible.
	Implementing Action Implementing Action PRC-9.1.a: Development Review As part of the development review process, the City will review individual projects to determine the setback requirements that will adequately buffer natural drainage corridors from development. The City will require that new development protect natural drainage corridors and other watercourses from the adverse effects of construction activities and urban runoff.
	Policy PRC- 9.2: The City shall periodically review the status of the City's groundwater resources.
	Implementing Action Implementing Action PRC-9.2.a: Water Resources Report The City will prepare a Water Resources bi-annual report to the City Council. This report, in part, will include an analysis of groundwater resources, including groundwater quality. The City will use this report to ensure groundwater resources are protected from contamination and overdraft. As part of the bi-annual Water Resources Report, the Public Works Department will analyze the quality of drinking water in the City. The City will encourage activities that maintain and improve drinking water quality.
	Policy PRC – 9.3: The City shall maintain its ability to meet its water supply requirements. Implementing Action PRC-9.3.a: Development Review As part of the development review process, the City will evaluate the incorporation of water conservation techniques in all new development.
	Implementing Action Implementing Action PRC-9.3.b: Development Impact Fees (see Implementing Action MFS-1.1.b).
	Policy PRC-9.4: The City shall encourage the use of treated wastewater and other non-potable water sources for irrigation and groundwater recharge.
	Implementing Actions Implementation Action PRC-9.4.a: Landscape Ordinance The City will adopt and implement a landscape ordinance, which will establish standards for water-conserving landscaping in order to reduce water use in developed areas. Requirements will specify the use of reclaimed water, trees, and other vegetation. This ordinance will be applied in the design and development of private and public development projects and will be consistent with the provisions of the General Plan. Implementation Action PRC-9.4.b: Interagency Coordination In cooperation with the Colusa County Water District, the City will identify and develop opportunities for reuse of non-potable water, including reclaimed water, for non-domestic uses.
Municipal Facilities	
Water System	
Goal MFS – 7: To maintain and enhance a water system that meets the needs of existing and future residents of Colusa.	**Policy MFS-7.1:** The City shall establish development standards and plans to ensure that the water treatment and delivery system is not unduly burdened by new development.
	Implementing Action Implementing Action MFS-7.1.c: Water Master Plan The City will prepare and implement a Water Master Plan to provide a framework for timed capital improvements and facility expansion projects. The plan will aid the City in identifying and establishing funding sources beyond monthly service charges to finance improvements related to water quality, supply, recycling, distribution, conservation, and other issue areas identified issue areas identified by the City and the plan. The plan will evaluate the depth, size, recharge rate, and capacity of the aquifer to accommodate the City's projected future growth. The plan will also make determinations regarding the need to develop additional water sources during the planning period of this General Plan.
	Policy MFS-7.2: To minimize the need for the development of new water sources and facilities and to minimize sewer treatment needs, the City shall promote water conservation in City operations and in private development. The City shall annually monitor water usage to assess the effectiveness of the water conservation program.
	Implementing Action MFS-7.2.a: Water Master Plan The City will implement a water conservation program, to be defined and incorporated in its Urban Water Management Plan, to be prepared with the Water System Master Plan. If groundwater levels decline and/or if the "moderate" program does not achieve its intended results, the City will implement the "aggressive" or "maximum" water conservation program as defined in the Water Management Plan.
	Policy MFS-7.3: The City shall, to the extent practical, require the use of drought-tolerant plant species and water efficient irrigation systems in the landscaping of new public and private open space areas, common areas, and parks.
	Implementing Action MFS-7.3.a: Development Review Through review of development projects, the City will condition development, where practical, on water conservation practices.
Stormwater Drainage System	
Goal MFS – 9: To provide adequate stormwater drainage for all existing and future development.	**Policy MFS-9.1:** The City shall ensure its stormwater drainage system is upgraded in phases to adequately accommodate drainage resulting from new development prior to project construction.
	Implementing Action Implementing Action MFS-9.1.a: Storm Drainage Master Plan The City will prepare and adopt a Storm Drainage Master Plan for Colusa. The Master Plan will identify drainage facilities that will be constructed to eliminate existing drainage problems and avoid future drainage problems in the City and describe the means for financing the improvements. The Storm Drainage Master Plan will be consistent with any Capital Improvement Program prepared by the City and address Regional Water Quality Control Board water quality standards, including Best Management Practices for storm drainage.

Table 4. Selected City of Williams General Plan Goals and Policies	
Goal or Objective	**Policy or Action**
Land Use and Character	
Achieving a Quality Community Character	
	Policy 3.27: The land use plan and zoning districts will address for the character of development, which accounts for the design/intensity of development, the arrangement of buildings and parking areas, and the preservation of open space. Actions **3.hh.** Establish minimum open space standards within each district, which may be used for storm water detention, resource protection (e.g. riparian buffers along streams), bufferyards, and/or parks, trails, and open space. The amount of private or common open space relates to the character of development. For instance, in the Agriculture and Estate Residential districts, there is a high proportion of private open space whereas the Suburban Residential and Urban Residential districts have increasing percentages of common (public or semipublic) open space. **3.jj**. Incorporate development options within each zoning district. Different lot sizes and percentages of open space maintain the district character while allowing market flexibility and adjustment to site conditions. In other words, a smaller lot may be used and clustered to set aside adequate open space to preserve agricultural resources, such as the orchards, or to fulfill the City's storm water management objectives. A comparable density and character is achieved.
Service Provision	
	Policy 3.41: The City's land use pattern shall focus new development and significant redevelopment where adequate public services and utility capacity are already in place or projected for improvement, including streets, water, wastewater, and drainage infrastructure.
Environmental Sensitivity, Resource Protection, and Flood Prevention	
	Policy 3.45: Sensitive resources, including floodplains, wetlands, riparian buffer areas along stream channels, and valued view sheds, will be protected and preserved. **Policy 3.50:.** The City will consider the location of natural resources to be used for groundwater recharge and stormwater management.
Public Safety	
Flood Protection	
	Policy 4.9: The design of drainage improvements will be sensitive to community aesthetics, aquatic habitat, recreation (trails, playing fields), wetlands, and water quality mitigation. **Policy 4.10:** The City will encourage design strategies to reduce the impact of impervious surfaces on storm water quality through the use of water gardens, rain barrels or cisterns, pervious pavement, vegetated swales, swale blocks, and green roofs, among others. Actions **4.d.** Maintain a Flood and Drainage Master Plan that addresses the following, at a minimum: • Storm water and drainage improvements for all sections of the City that are needed to accommodate planned growth; • Coordination with irrigation districts, the County and other affected flood control agencies to develop uniform standards for irrigation and storm water conveyance infrastructure; and • Standard measures used for new development to address localized flooding, such as measures to avoid off-site drainage impacts from adjacent agricultural operations. **4.e.** At the time the City reaches a size by which it is required to comply with Section 402(p) of the Federal Clean Water Act, prepare a Storm Water Management Plan (SWMP) to fulfill the requirements for improving the quality of storm water discharges from Small Municipal Separate Storm Sewer Systems (MS4) for Phase II municipalities. **4.f.** Begin identifying Best Management Practices (BMPs), particularly construction site storm water runoff control and post-construction storm water management, to reduce the discharge of pollutants to the storm water system. These should be integrated as standards into the City's subdivision regulations. **4.g.** Through improved land development practices and regulations, establish a hierarchy for managing storm water with the following priorities: minimize impervious surfaces, attenuate flows by use of open, vegetated swales and natural depressions and preserve existing natural stream channels, infiltrate runoff 3, provide storm water retention and then detention structures, provide velocity dissipation structures or channel design, and construct storm sewers. **4.m.** Investigate the feasibility of the alternatives outlined in the Preliminary Technical Memorandum for Flood Hazard Mitigation Study Project Alternatives. The structural alternatives include improving the conveyance capacity of Freshwater and Salt Creeks and the supporting network of drainage laterals, replacing bridge crossings to remove obstructions, constructing diversion dams to channel flows away from the City, constructing flood detention and multi-purpose flood retention reservoirs, constructing levees to the west and north of the City with removable floodwall sections, and elevating existing structures. The non-structural alternatives include land acquisition, cropland storage, channel restoration, upland re-vegetation, and improved maintenance of stream channels.

Table 4. Selected City of Williams General Plan Goals and Policies	
Goal or Objective	Policy or Action
Public Facilities	
Water, Wastewater, and Storm Drainage	
	Policy 5.1: The City of Williams will provide utilities concurrently with development. Actions **5.b.** Continue developing the City's Capital Improvement Program (CIP) to repair and replace aging and deteriorated sewer lines, which will improve the flow efficiency, reduce inflow and infiltration into the collection and treatment systems, and help to mitigate ground water impacts. **5.c.** Execute plans to install a new water well. **5.d.** Further develop plans for a second water storage tank. **5.e.** Amend the zoning ordinance to include ground water protection measures in site development standards. Include open space provisions in the density standards. **5.f.** Amend the subdivision ordinance to include ground water protection measures in future subdivisions. **5.g.** In accordance with AB 1881, the Water Conservation Landscape Act of 2006, develop water efficient landscaping standards for new development to include: • Requirements for specific species of plantings; • Prohibition of invasive species; • Submittal requirements for landscaping and irrigation plans (and requirement for both to be installed per approved plans); • Landscaping and hardscaping to be designed based on "hydrozone" specifications; • Provision for recirculating and recycling water systems; • Requirements for a soil report with recommendations regarding the most efficient types of planting and irrigation for the specific soil types existing on a site; • Specific "plant factors" in compliance with state standards for high, medium and low water using plantings; and • Irrigation to be designed according to hydrozone needs. **5.k.** Incorporate into City standards and specifications means for addressing storm water quality, including a first preference for nonstructure best management practices such as bioretention, vegetated swales and buffer strips, constructed wetlands, and other environmentally sensitive design and construction practices.
Open Space and Conservation	
Vegetation	
	Policy 7.24: Preference will be given to native and drought-tolerant plant species to reduce water consumption, minimize invasive species, and preserve the appearance of the natural landscape. Actions **7.zz** Consider provisions in the subdivision regulations may require riparian buffers around all naturally occurring water bodies and wetlands. The standards shall restrict septic systems within the buffer area and include requirements for planting indigenous plants and trees to enhance the buffer's absorption and filtering potential. 7.aaa Include the use of bio-swales and permanent water features for drainage management to reduce the volume and rate of stormwater runoff from new developments. 7.bbb Support green roofs on new developments as a method of stormwater mitigation, as well as reduction of the urban "heat island" effect. For new construction, the use of green roofs shall result in a reduction in the extent of stormwater facilities that need to be constructed to meet standards. 7.ccc The City will identify areas that may accommodate floodwater for the purposes of groundwater recharge and stormwater management.

Table 5. Selected City of Orland General Plan Goals and Policies	
Goal or Objective	**Policy or Action**
Safety Element	
Subsidence	
	Policy 4.6.C: Applications for projects that extract groundwater, oil, or gas shall include a report evaluating the potential for resulting subsidence. Reports shall discuss appropriate mitigation measures to reduce the potential for subsidence.
Open Space, Conservation, and Public Facilities Element	
Water Quality	
Goal 5.6: Conserve, enhance, and manage water resources, protect their quality, and ensure an adequate long-term supply of water for domestic, agricultural, industrial, and recreational use.	**Policy 5.6.A:** Ensure that new development complies with State and federal regulations and standards in order to maintain and improve water quality. Program 5.6.A.1: The City shall require applicants for new development projects to adhere to RWQCB discharge standards, including identifying specific measures for minimizing project related erosion and resulting siltation of surface water features. Programs Program 5.6.A.2: The City shall require that a grading and erosion control plan be submitted with each tentative parcel and tentative subdivision map prior to action by the City. Standard RWQCB best management practices (BMPs) shall be incorporated in these plans as a means to control runoff and minimize erosion impacts. Program 5.6.A.3: The City shall ensure that new development has a minimal impact on natural drainage channels and flow capacity. **Policy 5.6.B:** Reduce the potential for sediment and other pollutants to contaminate surface and ground water resources. Programs Program 5.6.B.1: Where feasible, the City shall maintain the natural condition of waterways and floodplains and protect watersheds to ensure adequate ground water recharge and water quality. Program 5.6.B.2: The City shall require that new development at a density greater than one unit per acre and commercial and industrial areas annexed to the City be connected to the City's wastewater collection system. Existing residential development and individual homes where septic systems have failed also may be connected to the system. Program 5.6.B.3: The City shall review City standards for drainage structures and, if determined appropriate, adopt requirements for grease and sediment traps for roads and parking lots to improve water quality of urban runoff. **Policy 5.6.C:** Explore the use of pervious concrete/pavement to allow the continued filtration of groundwater into the soil. **Policy 5.6.D:** Encourage the use of site design techniques for non-residential uses that provide for the discharge of on-site stormwater into landscaped basins or swales prior to discharge to the City's storm drainage system. **Policy 5.6.E:** Encourage water conservation as a means of conserving not only water but also minimizing energy consumption and costs associated with pumping and delivery systems.
Water Supply	
Goal 5.7: Protect the quantity and quality of community water supplies	**Policy 5.7.A:** Ensure that groundwater resources in the vicinity of Orland are protected from contamination. Programs Program 5.7.A.1: The City shall require wells located on land annexed to the City and served by City water service to be properly abandoned or all possibility of cross connection with the City water system eliminated in accordance with Glenn County Health Department guidelines. Program 5.7.A.2: The City shall ensure that all City wells are operated and maintained to meet California Department of Health Services standards for public drinking water supplies. **Policy 5.7.B:** Avoid the wasteful use of water within the planning area. Program 5.7.B.1: The City shall promote the use of water-conserving devices and practices in both new construction and major alterations and additions to existing buildings.
Stormwater Drainage System	
Goal 5.9: Provide for the collection, transport, and stormwater in a safe manner to protect people and property from damage arising from storm drainage.	**Policy 5.9.A:** Require new development to ensure that the cumulative rate of peak runoff does not exceed pre-development levels. Programs Program 5.9.A.1: New development and redevelopment of existing sites should provide storm water detention or retention facilities (on- or offsite), if necessary, to prevent flooding due to runoff or where existing storm drainage facilities are unable to accommodate increased storm water drainage. Program 5.9.A.2: The City shall review and revise its Zoning and Subdivision Ordinances, as needed, to incorporate specific data and design requirements related to stormwater drainage that are contained in this general plan. Program 5.9.A.3: The City shall complete its Storm Drainage Master Plan. **Policy 5.9.B:** Minimize the potential for flood damage to buildings and other structures, particularly from storm water runoff. Programs Program 5.9.B.1: The City shall explore the use of pervious concrete and pavement to assist in the return of water to the regional aquifer and to assist in the management of storm drainage. Program 5.9.B.2: The City shall encourage the use of landscaped bioswales to filter oil and other pollutants from stormwater drainage. Program 5.9.B.3: The City shall consider the use of filtered storm drainage inlets to screen pollutants from drainage waters.

Table 6. Selected City of Willows General Plan Goals and Policies	
Goal	**Objective, Policy or Implementation**
Land Use Element	
Development	
DPS-1 Goal: Accommodate and plan for new growth.	Objective: During the life of this plan, maintain flexibility and responsiveness to the changing conditions and opportunities for development. Policy: The City should only approve development proposals that are consistent with this plan.
Community Services, Facilities, and Infrastructure	
DPS-4 Goal: Adequate community services, facilities, and infrastructure.	Objective: Maintain existing services, facilities, and infrastructure, and provide for expansion, extension, or upgrades to meet the needs of new development without adversely impacting existing levels of service or the revenues required to provide them. Policy: Before approving a development proposal, the City should determine through the California Environmental Quality Act (CEQA) process that a proposed project will not adversely impact existing community services, facilities, and infrastructure The City Council should determine that revenues are, or will be, available to maintain and/or expand, extend, or upgrade services related to new development.
High Groundwater	
DPS-13 Goal: Protect water quality.	Objective: Prevent septic system failure and ground water contamination in high groundwater areas. Policy: The City Council should only approve projects in the high ground water areas that will be served by city sewers.

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Appendix 2B

Comment Tracking System and Comment Availability

2B-1: Comment Tracking System and Table

2B-2: Letters

2B-3: Emails

2B-4: Projects and Management Actions Submittal Forms

2B-5: GSP Chapter Input Submittal Forms

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2B-1. Comment Tracking System and Table

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#	Date Submitted	Commenter Name (if available)	Commenter Organization (if applicable)	Venue Received	Subject	Comment	Link to Full Comment/ Reference Materials (if applicable)	Categorized Comment	Response Needed
1	7/6/2020	Ben King	Land Owner	Email	Connate Water	My concern is that the connate seawater under the Sutter Buttes is contaminating groundwater and drinking water quality….My suggestion would be to pick up where the SWRCB left off in 1952 and examine salt water and arsenic levels within a 15 mile circumference around the Buttes and set up a monitoring network to monitor changes in ground water quality going forward. This would not only focus on the southern part of the Buttes but within the whole circumference.*	https://app.box.com/s/auy1v5yuwgoesm5dttz489jg41r7zl5b	General Input	Response included in Administrative Record Files
2	8/9/2019	Brian Cahill	Land Owner		Projects	While there will be private landowner sites for groundwater recharge ponds, private sites would be most effective if they augment a public effort by Colusa county to revamp road crossing drainage culverts such that storm flows are re directed to intermittent streams like Salt creek via trenching the side road ditches. At present, the road culverts facilitate storm flows crossing the public road (necessary) but because there is no attempt to re-direct the storm flows the volumes accumulate such that the volumes arriving on private property are difficult to manage.		General Input	Comments will be logged for consideration when the PMAs portion of the GSP is being developed. Will need to coordinate also with land use entities.
3	10/20/2020	Ben King	Land Owner	Email	Water Quality	I want to highlight the C 14 dating results and trace metal contamination levels for IASC 21 generally. See the Tables for IASC 21 at the end of the Report. (Referencing USGS Middle Sacramento Valley 2006 Water Quality Report)...Perhaps we can work with the USGS to expand its network around the Sutter Buttes. Even if we get USGS testing every 10 years that may be enough to detect water quality trends. We just need a baseline because this may be 100 year issues. My concern is how the increased pumping to support permanent crops may effect the lateral and upward movement of natural contaminants. I think that recharge probably can mitigate this and may have contained the issue before the levees were built. With recharge we can tactically simulate some of the the natural benefits of the historical benefits of flooding in the Sacramento Valley while benefiting from the State's investment in flood control and reclamation.*	https://app.box.com/s/45i9kz30hb3ci2qxah7r66dgrvi8s0iy	General Input	Response included in Administrative Record Files

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4	11/18/2019	Ben King	Land Owner	Email	Water Quality	I am concerned about the potential for further later movement of the salt water northward towards the Butte Sink that may be cause by future groundwater substitution on east side of the Sacramento River near Colusa. As you know Colusa, Grimes, Sutter and Meridian use groundwater. The other issue that came to my mind was the potential for further deterioration due to future earthquake activity. Perhaps – this area might be a good candidate for an Aerial mapping if the mapping could detect higher chloride levels in the groundwater? References: SWRCB Bulletin #6 (1952), Hydrogeology of the Sutter Basin (George Curtin 1920), USGS Geochemistry of groundwater in the Sacramento Valley (1984), USGS Late Cenozoic Tectonism of the Sacramento Valley (1987) *	https://app.box.com/s/7l3fswdsa97yzxm84zjdnwylf18jze29	General Input	Response included in Administrative Record Files
5	12/9/2020	Ben King	Land Owner	Email	Water Quality	I want to make the point that the current law is that the SWRCB will curtail Sacramento River and Sacramento River tributary diversions during critically dry years. This is the legal status quo after the 2015 year drought and the curtailments should be included in the Water Budget. The reason I am making this point is the recent decision regarding diversions from Deer Creek during the 2014/15 drought.This litigation was appealed to the California Appellate court which confirms the current power to curtail water supplies for the Colusa Basin. The California Supreme Court declined to review the Appellate Courts decision on September 23, 2020. I have attached the Appellate Court decision confirming existing law and current limitations of surface water supplies for the Colusa Basin. Just to reiterate the current law gives the SWRCB to enforce the current instream minimums under the Bay Delta Plan. Any voluntary settlement that may be less restrictive is speculative and does not represent the in stream requirements currently enforced.		General Input	
6	12/9/2020	Member of the Public	N/A	Public Meeting	Aquifer Depths	Has the consultant team ground-truthed the freshwater aquifer depths across the basin? Due to the seawater aquifer under the subbasin's groundwater system, these depths are an important consideration. The interplay between the two has resulted in areas where there are no wells due to water quality being impacted by the saltwater.		Question	Answer provided in 12/09 public meeting. See meeting summary for full response.
7	12/9/2020	Ben King	Land Owner	Public Meeting	Water Quality	I am concerned about drinking water quality and availability in Colusa county including arsenic contamination.*	https://app.box.com/s/xf8ke3p5morjfcmy870xays1lignnzwp	General Input	
8	12/9/2020	Ben King	Land Owner	Email	Subsidence	I would suggest that our most critical infrastructure is the transportation infrastructure of I-5 and the residential infrastructure of Arbuckle including the Arbuckle cemetery. The cemetery is very close to the greatest level of subsidence and I -5 crosses adjacent to the area of greatest subsidence. I believe we have to look at the potential for multi-feet subsidence over decades and we need to look at the subsidence potential in the context of historical events. *	https://app.box.com/s/jgjdb714deysi7rn3ofevevelu7egu8v	General Input	

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9	12/9/2020	Member of the Public	N/A	Public Meeting	Funding	What type of studies might be done with Proposition 68 funds?		Question	Answer provided in 12/09 public meeting. See meeting summary for full response.
10	12/9/2020	Member of the Public	N/A	Public Meeting	Water Supply	Under the Bay-Delta Plan, aren't we going to have only 40-50% of the surface water we had in the past? Have you tracked how much water we lose from the basin through water transfers? How much do we pump for groundwater substitution? These do not appear to be included in the budget.		Question	Answer provided in 12/09 public meeting. See meeting summary for full response.
11	12/9/2020	Member of the Public	N/A	Public Meeting	Water Supply	Do models show any significant variation in storage in some parts of the subbasin compared to others, and if so, would some areas have more issues than others?		Question	Answer provided in 12/09 public meeting. See meeting summary for full response.
12	12/9/2020	Member of the Public	N/A	Public Meeting	Water Budgets	Have zone water budgets been created at this point for sub areas of the basin and if not, are they are planned?		Question	Answer provided in 12/09 public meeting. See meeting summary for full response.
13	12/9/2020	Leslie Nerli	GGA Board Member Alternate	Public Meeting	Thresholds	Since conditions vary between wet years and dry years, will you take into account dry years vs wet years when setting thresholds? Can you set multiple thresholds?		Question	Answer provided in 12/09 public meeting. See meeting summary for full response.
14	12/9/2020	Member of the Public	N/A	Public Meeting	Water Supply and Quality	The residents in Colusa County rely on groundwater for drinking water. The County faces issues around water availability, such as when domestic wells run dry in critically dry years as a result of competition with agricultural use. Domestic use should be the priority and that use should grow in a reasonable way. Colusa County also faces issues around maintaining groundwater quality in critically dry years. The U.S. Environmental Protection Agency standard for arsenic is ten parts per million, and there are areas that exceed that. This issue will continue due to the connate water coming out of Sutter Buttes and can't be mitigated. In the future, Colusa County may need water from the Sacramento River, which is very expensive, but may be a good investment.		General Input	

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15	12/9/2020	Member of the Public	N/A	Public Meeting	Sites Project	Regarding his concerns about the Sites Reservoir project and the proposed interconnect between the Tehama-Colusa Canal and Colusa Basin Drain, the speaker stated that this project should be in Colusa County, because Sites Reservoir is in Colusa, and it needs to promote safe drinking water supply in Williams and Arbuckle. It should be close to Williams and Arbuckle. The Tehama-Colusa Canal jags southeast of Arbuckle. One of the closest distances between the canal and drain is south of Arbuckle. The County needs to push for the interconnect to be in Colusa County.		General Input	
16	12/10/2020	Member of the Public	N/A	Public Meeting	Groundwater Dependent Ecosystems	The Nature Conservancy (TNC) cuts off groundwater dependent ecosystems at a depth of 30 feet. However, the U.S. Department of Agriculture notes that Valley Oak groves can tap into groundwater as deep as 80 feet and are groundwater dependent. Thus, the GSP should take into consideration that Valley Oak woodlands may be tapping deeper than the TNC guidelines suggest. This information has also been presented to the Butte County Department of Water and Resource Conservation and should be shared in the upcoming Interbasin Coordination Group meeting.		General Input	
17	12/10/2020	Member of the Public	N/A	Public Meeting	Interbasin Coordination	There have been discrepancies between basin setting and water budget reports during the initial stages of groundwater sustainability planning. The Interbasin Coordination Group stated in their December 1st meeting agenda that they would review compiled data, identify significant differences, and discuss potential ways to reconcile those differences. Has there been an update? For example, is there an update on reconciling the discrepancies from the various water models used, since consistency is critical to the foundation of groundwater planning.		Question	Answer provided in 12/10 public meeting. See meeting summary for full response.
18	12/10/2020	Member of the Public	N/A	Public Meeting	Groundwater Dependent Ecosystems	Was the map on groundwater ecosystem also based on soil mapping based on the lines along with west side of the basin?		Question	Answer provided in 12/10 public meeting. See meeting summary for full response.
19	12/10/2020	Member of the Public	N/A	Public Meeting	Subbasin Mapping	Are the 38 subareas tools for data collection for management of the whole basin or 38 separate Management Areas?		Question	Answer provided in 12/10 public meeting. See meeting summary for full response.
20	12/10/2020	Member of the Public	N/A	Public Meeting	SGMA	Are other regions in the state where the State of California has taken over the monitoring--the thing we are trying to avoid?		Question	Answer provided in 12/10 public meeting. See meeting summary for full response.

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21	12/10/2020	Mathew E. Jones	T&P Farms	Email	Subbasin Mapping	In regards to the 38 subbasins, how can we access the interactive mapping for these? How were they determined etc.*	https://app.box.com/s/c4xl3rj9tdsfpr4ailf91gnp5ta90tz8	Question	Byron Clark followed up directly with Mathew Jones
22	12/10/2020	Mathew E. Jones	T&P Farms	Email	Recharge	Recharge was touched upon in the public meeting. I did not see or hear discussion regarding banking of in-lieu or recharged water within the basin. I am sure it would be a minimal amount, but may think about using within the water budget. Is banking being addressed in the GSP? *	https://app.box.com/s/c4xl3rj9tdsfpr4ailf91gnp5ta90tz8	Question	Byron Clark followed up directly with Mathew Jones
23	12/10/2020	Antionette Marsh	N/A	Public Meeting	Groundwater Dependent Ecosystems	Was the map on groundwater exosystem also based on soil mapping? Based on the lines along the West side?		Question	Answer provided in 12/10 public meeting. See meeting summary for full response.
24	12/17/2020	Karen Biane	"Stakeholder" in the Glenn County subwatershed basin	Email	Outreach Approach	I have attached a memo outlining my commentary on specific areas about the presentations and plans. I am aware of the incredible complexity and challenges the planning and implementation of the program will involve. The ideas presented are designed to potentially improve the communications to, and understanding by, the water community. *	https://app.box.com/s/8gnkuuq4xnuznj5e13cjxv028xjlkdxa	General Input	
25	12/17/2020	Sharon Wiggin	N/A	Email	General Input	One of our concerns is on Sand Creek. 50 years ago, that Creek spread out very wide and we believe that gave us recharge for out underground runs very fast. We can't do anything about it because of the California Department of Fish and Wildlife. They will allow some low berms as long as one side has no berm. This isn't much help.		General Input	
26	1/12/2021	Mathew E. Jones	T&P Farms	Email	Management Areas	Wanted to follow up regarding "management areas". It is a tough discussion and should include laying out the facts regarding areas of concern. I vague statement regarding an area does not do anybody justice and leads to speculation and possibly inaccurate conclusions. The attached maps paint a clearer picture of "areas" of concern, but more importantly it emphasizes how our basin is interconnected and impacts of "areas" not within the "management areas"? I would also like to follow up regarding recharge and banking. I am trying to get an understanding of how it will play a roll in the GSP or if it will be addressed within the GSP.*	https://app.box.com/s/c4xl3rj9tdsfpr4ailf91gnp5ta90tz8	General Input	

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27	2/2/2021	Ben King	Land Owner	Email	Geographical Features	I believe that it is important to have the correct location of the Willows Fault regarding the proximity of the Fault to the City of Colusa. As you will see in the attached Figure 7 from the Sutter County GMP it looks like a wishbone like structure near the City with one fork trending south east away from the City on the east side of the Sacramento River and another fork on the west side of the River nearer to the City trending more in a north south direction... The reason I think it is important to get the best information on this fork in the Willows Fault is the potential for the movement of arsenic contamination along the Willows Fault from the desorption of arsenic from the metal and iron oxides in the volcanic rock of the Sutter Buttes. So far the public water supply for the City does not seem to be contaminated but the location of this fork may be problematic for the future risk profile. *	https://app.box.com/s/lan700issfbfqeis565rjz6caxrarzqj	General Input	
28	2/8/2021	Ben King	Land Owner	Email	Geographical Features	The location of the Willows Fault appears to have a fork north of the Colusa State Park and ironically appears to run under the Colusa County Courthouse. I have included three photos from the link. https://maps.conservation.ca.gov/cgs/fam/app/ I believe this is a different location than set out in the Geologic Figure in the HCM. It seems to be very close to the City of Princeton and the Colusa Rancheria. It actually runs through Colusa and towards Grimes and Meridian along Hwy 20. As I mentioned before I wanted to raise the issue of the Fault as the mechanism whereby the arsenic and seawater contamination from the Sutter Buttes may be translocating.*	https://app.box.com/s/k6l7gg1slg0qhv23gx343pafk3tx0o8j	General Input	
29	2/27/2021	Ben King	Land Owner	Email	Maps	I wanted to point out that there are two different versions of the Presentation for the 2/17/21 on the CGA Website*	https://app.box.com/s/s0wz3qrux0gvolnabxdkn97h9u4uloyd	Clarification	
30	2/28/2021	Ben King	Land Owner	Email	Water Quality	I was finally able to get access to Stephen Springhorn's paper on the Sutter Buttes Rampart.I want to make sure that Mr. Clark and Mr. Loy are aware of his recommendations and concerns as they draft the Basin Setting for the Colusa Basin especially in light of the work highlighted in a recent USGS Paper on arsenic contamination.*	https://app.box.com/s/fw2ie13mxvwqctb5zw9i0n29isg5wszx	General Input	

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31	4/8/2021	William Vanderwaal	RD 208	Email	Hydrographs	Jim Wallace, Derrick Strain, Lewis Bair, Hilary Reinhard and I looked through these last week and we had some questions. We really like and appreciate the Google Earth set up. There are two potential controlling factors that determine the MT. Please label which controlling feature it is that controls for each well. I see from a cursory look at the package for the upcoming meeting that you've included MO's but we noted on these there were not MO's. We would like to see the MT/MO compared with the historical well data. We requested and appreciate seeing these compared to the model runs but also want to see how they compare to actual historical. Some MT's seem extremely deep on the initial look. It would be helpful to also see the number of wells per polygon for each well. That would help us understand the magnitude of wells that could be impacted if the controlling feature is the 20% of domestic wells criteria. I've attached a screen shot of what Yolo has provided in the past that shows domestic well density as an example of what could be helpful. We have some questions about the water budgets (we were looking through those also). We noticed in CCWD, that the change in storage and the net recharge numbers don't seem to align with what we'd expect. For example, change in storage increases in 'Dry' years, but decreases in 'BN' and 'Critical' years. Also, net recharge is greater (or less extreme) in 'Dry' vs 'BN'. Is there any known explanation for that? Also, this doesn't just occur in CCWD, we're not picking on them, it's just where we noticed it first.*	https://app.box.com/s/jq7totuwt0sxxb9l1fu9ccinrlgbwnrj	Request	
32	3/20/2021	Ben King	Land Owner	Email	Subarea Water Budgets	Can I get a map of all the model subarea in the Colusa County portion of the Colusa Basin? Also – Does the example on Page 24 tie into real numbers? The numbers and graph on the left side of Page 24 seem different than the graphs on Page 20 for example? Could I get the data tables for Subareas CDMWC and COLGWE? Thanks for your assistance. *	https://app.box.com/s/phbj56zzpmzf0ife7zmnpdeb6arksi6d	Request	

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33	4/12/2021	Donald Bills	USGS	Email	Subsidence	A couple of points were made during the discussion on subsidence in the TAC meeting on Friday April 9th. I had comments to add to the discussion but was having difficulty with an unstable ZOOM connection and was unable to contribute. Please feel free to pass this on to however is most appropriate. The points I wanted to comment on are: 1.—Subsidence in the regional aquifer is mostly going to be due to dewatering of clays. Little subsidence occurs related to dewatering of sand and gravels. 2.—Subsidence is largely a surface problem. 3.—There is a significant lag time between groundwater withdrawals and subsidence. 4.—What is critical infrastructure? 5.—Surveyed subsidence monuments every 5 years is not enough. *	https://app.box.com/s/zmjnrgcy6lsfag9wrh7eoo7bc134swpw	General Input	
34	4/26/2021	Donald Bills	USGS	Email	Invasive Phreatophytes	As I was thinking about evasive phreatophytes that could result in a significant GW savings, eucalyptus occurred to me. They were imported to California from Australia as a source of wood for RR ties in the mid to late 1880's before anyone realized that the wood splits easily. Since then, they have become obliquitous in the state. The tree has an extensive root structure that is capable of reaching 50 ft or more to access groundwater. I was hesitant to suggest this during the meeting because I did not know if it had been addressed in the past, or who I should suggest it to for further consideration. As with my comments on land subsidence, if you could pass it on, or not, as appropriate.		General Input	
35	7/2/2021	Jim Wallace			Data	Not sure if your challenge getting transfer data from reclamation is intentional or not, but a clear and complete picture of the water dynamics affecting the basin is a fundamental requirement to successful management. We can't manage what we don't understand. So ultimately, the business of water transfers, both inside and outside the basin, has to be transparent and well understood by the CGA. Gathering that data directly from USBR(as opposed to trying to collect from 33 separate districts/agencies) seems the most efficient way to do this. Perhaps a conference call with USBR that includes some CGA staff or board member to inquire how the CGA might best organize a formal request to gather this this information would help your efforts. Ultimately, a FOIA request might be necessary, but hopefully, USBR staff will be responsive to a reasonable request for the information relevant to the CGA's responsibilities.		Suggestion	Responded to by email Wednesday, July 7, 2021 8:02 AM

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36	7/2/2021	Jim Wallace			Baseline	I am not sure what kinds of practices or processes you have considered for capturing data and quantifying a recharge project, but establishing a baseline seems like it will be an important part of the process. A typical CDMWC shareholder, for example, uses a mix of well water and surface water in any given year. Once implemented should a recharge project consider all of the surface water diverted to be in-lieu recharge or only that portion in excess of some historical baseline diversion?		Question	Responded to by email Wednesday, July 7, 2021 8:02 AM
37	7/2/2021	Jim Wallace			Legal	I have read and re-read a few times the December 18, 2020 memo directed to the Vina GSA from its Administrator, Paul Gosselin, and Legal Counsel, Valerie Kincaid that was circulated during a recent CGA TAC meeting. Admittedly, there is much in this memo that I do not yet fully understand. But what is clear, is that recharge projects will potentially have legal implications that affect stakeholders across the sub-basin and that we (CGA) should consider these implications as part of our project development. I attached this memo here in case you have not yet seen it. I would be interested in a meeting with CGA counsel to review this memo (or perhaps a white paper of our counsels own origination) to better understand these issues and then discuss potential policies and priorities that CGA should consider to address these issues.		Request	Responded to by email Wednesday, July 7, 2021 8:02 AM
38	7/29/2021	Ben King	Land Owner	Public Meeting	PMAs	Ben King asks for clarification on process of approving PMAs. He also wants to know what it means when an action was recommended by the board. Response: This will be addressed in the next section of the presentation.		Question	Answer provided at the 7/29/2021 meeting. See comment section.
39	7/29/2021	Ben King	Land Owner	Public Meeting	PMAs	Ben King's question on the status of public approval and if the SMCs/PMAs been vetted through the TAC or had an approval process. Response: Presentations on the PMAs were presented to the Joint TAC along the way, but the full list of 33 PMAs were not formally approved by the TAC		Question	Answer provided at the 7/29/2021 meeting. See comment section.
40	7/29/2021	Ben King	N/A	Public Meeting	PMAs	Ben King would like to know who ranked the PMAs. Response: Lisa Hunter commented that they aren't ranked, but the top five are included because they are in process and ready to go. The ones that are in planning stage are in the next tier. Mary Fahey added that the PMA submittal process was very open and transparent and that projects are accepted on an ongoing basis. Ben King wanted there to be a TAC discussion for ranking, and including more PMAs possibly, as well as a process in place for adding and ranking them.		Question	Answer provided at the 7/29/2021 meeting. See comment section.

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41	7/29/2021	Joe Carancho	N/A	Public Meeting	TAC	Joe Carancho wanted transparency in who is on the TAC committee and what decisions they are making. Response: Dave Ceppos responded that TAC members are listed on the websites. Thirteen TAC Meetings were held and publicly noticed, and the PMA list is available in the matrix within the PMA chapter.		General Input	Answer provided at the 7/29/2021 meeting. See comment section.
42	7/29/2021	Joe Carancho	N/A	Public Meeting	PMAs	Joe Carancho wanted more ideas for PMAs from local farmers and ranchers. Response: John Amaro let him know that people on the TAC and GSA Boards are local and any decisions the TAC makes have to be approved by the full board. This led to introductions of board and TAC members who were present to show they were local and involved in agriculture/local activities.		General Input	Answer provided at the 7/29/2021 meeting. See comment section.
43	7/29/2021	Darrin Williams	N/A	Public Meeting	MTs	Darrin Williams asks about the timing for MTs. Stating that there is a two-year period before we reach an UR. He asks when the two-year period starts – is it on January 31, 2022 or has it already started? Response: Grant Davids and Ken Loy clarified that the two-year period would only start when 25% of the wells get below the MT. Darrin Williams is concerned that some MTs for some of the wells may be something we will reach too quickly.		Question	Answer provided at the 7/29/2021 meeting. See comment section.
44	7/29/2021	Lester Messina	N/A	Public Meeting	Slide 16	Lester Messina asks a question about the hydrograph on Slide 16. Are there any wells in the monitoring network that stopped being monitored in the 2015 drought, and will they be monitored in 2022? Response: Ken Loy said there are one or two wells in the current monitoring network that have not had recent measurements and he is not sure why. They will be reviewed		Question	Answer provided at the 7/29/2021 meeting. See comment section.
45	7/29/2021	Sharon Ellis	Land Owner	Public Meeting	Well Monitoring Network	Sharon Ellis asks who is responsible for monitoring the 48 wells in the Monitoring network. Response: Ken Loy responded that the GSAs are making use of existing monitoring wells and DWR currently does the monitoring.		Question	Answer provided at the 7/29/2021 meeting. See comment section.
46	7/29/2021	Sharon Ellis	Land Owner	Public Meeting	Undesirable Results	**Sharon Ellis** asks who is in charge of alerting DWR if we are experiencing UR, is it the County? Response: Ken Loy responded that the Groundwater Authorities will take the monitoring data and prepare annual and 5-year reports to DWR.		Question	Answer provided at the 7/29/2021 meeting. See comment section.

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47	7/29/2021	Sharon Ellis	Land Owner	Public Meeting	Dry Wells	Sharon Ellis expresses concern over dry wells on her property and drying of Stony Creek. She asks who to notify or who will address these concerns. She and Emil Cavagnolo discuss why people chose to use groundwater instead of surface water in a dry year. There is then a discussion of GSAs and the fact that they are the regulatory agency that has authority to take action. Sharon is implying that locally we are already experiencing UR.		General Input	Answer provided at the 7/29/2021 meeting. See comment section.
48	7/29/2021	Joe Carancho	N/A	Public Meeting	General Input	Joe Carancho mentions that farmers shouldn't be told how to farm. John Amaro comments that we have a fine line to walk to work locally to keep the management local.		General Input	Answer provided at the 7/29/2021 meeting. See comment section.
49	7/29/2021	Member of the Public	N/A	Public Meeting	GSP	Unknown person asks if we have to wait for the GSP to pass before taking action and moving forward with actions. He also asks who will police actions that will be needed if we fall below MTs. Does GSA have authority to place usage restrictions, etc.? Response: Darrin Williams responded that there can be self-regulation through the GSA and there should be regulation before MTs are reached. The goal is to operate at the MO. "SGMA has very few 'shalls', and very many 'mays'".		Question	Answer provided at the 7/29/2021 meeting. See comment section.
50	7/29/2021	Ben King	Land Owner	Public Meeting	General Input	Ben King mentions that the PMA section needs to be scrutinized as the Demand Management PMA will affect income and jobs in Colusa and Glenn County. He mentions the tomato subsidy to manage land and therefore use less water. Response: Grant Davids responded that there are 2 demand management actions in the Plan, but they are not preferred. In the end, it is one of the tools in the tool box that the GSAs can pull from as situations warrant actions. Just because it is in the toolbox does not mean it will be used. Discussion followed that Demand Management isn't the first choice for our area.		General Input	Answer provided at the 7/29/2021 meeting. See comment section.
51	7/29/2021	Member of the Public	N/A	Public Meeting	Surface Water Use	**Unknown person** addressed Emil Cavagnolo and asks if the GSAs have the power to have people use surface water to the extent its available before pumping? And can the price of the water be subsidized? Response: **Emil Cavagnolo** mentions that his district already works to lower surface water costs and make it more enticing to use it first. Discussion follows that surface water absolutely has to be used first to allow for recharge along with additional recharge projects. It was answered that a GSA can build incentive programs into it to encourage surface water, and use all available surface water.		Question	Answer provided at the 7/29/2021 meeting. See comment section.

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52	7/29/2021	Member of the Public	N/A	Public Meeting	Surface Water Cost	Unknown person asked how to reduce surface water costs? And how to keep discrepancies between districts low? Emil Cavagnolo offers an explanation of where Orland-Artois Water District comes from and how expensive transferred water is, as well as how different districts have access to different water.		Question	Answer provided at the 7/29/2021 meeting. See comment section.
53	7/29/2021	Sharon Ellis	Land Owner	Public Meeting	Undesirable Results	Sharon Ellis asks to address her original question. If we get significant UR who is responsible? Response: Ken Loy described how a landowner would want to communicate with your GSA board member and they would make sure DWR has the most up to date data. Emil Cavagnolo pointed out that there is a monitoring well near Sharon's house and she can see that data.		Question	Answer provided at the 7/29/2021 meeting. See comment section.
54	7/29/2021	Ben King	Land Owner	Public Meeting	Recharge	**Ben King** asks if the board would consider giving incentives for people participating in recharge.		Question	N/A
55	7/29/2021	Darrin Williams	N/A	Public Meeting	General Input	Darrin Williams comments that he is happy to see new people at the meeting. We are really fortunate that we are in this subbasin and that we have had dry years since 2015 but aren't terribly bad off. He is positive about the projects on the horizon and the future. He states that using 100% of available surface water needs to be at the top of the list to protect groundwater.		Comment	Answer provided at the 7/28/2021 meeting. See comment section.
56	7/28/2021	Pete Carr		Virtual Public Meeting	Table 5.1	Pete Carr noted that Chapter five describes the methodology of how those minimum thresholds are established, but the practical result then as illustrated by the sample monitoring well hydro graph in figure five dash one shows that well levels can at least this well, I will could get all the way down to 208 feet before it exceeds the minimum threshold, so that would suggest unless i'm misunderstanding this that a domestic well or municipal well that's a 200 feet is still acceptable and not considered unreasonable, in other words, I mean 200 feet would run most domestic wells and half of our municipal wells dry and yet that's not exceeding the threshold I don't understand how that could be. Response: Ken Loy responded that the minimum thresholds are not like the example that we showed that's just for that specific well. Each one of the 48 representative monitoring network wells has its own on site specific minimum threshold and measurable objective.		Question	Answer provided at the 7/28/2021 meeting. See comment section.

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57	7/28/2021	Member of the Public		Virtual Public Meeting		In the PMA you have a couple of these that are predicated on having an available surface water, and it was even brought into the equation that you have it tough to have the economics for the surface water. is maybe, as are more affordable than the groundwater and so when you bring this into the equation, knowing that it's outside of the base and where those economics are established i'm just wondering how that works. Response: Grant Davids responded that there are some entities with surplus water at times. Under the settlement contracts and some surplus project water and philosophically they might be predisposed to keeping that water in the sub basin for for local benefit rather than letting it go out but. Others, maybe not so much. I can't tell you how it's going to play out, but I think it comes down to negotiation and it depends kind of on the philosophy of the folks with the available surface water. Jeff Sutton added that project water held by the settlement contractors is only available for sale pursuant to section 3405 within the area of origin, so that water is not available to be sold outside of basin.		Question	Answer provided at the 7/28/2021 meeting. See comment section.
58	7/28/2021	H Brich		Virtual Public Meeting		H. Birch asked in the chat: You mentioned groundwater's impact on ecosystems, but can we say more specifically that groundwater is impacting forests, and that (lack of) groundwater is a contributing cause to the increased numbers and intensity of fires in CA? Response: Ken Loy responded that forests are not in the bounds of the ground water basin and to the extent that there are plants that are groundwater dependent that is something that we do look at, and we look at the routing depth of those plants that are generally along the riparian corridors of the sacramento river and other streams in the groundwater basin not up in the foothills that are you know up in the in the Highlands that are part of the counties that's those areas are not part of of the groundwater basin as defined by the Sigma regulations.		Question	Answer provided at the 7/28/2021 meeting. See comment section.

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59	7/28/2021	Scott Bradford		Virtual Public Meeting		Scott asked in the chat: Please briefly discuss the water balance. What are the present values of groundwater outputs to inputs? How long will the proposed recharge projects take to bring groundwater into balance? Will recharge projects have adverse impacts on groundwater quality? Response: Grant Davids responded You know the the system is going to be fairly well unbalanced, meaning that there's no large negative or positive change in groundwater storage. 01:40:35So that's what we think about the future, you know, in the near term or in the present we've got and looking backward in time we've got. 01:40:43Obviously, declining groundwater levels in a couple of areas within the sub base and even more generally throughout the seven days in which we feel is primarily a consequence of drought. 01:40:54And then the extension of that would be that you know if drought debates and we get some good water years back on the books that the groundwater levels would recover.		Question	Answer provided at the 7/28/2021 meeting. See comment section.
60	7/28/2021	Arne Gustafson		Virtual Public Meeting		It sounds as if the management of issues that arise but don't yet meet the standards of Undesirable Results is critical to the success of SGMA. Can you speak a little more specifically to how those activities will be addressed? Response: Grant Davids responded that how you balance that and where you begin to take action, all depends on decision making and policies at the board level and let them know what you think.		Question	Answer provided at the 7/28/2021 meeting. See comment section.
61	7/28/2021	Pete Carr		Virtual Public Meeting		Pete asked in the chat: Plan is based on an assumption of 26-140 maf of underground aquifer volume, and that this has only been depleted 5% in recent years. How confident are we that at least 26 maf actually exists? How stable and reliable is this data? Response: Ken Loy responded the best place to go for the that water budget information is in chapter three of the groundwater sustainability, where the plan authors talk about the water budget which is really a flux, it changes its water moving through the system it's not a static number.		Question	Answer provided at the 7/28/2021 meeting. See comment section.
62	7/28/2021	Pete Carr		Virtual Public Meeting		Pete asked in the chat: 1/2 foot per year of subsidence may be acceptable out in the county, but even a couple of inches in a year could/would be devastating to municipal services like sewer, water and storm drainage underground infrastructure. How can subsidence of up to 1/2 foot / year be considered not significant or unreasonable enough to trigger action? Response: Ken Loy responded that in Chapter Chapter three you'll see that there is very little subsidence up in the Orland area, if that were to change, then that would be the whole adaptive management part of this, then the the GSA would be looking for the local feedback on on what's going on in that area and then what's the right thing to do to mitigate it.		Question	Answer provided at the 7/28/2021 meeting. See comment section.

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63	7/28/2021	H Brich		Virtual Public Meeting		H Brich asked in the chat: Re Slide 24: you said it was dependent upon how many farmers sign up for the (Sacramento River?) program. How do farmers find out about what programs are available to them to participate in? We have a farm manager and several owners. Response: Lisa Hunter responded that you should email either LHunter@countyofglenn.net or mfahey@countyofcolusa.com and sign up for the interested parties list.		Question	Answer provided at the 7/28/2021 meeting. See comment section.
64	7/28/2021	H Brich		Virtual Public Meeting		H Brich asked in the chat: Re: Slide 17, how does the groundwater become electrically conducting when it is "degraded"? Is it full of metal contaminants? Response: Ken Loy responded that the Groundwater does become more electrically conducted as the salinity goes up and we want to pay attention to that, but it doesn't mean that it's full of metal contaminants you could have high conductivity and and low metal contaminants or vice versa, you could have low electrical conductivity and high metal contaminants you can't correlate one with the other necessarily.		Question	Answer provided at the 7/28/2021 meeting. See comment section.
65	10/13/2021	Shelly Morris		Virtual Public Meeting		What does "state intervention" include if "undesirable results"? Response: Ken Loy responded the State Water Resources Control Board can take over management and levy fines and fees.		Question	Answer provided at the 10/13/2021 meeting. See comment section.
66	10/13/2021	Erik Kolderup		Virtual Public Meeting		Is there precedent for the DWR not accepting the minimum thresholds established by local authorities? Are they likely to accept this plan? Response: Grant Davids responded of the four plans submitted so far 2 were not accepted. Pat Vellines recommended checking DWR website as the next round of GSP approvals will be out soon. Mary Fahey added that		Question	Answer provided at the 10/13/2021 meeting. See comment section.
67	10/13/2021	John Monroe		Virtual Public Meeting		How is this Sites project, which is in this subbasin taken into account, is it considered to be a PMA? Response: Grant Davids responded I believe it is a potential source of water for in lieu recharge. In ieu recharge is when you have got groundwater pumping going on, and you can deliver surface water, instead of pumping the groundwater.		Question	Answer provided at the 10/13/2021 meeting. See comment section.
68	10/13/2021	Anonymous		Virtual Public Meeting		One of the PMAs was ground water extraction fees. How would those fees be set and how frequently could those fees be increased. Response: Grant Davids responded that will be decided by the GSA once the GSP is adopted.		Question	Answer provided at the 10/13/2021 meeting. See comment section.
69	10/15/2021	Del Raymond		In-Person Public Meeting		Would be better to work to keep surface water in the area. Surface water users should not pay as much as ground water pumpers. Response: Grant Davids responded that the GSA will decide fees that it outside the scope of this plan.		Comment	Answer provided at the 10/15/2021 meeting. See comment section.
70	10/15/2021	Reimers		In-Person Public Meeting		Plan is to technical for average person to understand. Written so only an expert can understand. Trees are dying for lack of water. Only allowed to irrigate every 21 days instead of 14 days.		Comment	
71	10/15/2021	Anonymous		In-Person Public Meeting		Willing to pay an assessment to keep the GSA running but not to pay for projects to solve problems that I did not cause.		Comment	
72	10/15/2021	Ben King		In-Person Public Meeting		SIGMA regulations are a trojan horse. This is a way to turn our subbasin into a Sacramento water market.		Comment	

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73	10/15/2021	Ben King		In-Person Public Meeting		Request that the bylaws from the GSA require proof of residency to be on the board.		Comment	
74	10/15/2021	Anonymous		In-Person Public Meeting		When will the PMAs be reviewed? Response: Lisa Hunter responded that they have been reviewed by the TAC.		Question	Answer provided at the 10/15/2021 meeting. See comment section.
75	11/1/2021	Mary Fahey	CGA	Email	PMAs	Regarding the South Valley Water Resources project, the comment is that this project should be removed because it includes sending water out of the basin to the San Joaquin Valley		Comment	
76	11/1/2021	Mary Fahey	CGA	Email	PMAs	Regarding the Glenn-Colusa Irrigation District (GCID) Water Transfers to TCCA CVP Contractors – The comment on this project proposal is to update it to include all Settlement Contractors since there are many that transfer to the TCCA.		Suggestion	
77	10/30/2021	Ben King		Email		As discussed over the last couple of days the GSP Maps and Budget Subareas need to be adjusted to include the correct boundary and surface water delivery area for the CDMWC. The CDMWC delivery area on the west side of the Colusa Basin Drain south of Hahn Road needs to be included in the CDMWC Budget Subarea in Figure 3-6. Likewise the boundary for the CDMWC has to be adjusted throughout the GSP Maps in Chapter 2 and elsewhere.		Suggestion	
78	10/25/21	Holly Dawley	GCID	Letter		We ask that as GSAs move from planning to implementation and continue to look for opportunities to leverage surface water over groundwater, you consider those members and partners with senior water rights and stable contracts that contribute to our shared aquifers and provide high quality environmental habitat. We look forward to better identifying and quantifying this benefit for the subbasins during implementation. Further, we ask that GSAs work with their County partners to consider land use planning and accountability.		Request	
79		Ashley Driver	Driver Performance Improvement	Email		Was follow-up information provided on how the groundwater pumping fees will be calculated? Response: Mary Fahey responded there have been no decisions regarding a pumping fee. Those discussions will start happening early next year. It is still to be determined how/if fees will be instated. Those discussions and decisions will happen at public GSA Board meetings. There may be other subcommittee meetings where recommendations for the Boards will be developed.		Question	Response included with comment.

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80	11/4/2021	Ashley Driver	Driver Performance Improvement	Email		Also, how easy is it to adjust our compliance markers (e.g. minimum thresholds)? Is there a formal process, is the public included, and does the state have to approve changes? Response: Mary Fahey responded The GSAs are required to report annually on their progress and to update the Plans every five years. They can adjust the Sustainable Management Criteria during these updates. Any adjustments will need to be justified to DWR with data and reasoning, and DWR will have to approve any changes. It will be a public process, likely similar to what has been done the last couple years with information coming to the Technical Advisory Committees at public meetings and then to the Boards at their public meetings for final decisions.		Question	Response included with comment.

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1	1/21/2021	Ben King	Land Owner	PMA Form	PMA	See PMA suggestion using link to right	https://app.box.com/s/lu6rphiyxs6bhqg7g7t6ljijcztnyhax	PMA Submission	
2	4/15/2021	Scott Hamilton	South Valley Water Resources Authority	PMA Form	PMA	See PMA suggestion using link to right	https://app.box.com/s/uwxdng5fz9tci2hs7titczm31vj4j9bt	PMA Submission	
3	5/11/2021	Halbert Charter	H&A Charter Farm	PMA Form	PMA	See PMA suggestion using link to right	https://app.box.com/s/xuv9na4x006uh89fu91jpdzxjxl41asn	PMA Submission	
4	5/13/2021	Michael Doherty	Chamisal Creek Ranch, LLC	PMA Form	PMA	See PMA suggestion using link to right	https://app.box.com/s/a725mc27se172b0yaz29t4mrrmg52vue	PMA Submission	
5	6/17/2021	David Kehn	Cal Water	PMA Form	PMA	See PMA suggestion using link to right	https://app.box.com/s/0jnshdii9yxikh68s5d6nugud8g07gie	PMA Submission	
6	6/18/2021	Lorraine Marsh	Sycamore Marsh Farm	PMA Form	PMA	See PMA suggestion using link to right	https://app.box.com/s/rbskos3erj5j6a3pd49onrsevrswm6i6	PMA Submission	
7	6/18/2021	Lorraine Marsh	Sycamore Marsh Farm	PMA Form	PMA	See PMA suggestion using link to right	https://app.box.com/s/7ydonx5rc8b2x0mixl5tytcy3g846xce	PMA Submission	
8	6/18/2021	Ben King	Land Owner	PMA Form	PMA	See PMA suggestion using link to right	https://app.box.com/s/awk617yabd9tdur5m20ach7lpmwlkg90	PMA Submission	
9	6/19/2021	Jim Wallace	Colusa Drain Mutual	PMA Form	PMA	See PMA suggestion using link to right	https://app.box.com/s/5a5wqzn0kk7d5zzhroku1xo4u4tk46f2	PMA Submission	
10	6/21/2021	Jenny Scheer	Water & Land Solutions	PMA Form	PMA	See PMA suggestion using link to right	https://app.box.com/s/60motdbxwt2kdonery60belfae8ro9vh	PMA Submission	
11	10/27/2021	Lewis Bair or Bill Vanderwaal	RD-108	PMA Form	PMA	See PMA suggestion using link to right	https://app.box.com/s/x8gjutvrr6rx0bxrnavksymc20grogy3	PMA Submission	

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Document Comment and Response Tracking Table
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#	Commenter Name (if available)	Commenter Organization (if applicable)	Chapter	Section	Page Number	Paragraph Number (from top of page)	Figure/ Table Number (If Applicable)	Comment	Response
1	Emil Cavagnolo	GGA/OAWD	2	2.1.2	2-4			Monroeville is a Groundwater District	Comment acknowledged. Monroeville is a water district formed to give its landowners (groundwater pumpers) a voice during the SGMA process. Table 2-2 contains municipal public potable water suppliers while Table 2-3 contains ag or other non-municipal water suppliers. Monroeville WD falls into the latter category and is included in Table 2-3.
2	Emil Cavagnolo	GGA/OAWD	2				2-3	OAWD's service area is currently just under 30,000 acres	Comment addressed in the GSP section indicated.
3	Emil Cavagnolo	GGA/OAWD	2	2.2.1.1	2-16	4		OAWD's latest WMP I 2020	Comment addressed. The 2020 WMP was used.
4	Emil Cavagnolo	GGA/OAWD	2	2.5.1.2	2-29	1		Colusa Subbasin now Chowchilla	Comment addressed in the GSP section indicated.
5	Emil Cavagnolo	GGA/OAWD	2	2.5.1.3	2-32	5		The public meeting in Orland was at the Glenn County Fairgrounds	Comment acknowledged. There was no meeting held at the fairgrounds, to our knowledge.
6	Emil Cavagnolo	GGA/OAWD	2	2.5.1.3	2-33	6		I do not remember this type of meeting in Glenn County	Comment acknowledged.
7	Emil Cavagnolo	GGA/OAWD	3	3.3.3.3	3-83	last		Agricultural Water Demand is a heading and should be Bold Print	Comment addressed in the GSP section indicated.
8	Leslie Nerli	GGA Board	2	2.1.2	Plan Area	1	2	The obvious and probably already corrected is….primary urban….Colusa & William in Glenn Co…wrongly printed for both counties	Comment addressed in the GSP section indicated.
9	Leslie Nerli	GGA Board	2	2.4	23		3	Water purveyors along TC Canal Re: 0%-100% depending on available water - truly dependent on what Bureau feels to allow each year and is announced very early in year.	Comment acknowledged. The text has been updated to reflect the agency responsible for the allocation volume.
10	Leslie Nerli	GGA Board			32			Areas of sustainability concerns: Glide Water District Please see attached MAP of what I believe to be an excellent area of land to recharge. First off, the land owner of the property has changed hands from Pete Galaya to: RD 45 , LLC , 1380 East Ave, Ste 124, Chico, CA, Parcel number 020-240-0140 There is 41.5 acres of Glide water district in the block of Habitat. Not sure what plain ole Habitat is but definitely good percolation in this area. Of course this is a statement made only by experience and not as a geologist/hydrologist which would have to be confirmed by science. A rice farmer to the west of the proposed property for recharge used almost 10 acre feet one year for his crop. Again, the cost of water and other crop costs combined with returns have forced this farmer to sell part of his land using the sale of his land from many generations in his family to develop orchards so that he can keep some of the remaining 4rth or 5th generation family farm. From what I was told by Mike Alves regarding there are 41.5 acres of glide district land within the 300+/- acres of Habitat. When available from the Bureau, water can be surface water that can be purchased at each year's allocation rate for the only the 41.5, but not more than the allocation for each year. In addition to the glide surface water yearly allocation, any Bureau excess flow water could be captured in the 41.5 acres and remaining property acres as well. So using the Glide	Comment acknowledged. This would make a great addition to the list of "potential PMAs" in Section 6.5 of the GSP, and will be considered for inclusion in the GSP. We also invite everyone to submit suggestions for PMAs through the Colusa Subbasin PMA Submittals portal: https://colusagroundwater.org/projects-and-management-actions-submittals/.

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11	Leslie Nerli	GGA Board			32			in "excess flows available" Of course, they still charge a fee and Glide a fee as well, but usually at a more reasonable price. Because this property lies between the 2 creeks, it does flood during wet years. So, maybe some improvements could be made to capture more of the flood water that flows so quickly away and allow for more time to capture excess flood water to our groundwater storage. Maybe it will be so simple and cost effective as placing Check damns? and/or doesn't need them just some drainage management. I do not know who the RD 45 LLc people are or if they would even consider working with the ground water recharge project. Even to the north of Wilson Creek is land in the habitat. It is a very large piece of property. 300 +/- acres.	Please see the response to comment 10.
12	Mary Fahey	CGA	1	Cover Page	Cover Page	N/A	N/A	1. Title: Change to Colusa Subbasin Groundwater Sustainability Plan. 2.Add logo to page 3.Under "Prepared for", change Colusa GSA and Glenn GSA to: Colusa Groundwater Authority and Glenn Groundwater Authority 4.Make these same changes on the second page	Comment addressed in the GSP section indicated.
13	Mary Fahey	CGA	All Chapters	Entire Document – footer				Change footer to read: Colusa Groundwater Authority and Glenn Groundwater Authority Colusa Subbasin Groundwater Sustainability Plan	Comment addressed in the GSP section indicated.
14	Mary Fahey	CGA	1	1.3.1	1-3	1		Please specify that there are **two** Private Pumper Representatives from the Colusa County Groundwater Commission, **appointed by the Colusa County Board of Supervisors**	Comment addressed in the GSP section indicated.
15	Mary Fahey	CGA	1	1.3.1	1-3	4		Second Sentence, please edit as follows: **Except for the Private Pumper representatives**, Board members are chosen in public meetings by the respective governing boards of the Member Agencies…. **Private Pumper representatives on the CGA Board are recommended by the Colusa County Groundwater Commission and appointed by the Colusa County Board of Supervisors**.	Comment addressed in the GSP section indicated.
16	Mary Fahey	CGA	2	2.1.1	2-1	4		Glenn and Yolo County boundary should be **Colusa** and Yolo County boundary	Comment addressed. The GSP has also been revised to include the new RD 1004 subbasin boundary line.
17	Mary Fahey	CGA	2	2.1.2	2-4	1		Fourth line – Change water pumpers to groundwater pumpers: …and two appointed private groundwater pumpers…	Comment addressed in the GSP section indicated.
18	Mary Fahey	CGA	2	2.1.2	2-4	2		Orland and Willows are in Glenn County. Colusa and Williams are in Colusa County.	Comment addressed in the GSP section indicated.
19	Mary Fahey	CGA	2		2-4		Table 2-2	Grimes water district should be: Colusa County waterworks district #1 – Grimes Also in Colusa County: Colusa County waterworks district #2 - Princeton	Comment addressed. Colusa County Waterworks Districts for Grimes and Princeton have been added to Table 2-2. Del Oro Black Butte District was also added.

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20	Mary Fahey	CGA	2				Fig. 2-3	The map is titled Colusa Subbasin GSA Member Agencies but does not show/list Colusa County or Glenn County Under Note 1: There are two private pumpers from the Colusa County Groundwater Commission on the CGA Board There are no private pumpers on the GGA Board	Comment addressed. Edits were made to the note section that Colusa and Glenn Counties are member agencies but are not shown on the map.
21	Mary Fahey	CGA	2	2.2.1.1	2-15	6		(NSV IRWM) last sentence, add year that the update was adopted. In March, 2021….	Comment addressed in the GSP section indicated.
22	Mary Fahey	CGA	2	2.2.1.1	2-18	2		Second bullet states "The following GSAs have readily available MSRs:" Don't you mean "The following GSA Member agencies…"?	Comment addressed in the GSP section indicated.
23	Mary Fahey	CGA	2	2.2.1.2	2-19	1		I believe CCWD has a SCADA system. There may be other districts as well that are not listed.	Comment acknowledged. USBR funded the project in 2014.
24	Mary Fahey	CGA	3	3.1.7.3.1	3-32	5		Faults: Second to last sentence, Zamora Fault should be listed along with the others that were analyzed.	Comment addressed in the GSP section indicated.
25	Mary Fahey	CGA	3	3.1.10.2	3-42	1		Primary Users, first sentence – can this be re-worded. It sounds like there are only 20 Stakeholders in the basin.	Comment addressed. The text was changed to include the total count of water service agencies within the Colusa Subbasin based on DWR's GIS dataset.
26	Mary Fahey	CGA	3	3.1.11.2.3	3-45	2		– The TNC project is better described as an on-farm multi-benefit managed aquifer recharge and shorebird habitat program. Where it says migratory birds, please specify migratory shorebirds.	Comment addressed. The section title has been changed as suggested.
27	Mary Fahey	CGA	3				3-19	Water source layer missing for Colusa County portion	Comment acknowledged. Water source was not surveyed for water use by DWR in Colusa County during the displayed survey year. Land and water use surveys are constantly being conducted, so more recent information will be included in GSP annual reports and/or periodic GSP evaluations and updates.
28	Mary Fahey	CGA	4	4.1	4-1	1+		Should monitoring for GDEs be mentioned in the discussion about the monitoring networks?	Comment acknowledged. GDEs have been included in the write up as part of the stream-aquifer monitoring.
29	Mary Fahey	CGA	4	4.2.2.2	4-4	1		Will this section be expanded to include more details?	Comment addressed. The monitoring protocols now include protocols that are used by the GSAs.
30	Mary Fahey	CGA	4	4.2.3.3	4-17	1		Suggest spelling out Irrigated Lands Regulatory Program (ILRP) in first sentence	Comment addressed in the GSP section indicated.
31	Mary Fahey	CGA	4					General chapter 4 comment: This Chapter will need to be updated based on recent activities/discussions/decisions, especially regarding monitoring and filling data gaps for stream interactions and GDEs. Also, information about the coordination efforts taking place along basin boundaries between the neighboring subbasin GSAs should be expanded. Overall, this chapter reads light on describing the Colusa Subbasin monitoring network and heavy on listing excerpts from the regulations.	Comment addressed. We have included a section on the representative monitoring networks for groundwater levels and stream-aquifer interaction, of which the latter includes monitoring for surface water depletions and impacts to GDEs. All monitoring protocol sections have been revised to include more information regarding protocols used by the monitoring agencies and not just the requirements listed under SGMA regulations. The requirements listed in the BMPs have been summarized instead of comprehensively listed.
32	Evan Markey/Michael Bolzowski	GGA/Cal Water	2	2.1.2.1	8	4	-	The plan states Willows used 1.6 MGD. Our records show and average of 1.2 MGD for the same time.	Comment addressed. This typo has been corrected. The volume listed in Table 2-2 also equates 1.2 MGD (1,044 AFY = 1.16 MGD).

