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SB 552 DROUGHT RESILIENCY PLAN
FY24/25 REPORT

PREPARED FOR

TEHAMA COUNTY

PREPARED BY

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LIST OF ACRONYMS AND ABBREVIATIONS

Acronym	Meaning
AWWA	American Water Works Association
bgs	below ground surface
CALFED	CALFED Bay-Delta Program
CCRCD	Colusa County Resource Conservation District
CDAG	County Drought Advisory Group
Cfs	Cubic feet per second
County	County of Tehama
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
Drought Plan, Plan	Tehama County Drought Resiliency Plan
DWR	California Department of Water Resources
DWSRF	California Drinking Water State Revolving Fund
EHD	Environmental Health Department
EWA	Environmental Water Account
FAAST	Financial Assistance Application Submittal Tool
FCWCD	Tehama County Flood Control and Water Conservation District
GCID	Glenn Colusa Irrigation District
GIS	Geographic Information Systems
GMP	Groundwater Management Plan
GSA	Groundwater Sustainability Agency

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Acronym	Meaning
GSP	Groundwater Sustainability Plan
GWLive	California's Groundwater Live Website
IRWM	Integrated Regional Water Management
IRWMP	Integrated Regional Water Management Plan
JPA	Joint Powers Agreement
LHMP	Local Hazard Mitigation Plan
MCL	Maximum Contaminant Level
MT	Management threshold
NCWA	Northern California Water Association
O&M	Operation and Maintenance
OSWCR	Online System of Well Completion Reports
RC	Risk Component
RD 2047	Reclamation District 2047
Regional Plan	Integrated Regional Water Management Plan for the Sacramento Valley
Risk Explorer Tool	Drought and Water Shortage Risk Explorer Tool for Self-Supplied Communities
ROD	Record of Decision
SAFER	Safe and Affordable Funding for Equity and Resilience
SB 552	Senate Bill 552, Drought Planning for Small Water Suppliers and Rural Communities
SGMA	Sustainable Groundwater Management Act
SWRCB	State Water Resource Control Board
TCCA	Tehama Colusa Canal Authority
TMF	technical, managerial, and financial
USBR	U.S. Bureau of Reclamation
WCR	Well Completion Reports

1. INTRODUCTION AND BACKGROUND

This Tehama County Drought and Water Shortage Response Plan (Drought Plan) has been developed to satisfy the requirements of Senate Bill 552 (Drought Planning for Small Water Suppliers and Rural Communities, SB 552) and to prepare the County of Tehama (County) for future droughts and water shortages. This Drought Plan improves the County's preparedness for and resiliency to future drought in the following ways.

(1) The Plan explores the risk of water shortage for the County's self-supplied communities, including analysis of State data and local stakeholder feedback.

(2) The Plan considers opportunities to improve reliability through water system consolidations where feasible.

(3) The Plan includes an implementation plan, including monitoring protocols the County will use to detect water shortages, and interim long-term solutions for state small water systems and domestic wells within the County, to achieve Plan goals and objectives.

(4) The Plan concludes with recommendations for additional policies and actions that can further improve the County's preparation for future drought cycles and water shortage conditions.

Overall, this Drought Plan allows the County to anticipate water shortages before they occur and respond proactively, reducing the risk of drought impacts throughout the County.

1.1. Legal Basis

In response to the historic and continued drought conditions California experienced from 2012 to 2016, the State Legislature implemented a series of legislative water initiatives designed to improve the drought planning and response processes for water providers and counties. There was a particular focus on small water suppliers and rural communities, which were identified as being more vulnerable to water shortages during drought cycles because they vary widely in supply source reliability, emergency source availability, and organizational capacity. In 2018, the California Department of Water Resources (DWR) organized a County Drought Advisory Group (CDAG) to identify small water suppliers and rural communities that are vulnerable to drought and water shortage conditions and developed policy recommendations that would improve drought preparedness through more proactive water shortage contingency planning. DWR subsequently submitted a recommendation report, Small Water Systems and Rural Communities Drought and Water Shortage Contingency Planning and Risk Assessment, to the Legislature and Governor Newsom in Spring 2021 as part of implementing the 2018 legislative package to make conservation a way of life. The CDAG recommendations were moved forward by DWR and became foundational recommendations that became the basis for SB 552 legislation (see **Appendix A**).

SB 552 amends California Water Code §10609.70 to include new drought planning requirements for counties, which this Drought Plan fulfills. The requirements are as follows:

a. Establish a standing county drought and water shortage task force or alternative process that facilitates drought and water shortage preparedness for state small water systems and domestic wells

b. Assess potential drought and water shortage risk

c. Provide emergency and interim drinking water solutions in the County's drought and water shortage risk mitigation plan (plan)

d. Consider consolidations for existing water systems and domestic wells in the plan

e. Consider domestic well drinking water mitigation programs in the plan

f. Consider an analysis of steps to implement the plan

g. Consider analysis of local, state, and federal funding sources available to implement the plan

Tehama County has already established a Drought Task Force working group (see **Appendix B**), which satisfies the requirement for a "standing county drought and water shortage task force or alternative" process. Drought preparedness and response actions are coordinated on an ongoing basis through regular meetings of the County's Drought Task Force; meetings will include guest speaker presentations, discussions with State and Federal agencies, local agency updates, and discussion of drought tools applied in the Central Valley. A list of the stakeholders included in the Drought Task Force is included in **Appendix B**. The remaining requirements of SB 552 are satisfied by this Drought Resiliency Plan.

The focus of the Drought Plan is on the County's smallest water systems – those with 14 or fewer connections and domestic wells. While other larger water systems also face drought-related risks, the Legislature has assigned water systems with 15 or more service connections the responsibility for completing their own drought planning efforts. In contrast, water systems with 14 or fewer connections and domestic well owners often lack the organizational capacity to complete their own drought planning process. The responsibility of drought planning for water suppliers of different sizes is illustrated in **Figure 1-1**. As shown on the right-hand side of the figure, SB 552 assigns the County responsibility to complete a Drought Plan for these smallest systems and domestic wells (also called Self-Supplied Communities or Rural Communities).

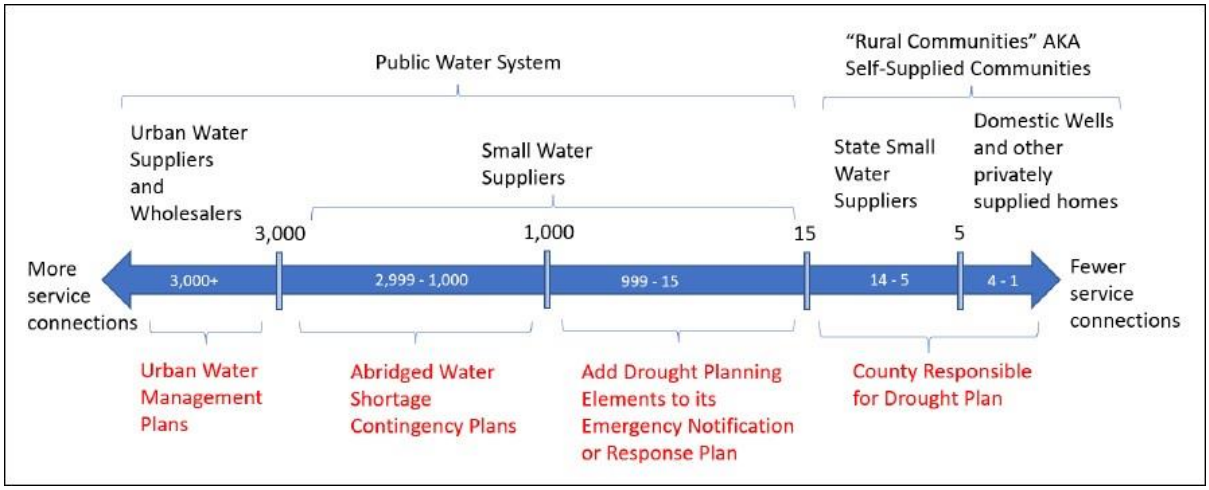


Figure 1-1. Drought Planning Responsibility by Number of Service Connections

Human Right to Water

California is one of the first states in the nation to legislatively recognize the human right to water. Through the passage of AB 685 and the subsequent amendment to Section 106.3 of the Water Code, "every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes." Importantly, the human right to water extends to all communities, including rural and disadvantaged individuals. Implementation requires sustained engagement at the regional and state levels. The SWRCB is making efforts to implement outreach programs and improve access to technical assistance providers, which is fundamental to ensure the human right to water for all Californians. Many of the programs and actions documented in this Drought Plan also advance the State's goal of protecting the human right to water.

1.2. Drought Planning in Tehama County

Several local agencies in Tehama County play a vital role in facilitating drought preparedness. These agencies include the Tehama County Environmental Health and Office of Emergency Services, the Tehama Groundwater Sustainability Agency (TGSA) formed under the Sustainable Groundwater Management Act (SGMA), the Tehama County Flood Control & Water Conservation District, the Tehama County Groundwater Commission, and the Tehama County Resource Conservation District.

The following Subbasins, managed by the TGSA, are in Tehama County:

- Antelope Subbasin
- Bend Subbasin
- Bowman Subbasin
- Corning Subbasin (Tehama County portion)
- Los Molinos Subbasin
- Red Bluff Subbasin
- South Battle Creek Subbasin

Numerous water resource agencies and districts oversee the provision and development of water supplies in Tehama County. These include the following agricultural water purveyors-entities, urban water purveyors, agencies with flood management responsibilities, and agencies with land use management responsibilities:

<u>Agricultural Water Purveyors-Entities</u>

- Tehama County Flood Control & Water Conservation District
- Tehama Colusa Canal Authority
- US Bureau of Reclamation
- US Army Corps of Engineers
- Individual Landowner Irrigation Wells
- Central Valley Flood Protection Board
- California Department of Water Resources
- Tehama County Resource Conservation District

Urban Water Purveyors

- City of Red Bluff
- City of Corning
- City of Tehama
- Rio Alto Water District
- Los Molinos Community Services District
- Gerber Las Flores Community Services District
- R-Wild Horse Ranch
- Mineral County Water District
- Rio Vista Mobile Home Park

Flood Management Agencies

- Tehama County Flood Control and Water Conservation District (FCWCD)
- Army Corps of Engineers
- California Department of Water Resources

Land Use and Resource Agencies

- Tehama County
- Tehama County Resource Conservation District

Other County agencies, such as Environmental Health, Planning, and Office of Emergency Services, and a number of urban areas and community-based organizations, have also played a key role in the County's water management and drought response efforts. During the recent historic 2012-2016 and 2020-2022 drought cycles, entities pulled together to provide dry well support and emergency water supply services to residents in the County, managing surface water cutbacks and the need for increased groundwater supplies to meet basic water uses.

While Tehama County has elected to prepare this Drought Plan as a stand-alone document, there are substantial opportunities for synergy with other County planning documents and efforts. This Drought Plan advances goals of the County's 2024 Local Hazard Mitigation Plan (LHMP), such as reducing drought/water shortage risk and vulnerability in Tehama County and developing a comprehensive, countywide water plan to provide for existing development to foster the preservation of the economic base and to guide future development opportunities within known water constraints. The conclusions of this Drought Plan can also help guide future planning efforts, such as Groundwater Sustainability Plan (GSP) updates, LHMP updates, Integrated Regional Water Management Plan (IRWMP) updates, and General Plan updates.

1.3. Stakeholder Engagement

Stakeholder engagement during the development of this Drought Plan was conducted primarily through the Tehama County Drought Task Force, which includes major stakeholder organizations involved in water management and drought-related issues in the County. During the latter portion of FY24/25, multiple presentations on the development of the Tehama County SB 552 compliant Drought Resiliency Plan were given during the regular recurring Drought Task Force Meetings or to other entities, including:

(1) 3.21.2024: Drought Task Force Meeting - Announcement of Plan Preparation and Invitation to Engage in Plan Development

(2) 6.06.2024: Drought Task Force Meeting – Discussion of risk factors and discussion of DWR grant funds to prepare Drought Resiliency Plan.

(3) 10.24.2024: Drought Task Force Meeting - Presentation regarding drought response actions and status of Drought Resiliency Plan development process.

(4) 3.12.2025: Discussion of Draft Drought Resiliency Plan elements with Groundwater Commission members.

(5) 6.10.2025: Presentation of Drought Resiliency Plan to the Board of Supervisors for review and approval.

(6) Website Updates: Provided throughout the project development process, with a primary SB 552 website page developed with links providing key documents and County organization dates as needed throughout the project duration.

(7) Member organizations of the Drought Task Force were encouraged to distribute meeting invitations and engagement materials to their membership (contact lists).

1.4. Plan Organization

The Tehama County Drought Plan is organized into the following sections:

Section 1 – Introduction and Background

Section 2 – Identification of Drought and Water Shortage Risk

Section 3 – Small System Consolidation Opportunities

Section 4 – Shortage Response Actions (Action Plan)

Section 5 – Conclusions and Recommendations

Definitions

Consistent with the definitions presented in DWR guidance literature and the California Water Code, terms used in this Drought Plan have the following meanings:

Community Water System – A public water system that serves at least 15 service connections used by yearlong residents or regularly serves at least 25 yearlong residents of the area served by the system, as defined in Section 116275 of the Health and Safety Code (Water Code §10609.51 subd. (a)).

Domestic Well – A groundwater well used to supply water for the domestic needs of an individual residence or a water system that is not a public water system and that has no more than four service connections, as defined in Section 116681 of the Health and Safety Code (Water Code §10609.51 subd. (k)).

Drought Risk Explorer – A map-based web tool developed by the Department of Water Resources to support drought resilience planning among rural communities.

Non-community Non-transient Water System – A public water system that is not a community water system and that regularly serves at least 25 of the same persons over 6 months per year, as defined in Section 116275 subd. (k) of the Health and Safety Code. An example of this includes a school (Water Code §10609.51 subd. (g)).

Public Water System – A system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily for at least 60 days out of the year (Health and Safety Code §116275 subd. (h)).

Rural Community – A community with fewer than 15 service connections or regularly serving less than 25 individuals daily at least 60 days out of the year, including domestic wells (Water Code §10609.51 subd. (j)). In other words, the rural community, according to this law, covers all water systems or domestic wells for human consumption that are not public water systems.

Self-supplied Community – A community with fewer than 15 service connections. For the purposes of this Drought Plan, a self-supplied community is defined as the same as a rural community.

Small Water System – A community water system serving 15 to 2,999 service connections, inclusive, and that provides less than 3,000 acre-feet of water annually (Water Code §10609.51 subd. (k)).

State Small Water System – A system for the provision of piped water to the public for human consumption that serves at least five, but not more than 14, service connections and does not regularly serve drinking water to more than an average of 25 individuals daily for more than 60 days out of the year as defined in Section 116275 (n) of the Health and Safety Code (Water Code §10609.51 subd. (m)). These systems are sometimes referred to as “State Smalls”.

Sustainable Groundwater Management Act – A three-bill legislative package passed in 2014 set forth a statewide framework to help protect groundwater resources over the long term. Groundwater Sustainability Agencies (GSAs) are responsible for adopting Groundwater Sustainability Plans (GSPs) to avoid undesirable results and mitigate overdraft within 20 years.

Urban Water Supplier – A supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than

3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers.

These terms may be used in this Drought Resiliency Report and, in reference, will assume the above-summarized definitions as specified in the SB 552 legislation.

2. IDENTIFYING DROUGHT AND SHORTAGE RISK FOR SELF-SUPPLIED COMMUNITIES

For Tehama County to prepare for future droughts and water shortages effectively and proactively in advance of when they occur, it is important to evaluate high-risk communities and what factors contribute to that risk. The County's risk evaluation focuses specifically on Self-Supplied Communities, which consist of State Small Water Systems (5-14 service connections) and domestic wells, and other privately supplied homes (4 or fewer connections). The Legislature has found that these Self-Supplied Communities are the most likely to rely on shallow domestic wells, the most susceptible to well failure when droughts occur, or groundwater levels drop from consistent over pumping, and the least likely to have access to alternative water supplies.

The Department of Water Resources (DWR), through a collaboration with other State agencies and stakeholders, developed the Drought and Water Shortage Risk Explorer Tool for Self-Supplied Communities (Risk Explorer Tool) to assist counties in performing risk assessments. DWR also administers California's Groundwater Live (GWLive) web interface, which provides additional information about current groundwater conditions and domestic well infrastructure. In addition, the SWRCB's Division of Drinking Water, Division of Financial Assistance, and Office of Public Participation work together to implement the Safe and Affordable Funding for Equity and Resilience (SAFER) program. The SAFER Mapping Tool illustrates the current failing Human Right to Water systems and the results of the Risk Assessment for state small water systems.

This section of the County's Drought Plan reviews the results of three tools (Risk Explorer Tool, GWLive, and SAFER), including a county-wide risk evaluation. It considers the factors most predictive of future water shortages. Section 2 concludes with a discussion of the tools' limitations and recommendations for incorporating their findings into the response action framework described in Section 4 of the Tehama County plan.

2.1. Tehama County Hydrology

Water supplied to Tehama County comes from two sources: groundwater and surface water. All domestic water systems in the County are supplied with groundwater, while most irrigation systems are supplied with surface water from the Tehama-Colusa Canal or the Sacramento River and groundwater. Tehama County is comprised of multiple groundwater subbasins: Antelope, Bowman, Corning, Los Molinos, and Red Bluff.

There are community water systems located in the larger cities such as Red Bluff, Corning, and Tehama. There are also numerous private groundwater wells located throughout the County that serve individual parcels throughout the unincorporated areas of the County.

As with most Sacramento Valley counties, Tehama County is subject to flooding problems in its poorly drained valley floor. Although Tehama County's foothill and upland areas generally do not experience severe flooding, drainage problems can occur in the western portion of the County. This section provides a background discussion of the regional hydrology, surface water bodies, seasonal and long-term hydrology, surface water supply contracts, flooding, drainage, and water quality in Tehama County, which lays the groundwork for when drought and water shortage conditions may occur as a focus for County drought planning and management activities.

2.1.1. Surface Water Bodies

The Sacramento River is the only major naturally occurring water body in Tehama County. There are smaller creeks throughout Tehama County that flow into the Sacramento River (e.g., Reeds Creek, Pine Creek, Elder Creek and Thomas Creek) (**Figure 2-1**). The Tehama-Colusa Canal is the major man-made water body in the County that supplies the majority of surface water for each subbasin. The following discussion provides information on these surface water features.

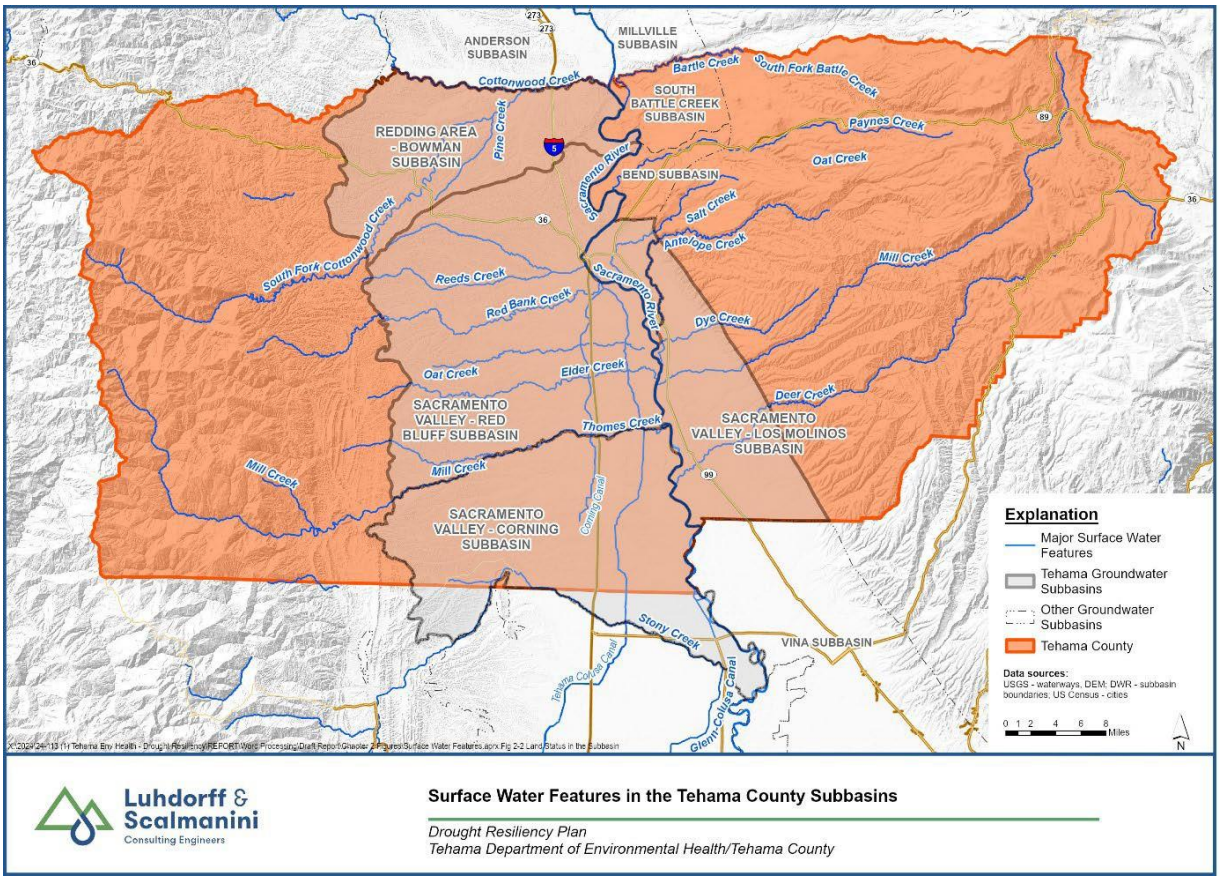


Figure 2-1. Surface Water Features

Sacramento River

The Sacramento River is the only major naturally occurring water body in Tehama County. It runs north-south through the central part of the County on its way to the Delta and San Francisco Bay. Many tributary streams flow from the mountains on both sides of the valley into the Sacramento River. To properly determine groundwater-surface water interaction, it is necessary to have nested monitoring wells located in close proximity to a stream gauge. The nested monitoring wells must be completed in the very shallow groundwater zone that is directly connected to a surface water system, as well as in the deeper zones. The existing well locations are not suitable for characterizing the stream/aquifer interaction. The Department of Water Resources Northern District has stated that existing data is inadequate to characterize the system (GMP, 2008).