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33	Evan Markey/Michael Bolzowski	GGA/Cal Water	Appendix	2.7.3	121	-	2-4	Table shows Willows average per capita as 231 Gallons per Capita Per Day from 1990 to 2015. Our current average 2015 to 2020 is much lower, 143 Gallons per Capita Per Day. The model maybe overestimating our demands for the basin.	Comment acknowledged. The C2VSimFG-Colusa model inputs and results are finalized for GSP development. This and other concerns would be addressed in future revisions of the model, and incorporated into GSP annual reports and/or periodic GSP evaluations and updates.
34	Lester Messina	Colusa Glenn Subwatershed Program (SVWQC)	2	2.2.1.2	2-20	2		Recommended Change: Irrigated Lands Regulatory Program The Central Valley Regional Water Quality Control Board (CVRWQB) has adopted waste discharge requirements (WDRs) for discharges from irrigated commercial croplands to protect both surface water and groundwater supplies. When land is in agricultural production it is irrigated and fertilized. It is assumed that portions of the soil amendments, particularly fertilizer, is converted to nitrate which has the potential to percolate into groundwater The ILRP regulates such discharges, growers can minimize the percolation of nitrate to groundwater through the implementation of effective management practices. Commercial irrigated lands, including managed wetlands are required to obtain regulatory coverage.	Comment addressed in the GSP section indicated.
35	Ben King	Land Owner	2	2.1.1				How were the vertical boundaries of the annexed area of the previous West Butte Subbasin determined since the HCM did not cover this area during previous data collection?	Comment acknowledged. The 2016 preliminary hydrogeologic investigation included the entire groundwater aquifer system within Colusa and Glenn Counties, including the portions of the previous West Butte Subbasin and current existing Corning Subbasin. Vertical boundaries of subbasin were defined using the same information regarding depths to relatively impermeable geologic formations, interpretation of geologic formations, and the estimated freshwater-brackish water interface.
36	Ben King	Land Owner	2	2.1.1				The lateral extent is not bounded by the Sacramento River to the east but it is bounded by the western boundary of RD 1004.	Comment addressed in the GSP section indicated.
37	Ben King	Land Owner	2	2.1.2.1				How many wells and what is the volume for Del Oro Arbuckle?	Comment addressed. There are two wells, the second well was installed and operational in October 2015. The average annual volume in 2016-2020 was 48.35 AFY.
38	Ben King	Land Owner	2	2.3				Why is Colusa Drain Mutual Water Company only on the map in Yolo County? All of Colusa County CDMWC is missing from the Map.	Comment acknowledged. Our understanding is that CDMWC/CDWUA has a shared service area with many other water districts and agencies. CDMWC/CDWUA was included on the map, but was drawn "underneath" the other agency boundaries. Figures 2-3 and 2-4 have been revised to better identify the CDMWC/CDWUA service area in those shared locations. Figure 2-3 has been revised to show the CDMWC everywhere that it exists.

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39	Ben King	Land Owner	2		2-9		Table 2-3	There are no entries for Surface Water Supply or Volume Descriptions for CDMWC or RD479. If there is some valid reason for the omission it should be explained in a footnote rather than just omitted.	Comment addressed. Surface water supply available to CDMWC is variable and consists of the Colusa Drain and its tributaries. The major water source available during the irrigation season is return flow or drainage water from districts in the northern part of the Colusa Basin that divert water from the Sacramento River and discharge their return water to the Colusa Drain. RD 479 conveys drain water and relies on the RD 2047 to convey drainage water to the Sacramento River.
40	Ben King	Land Owner	2	2.8	2-21		Table 2-6	Relating to Table 2-3 above there are no diversions cited for Model Input as Diversions attributable to CDMWC acreage. What is the impact of this omission?	Comment acknowledged. Please refer to Figure 3-6 and Table 3-2.
41	Ben King	Land Owner	2		2-21		Table 2-6	The USEPA SDWIS system reports violations and maintains a log of monitoring events. This monitoring data and time line of violations does not seem accessible on the Waterboards site. The EPA link should be included. Why isn't the Drinking Water Open Data Portal referenced as it is in 2.6?	Comment addressed. The EPA SDWIS website has been added to the list as another resource. The California Open Data Portal has also been added to Table 2-6. These different websites contain slightly different, but also duplicate information regarding public drinking water supply requirements and monitoring information.
42	Ben King	Land Owner	2		2-21			The CV Salt information is not online? How do stakeholders access this data. Where can Stakeholders access GAMA data? Where is the Sacramento Valley Water Coalition Data? Where is the groundwater quality data relating to wells used for groundwater substitution accessible? It is part of the Appendix of the Environmental Assessment for Tehama-Colusa Canal Authority In-Basin Water Transfers.	Comment acknowledged and addressed. Stakeholders can obtain data from programs that do not post data online by contacting the responsible agency and requesting the data. In some cases, data from these programs are available on other data repositories, such as USGS or GeoTracker websites. In the case of the SVWQC, data is available via GeoTracker GAMA and from Luhdorff & Scalmanini, their monitoring entity. Websites to the individual programs, through which contact information for all of the agencies and coalitions participating in those programs can be accessed, were added to Table 2-6. Groundwater quality data relating to wells used for groundwater substitution is not currently included in the groundwater monitoring network, other than those wells that are part of other existing monitoring programs. For example, the environmental assessment for the Tehama-Colusa Canal Authority In-Basin Water Transfer Initial Study evaluated groundwater from wells included in the GAMA program, which is already listed in Table 2-6.
43	Ben King	Land Owner	2					According to the City of Colusa Policy PRC –9.2-The City will prepare a Water Resources bi-annual report to the City Council. The Public Works Department will analyze the quality of drinking water in the City. The description of the General Plan is incomplete because it does not mention that water quality is addressed and included in this bi-annual report to the City Council for the City of Colusa.	Comment addressed. Table 3 of Appendix 2A has been reworded to clarify this statement.
44	Ben King	Land Owner	2					The Human Right to Fresh Water should be addressed somewhere in 2.3 or 2.4. Ultimately this will affect the priority of beneficial use, management actions and minimum thresholds to comply with the requirements of this Law.	Comment addressed. Section 2.4, Additional GSP Elements, and Section 2.2.1.3, Groundwater Monitoring and Management, now include references to Water Code Section 106.3 text and related actions taken by the GSAs.

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45	Ben King	Land Owner	2		2-30			Don't understand the reference to Human Right to Water as described. Doesn't this Right apply to all residents in the Colusa Subbasin and all water systems?	Comment acknowledged. The stakeholders listed in Table 2-8 are just a shortlist of sample stakeholders, not a comprehensive list of all stakeholders that apply to that category of interest. The stakeholders listed in Table 2-8 for the "Human Right to Water" topic are those that are most vulnerable to losing access to clean drinking water.
46	Ben King	Land Owner	Table 3-1					What change in Data Sources were used to incorporate the annexed area from the West Butte Basin? What sources were used for Geochemistry and water quality?	Comments acknowledged and addressed. The Colusa Subbasin boundary was revised along its eastern edge to follow the Sacramento River or the western boundary of RD 1004. Basin boundary modifications were redrawn in coordination with CGA and RD 1004 staff and submitted to DWR for approval. A previous basin boundary modification had the eastern edge of the Colusa Subbasin follow the county boundary, regardless of whether it was east of the Sacramento River or not. Digital data sources for mapping the water chemistry have been added to Table 3-1. Table 3-1 is not a full list of all data and information sources, please refer to Chapter 8 References, Chapter 3.2 Groundwater Conditions, and Chapters 2 and 4 for more information regarding the different sources of water quality data and informative reports that were downloaded and used.
47	Ben King	Land Owner	3.1.5		3-7			The Hydrology of the Colusa Subbasin is also influenced by the Geochemistry and underlying Faults. Since the Subbasin water quality is influence by the volcanic rock of the Sutter Buttes and influences from the marine and lacustrine geologic history of the Subbasin – can Hydrology be determined without Geochemistry? Faults are known to influence Geochemistry and water quality since there may be anoxic water upwelling and lateral movement of naturally occurring contaminants via faults like the Willows Fault.	Comment acknowledged. Section 3.1.5 only discusses physical surface hydrology, specifically, surface waters that exist within the Subbasin. The section introduction has been revised to include a statement regarding water chemistry and refers the reader to the groundwater quality discussion sections found later in the chapter.
48	Ben King	Land Owner	3.1.5		3-11		Figure 3-6	Why is part of the CDMWC delivery area included in ColGGWS? The CDMWC on the west side of Colusa Basin Drain south of Hahn Road receives surface water deliveries as the rest of the CDMWC. There are CDMWC subarea components on multiple sides of this area but for some reason this jurisdictional area of the CDMWC is treated differently. This area is also part of the flood zone and receives significant seepage during seasonal winter flows.	Comment acknowledged. The subareas labeled in Figure 3-6 are collections of C2VSimFG-Colusa model elements that approximately represent water supplier service areas based on GIS mapping. CDMWC has a discontinuous service area along the Colusa Drain, and so is represented by several model subareas. The representation of water supplier service areas is limited by the spatial resolution of model elements. Service areas were modeled to capture the best representation of the service area alignment possible, while also simulating a total acreage that is closest to the actual acreage of that service area.
49	Ben King	Land Owner			3-16		Table 3-2	What assumptions are included in Model Diversion ID 113? As mentioned above a portion withing the jurisdictional boundaries of the CDMWC and a CDMWC surface water delivery area is left out of the CDMWC budget subarea.	Please see the response to comment 48. Per Table 3-6, the diversion records (input files) that came with DWR's C2VSimFG Beta2 model were used without adjustment for this diversion in the C2VSimFG-Colusa model.

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50	Ben King	Land Owner	3.1.7				3-3	See Springhorn Page 22 – Table 2.1 and Page 93 Table 3.3, Need to incorporate Turlock Lake Lacustrine influence to document Corcoran like clay components to the Lithology and also need to incorporate the formation of the Sutter Buttes Rampart and Geomorphic influence of the Sutter Buttes volcanic structure. Both Springhorn and Harwood and Helly differentiate the lithology of the Pliocene and Pleistocene periods this way. Water quality and subsidence issues are related to this geologic history. Figure 3-10 is probably the most complete Geologic Map I have seen for the region – excellent!	Comment acknowledged and addressed. The extent of the Turlock Lake Formation is unknown within the Colusa Subbasin west of the Sutter Buttes. Many of the boreholes used by Springhorn southwest of the Sutter Buttes did not encounter the Turlock Lake Formation, though there were some lithologies that may be related to it.
51	Ben King	Land Owner					3.11, 3.14 &3.15	See Springhorn Page 113 Figure 4.4. This Geologic Crossection needs to be incorporated in Cross Section C-C on Figure 3-11. Otherwise the Cross section leaves out the influence of the most unique Geomorphic Unit in the Sacramento Valley which is the Sutter Buttes. Also there is a critical need to address the Cross Section next to the City of Colusa because of the interrelationships of the Willows Fault, Sutter Buttes Rampart, Colusa Dome and Sacramento River. As it now stands Cross Section C-C is not consistent with the robust Geology set out in Figure 3-10 which seems to be a recent update since it references Springhorn. Regarding 3.14 how can you have a 3 Dimensional Model that omits the geology of the Sutter Buttes? Regarding 3.15 – it is important to map the area of the Corcoran like clays deposited by the Turlock Formation to know the potential area of impact for future subsidence.	Comment acknowledged. The 3D HCM representation focuses on the shallow marine and continental sedimentary geologic formations. It excludes the relatively more impermeable underlying plutonic and metamorphic formations. The 3D representation also fits slightly inside of the Colusa Subbasin boundary. Permeable subsurface volcanic formations that far west of the Sutter Buttes are thin at the scale being shown. Intrusive igneous formations related to the Sutter Buttes exist deeper than what the 3D representation shows. It is recommended to include more subsurface mapping of the permeable volcanic deposits and relatively impermeable plutonic formations, and to expand the 3D HCM beyond the subbasin boundaries in future HCM revisions. Cross Section C-C' has been revised a bit to include the Willows Fault zone near Colusa.
52	Ben King	Land Owner	3.1.9.2					See USGS Circular 1358 "Water Quality in Basin-Fill Aquifers of the Southwestern United States: Arizona, California, Colorado, Nevada, New Mexico and Utah, 1993-2009. Thiros,Paul, Bexfield and Anning 2014.(USGS Thiros et al 2014) See Page 56 – it is clear that arsenic contamination occurs and translocates along fault zones like the Willows Fault as is currently is the case in the Middle Rio Grande Basin. The water system for the City of Colusa could have the same fate as the water system for the City of Albuquerque.	Comment acknowledged and addressed.
53	Ben King	Land Owner	3.1.8.2		3-35	2nd and 3rd		The base of freshwater should not include brackish water which is defined by the USGS and others at 1000 ug/L. Water quality definitions should be consistent with the California Human Right to Fresh Water. Brackish water is not potable. The reference to brackish water in the Upper Princeton Valley is inconsistent with the outdated Olmstead and Davis referenced in paragraph 2 . See Springhorn Page 149 for additional references.	Comment acknowledged. The base of fresh water presented in the GSP are based on historical reports, of which many regulatory agencies use differing concentrations to define brackish versus fresh water. Data gaps regarding the lateral base of fresh water mapping or regarding discrete location well depth information for wells with measured water quality issues have been expanded upon in the Section 3.1.12.

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54	Ben King	Land Owner			3.37		3.17	The Base of Freshwater Depths in the annexed area from the old West Butte Basin seem incorrect based on the vertical depths included in Springhorn's Cross Section work. Also the area west of Colusa on Lurline near Roberts Ditch is known to have lower fresh water base levels. Levels are probably in the 300 to 400 ft levels or less in both areas.	Please see the response to comment 53.
55	Ben King	Land Owner	3.1.10.2		3-39			The potential for vertical movement via abandoned gas wells and faults needs to be mention since it most likely will lead to aquifer degradation in areas where the subsurface groundwater have elevated TDS levels and/or anoxic conditions.	Comment acknowledged and addressed.
56	Ben King	Land Owner	3.1.10.3		3-42			Arsenic contamination at the abandoned Del Oro Walnut Ranch well and the well at the CIP site which was cited by SWRCB show arsenic contamination has been found in the Colusa City limits. The USEPA reports also show arsenic contamination in the Princeton water supply system.	Comment acknowledged.
57	Ben King	Land Owner	3.1.12.1		3-50			Additional Areas of Uncertainty: 1. See Springhorn Page 165 Figure 6.1 Areas where subsurface information is needed regarding the area outlined west of the Sutter Buttes, 2. Research regarding the vertical and lateral movement of saline water within and across the Willows Fault as generally described on Page 56 of USGS Thiros et al 2014, 3 The predicted desorption of arsenic from a volcanic structure like the Sutter Buttes in Figure 6-5 of Thiros on Page 58, 3. The breadth and depth of the Corcoran type clays from the Turlock Lake formation highlighting the potential for future subsidence, 4 – the water quality issues near the Freshwater area west of Williams as described in the Colusa County Groundwater Management Plan.	Comment addressed. Descriptions of these issues of concern and existing data gaps have been incorporated into various sections of Chapter 3.1, HCM.
58	Ben King	Land Owner	3.1.12.1				3-5	The C2VSimFG Model has to incorporate the saline and anoxic seawater around and south of the Sutter Buttes. According to the Sutter- Yuba investigations (SWRB Bulletin No. 6, 1952) a TDS level as high as 10,000 was observed near Robbins. Others including the DWR and Curtin have observed TDS levels from 4,000 to 6,000 south of the Sutter Buttes.	Comment acknowledged.
59	Ben King	Land Owner	3.1.12.3				3-51	What are the statutory obligations to address the Human Right to Fresh Water in the HCM?	Comment acknowledged. The Human Right to Water is not specifically addressed in SGMA regulations. SGMA and the Human Right to Water are intrinsically related, however, as the projects and plans proposed and implemented under SGMA aim to directly address the concerns outlined under the Human Right to Water. Section 2.4, Additional GSP Elements, and Section 2.2.1.3, Groundwater Monitoring and Management, include references to Water Code Section 106.3 text and related actions taken by the GSAs.

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60	Ben King	Land Owner	3.2.5				3-64	The worst reported arsenic contamination for any public water system in the Sacramento Valley water supply system is in Grimes. The USEPA has documented arsenic contamination in the Princeton public supply system. There has been two incidences of arsenic contamination in supply wells within the boundaries of the City of Colusa. The wide scope of arsenic contamination around the extent of the Sutter Buttes Rampart and south of the Sutter Buttes in the Colusa Basin needs to be disclosed as an area of grave concern. See Springhorn Page 164 highlighting the need for more research about the need for more work regarding the relationship of arsenic contamination and the health risks from arsenic.	Comment acknowledged. Chapter 3 text has been revised to include data gaps regarding characterizing sources of arsenic near and downgradient of the Sutter Buttes and flow mechanics along the Willows Fault.
61	Ben King	Land Owner	3.2.5.1.1				Figure 3-30	What is the source for this data? Is there a time series? Stakeholders should have access to time series for water quality data and it should be included in the Appendix like the hydrograph data concerning water levels. Arguably water quality data should have a higher level of access and transparency due to the Human Right to Fresh Water.	Comment acknowledged. The TDS concentrations shown on Figure 3-30 are those recorded in GeoTracker and USGS website databases, last downloaded in 2020. The mapped TDS concentrations are the historical high at all groundwater sample locations. Historical EC charts are included in Chapter 5 for the representative groundwater quality monitoring network wells. All data taken from existing monitoring programs and data repositories (e.g., GeoTracker, GeoTracker GAMA, DWR WDL, USGS NWIS, CEDEN, etc.) will be evaluated in future GSP annual reports and periodic GSP evaluations and updates. EC/TDS concentration time series charts for all current active monitored wells will also be considered for inclusion in future GSP annual reports and periodic GSP evaluations and updates.
62	Ben King	Land Owner			3-66			According to the 2020 Tehama-Colusa Canal Water Authority Initial Study/Environmental Assessment there were several wells used for Groundwater Substitution with elevated Specific Conductance. As reported in the Appendix for the report GCID, 7 of the 16 reported wells had a consistent annual reported level of Specific Conductance greater than 1000 ug/L. Three of these wells had levels greater than 1500 and the other 4 were between 1000 and 1500. Are these wells included in the data points of Figure 3-30 and the discussion on page 3-66?	Comment acknowledged. Wells were not included in Figure 3-30 unless their TDS measurements were submitted to GeoTracker or USGS before the datasets were downloaded to generate the map in 2020. These wells do not appear to have been submitted before then. The TCC environmental assessment does not include named well locations or additional well identification information. These wells will be evaluated in relevant future projects, GSP annual reports, and periodic GSP evaluations and updates.

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63	Ben King	Land Owner	3.2.5.2.1		3-67			Where is the location of the well near Grimes with Arsenic at 200 ug/L.? Grimes arsenic levels are reported to be approximately 25 ug/L. The USGS publication by Thiros et al has an extensive discussion of the desorption process of arsenic for volcanic rocks in saline groundwater with PH greater than 8. The USGS predictive model predicts the occurrence of arsenic in basin discharge areas like Robbins and the areas south of Grimes. This USGS publication also highlights how arsenic had moved into the groundwater of Albuquerque via a fault. The Willow fault crosses the Sacramento River at Colusa and runs south towards Grimes and the area where the two arsenic contaminated wells were found at the Del Oro Walnut Ranch site and CIP which is now in the boundary of the City of Colusa. The Sutter GMP includes a Figure showing elevated areas of TDS and Arsenic with levels as high as 370 ug/L. There is discussion of a biotic response that coincides with anoxic groundwater becoming oxidated from soil microbial activity that release arsenic as a bi-product. Arsenic contamination of the Colusa public water supply would be disastrous and a violation of the Human Right to Fresh Water.	Comment acknowledged. The 200 ug/L arsenic concentration near Grimes was a typo and should be 28 ug/L. References and discussion regarding Human Right to Water have been added to Chapters 2 and 3. Groundwater flow along faults is discussed in Chapter 3.
64	Ben King	Land Owner	3.2.6				Figure 3.31	Figure 3.31 should overlay the area of the Corcoran like clays from the Turlock Lake geological formation to show a potential relationship of subsidence and the presence of this clay formation	Comment acknowledged. Data is lacking regarding the lateral extent of the Turlock Lake Formation west of the Sutter Buttes. This has been added to the data gaps section of the HCM and additional commentary has been included in the regional geology discussion.
65	Ben King	Land Owner			3-72			The relationship between the Corcoran like clay formation and the presence of inelastic subsidence should be discussed based off the history in the San Joaquin Valley.	Comment acknowledged. The text has been revised to address the comparison.
66	Ben King	Land Owner	3.3.3	3-80			Table 3-9	Using only 2013 and 2015 water diversion data would lead to a wrong outcome if the diverter did not use surface water available during those years. It is an extremely small and not representative data set. Landowners could have not diverted during those years because they were trying to help other landowners out with their surface water allocations since they had wells or the landowner could have been converting land for orchard development with a new filter system.	Comment acknowledged. The point of the comment is understood; however, use of 2013 and 2015 land use and water supply conditions for all but the historical water budget scenario is driven by the GSP regulations. Those regulations state: "Projected water demand shall utilize the most recent land use...", and "Projected surface water supply shall utilize the most recent water supply information..." Since the historical model runs up through 2015, the "most recent" information would be 2015. However, 2015 (and 2014) was a Shasta Critical year, so for the projections 2015 was used to represent Shasta Critical years, and 2013 was used to represent Shasta Non-Critical years. This assumption was reviewed with several district managers and deemed as reasonable. Note that the 2013 TCCA allocation was 75%, equal to the average 1990-2015 allocation.
67	Ben King	Land Owner		3-81,2				Using Land Use data only for the years of 2003,2009 and 2014 is not representative if there was a conversion from rice to row crops or row crops to orchards. The impact of this narrow assumption set could lead to incorrect Budget Subareas.	Comment acknowledged. These are the years when DWR land use surveys are available. Years in between are interpolated to develop the best historical land use characterization.

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68	Ben King	Land Owner	3-4	3-102				Management Areas should not be set until the GSP is approved and implemented for several years. The history and genesis of the Colusa Groundwater Authority JPS was for collective management of the Subbasin and there is no basis to change the jurisdictional management of the Subbasin in contravention of those principals. Stakeholders and property owners who are paying Prop 218 Assessments must know there is a rational basis for any changes in jurisdictional oversight within the Basin to maintain confidence in the GCA's governance. What should not happen are actions which may lead to a perception that a few powerful members have manipulated the process for their own benefit.	Comment acknowledged. Management Areas were not defined for the Colusa Subbasin.
69	Ben King	Land Owner	4.2.3.3		4-17		Table 4-4	The Monitoring Network is woefully inadequate to protect against groundwater quality degradation and to protect the Human Right to Fresh Water. All wells used for Groundwater Substitution should be used to collect water quality samples and to preserve public accountability against over pumping. There is an incentive for quantity rather than quality and Stakeholders should be entitled to publicly available water quality data from groundwater substitution wells. In order to protect Colusa County Resident's Human Right to Fresh Water Monitoring Wells should be placed in the study area suggested by Springhorn as referenced in the Comments on Section 3. Springhorn raised concerns about high Saline TDS levels and arsenic levels in a large area west and southwest of the Sutter Buttes. Several monitoring wells should be placed in this area. Monitoring wells may also need to be placed around the City of Williams to provide a historical time series to monitor TDS levels over time. If water banking activities start with the development of Sites, this enhanced Monitoring Network and time series will become critical to protect the water supply for the City of Williams.	Comment addressed. The text has been revised to include a better description of the data gaps in the groundwater quality monitoring network.
70	Ben King	Land Owner	4.2.3.4		4-19			Springhorn highlighted a wide area where there are water quality monitoring data gaps. Monitoring wells should be placed in this area in consultation with the DWR and Springhorn's personal input since he highlighted this concern in the first place. Additional monitoring wells may be needed around the City of Williams and any potential water banking sites that could cause degradation of drinking water supplies for on the west side of the Subbasin.	Comment addressed. The text has been revised to include a better description of the data gaps in the groundwater quality monitoring network.

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71	Ben King	Land Owner	4.2.4.4		4-20			One or two Extensometers need to be installed near Arbuckle and Dunnigan. One site should be near the intersection of Bailey Road and Hwy 99 since it is the site of greatest subsidence and because the infrastructure of I-5 is there in addition to the Arbuckle Cemetery and old railroad tracks. The other Extensometer should be installed near Dunnigan working with the Yolo County GSA to choose a site. There are approximately 500 residences in the area and an ever-growing commercial infrastructure.	Comment acknowledged. Colusa County was originally considering installing an extensometer, but has recently been coordinating with DWR (through the CGA) to install a continuous GPS station near Arbuckle instead. We agree that the installation of more real-time monitoring stations both within the heart of current subsidence and along the edges would be beneficial in quantifying the magnitude and rate of subsidence in this area of concern.
72	Donald Bills	GGA-TAC	1	1.2	1.2	2		1.—Sustainable groundwater resources not only preserve, and enhance the economic viability, social well-being and culture of all beneficial uses and users, but also insure the sustainability of water for natural and environmental needs. Especially those of at risk or critical resource value (i.e. springs, wetlands, riparian habitat, and baseflow reached of perennial and/or intermittent streams). I would suggest adding something like this to the stated goal of the Colusa Subbasin GSP. 2.—there is no such thing as sustainable/safe yield. At best the term means planned depletion. I suggest you replace it with sustainable goal.	Comment addressed. The sustainability goal has been updated to precisely match the phrasing adopted by the CGA and GGA, and "sustainable yield" has been changed to "sustainable goal" where it is not text taken directly from DWR or SGMA documentation.
73	Donald Bills	GGA-TAC	1	1.2	1.2	3		1.—Sustainable/safe yield is no longer considered to be a valid term in the context of hydrogeology. The term was originally developed as a legal term to characterize a water budget in balance by relating recharge (from precipitation) with discharge, two terms that are not related. I suggest that you replace it here with sustainable goal.	Please see the response to comment 72.
74	Donald Bills	GGA-TAC	1	1.3	1.2	3		1.—Suggest that you modify Both GSAs in the last sentence to “Both the Colusa and Glenn GSAs…” for clarity.	Comment addressed in the GSP section indicated.
75	Donald Bills	GGA-TAC	1	1.4	1.4	1, bullet 5		1.—Suggest that you add to seawater intrusion, brackish or saline groundwater intrusion. As discussed during TAC meetings, as freshwater is removed from storage in the regional aquifer. The reduced hydraulic head will allow brackish and/or saline water at depth to seep upward into the regional aquifer. Unless monitoring of water quality at depth in the regional is intended to be the monitoring tool for this.	Comment acknowledged. The upwelling or mobilization of brackish or saline connate/deep groundwater is included as part of the "degradation of water quality" undesirable result topic and is monitored via the groundwater quality monitoring program. It is not addressed under the "seawater intrusion" undesirable result topic.
76	Donald Bills	GGA-TAC	1	1.4	4 of 7	Article 5 sub-article 2	1-1, GSP regulation section 354.18, bullet 3	Suggest replacing estimate of sustainable yield with estimate of sustainable goals.	Comment acknowledged. Table 1-1 contains the checklist requirements posted by DWR in 2016. The text and terminology in the "Description" column come directly from that document and were not edited.
77	Donald Bills	GGA-TAC	1	1.4	4 of 7	Article 5 sub-article 2	1-1 GSP regulation section 354.18, surface water supply	Shouldn’t this also include reclaimed water and/or	Comment acknowledged. Table 1-1 contains the checklist requirements posted by DWR in 2016. The text and terminology in the "Description" column come directly from that document and were not edited. Reclaimed water (as "recycled water" or "reused water") is one of the water source types considered under §354.18(b) (as applicable).

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78	Donald Bills	GGA-TAC	1	1.4	6 of 7	Article 5 sub-article 4	1-1, GSP regulation section 354.36, representative monitoring.	Remote-sensing data was discussed as an additional proxy in addition to groundwater elevations for other sustainable indicators. Should it be mentioned here?	Comment acknowledged. Remote sensing is being conducted by DWR. The schedule and flight paths have not yet been determined for the Colusa Subbasin. Chapter 7 includes DWR's planned airborne electromagnetic (AEM) survey as available data to be used for updating the HCM and potentially evaluating groundwater levels, the interface with deeper brackish waters, and lithologies along fault zones. We do not discuss including remote sensing data as an ongoing recurring monitoring program, other than whatever DWR, USGS, and NASA have already planned or implemented. Existing datasets, however, will be evaluated in each GSP annual report and/or periodic evaluation.
79	Donald Bills	GGA-TAC	1	1.4	6 of 7	Article 5 sub-article 4	1-1, GSP reg section 354.36, Assessment and Improvement of Monitoring Network	Again remote-sensing methods and data are another tool that seems suited for filling data gaps by improving monitoring frequency, accuracy, and density of data sites. Discussion of DWR INSAR and gravity data as possibilities.	Comment addressed. All of the satellite surveys, remote sensing surveys, GPS, gravity surveys, SAR/InSAR, etc. are included under the UNAVO umbrella. The text has been updated to specifically call out InSAR as part of the monitoring network for land subsidence and mention other sources of subsidence or displacement data.
80	Donald Bills	GGA-TAC	3	3.1	3-1	1, first sentence		First occurrence of abbrev. Should be spelled out in text. I.E. This section describes the hydrologic conceptual model (HCM) of the Colusa Subbasin.	Comment addressed in the GSP section indicated.
81	Donald Bills	GGA-TAC	3	3.1.3	3-6		3-3. Note in upper left of plot. Second sentence.	There appears to be missing or jumbled text at the start of sentence 2. " at r y ars missing more that 30 days…". Suggest that it be fixed is needed.	Comment addressed in the GSP section indicated.
82	Donald Bills	GGA-TAC		3.1.4	3-8		3-4	Since land surface elevation is color coded on the Topography map, it might help to identify the very light shade of blue as surface water as it can be easily confused with the very light green (greenish-blue?) that is land surface less than 30 ft.	Comment addressed. Edits have been made to Figure 3-4.
83	Donald Bills	GGA-TAC		3.1.5	3-7	Paragraph2, 1st sentence	3-5	"The regional watersheds and natural waterways are shown on Figure 3-5." Figure 3-5 also shows principal water infrastructure. I suggest it be added to the sentence and the fig. 3-5 title.	Comment addressed. Edits have been made to Figure 3-5.
84	Donald Bills	GGA-TAC		3.1.5	3-10	First paragraph, last sentence		"These streams are intermittent and drain the foothills that border the Coast Ranges to the west." Perennial streams are connected to the regional groundwater table and get most of their base flow by groundwater discharge. Intermittent streams are only seasonally connected to the regional groundwater table and flow seasonally or in response to runoff. Ephemeral streams are not connected to the regional groundwater table and only flow in response to seasonal runoff. Are Foothill streams of the Coast range truly intermittent?	Comment acknowledged. The foothill streams are historically a mix of intermittent and ephemeral streams. However, given the many back-to-back, multi-year droughts that the region has been experiencing over the past two decades, these foothill creeks and streams are most likely all ephemeral until they reach the valley floor, where they may have stretches of connectivity with shallow groundwater aquifers.

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85	Donald Bills	GGA-TAC	3	3.1.5.1.1	3-10			Is there no range of flow data for Stony Creek pre-Black Butte Dam (and even Stony Gorge Dam)? This would give some context to the releases from Black Butte Dam since 1996.	Comment acknowledged and addressed. Stony Gorge Reservoir was constructed in 1928. Black Butte Lake was constructed in 1963. Streamflow measurements in Stony Creek downstream of Black Butte Lake are not available prior to 1941. These post-Stony Gorge Reservoir / pre-Black Butte Lake discharges have been summarized in Chapter 3.
86	Donald Bills	GGA-TAC		3.1.5.1.2	3-13			"Sacramento River stream flows measured at the Ord Ferry-Main Channel stream gauge, in the northern part of the Subbasin, varied between 200 and 160,000 cfs during the 1984 to 2020 time period, with extreme low flows measured in the spring of 1990." Why is the time p3.1.5.1.3eriod limited to 1984 to 2020? If the intent here is to describe natural surface waters, there are documented (USGS) periods of extreme flows greater that this range extending back to the 1920 from stream-flow gaging stations in or adjacent to the Colusa subbasin.	Comment acknowledged and addressed. There are limited stream gauges north of the Sutter Buttes with historical discharge data.
87	Donald Bills	GGA-TAC		3.1.5.1.3	3-13			3.1.5.1.4 Glenn Colusa Canal lists acres serviced. Wouldn't it be appropriate to do the same for the Tehama-Colusa Canal? Also the length of the canal and diversions? I watched the Tehama-Colusa Canal being built less that a quarter-mile away from where I grew up on Co. Rd. 21 south of Orland. I even rode my bike in the bottom of the canal once it was cemented in. I noticed at the time there was a line of one-way valves on the bottom of the canal. I later learned they were there to relieve stress on the canal by allow rising groundwater to move into the canal. Is this something you are accounting for in your groundwater models during those wet years when WLS are very close to the surface?	Comment acknowledged. Commentary has been added to the TCC section. The groundwater model does not currently model TCC as a canal. Surface water supplies and agricultural demand are accounted via diversion and place of use information.
88	Donald Bills	GGA-TAC		3.1.5.1.6	3-15	1		"These foothill drainages and their tributaries are classified as part of the Sacramento-Stone Corral Watershed…". I think you mean the Upper Stony Watershed.	Comment acknowledged. Upper Stony Watershed drains into Stony Creek and Stony Gorge Reservoir. The fringe foothills are part of the Sacramento-Stone Corral Watershed. These foothills drain through the ephemeral and intermittent streams.

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89	Donald Bills	GGA-TAC		3.1.5.1.6	3-15	2		"Runoff in these ephemeral and intermittent streams generally begins in late fall when the rainy season starts and may continue until late spring." Intermittent streams suggest some seasonal contact with the regional groundwater table. Probably not true for many of these streams in the north part of the subbasin. I do not know about those in the southern part of the subbasin. Springs are overlooked in this discussion (or elsewhere). Many of these smaller streams have springs at or near their headwaters that issue from either the Tehama (exposures of pre-Paleogene, would have a QW signature), Riverbank or Modesto Formations. Discuss here?... High elevation areas to the west of Orland/Willows. GW contours do not extend that far west. 3.1.11.3 does not address springs. Black butte Lake overlies mostly Tehama formation. Is there ant possibility of Reservoir water seeping into Tehama and showing up in springs to the south? QW signature, spring flow related to lake level not climate, etc.	Comment acknowledged. The foothill streams are historically a mix of intermittent and ephemeral streams. However, given the many back-to-back, multi-year droughts that the region has been experiencing over the past two decades, these foothill creeks and streams are most likely all ephemeral until they reach the valley floor, where they may have stretches of connectivity with shallow groundwater aquifers. Springs are discussed in Section 3.1.11. We decided not to discuss streams in the Hydrology section given the lack of reported information regarding those springs' discharge and source. Some text has been added regarding the historical presence of springs at the headwaters. Groundwater contours are not shown in the northwestern area of the Subbasin due to lack of published data and lack of wells in those upland areas. This indicates either that there is no groundwater in those areas that is economically feasible to access, that the wells in those areas are old and are not included in the DWR well database, and/or that the wells are not currently being monitored and reported. There is a possibility of groundwater in the Tehama Formation to be discharging into Black Butte Lake; however, given the studies conducted by TNC regarding stream-aquifer interactions, available groundwater level data, and a thalweg analysis that has been added to Chapter 3 for Stony Creek, it seems highly unlikely that that is occurring unless it is shallow groundwater or "perched" shallow recharged waters that are not connected to the main freshwater aquifer system.
90	Donald Bills	GGA-TAC	3	3.1.6	3-18		3-9	The color for soil type C and water bodies on fig. 3-9 (light blue) are so similar it is hard to tell them apart. I suggest you consider using more contrasting colors and adding waterbodies to the explanation to make them easier to tell apart.	Comment addressed in the GSP section indicated.
91	Donald Bills	GGA-TAC			3-27		3-16	Top of Cretaceous rocks contours are in meters MSL, and tops of Cretaceous rocks elevation are in feet MSL. Using both metric and SI units makes them a little difficult to compare. Can they both be in the same units? Also, there are places where the contours do not match the elevations (SE of Black Butte, Artois, Princeton, etc.). I assume this is related to structural offsets. I suggest you consider adding the principal structures (faults) to this map to help with the interpretation.	Comment addressed in the GSP section indicated.

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92	Donald Bills	GGA-TAC		3.1.7.2.3	3-31	4		During a review of USGS topographic maps that cover the area west of Orland and Willows, I found about 24 marked springs, a few with actual names. Based on their location, these springs appear to be discharging from either the Tehama, Riverbank or Modesto Formations in the northwest part of the Colusa Subbasin, There is little hydrogeologic information shown on the maps of this report for this area owing to a lack or well data. Springs represent a source of hydrogeologic information that can be used in the absence of well data to extend water level contours and improve understanding of groundwater conditions in the area. Any information about these springs from land owners or site inventories by DWR or the USGS will improve the hydrogeologic characterization of this area of the subbasin. Some mention of spring discharge from the Tehama, Riverbank, and Modesto Formations might be appropriate here, with a more complete discussion in groundwater discharge.	Comment acknowledged. Springs are discussed in Section 3.1.11. We decided not to discuss streams in the Hydrology section given the lack of reported information regarding those springs' discharge and source.
93	Donald Bills	GGA-TAC		3.1.8.2	3-36	2-3		?... Base of the Tehama and Tuscan Formation and (or, and/or?) Base of freshwater excluding those areas where post-Cretaceous sediments contain brackish water. Freshwater is defined as 3,000, 2,000, and 1,000 mg/L depending on which reference is used (USGS, DWR, of C2VSim). Which is it? I would also suggest that you define brackish water here as its related freshwater and the freshwater boundary. The vertical extent of these boundaries shown on fig. 3-11 to 3-13 while approximate do not appear to consistently align with either of these definitions. Perhaps it would be appropriate to add queries ("?") where the degree of uncertainty is highest.	Comment acknowledged. The varying definitions for freshwater versus brackish water are among several issues with defining the base of freshwater. DWR is working on a new base of freshwater study, potentially with a threshold of 1000 mg/L. This threshold concentration is anticipated to be adopted as industry standard for the base of fresh water, and will be used for future versions of the HCM. It is recommended that the model be revised to account to for that. Comment on the cross section mapping has been addressed.
94	Donald Bills	GGA-TAC		3.1.9.2	3-38	1		"These basin faults may act as barriers or conduits to fresh groundwater flows." I think it is also important to mention that, if the faults are deep seated, they can also provide conduits for poorer quality (brackish) water from the marine sediments below to migrate up into the freshwater layer. This is particularly true if the hydraulic head of the freshwater layer is consistently reduced owing to groundwater withdrawal.	Comment addressed. The text has been clarified.
95	Donald Bills	GGA-TAC	3	3.1.10, Principal aquifers	3-39			Some text edits for clarity.	Comment acknowledged. It is unclear what text edits this comment refers to. The entire Chapter 3 has gone through several proofreaders since comments were received and prior to issuance of the public draft GSP.

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96	Donald Bills	GGA-TAC		3.1.10.3, water Quality	3-42	1		Electrical conductivity (EC) is not a measure of the quality of the water. It is a measure of how electrically conductive the water is. As a result, there is a nearly direct relationship between EC and total dissolved solids (TDS) in the water. TDS is one general measure of water quality. The more dissolved solids in the water, the more electrically conductive it is and, as a result, the quality of the water is generally poorer. For this reason, I suggest you delete reference to EC in the first sentence of the paragraph.	Comment addressed in the GSP section indicated.
97	Donald Bills	GGA-TAC		3.1.10.3	3-42			Fire retardant used to be manufactured in Orland and included boron with other chemicals known for both their fire suppression properties and as chemical fertilizer. Currently, fire retardant is a mix of ammonium polyphosphate, diammonium phosphate, diammonium sulfate, monoammonium phosphate, attapulgus clay, guar gum known as Phos Chek. Over time, after a fire, this material gets watered into a watershed and may be a concern for the water quality of an aquifer. It is also highly concentrated where manufactured and distributed (Airports like Orland, Willows, and USFS and CDF fire bases).	Comment acknowledged.
98	Donald Bills	GGA-TAC		3.1.10.3	3-42	3		Most drycleaners use both Trichloroethylene (TCE) and Tetrachloroethylene (PCE) (as did the one in Orland). The studies I have seen on this issue for the Orland area refer mostly to TCE.	Comment acknowledged. Documentation from the Department of Toxic Substance Control and EnviroStor that we have seen indicate that PCE is the constituent of concern for the Orland Dry Cleaner Site.
99	Donald Bills	GGA-TAC		3.1.11, Ground water Inflows and Outflows	3-42 to 48	1		The section heading is groundwater inflows and outflows. The lead sentence begins “Groundwater underflows between the Colusa Subbasin and neighboring groundwater subbasins…”. Groundwater underflow is a specific type of inflow or underflow. I would suggest that a better use of this introductory paragraph would be to list all the relevant GW inflows and outflows to the Colusa Subbasin as discussed in the following subsections. I would also add the Corning Subbasin in the first sentence in relation to groundwater underflow. As water-level contours indicate (fig. 3-19), Stony Creek is not a barrier to groundwater flow.	Comment acknowledged and addressed. The text has been updated to clarify underflows along the Subbasin boundaries.
100	Donald Bills	GGA-TAC		3.1.11.2.2, GW banking?	3-43			Groundwater banking. Not in the glossary of terms and it appears to mean something different here (recharge) as opposed to the most common definition (water management mechanism designed to increase water supply reliability through the buying, selling, and storage of surface water and groundwater rights for later use). I would suggest artificial recharge as a alternate term since the main heading (2.1.11.2) is Groundwater Recharge Areas.	Comment addressed in the GSP section indicated.

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101	Donald Bills	GGA-TAC		3.1.11.3, Ground water discharge areas	3-45	2		I suggest that you consider adding a few sentences about springs in the Colusa Basin to this paragraph. Something like: "Most springs in the Colusa Subbasin occur near the western boundary and discharge from the Tehama, Riverbank, or Modesto Formations and stream channel alluvium. About 25 springs can be identified from USGS topographic maps of the subbasin. A number of these springs have been developed for agricultural use by landowners locally (apparent on satellite imagery). The flow, and water quality of these springs may exist in DWR or USGS databases based on past historical inventories." If properly inventoried these springs would represent significant additional information about the occurrence, movement, and quality of ground water in the regional aquifer of the Colusa Subbasin, especially where this information is poorly defined.	Please see the response to comment 92.
102	Donald Bills	GGA-TAC	3	3.1.11.3	3-48	2, 4th sentence		"There are also many unmetered domestic wells located throughout the study area." I suggest adding unmetered small ag wells also: "…unmetered domestic and small agricultural wells…"	Comment addressed in the GSP section indicated.
103	Donald Bills	GGA-TAC				2, 5th sentence		It might be appropriate to add a sentence or two here to briefly explain how the annual rate of withdrawal from domestic wells was determined (estimated). Average pump capacity of all domestic wells, seasonal domestic water use estimates, or other. Adding small unmetered ag. wells to this total would increase significantly I imagine.	Comment addressed. The methodology used to estimate rural residential (domestic) pumping in the GSP has been added. This is the current, best available approach for quantifying domestic groundwater pumping in the Colusa Subbasin.
104	Donald Bills	GGA-TAC		3.1.11.3	3-48	3		I would also add a comment to this paragraph that during years when surface water deliveries are significantly cut back (drought), agricultural lands rely heavily on wells to make up the difference.	Comment addressed. The suggested text has been added.
105	Donald Bills	GGA-TAC	3	3.1.12.1	3-51	4		other methods or data sources: I'd like to suggest passive seismic. The method uses seismic signals already available in the environment, either anthropogenic (i.e. freeway traffic), or natural (i.e. earthquakes, ocean waves, etc). the seismic signals are processed similar to standard reflection and/or refraction surveys but for much larger areas and depths. Ground-based, non-invasive CSAMT (Controlled Source Audio-frequency Magnetotellurics) and TEM (transient electromagnetic or alternately called time-domain EM (TDEM)) surveys can provide detailed subsurface information on stratigraphy, structure, depth to water and water quality in localized areas of interest. Survey lines that pass over or by existing wells provide ground-truth.	Comment addressed. Thank you for pointing out these alternate methods of subsurface mapping. The text has been revised.

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106	Donald Bills	GGA-TAC	3	3.1.12.1	3-52	1		Different TDS thresholds to define base of freshwater. Part of the problem may also be that water use type has a lot to do with whether water is considered fresh or not. MCL for safe drinking water is 500 mg/L, Livestock can tolerate about 1,500 mg/l. A lot of commercial ag. plants can tolerate 2,000 to 3,000 mg/L. There is also not broad agreement on what constitutes fresh, saline, or brackish water. It seems to me that the standard for what constitutes freshwater should be the same for all subbasins in the Sacramento Valley, if not the entire Central Valley.	Comment acknowledged. Please see the response to comment 92. The idea is to use the upcoming DWR study as the standard TDS threshold for freshwater.
107	Donald Bills	GGA-TAC		3.2.2.1	3-53	2, second sentence		"The most notable recovery period occurred around 1983, which was both a wet year and when water users added more surface water to their supply portfolios." The recovery after the 1987 to 1991 drought seems at least as great if not greater.	Comment addressed. The 1991 recovery is a notable recovery in terms of magnitude while the 1983 recovery is notable in terms of conditions prior to 1983 and after 1983. When surface water supply increased, there was a large rise in water levels.
108	Donald Bills	GGA-TAC			3-53		3-22	It is hard to evaluate temporal trends on this plot referring back to the average annual precipitation plot at the beginning of this chapter. To help understand and evaluate this temporal data it would seem appropriate to add a plot of the annual average precipitation to this graph.	Comment acknowledged. Precipitation was excluded from this hydrograph in the interest of using the two existing vertical axes to show depth to water and elevation. The drought periods are shown on the hydrograph for reference to climatic events. The text has been revised to clarify that the peaks and valleys in the water level hydrograph represent the rainy season and dry season, respectively.
109	Donald Bills	GGA-TAC		3.2.2.1	3-55	1		Besides showing the general direction of flow to the SE, Figure 2 appendix 3-B appears to show Walker Creek to be a gaining stream (i.e. perennial, groundwater contours point up stream) from the NW part of the subbasin to Artois. Comparing land surface contours (fig 3-4) to the groundwater contours for this area seems to indicate that the depth to water is from -10 to -30 ft below the streambed throughout. Is there a discrepancy here that needs to be resolved?	Comment acknowledged. The contours shown are groundwater elevations, not depth to water. The contours point upstream and indicate groundwater flow is in the direction of the drainage. There are a number of potential factors for why it looks like the depth to water is above land surface. These include, but are not limited to, the spatial density of available data, construction of monitored wells, assumptions made during interpolation into contours, and the scale of regional mapping. Many of the multiple completion monitoring wells show an upward gradient within the Subbasin, and most of the monitored wells are constructed in the semi-confined to confined zone of the principal aquifer. It is possible that groundwater is discharging to Walker Creek in this area during the spring of 2006.
110	Donald Bills	GGA-TAC	3	3.2.2.1	3-55	4		"Current groundwater levels are similar to those measured in 2017, indicating that regional groundwater levels have been relatively stable since the end of the previous multiple-year drought." I find this statement a little misleading. What it overlooks is the fact that the combined effect of the 2007-09 and 2012-16 droughts was an average depth to water decline of over 30 ft (fig 3-22) from which the principal aquifer has yet to recover. In addition the 2019 and 2020 was appear to continue trending down, not stable, as cones of depression continue to expand (fig 3-24 and 3-25).	Comment acknowledged. As of the making of the hydrograph, the water levels had somewhat stabilized. Of course, we have entered a period of alternating average and dry or multiple-dry years and this is taking a toll on the aquifer system. In particular, it is taking a toll on the shallow groundwater aquifer system, which is lacking in available water level data. DWR and GSAs have started working to improve monitoring and record-keeping of shallow wells and wells that are going dry, but that has not been evaluated as part of this GSP given the SGMA time constraints. The text has been revised to mention this.

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111	Donald Bills	GGA-TAC		3.2.2.1	3-55	1,3rd sentence		"Impacts due to pumping are the exception to the typical gradients and disrupt both local and regional gradients." I suggest that you add to this sentence or the first sentence of the paragraph a comment on the effects of changing hydraulic parameters on the lateral groundwater gradient.	Comment addressed in the GSP section indicated.
112	Donald Bills	GGA-TAC		3.2.5	2-64	Second		Delete EC. It is not a water quality parameter.	Comment addressed in the GSP section indicated.
113	Donald Bills	GGA-TAC				third		Who monitors and regulates the water quality of municipal supply systems? Worth mentioning here? Regional water quality control boards? Saline connate water? Connate water is water trapped within the pores of sedimentary rocks. For that to happen it would have to be fully confined laterally and vertically and not be faulted or fractured. In the geologic discussion it states that pre-Cretaceous rocks are faulted and fractured. Groundwater is almost always in motion and always flows in response to gravity and/or the hydraulic gradient. The flow rates can be very slow, ft per hundreds to thousands of years or more. The connate water would be in pre-Cretaceous sediments. Has anyone dated the water to see if it is, in fact, greater than 145 million years old, give or take?	Comment acknowledged. The municipal wells are regulated under SWRCB and the Division of Drinking Water. Drinking water quality is submitted to the SWRCB SDWIS Water Watch and GeoTracker systems. This is discussed in Chapter 4, Monitoring Networks.
114	Donald Bills	GGA-TAC		3.2.5.1.1	3-64	1		End of first sentence add "…and/or EC value (EC is a surrogate [estimate of] for TDS because it is more easily measured on site)." There appears to be a discrepancy in the Secondary MCL for TDS; 500mg/L in sentence 2 and 500 mg/L in sentence 4. Fix?	Comment acknowledged. TDS has three MCLs: the recommended limit (500 mg/L), the upper limit (1000 mg/L), and the short-term limit (1500 mg/L). This has been explained in the text.
115	Donald Bills	GGA-TAC		3.2.5.1.1	3-66	1		"Wells screened in the unconfined to semi-confined zone of the aquifer (i.e. in wells less than 200 feet deep) had the highest number of wells with elevated TDS concentrations." I suggest adding "in thew central and southern part of the subbasin" to the end of this sentence.	Comment addressed in the GSP section indicated.
116	Donald Bills	GGA-TAC		3.2.5.1.1	3-66	2		First sentence, …In these areas…. What areas? Suggest replacing with …southwest of Colusa…	Comment addressed in the GSP section indicated.
117	Donald Bills	GGA-TAC		3.2.5.1.2	3-67	1		Anthropogenic source for increasing chloride and sulfide concentrations? Septic systems, landfills, other?	Comment addressed in the GSP section indicated.
118	Donald Bills	GGA-TAC		3.2.5.2.2	3-67	1		Boron. Pre, late 1970's Boron was a component of fire retardant for its fire suppression characteristics. Fire retardant was manufactured in a plant in Orland and stored at firebases (airports) in Glenn and Colusa counties. Is saw wide use in suppressing forest, brush, and grass (at lower elevations) fires in Glenn and Colusa Counties.	Comment addressed.
119	Donald Bills	GGA-TAC		3.2.5.2.3	3-68	1		Known or suspected cause for increases in iron and manganese worth mentioning here? Natural or human caused? Landfill west of Artois? Junk yards? Suggest adding if appropriate.	Comment addressed.
120	Donald Bills	GGA-TAC		3.2.5.2.3	3-68	1		Known or suspected cause for anthropogenic increases in hexavalent chromium worth mentioning here? Landfill west of Artois? Suggest adding if appropriate.	Comment addressed.

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121	Donald Bills	GGA-TAC		3.2.7	3-73	2 and 3 paragraphs		The second paragraph is misleading ("While Stony Creek, Sacramento River, and the Colusa Basin Drain all experience gaining and losing conditions throughout the year,…") and appears to contradict the information provided in the 3rd paragraph. I would suggest deleting the second paragraph entirely and moving the table references to the 3rd paragraph.	Comment addressed in the GSP section indicated.
122	Donald Bills	GGA-TAC		3.2.8	3-74	2nd paragraph	3-34	I do not follow the scoring criteria for GDE. A GDE where groundwater is near the surface has a score of 1; least likely to be GDE when it should be more likely to be a GDE. If a GDE is not near surface water OR crop land it scores a 4; most likely to be a GDE when it should be least likely to be a GDE. How the 30 ft DTW line was derived is explained in paragraph 1 on page 3-75. But I could not find or estimate the 30 ft DTW on any or the other figures in the text or appendix. An approximated 30 ft DTW line for 2006 data on figure 3-19 would run from between Arbuckle and College City, to near the boundary of the subbasin west of Williams, to just west of Artois, ending at Stony Creek just N/NW of Orland. This is nowhere near the line shown on figure 3-35. Using figure 5 in appx 3B I can approximate a 30 ft contour to the 2017 data. But it also does not compare to the 30 ft DTW contour on figure 3-35. The explanation table on figure 3-35 does not reference a time period (2014 to 2018?) for the 30 ft DTW line or any of the other features shown. Finally, there is no reference to springs and the riparian habitat they support at headwater streams in the NW part of the subbasin between Willows and Orland. These would represent some of the most important and species diverse habitat in the subbasin. I would suggest that the entire GDE section be revised so it more clearly and plainly represents GDE's that occur within the subbasin.	Comment addressed. Clarification has been added in the section indicated. The scoring criteria uses an if/then method. If the response to criteria 1 is "yes," then the scoring moves on to criteria 2. If the response to criteria 1 is "no," then that land receives a score of 1 and the scoring ends. GDEs are near shallow groundwater and not near agricultural lands or surface water features.
123	Donald Bills	GGA-TAC	3	3.3 Water budget information	3-77	1		This section describes water budget components in detail but, I did not see a clear statement of what the water budget was for. Water budgets can be used for many things (i.e. GW gains or losses, basin gains or losses, etc). Is there a statement of the purpose of the water budget in the Groundwater Sustainability Plan Emergency Regulations §354.18 that could be added to the introduction here? The name suggests it is to determine groundwater sustainability of the principal aquifer in the subbasin. That implies that all the inflows and outflows are on onside of the equation and +/- change in storage is the result.	Comment addressed. The introduction has been edited to explain the purpose and utility of water budgets.

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124	Donald Bills	GGA-TAC	3	3.3.3	3-80		3-9	What is the Shasta non-critical and Shasta Critical, mentioned on the table? How does it relate to the Colusa Subbasin? I think it is defined two pages later under Land use. But there is still no explanation of what a Shasta critical and Shasta noncritical year is. Reservoir contents? Outflow? Both? Is there a reference for this missing? It would be worth providing a footnote to table 3-9 to define Shasta critical and Shasta non critical.	Comment addressed. An explanatory footnote has been added at the first reference to "Shasta Critical" and "Shasta Non-Critical" years in the text.
125	Donald Bills	GGA-TAC		3.3.3.3	3-83	3, Land Use		"…modified based on planned development according to the Colusa County 2030 General Plan." Is there a 2030 Glenn County General plan worth considering here as well?	Comment acknowledged. The Glenn County General Plan is currently being updated. The current plan is 28 years old, and thus does not have much direct utility for this application.
126	Donald Bills	GGA-TAC	3	3.3.4	3-84	1, bullet 1		Groundwater pumping and stream accretion are described as inflows here. In paragraph 2 second bullet on page 3-85 they are described as outflows. Which is it? I would suggest they are both outflows from the principal aquifer and the text needs to be fixed accordingly.	Comment acknowledged. From the perspective of the surface water system, which is essentially the root zone and surface waterways, groundwater pumping and accretions are inflows. From the perspective of the underlying groundwater system, these same two flow paths are outflows.
127	Donald Bills	GGA-TAC		3.3.4	3-85	3rd bullet of first paragraph (3-84)		Change in Storage is defined as changes in soil moisture storage within the upper several feet of soil in the root zone, as well as changes in storage in surface water bodies within the basin. Neither of these are change in storage. They are either inflows or outflows components that when summed with other inflows or outflows result in a change in storage of the principal aquifer. I would suggest that the text be fixed accordingly.	Comment acknowledged. The volume of water stored in the root zone and surface water bodies (mainly canals and drains) changes over time (seasonally) depending on a variety of factors. But on an annual basis the change from year to year is very small.
128	Donald Bills	GGA-TAC			3- 86 and 3-87		3-10 and 3-11	The tables do a much better job of representing the various SW and GW components of the water budget. Is there some way change the text so it is mere consistent with the tables? Also, In both table 3-10 and 3-11 the column headings for future conditions climate change relate to a specific date (2030 and 2070). It would be useful to the reader if the other columns (historical simulation, current baseline, and future condition no climate change base line) had the time periods they are based on as well. 1990 to 2015, 2015, and 1966 to 2015 respectively.	Comment addressed. The suggested edits have been made.
129	Donald Bills	GGA-TAC		3.3.4.1	3-88	4		I would suggest that ET from the riparian corridor of the Sacramento River as well as evaporation from the rivers surface can also be significant and worth discussing here. Especially during the summer months when ET is at a maximum and daytime temperatures can exceed 100 degrees for weeks at a time. This is important to consider under future climate change scenarios where temperatures and the days per year of excessive heat are predicted to increase.	Comment addressed. A sentence has been added preceding Tables 3-10 and 3-11 noting that Native Vegetation ET includes riparian corridors along streams and rivers.
130	Donald Bills	GGA-TAC		3.3.4.1	3-89		3-38	I would suggest that you add the change in storage (3taf.yr) to the graph. It is not apparent on the graph even though it is color coded in the legend. The columns look equal. In any case it should not be a color-coded box as inflow or outflow. It is the result of both.	Comment addressed in the GSP section indicated.

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131	Donald Bills	GGA-TAC		3.3.4.1	3-90		3-39	The GW change is storage in table 3-12 is shown as a negative number (-27.5 taf/yr, a loss). So, why is it shown as an inflow in this figure? Change in storage is neither an inflow nor a outflow but the result (sum) of both. Showing it this way graphically suggests the inflows and outflows are in balance. They are not. I would suggest that you add the actual change in storage (-27.5 taf/y) to the legend and remove it from the inflow column. I suggest you make similar changes to figures 3-40 to 3-47.	Comment acknowledged. The convention we choose to use is to include change in storage on the chart so the sum of the 2 columns are equal. A negative change in storage results from inflows being less that outflows, so the change in storage gets added to the inflows so that the two columns balance.
132	Donald Bills	GGA-TAC		3.3.4.1.1	3-91	1 and 2	3-12	"The primary sources of surface water in the basin are the Sacramento River and Stony Creek. Surface water supplies are relatively reliable in the basin and represent approximately 74 percent of the total water supplies." Is this statement accurate? How do Shasta critical and non-critical years affect it? I would think that during Shasta critical years SW deliveries would be much and during Shasta non-critical years would be at or near 100 percent. The second paragraph seems to support this.	Comment addressed. We have verified the calculation and the value is 70%. The value has been corrected, and clarification has been added.
133	Donald Bills	GGA-TAC	3	3.3.4.2	3-93	2		Average annual inflows to and outflows from the groundwater system were estimated to be 997 taf/yr during the current conditions baseline simulation period on figure 3-41 are shown as 998 taf/yr not 997. Which is right?	Comment acknowledged. The 1 AFY discrepancy results from rounding. Both numbers as regarded as right, within uncertainty.
134	Donald Bills	GGA-TAC		3.3.4.3.1	3-95	4		"There is negligible change in groundwater storage under the future condition, no climate change baseline water budget." I suggest you add the actual change in parentheses: "…negligible change (+0.6 taf/yr)…"	Comment addressed in the GSP section indicated.
135	Donald Bills	GGA-TAC		3.3.4.3.2	3-97	1		"Average annual inflows to and outflows from the groundwater system were estimated to be 1.0 maf/yr." I suggest you add the type and time period to toe sentence so it is consistent with the title of this section and the figure referenced. "Average annual future conditions 2030 climate change baseline groundwater system inflows to and outflows from the groundwater system were estimated to be 1.0 maf/yr."	Comment addressed in the GSP section indicated.
136	Donald Bills	GGA-TAC		3.3.4.3.2	3-98		3-45	Change in storage is not an inflow as shown…. See previous comments.	Please see the response to comment 131.
137	Donald Bills	GGA-TAC		3.3.4.3.3	3-100		3-47	Change in storage is not an inflow as shown…. See previous comments	Please see the response to comment 131.
138	Donald Bills	GGA-TAC		3.3.5	3-101	1		"Uncertainty refers to a lack of understanding of the basin setting…" Add Water Budget to uncertainty in the first sentence to be consistent with the section title. I.E. "Water budget uncertainty refers to…"	Comment addressed in the GSP section indicated.

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139	Donald Bills	GGA-TAC		3.3.6	3-102	1		"Based on the current conditions and future conditions with no climate change scenarios, which represent long-term average conditions in the subbasin, overdraft conditions are not expected to occur in the Colusa Subbasin." The rest of the paragraph appears to contradict this. I suggest you change not to expected to occur to minor or modest overdraft is expected to occur.	Comment addressed in the GSP section indicated.
140	Donald Bills	GGA-TAC		3.3.7	3-102	1		"As described previously, sustainable yield refers to the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin, and including any temporary surplus that can be withdrawn annually from a groundwater supply without causing an undesirable result." At the beginning of this chapter sustainable yield was also related to a maximum depth below lands surface, 200 ft I believe. I suggest you add that add that condition her also.	Comment acknowledged. Yes, other sustainability indicators need to be brought into the estimate of sustainable yield, particularly streamflow depletion, and effects on GDEs and other beneficial uses and users.
141	Donald Bills	GGA-TAC		3.5, references				I did not attempt to check or verify references…	Comment acknowledged.
142	Donald Bills	GGA-TAC	4	4.2.2.2.1	4-4	1		Groundwater levels should be measured from a pre-established and recorded reference point. — The reference point elevations (RPE) need to have been surveyed to the NAVD 88, feet and shall be accurate to within 0.5 feet, at a minimum (23 CCR §352.4(a)(4). The USGS standard is 0.1 ft. The reasoning is related to the accuracy of GW model results. If the accuracy of GWLs input to GW models are not accurately known, any errors in model results propagate over time through the model runs. As a result, GWL changes and associated changes in inflow, outflow and storage become increasing less certain. In the case of the Colusa subbasin knowing the accuracy of the MP to only 0.5 ft could result in WL changes of +/- 0.5 ft and storage changes of +/- 0.5 ft (100,000s af/y potentially). Also, Accurate to within 0.5 ft at a minimum seems a little ambiguous. Do you mean that 0.5 ft is the least accurate value acceptable but greater values (1.0 ft, 5.0 ft, etc.) are also acceptable? I would suggest you change this phrase to : " accurate to within +/- 0.5 ft (+/- 0.1 ft if you are going to use the more broadly accepted standard). If you make the change here, make it throughout the rest of the text.	Comment addressed. The protocols and requirements have been shortened to include only a summary of the requirements and references for approved protocols. This level of detail is no longer included in Chapter 4.

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143	Donald Bills	GGA-TAC		4.2.2.2.1	4-4	1, bullet 2		"…Equipment should be operated and maintained in accordance with the manufacturer's instructions." The WL measuring equipment should be calibration checked annually to be sure it is still the same as the original manufacture calibration. In addition, if a well probe is stuck in is a well but can be removed. The calibration of the well probe should be verified before the probe is used again.	Comment addressed. Please see the response to comment 142.
144	Donald Bills	GGA-TAC		4.2.2.2.1	4-4	1, bullet 3		Monitoring wells developed in partially confined or confined aquifers can have a pressure gage installed in the well cap as a further indication of potential hydraulic head.	Comment addressed. Please see the response to comment 142.
145	Donald Bills	GGA-TAC		4.2.2.2.1	4-4	1, bullet 4		Near pumping, recently pumping nearby. Nearby stream flowing or not recently following or not, etc.	Comment addressed. Please see the response to comment 142.
146	Donald Bills	GGA-TAC		4.2.2.2.1	4-4	1, bullet 6		Water levels shall be measured to the nearest 0.1 foot, at a minimum (23 CCR §352.4(a)(3). Measurements to the nearest 0.01 feet are preferred and should be used if the equipment allows. — Groundwater elevations (GWE) are calculated as the RPE minus measured depth to water (DTW). See the problem here? It your RPE is only accurate to +/- 0.5 ft, your GWE is now only accurate to +/- 0.6 ft. USGS standard is to measure RPE's to +/- 0.1 ft and WLS to +/- 0.01 ft (depths less than 500 ft) and round to the nearest 0/1 ft. In addition, all depth to water measurements in wells are repeated until you can get three results within 0.1 ft of each other. The average is used.	Comment addressed. Please see the response to comment 142.
147	Donald Bills	GGA-TAC	4	4.2.2.2.1	4-5	2, bullet 5		"Recorded information should include:…" NOTE: The Height of the RPE can and will change over time. That is why it should be checked at least annually, and the new elevation noted if it has changes.	Comment addressed. Please see the response to comment 142.
148	Donald Bills	GGA-TAC		4.2.2.3	4-6		Figure 4-1	Significant cones of depression (GW withdrawal for Ag.) occur to the NW of Orland just south of Stony Creek and to the SW of Orland. Yet, there is only one monitoring well (21N04W12A001-004M) available to evaluate these drawdowns as they develop over time. I would suggest additional monitoring wells be places in these areas. The same is true in the area to the west of Artois and Willows.	Comment addressed. Please see the response to comment 142.
149	Donald Bills	GGA-TAC		4.2.2.3	4-12	2		"Many of the surface waters are near wells included in the current groundwater monitoring network, except for the surface waters within the Colusa National Wildlife Refuge, east of Williams." Suggest you add the following to this: "…east of Williams, N and NW of Orland near Stony Creek, NW of Artois along the middle reaches of Walker Creek, and NW of Willows along the middle reaches of Willow Creek."	Comment addressed. These additional data gap areas are now called out in the GSP.

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150	Donald Bills	GGA-TAC		4.2.2.3	4-12	5		Are the caved-in of casing collapsed wells going to be repaired or replaced?	Comment acknowledged. To the best of our knowledge, there are no plans to repair or replace these damaged wells. The GSP now excludes the damaged wells from the monitoring network and includes recommended replacement wells, as well as recommended locations for new wells to add to the monitoring network.
151	Donald Bills	GGA-TAC		4.2.2.4	4-12	2, item 2		Consider adding: c. Areas of active drawdowns (storage decline) with minimal monitoring well coverage.	Comment addressed in the GSP section indicated.
152	Donald Bills	GGA-TAC	4	4.2.2.5.2	4-14			I would recommend considering adding monitoring wells in the areas mentioned in my comments on page 4-6 and 4.12. Figure 4.2 already shows one well being removed from the network in the areas near Orland mentioned in comments on page 4-6.	Comment addressed. These additional data gap areas are now called out in the GSP.
153	Donald Bills	GGA-TAC		4.2.3	4-14			Irrigated Ag is also known to increase salinity in shallow water-bearing zones as irrigation leaches minerals from the soil. I would also add nitrate as a constituent of concern for the Colusa subbasin. Nitrates resulting from livestock operations and areas with a high density of septic systems are known to also leach in to the subsurface.	Comment acknowledged. The GSAs decided to focus on salinity for their groundwater quality monitoring as nitrate is more heavily regulated, monitored, and required to have management actions if exceedances occur. The GSP annual report and periodic GSP evaluations and updates will evaluate existing nitrate concentrations, but nitrate is not currently a constituent of concern for action from the GSAs.
154	Donald Bills	GGA-TAC		4.2.3.2	4-16	1		Wilde, 2005 has been updated extensively. Newer versions od different chapters of the report were developed in 2008, 2012, 2014, 2018, 2019, 2021 The entire manual is now available online at: https://www.usgs.gov/mission-areas/water-resources/science/national-field-manual-collection-water-quality-data-nfm?qt-science_center_objects=0#qt-science_center_objects 3rd Bullet: Sample integrity, i.e. ppb protocol? Perhaps add a comment about the chain of custody (oops… bullet 14).	Comment addressed. Wilde (2005) is the version recommended in the DWR BMPs. The text was revised to acknowledge this recommendation, but also to allow for more recent versions to be used.
155	Donald Bills	GGA-TAC		4.2.3.2	4-16	2, bullet 2		And the unique identifier should be verified to already exist in the data base so the data has a home and does not end up in a "unknown site" file.	Comment addressed. Please see the response to comment 142.
156	Donald Bills	GGA-TAC		4.2.3.2	4-16	2, bullet 6		During purging of the well field parameters should be monitored until stable to insure the well has been correctly purged. Easy to do with a QW multi meter.	Comment addressed. Please see the response to comment 142.
157	Donald Bills	GGA-TAC		4.2.3.2	4-16	2,bullet 8		Suggest adding dissolved oxygen (DO) to the list of filed parameters. GW typically has low or near zero DO. Water sitting in well casing for a period of time will accumulate concentrations of DO. Represents another good indicator of proper well purge.	Comment addressed. Please see the response to comment 142.