Antelope Subbasin

The primary surface water features in the Antelope Subbasin are the Sacramento River, Antelope Creek, Salt Creek, Craig Creek, and New Creek. The flow of all these waterways occurs throughout the year (perennial). The Sacramento River flows southward along the western boundary of the Subbasin, while Antelope Creek flows southward along the eastern boundary. The New Creek and several other tributaries in the northern part of the Subbasin contribute flows to Salt Creek, which enters the Sacramento River about two miles downstream of the Red Bluff Diversion Dam. Craig Creek is a distributary channel flowing from Antelope Creek. It has a relatively small drainage area and enters the Sacramento River slightly downstream of where Salt Creek enters the Sacramento River. There are several intermittent or ephemeral streams in the Subbasin. These streams are tributaries of the Sacramento River and have a general flow direction of north to south. Several small seasonal ponds (surface area less than 10 acres) occur along streams, but there are no natural lakes or reservoirs within the Subbasin.

Bowman Subbasin

The primary surface water features in the Subbasin are the Sacramento River, Cottonwood Creek (including the South Fork), Little Dry Creek, Hooker Creek, Patterson Creek, and Pine Creek. The Sacramento River and Cottonwood Creek flow throughout the year (perennial), but the remaining streams flow seasonally. The Sacramento River flows southward along the eastern boundary of the Subbasin. The other streams flow northward, draining the Subbasin and feeding Cottonwood Creek. Cottonwood Creek flows eastward where it enters the Sacramento River at the eastern boundary. Several small seasonal ponds (surface area less than 10 acres) occur along streams, but there are no natural lakes or reservoirs within the Subbasin.

Corning Subbasin

The Sacramento River is a defining surface water body that forms the Subbasin's eastern boundary. The river provides surface water for irrigation for a portion of the Subbasin, mainly via the Red Bluff diversion to the Corning Canal. However, very little surface water is currently being used in the subbasin, and levels of use have been declining with a change in cropping types and the unreliable and increased cost of surface water. Available discharge measurements taken at a USGS streamflow gauge near Hamilton City (11383800) range from under 500 cubic feet per second (CFS) in the dry season (May-October) to over

15,000 CFS in the wet season (November-April). Total discharge is much higher during flood conditions, reaching well over 150,000 CFS.

The Sacramento River is generally connected to groundwater, with the direction and magnitude of flows depending on climatic conditions and local hydrogeology. The Sacramento River flows support agriculture and provide habitat for aquatic and groundwater-dependent ecosystems across the Northern Sacramento Valley. Stony Creek, which forms part of the Subbasin's southern boundary, is a typically perennial stream that flows eastward from Black Butte Lake to the Sacramento River. Runoff in Stony Creek peaks in the winter and is generally low in the summer, though flows are regulated by upstream storage in Black Butte Lake (Davids Engineering and West Yost, 2018) and releases from the Dam. Diversions on Stony Creek support agriculture in the southeastern subbasin and the Colusa subbasin to the south. Thomes Creek, which forms the Subbasin's northern boundary, flows eastward from the Coast Range foothills to the Sacramento River. Thomes Creek typically runs year-round in the western portion of the Subbasin but often runs dry roughly east of Henleyville during the summer months (VESTRA, 2006). Diversions on Thomes Creek support agriculture in the northern portion of the Subbasin and in the Red Bluff Subbasin. In addition to the major creeks and streams discussed above, numerous intermittent and ephemeral creeks flow eastward across the Subbasin in wet conditions. Flow in these streams typically occurs only during large storms or especially wet conditions; during normal conditions, these creeks generally do not contain flow. Due to their intermittent nature, these streams are not used as significant sources of water supply.

Surface water systems in the Corning Subbasin are generally connected to groundwater, either in losing or gaining conditions, depending on climatic conditions. Flow in the summer and fall is generally supported more by baseflow and less by stormflow, with the opposite relationship occurring in the winter and spring. The Subbasin's river and creeks generally support groundwater recharge, as they convey stormflow occurring at higher elevations into the Subbasin and support percolation into the Subbasin's aquifer system.

Canals and Reservoirs

Some of the agricultural water demand in the Corning Subbasin is supported by surface water deliveries, which pass through a system of canals, dams, and other surface water conveyance infrastructure. Black Butte Lake is a large surface water reservoir located in the southwestern portion of the Subbasin, formed via the damming of Stony Creek. Construction of the Black Butte Dam and Reservoir was finalized by the USACE in 1963, as part of a regional flood protection strategy.

This reservoir also functions as upstream storage and flow regulation for Stony Creek, with a total capacity estimated at 143,700 AF (CDM, 2003). The USACE manages releases in the winter for flood control, and the USBR manages releases in the growing season for irrigation source water for the Orland Project (Davids Engineering, 2017). The Tehama-Colusa Canal runs southward through the entire Subbasin, entering northeast of Corning and exiting northeast of Orland. The cement-lined canal originates north of the Subbasin at the Red Bluff Pumping Plant and Fish Screen on the Sacramento River near the City of Red Bluff and terminates southwest of Dunnigan in Yolo County. The Tehama-Colusa Canal provides only very limited surface water supplies in the Subbasin.

The Corning Canal likewise originates from the Sacramento River at the Red Bluff Pumping Plant and Fish Screen and flows southward into the Subbasin from the Red Bluff Subbasin to the north. The Corning Canal enters the Subbasin northwest of Corning and terminates near the center of the Subbasin, southwest of Corning. Operations and maintenance of the Tehama-Colusa Canal and the Corning Canal are handled by the Tehama-Colusa Canal Authority. Surface water supplies from the Corning Canal are utilized within the Corning Subbasin. The Glenn-Colusa Canal originates from a diversion of the Sacramento River near Hamilton City in the southeastern portion of the Subbasin and terminates south of the Subbasin near Williams in Colusa County. The Glenn-Colusa Canal is owned and operated by GCID, which provides water to agricultural users, protected federal wildlife areas, and private habitat land. The GCID also owns two groundwater production wells in the Subbasin adjacent to the Glenn-Colusa Canal to be utilized as a backup water source for export from the Subbasin during extreme drought or water shortages, such as in the 2012-2016 drought. The wells were not operated between 2016 and 2019. The Glenn-Colusa Canal does not supply water within the Corning Subbasin. The OUWUA Orland Project canals are the main channels of the OUWUA Northside and Southside area distribution systems. Both canals begin as diversions on lower Stony Creek and provide water for agricultural users. The Northside distribution system supplies water within the Corning Subbasin, while the Southern distribution system supplies water to OUWUA-managed areas in the Colusa Subbasin to the south.

Los Molinos Subbasin

The Los Molinos Subbasin contains several prominent perennial surface water bodies, including the Sacramento River, Dye Creek, Mill Creek, Deer Creek, Little Antelope Creek, and Antelope Creek, all of which contribute to year-round streamflow. The Sacramento River forms the western boundary of the Subbasin, receiving flow from major tributaries including Antelope Creek, Dye Creek, Mill Creek, and Deer Creek, each entering the river at distinct points. Additional intermittent or ephemeral streams, such as Champlin Slough, Delaney Slough, Brush Creek, and Wildcat Creek, also drain toward the Sacramento River. While seasonal ponds occur along these streams, there are no natural lakes or reservoirs within the Subbasin.

Surface water flow data in the Los Molinos Subbasin are limited to a few primary watercourses, though several perennial and intermittent streams traverse the region. The Sacramento River, Antelope Creek, Little Antelope Creek, Dye Creek, Mill Creek, and Deer Creek are the major perennial surface water features, flowing throughout the year. Additional seasonal or intermittent waterways include Champlin Slough, Delaney Slough, Wildcat Creek, Brush Creek, and other minor tributaries.

Flow monitoring data are available for the Sacramento River, Mill Creek, and Deer Creek. The Sacramento River exhibits a mean annual flow of approximately 12,300 cubic feet per second (CFS), with peak flows occurring between January and March (averaging over 18,600 CFS), and the lowest flows in October, averaging around 7,000 CFS. Mill Creek shows a mean annual flow of approximately 300 CFS, with peak flows in February and March (ranging from 375 to 470 CFS), and low flows in late summer (August and September), ranging between 13 and 112 CFS, depending on monitoring location. Deer Creek displays average annual flow rates of approximately 320 CFS, with peak flows between January and March (exceeding 325–610 CFS), and minimal flows in late summer (August–September), which typically fall to 20–96 CFS.

Red Bluff Subbasin

The Red Bluff Subbasin contains a network of significant surface water features, including the Sacramento River, Pine Creek, Reeds Creek, Red Bank Creek, Oat Creek, Elder Creek, Mill Creek, and Thomes Creek. Of these, only the Sacramento River and Thomes Creek are perennial, while the remaining streams exhibit seasonal flow. In addition to natural waterways, the Tehama, Colusa, and Corning Canals traverse the Subbasin, conveying diverted Sacramento River water from the Red Bluff Pumping Plant for agricultural use in Red Bluff, Corning, and the Colusa Subbasins. Numerous smaller streams and seasonal ponds (less than 10 acres in surface area) also contribute to localized hydrology, though there are no natural lakes or reservoirs within the Subbasin.

Surface water flow data in the Red Bluff Subbasin is limited, particularly for tributary streams, with the most consistent and long-term records available for the Sacramento River. Within the Subbasin, the Sacramento River and Thomes Creek exhibit perennial flow, while Elder Creek, Oat Creek, Red Bank Creek, Reeds Creek, and Pine Creek flow seasonally, with many becoming dry during the summer and early fall months.

The Sacramento River has a mean annual flow of approximately 12,500 cubic feet per second (CFS), with peak flows occurring from January to March (averaging over 16,000 CFS), and lowest flows in October (averaging around 7,000 CFS). This river serves as a major hydrologic feature along the Subbasin's eastern boundary and contributes significantly to groundwater recharge and regional hydrology.

Thomes Creek exhibits a mean annual flow of roughly 300 CFS, with flows exceeding 700 CFS in winter months (January and February) and dropping to less than 10 CFS in late summer. Historical data suggest that this creek typically ceases to flow between July and September. Elder Creek has a mean annual flow of around 170 CFS, with peak discharges during January and February (~250 CFS). During August and September, flows drop sharply, often to as low as 3 CFS. Historic observations from upstream locations confirm similar seasonal fluctuations, with little to no flow occurring between July and October in dry years. Red Bank Creek has historically shown mean annual flows of 60–70 CFS, with peak flows in January (averaging up to 285 CFS) and very limited flow during summer and early fall, commonly going dry between July and October.

Tehama Colusa Canal

The Tehama Colusa Canal receives water from the settling basin at Red Bluff Diversion Dam. Groundbreaking ceremonies for the canal took place on July 31, 1965. The canal is 110.9 miles long. It travels south from Red Bluff Diversion Dam through Tehama, Glenn, and Colusa Counties and into Yolo County and terminates about two miles south of Dunnigan, California. The initial capacity of the canal is 2,530 cubic feet per second, diminishing to 1,700 cubic feet per second at the terminus. The Tehama Colusa Canal System diverts water from the Sacramento River for use by various water districts across the region. The canal system is owned by the U.S. Bureau of Reclamation (USBR) and operated by the Tehama Colusa Canal Authority (TCCA). The dam at Red Bluff is owned and operated by USBR. Within this arrangement exists a network of release structures and pumps that frequently result in complex flow conditions in the canals and pipes that deliver water to the districts. The TCCA's mission statement is: "... to secure, protect, and develop dependable and affordable sources of water and to operate, maintain,

and improve the works essential to deliver such water." Operating two canal systems for the USBR (the Tehama Colusa Canal, 110 miles long, and the Corning Canal, 15 miles long), the combined system serves 17 water districts.

2.1.2. Seasonal and Long-term Hydrology

Climate has a direct impact on the availability of water in Tehama County. According to the data collected by the Western Regional Climate Center, the average annual precipitation is 15.64 inches per year, and the average snowfall is 0.5 inches per year (GMP, 2008). The annual average temperature is approximately 61°F, with an average high of 96.6°F in July and 36.1°F in January. Rainfall in the Sierra Nevada, Coast Range, and Cascade Mountains contribute to surface water flow and groundwater recharge in the Sacramento River Basin. The general direction of surface water flow is toward the center of the valley, flowing south. Water diversions, evaporation, and groundwater recharge reduce flows as the Sacramento River approaches the Delta. Peak flow typically occurs in the months of January through March, and minimum flow typically occurs from September through November (GMP, 2008).

2.1.3. Groundwater Supply Information

Tehama County is responsible for groundwater management programs and policies that impact all water users, communities, farmers, businesses, and other stakeholders. Below are some of the key policies in place that encourage groundwater management.

Ordinance 1617

An ordinance of the Board of Supervisors of the County of Tehama that repeals and reenacts the substantive provisions of Ordinances 1552 and 1553 to enhance local oversight of groundwater extraction, particularly for off-parcel use. It establishes a permitting system to govern groundwater use, prohibits groundwater "mining," and sets forth strict requirements for off-parcel extraction. It also defines key groundwater-related terms and enforces standards to prevent overdraft, saltwater intrusion, and adverse effects on aquifers. The permit process involves environmental review, agency coordination, public hearings, and ongoing annual evaluation. Violations are subject to criminal penalties, and the ordinance emphasizes severability to ensure continued enforcement. Overall, the ordinance strengthens groundwater management in Tehama County to safeguard long-term water availability and public welfare.

Ordinance 2006

An ordinance of the Board of Supervisors of the County of Tehama amending titles 9 and 10 of the Tehama County code to strengthen aquifer protection and regulate water wells in response to prolonged drought conditions and increased groundwater reliance. Key provisions include a requirement for permits before groundwater can be extracted for off-parcel use, and a prohibition on drilling non-agricultural wells on vacant parcels unless a permitted use or off-parcel use permit is in place. It also introduces requirements for idling dormant wells to prevent unauthorized extraction and potential contamination, declaring non-compliant wells as public nuisances subject to abatement. Administrative penalties for violations were increased, with fines reaching up to $1,000 per day for

unauthorized groundwater use. These changes aim to reduce groundwater waste, support lawful land uses, and protect Tehama County's long-term water supply.

Ordinance 2118

An ordinance of the Tehama County Flood Control and Water Conservation District Board of Directors establishing rules for the adoption of groundwater sustainability regulations under the authority of the Tehama County Flood Control and Water Conservation District, acting as the county's Groundwater Sustainability Agency. The ordinance outlines a structured, transparent process for regulation development, including public notification, comment periods, Commission review, and Board adoption. It allows for emergency regulations under specific conditions, provided they are justified and followed by public hearings within a defined timeframe. The ordinance ensures that regulations are regularly reviewed to align with the goal of maintaining sufficient groundwater for present and future beneficial uses. It also permits judicial review to determine regulatory validity. Through these rules, the ordinance reinforces local control, stakeholder involvement, and accountability in sustainable groundwater management across Tehama County.

Ordinance 2023-1

An ordinance of the Tehama County Flood Control and Water Conservation District Board of Directors establishing the Tehama County Groundwater Commission to advise on groundwater management in areas where the district serves as the Groundwater Sustainability Agency under the Sustainable Groundwater Management Act. The Commission consists of 11 members appointed by various local agencies and the District Board, with a focus on representing a range of stakeholders and technical expertise. Commissioners are tasked with advising on the development and implementation of Groundwater Sustainability Plans, reviewing grant opportunities, conducting investigations, and recommending enforcement actions. Meetings are held at least quarterly in compliance with the Brown Act, and members receive modest compensation and travel reimbursement. The ordinance emphasizes public representation, transparency, and collaborative groundwater governance across Tehama County's subbasins.

Tehama County Flood Control and Conservation District

The Tehama County Flood Control and Water Conservation District (TCFCWCD) is headed by the Board of Directors and was established under the 1957 Tehama County Flood Control and Water Conservation District Act. Its primary purpose is to manage storm and floodwater and to ensure the availability of water for various beneficial uses within Tehama County. These uses include irrigation, domestic consumption, fire protection, municipal, commercial, industrial, and recreational needs. It also serves as the Groundwater Sustainability Agency (GSA) for the Antelope, Bend, Bowman, Corning, Los Molinos, Red Bluff, and South Battle Creek subbasins within the county.

Tehama County Groundwater Management Plan

The Groundwater Management Plan was completed in 2008 and covers the entirety of Tehama County and contains various groundwater management goals; Basin Management Objectives, which are measurable parameters or criteria related to data that can be scientifically collected; an Action Program, which includes specific actions that will be implemented to manage groundwater resources and to

develop a better understanding of the groundwater resources; and a Groundwater Management Process, which should be followed in order to achieve the goals stated in the GMP. The GMP does not regulate the actions or procedures of water districts and non-county water providers within Tehama County.

Tehama County's groundwater management goals represent the overarching intent of the County regarding groundwater management. Basin Management Objectives and Management Actions must be consistent with the Groundwater Management Goals and must contribute to the achievement of the goals. Tehama County's goals for groundwater management (as developed with input from the public through Plan Advisory Committee meetings, workshops, and surveys) are to:

- Ensure a Reliable Water Supply
- Ensure Long-term Groundwater Sustainability
- Optimize Conjunctive Use of Surface Water and Groundwater
- Protect Water Rights
- Maintain Local Control
- Prevent Unnecessary Restrictions on Groundwater Use

Tehama County Sustainable Groundwater Management Act Compliance

In 2014, California enacted the Sustainable Groundwater Management Act (SGMA), which established the boundary conditions in Tehama County – this includes the 11 groundwater subbasins or subbasin portions shared with adjacent counties (e.g., the Corning Subbasin with Glenn County). In response, the Tehama County Flood Control and Water Conservation District was designated as the exclusive Groundwater Sustainability Agency (GSA) for the 11 groundwater subbasins within Tehama County in February 2016. The District formed the Groundwater Commission in November 2016 to assist in complying with SGMA regulations, such as developing Groundwater Sustainability Plans (GSPs) and the submittal of Annual Reports for these subbasins, including Bowman, Corning, Red Bluff, Antelope, and Los Molinos. Since the Corning Subbasin spans both Tehama and Glenn counties, the District collaborates with Glenn County agencies under a Memorandum of Understanding to develop a coordinated GSP.

GSPs assess groundwater conditions and outline strategies to avoid undesirable results such as groundwater level decline, water quality degradation, and land subsidence, as well as the submittal of Annual Reports. As of early 2025, the Department of Water Resources approved the revised GSPs for all Tehama County subbasins, marking full compliance with SGMA and setting a path toward groundwater sustainability by 2042.

Tehama County Resource Conservation District (TCRCD) East and West Watershed Management Plans

The TCRCD East and West Watershed Management Plans provide a foundation whereby resource concerns within Tehama County may be identified, studied, and addressed. The East and West Management Plans were completed in 2010 and 2008, respectively. While they do not specify fixed expiration dates, they intend to guide ongoing and future conservation efforts. The plans are designed to be adaptable, allowing for updates and revisions as new data emerges, funding becomes available, and

stakeholder priorities evolve. This approach ensures that the management strategies remain relevant and effective in addressing the dynamic environmental and resource challenges within the county. The TCRCD anticipates that water quality and quantity, vegetation resources, and fire and fuels management will remain priority concerns well into the timeframe of the East and West Watershed Management Plans.

The Tehama East Watershed Management Plan addresses the unique environmental and resource challenges of eastern Tehama County. The plan emphasizes the importance of protecting aquatic habitats, particularly for species like salmon and steelhead, maintaining reliable surface and groundwater supplies for agriculture, reducing forest fuel loads to mitigate wildfire risks, and preserving open spaces and rural agriculture.

The Tehama West Watershed Management Plan addresses the environmental and land use challenges of western Tehama County. The plan focuses on reducing wildfire risks through vegetation management, improving rangeland and wildlife habitat conditions, addressing erosion and degraded stream channels, and conserving agricultural lands and rural character. It also emphasizes protecting water quality and managing land use conversion to preserve natural resources.

- These objectives were developed in collaboration with a Technical Advisory Committee, landowners, public agencies, and local organizations to ensure practical and community-informed watershed stewardship.

Tehama County Zoning Regulations

Chapter 17.24. PF Primary Floodplain District.

The PF, primary floodplain district is intended to be applied by the county to properties which lie within a primary floodway which, for the purposes of this title, shall be construed to be a stream channel, and the portions of the adjacent floodplain as are required to efficiently carry the flood flow of the stream and on which properties special regulations are necessary for the minimum protection of the public health and safety and of property and improvements from hazards and damage resulting from floodwaters.

Principal permitted uses:

(1) The provisions of the agreement made January 26, 1971, and any amendments made subsequent thereto between the Reclamation Board of the state and the county shall be considered when interpreting and administering this district.
(2) Crop and tree farming, truck gardening, viticulture, livestock grazing, and other agricultural uses which are of the same or a closely similar nature.
(3) Public utility wires and pipelines for transmission and local distribution purposes.

Uses permitted with a use permit:

A. The following uses, buildings, and structures when it is found by the planning commission that such buildings and structures will be so constructed or placed or will be so protected by the levees or other floodproofing that they will not be appreciably damaged by flooding, will offer a minimum obstruction to the flood flow, and will resist flotation:

(1) Buildings and structures that are accessory to agricultural use for the storage of goods and equipment and the shelter of animals and/or fowl, but not residences of any type.
(2) Public utility buildings and structures other than wire and pipelines.
(3) Public parks and recreation areas and facilities, including boat ramps, docks, parking areas, picnic tables, fireplaces, and private and commercial recreation developments and facilities, campgrounds, and recreational vehicle parks; provided that restroom facilities shall be located and constructed in accordance with health department requirements.
(4) Commercial excavation of natural materials, filling of land areas, construction of levees, dikes, or other structures designed to divert or obstruct the flow of floodwaters.

Williamson Act and Farmland Security Zone Contracted Lands

Notwithstanding any other provision of this title, any use on land subject to a Williamson Act or Farmland Security Zone contract must be consistent with Government Code sections 51200 et seq. (the Williamson Act), the terms of the Williamson Act or Farmland Security Zone contract, and any compatible rules or determinations heretofore or hereinafter adopted by the board of supervisors. Any application for a use permit pursuant to Government Code section 51238.1, subdivision (b), for a use otherwise permitted in a PF district must be approved by the board of supervisors.

Sacramento Valley Integrated Regional Water Management Plan

Northern California water suppliers, in partnership with local governments, environmental representatives, and state and federal agencies, continue to refine an "Integrated Regional Water Management Plan for the Sacramento Valley" (Regional Plan). The Regional Plan is designed to protect Northern California water rights and supplies, including groundwater, and it will serve as a roadmap for present and future generations to provide water for urban, agricultural, and environmental needs.

Sec. 4.14. Floodplain or F-P zone.

The floodplain or F-P zone is intended to be applied to areas other than floodway areas that have been inundated by overflow floodwaters in the past and which may reasonably be expected to be inundated by such floodwaters in the future. The floodplain zone is intended to limit the use of areas subject to such inundation and flooding to protect lives and property from loss, destruction, and damage due to floodwater and the transportation of wreckage and debris by water flow.

Principal permitted uses:

(1) General agriculture, nurseries and greenhouses, and animal sales and feed yards, except as provided in subsection (b) hereof
(2) Recreational uses, including public stables, docks, boathouses, golf courses, and shooting ranges

Uses permitted with a use permit:

(1) Residential uses, including farm dwellings
(2) Trailer camps and mobile home parks
(3) Recreational uses requiring enclosed buildings

Sacramento Valley Integrated Regional Water Management Plan

Northern California water suppliers, in partnership with local governments, environmental representatives, and state and federal agencies, continue to refine an "Integrated Regional Water Management Plan for the Sacramento Valley" (Regional Plan). The Regional Plan is designed to protect Northern California water rights and supplies, including groundwater, and it will serve as a roadmap for present and future generations to provide water for urban, agricultural, and environmental needs.

2.1.4. Groundwater Basin Understanding

The Sacramento Valley Groundwater Basin covers over 5,900 square miles and 10 counties and has been divided into 18 subbasins. The California Department of Water Resources defines the following:

> *"A groundwater basin is defined as an alluvial aquifer or a stacked series of alluvial aquifers with reasonably well-defined features that significantly impede groundwater flow, such as rock or sediments with very low permeability or a geologic structure such as a fault."*
>
> *"A subbasin is created by dividing a groundwater basin into smaller units using geologic and hydrologic barriers or, more commonly, institutional boundaries. These subbasins are created for the purpose of collecting and analyzing data, managing water resources, and managing adjudicated basins."*

Tehama County overlies portions of several subbasins of the Sacramento Valley Groundwater Basin, including the Antelope, Bend, Bowman, Corning, Los Molinos, Red Bluff, and South Battle Creek Subbasins. The majority of the Corning Subbasin overlies Tehama County, with the remaining portion located within Glenn County. Groundwater basins in Tehama County are shown in **Appendix D**.

Two principal aquifer units are defined in the Tehama County Subbasins (excluding Corning): Upper Aquifer and Lower Aquifer. The two-aquifer designation is based on an examination of time-series groundwater elevation hydrographs, electric resistivity data from geophysical logs, lithologic logs, well construction details, and a review of previous studies in the Subbasin. The northern Sacramento Valley depositional environment is dominated by fluvial and alluvial deposition after the Eocene marine depositional environment transitioned to a subaerial one. The Pliocene depositional environment is similar to the current depositional conditions, with eastern depositional streams sourced from the Cascade Range and western depositional streams sourced from the Coast Ranges draining onto a central floodplain. This depositional environment resulted in a complex and varied series of water-bearing sedimentary deposits and the Tuscan / Tehama Formations that collectively form a two-aquifer system in the Subbasin and beyond. Within singular water-bearing formations, there are areas where confined or unconfined conditions can be dominant. Generally, confined aquifer conditions are encountered at depth, and unconfined conditions are seen in the shallower porous media. The complexity of the geologic materials and formations makes it difficult to define a singular widespread aquitard or a distinctive change in geologic materials separating an upper and lower aquifer. To delineate between areas with a higher likelihood of confined conditions, well construction data throughout the Subbasin were examined. Most of the wells in the Subbasins are screened or completed above 400 feet below ground surface (ft

bgs). The bottom of the numerical hydrogeological model layer 5 (of the GSA SGMA Model) best corresponds with this depth. The bottom of model layer 5 is used as the delineation between the Upper and the Lower Aquifer. This model layer boundary also generally corresponds to fine-grained lithology from available well completion reports. Lastly, the degree of heterogeneity and anisotropy (directional preferable flow) is likely significant, but not easy to define based on current information.

Upper Aquifer

The Upper Aquifer is defined as the water-bearing material from the ground surface to the bottom of model layer 5 (approximately 350-450 ft bgs in the Subbasin). The Upper Aquifer has unconfined to semi-confined water conditions. Water-bearing geologic units in the Upper Aquifer include the Quaternary formations and the upper portions of the Tehama and Tuscan Formations. Wells screened in the Upper Aquifer are largely for domestic purposes. The depth to the bottom of the Upper Aquifer is approximately 350-450 ft bgs. Site-specific Aquifer properties obtained from aquifer tests were not readily available for the Subbasin. However, aquifer tests were conducted in surrounding subbasins. Hydraulic conductivity (rate at which water moves through an aquifer), transmissivity (hydraulic conductivity multiplied by aquifer thickness), and storage coefficients (ability of the aquifer to store water, commonly expressed as specific yield for water table/unconfined aquifers and storativity for confined aquitards) have been estimated near the Subbasin.

In the Los Molinos Subbasin, the estimated transmissivity of the upper portion of the Tuscan Formation (70-530 ft bgs) is approximately 14,000 square feet per day (ft^2/day) to approximately 55,000 ft^2/day (DWR, 2003). This depth interval covers a portion of the Lower Aquifer but is mostly within the Upper Aquifer. In the Red Bluff Subbasin, the Tehama Formation has an average transmissivity of approximately 4,000 ft^2/day, an average storativity of 0.00089, and an average hydraulic conductivity of 120 ft/day based on a 1989 constant discharge aquifer test at the Rancho Tehama Reserve (McManus, 1993; DWR, 2003).

Lower Aquifer

The Lower Aquifer is defined as the freshwater-bearing geologic units throughout the Subbasins from the bottom of model layer 5 at approximately 350-450 ft bgs, to the bottom of each Subbasin. The aquifer is confined to semi-confined conditions. Water-bearing geologic units include the lower portions of the Tehama and Tuscan Formations. Wells screened in the Lower Aquifer are largely for non-domestic purposes. The lack of wells screened in the Lower Aquifer in the Subbasin creates a data gap for hydraulic properties. Hydraulic conductivity has not been directly measured; however, the lower Tuscan Formation (Units A and B) has a hydraulic conductivity estimate (via an aquifer test south of Deer Creek and North of Little Chico Creek in Antelope) of 41-88 ft/day (Brown and Caldwell, 2013). Transmissivity of the lower parts of the Tuscan Formation (340-920 ft bgs) ranges from 5,415 ft^2/day to 49,986 ft^2/day in the Los Molinos Subbasin (DWR, 2003). Storativity in the Los Molinos Subbasin is estimated to be 0.0025, and hydraulic conductivity is estimated to be 40 ft/day to 60 ft/day (Harrison, 1989; Ely, 1994; DWR, 2003). The Tehama Formation has an average transmissivity of 4,341 ft^2/day, an average storativity of 0.00089, and an average hydraulic conductivity of 120 ft/day based on a 1989 constant discharge aquifer test at the Rancho Tehama Reserve in the Red Bluff Subbasin (McManus, 1993; DWR, 2003).

Corning Subbasin

In the Corning Subbasin, the largest freshwater-bearing formations were deposited contemporaneously, creating expansive zones of interlayering formations. These were then overlain by conductive quaternary alluvial formations, which are unlikely to create boundaries to flow (DWR, 2014). Interlayering of these formations may facilitate groundwater flow between units by increasing the surface area at which units are in contact (DWR, 2009). Interlayering also increases the likelihood that wells are screened in multiple units, further facilitating vertical groundwater transmission. While some areas may experience localized differences in geology and groundwater flow patterns, the Subbasin does not contain expansive contiguous impervious aquitards that may cause regional differences in flow patterns and water quality.

This depositional history results in a hydro-geologically interconnected aquifer system where impacts to one unit have the potential to impact the larger aquifer network. Further, in this Subbasin, no regionally continuous impervious layers are found, wells are often screened within several geologic units, and water flows mostly freely between vertical aquifer units. As such, the Subbasin is best described as having one principal aquifer comprised of the interlayered freshwater-bearing formations within the Subbasin. These are:

- Quaternary Alluvium,
- The Tuscan Formation, and
- The Tehama Formation.

This determination is based on the best available information at the time of GSP development. There is potential for data refinement and/or collection of additional information during GSP implementation to either more fully support or refine aquifer designation.

Beneficial uses of groundwater in the Corning Subbasin include agricultural (primary use), industrial (minor use), municipal (only two main areas), tribal use (one main area), and domestic use (widespread over the entire Subbasin). Groundwater also supports designated wildlife and habitat protection areas. Groundwater-dependent ecosystems near the Sacramento River and other larger creeks are present in the Subbasin and are further described in the Groundwater Conditions Section.

2.1.5. Geology

Groundwater is water that is underground and below the water table, as opposed to surface water, which flows across the ground surface. There are three main types of subsurface geology where groundwater can exist:

- **Hard rock** – Groundwater can be present in cracks or fractures in the rocks
- **Underground caverns** – Groundwater can fill these underground voids
- **Porous sediments** – Groundwater can fill the pore spaces between grains of sand and gravel

In Tehama County, groundwater can be found in both hard rock and porous sediments. In the mountainous portions of the County, groundwater exists primarily in hard rock aquifers; in the valley portions, groundwater exists primarily in porous sediments or alluvial aquifers.

In the eastern portion of the County, the surface and subsurface are made up of igneous and metasedimentary rocks. In these areas, groundwater is present in the cracks and fractures in the rocks. For groundwater in this material to be replenished after it is removed by pumping, the fractures must receive recharge from precipitation or a renewable water source such as a river or stream, which must have an available supply of water to recharge the fractures. The fractures in hard rock can be irregular and disconnected, which can explain why two wells in a hard-rock setting can be very close together but may have very different yields and water quality. Additionally, the groundwater available to supply and recharge wells in hard rock aquifers can vary significantly with seasonal and year-to-year variations in rainfall.

In the western and central portion of the County, the surface and subsurface are made up of marine sediments. Marine sediments are not typically as hard as the igneous and metasedimentary rocks, but function much like hard rock aquifers. The marine sediments were deposited in a saltwater environment, so water quality can be poor and often deteriorate with depth. Groundwater aquifers in marine sediments can be irregular and disconnected, so nearby wells can have very different yields and water quality.

In the valley portions of the County, both in the small valleys in the Coast Ranges and in the Sacramento Valley, the subsurface consists of layers of gravel, sand, clay, and, in some cases, volcanic ash. Groundwater is present in the pore spaces between the particles that make up the alluvial aquifers. The characteristics of different aquifers, as well as the zones within each aquifer, are related to the materials that comprise the aquifer (sands, gravels, clays, etc.). Within a single aquifer zone, nearby wells with similar construction can have very similar yields and water quality. It should be noted that many of the geologic formations that contain alluvial aquifers are continuous units that extend to adjacent counties.

Smaller valleys often contain a very limited amount of sediment and thus have less capacity to store groundwater. For this reason, changes in the balance of recharge and pumping can quickly cause significant changes in groundwater conditions in small valleys. It is possible for small valleys to experience a significant decrease in water level during a single year if pumping exceeds recharge. In contrast, the larger storage capacity in larger valleys can, in many cases, accommodate fluctuations in the recharge/pumping balance over a number of years, with smaller variations in water levels.

It is difficult to characterize groundwater in the igneous and metasedimentary rocks and marine sediments over large areas. Groundwater in these areas is generally limited, and data on water levels and water quality have not been collected. Additionally, the nature of hard rock aquifers makes them difficult to study. Groundwater is not continuous over large areas, so data from one area may be completely unrelated to data in another area. In the small alluvial valleys in the Coast Ranges, there is very limited data available to characterize their groundwater systems; however, if data were collected and analyzed, these valleys could likely be well-characterized because groundwater is probably continuous within these valleys. Due to the large amount of data that has been recorded and studied regarding the Sacramento Valley, it is generally understood that groundwater is continuous within specific aquifer zones (although discontinuous between different aquifer zones) over large areas within the Sacramento Valley.

2.1.6. Status of Understanding of Regional and Local Geology.

The geology of the Sacramento Valley has been studied for at least 95 years and much has been learned over this time (**Figures 2-2A and 2-2B**). However, there are still many areas of active study and debate. In Tehama County, areas that are not well understood include:

- The nature and extent (location and depth) of the deposits that eroded from the Sutter Buttes
- The interaction between the Coast Range-sourced Tehama Formation and analogous Sierra Nevada-sourced deposits, and where this interaction occurs
- The possible existence of subsurface barriers to groundwater flow within the County
- The nature and extent of different aquifer units within the Tehama Formation

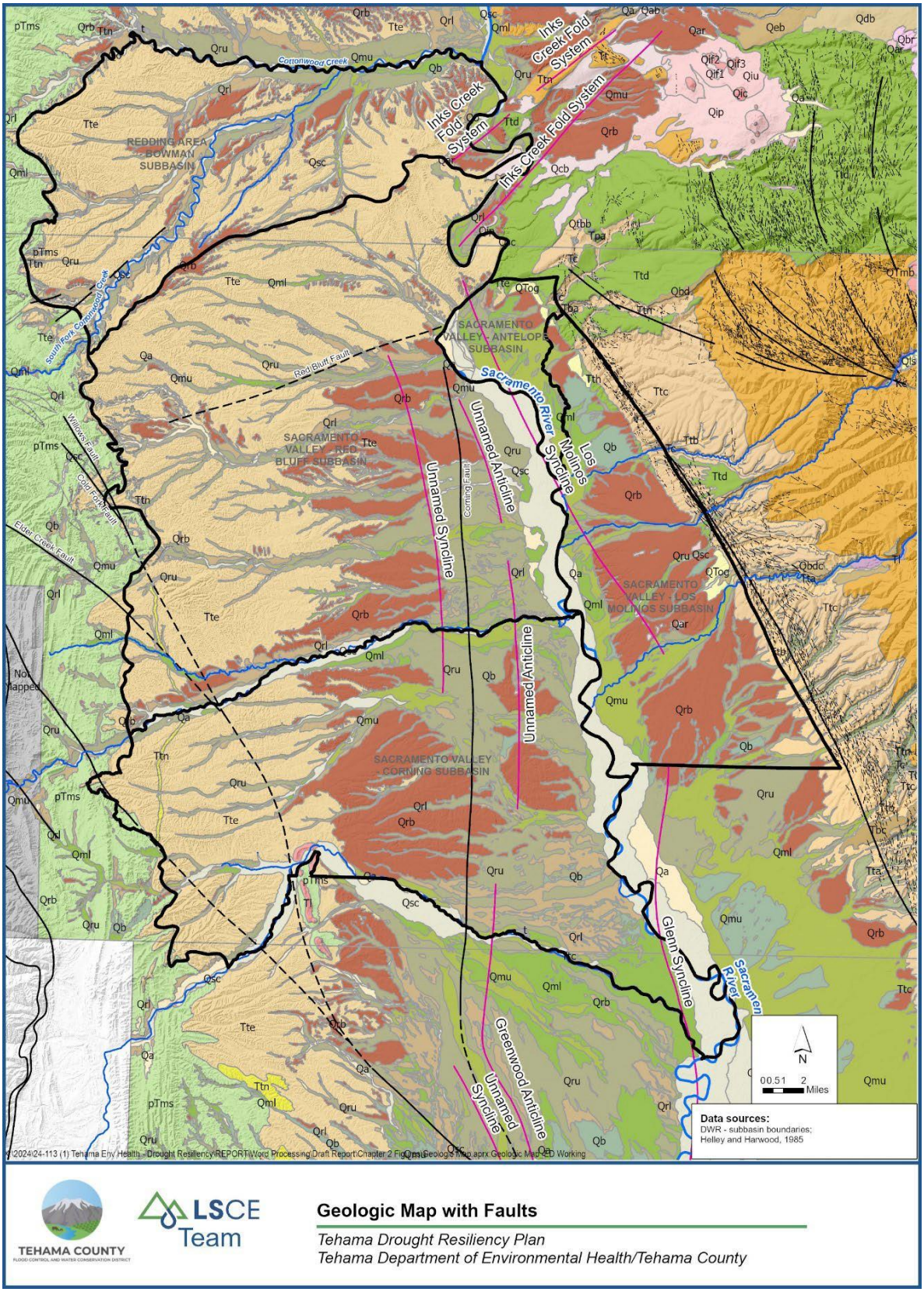


Figure 2-2A. Geologic Map with Faults

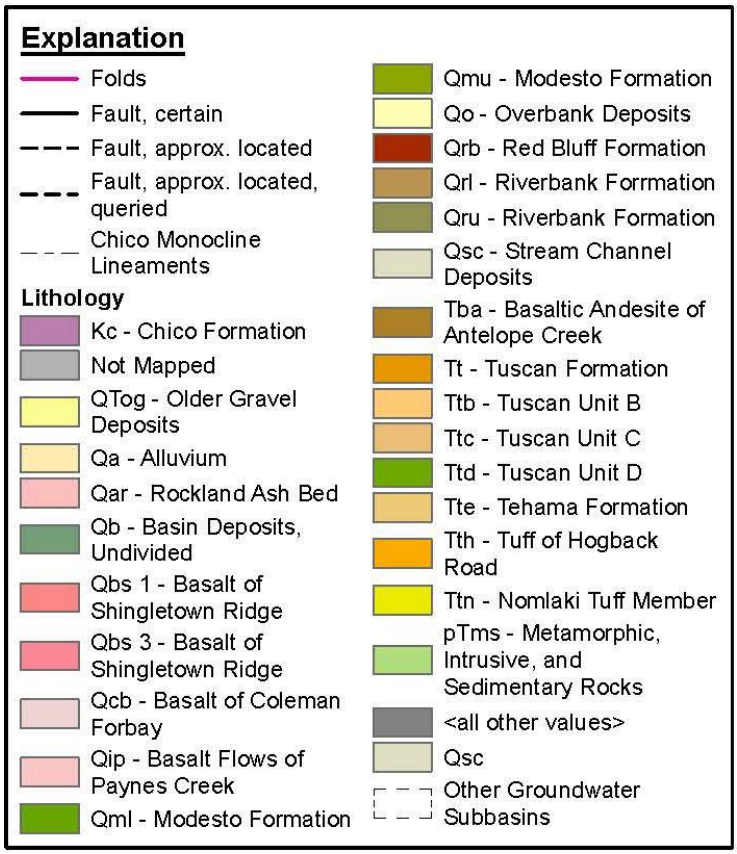


Figure 2-2B. Geologic Map Key

Regional Geology and Structure. The Sacramento Valley Groundwater Basin acts as a trough that is filled with layers of different sediments. The deepest portions of the Basin generally consist of marine sedimentary rocks of various ages, ranging from Late Jurassic to early Miocene. These marine units are overlain by younger alluvial and locally prominent volcanic rocks of the early Miocene to Holocene age. Within the Basin, these deposits are disrupted by deformational stresses derived from east-west compressional forces associated with regional uplift along the western margin of the valley and extensional forces within the Basin and Range Provenance. Over time, these forces have applied great stresses and strain on valley deposits, creating complex and diversely oriented fold and fault structures.

Recent Alluvial Deposits. Recent alluvial deposits include stream channel deposits, basin deposits, the Modesto Formation, and Riverbank Formation. These deposits were created by moving stream channels that meandered, cutting through existing sediments within the valley and creating an interconnected relationship. As such, it is likely that many channels or pathways exist that allow groundwater to move among all of the recent alluvial deposits. There is limited data in well logs to allow for differentiation among the different recent alluvial deposits.

Stream channel deposits are Holocene in age and were deposited between 11,000 years ago and the present day. The stream channel deposits occur along the current and ancestral paths of streams and rivers in Tehama County. Where present, the stream channel deposits extend from ground surface to a depth of one to 200 feet below ground surface (bgs). The stream channel deposits consist of unconsolidated gravels, sand, silt, and clay, derived from the erosion and reworking of the Quaternary stream terrace deposits (Modesto and Riverbank Formations) and the Tehama Formation. This unit is moderately to highly permeable, but because of its shallow depth and limited thickness, it possesses limited water-bearing capacity.

Basin deposits are Holocene in age and, like stream channel deposits, were deposited between 11,000 years ago and present day. Basin deposits occur where sediment-laden floodwaters breach natural streams and river levees and spread across lower-lying topography. Where present, the basin deposits extend from ground surface to a depth of 1 to 200 feet bgs. The basin deposits consist mainly of silts and clays. These units have low permeability and generally yield small quantities of water to wells.

The Modesto Formation is Pleistocene in age and was deposited between 2 million and 500,000 years ago. The Modesto Formation is a stream terrace deposit consisting of gravels, sands, and clays derived from the reworking and deposition of the Riverbank Formation. The Modesto Formation was probably deposited by the same stream and river systems that flow today because it generally borders existing channels (Blake et. al., 1999). Where present, the Modesto Formation begins between ground surface and 100 feet bgs and extends to a depth of approximately 200 feet bgs. The units of the Modesto Formation are moderately to highly permeable and can yield limited quantities of water to wells.

The Riverbank Formation is Pleistocene in age and was deposited between 2 million and 500,000 years ago. The Riverbank Formation consists of pebbles and small cobble gravels interlayered with reddish clay, sands, and silts. Like the Modesto Formation, the Riverbank Formation is a stream terrace deposit; however, the Riverbank Formation is older than the Modesto Formation. The Riverbank Formation has two units. The lower unit of the Riverbank Formation is lithologically similar to the Red Bluff Formation (which occurs further north in the Sacramento Valley) and has a similar brick-red color. It occurs on the higher of two terraces that have been cut and filled into the surface of the Red Bluff and/or Tehama Formations. The upper unit of the Riverbank Formation consists of extensive flat stream terraces along major creeks in the valley (Helley and Harwood, 1985). The Riverbank Formation begins between ground surface and 150 feet bgs and extends to a depth of approximately 200 feet bgs. The Riverbank Formation is moderately to highly permeable and can yield moderate quantities of water to wells.

Sutter Buttes Alluvium

The Sutter Buttes Alluvium is an alluvial fan deposit observed in the subsurface, which may range in thickness up to 600 feet thick (DWR, 2000). These fan deposits consist largely of gravels, sands, silts, and clays and may extend up to 15 miles north of the Sutter Buttes and west beyond the Sacramento River. Certain zones within this unit yield large quantities of water (DWR, 2004).

Tehama Formation

The Tehama Formation is Pliocene in age and was deposited between four million and one million years ago. The Tehama Formation was deposited by coalescing alluvial fan deposits from the Coast Ranges and

consists of inter-braided gravel, sand, silt, and clay. The Tehama Formation outcrops in the low foothills of the Coast Ranges at the western edge of the Sacramento Valley. Throughout the flat areas of the western Sacramento Valley, the Tehama Formation is overlain by one or more of the younger deposits described above. Toward the center of the Sacramento Valley, near the Sacramento River, the Tehama Formation interfingers with the Sierra Nevada - and Cascade Mountains - sourced Tuscan and Laguna Formations. Within the Tehama Formation, the gravel, sand, and silt materials are separated into distinct zones by impermeable and semipermeable layers of clay and other fine-grained materials. The gravel and sand zones are generally less than 50 feet thick and may lack lateral continuity. Although the Tehama Formation is the principal water-bearing formation in the western half of the Sacramento Valley, the units of the Tehama Formation have not been studied in detail in Tehama County. The Tehama Formation begins between ground surface (in the outcrop areas) to 200 feet bgs and becomes thicker toward the center of the Sacramento Valley, extending to a depth of up to 1700 feet bgs. The units of the Tehama Formation are moderately permeable, but because of its extent and thickness, the Tehama Formation can yield moderate to high volumes of water to wells.