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158	Donald Bills	GGA-TAC		4.2.3.2	4-16	2, bullet 9		Sample labels can be preprinted in the lab with all the appropriate info. Prevents the smearing of hand-written labels using pencil, ink and even waterproof ink (Sharpie). Also be aware that the outside of the sample bottles can "sweat" in coolers or other containers. The result is the label glue will weaken and the labels will come off. Double bag samples is one solution.	Comment addressed. Please see the response to comment 142.
159	Donald Bills	GGA-TAC		4.2.3.2	4-16	2, bullet 10		Field parameter DO is a good indicator of this. Laminar flow may require the use of a variable speed pump so DD is not excessive during collection of the water sample.	Comment addressed. Please see the response to comment 142.
160	Donald Bills	GGA-TAC		4.2.3.2	4-16	2, bullet 11		DQOs? Is this a reference to Quality assurance. If so a number of duplicates, blanks and spike samples will need to be processed either in the lab or on site, depending on the type and number of water samples being collected during an individual field run. Maybe briefly explain here?	Comment acknowledged. The references to DQOs have been removed or reworded, as necessary, as we did not define specific DQOs.
161	Donald Bills	GGA-TAC		4.2.3.2	4-16	2, bullet 12		In this case DQOs appears to be referring to lab detection limits for individual constituents. Correct or no? May need more explanation here.	Comment acknowledged. The references to DQOs have been removed or reworded, as necessary, as we did not define specific DQOs.
162	Donald Bills	GGA-TAC		4.2.3.5	4-19	1		The lead sentence suggesting the existing QW monitoring programs as sufficient contradicts 4.2.3.4 which says they are not sufficient. If the existing monitoring wells are not spatially located enough to address salinity concerns or, not deep enough to detect upwelling of brackish GW from below, they are indeed not sufficient.	Comment acknowledged. The text has been revised to include a more in-depth discussion about the rationale, data gaps, and recommendations for the groundwater quality monitoring network.
163	Donald Bills	GGA-TAC		4,2,3,5	4-19	2		Small diameter monitoring wells pose additional issues for the collection of Value QW samples. Small diameter submersible pumps (less than 2 inches) are few and far in between. Typically, they are limited to lifts of 100 ft or less, and have small pumping rates (~one gpm or less). Bailers (Teflon preferred) are another option and are readily sized to fit in 2-inch monitoring wells. Bailing a well to purge can be difficult depending on the depth. Bailers have to be pre cleaned between each water sample. Bailer sample volumes may be on the order of 1 liter or less meaning several bail volumes to collect a sample. Then there is still the issue if ant of the monitoring wells are deep enough to register upwelling of brackish water from below.	Comment addressed. Please see the response to comment 142.
164	Donald Bills	GGA-TAC		4.2.4.1 lands subsiden ce	4-20	2, bullet 8		Land subsidence should be measured at least as accurately as SWLs if not more accurate. Small changes in land subsidence (tenths of a foot, not half a foot or more) can have a significant impact on the surface and on GW storage. If you are measuring the elevation of ground surface to +/- 0.1 ft and the elevation of your RP to +/- 0.5 ft, again the accuracy of your subsidence measurement is no better than +/- 0.6 ft.	Comment addressed. Please see the response to comment 142.

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165	Donald Bills	GGA-TAC		4.2.5.1	4-24	1, bullet 7		Benchmarks at USGS stream-flow gaging stations are surveyed to the nearest 0.01 ft. One-hundredth foot accuracy is critical to development of a good (+/- 5 percent of the actual flow) or better stage-discharge relationship. If not, you risk losing indications of GW supported base flow and any seasonal signature of gaining or losing flow to/from GW. As an aside, the USGS also requires a minimum of 10-years of continuous (every 15-minutes) record for the data to have any statistical significance.	Comment addressed. Please see the response to comment 142.
166	Donald Bills	GGA-TAC		4.2.5.2	4-24	3		Accuracy of stage data is +/- 0.01 ft (required).	Comment addressed. Please see the response to comment 142.
167	Donald Bills	GGA-TAC		4.2.5.5	4-24	1		Figure 4-4 is land subsidence. I think you mean figure 4-5. The legend for figure 4-5 does not provide adequate explanation of the different stream types shown on the map (perennial, intermittent, ephemeral, canals, or drains). The line widths and colors vary from thick to very thin and light blue to very light blue respectively. It needs to be revised.	Comment addressed. Waters in the maps have been adjusted in coloring, as deemed necessary.
168	Donald Bills	GGA-TAC		4.2.5.5	4-25	2		"Additionally, existing stream and drainage reports will be evaluated for additional information on the timing, stage, and magnitude of flows in ephemeral and intermittent streams in the subbasin, if necessary to fill data gaps or support projects and management actions during GSP implementation." There used to be a stream-flow gaging station on Walker Creek at Artois. Still there? Still active? There also use to be a gage on the Glenn-Colusa Canal where it crosses Stony Creek south of Hamilton City. Still there? Still Active? I imagine there are additional discontinued stream-flow gaging stations scattered across the Colusa subbasin. If the structures for these sites are still there, they can be re-established by installing stage recorders and making periodic discharge measurements to verify the old stage discharge relationships. Besides the Colusa Drain, Willow Creek west of Willows is another intermittent/ephemeral stream that would be worth the effort to gage.	Comment addressed. The text has been revised to include a more in-depth discussion about the rationale, data gaps, and recommendations for surface flow and spring monitoring.
169	Donald Bills	GGA-TAC		4.3 References	4-27			Add Wilde (2005) or most recent reference(s) available. Reference for California Rice Commission? Reference for California Statewide Groundwater Elevation Monitoring Program (CASGEM)?	Comment addressed. The references are included under the consulting agencies name. Wilde (2005) is the version recommended in the DWR BMPs. The text was revised to acknowledge this recommendation, but also to allow for more recent versions to be used.
170	Holly Reimers		1	1.1	1-1	2		The priority being to halt overdraft and bring basins into balance? This is not even close to being complied with. The overdraft is far greater than the recharge with the ground water tables lowering each year.	Comment acknowledged. Halting overdraft and bringing the subbasin into hydrologic balance is a goal. Achieving this goal will take a lot of effort, collaboration, and give-and-take between all of the affected peoples, communities, industries, and environments.
171	Holly Reimers		1	1.1	1-1		1, 2 & 6	Sounds good but is NOT will not work and is not doable.	Comment acknowledged. This bullet list includes the "undesirable results" as defined by DWR and SGMA.

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172	Holly Reimers		1	1.1	1-1	4		Achieving the groundwater management within 20 years WILL BE TOO LATE.	Comment acknowledged. The 20-year timeframe was decided and established through SGMA, and is simply a deadline for sustainability to be reached or improvements to be shown. Ideally, improvements to groundwater and surface water conditions will occur much sooner than the 20-year deadline.
173	Holly Reimers		1	1.2	1-2	1		SEE ABOVE!	Comment acknowledged. The 20-year timeframe was decided and established through SGMA, and is simply a deadline for sustainability to be reached or improvements to be shown. Ideally, improvements to groundwater and surface water conditions will occur much sooner than the 20-year deadline.
174	Holly Reimers		1	354-10	3 of 7		1-1	The whole process has been totally lacking in "public engagement". Nor has the GGA encouraged any "active involvement". As the times we have given input we have been overridden by counsel.	Comment acknowledged. This concern has been conveyed to the public outreach team.
175	Holly Reimers		2	2.1.2	2-4	2.1.2.1		With the Colusa Subbasin depending on ground water for their potable water the ground water for these wells should be closely watched as the number of wells are going dry or having to be lowered at an alarming rate.	Comment acknowledged. Additional text has been added to Chapter 2 to specify private pumper representation in the GSAs and to Chapter 3 to include a data gap concerning groundwater levels in shallow domestic wells.
176	Holly Reimers		2				2-6	The table shows the density of Ag. wells around Orland. Is anyone reporting the number of domestic wells that are being affected by this?	Comment acknowledged. The density of domestic wells is shown in the middle panel of Figure 2-6. Well densities are based solely on DWR's records and may not reflect all existing wells in the Subbasin. Domestic wells impacted by lowering of groundwater levels are not being tracked in this figure. Additional text has been added to the GSP Chapter 3 to include a data gap concerning groundwater levels in shallow domestic wells.
177	Holly Reimers		2	2.2	2-16	2.2.1.1		"Manage and reduce invasive plant populations" This has been one of my main talking points for many years. The Salt Ceder and the Bamboo are non native and are using more water than any other source. Especially in this dry year these plants need to be eradicated!	Comment acknowledged.
178	Holly Reimers		2	2.2	2-17	2.2.1.1		"Ensure long-term Groundwater Sustainability" At the rate this is going and where it is headed the train has left the station and we in Glenn County will have little or no ground water in the very near future. Domestic and livestock wells MUST be protected.	Comment acknowledged.
179	Holly Reimers		2	2.2	2-17	2.2.1.1		The definition of sustainable: "related to, or being a method of harvesting or using a resource so that the resource is NOT depleted or PERMANENTLY damaged". To date all that I have seen and hear coming from the GGA has been a JOKE!!!	Comment acknowledged.
180	Holly Reimers		2		2-23	2.2.4		With 2021 being one of if not the driest years on record to transfer surface water OUT of the subbasin should be at the very least suspended. To transfer serfice water then pump ground water as a substitute should not be allowed.	Comment acknowledged. Much of the surface water that flows within or through Colusa Subbasin is managed by USBR, a federal agency. Local agencies have little to no power to determine the amount of surface water that is transferred out of the Subbasin.
181	Holly Reimers		2		2-29	2.5.1.2		Chowchilla?????	Comment addressed in the GSP section indicated.

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182	Holly Reimers		3		ALL	ALL		Anyone reading this needs a Masters degree in Geology. Anyone looking for something to put them to sleep at night can try this chapter. Most of what is contained is FAR above most people and especially those here in Northern California. Maybe this chapter is necessary but it is way over the top on so much detail that it loses the normal person. It certainly lost me.	Comment acknowledged. All of the topics are either required by DWR and SGMA or are industry-standard supplemental topics that were deemed to be appropriate for inclusion in this Chapter. The goal of Chapter 3 was to meet DWR/SGMA requirements and provide information to GSAs, residents, and other scientists and engineers that may work on future SGMA-related projects. The Executive Summary contains a simplified version of Chapter 3. Chapter 3 is very technical as it describes the physical, chemical, and climatic history of the area designated as Colusa Subbasin, discusses existing conditions of the subbasin (as of 2020), and introduces future scenario model and water budget calculations based on predictions of future conditions. The techniques and tools to characterize aquifer properties, flow mechanics through a substrate, water budgets, etc. require scientific terminology to accurately convey the necessary information.
183	Holly Reimers		4		ALL	ALL		There is no mention of using those locals that are drillers and or anyone that repairs pump and wells. It should be noted that those working in the "field" just might have a better idea as to what is happening to our groundwater than someone sitting at a computer someplace other then in the field in Glenn County.	Comment acknowledged. Additional testing and local data collection is recommended. Chapters 5, 6, and 7 provide suggestions and recommendations for future technical studies, next steps, water management studies, etc. to reach the sustainability goals.
184	Holly Reimers							After reading through this whole draft. Witch I will have to admit was in many places very boring, I see no offers of solutions. Lots of "we will Keep looking at it" but nothing to address what some are saying is a major overdraft of our ground water. Domestic and stock wells are having to be lowered or are running out of water. The word on the street is that the ground water is dropping by over 1' per year and that was BEFORE the current very dry year. To me this is nothing more than a "make someone feel good" and a waste of time and energy of some that are well meaning but this is NOT getting the job done.	Comment acknowledged. The "we will look into it" is primarily due to lack of available information regarding groundwater flow mechanics. Additional testing and local data collection is recommended. Chapters 5, 6, and 7 provide suggestions and recommendations for future technical studies, next steps, water management studies, etc. to reach the sustainability goals.
185	Jim Wallace		3		3-86	Table 3-10		The table lists diversions only from Stony Creek (SC) and the Sac River (SR), and not the CBD.	Comment acknowledged. The table represents a boundary budget for the Subbasin, so only diversions from boundary waterways outside the Subbasin are reported separately (please refer to the table footnote (a)). In an effort to simplify the number of flow paths shown, inflows to the Colusa Basin Drain are included as part of the total "Sacramento River Inflows." A footnote clarifying this has been added to the table (please refer to table footnote (c)). Diversions from the Colusa Basin Drain are internal to the Subbasin, and are thus not shown in this table.
186	Brooke Davis		6	6.2	5	1	Summary of all PMAs	It is clear what Direct Groundwater recharge is, but not clear what In-Lieu Groundwater recharge is to someone not familiar with it. Is it meaning there is recharge happening simply because there is less ground water used?	Comment addressed. Clarification has been added to Section 6.2 to describe all project types. "In-lieu groundwater recharge" refers to projects that offset groundwater pumping by supplying or otherwise incentivizing use of surface water or other water supplies instead.

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187	Ben King		5.3.1.3		5-6			Last paragraph should include impact of SWRCB water curtailments to TC Contractors. The example just refers to Federal curtailments. Comment should also highlight the fact that TC Member groundwater pumpers will have no alternative but to pump groundwater during curtailments because they need to irrigate their permanent plantings.	Comment addressed. The text in Section 5.3.1.1 has been revised to note that both "federal and state water allocation policies," among other factors, could potentially lead to reductions in available surface water supplies.
188	Ben King		5	5.3.1.4				Comment should address the dewatering of small water systems and domestic wells and the impact on DAC and SDAC households in the affected areas. This is not a hypothetical issue – domestic wells in College City and Arbuckle have run dry. This should be highlighted in the GSP.	Comment addressed. We have added a preface to the GSP to acknowledge the current drought conditions and summarize what is known at this time about the severity of well dewatering experienced by water users, including domestic well users and DAC/SDAC/EDA households. Notably, the majority of the populace in the Colusa Subbasin is classified as a DAC, SDAC, or EDA - just as impacts to groundwater conditions affect these communities, ongoing outreach and implementation of the GSP and PMAs will also benefit them. It is noted that ongoing management of the Colusa Subbasin under the GSP will follow an "adaptive management" strategy that involves active monitoring of Subbasin conditions and addressing any challenges related to maintaining groundwater sustainability by scaling and implementing PMAs in a targeted and proportional manner in accordance with the needs of the Subbasin. Annual reports provide an opportunity each year to evaluate current Subbasin conditions and assess needs for further PMAs. During periodic evaluations, the GSP will be reviewed and revised, as needed, as we learn more about the effects of current and future conditions. At this time, prior to completion and adoption of the GSP, drought response efforts in the Subbasin are the responsibility of the counties, cities, and other local agencies. Counties are currently leading a number of efforts to document and address dewatered wells, including putting programs in place to bring water to those users whose wells are dry. Following adoption of the GSP, those responsibilities may shift to or be coordinated with the GSAs. A strategy for guiding potential coordination between the GSAs, counties, cities, and other local agencies is described in Ch 7. Coordination would ensure preservation of public health and safety (purview of counties/cities) and groundwater sustainability (purview of GSAs).
189	Ben King		5	5.3.1.5				Discussion should include the impact on small water systems and domestic wells. The number of reported domestic wells should be recorded and highlighted. It is my understanding that over 19 domestic wells have already ran dry. The impact on households in SDAC and DAC areas should be highlighted.	Please see the response to comment 188.

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190	Ben King		5	5.3.4.1	5-10			Discussion of the role of the USEPA should be included. The USEPA has cited the small water systems of Grimes and Princeton for arsenic contamination. It is very important that that the discussion includes the degradation of fresh water aquifers caused by upwelling of poor quality water. There is a possibility that over pumping could cause or exasperate this undesired outcome.	Comment addressed. The California Safe Drinking Water Act addresses the regulation and control of public water systems in the State of California, including enforcing provisions of the federal Safe Drinking Water Act. The federal government first granted primary enforcement responsibility to the State in 1978. The State Water Resources Control Board Division of Drinking Water (DDW) is the agency responsible for enforcement in Colusa and Glenn Counties, including the entire Colusa Subbasin. Chapter 5 has been revised to clarify the state and federal regulatory relationship. Grimes and Princeton have had violations of the 10-microgram per liter Primary Maximum Contaminant Level (MCL), which is both the State of California and federal standard. Chapter 3 has been revised to include discussion of arsenic in Grimes and Princeton.
191	Ben King		5	3.4.2	5-11			Impact on SDAC and DAC areas should be identified and discussed by the GSA. Water quality of monitoring wells with multi-completion stages should be documented for each depth stage to identify degraded fresh water aquifers caused by upwelling. We should avoid water quality monitoring cherry picking and record the data for all depth stages and monitor trends over time to identify possible upwelling.	Comment addressed. Chapter 2 has been revised to include discussion and mapping of Disadvantaged Communities (DAC) and Severely Disadvantaged Communities (SDAC). We concur that multiple completion wells should be used for monitoring EC trends when such wells are available. Monitoring and reporting of EC for all completions in multiple completion wells should be included in the monitoring for potential upwelling of brackish or saline water. New monitoring wells used for monitoring upwelling should be multiple completions when feasible.
192	Ben King		5	3.4.3	5-11			If Sites is constructed, water quality may be adversely impacted by the elevation gradient between the elevation of sites and the bowels of wells on the valley flow. This gradient could be 600 to 900 feet of elevation head and may take decades to document. Especially around the Sutter Buttes Rampart we need to monitor for potential effects of a redox reaction when connate water upwells and starts an oxidation process. Arsenic desorption is a predicted outcome when the pH of the connate water is greater than 8. There are also potential biotic outcomes again arsenic related when connate salt water starts the oxidation process. Certain anoxic microbes may add to the arsenic contamination similar to the cause of arsenic contamination in Chesapeake Bay. Earthquake activity could also affect the movement of upwelled contaminants. The west side of the valley has a history of geothermal conditions which could be impacted by earthquakes and earthquakes could also be a catalyst for upwelling via active faults.	Comment acknowledged. The stage of Sites Reservoir will be higher than the intakes of wells in the Colusa Subbasin, and an elevation gradient will exist between the reservoir stage and groundwater levels in wells in the Colusa Subbasin. The reservoir is located in the Coast Range adjacent to the groundwater subbasin. Most of the reservoir will be separated from the Subbasin by at least two miles of Coast Range rocks. Seepage from the reservoir to the groundwater subbasin is expected to be very low because of the low permeability of the Coast Range rocks. Because seepage rates are anticipated to be very low, no significant impact to the pH of groundwater in the subbasin is expected. As documented in Chapter 3, arsenic concentrations are known to be elevated in the vicinity of the Sutter Buttes. The elevated arsenic concentrations are a consequence of the geologic materials comprising the aquifer and the geochemistry of the aquifer and groundwater. The geology and current groundwater geochemistry, along with geothermal activity, earthquake activity and the potential for movement of connate water constitute the existing conditions in the Subbasin.

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193	Ben King		5	3.4.4.	5-12			How about birth defects, mother health and other arsenic contamination related outcomes Rather than adverse effect to property values – loss homeowner values and loss of housing if a domestic well becomes contaminated.	Comment addressed. Section 5.3.4.4 has been revised to reference public health concerns as "Potential Effects of Undesirable Results" associated with degraded water quality.
194	Ben King		5	3.4.5	5.12			USEPA and SWRCB Citations should be evaluated.	Comment addressed. Chapter 3 has been revised to provide additional information on exceedances of drinking water standards. Please see also the responses to comments 190 and 193.
195	Ben King		5	4.1	5-16			The stakeholder input regarding the 80 pct level should be documented and recorded for future public comment. As you may know there has been over 20 domestic wells reported dry with several in the College City area. The domestic well threshold should be an area of future discussion and stakeholder input as the drought progresses. The advocates of the 80 pct threshold should be documented and disclosed and the issue of domestic wells should have a future public discourse. Was there a GSA vote on the 80 percent level?	Comment acknowledged. The SMC were presented to the public and discussed at Joint TAC meetings. Joint TAC meetings were held approximately monthly, with a total of 13 meetings held between May 8, 2020, and June 11, 2021. SMC were addressed at nine of the 13 meetings, and at all seven meetings held between January 8, 2021, and June 11, 2021. TAC members engaged in a very thorough, thoughtful, and constructive manner, giving consideration to all interests in the Subbasin involved with or affected by groundwater use and management. SMC were ultimately vetted and approved by both the CGA and GGA Boards at open Board meetings. Public notice was given in advance of those meetings. The decision records for the SMC are documented in Appendix 5A, and referenced in Section 5.3 of the GSP.
196	Ben King		5	5.4.1.1.1				The adverse degradation from the redox process for connate salt water will most likely be permanent. Significant lowering of groundwater near Grimes and the East Side of the Sacramento River could be the most vulnerable are for redox and potential adverse biotic outcomes. On the west side where there is natural geothermal pressures the lowering of groundwater levels could affect the hydrologic balance of groundwater and result in more upwelling. Again another reason to measure all water quality at all observable depths.	Comment acknowledged. Please see responses to comments 192 and 234.
197	Ben King		5	5.4.4.1				There should be a Minimum Threshold for Arsenic Contamination. There are two small water supply systems in Colusa County with USEPA Citations, two abandoned wells at the southern part of the City of Colusa and a reported observation of 200 ug/L near Grimes. Trends in arsenic contamination should be monitored over time due to the potential for continued redox of connate salt water and potential movement via faults which could be adversely aggravated by future tectonic activity.	Comment acknowledged. Please see responses to comments 190, 192, 193, 194 and 234.

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198	Ben King		5	5.4.4.2				The Measurable Objective for arsenic should be the USEPA MCL of 10 ug/L	Comment acknowledged. Please see responses to comments 190, 192, 193, and 194. The State Water Resources Control Board Division of Drinking Water (DDW) requires drinking water service providers to issue Consumer Confidence Reports (CCRs) to the public on an annual basis. The CCRs must report on detected contaminants on state and federal lists and contaminants exceeding their California Public Health Goals (PHGs) and Primary and Secondary Maximum Contaminant Levels (MCLs). PHGs are non-enforceable goals established by the California EPA's Office of Environmental Health Hazard Assessment (OEHHA). The law requires that where OEHHA has not adopted a PHG for a constituent, the water service providers are to use the federal Maximum Contaminant Level Goal (MCLG). PHGs and MCLGs are health-based standards, which are typically much lower than MCLs. For example, the California PHG and MCL for arsenic are 0.004 micrograms per liter (µg/L) and 10 µg/L, respectively. The regulations also require water service providers to include specific language on the health effects of arsenic in the CCRs if the arsenic concentration is above 5 µg/L, but below or equal to 10 µg/L. Violations must be documented, including an explanation of the violation including, duration of the violation, potential adverse health effects, and actions taken to address the violation. DDW may refer enforcement to the United States Environmental Protection Agency.
199	Ben King		5	5.4.4.4				The Interim Milestone discussion should include the GSA's role in working with the State of California to guarantee the Human Right to Fresh Water to the residents of the Colusa Subbasin. The State has the responsibility to uphold this Human Right and the GSA will likely have to work with the State on targeted solutions or mitigation efforts.	Comment addressed. A specific reference to the Human Right to Fresh Water is now added to Section 5.4.4.4. Additional discussion of the Human Right to Water and its relationship to the GSAs and the GSP is provided in Chapter 2.

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200	Ben King		Appendix 6A		1			The potential for In-Lieu Recharge within the service are of the Tehama-Colusa Canal needs to be evaluated on a month by month or week by week basis and at incremental delivery points on the Canal itself. The physical capacity of the Canal and the physical limitations of all the component irrigation systems that use delivered water will constrain the potential for In-Lieu Recharge. Additionally, there is no discussion about how the use of the Canal for groundwater conveyance under the Warren Act. To the extent the Canal infrastructure is used to store groundwater or convey groundwater from one irrigation system to another (potentially against the flow of the Canal) the potential for the use of In-Lieu deliveries will be constrained.	Comment acknowledged and addressed. Considering historical canal operations, Jeffrey Sutton (General Manager, Tehama-Colusa Canal Authority) has expressed his (caveated) opinion that it is likely that conveyance capacity is available to facilitate the in-lieu projects proposed, subject to certain conditions. The exact communication with Jeffrey Sutton is included in a new attachment to Appendix 6A, and footnoted on the reference to the TCC. A monthly, weekly, or daily operations model of the TCC was not readily available, and creation of such was not in the scope or budget for GSP development work at this time.
201	Ben King		Appendix 6A					It was not clear from the analysis if any of these constraints were considered or analyzed in the potential for the target In-Lieu deliveries. Additional constraints may be relevant once the seasonality of water demand is considered and whether or not the cumulative capacity of the connected irrigation systems is considered since it is likely that both groundwater and surface water would be a required supply during peak ET demand periods.	Please see the response to comment 200.
202	Ben King		Appendix 6A					Is there a model for monthly or weekly water availability at the various delivery points down the Canal infrastructure and monthly or weekly cumulative ET demand for the service area as the water flows southward. Currently water available for the CCWD has to traverse all the northern user service areas and also be of sufficient supplies to meet the needs of Dunnigan Irrigation District. If Sites is constructed, the water flows across both CCWD and DID service area will have be of sufficient volume to meet the delivery needs of the TC – Colusa Basin Drain interconnect pipeline.	Please see the response to comment 200.

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203	Ben King		Appendix 6B	Introduction				These demand actions are not "backstops" and should not be implemented without full and transparent support the Cities of Colusa, Williams, Willows and Orland and the Board of Supervisors of Glenn and Colusa Counties. If there is a need to implement this type of action it should be done by a member irrigation company and fully paid by the local irrigation company since there are substantial property rights at issue. Rather than a "back stop" the proposed demand actions should be considered the last and least desired option and should only be done extensive public discourse and public meetings. . As discussed on Page 10, any such Demand Action "..should include consideration of legal, economic, engineering, hydrogeologic, and political considerations".	Comment acknowledged. The demand management action is described as a backstop option because it is viewed as an option that would be considered after other available options. This is stated in the second paragraph of Section 6.5.2.3. As summarized in Table 6-47 of the same section, the management action would be considered in consultation with stakeholders and all local governing agencies, including the GSAs.
204	Ben King			Sponsor				There should be a sponsor disclosed for the two proposed demand actions. Grant Davies mentioned that Mary Fahey and Lisa Hunter were the sponsors which is obviously not correct because they are County Employees.	Comment acknowledged. It was the decision of the CGA and GGA to include demand management in the list of potential PMAs. The CGA and GGA are listed as the proponents of these management actions in Table 6-2. The responsibility for implementing specific components of demand management would depend on the precise action selected. However, we reiterate that demand management is viewed as an option that would be considered after other available options (per Section 6.5.2.3).

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205	Ben King						Table 1	What Does Rice Milling encompass? There are Tree Nut Farming and a Vegetable and Melon Farming, Grain Farming but no Rice Farming. Is Rice Farming part of Rice Milling or Grain Farming. Rice farming and related local jobs should be identified separately since some rice farmers already fallow ground as necessary for organic rice production and/or sell surface water. The data seems to be from 2014 and only one year which happens to be a drought year. Since it is 7 year old data if could be irrelevant and/or unrepresentative because it reflects the economic impact of the last drought. Has this data been assessed against more recent year's data? What kind of volatility is there in the IMPLAN data set? There should be more recent data presented and presented over a multiple year period. It is interesting to note that 3750 or approx. 31% of the 12,255 FTE jobs are local government. The dependent economic relationship between local government jobs and the local economy should be discussed and analyzed. Fallowed land and out of basin water sales and transfers take away local jobs and dimmish the tax base necessary for local government jobs. There is no discussion about seasonal employment and the positive add on revenue derived from unemployment benefits, fringe benefits and retirement/government payments that come with seasonal employment. Many seasonal employees are women and mothers of low to middle income household units that depend on the marginal income, unemployment insurance and other government payments that comes with seasonal employment. This is a critical and necessary component for any economic costs benefit analysis for a program that will lead to fallowing farmable acreage	Comment acknowledged and addressed. IMPLAN sectors for the economy are based on an aggregation of North American Industry Classification System (NAICS) codes. Rice milling includes NAICS 311212. This includes a number of businesses related to the milling of rice. It does not include rice farming. Rice farming is under the Grain Farming IMPLAN model sector. This includes NAICS 111130, 111140, 111150, 111160, 111191, and 111199. It includes rice in addition to other grains. All values shown in the GSP represent current dollars, not 2014 dollars. The 2014 IMPLAN "multipliers" are used to calculate the total value of the industry based on current industry values. Multipliers capture the relationship between a dollar spent in different sectors of the economy. This relationship is generally stable over time. The results of the analysis are sensitive to changes in the value of the crops produced over time, and less so to the use of base IMPLAN data for industry multipliers. Therefore, the values as reported in the GSP reflect current conditions. Comments regarding the number of jobs and different types of employment are noted and would be considered in a benefit-cost assessment. The purpose of the analysis summarized in Table 1, as described in that section, is to demonstrate the economic contribution of agriculture to Colusa/Glenn counties. It is summarizing the value of the current industry. It is not a benefit-cost analysis of a specific or hypothetical demand management program. That would require a different analysis framework that was not developed here. It may be appropriate to develop additional analysis under future GSP implementation that would include these considerations. A sentence was added to clarify that "This section describes the current contribution of agriculture to the Colusa Subbasin economies."

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206	Ben King				3	Demand Management Costs		There is no reason to assume that Net Groundwater Pumping reduction assumed would actually provide a physical benefit to the stressed aquafers in the Colusa Subbasin. This type of program may work within irrigation districts but it needs to be applied within the sphere of adjacent wells or at least within an irrigation system. Paying a rice farmer not to plant a rice field near Grimes is not going to mitigate the pumping depletion caused by pumping groundwater to irrigate a tomato field on the west side of I-5. Perhaps this will with the accounting of a water budget but in reality do nothing to mitigate the short term or long term impact of dropping water levels in stressed parts of the aquifers. The most likely outcome of this type of Demand Action would be to pit certain ag industry vs ag industry. Many tomato farmers are tenant farmers who make substantial investment in buried drip lines. Many rice farmers are settlement contractors who can make money selling water especially during critically dry years and some of which are organic rice farmers who need to idle production fields for a growing season and who would have great incentive to idle and receive payment.	Comment acknowledged. The hydrogeologic conditions of the Subbasin affect outcomes for PMAs in different parts of the Subbasin. These would be assessed as part of PMA implementation. As described under Section 6.5.2.4, a demand management program could be targeted to specific areas within the Subbasin. Similarly, other PMAs would be targeted to areas of need so that specific benefits occur in these regions. Broader benefits would accrue to the entire subbasin because the subbasin is viewed as a single unit for groundwater sustainability.

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207	Ben King						Figure 3	There is no transparency regarding the methodology, source or assumptions made for the water costs presented.	Comment acknowledged and addressed. The method is briefly summarized on Pages 4 and 5, prior to Figure 2. The section title on Page 4 was changed to "Methods." The paragraphs within that section were edited and two technical references were added. The figure formatting was also corrected so that figures are referenced within the correct sections. The revised paragraphs are: "An economic model of the Colusa Subbasin was applied to evaluate the supply and demand for water and establish the cost of demand management. It reflects the local water supplies and uses, financial data on returns to farming, and current crop market conditions for Sacramento Valley crops. This includes current crop prices and yields. Production costs are representative averages based on University of California Cooperative Extension crop budgets. It The model is calibrated to the GSP water budget (applied water and evapotranspiration of applied water) and geospatial land use data described in Chapter 3 of the GSP. A technical description of the economic calibration method is beyond the scope of this technical appendix. The method applied is a standard, peer-reviewed economic analysis approach that is widely applied for valuation of water supply and water supply projects in California [refs footnote]. This same technical approach was applied for calibration of an economic optimization model of the Colusa Subbasin. The model quantifies the effect of changes in water supply availability and cost on farm income (e.g., net income and gross farm revenues) and simulates how the agricultural sector would respond to changes in water availability and cost. Responses include switching to higher value and/or lower water use crops, adjusting input use, and idling land. The decision to switch crops and/or idle land depends on agricultural market conditions simulated by the model under increasing levels of a range of (hypothetical) demand management. The economic analysis quantifies the direct economic cost of changing crops and idling land under implementation of demand reduction. For this technical appendix, costs are expressed on a per acre-foot basis for comparability to other PMAs in the GSP. " References added to the footnotes include: Department of Water Resources. Water Plan Update. 2009. Data and Tools Technical Appendix. Economic Modeling of Agriculture and Water in California using the Statewide Agricultural Production Model. U.S. Bureau of Reclamation. 2019. CVP Long Term Operations EIS. Appendix 12A: Statewide Agricultural Production Model (SWAP) Documentation.

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208	Ben King				8			It is true that a specific allocation " would require careful analysis of the legal, hydrogeologic, economic and engineering implications, and would require vigorous and informed discussion with stakeholders." The Colusa Subbasin stakeholders should first have the opportunity to be informed and then have the vigorous discussion before considering these Demand Actions.	Comment acknowledged. Demand management is a backstop to other PMAs that would only be implemented if determined necessary after analysis of legal, hydrogeologic, economic and engineering implications, and would require vigorous and informed discussion with stakeholders.
209	Ben King				11			The following statemen as it applies to California is false : " Most GSA's in the state….use.. wellhead meters , to track and enforce allocations." Is it really true that the use of crop type and/or ET calculations are less common than wellhead metering. The DWR has spent extensive resources with the LandIQ crop mapping and many water budgets and irrigation systems are built on CIMIS ET Data and crop coefficients. Ultimately drip lines only have so much capacity so a lot can be done without metering especially when there is only one source of irrigation water. Metering for private pumpers with only source of water would seem like an unnecessary burden and regulatory overreach.	Comment acknowledged and addressed. The full statement reads "Most GSAs in the state and groundwater management entities outside the state use some form of measurement, usually wellhead meters, to track and enforce allocations. There are also examples of allocations that use crop type and/or ET calculations to estimate water use and groundwater pumping, but this approach is less common. Estimation versus measurement is a GSA policy decision that can have important effects on the cost and its ability to manage the allocation effectively." The meaning was not to imply all GSAs use meters. Edited for additional clarity as follows: "Most groundwater management entities outside the state use some form of measurement, including wellhead metering, to track allocations. In California, many GSAs are proposing or considering direct measurement or using crop type and/or ET calculations to estimate water use and groundwater pumping. Estimation versus measurement is a GSA policy decision that can have important effects on the cost and its ability to manage the allocation effectively."
210	Ben King				11			Secondary economic impacts SHOULD be considered BEFORE "future iterations" and more importantly any further consideration of the implantation or adoption of the Demand Management PMAs proposed in this Appendix.	Comment addressed. The text has been revised to indicate that these impacts "should be considered" in future iterations of this analysis.
211	Ben King		Appendix 6D					Please consider my comments from Appendix 6A regarding the assumptions for Modeling Parameters as it relates to projects relying on surface water deliveries from the Tehama - Colusa Canal and Colusa County Water District in particular.	Please see the response to comment 200.

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212	Holly Dawley	GCID	5	5.1	5 1	N/A		The Sustainability Terminology could use some context. It might be helpful at the end of 5.1 before 5.1.1 to reiterate what the MTs and MOs are and how they relate.	Comment addressed. Additional clarification of terminology has been added to Section 5.1.
213	Holly Dawley	GCID	5	5.1.1	5 2	2nd bullet list		Would be helpful to carry symbols through to the bullet list indicating the five sustainability indicators that are relevant to the GSP	Comment addressed. Symbols have been added to the bullet list in Section 5.1.1.
214	Holly Dawley	GCID	5	5.1	Not specific			Since it has come up, it might be helpful to address that there is a layer of Ancient Seawater but why that does not trigger the indicator.	Comment acknowledged. Connate water and the base of the freshwater are discussed in Chapter 3 of the GSP.
215	Holly Dawley	GCID	5	5.1	5 2	1st after 2 bullet lists		Suggest add sentence after the 1st sentence quickly explaining why those 2 indicators are using proxies.	Comment addressed. A sentence has been added to explain the correlation between groundwater levels and groundwater storage and depletions of interconnected surface water, allowing groundwater levels to serve as a proxy for those sustainability indicators.
216	Holly Dawley	GCID	5	5.2.1	5 3	3rd paragraph		Why are “planned projects” in quotes? This is a title/name not a nickname.	Comment addressed. The quotation marks have been removed.
217	Holly Dawley	GCID	5	5.3.1.1	5 5	2nd		What is “foreseeable?”	Comment addressed. "Foreseeable" has been revised to reference the projected water budget analysis period (2016-2065), both in Section 5.3.1.1 and Section 5.3.2.1.
218	Holly Dawley	GCID	5	5.3.1.3	5 6	Last paragraph in 5.3.1.3		Suggest add “or state” after federal in 1st sentence. Water use in the CVP can be dictated by State, too.	Comment addressed. The text in Section 5.3.1.1 has been revised to note that both "federal and state water allocation policies," among other factors, could potentially lead to reductions in available surface water supplies.
219	Holly Dawley	GCID	5	5.3.4	5 10			Consistency: Add indicator symbols as in other sub-task titles.	Comment addressed in the GSP section indicated.
220	Holly Dawley	GCID	5	5.3.4.1	5 10	3rd paragraph		Suggest clarify “existing regulatory programs.”	Comment addressed. The existing regulatory programs are described in the paragraphs following the referenced paragraph. The following text was added: "The California Safe Drinking Water Act addresses the regulation and control of public water systems in the State of California, including enforcing provisions of the federal Safe Drinking Water Act. The federal government first granted primary enforcement responsibility to the State in 1978. The State Water Resources Control Board Division of Drinking Water (DDW) is the agency responsible for enforcement in Colusa and Glenn Counties, including the entire Colusa Subbasin."

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221	Holly Dawley	GCID	5	Global				Suggest putting together a summary table to show indicators and thresholds and perhaps MOs, MTs for more visual/condensed readers. It's a lot of text with no easy summary or cross walk.	Comment addressed. A table has been added to the beginning of Section 5.4 that summarizes the sustainability thresholds for all applicable sustainability indicators.
222	Holly Dawley	GCID	6	6.1	6 2		Table 6-1	Units need to be better identified	Comment addressed. The units have been clarified (average annual volumes; taf/yr).
223	Holly Dawley	GCID	6	6.1	6 2			Changed storage is so small…it is within the error of the model?	Comment addressed. Yes, the change in groundwater storage (-0.8%) is considered to be within the uncertainty of the groundwater model analysis. Commentary on this has been added to the water budget uncertainty and model uncertainty (Ch. 3 and Appendix 3D), and indicated in a footnote.
224	Holly Dawley	GCID	6		6 7		Table 6-2	GCID In-Basin Project: This is only potentially available in Shasta Non-Critical Years.	Comment addressed. Clarification has been added to Table 6-2 and to the project description in Section 6.4.1.4.
225	Holly Dawley	GCID	6		6 8		Table 6-2	Delevan Pipeline Project. Might need to ground truth with Sites or Bill Vanderwaal. The way it is written up indicates an older understanding of the proposed Delevan	Comment acknowledged. The GSP Technical team will review this information and confirm the current details of the proposed Delevan Pipeline.

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226	Ben King		5A		2	Outreach		Since the majority of the Outreach and Public Involvement Process was done before the severity of the current drought was known the outreach process does not reflect the impact on domestic well users nor does have domestic well users had the opportunity to give their input. The reported number of domestic well problems should be documented and there should be a concerted outreach program to get their input on the Minimum Thresholds and mitigation measures. The GSA has an opportunity to truly understand the impact on domestic wells from lowered groundwater levels and act in a proactive manner to help manage and mitigate adverse outcomes for the future. The current Memorandum does not reflect input from domestic well users.	Comment acknowledged. We have added a preface to the GSP to acknowledge the current drought conditions and summarize what is known at this time about the severity of well dewatering experienced by water users in the Subbasin, including domestic well users. As stated in Appendix 5A, "Members of the public were welcome to attend the Joint TAC and open Board meetings and were encouraged to express their opinions, and suggestions, and comments on the SMCs, as well as other aspects of the GSP. Members of the public attended and participated in most Joint TAC meetings, including those in which SMCs were discussed." It is noted that GSP development has occurred over several years, with continued public outreach and consideration of the most sufficient and credible information and data available for the decisions being made and the time frame available for making those decisions. Ongoing management of the Colusa Subbasin under the GSP will follow an “adaptive management” strategy that involves active monitoring of Subbasin conditions and ongoing public outreach. Data, information, and input from the public will be evaluated, reported, and used to guide GSP implementation. GSP annual reports provide an opportunity each year to check in and evaluate current Subbasin conditions and assess needs for additional PMAs. The first annual report, due April 2022, will evaluate groundwater conditions in the Colusa Subbasin since 2015. During the periodic (five-year) evaluations, the GSP will also be reviewed and revised, as needed, to address new understanding of Subbasin conditions. Please note that Appendix 5A has been changed to Appendix 5B for the final GSP.
227	Ben King		5A			Hydrographs		The hydrograph for 14N02W22A002 does not have any data on the two pages it is presented.	Comment acknowledged. Well 14N02W22A002 is newly constructed and has not yet been monitored. This well is included in the Colusa Subbasin groundwater monitoring network and will be monitored in the future. Please note that Appendix 5A has been changed to Appendix 5B in the final GSP.

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228	Ben King		5B		1			The statement " This appendix describes an economic analysis of MT's that was developed and presented to the TAC at the May 13,2021 Meeting" is false. While it is clear that the economic analysis was included in the presentation there is no indication that the economic analysis was presented or discussed at the meeting. The Minutes of the May 13, 2021 TAC Meeting do not reflect any discussion of the ERA proposal and states on Page 8 of the Minutes in Agenda Item 4.b Projects and Management Actions (PMAs) - " This Agenda item was not discussed during the TAC meeting due to time constraints"	Comment addressed. The presentation was given at the next TAC meeting on June 11, 2021. The text was edited to reflect this date. ERA Economics was asked by the GSAs to develop a description of general demand management programs and prepare economic analysis to illustrate initial concepts for the TAC and public. The demand management program is not a PMA proposal developed by ERA. All PMAs were proposed and defined, and will ultimately be implemented, by the GSAs and stakeholders (which includes the TAC and all local entities). Please note that Appendix 5B has been changed to Appendix 5C in the final GSP.
229	Ben King		5B		2			What are the assumed capital cost for refurbishing potentially dewatered domestic wells? What are the assumptions for energy costs caused by additional pumping? What rate schedule? As you probably are aware there are many critical assumptions depending on season and time of use.	Comment addressed. The following sub-paragraphs have been added to summarize cost assumptions: "1.a.The capital cost of well replacement is set at $40,000 per well based on costs for domestic well replacement used in other GSPs . These costs generally include drilling at $40 per foot, a sanitary seal for a $2,500, and a pump for $5,000. This does not include permit costs. Actual costs will vary based on the costs of materials and supply and demand for well drilling services. " "2.a.Agricultural pumping energy cost depends on lift, pump efficiency, and the power rate which varies by time of use and size of load. For purposes here, the analysis used an average over several 2021 PG&E agricultural power rates to get a total variable pumping cost of about $0.52 per acre-foot per foot of lift." Please note that Appendix 5B has been changed to Appendix 5C for the final GSP.
230	Ben King		5B		4		Figure 2	What does the Table Crop and Acres mean? There is not explanation for the inclusion of this table of the documentation for and reference source.	Comment addressed. The following statement has been added to clarify the acreage shown in the figure: "The irrigated acreage within the Thiessen polygon is also shown in the figure. The mix of crops grown affects the cost of demand management. The example polygon is predominantly planted to permanent crops (almonds and olives), which are costly to idle due to higher net return relative to other annual crops and the substantial capital investment required to establish orchards." Please note that Appendix 5B has been changed to Appendix 5C for the final GSP.

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231	Ben King		5B		2			Why does the economic analysis assume that demand management would be adopted by the GSA? The economic analysis in Chapter 6 appears to be highly speculative and is difficult to assess since the assumptions for the analysis have not been disclosed.	Comment addressed. Appendix 5B uses demand management as an example only, and does not imply it would be implemented. The following sentence was added to make this clearer to the reader: "It is noted that demand management is not a planned PMA in the Colusa Subbasin, and these costs are used as a proxy for the costs of other projects." Two paragraphs were added to the appendix to describe the costs for well drilling and replacement. Please see also the response to comment 229. Please note that Appendix 5B has been changed to Appendix 5C for the final GSP.
232	Ben King		5B		All	General Comment		Regarding the costs of replacing the domestic well it is hard to assess whether or not the analysis is based on representative costs because the assumptions were not disclosed. The analysis seems to make rudimentary assumptions and not real life assumptions. In the crisis of a drought, local drilling capacity and well repair services are very limited and usually focused on serving the biggest and best customers. Domestic well owners are likely to have to wait until the growing season is over and pay for the costs to maintain their personal health and livelihood during the loss of the well. Some domestic well owners may not have access to the capital they need to make the repairs and most would not be able to secure 20 year financing unless they had equity in their houses and could refinance. Having a well run dry and being ablet to get an appraisal for refinancing is probably near impossible and ultimately the loss of a well may mean substantial loss of market value of their house. To make this a meaningful analysis, there is a timely opportunity to contact the County administrators and survey the domestic well users that have lost their wells during the current drought and ask them about direct and consequential economic costs and costs due to loss of income due to their well depletions. There are more than 20 such dry domestic wells in Colusa County alone.	Comment addressed. Two paragraphs were added to clarify the underlying costs applied to the analysis (see response to comment 229). The analysis is developed to support long-run planning for MTs/MOs. The short-run costs listed in the comment are important to consider in severe drought emergencies, such as 2021. The following paragraph was added to the discussion section of the appendix: "The analysis is developed to support long-run planning for setting MTs. PMAs needed to support higher MTs require time to develop and implement and cannot be implemented rapidly in response to severe, unprecedented drought. The short-run costs of wells running dry during severe drought events can include other cost factors that were not explicitly analyzed. For example, in the crisis of a severe drought, local drilling capacity and well repair services can be limited, which can result in higher cost or increased wait times. This can place additional financial stress on households with domestic wells." An expanded analysis working with local well drillers and other parties in the county could be considered as part of GSP implementation. The additional costs of domestic well replacement during a drought emergency are noted.

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233	Ben King		5C	General				Arsenic levels should be included for Grimes and Princeton since the USEPA has continuously reported that observed levels are above the USEPA MCL. Arsenic should also be reported for all the wells for the Colusa Supply system since there has been the Del Oro Walnut Ranch well abandonment and the CIP enforcement action. Also the well near Grimes with the 200 ug/L observation should be included and reported for each observable depth if it is a multi-completion well.	Comment acknowledged and addressed. Public drinking water systems in the Colusa Subbasin are regulated by the State Water Resources Control Board Division of Drinking Water (DDW), and the regulated public systems have the responsibility for monitoring and reporting on drinking water quality for regulated constituents and unregulated constituents requiring monitoring and reporting. As described in Chapter 5, the GSAs will coordinate with the public systems to address water quality issues in the basin but are focusing GSP monitoring efforts on upwelling of brackish or saline water, which is not explicitly addressed under other existing monitoring and reporting programs. Chapter 3 has been revised to include additional discussion of arsenic impairments in the subbasin. The appendix has been updated to include EC plots for Grimes and Princeton. Please note that Appendix 5C has been changed to Appendix 5D for the final GSP.
234	Ben King		5C	General				All of the reported locations should have EC observations for each observable stage if any of the reported locations are multi-completion wells. The new well drilled by the County of Darrin Williams property should be included in the appendix and water quality observations should be tracked for each observable depth. Mr. Williams reported upwelling near the 1000 foot depth and the water quality from the upwelling aquifer should be observed and tracked.	Comment acknowledged. We concur that multiple completion wells should be used for monitoring EC trends when such wells are available. Monitoring and reporting of EC for all completions in multiple completion wells should be included in the monitoring for potential upwelling of brackish or saline water. New monitoring wells used for monitoring upwelling should be multiple completions when feasible. Please note that Appendix 5C has been changed to Appendix 5D for the final GSP.
235	Ben King		5C	General				Overall the Appendix needs to incorporate the wells discussed in Section 3.2.5.11. There is a multicompletion well near Maxwell with 4 stages and TDS levels as high as 1640 mg/L. There is a shallow well west of Grimes with a measurement of 2,040 mg/L. Wells near College City with TDS concentrations greater than 1000 should be of immediate concern since domestic wells are running dry and bowls are being lowered. Where are the measurements for the shallow wells west of Colusa with TDS levels greater than 2000 mg/L.	Comment acknowledged. The appendix provides EC plots for the subset of wells comprising the water quality representative monitoring network. Other water quality monitoring wells exist in the Subbasin. The historical water quality results are discussed in Chapter 3, and water quality results from existing wells and monitoring programs will be evaluated by the GSAs in coordination with the regulated entities during implementation of the GSP. Please note that Appendix 5C has been changed to Appendix 5D for the final GSP.
236	Ben King		5C	General				Generally we should have up to date observations for all reported wells. The data for the Maxwell public supply system ends before 2013. The data for the Princeton public supply system ends before 2014 Arbuckle only has 3 observations ending in 2016. Since the Williams supply system has elevated EC levels, all the supply wells for Williams should be reported so as to avoid cherry picking and also to monitor any adverse trends.	Comment acknowledged. Some of the drinking water compliance sampling is conducted on a two to three year cycle for a given well. The data presented is the latest data available through the State Water Resources Control Board Division of Drinking Water (DDW), as of June 29, 2021. The data, as available from DDW, will be updated annually during implementation of the GSP. Please note that Appendix 5C has been changed to Appendix 5D for the final GSP.
237	Mary Fahey	Colusa County/CGA	5	Intro	5 - 1	1		Second sentence, instead of “Colusa GSAs”, please use either “Colusa Subbasin GSAs” or “Colusa Groundwater Authority and Glenn Groundwater Authority”	Comment addressed. The text has been revised to "Colusa Groundwater Authority and Glenn Groundwater Authority."
238	Mary Fahey	Colusa County/CGA	5	5.3.1.3	5 - 6	3		Type-o, line 3, pumping would have to increase…	Comment addressed. The text has been corrected.
239	Mary Fahey	Colusa County/CGA	5	5.3.4.1	5 - 11	1,2nd bullet		Type-o, increase in the number of...	Comment addressed. The text has been corrected.

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240	Mary Fahey	Colusa County/CGA	5	5.4.1	5 - 16	1		Is "Section 0" correct?	Comment addressed. The text has been corrected.
241	Mary Fahey	Colusa County/CGA	5	5.4.7	5 - 33	5		Type-o, Stony Creek	Comment addressed. The text has been corrected.
242	Mary Fahey	Colusa County/CGA	5	5.4.7	5 - 32			If you feel it's appropriate, this is a good opportunity to mention here that the CGA, GGA and neighboring GSAs have been coordinating throughout GSP development and will continue to coordinate and share technical data during GSP implementation.	Comment addressed. This point has been added to Section 5.4.7 with reference to additional coordination activities described in Chapter 7.
243	Mary Fahey	Colusa County/CGA	Appx 5A		2	1-3		It should be noted that the SMC were also vetted and approved by both the CGA and GGA Boards at open, publicly noticed meetings.	Comment addressed. The text has been revised to note this. The SMC decision records have also been added as a new appendix to Chapter 5 (Appendix 5A).
244	Mary Fahey	Colusa County/CGA	Appx 5A		2	3		Members of the public were welcome to attend all of these meetings and were encouraged to express their opinions and suggestions. There was very good stakeholder attendance and participation at these meetings.	Comment addressed. Clarification has been added to reinforce this.
245	Mary Fahey	Colusa County/CGA	6	Section 6 -1	6-4			2nd bullet: Suggest removing the second sentence regarding demand management. This type of PMA is a last resort and should not be highlighted.	Comment addressed. This reference to demand management has been removed.
246	Mary Fahey	Colusa County/CGA	6		6-6		Table 6-2	First project: Colusa Subbasin Multi-Benefit Groundwater Recharge (TNC). This project concludes in the spring of 2021, not 2020.	Comment addressed. The text has been corrected.
247	Mary Fahey	Colusa County/CGA	6	6.3.3.1	6-29			Add a program benefit – Groundwater conditions (via groundwater Recharge)	Comment addressed. This benefit has been added.
248	Mary Fahey	Colusa County/CGA	6	6.3.3.1	6-29			Pilot program concludes in 2021. The program evaluated flooding that would provide habitat benefits for migrating shorebirds, and groundwater recharge. Both (habitat and recharge) are equal goals of the project.	Comment addressed. The text has been revised to clarify these equal goals.
249	Mary Fahey	Colusa County/CGA	6	6.3.3.1	6-30			While the current project is limited to SDAC communities due to grant funding requirements, ongoing, the project would not be limited to benefitting water levels in DACs.	Comment addressed. Clarification has been added to not that other communities may also benefit depending on where the project is implemented.
250	Mary Fahey	Colusa County/CGA	6	6.3.3.2	6-32			Pilot program runs from 2018-2021. Also update dates in Table 6-13.	Comment addressed. The text has been corrected.
251	Mary Fahey	Colusa County/CGA	6	6.3.3.4	6-32			Depending on the farm, there may be installation of monitoring equipment required (flow meters, groundwater level monitoring devices)	Comment addressed. The text has been revised and additional context has been given for potential infrastructure/equipment needs, depending on the field.
252	Mary Fahey	Colusa County/CGA	6	6.3.3.6	6-32			Program completed in 2021	Comment addressed. The text has been corrected.
253	Mary Fahey	Colusa County/CGA	6	6.3.3.6	6-33			Last three bullets should be indented further	Comment addressed. The text has been corrected.
254	Mary Fahey	Colusa County/CGA	6	6.3.3.7	6-33			Could the CGA and GGA also serve permitting roles?	Comment addressed. The CGA and GGA have been added to the list of agencies with potential permitting roles.
255	Mary Fahey	Colusa County/CGA	6	General				General comment – excellent work on this chapter. This is a great set of tools that the GSAs can pull from as they implement SGMA in the Colusa Subbasin.	Comment acknowledged.
256	Zac Dickens	GCID	6	6.2	pg 6-11	N/A	6 - 3	For chapter consistency, in the "Planned" section on the "In-lieu Groundwater Recharge" row, please move "GCID In-lieu Groundwater Recharge" to the "Potential" section on the "In-leu Groundwater Recharge" row.	Comment addressed. The text has been corrected.

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257	Zac Dickens	GCID	6 and associated appendix items	Through out				Minor formatting request. Please use Word's find and replace for all instances of "Glenn Colusa Irrigation District" and substitute with "Glenn-Colusa Irrigation District".	Comment addressed in the GSP section indicated.
258	Holly Reimers	West Side Landowner	6	Section 6.1,	Page 6-3			It should be noted that in the past 15 to 20 years the number of orchards has greatly increased while the number of flood irrigated acres had been greatly reduced. Flood irrigation aids in the recharging of the ground water. The number of acres that has been moved from flood irrigation to drip irrigation is quite substantial with the overall drop of the ground water levels. I have seen this personally when my neighbor changed his irrigated pastures to trees and drip irrigation. On property I own to the East of his now drip irrigated fields the old Oak trees started to suffer then die. These trees were in some cases well over 300 years old but had grown accustomed to the supply of water from the surface. When this water was reduced or eliminated they were unable to survive. Also the water level of my domestic well to the East dropped.	Comment addressed. A sentence has been added to Section 6.1 to acknowledge the shift in irrigation practices.
259	Holly Reimers	West Side Landowner		Section 6.2	Page 6-8			Orland Unit Water Users Flood Water Conveyance. I would note that the conveyance is already in place to be able to run any flood waters from the South Canal into the "Low Line Ditch" then into Hambright Creek, just North of the Graves Cemetery. There is also the option to flood acres at the Black Butte Ranch to provide for additional groundwater recharge. Being on the upper end of the water recharge system it has been noted that when there is no surface irrigation waters applied to the grounds at the Black Butte Ranch the ground water levels in the areas to the East start to drop.	Comment addressed. These details have been added to the project description in Section 6.5.1.5 as an example of potential project configurations.
260	Holly Reimers	West Side Landowner			Page 6-9		Table 6-2	There is no mention of Walker Creek of Hambright. Both of these creeks help in the ground water recharge.	Comment addressed. Section 6.5.1.2 has been revised to acknowledge the potential recharge benefits and opportunities along other streams and creeks, including Walker Creek and Hambright Creek. However, it is noted that the westside streams diversion project analysis was confined to the six streams listed because of the availability of monthly flow estimates.
261	Holly Reimers	West Side Landowner			Page 6-10		Table 6-2	OH one of my favorite points. Invasive species and the Eradication of such!! Arundo & Tamarisk, also known as Bamboo and Salt Cedar. Non-native and VERY invasive. Stony Creek has the largest overgrown population of Bamboo in the WHOLE state of California. I'm not sure that the Salt Cedar has been inventoried but it is just as invasive and a major user of ground/surface water. To anyone that is worried about the "riparian" habitat I would suggest they take a drive up 1-5 or drive Hwy. 32 between Orland and Chico. It takes water to make "riparian" habitat at this time there is NO WATER. **These no-native invasive plants need to be destroyed and eradicated.**	Comment acknowledged.

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262	Holly Reimers	West Side Landowner		Section 6.3.2.10			Table 6-11	Why is there even a conversation about water transfers. Especially when that water could be used to recharge our deleted groundwater basin? When there is conversations about putting meters on wells why would water be transferred out of the basin?	Comment acknowledged. Table 6-11 establishes the cost of within basin transfers and is used to support the Planned PMA cost estimates. No water transfers outside of the basin are considered or included in this GSP.
263	Holly Reimers	West Side Landowner		Section 6.5.1.2			Figure 6-10	Should also list Hambright Creek and Walker Creek	Please see the response to comment 260.
264	Holly Reimers	West Side Landowner		Section 6.5.1.5	Page 6-69		Table 6-33	Cost: There should be little cost to this as the conveyance system is already in place the proper gates just need to be opened.	Comment acknowledged. The anticipated costs of this project have yet to be determined and would be reported in GSP annual reports and five-year updates when known
265	Emily Reinhart	Davis Ranches/Sycamore Mutual Water Company	6	5.1.7	6-70	1 (above Table 6-35)		Question: What do you mean by "newly formed water storage district"? We are already within an existing water district (Sycamore Mutual Water Company). Davis Ranches is the participating Landowner within the district that will be hosting the recharge site.	Comment addressed. The text has been revised to correct these details.
266	Emily Reinhart	Davis Ranches/Sycamore Mutual Water Company	6	5.1.7	6-70	1 (above Table 6-35)		Water would be sources from Sacramento River during high flows in the system. Currently, Sycamore Mutual Water Company (a Sacramento River Settlement Contractor). We will be looking to rely on our Riparian water rights in order to do winter flooding (beneficial use). We will not have 215 water from the Colusa Drain. Should project start before Nov. 1, we would use some of our settlement contract water to recharge.	Comment addressed. The text has been revised to correct these details.
267	Emily Reinhart	Davis Ranches/Sycamore Mutual Water Company	6	5.1.7	6-70	1 (above Table 6-35)		Habitat benefits also include winter floodplain habitat for migrating shorebirds/waterfowl as we pulse flood the field	Comment addressed. The text has been revised to correct these details.
268	Emily Reinhart	Davis Ranches/Sycamore Mutual Water Company	6	5.1.7	6-71	Table 6-35	Water Source & Reliability	Source is Sacramento River. Reliability is good, but still unknown at this time.	Comment addressed. The text has been revised to correct these details.
269	Emily Reinhart	Davis Ranches/Sycamore Mutual Water Company	6	3.5.1	6-42	1		30 – 45 days during fall/winter. We aren't tied to a specific start date. There is flexibility built into the project to allow for water availability, etc. The target is Fall/Winter for the habitat benefits as well as availability of water in the system. Settlement contract waters would be used if the project starts before Nov. 1.	Comment addressed. The text has been revised to correct these details.
270	Emily Reinhart	Davis Ranches/Sycamore Mutual Water Company	6	3.5.1	6-42	2		We do not have contract for 215 water. We do have riparian rights that we would be exercising for this project for beneficial use (habitat).	Comment addressed. The text has been revised to correct these details.
271	Emily Reinhart	Davis Ranches/Sycamore Mutual Water Company	6	3.5.1	6-42	2		5,000 acre feet over 10-years is our goal.	Comment addressed. The text has been revised to correct these details.
272	Emily Reinhart	Davis Ranches/Sycamore Mutual Water Company	6	3.5.5	6-44	1		No 215 water.	Comment addressed. The text has been revised to correct these details.

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273	Emily Reinhart	Davis Ranches/Sycamore Mutual Water Company	6	3.5.7	6-45	2		No 215 water.	Comment addressed. The text has been revised to correct these details.
274	Emily Reinhart	Davis Ranches/Sycamore Mutual Water Company	6		6-8		Table 6-2	Diversion of winter flows from Sacramento River (riparian) or settlement contract flows (should project start before Nov.1).	Comment addressed. The text has been revised to correct these details.
275	Donald Bills	GGA/CGA TAC Member	5	5.2.1	5.3	1		Nothing in chapter 6 refers to sustainable yield. Should this be a reference to chapter 1 section 1.2? As I mentioned in my review comments there, sustainable/safe yield has not been considered a valid term by the hydrologic community for close to 20 years now (USGS Circular 1186, 1999 Alley and others., USGS SIR 2013-5079, The journey from safe yield to sustainability, Leake and Alley, 2005, A critical review of the Water-budget myth and safe yield, Zhou, 2009, Groundwater depletion in the U.S. 1900 to 2008), Konikow, 2013, The myth of safe yield Kathleen Ferris and Sarah Porter, May 2021, Kyl Center for Water Policy, . It would be better to confine this discussion in terms of the sustainable goal(s). This year proves the point. Estimates of sustainable yield based on historical records are being broken almost everywhere in the subbasin this year.	Comment addressed. The title of the subsection has been revised to, "Sustainable Operation of the Subbasin". The text of the subsection has been revised and no longer refers to sustainable yield. It now refers to sustainable operation of the subbasin. Sustainable yield must be reported and described, per the GSP regulations. See § 354.18(b)(7) and § 354.18(c)(2)(C)). This requirement is addressed in Chapter 3 of the GSP.

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276	Donald Bills	GGA/CGA TAC Member	5	5.2.1	5.3	2		"…it is uncertain that undesirable results will develop in the future." They are occurring now with wells drying up through the basin.	Comment acknowledged. We have added a preface to the GSP to acknowledge the current drought conditions and summarize what is known at this time about the severity of well dewatering experienced by water users in the Subbasin, including domestic well users and DAC/SDAC/EDA households. It is noted that development of the GSP has occurred over several years utilizing the best available science and tools, with the most sufficient and credible information and data available for the decisions being made and the time frame available for making those decisions. Current and historical groundwater conditions and water budgets have been evaluated for the Subbasin in alignment with the GSP regulations, using the most recent and complete hydrologic, water supply, water demand, and land use data available at the time GSP development began. Unfortunately, drought conditions in 2020-2021 have coincided with development of the GSP, a timing that has not permitted complete evaluation and inclusion of data from these years in the GSP at this time. It is noted that ongoing management of the Colusa Subbasin under the GSP will follow an "adaptive management" strategy that involves active monitoring of Subbasin conditions and addressing any challenges related to maintaining groundwater sustainability by scaling and implementing PMAs in a targeted and proportional manner in accordance with the needs of the Subbasin. Data and information collected through ongoing monitoring will be evaluated, reported, and used to guide GSP implementation. GSP annual reports provide an opportunity each year to evaluate current Subbasin conditions and assess needs for additional PMAs. The first annual report, due April 2022, will evaluate groundwater conditions in the Colusa Subbasin since 2015. During the periodic (five-year) evaluations, the GSP will also be reviewed and SMC will be revised, as needed, as we learn more about the effects of current and future conditions.
277	Donald Bills	GGA/CGA TAC Member	5	5.2.2	5.3			"As discussed above, the Colusa Subbasin does not currently have undesirable results, which shows that the Subbasin is being managed sustainably." As of 2021 this is no longer true. It might be reasonable to add a second footnote here to indicate that extreme dry and heat in 2020 and 2021(not seen in the last 1,200 years) has exacerbated the already dry conditions pushing the basin into undesirable results.	Please see the response to comment 276.

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278	Donald Bills	GGA/CGA TAC Member	5	5.3.1.1	5.5	2		"…and are not currently occurring. Per the projected water budget (Chapter 3), these effects are not likely to occur in the foreseeable future." I would suggest amending this text possibly by adding reference to the proposed footnote 2 to account for the existing 2020/21 conditions that clearly have exceeded the undesirable result ("…sustained groundwater levels are too low to reasonably satisfy beneficial uses within the Subbasin").	Please see the response to comment 276.
279	Donald Bills	GGA/CGA TAC Member	5	5.3.1.2	5.5	2		"…impact that would potentially harm the "long-term viability" of affected beneficial uses and users in the Subbasin." It may be necessary to re-evaluate this undesirable result given the current conditions in the subbasin. A significant number of domestic wells and shallow irrigation wells are currently dry or close to being dry while the required amount of representative monitoring wells does not appear to show chronic lowering of groundwater levels.	Please see the response to comment 276.
280	Donald Bills	GGA/CGA TAC Member	5	5.3.1.3	5.6			Suggest replacing sustainable yield with sustainable goals as mentioned earlier. I would also suggest adding a third bulleted Cause: Decrease in the annual precipitation and increase in maximin temperature days (above 100 degrees) related to the changing climate ("Climate Crisis").	Comment addressed. The text of the subsection has been revised and no longer refers to sustainable yield. Sustainable yield must be reported and described, per the GSP regulations. See § 354.18(b)(7) and § 354.18(c)(2)(C)). This requirement is addressed in Chapter 3 of the GSP.
281	Donald Bills	GGA/CGA TAC Member	5	5.3.1.4	5.6			I would suggest adding two additional bulleted items here: Permanent loss of crops due to lack of water (farm failure?). Hauling of water to meet minimum household needs.	Comment addressed. These suggested potential effects have been added to Section 5.3.1.4.

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282	Donald Bills	GGA/CGA TAC Member	5	5.3.2.2	5.7/5.8			"…provided the GSP demonstrates that there is a significant correlation between groundwater levels and the other metrics." The Freshwater zone of the aquifer extends from near the surface to as much as 2,200 ft below the surface with storage estimates of 26 to 140 maf, almost a full order of magnitude difference (chapter 3, section 3.2.3). But most domestic and shallow wells are located within the first 200 ft below the surface where storage is estimated at only about 13 maf. If all these wells were dewatered there would still be significant water in storage (1/2 to 9/10?) not to warrant an undesirable result for GW storage. The 48 monitoring wells represent storage of 1.4 to 7.7 maf… 5 percent of total estimated GW volumes. So, while GW storage is unlikely to see an undesirable result, most of the water wells can go dry anyway affecting beneficial uses and inflicting significant damage to the economy (as we are currently seeing; 2020/21). I realize it is too late in the game to change undesirable results, MTs and MOs now. But I would suggest that consideration for their revision be modified or changed when appropriate to reflect the differences between the unconfined (first 200ft) and confined/ semi-confined (2,000 ft) of the aquifer and more directly link then to climate impacts5.	Comment acknowledged. The referenced subsection has been revised to include the following statement, "As discussed in Section 5.2.1, implementation of the GSP will be based on adaptive management, as required to adapt to changing climatic conditions. The SMCs for groundwater levels and storage will continue to be evaluated and updated as new information about groundwater conditions is acquired and data gaps are filled."
283	Donald Bills	GGA/CGA TAC Member	5	5.3.2.2	5.7/5.8	2		It is unreasonable to use "…groundwater levels ranging from historical lows…". As the current drought and heat crisis is showing us historic ranges can be misleading (e.g. the Colorado River compact based on only 20 years of record) if not used in context.	Comment acknowledged. The sentence reading, "Based on the estimated range of current storage volume in the Colusa Subbasin (Chapter 3) and the small percentage changes in storage estimated to occur over groundwater levels ranging from historical lows to the groundwater levels minimum thresholds, it is anticipated that an undesirable result related to the chronic lowering of groundwater levels would occur before the Subbasin would experience significant and unreasonable effects related to reduction of groundwater storage," has been revised to read, "Based on the estimated range of current storage volume in the Colusa Subbasin (Chapter 3) and the small percentage changes in storage estimated to occur over groundwater levels ranging from current levels to the groundwater levels minimum thresholds, it is anticipated that an undesirable result related to the chronic lowering of groundwater levels would occur before the Subbasin would experience significant and unreasonable effects related to reduction of groundwater storage". Also, please see to the response to comment 282.