Tuscan Formation

The Tuscan Formation has been the subject of much interest in recent years, but records from gas wells indicate that it is likely only present in the very northeastern corner of Colusa County and, consequently, is not a major water source for the County.

Groundwater Levels

The California Department of Water Resources maintains a publicly available online database that includes groundwater level data for the County. DWR's Water Data Library Website can be found at https://wdl.water.ca.gov/. The State Well Numbering System identifies wells that are monitored by DWR and cooperating agencies. Data can be obtained for specific wells by means of a map interface, by groundwater basin, or by the assigned State Well Numbering System.

The 77-year period of record for water level measurements in Tehama County depicts a groundwater system that has experienced changing conditions over time. In areas of high groundwater use and differing water conditions, water levels fluctuate, sometimes dramatically, in response to changes in groundwater use and hydrologic conditions. In areas of lower groundwater use and more stable water conditions, water levels have not exhibited significant fluctuations over time. In areas where agricultural water needs are met with surface water, wells generally exhibit more stable conditions.

Groundwater levels decreased during the 1975 to 1977 drought, then increased slightly until 1982. At that point, surface water from the Tehama Colusa Canal became available, and groundwater levels increased quickly from 1982 through 1986. Seasonal water level fluctuations decreased during this period from about 20 feet to less than 10 feet, indicating a reduction in groundwater pumping. Groundwater levels declined from 1988 through 1994, when deliveries from the TCC were only 25-65 percent of normal and have generally increased from 1994 through present. Groundwater levels in this well are currently about 50 feet higher than they were in 1970.

The direction of spring groundwater flow within the County has not changed from 1977 to 2006. It generally follows the topography of the County, flowing from the Coast Ranges toward the Sacramento

Valley (west to east), and north to south within the Valley. Spring groundwater elevations were about five to 30 feet higher in 2006 than in 1977, depending on the area.

Data from the two nested monitoring wells at the extensometer sites in the County shows that for the four years of available data, the spring groundwater elevations in the monitored aquifer zones have been very similar, within three feet of one another.

Groundwater Quality

DWR maintains a database for groundwater quality that can be obtained from the Water Data Library for specific well sites within Tehama County, identified by the assigned State Well Numbering System. Data can also be obtained by groupings of wells.

Multiple approaches can be used to evaluate overall water quality. The most common are specific conductance or total dissolved solids, which are indicators of the total concentration of minerals in the water. Lower specific conductance or concentrations of total dissolved solids generally indicate better water quality, while higher specific conductance or concentrations of total dissolved solids generally indicate poorer water quality. For Tehama County, specific conductance was selected as an indicator of overall water quality because there were more records for specific conductance than for total dissolved solids.

Specific conductance within the County is generally acceptable for agricultural and domestic use, except for two areas. In the marine sediments in the foothills of the Coast Ranges, specific conductance is marginally acceptable for domestic use and can reduce the yield of several crops grown in the County.

Nitrate concentrations in the County are generally acceptable. Nitrate concentrations typically meet drinking water standards; however, Antelope Subbasin has for many years been monitoring nitrate concentrations and requiring reporting of levels in annual reports. Where present, elevated concentrations of nitrate are likely a result of inadequate sanitary seals or point sources (i.e., septic systems). Manganese and Chromium 6 concentrations are elevated in the Western portion of the County at levels that may cause aesthetic problems (odor or staining for Manganese) and public health problems (associated with lung cancer and nasal and sinus cancer) for Chromium 6 for domestic and municipal uses, but generally below levels that could represent a health risk. Naturally occurring Arsenic has been found in shallow wells in the Los Molinos Area.

Corning Subbasin

Groundwater quality in the Corning Subbasin principal aquifer is predominantly of a calcium magnesium bicarbonate or magnesium-calcium bicarbonate type. There are also some localized areas of calcium bicarbonate groundwater near Stony Creek (DWR, 2006a). Overall, the Corning Subbasin contains groundwater that generally meets or exceeds primary and secondary water quality standards. Similarly, anthropogenic contamination of groundwater is not extensive in the Subbasin. However, there are some known areas of naturally occurring and non-point source groundwater quality constituents, including nitrate and salinity.

Surface Water Flow and Quality

Historic data for Tehama County is inadequate to evaluate the changes in surface flow or quality that directly affect groundwater levels or quality or are caused by groundwater pumping. To make these determinations, it is necessary to have clustered monitoring wells located immediately adjacent to a surface water body, with a stage gauge located in the immediate vicinity. Even with these grouped monitoring locations (which do not currently exist in Tehama County), the flow in a stream or river may be so great that any interactions among groundwater and surface water are smaller than the measurement error.

Surface-Groundwater Bottom Line with Respect to Drought/Water Shortage Events

Tehama County will be collecting more groundwater and surface water data over time, which will provide policymakers with much-needed information for water management decisions to meet water needs for all users during dry conditions. During drought and water shortage events, surface water supplies can experience large cutbacks, which correspond with higher groundwater use to compensate for lower surface water supply availability. During extended droughts, when more groundwater is utilized, safe yields may be in jeopardy, and negative groundwater impacts such as subsidence may occur. Mitigating the surface-groundwater dynamics in Tehama County will likely require a combination of demand management, increased recharge, and higher surface water use when available to take the pressure off groundwater supply depletions that exceed the safe yield of the Subbasins.

2.2. DWR Drought Risk Assessment Tool

To evaluate the relative risk of drought and water shortage vulnerability for Self-Supplied Community water systems, DWR collaborated with the Water Board and CDAG to develop a tool that used a common framework based on important risk indicators. The methodology used by the Risk Explorer Tool does not define thresholds whereby certain communities are “at risk” of drought and water shortage, and others are not. Instead, according to the CDAG report, “the methodology inherently recognizes that all communities in California face some risk of drought and water shortage and thus provides a tool to calculate the relative risk of these suppliers and communities.” The primary benefit of the Risk Explorer Tool is to offer local and regionally specific information to assist with drought and water shortage planning.

The unit of analysis for the Risk Explorer Tool is the Census Block Group (the geographical unit used by the United States Census Bureau, typically between 600 and 3,000 people), with a record of a domestic well installed within the last 50 years (1970-2019). Census Block Groups with zero population and no domestic well record within the last 50 years were excluded from the analysis. In Tehama County, an estimated 7,000 households reside in the Census Block Groups evaluated by the Tool (but not all of these households are Self-Supplied, as defined by this report). About 9,500 domestic wells have been recorded with DWR in Tehama County over the last 50 years. The Census Block Groups do not necessarily represent individual “communities” in the traditional sense but do cover populated areas. The Risk Explorer Tool used this spatial unit for its analysis to allow DWR to access demographic information that is otherwise not available. Actual drought risk within each census block can vary substantially, as even close neighbors may rely on different water sources or wells of different ages and

depths. The Risk Explorer Tool is useful for analyzing how risk varies across the County but should not be assumed to reflect the actual drought risk of any specific water system or domestic well.

2.2.1. DWR Drought Risk Tool – Risk Indicators

The Risk Explorer Tool identifies 20 indicators for the Self-Supplied Community grouping. These indicators were created to cover three general categories of risk defined by the State Water Resources Control Board, CDAG, and other stakeholders. These components are: (1) the exposure of suppliers and communities to hazardous conditions and events, (2) the physical and social vulnerability of suppliers and communities to the exposure, and (3) the recent history of shortage and drought impacts. The Risk Explorer Tool evaluates risk based on these categories, looking more closely at individual indicators separated into five Risk Components (RC) groups, with each component broken into individual metrics as presented below in **Figure 2-1**.

Figure 2-1. Drought and Water Shortage Risk Indicators

Brief descriptions of the risk indicators shown above are listed below, along with the data source in parentheses.

Component 1 – Climate Change

- RC1a Temperature Shift tracks projected increases in maximum temperature by mid-century, averaged across climate models. (DWR)
- RC1b Wildfire Risk projects severe or high-severe wildfire risk for each block group boundary. (UC Merced)
- RC1c Saline Intrusion Risk identifies susceptibility to seawater intrusion as measured by 1 meter of sea level rise into coastal aquifers. (University of Wyoming/USGS)

Component 2 – Exposure to Current Conditions and Events

- RC2a Drought Early Warning tracks an annual early drought risk warning, indicating less than 70% of average precipitation by January 31 of that water year. (PRISM OSU)
- RC2b Wildfire Risk models the current maximum risk for wildfire for each block group. (CalFire)
- RC2c Fractured Rock Area shows if the community is located in a fractured rock area. (DWR)
- RC2d Subsidence Presence documents a record of subsidence within the block group. (DWR)
- RC2e Salt Presence (basin) documents a record of salts and salt intrusion points in the basin. (DWR)
- RC2f Over drafted Basin shows if the area is in a critically over-drafted basin. (DWR)
- RC2g Declining Water Levels identifies declining groundwater levels. (DWR)
- RC2h Population Growth uses census data to estimate the population growth rate to determine projected population growth. (DWR)
- RC2i Water Quality Index indicates the likelihood that groundwater accessed by domestic wells may contain constituents above regulatory levels. (SWRCB)
- RC2j Surrounding Irrigated Agriculture identifies the presence of irrigated agriculture in the surrounding basin. (DWR)

Component 3 – Physical Vulnerability

- RC3a Well Depth Flag flags “relatively shallow” well depth if any portion of the groundwater units intersect with the block group. (OSWCR-DWR)
- RC3b Well Depth Proportion identifies where the max depth of domestic wells is 10% or more shallow than the max depth of public wells. (OSWCR-DWR)

Component 4 – Social Vulnerability

- RC4 is a composite index of demographic indicators shown above from the American Community Survey 2012-2016 and the 2010 US Census.

Component 5 – Water Shortage Record

- RC5a Reported Household Outages on Domestic Well indicates the presence of one or more households that have reported a domestic well outage in the block group. (DWR)

- RC5b Reported Household Outages on Private Well shows the proportion of households with reported outages in the block group using a 0-1 scalar metric. (DWR)

Some risk components have fewer implications than others in Tehama County. For example, because the County is located more than 75 miles inland, seawater intrusion is not a concern. Some risk components are more applicable in some parts of the County than in others. Certain issues like groundwater subsidence are much more likely to occur in the Central Valley floor portion of the County within the alluvial groundwater basin, which is impacted by urban areas and surrounding irrigated agriculture more susceptible to overdraft (RC2f) and documented areas of subsidence (RC2d). The geographic differences in the western foothill areas would mean more limited access to groundwater and less likelihood of dealing with overdraft or subsidence issues. Water use intensity is much lower in the western foothill areas of the Subbasin than in the alluvial groundwater areas dominated by urban and agricultural groundwater use. Understanding the geographic risk and diversity of the watershed will assist the County in properly categorizing risk across different geographic areas based on weighting risk factors accordingly.

2.2.2. Tehama County – Physical Vulnerability Summary

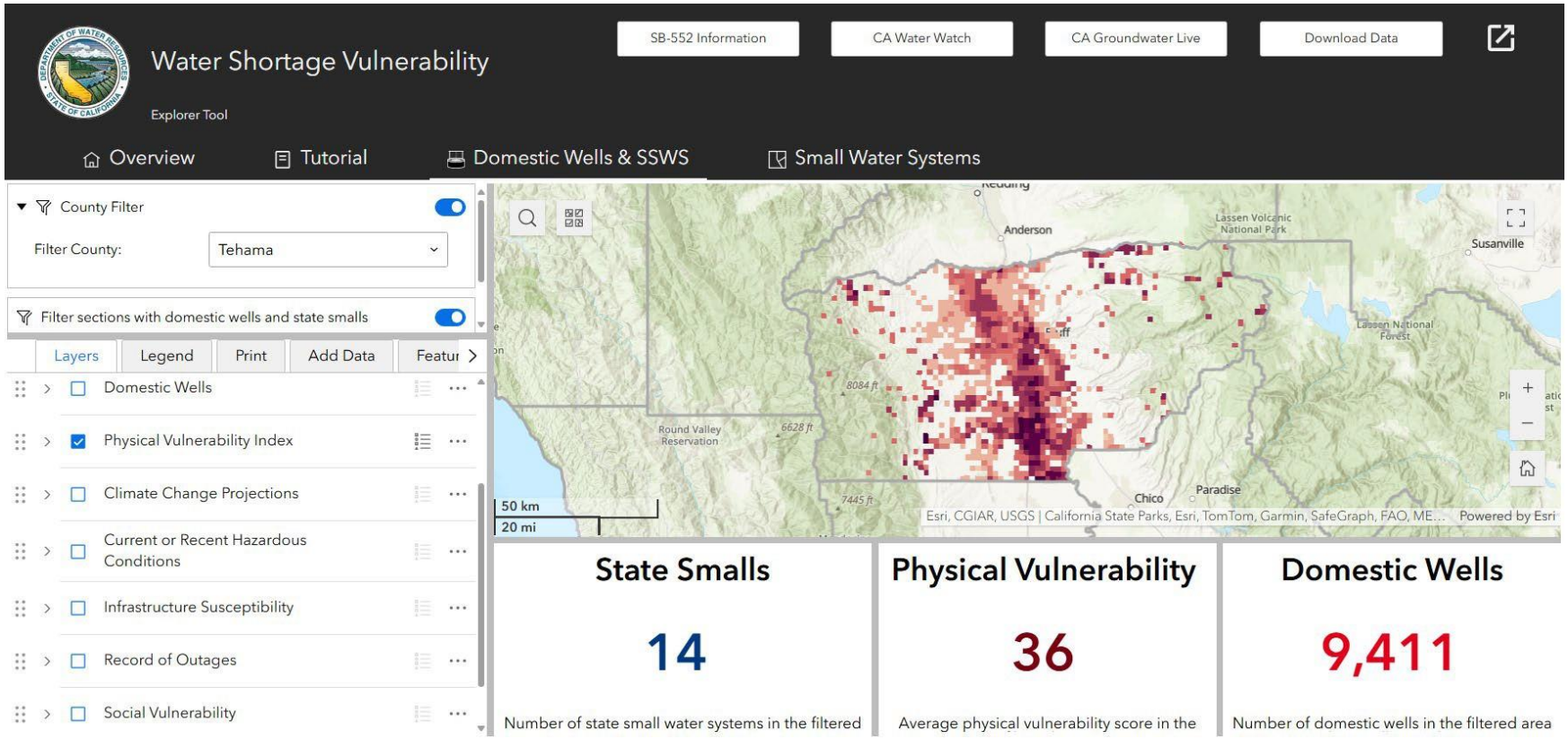


Figure 2-2. Tehama County Physical Vulnerability

Indications are that there are some areas in the County with physical vulnerability risks that can be further evaluated in those specific areas.

2.2.3. Tehama County – Social Vulnerability Summary

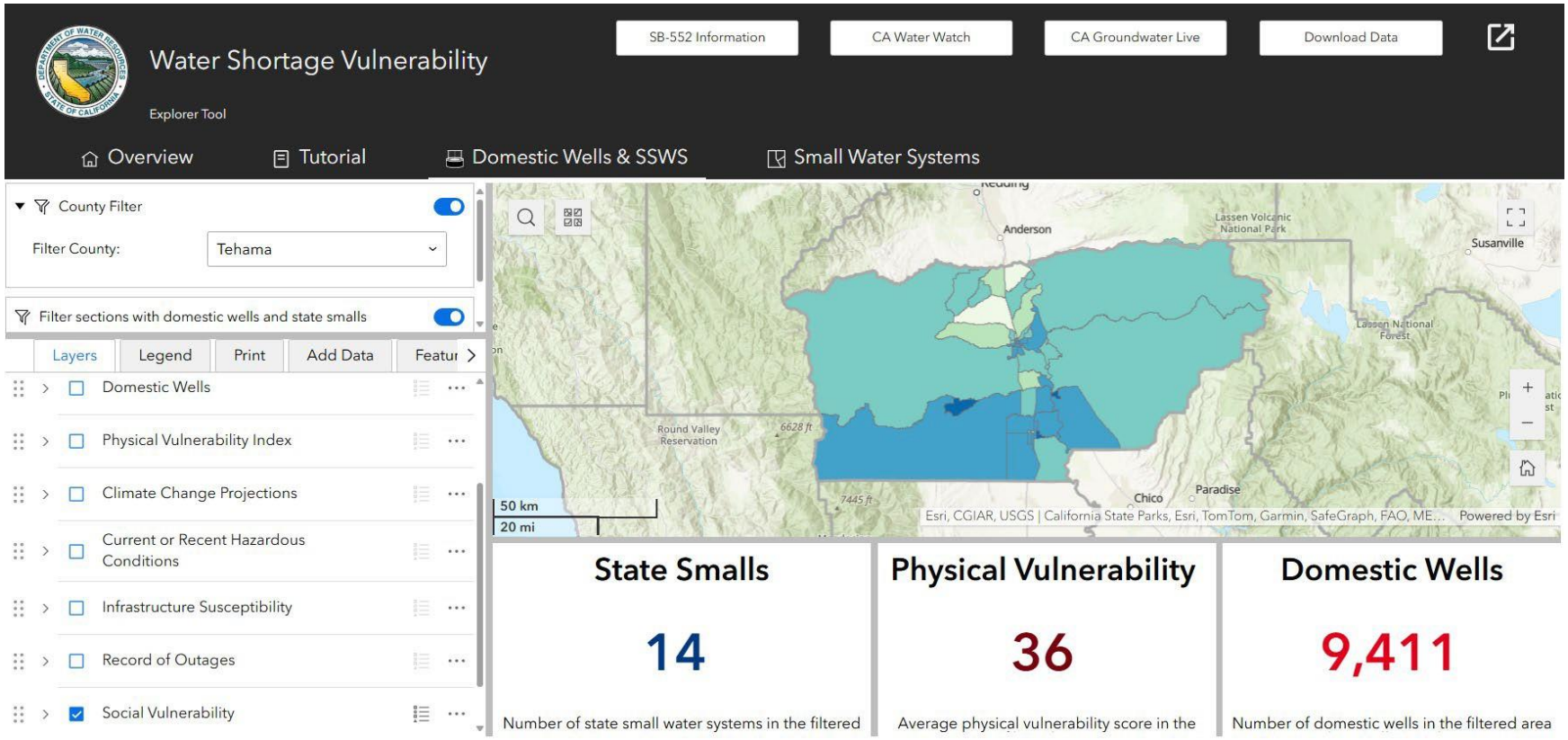


Figure 2-3. Tehama County Social Vulnerability

Indications are that there are some areas in the County with social vulnerability risks that can be further evaluated in those specific areas.

2.2.4. Tehama County – Infrastructure Susceptibility Risk

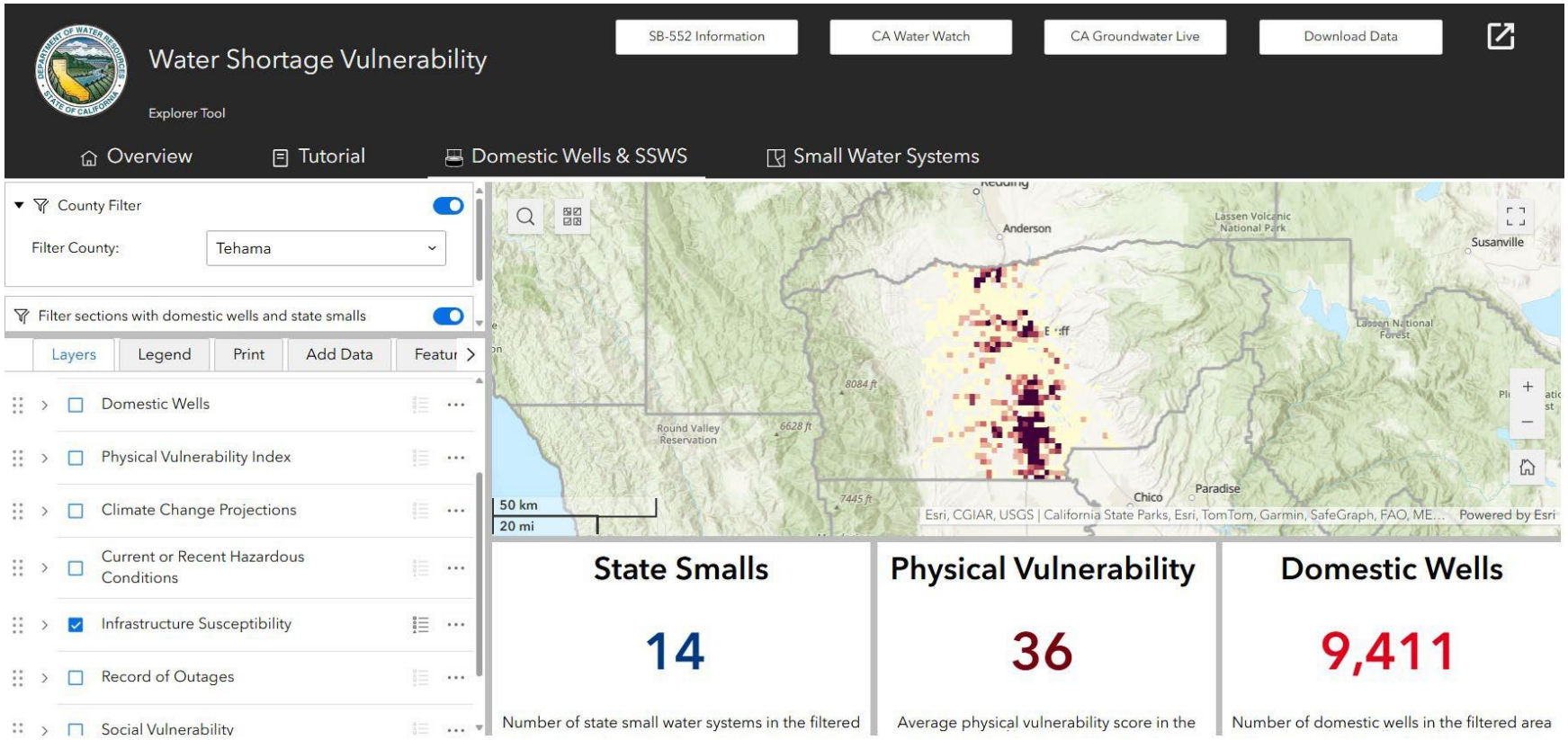


Figure 2-4. Tehama County Infrastructure Susceptibility Risk

It appears that there are some areas with infrastructure susceptibility risk typically associated with dry well issues and/or limited access to water supplies.