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284	Donald Bills	GGA/CGA TAC Member	5	5.3.2.3	5.8	1		"Additional justification and information supporting the criteria used to define when and where the effects of the groundwater conditions cause undesirable results is provided in Appendix 5A." And from Appendix 5, footnote 1 under MTs, "The lack of shallow groundwater data is identified as a data gap and will be addressed along with other data gaps during plan implementation" …And already too late to identify a undesirable condition for 2020/21.	Comment acknowledged. Please see the response to comment 282.
285	Donald Bills	GGA/CGA TAC Member	5	5.3.2.3	5.8	2		"These criteria were determined based on the evaluation of best available data pertaining to the Subbasin's specific conditions and characteristics, as described in the Plan Area and Basin Setting sections of this GSP (Chapter 2 and Chapter 3, respectively),…" Based on 2020/21 conditions it would seem wise to consider adding an interim evaluation to the 5-year period. Suggest every 2 years.	Comment acknowledged. Please see the response to comment 282.
286	Donald Bills	GGA/CGA TAC Member	5	5.3.5.2	5.12	1		As I have commented before and backed up with references from the San Joaquin Valley and Salt River and Tucson Basins in Arizona, 0.5 to 0.6 ft (half a foot…) in a couple months much less 24 is too much to be able to stop or remediate.	Comment acknowledged. The subsidence SMC are being reviewed and will potentially be revised in the final GSP. Additional clarification has also been added to Section 5.3.5.5 to note that: "[...]recognizing that there is uncertainty in Subbasin conditions and that data gaps exist, the GSAs will continue to monitor groundwater levels to identify potential undesirable results as part of GSP annual reports and five-year updates, and adapt GSP implementation, as needed, to avoid undesirable results." Ongoing monitoring and data collection will inform potential updates to sustainable management criteria (including the minimum thresholds, as needed). Potential updates to the GSP will occur during the periodic evaluation process to ensure that the Subbasin is on track to achieve the sustainability goal. Annual reports also provide an opportunity to reassess Subbasin conditions in the interim, and identify whether more urgent evaluation of the GSP is needed.
287	Donald Bills	GGA/CGA TAC Member	5	5.3.5.3	5.13	2		I would suggest adding another potential cause of undesirable result to the list: "decrease in hydraulic conductivity and the resultant increase in well M&O costs."	Comment addressed. These considerations have been clarified in Section 5.3.5.4, as these are viewed more as potential effects of undesirable results.
288	Donald Bills	GGA/CGA TAC Member	5	5.3.6.1	5.13	1		I would suggest adding "Significant and unreasonable impacts to springs".	Comment addressed. The suggested text has been added.
289	Donald Bills	GGA/CGA TAC Member	6	6.2	page 6-12		Table 6.3	"Westside Streams Diversion for Direct or In-lieu Groundwater Recharge…" This type of GW recharge should help mitigate Land subsidence. Suggest you add an "X" to that column.	Comment addressed. The table has been revised to indicate that benefits are expected for land subsidence.

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290	Donald Bills	GGA/CGA TAC Member	6	6.5	Page 6-58		Figure 6.9	I would strongly suggest/recommend adding Walker Creek to the map and this section a one of the Westside larger Streams Diversion for Direct or In-lieu Groundwater Recharge. The Walker Creek Watershed drains an area at least as big as the Willow Creek watershed and bigger than either the Logan or Hunter Creek watersheds. In addition, the Walker Creek watershed contains a number of, as yet characterized springs that would be a source of potential recharge.	Comment addressed. Section 6.5.1.2 has been revised to acknowledge the potential recharge benefits and opportunities along other streams and creeks, including Walker Creek and Hambright Creek. However, it is noted that the westside streams diversion project analysis was confined to the six streams listed because of the availability of monthly flow estimates.
291	Donald Bills	GGA/CGA TAC Member	6	6.5.1.2	page 6-61	1	Figure 6.9	Suggest/recommend adding Walker Creek to the list here. See reasons above.	Please see the response to comment 290.
292	Donald Bills	GGA/CGA TAC Member	6	6.5.1.2	page 6-62		Figure 6-10	Suggest/recommend adding Walker Creek to the map.	Please see the response to comment 290.
293	Donald Bills	GGA/CGA TAC Member	6	6.5.1.2	page 6-63		Table 6-29	Water source and reliability: Add Walker Creek.	Please see the response to comment 290.
294	Ben King		1	1.2				This is a question for the DWR. Since the DWR formally adopted a Human Right to Water ("HRTW) Policy in its Department Administrative Manual during April 2021 – does it want to state that it will be including HRTW considerations in the DWR's decision making, program activities and public engagement in SGMA and the GSP development. Wont this statement promote HRTW engagement?	Comment acknowledged. Please note that the Colusa Subbasin GSP does reference the Human Right to Water policy and how that has been factored into GSP development and SGMA-related processes. Please refer to Sections 2.6.1, Human Right to Water, and Sections 2.7.1.2 and 5.4.4.4 of the GSP.
295				1.3.1				Typo for Private Pumpers – appointed by Colusa Groundwater BOS ? Did you mean to say recommended by the Commission and appointed by the BOS? Were there public meetings for the appointment by the Board Members by GSA's? It would be great to know that the GSA's have public meetings. Do they have websites and interested party lists? Please confirm that each GSA has websites and posts notice of meetings at a minimum.	Comment addressed. The description of the Private Pumper Representatives has been corrected as suggested. As described in Section 1.3.1 (in the paragraph following the bulleted list of GGA representatives): "Board members are chosen in public meetings by the respective governing boards of the Member Agencies. Alternates for each Board member are chosen in the same manner by the same Member Agencies." To clarify, member agencies of the CGA and GGA are not GSAs and are not individually held to the requirements of GSAs, but the member agencies do hold public meetings. As described in Section 2.7.3, the CGA and GGA (GSAs) do maintain interested party lists, and do maintain websites that provide notice of meetings, as well as other information and materials related to GSP development. Those websites are: https://colusagroundwater.org/ https://www.countyofglenn.net/dept/planning-community-development-services/water-resources/glenn-groundwater-authority

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296	Ben King			1.3.3				Are these costs for the Basin as a whole? It would be good to break these costs on a per acre basis and discuss how the costs are allocated to Cities and small water systems. For example – what does the CGA expect the City of Williams to pay going forward? Voters in the Cities need to know. What will the County of Glenn and the County of Colusa be expected to contribute?	Comment addressed. Yes, the costs summarized in Table 1-1 are the total estimated annual GSP implementation costs for the Colusa Subbasin as whole. This clarification has been added to the text in Section 1.3.1. Specific financing plans and cost-allocation approaches are not yet determined, but will be identified and determined with stakeholder involvement following GSP adoption. Those decisions are expected to be made in the coming year. As described in the last paragraph of Section 1.3.1, "The Colusa Subbasin GSAs will develop a financing plan for the overall implementation of the GSP that will specify funding sources and cost-allocation approaches across entities for the different GSP implementation activities (see Chapter 7 and Appendix 7A for a description of existing options)."
297	Ben King		2	2.1			Table 2-3	Table 2-3 is misleading in that it does not reflect the loss in surface supply due to water transfers. There needs to be a table that reflects the historical amount of water transfers for every water purveyor and how much of the water remains in Basin and out of Basin. Without this stakeholders can not assess the available water supply for the Basin.	Comment acknowledged. It is noted that Tables 2-2 and 2-3 are within the Plan Area section of the GSP, and are intended to summarize general information about water purveyors and agencies with water management responsibilities in the Colusa Subbasin (per 23 CCR §354.8). The historical volume of surface water that has remained in the Subbasin is summarized in the water budget (Section 3.3, per 23 CCR §354.18). Please also see the response to comment 298.
298	Ben King		2	2 generally				The Colusa County GMP does a good job discussing water transfers but the GSP is silent on it. Stakeholders need transparency and understanding how water transfers work and how ground water substitution and fallowing work into the available water supply. The transparency and discussion regarding water transfers, fallowing and groundwater substitution also have potential negative DEI and HRTW outcomes because water transferred out of basin and fallowed acreage means less jobs and ground water pumped for ground water substitution could lead to aquifer degradation if the groundwater pumped is pool quality.	Comment addressed. Clarification has been added to Section 3.3.3 (Water Budget Assumptions) to explain how water transfers were factored into the Subbasin water budget. In the historical water budget, surface water supplies were configured to implicitly reflect historical surface water transfers and any effects of transfers on historical groundwater pumping. In the current conditions and future conditions water budgets, it would be highly speculative to characterize possible future water transfers. The approach we used to specify projected surface water supply is consistent with 23 CCR §354.18(c)(3)(C). The uncertainty of future conditions related to surface water supplies is one of many reasons that GSP implementation will be based on adaptive management. As described throughout the GSP, the GSAs are committed to ongoing monitoring and implementation of projects and management actions to respond to changing Subbasin conditions.

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299	Ben King		2					Again there needs to be discussion about surface water transfers and a Table listing the number of acre feet pumped for groundwater substitution and the acres fallowed by each Settlement Contractor. Stakeholders need to know this for HRTW and DEI concerns and also for the general sustainability of economic health of the Subbasin.	Comment acknowledged. Please see the responses to comments 297-298.
300	Ben King		2	2.3.2				There needs to be a discussion regarding groundwater trading markets and how this would impact the potential water demands. The California Water Commission are holding hearings regarding groundwater trading and it is very relevant to the effects on water demands and the economic feasibility and sustainability for the subbasin. To not include any discussion is misleading and could lead stakeholders to misallocate resources or make material economic decisions without full knowledge of a likely outcome. The CWC appears to quite committed to groundwater trading and the PPIC has come out strongly in favor of water markets. It is misleading not to discuss this likelihood especially when there is such a focus on recharge in the PMAs. It would seem that some PMAs may not be economically efficient if water could be traded instead. In June of 2021, Steven Springhorn , Acting Director of SGMA discussed the framework for Water Trading for SGMA Implementation – it seems ingenious to go through this process and not discuss what the Acting Director of SGMA is presenting to the California Water Commission.	Comment acknowledged. The concept of a water market is addressed in the GSP under Section 6.5.2.3, Long-Term Demand Management Action. The market-based concept of financial incentives to encourage the reallocation of groundwater is also a core component of the PMA described in Section 6.5.2.4, Strategic Temporary Land Idling for Drought and Localized Short-Term Groundwater Management. The concept of groundwater markets is further explored in Appendix 6.B, Economic Analysis of Demand Management and Conceptual Allocation Approaches. Page 11 of Appendix 6.B. notes that groundwater trading is a potential option for the subbasin and that other GSAs across the state are currently exploring such options. Appendix 6.B. also presents an economic analysis of potential demand management actions in the Colusa Subbasin. This provides a basis for establishing whether projects are cost-effective relative to other demand management actions, such as a limit on groundwater extractions and a groundwater trading market. However, that type of analysis would be completed as part of future GSP implementation. The GSP acknowledges the potential benefits of a market for improving flexibility for stakeholders that would face limits on groundwater pumping. However, it also acknowledges that developing a market is a substantial undertaking that is beyond the scope of initial GSP development. A market is an institution that would allow willing buyers and sellers of water to make voluntary exchanges. It requires defining property rights to groundwater (e.g., allocation), market and trading rules, administration, and monitoring and enforcement. These may be considered in the future if it is determined to be of interest to the subbasin stakeholders. Any evaluations would be conducted in a public, stakeholder-driven process.

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301	Ben King		2	2.3.2				There needs to be reference to the ERA Demand Management Actions if they remain in the GSP. If implemented these Management Actions will have the intended effect which is to limited Demand. These PMAs are DEMAND Management Actions and should be referenced and discussed in this section.	Comment addressed. A reference has been added in Section 2.3.2 to indicate that potential demand management actions are discussed in Section 6.5.2.
302	Ben King		2	2.5.1				Discussion about water quality testing, determination of appropriate well depth and what happens if the driller finds poor water quality. I think the answer is that this information is not captured or disclosed and therefore it is a concern for water quality and HRTW issues.	Comment addressed. Section 2.5 provides an overview of coordination of the GSAs' management efforts with existing county and state programs, including county well permitting programs. The following has been added to Section 2.5. "The State recognizes the Human Right to Water pursuant to Water Code Section 106.3, which states, “every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes.” The human right to water extends to all Californians, including disadvantaged individuals and groups and communities in rural and urban areas (State Water Resource Control Board [State Board], 2021). The GSAs will seek to work with their respective counties, State Board staff and stakeholders in support the State Board’s efforts, “to develop new systems or enhance existing systems to collect data and identify and track communities that do not have, or are at risk of not having, safe, clean, affordable, and accessible water for drinking, cooking, and sanitary purposes (State Board, 2021)."

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303	Ben King		2	2.6.1				The following was taken verbatim from the DWR's recent Drought Memo. This is from a footnote: DWR formally adopted the Human Right to Water (HRTW) Policy in its Departmental Administrative Manual which outlines how the HRTW should be included in DWR decision-making, program activities, and public engagement. The Water Board adopted a HRTW Resolution, recognizing HRTW as a core value and directing its implementation across programs and activities. The Water Board is also currently drafting a Racial Equity Resolution. There should be a reference to the emerging HRTW and Racial Equity actions by the DRWR and the SWRCB since it is central to Stakeholder HRTW and Diversity Equity and Inclusion (DEI) concerns regarding the GSP and its future implementation.	Comment addressed. Commentary has been added to the existing discussion in Section 2.6.1, Human Right to Water, to reference these emerging efforts.
304	Ben King							I strongly disagree with the statement that the GSA supported and allowed for effective engagement of all stakeholders regarding HRTW and DEI issues. I would urger the DWR to expressing prohibit GSAs taking any action against a stakeholder unless a mediator is brought in especially regarding situations where there are HRTW and DEI or potentially negative racial outcomes.	Comment acknowledged. It is noted that the GSAs created and followed a Communication and Engagement Plan (Appendix 2E) and sponsored, publicized, and conducted numerous engagement opportunities for stakeholders in the Subbasin (Section 2.7.2), including more than 236 separate meetings and workshops. Meetings and workshops have touched on all aspects of GSP development and decision-making, including issues relevant to HRTW and DEI. Meetings and workshops have been open to the public, and meeting notes, materials, and/or recordings have been available to the public. Communication and outreach for these meetings and for GSP development (Appendix 2C) has reached stakeholders of varied backgrounds. All comments related to the GSP have been logged and addressed appropriately (Appendix 2B). The GSAs have made clear and consistent efforts to respectfully engage with stakeholders through robust discussion.

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305	Ben King			Public Engagement 2.7.3.6				The Stakeholder Engagement Process was materially flawed because there was no discussion about the California Water Commissions initiatives around groundwater water trading. It is unreasonable to have no public engagement and submit a GSP without any public discussion of an issue that the DWR Acting Deputy Director of SGMA is presenting at the California Water Commission. As I said, we are spending a lot of time and money considering and debating potential PMAs when we have spent no time regarding the water trading policies being considered by the California Water Commission. Water Trading will have many intended consequences on the allocation of resources and many unintended consequences – some of which could be extremely detrimental to the long term sustainability of the fresh water aquifers of the Sacramento Valley. It seems like the PMA considerations may be a real waste of time – I just found out about the Water Trading discussions of the CWC yesterday which happens to be the last business day for the comment period for this GSP. Where are the GSAs websites. There is a lot of discussion regarding the CGA website but is there any other website. Do they exists for each Member GSA ? If not – why and how can stakeholders gain transparency. Does each Member GSA have an interested person list?	Comment acknowledged. The GSAs have engaged in extensive public engagement, please see the response to comment 304 for additional information. As described in Section 2.7.3, the CGA and GGA (GSAs) do maintain interested party lists, and do maintain websites that provide notice of meetings. Please see the response to comment 295 for more information. The concept of groundwater markets is noted in the GSP. As described under Comment Response 300, the concept of a water market is addressed in the GSP under Section 6.5.2.3, Long-Term Demand Management Action, market-based concept of financial incentives to encourage the reallocation of groundwater under Section 6.5.2.4, Strategic Temporary Land Idling for Drought and Localized Short-Term Groundwater Management, and Appendix 6.B., Economic Analysis of Demand Management and Conceptual Allocation Approaches. It is noted that these groundwater trading discussions have occurred since GSP development began, and draft recommendations for groundwater trading policies will not be available from the California Water Commission until 2022, after GSP adoption. There are various uncertain factors that could affect future water supplies, but would be speculative to define now. The uncertainty of future conditions related to water supplies and potential water trading policies are among the many reasons that GSP implementation will be based on adaptive management. As described throughout the GSP, the GSAs are committed to ongoing monitoring and implementation of projects and management actions to respond to changes in Subbasin conditions. The GSP is a "living document" that the GSAs will review and revise as more information about the basin setting becomes available (per 23 CCR §356.4).

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306	DEPARTMENT OF FISH AND WILDLIFE			3.2.7; starting page 3-77):				The GSP does not include sufficient detail describing the timing of depletions of interconnected surface water (ISW). a. Issue: Though the GSP discusses annual gains and losses from interconnected surface waters in the subbasin and summarizes net gains by water year type (Table 3-6, page 3-79), the GSP does not include sufficient detail on the timing of depletions as required by 23 CCR § 354.16(f). In order to adequately assess ISW that may be gaining or losing at different times of the year, it is preferential to present net gain/loss values by month, rather than by year. Quantifying depletions by month for each reach will facilitate evaluation of impacts or benefits to environmental beneficial users that rely on surface waters during specific portions of the year. b. Recommendation: The Department recommends including net gains or losses to interconnected surface waters by month, rather than by year.	Comment addressed. A summary of average monthly net gains/losses has been added to Appendix 3G, in addition to the existing summary of annual and average annual net gains/losses. It is noted that these results are summarized from the C2VSimFG-Colusa groundwater model, and therefore carry significant uncertainty. However, at the time of GSP development the model results are considered to be the best available data to describe streamflow depletion. The GSAs have proposed studies to improve model calibration and close data gaps related to depletions of interconnected surface water (please refer to Chapter 7 of the GSP).
307	DEPARTMENT OF FISH AND WILDLIFE			3.2.8; starting page 3-82				Groundwater dependent ecosystem (GDE) identification, required by 23 CCR § 354.16(g), is based on methods that risk exclusion of ecosystems that may depend on groundwater. a. Issues: i. GDE Scoring Criteria: The GSP assigns a rank of '1' (less likely to be a GDE) to '4' (more likely to be a GDE) to potential GDE areas within the Natural Communities Commonly Associated with Groundwater dataset. It is unclear how the rankings are utilized throughout the remainder of the GSP to assess monitoring networks, management criteria, or potential projects. Accordingly, the ranking system has no apparent actionable groundwater management relevance.	Comment addressed. The text in Section 3.2.8 has been revised to clarify that preliminary screening of the potential GDEs within the Colusa Subbasin was conducted to help prioritize areas for further mapping, evaluation and monitoring of GDEs during implementation of the Colusa Subbasin GSP. The preliminary screening supported the assessment of data gaps, evaluation of existing monitoring networks, which could potentially be used for GDE monitoring, and development of PMAs. The GSAs will seek to work with resource agencies, stakeholders, beneficial users and the public to refine the understanding of GDEs in the Colusa Subbasin, fill data gaps and develop PMAs with consideration of GDEs.

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308	DEPARTMENT OF FISH AND WILDLIFE			3.2.8; starting page 3-82				ii. Depth to Groundwater Threshold: The GSP relies on a groundwater level threshold of 30-feet below the ground surface (bgs) to screen potential GDEs within the subbasin. However, mature Valley Oak (Quercus lobata) can access groundwater up to 80 feet bgs (Howard 1992, Lewis & Burgy 1964). The use of a 30-foot threshold may incorrectly result in Valley Oak communities receiving a GSP-imposed score of '1,' indicating that they are least likely to be a GDE.	Comment acknowledged. The GDEs analysis will be refined during GSP implementation. Additional clarification has been added to the GSP Chapter 3 to acknowledge that significant data gaps exist for the precise locations and characteristics of GDEs in the Colusa Subbasin. It is noted that the prioritization, or "scoring," of GDEs is intended as a step toward identifying GDEs using the information available at the time of GSP development. This "scoring" is not seen as a final call on the classification of GDEs, but rather a prioritization for future work to better identify and expand monitoring of potential GDEs. Section 4.2.5.4 has been revised to state that the ISW monitoring network wells may be useful for monitoring groundwater levels near GDEs; however, a dedicated network of shallow monitoring wells will be developed specifically for GDE monitoring during implementation of the GSP. As described in the GSP Chapter 7, the GSAs have proposed a study to investigate expansion of the shallow groundwater level monitoring network for GDEs during GSP implementation. Among other goals, this study is planned to help close data gaps related to identification of GDEs. The prioritization will be refined in this study, and will be factored into decisions for the placement of new monitoring sites to improve the understanding and protection of GDEs.
309	DEPARTMENT OF FISH AND WILDLIFE			3.2.8; starting page 3-82				iii. GDEs Near Surface Water: The GSP assesses whether potential GDE areas are located near surface waters or irrigated cropland, or both. The GSP considers potential GDE areas within 150 feet of surface waters, within 150 feet of irrigated rice paddies, and within 50 feet of other irrigated croplands to have access to surface water; and therefore, the GSP assigns these areas a score of '2' or '3,' indicating they are less likely to be groundwater dependent. The GSP states that "GDEs include vegetation and habitat that are wholly dependent on groundwater" (line 9, page 3-83); however, this narrow definition of a GDE disregards a GDE's adaptability and opportunistic approach to accessing water in which vegetation and ISW may rely on both surface water and groundwater across seasons and years. Furthermore, this GDE definition contradicts an earlier description of GDEs within the GSP, in which the plan states that "a GDE's dependence on groundwater refers to reliance of GDE species and/or communities on groundwater for all or a portion of their water needs" (line 3, page 3-82). Particularly as the GDE areas receiving scores of '2' or '3' have already been determined to be located in areas with depths to groundwater of less than 30 feet, proximity to potential surface waters is insufficient evidence to categorize them as 'less likely' to be GDEs.	Comment acknowledged. Please see the response to comment 308. It is noted that the GDE "scoring" is not seen as a final call on the classification of GDEs, but rather a prioritization for future work to better identify and expand monitoring of potential GDEs. The prioritization will be refined during GSP implementation and will be factored into decisions for the placement of new monitoring sites to improve the understanding and protection of GDEs (see GSP Chapter 7).

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310	DEPARTMENT OF FISH AND WILDLIFE			3.2.8; starting page 3-82				iv. Data Gaps: The GSP states that there is potential for GDEs to be present in the uplands west of Orland and west of Arbuckle, but that groundwater level data is lacking in these areas and there is insufficient information "to determine their existence" (line 26, page 3-83). Rather than waiting an indeterminate amount of time to gather data to prove groundwater dependence of potential GDE areas and leaving the potential GDEs unclassified in the interim, the GSP should conservatively consider these areas to be GDEs until sufficient data is collected that proves otherwise.	Comment acknowledged. Please see the response to comment 308. It is noted that the GDE "scoring" is not seen as a final call on the classification of GDEs, but rather a prioritization for future work to better identify and expand monitoring of potential GDEs. The GSAs are not discounting that these western areas are GDEs. During GSP implementation, the GSAs are planning to refine the GDE assessment, and have proposed studies to investigate the western boundary of the Subbasin and expand shallow groundwater monitoring to close data gaps in areas where potential GDEs exist. Please see Section 7.1.2 for additional information about these studies.
311	DEPARTMENT OF FISH AND WILDLIFE			3.2.8; starting page 3-82				v. Special Status Species: SGMA defines GDEs as ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface [23 CCR § 351 (m)]. The GSP does not identify or discuss species that may be present within the subbasin that rely on groundwater, groundwater dependent ecosystems, or interconnected surface waters.	Comment addressed. A reference to TNC's analysis of freshwater species located in the Colusa Subbasin has been added to Section 3.2.8 of the GSP (based on analysis of the California Freshwater Species Database version 2.0.9 within the Subbasin boundary). We have also added more text to acknowledge data gaps regarding which of these species are found within GDEs, and references to GSP studies in Chapter 7 to help close those data gaps and expand understanding of GDEs in the Subbasin.
312	DEPARTMENT OF FISH AND WILDLIFE			4.2.5.4; starting page 4-33				The GSP should include additional details related to the plans to improve the monitoring network for GDEs and ISW within the subbasin. a. Issue: The GSP states that the ISW representative monitoring network will also be used to monitor GDEs. The GSP does not present any information or figures to support its assertion that the ISW monitoring sites are located sufficiently near to GDEs to assess shallow groundwater levels in those areas. While the Department appreciates the GSP's acknowledgement of data gaps related to the characterization of GDEs and ISW within the subbasin and the GSP's proposed plan to install up to an additional 10 shallow monitoring wells, the GSP does not provide details on planned locations or timelines for installation of these additional monitoring locations. b. Recommendation: The GSP should include additional detail related to the anticipated timeline for installation of additional wells to further refine ISW and GDE characterization and management. The Department recommends that the GSP assess the locations of special status species within the subbasin to determine which GDE areas likely provide priority habitat. GDE areas and ISW that support special status species or are most at risk of negative impacts due to groundwater pumping should be prioritized for monitoring to inform management actions (See Comment #2(v)).	Comment addressed. Section 4.2.5.4 has been revised to state that the ISW monitoring network wells may be useful for monitoring groundwater levels near GDEs; however, a dedicated network of shallow monitoring wells will be developed specifically for GDE monitoring during implementation of the GSP. The development of a dedicated groundwater dependent ecosystem monitoring network consisting of shallow monitoring wells is discussed in Chapter 6.5.2.9 Potential Management Actions and Chapter 7.1.2.1 GSP Studies. Although the GSAs used the best available scientific data and information to assess potential GDEs within the Colusa Subbasin, significant data gaps exist in the understanding of the GDEs and the associated species. The GSAs will seek to work with resource agencies, stakeholders, beneficial users and the public to refine the understanding of GDEs in the Colusa Subbasin, fill data gaps and develop PMAs with consideration of GDEs.

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313	DEPARTMENT OF FISH AND WILDLIFE			5.3.6, 5.4.6 ; starting pages 5-15 and 5-30				Interconnected surface water sustainable management criteria (SMC) may not protect against undesirable results for fish and wildlife beneficial uses and users. a. Issues: i. Minimum Thresholds: Minimum thresholds (MTs) for ISW are set at 10 feet below the measured historical low for each representative monitoring well. The GSP states that establishing MTs below the historic lows is necessary to provide a sufficient margin of operational flexibility during GSP implementation, and that no undesirable results were observed at the historic low; however, the GSP does not include sufficient analysis or discussion to support this claim. In 2015, the second of back-to-back critically dry water years in the Sacramento Valley which resulted in recent historical low groundwater levels, vegetated and aquatic GDEs experienced adverse impacts including stressed or dying riparian vegetation, poor instream habitat availability, and increased water temperatures (DFW 2019). It is unclear what, if any, studies or analyses were completed to assess whether environmental users within the subbasin experienced undesirable results at the historical low groundwater levels, or what metrics the GSP would evaluate to determine the presence of an undesirable result for GDEs or ISW in the event of additional groundwater decline beyond the historic low as the MTs allow. The ISW SMC are also referenced as protective of GDE beneficial users of	Comment acknowledged. The sustainable management criteria for depletion of interconnected surface water were established with the GSAs' understanding that significant data gaps exist in the understanding of stream aquifer interactions in the Colusa Subbasin. Additional studies, more refined numerical models, and additional monitoring will be needed to address these data gaps and uncertainties. Additionally, the GSAs acknowledge that the sustainability thresholds will need to be reviewed and evaluated, and potentially refined, as additional data and information becomes available. The GSAs will seek to work with stakeholders, beneficial users, the public and GSAs representing adjacent subbasins during this process.

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313 cont'd								groundwater according to the GSP, but the supporting discussion focuses on groundwater gradients and associated depletions. No analysis is presented that characterizes whether the established MTs are sufficient to maintain water levels that have historically been shallow enough to support GDEs, or if the MTs would permit groundwater levels to fall below root zones, removing groundwater as an available water source to some GDEs. If MTs are not protective of GDE access to groundwater supplies, significant impacts to environmental beneficial users of groundwater will likely be experienced before MTs are reached. Furthermore, the GSP reports annual net values for streamflow depletion from the modeled baseline conditions, baseline conditions with climate change, and baseline conditions with climate change and project scenarios. However, the annual analysis does not provide sufficient detail on the timing of depletions to adequately assess potential impacts to environmental users (See Comment #1). The GSP compares modeled annual depletions to total annual flow in these river systems, and uses this annual normalization to characterize groundwater contributions to ISW as nominal. This coarse annual comparison does not take into account how groundwater contributions to river base flows are often proportionately greater in dry years or during annual low-flow seasons, or how groundwater contributions play a key role in maintaining water quality and temperatures. Properly contextualizing groundwater contributions to surface water is especially important to understanding potential impacts of groundwater depletion on surface waters and their ecosystems, particularly when the GSP states that streamflow accretion is expected to decrease by 38.3% with climate change impacts (line 9, page 6-2). The Department recommends the GSP reselect minimum thresholds that would better protect environmental uses and users of groundwater, rather than enabling declines in groundwater levels over the implementation horizon beyond the historic low. Additional analyses of the specific impacts of the established thresholds on GDE and ISW beneficial users of groundwater should be included.	

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314	DEPARTMENT OF FISH AND WILDLIFE			5.3.6, 5.4.6 ; starting pages 5-15 and 5-30				ii. Undesirable Results: The GSP requires 25% of ISW representative monitoring wells in the subbasin to fall below their MTs for 24 consecutive months before identifying an undesirable result to GDEs or ISW. While environmental users are adapted to sustain short-term lowering of groundwater levels during dry periods, environmental users may not be able to sustain extended periods of reduced groundwater access that would result from allowing groundwater levels to fall to historic lows for 24 months. By the time an undesirable result is declared, and management actions are triggered in response to the undesirable result, environmental groundwater users will have already experienced significant stress and potentially irreversible mortality. The Department recommends the GSP reconsider the 24-month duration of groundwater levels below MTs required to constitute an undesirable result, recognizing that extended durations of groundwater inaccessibility for environmental users will likely lead to adverse impacts that cannot be easily reversed when groundwater levels recover. At a minimum, the Department recommends identifying physical triggers (e.g., declining Normalized Difference Vegetation Index signals) and associated management actions (e.g., demand reduction) to enable the GSAs to identify and mitigate localized patterns of lowering groundwater or depleted ISW and associated negative impacts before the second year of MT exceedances yields more	Comment acknowledged. The GSAs will conduct local management of the Colusa Subbasin based on measurable objectives and interim milestones with the goal of avoiding exceedances of minimum thresholds and triggering of undesirable results. The GSAs will conduct this local management with consideration of all beneficial users and will seek to work with resource agencies, stakeholders, beneficial users, the public and GSAs representing adjacent subbasins to avoid exceeding minimum thresholds and incurring undesirable results.

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314 cont'd								significant and undesirable impacts. These interim action triggers will help preempt irreversible losses and undesirable results for environmental users. Undesirable Results: The Department recommends the GSP reconsider the 24-month duration of groundwater levels below MTs required to constitute an undesirable result, recognizing that extended durations of groundwater inaccessibility for environmental users will likely lead to adverse impacts that cannot be easily reversed when groundwater levels recover. At a minimum, the Department recommends identifying physical triggers (e.g., declining Normalized Difference Vegetation Index signals) and associated management actions (e.g., demand reduction) to enable the GSAs to identify and mitigate localized patterns of lowering groundwater or depleted ISW and associated negative impacts before the second year of MT exceedances yields more significant and undesirable impacts. These interim action triggers will help preempt irreversible losses and undesirable results for environmental users.	

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315	DEPARTMENT OF FISH AND WILDLIFE			6.5.2.3, 6.5.2.4; starting page 6-84				The GSP should include additional metrics and timelines related to the implementation of demand management within the subbasin. a. Issue: The Department appreciates the GSP's identification of both shortand long-term demand management actions that will serve as a "backstop" to the other identified PMAs. As the other PMAs focus largely on implementing recharge projects that may be costly, rely on securing additional surface water supplies, and/or require potentially lengthy permitting processes, demand management may be necessary in instances where a quick response to undesirable results within the subbasin is needed. Though the GSP identifies various demand management strategies, the GSP states that these management actions are in the "early conceptual stage" and as such, no timelines have been determined. b. Recommendation: The Department recommends detailing specific timelines and metrics that would trigger the implementation of the identified demand management scenarios should recharge projects encounter delays or fail to produce the anticipated groundwater benefits to the subbasin.	Comment acknowledged. It is noted that the decisions pertaining to demand management involve major public policy questions that will require evaluations of conditions in a public, stakeholder-driven process. The GSP acknowledges a non-exhaustive list of events that may trigger demand management in Section 6.5.2.3. The precise decisions for whether and how demand management would be applied will be determined by the GSA boards through a stakeholder-driven process during GSP implementation. If demand management is pursued, the establishment of implementation metrics and timelines should be considered.
316	Holly Reimers			ES-14				What happened to the wells between 200' and 2,000'?	Comment acknowledged. The criteria for selecting interconnected surface water monitoring wells are that the wells must be less than 200 feet deep and the wells must be located between 2,000 feet and 5 miles from the surface waters being monitored. Wells that are deeper than 200 feet do not meet the criteria for monitoring interconnected surface waters.
317	Holly Reimers			ES-16		ES-16		Wells falling below their MT should be monitored more often than every 24 months. Every two years allows for a severe lowering of the ground water level that might not be recoverable. Any well falling below it's MT should be checked at least twice a year. Any land subsidence should not be acceptable. This is not something that is recoverable.	Comment acknowledged. As described in Section 4.2.1.3, groundwater level measurements will be collected twice annually, at a minimum, to ensure seasonal trends are well accounted for (23 CCR §354.34(c)(1)(B)). Manual measurements for all network wells should be collected in the spring and fall, at a minimum, unless more frequent measurements are required to characterize changes in groundwater levels.

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318	Holly Reimers			ES-17 12-15				" .. not currently occurring ... " WHAT?? Has anyone noted the number of dry and going dry wells in Glenn County? Granting that this is an usually dry year and that Stony Creek has not run all year it is almost amazing that there have not been more dry wells. Yet there are those around the County that continue to pump great amounts of ground water from their deep wells. Sort of like putting a straw on a glass and sucking. The top part of the glass will go dry first as the water is pulling from the bottom.	Comment acknowledged. We have added a preface to the GSP to acknowledge the current drought conditions and summarize what is known at this time about the severity of well dewatering experienced by water users in the Subbasin, including domestic well users and DAC/SDAC/EDA households. It is noted that GSP development - including work to define undesirable results and establish the Sustainable Management Criteria - has occurred over several years utilizing the best available science and tools, with the most sufficient and credible information and data available for the decisions being made and the time frame available for making those decisions. Current and historical groundwater conditions and water budgets have been evaluated for the Subbasin in alignment with the GSP regulations, using the most recent and complete hydrologic, water supply, water demand, and land use data available at the time GSP development began. Unfortunately, drought conditions in 2020-2021 have coincided with development of the GSP, a timing that has not permitted complete evaluation and inclusion of data from these years in the GSP at this time. Ongoing management of the Colusa Subbasin under the GSP will follow an “adaptive management” strategy that involves active monitoring of Subbasin conditions and addressing any challenges related to maintaining groundwater sustainability by scaling and implementing PMAs in a targeted and proportional manner in accordance with the needs of the Subbasin. Data and information collected through ongoing monitoring will be evaluated, reported, and used to guide GSP implementation. GSP annual reports provide an opportunity each year to evaluate current Subbasin conditions and assess needs for additional PMAs. The first annual report, due April 2022, will evaluate groundwater conditions in the Colusa Subbasin since 2015. During periodic GSP evaluations, the GSP will also be reviewed and SMC will be revised, as needed, as we learn more about the effects of current and future conditions.

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319	Holly Reimers			Ch 2-1				The basin boundaries should be redrawn to exclude those lands that do not have access to groundwater primarily those lands in the western portion of the basin. Not only is there little to no groundwater these lands are receiving no benifit from being in the basin, only an expense.	Comment acknowledged. There are currently no specific plans for submitting a basin boundary modification request to exclude the lands indicated in this comment. At this time, there is insufficient information to determine whether those areas are hydrogeologically disconnected from the Colusa Subbasin. In Section 7.1.2.3 of the GSP, the GSAs have proposed the Colusa Subbasin Western Boundary Investigation to fill data gaps and better define the western fringes of the Subbasin. Also, specific financing plans and cost-allocation approaches are not yet determined, but will be identified and determined with stakeholder involvement following GSP adoption. Please see the response to comment 321.
320	Holly Reimers			3-15 3.1.5.16				Why is Hambright creek not mentioned? When running it is a major source of groundwater recharge.	Comment addressed. Hambright Creek has been added to the list of streams and creeks in Section 3.1.5.1.6.
321	Holly Reimers			6.5.1				The OUWUA is acknowledged as direct Groundwater Recharge. The land owners in the OUWUA should also be acknowledged as having the ability to assist in the ground water recharge. Those that apply only surface water should be given credit and not charges as they are helping the recharge when ever they apply surface water.	Comment addressed. An acknowledgement to participating landowners has been added to the project description in Section 6.5.1.5. Specific financing plans and cost-allocation approaches are not yet determined, but will be identified and determined with stakeholder involvement following GSP adoption. As described in Section 1.3.1, "The Colusa Subbasin GSAs will develop a financing plan for the overall implementation of the GSP that will specify funding sources and cost-allocation approaches across entities for the different GSP implementation activities (see Chapter 7 and Appendix 7A for a description of existing options)."
322	Holly Reimers			7.6	8-23			Charging the landowners on the west side of the basin, with no groundwater, the same amounts as those that have the water under their ground and are pumping for their perennial crops is unfair. Paying a "tax" or "fee" when there is no benefit to the landowner, there should be some benefit but so far we on the west side are seeing none. To place this additional burden on these land owners may force them to look at other uses of their ground to be able to "pay" for your additional fees.	Comment acknowledged. Specific financing plans and cost-allocation approaches are not yet determined, but will be identified and determined with stakeholder involvement following GSP adoption. As described in Section 1.3.1, "The Colusa Subbasin GSAs will develop a financing plan for the overall implementation of the GSP that will specify funding sources and cost-allocation approaches across entities for the different GSP implementation activities (see Chapter 7 and Appendix 7A for a description of existing options)." These considerations will be folded into the financing plan development and discussions.
323	Holly Reimers			Appendix 7A			Table 1	All "fees" should be passed only by a majority approval vote. Any "vote" should be conducted on a per/acre basis and should take into consideration what benefit there is to the landowner(s). You can call it is "fee" BUT if it looks like a duck, quacks like a duck IT IS A DUCK! A "fee" by any other name is still a tax on our property.	Please see the response to comment 322.

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324	Holly Reimers		General Comments					It has been said that there are outside groups purchasing ground in the basin with the only purpose of mining the ground water. This is not a supportable option for the basin to be able to sustain its self. NO GROUND WATER SHOULD BE EXPORTED FROM THE BASIN -EVER! Chapters 3, 4 & 5 one needs to have a Doctorate Degree in Hydrology, Geology and Engineering to even start to understand any of this. This should be written so that the general public and landowners would have some kind of understanding as to what some of these proposals are and how they as landowners will be effected. Or at least put in a summary that the landowner can understand, it may be included I might have missed it in all the other "stuff'.	Comment acknowledged. All of the topics are either required by DWR and SGMA or are industry-standard supplemental topics that were deemed to be appropriate for inclusion in these chapters. The goal of Chapters 3 through 5 was to meet DWR/SGMA requirements and provide information to GSAs, residents, and other scientists and engineers that may work on future SGMA-related projects. The techniques and tools to characterize aquifer properties, flow mechanics through a substrate, water budgets, and monitoring require scientific terminology to accurately convey the necessary information. The Executive Summary contains a simplified version of these chapters.
325	Lisa Hunter	GGA	Executive Summary	N/A	ES-1	19-Dec		This is a general discussion on SGMA- suggest changing "subbasin(s)" to "basin(s)"	Comment addressed in the GSP section indicated.
326	Lisa Hunter	GGA	Executive Summary	N/A	ES-3		Figure ES-1	In the legend, remove "(Colusa Subbasin)" following "Colusa Groundwater Authority GSA"	Comment addressed in the GSP section indicated.
327	Lisa Hunter	GGA	Executive Summary	N/A	ES-5		Figure ES-2	The background color makes it difficult to read the cities and see the boundary on the fence diagram- consider changing the color of the background or the boundary & city names	Comment addressed in the GSP section indicated.
328	Lisa Hunter	GGA	Executive Summary	N/A	ES-14	12		Change "twelve" to "12" to be more consistent with the format in the prior paragraph	Comment addressed in the GSP section indicated.
329	Lisa Hunter	GGA	Executive Summary	N/A	ES-21		Table ES-5	Consider using thousands rather than millions in the 5th column so there are fewer decimals. It may be easier to ready.	Comment addressed. The suggested edits have been incorporated into the indicated table in the Executive Summary and in Chapter 6.
330	Lisa Hunter	GGA	1	1.1	1-1	11		adopt Groundwater Sustainability Plans (GSPs) for non-critically overdrafted medium- and high-priority groundwater basins	Comment addressed in the GSP section indicated.
331	Lisa Hunter	GGA	1	1.3	1-2	26		~~Colusa and Glenn GSAs~~ CGA and GGA	Comment addressed in the GSP section indicated.
332	Lisa Hunter	GGA	1	1.3.1	1-3	18-19		Please add details similar to what is included for the CGA. The GGA was formed 6/20/2017 as a JPA with 9 member agencies (8 Director seats). The JPA was amended 10/14/19 to add a 10th member and one additional Director seat for a total of 9 Director seats. The GGA is the exclusive GSA for the Glenn County portion of the Colusa Subbasin.	Comment addressed in the GSP section indicated.
333	Lisa Hunter	GGA	1	1.3.1	1-3	19		The GGA has nine Director seats (this change is also suggested in the comment above)	Comment addressed in the GSP section indicated.
334	Lisa Hunter	GGA	1	1.3.1	1-4	1		Update GGA contact information: Glenn Groundwater Authority: Lisa Hunter, Water Resources Coordinator (530) 934-6501 (530) 934-6540 720 North Colusa Street 225 North Tehama Street Willows, CA 95988 lhunter@countyofglenn.net	Comment addressed in the GSP section indicated.
335	Lisa Hunter	GGA	1	1.3.2	1-4	15		with preparing the GSP and coordination activities in	Comment addressed in the GSP section indicated.
336	Lisa Hunter	GGA	1	1.3.3	1-5	4		under separate rate studies	Comment addressed in the GSP section indicated.

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337	Lisa Hunter	GGA	2	2.1.1	2-1			It might be helpful to note that no basins/subbasins border the western portion of the Colusa Subbasin.	Comment addressed in the GSP section indicated.
338	Lisa Hunter	GGA	2	2.1.1	2-2		Table 2-1	~~Corning Subbasin GSA~~ ~~Corning Sub-basin GSA~~	Comment acknowledged. The GSAs in the Corning Subbasin have been checked to confirm their alignment with the GSAs listed on the SGMA Portal and in the Corning Subbasin GSP (https://www.corningsubbasingsp.org/).
339	Lisa Hunter	GGA	2	2.1.2	2-4	8		water/irrigation districts	Comment addressed in the GSP section indicated.
340	Lisa Hunter	GGA	2	2.1.2	2.-4	11		Butte City is in the Butte Subbasin and should not be included here.	Comment addressed. The reference to Butte City is now removed.
341	Lisa Hunter	GGA	2	2.1.2.1	2-4	18-19		"Municipal water users in the Colusa Subbasin depend on groundwater." This sentence seems to be more appropriate in the next paragraph under "Municipal Water Purveyors"	Comment addressed. The reference to municipal water users has now been moved to the suggested section.
342	Lisa Hunter	GGA	2	2.1.2.1			Figure 2-2	Remove "Colusa Subbasin" after Colusa Groundwater Authority GSA in the legend	Comment addressed in the GSP section indicated.
343	Lisa Hunter	GGA	2	2.1.2.1				Are small water systems discussed?	Comment addressed in the GSP section indicated. State small water systems are defined in Chapter 2.1.2.1.
344	Lisa Hunter	GGA	2	2.1.2.1			Table 2-3	The page number appears as 2-11 (and should be 2-10)	Comment addressed in the GSP section indicated.
345	Lisa Hunter	GGA	2	2.2.1.1	2-17	16-18		Add "tribes"	Comment addressed in the GSP section indicated.
346	Lisa Hunter	GGA	2	2.2.1.1	2-17	33		The NSV IRWM Plan was revised March 2020	Comment addressed in the GSP section indicated.
347	Lisa Hunter	GGA	2	2.2.1.1	2-19	18-30		The Glenn County Groundwater Management Plan was adopted in 2000 (Ordinance 1115), revised in 2012 (Ordinance 1237). Incorporation of the Preliminary Plan and the Export Water Transfer Guidelines in Ordinance 1237 was very important.	Comment addressed in the GSP section indicated.
348	Lisa Hunter	GGA	2	2.2.1.1	2-20	11		~~A Counties'~~ Local Agency Formation Commissions (LAFCO) in each County conducts reviews of municipal	Comment addressed in the GSP section indicated.
349	Lisa Hunter	GGA	2	2.2.1.2	2-22	31		When land is in agricultural production it is generally irrigated and fertilized.	Comment addressed in the GSP section indicated.
350	Lisa Hunter	GGA	2	2.2.3	2-26	4-Jan		Exhibit C also contains Export Water Transfer Guidelines	Comment addressed in the GSP section indicated.
351	Lisa Hunter	GGA	2	2.5	2-31	29		The GSAs in the Colusa Subbasin will seek to work with Colusa and Glenn Counties	Comment addressed in the GSP section indicated.
352	Lisa Hunter	GGA	2	2.7.1	2-34	28		To guide and facilitate beneficial user engagement in the ~~GSA~~ GSP process,	Comment addressed in the GSP section indicated.

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353	Lisa Hunter	GGA	2	2.7.1	2-35	5-Apr		"Reflecting its "living document" role as a compilation / repository reflecting various engagement activities implemented or planned to be implemented by the GSAs." This sentence does not appear to be complete. Consider revising.	Comment addressed in the GSP section indicated.
354	Lisa Hunter	GGA	2	2.7.1.1	2-35	25		Were the mandates adopted by the counties? Is that the appropriate word? Please double-check.	Comment addressed in the GSP section indicated.
355	Lisa Hunter	GGA	2	2.7.1.2	2-37		Table 2-8	In the Tribes row, it notes "consult". Consult has a very specific meaning here. It that the appropriate word. Would it be more accurate to note collaborate? Consult if requested?	Comment acknowledged. "Consult" is considered the appropriate word in this context.
356	Lisa Hunter	GGA	2	2.7.1.3	2-38	2		~~SMGA~~ SGMA	Comment addressed in the GSP section indicated.
357	Lisa Hunter	GGA	2	2.7.1.3	2-38	9-12		Consider revising to be clear that all boards/committees requiring Brown Act compliance were conducted in such a manner and an effort was made to be inclusive. (There are ad hoc committees that did not require Brown Act compliance)	Comment addressed in the GSP section indicated.
358	Lisa Hunter	GGA	2	2.7.1.3	2-38	9-12		the GSAs have adopted a comprehensive table-based GSP comment	Comment addressed in the GSP section indicated.
359	Lisa Hunter	GGA	2	2.7.1.3	2-38	29		~~weekly by GSA staff~~ on a regular basis by facilitation staff and is then included in the agenda packet for each ~~GSP~~ GSA Board meeting beginning in XX (Date)	Comment addressed in the GSP section indicated.
360	Lisa Hunter	GGA	2	2.7.1.3	2-38	32-34		each Board agenda defines said decision as a formal action ~~and further includes an agendized item for~~ which could include discussion by each Board about associated public input recorded in the comments tables that might inform their decision-making.	Comment addressed in the GSP section indicated.
361	Lisa Hunter	GGA	2	2.7.1.3	2-38	41		• ~~Final public comment period prior to adjournment of each meeting.~~ Final public comment is not agendized on Board or TAC meeting agendas- Member comments are. While frequently, final public comments are taken at that time, I suggest removing the general statement because it may not be accurate.	Comment addressed in the GSP section indicated.
362	Lisa Hunter	GGA	2	2.7.2.1	2-39	3-4		thereafter ~~to present~~ September 2021, the parties that make up the CGA and GGA have collectively sponsored, publicized and conducted over 236 separate It may be helpful to note in this section, the meetings referenced were the meetings that are open to the public. Additional ad hoc meetings were held (some of which members of the public attended)	Comment addressed in the GSP section indicated.
363	Lisa Hunter	GGA	2	2.7.2.1	2-39	22-23		Committee and Subcommittee meetings) requiring compliance with the Brown Act, agendas ~~and associated background information~~ are posted no less than 72 hours before a meeting and all materials presented in said meetings. Background material is made available once prepared and distributed to the board.	Comment addressed in the GSP section indicated.
364	Lisa Hunter	GGA	2	2.7.2.1	2-39	29-30		All public outreach meetings were similarly publicized through Facebook and Twitter.	Comment addressed in the GSP section indicated.

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365	Lisa Hunter	GGA	2	2.7.2.1	4-40	15-17		On a regular ~~and publicly noticed~~ basis, inter-basin meetings of representatives from the Colusa Subbasin met with representatives from the adjacent Corning, Butte, Sutter and Yolo Subbasins (and other non-adjacent subbasin representatives) to discuss interconnected	Comment addressed in the GSP section indicated.
366	Lisa Hunter	GGA	2	2.7.2.1	4-40	28		As described above, ~~In~~ in the initial stages of GSA	Comment addressed in the GSP section indicated.
367	Lisa Hunter	GGA	2	2.7.2.1	4-40	35+		There were also 3 meetings in 2015 with general SGMA information co-sponsored by the Glenn County WAC, Glenn County Farm Bureau, and the UC Cooperative Extension.	Comment addressed in the GSP section indicated.
368	Lisa Hunter	GGA	2	2.7.2.2	2-42		Table 2-9	Include the Preface in the Public Draft Review	Comment addressed in the GSP section indicated.
369	Lisa Hunter	GGA	2	2.7.3.1	2-42	15-17		~~Confidentiality~~ sensitive information, actual contact information of interested parties is not appropriate to publish as part of this GSP). Any interested member of the public could be added to the lists by signing up via ~~respective~~ online entry options located on the CGA ~~respective GSA's~~ website~~s~~ and through email sign up options or requesting by phone for each GSA.	Comment addressed in the GSP section indicated.
370	Lisa Hunter	GGA	2	2.7.3.1	2-42	18+		Did we connect with Cortina?	Comment addressed. Clarifications have been added to the GSP.
371	Lisa Hunter	GGA	2	2.7.3.5	4-43	33		to view all outreach events from late 2020 through (ADD DATE) and including public review and subsequent GSA	Comment addressed in the GSP section indicated.
372	Lisa Hunter	GGA	2	2.7.3.6	2-44	9		(when available after ~~Match~~ March 2020)	Comment addressed in the GSP section indicated.
373	Lisa Hunter	GGA	2	2.7.3.6	2-44	22		GSP background documents ~~including Drought Preparedness and Response~~	Comment addressed in the GSP section indicated.
374	Lisa Hunter	GGA	2	2.7				General comment: It would be helpful to define "public meeting". It is referenced frequently and may confusion between Board and/or committee meetings which are open to the public and public outreach meetings which follow a different process, including the outreach done to advertise public outreach meetings (for instance board meetings are not publicized in the social media and via press release, whereas public outreach meetings were)	Comment acknowledged. The general distinction is: "public meetings" are open to the public and allow comments and feedback from the public, but are not exclusively held for that purpose (e.g., Board meetings, TAC meetings), whereas "public outreach meetings/workshops" are open to the public and are primarily designed to engage with the public and stakeholders to solicit their opinions and feedback. This has been clarified in Section 2.7.2
375	Lisa Hunter	GGA	3	3.1.3	3-4	6-May		with periods ~~of~~ exceeding 100-degree Fahrenheit temperatures.	Comment addressed in the GSP section indicated.
376	Lisa Hunter	GGA	3	3.1.5.1.1			Figure 3-7	This comment refers to this figure and other similar figures. The small inset graphic is useful to see the trends; however, the x and y axis labels are not legible- can the labels be clearer? Perhaps darker to facilitate reading them?	Comment addressed in the GSP section indicated.
377	Lisa Hunter	GGA	3	3.1.5.1.3	3-13	21		Missing a "." after Subbasin	Comment addressed in the GSP section indicated.
378	Lisa Hunter	GGA	3	3.1.7.2.1	3-30	33-34		Is the sentence referencing the average yield in the West Butte Subbasin relevant here? If so, should it reference the Butte Subbasin instead? If not, I suggest removing.	Comment addressed in the GSP section indicated.
379	Lisa Hunter	GGA	3	3.7.8.1	3-35	39-40		Also reference the CCWD jurisdictional boundary	Comment addressed in the GSP section indicated.

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380	Lisa Hunter	GGA	3	3.1.8.2	3-36	6		Is the Corning Subbasin intended to be referenced in the text or was this a carryover from prior work?	Comment addressed in the GSP section indicated.
381	Lisa Hunter	GGA	3	3.1.11.1	3-43	17-18		, along Stony Creek. ~~Stony Creek is~~ Groundwater underflow may occur…	Comment addressed in the GSP section indicated.
382	Lisa Hunter	GGA	3				Figure 3-18	Why is there no soils color shading in the vicinity of Orland?	Comment acknowledged. The underlying dataset used to evaluate the soil agricultural groundwater banking index (SAGBI) potential is the Natural Resources Conservation Service (NRCS) Soil Survey Geographic Database (SSURGO) which does not include soil survey mapping for the city of Orland urban center. The soil survey dataset does not specify why certain areas were not surveyed.
383	Lisa Hunter	GGA	3	3.1.11.3	3-46	11		or through discharge to ponds, springs, wetlands,	Comment addressed in the GSP section indicated.
384	Lisa Hunter	GGA	3				Figure 3-19	The labels appear to be missing.	Comment addressed in the GSP section indicated.
385	Lisa Hunter	GGA	3				Figure 3-21	Figure 3-21 is referenced but appears to be missing. Instead Figure 3-23 is inserted two times (once after page 3-49 and once after page 3-58)	Comment addressed in the GSP section indicated.
386	Lisa Hunter	GGA	3	3.1.11.3	3-49	25		It may be useful to note that the well extraction information includes more that just the Colusa County portion of the Colusa Subbasin- if I understand, it includes all of Colusa County.	Comment addressed in the GSP section indicated.
387	Lisa Hunter	GGA	3	3.1.12.4	3-54	31		Glenn County is also mapping and recording reports of dry wells. See regular updates at: https://arcg.is/10nmyT2 Colusa may also be tracking.	Comment addressed in the GSP section indicated.
388	Lisa Hunter	GGA	3	3.1.12.5	3-55	1		delineation of groundwater dependent ecosystems	Comment addressed in the GSP section indicated.
389	Lisa Hunter	GGA	3	3.2.2	3-55	29		Add the conditions to 2020 to be consistent with the rest of the sentence.	Comment addressed in the GSP section indicated.
390	Lisa Hunter	GGA	3	3.2.2	3-55	32		Consider adding potential environmental impacts	Comment addressed in the GSP section indicated.
391	Lisa Hunter	GGA	3	3.2.5.1	3-67	38		Is “Eh” a typo? Should it be EC? If so, please correct. If not, please add to the acronym list.	Comment addressed in the GSP section indicated.
392	Lisa Hunter	GGA	3	3.2.5.2	3-70	35		Is this intended to be Colusa County’s wells of Colusa Subbasin wells?	Comment addressed in the GSP section indicated.
393	Lisa Hunter	GGA	3	3.2.6	3-73	38		near Zamora in Yolo County (outside of the Colusa Subbasin), at 12N1E34Q1	Comment addressed in the GSP section indicated.
394	Lisa Hunter	GGA	3				Figure 3-32	It would be helpful to add the cities points layer with labels similar to the other figures.	Comment addressed in the GSP section indicated.
395	Lisa Hunter	GGA	3	3.2.7.1	3-78	16		For clarity please note if the net gain is to groundwater or to the stream. (I assume the gain is to groundwater.)	Comment addressed in the GSP section indicated.
396	Lisa Hunter	GGA	3				Figure 3-34	Suggest adding Stony Creek to the title “Stony Creek Thalweg Analysis”	Comment addressed in the GSP section indicated.

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397	Lisa Hunter	GGA	3				Figure 3-36	In this figure, it is difficult to understand where the final "potential GDEs" or likelihood of GDEs exist. The legend is a bit difficult to follow as well. It may be useful to have a final figure without the extra layers to clearly denote the potential GDEs and likelihood scores.	Comment acknowledged. The figure will be updated during future updates to the Colusa Subbasin GSP.
398	Lisa Hunter	GGA	3	3.3.1	3-86	8		This references a 26-year period. Page 3-98 states a 25-year period. Please reconcile throughout.	Comment addressed in the GSP section indicated.
399	Lisa Hunter	GGA	3	3.3.1	3-86	30		Capitalize Subbasin	Comment addressed in the GSP section indicated.
400	Lisa Hunter	GGA	3	3.3.3.1	3-89	37-42		Was the Glenn County General Plan used? If not, please specify how the information was interpolated, similar to how it was done under the Urban and Industrial Water Demand section on page 3-93	Comment addressed in the GSP section indicated.
401	Lisa Hunter	GGA	3	3.3.3.3	3-92	37-39		Was the Glenn County General Plan used? If not, please specify how the information was interpolated, similar to how it was done under the Urban and Industrial Water Demand section on page 3-93	Comment addressed in the GSP section indicated.
402	Lisa Hunter	GGA	3	3.3.4.1.1	3-101	14-15		Diversion agreements/reductions are specifically called out for Sac River Settlement Contractors. Would it be useful to also note other supply cutbacks such as the TCC Districts?	Comment acknowledged. Reduced allocations to Tehama Colusa Canal CVP contractors in certain years and Stony Creek water shortages experienced by the OUWUA are noted in Section 3.3.4.1.1.
403	Lisa Hunter	GGA	3	3.3.4.1.2	3-101	36		Change basin to Subbasin.	Comment addressed in the GSP section indicated.
404	Lisa Hunter	GGA	3	3.3.4.3.1	3-105-3-106	21-22	Figure 3-44	The text indicates +0.6 taf/yr while the figure indicates 1 TAF per year (I assume to figure is rounding). This may be helpful to reconcile.	Comment addressed in the GSP section indicated.
405	Lisa Hunter	GGA	3	3.3.4.3.2	3-107-3-108	13-Dec	Figure 3-46	The text indicates -2.7 taf/yr while the figure indicates -3 TAF per year (I assume to figure is rounding). This may be helpful to reconcile	Comment addressed in the GSP section indicated.
406	Lisa Hunter	GGA	3	3.3.4.3.3	3-109-3-110	14-15	Figure 3-48	The text indicates -7.3 taf/yr while the figure indicates -7 TAF per year (I assume to figure is rounding). This may be helpful to reconcile	Comment addressed in the GSP section indicated.
407	Lisa Hunter	GGA	4				Table 4-2	Footnote d- SWL should be SWD	Comment addressed in the GSP section indicated.
408	Lisa Hunter	GGA	4	4.2.4.5	4-29	29		The ~~Colusa and Glenn~~ Colusa Subbasin GSAs are	Comment addressed in the GSP section indicated.
409	Lisa Hunter	GGA	4	4.2.4.5	4-29	34		Remove the "s" from Willows. Should be Willow Creek.	Comment addressed in the GSP section indicated.
410	Lisa Hunter	GGA	4	4.2.4.5	4-30	7		the ~~Colusa and Glenn~~ Colusa Subbasin GSAs	Comment addressed in the GSP section indicated.
411	Lisa Hunter	GGA	4	4.2.5.4	4-33	31		monitoring sites for groundwater dependent ecosystems.	Comment addressed in the GSP section indicated.

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412	Lisa Hunter	GGA	5	5.2.1	5-3	28		Might be useful to indicate the PMAs could be implemented by other partners (not just the GSAs).	Comment addressed in the GSP section indicated.
413	Lisa Hunter	GGA	5	5.3.1.4	5-7			Include stock water impacts (hauling water, selling livestock, etc)	Comment addressed in the GSP section indicated.
414	Lisa Hunter	GGA	5	5.3.2.5	5-10			Include stock water impacts (hauling water, selling livestock, etc)	Comment addressed in the GSP section indicated.
415	Lisa Hunter	GGA	5	5.3.2.6	5-10	27		Updates should not be capitalized	Comment addressed in the GSP section indicated.
416	Lisa Hunter	GGA	5	5.3.4.1	5-12	9		Irrigation or stock water supply	Comment addressed in the GSP section indicated.
417	Lisa Hunter	GGA	5	5.3.6.2	5-15	31		Use GGA and CGA instead of spelling out	Comment addressed in the GSP section indicated.
418	Lisa Hunter	GGA	5	5.3.6.2	5-15	33		will occur utilizing a subset of wells in the Subbasin's groundwater elevation monitoring network selected for	Comment addressed in the GSP section indicated.
419	Lisa Hunter	GGA	5	5.4.1.1	5-19	Not present		In the Minimum Thresholds section #1- when discussing domestic wells, it may be appropriate to reference the Human Right to Water. It may also be useful to note in the section (when discussing that very shallow wells likely do not meet current health standards. At the end of #1, add "contained in the DWR database" after protect 80 percent of domestic wells.	Comment addressed in the GSP section indicated.
420	Lisa Hunter	GGA	5				Figure 5-1 and similar	It would be useful to add which method was used to determine the MT. Could be added on the right hand side under Minimum Threshold: XX ft	Comment addressed in GSP. This only applies to Figure 5-1, as Figures 5-2 and 5-3 represent wells included in the interconnected surface water monitoring network. The method used to determine the MT for the interconnected surface waters is different from the two alternative methods used for the groundwater levels.
421	Lisa Hunter	GGA	5				Table 5-2	It would be helpful to add a column to denote which method was used to determine the MT. It could be simply 1 or 2 with explanation in the footnote section.	Comment addressed in the GSP section indicated.
422	Lisa Hunter	GGA	5	5.4.5.1	5-29	10-Mar		Based on discussion, evaluating infrastructure sensitivity may be a good project for the GSP.	Comment addressed. A proposed study of infrastructure sensitivity to land subsidence has been added to Chapter 7, and is referenced in Section 5.4.5.1.
423	Lisa Hunter	GGA	5	5.4.5.1	5-29	17		Glenn County has data from 2004.	Comment addressed in the GSP section indicated.
424	Lisa Hunter	GGA	5				Figure 5-2 and similar	Minimum Threshold should be ft bgs not ft	Comment addressed in the GSP section indicated.
425	Lisa Hunter	GGA	5	5.4.6.1	5-34	4		better represented local conditions at that time rather than adding an additional 10 feet (in order to be more protective).	Comment addressed in the GSP section indicated.

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426	Lisa Hunter	GGA	5	5.4.7	5-36			Should water quality and subsidence be mentioned in this section?	Comment addressed. Section 5.4.7 of the GSP was revised as follows: "The Colusa Subbasin GSAs and the GSAs in the adjacent subbasins coordinated their approach to developing sustainable management criteria during development of their respective GSPs and will continue to coordinate their efforts during plan implementation. The Colusa Subbasin GSAs and the GSAs in the adjacent subbasins developed similar sustainable management criteria for degraded water quality and inelastic land subsidence. Because of the similarity in these sustainable management criteria across the subbasins, and the ongoing interbasin coordination efforts, it is anticipated that the minimum thresholds established in the Colusa Subbasin for degraded water quality and inelastic land subsidence will help avoid undesirable results for the Colusa Subbasin and the adjacent subbasins. GSP Section 7.1.2 describes implementation activities focused on interbasin coordination for degraded water quality, inelastic land subsidence and other sustainability indicators."
427	Lisa Hunter	GGA	6					This chapter should discuss the PMA submittal process including the online submittal forms to gather stakeholder ideas and ongoing nature of including PMAs in the GSP.	Comment addressed. Additional information has been added to Section 6.1.3 to describe the PMA submittal process.
428	Lisa Hunter	GGA	6				Figure 6-1	The title "Colusa Subbasin PMA" does not seem appropriate for the image and may be unnecessary. The legend indicates blue lines for "Groundwater Basins"- is that correct? It seems to be streams. The legend does not include water districts or what I assume are wells. Those may be helpful to include. Generally, this is quite a busy figure for the purpose. Consider simplifying.	Comment addressed. Map has been simplified and updated as suggested.
429	Lisa Hunter	GGA	6	6.1	6-4	6		Planned PMAs ~~that will~~ are expected to be implemented to primarily address current,	Comment addressed in the GSP section indicated.
430	Lisa Hunter	GGA	6	6.1	6-4	34		Add "The PMAs are not ranked."	Comment addressed in the GSP section indicated.

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431	Lisa Hunter	GGA	6	6.2.1	6-6	24-28		Note that not all projects are the responsibility of the GSAs, but rather a partnership or sometimes the GSAs will have a supporting role.	Comment addressed in the GSP section indicated.
432	Lisa Hunter	GGA	6	6.2.1	6-6	34		GSAs, ~~and~~ districts, and other partners in the Colusa Subbasin will further develop	Comment addressed in the GSP section indicated.
433	Lisa Hunter	GGA	6				Table 6-2	DWR is also a partner in the Colusa Subbasin Multi-Benefit Groundwater Recharge moving into the expanded program. In the Sycamore Slough Groundwater Recharge Pilot Project- "from" should not be capitalized. "would be available From settlement contract" The Sites Reservoir Project says "The Sites Project is a new off-stream storage…" It might be helpful to clarify this is in development, not that the project has completed a new storage facility. The well abandonment outreach and funding program should specify this would be accomplished by working with well permitting agencies. Review of County Well Permitting Ordinances should specify the GSAs would work with the counties to review and suggest revisions to ordinances (these are outside of the jurisdiction of the GSAs)	Comment addressed in the GSP section indicated.
434	Lisa Hunter	GGA	6	6.3.1.3	6-19	5		~~County~~ LAFCO	Comment addressed in the GSP section indicated.
435	Lisa Hunter	GGA	6	6.3.3.1	6-29			See comments on Table 6-2 relating to this project.	Comment addressed. Applicable edits have been added to Section 6.3.3.1.
436	Lisa Hunter	GGA	6	6.3.3.1	6-30	3		Should this reference waterbirds or shorebirds?	Comment addressed in the GSP section indicated.
437	Lisa Hunter	GGA	6	6.3.3.4	6-32	11		recharge sites	Comment addressed in the GSP section indicated.
438	Lisa Hunter	GGA	6	6.3.3.4	6-32	13		~~winter~~ specific months	Comment addressed in the GSP section indicated.
439	Lisa Hunter	GGA	6	6.3.3.5	6-32	24-25		The program is summer/early fall and/or spring (July 15-October 15 and/or March 15-April 15). Please adjust references to timing, here and in other sections relating to this project.	Comment addressed. References to the timing of the Colusa Subbasin Multi-Benefit Recharge project have been revised to include the spring period.
440	Lisa Hunter	GGA	6	6.3.3.6	6-32	29		Add a sentence to provide an update on 2021. Due to dry conaditions in 2021, the project implementation was delayed.	Comment addressed in the GSP section indicated.
441	Lisa Hunter	GGA	6	6.3.3.6	6-33	3		Clarify the availability of **surface** water rights	Comment addressed in the GSP section indicated.
442	Lisa Hunter	GGA	6	6.3.3.6	6-33	4		Missing bullet point	Comment addressed in the GSP section indicated.
443	Lisa Hunter	GGA	6	6.3.3.6	6-33	21		Indicates the project is not expected to terminate. Please note this is a pilot project that could be continued if deemed appropriate.	Comment addressed in the GSP section indicated.
444	Lisa Hunter	GGA	6	6.3.4.2	6-37		Table 6-15	Glenn County LAFCO should be changed to Glenn LAFCO	Comment addressed in the GSP section indicated.