The Risk Explorer Tool is useful for helping determine overall drought risk trends and vulnerabilities across broad block-level areas, but its effectiveness for providing risk evaluation at the household level and incorporating specificity into its overall risk evaluation is limited. While the RC indicator model and methodology are comprehensive and the result of a large, coordinated effort of experts and a diverse group of stakeholders, there is inherent variability within the units of analysis. The Tool is unable to comprehensively communicate risk through an aggregated score based on census block groups.

The variability between household wells within the same block group is hard to quantify. Water quality is specific to individual well locations, underlying geology, proximity to potential contaminants, and the presence of salinity. For instance, a single property with multiple wells can have different water quality from well to well, along with different productivity and risk. Importantly, household and private well data is only as accurate as the reporting and record keeping. Some households and communities may be averse to reporting the presence of a well or outages for a variety of reasons, from lack of trust in government institutions to language barriers or simply being unaware of reporting tools or requirements.

Examining the individual Risk Components from the Risk Explorer Tool, putting them into context using County-specific knowledge, and engaging additional resources will complement the Risk Explorer Tool's data sets and maximize the effectiveness of the County's drought planning and response. Section 4 expands on these ideas through the proposed Action Plan.

The County can use the analysis using the DWR water shortage risk tool to identify areas with higher risks associated with drought and water shortage conditions providing a starting point for drought mitigation and response measures.

2.3. California Groundwater Information

DWR's GWLive (https://sgma.water.ca.gov/CalGWLive/) is another online resource that provides additional groundwater information through a suite of dashboards to assess the state's latest groundwater information on groundwater conditions, groundwater levels, well infrastructure, and land subsidence. The Well Infrastructure section of GWLive includes dashboards to help identify the location of individual domestic wells, their susceptibility to going dry, and a record of well characteristics and reliability.

DWR's GWLive uses Geographic Information Systems (GIS) "story maps" (https://storymaps.arcgis.com/stories/f2b252d15a0d4e49887ba94ac17cc4bb) for spatial analysis of California groundwater resources, based on data from Well Completion Reports (WCRs) to DWR's Online System of Well Completion Reports (OSWCR). These maps are valuable for determining a well's location, depth, age, and other defining characteristics, as well as assessing susceptibility and patterns of outages. GWLive can help the County evaluate future risk for Self-supplied communities with greater spatial detail than the Drought Risk Explorer Tool described in Section 2.2. The following sections present information available through the GWLive tools used for the preparation of this Drought Plan: Domestic Wells, Irrigation Wells, Public Water

Systems, and Reported Dry Wells. Information regarding Dry Domestic Well Susceptibility within Groundwater Basins and the County is also available if needed.

DWR's GWLive provides a wide variety of well data for the County to get more detailed information about all well types including domestic, irrigation, public water system, and dry wells (left to right in the diagram below).

Figure 2-5. GWLive Example Well Type Data

This section includes the latest information on the well infrastructure in California. Information for domestic and irrigation wells is based on DWR's Online System for Well Completion Reports, and information for public supply wells is based on data from the State Water Resource Control's Division of Drinking Water. The County or other users can click on the well icon above (once on the GW Live website) based on well information needed to explore the interactive and user-friendly dashboards, that detail California's well infrastructure.

2.3.1. Domestic Wells

Below is an example of querying domestic wells using the GWLive website in Tehama County. If needed, domestic wells can be categorized by specific well depths or parameters.

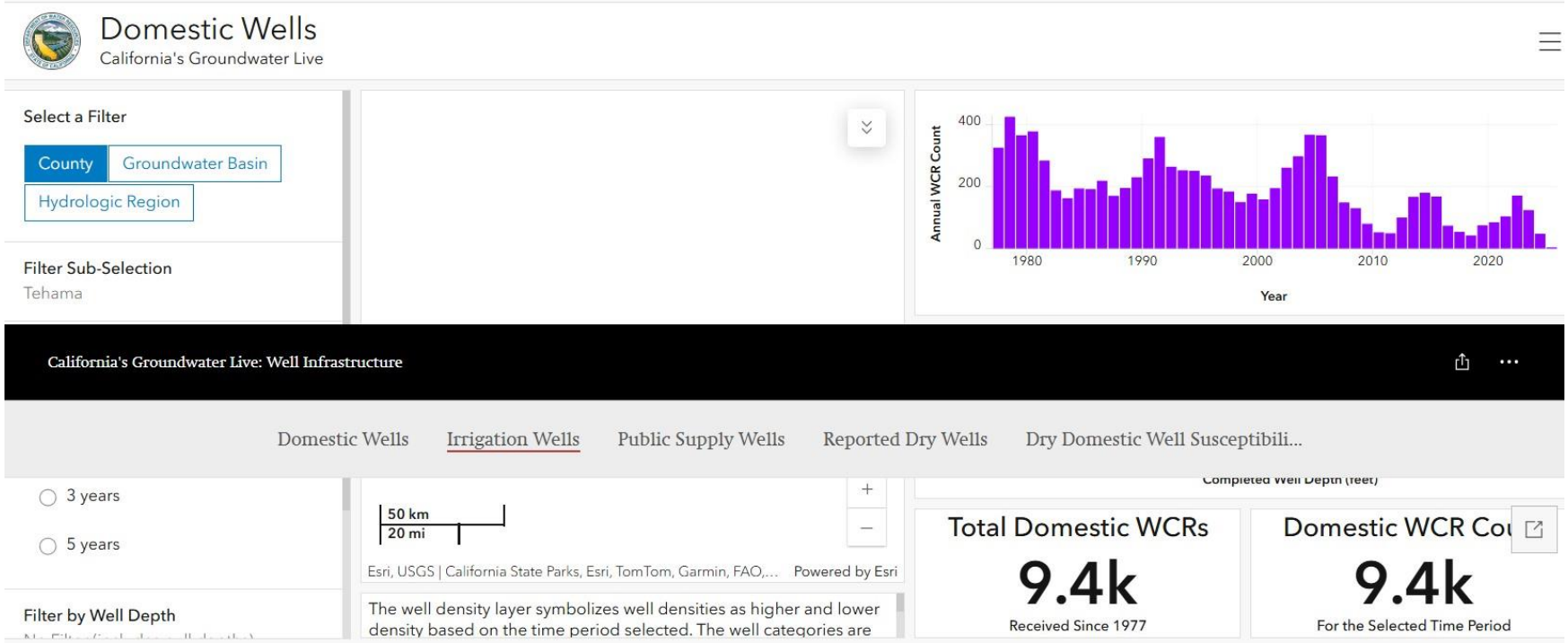


Figure 2-6. Example Domestic Well Query Using GWLive Website in Tehama County

The location of domestic wells, along with the details filed in the OSWCR, is useful to understand where wells are concentrated in the County and what communities rely on domestic and private wells. The Domestic Wells Tool in GWLive pulls information from the state's Well Completion Reports, which have been required for every person who "digs, bores, or drills a water well" by California Water Code § 13751 since January 1997. Key pieces of information include the total depth of the well and the depth of water in the well.

2.3.2. Irrigation Wells

Below is an example of querying irrigation wells using the GWLive website in Tehama County. Irrigation wells can be categorized by specific well depths or parameters if needed. Irrigation wells may include those drilled to greater depths to meet well irrigation needs.

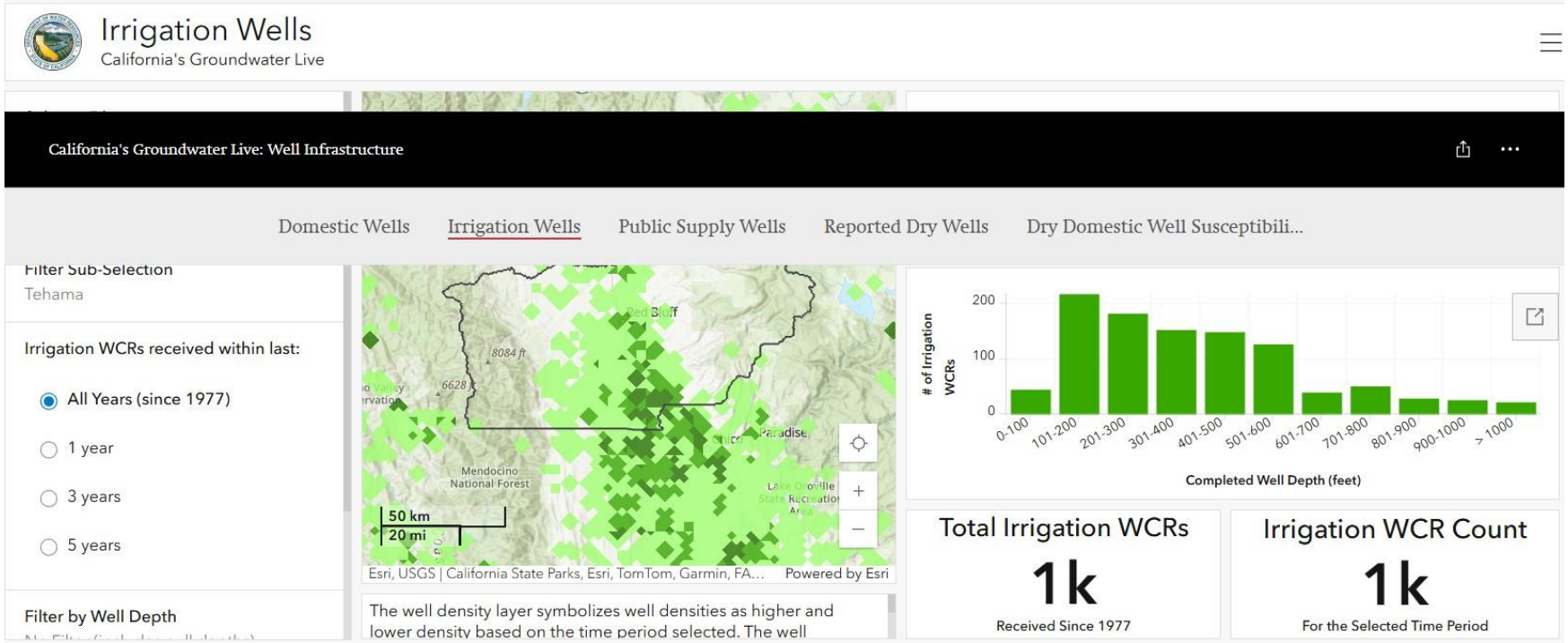


Figure 2-7. Example Irrigation Well Query Using GWLive Website in Tehama County

2.3.3. Public Supply Wells

Below is an example of querying public supply wells using the GWLive website in Tehama County. Public supply wells typically serve larger populations and are tracked by DWR and each County. Information on public supply wells is typically well documented, and data is easily available through various public water system reporting processes.

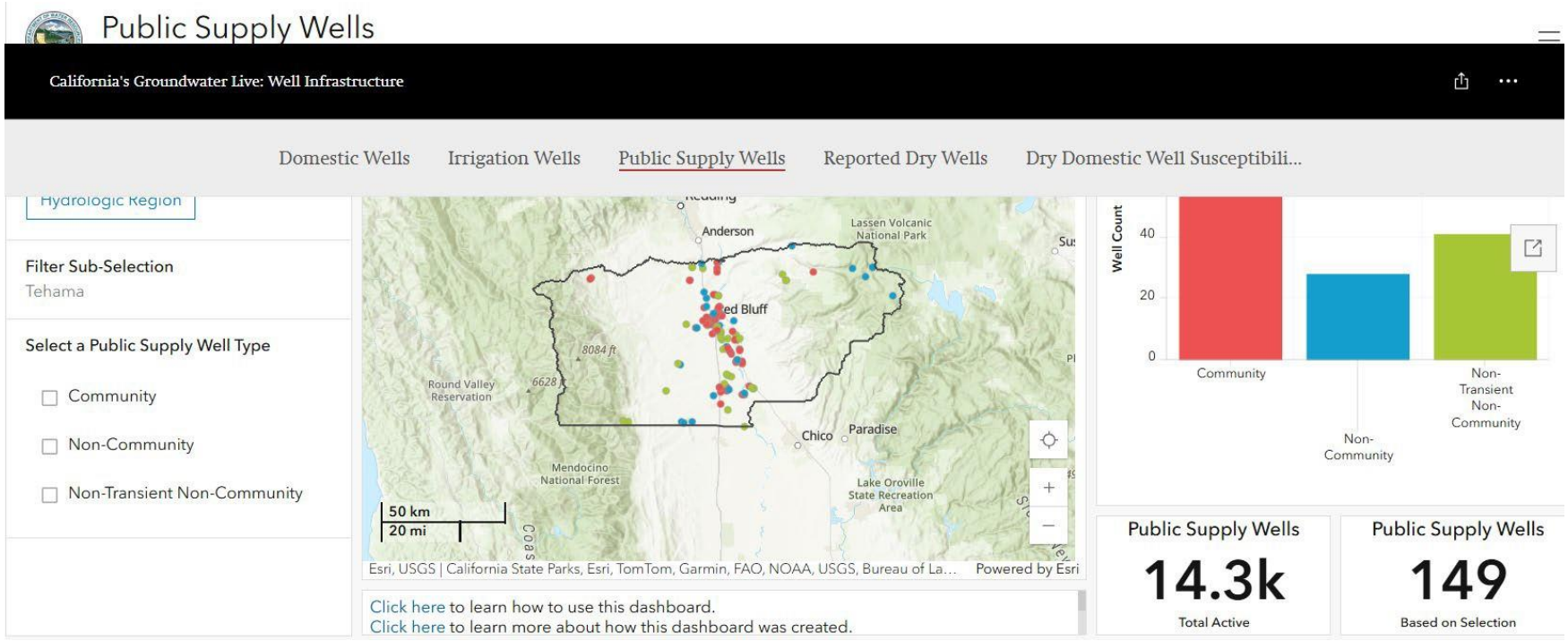


Figure 2-8. Example Public Supply Well Query Using GWLive Website in Tehama County

2.3.4. Reported Dry Wells

Below is an example of querying reported dry wells using the GWLive website in Tehama County. Dry wells are tracked by DWR and by each County.

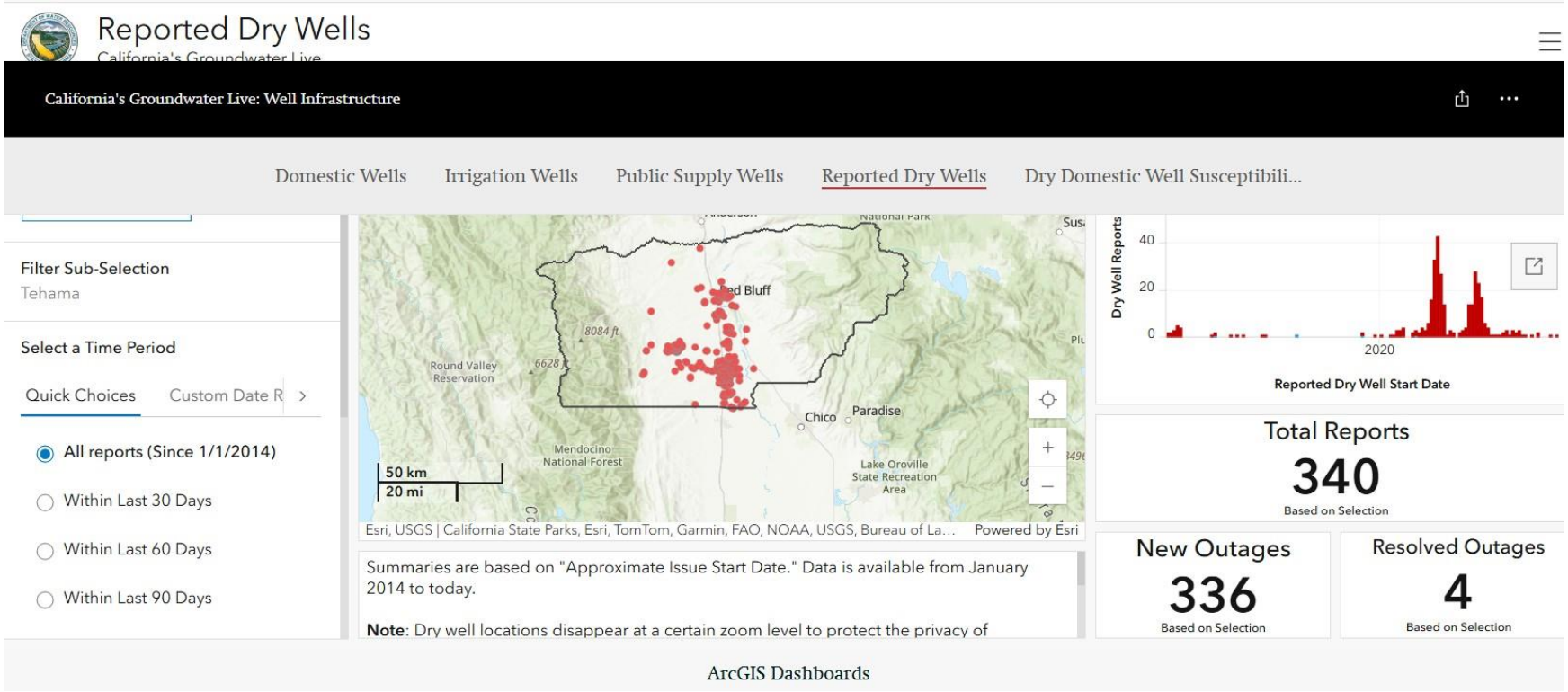


Figure 2-9. Example Reported Dry Wells Using GWLive Website in Tehama County

The GWLive Reported Dry Wells tool is intended to inform state, county, and local agencies of drought impacts on household water supplies. If households are experiencing issues with well production, they should be encouraged to complete the Dry Well Report Form. Data collected includes contact information of the household reporting the issue, water shortage issue, location, and well-log data. This data is displayed on a map with the specific locations of reported dry wells. Filters allow users to select a designated time period within the last year or see all dry well reports from 2014 to the present. The Report Type filter shows either reported dry wells, resolved dry wells, or both as needed to be plotted on the map. Clicking on the individual report on the map shows the individual well detail that is issued, including the basin and subbasin name. Resolved Outage reports indicate that a well that reported an outage in the past was updated during the report time period selected as having started producing water again.

Using the Reported Dry Wells Tool to identify geographic and basin-specific trends can help risk assessment for nearby wells, especially when combined with data regarding well depth and reported depth of water in the well. Households are also given homeowner resources such as links to contact the County's Office of Emergency Services, well contractors, and County well permit application links in case of a need to refurbish or drill a new well.

2.3.5. Well Inventory-Data Summary

The bottom line is that the DWR GWLive website is a very useful tool for the County to use in assessing the well infrastructure that is in place, utilizing local groundwater resources to better understand how groundwater can be managed within the safe yield of local groundwater basins. Using the data in DWR GWLive will assist the County in developing and updating water resource policies and programs that reflect the best available well information. As more local well data is collected, this will, in turn, assist the County in reviewing and updating well-related policies to minimize the drought and water shortage impacts on water users and self-supplied communities within the County.

2.4. SAFER Drinking Water Needs Assessment Dashboard

The SWRCB has implemented the SAFER program, which provides a set of dashboards, funding sources, and regulatory authorities designed to assist Californians who currently lack safe and affordable drinking water in a timely manner. This is accomplished through the identification of public water systems and domestic and private wells that are considered "at-risk" of failing. Therefore, the SWRCB can proactively target these areas through technical and financial assistance. Information on the SAFER Drinking Water Needs Assessment dashboards can be found here:
https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/saferdashboard.html

According to the SAFER Drinking Water Needs Assessment Dashboard, the Failing systems are identified based on Monitoring and Reporting Violations, Primary Maximum Contaminant Level (MCL) Violations, Secondary MCL Violations, Treatment Technique Violations, or E. coli Violations. When a water system fails to conduct regular monitoring, fails to address MCL violations, or does not follow the required treatment techniques to reduce risk from contaminants, the system is considered failing.

In accordance with federal regulations, public water systems are required to sample water sources to determine compliance with drinking water standards. In the County, all well drilling activities require a permit from Tehama County Environmental Health Department (EHD). However, after initial well

construction, only State Small Water Systems (5-14 service connections) are required to regularly monitor and report water quality data to the Tehama County Environmental Health Department (TCEH) does not have any ongoing regulatory oversight authority over domestic wells and self-supplied residences, so TCEH cannot monitor water quality data for all these wells.

The water systems included as part of the SAFER Drinking Water Needs Assessment Dashboard Map are organized by various risk categories, including Failing, At-Risk, Potentially At-Risk, Not At-Risk, and Not Assessed. For state small water systems, the risk status is based on aquifer risk reflecting the drinking water quality. In addition, the SAFER dashboard database search can be filtered by the number of service connections and population within a county or city. The map display is useful for visually seeing the identified service connections with their respective SAFER status (based on available information at the time of the analysis).

Using the SWRCB online database tools can help counties determine the individual facilities and communities that are at risk and/or failing. Based on the SAFER mapping tool results, the number of water systems at risk is shown, along with the associated risk status as of December 2024. There are roughly 9,500 residents who rely upon a small water system for their potable water supply in the County at risk. Out of the small water systems identified, two systems are considered failing, one system is at risk, and six 6 systems are not at risk. Recognizing the reasons for a specific water system to be at-risk can help create a strategy for future action to reduce risk. Every failing system identified within the County resulted from a water quantity, water quality, or accessibility risk category (or combination thereof). While the water quality challenges documented by the SAFER tool are not necessarily caused by drought, water systems that are currently addressing water quality issues may be at heightened risk of water shortage during droughts, when alternative water supplies are least available. The SAFER tool provides additional useful context when evaluating drought risk in the County.