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445	Lisa Hunter	GGA	6	6.3.4.3	6-37	13		Glenn County LAFCO should be changed to Glenn LAFCO	Comment addressed in the GSP section indicated.
446	Lisa Hunter	GGA	6	6.3.4.6	6-38	20		Glenn County LAFCO should be changed to Glenn LAFCO	Comment addressed in the GSP section indicated.
447	Lisa Hunter	GGA	6	6.4.1	6-46	14		This section ~~described~~ describes ongoing	Comment addressed in the GSP section indicated.
448	Lisa Hunter	GGA	6	6.5.1	6-58	2		If determined to be necessary or desirable under	Comment addressed in the GSP section indicated.
449	Lisa Hunter	GGA	6				Table 6-34	Reference to migratory waterfowl be changed to migratory birds (could be waterfowl or shorebirds?)	Comment addressed in the GSP section indicated.
450	Lisa Hunter	GGA	6	6.5.1.7	6-69	11		shorebirds/waterfowl as ~~we pulse flood the field~~ the field is pulse flooded, or	Comment addressed in the GSP section indicated.
451	Lisa Hunter	GGA	6				Table 6-35	One period after Sycamore Slough in the implementation description. In the benefits and benefit evaluation methodology, it notes waterfowl. Will it also include shorebirds?	Comment addressed in the GSP section indicated. Yes, this project may benefit migratory waterfowl or shorebirds, so the text has been modified to "migratory birds".
452	Lisa Hunter	GGA	6				Table 6-36	In the implementation description, it may be useful to add a sentence indicating that this concept could be applied throughout the Colusa Subbasin.	Comment addressed in the GSP section indicated.
453	Lisa Hunter	GGA	6	6.5.2.3	6-84	6		Remove “or MO”	Comment addressed in the GSP section indicated.
454	Lisa Hunter	GGA	6	6.5.2.3	6-86	1		action ~~will only~~ could be triggered	Comment addressed in the GSP section indicated.
455	Lisa Hunter	GGA	6	6.5.2.3	6-86	13		Add “for domestic purposed only” when describing de minimis use	Comment addressed in the GSP section indicated.
456	Lisa Hunter	GGA	6	6.5.2.7	6-91	1		would review and ~~revise~~ suggest revisions to the county	Comment addressed in the GSP section indicated.
457	Lisa Hunter	GGA	6	6.5.2.7	6-91	11-12		Replace “better” with “appropriate” It might also be useful to note requiring depths to be deeper than MTs.	Comment addressed in the GSP section indicated.
458	Lisa Hunter	GGA	6				Table 6-51	In the implementation description, it should not the action would be to review and **suggest revisions** to the county well permitting	Comment addressed in the GSP section indicated.
459	Lisa Hunter	GGA	6				Table 6-52	In the implementation description, it may be useful to include that this action could be done in coordination with neighboring GSAs, especially along Stony Creek.	Comment addressed in the GSP section indicated.
460	Lisa Hunter	GGA	7				Table 7-1	There are two Table 7-1 (page 7-3 and 7-4) In the second table, in the well inventory program description: Add that the program would seek to identify wells that are no longer active In the well registration program- remove the reference to voluntary. This could be voluntary or not.	Comment addressed in the GSP section indicated. It is noted that there is only one Table 7-1, the table on page 7-4 is a continuation of the same table on the prior page.
461	Lisa Hunter	GGA	7	7.1.2.8	7-9			Add that the program would seek to identify wells that are no lo	Comment addressed in the GSP section indicated.

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462	Lisa Hunter	GGA	7	7.1.2.9	7-10	2		Remove reference to voluntary.	Comment addressed in the GSP section indicated.
463	Lisa Hunter	GGA	7	7.2	7-16			It might be appropriate to add that some details on the cost allocation between the GSAs remain to be finalized.	Comment addressed in the GSP section indicated.
464	Lisa Hunter	GGA	7	7.6	7-22	24		GSAs are ~~pursuing~~ considering a combined approach…	Comment addressed in the GSP section indicated.
465	Pamela Plemmons		Executive Summary			22-2		(Executive summary-Line 22-27 and corresponding sections in the text) I believe that the foundational assumptions with the water budgets do not reflect the reality of future climate change and the assumptions of data used as the baseline were not indicative of drought years. In addition, the idea that using a central tendency for climate change is short sighted at best. It seems to me that a "critical' tendency for climate change should also be included in the analysis—one that looks at a serious increase in overall earth temperature above 2.5*C. Otherwise, we are just putting our heads in the sand with regard to future water/crop issues. What mitigation factors could be planned for? How is water distributed equitably in times like that? What future cropping patterns might be considered? (maybe more annual crops when water is available..)	Comment acknowledged. As the commenter acknowledges, there is significant uncertainty in future conditions related to climate, water supplies, and other factors that will impact groundwater conditions and sustainability in the Colusa Subbasin. The uncertainty of future conditions is one of many reasons that GSP implementation will be based on adaptive management. The GSAs' adaptive management strategy for GSP implementation is described extensively in Chapter 6. The GSAs are committed to ongoing monitoring and implementation of projects and management actions to respond to changing Subbasin conditions. Additionally, the GSP is considered a "living document," and will be revised over time, as needed, once more is known about the basin setting through monitoring (Chapter 4) and GSP studies (Chapter 7). It is also noted that use of the 2070CT climate change scenario is consistent with GSP regulations, and assumes that 2070CT climate change effects will occur immediately and continue over the entire projected period. In reality, climate change effects will occur gradually with uncertain interannual changes.
466	Pamela Plemmons		Executive Summary			17-21		(Executive summary-Line 17-21 and corresponding sections in the text)) I also would like to add that the assumptions of surface water use and a reduction in irrigated acreage from Shasta in critical years would be less is actually inaccurate. Since much of the irrigated agriculture in the Glenn and Colusa area are permanent crops (almonds and walnuts), they need to be irrigated no matter what…what it does trigger is a significant increase in ground water use.	Comment acknowledged. Please see the response to comment 465.
467	Pamela Plemmons		Additional Comment					Finally, what I find distinctly disturbing is that in the entire plan there is no individual accountability for ground water use by individual growers, no monitoring of private wells or individuals who are excessive consumers of our precious and shared resource. For example, I am aghast at the practice of almond farmers extensively irrigating to "fatten up" the nuts just prior to harvest. Seriously!!! What a waste of water!!! The extra moisture has to be dried out using more energy in the drying process. Why is there no individual accountability for each well and that each grower pay the price for water just like most consumers have to do? I believe this is something that truly needs to be included in the plan.	Comment acknowledged and addressed. Specific plans for determining accountability and cost-allocation approaches are not yet determined. Cost-allocation approaches and related accountability measures will be identified and determined by the GSA Boards through a stakeholder-driven process following GSP adoption. Those decisions are expected to be made in the coming year. In Chapter 7, GSP studies are also proposed to expand monitoring, which may help to inform these decisions.

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468	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	6	6.5.2	6-81			*(Summary of Comment A.1)* The Draft GSP has a lot of words but little action, except recharge projects. In Chapter 6, the GSP describes an adaptive management approach and projects and management actions that the GSAs **could** implement to ensure that the Colusa Subbasin is operated sustainably (i.e., to avoid undesirable results). The management actions given in Chapter 6 are all "Potential Management Actions", and all are currently in the early conceptual stage, so there is no understanding of the benefits, costs, the funding sources, or specifics about how the actions will maintain sustainable groundwater levels.	Comment acknowledged. As described in Section 6.1, the GSAs recognize that there are data gaps and uncertainties in future conditions (per 23 CCR §354.44(d)), and have planned an adaptive management strategy for PMA development and implementation. The adaptive management strategy involves active monitoring of Subbasin conditions (as described in Chapter 4) and addressing any challenges related to maintaining groundwater sustainability by scaling and implementing PMAs in a targeted and proportional manner in accordance with the needs of the Subbasin. The adaptive management approach is consistent with SGMA (CWC §10728.2, §10733.8), consistent with DWR recommendations, and consistent with GSPs that have been approved by DWR. Notably, the GSAs have proposed several "planned PMAs" (described in detail in Section 6.3) that do provide more specific information, as available, about project benefits, costs, and funding. As described in Section 6.2.2, the "planned PMAs" are expected to provide more than 80 TAF/yr in gross average annual benefits that will offset groundwater pumping and support groundwater sustainability in the Colusa Subbasin. These benefits are expected to address sustainability concerns in the projected future water budget, even under the effects of 2070CT climate change (Table 6-1). The GSAs expect that the planned PMAs will achieve the sustainability goal for the Colusa Subbasin and avoid reaching the minimum thresholds defined in this GSP under future, changing conditions. Nevertheless, recognizing the uncertainty in future conditions, the GSAs have proposed numerous "potential PMAs" that could be implemented if conditions change unexpectedly from the projected future water budgets. These potential PMAs are an essential part of the adaptive management approach, offering the GSAs options to address uncertain future conditions that may be selected and developed further, as needed.

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469	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	6	6.1	6-2		Table 6-1	*(Summary of Comment A.2, part 1)* Section 6.1 of the draft GSP talks about climate change and then gives a selection of water budget values with and without climate change (2070 central tendency). According to Table 6-1, water users will pump 13% more groundwater to make up for evapotranspiration (ET) increase due to climate change, and stream accretion (groundwater that discharges to the steams) will remain positive but will decrease by 48,000 acre-feet / year with climate change, approximately 38% from the future conditions without climate change and approximately 0.5% of the Sacramento River flow.	Comment acknowledged. Clarification has been added to Section 6.1. As indicated in its title, Table 6-1 summarizes key water budget parameters that were evaluated to formulate PMAs. Table 6-1 does not include the benefits of planned PMAs, nor does it summarize the GSAs' plans for future management of the Subbasin. As described in Section 6.2.2 (and clarified in Section 6.1), the "planned PMAs" are expected to provide more than 80 TAF/yr in gross average annual benefits that will offset groundwater pumping and support groundwater sustainability in the Colusa Subbasin. These benefits are expected to address potential sustainability concerns in the projected future water budget (Table 6-1), especially for areas of localized groundwater declines in the Orland and Arbuckle areas.
470	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network						*(Summary of Comment A.2, part 2)* It isn't clear how the stream depletion monitoring program will interact with the stream accretion assumptions. The stream depletion monitoring program only monitors groundwater levels, but it should also include monitoring of stream flow changes, i.e., seepage and accretion changes, to validate the assumptions about climate change and sustainability	Comment acknowledged. The CGA and GGA are coordinating with GSAs in other subbasins through the Northern California Water Association (NCWA). NCWA is leading a Sacramento Valley-wide effort for improved and coordinated streamflow measurement, which will continue during GSP implementation. However, the GSAs' plans for monitoring shallow groundwater levels as a proxy for stream depletion monitoring are consistent with GSP regulations and consistent with recommendations of the Environmental Defense Fund (EDF, 2018). It is also noted that if the GSAs were to measure stream flow changes, as suggested, it is expected that measurement accuracy would limit the ability to differentiate the estimated +/-0.5% of streamflow change in the Sacramento River discussed in previous comments.
471	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	5-6					*(Summary of Comment A.3, part 1)* The groundwater monitoring for sustainability focuses on domestic wells and stream depletion, but not much on subsidence.	Comment acknowledged. Land subsidence in the Colusa Subbasin will not be monitored using the groundwater level monitoring network or wells. As described in Section 4.2.3.2 of the Colusa Subbasin GSP: "The Colusa Subbasin land subsidence monitoring network is comprised of survey benchmarks, benchmarks, continuous GPS stations, extensometers, and remote sensing data."
472	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	5	5.4.1	5-19:5-21			*(Summary of Comment A.3, part 2)* The MTs for domestic well sustainability are developed by taking the greater depth of either the depth where 20% of the domestic wells within the Thiessen polygon around each of the 48 RMN monitoring wells are shallower, or the depth at 50% of the historical range below the deepest groundwater level prior to January 1, 2015 (and sometimes 2016). These GSP standards for the MTs effectively means that domestic wells in the Colusa subbasin can experience groundwater levels deeper than historical levels and still be considered sustainable.	Comment acknowledged. The CGA and GGA Boards made decisions to set the Sustainable Management Criteria for all sustainability indicators through a transparent process in public meetings with extensive stakeholder engagement. The decisions are documented in Appendix 5.A. All decisions were made in meetings open to the public, following technical presentations and discussions, also held in meetings open to the public.

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473	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	5				Tables 5-1 through 5-3	*(Summary of Comment A.4)* The draft GSP establishes different MTs for each monitoring site (except for subsidence benchmarks) and evaluates MTs in sub-groups of sites with a minimum size and minimum duration. The draft GSP requires that all monitoring sites in a sub-group must exceed their respective MTs together before an undesirable result can occur. This requirement implies that the monitoring site with the greatest MT depth will likely control the occurrence of an undesirable result.	Comment acknowledged. The minimum thresholds are applied at each individual monitoring location within the representative monitoring network for each sustainability indicator. There is no predetermined grouping of locations for the purpose of determining whether undesirable results are occurring in the Colusa Subbasin. The occurrence of an undesirable result for each applicable sustainability indicator in the Colusa Subbasin is determined when a defined percentage of the monitoring locations in the corresponding representative monitoring network exceeds minimum thresholds, regardless of where the monitoring locations are within the basin. The undesirable result is judged to occur based on the percentage of locations exceeding their minimum thresholds, not on the magnitude of the minimum thresholds or the magnitude by which the minimum thresholds are exceeded.
474	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	App. 5C					*(Summary of Comment A.5, part 1)* Are there any facts to document that domestic wells in the WCR database are no longer in use or previously dewatered? DWR has a web site where people can volunteer that their well went dry (https://mydrywell.water.ca.gov/report/). The assumption that the wells previously went dry when groundwater was at the lowest pre-2015 point, allows the GSP to reason that an MT that allow loss of up to 20% percent of the shallow domestic wells is cost-effective, and an acceptable balance between avoiding significant and unreasonable impacts to domestic (and other shallow) wells and allowing sufficient flexibility for conjunctive management of Subbasin surface and groundwater supplies. We ask, cost effective to whom?	Comment addressed. The GSP covers the entire Colusa Subbasin, and measures of cost-effectiveness are consequently from that perspective, as is standard practice. The benefit-cost analysis of PMAs and potential dewatered well impacts is additionally defined at the monitoring well Thiessen polygon level. As described in Appendix 5C, it is important to emphasize that groundwater levels in the Subbasin will be managed for MOs, which are generally set substantially above MTs that the economic analysis is based on. Historical low water levels below the total domestic well depth being an indicator for wells that may have been previously dewatered was deemed to be a reasonable assumption, given the data available and data gaps identified in the GSP. The following paragraph was added to the introduction section of Appendix 5C so that assumptions, data limitations, and other potential GSP PMAs are clear to the reader. "The reconnaissance-level economic analysis was based on the data available for GSP development and the simplifying assumptions described in the sections below. Important assumptions include: (i) the analysis was developed for MTs, not MOs that the Subbasin will be managed for and are substantially higher than MTs, (ii) only a subset of costs and benefits (pumping cost, well replacement cost, PMA avoided costs) associated with PMA implementation dewatered domestic were considered, and (iii) the example PMA considered was demand management (reducing pumping). The analysis can be refined and expanded as

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474 cont'd									GSP data gaps are addressed and additional information becomes available. It is also noted that the GSP includes additional potential actions for monitoring potential impacts to domestic wells, as described in Section 6.5.2.1, Domestic Well Mitigation Program." As documented in Appendices 5B and 5C, for the Subbasin as a whole, approximately 46 percent of the domestic wells in the WCR database are shallower than the pre-2015 historical groundwater levels as defined by the groundwater level representative monitoring network. Many of these shallow wells may no longer be used, or they may have been deepened because they would have otherwise been dry at times prior to 2015. Nevertheless, all wells in the WCR database were considered in the calculation of the groundwater level minimum thresholds. Including these shallow, potentially unused or deepened wells in the analysis of well completions depths resulted in groundwater level minimum thresholds that are shallower than they would have been if the wells had been excluded, and is viewed as a conservative approach to avoiding undesirable results for all users, considering data gaps.
475	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	App. 5C					*(Summary of Comment A.5, part 2)* The economic analysis concludes that groundwater levels will be managed to the higher MOs levels and therefore no harm will occur to domestic wells; but if harm occurs, then the GSAs should develop a domestic well mitigation program (see Chapter 6) that would provide a safety net to potentially compensate for impacts to domestic wells. It appears to AquAlliance that the GSP has decided that the shallow domestic wells can go dry, and the GSAs might find a way to help the well owners, but they aren't ready to commit to the compensation portion.	Comment acknowledged. Please note that the GSAs have revised the MTs for chronic lowering of groundwater levels at several RMS sites, particularly around the Orland area. These revisions have created shallower MTs that are more protective of the 20th percentile depths of domestic wells. The GSAs still propose a potential domestic well mitigation program, though the precise policies, funding, and other factors underlying that program will need to be determined by the GSAs through a public, stakeholder-driven evaluation and decision-making process during GSP implementation. The GSAs also reiterate that they are planning an adaptive management strategy for GSP implementation. Please see the response to comment 468.

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476	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	4-5				Table 5-1	(Summary of Comment A.6) A 50% range, or Margin of Operational Flexibility (MOF), has been established at each monitoring well to accomodate seasonal fluctuations in groundwater levels. Is the MOF about the MT depth not considered an undesirable result? Isn't the period, presumably summer months, when groundwater drops below the MT an unreasonable result? What happens if the seasonal decline is greater than the 50% range? How many of the domestic wells in the well 22N03W24E001 Thiessen polygon will go dry with groundwater at a depth of 349+ feet?	Comment acknowledged. The minimum threshold for groundwater level declines is based on the lower of 1) the 20th percentile of shallowest domestic well depths in each representative monitoring well's Thiessen polygon, or 2) 50 percent of range below the historical low groundwater elevation measured in each representative monitoring network well. The measurable objective is the mean of most recent five years of available groundwater elevation measurements up to March 2020 in each representative monitoring network well. The margin of operational flexibility is the difference between the measurable objective and the minimum threshold. The GSAs will conduct local management of the Colusa Subbasin based on measurable objectives with the goal of avoiding exceedances of minimum thresholds and triggering of undesirable results. The GSAs will conduct this local management with consideration of all beneficial users and will seek to work with resource agencies, stakeholders, beneficial users, the public and GSAs representing adjacent subbasins to avoid exceeding minimum thresholds and incurring undesirable results.
477	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	5				Table 5-1	(Summary of Comment A.7) The draft GSP appears to plan for subsidence throughout the subbasin to be as much as 10 feet over the next 40 years with a subsidence MO set at 0.25 feet per year for each of 63 survey benchmarks. The subsidence benchmark MTs are set at 0.50 to 0.60 feet per year or as much as 20 to 24 feet over the next 40 years, depending on the current rate of subsidence. There doesn't appear to be any Management Actions other than recharge to mitigate subsidence, and no proposal to create a subsidence mitigation program. Clarification is needed on the maximum rate of subsidence at any point that will trigger an undesirable results and the duration for averaging.	Comment acknowledged and addressed. The CGA and GGA Boards made decisions to reduce the MT and MO land subsidence rates to lower values, consistent with other GSPs in the Sacramento Valley. These revisions are incorporated throughout Chapter 5. The revised MT is 0.5 feet per five years for all sites, and the revised MO is 0.25 feet per five years for all sites. The criteria that an undesirable result is considered to occur is when the Minimum Threshold is exceeded at 20 percent of the land subsidence monitoring benchmarks.

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478	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network					Figures 3-23, 3-31, 3-32	(Summary of Comment A.8) The draft GSP requirement to consider monitoring sites as a group when determining whether the MTs have been exceeded may create areas where the number of sites are too small to allow for the groups to encompass all monitoring sites, and/or create scientifically logical groups. The draft GSP should give the boundaries of the subsidence and groundwater monitoring well groups.	Comment acknowledged and addressed. Clarification has been added to Chapter 5 to explain the monitoring site subsets. For each monitoring network the subset of locations is not predetermined; rather, it is delineated only as sites collectively exceed their minimum threshold values. The subset of sites may be any combination of monitoring sites subbasin-wide, and do not necessarily need to be located in the same region.
479	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	4-5					(Summary of Comment A.9) The draft GSP should give the boundaries of the Thiessen polygons for the monitoring wells that are used to measure groundwater levels for either domestic wells or stream depletion, and provide a table of the number and depths, with cumulative frequency for domestic wells in each polygon.	Comment acknowledged. Thiessen polygons were not used to develop sustainable management criteria for surface water depletions.
480	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	4					(Summary of Comment A.10, part 1) The depth of the screens for some of the 48 RMN groundwater monitoring wells in Table 5-2 are given in Table 4-2. The draft GSP doesn't explain why the deep screened monitoring wells are selected to monitor shallower aquifers used by domestic wells even, when there is often a shallow monitoring well at the same location.	Comment acknowledged and addressed. Some of the monitoring wells in the representative monitoring network for lowering of groundwater levels are multiple completion monitoring wells, meaning that they have multiple discretely screened intervals at different depths within the aquifer. The completion depths, and therefore the measurable objectives and minimum thresholds, for the multiple completion monitoring wells in the representative monitoring network were misidentified as the deepest completion intervals in Table 5-2 of the public draft GSP. The completions selected for the representative groundwater level monitoring network have been updated to reflect the completions that best represent the median depth of nearby domestic wells. Thresholds, tables, and hydrographs in Chapters 4 and 5, including Table 5-2 and corresponding appendices, have been updated to reflect these changes.

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481	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	5				Tables 5-2 and 5-3	(Summary of Comment A.10, part 2) Seven of the wells in the domestic well monitoring network are shallow and are also part of the 12-well stream depletion monitoring network. While the MOs for the stream depletion network in the seven shallow wells are nearly equal to the MOs for the domestic well network, the MTs are very different and much deeper. The draft GSP doesn't clearly explain the differences in any Management Actions needed to maintain the sustainability of domestic wells and interconnected surface waters that result from the different MTs at these same shallow monitoring wells.	Comment acknowledged. There are 48 well locations used as representative monitoring locations for groundwater levels and 12 well locations used as representative monitoring locations for interconnected surface waters. The minimum threshold for assessing impacts to chronic lowering of groundwater levels were calculated using the deeper value of either (1) the 20th percentile of shallowest domestic well depths in the monitoring well's Thiessen polygon, or (2) 50% of range below the historical low groundwater elevation at the monitoring location. The minimum thresholds in the representative monitoring network for assessing depletions of interconnected surface waters were calculated by using the historical fall 2015 groundwater elevations and adding 10 feet to that depth. Appendix 5B provides a detailed discussion of the relationship between the sustainable management criteria for groundwater levels and surface water depletions. For locations in which both groundwater level and surface water depletion monitoring network wells exist, along with their well-specific sustainable management criteria, the management of the Colusa Subbasin will be based on the more conservative monitoring well and its associated sustainable management criteria. Sustainable management criteria for depletion of interconnected surface waters allow for the least reduction in groundwater levels, and management actions related to this sustainability indicator will be based on the surface water depletion monitoring network wells.

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482	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network						(Summary of Comment A.11) The draft GSP proposes to investigate the possibility of compensating domestic well owners for impacts from groundwater production. What is the recommendation in the GSP for how the well owner should determine the depth for the new well? What assurances does the GSP give to the domestic well owner that the depth for the new well will be sufficient to ensure a future domestic water supply? Can the well owner assume that if they follow the GSP's recommended depth procedures for a new domestic well, they will receive compensation if the depth to groundwater is ever exceeded?	Comment acknowledged. It is noted that the domestic well mitigation program proposed in the GSP (described in Section 6.5.2.1) does not state that well owners would receive direct compensation. Funds may be directed toward projects designed to secure reliable water sources for affected domestic well owners (through, for example, public water system consolidations funded by state or federal programs). The precise policies, funding, and other factors underlying that program will need to be determined by the GSAs through a public, stakeholder-driven evaluation and decision-making process during GSP implementation.
483	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network						(Summary of Comment A.12) Will the GSP also include a subsidence mitigation program that financially compensates homeowners and landowners for damage from subsidence? Will there be funds to repair infrastructures such as roads, bridges, levees, stormwater drainage, pipelines, home and building foundations, walls and roofs, domestic, municipal, industrial, and agricultural wells? What are the possible sources of subsidence mitigation funding, a consumption tax, a property tax, a flat tax per well Will the subsidence fund be designed to anticipate the cost of mitigation repairs over the full 40 years, that is, mitigate the planned 10 to 20+ feet of subsidence?	Comment acknowledged. Please see the response to comment 482 regarding the GSP's discussion of how mitigation program funds may be directed. Regarding subsidence, it is noted that the CGA and GGA Boards made decisions to reduce the MT and MO land subsidence rates to lower values, consistent with other GSPs in the Sacramento Valley. Please see the response to comment 477. Additionally, the GSAs have proposed a study of infrastructure sensitivity to land subsidence in Section 7.1.2.15. This study will help to fill data gaps related to infrastructure sensitivity to subsidence and address questions related to needs for subsidence mitigation. If needed, specific mitigation provisions will be developed by the GSA Boards through a public, stakeholder-driven process during GSP implementation.

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484	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	4				Table 4-2	(Summary of Comment A.13) Table 4-2 lists the characteristics of the monitoring wells in the GSP network, a total of 104 completions wells. However, only 48 completions are used for the domestic well network and another 5 for the stream depletion network. Only those 53 domestic and stream depletion wells have sustainability criteria, MOs and MTs. Why weren't MOs and MT calculated for the remaining 51 monitoring wells? Why are the other 51 wells included in the "groundwater monitoring network"? How will measurements in these other 51 wells be used in the groundwater monitoring program?	Comment acknowledged. There are 48 well locations used as representative monitoring locations for groundwater levels and 12 well locations used as representative monitoring locations for interconnected surface waters. The representative monitoring network wells (see Chapter 5) are a subset of wells used for establishing and monitoring sustainable management criteria. Sustainability thresholds such as the MT, MO, and interim milestones are defined at these representative monitoring network sites. Measurements at the representative sites are used to evaluate plan implementation. Measurements from the other monitoring locations are used to support evaluation of the plan implementation and support future decision making regarding sustainability thresholds, projects, and monitoring. The other groundwater monitoring well completions (totaling 104 completions, including the representative monitoring network) will be used to monitor overall groundwater level conditions in the Subbasin. The monitoring sites will be used to demonstrating progress towards during plan implementation, monitoring impacts to beneficial uses and users, monitoring changes in groundwater conditions, and quantifying annual changes in the water budget components (CCR § 354.34).
485	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	App. 5B					(Summary of Comment A.14) The hydrographs in Attachment A of Appendix 5B give the values of the MO and MT and graphically show their implications. Of interest are those wells where the MT based on the 20% shallower wells depth is below the 50% range depth. This occurs at 30 of the 48 wells.	Comment acknowledged. As described in Section 5.4.1.1, the MT is calculated as the deeper value of the 20th percentile of shallowest domestic well depths in the monitoring well's Thiessen polygon, or 50% of range below the historical low groundwater elevation. Also, it is noted that the GSAs have revised the MTs for chronic lowering of groundwater levels at several representative monitoring network sites. These revisions have resulted in shallower MTs that are more protective of domestic wells. See the response to comment 485.
486	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	App. 5B					(Summary of Comment A.15) The selection of the MO and lowest point for the MT appears to use groundwater levels after January 1, 2015 when it produces a lower elevation than measurement before the SGMA Benchmark date. The use of all historical data to calculate the 50% range appears to be continuing the pre-SGMA impacts into the GSP management actions. This seems to invert the concept that the GSP doesn't have to remedy pre-2015 impacts by making the GSP continue the pre-2015 impacts in the determination of sustainability criteria.	Comment acknowledged. The measurable objective is the mean of most recent five years of available groundwater elevation measurements up to March 2020 in each representative monitoring network well. The minimum threshold for groundwater level declines is based on the lower of 1) the 20th percentile of shallowest domestic well depths in each representative monitoring well's Thiessen polygon, or 2) 50 percent of range below the historical low groundwater elevation measured in each representative monitoring well.

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487	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	App. 5C					(Summary of Comment A.16) In Appendix 5C, the economic analysis argues that the maximum number of domestic wells that would go dry at the MT threshold is 12%, but excludes wells with depths shallower than the pre-January 2015 low because it was assumed those wells went dry with the lowest groundwater level and/or are no longer used. The economic analysis doesn't address if these wells recovered, nor document that these wells actually went dry. To evaluate the groundwater level in domestic wells, you need to use a wells screened at the depth of the domestic wells, for example the stream depletion monitoring wells.	Comment acknowledged. The analysis is based on the information available in the WCR database. Data gaps will be addressed in subsequent GSP updates, as described in Chapter 4 of the GSP. In addition, ss noted in the GSP, additional studies of potential domestic well impacts and for development of a program to mitigate for any well impacts is described under Section 6.5.2.1, Domestic Well Mitigation Program.
488	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	App. 5C					(Summary of Comment A.17, part 1) Appendix 5C says that the portion of the wells shallower than the proposed MT is in aggregate 12% of the domestic wells, not 20%. Histograms of RMN and domestic well depths, and cumulative frequency depth statistics are needed to understand the validity and significance of this economic analysis.	Comment acknowledged. We were unable to find a statement in Appendix 5C that says or implies that "the proposed MT is in aggregate 12% of the domestic wells, not 20%." The MTs are based on the lower of 50% below the historical low groundwater level or 20th percentile of domestic well depths, so it is anticipated that the aggregate share of domestic wells shallower than the MT would be less than 20%.
489	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	App. 5C				Table 1	(Summary of Comment A.17, part 2) A review of the statistics in Appendix 5C (Table 1) finds a large range in the percentage of wells that are shallower than the historical low before January 2015, ranging from zero to 97% across the 48 RMN wells. The aggregate for these dry wells is 46%. Does this average give the GSP's estimated future reduction in domestic well reliability within each RMN well polygon? How does the 12% aggregate for 20% shallower dry wells relate to the 46% well shallower than the lowest pre-January 2015 groundwater level? What are the depths, percentiles and the number of wells that could possibly go dry for each of the RMN well polygons where the MTs are based on the 50% range below the historical low, and/or based on the 20% shallower depth?	Comment unclear. The MTs are based on the lower of 50% below the historical low groundwater level or 20th percentile of domestic well depths, so it is anticipated that the aggregate share of domestic wells shallower than the MT would be less than 20%. Table 1 summarizes the available well data for each polygon. As described in Chapter 4 of the GSP, data gaps will be addressed in future GSP updates. The MT set is an input to the analysis described in Appendix 5C. That is, the economic analysis did not set the MT, it evaluated the costs and benefits (as identified in Appendix 5C) of the proposed MT.

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490	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	App. 5C					(Summary of Comment A.18) Obviously, the future cumulative average of dry wells under the GSP will be greater than the 46% of total wells. When 50% of the historical range is subtracted from the lowest pre-January 2015 groundwater level to calculate the MT, it creates a lower-than-the-lowest sustainable threshold. By this logic, the number of wells listed in Appendix 5C (Table 1) will go dry, at minimum, whenever groundwater levels go below the lowest historical elevation, and possibly more when groundwater levels reach the +50% depth threshold. For areas around the monitoring wells where the MT was set at the 20% shallower wells threshold (because that depth was greater than the lowest +50% depth), Appendix 5C (Table 1) shows a "share" less than 20% (0.20). Does this mean that additional wells will go dry in the future if groundwater levels reach the MT?	Comment unclear. We are not able to follow the logic in the comment and the comment appears to reference information that is not in Appendix 5C (e.g., the MT and selection criteria). In general, the MTs are based on the lower of 50% below the historical low groundwater level or 20th percentile of domestic well depths. This calculation is completed for each polygon individually to establish the MT, not for the entire Subbasin in aggregate. The MT were an input to the economic analysis described in Appendix 5C. That is, the economic analysis did not set the MT, it evaluated the costs and benefits (as identified in Appendix 5C) of the proposed MT.
491	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	App. 5C					(Summary of Comment A.19, part 1) Does the Table 1 in Appendix 5C total of 2,925 wells being shallower than the historic low groundwater level before January 2015 agree with the statistics on dry or no longer used wells collected by DWR or any government agency?	Comment acknowledged. The analysis described in Appendix 5C is based on Well Completion Report data published by DWR.
492	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	App. 5C					(Summary of Comment A.19, part 2) Table 1 of Appendix 5C shows that for the RMN well 22N03W24E001 near Orland, 1,589 out of a total of 1,677 wells are shallower than the historic low before January 2015, or 97%. This monitoring well is the closest RMN well to the City of Orland. Did 97% of the domestic wells around Orland go dry at least once sometime before 2015, and/or have they been abandoned? If yes, what is the source of this data?	Comment acknowledged. The economic analysis described in Appendix 5C excluded domestic wells that were shallower than the historic low groundwater level in each polygon. These data are from the DWR WCRs. As described in Chapter 4 of the GSP, data gaps will be addressed in future GSP updates, and this analysis may be refined with new information.
493	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	3, 6	3.3			Tables 3-11, 3-12, 6-1	(Summary of Comment A.20) The draft GSP provides a general background discussion on the surface water and groundwater budgets in Section 3.3. Tables 3-11 and 3-12 provide the average annual values for the surface water and groundwater budget components for all five analysis periods, respectively (pages 3-96 and 3-97). The water budget analysis selected as representative of conditions in the next 50 years is the projected Future Condition with the 2070 Central Tendency Climate Change provided by DWR.	Comment acknowledged.

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494	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	3	3.3			Tables 3-11, 3-12	(Summary of Comment A.21) Unfortunately, there appears to be a calculation error in the 2070 Future Conditions outflow, the right-hand column of Table 3-12. The three groundwaterpumping components, Agricultural, Urban and Industrial and Managed Wetlands, have future 2070 values of 548,000, 10,000 and 35,000 AFY, respectively. The sum of these three groundwater components equals 593,000 AFY, not the 559,000 AFY shown. This results in a Change in Storage (Inflow – Outflow) value of -42,000 AFY, not the -7,000 AFY shown. The values of the three groundwater components listed as inflow components in the surface water budget, Table 3-11, have different future 2070 values that sum to 558,000 AFY. This error in the Groundwater Pumping components needs to be corrected.	Comment acknowledged and addressed. We appreciate your identification of this potential issue. Upon review, it was found that the total groundwater pumping and urban groundwater pumping in Table 3-12 are correct, and that the error was an issue with the summary of agricultural and managed wetlands pumping. These two values have been corrected, and now align with the values in Table 3-11. The total Change in Storage (Inflow - Outflow) of -7 taf/yr corresponds to the model results, and is unchanged.
495	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	6				Table 6-1	(Summary of Comment A.22, part 1) In Table 6-1, the change in annual average groundwater storage with the 2070 climate change is a negative 7,900 AFY. This value differs from the -7,000 AFY value shown in Table 3-11, but this may be the result of round-off error in the Table 3-11 values. Note that the error in the total Groundwater Pumping in Table 3-12 could significantly change the rate of groundwater storage in Table 6-1, so it needs to be corrected.	Comment acknowledged. The difference is due to rounding, and has now been noted in Table 6-1. The concern with the change in groundwater storage has been corrected, please see the response to comment 494.
496	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	6				Table 6-1	(Summary of Comment A.22, part 2) Table 6-1 shows that there will be an annual average decrease in Stream Accretion of 48,000 AFY, or 38.3%, in the Net Stream Accretion in the future with the 2070 climate change scenario. The sums listed in Table 6-1 for future without climate change, 125,000 AFY and for 2070 with climate change, 77,000 AFY, don't appear to agree with the sums that would be obtained using values listed in Table 3-11, but the difference is the same - 48,000 AFY.	Comment acknowledged. The difference is due to rounding and slight changes in how values are summarized from the C2VSimFG-Colusa model results between the two summary tables; however, as noted the difference remains the same. This has now been noted in Table 6-1.
497	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	3					(Summary of Comment A.23, part 1) The increase in Groundwater Pumping and the decrease in Net Stream Accretion in the future with the 2070 climate change scenario suggest that the assumptions being made regarding loss of surface water flows during a groundwater substitution transfer are flawed. The decrease in Net Stream Accretion with future Groundwater Pumping suggests that the overall percentage of groundwater being pumped that will be recharged from the streams in the Colusa Subbasin, i.e., stream depletion, with any future pumping increase is significantly greater than the DWR/BOR assumed 13% stream flow loss from a groundwater substitution transfer.	Comment acknowledged. Please see the response to comment 298.

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498	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	3					(Summary of Comment A.23, part 2) The groundwater budget in draft GSP Table 3-12 shows that more surface water will infiltrate into the groundwater basin to the detriment of the streams, and that the future increase in groundwater pumping will decrease the discharge of groundwater to streams. Under the existing conditions streams gain more water from the groundwater system than they give. With the 2070 climate change scenario, streams will continue to gain more from the groundwater system, but the gain will be less. The decline in Net Stream Accretion with future increased Groundwater Pumping that changes the streams for gaining to losing suggesting that the subbasin maybe at a tipping point where the impacts from future pumping increases are amplified and cause significantly more harm than just the existing condition.	Comment acknowledged. Please see the response to comment 465.
499	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	3					(Summary of Comment A.24) Figures 3-29 and 3-49 graph the cumulative change in groundwater storage across the water budget scenarios. In 2015 the cumulative change in groundwater storage since 1990 is approximately a negative 600,000 AF, lower than in than any time prior to the start of SGMA. This should be the starting point for going forward in an evaluation of the subbasin's groundwater sustainability. If the anticipated future loss in groundwater storage under the 2070 climate change scenario is added to existing loss in groundwater storage, the cumulative loss is groundwater storage for the Colusa Subbasin in 2065 is approximately 1,000,000 AF. The authors of the draft GSP may know this, and that's maybe why many of the groundwater monitoring well MTs are set at 50% of the historical range below the historical low to allow for an additional 400,000 AF of loss in groundwater storage predicted by the 2070 climate change scenario without triggering an undesirable result.	Comment acknowledged. 23 CCR § 354.18(c)(3) requires that a 50-year period of historical data be used as a baseline for estimating future hydrology. The selected, SGMA-required 50-year period is 1966-2015, which includes the effects of the 2014-2015 critical years. However, it would not be correct to start with those conditions and add those years to the record. The basic assumption is that hydrologic patterns will repeat themselves with adjustments made to the records per DWR guidelines to reflect the effects of climate change. It is noted that GSP regulations do require that GSAs use the most recent land use, evapotranspiration, crop coefficients, and surface water supply information as a baseline for estimating future water demand and surface water supply. As described in Section 3.3.3, the Colusa Subbasin GSP does use data from the most appropriate recent years as a baseline for estimating future water demand and surface water supply.

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500	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network						(Summary of Comment A.25) The existing groundwater contours in the Butte and Colusa subbasins suggest that the current flow of groundwater in the aquifers shallower than 700 feet flow towards the center of the valley with the flow generally north to south aligned with the Sacramento River. There are several sets of monitoring wells that are approximately opposite each other along the north-south boundary between the subbasins. After comparing MTs for sets of west-to-east monitoring well matches, it was found that the MT elevations in the Butte Subbasin are higher in all but one of the 10 sets. This may create a condition where the Butte Subbasin is providing more interbasin groundwater flow to the west in the future. The implications from setting the MT values in the Colusa Subbasin at elevation lower than the MTs in the Butte Subbasin should be analyzed and management action(s) should be included in the GSPs for each other subbasin to maintain sustainable interbasin groundwater flow.	Comment acknowledged. The GSAs coordinated with the GSAs in the adjacent basins during development of sustainable management criteria, including sustainable management criteria for chronic lowering of groundwater levels and depletions of interconnected surface waters. The GSAs will continue to coordinate with the GSAs in the adjacent basins during implementation of the GSP. Groundwater levels in the Colusa Subbasin near the boundary with the Butte Subbasin will be managed to limit potential increases in surface water depletions, meaning that the minimum thresholds for groundwater levels will be superseded by the minimum thresholds for surface water depletions in the Colusa Subbasin near the Butte Subbasin boundary. Appendix 5B provides a detailed discussion of the relationship between the sustainable management criteria for groundwater levels and surface water depletions. For locations in which both groundwater level and surface water depletion monitoring network wells exist, along with their well-specific sustainable management criteria, the management of the Colusa Subbasin will be based on the more conservative monitoring well and its associated sustainable management criteria. Surface water depletion sustainable management criteria allow for the least reduction in groundwater levels, and management actions related to this sustainability indicator will be based on the surface water depletion monitoring network wells. Projects and management actions will be undertaken by the GSAs, agencies and stakeholders in the Colusa Subbasin.
501	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	3-4					(Summary of Comment A.26) The GSP should specifically state that the water quality MOs and MTs for the Colusa Subbasin will follow the requirements of the CVVRWQCB's Sacramento River Basin Plan. In addition, the GSP should maintain the subbasin's water quality so that it meets all required health protective drinking water standards at levels below the Maximum Contaminant Levels (MCLs) for public water systems, and below the public health goals (PHGs). The GSP should specify Management Actions that will maintain and/or improve the subbasin water quality with an emphasis on the known problems.	Comment acknowledged.

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502	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network	7					(Comment A.27) Is voter approval necessary for any fees or taxes levied to raise funding for any of the Mitigation Actions? Who are the actual voters? Are they all landowners in the Colusa Subbasin, only landowners in a GSA, or all citizens of the Colusa subbasin? The GSP actions may need to fund mitigations to municipal or small water systems, so how are these systems represented in the funding decisions? Will the de minimus extractors, a person who extracts, for domestic purposes, two acre-feet or less of groundwater per year, be allowed a vote? How many votes does each eligible voter get? Will the number of votes be based on the acres owned, number of wells owned, volume of groundwater pumped, or some combination of factors? What happens if the economic burden to fund the management actions falls disproportionately on one group, to whom can they appeal? Will mitigation funds go to the de minimus extractor because their wells can go dry like anyone else's, but they are otherwise exempt from SGMA? Are there any statutes that govern how government agencies determine the per capita or per centum rate of a tax or fee?	Comment acknowledged. Developing a finance plan for the Subbasin will be part of GSP implementation and is not part of initial GSP development. As described on page 1 of Appendix 7A, there are a series of activities that the GSAs will need to undertake to continue to fund and finance GSP implementation activities.
503	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network						(Comment A.28) Do the stream depletion MOs and MTs take precedence over the domestic well MOs and MTs when the monitoring well are adjacent? How should the domestic well owner utilize the stream depletion thresholds?	Comment acknowledged. Appendix 5B provides a detailed discussion of the relationship between the sustainable management criteria for groundwater levels and surface water depletions. For locations in which both groundwater level and surface water depletion monitoring network wells exist, along with their well-specific sustainable management criteria, the management of the Colusa Subbasin will be based on the more conservative monitoring well and its associated sustainable management criteria. Surface water depletion sustainable management criteria allow for the least reduction in groundwater levels, and management actions related to this sustainability indicator will be based on the surface water depletion monitoring network wells. Projects and management actions will be undertaken by the GSAs, agencies and stakeholders in the Colusa Subbasin.
504	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network						(Comment A.28) What is the lateral extent that the stream depletion MO and MT applies? Up to 5 miles from the well? Only in the area where the 5 miles zone intersects a stream? Only in the area between the monitoring well and the stream?	Comment acknowledged. Sustainable management criteria (e.g., measurable objectives and minimum thresholds) for depletions of interconnected streams were assigned to each monitoring well in the representative monitoring network based on the historical groundwater levels at that specific monitoring well. During implementation of the Colusa Subbasin GSP, groundwater levels in each monitoring well in the representative monitoring network will be evaluated in comparison to the well-specific measurable objectives and minimum thresholds. Undesirable results will be judged to have occurred when 25 percent of the representative monitoring network wells exceed their well-specific minimum thresholds.

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505	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network						(Comment A.28) Is there a map of the 48 Representative Monitoring Network (RMN) Thiessen polygon boundaries? What is the area of each polygon? How many domestic wells are in each polygon?	Comment acknowledged. The density of domestic wells is portrayed in Chapter 2 of the GSP. The GSAs will consider including a map of the Thiessen polygons during future updates to the Colusa Subbasin.
506	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network						(Comment A.28) Do the MO and MT apply to all domestic wells within that well's polygon? How does the requirement to evaluate undesirable results using 12 RMN wells affect the MO and MT at a specific domestic well? Should a domestic well owner be prepared to have a dry well if depth of their well is shallower than the MT in their polygon, or if the depth is shallower than the deepest MT in the group of 12 RMN wells?	Comment acknowledged. Sustainable management criteria (e.g., measurable objectives and minimum thresholds) do not apply to individual domestic wells, only wells in the representative monitoring network for the applicable sustainability indicators. Sustainable management criteria for depletions of interconnected streams were assigned to each monitoring well in the representative monitoring network based on the historical groundwater levels at that specific monitoring well. During implementation of the Colusa Subbasin GSP, groundwater levels in each monitoring well in the representative monitoring network will be evaluated in comparison to the well-specific measurable objectives and minimum thresholds. Undesirable results will be judged to have occurred when a percentage of the representative monitoring network wells exceed their well-specific minimum thresholds. Sustainable management criteria and the corresponding representative monitoring networks for the sustainability indicators applicable to the Colusa Subbasin are designed for sustainable management of the Subbasin as a whole. Groundwater conditions at specific domestic wells are subject to local and well-specific influences, which are uncertain. Domestic well owners are urged to participate with the GSAs, their respective Counties and stakeholders to address domestic well concerns during implementation of the Colusa Subbasin GSP.

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507	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network						(Comment A.28) If a domestic well is being installed or replaced, can the well owner rely on the MO and MT depths in their polygon to determine a minimum depth of their new well? Does the GSP offer any advice on the sustainability criteria for the minimum depth of a new well or replacement well? Should the new well be at least the depth of the old well's polygon MT, or the 12-well group MT, to ensure that the well doesn't go dry in the future?	Comment acknowledged. Sustainable management criteria (e.g., measurable objectives and minimum thresholds) do not apply to individual domestic wells, only wells in the representative monitoring network for the applicable sustainability indicators. Sustainable management criteria for depletions of interconnected streams were assigned to each monitoring well in the representative monitoring network based on the historical groundwater levels at that specific monitoring well. During implementation of the Colusa Subbasin GSP, groundwater levels in each monitoring well in the representative monitoring network will be evaluated in comparison to the well-specific measurable objectives and minimum thresholds. Undesirable results will be judged to have occurred when a percentage of the representative monitoring network wells exceed their well-specific minimum thresholds. Sustainable management criteria and the corresponding representative monitoring networks for the sustainability indicators applicable to the Colusa Subbasin are designed for sustainable management of the Subbasin as a whole. Groundwater conditions at specific domestic wells are subject to local and well-specific influences, which are uncertain. Domestic well owners are urged to participate with the GSAs, their respective Counties and stakeholders to address domestic well concerns during implementation of the Colusa Subbasin GSP.
508	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network						(Comment A.28) What advice does the GSP give on how a domestic well owner should interpret the MO and MT values when their well is near the polygon boundary? For example, if a domestic well is installed or replaced in the 22N02W30H002 polygon that's close to the boundary with the 22N03W24E001 polygon, should the depth of the new well be at the deeper MT of the 22N03W24E001 polygon or the shallower 22N02W30H002 polygon?	Comment acknowledged. Sustainable management criteria (e.g., measurable objectives and minimum thresholds) do not apply to individual domestic wells, only wells in the representative monitoring network for the applicable sustainability indicators. Sustainable management criteria for depletions of interconnected streams were assigned to each monitoring well in the representative monitoring network based on the historical groundwater levels at that specific monitoring well. During implementation of the Colusa Subbasin GSP, groundwater levels in each monitoring well in the representative monitoring network will be evaluated in comparison to the well-specific measurable objectives and minimum thresholds. Undesirable results will be judged to have occurred when a percentage of the representative monitoring network wells exceed their well-specific minimum thresholds. Sustainable management criteria and the corresponding representative monitoring networks for the sustainability indicators applicable to the Colusa Subbasin are designed for sustainable management of the Subbasin as a whole. Groundwater conditions at specific domestic wells are subject to local and well-specific influences, which are uncertain. Domestic well owners are urged to participate with the GSAs and their respective Counties to address domestic well concerns during implementation of the Colusa Subbasin GSP.

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509	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network						(Comment A.28) Will monitoring the RMN wells only 2 to 3 times each year effectively capture the fluctuations in groundwater level? In particular, the periods of maximum decline which have significant influence over domestic wells and stream depletion?	Comment acknowledged. Most of the wells within the Colusa Subbasin groundwater monitoring network are monitored by DWR staff 2 or 3 times per year, usually in the spring and fall to account for seasonal fluctuations. Monitoring twice per year is acceptable per CCR § 354.34. Increased monitoring frequency may be requested or conducted, as needed for plan implementation.
510	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network						(Comment A.28) What is the distribution of the depths of domestic wells associated with each RMN monitoring well? How many of the 20% shallower wells will go dry with each increment of groundwater level decline? Histograms of wells depth and cumulative frequency of depth statistics are needed to understand the validity and significance of the 20% shallower threshold.	Comment acknowledged. The density of domestic wells is portrayed in Chapter 2 of the GSP (Figure 2-7). The GSAs may consider including a map of the Thiessen polygons with domestic well depth statistics during plan and project implementation, or future updates to the Colusa Subbasin GSP.
511	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network						(Comment A.28) Will the construction of deeper domestic wells in the future influence the MO and MT values? If so, how will the MO and MT change, when will the change occur and what measures should a domestic well owner take when and if this change occurs?	Comment acknowledged. Construction of deeper domestic wells in the future may result in changes in the sustainable management criteria for chronic lowering of groundwater levels. The GSAs will evaluate sustainable management criteria during implementation of the GSP, including during periodic updates of the GSP. The GSAs will consider beneficial uses and users during plan implementation and will coordinate with stakeholders, and the GSAs representing the adjacent subbasins during this public process.

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512	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network						(Comment A.28) Will the use of 50% range values in deep aquifers to set the domestic well MTs cause more the wells to go dry and/or for longer periods than if the range in shallower aquifers were used? In other words, will the use of MT developed on deeper data delay actions needed to maintain the sustainability of the domestic wells because they allow greater declines in groundwater level before an undesirable result is acknowledged?	Comment acknowledged and addressed. Some of the monitoring wells in the representative monitoring network for chronic lowering of groundwater levels are multiple completion monitoring wells, meaning that they have multiple discretely screened intervals at different depths within the aquifer. The completion depths, and therefore the measurable objectives and minimum thresholds, for the multiple completion monitoring wells in the representative monitoring network were misidentified as the deepest completion intervals in Table 5-2 of the public draft GSP. The completions selected for the representative groundwater level monitoring network have been updated to reflect the completion that best represents the median depth of nearby domestic wells. Sustainable management criteria and hydrographs in Chapters 4 and 5, including Table 5-2 and corresponding appendices have been updated to reflect these changes. Also, the GSAs will implement the Colusa Subbasin GSP using a public process that includes domestic well owners and other beneficial users with the goal of implementing projects and management actions geared towards achieving and maintaining measurable objectives, and avoiding reaching minimum thresholds.
513	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network						(Comment A.28) Where in SGMA is the standard that 20% dry wells can be determined to be acceptable and non-significant, and therefore not an undesirable result? Where in SGMA does it give the standards for the economic analysis to determine the cost-effectiveness and the acceptable balance between avoiding significant and unreasonable impacts to domestic and other shallow wells in determining the MTs? Is the GSP's sacrifice of a 20% shallower well considered a taking? Does there need to be compensation? What is the value of the compensation, replacement costs of a deeper well, the original cost of the well, the value of the water at the time it goes dry or the change in water quality makes the water unusable, or all of the above.	Comment acknowledged. Please note that the GSAs have revised the MTs for chronic lowering of groundwater levels at several RMN sites. These revisions have resulted in shallower MTs that are more protective of the 20th percentile depths of domestic wells. The GSAs still propose a potential domestic well mitigation program, though the precise policies, funding, and other factors underlying that program will need to be determined by the GSAs through a public, stakeholder-driven evaluation and decision-making process during GSP implementation. Please see the response to comment 482 regarding the GSP's discussion of how mitigation program funds may be directed.

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514	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network		6.5.2.1				(Comment A.28) The Management Action for the Domestic Well Mitigation Program states that the GSP (GSA) is in the early conceptual stage. SGMA exempts the GSP from CEQA (WC 10728.6), but requires implementation projects to undergo CEQA review. All eight of the Management Actions given in GSP Chapter 6.5.2 are in early conceptual stage. If the GSP is adopted with this language and no specifics are provided about what actions will be taken, does that mean that any future projects or actions to implement the GPS Management Actions are still CEQA exempt?	Comment acknowledged. Please see the response to comment 482.
515	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network						*(Summary of Comment B, part 1)* The Plan as proposed will degrade the groundwater basin and harm groundwater users who are not involved in conjunctive use, water transfers, or water banking but are reliant on the same groundwater basin.	Comment acknowledged.
516	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network						*(Summary of Comment B, part 2)* The public and SGMA governing bodies and committees have been excluded from NorthState inter-basin discussions. When participants in the Vina Stakeholder Advisory Committee asked staff if discrepancies in inter-basin flow volumes/direction that are estimated in the various GSA Basin Settings had been deliberated within the Inter-Basin Coordinating Committee, they answered that they are too busy, but would examine the issue after the GSPs are submitted in 2022.	Comment acknowledged. Interbasin coordination has occurred throughout GSP development and will continue during plan implementation. The CGA and GGA have engaged in robust interbasin coordination through NCWA and participation in GSP planning meetings in adjacent subbasins. Staff, representatives, and consultants from the Colusa Subbasin and neighboring basins have coordinated for consistency between GSPs, including at meetings open to the public. The GSP process recognizes that data gaps exist, and has built in a structured monitoring and annual/periodic review process to develop clearer understanding of subbasin conditions and progress toward sustainability over time. The GSP is a "living document" that the GSAs will review and revise as more information about the basin setting becomes available (per 23 CCR §356.4).
517	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network						*(Summary of Comment B, part 3)* Achieving sustainability requires local agencies, stakeholders, and water users to make many difficult and potentially contentious decisions. These decisions are prone to conflict, particularly when pumping restrictions are viewed as infringing on property rights or when fees are charged to support local management. The Colusa GSP is not complete without a detailed process and funding to resolve conflicts that arise both within and external to the GSA boundaries.	Comment acknowledged. The GSAs have made clear and consistent efforts to respectfully engage with all stakeholders through robust discussion. Public outreach and engagement is described in the response to comment 304, and is documented in Chapter 2 and associated appendices. The GSAs have also engaged in a transparent and public decision-making process through numerous GSA Board meetings and TAC meetings, documented in Appendix 5A. The GSAs are not searching for conflict, but are prepared to address it if it arises.

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518	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network						(Summary of Comment C, part 1) The Colusa GSP must not assume that local ordinances will in any way protect the population and environment of Glenn and Colusa counties from any transfers and expanded conjunctive use. Water transfers are not protective of the public or the environment, and Think tanks are already encouraging the California Legislature to override local ordinances: "If counties with restrictive groundwater export ordinances fail to amend their laws to conform to SGMA, the legislature should consider preempting local laws that discriminate against out-of-county uses or place undue burdens on groundwater and groundwater-substitution transfers that would not jeopardize sustainable groundwater management of the source aquifer." (comment provides some other examples)	Comment acknowledged.
519	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network						(Summary of Comment C, part 2) Sustainability is not found in the Colusa GSP, let alone equitable sustainability for all residents, farms, businesses, and the environment. The Colusa and Butte GSAs are dominated by large, non-residential landowners, many of whom have sought to play in the lucrative water market already to the detriment of their neighbors, streams, rivers, and species.	Comment acknowledged. The GSAs have made clear and consistent efforts to respectfully engage with all stakeholders through robust discussion. Public outreach and engagement is described in the response to comment 304, and is documented in Chapter 2 and associated appendices.
520	Barbara Vlamis, Jim Brobeck, Bill Jennings, Carolee Krieger	AquAlliance, California Sportfishing Protection Alliance, California Water Impact Network						(Summary of Comment C, part 3) In addition to exports, it is foreseeable that a future GSA will encourage drawdown of the aquifer (based on Los Angeles v. San Fernando) to satisfy massive crop thirst as the drought continues, which will then create extra storage space for imported waters to “recharge” the Basin.	Comment acknowledged. This comment appears to suggest that intentional overdraft will occur because of SGMA. The GSP does not plan for intentional overdraft. The GSP plans for projects and management actions and adaptive management to achieve and maintain sustainability and respond to unforeseen future conditions that may impact sustainable operation of the Subbasin (see Chapter 6). The GSP does not authorize or encourage exports out of the Basin.
521	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	2					(Summary of Comment 1.A, Disadvantaged Communities, Drinking Water Users, and Tribes) The plan fails to clearly document the population of each DAC and the population dependent on groundwater as their source of drinking water in the subbasin. The plan should provide the population of each identified DAC, and identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems).	Comment acknowledged and addressed. We have added additional clarification in Section 2.1.2.1, Water Purveyors, to indicate that municipal and rural domestic water supplies in the Colusa Subbasin largely serve DACs, SDACs, and EDAs, and thus the water sources (groundwater) used to meet all urban (including rural domestic) water needs in the Subbasin are those used by DAC/SDAC/EDA populations.

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522	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	2					(Summary of Comment 1.A, Disadvantaged Communities, Drinking Water Users, and Tribes) The GSP fails to provide depth of domestic wells (such as minimum well depth, average well depth, or depth range) within the subbasin. The plan should include a map showing domestic well locations and average well depth across the subbasin (i.e., a map similar to Figure 2-7 showing average well depth per square mile).	Comment acknowledged. Domestic well densities per one square mile throughout the Colusa Subbasin are discussed in Chapter 2. The GSAs may consider additional evaluations of domestic well depths during GSP implementation, including in the implementation of projects and management actions and during periodic updates of the GSP.
523	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	Appendix 3G					(Summary of Comment 1.A, Interconnected Surface Waters) The identification of Interconnected Surface Waters (ISWs) is insufficient, due to lack of a comprehensive map of ISWs in the subbasin. The plan should provide a map showing all the stream reaches in the subbasin, with reaches clearly labeled as interconnected (gaining and losing) or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.	Comment acknowledged. The C2VSim-ColusaFG numerical model was used to determine a subbasin-wide aggregate gain/loss within interconnected surface waters. The model is not currently scaled to determine gains and losses along every ephemeral, intermittent, and perennial stream or canal reach within the Subbasin, but has recently been updated to include a finer timestep. The Stony Creek thalweg analysis discussed in Chapter 3 explores the potential for using groundwater level measurements within shallow wells as a means to determine if stream reaches are connected or not. The thalweg analysis results were compared to the results of the Interconnected Surface Water in California's Central Valley (ICONS) study (TNC, 2021). The results between the two analyses were consistent, but also confirmed data gaps regarding availability of reliable data to evaluate for stream-aquifer connectivity. The GSAs will seek to work with resource agencies, stakeholders, beneficial users and the public to refine the understanding of interconnected surface waters in the Colusa Subbasin, fill data gaps, and develop PMAs with consideration of interconnected surface waters. Future model refinement may be considered to support understanding and quantification of surface water and groundwater connectivity. Additional mapping of surface water connectivity may be included in plan and project implementation reports or future updates to the GSP.

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524	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	Appendix 3G					(Summary of Comment 1.A, Interconnected Surface Waters) While the GSP presents a thorough, comprehensive evaluation of ISWs using the C2VSimFG-Colusa model (Appendix 3G), the plan should confirm those results by overlaying the stream reaches with depth-to-groundwater contour maps and should also discuss stream reaches in the interior of the subbasin (e.g., whether they were included in the groundwater model; their relevant depth to groundwater; whether they are considered to be disconnected, and what data was utilized to support that conclusion).	Comment acknowledged. The GSP includes groundwater elevation contour maps and hydrographs with depth to water in Chapter 3. Depth to water contour maps are not included in this initial Colusa Subbasin GSP but may be included in future revisions or projects completed during plan implementation.
525	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	3					(Summary of Comment 1.A, Groundwater Dependent Ecosystems) The identification of Groundwater Dependent Ecosystems (GDEs) is insufficient. The GSP identified and mapped GDEs using the NC dataset, but incorrectly removed NC dataset polygons in areas adjacent to irrigated fields or due to the presence of surface water supplies. NC dataset polygons adjacent to irrigated land or surface water supplies can still potentially be reliant on shallow groundwater aquifers, and therefore should not be removed solely based on their proximity to irrigated fields or surface water supplies. The plan should provide a comprehensive set of maps for the subbasin's GDEs (e.g., map the NC dataset and label polygons retained, removed, or added to/from the dataset) and discuss how local groundwater data was used to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.	Comment acknowledged and addressed. The preliminary screening of the potential GDEs within the Colusa Subbasin was conducted to help prioritize areas for further mapping, evaluation and monitoring of GDEs during implementation of the Colusa Subbasin GSP. The preliminary screening supported the assessment of data gaps, evaluation of existing monitoring networks, which could potentially be used for GDE monitoring, and development of PMAs. The GSAs will seek to work with resource agencies, stakeholders, beneficial users and the public to refine the understanding of GDEs in the Colusa Subbasin, fill data gaps and develop PMAs with consideration of GDEs. The GDEs analysis will be refined during GSP implementation. Additional clarification has been added to the GSP Chapter 3 to acknowledge that significant data gaps exist for the precise locations and characteristics of GDEs in the Colusa Subbasin. It is noted that the prioritization, or "scoring," of GDEs is intended as a step toward identifying GDEs using the information available at the time of GSP development. This "scoring" is not seen as a final call on the classification of GDEs, but rather a prioritization for future work to better identify and expand monitoring of potential GDEs.

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526	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	3		3-82			(Summary of Comment 1.A, Groundwater Dependent Ecosystems) The GSP states (3-82): "Average spring groundwater level data from 2014 to 2018 indicates that shallow groundwater levels (i.e., within 30 feet of ground surface) exists throughout most of the subbasin. A depth to water (DTW) of 30 feet based on the average DTW for 2014 to 2018 was used as one of the primary criteria in the initial screening of potential GDEs." While we recognize that the period 2014-2018 represents multiple water year types, we recommend that a longer baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types.	Comment acknowledged and addressed. The GDEs analysis will be refined during GSP implementation. Additional clarification has been added to the GSP Chapter 3 to acknowledge that significant data gaps exist for the precise locations and characteristics of GDEs in the Colusa Subbasin. It is noted that the prioritization, or "scoring," of GDEs is intended as a step toward identifying GDEs using the information available at the time of GSP development. This "scoring" is not seen as a final call on the classification of GDEs, but rather a prioritization for future work to better identify and expand monitoring of potential GDEs.
527	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	3					(Summary of Comment 1.A, Groundwater Dependent Ecosystems) The GSP does not provide an inventory of the flora or fauna species present in the subbasin's GDEs, except to discuss the four most prevalent vegetation species. The plan should include an inventory of the fauna and flora present within the subbasin's GDEs (Attachment C of this letter lists freshwater species located in the Colusa Subbasin), and note any threatened or endangered species.	Comment acknowledged and addressed. A reference to TNC's analysis of freshwater species located in the Colusa Subbasin has been added to Section 3.2.8 of the GSP (based on analysis of the California Freshwater Species Database version 2.0.9 within the Subbasin boundary). We have also added more text to acknowledge data gaps regarding which of these species are found within GDEs, and references to GSP studies in Chapter 7 to help close those data gaps and expand understanding of GDEs in the Subbasin.
528	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	3					(Summary of Comment 1.A, Groundwater Dependent Ecosystems) The GSP should provide depth-to-groundwater contour maps.	Comment acknowledged. Several depth to groundwater contour maps are included in Chapter 3 (see Figure 3-19, 3-20). It is noted that GSP regulations require groundwater elevation contour maps (§354.16(a)(1)), which are also included in Chapter 3 and Appendix 3B.

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529	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	3				Figure 3-36	(Summary of Comment 1.A, Groundwater Dependent Ecosystems) If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as “Potential GDEs” in the GSP until data gaps are reconciled in the monitoring network. It is not clear from the description in the GSP whether NC dataset polygons labeled with a ‘GDE Likelihood Score’ of 1 to 3 on Figure 3-36 are retained as potential GDEs.	Comment acknowledged. Figure 3-36 will be updated during future updates to the Colusa Subbasin GSP. The preliminary screening of the potential GDEs within the Colusa Subbasin was conducted to help prioritize areas for further mapping, evaluation and monitoring of GDEs during implementation of the Colusa Subbasin GSP. The preliminary screening supported the assessment of data gaps, evaluation of existing monitoring networks, which could potentially be used for GDE monitoring, and development of PMAs. The GSAs will seek to work with resource agencies, stakeholders, beneficial users and the public to refine the understanding of GDEs in the Colusa Subbasin, fill data gaps and develop PMAs with consideration of GDEs. The GDEs analysis will be refined during GSP implementation. Additional clarification has been added to the GSP Chapter 3 to acknowledge that significant data gaps exist for the precise locations and characteristics of GDEs in the Colusa Subbasin. It is noted that the prioritization, or "scoring," of GDEs is intended as a step toward identifying GDEs using the information available at the time of GSP development. This "scoring" is not seen as a final call on the classification of GDEs, but rather a prioritization for future work to better identify and expand monitoring of potential GDEs.
530	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	3					(Summary of Comment 1.A, Native Vegetation and Managed Wetlands) The integration of native vegetation and managed wetlands into the water budget is sufficient because the GSP included the groundwater demands of native vegetation and managed wetlands in the historical, current, and projected water budgets.	Comment acknowledged.

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531	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	Appendix 2E					(Summary of Comment 1.B, Stakeholder Engagement during GSP Development) Stakeholder engagement during GSP development is insufficient. SGMA's requirement for public notice and engagement of stakeholders is not fully met by the description in the Stakeholder Communication and Engagement Plan (Appendix 2E). The opportunities for public involvement and engagement with DACs, drinking water users, tribes, and environmental stakeholders are described in very general terms. They include technical and informational workshops and meetings open to the public. No specific outreach targeted to DACs, drinking water users, tribes, or environmental stakeholders is described in the GSP.	Comment acknowledged. It is noted that the GSAs have made clear and consistent efforts to respectfully engage with all stakeholders and interested parties through robust discussion. As described in Section 2.7.2, the CGA and GGA sponsored, publicized, and conducted numerous public engagement opportunities for stakeholders and interested parties in the Subbasin, including more than 236 separate meetings and workshops. Meetings and workshops have been consistently advertised and open to the public, and meeting notes, materials, and/or recordings have been available to the public. Other specific communication and outreach activities are described in Section 2.7.3, including tribal engagement. Communication and outreach has reached stakeholders and interested parties of varied backgrounds, including DACs, drinking water users, tribes, and environmental stakeholders. The GSAs have made clear efforts to reach and engage with all stakeholders and interested parties in the Colusa Subbasin. Notably, the majority of the populace in the Colusa Subbasin is classified as a DAC, SDAC, or EDA (see Section 2.1.2.3). Outreach and communication with communities in the Colusa Subbasin is intrinsically communication with DACs, SDACs, and EDAs.
532	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	Appendix 2E					(Summary of Comment 1.B, Stakeholder Engagement during GSP Development) The Stakeholder Communication and Engagement Plan does not include a plan for continual opportunities for engagement through the implementation phase of the GSP for DACs, domestic well owners, tribes, and environmental stakeholders. The plan should describe efforts to consult and engage with these stakeholders, and should utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the subbasin within the GSP.	Comment acknowledged. Engagement strategies listed throughout Appendix 2.E are nearly all expected to be used during GSP "development (or planning) and implementation," which is explicitly stated in several locations. Those engagement strategies apply to GSP implementation. Additionally, Section 2.7.3 of the GSP specifically describes the GSAs' consistent tribal engagement during GSP development. The GSAs are prepared to continue tribal engagement during GSP implementation. Table 4 in Appendix 2.E presents "Educational and Reference Documents for SGMA Implementation" and was used to inform the Communication and Engagement Plan. That list includes DWR's SGMA Engagement With Tribal Governments, thus, said guidance was and continues to be used. Finally, all PMA descriptions in Chapter 6 describe plans for "Notice to Public and other Agencies," summarizing plans for outreach related to implementation of that PMA. As described in Section 2.7.1, the GSAs are committed to periodically update the C&E Plan as conditions warrant, including but not limited to any necessary and beneficial conditions associated with the transition from GSP development to GSP implementation.