A snapshot summary of the SAFER dashboard results for Tehama County (2024) is as follows:

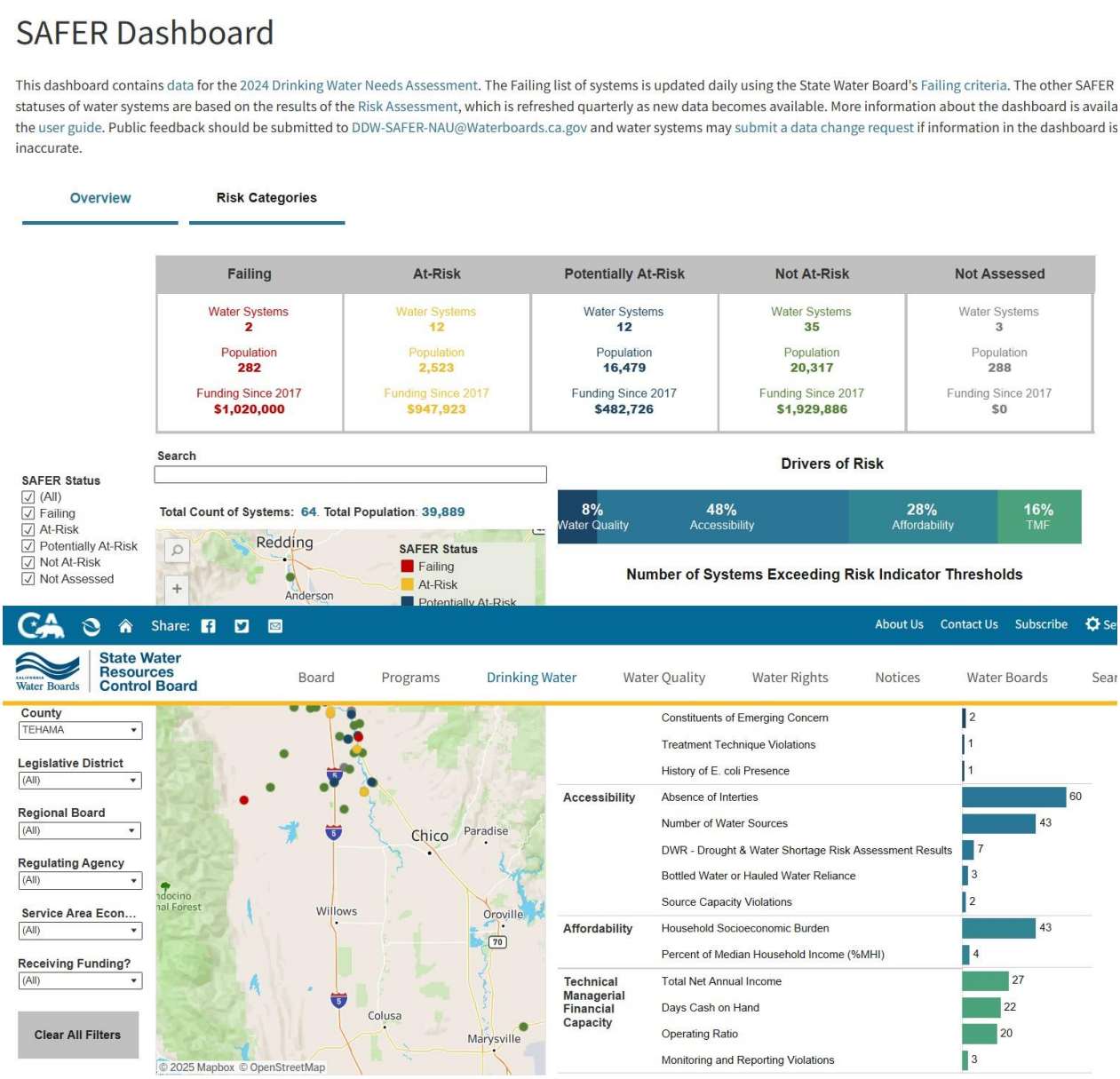


Figure 2-10. Example of SAFER Dashboard Results for Tehama County

2.5. Community Stakeholder Engagement

Stakeholders in the County were given the opportunity to comment on the draft contents of this plan through meetings of the County's Drought Task Force through calendar year 2024 and Spring 2025. The Drought Task Force meeting agendas and material handouts provided to Drought Task Force members in advance of scheduled meetings. Some of the comments received during the Drought Task Force Meetings included providing drought monitoring benchmarks or indicators as part of an early warning system of emerging drought conditions, continuing the emergency water supply program during future drought conditions, continuing the well enhancement program to deepen shallow wells where feasible and continue to evaluate increased use of surface water supplies when available to reduce long-term drought impacts on groundwater users.

The project website established for developing the County's SB 552 compliant drought resiliency plan will continue to be used for project implementation to work with the Drought Task Force in proactively addressing future drought and water shortage conditions, including how to report dry wells, request emergency water supplies, and receive stakeholder engagement materials and information. Stakeholder engagement will be focused on areas that are more susceptible to groundwater quality issues, some of which originate from naturally occurring contaminants such as arsenic and chromium 6 that are found in fractured rock aquifers. In contrast, Stakeholders noted that many of the Valley Floor communities face risks associated with long-term groundwater declines that are not simply caused by a single dry year.

Throughout the County, the age and maintenance status of domestic wells were identified as a major factor causing dry wells and/or well service interruptions. Many wells have not been regularly serviced and maintained, which makes the individuals and communities that rely on these wells more vulnerable to service interruptions. Well location, construction characteristics, and installation date were suggested as important factors that may be useful for predicting future service interruptions. There was general agreement that maintaining the project website as a communication portal for drought-related actions would be helpful for assisting those at higher risk during drought and water shortage conditions, and adding an App allowing cell phone access for areas lacking broadband internet access could be helpful.

2.6. Risk Summary and Conclusions

The analysis presented in Section 2 indicates that Tehama County faces a variety of risks related to drought and water shortage. The Drought Risk Explorer Tool highlights multiple intersecting risk factors facing communities, including long-term groundwater declines, climate change, and social vulnerability. In particular, the risks faced by communities in the Valley Floor, within the Tehama GSA service area, and the white areas outside of GSA service areas within the County are quite different. The County faces periodic surface water supply cutbacks, declining groundwater levels and storage in some areas, periodic well failures, and dry domestic well susceptibility, which are among the key indicators of drought and water shortage risk. Domestic wells drilled into areas of high groundwater use or adjacent to large groundwater users face heightened risk.

DWR's GWLive Dashboards provide additional details on drought risks to domestic wells in the County. There is a high degree of domestic well reliance, including many wells that are relatively old or

shallow. The County has experienced increases in the number of domestic well outages during recent droughts, with those outages often concentrated in specific communities. Many of these same communities may be highly susceptible to future domestic well outages because well depths are relatively shallow compared to underlying groundwater levels.

The SAFER Tool focuses on risk drivers such as water quality and accessibility indicators that may not be directly related to drought risk. However, water systems that are currently struggling in these categories may be at heightened risk of water shortage during drought conditions when alternative water supplies are least available.

3. SMALL WATER SYSTEM CONSOLIDATION OPPORTUNITIES

Senate Bill 552 requires the County to consider Water System Consolidation, which is the joining of two or more water systems to improve the water supply reliability and/or quality of drinking water for at least one of the systems. Water system consolidation usually involves a smaller water system being absorbed into a larger system, extending the drinking water infrastructure or the extension of water services to households relying on domestic wells and communities that are not connected to publicly regulated systems with higher technical, managerial, and financial capacity because of the rural nature of Tehama County there may be limited opportunities to achieve consolidation of small water systems.

The California State Legislature passed Senate Bill 88 in 2015, which authorized the SWRCB to facilitate the consolidation of severely underperforming water systems. For water systems that the SWRCB has not designated as severely underperforming, consolidation remains voluntary. The County does not have the authority or desire to compel mandatory consolidation but may support voluntary consolidation where appropriate, cost-effective, and supported by the local agencies involved.

Consolidation can offer substantial benefits that result in improved water system resiliency and customer affordability. The process to achieve a successful consolidation is complex and may take some time to plan and complete. A key challenge for small water systems when considering consolidation is the high costs of providing water service. Typically, a larger water system can achieve consolidation at lower costs for drinking water purposes per individual service by spreading capital, maintenance, and operational costs across a larger pool of ratepayers, which can lower the cost per service connection. Water service rates can be significantly higher for small systems due to outdated infrastructure and deferred maintenance costs that are spread over fewer service connections. Another externality of water system consolidation can be the ability to accommodate planned water system growth within communities and reduce the risk of adverse public health risks to water system customers.

This section of the Drought Plan provides an overview of water system consolidation types and implementation approaches and discusses the communities within the County that have already considered consolidation. It concludes with recommendations and the next steps to guide the County's implementation of consolidation support.

3.1. Water System Consolidation Descriptions

Consolidation can involve a spectrum of collaborative efforts between at least two separate entities that merge mutually beneficial aspects of the water systems involved in the process. Water system consolidation is a high priority for the State of California because it can address drinking water system regulatory compliance issues and improve the technical and managerial capacity of the resulting entity. Consolidations can be implemented at a managerial level, such as merging and sharing of system operations, including administration, monitoring, and billing tasks. Consolidation can also be considered at the physical level, which involves the merging of the physical water system infrastructure, including distribution pipelines, water storage, pumping, and/or water treatment facilities.

3.1.1. Managerial Consolidations

Managerial Consolidation involves the technical, managerial, and financial (TMF) components, where systems combine billing, equipment sharing, and merging staff or consultants into one system. A managerial consolidation can be better suited for two or more systems within 30 miles or less of each other. Because managerial consolidations require the merging of staff and human resources into one system, a consideration of commute time is important. It is suggested that a commute greater than one-hour results in reduced productivity and efficiency.

Smaller systems are less likely to have the TMF necessary to ensure a drinking water system is compliant with state and federal requirements. Rural systems servicing disadvantaged communities, especially when they are largely or entirely reliant on groundwater, may struggle to provide and maintain clean and reliable drinking water. In addition, prolonged insufficient TMF levels can result in the degradation of standards and a higher risk of failure for the system. Hiring experienced staff, maintaining adequate O&M practices, and preparing rate studies on a regular basis are critical factors in determining the real costs of providing water service and adequately maintaining infrastructure assets over their useful lives. A small system may not fully understand the condition of its infrastructure assets and may increase the possibility of system failure because they are unable to maintain or replace infrastructure based on recommended American Water Works Association (AWWA) asset management standards and practices. Small water systems facing TMF challenges may be good candidates for managerial consolidations to enable the consolidated system to achieve regulatory compliance and economies of scale in its capital replacement and Operation and Maintenance (O&M) staffing levels without the cost of constructing new physical infrastructure.

3.1.2. Physical Consolidations

Physical consolidation involves the merging, sharing, or expansion of the physical water system infrastructure, including distribution pipelines, water storage, and/or water treatment facilities. The best candidates for physical consolidation are water systems or privately supplied well communities that are within three miles or less, due to potentially high development costs to connect pipelines and other infrastructure needs. Current experience suggests that these communities within one mile or less of existing higher TMF systems are much more likely to be feasible for a cost-effective physical consolidation approach to avoid potential water system failures or below-standard performance.

3.1.3. Regionalization

Regionalization is the consolidation on a larger scale when two or more water systems or private well communities form into a single regional water system. It can be used when a large geographic area, such as a watershed, an entire county, or several contiguous local water systems or communities, forms into a single combined regional water system. This approach is more legally complex, but the overall goals and outcomes are functionally similar to other consolidation options. The process of regionalization could result in water partnerships, such as formal agreements and joint ventures, that may not require the degree of infrastructure integration associated with physical consolidation. Typically, regionalization will involve an organizational structure (e.g., a Joint Powers Authority or other legal form of regionalization

agreed to by the participating water systems). Assets must be consolidated into regional accounting and documentation, including assets and liabilities for all systems involved.

3.2. Implementing Consolidations

There are a variety of institutional arrangements and structures that can be used to implement water system consolidations. It should be emphasized that consolidation possibilities and feasibility can be a continuous process that reflects the approach (voluntary vs. involuntary) and urgency based on water system risk. Water systems typically review their potential consolidation options and may select the combinations and options for participation that provide the best available solution for their circumstances, which is important when seeking a long-term consolidation solution.

Figure 3-1 below illustrates the combined relationship options between physical and managerial consolidation, such as annexation of unincorporated areas into cities, extraterritorial service agreements, and purchases. There has also been success from the managerial consolidation structures through Joint Powers Agreements (JPAs) and mutual aid agreements, as well as shared accounting and billing, or shared operations functions and staff. Physical options of water exchanges or wholesale agreements, emergency interties (or interconnection), and shared treatment plants create solutions for at-risk communities without access to water.

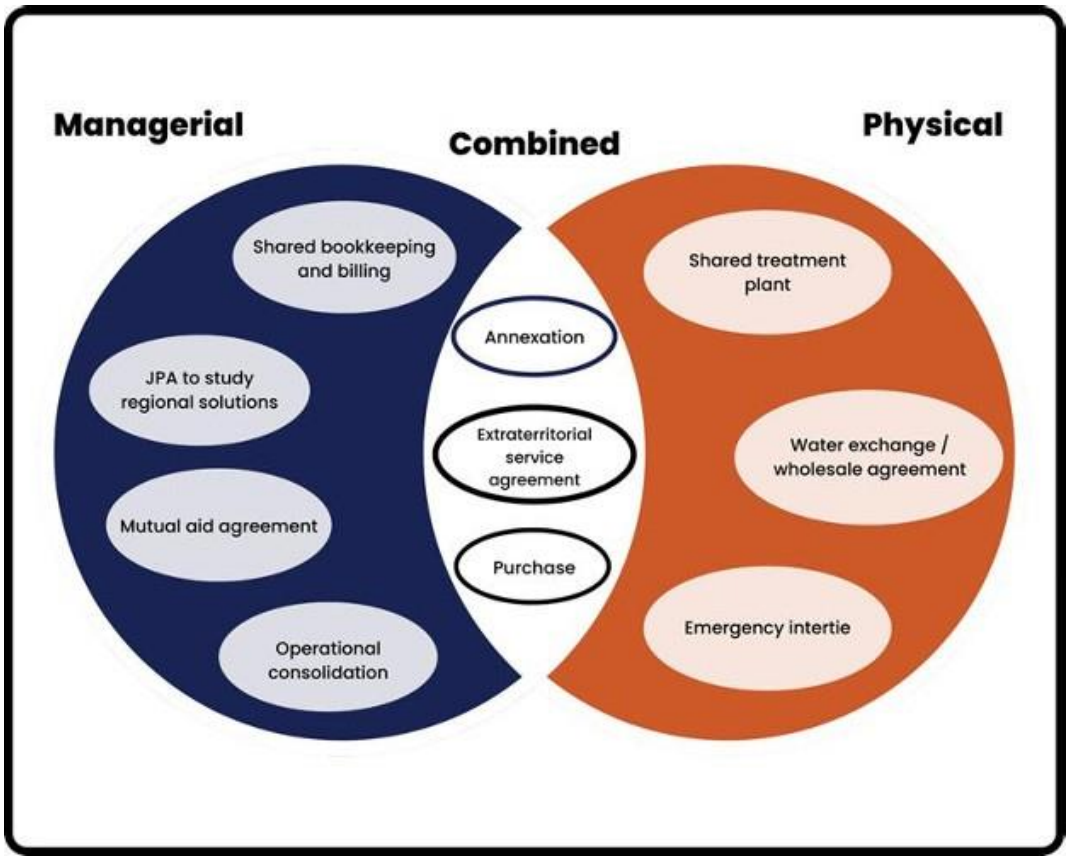


Figure 3-1. Combined Relationship Options between Physical and Managerial Consolidation

3.2.1. Consolidation Funding Sources

Financial incentives and additional support for small system consolidations are in place through the State of California Drinking Water State Revolving Fund (DWSRF) and SWRCB SAFER Programs, which can expedite and facilitate the implementation of certain water system consolidations as a function of respective challenges when considering consolidation opportunities. Because water system consolidations can be expensive and can result in short-term rate shock and long-term large water rate increases, funding is an important factor in achieving progress and successful consolidation implementation results. Funding and grant opportunities may be available for certain water system consolidation purposes through DWR and the SWRCB DWSRF Program, which currently prioritizes Category A-C projects for funding, with consolidation being ranked as a high priority for selecting projects to be funded in a timely manner. The SWRCB also established the SAFER program to fund small systems at risk of failure or potential failure (including consolidations), with local and regional funding solicitations available for eligible partner entities to receive funding for regional programs related to drought or contamination issues with small water systems. The eligible project types to receive funding include those with a higher ranking in the SWRCB water need assessment process, who may already have domestic well testing or interim water solutions in place, including delivered bottled water and hauled water measures, provisions for emergency water storage tanks, and POU/POE systems. Funding programs for long-term water system solutions, such as well replacements or limited-scale consolidations, are available through the SWRCB. Applications can be prepared by eligible applicants interested in water system consolidation and submitted using the SWRCB's Financial Assistance Application Submittal Tool (FAAST). Additional funding may also be available through the Integrated Regional Water Management (IRWM) grant program, but the future of the IRWM program is uncertain at this time. Funding may also be available through the DWR Small Communities Program, which is currently unfunded and has a long project waiting list. Ultimately, the availability of outside funding support will affect the feasibility and implementation success of most small water system consolidation projects.

3.2.2. Community Outreach and Support Strategies

Communities that are interested in water system consolidation should include the community in the planning and feasibility stages of the water consolidation process to ensure that ratepayers have access to important and relevant project information and data. Outreach and support, tailored to the specifics of each small system water consolidation process, is a key ingredient for consolidation success by providing access to key project information throughout the process to ensure there is local support for the consolidation approach to achieve a sustainable, long-term solution with acceptable risk. The information can include water system conditions and risks, the ability to comply with water regulations, financial liabilities and risks, and public health and safety benefits that can mitigate current water system threats and risks. The information would objectively state the overall goals and objectives of small water system consolidation with materials that are accessible to those impacted. The County's involvement will vary based on the proposed consolidations under consideration and what type of assistance is needed to complete a given consolidation project.

Direct Support

Agencies within Tehama County and the Sacramento Valley continue to directly support the communities impacted by drought and water shortage condition risks with solutions such as interim water hauling and bottled water services, emergency water supply storage tanks, technical assistance for emergency solutions, and ongoing information and assistance for domestic well owners to maintain and sustain their supplies. Providing continued assistance and services to small water systems within the County during future drought and water shortage conditions is going to be subject to funding availability.

3.2.3. Challenges to Consolidation

Consolidation can be challenging when the customers of the water system incorporated into a larger system are reluctant to give up the independent autonomy of their current system management approach. There is a range of consolidation options available to enable a small water system to retain some autonomy that comes from the spectrum of possible institutional arrangements, which are illustrated in **Figure 3-2** below.

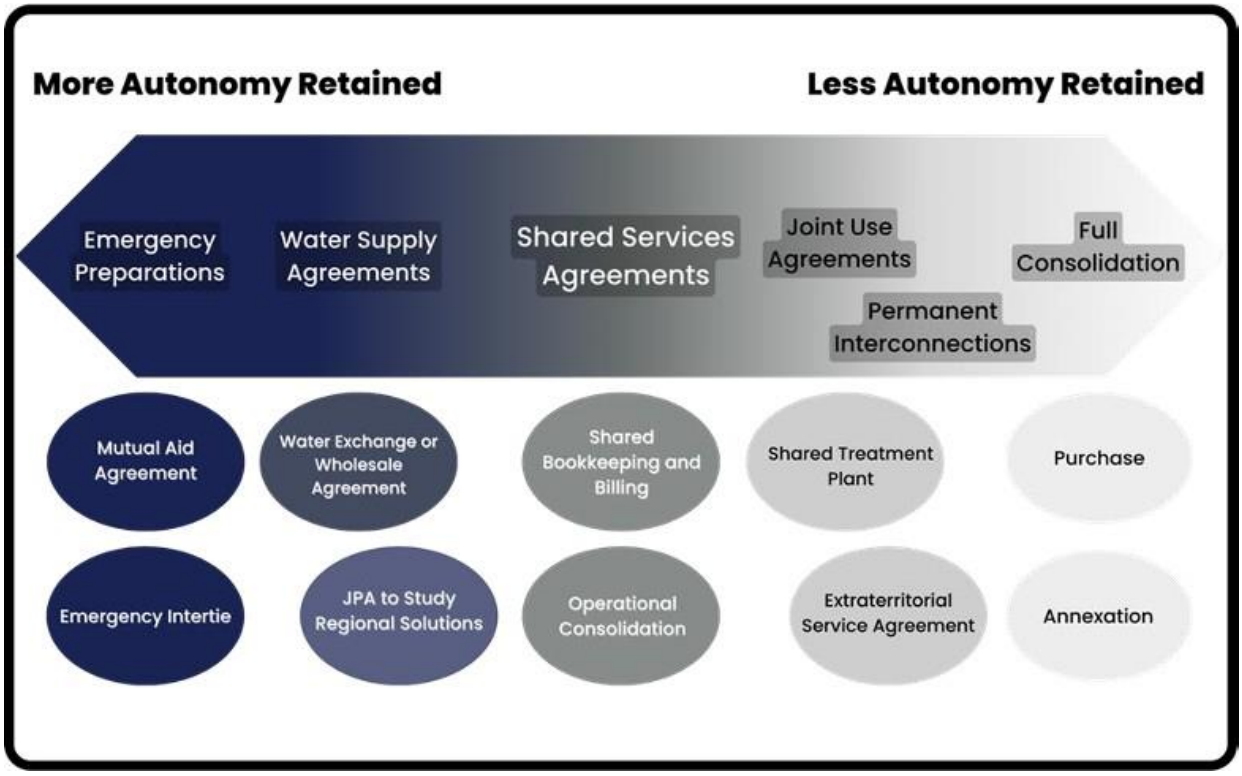


Figure 3-2. Consolidation Options for Autonomy

Defining the level of autonomy a small water system would like to retain for a given consolidation project should be considered to reflect the best solution available to those involved in the process. Depending on the acceptable arrangement, the level of local control may vary for a given project. A realistic approach could start with a managerial option that can provide some operational savings, build partnerships, and further develop relationships before fully moving towards a physical consolidation or regionalization approach.

It should be noted that, depending on the funding mechanism involved, the consolidation may be contingent upon the levels of consolidation and autonomy required to secure funding. It is important for communities involved to understand these tradeoffs when considering the consolidation of their water system. Consequently, a receiving system and its residents may resist consolidation efforts due to a reluctance to take on the debt, tax liability, and/or non-compliance penalties accrued by the small water system. These concerns highlight the necessity for accurate information regarding the costs and benefits, local water security, and improved economies of scale for all systems involved in the consolidation project before proceeding with the construction phase of work.

3.3. Opportunities for Consolidations

The County has assessed the opportunities for consolidation based on past water resource planning efforts. The geography in the County includes several urban or developed areas that are geographically disaggregated with no service areas within one mile of another's respective service area boundaries. This includes the cities of Red Bluff and Corning, Rio Alto Water District, Los Molinos Community Services District, Gerber Las Flores Community Services District, R-Wild Horse Ranch, Mineral County Water District, and Rio Vista Mobile Home Park. The list of urban or developed areas is included in **Table 3-1** below.

Table 3-1. List of Tehama County Urban Developed Areas

Urban Area Entities		Population	Water Connections	Acres
1	City of Red Bluff (GW)	14,413	4,853	4,915
2	City of Corning (GW)	8,244	2,436	2,240
3	Rio Alto Water District (GW)	3,329	1,418	1,000 (est.)
4	Los Molinos CSD (GW)	1,590	373	1,408
5	Gerber Las Flores CSD (GW)	1,200	400	832
6	R-Wild Horse Ranch (GW)	1,055	30	-
7	Mineral County Water District (GW)	634	186	-
8	Rio Vista Mobile Home Park (GW)	543	195	-
9	City of Tehama	418	150	-
	TOTAL	**31,428**	**10,041**	**9,000 (est.)**

When looking at potential consolidation opportunities, the following five criteria are considered to determine which consolidation opportunities seem the most feasible.