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533	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	5					(Summary of Comment 1.C, Disadvantaged Communities and Drinking Water Users) The GSP does not sufficiently describe or analyze direct or indirect impacts on DACs or tribes when defining undesirable results, nor does it describe how the groundwater levels minimum threshold will avoid significant and unreasonable impacts on beneficial users beyond 2015 and be consistent with Human Right to Water policy. The plan should describe direct and indirect impacts on drinking water users, DACs, and tribes when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.	Comment acknowledged and addressed. Section 5.3.1 has been revised to include the following, "As described in Chapter 2, most of the Subbasin is classified as an Economically Disadvantaged Area and has a high proportion of Disadvantaged Communities (DACs), and Small Disadvantaged Communities (SDACs). These beneficial users, along with members of California Native American Tribes (Tribes), including the federally recognized Cachil Dehe Band of Wintun Indians and the Cortina Indian Rancheria of Wintun Indians of California, typically rely on groundwater to meet their drinking water needs. As expressed in California Water Code Section 106.3, "every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes." The human right to water extends to all Californians, including disadvantaged individuals and groups and communities in rural and urban areas (SWRCB, 2021). Undesirable results caused by chronic lowering of groundwater levels could affect the Human Right to Water by limiting the ability of drinking water beneficial users, including DACs, SDACs and Tribes, to access safe, clean, and affordable water for human consumption, cooking, and sanitary purposes. These drinking water beneficial users could experience cumulative effects of undesirable results caused by chronic lowering of groundwater levels and degraded water quality." Also in Section 5.3.1, the listing of the potential effects of the undesirable results caused by chronic lowering of groundwater levels was revised to include decreased access to safe, clean and affordable drinking water, and additional references to projects and management actions and implementation activities focused on maintaining groundwater levels and mitigating drought impacts to drinking water beneficial users was added. Section 5.4.1 was revised to discuss the Human Right to Water in the context of minimum thresholds for chronic lowering of groundwater levels.

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534	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	5					(Summary of Comment 1.C, Disadvantaged Communities and Drinking Water Users) The plan should describe direct and indirect impacts on drinking water users, DACs, and tribes when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."	Comment acknowledged and addressed. Section 5.3.4 has been revised to include the following, "Undesirable results caused by degraded water quality could affect the Human Right to Water by limiting the ability of drinking water beneficial users, including DACs, SDACs and Tribes, to access safe, clean, and affordable water for human consumption, cooking, and sanitary purposes. These drinking water beneficial users could experience cumulative effects of undesirable results caused by chronic lowering of groundwater levels and degraded water quality." Also in Section 5.3.4, the listing of the potential effects of the undesirable results caused by degraded water quality was revised to include decreased access to safe, clean and affordable drinking water, and additional references to implementation activities focused on coordinating with drinking water providers and regulatory agencies to support drinking water beneficial uses and users was added. Section 5.4.4 was revised to discuss the Human Right to Water in the context of minimum thresholds for degraded water quality.
535	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	5					(Summary of Comment 1.C, Disadvantaged Communities and Drinking Water Users) The plan should evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users, DACs, and tribes.	Comment acknowledged and addressed. See responses to comments 533 and 534.

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537	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	5					(Summary of Comment 1.C, Disadvantaged Communities and Drinking Water Users) The plan should set minimum thresholds and measurable objectives for all water quality constituents within the subbasin that can be impacted and/or exacerbated as a result of groundwater use or groundwater management. Ensure they align with drinking water standards.	Comment acknowledged. MCL exceedances are managed by individual water supply agencies.
538	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	5					(Summary of Comment 1.C, Groundwater Dependent Ecosystems and Interconnected Surface Waters) Sustainable management criteria for chronic lowering of groundwater levels provided in the GSP do not consider potential impacts to environmental beneficial users. When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the subbasin. Defining undesirable results is the crucial first step before the minimum thresholds can be determined.	Comment acknowledged. The development of a dedicated groundwater dependent ecosystem monitoring network consisting of shallow monitoring wells is discussed in Chapter 6.5.2.9 Potential Management Actions, and Chapter 7.1.2.1 GSP Studies. Although the GSAs used the best available scientific data and information to assess potential GDEs within the Colusa Subbasin, significant data gaps exist in the understanding of the GDEs and the associated species. These data gaps include potential undesirable results impacting environmental beneficial users. The GSAs will seek to work with resource agencies, stakeholders, beneficial users and the public to refine the understanding of GDEs in the Colusa Subbasin, fill data gaps, re-evaluate sustainability thresholds, and develop PMAs with consideration of GDEs.

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539	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	5					(Summary of Comment 1.C, Groundwater Dependent Ecosystems and Interconnected Surface Waters) The GSP does not explain how the chosen minimum thresholds and measurable objectives avoid significant and unreasonable effects on surface water beneficial users in the subbasin, such as increased mortality and inability to perform key life processes (e.g., reproduction, migration). When establishing SMC for the subbasin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems".	See response to comment 538.
540	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	5					(Summary of Comment 1.C, Groundwater Dependent Ecosystems and Interconnected Surface Waters) When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the subbasin are reached. The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.	Comment acknowledged and addressed. Section 4.2.5.4 has been revised to state that the ISW monitoring network wells may be useful for monitoring groundwater levels near GDEs; however, a dedicated network of shallow monitoring wells will be developed specifically for GDE monitoring during implementation of the GSP. The development of a dedicated GDE monitoring network consisting of shallow monitoring wells is discussed in Chapter 6.5.2.9 Potential Management Actions and Chapter 7.1.2.1 GSP Studies. Although the GSAs used the best available scientific data and information to assess potential GDEs within the Colusa Subbasin, significant data gaps exist in the understanding of the GDEs and the associated species. These data gaps include potential undesirable results impacting environmental beneficial users and in-stream habitat. The GSAs will seek to work with resource agencies, stakeholders, beneficial users and the public to refine the understanding of GDEs in the Colusa Subbasin, fill data gaps, re-evaluate sustainability thresholds, and develop PMAs with consideration of GDEs.
541	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	3					(Summary of Comment 2, Climate Change) The integration of climate change into the projected water budget is insufficient. The GSP incorporates climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the plan does not consider multiple climate scenarios (e.g., the 2070 extremely wet and extremely dry climate scenarios) in the projected water budget. While these extreme scenarios may have a lower likelihood of occurring, their consequences could be significant and their inclusion can help identify important vulnerabilities in the subbasin's approach to groundwater management.	Comment acknowledged. The GSAs have chosen to evaluate future scenarios of hydrologic uncertainty associated with projections of climate change using the 2030CT and 2070CT scenarios, consistent with GSP requirements (§354.18(c)(3)(A)). However, the GSAs acknowledge that there is significant uncertainty in future conditions related to climate change and other factors that will impact groundwater conditions and sustainability in the Colusa Subbasin. The uncertainty of future conditions is one of many reasons that GSP implementation will be based on adaptive management, described extensively in Chapter 6. It is also noted that the 2030CT and 2070CT climate change effects are simulated over the entire projected period. In reality, climate change effects will occur gradually with uncertain interannual changes.

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543	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	3, 6					(Summary of Comment 2, Climate Change) The plan should incorporate climate change scenarios into projects and management actions.	Comment acknowledged. As described in Chapter 6 (Section 6.1), PMAs were developed with consideration for the 2070CT climate change scenario. Select planned PMAs were also simulated in the 2070CT climate change scenario to evaluate depletions of interconnected surface water along major waterways in the Colusa Subbasin (see Appendix 3G).

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545	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	4, 7					(Summary of Comment 3, Data Gaps) The GSP should provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, tribes, GDEs, and ISWs to clearly identify potentially impacted areas.	Comment acknowledged. Maps of the DACs, tribal lands, GDEs, and surface waters are provided in Chapters 2 and 3. Surface waters are shown on maps in Chapter 4 with the interconnected surface waters and groundwater level monitoring network locations. As more information becomes available during plan implementation, the capability and appropriateness of monitoring sites to accurately and reliably monitoring conditions relative to specific areas of concern may be evaluated and addressed in future reports.

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546	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	4					(Summary of Comment 3, Data Gaps) The GSP should describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the subbasin.	Comment acknowledged and addressed. Although the GSAs used the best available scientific data and information to assess potential GDEs and ISWs within the Colusa Subbasin, significant data gaps exist in the understanding of ISWs, GDEs, and associated species. As described in Sections 6.5 and 7.1.2, the GSAs will seek to work with resource agencies, stakeholders, beneficial users and the public to refine the understanding of GDEs and ISWs in the Colusa Subbasin, fill data gaps, and develop PMAs with consideration of these beneficial users. Section 6.5 described opportunities for evaluating and planning biological monitoring.
547	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	6					(Summary of Comment 4, Addressing Beneficial Users in Projects and Management Actions) The GSP should clarify the planning horizon of the described domestic well mitigation program to ensure that it will proactively monitor and protect drinking water wells through GSP implementation.	Comment acknowledged. It is noted that Glenn and Colusa Counties both track and monitor well problems through a voluntary reporting program (described in the Preface). Additionally, it is noted that the GSAs have revised the MTs for chronic lowering of groundwater levels at several RMS sites, particularly around the Orland area. These revisions have created shallower MTs that are more protective of the 20th percentile depths of domestic wells. The GSAs still propose a potential domestic well mitigation program, though the precise policies, funding, and other factors underlying that program will need to be determined by the GSAs through a public, stakeholder-driven evaluation and decision-making process during GSP implementation. Mitigation could involve actions designed to secure reliable water sources for affected domestic well owners (through, for example, public water system consolidations funded by the GSA).
548	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	6					(Summary of Comment 4, Addressing Beneficial Users in Projects and Management Actions) For DACs and domestic well owners, the GSP should include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSAs plans to mitigate such impacts.	Comment acknowledged. Additional text has been added to Section 6.2.2 to describe the anticipated effects of planned PMAs on water quality, including that experienced by domestic well users and DACs.

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549	Ngodoo Atume, Samantha Arthur, E.J. Remson, Amy Merrill, J. Pablo Ortiz-Partida, Danielle V. Dolan, Melissa M. Rohde, Kristan Culbert	Clean Water Action/Clean Water Fund, Audubon California, The Nature Conservancy, American Rivers, Union of Concerned Scientists, Local Government Commission	6					(Summary of Comment 4, Addressing Beneficial Users in Projects and Management Actions) The GSP should develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.	Comment acknowledged. As described in Chapter 6 (Section 6.1), PMAs were developed with consideration for the 2070CT climate change scenario. Select planned PMAs were also simulated in the 2070CT climate change scenario to evaluate depletions of interconnected surface water along major waterways in the Colusa Subbasin (see Appendix 3G). As the comment indicates, there is significant uncertainty in future conditions related to climate, water supplies, and other factors that will impact groundwater conditions and sustainability in the Colusa Subbasin. The uncertainty of future conditions is one of many reasons that GSP implementation will be based on adaptive management. The GSAs' adaptive management strategy for GSP implementation is described extensively in Chapter 6.
550	Samantha Arthur	Audubon California	3					Audubon appreciates that the GSA has identified and specifically included managed wetlands in maps and water budgets, specifically the three primary refuges: Sacramento National Wildlife Refuge, Delevan National Wildlife Refuge, and Colusa National Wildlife Refuge.	Comment acknowledged.
551	Samantha Arthur	Audubon California	3					The future condition water budgets should reflect CVPIA Full Level 4 water supplies being available and delivered to each of the three national wildlife refuges. The use of 2013 to represent unconstrained delivery conditions (e.g. see GSP Table 3-9, page 3-88) reflects deliveries to these refuges that are less than the CVPIA Full Level 4 mandated quantities. Annual Full Level 4 water supplies during unconstrained conditions are as follows: a. Sacramento NWR = 50,000 acre-feet, b. Delevan NWR = 30,000 acre-feet, and c. Colusa NWR = 25,000 acre-feet. During constrained conditions, these same refuges generally are provided 75% of this quantity, as stipulated in their water delivery agreements with the U.S. Bureau of Reclamation.	Comment acknowledged. Table 2-3 has been edited to acknowledge the expected availability of CVPIA Full Level 4 water supplies to the national wildlife refuges. A footnote has been added stating that although CVPIA Full Level 4 supply quantities are known, they were not used in the projected water budgets due to the uncertainty in those quantities actually being provided. In light of these uncertainties, simulating constrained surface water supplies was considered a more conservative approach to GSP planning, as more surface water supply availability would increase groundwater recharge and likely decrease groundwater pumping. It is noted that the GSP is a "living document," and will be revised over time, as needed, once more is known about actual future water supplies. It is expected that the C2VSimFG-Colusa model and water budgets will be updated periodically during GSP implementation to incorporate new information and revised assumptions as we learn more about conditions in the Colusa Subbasin.
552	Samantha Arthur	Audubon California	6				Table 6-2	Audubon appreciates that several of the listed projects included in Table 6-2 include identified opportunities for multi-benefit projects that provide water supply and wildlife habitat benefits.	Comment acknowledged.

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553	Samantha Arthur	Audubon California	2				Figure 2-8	Suggest modifying the color scheme or naming for the category "native" to distinguish the refuges from other "native" areas as the refuges are distinctly different land uses than the traditional native upland areas, for instance, in the southwestern portion of the subbasin. Private managed wetlands and managed wetlands in U.S. Fish and Wildlife Service Management Areas that have federal easements are currently not identified in land use or jurisdictional maps.	Comment acknowledged and addressed.
554	Samantha Arthur	Audubon California	2		page 2-11		Table 2-3	Since the three national wildlife refuges are mandated to receive stipulated quantities (though have yet to achieve them), this table should also list the CVPIA Full Level 4 quantities of: Sacramento NWR = 50,000 acre-feet, Delevan NWR = 30,000 acre-feet, and Colusa NWR = 25,000 acre-feet. While the historic average deliveries are useful for baseline understanding, modeling of future conditions should include the full water supplies for these three refuges.	Comment acknowledged and addressed. Please see the response to comment 551.
555	Samantha Arthur	Audubon California	3		Page 3-13	line 32/33		The term "land" should be added to the end of the sentence to result in "federal wildlife land."	Comment addressed in the GSP section indicated.
556	Samantha Arthur	Audubon California	3		Page 3-88		Table 3-9	The future condition water supplies for the three national wildlife refuges should reflect the CVPIA Full Level 4 water supply. Deliveries in 2013, represented as a Shasta Non-critical year, did not result in Full Level 4 deliveries to these refuges. The CVPIA Full Level 4 quantities include a portion that is labeled "Level 2" that reflects delivery of CVP project water, and a portion labeled "Incremental Level 4" (the difference between Full Level 4 and Level 2) that can come from other sources. The GSP will need to make reasonable assumptions whether the Incremental Level 2 supply will be derived from other surface water sources or from groundwater, though either is possible.	Comment acknowledged. Please see the response to comment 551.
557	Samantha Arthur	Audubon California	3	Section 3.3.3.1 Historical (Water Budget)	Page 3-89			Under "Agricultural Water Demand" the following sentence is included: "For ponded land uses (rice and managed wetlands), pond depths and pond drainage are also considered to simulate demands." Under the "Current Conditions" (Section 3.3.3.2) and "Future Conditions Scenarios" (Section 3.3.3.3) water budget discussions, this same language is missing. Did these budgets recognize managed wetlands in a similar fashion as described for the historical budget? If so, we suggest adding the same sentence to each of the other water budget descriptions for clarity.	Comment acknowledged and addressed. Clarification has been added to Sections 3.3.3.2 and 3.3.3.3 to verify that, yes, the current and future conditions water budgets did recognize managed wetlands in a similar fashion as described for the historical budget.

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558	Samantha Arthur	Audubon California	3		Page 3-96		Table 3-11	As a result of including the CVPIA Full Level 4 water supplies for the national wildlife refuges, the values for the various future conditions for "Sacramento River Diversions" and "Groundwater Pumping – Managed Wetlands" as well as the "Evapotranspiration – Managed Wetlands" may all change. The table should be updated accordingly.	Comment acknowledged. Please see the response to comment 551. It is also noted that adding CVPIA Level 4 supplies to the water budget will increase total surface supply to the subbasin and reduce estimated future groundwater pumping, so the approach used in the GSP water budgets represents a relatively worse case scenario for groundwater sustainability planning purposes.
559	Samantha Arthur	Audubon California	3		Page 3-97		Table 3-12	Similar to the prior comment, values in this table for the future conditions would be expected to change when the CVPIA Full Level 4 water supply quantities are incorporated	Comment acknowledged, please see the response to comment 558.
560	Samantha Arthur	Audubon California	6	Section 6.5.2.3	Page 6-84 to 6-86			Several demand reduction concepts are initially outlined in this section. Audubon suggests the following be considered associated with each suggested method: 1. Allocation: Use of groundwater by managed wetlands should not be restricted without adequate replacement with surface water sources, especially the national wildlife refuges. Managed wetlands in the Colusa subbasin provide invaluable benefits to the Pacific Flyway. 2. Allocation with a market: If a market is created and managed wetlands are assigned an allocation, such parcels should be able to participate in a market to optimize the use of their allocations for achieving habitat objectives, but managed wetlands should not be required to participate in a market to secure the water they need. 3. Land repurposing: Strategic siting of where irrigated lands are retired and others are kept in production should consider the potential benefits to wildlife. Areas surrounding protected areas, such as the Sacramento, Delevan and Colusa National Wildlife Refuges, should be prioritized habitat benefits. 4. Financial incentives: Public beneficial uses such as managed wetlands should not be subject to financial conditions that lesson the public benefit otherwise achieved on the lands.	Comment acknowledged. The following statements were added to Chapter 6, Section 6.5.2.3: "Allocation design may include specific considerations for managed wetlands and other habitat benefits uses of water." "Other market rules might consider habitat and ecosystem service benefits." "Other land repurposing program considerations might consider strategic location of repurposed lands considering proximity to protected areas (e.g., National Wildlife Refuges)." and "Financial incentives could consider public benefits (e.g., habitat) separately from private benefits (e.g., irrigation) of water use."
561		City of Orland	5					Chapter 5 states that the subbasin in is currently being managed sustainably without undesirable result despite over 150 domestic wells going dry this summer alone as 2021 data is not yet included in plan development. It is notable that a key partner in the draft plan explained at the October 13th public meeting. "The current actual drought is more compelling than modeled future sustainability challenges."	Comment acknowledged. Please see the response to comment 318.

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562		City of Orland						The plan's allowance for up to 20% of domestic wells going dry may be understandable in light of the age and depths of most of the wells. However, depletion of up to 5% of groundwater storage (over 5 years) and inelastic subsidence of up to½ foot per year were also considered acceptable in the July version of the draft plan, apparently due to an estimate that we still have 26-140 million AF (acre feet) of water in the aquifer. Consultants to the GGA suggest that 26M AF is reliably established, but the estimate of upwards of 140M AF is more of a projection. We are concerned about any reliance on the 140M AF estimate, and suggest that the subbasin should be more conservatively managed to an assumption of 26M AF.	Comment acknowledged. Please note that the GSAs have since revised the MTs and MOs for subsidence at all RMS benchmarks (please see the response to comment 477) and have updated the MTs for groundwater levels at several RMS wells, including those around Orland (please see the response to comment 564). Change in groundwater storage is monitored and managed in proxy through management of groundwater levels according to these revised SMC. However, recognizing the data gaps in the basin setting and the uncertainty of future conditions, GSP implementation will be based on adaptive management (see the response to comment 468). The GSAs have also proposed a number of studies to close data gaps during GSP implementation (see Chapter 7), including a study of infrastructure sensitivity to land subsidence.
563		City of Orland						We welcome the recent consultant proposal, adopted by the Board October 11th to revise the plan with an amendment tightening the measurable objectives (MO) and minimum thresholds (MT) for inelastic subsidence, as the draft plan's original allowance for excessive subsidence would have exposed municipal services like water, wastewater and storm drainage to unacceptable risk of severe disruption.	Comment acknowledged.
564		City of Orland						City of Orland observes that the draft plan as written does not appear to adequately protect the integrity of domestic and municipal drinking water wells. With most said wells being less han 200' deep, more than 20% would be dry by the time well depth MO were reached and almost all would be dry by the point MT were reached. It would seem that the MO and MT for well depths should be reconsidered and revised to a more conservative and protective standard.	Comment acknowledged. Please note that the GSAs have revised the MTs for chronic lowering of groundwater levels at several RMS sites, particularly around the Orland area. These revisions have created shallower MTs that are more protective of the 20th percentile depths of domestic wells, considering historical groundwater levels since the mid-2000s. The GSP also plans to manage groundwater levels to the higher MO levels, which are shallower than 200 ft bgs at all wells and considerably shallower at most. If harm does occur to domestic wells, the GSAs propose implementing a domestic well mitigation program, though the precise policies, funding, and other factors underlying that program will need to be determined by the GSAs through a public, stakeholder-driven evaluation and decision-making process during GSP implementation. The GSAs also reiterate that they are planning an adaptive management strategy for GSP implementation. Please see the response to comment 468.

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565		City of Orland						Finally, we commend the GGA Board for its many projects in progress, planned and contemplated, as laid forth in Chapter 6. However, there do not yet appear to be real "triggers" that would commit the GGA to certain substantive actions when passing MO and approaching MT. We hope the GGA works with the State and consultants in coming years to develop and specify such triggers as a backstop to recharge projects in order to truly protect the precious drinking water resources on which the people of Orland and Glenn County rely.	Comment acknowledged. The GSAs plan to select and implement PMAs to effectively address the specific concerns that arise in the Subbasin, with regard for the specific sustainability concern and relative costs and benefits. The uncertainty of future conditions is one of many reasons that GSP implementation will be based on adaptive management (see the response to comment 468). Planned PMAs (with a timeline and plans for action) alone are expected to address sustainability concerns over the projected future period (see Sections 6.1 through 6.3); however, other potential PMAs are available as needed. Implementation of many potential PMAs, including demand management, involve major public policy questions that will require evaluations of conditions in a public, stakeholder-driven process. The precise decisions for whether and how potential PMAs would be initiated will be determined by the GSA boards through a stakeholder-driven process during GSP implementation.

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2B-2. Letters

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AQUALLIANCE
DEFENDING NORTHERN CALIFORNIA WATERS

October 31, 2021

Lisa Hunter, Program Manager
Glenn Groundwater Authority
lhunter@countyofglenn.net

Mary Fahey, Program Manager
Colusa Groundwater Authority
mfahey@countyofcolusa.com

Re: Draft Colusa Subbasin Groundwater Sustainability Plan

Dear Ms. Hunter and Ms. Fahey:

AquAlliance, the California Sportfishing Protection Alliance, and the California Water Impact Network (hereinafter AquAlliance) submit the following comments and questions on the draft Colusa Subbasin Groundwater Sustainability Plan ("Colusa GSP" or "Plan"). There are serious weaknesses in the Plan that require significant changes to the document, without which the public and policymakers are truly left in the dark and dangerous consequences are obfuscated.

The information and analysis provided in Section A discuss the future changes described in the draft GSP for the Colusa Subbasin groundwater system and the overlying surface waters, and the implications of the proposed sustainability objectives and minimum thresholds. The draft Colusa GSP presents a rosy scenario suggesting that future precipitation, evapotranspiration, and surface water supplies will adjust to the 2070 Central Tendency climate change scenario provided by DWR and keep groundwater levels stable. However, elsewhere in the Plan is material that indicates the proposed GSP management of the subbasin under the 2070 Central Tendency scenario will cause detrimental changes to both surface waters and groundwater. The 2070 scenario sustainable management of subbasin assumes that annual average groundwater pumping will increase approximately 13%, while allowing declines in groundwater below the historical lows. The groundwater storage will be partially sustained by increases in seepage from overlying streams and a reduction in groundwater accretion to the streams.

Section B demonstrates the serious deficiencies in definitions of and plans to resolve conflicts. This failure will lead to escalating costs to residents, farms, and businesses to protect access to groundwater by deepening wells or drilling a replacement, plus likely legal expenses. Adam Keats and Chelsea Tu discussed this at length in 2016: "[i]f a medium or highpriority [sic] groundwater basin becomes a multi-use basin that includes imported water rights, overlying rights, and interconnected instream rights, the relationship between those rights, and the priority given to each of the rights-holders, remains unresolved by the Act. The responsibility for

identifying and addressing the foreseeable legal and use conflicts between imported water, overlying use, and/or in-stream use where groundwater interconnects with surface water is thus left to the GSAs, or ultimately, the courts."[1]

Section C provides historic information on some of the destructive planning and practices that have transpired in the Sacramento Valley that have caused groundwater basins elsewhere in California to become private assets as opposed to public commons. It is a tragedy in the making to have local government, the cities of Colusa, Orland, Williams, and Willows and the counties of Colusa and Glenn, promote a Plan that accepts the failure of 20 percent of the domestic wells and the loss of almost 1,000,000 AF of groundwater storage by 2070.

A. Sustainability objective and threshold for undesirable results

1. The Draft GSP has a lot of words but little action, except recharge projects. The sustainable operation of the subbasin is described as [*p]rojects and management actions that the GSAs **could** implement to ensure that the Colusa Subbasin is operated sustainably (i.e., to avoid undesirable results) are described in Chapter 6. The Introduction to Chapter 6 describes an adaptive management approach for implementing projects and management actions that will be informed by monitoring of groundwater conditions and will lead to implementation of **additional projects if Measurable Objectives (MOs) are not being maintained and Minimum Thresholds (MTs) are being approached** (emphasis added).*

   > *An adaptive management approach **recognizes that undesirable results do not currently exist in the Subbasin**, and it is **uncertain that undesirable results will develop in the future** (emphasis added).* Section 5.2.1, pages 5-3 and 5-4.

   The sustainability management actions given in Chapter 6 are all "**Potential Management Actions**" (Section 6.5.2, page 6-81), and all are ***currently in the early conceptual stage***, so there is no understanding of the benefits, costs, the funding sources, or specifics about how the actions will maintain sustainable groundwater levels (emphasis added).

2. Section 6.1 on Project and Management Actions Development Approach gives the true goal: **pumping more groundwater, 13% more, to make up for evapotranspiration (ET) increase due to climate change**. The draft GSP talks about climate change and then gives a selection of water budget values with and without climate change, Table 6-1 (page 6-2). See page 1 of AquAlliance Exhibit A. The draft GSP assumes that rainfall will increase with the 2070 climate change scenario to meet 74% of the addition ET from climate change, (75 taf/yr / 102 taf/yr = 0.735). The draft GSP says that stream accretion (groundwater that discharges to the steams) will remain positive with and without climate change, but with the 2070 climate change it decreases 48,000 acre-feet / year (AFY) approximately 38% from the future conditions without climate change. That's a lot of decrease, but that's only 0.5% of the Sacramento River flow, so a cynic might ask, why worry (page 6-2)? It isn't clear how the stream depletion monitoring program will interact with the stream accretion assumptions.

[1] Keats, Adam et al., 2016. *Not All Water Stored Underground is Groundwater: Aquifer Privatization and California's 2014 Groundwater Sustainable Management Act*. p. 98.

The stream depletion monitoring program only monitors groundwater levels, but it ***should*** also include monitoring of stream flow changes, i.e., seepage and accretion changes, to validate the assumptions about climate change and sustainability (emphasis added).

3. The groundwater monitoring for sustainability focuses on domestic wells and stream depletion, but not much on subsidence. The MOs and MTs for domestic well sustainability use point data of historical groundwater depth and hydrographs for 48 Representative Monitoring Network (RMN) wells out of the 104 monitoring wells identified in the subbasin, listed on Table 5-2 and 4-1, respectively. The MOs are defined at the middle of the historical range of groundwater levels. (See pdf pages 56 through 67, and 105 through 116 in Appendix 5B for graphic presentation of MOs and MTs with values from Table 5-2.) The MTs are developed by taking the greater depth of either the depth where 20% of the domestic wells within the Thiessen polygon around each of the 48 RMN monitoring wells are shallower, or the depth at 50% of the historical range below the deepest groundwater level prior to January 1, 2015 (and sometimes 2016) (Section 5.4.1, pages 5-19 through 5-21). These GSP standards for the MTs effectively means that ***domestic wells in the Colusa subbasin can experience groundwater levels deeper than historical levels and still be considered sustainable***.

4. The draft GSP requires that the determination of when an MT is exceeded and creates an ***undesirable result*** for domestic wells, stream depletion, water quality, or subsidence, that the monitoring sites, at either monitoring wells or survey benchmarks, must be evaluated in sub-groups of a minimum size and minimum duration, see Table 5-1 (see page 2 of AquAlliance Exhibit A), and all monitoring sites must **exceed their respective MTs together** before an ***undesirable result*** can occur. The draft GSP identifies the monitoring wells, but doesn't identify the monitoring well groups, or define criteria for the making the groups other than state the minimum number needed in a group. The draft GSP does say that once formed the groupings can't change. Except for subsidence, the MTs for each monitoring site are different, Tables 5-2 and 5-3. See pages 3 through 5 of AquAlliance Exhibit A. The requirement that all monitoring sites must **exceed the MTs together** implies that the monitoring site with the greatest MT depth will likely control the occurrence of an ***undesirable results***. In other words, until the deepest or greatest MT value is exceeded, the group hasn't exceeded the collective MT and therefore no ***undesirable result*** has occurred (emphasis added).

   For example, a group of 12 monitoring wells in the northern portion of the Colusa subbasin surrounding Orland, the last 12 wells listed in Table 5-2, have MTs depths that range from 90 to 356 feet, or elevations from 71 to -108 feet amsl. (See pages 5 and 6 of AquAlliance Exhibit A) The MT listed in column 5 is the greatest value of either of the right two columns in Table 5-2. Note that the MT depth selected for these 12 wells are all at or greater than the depth of the 20th percentile of domestic wells. This means that if these 12 wells are a domestic well monitoring group, then an ***undesirable result*** can't occur until the depth to groundwater at the well with the greatest MT depth, well 21N04W12A004, exceeds 356 feet, or an elevation lower than -108 feet (columns 4 and 5 in Table 5-2) for 24 consecutive months. This maximum depth is significantly greater than the 20th percentile depth for the surrounding domestic wells, column 4 versus column 11.

The ***all-or-none*** requirement makes it possible that the depth to groundwater in the other 11 wells could decline far below their MTs, perhaps even exceed a depth of 356 feet, yet not trigger an ***undesirable result***. In fact, the groundwater elevation contour maps for spring and fall 2020, Figures 3-24 and 3-25 (see pages 8 and 9 of AquAlliance Exhibit A) show that the elevations decline beneath Orland from a high point on the northwest side of the town at approximately 240 to 220 feet in spring and fall 2020, respectively. The groundwater well 21N04W12A004 with the lowest MT elevation, -108 feet, is in southwest of Orland. See page 8 of AquAlliance Exhibit A. The requirement that all 12 RMN wells in the group exceed their MTs before an ***undesirable result*** occurs, seems to allow for the low southwest of Orland to either expand laterally, deepen significantly (decline approximately 190 ft or greater, from current elevation of approximately +80 ft down to the MT of -108 ft) before the MT at well 21N04W12A004 is exceeded when mitigation action(s) would be required. It is possible that another well in the group of 12 will be the last to exceed its MT, but the concept is still the same. The depth to groundwater can exceed the MT depths at 11 out of the 12 RMN wells in a group, and still the groundwater is considered sustainable, regardless of the maximum depth to groundwater in the group's Thiessen polygons (emphasis added).

5. The draft GSP has an economic analysis in Appendix 5C (pdf pages 144 through 155) to apparently reason why the MTs are set at the lowest level of either allowing the shallowest 20% of the domestic wells to go dry and/or 50% of the historical water level range below the lowest depth before January 2015 (or 2016). The GSP states that …*[t]he purpose of the analysis was to establish what share of domestic wells in the WCR database may have been* ***previously dewatered and/or are no longer used***. (see page 3 in Appendix 5C). Are there any facts to document that these wells are no longer in use or previously dewatered? DWR has a web site where people can volunteer that their well went dry (https://mydrywell.water.ca.gov/report/). There are 1,589 wells out of a total of 1,677 wells in the Orland area that are assumed to have gone dry according to Table 1 in Appendix 5C near monitoring well 22N03W24E001 – ***95% of the wells.*** See page 3 of AquAlliance Exhibit A for well locations. The assumption that the wells previously went dry when groundwater was at the lowest pre-2015 point, allows the GSP to reason that an MT that allow loss of up to 20% percent of the shallow domestic wells is ***cost-effective***, and ***an acceptable balance between avoiding significant and unreasonable impacts to domestic (and other shallow) wells and allowing sufficient flexibility for conjunctive management of Subbasin surface and groundwater supplies*** (page 9 in Appendix 5C). The economic analysis concludes on page 9 of Appendix 5C that: (1) MT groundwater levels shouldn't be raised because it's not cost effective. We ask, cost effective to whom?; (2) the groundwater levels will be managed to the higher MOs levels and therefore no harm will occur to domestic wells; but (3) if harm occurs, then the **potential** management action that the GSAs **should** develop a domestic well mitigation program (see Chapter 6) would provide a safety net to **potentially** compensate for impacts to domestic wells. It appears to AquAlliance that the GSP has decided that the shallow domestic wells can go dry, and the GSAs **might** find a way to help the well owners, but they aren't ready to commit to the compensation portion (emphasis added).

6. The *undesirable results* for domestic wells protection are only triggered when the groundwater levels in 25% (12 of the 48 network wells) are continuously below their MTs for 24 consecutive months, Table 5-1. Because groundwater levels naturally fluctuation with season, the 50% range has been established at each monitoring well, this standard seems to also say that the seasonal fluctuation about the MT depth, i.e., the GSP Margin of Operational Flexibility (MOF), is not considered an *undesirable result*? For example, well 22N03W24E001, the closest well to Orland (see Figure 4-2, page 3 of AquAlliance Exhibit A), has a MOF of 79 feet with an MT of 273 feet. See page 5 of AquAlliance Exhibit A.

   Answers to the following questions are crucial for the public, policy makers, and AquAlliance members:
   - If the depth to groundwater seasonally fluctuates for years about say 270 feet, from a depth of 191 to depth of 349 feet, isn't the period, presumably summer months, when groundwater drops to 349 feet an *unreasonable result*? Especially because the 20% domestic well depth is only 90 feet, 259 feet higher than this potential seasonal drop in groundwater.
   - What happens if the seasonal decline is greater than the 50% range?
   - How many of the domestic wells in the well 22N03W24E001 Thiessen polygon will go dry with groundwater at a depth of 349+ feet?

7. The draft GSP appears to plan for subsidence throughout the subbasin to be as much as 10 feet over the next 40 years with a subsidence MO set at 0.25 feet per year for each of 63 survey benchmarks. The subsidence benchmark MTs are set at 0.50 to 0.60 feet per year or as much as 20 to 24 feet over the next 40 years, depending on the current rate of subsidence, Table 5-1. See page 2 of AquAlliance Exhibit A. The subsidence MTs imply that groundwater levels are considered "sustainably" managed until subsidence exceeding 20+ feet over an area of at least 15% of the benchmarks, 9 out of 63 benchmarks. The benchmarks seem uniformly distributed across the subbasin, Figure 3-31(page 10 of AquAlliance Exhibit A), so the area subsidence will likely need to be at least 15% of the total basin area or approximately 138,000 acres (the total subbasin area is 918,380 acres – DWR B118). Section 5.4.5 says that the 9 of 63 benchmarks *must be the same subset of locations not any combination of nine locations*. This seems to say that a large area of subsidence needs to develop before any "action" to stop subsidence will be taken. As with the other network groups, the GSP doesn't identify which benchmark belong to each group of 9.

   The Management Actions in Chapter 6 that affect subsidence include In-Lieu recharge or direct surface water recharge, and reviewing the County well ordinances, see Table 6-3 (page 6-12). The In-Lieu and direct surface water recharge assume that this surface water for recharge is available to divert from the rivers. This assumption needs to be verified given all the other requirements on the river flows. There doesn't appear to be any Management Actions other than recharge to mitigate subsidence, no proposal to **possibly** create a subsidence mitigation program like the **possible** domestic well compensation program. The draft GSP also doesn't appear to be concerned about damage from subsidence to infrastructure, homes, stormwater flood control, or levees that might be impacted by 10+ feet of subsidence. As with domestic wells, the trigger required for an ***undesirable result*** is the ***all-or-none*** monitoring group exceedance of the MT for a group of least 9 benchmarks. This

ignores that fact that subsidence often occurs around a lowest point that then spreads outwards. The draft GSP doesn't give a maximum rate or depth of subsidence allowed for the subsidence group of 9 benchmarks or between the benchmarks, just an annual average. With the advent of InSAR radar to measure changes in ground elevation, Figure 3-32, the subsidence in between benchmarks can now be measured. See page 11 of AquAlliance Exhibit A. The draft GSP doesn't indicate whether the subsidence rate for determining whether an **undesirable result** has occurred will be normalized over the years since 2015, over all 40 years of the GSP plan, over every 5 years with GSP updates, or considered as a separate annual value. Clarification is needed on the maximum rate of subsidence at any point that will trigger an **undesirable results** and the duration for averaging (emphasis added).

8. The draft GSP requirement to consider monitoring sites as a group when determining whether the MTs have been exceeded may create areas where the number of sites are too small to allow for the groups to encompass all monitoring sites, and/or create scientifically logical groups. For example, try creating groups of 9 or more from the subsidence benchmarks in Figure 3-31 that encompass the two known areas of subsidence around Arbuckle and Artois, see Figure 3-32. See pages 10 and 11 of AquAlliance Exhibit A. Now, fill in the rest of the Colusa subbasin with groups of 9+ subsidence benchmarks. Do the shapes of these other subsidence groups make sense? Except for the two around the known high subsidence areas, the other groups are likely very irregular in shape and may not properly encompass the other areas of greatest groundwater pumping, or the other areas with the greatest potential for subsidence, see Figure 3-23 (see page 12 of AquAlliance Exhibit A). To have the necessary minimum numbers to form a subsidence group, more distant and unrelated benchmarks would likely have to be combined. The requirement for a minimum of 9 benchmarks in a group along with the irregular shape of the groups could result an area of subsidence having to be monitored by two or more groups. The draft GSP should give the boundaries of the subsidence and groundwater monitoring well groups to show that this group monitoring scheme to determine a trigger of **undesirable results** is practical and show that it will work (emphasis added).

9. The domestic well monitoring program assigns to each monitoring well a portion of the subarea based on a Thiessen polygon network. The draft GSP doesn't appear to have a map of the shapes of these polygons or list the area of each polygon. The Table 1 in economic analysis of Appendix 5C does lists the total number of domestic wells associated with each monitoring well and the number of domestic wells that are shallower than the depth to the lowest groundwater level before January 2015 (or 2016). There is an assumption that these domestic wells are in the associated monitoring well's polygon, but the spatial distribution of the domestic wells is unspecified. The draft GSP doesn't give a distribution of the depths of these domestic wells for each polygon, such as a histogram or frequency table by depth, so the impact of an incremental decline in groundwater in each polygon as it goes towards the MT, or lower, is unknown. The draft GSP should give the boundaries of the Thiessen polygons for the monitoring wells that are used to measure groundwater levels for either domestic wells or stream depletion, and provide a table of the number and depths, with cumulative frequency for domestic wells in each polygon.

10. The draft GPS assumes and plans to allow domestic wells to go dry even when the MOs and MTs are achieved. The draft GSP says that managing to the MOs through actions yet to be determined, will minimize the number of wells that dewater, i.e., go dry, see Chapter 6.5.2.1 (page 6-81). The depth of the screens for some of the 48 RMN groundwater monitoring wells in Table 5-2 are given in Table 4-2, Chapter 4 pages 7 through 10. Eighteen of the RMN wells are screened deeper than 700 feet below the ground surface (bgs), 15 are screened from 250 to 700 feet bgs, and 15 are screen shallower than 20 feet bgs. ***The draft GSP doesn't explain why the deep screened monitoring wells are selected to monitor shallower aquifers used by domestic wells*** even, when there is often a shallow monitoring well at the same location, see Figures 4-2 and Figure 4-8. See pages 3 and 6 of AquAlliance Exhibit A. Seven of the wells in the domestic well monitoring network are shallow and are also part of the 12-well stream depletion monitoring network, Table 5-3. See page 7 of AquAlliance Exhibit A. The remaining 5 shallow wells in the stream depletion monitoring network appear to have deeper companion wells that are part of the 48 RMN network. While the MOs for the stream depletion network in these seven shallow wells are nearly equal to the MOs for the domestic well network, the MTs are very different and much deeper, (compare values in Table 5-2 to Table 5-3). The draft GSP doesn't clearly explain the differences in any Management Actions needed to maintain the sustainability of domestic wells and interconnected surface waters that result from the different MTs at these same shallow monitoring wells. Perhaps, because the Management Actions are ***currently in the early conceptual stage (emphasis added).***

11. The draft GSP proposes to investigate the **possibility** of compensating domestic well owners for impacts from groundwater production. Whether this compensation program is ever created, a well owner that needs to replace a dry or broken well will need to know the depth for that new well, so that it won't go dry again under the GSP. That depth should be related to the MT of the polygon where the new well will be constructed. However, as discussed above in comment 4, the MT for the well's polygon may not be the maximum future "sustainable" depth of groundwater. It will likely be deeper because of the monitoring group ***all-or-none*** requirement to trigger an ***undesirable result***.

    - So, what is the recommendation in the GSP for how the well owner should determine the depth for the new well?
    - What assurances does the GPS give to the domestic well owner that the depth for the new well will be sufficient to ensure a future domestic water supply?
    - Can the well owner assume that if they follow the GSP's recommended depth procedures for a new domestic well, they will receive compensation if the depth to groundwater is ever exceeded? (emphasis added)

12. The Management Action for the Domestic Well Mitigation Program, Section 6.5.2.1, states that the GSP (GSA) will ***investigate implementing a domestic well mitigation program*** with funding to mitigate dewatered well (based on yet undefined eligibility) (emphasis added).

    - Will the GSP also include a subsidence mitigation program that financially compensates homeowners and landowners for damage from subsidence?

- Will there be funds to repair infrastructures such as roads, bridges, levees, stormwater drainage, pipelines, home and building foundations, walls and roofs, domestic, municipal, industrial, and agricultural wells?
- What are the possible sources of subsidence mitigation funding, a consumption tax, a property tax, a flat tax per well?
- Will the subsidence fund be designed to anticipate the cost of mitigation repairs over the full 40 years, that is, mitigate the planned 10 to 20+ feet of subsidence?

13. Table 4-2 lists the characteristics of the monitoring wells in the GSP network, a total of 104 completions wells (page 4-3). However, only 48 completions are used for the domestic well network and another 5 for the stream depletion network. Only those 53 domestic and stream depletion wells have sustainability criteria, MOs and MTs.

    Answers to the following questions are crucial for the public, policy makers, and AquAlliance members:
    - Why weren't MOs and MT calculated for the remaining 51 monitoring wells?
    - Why are the other 51 wells included in the "groundwater monitoring network?"
    - How will measurements in these other 51 wells be used in the groundwater monitoring program?

14. Attachment A of Appendix 5B shows on 48 hydrographs how the groundwater level thresholds are developed and includes the numbers given in Table 5-2. The hydrographs in Attachment A of Appendix 5B gives the values of the MO and MT and graphically show their implications. Of interest are those wells where the MT based on the 20% shallower wells depth is below the 50% range depth. This occurs at 30 of the 48 wells. ***This seems to say that "sustainability" includes dewatering, drying up, 20% of the domestic wells.***

15. The selection of the MO and lowest point for the MT appears to use groundwater levels after January 1, 2015 when it produces a lower elevation than measurement before the SGMA Benchmark date. For example, monitoring well 21N02W36A002 (hydrograph on pdf page 61 in Appendix 5B; see page 13 of AquAlliance Exhibit A) has significant declines in groundwater elevation during 2015, but the other years have minor seasonal variation. The MO is set as the "average" that appears to include the over pumping in 2015, which doesn't reflect the historical groundwater condition. The 50% range also appears to include the 2015 pumping decline and the lowest point appears to be in 2015, after January 1, 2015. The use of the 2015 overdraft seems to make the post-January 2015 conditions the acceptable standard, rather than require them to be corrected. But even if the proper MO and MT were selected for this well, the 20% shallower groundwater level at 81 feet is approximately 50 feet lower than the seasonal average would be if following the GSP's requirement to take the lowest MT depth. How many of the MTs in the 30 out of the 48 Representative Monitoring Network (RMN) (see page 4 of Appendix 5B) wells are calculated using a post-January 1, 2015 historical low can't be determined because the GSP doesn't clearly tabulate the elevations of the lows used for the MT calculation. In addition, the MT calculation use the entire historical range of groundwater levels rather than the most recent 5 years as is done with the MOs, see Table 5-1. The use of the entire historical record brings the pre-2015 historical decline in groundwater level into the calculation of 50% range, which doesn't represent the actual

current post-January 2015 conditions, see the hydrograph for well 20N03W07E007on pdf page 56 in Appendix 5B, as an example. See page 14 of AquAlliance Exhibit A. The use of all historical data to calculate the 50% range appears to be continuing the pre-SGMA impacts into the GSP management actions. **This seems to invert the concept that the GSP doesn't have to remedy pre-2015 impacts by making the GSP continue the pre-2015 impacts in the determination of sustainability criteria (emphasis added).**

16. MT thresholds assume that the definition of "sustainable" means that up to 20% of the domestic wells can go dry. They make arguments that this number will be less, 12% (see pages 4 and 5 in Appendix 5B). But the economic analysis on page 3 in Appendix 5C apparently removed wells with depth shallower than the pre-January 2015 low (or maybe the analysis included the 2015 low, see comment 15) because it assumes these wells went **dry with the lowest groundwater level and/or are no longer used**. The economic analysis doesn't address if these wells recovered, nor document that these wells actually went dry. Remembering that the 20% depth is taken in a deep well, not a shallow water table well. To evaluate the groundwater level in domestic wells, you need to use a wells screened at the depth of the domestic wells, for example the stream depletion monitoring wells, Table 5-3. Table 1 in Appendix 5C says the subbasin average for wells with total depths shallower than the lowest groundwater level before January 2015 is a "share" of 46%. The "share" around each monitoring well varies widely in Table 1 of Appendix 5C, from zero to as much as 97%.

17. The economic analysis in Appendix 5C also says that the portion of the wells shallower than the proposed MT is in aggregate 12% of the domestic wells, not 20% (see pages 4 and 5). This calculation is apparently saying that the number of wells with total depths greater than the pre-January 2015 low (or maybe pre-2016 low), but less than the maximum of the selected MT depth, is lower if either the 20% shallower depth or the historical low plus 50% range depth. This is 8% fewer wells than when the 20% shallower criteria was used by itself. Histograms of RMN and domestic well depths, and cumulative frequency depth statistics are needed to understand the validity and significance of this economic analysis.

    The rationale for setting the MTs acknowledges that for 30 of the 48 RMN wells there is a possibility that more than 20% or the domestic wells will be shallower and be at risk for dewatering (going dry) (page 4 in Appendix 5B). But then the GSP says that wells shallower than the historical low before January 1, 2015 were removed from the analysis, which then resulted in an "aggregate" of approximately 12 percent of the wells potentially go dry. The GSP states that this is much better than 20% going dry and is viewed as an … *acceptable balance between avoiding significant and unreasonable impacts to domestic (and other shallow) wells and allowing sufficient flexibility for conjunctive management of Subbasin surface and groundwater supplies.* A review of the statistics in Table 1 of Appendix 5C for wells associated with each of 48 RMN wells finds a large range in the percentage of wells that are shallower than the historical low before January 2015, ranging from zero to 97%. The aggregate for these dry wells in Table1 is 46%. Does this average give the GSP's estimated future reduction in domestic well reliability within each RMN well polygon? How does the 12% aggregate for 20% shallower dry wells relate to the 46% well shallower than the lowest pre-January 2015 groundwater level? What are the depths, percentiles and the

number of wells that could possibly go dry for each of the RMN well polygons where the MTs are based on the 50% range below the historical low, and/or based on the 20% shallower depth?

18. When 50% of the historical range is subtracted from the lowest pre-January 2015 groundwater level (maybe pre-2016) to calculate the MT, method selected for 30 out of 48 RMN wells, it creates a ***lower-than-the-lowest*** sustainable threshold. Domestic wells could now experience groundwater levels below the historical lowest depth, and the GSP would still find this condition sustainable, **not an undesirable result**. By this logic, the GSP seems to say that at least the number of wells listed in Table 1 of Appendix 5C will go dry whenever groundwater levels go below the lowest historical elevation and possibly more when the 50% threshold depth sets the MT. As if this isn't enough, the MT levels in 18 of the 48 wells are set at the 20% shallower wells threshold whenever that depth was greater than the lowest+50% depth (see page 4 in Appendix 5B). Does this mean that in those areas around the monitoring wells listed in Table 1of Appendix 5C that have a "share" less than 20% (0.20) and may have additional wells dry whenever the 20% shallower depth is used to set the MT? Obviously, the future cumulative average of dry wells under the GSP will be **greater than the 46% of the total wells** (emphasis added).

19. Does the Table 1 in Appendix 5C total of 2,925 wells being shallower than the historic low groundwater level before January 2015 agree with the statistics on dry or no longer used wells collected by DWR or any government agency? DWR does have a website where dry wells can be reported, which appears to list far fewer dry wells in the area around Orland. As an example, Table 1 shows that for well the RMN well 22N03W24E001 near Orland, 1,589 out of a total of 1,677 wells are shallower than the historic low before January 2015, or 97%. This monitoring well is the closest RMN well to the City of Orland. Did 97% of the domestic wells around Orland go dry at least once sometime before 2015, and/or have they been abandoned? If yes, what is the source of this data?

20. The draft GSP provides a general background discussion on the surface water and groundwater budgets in Section 3.3 (pages 3-85 to 3-97). The water budget analysis uses a 26-year Historical period from 1990 to 2015, a Current Conditions period from 2016 to 2065, and three Future Conditions periods from 2016 to 2065. The hydrology baseline used for the Current and Future conditions is the historical data from 1966 to 2015, see Table 3-9. Tables 3-11 and 3-12 provide the average annual values for the surface water and groundwater budget components for all five analysis periods, respectively (pages 3-96 and 3-97). See pages 15 and 16 of AquAlliance Exhibit A. Table 6-1 (page 6-2) provides a summary of the key water budget parameters that influenced the development of the project and management actions. See page 18 of AquAlliance Exhibit A. The water budget analysis selected as representative of conditions in the next 50 years is the projected Future Condition with the 2070 Central Tendency Climate Change provided by DWR (page 3-92).

21. The groundwater water budget in Table 3-12 shows that during the Historical 26-years from 1990 to 2015 there was an average annual deficit of 28,000 acre-feet per year (AFY). Note that units in Tables 3-11 and 3-12 are thousands of acre-feet per year (taf/yr). With the 2070 Future scenario the deficit is reduced, but there is still a loss of storage of 7,000 AFY.

Unfortunately, there appears to be a calculation error in the 2070 Future Conditions outflow, the right-hand column of Table 3-12.

The sum of the Groundwater Pumping components in Table 3-12 is given as 559,000 AFY. See page 17 AquAlliance Exhibit A. The three groundwater components, Agricultural, Urban and Industrial and Managed Wetlands, have future 2070 values of 548,000, 10,000 and 35,000 AFY, respectively. The sum of these three groundwater components equals 593,000 AFY, not the 559,000 AFY shown. If the 593,000 AFY values is used in calculating the outflows, then the ***total groundwater outflow is now 1,063,000 AFY***. This results in a Change in Storage (Inflow – Outflow) value of -42,000 AFY, not the -7,000 AFY shown. This is a 50% increase in the change in storage from the Historical condition, and essentially a 100% increase from the 1966-2015 Current condition.

The values of the three groundwater components listed as inflow components in the surface water budget, Table 3-11, Agricultural, Urban and Industrial and Managed Wetlands, have future 2070 values or 516,000, 10,000 and 32,000 AFY, respectively (see page 15 AquAlliance Exhibit A). The sum of these values is 558,000 AFY, almost equal to the 559,000 AFY sum listed in both Table 3-11 and 3-12. This error in the Groundwater Pumping components needs to be corrected.

22. Table 6-1 provides the differences in the average annual projections for six key water budgets parameters. These parameters appear to be from Table 3-11 and some of the values are the same in both tables, while others have to be calculated from separate component values listed in Table 3-11. See page 18 of AquAlliance Exhibit A. Note that units in Tables 3-11, 3-12 and 6-1 are thousands of acre-feet per year (taf/yr).

    Table 6-1 shows that with the 2070 climate change scenario groundwater pumping will increase 58,000 AFY, or 12.7%. during the next 50 years. Precipitation and Evapotranspiration (ET) is also expected to increase 75,000 AFY and 102,000 AFY, or 6.3% and 6.8%, respectively. The change in annual average groundwater storage with the 2070 climate change is a negative 7,900 AFY. This value differs from the -7,000 AFY value shown in Table 3-11, but this may be the result of round-off error in the Table 3-11 values. Note that the error in the total Groundwater Pumping in Table 3-12 could significantly change the rate of groundwater storage in Table 6-1, so it needs to be corrected.

    Table 6-1 shows that there will be no change in the average annual total of the Sacramento River and Stoney Creek Diversions to the Colusa Subbasin in the future with the 2070 climate change scenario. Table 3-11 shows that there will likely be a small increase in diversions from the Sacramento River, 4,000 AFY, that's balanced by a 4,000 AFY decrease in Stony Creek diversions. Table 3-11 also shows that the sum of these two diversions will increase approximately 119,000 AFY, or 10.2%, when compared to the 1990-2015 Historical baseline diversion of 116,800 AFY. See page 15 of AquAlliance Exhibit A.

    Table 6-1 shows that there will be an annual average decrease of 48,000 AFY, or 38.3%, in the *Net Stream Accretion* in the future with the 2070 climate change scenario. The *Net Stream Accretion* is the sum of the *Stream Gains from Groundwater (Accretion)* inflow

minus the *Stream Seepage* outflow in Table 3-11. See page 15 of AquAlliance Exhibit A. The sums listed in Table 6-1 for future without climate change, 125,000 AFY and for 2070 with climate change, 77,000 AFY, don't appear to agree with the sums that would be obtained using values listed in Table 3-11, but the difference is the same -48,000 AFY. Note that if a comparison is made between the 1990-2015 *Historical Net Stream Accretion*, 160,000 AFY from Table 3-11 values (366,000 AFY – 206,000 AFY = 160,000 AFY), and the future 2070 climate change of 70,000 AFY from Table 3-11 values (323,000 AFY – 253,000 AFY = 70,000 AFY), the future change in *Net Stream Accretion* is -90,000 AFY, or a 56.3% decline (70,000 AFY - 160,000 AFY = -90,000 AFY; -90,000 AFY / 160,000 AFY = 0.563). See page 19 of AquAlliance Exhibit A.

23. The increase in *Groundwater Pumping* and the decrease in *Net Stream Accretion* in the future with the 2070 climate change scenario suggest that the assumptions being made regarding loss of surface water flows during a groundwater substitution transfer are flawed. The change from any of the baseline water budgets in the *Net Steam Gains from Groundwater (Accretion)* (see page 20 of AquAlliance Exhibit A) that occurs with the increase in groundwater production during the next 50-year with the 2070 climate change scenario is much greater than the DWR/BOR assumed *stream depletion factor* of 13 percent[2]

    The groundwater budget in draft GSP Table 3-12 shows that with the future increase in groundwater pumping under the 2070 climate change scenario, there is an increase in seepage from surface waters to the groundwater ranging from 22,000 AFY to 47,000 AFY with the Historical and Current baseline, respectively. See page 20 of AquAlliance Exhibit A. In other words, more surface water will infiltrate into the groundwater basin to the detriment of the streams.

    The groundwater budget in draft GSP Table 3-12 also shows that with the future increase in groundwater pumping the discharge of groundwater to streams, the *Stream Gains from Groundwater (Accretion)* during the next 50 years will decrease from 366,000 AFY and 349,000 AFY, with the Historical and Current baselines, down to 323,000 AFY under the 2070 climate change scenario. A reduction in Stream Accretion of 48,000 AFY (-11,7%) and 26,000 AFY (-7.4%) from the Historical and Current baseline, respectively (see page 20 of AquAlliance Exhibit A).

    The combined loss of stream flow, or net change, over the next 50 years with climate change from the increased seepage and reduced accretion ranges from 48,000 AFY to as much as 90,000 AFY, from the Table 3-12 Current or Historical baselines, respectively. See page 20 of AquAlliance Exhibit A. This loss of stream flow occurs while groundwater pumping is increasing from 94,000 AFY to 91,000 AFY, Current or Historical baselines, respectively. This is a ratio of the change in *Net Stream Accretion* to the change in *Groundwater Pumping* that ranges from approximately negative 51% to as much as a negative 99%, Current or Historical baselines, respectively (see page 20 of AquAlliance Exhibit A.

[2] https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/State-Water-Project/Management/Water-Transfers/Files/Draft_WTWhitePaper_20191203.pdf

The change in the ratio of *Net Stream Accretion* to *Groundwater Pumping* during the 1990-2015 Historical and Current baseline conditions are positive ranging from positive 31.9% to 23.6%, respectively. In other words, under the existing conditions streams gain more water from the groundwater system than they give. With the 2070 climate change scenario, streams will continue to gain more from the groundwater system, but the gain will be less (see page 20 of AquAlliance Exhibit A).

The decrease in *Net Stream Accretion* with future *Groundwater Pumping* suggests that the overall percentage of groundwater being pumped that will be recharged from the streams in the Colusa Subbasin, i.e., stream depletion, with any future pumping increase is significantly greater than the DWR/BOR assumed 13% stream flow loss from a groundwater substitution transfer. ***In fact, with the Historical baseline, the loss is essentially equal to the volume of groundwater being pumped, which is consistent with stream depletion literature.[3] The decline in Net Stream Accretion with future increased Groundwater Pumping that changes the streams for gaining to losing suggesting that the subbasin maybe at a tipping point where the impacts from future pumping increases are amplified and cause significantly more harm than just the existing condition.***

24. The draft GSP's Figure 3-29 (page 3-66) graphs the cumulative change in groundwater storage from 1990 to 2015 for the Historical condition where the average annual change in groundwater storage was a negative 28,000 AFY. See page 21 of AquAlliance Exhibit A. The figure shows that in 2015 the cumulative change in groundwater storage since 1990 is approximately a negative 600,000 AF.

    The draft GSP gives in Figure 3-49 (page 3-111) graphs of the cumulative change in groundwater storage from 1966 to 2015 for the Current condition and the three future 50-year scenarios. See page 22 of AquAlliance Exhibit A. The figure shows that in 2065 under the 2070 climate change scenario the cumulative change in groundwater storage from the present will be approximately a negative 400,000 AF, which is consistent with the annual average decline of -7,300 AFY given in Table 6-1 (-7,300 AFY x 50 years = -365,000 AF) (see page 18 of AquAlliance Exhibit A).

    If the anticipated future loss in groundwater storage under the 2070 climate change scenario is added to existing loss in groundwater storage, ***the cumulative loss is groundwater storage for the Colusa Subbasin in 2065 is approximately 1,000,000 AF*** (-365,00 AF + -600,000 AF = -965,000 AF).

    The use of the past 50-year Current scenario as the input for the hypothetical future scenarios is reasonable. Repeat the past with the climate changes applied to see what happens. However, the starting point for going forward in an evaluation of the subbasin's groundwater

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[3] Barlow, P.M., and Leake, S.A., 2012, Streamflow depletion by wells—Understanding and managing the effects of groundwater pumping on streamflow: U.S. Geological Survey Circular 1376, 84 p.
(Also available at *http://pubs.usgs.gov/circ/1376/*.)

sustainability should be at today's conditions, not the average of the past 50 years. The volume of storage at the SGMA benchmark date of January 1, 2015 was near -500,000 AF, which is lower than in than any time prior to the start of SGMA. The additional decline in groundwater storage from the 2070 climate change scenario should be started at the -500,000 AF value of the SGMA Benchmark date, not the zero of 1966. The authors of the draft GSP may know this, and that's maybe why many of the groundwater monitoring well MTs are set at 50% of the historical range below the historical low. The GSP authors want to allow for an additional 400,000 AF of loss in groundwater storage predicted by the 2070 climate change scenario, for a total of 900,000 since the 1990, without triggering an *undesirable result*. The draft GSP doesn't actually say that it's planning to have this amount of groundwater storage loss, but the water balance calculations suggest that it is likely.

25. While this GSP is being developed for the Colusa Subbasin, a GSP is being developed for the Butte Subbasin to the east. A draft GSP for Butte Subbasin was released for public review. The Butte draft GSP also provides MOs and MT for monitoring wells across the subbasin. The monitoring well network for the Butte Subbasin is divided into a Primary Aquifer, wells less than 700 feet depth, and a Very Deep Aquifer, wells greater than 700 feet depth. There are 41 Primary Aquifer monitoring wells in the Butte Subbasin GSP. See pages 23 and 24 of AquAlliance Exhibit A. The MOs and MT for the Colusa Subbasin are given in Table 5-2, pages 4 and 5 of AquAlliance Exhibit A.

    The existing groundwater contours in the two subbasins suggest that the current flow of groundwater in the aquifers shallower than 700 feet flow towards the center of the valley with the flow generally north to south aligned with the Sacramento River (see pages 8, 9, 25, and 26 of AquAlliance Exhibit A). There are several sets of monitoring wells that are approximately opposite each other along the north-south boundary between the subbasins. See page 3 and 24 of AquAlliance Exhibit A. If the MT elevations for these west-to-east sets of wells are compared, knowledge might be gained on how the management of the groundwater in these basins will affect each other. A table is provided on page 27 of AquAlliance Exhibit A that lists the state well numbers and the MT elevations for monitoring wells in the Colusa GSP along with their nearest eastern counterpart monitoring well(s) in the Butte GSP with the MT elevations. Note that sometimes multiple wells are listed for a single well. This is done whenever there is more than one well that aligns along a general west-to-east orientation.

    The right-hand column of the table gives the difference between the Butte GSP well(s) and the Colusa GSP well(s). A positive value indicates that the MT elevation in the Butte Subbasin is higher than the corresponding MT value in the Colusa Subbasin. In all but one of the 10 sets of west-to-east monitoring wells matches, the MT elevations in the Butte Subbasin are higher.

    This suggests that the groundwater elevations in the Colusa Subbasin will be allowed to be deeper under the Colusa Subbasin GSP than in the Butte Subbasin before an undesirable result is declared. This may create a condition where the Butte Subbasin is providing more interbasin groundwater flow to the west in the future. The implications from setting the MT values in the Colusa Subbasin at elevation lower than the MTs in the Butte Subbasin should

be analyzed and management action(s) should be included in the GSPs for each other subbasin to maintain sustainable interbasin groundwater flow.

26. The Draft GSP states that the primary groundwater quality constituent of concern within the Colusa Subbasin is salinity, specifically the upwelling of brackish connate water into the principal aquifer (page 4-15). The water quality sustainable thresholds listed in Table 5-1 only sets MO and MT values for salinity using electrical conductivity (EC). The MO is 700 µS/cm, and the MT is set at the higher of 900 µS/cm or the measured historical high, whichever is greater (Table 5-1 on page 5-18; page 4 in Appendix 5A). In the basin setting discussion, the plan significantly expands on the water quality issues in the Colusa Subbasin noting in Section 3.1.10.3 on pages 3-42 and 3-43 that:

- *Historical groundwater quality concerns within the Subbasin include locally elevated levels of salinity, TDS, adjusted sodium absorption ratio, boron, nitrate, and manganese (DWR, 2006a; Wood Rodgers, 2008) (page 3-42).*
- *Recent groundwater quality concerns within the Colusa Subbasin include salinity, boron, nitrate, heavy metals, including arsenic, and hexavalent chromium. High concentrations of sodium, chloride, and sulfate, all of which are related to salinity have been observed south of Maxwell (CH2MHILL, 2016a; RD 108, 2008) and could negatively impact agricultural applications.*
- *Elevated salinity levels throughout much of Colusa County, nitrates near Orland and Willows, arsenic near Grimes, and iron and manganese near Williams and Colusa are of concern with respect to drinking water MCLs (CH2MHILL, 2016a).*
- *Arsenic, especially, has been a constituent of concern for Grimes, Colusa, and the surrounding area. Local agencies have been working to mitigate arsenic contamination in groundwater in this area.*
- *Drinking water supply wells near Willows, Glenn County, have experienced high concentrations of hexavalent chromium (California Water Service, 2016).*
- *There are also several active groundwater contamination cleanup sites in the Subbasin. These primarily include leaky storage tanks and unauthorized releases of contaminants such as petroleum hydrocarbons, nitrate, pesticides and herbicides including dicamba, and solvents. Most of these cleanup sites impact the unconfined portion of the principal aquifer, but there is a risk that the contamination could migrate into the deeper, more heavily pumped portions of the aquifer.*
- *The largest contamination site is the Orland Dry Cleaner site, a tetrachloroethylene (PCE) plume that extends approximately two miles southeast of the source location in Orland, Glenn County (Department of Toxic Substances Control [DTSC], 2020; SWRCB, 2020b). In 2007, PCE contamination was recorded at depths of 127 feet bgs (DTSC, 2020).*

More details regarding existing and historical groundwater quality issues and trends is provided in Section 3.2. The Draft GSP acknowledges that the *[g]roundwater quality data collected under existing regulatory programs may not be sufficient for SGMA compliance* (page 4-20). The plan indicates that:

- *The GSAs will continue to coordinate and collaborate with other agencies regarding their monitoring programs, including changes to monitoring sites, monitoring protocols or frequencies, and management actions. Data acquisition is not anticipated to be an issue. If necessary, the GSAs **will consider** implementing their own monitoring programs to address concerns over undesirable results, data gaps in the monitoring networks, or GSP project needs* (page 4-15) (emphasis added).
- *The Colusa and Glenn GSAs **will consider** coordinating with the SVWQC, Northern California Water Association (NCWA), and the California Rice Commission in the establishment and ongoing evaluation of these groundwater quality monitoring network sites with the goal of using data collected under the ILRP for SGMA compliance* (page 4-20) (emphasis added).
- *Annual reports and future revisions to the GSP will provide updates on actions taken to address data gaps over the reporting period* (page 4-20).