Connection Charges – may be a substantial cost item

Connection Infrastructure – may be expensive, depending on the infrastructure

Existing Infrastructure – Is it easy to connect the water systems

Existing Debt – must be considered in the cost of consolidation analysis

Water Rate Comparison – rates may be after consolidation

Since 2017, the SWRCB has completed 33 water system consolidation projects that have improved TMF capacity, water system regulation compliance, and system resiliency. Based on feedback from other entities who have participated in water consolidation projects, the consolidation challenges that are typically encountered are listed below.

- Customers don't want to pay monthly water bills
- Customers lack the technical and operating skills to operate a water system
- Addressing water quality issues requires outside assistance
- Connection costs from the larger system – between systems and parcel level
- Customer mindset to save the well for future generations
- Lack of space to install treatment systems
- Rural sections of the County are a challenge; urban areas are easier
- Short-term measures to consider

The County will focus its efforts on further identifying the communities or systems that are susceptible to dry wells to promote and facilitate the managerial and/or physical consolidation processes. The Drinking Water System Outreach Tool is an additional database that maintains records of completed consolidation projects. This database may be helpful in determining future consolidation possibilities. The County will continue to discuss possible consolidation opportunities with urban area suppliers and coordinate with Environmental Health on drinking water systems, small systems, and/or domestic wells that are failing or have the potential to fail as targets for future consolidation opportunities. **Appendix F** contains considerations the County would utilize in assessing potential water system consolidations, as well as State consolidation guidelines.

3.4. Conclusions and Next Steps

To support and navigate the coming challenges that drought will create on small water systems and domestic well owners, the County (in accordance with department objectives and SB 552 directives) will continue to encourage water systems to take proactive steps to ensure resilience, prepare for emergency situations, and respond to consolidation efforts where feasible. The County may assist with planning outreach and educational opportunities and implement support strategies to provide interim and permanent solutions to assure water availability for all communities and water users.

The County acknowledges that water consolidations are challenging and for any consolidations to be feasible must be supported by outside funding sources. To that end, consolidation funding will be a key element to discussions with communities and stakeholders who could benefit from consolidation to improve drought resiliency where cost-effective. The County's Drought Task Force will continue to discuss consolidation opportunities as a drought mitigation strategy and develop plans for implementation wherever feasible that may involve domestic well, small system, and/or urban area users and systems.

4. SHORTAGE RESPONSE ACTIONS

The County is not a large water purveyor directly responsible for managing water supplies or planning to ensure water supply reliability. The County owns and operates a few small community water systems. Other Special Districts and urban suppliers provide other legal and fiduciary responsibilities to assist with the general provision of water services to their customers, including the availability and reliability of water for agricultural and urban water uses and consumption. Before and during drought events, the County of Tehama can take actions that improve the County's preparedness for drought, reduce the risk of water shortages, and coordinate response actions to relieve or mitigate drought impacts. SB 552 requires the County to provide emergency and interim drinking water solutions and consider domestic well drinking water mitigation programs. The focus of the County's drought and water shortage response plans is on domestic and self-supplied communities (also called "rural communities), which are supplied by water systems with 14 or fewer service connections. Small systems and domestic well owners tend to be the most impacted during drought and water shortage conditions and, therefore, need County assistance during these periods.

Section 4 of this Drought Plan is intended to identify and evaluate both short- and long-term drought and water shortage response and mitigation actions that will reduce the impact on water users during future drought and water shortage conditions. The County will identify and evaluate potential actions that can be used by County staff to coordinate and assist with drought response actions both prior to and during drought and water shortage conditions. These actions will serve as an action plan to be implemented during drought conditions, and other actions will require additional County staff review and development efforts, including updating existing County policies and programs, following approval by the County Board of Supervisors. County staff will work collaboratively with stakeholders and those impacted by County policies before requesting Board approvals. County staff will coordinate its actions before and during drought conditions to mitigate drought impacts on those most impacted, with implementation presented in Section 4, organized in stages of increasing severity.

4.1. Primary Risk Factors

As described in greater detail in Section 2 of this Drought Plan, the County has taken steps to assess potential drought and water shortage risks. The following risk factors represent the most serious threat to the reliability of water supplies for water users in Tehama County including rural communities.

4.1.1. Declining Groundwater Levels

Over recent decades, groundwater levels in the Tehama GSA Subbasins within the County have experienced declining groundwater levels associated with declining groundwater storage. Groundwater declines often accelerate during droughts and may not fully recover during subsequent normal or wet hydrologic periods. The GSPs for the Tehama Subbasins underlying the County have identified actions that should correct these declines and return groundwater levels to meet sustainability metrics within the context of SGMA legislation and requirements.

4.1.2. Surface Water Supply Cutbacks

There are a variety of surface water-related water rights allowing surface water to be used under certain hydrologic conditions. During drought and water shortage conditions, there are surface water supply cutbacks that may result in increased groundwater use to enable beneficial water uses to occur. Certain drought and water shortage response actions may be triggered due to future surface water supply cutbacks, depending on their severity and duration.

4.1.3. History of Well Failure

According to California Groundwater Live, 338 dry wells were reported in the county from 2014 to 2022. Of these, several have been repaired due to pump failure. This is likely an undercount, with more wells going dry than are reported to the State. The majority of recent well failures have occurred during the summer and fall months of severe drought years, such as 2015 and 2021. In the County, fifteen (15) well failures have been replaced by the landowner or deepened/reconstructed to allow well operations without risk of future well failure. Confirmed well failures are an important metric to monitor on a regular basis. More information on dry well reporting is contained in Appendix G.

4.1.4. Dry Domestic Well Susceptibility

DWR has provided a tool on its GWLive portal that compares current groundwater level conditions to available information on domestic well locations and depths. According to this tool, the County contains many areas with a high dry domestic well susceptibility, including some areas above the 90th percentile of risk. Domestic wells that are relatively shallow compared to groundwater levels are at greater risk of going dry.

4.1.5. Domestic Wells

There are more than 9500 domestic wells in Tehama County. Based on known information, domestic wells are typically developed to depths between 50 and 200 feet. Domestic well owners may have shallow wells that are at risk of going dry during severe drought and water shortage conditions. Another risk is pumping interference, where a small domestic well, if located near a larger production well, can cause higher than normal drawdown in the domestic well water levels, increasing dry domestic well susceptibility. The County has updated its well inventory database to help identify areas of risk for domestic wells and is working to identify opportunities to replace and/or reconstruct older wells based on updated information to avoid future water supply interruptions. Adding some domestic well-monitoring locations could be useful in identifying high-risk wells and assisting the County in developing cost-effective mitigation solutions.

4.1.6. Social Vulnerability

Communities and individuals vary not only in their exposure to drought risks but also in their ability to cope with impacts when water shortages occur. Factors such as income, English fluency, age, education, and whether residences are rented or owner-occupied can all affect an individual's ability to access support and resources during water shortages. Based on DWR's risk tools, the County contains some socially vulnerable areas that measure highly on one or more of these social vulnerability metrics,

specifically in areas that have a high degree of Dry Domestic Well Susceptibility. In addition, some areas also lack reliable broadband connectivity, especially in remote areas of the County, which adds challenges for the County to communicate risks and learn about water supply interruptions or physical risks (e.g., pump failure).

4.2. Monitoring And Tracking Protocols

Through the risk assessment and stakeholder engagement processes described in Section 2 of this Drought Plan, a number of key metrics were identified that can be used to measure drought and water shortage severity and trigger the response actions identified below. All the tracking protocols identified in this Drought Plan can be monitored on a regular, ongoing basis. The framework of tracking protocols and the level or magnitude of response actions are summarized in **Table 4-1** below.

Table 4.1. Tehama County - Drought Tracking Measures

Drought Stage	Rainfall Totals	Groundwater Declines	Dry Wells Reported (DWR + County)	Sac. Valley Water Year Index	CVP Water Supply Cutbacks	Drought Response Actions
1	Normal, Above Avg.	0 wells below MTs	< 5 per month	Wet, Above Normal	0 - 25%	Long-term Resiliency Actions
2	Up to 30% below Avg.	10% wells below MTs	5-10 per month	Below Normal, Dry	25 - 50%	Moderate Drought
3	> 30% below Avg.	> 25% wells below MTs	> 10 per month	Dry, Critically Dry	> 50%	Severe Drought

Rainfall Totals: The locations include the City of Red Bluff and Northern Sierra 8-Station Index (up watershed). Other locations can be added.
Groundwater Declines: Based on monitoring of Tehama Well Monitoring Network (locations within Tehama County). Wells can be added to fill gaps or improve data.
Dry Well Reporting: Based on County and DWR dry well reporting with confirmation. Areas of higher risk will be identified.
Sac. Valley WY Index: Bulletin 120 Sac. Valley Index indicating water year type - W = Wet, AN = Above Normal, N = Normal, BN = Below Normal, D = Dry, C = Critically Dry.
CVP Supply Cutbacks: Each year, the USBR assesses water conditions and sets allocations for CVP deliveries. Cutbacks are based on drought severity.

If a particular risk metric and/or a combination of metrics are found to be above a staged threshold, the County will have the option to activate the corresponding drought and water shortage response actions. If the tracking protocols described below indicate that a particular region or area within the County is experiencing the greatest risk of drought impacts, response actions will be concentrated in that highest-risk area. The County has the option of implementing response measures on a county-wide basis or within designated areas of high risk, depending on water conditions and other factors. If the County determines that response actions are needed to mitigate drought and water shortage-related water user impacts, it will

coordinate with the Drought Task Force, Groundwater Commission, Tehama GSA, and other entities in the County.

There are several reasons and scenarios that drought and water shortage response measures may be triggered. **Table 4-2** highlights the different scenarios under which the County or other entity may trigger drought and water shortage response measures.

Table 4-2. Tehama County - Possible Drought Triggers

Drought Trigger	Domestic Well Owners	Urban Areas	State Small Systems	Ag-GW	Ag-GW & SW	Response Actions
Local Water Supply Shortage	x	x	x	x	x	Local
State-Imposed Water Shortage		x				Regional
Regulatory Water Shortage				x	x	Imposed Area
Natural or Man-Made Disasters	x	x	x	x	x	Impacted Area
(power failure, dam breaks)						

Local Water Supply Shortage: Examples - well pump failure, well casing collapse, sanding, water quality degradation, interference, energy interruption, and others.
State-Imposed Water Shortage: An example is the SWRCB state-wide urban cutback policy (up to 28%) in 2015.
Regulatory Water Shortage: An example is SGMA legislation compliance if there are subsidence and/or groundwater overdraft conditions.
Ag-GW = wells only source, Ag-GW&SW = wells and surface water supplies available.
Response Actions: The county will structure drought and water shortage response actions based on drought triggers and corresponding drought or shortage impacts on water users in the county.

The County will tailor drought and water shortage response measures based on the reason(s) why drought and water shortage measures were triggered in the first place, and who the lead entity would be, depending on the water use sector being assisted.

4.2.1. Rainfall Totals Metric

Tracking changes in seasonal and annual rainfall data can be very useful in determining if the County is experiencing drought and water shortage conditions. It is recommended that the County track local rainfall data (e.g. for the City of Red Bluff) as well as the 8-Station Index (up watershed) rainfall data to assess changing water conditions with respect to drought response stages in **Table 4-1**.

Stage 1 – Long-term Resiliency

Annual and seasonal rainfall data will be tracked locally (e.g., City of Red Bluff) and regionally (8-Station Index), with rainfall data within the average or above average range based on historical data.

Stage 2 - Moderate Drought

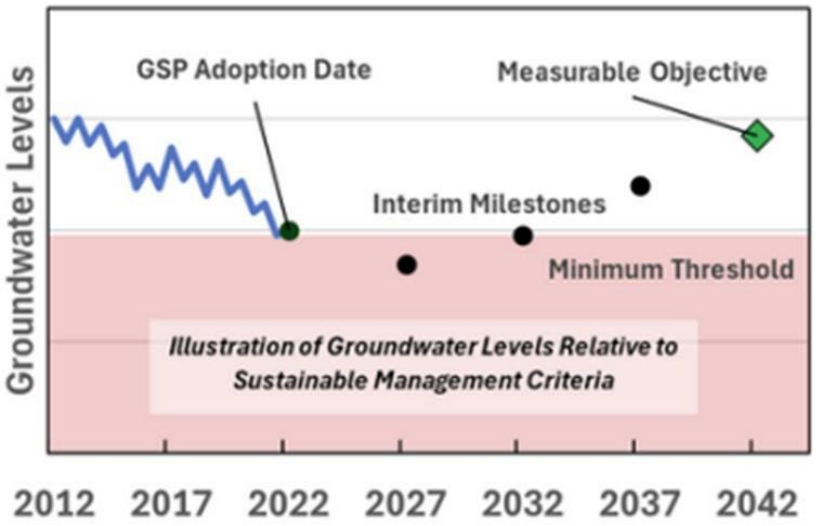
Annual and seasonal rainfall data will be tracked locally (e.g., City of Red Bluff) and regionally (8-Station Index), with rainfall data within the below-average range, down to 30% below-average range based on historical data.

Stage 3 – Severe Drought

Annual and seasonal rainfall data will be tracked locally (e.g., City of Red Bluff) and regionally (8-Station Index), with rainfall data more than 30% below the average range based on historical data.

4.2.2. Groundwater Levels Metric

Tracking groundwater level changes from previous years in alluvial groundwater basins can be useful in assessing current groundwater levels relative to the previous year's conditions, which can be important in predicting the risk of water shortage, especially for self-supplied communities. If groundwater levels drop below the elevation generally accessed by domestic wells, there is a significant risk that those wells will run dry. The Tehama GSA, serving as the Groundwater Sustainability Agency in Tehama County, is responsible for maintaining and collecting groundwater level data within the County and can provide the most accurate and up-to-date information on groundwater levels within the GSA service portion of the County. Each year, by April 1, SGMA requires GSAs to release their annual reports. In Tehama County, the Tehama GSA provides information on groundwater levels and changes in levels and storage over time. The goal is to keep groundwater levels above the minimum thresholds (MTs) for each monitoring well location on a regular basis. If groundwater levels fall below the MT level in at least 25% of the monitored wells for two consecutive measurements, undesirable results would occur, requiring corrective action by the GSA. The following schematic of the GSA monitoring network data can inform water users if the groundwater levels are being maintained above the approved MT levels.



Groundwater levels, storage, and conditions information is included in the Tehama GSA's Annual Reports which can be found on the Tehama GSA website: https://tehamacountywater.org/gsa/groundwater-sustainability-plans-public-draft/.

Stage 1 – Long-term Resiliency

Groundwater levels are measured in the Tehama GSA groundwater monitoring network wells located within Tehama County, with zero wells below the approved MT levels based on the most recent Tehama GSA Annual Report data.

Stage 2 - Moderate Drought

Groundwater levels as measured in the Tehama GSA groundwater monitoring network wells located within Tehama County with up to 10% of wells below the approved MT levels based on the most recent Tehama GSA Annual Report data.

Stage 3 – Severe Drought

Groundwater levels are measured in the Tehama GSA groundwater monitoring network wells located within Tehama County, with 25% or more wells below the approved MT levels based on the most recent Tehama GSA Annual Report data.

4.2.3. Dry Well Reports Metric

Dry well reporting may occur at any time within Tehama County during any water year type due to well age, lack of maintenance, equipment failure, well column failure, and excessive groundwater level declines. Historically, many counties in rural areas have observed that the incidence of dry wells reported tends to increase during drought and water shortage conditions. Tehama County has historical experience with some dry well reporting and will likely continue to experience a Dry Wells Reported

during severe drought conditions. Recent history suggests that the number of dry well reports can increase during droughts, with serious water supply disruptions for the communities and areas with a heavy reliance on domestic wells. During the recent drought cycle, the County was able to facilitate hauled water for domestic wells that have gone dry due to drought impacts. The County is looking to further assist with domestic well replacement and/or redevelopment using state drought emergency or other outside funding sources. The State maintains a Dry Well Reporting System to gather information on wells with water supply interruptions and connect individuals and communities with available aid and resources. The County will monitor the State's Reported Dry Well portal and other information as available and will trigger drought response actions if an uptick is observed in the number of confirmed dry wells reported. Effective communication with constituents can inform County residents on how they can report a dry well situation, which will also be an important strategy to ensure that Dry Well Reports remain an accurate indicator of drought and water shortage response impacts.

Stage 1 – Long-term Resiliency

Less than five (5) dry wells are reported monthly to the County. DWR and County dry well reporting data will be evaluated and considered in the analysis.

Stage 2 - Moderate Drought

Five (5) to ten (10) dry wells are reported monthly to the County. DWR and County dry well reporting data will be evaluated and considered in the analysis.

Stage 3 – Severe Drought

More than ten (10) dry wells are reported monthly to the County. DWR and County dry well reporting data will be evaluated and considered in the analysis.

4.2.4. Sacramento Valley Water Year Metric

The Central Valley Project (CVP) provides surface water supplies to users in Tehama County on an annual basis. The actual CVP water deliveries vary based on changing hydrologic conditions tracked through a water year metric. The federal water year is October 1 – September 30, and various surface water supply metrics are tracked and reported, formulating water year designations. In wet and above-average water years, water deliveries tend to be in the 75-100% range, depending on final CVP water allocation determinations. During dry years, typically consecutive dry and critically dry water years, CVP surface water deliveries are curtailed, with deliveries getting cut back to 0-25% levels during severe drought conditions. Tracking water years will provide the County with a useful metric to track surface water availability to water users in the County to indicate how modest or severe overall water conditions are during a specific period. Tracking water levels and storage information in Lake Shasta is another indicator that can be tracked as an indication of expected surface water supply deliveries for a given year.

A summary of recent Sacramento River Index water year types is presented below in **Table 4-3** for informational purposes. Water year index data can be useful in identifying recent drought cycles, as indicated in the Dry or Critically Dry years that occurred from Water Years 2007-2009, 2012-2016, and

2020-2022. During these drought cycles, surface water supply cutbacks were drastic and caused significant drought and water shortage impacts on water users in Tehama County.

Table 4-3. Tehama County - Water Year Tracking Metric

Water Year Sac Valley Index	Water Year Type Sac Valley Index	Recent Drought Cycle
2005	Above Normal	
2006	Wet	
2007	Dry	Drought Cycle
2008	Critically Dry	Drought Cycle
2009	Dry	Drought Cycle
2010	Below Normal	
2011	Wet	
2012	Below Normal	Drought Cycle
2013	Dry	Drought Cycle
2014	Critically Dry	Drought Cycle
2015	Critically Dry	Drought Cycle
2016	Below Normal	Drought Cycle
2017	Wet	
2018	Below Normal	
2019	Wet	
2020	Dry	Drought Cycle
2021	Critically Dry	Drought Cycle
2022	Critically Dry	Drought Cycle
2023	Wet	

The County will monitor DWR's Bulletin 120 report each winter and spring to assess Sacramento River watershed data. This data can be a good indicator of surface water availability and the possibility of increased groundwater usage to compensate for surface water delivery cutbacks.

Stage 1 – Long-term Resiliency

Annual tracking of Sacramento Valley water year classification with recent water years in the range of Wet, Above Normal, and/or Normal.

Stage 2 - Moderate Drought

Annual tracking of Sacramento Valley water year classification with recent water years in the range of Normal, and/or Below Normal.

Stage 3 – Severe Drought

Annual tracking of Sacramento Valley water year classification with recent water years in the range of Below Normal, Dry, and/or Critically Dry.

4.2.5. Central Valley Project (CVP) Water Deliveries Metric

The Central Valley Project (CVP) provides surface water supplies to users in Tehama County on an annual basis. The actual CVP water deliveries vary based on changing hydrologic conditions tracked through a water year metric. The federal water year is October 1 – September 30, and various surface water supply metrics are tracked and reported, formulating water year designations. In wet and above-average water years, water deliveries tend to be in the 75-100% range, depending on final CVP water allocation determinations. During dry years, typically consecutive dry and critically dry water years, CVP surface water deliveries are curtailed, with deliveries getting cut back to 0-25% levels during severe drought conditions. Tracking water years will provide the County with a useful metric to track surface water availability to water users in the County to indicate how modest or severe overall water conditions are during a specific period. Tracking water levels and storage information in Lake Shasta is another indicator that can be tracked as an indication of expected surface water supply deliveries for a given year.

A summary of recent Central Valley Project water deliveries based on different water year types is presented below in **Table 4-4** for informational purposes. CVP water supply reliability is quite variable, with allocations to agriculture ranging from 0% in critically dry years to 100% in wet years. Tracking CVP water delivery allocation data can be useful in identifying upcoming surface water cutbacks that may result in increased groundwater usage during the cutback periods. During recent drought cycles, surface water supply cutbacks were drastic and caused significant drought and water shortage impacts on water users in Tehama County.

Table 4-4. Tehama County - CVP Water Deliveries Metric

North of Delta, Sac. River	2022 Critically Dry Year CVP Water Delivery Allocation	2024 Wet Year CVP Water Delivery Allocation	2023 Post-Drought Year CVP Water Delivery Allocation
Agriculture	0%	100%	35%
M&I	5%	100%	75%
Water Rights	18%	100%	100%
Refuge	18%	100%	100%

Stage 1 – Long-term Resiliency

Annual tracking of CVP water deliveries, in north-of-delta Sacramento River area, with recent water year CVP water delivery allocation cutbacks in the 0-25% range.

Stage 2 - Moderate Drought

Annual tracking of CVP water deliveries in the north-of-delta Sacramento River area, with recent water year CVP water delivery allocation cutbacks in the 25-50% range.

Stage 3 – Severe Drought

Annual tracking of CVP water deliveries in the north-of-delta Sacramento River area, with recent water year CVP water delivery allocation cutbacks in the > 50% range.

4.3. Response Strategies

This section of the Drought Plan describes the response strategies the County can pursue to prepare for drought and water shortage conditions commensurate with the stage of drought in effect. Response strategies need to include interim and long-term solutions to water shortages. While SB 552 assigns new responsibilities to the County, the law does not directly provide new funds for the County to implement its drought and water shortage response strategies. Therefore, many of the strategies described below focus on more focused proactive tracking and monitoring of water conditions, with the County taking the lead in coordination with other agencies, entities, and partner organizations.

SB 552 requires that each county develop a drought and water shortage plan that includes proposed Interim solutions for state small water systems and domestic wells, per CWC Section 10609.70.

4.3.1. Short-term Response Actions

Recognize the vulnerability and the need to expeditiously mitigate impacts during the early stages and during ongoing drought conditions and water shortage events. **Table 4-5** summarizes the short-term measures considered by the County in developing this Plan.

Table 4-5. Tehama County - Short-Term Measures Evaluated

Short-Term Measures Evaluated	Assessment	Next Step
Mutual Aid Agreements	Evaluated	Not feasible at this time.
Intertie activation	Evaluated	Not feasible at this time.
Permit Streamlining and Coordination	Evaluated	Updated Well Permitting Forms and Process. Updated County Well Inventory Database.
Partnership with Other Agencies	Evaluated	Continue existing partnerships (Tehama GSA, other local entities).
Emergency and Interim Drinking Water Supplies	Evaluated	Continue existing program (have storage tanks).
Dedicated Water Filling Stations by Large Water Purveyors	Evaluated	Not feasible at this time.
Treatment of Available Alternate Water Sources Not Typically Used	Evaluated	Not feasible at this time.

Packaged or Bottled Water	Evaluated	Can implement through OES with w/funding.
Domestic Well Mitigation Program	Being Evaluated	Based on the outcome of the Tehama GSA Well Mitigation Program.
Water Hauling or Bulk Water Delivery	Evaluated	Can implement through OES with w/funding.
Water Consolidation	Evaluated	No feasible short-term consolidations.

The County already has some of the short-term measures summarized in **Table 4-5** in place, while others are not feasible either from a physical, water resource and/or economic perspective. The County has retained already used emergency water supply storage tanks (2,000-gallon capacity), purchased and used during the 2020-2022 drought cycle, that can be deployed to those in need of emergency water supplies to mitigate short-term drought impacts.

Stage 1 – Long-term Resiliency

Continue implementation of short-term measures already in place. And continue to evaluate consolidation possibilities and funding sources for programs to be coordinated with OES.

Stage 2 - Moderate Drought

Be prepared to implement existing emergency and interim drinking water supply programs as needed during moderate drought conditions.

Stage 3 – Severe Drought

Proactively implement the existing emergency and interim drinking water supply program and expedite the well permit process during severe drought and water shortage conditions. Consider implementing additional short-term measures based on available State funding.

4.3.2. Long-term Response Actions

Drought preparedness is most effective when certain adaptive actions become integrated into County policy and inter-agency coordination efforts to be implemented as foundational actions that are in place prior to the onset of drought and water shortage conditions. The alternative is to adopt a reactive approach to drought response, only by implementing drought response activities during severe water shortage emergency conditions. The goal of long-term response actions is to mitigate future potential drought impacts in a proactive manner and should be reviewed and updated as part of future Plan updates. The County Plan is required to evaluate long-term drought response actions to be better prepared to respond to future drought conditions while minimizing impacts on water users. Progress made on long-term response actions during non-drought periods is important to achieve the long-term benefits of the actions. The long-term response actions presented in **Table 4-6** were evaluated for inclusion in this Plan and provided a foundation for implementing short-term emergency response actions listed in Section 4.3.1.

Table 4-6. Tehama County - Long-term Measures Evaluated		
Long-term Measures Evaluated	**Assessment**	**Next Step**
Establish Long-term Drought Monitoring and Tracking Metrics	Evaluated	Recommended metrics are ready for implementation.
Maintain SB 552 County Website With All Program Information	Evaluated	Website Established. Update periodically.
Water Consolidation	Evaluated	Continue evaluating consolidation feasibility. Evaluate funding opportunities for future projects.
Drought Task Force	Evaluated	Continue Drought Task Force Meetings.
Groundwater Commission	Evaluated	Continuing Groundwater Commission Meetings.
Tehama GSA	Evaluated	Coordinate on-demand mgmt./Well mitigation programs.
Funding needed for infrastructure improvements	Evaluated	Domestic wells, state smalls, and community systems.
Assess future water resiliency needs.	Evaluated	Infrastructure improvements, TMF capacity.
Demand Management Program	Being Evaluated	Based on the outcome of the Tehama GSA Demand Management Program.
Domestic Well Mitigation Program	Being Evaluated	Based on the outcome of the Tehama GSA Well Mitigation Program.
Well Ordinance Updates	Evaluated	Coordinate with the Tehama GSA Well Mitigation Program.
Water User Outreach	Evaluated	Website. List Serve. Fact Sheets. Workshops.

Establish Long-term Monitoring and Tracking Metrics

The County plans to add long-term monitoring and tracking metrics that relate to rainfall, groundwater conditions, surface water availability, dry well reporting, water-year type, and CVP water deliveries, as described in Section 4.2. These metrics would be added to the County's SB 552 website and updated periodically. Having these metrics in place would provide an 'early warning' indication as drought conditions become more severe. The tracking metrics would be updated and evaluated annually to determine current drought conditions. In some cases, additional data may be monitored more often during times of drought. The County's Environmental Health Department is anticipated to be the lead based on budget availability and staff. Recommended metrics examples are included in **Appendix G**.

Maintain SB 552 County Website

The County plans to maintain an ongoing SB 552 website as an indication of compliance with SB 552 and, more importantly, to serve as a single point where water users can access key information related to drought and water shortage planning activities. The website will include the approved Drought Resiliency Plan, monitoring and tracking metrics, documentation of Drought Task Force and Groundwater Commission Meeting activities, a list of short- and long-term drought response measures, water consolidation information, and additional information as needed. The County's Environmental Health Department is anticipated to be the lead based on budget availability and staff.

Water Consolidation

There is potential for limited water consolidation activities in Tehama County. However, there are no economically feasible consolidations to pursue at this time. The County has several smaller community water systems that are geographically separated with large capital costs involved for system interties, physical water system connections, and additional local system improvements. The County will continue to evaluate the merits of consolidation, with more information on consolidation included in **Appendix F**.

Drought Task Force Meetings

The County has an established Drought Task Force that met during the development of this DRP and will continue to meet on a regular basis as part of the DRP implementation process. The goal is to provide easy access to Drought Task Force meeting agendas and materials on the County's new SB 552 website in 2025. The County's Environmental Health Department is anticipated to be the lead based on budget availability and staff.

Groundwater Commission Meetings

The County has an established Groundwater Commission that met during the development of this DRP and will continue to meet on a regular basis as part of the Plan implementation process. The County's Flood Control District is anticipated to be the lead based on budget and staff availability.

GSA Coordination

The Tehama GSA is the exclusive GSA for the portion of the Tehama Subbasins that are located within Tehama County. The Tehama GSA coordinates with the Subbasins within Tehama County to meet SGMA requirements in the Tehama Subbasins. The County is a member of the Tehama GSA and supports the activities of the Tehama GSA to achieve SGMA compliance for lands within the Tehama GSA service area. The Tehama GSA is the organization with the most accurate and up-to-date groundwater data regarding groundwater conditions within the GSA service area. The GSA is also responsible for developing demand management and well mitigation programs. The County will continue to support and serve as a member of the Tehama GSA as part of maintaining compliant Groundwater Sustainability Plans. The Tehama GSA coordination efforts will continue and involve regular communication, collaboration on areas of overlapping responsibility, technical support, and joint pursuit of grant funding where appropriate. The

County's Flood Control is anticipated to be the lead based on budget availability and staff.

Assess Future Water Resiliency Needs

It is recommended that the County track water system infrastructure needs for community water systems and small water systems to maintain resilient water supplies to the larger systems in the County. Maintaining sustainable communities and small water systems would provide future opportunities for consolidations and reduce the possibility of future drought impacts. This would be beneficial to water users and reduce future risk for water system failures and deficiencies. This can be accomplished through the Drought Task Force or as part of an annual assessment process led by the County. State databases also contain information on current water system conditions that can be used in the funding needs analysis. The County's Environmental Health Department is anticipated to be the lead based on budget availability and staff.

Domestic Well Mitigation Program

The County will coordinate with Tehama GSA as they develop a Well Mitigation Program as part of maintaining compliant Groundwater Sustainability Plans. Based on the outcome of the Tehama GSA's Domestic Well Mitigation Program, the County will make any necessary policy adjustments to facilitate implementation of the Program within the SGMA compliance period. The Program should reduce the risk of drought impacts on some domestic wells within the Tehama GSA service area. The County's Flood Control Well Mitigation Program will strive to include funding to drill replacement wells for highly impacted wells. The Flood Control District is anticipated to be the lead based on budget availability and staff.

Well Ordinance Updates

The County will coordinate with the Tehama GSA as they develop a Well Mitigation Program as part of maintaining compliant Groundwater Sustainability Plans. The County will be prepared to update its well ordinance as needed to be consistent with Tehama GSA groundwater programs and reduce the risk of future drought impacts on water users within the County. The County's Environmental Health Department is anticipated to be the lead based on budget availability and staff.

Water User Outreach

The County will be responsible for maintaining and providing outreach activities to water users in the County. The goal is to keep residents informed regarding water conditions, drought response measures, dry well reporting, and drought mitigation assistance. This would include maintaining the County's SB 552 website, providing updated information on water conditions and drought status, providing fact sheets on key topics, and related outreach activities to mitigate drought impacts on water users within the county. The County's Environmental Health Department is anticipated to be the lead based on budget availability and staff.

4.3.3. Short- and Long-term Measure Implementation

The County has evaluated short-term (Section 4.3.1) and long-term (Section 4.3.2) drought and water shortage response measures as required by SB 552 and summarized in **Appendix H**. While SB 552 adds new responsibilities for counties, the legislation does not provide a new long-term funding source for counties to implement new programs and policies that may be included in the County's Drought Resiliency Plan. The County was able to secure a $125,000 grant from DWR to fund the development of the County's Plan. The County will need to continue to fund an annual water resource planning budget to implement recommendations that are in the Plan that would maintain compliance with SB 552. For the County's Plan to be most effective, additional funding sources will need to be secured to continue the provision of emergency water supply assistance. Potential funding sources include FEMA Individual Assistance, FEMA Hazard Mitigation Funding, FEMA Building Resilient Infrastructure and Communities, IRWM grants, State Revolving Funds, SGMA Funds, and other State and Federal grant funds when available.

The implementation of the Drought Plan will rely on sharing responsibilities between Departments through coordination between multiple departments and divisions within the County, as well as coordination with outside organizations. The Environmental Health Department, which leads the Drought Task Force and issues well permits, will be the lead on DRP planning and implementation efforts. Based on the availability of staff and funding, the Department will be responsible for ongoing monitoring of the Plan's tracking protocols, constituent communication, and coordination with other departments and organizations. The Department has not yet obtained a new funding source to support new programs, but will continue to coordinate with its partners to provide long-term and short-term drinking water solutions. Collaborations with other County agencies will continue to facilitate the cost-effective implementation of Plan activities.

The County will increase coordination during drought conditions to ensure all funding opportunities are pursued and secured that are attainable to support local drought and water shortage response actions.

Table 4-7 provides a summary of how the County will manage and implement the Plan actions based on water conditions and necessary measures that may need to be implemented during triggered water shortage conditions. This is a flexible framework that the County may amend or update as necessary to achieve Plan goals and objectives.

Table 4-7. Tehama County - Drought/Shortage Measure Implementation

Drought/Shortage Measure	Environmental Health Dept.		Tehama County Office of Emergency Services	Public Works Dept	Tehama GSA	CA DWR and OES Funding Assistance
	Well Permitting	Env Health				
Short Term Measures						
Mutual Aid Agreements	X	X	X			
Intertie activation	X	X		X		
Permit Streamlining/ Coordination	X	X		X		

Table 4-7. Tehama County - Drought/Shortage Measure Implementation						
Partnership with Other Agencies	X					
Emergency/Interim Drinking Water Supplies	X	X	X	X		X
Dedicated Water Filling Stations	X	X				X
Treatment of Alternate Water Sources		√				√
Packaged or Bottled Water		√	√			√
Water Hauling or Bulk Water Delivery		√	√	√		√
Domestic Well Mitigation Program	√	√			√	√
Water Consolidation	√	√				√
Long-term Measures						
Establish Drought Monitoring/Tracking Metrics	√					
Maintain County SB 552 Website	√	√				
Water Consolidation	√	√				
Drought Task Force	√					
Groundwater Commission	√					
Tehama Groundwater Sustainability Agency	√					
Infrastructure Funding Needs	√	√				√
Assess Future Resiliency Needs	√	√		√		
Demand Management Program	√	√			√	
Domestic Well Mitigation Program	√	√			√	
Well Ordinance Updates	√	√			√	
Water User Outreach	√	√	√			

Short-Term Measures: drought and water shortage response measures implemented during moderate and/or severe drought conditions to minimize impacts on water users.
Long-term Measures: measures that can reduce or mitigate water user impacts during future drought and water shortage cycles.

Table 4-7. Tehama County - Drought/Shortage Measure Implementation
Tehama GSA: a cooperating agency working with the County to achieve groundwater sustainability in the Tehama GSA service area within the county. **State DWR and OES Assistance:** The county will work with the State to secure future grant funds to assist with the local implementation of the DRP short and long term measures.

The Environmental Health Department, coordinating with other County Departments, will lead ongoing Plan tracking protocols, constituent communications, water user outreach, coordination with other departments and organizations, and pursuit of future grant funding opportunities to fund Plan implementation activities. Potential funding sources are included in **Appendix I**.

The County's Environmental Health Department will continue to protect and promote the health and welfare of County residents and visitors by providing environmental health services through various programs, including regulating small water systems, state small water systems, and the permitting of water wells. County well permitting information, coordinated with the Tehama GSA, is included in **Appendix J**.

The County's Office of Emergency Services division will coordinate with the Department in the funding and delivery of water emergency response actions that are listed in Section 4.3.1. The County Sheriff's Emergency Services group will be the lead agency within the County for Plan Implementation of emergency response actions presented in Section 4.3.1.

The North Valley Community Foundation will use its grant money to continue to assist with the implementation of the emergency drinking water supply program involving the provision of 2,000-gallon water tanks that can be filled with potable water supplies. Public Works is storing any leftover 2,000-gallon water tanks in their Corporation Yard. These water tanks, used during the recent drought cycle, are available for use by county residents who need emergency water supplies during drought and water shortage conditions. Additional emergency water storage grants are available through DWR until 12/31/2025 to enable the County to purchase additional storage tanks as may be needed during future water storage conditions.

The Department will continue to coordinate and collaborate with the Tehama GSA regarding groundwater management policies and programs that achieve groundwater sustainability in the Tehama GSA service area. This will include attending Tehama GSA Board meetings and keeping County policies and programs integrated with Tehama GSA Demand Management and Well Mitigation Programs.

5. CONCLUSIONS AND RECOMMENDATIONS

This Drought Resiliency Plan was prepared to fulfill the requirements of Senate Bill 552 (Drought Planning for Small Water Suppliers and Rural Communities, SB 552) and better position the County for future droughts and water shortages. The DRP assesses the risk factors (Section 2) that may affect water supply reliability in the County. Voluntary water system consolidation can be one of the best methods available for decreasing risk exposure for small systems and domestic wells in the long term (Section 3). Other drought and water shortage response actions the County can pursue to mitigate drought risks and respond to shortages are presented as an Action Plan in a Table with tiered levels of response tied to increasing drought severity (Section 4).

The County has experienced serious droughts in the past, and many of the response actions presented in this DRP are a continuation of programs the County already has in place. One major benefit of this DRP, beyond complying with the requirements of SB 552, is to document and formalize the County's drought response strategies so the County is more prepared for future drought cycles. This Plan concludes with recommendations for the implementation of short-term immediate actions to address present water shortage conditions while planning for the implementation of long-term response measures that can more effectively mitigate the impacts during future drought and water shortage conditions and cycles.

The County is taking the necessary steps to comply with SB 552. This DRP provides a policy framework for the County to monitor drought and water shortage conditions, communicate with water users about drought and water shortage response and mitigation measures, and position the County for long-term funding opportunities to implement long-term drought response actions that mitigate the impact of future droughts on all water users within the County. Residents, stakeholders, and interested parties can follow the County's ongoing DRP implementation efforts on the County's dedicated DRP website: <insert new County website address link here>.

5.1. Immediate Near-term Actions

For this DRP to be most effective, the County can take several immediate actions to enhance its preparedness for future drought and water shortage conditions. Some of the actions the County may consider are summarized below.

Coordination and Collaboration - Between County Departments and With External Organizations

Because the responsibility for this DRP is spread across multiple County departments and External organizations, communication and coordination are crucial. It is recommended that the County continue regular meetings with the following established groups

- Drought Task Force
- Groundwater Commission
- Office of Emergency Services
- Environmental Health

- Community Development
- Tehama Groundwater Sustainability Agency

It is important to maintain accurate member and participant rosters, post meeting agendas in advance, and provide a summary of meeting outcomes and action items. Maintaining regular communications will prepare groups involved for timely response to impending drought and water shortage conditions and facilitate policy and program updates as needed to address shortage issues.

Integrate DRP With County Policy Documents and Processes

The DRP elements should be incorporated into related County policies accordingly, including the Hazard Mitigation Plan, OES Programs, General Plan Updates, and Water Policies and Programs (ordinances, County Codes, policy updates). As related documents are updated, consistency and integration with the DRP can be achieved through policy document amendments.

Develop Long-term Monitoring and Tracking Protocols

The County should decide on which factors to monitor and track, which serve to provide an early warning system for existing and worsening drought and water shortage conditions. It is recommended that the County consider establishing the following monitoring and tracking sources and metrics.

Surface Water – Lake Shasta water levels and CVP Water Deliveries.

Groundwater – Tehama GSA Monitoring Network Wells, add other wells to address data gaps.

Rainfall – Local annual and seasonal rainfall data, regional 8-Station Rainfall Index data (up watershed).

Dry Well Reporting – Track county and DWR reporting sources and confirm dry well conditions.

Water Year Type – monitor Sacramento River Index water year patterns to assess relative drought conditions and future risks to water users.

SW-GW Use Patterns – monitor the mix of surface and groundwater use in different year types with respect to SGMA compliance activities and their impacts on water users.

The Tehama County Drought Task Force can be leveraged to advance this coordination. Any agencies that do not regularly attend the scheduled Drought Task Force meetings should be encouraged to attend.

Continuing GSA Coordination Activities

Continue to attend GSA meetings and coordinate and collaborate with the Tehama GSA as water management policies and programs are developed to achieve compliance with SGMA requirements. The County would ensure that its policies are consistent with Tehama GSA policies and programs as required for SGMA compliance.

Continuing Drought and Water Shortage Outreach

The County will continue to provide information on its website dedicated to SB 552 compliance for easy access to the County's drought and water shortage planning and implementation efforts.

The County will continue constituent outreach and education, encouraging voluntary water system consolidations where feasible and updating well permit and related land use regulations as needed to meet DRP goals and objectives.

Continuing To Pursue New Funding Sources

As discussed in Section 4, reliable funding is a key factor that will affect the implementation of the County's DRP. Once complete, approved, and submitted to DWR, the County can consider applying for grants to obtain additional funding as the lead agency or in coordination with agency partners to apply for grants that advance DRP implementation efforts. Potential funding sources include SWRCB's SAFER program, FEMA Hazard Mitigation and Building Resilient Infrastructure and Communities programs, LandFlex, IRWM, and Proposition 4 (approved by voters in November 2024). Other funding sources, in addition to those identified by this DRP, should be considered and pursued when appropriate. See Appendix I for more information on potential funding sources. **See Appendix I**.

5.2. Long-term Actions

The Tehama County DRP is intended to function as a 'living' document that should be reviewed and updated periodically after completion and approval of this DRP. Certain risk indicators, tracking protocols, thresholds, and/or response actions may require adjustments as conditions in the County evolve and staff gain experience through DRP implementation activities. As this DRP is implemented, the County may identify further opportunities for improving its ability to reduce future drought impacts on water users within the County. It is recommended that the County update its DRP every five years, with annual updates executed as needed to improve drought and water shortage mitigation results.

One specific opportunity for future improvement involves the documentation of institutional knowledge. The County has recently experienced severe droughts, namely 2012-2015 and 2020-2022, that have caused serious water supply challenges for various water users, and the County has been forced to find emergency solutions to mitigate those impacts. As a result, County staff has established valuable institutional knowledge, which is a major asset when responding to future drought and water shortage conditions. This DRP should continue to document its experience gained in drought response activities and include it in future DRP updates to memorialize documentation of County staff institutional knowledge. This could take several forms, including transcribed interviews, survey results, fact sheets, or saving documentation on previously successful DRP implementation activities. Key topics that should be documented include implemented programs, lessons learned, effective communication strategies, and operational challenges that could potentially be adjusted or translated into remedies for future DRP implementation efforts. This information will provide the foundation to develop and implement long-term drought and water shortage measures that can mitigate future drought impacts.

Given California's hydrologic history and repeated drought and water shortage cycles, water supply resiliency challenges are an unavoidable hazard in Tehama County. Looking to the future, these hazards may intensify due to climate change and other factors (e.g., availability of surface water supplies). The goal of this DRP is to improve the water resilience for water users in the county to mitigate future drought and water shortage impacts. Importantly, even if this DRP is successful, drought and water shortage hazards will

continue to occur in the region. This DRP will be most effective as part of a larger framework, including integration with the Tehama GSA Subbasin GSPs, the County's Local Hazard Mitigation Plan, and related policies and programs. Through the integration of a broader policy framework, the DRP is most likely to be successful in reducing water users' exposure to drought and water shortage risk and preparing the County to respond proactively and effectively when those challenges occur.

5.3. Recommended Action Plan

The Tehama County DRP has been prepared and is compliant with SB 552. Based on the risk analyses using State provided risk assessment tools conducted in the development of the DRP, past County experiences with drought and water shortage conditions, and water resource characteristics in the County, the recommended action plan is summarized below with a focus on activities that can be prioritized over the initial five-year implementation period (FY25-26 through FY30-31). County staff have the flexibility to implement DRP implementation actions based on policy needs and available resources. The action plan positions the County to address important issues that will influence how the DRP implementation efforts are structured and prioritized over the upcoming five-year period. It is recommended that the County's DRP be updated every five years, including the recommended action plan.

Table 5-1. Recommended Tehama County DRP Implementation Actions

DRP Recommend Actions	County Activities
Coordination and collaboration between county departments and outside organizations	Continuing Drought Task Force Meetings. Continuing Groundwater Commission Meetings. Continuing collaboration with the Tehama GSA. Other coordination activities as needed.
Integrate DRP with county policy documents and processes	Annual review process – update key County policy documents to align with the DRP as needed.
Develop long-term monitoring and tracking protocols.	Finalize monitoring metrics. Post metric data to the County website during FY25- 26. Update drought metric data at least annually.
Continuing GSA coordination activities	Attend Tehama GSA Board Meetings. Track the Tehama GSA Demand Management Program. Track the Tehama GSA Well Mitigation Program. Update County policies accordingly.
Continuing drought and water shortage outreach	Complete and maintain the SB 552 County website. Conduct periodic workshops as needed. Publish fact sheets as needed. Provide e-updates to water users enlisting in the list serve communications. Provide consolidation information for opportunities as requested.
Continuing to pursue new funding sources	Track available grant funding opportunities. Pursue grants as a lead agency or in partnership with other entities to secure grant funding.

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