Although the Draft GSP acknowledges that there are other agencies with water quality monitoring programs with water quality standards, the plan doesn't set or identify any standards for the water quality constituents that are known to impact the subbasin. Water quality standard already exist for the Colusa Subbasin in the Central Valley Regional Water Quality Control Board's (CVRWQCB) Water Quality Control Plan (Basin Plan) for the Sacramento River Basin and the San Joaquin River Basin.[4] The GSP should specifically state that the water quality MOs and MTs for the Colusa Subbasin will follow the requirements of the CVVRWQCB's Sacramento River Basin Plan. In addition, the GSP should maintain the subbasin's water quality so that it meets all required health protective drinking water standards at levels below the Maximum Contaminant Levels (MCLs) for public water systems, and below the public health goals (PHGs).[5,6] The GSP should specify Management Actions that will maintain and/or improve the subbasin water quality with an emphasis on the known problems.

27. Section 7.6 Financing

Is voter approval necessary for any fees or taxes levied to raise funding for any of the Mitigation Actions? Who are the actual voters? Are they all landowners in the Colusa subbasin, only landowners in a GSA, or all citizens of the Colusa subbasin? The GSP actions may need to fund mitigations to municipal or small water systems, so how are these systems represented in the funding decisions? Will the de minimus extractors, a person who extracts, for domestic purposes, two acre-feet or less of groundwater per year, be allowed a vote? How many votes does each eligible voter get? Will the number of votes be based on the acres owned, number of wells owned, volume of groundwater pumped, or some combination of factors? What happens if the economic burden to fund the management actions falls disproportionately on one group, to whom can they appeal? Will mitigation funds go to the de minimus extractor because their wells can go dry like anyone else's, but they are

[4] https://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/sacsjr_201805.pdf
[5] https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/MCLsandPHGs.html
[6] https://www.waterboards.ca.gov/laws_regulations/docs/drinking_water_code_2021.pdf

otherwise exempt from SGMA? Are there any statutes that govern how government agencies determine the per capita or per centum rate of a tax or fee?

28. The following are additional questions about the management actions and procedures in the draft GSP:

- Do the stream depletion MOs and MTs take precedence over the domestic well MOs and MTs when the monitoring well are adjacent? How should the domestic well owner utilize the stream depletion thresholds?

- What is the lateral extent that the stream depletion MO and MT applies? Up to 5 miles from the well? Only in the area where the 5 miles zone intersects a stream? Only in the area between the monitoring well and the stream?
- Is there a map of the 48 Representative Monitoring Network (RMN) Thiessen polygon boundaries? What is the area of each polygon? How many domestic wells are in each polygon?

- Do the MO and MT apply to all domestic wells within that well's polygon? How does the requirement to evaluate *undesirable results* using 12 RMN wells affect the MO and MT at a specific domestic well? Should a domestic well owner be prepared to have a dry well if depth of their well is shallower than the MT in their polygon, or if the depth is shallower than the deepest MT in the group of 12 RMN wells?

- If a domestic well is being installed or replaced, can the well owner rely on the MO and MT depths in their polygon to determine a minimum depth of their new well? Does the GSP offer any advice on the sustainability criteria for the minimum depth of a new well or replacement well? Should the new well be at least the depth of the old well's polygon MT, or the 12-well group MT, to ensure that the well doesn't go dry in the future?

- What advised does the GSP give on how a domestic well owner should interpret the MO and MT values when their well is near the polygon boundary? For example, the MO for well 22N02W30H002 is 104 feet bgs, and the MT at 175 feet, while the MO of the adjacent well 22N03W24E001 is 194 feet bgs and the MT is 273 feet bgs. If a domestic well is installed or replaced in the 22N02W30H002 polygon that's close to the boundary with the 22N03W24E001 polygon, should the depth of the new well be at the deeper MT of the 22N03W24E001 polygon or the shallower 22N02W30H002 polygon?

- Will monitoring the RMN wells only 2 to 3 times each year effectively capture the fluctuations in groundwater level? In particular, the periods of maximum decline which have significant influence over domestic wells and stream depletion?

- What is the distribution of the depths of domestic wells associated with each RMN monitoring well? How many of the 20% shallower wells will go dry with each increment of groundwater level decline? Histograms of wells depth and cumulative frequency of depth statistics are needed to understand the validity and significance of the 20% shallower threshold.

- Will the construction of deeper domestic wells in the future influence the MO and MT values? If so, how will the MO and MT change, when will the change occur and what measures should a domestic well owner take when and if this change occurs?

- Will the use of 50% range values in deep aquifers to set the domestic well MTs cause more the wells to go dry and/or for longer periods than if the range in shallower aquifers were used? In other words, will the use of MT developed on deeper data delay actions needed to maintain the sustainability of the domestic wells because they allow greater declines in groundwater level before an *undesirable result* is acknowledged?

- Where in SGMA is the standard that 20% dry wells can be determined to be acceptable and non-significant, and therefore not an *undesirable result?* Where in SGMA does it give the standards for the economic analysis to determine the *cost-effectiveness* and the *acceptable balance between avoiding significant and unreasonable impacts to domestic and other shallow wells* in determining the MTs? AquAlliance believes that the domestic landowner, or agricultural landowner, that losses a well due to declining groundwater levels might see any loss of a well as *significant and unreasonable*, and disagree with the GSP's criteria for which wells can be sacrificed for the "greater good." This is analogous to a developer directing the stormwater runoff onto adjacent lands without regard to the flooding it might cause, because it's for the economic good of a community to have more homes. This is not allowed in most of California. Is the GSP's sacrifice of a 20% shallower well considered a **taking**? Does there need to be compensation? What is the value of the compensation, replacement costs of a deeper well, the original cost of the well, the value of the water at the time it goes dry or the change in water quality makes the water unusable, or all of the above?

- The Management Action for the Domestic Well Mitigation Program, Section 6.5.2.1, state that the GSP (GSA) will *investigate implementing a domestic well mitigation program* with funding to mitigate dewatered well (based on yet undefined eligibility). This Management Action along with the others is … ***in the early conceptual stage***. SGMA exempts the GSP from CEQA (WC 10728.6, see below), but requires implementation projects to undergo CEQA review. All eight of the Management Actions given in GSP Chapter 6.5.2 are ***in early conceptual stage***. If the GSP is adopted with this language and no specifics are provided about what actions will be taken, does that mean that any future projects or actions to implement the GPS Management Actions are still CEQA exempt?

  WC 10728.6 - Division 13 (commencing with Section 21000) of the Public Resources Code does not apply to the preparation and adoption of plans pursuant to this chapter. Nothing in this part shall be interpreted as exempting from Division 13 (commencing with Section 21000) of the Public Resources Code a project that would implement actions taken pursuant to a plan adopted pursuant to this chapter.

B. Conflict Resolution

State and federal agencies have long viewed the Northern Sacramento Valley as a source of "surplus" water that will one day serve the accelerating water market through conjunctive-use and water banking (more in Section C). Sadly, the Colusa GSP reflects the willingness of the participants[7] to create a destruction model, emulating the demise of the Owens and San Joaquin valleys. As discussed in Section A, the Plan as proposed will degrade the groundwater basin and harm groundwater users who are not involved in conjunctive use, water transfers, or water banking but are reliant on the same groundwater basin.

It is easy to see that newly formed GSAs have layers of potential conflict. Questions regarding authority, streamlined legal and regulatory timelines, a lack of existing precedents, and the need to represent agency and constituent interests have the potential to exacerbate regional conflicts under SGMA. In some cases, where authoritative interpretations of legal authority and truly sustainable limits have not been established yet, litigation may be necessary and warranted.

The public and SGMA governing bodies and committees have been excluded from NorthState inter-basin discussions. Moreover, when participants in the Vina Stakeholder Advisory Committee asked staff if discrepancies in inter-basin flow volumes/direction that are estimated in the various GSA Basin Settings had been deliberated within the Inter-Basin Coordinating Committee, they answered that they are too busy, but would examine the issue after the GSPs are submitted in 2022.

The drama surrounding the nascent Tuscan Water District and highly questionable Minimum Objectives and Minimum Thresholds in this and other plans are examples of "issues" that have already emerged. Achieving sustainability requires local agencies, stakeholders, and water users to make many difficult and potentially contentious decisions. These decisions are prone to conflict, particularly when pumping restrictions are viewed as infringing on property rights or when fees are charged to support local management.

The Colusa GSP is not complete without a detailed process and funding to resolve conflicts that arise both within and external to the GSA boundaries.

C. Water Transfers and Conjunctive Use

The Colusa GSP must not assume that local ordinances will in any way protect the population and environment of Glenn and Colusa counties from any transfers and expanded conjunctive use. Historic facts and current proposals by DWR funded think tanks belie this:

- Water transfers are not protective of the public or the environment. Transfers implement the dreams of the California's Department of Water Resources, the U.S. Bureau of Reclamation, and State Water Project and Central Valley Project water sellers who have

[7] County of Colusa, City of Colusa, City of Williams, Glenn-Colusa Irrigation District, Maxwell Irrigation District, Westside Water District, Princeton-Codora-Glenn Irrigation District, Provident Irrigation District, Colusa County Water District, Reclamation District 108, Reclamation District 479, Colusa Drain Mutual Water Company, Two representatives of private groundwater pumpers. City of Orland, City of Willows, County of Glenn, Glenn-Colusa Irrigation District, Glide Water District, Kanawha Water District, Monroeville Water District, Orland-Artois Water District, Princeton-Codora-Glenn Irrigation District, Provident Irrigation District.

demonstrated over decades that their interests are not the same as the public's interest. Once the state recognized that they were considerably short on water after former Governor and President Ronald Reagan protected North Coast rivers with Wild and Scenic status, it began trolling for other water sources.

- Some of the Butte GSA entities in Butte County sold surface water from Oroville Reservoir to the 1994 Drought Water Bank.[8] This led to an increase in groundwater withdrawals used for irrigating rice, called groundwater substitution transfers. Until the time of the water transfers, groundwater levels had sustained the normal demands of domestic and agricultural users in the region. The 1994 extractions, however, caused the water levels to suddenly fall in shallow domestic wells, water quality to deteriorate in the wells serving the town of Durham, irrigation wells to fail on several orchards, and one farm to enter bankruptcy because it didn't recover from the loss of its crop. Harmed farmers and residents were told to, "Go hire an attorney."
- State and federal water agencies kept exploring how to manipulate groundwater systems during the 1990s to set up conjunctive use programs. CalFed was one such effort. **"**Potential projects at Stony Creek, Butte Basin, and the Cache-Putah Basin (Conaway Ranch) were eliminated because these aquifers are generally full. *Using these aquifers conjunctively would require initial extraction followed by active or passive recharge*. These may prove to be attractive projects in the future if potential third-party impacts are addressed adequately."[9] **(emphasis added)**
- Additional CalFed material recognized that conjunctive use will require an extra 100 feet of aquifer drawdown and "may be an issue." [10]
- Glenn Colusa ID received close to $3,000,000 of public money to study the Stony Creek Fan Conjunctive Water Management Program and Regional Integration of the Lower Tuscan Groundwater formation project.
- Glenn Colusa ID, Western Canal WD, and Richvale ID actively planned to implement conjunctive use schemes: "Ultimately the project evaluated the effects of exercising both the northern Sacramento Valley's deep aquifer system, which is presently relatively undeveloped, and the shallower, regional aquifer, which is more heavily pumped for both domestic and agricultural needs."[11]

- Think tanks are already encouraging the California Legislature to override local ordinances. "Once GSAs establish sustainability plans that address undesirable impacts of

[8] Thomas, Gregory, 2001. Designing Successful Groundwater Banking Programs in the Central Valley: Lessons From Experience. "The Butte County/Basin districts that increased groundwater pumping during the 1991 State Drought Water Bank included: Western Canal Water District, the Joint Water Districts Board (Richvale Irrigation District, Biggs-West Gridley Water District, Butte Water District, and Sutter Extension Water District) Ramirez Water District, Cordua Irrigation District, Hallwood Irrigation Company, and Browns Valley Irrigation District." p. 30.
"Participants in the 1994 State Drought Water Bank were Richvale Irrigation District, Western Canal Water District, Browns Valley Irrigation District, Cordua Irrigation District, and Ramirez Water District." p. 30.
[9] CalFed Bay Delta Program, 1999. *Conjunctive Use Assessment*. p. 6.
[10] CalFed Bay Delta Program. Groundwater Storage Attribute Matrices, Appendix B. p. B-5.
[11] Glenn Colusa ID, et al, 2012. *Feasibility Investigation of Re-Operation of Shasta and Oroville Reservoirs in Conjunction with Sacramento Valley Groundwater Systems to Augment Water Supply and Environmental Flows in the Sacramento and Feather Rivers*. p. ii.

> pumping, it should be possible to ease the coarser restrictions on this practice found in most county ordinances—which effectively preclude trades if they entail water leaving the county. If counties with restrictive groundwater export ordinances fail to amend their laws to conform to SGMA*, the legislature should consider preempting local laws that discriminate against out-of-county uses or place undue burdens on groundwater and groundwater-substitution transfers* that would not jeopardize sustainable groundwater management of the source aquifer."[12] (emphasis added)

Sustainability is not found in the Colusa GSP, let alone *equitable* sustainability for all residents, farms, businesses, and the environment. The Colusa and Butte GSAs are dominated by large, non-residential landowners, many of whom have sought to play in the lucrative water market already to the detriment of their neighbors, streams, rivers, and species. Sadly, SGMA opened this door further: "Non-residential landowners and future banking partners may find it in their common interest to interpret the legislative intent (74)[13] and lax definitions of safe yield and overdraft provided in the Act (75)[14] based on the opinion in *Los Angeles v. San Fernando*, which encourages drawing down basins to create additional storage space and prevent water "wasting."(76)[15] Thus, in addition to exports, it is foreseeable that a future GSA will encourage drawdown of the aquifer to satisfy massive crop thirst as the drought continues, which will then create extra storage space for imported waters to "recharge" the Basin. As a result of future water exchanges and banking, local residents will bear the additional cost of digging deeper wells just to maintain their straws in the aquifer, and will increasingly compete with each other over a diminishing percolated supply while banked supplies increase."

B. Conclusion

By its own admission, the Colusa GSP is bent on pursuing long-held plans to expand conjunctive use through groundwater manipulation, artificial recharge, and potential dam reoperation that will harm the people and environment of the GSA and surrounding region. The draft Plan will not lead to sustainability as required by SGMA, but will allow major groundwater fluctuations,

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[12] Ayres, Andrew, et al., 2021. *Improving California's Water Market: How Water Trading and Banking Can Support Groundwater Management*. p. 34.

[13] Keats, Adam et al., 2016. *Not All Water Stored Underground is Groundwater: Aquifer Privatization and California's 2014 Groundwater Sustainable Management Act*. Footnote: *2014 Act, § 10720.1(g) (It is the intent of the Legislature "[t]o increase groundwater storage and remove impediments to recharge.").* p. 106.

[14] *Id. Footnote: 2014 ACT, § 10721(v) ("Sustainable yield" is defined as "the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually from a groundwater supply without causing an undesirable result."); 2014 ACT, § 10735(a) ("Condition of long-term overdraft" means the condition of a groundwater basin where the average annual amount of water extracted for a long-term period, generally 10 years or more, exceeds the long term average annual supply of water to the basin, plus any temporary surplus. Overdraft during a period of drought is not sufficient to establish a condition of long-term overdraft if extractions and recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.").*

[15] *Id. Los Angeles v. San Fernando 14 Cal. 3d 199, 280 (1975) ("We agree with plaintiff that if a ground basin's lack of storage space will cause a limitation of extractions to safe yield to result in a probable waste of water, the amount of water which if withdrawn would create the storage space necessary to avoid the waste and not adversely affect the basin's safe yield is a temporary surplus available for appropriation to beneficial use. Accordingly, overdraft occurs only if extractions from the basin exceed its safe yield plus any such temporary surplus.").*

significant well losses, and cost burdens on harmed groundwater dependent farms, homes, and businesses. This was predicted in 2016: "This potential conflict will become acute in the likely scenario where artificial recharge inhibits natural recharge so that it is difficult, if not impossible, to determine the relative quantity of each. Given explicit provisions in the Act and statewide policy favoring storing surface water underground it is not difficult to envision a privately-controlled GSA systematically drawing down percolated groundwater to create storage space in the basin, and then replenishing the basin with imported water, with little consideration of the ability for overlying users to access the basin or the long-term health of the surrounding ecosystem." [16]

Due to the inequity of the Plan for all groundwater dependent residents, farms, and the environment, the deficient presentation of the consequences in the text (see Section A above), and the unacceptable impacts to both ground and surface waters, it should be rejected by the Colusa Subbasin governing body.

Respectfully submitted,

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[16] *Id.* pp. 98-99.

Table 6-1. Summary of Key Colusa Subbasin Water Budget Parameters Influencing Formulation of Projects and Management Actions (average annual volumes, taf/yr)

Water Budget Parameter	Projected Future Conditions without Climate Change	Projected Future Conditions with 2070 Central Tendency Climate Change	Difference (Projected future with 2070 Central Tendency climate change minus without climate change)	Percent Difference[(a)]
Avg. Agricultural Evapotranspiration	1,494	1,596	102.0	6.8%
Precipitation	1,183	1,258	75.0	6.3%
Agricultural Pumping	458	516	58.0	12.7%
Avg. Rate of Change in Groundwater Storage, af/yr	0.6	-7.3	-7.9	-0.8%
Sacramento River and Stony Creek Diversions to Colusa Subbasin	1,287.0	1,287.0	0.0	0.0%
Net Steam Accretion	125	77	-48.0	-38.3%

(a) Calculated as the difference in the fourth column divided by the Projected Future Condition without Climate Change quantity in the second column, except for Avg. Rate of Change in Groundwater Storage, for which the percent difference is based on the approximately 1 million acre-feet that flow into and out of the Colusa Subbasin on an average annual basis. Water budget uncertainty is discussed in Chapter 3, Basin Setting, and model uncertainty is discussed in Appendix 3D. The average change in groundwater storage is considered to be within standard modeling error for this type of groundwater model analysis.

Under projected future conditions without climate change, groundwater storage is forecast to increase modestly, at an average rate of 0.6 taf/yr. With 2070 CT climate change and the associated increase in groundwater pumping to meet increased irrigation demands, groundwater storage is projected to decrease at a rate of 7.3 taf/yr. This net change of -7.9 taf/yr is 0.8 percent of the approximately one million acre-feet that flow into and out of the Colusa Subbasin groundwater system annually.

Under projected future conditions without climate change, net stream accretion (stream accretion minus stream depletion) is projected to be 125 taf/yr on average. This aggregate net stream accretion is for the Sacramento River, Stony Creek, and the Colusa Drain combined[2]. With 2070 CT climate change, net stream accretion is projected to remain positive but to decrease by about 48 taf/yr, or by 38 percent, with respect to the without climate change condition. However, viewed in relation to the average Sacramento River flow above the Feather River confluence of approximately 11.7 million acre-feet per year (af/yr) the projected change is roughly one half of one percent.

The aggregate changes in groundwater storage, 0.8 percent, and net stream accretion, 0.5 percent of the average Sacramento River Flow, are considered to be within standard modeling error for this type of analysis. The GSAs will continue to evaluate and review all Subbasin water budget parameters, including net

[2] A more detailed assessment of projected streamflow accretion-depletion is presented in Appendix 3G. The analysis considers the Sacramento River, Stony Creek, and the Colusa Drain individually and collectively, and evaluates temporal accretion-depletion patterns over the 50-year simulation period.

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Table 5-1. Summary of Sustainability Thresholds for All Sustainability Indicators Applicable to the Colusa Subbasin

Sustainability Indicator	Monitoring Network	Undesirable Result	Minimum Threshold (MT)	Measurable Objective (MO)
Chronic Lowering of Groundwater Levels	48 Representative Monitoring Network (RMN) wells monitored at least 2-3 times annually by DWR	25% (12 of 48) RMN wells fall continuously below their MT for 24 consecutive months	The lower of 50% of measured historical groundwater elevation range below the historical measured low elevation and the elevation corresponding to the 20th percentile of domestic well depths in the RMN well's Thiessen polygon, subject to interbasin coordination and consistency to ensure operational compatibility	Mean of last 5 years available groundwater elevation measurements subject to interbasin coordination and consistency to ensure operational compatibility. A fixed value, not a rolling average.
Reduction in Groundwater Storage	48 RMN wells monitored at least 2-3 times annually by DWR (same as Groundwater Level monitoring network)	Use groundwater levels as proxy	Use groundwater levels as proxy	Use groundwater levels as proxy
Seawater Intrusion	Not applicable	Not applicable	Not applicable	Not applicable
Degraded Groundwater Quality	25 RMN wells monitored by others at variable intervals under existing State of California regulatory programs.	Electrical conductivity (EC) in 25 % (6 of 23) of the RMN wells exceeds the MT for two (2) consecutive years.	The higher of EC of 900 microSiemens per centimeter (µS/cm) (the recommended California Secondary Maximum Contaminant Level) OR the pre-2015 historical maximum measured EC.	EC of 700 µS/cm (corresponding to an agricultural water quality objective providing for no yield reduction for crops commonly grown in the Colusa Subbasin).
Land Subsidence[(a)]	Existing Sacramento Valley Height Modernization Project (SVHMP) benchmarks (63 sites)	15% or more (9 of 63) monitoring sites (benchmarks) experience subsidence rates above the MT	Benchmarks with greater than 1 foot historical subsidence (measured between 2008 and 2017): set MT at 0.60 foot/year. Benchmarks with less than 1 foot historical subsidence (measured between 2008 and 2017): set MT at 0.50 foot/year.	Benchmarks with greater than 1 foot historical subsidence (measured between 2008 and 2017): set MO at 0.25 foot/year. Benchmarks with less than 1 foot historical subsidence (measured between 2008 and 2017): set MO at 0.25 foot/year.
Depletions of Interconnected Surface Waters	12 RMN wells less than 200 feet deep and between 2,000 feet and five miles of interconnected stream (Sacramento River, Colusa Basin Drain, Stony Creek)	25% (3 of 12) RMN wells fall below their MT for 24 consecutive months.	Ten (10) feet below the observed fall 2015 groundwater level. (Fall 2015 level is the measured elevation recorded on the date closest to Oct 15.)	Mean of last 5 years available groundwater elevation measurements subject to interbasin coordination and consistency to ensure operational compatibility. A fixed value, not a rolling average.

(a) Sustainable management criteria for inelastic land subsidence are under review and may be revised after publication of this draft GSP.

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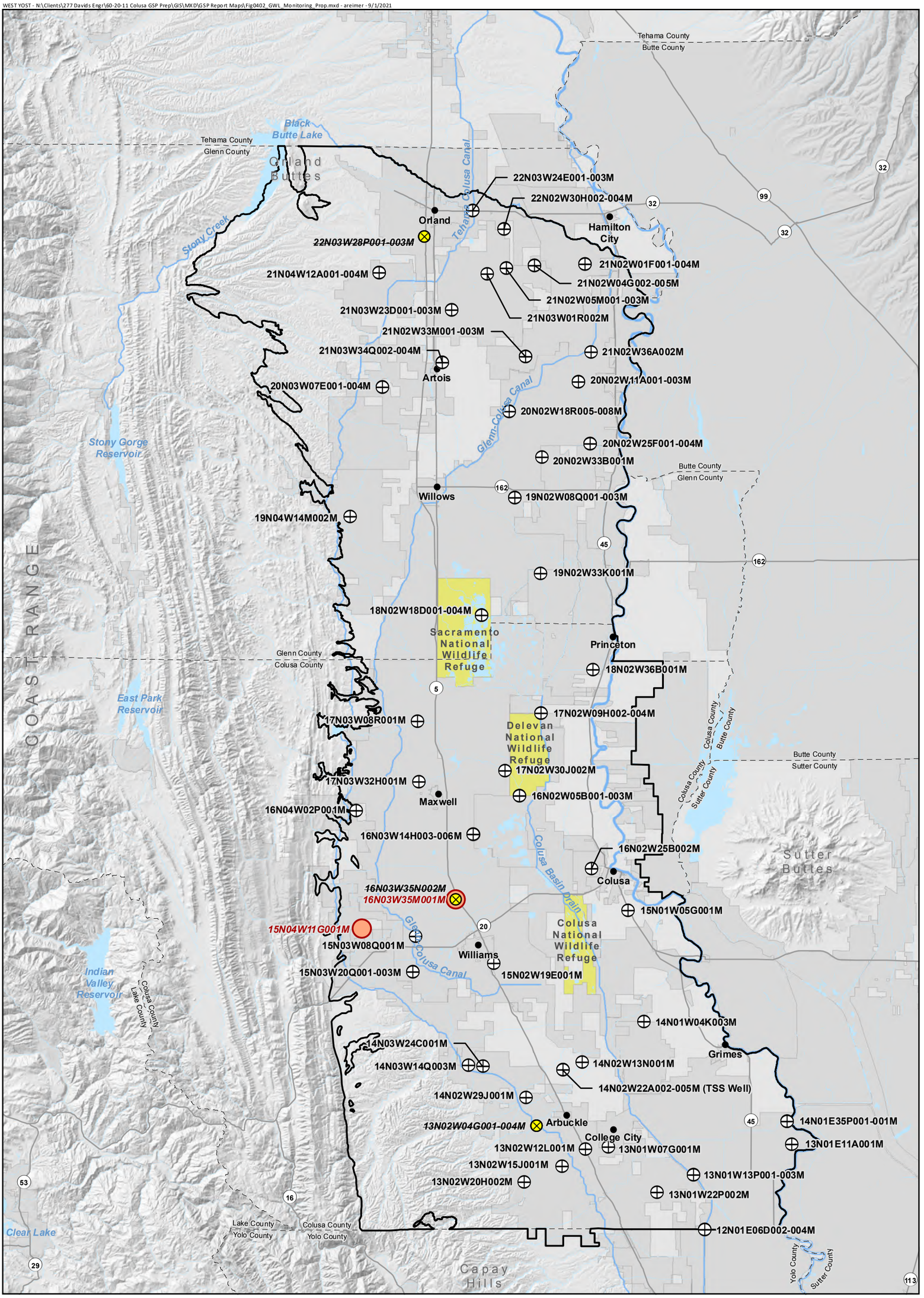

Groundwater Monitoring Network Well

Well Removed from Groundwater Monitoring Network due to Damage or Destruction

Existing Well to Potentially Add to the Groundwater Monitoring Network

Colusa Subbasin

Water Agencies

U.S. Fish and Wildlife Refuge

Horizontal Datum: North American Datum of 1983 (NAD 83), California State Plane Zone II, feet.

0 2.5 5

Scale in Miles

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Proposed Groundwater Monitoring Network Wells

Colusa Groundwater Authority and Glenn Groundwater Authority
Colusa Subbasin
Groundwater Sustainability Plan

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Table 5-2. Groundwater Level Representative Monitoring Network and Sustainability Criteria

SWN	CASGEM ID	Ground Surface Elevation, ft	Minimum Threshold GWE, ft amsl	Minimum Threshold DTW, ft bgs	Measurable Objective GWE , ft amsl	Measurable Objective DTW, ft bgs	Interim Milestone GWE ft amsl	Interim Milestone DTW ft bgs	Margin of Operational Flexibility, ft	20th Percentile Domestic Wells, ft bgs	50% of Range Below Historical Low, ft bgs
12N01E06D004	16331	28	-108	136	-1	29	-1	29	107	136	94
13N01E11A001	18534	32	-75	106	22	10	22	10	96	106	28
13N01W07G001	36246	90	-106	196	-9	99	-9	99	97	153	196
13N01W13P001	18549	32	-88	120	-2	34	-2	34	86	120	89
13N01W22P002	16357	60	-124	184	26	34	26	34	150	184	116
13N02W12L001	31899	135	-72	208	9	126	9	126	82	200	208
13N02W15J001	39884	213	-62	274	61	152	61	152	122	215	274
13N02W20H002	25005	343	95	248	174	169	174	169	79	248	201
14N01E35P001	38718	47	-118	165	18	29	18	29	136	165	48
14N01W04K003	18554	37	-86	124	12	25	12	25	99	124	44
14N02W13N001	18563	62	-80	142	24	38	24	38	104	142	78
14N02W22A002	54756	84	-126	210	84	0	84	0	210	210	0
14N02W29J001	18566	163	-86	248	22	141	22	141	107	216	248
14N03W14Q003	32324	173	-89	261	-13	186	-13	186	75	115	261
14N03W24C001	16691	173	-5	178	38	135	38	135	43	138	178
15N01W05G001	14309	47	-54	101	28	19	28	19	82	101	51
15N02W19E001	14319	87	-13	100	73	14	73	14	86	100	50
15N03W08Q001	N/A	113	43	70	107	6	107	6	64	70	10
15N03W20Q001	38293	129	60	69	103	26	103	26	43	69	34
16N02W05B001	25511	65	-71	136	33	32	33	32	104	136	74
16N02W25B002	33868	55	-25	80	30	25	30	25	55	80	54
16N03W14H003	24683	66	-94	160	72	-6	72	-6	166	160	3
16N04W02P001	16308	163	63	100	139	24	139	24	76	100	42
17N02W09H002	25514	67	-52	119	49	18	49	18	101	119	56
17N02W30J002	16960	63	-119	182	44	19	44	19	163	182	51
17N03W08R001	39127	107	-13	120	88	19	88	19	101	120	28
17N03W32H001	35475	100	-38	138	92	8	92	8	130	138	35
18N02W18D001	24953	82	-83	165	69	13	69	13	152	165	24
18N02W36B001	16914	75	-3	78	53	22	53	22	56	78	59

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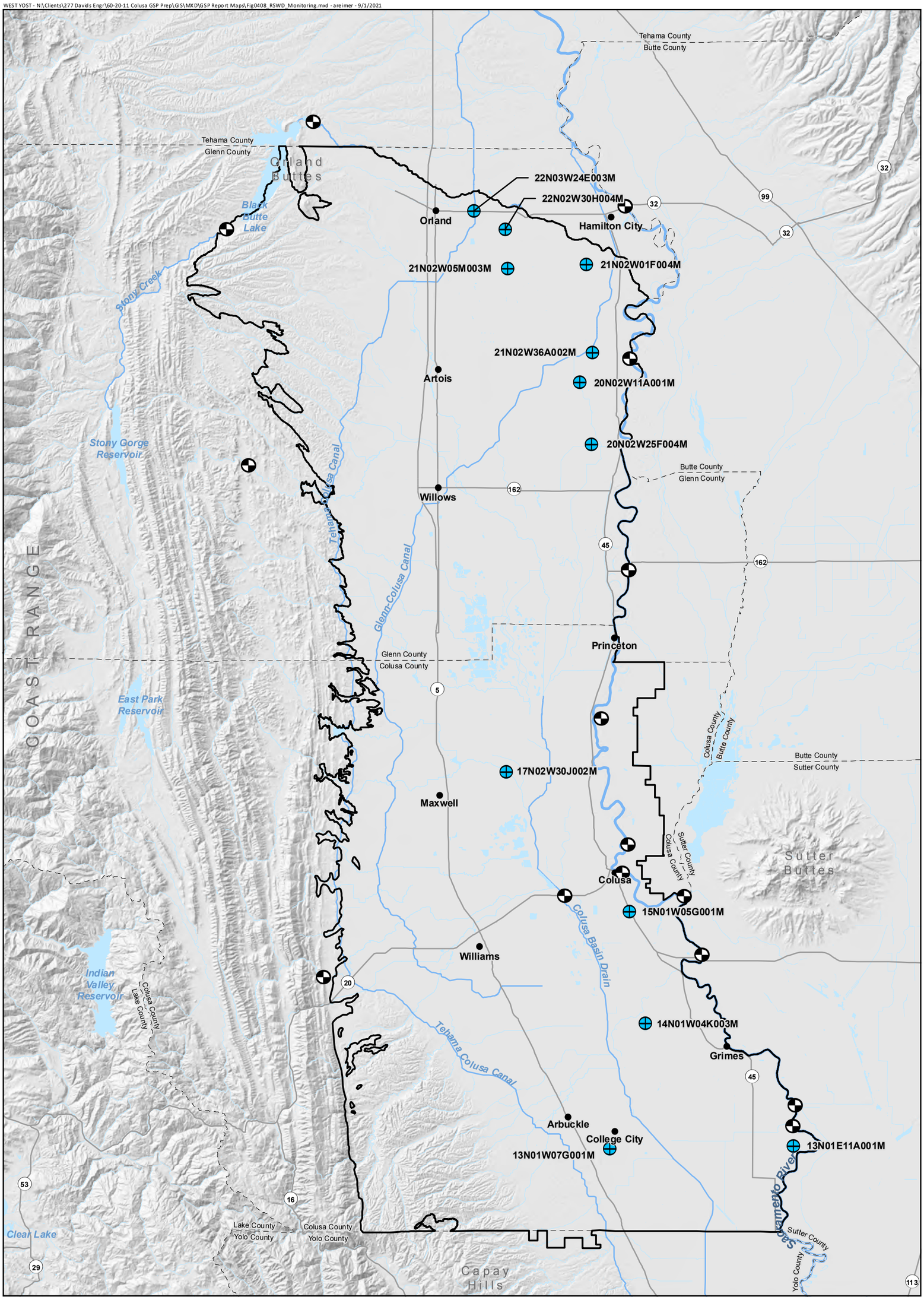
Table 5-2. Groundwater Level Representative Monitoring Network and Sustainability Criteria

SWN	CASGEM ID	Ground Surface Elevation, ft	Minimum Threshold GWE, ft amsl	Minimum Threshold DTW, ft bgs	Measurable Objective GWE , ft amsl	Measurable Objective DTW, ft bgs	Interim Milestone GWE ft amsl	Interim Milestone DTW ft bgs	Margin of Operational Flexibility, ft	20th Percentile Domestic Wells, ft bgs	50% of Range Below Historical Low, ft bgs
19N02W08Q001	25762	108	12	96	79	29	79	29	67	96	72
19N02W33K001	19793	87	21	66	71	16	71	16	50	66	53
19N04W14M002	25787	186	46	140	151	35	151	35	105	140	50
20N02W11A001	17170	125	49	76	119	6	119	6	70	76	22
20N02W18R005	23986	131	29	103	70	61	70	61	42	84	103
20N02W25F001	23989	102	37	65	96	6	96	6	59	65	16
20N02W33B001	17174	105	31	74	100	5	100	5	69	74	17
20N03W07E001	37860	179	-50	229	33	146	33	146	83	148	229
21N02W01F001	38535	161	71	90	116	45	116	45	45	90	89
21N02W04G002	24993	178	41	138	103	75	103	75	63	92	138
21N02W05M001	39676	189	39	150	130	59	130	59	91	134	150
21N02W33M001	38536	149	52	97	94	55	94	55	42	82	97
21N02W36A002	21239	135	24	112	91	44	91	44	68	81	112
21N03W01R002	25232	203	48	155	151	52	151	52	103	108	155
21N03W23D001	23992	205	26	179	142	63	142	63	116	89	179
21N03W34Q002	25789	167	-54	221	36	131	36	131	90	125	221
21N04W12A004	24650	248	-108	356	11	237	11	237	119	98	356
22N02W30H002	25726	204	30	175	100	104	100	104	71	76	175
22N03W24E001	25236	231	-42	273	37	194	37	194	79	90	273

CASGEM ID = California Statewide Groundwater Elevation Monitoring Identification Code
GWE = groundwater elevation
DTW = depth to water
ft = feet
amsl = above mean sea level
bgs = below ground surface



Surface Water Monitoring Stream Gage

Representative Surface Water Depletion Monitoring Site

Colusa Subbasin

Horizontal Datum: North American Datum of 1983 (NAD 83), California State Plane Zone II, feet.

N

0 2.5 5

Scale in Miles

DRAFT **Figure 4-8**

Representative Surface Water Depletion Monitoring Network

Colusa Groundwater Authority and Glenn Groundwater Authority
Colusa Subbasin
Groundwater Sustainability Plan

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Table 5-3. Depletions of Interconnected Surface Water Representative Monitoring Network and Sustainability Criteria

SWN	CASGEM ID	Ground Surface Elevation, ft	Minimum Threshold GWE, ft amsl	Minimum Threshold DTW, ft bgs	Measurable Objective GWE, ft amsl	Measurable Objective DTW, ft bgs	Interim Milestone GWE, ft amsl	Interim Milestone DTW, ft bgs	Margin of Operational Flexibility, ft	Fall 2015 DTW, ft bgs
13N01E11A001	18534	32	13	19	22	10	22	10	9	9
13N01W07G001	36246	90	-19	110	-10	100	-10	100	10	100
14N01W04K003	18554	37	3	34	12	25	12	25	9	24
15N01W05G001	14309	47	19	29	27	20	27	20	9	19
17N02W30J002	16960	63	26	37	44	19	44	19	18	27
20N02W11A001	17170	125	106	20	119	6	119	6	14	10
20N02W25F004	23991	102	87	15	97	5	97	5	10	5
21N02W01F004	40029	162	105	57	126	36	126	36	21	47
21N02W05M003	23996	189	125	64	148	41	148	41	23	54
21N02W36A002	21239	135	59	76	91	44	91	44	32	76
22N02W30H004	38609	204	161	43	179	25	179	25	18	33
22N03W24E003	25758	231	194	36	208	23	208	23	13	26

CASGEM ID = California Statewide Groundwater Elevation Monitoring Identification Code
GWE = groundwater elevation
DTW = depth to water
ft = feet
amsl = above mean sea level
bgs = below ground surface

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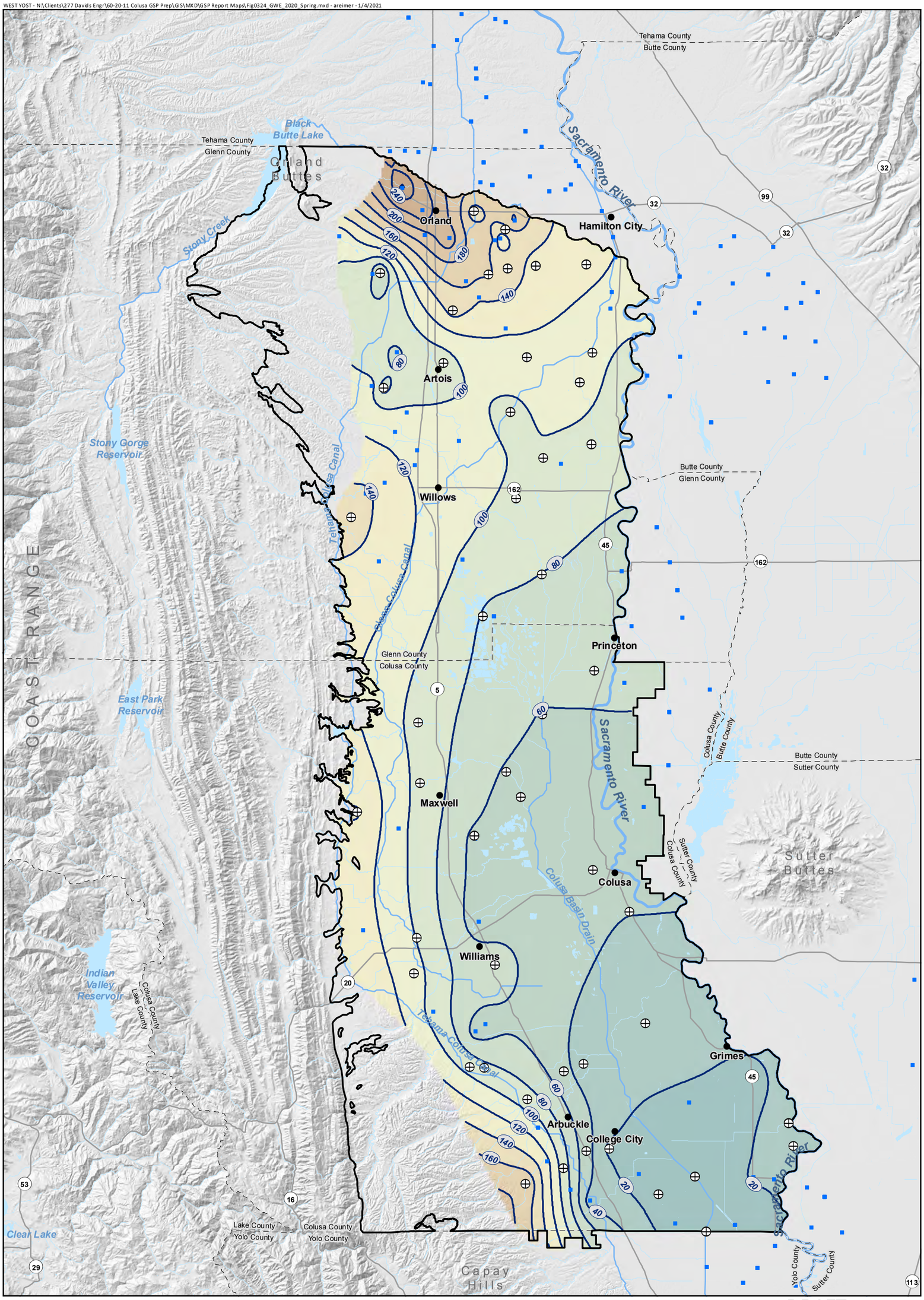

Groundwater Elevation (ft)

260 - 280	140 - 160	20 - 40
240 - 260	120 - 140	0 - 20
220 - 240	100 - 120	-20 - 0
200 - 220	80 - 100	-40 - -20
180 - 200	60 - 80	
160 - 180	40 - 60	

- Well Used for Contouring
- Monitoring Network Wells
- Groundwater Elevation Contour (20-Foot Interval)
- Colusa Subbasin

Horizontal Datum: North American Datum of 1983 (NAD 83), California State Plane Zone II, feet.

Vertical Datum: North American Vertical Datum of 1988, feet (NAVD 88).

N

0 2.5 5

Scale in Miles

DRAFT **Figure 3-24**

Groundwater Elevation Contours Spring 2020

Colusa Groundwater Authority and Glenn Groundwater Authority
Colusa Subbasin
Groundwater Sustainability Plan

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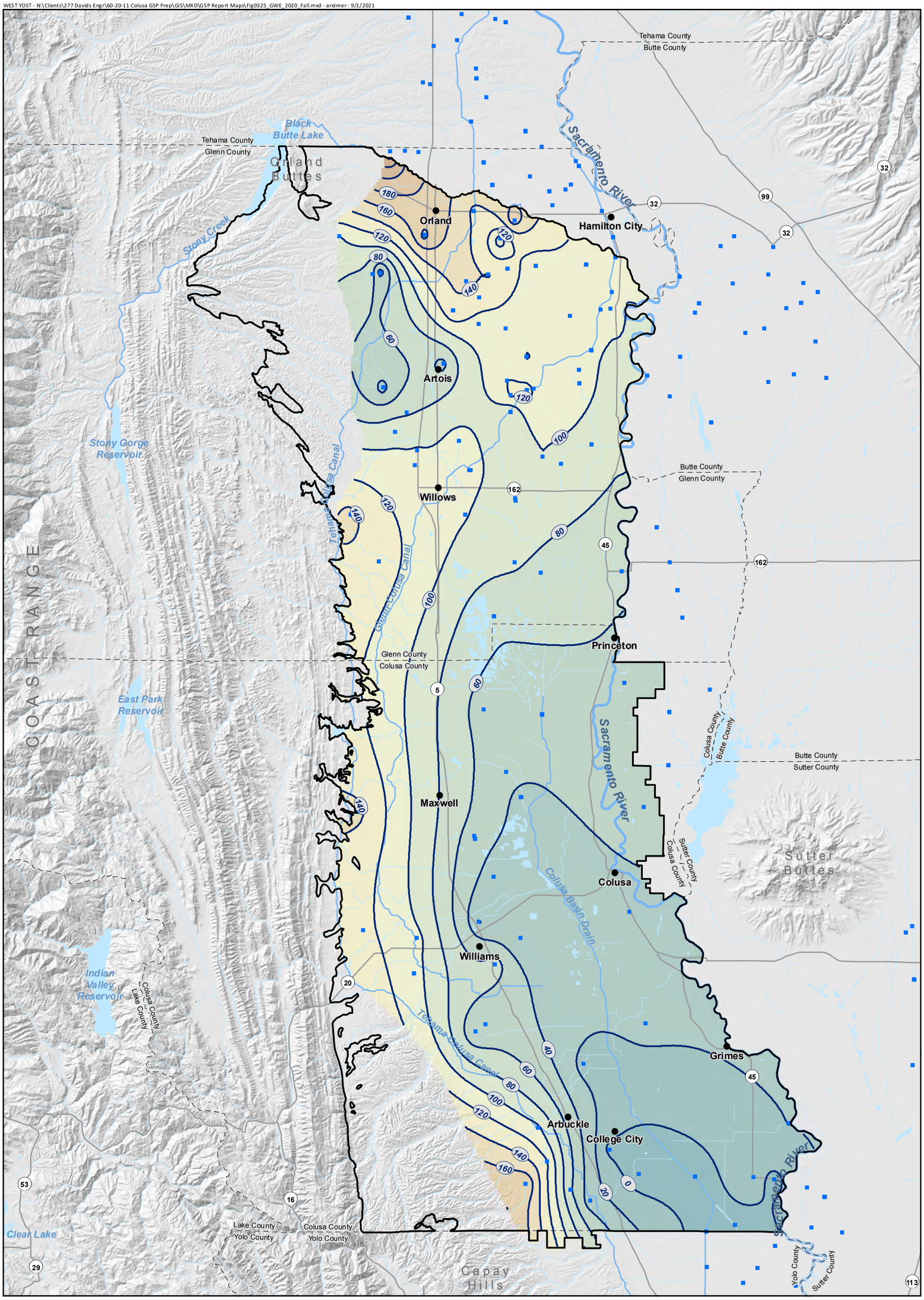

Groundwater Elevation (ft)

260 - 280	140 - 160	20 - 40
240 - 260	120 - 140	0 - 20
220 - 240	100 - 120	-20 - 0
200 - 220	80 - 100	-40 - -20
180 - 200	60 - 80	
160 - 180	40 - 60	

- Well Used for Contouring
- Groundwater Elevation Contour (20-Foot Interval)
- Colusa Subbasin

Horizontal Datum: North American Datum of 1983 (NAD 83), California State Plane Zone II, feet.

Vertical Datum: North American Vertical Datum of 1988, feet (NAVD 88).

N

0 2.5 5

Scale in Miles

DRAFT **Figure 3-25**

Groundwater Elevation Contours Fall 2020

Colusa Groundwater Authority and Glenn Groundwater Authority
Colusa Subbasin
Groundwater Sustainability Plan

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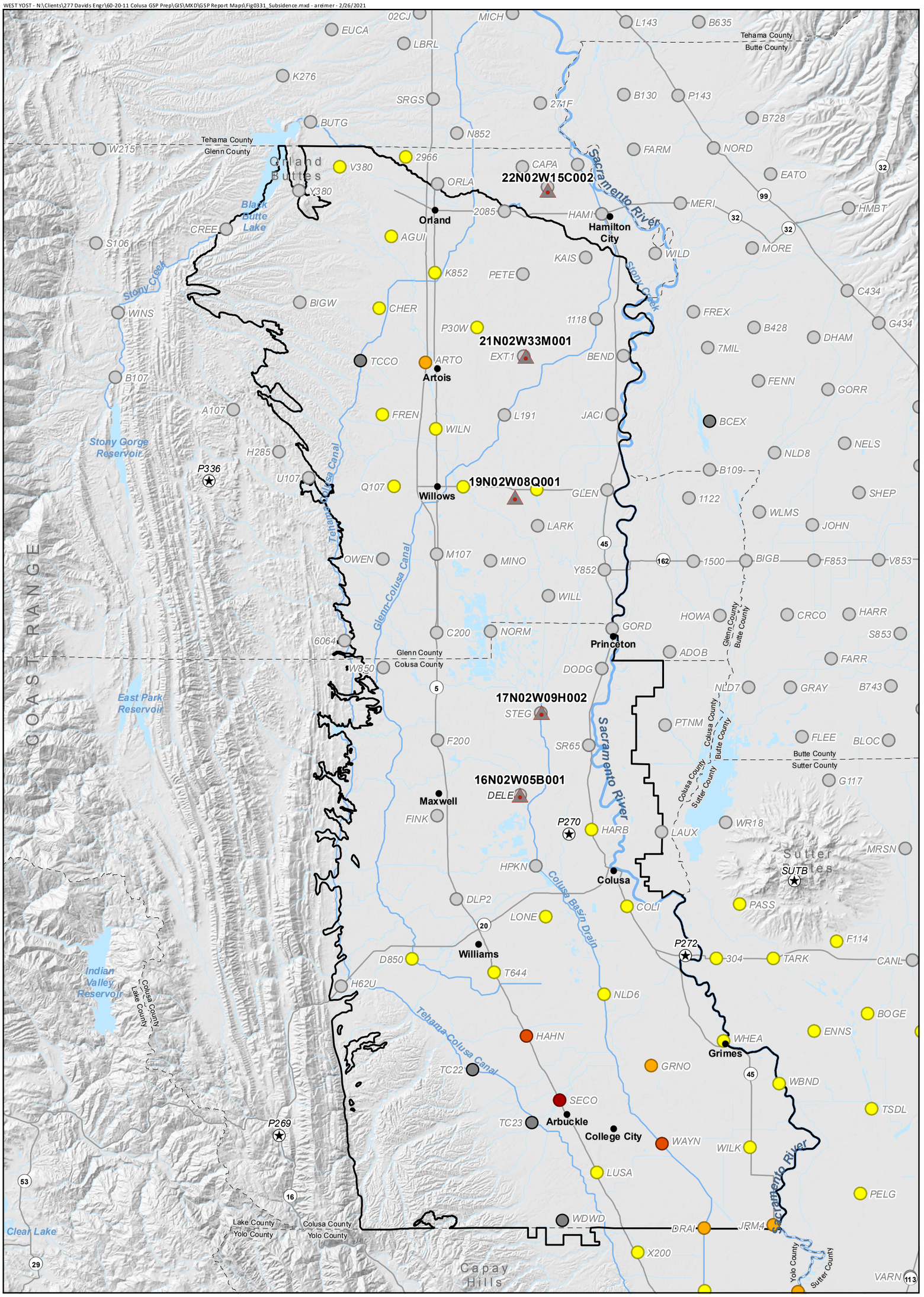

Source: Extensometers and continuous GPS stations were obtained from DWR and USGS. Benchmarks and displacement data were obtained from a resurvey report puublished by DWR (2020).

Datums: North American Datum of 1983 (NAD 83), California State Plane Zone II, feet.

Extensometer

Continuous GPS Station

Colusa Subbasin

Sacramento Valley Benchmark Subsidence Measured Between 2008 and 2017

- > 2 ft
- 1 - 2 ft
- 0.5 - 1 ft
- 2 inches - 0.5 ft
- < 2 inches
- New Benchmark or Not Surveyed

N

0 2.5 5

Scale in Miles

DRAFT **Figure 3-31**

Measured Subsidence 2008 to 2017

Colusa Groundwater Authority and Glenn Groundwater Authority
Colusa Subbasin
Groundwater Sustainability Plan

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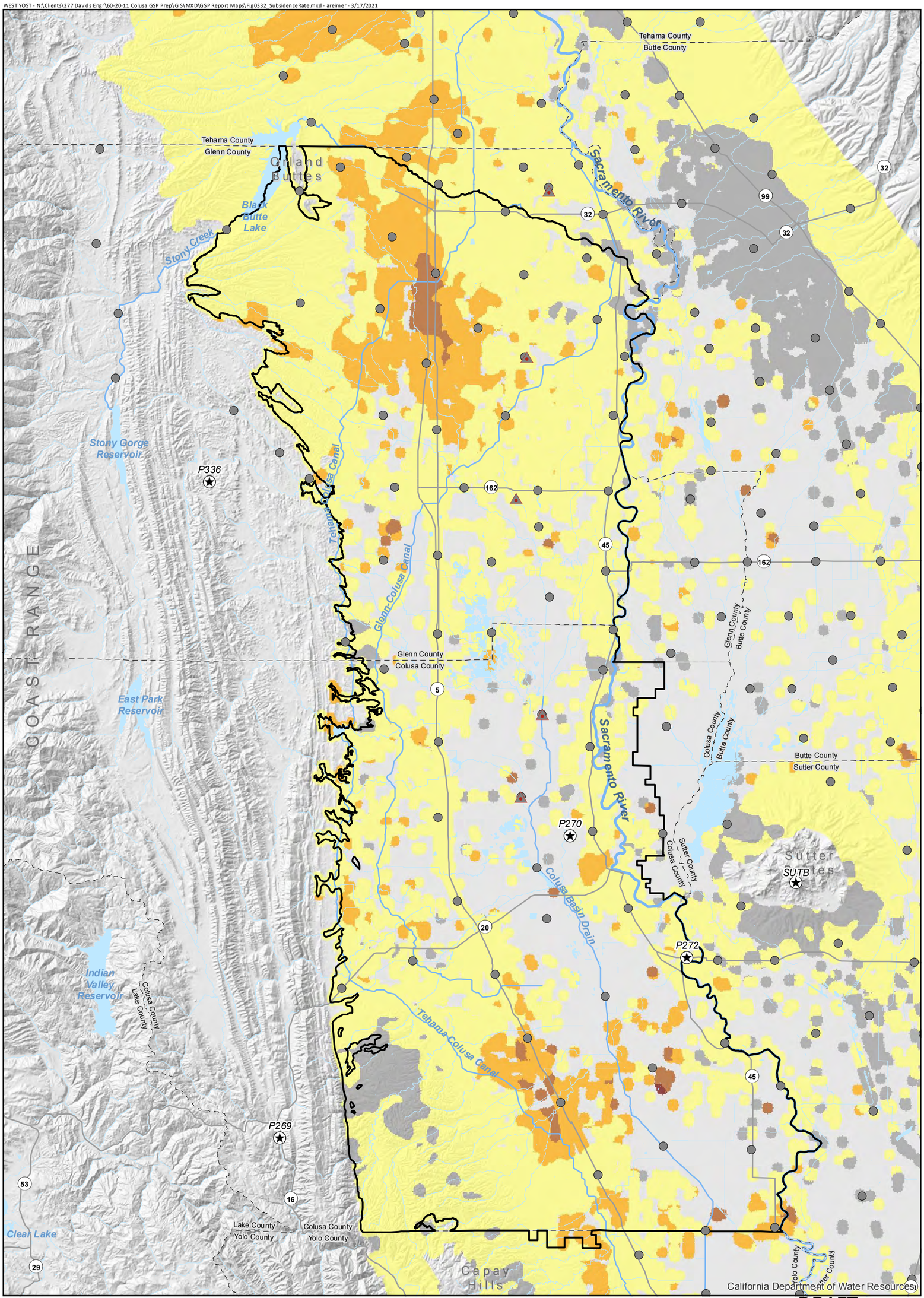

Source: TRE ALTAMiRA, 2020, InSAR Land Surveying and Mapping Services in Support of the DWR SGMA Program, Vertical Displacement v2019 Annual Rate 2018-09-01 to 2019-09-01, March 2020.

Datums: North American Datum of 1983 (NAD 83), California State Plane Zone II, feet.

- Extensometer
- Continuous GPS Station
- Sacramento Valley Subsidence Benchmark
- Colusa Subbasin

Annual Subsidence Rate (inches per year) Between September 2018 and September 2019

- > 2
- 1 - 2
- 0.5 - 1
- 0 - 0.5
- Uplift or No Subsidence

N

0 2.5 5

Scale in Miles

DRAFT

Figure 3-32

Annual Subsidence Rate 2018 to 2019

Colusa Groundwater Authority and Glenn Groundwater Authority
Colusa Subbasin
Groundwater Sustainability Plan

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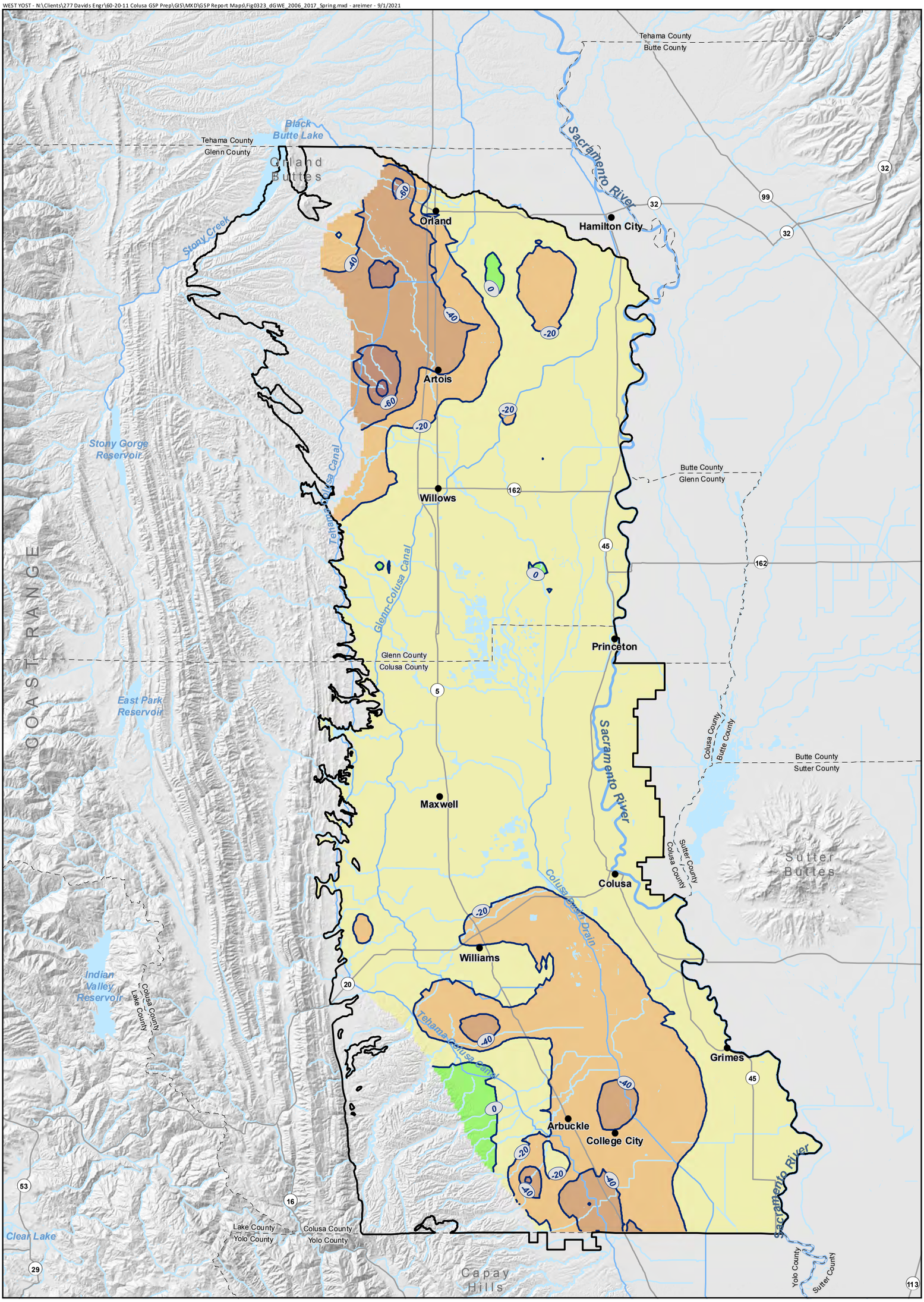

Change in Groundwater Elevation Contour (20-Foot Interval)

Colusa Subbasin

Change in Groundwater Elevation: Spring 2006 to Spring 2017

< -80 | -60 to -40 | -20 to 0

-80 to -60 | -40 to -20 | > 0

Horizontal Datum: North American Datum of 1983 (NAD 83), California State Plane Zone II, feet.

Notes:

1. Negative change in groundwater elevation indicates a decrease in the spring groundwater elevation and an increase in the seasonal depth to water, from 2006 to 2017.

N

0 2.5 5

Scale in Miles

DRAFT **Figure 3-23**

Change in Groundwater Elevation
Spring 2006 to Spring 2017

Colusa Groundwater Authority
and Glenn Groundwater Authority
Colusa Subbasin
Groundwater Sustainability Plan

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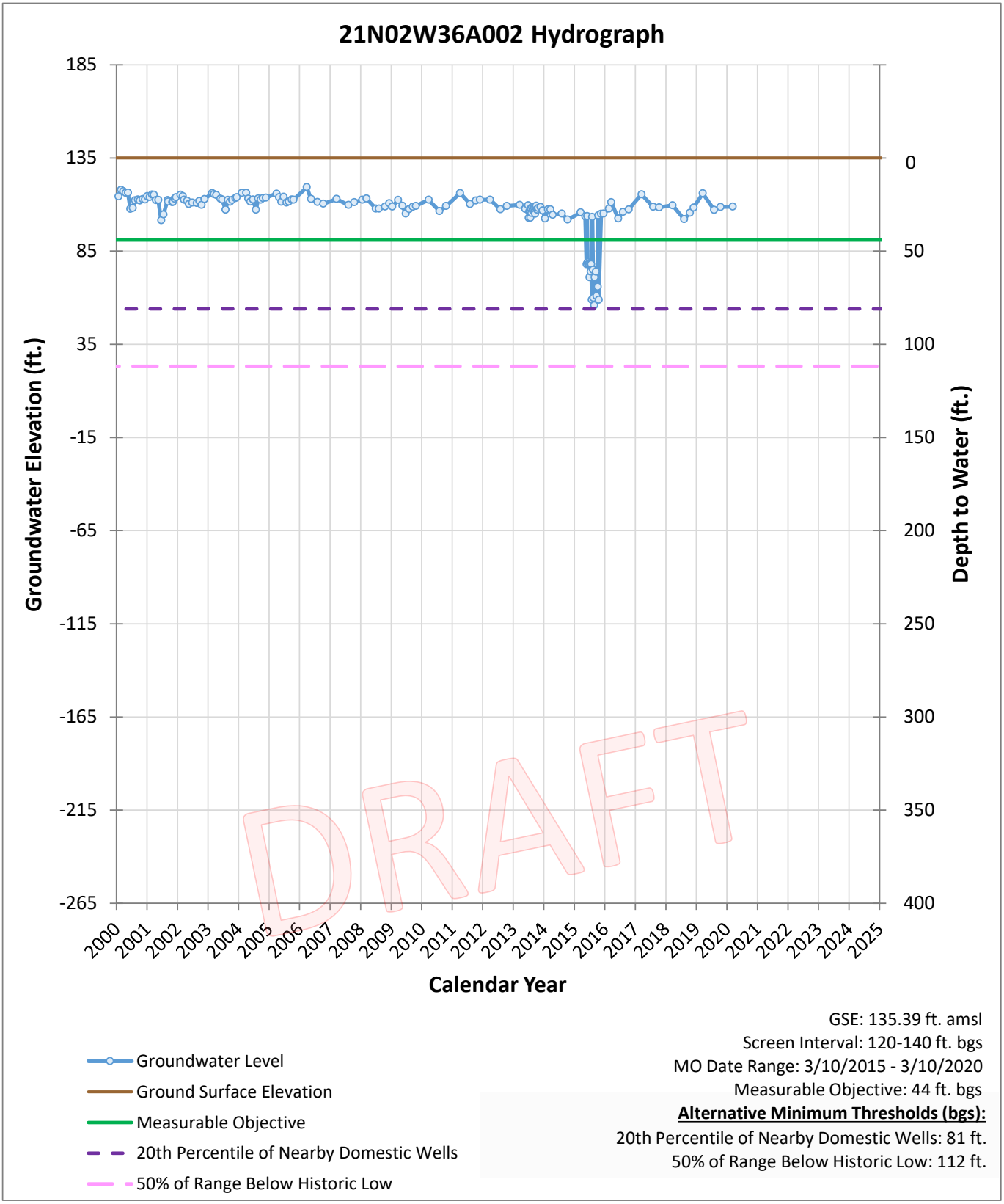
21N02W36A002 Hydrograph
Groundwater Elevation (ft.)
Depth to Water (ft.)
Calendar Year
185
135
85
35
-15
-65
-115
-165
-215
-265
0
50
100
150
200
250
300
350
400
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
DRAFT
Groundwater Level
Ground Surface Elevation
Measurable Objective
20th Percentile of Nearby Domestic Wells
50% of Range Below Historic Low
GSE: 135.39 ft. amsl
Screen Interval: 120-140 ft. bgs
MO Date Range: 3/10/2015 - 3/10/2020
Measurable Objective: 44 ft. bgs
Alternative Minimum Thresholds (bgs):
20th Percentile of Nearby Domestic Wells: 81 ft.
50% of Range Below Historic Low: 112 ft.

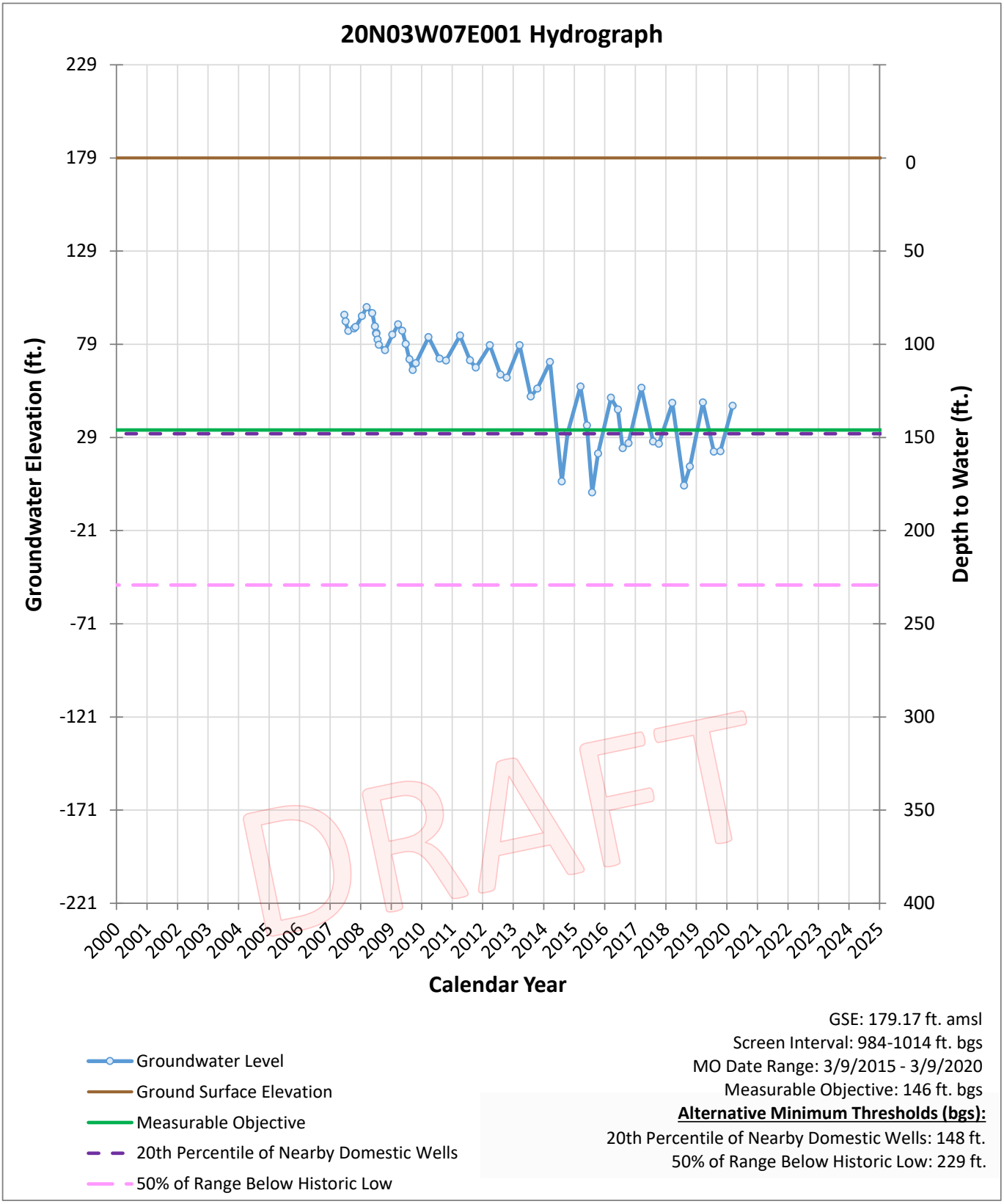
20N03W07E001 Hydrograph
Groundwater Elevation (ft.)
Depth to Water (ft.)
229
179
129
79
29
-21
-71
-121
-171
-221
0
50
100
150
200
250
300
350
400
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
Calendar Year
DRAFT
Groundwater Level
Ground Surface Elevation
Measurable Objective
20th Percentile of Nearby Domestic Wells
50% of Range Below Historic Low
GSE: 179.17 ft. amsl
Screen Interval: 984-1014 ft. bgs
MO Date Range: 3/9/2015 - 3/9/2020
Measurable Objective: 146 ft. bgs
Alternative Minimum Thresholds (bgs):
20th Percentile of Nearby Domestic Wells: 148 ft.
50% of Range Below Historic Low: 229 ft.

Table 3-11. Average Annual Land and Surface Water System Inflows, Outflows, and Changes in Storage in taf/yr for the Water Budget Analysis Periods Listed in Table 3-9

Component	Historical Simulation	Current Conditions Baseline	Future Conditions, No Climate Change Baseline	Future Conditions, 2030 Climate Change Baseline[a]	Future Conditions, 2070 Climate Change Baseline[b]
Inflows					
Surface Water Inflows	11,747	12,556	12,556	12,597	12,715
Sacramento River Diversions	1,076	1,192	1,196	1,196	1,196
Stony Creek Diversions	92	95	91	91	91
Sacramento River Inflows[c]	10,500	11,188	11,188	11,228	11,335
Other Inflows from Boundary Streams	78	81	81	81	92
Precipitation	1,210	1,183	1,183	1,198	1,258
Groundwater Pumping	502	499	499	525	559
Agricultural	463	458	458	484	516
Urban and Industrial	11	11	10	10	10
Managed Wetlands	28	30	30	31	32
Stream Gains from Groundwater (Stream Accretions)	366	349	349	337	323
Total Inflow	**13,824**	**14,587**	**14,586**	**14,658**	**14,853**
Outflows					
Evapotranspiration	1,740	1,790	1,790	1,841	1,901
Agricultural	1,430	1,494	1,494	1,542	1,596
Urban and Industrial	22	28	28	28	28
Managed Wetlands	69	69	69	70	73
Native Vegetation	180	163	163	165	167
Canal Evaporation	40	36	36	36	36
Deep Percolation	441	416	415	415	411
Precipitation	174	162	162	160	156
Applied Surface Water	196	162	162	161	158
Applied Groundwater	72	92	91	94	97
Seepage	345	379	379	387	401
Streams	206	231	231	239	253
Canals and Drains	139	148	148	148	148
Surface Water Outflows	11,302	12,002	12,003	12,015	12,141
Precipitation Runoff	55	51	51	52	60
Applied Surface Water Return Flows	96	93	93	92	90
Applied Groundwater Return Flows	22	19	18	19	20
Sacramento River	9,371	11,049	11,050	11,086	11,187
Colusa Basin Drain	709	759	759	742	774

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Table 3-11. Average Annual Land and Surface Water System Inflows, Outflows, and Changes in Storage in taf/yr for the Water Budget Analysis Periods Listed in Table 3-9

Component	Historical Simulation	Current Conditions Baseline	Future Conditions, No Climate Change Baseline	Future Conditions, 2030 Climate Change Baseline[a]	Future Conditions, 2070 Climate Change Baseline[b]
Colusa Weir to Sutter Bypass	994	0	0	0	0
Other Outflows to Boundary Streams	56	32	32	23	10
Total Outflow	**13,828**	**14,587**	**14,587**	**14,658**	**14,853**
Change in Storage (Inflow - Outflow)	**-3**	**0**	**0**	**0**	**0**

(a) Central Tendency Climate Change Projections
(b) Sacramento River Diversions and Stony Creek Diversions are diversions from boundary streams outside the subbasin. About 20 percent of the total diversions come from streams within the subbasin and are included in the Sacramento River Inflow.
(c) Sacramento River Inflows include flows along the Sacramento River and the Colusa Basin Drain that enter the Colusa Subbasin.

1

Table 3-12. Average Annual Groundwater System Inflows, Outflows, and Changes in Storage in taf/yr for the Water Budget Analysis Periods Listed in Table 3-9

Component	Historical Simulation	Current Conditions Baseline	Future Conditions, No Climate Change Baseline	Future Conditions, 2030 Climate Change Baseline[a]	Future Conditions, 2070 Climate Change Baseline[b]
Inflows					
Subsurface Water Inflows	200	203	203	205	209
Deep Percolation	441	416	415	415	411
Precipitation	174	162	162	160	156
Applied Surface Water	196	162	162	161	158
Applied Groundwater	72	92	91	94	97
Seepage	345	379	379	387	401
Streams	206	231	231	239	253
Canals and Drains	139	148	148	148	148
Total Inflow	**986**	**997**	**997**	**1,008**	**1,021**
Outflows					
Subsurface Water Outflows	146	149	149	148	147
Groundwater Pumping	502	499	499	525	559
Agricultural	463	458	458	484	548
Urban and Industrial	11	11	10	10	10
Managed Wetlands	28	30	30	31	35
Stream Gains from Groundwater (Stream Accretions)	366	349	349	337	323
Total Outflow	**1,014**	**997**	**996**	**1,011**	**1,028**
Change in Storage (Inflow - Outflow)	**-28**	**1**	**1**	**-3**	**-7**

(a) Central Tendency Climate Change Projections
(b) Sacramento River Diversions and Stony Creek Diversions are diversions from boundary streams outside the subbasin. About 20 percent of the total diversions come from streams within the subbasin and are included in the Sacramento River Inflow.

Table 3-11. Average Annual Land and Surface Water System Inflows, Outflows, and Changes in Storage in taf/yr for the Water Budget Analysis Periods Listed in Table 3-9

Component	Historical Simulation	Current Conditions Baseline	Future Conditions, No Climate Change Baseline	Future Conditions, 2030 Climate Change Baseline[a]	Future Conditions, 2070 Climate Change Baseline[b]
Colusa Weir to Sutter Bypass	994	0	0	0	0
Other Outflows to Boundary Streams	56	32	32	23	10
Total Outflow	**13,828**	**14,587**	**14,587**	**14,658**	**14,853**
Change in Storage (Inflow - Outflow)	**-3**	**0**	**0**	**0**	**0**

(a) Central Tendency Climate Change Projections
(b) Sacramento River Diversions and Stony Creek Diversions are diversions from boundary streams outside the subbasin. About 20 percent of the total diversions come from streams within the subbasin and are included in the Sacramento River Inflow.
(c) Sacramento River Inflows include flows along the Sacramento River and the Colusa Basin Drain that enter the Colusa Subbasin.

1

Table 3-12. Average Annual Groundwater System Inflows, Outflows, and Changes in Storage in taf/yr for the Water Budget Analysis Periods Listed in Table 3-9

Component	Historical Simulation	Current Conditions Baseline	Future Conditions, No Climate Change Baseline	Future Conditions, 2030 Climate Change Baseline[a]	Future Conditions, 2070 Climate Change Baseline[b]
Inflows					
Subsurface Water Inflows	200	203	203	205	209
Deep Percolation	441	416	415	415	411
Precipitation	174	162	162	160	156
Applied Surface Water	196	162	162	161	158
Applied Groundwater	72	92	91	94	97
Seepage	345	379	379	387	401
Streams	206	231	231	239	253
Canals and Drains	139	148	148	148	148
Total Inflow	**986**	**997**	**997**	**1,008**	**1,021**
Outflows					
Subsurface Water Outflows	146	149	149	148	147
Groundwater Pumping	502	499	499	525	593 ~~559~~
Agricultural	463	458	458	484	548
Urban and Industrial	11	11	10	10	10
Managed Wetlands	28	30	30	31	35
Stream Gains from Groundwater (Stream Accretions)	366	349	349	337	323
Total Outflow	**1,014**	**997**	**996**	**1,011**	1,063 ~~1,028~~
Change in Storage (Inflow - Outflow)	**-28**	**1**	**1**	**-3**	-42 ~~-7~~

(a) Central Tendency Climate Change Projections
(b) Sacramento River Diversions and Stony Creek Diversions are diversions from boundary streams outside the subbasin. About 20 percent of the total diversions come from streams within the subbasin and are included in the Sacramento River Inflow.

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Table 6-1. Summary of Key Colusa Subbasin Water Budget Parameters Influencing Formulation of Projects and Management Actions (average annual volumes, taf/yr)

Water Budget Parameter	Projected Future Conditions without Climate Change	Projected Future Conditions with 2070 Central Tendency Climate Change	Difference (Projected future with 2070 Central Tendency climate change minus without climate change)	Percent Difference[(a)]
Avg. Agricultural Evapotranspiration	1,494	1,596	102.0	6.8%
Precipitation	1,183	1,258	75.0	6.3%
Agricultural Pumping	458	516	58.0	12.7%
Avg. Rate of Change in Groundwater Storage, af/yr	0.6	-7.3	-7.9	-0.8%
Sacramento River and Stony Creek Diversions to Colusa Subbasin	1,287.0	1,287.0	0.0	0.0%
Net Steam Accretion	125	77	-48.0	-38.3%

(a) Calculated as the difference in the fourth column divided by the Projected Future Condition without Climate Change quantity in the second column, except for Avg. Rate of Change in Groundwater Storage, for which the percent difference is based on the approximately 1 million acre-feet that flow into and out of the Colusa Subbasin on an average annual basis. Water budget uncertainty is discussed in Chapter 3, Basin Setting, and model uncertainty is discussed in Appendix 3D. The average change in groundwater storage is considered to be within standard modeling error for this type of groundwater model analysis.

Under projected future conditions without climate change, groundwater storage is forecast to increase modestly, at an average rate of 0.6 taf/yr. With 2070 CT climate change and the associated increase in groundwater pumping to meet increased irrigation demands, groundwater storage is projected to decrease at a rate of 7.3 taf/yr. This net change of -7.9 taf/yr is 0.8 percent of the approximately one million acre-feet that flow into and out of the Colusa Subbasin groundwater system annually.

Under projected future conditions without climate change, net stream accretion (stream accretion minus stream depletion) is projected to be 125 taf/yr on average. This aggregate net stream accretion is for the Sacramento River, Stony Creek, and the Colusa Drain combined[2]. With 2070 CT climate change, net stream accretion is projected to remain positive but to decrease by about 48 taf/yr, or by 38 percent, with respect to the without climate change condition. However, viewed in relation to the average Sacramento River flow above the Feather River confluence of approximately 11.7 million acre-feet per year (af/yr) the projected change is roughly one half of one percent.

The aggregate changes in groundwater storage, 0.8 percent, and net stream accretion, 0.5 percent of the average Sacramento River Flow, are considered to be within standard modeling error for this type of analysis. The GSAs will continue to evaluate and review all Subbasin water budget parameters, including net

[2] A more detailed assessment of projected streamflow accretion-depletion is presented in Appendix 3G. The analysis considers the Sacramento River, Stony Creek, and the Colusa Drain individually and collectively, and evaluates temporal accretion-depletion patterns over the 50-year simulation period.

Modified Colusa Draft GSP Table 3-11.

Average Annual Land and Surface Water System Inflows, Outflows, and Changes in Storage in Acre-Feet/Year for the Water Budget Analysis Periods

A	B	C	D	E	F	G	H	I	J
Component	Historical Simulation, 1990 - 2015	Current Conditions Baseline, 2016 - 2065	Future Conditions, No Climate Change Baseline	Future Conditions, 2030 Climate Change Baseline[(a)]	Future Conditions, 2070 Climate Change Baseline[(b)]	2070 Future - Historical, AFY	2070 Future - Historical, Percent	2070 Future - Current, AFY	2070 Future - Current, Percent
Inflows									
Surface Water Inflows	11,747,000	12,556,000	12,556,000	12,597,000	12,715,000	**968,000**	**8.2%**	**159,000**	**1.3%**
Sacramento River Diversions	1,076,000	1,192,000	1,196,000	1,196,000	1,196,000	120,000	11.2%	4,000	0.3%
Stony Creek Diversions	92,000	95,000	91,000	91,000	91,000	-1,000	-1.1%	-4,000	-4.2%
Sacramento River Inflows	10,500,000	11,188,000	11,188,000	11,228,000	11,335,000	835,000	8.0%	147,000	1.3%
Other Inflows from Boundary Streams	78,000	81,000	81,000	81,000	92,000	14,000	17.9%	11,000	13.6%
Precipitation	1,210,000	1,183,000	1,183,000	1,198,000	1,258,000	**48,000**	**4.0%**	**75,000**	**6.3%**
Groundwater Pumping	502,000	499,000	499,000	525,000	559,000	**57,000**	**11.4%**	**60,000**	**12.0%**
Agricultural	463,000	458,000	458,000	484,000	516,000	53,000	11.4%	58,000	12.7%
Urban and Industrial	11,000	11,000	10,000	10,000	10,000	-1,000	-9.1%	-1,000	-9.1%
Managed Wetlands	28,000	30,000	30,000	31,000	32,000	4,000	14.3%	2,000	6.7%
Stream Gains from Groundwater (Stream Accretions)	366,000	349,000	349,000	337,000	323,000	**-43,000**	**-11.7%**	**-26,000**	**-7.4%**
Total Inflow	**13,824,000**	**14,587,000**	**14,586,000**	**14,658,000**	**14,853,000**	**1,029,000**	**7.4%**	**266,000**	**1.8%**
Outflows									
Evapotranspiration	1,740,000	1,790,000	1,790,000	1,841,000	1,901,000	**161,000**	**9.3%**	**111,000**	**6.2%**
Agricultural	1,430,000	1,494,000	1,494,000	1,542,000	1,596,000	166,000	11.6%	102,000	6.8%
Urban and Industrial	22,000	28,000	28,000	28,000	28,000	6,000	27.3%	0	0.0%
Managed Wetlands	69,000	69,000	69,000	70,000	73,000	4,000	5.8%	4,000	5.8%
Native Vegetation	180,000	163,000	163,000	165,000	167,000	-13,000	-7.2%	4,000	2.5%
Canal Evaporation	40,000	36,000	36,000	36,000	36,000	-4,000	-10.0%	0	0.0%
Deep Percolation	441,000	416,000	415,000	415,000	411,000	**-30,000**	**-6.8%**	**-5,000**	**-1.2%**
Precipitation	174,000	162,000	162,000	160,000	156,000	-18,000	-10.3%	-6,000	-3.7%
Applied Surface Water	196,000	162,000	162,000	161,000	158,000	-38,000	-19.4%	-4,000	-2.5%
Applied Groundwater	72,000	92,000	91,000	94,000	97,000	25,000	34.7%	5,000	5.4%
Seepage	345,000	379,000	379,000	387,000	401,000	**56,000**	**16.2%**	**22,000**	**5.8%**
Streams	206,000	231,000	231,000	239,000	253,000	47,000	22.8%	22,000	9.5%
Canals and Drains	139,000	148,000	148,000	148,000	148,000	9,000	6.5%	0	0.0%
Surface Water Outflows	11,302,000	12,002,000	12,003,000	12,015,000	12,141,000	**839,000**	**7.4%**	**139,000**	**1.2%**
Precipitation Runoff	55,000	51,000	51,000	52,000	60,000	5,000	9.1%	9,000	17.6%
Applied Surface Water Return Flows	96,000	93,000	93,000	92,000	90,000	-6,000	-6.3%	-3,000	-3.2%
Applied Groundwater Return Flows	22,000	19,000	18,000	19,000	20,000	-2,000	-9.1%	1,000	5.3%
Sacramento River	9,371,000	11,049,000	11,050,000	11,086,000	11,187,000	1,816,000	19.4%	138,000	1.2%
Colusa Basin Drain	709,000	759,000	759,000	742,000	774,000	65,000	9.2%	15,000	2.0%
Colusa Weir to Sutter Bypass	994,000	0	0	0	0	-994,000	-100.0%	0	
Other Outflows to Boundary Streams	56,000	32,000	32,000	23,000	10,000	-46,000	-82.1%	-22,000	-68.8%
Total Outflow	**13,828,000**	**14,587,000**	**14,587,000**	**14,658,000**	**14,853,000**	**1,025,000**	**7.4%**	**266,000**	**1.8%**
Change in Storage (Inflow - Outflow)	**-3,000**	**0**	**0**	**0**	**0**	**3,000**		**0**	
Net Stream Gains (Accretion)	**160,000**	**118,000**	**118,000**	**98,000**	**70,000**	**-90,000**	**-56.3%**	**-48,000**	**-40.7%**
Net Stream Accretion / GW Pumping	**31.9%**	**23.6%**	**23.6%**	**18.7%**	**12.5%**	**-157.9%**		**-80.0%**	
Sacramento River (Inflows - Outflows)	**1,129,000**	**139,000**	**138,000**	**142,000**	**148,000**	**-981,000**	**-86.9%**	**9,000**	**6.5%**

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Bottom three rows added to original

Modified Colusa Draft GSP Table 3-12.

Average Annual Groundwater System Inflows, Outflows, and Changes in Storage in Acre-feet/Year for the Water Budget Analysis Periods

A	B	C	D	E	F	G	H	I	J
Component	Historical Simulation, 1990 - 2015	Current Conditions Baseline, 2016 - 2065	Future Conditions, No Climate Change Baseline	Future Conditions, 2030 Climate Change Baseline	Future Conditions, 2070 Climate Change Baseline	2070 Future - Historical, AFY	2070 Future - Historical, Percent	2070 Future - Current, AFY	2070 Future - Current, Percent
Inflows									
Subsurface Water Inflows	200,000	203,000	203,000	205,000	209,000	**9,000**	**4.5%**	**6,000**	**3.0%**
Deep Percolation	441,000	416,000	415,000	415,000	411,000	**-30,000**	**-6.8%**	**-5,000**	**-1.2%**
Precipitation	174,000	162,000	162,000	160,000	156,000	-18,000	-10.3%	-6,000	-3.7%
Applied Surface Water	196,000	162,000	162,000	161,000	158,000	-38,000	-19.4%	-4,000	-2.5%
Applied Groundwater	72,000	92,000	91,000	94,000	97,000	25,000	34.7%	5,000	5.4%
Seepage	345,000	379,000	379,000	387,000	401,000	**56,000**	**16.2%**	**22,000**	**5.8%**
Streams	206,000	231,000	231,000	239,000	253,000	47,000	22.8%	22,000	9.5%
Canals and Drains	139,000	148,000	148,000	148,000	148,000	9,000	6.5%	0	0.0%
Total Inflow	**986,000**	**998,000**	**997,000**	**1,007,000**	**1,021,000**	**35,000**	**3.5%**	**23,000**	**2.4%**
Outflows									
Subsurface Water Outflows	146,000	149,000	149,000	148,000	**147,000**	**1,000**	**0.7%**	**-2,000**	**-1.3%**
Groundwater Pumping	502,000	499,000	499,000	525,000	**593,000**	**91,000**	**18.1%**	**94,000**	**18.8%**
Agricultural	463,000	458,000	458,000	484,000	548,000	85,000	18.4%	90,000	19.7%
Urban and Industrial	11,000	11,000	10,000	10,000	10,000	-1,000	-9.1%	-1,000	-9.1%
Managed Wetlands	28,000	30,000	30,000	31,000	35,000	7,000	25.0%	5,000	16.7%
Stream Gains from Groundwater (Stream Accretions)	366,000	349,000	349,000	337,000	323,000	**-43,000**	**-11.7%**	**-26,000**	**-7.4%**
Total Outflow	**1,014,000**	**997,000**	**997,000**	**1,010,000**	**1,063,000**	**49,000**	**1.4%**	**66,000**	**3.1%**
Change in Storage (Inflow - Outflow)	**-28,000**	**1,000**	**0**	**-3,000**	**-42,000**	**-14,000**	**-75.0%**	**-43,000**	**-800.0%**
Net Stream Gains (Accretion)	**160,000**	**118,000**	**118,000**	**98,000**	**70,000**	**-90,000**	**-56.3%**	**-48,000**	**-40.7%**
Ratio Net Accretion / GW Pumping	**31.9%**	**23.6%**	**23.6%**	**18.7%**	**11.8%**	**-98.9%**		**-51.1%**	

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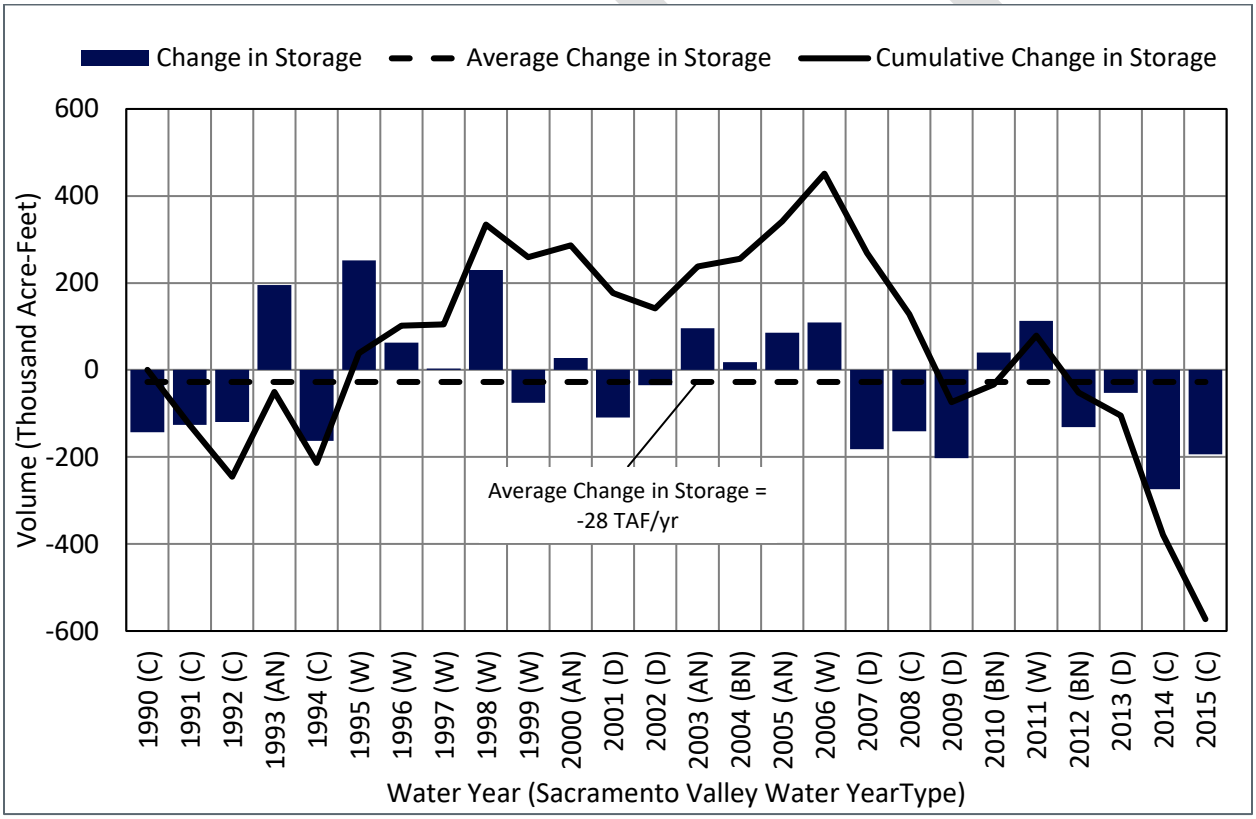
Bottom two rows added to original

The average annual change in storage was -28 thousand acre-feet per year (taf/yr) over the historical water budget period of 1990 to 2015. This indicates that, on average, more groundwater has left the Colusa Subbasin than entered, resulting in an average net reduction in groundwater stored in the Colusa Subbasin. Figure 3-29 summarizes the annual change in storage and the cumulative change in storage in the Colusa Subbasin aquifer system over the historical water budget period. A decrease in groundwater storage occurred during critically dry (C), dry (D), and below normal (BN) water years. This is most evident between 2007 and 2015, when the region experienced a series of consecutive, multiple-year droughts. While critically dry, dry, and below normal water years almost always correspond with a decrease in storage, above normal (AN) and wet (W) water years do not always result in an increase in groundwater storage. On average, the Colusa Subbasin's storage volume is influenced more by dry years than wet years. This is likely due to both a greater reliance on groundwater supply during dry years when surface water is less readily available and the relatively slow nature of deep percolation to recharge the groundwater system during wet years. Most of the groundwater inflows and outflows within the Colusa Subbasin are exchanged directly with the land and surface water system overlying the Colusa Subbasin groundwater system. More information regarding the groundwater storage calculations can be found in the water budget section of this GSP (Section 3.3) and the model development and calibration Technical Memorandum prepared by Woodard and Curran and Davids Engineering (2021) (Appendix 3D).



Reference: Woodard and Curran and Davids Engineeirng. 2021. C2VSimFG-Colusa Model Development and Calibration Technical Memorandum: (Appendix 3D).

Figure 3-29. Change in Groundwater Storage

Page 21 - Aqualliance Exhibit A

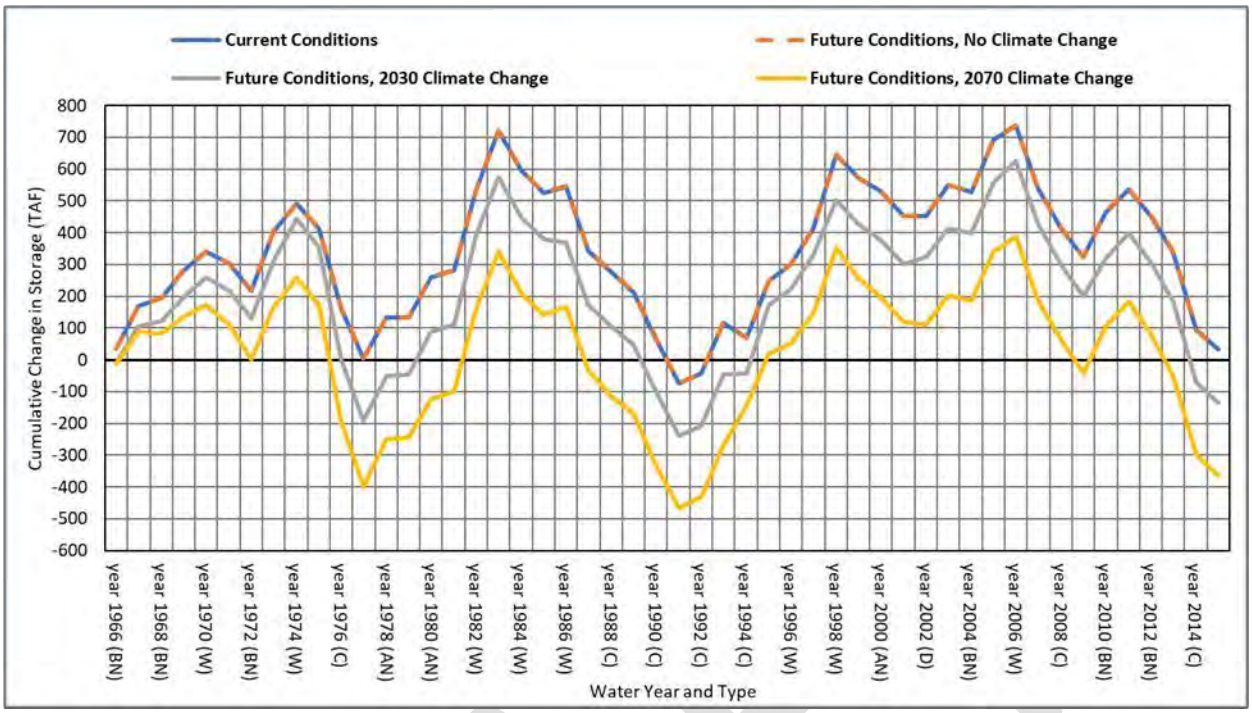


Figure 3-49. Cumulative Change in Groundwater Storage for Current and Future Conditions Baseline Scenarios

3.3.5 Water Budget Uncertainty

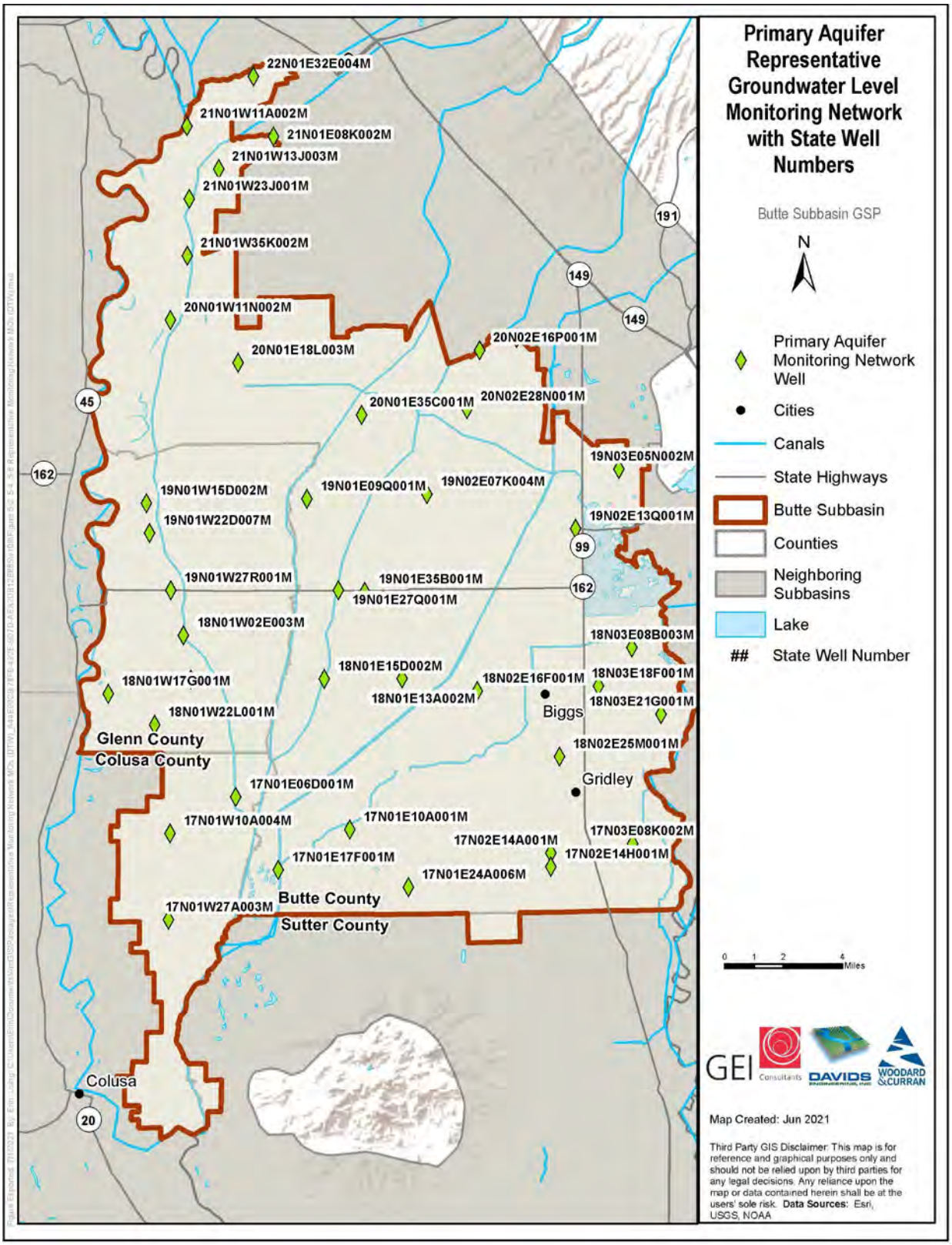
Water budget uncertainty refers to a lack of understanding of the subbasin setting that significantly affects an Agency's ability to develop sustainable management criteria and appropriate projects and management actions in a GSP, or to evaluate the efficacy of plan implementation, and therefore may limit the ability to assess whether a subbasin is being sustainably managed. Substantial uncertainty exists in all components of each water budget component. Substantial uncertainty also exits in the assumptions used to project potential future conditions related to planned development and associated urban demands, as well as, projections of climate change. Consequently, the estimated negligible or very small changes in groundwater storage for current and future water budgets, calculated as total subbasin inflows minus outflows, are highly uncertain. It is anticipated that confidence in model results will be increased over time through additional monitoring and data collection, refinements to C2VSimFG-Colusa input, and coordination with neighboring subbasins.

However, the uncertainties that currently exist do not substantially limit the ability to develop and implement a GSP for the subbasin including the ability to develop sustainable management criteria and appropriate projects and management actions, including improved monitoring, nor the ability to assess whether the subbasin is being sustainably managed over time. GSPs are by nature iterative, and each opportunity will allow for improvements that will (1) lower uncertainty and (2) facilitate more refined analyses of sustainable management criteria and projects and management actions, and (3) refine the GSP implementation.

Modified Butte Draft GSP Table 4-1 Primary Aquifer Monitoring Wells

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
Well ID	State Well Number	CASGEM Number	Total Well Depth	Monitored Zone	Ground Surface Elevation (ft msl)	Table 4-1 Minimum Threshold Depth (bgs)	Appendix 4A Minimum Threshold Depth (bgs)*	Table 4-1 Minimum Threshold Elevation (ft msl)	Table 4-1 Measureable Objective Depth (bgs)	Appendix 4A Measurable Objective Depth (bgs)*	Table 4-1 Measureable Objective Elevation (ft msl)	Table 4-1 MT - MO Difference (feet)	Appendix 4A MT - MO Difference (feet)**	Well Type	Figure and Table 4-1 MT Calculation Method	Appendix4A MT Calculation Method**	Appendix4A Model Adjustment Applied (feet)
B-1	17N01E06D001M	25513	500	Intermediate	63.37	35	35	28	6	6	57	-29	-29	Irrigation	-20 feet	-20 feet	10
B-2	17N01E10A001M	16951	110	Very Shallow	65.34	42	42	23	17	17	48	-25	-25	Residential	-20 feet	-20 feet	-10
B-3	17N01E17F001M	33031	160	Shallow	58.97	34	34	25	7	7	52	-27	-27	Observation	-20 feet	-20 feet	3
B-4	17N01E24A006M	24328	75	Very Shallow	72.80	29	29	44	6	6	67	-23	-23	Observation	-20 feet	-20 feet	-2
B-5	17N01W10A004M	24660	117	Very Shallow	64.28	38	38	26	5	5	59	-33	-33	Observation	-20 feet	-20 feet	3
B-6	17N01W27A003M	24981	203	Shallow	66.61	43	43	24	14	14	53	-29	-29	Observation	-20 feet	-20 feet	0
B-7	17N02E14A001M	33033	102	Very Shallow	84.79	56	56	29	15	15	70	-41	-41	Irrigation	Shallowest 7%	Shallowest 7%	-10
B-8	17N02E14H001M	16956	102	Very Shallow	86.29	53	53	33	23	23	63	-30	-30	Other	-10 feet	-10 feet	-10
B-9	17N03E08K002M	33037	100	Very Shallow	91.27	38	38	53	13	13	78	-25	-25	Residential	-20 feet	-20 feet	-5
B-10	18N01E13A002M	34015	317	Intermediate	79.34	65	**54**	14	12	12	67	-53	**-42**	Irrigation	100% Historic	**-20 feet**	-3
B-11	18N01E15D002M	16376	112	Very Shallow	72.35	79	**59**	-7	7	7	65	-72	**-52**	Residential	100% Historic	**-20 feet**	3
B-12	18N01W02E003M	25507	200	Shallow	78.50	60	**50**	19	19	19	60	-41	**-31**	Observation	100% Historic	**-20 feet**	0
B-13	18N01W14B001M	16377	204	Shallow	72.38	73	**58**	-1	26	26	46	-47	**-32**	Irrigation	100% Historic	**-20 feet**	-9
B-14	18N01W17G001M	40068	108	Very Shallow	81.39	52	**47**	29	21	21	60	-31	**-26**	Irrigation	100% Historic	**-20 feet**	0
B-15	18N01W22L001M	16378	147	Shallow	72.39	57	**50**	15	17	17	55	-40	**-33**	Irrigation	100% Historic	**-20 feet**	0
B-16	18N02E16F001M	16382	80	Very Shallow	82.32	39	39	43	13	13	69	-26	-26	Irrigation	-10 feet	-10 feet	-12
B-17	18N02E25M001M	16383	220	Shallow	89.30	58	58	31	18	18	71	-40	-40	Irrigation	100% Historic	100% Historic	-12
B-18	18N03E08B003M	32764	463	Intermediate	112.30	59	59	53	29	29	83	-30	-30	Irrigation	-10 feet	-10 feet	-12
B-19	18N03E18F001M	16916	462	Shallow	99.80	44	44	56	14	14	86	-30	-30	Irrigation	100% Historic	100% Historic	-20
B-20	18N03E21G001M	16917	125	Very Shallow	106.28	50	50	56	31	31	75	-19	-19	Irrigation	-10 feet	-10 feet	-15
B-21	19N01E09Q001M	19780	200	Shallow	92.36	45	**42**	47	11	11	81	-34	**-31**	Irrigation	100% Historic	**-20 feet**	-5
B-22	19N01E27Q001M	19782	548	Intermediate	87.35	54	**47**	33	9	9	78	-45	**-38**	Observation	100% Historic	**-20 feet**	4
B-23	19N01E35B001M	23978	156.7	Shallow	86.50	35	35	52	4	4	83	-31	-31	Observation	-20 feet	-20 feet	0
B-24	19N01W15D002M	**50096**	300	Intermediate	91.00	54	**?**	37	25	25	66	-29	**?**	Residential	-20 feet	**?**	**?**
B-25	19N01W22D007M	24498	120	Very Shallow	87.38	54	**50**	33	20	20	67	-34	**-30**	Observation	100% Historic	**-20 feet**	-7
B-26	19N01W27R001M	19786	465	Very Shallow	83.38	86	**65**	-3	33	33	50	-53	**-32**	Irrigation	100% Historic	**-20 feet**	-10
B-27	19N02E07K004M	24324	192	Shallow	102.70	35	35	68	5	5	98	-30	-30	Observation	-20 feet	-20 feet	0
B-28	19N02E13Q001M	23979	221	Shallow	119.88	32	32	88	5	5	115	-27	-27	Observation	-20 feet	-20 feet	5
B-29	19N03E05N002M	34319	180	Very Shallow	142.31	98	**77**	44	37	37	105	-61	**-40**	Residential	100% Historic	**-20 feet**	-20
B-30	20N01E18L003M	23981	173	Very Shallow	107.35	28	28	79	5	5	102	-23	-23	Observation	-20 feet	-20 feet	5
B-31	20N01E35C001M	16135	92	Very Shallow	102.35	34	34	68	6	6	96	-28	-28	Residential	-20 feet	-20 feet	0
B-32	20N01W11N002M	24713	170	Shallow	107.37	54	**50**	53	22	22	85	-32	**-28**	Stockwatering	100% Historic	**-20 feet**	0
B-33	20N02E15H001M	16151	180	Shallow	144.01	103	**78**	41	44	44	100	-59	-34	Observation	100% Historic?	-20 feet	0
B-34	20N02E16P001M	16285	466	Intermediate	131.83	116	**80**	16	30	30	102	-86	**-50**	Irrigation	100% Historic	**-20 feet**	0
B-35	20N02E28N001M	35611	277	Intermediate	123.43	49	49	74	12	12	111	-37	-37	Other	100% Historic	100% Historic	5
B-36	21N01E08K002M	19253	181.2	Very Shallow	146.04	109	**79**	37	49	49	97	-60	**-30**	Irrigation	100% Historic	**-20 feet**	0
B-37	21N01W11A002M	24975	200	Shallow	129.30	38	38	91	15	15	114	-23	-23	Observation	-20 feet	-20 feet	3
B-38	21N01W13J003M	48992	400	Intermediate	127.68	70	**60**	58	25	25	103	-45	**-35**	Observation	100% Historic	**-20 feet**	0
B-39	21N01W23J001M	19739	54	Very Shallow	121.36	67	**54**	54	23	23	98	-44	**-31**	Irrigation	100% Historic	**-20 feet**	0
B-40	21N01W35K002M	21221	270	Shallow	114.36	41	41	73	18	18	96	-23	-23	Irrigation	-20 feet	-20 feet	0
B-41	22N01E32E004M	19363	160	Shallow	150.94	73	73	78	39	39	112	-34	-34	Residential	Shallowest 7%	Shallowest 7%	0
	* Value **Bolded** when the differ from Table 4-1 value.																
	** Value **Bolded** when the differ from Figure 4-1 value.																

Table modified after Draft Butte GSP Table 4-1 and other information in the GSP



2271 ***Figure 3-1. Primary Aquifer Representative Groundwater Level Monitoring Network***
2272

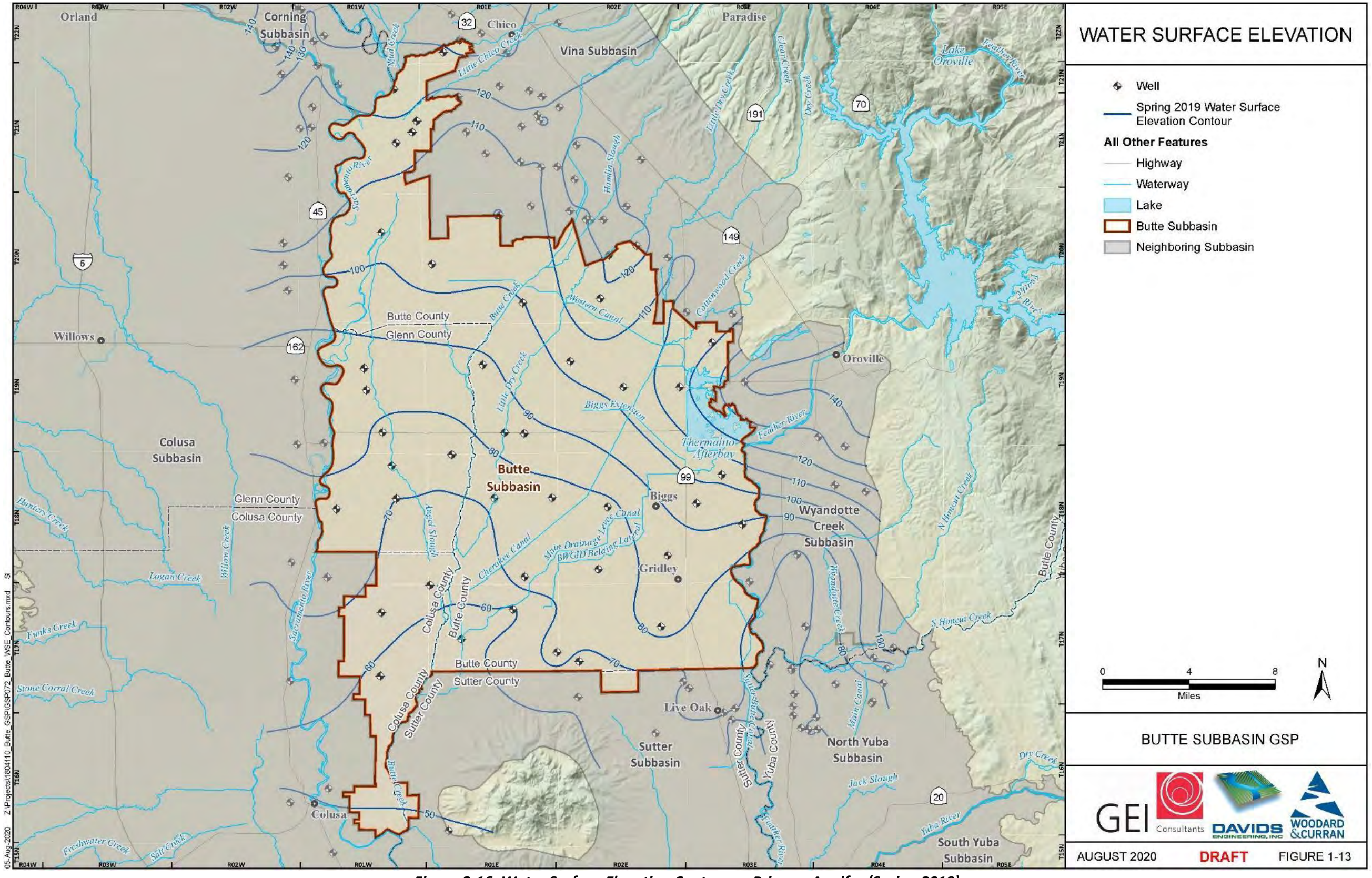


Figure 2-16. Water Surface Elevation Contours – Primary Aquifer (Spring 2019)

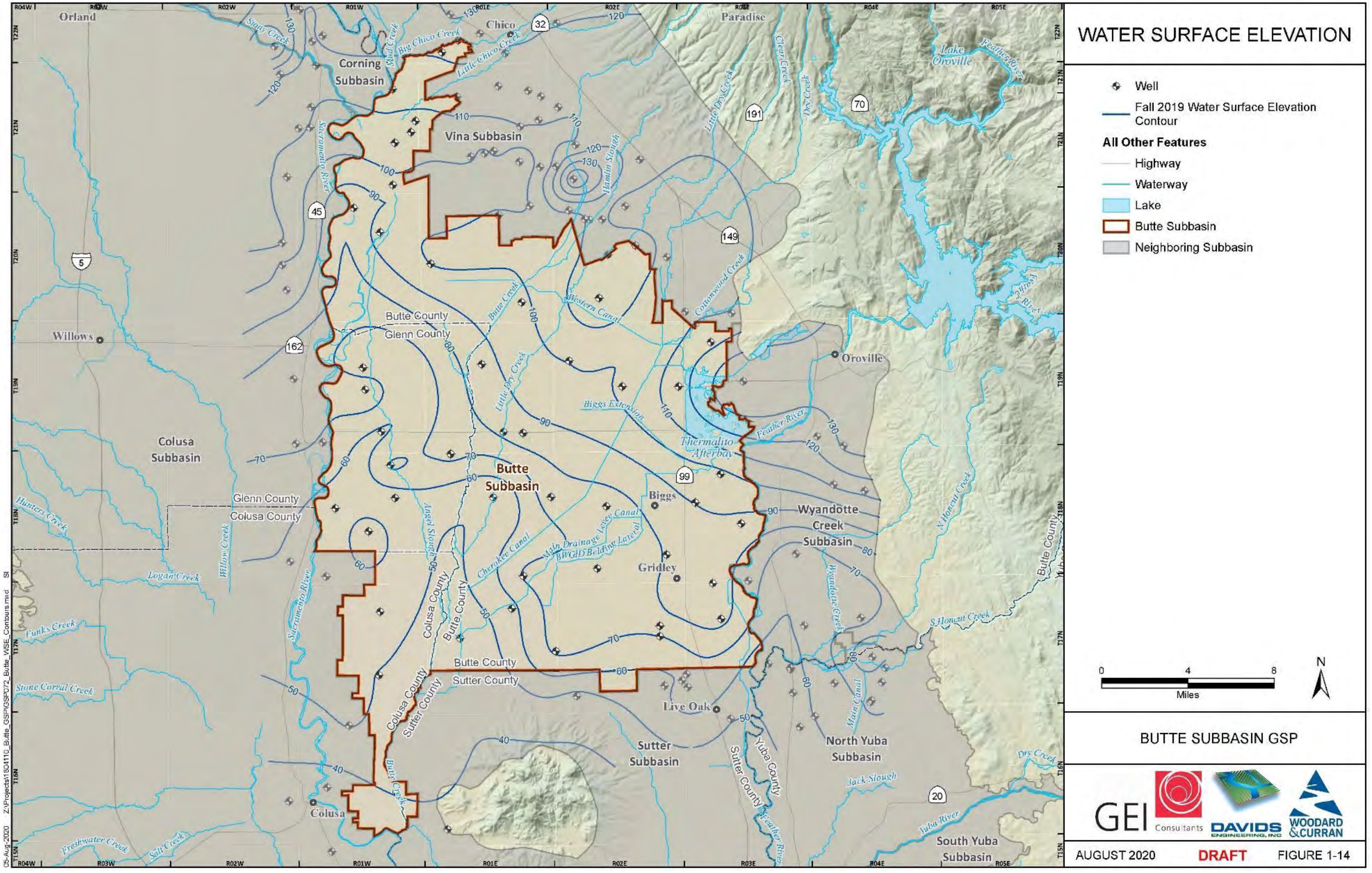


Figure 2-17. Water Surface Elevation Contours – Primary Aquifer (Fall 2019)

Groundwater Elevation Difference in Butte and Colusa GSP Monitoring Wells

West to East Across Sacramento River

Colusa GSP MW SWN	Colusa GSP MT GWE, ft amsl		Butte GSP MW SWN	Butte GSP MT GWE, ft amsl		GWE Difference, Butte GSP - Colusa GSP, ft
21N02W01F001	71		21N01W11A002M	91		20
21N02W36A002	24		21N01W23J001M	54		30
20N02W11A001	49		21N01W35K002M	73		24
20N02W18R005	29		20N01W11N002M	53		24
20N02W25F001	37					16
20N02W33B001	31					22
19N02W08Q001	12		19N01W15D002M	37		25
			19N01W22D007M	33		21
19N02W33K001	21		19N01W27R001M	-3		-24
			18N01W02E003M	19		-2
18N02W36B001	-3		18N01W17G001M	29		32
			18N01W22L001M	15		18
17N02W09H002	-52		17N01E06D001M	28		80
17N02W09H002	-52		17N01W10A004M	26		78
17N02W30J002	-119					145
16N02W05B001	-71		17N01W27A003M	24		95
17N02W30J002	-119					143

Audubon | CALIFORNIA

November 9, 2021

Colusa Groundwater Authority
Glenn Groundwater Authority
RE: Colusa Subbasin GSP
1213 Market Street
Colusa CA 95932

Sent via email to: mfahey@countyofcolusa.com

Re: Comments on the Draft Groundwater Sustainability Plan for the Colusa Subbasin

To Colusa Groundwater Authority and Glenn Groundwater Authority,

Audubon California appreciates the opportunity to provide public comment on the draft Colusa Subbasin Groundwater Sustainability Plan (GSP) prepared by the Colusa Groundwater Authority (CGA) and Glenn Groundwater Authority (GGA), collectively referred to hereafter as the "Colusa GSAs." Audubon California is a statewide nonprofit organization with a mission to protect birds and the places they need. Our organization has a long history of solutions-focused work in the Central Valley in collaboration with state and federal agencies, water districts, non-profits, and landowners. Audubon is reviewing draft GSPs as a stakeholder for the environment with a particular focus on managed wetlands. We are commenting on draft GSPs to provide technical assistance to Groundwater Sustainability Agencies (GSAs) to improve their GSPs prior to the deadline to submit final GSPs to the Department of Water Resources in January 2022. Audubon would also like to identify areas of opportunity to partner with landowners and GSAs to provide groundwater and wildlife habitat benefits in the implementation of the Sustainable Groundwater Management Act (SGMA).

Over 90 percent of historic wetlands in the Central Valley have been replaced with agriculture or urban development. Disconnected from natural water sources as a consequence of surface water diversions and groundwater over-pumping, wetland landowners must utilize surface water deliveries or pump groundwater to provide flooded habitat. But managed wetlands provide outsized public trust benefits for their minor water use.

The remaining wetlands in the Central Valley are a critical component of the Pacific Flyway, supporting millions of migratory waterfowl, hundreds of thousands of shorebirds, and state listed species like the Tricolored Blackbird. Central Valley managed wetlands are part of California's commitment to national and international Pacific Flyway agreements and provide significant public trust benefits, including habitat for migratory birds, recharge of overdrafted aquifers, carbon sequestration, and recreation opportunities for birders, hunters, and disadvantaged communities.

As recognized by the Colusa GSAs, managed wetlands require specific consideration in GSPs under SGMA statute and regulations, as detailed below. GSAs are required to identify managed wetlands as beneficial users of groundwater and as land uses and property interests and should recognize this land use consistent with other active users of surface and groundwater. The overall basin water budget must

include managed wetlands as a specific water use sector and the GSP is required to consider the effects of the GSP on managed wetlands as a beneficial user or land use.

When GSPs fail to adequately consider the water needs and recharge contributions of managed wetlands, projects and management actions may ignore managed wetlands, their need for protection as public trust resources, and their potential to be part of sustainability solutions. If future actions include groundwater allocations, managed wetlands face the potential of being excluded if not recognized in the GSP, risking further loss in critical wetland acreage.

SGMA Requirements Related to Managed Wetlands

A primary requirement for GSAs during GSP development is the consideration of the interests of "all beneficial uses and users of groundwater" [Water Code Section 10723.2], which includes "[e]nvironmental users of groundwater" [Water Code Section 10723.2(e)].

Articulated into the SGMA regulations, the concept of beneficial uses and users of groundwater is first represented in CCR, Title 23, Section 354.10. Notice and Communication, which directs the GSP to "…include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following: (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." [emphasis added].

Furthermore, the SGMA regulations provide a definition that explicitly includes managed wetlands as a beneficial user where:

> "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." CCR, Title 23, Section 351(al) [emphasis added].

GSAs are then directed to include all water user sectors in the description of the GSP area and to quantify groundwater use by these sectors in the historic, current and projected budgets [emphasis added]:

> CCR §354.8. Description of Plan Area: 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:
>
> (4) Existing land use designations and the identification of water use sector and water source type.
>
> and,
>
> CCR §354.18. Water Budget:
>
> (b) The water budget shall quantify the following, either through direct measurements or estimates based on data:
>
> (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow.

Given these explicit requirements, GSAs are required to identify and map managed wetlands and include their water needs in water budgets in the GSP.

Furthermore, each GSP is also required to describe "undesirable results" where such included:

> "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." CCR, Title 23, Section 354.26(b)(3) [emphasis added]

Comment Overview

In reviewing this draft GSP, we applaud the Colusa GSAs for their proactive effort to include managed wetlands throughout the GSP. As a result, our comments are limited and summarized as follows:

1. Identification of managed wetlands: Audubon appreciates that the GSA has identified and specifically included managed wetlands in maps and water budgets, specifically the three primary refuges: Sacramento National Wildlife Refuge, Delevan National Wildlife Refuge, and Colusa National Wildlife Refuge.
2. Water budget: Audubon appreciates the specific inclusion of managed wetlands into the water budgets (e.g. Table 3-11). However, the future condition water budgets should reflect CVPIA Full Level 4 water supplies being available and delivered to each of the three national wildlife refuges. The use of 2013 to represent unconstrained delivery conditions (e.g. see GSP Table 3-9, page 3-88) reflects deliveries to these refuges that are less than the CVPIA Full Level 4 mandated quantities. Annual Full Level 4 water supplies during unconstrained conditions are as follows:
    a. Sacramento NWR = 50,000 acre-feet,
    b. Delevan NWR = 30,000 acre-feet, and
    c. Colusa NWR = 25,000 acre-feet.

    During constrained conditions, these same refuges generally are provided 75% of this quantity, as stipulated in their water delivery agreements with the U.S. Bureau of Reclamation.
3. Consideration of managed wetlands: Audubon appreciates that several of the listed projects included in Table 6-2 include identified opportunities for multi-benefit projects that provide water supply and wildlife habitat benefits.

Draft Groundwater Sustainability Plan Page-by-Page Comments

Additional page-by-page comments on the Colusa GSAs' draft GSP are detailed below. We welcome any follow up questions and look forward to seeing the issues raised below addressed in the final GSP submission in January 2022.

> Figure 2-8: Suggest modifying the color scheme or naming for the category "native" to distinguish the refuges from other "native" areas as the refuges are distinctly different land uses than the traditional native upland areas, for instance, in the southwestern portion of the subbasin. Private managed wetlands and managed wetlands in U.S. Fish and Wildlife Service Management Areas that have federal easements are currently not identified in land use or jurisdictional maps.
>
> Table 2-3, page 2-11: Since the three national wildlife refuges are mandated to receive stipulated quantities (though have yet to achieve them), this table should also list the CVPIA Full Level 4 quantities of: Sacramento NWR = 50,000 acre-feet, Delevan NWR = 30,000 acre-feet, and Colusa NWR = 25,000 acre-feet. While the historic average deliveries are useful for baseline understanding, modeling of future conditions should include the full water supplies for these three refuges.

Page 3-13, line 32/33: The term "land" should be added to the end of the sentence to result in "federal wildlife land."

Table 3-9, page 3-88: The future condition water supplies for the three national wildlife refuges should reflect the CVPIA Full Level 4 water supply. Deliveries in 2013, represented as a Shasta Non-critical year, did not result in Full Level 4 deliveries to these refuges. The CVPIA Full Level 4 quantities include a portion that is labeled "Level 2" that reflects delivery of CVP project water, and a portion labeled "Incremental Level 4" (the difference between Full Level 4 and Level 2) that can come from other sources. The GSP will need to make reasonable assumptions whether the Incremental Level 2 supply will be derived from other surface water sources or from groundwater, though either is possible.

Section 3.3.3.1 Historical (Water Budget), page 3-89: Under "Agricultural Water Demand" the following sentence is included: "*For ponded land uses (rice and managed wetlands), pond depths and pond drainage are also considered to simulate demands*." Under the "Current Conditions" (Section 3.3.3.2) and "Future Conditions Scenarios" (Section 3.3.3.3) water budget discussions, this same language is missing. Did these budgets recognize managed wetlands in a similar fashion as described for the historical budget? If so, we suggest adding the same sentence to each of the other water budget descriptions for clarity.

Table 3-11, page 3-96: As a result of including the CVPIA Full Level 4 water supplies for the national wildlife refuges, the values for the various future conditions for "Sacramento River Diversions" and "Groundwater Pumping – Managed Wetlands" as well as the "Evapotranspiration – Managed Wetlands" may all change. The table should be updated accordingly.

Table 3-12, page 3-97: Similar to the prior comment, values in this table for the future conditions would be expected to change when the CVPIA Full Level 4 water supply quantities are incorporated.

Section 6.5.2.3, page 6-84 to 6-86: Several demand reduction concepts are initially outlined in this section. Audubon suggests the following be considered associated with each suggested method:

1. Allocation: Use of groundwater by managed wetlands should not be restricted without adequate replacement with surface water sources, especially the national wildlife refuges. Managed wetlands in the Colusa subbasin provide invaluable benefits to the Pacific Flyway.
2. Allocation with a market: If a market is created and managed wetlands are assigned an allocation, such parcels should be able to participate in a market to optimize the use of their allocations for achieving habitat objectives, but managed wetlands should not be required to participate in a market to secure the water they need.
3. Land repurposing: Strategic siting of where irrigated lands are retired and others are kept in production should consider the potential benefits to wildlife. Areas surrounding protected areas, such as the Sacramento, Delevan and Colusa National Wildlife Refuges, should be prioritized habitat benefits.
4. Financial incentives: Public beneficial uses such as managed wetlands should not be subject to financial conditions that lesson the public benefit otherwise achieved on the lands.

Thank you for your consideration of Audubon California's comments. If you would like to discuss this matter further, please do not hesitate to contact me at (916) 737-5707 or via email at samantha.arthur@audubon.org.

Sincerely,

Samantha Arthur
Working Lands Program Director
Audubon California

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October 26, 2021

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Subject: CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE COMMENTS ON THE COLUSA SUBBASIN DRAFT GROUNDWATER SUSTAINABILITY PLAN

Dear Ms. Fahey and Ms. Hunter:

The California Department of Fish and Wildlife (Department) appreciates the opportunity to provide comments on the Colusa Subbasin Draft Groundwater Sustainability Plan (GSP) prepared by the Colusa Groundwater Authority Groundwater Sustainability Agency (GSA) and Glenn Groundwater Authority GSA pursuant to the Sustainable Groundwater Management Act (SGMA). The Basin is designated as high priority under SGMA and must be managed under a GSP by January 31, 2022.

The Department is writing to support ecosystem preservation and enhancement in compliance with SGMA and its implementing regulations based on Department expertise and best available information and science. 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, species, and public trust resources depend on groundwater and interconnected surface waters (ISWs), 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 GSPs:

- GSPs must **consider impacts to groundwater dependent ecosystems** (GDEs) (Water Code § 10727.4(l); see also 23 CCR § 354.16(g));
- GSPs must consider the interests of all beneficial uses and users of groundwater, including environmental users of groundwater (Water Code §

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10723.2) and GSPs 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));

- GSPs 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
- GSPs 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)).

Furthermore, the Public Trust Doctrine imposes a related but distinct obligation to consider how groundwater management affects public trust resources, including navigable surface waters and fisheries. Groundwater hydrologically connected to surface waters is also subject to the Public Trust Doctrine to the extent that groundwater extractions or diversions affect or may affect public trust uses. (*Environmental Law Foundation v. State Water Resources Control Board* (2018), 26 Cal. App. 5th 844; *National Audubon Society v. Superior Court* (1983), 33 Cal. 3d 419.) The GSA has "an affirmative duty to take the public trust into account in the planning and allocation of water resources, and to protect public trust uses whenever feasible." (*National Audubon Society*, *supra*, 33 Cal. 3d at 446.) Accordingly, groundwater plans should consider potential impacts to and appropriate protections for ISWs and their tributaries, and ISWs that support fisheries, including the level of groundwater contribution to those waters.

In the context of SGMA statutes and regulations, and Public Trust Doctrine considerations, groundwater planning should carefully consider and protect environmental beneficial uses and users of groundwater, including fish and wildlife and their habitats, GDEs, and ISWs.

The Department recognizes and appreciates the effort of the GSAs to characterize current and projected groundwater conditions through detailed modeling. However, the Department believes the GSP could improve its considerations of environmental users of groundwater and establish more protective management criteria. The Department is providing additional comments and recommendations in Attachment A.

If have any questions related to the Departments comments and/or recommendations on the Colusa Subbasin Draft GSP please contact Bridget Gibbons, Environmental Scientist, at bridget.gibbons@wildlife.ca.gov.

Sincerely,

DocuSigned by:
Kevin Thomas
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Kevin Thomas
Regional Manager, North Central Region

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Enclosures (Attachments A, B)

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Attachment A

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE COMMENTS ON THE COLUSA SUBBASIN DRAFT GROUNDWATER SUSTAINABILITY PLAN

COMMENTS AND RECOMMENDATIONS

The Department's comments are as follows:

1. **Comment #1** – **Interconnected Surface Water Systems** (3.2.7 Interconnected Surface Waters; starting page 3-77): The GSP does not include sufficient detail describing the timing of depletions of interconnected surface water (ISW).
    a. Issue: Though the GSP discusses annual gains and losses from interconnected surface waters in the subbasin and summarizes net gains by water year type (Table 3-6, page 3-79), the GSP does not include sufficient detail on the timing of depletions as required by 23 CCR § 354.16(f). In order to adequately assess ISW that may be gaining or losing at different times of the year, it is preferential to present net gain/loss values by month, rather than by year. Quantifying depletions by month for each reach will facilitate evaluation of impacts or benefits to environmental beneficial users that rely on surface waters during specific portions of the year.
    b. Recommendation: The Department recommends including net gains or losses to interconnected surface waters by month, rather than by year.

2. **Comment #2** – **Groundwater Dependent Ecosystems** (3.2.8 Groundwater Dependent Ecosystems; starting page 3-82): Groundwater dependent ecosystem (GDE) identification, required by 23 CCR § 354.16(g), is based on methods that risk exclusion of ecosystems that may depend on groundwater.
    a. Issues:
        i. <u>GDE Scoring Criteria:</u> The GSP assigns a rank of '1' (less likely to be a GDE) to '4' (more likely to be a GDE) to potential GDE areas within the Natural Communities Commonly Associated with Groundwater dataset. It is unclear how the rankings are utilized throughout the remainder of the GSP to assess monitoring networks, management criteria, or potential projects. Accordingly, the ranking system has no apparent actionable groundwater management relevance.
        ii. <u>Depth to Groundwater Threshold</u>: The GSP relies on a groundwater level threshold of 30-feet below the ground surface (bgs) to screen potential GDEs within the subbasin. However, mature Valley Oak

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(*Quercus lobata*) can access groundwater up to 80 feet bgs (Howard 1992, Lewis & Burgy 1964). The use of a 30-foot threshold may incorrectly result in Valley Oak communities receiving a GSP-imposed score of '1,' indicating that they are least likely to be a GDE.

iii. GDEs Near Surface Water: The GSP assesses whether potential GDE areas are located near surface waters or irrigated cropland, or both. The GSP considers potential GDE areas within 150 feet of surface waters, within 150 feet of irrigated rice paddies, and within 50 feet of other irrigated croplands to have access to surface water; and therefore, the GSP assigns these areas a score of '2' or '3,' indicating they are less likely to be groundwater dependent. The GSP states that "GDEs include vegetation and habitat that are wholly dependent on groundwater" (line 9, page 3-83); however, this narrow definition of a GDE disregards a GDE's adaptability and opportunistic approach to accessing water in which vegetation and ISW may rely on *both* surface water and groundwater across seasons and years. Furthermore, this GDE definition contradicts an earlier description of GDEs within the GSP, in which the plan states that "a GDE's dependence on groundwater refers to reliance of GDE species and/or communities on groundwater for all *or a portion of* their water needs" (line 3, page 3-82). Particularly as the GDE areas receiving scores of '2' or '3' have already been determined to be located in areas with depths to groundwater of less than 30 feet, proximity to potential surface waters is insufficient evidence to categorize them as 'less likely' to be GDEs.

iv. Data Gaps: The GSP states that there is potential for GDEs to be present in the uplands west of Orland and west of Arbuckle, but that groundwater level data is lacking in these areas and there is insufficient information "to determine their existence" (line 26, page 3-83). Rather than waiting an indeterminate amount of time to gather data to prove groundwater dependence of potential GDE areas and leaving the potential GDEs unclassified in the interim, the GSP should conservatively consider these areas to be GDEs until sufficient data is collected that proves otherwise.

v. Special Status Species: SGMA defines GDEs as ecological communities *or species* that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface [23 CCR § 351 (m)]. The GSP does not identify or discuss species that may be present within the subbasin that rely on groundwater,

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groundwater dependent ecosystems, or interconnected surface waters.

b. Recommendations:
    i. GDE Scoring Criteria: The GSP should clarify how the ranking system is meaningfully used in relationship to groundwater management criteria. Specifically, the GSP should clarify what GDE areas are retained for further analysis in the plan as environmental beneficial users of groundwater and how likely GDEs may be impacted by management criteria, including identification of potential undesirable results.
    ii. Depth to Groundwater Threshold: The Department recommends the GSP update the methodology for classifying GDEs to reflect accurate maximum potential rooting depth for Valley Oak communities. For areas of Valley Oak within the subbasin, the Department recommends the GSP apply a threshold of 80 feet bgs as the maximum depth at which the potential GDE could access groundwater. The Department accepts the use of a 30-foot threshold for other potential GDE areas within the subbasin that do not contain Valley Oak.
    iii. GDEs Near Surface Water: The Department recommends that the GSP err on the side of inclusivity of potential GDEs until there is site specific evidence that the overlying ecosystem has no significant dependence on groundwater across seasons and water year types.
    iv. Data Gaps: The GSP should conservatively assume that potential GDEs located in areas with poor groundwater level data availability are groundwater dependent, until such time that data is collected that demonstrates otherwise.
    v. Special Status Species: The Department recommends the GSP include a list of special status species that may be present within the Colusa Subbasin and an assessment of each species' likely groundwater dependence. The GSP should also include a spatial assessment of special status species within the subbasin to characterize which surface waters or GDE areas provide these species habitat or forage; this level of GDE-species-relationship assessment enables GSAs to prioritize GDE monitoring and management decisions.

3. **Comment #3** – **Monitoring Networks** (4.2.5.4 Representative Surface Water Depletion Monitoring Network; starting page 4-33): The GSP should include