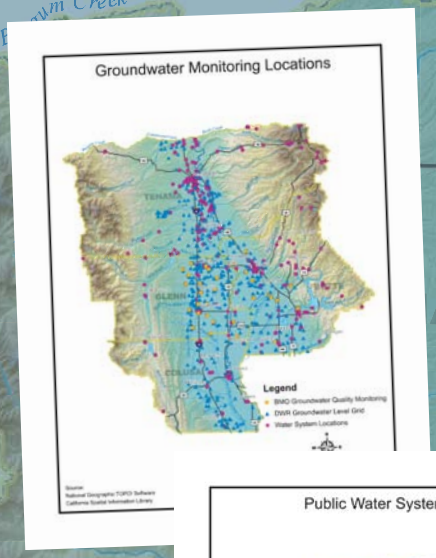
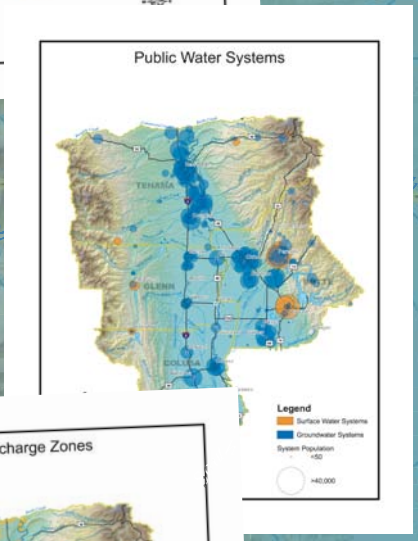
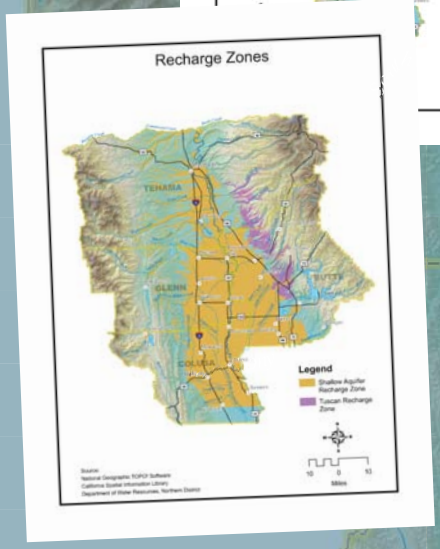
Glenn County Department of Agriculture







County of Glenn

County of Butte

County of Colusa

County of Tehama

Northern Sacramento Valley (Four County) Drinking Water Quality Strategy Document

June 2005

CDM
consulting · engineering · construction · operations

FINAL DRAFT

Glenn County Department of Agriculture

Northern Sacramento Valley (Four County) Drinking Water Quality Strategy Document

June 2005

Final Draft

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Section 1
Executive Summary

Butte, Colusa, Glenn, and Tehama County water resource managers oversee projects, programs, and policies within their individual county boundaries at the guidance and direction of county officials. Officials and water resource managers from these counties understand that both water sources as well as institutional operations transcend county boundaries. The primary water sources that link the four counties include the Sacramento River that flows through each county, shallow alluvial aquifers, and the deeper Lower Tuscan aquifer that underlies a portion of each county. Operational links include such commonalities as groundwater quality and level monitoring programs, water resource studies, data and information management, county ordinance oversight, public education, and stakeholder interaction.

County officials recognize that residents of their counties would benefit from improved regional collaboration and cooperation in areas where they currently share common operational practices and physical linkage. In response, officials in each county adopted a resolution directing water managers in Butte, Colusa, Glenn, and Tehama Counties (Four Counties) to pursue funding toward an initial exploration into the process and institutional issues of regional planning.

With funding provided by the CALFED Drinking Water Quality Program, the Four Counties collaborated to: understand their physical and institutional similarities and differences; develop project objectives; develop a recommended Four County institutional framework; understand the quality, uses, and impacts of drinking water sources; and develop a drinking water quality strategy and associated implementation activities. This report, the Northern Sacramento Valley (Four County) Drinking Water Quality Strategy Document, details the results of this initial Four County effort in collaboration and cooperation.

The overall project planning process, as shown in Figure 1-1, included work elements that were completed with input from a project steering committee comprised of the water resource leaders from each of the participating counties and individuals from each county with local water resource and water quality knowledge. Each of the project tasks afforded county water resource managers and steering committee members the opportunity to share information, priorities, successes, and observations relating to current and future activities, programs, and projects that have the potential to affect water quality.

In addition to steering committee input, the project team also solicited input from county officials and the public. The project team solicited input form county officials on two occasions, once early in the project associated with the overall project scope and at a second meeting late in the project to discuss results and recommendations. A February 9, 2005 public meeting in Willows, California was attended by over 60

persons. Additionally, a project update was presented at the April 1, 2005 California Bay-Delta Authority Drinking Water Quality Subcommittee meeting.

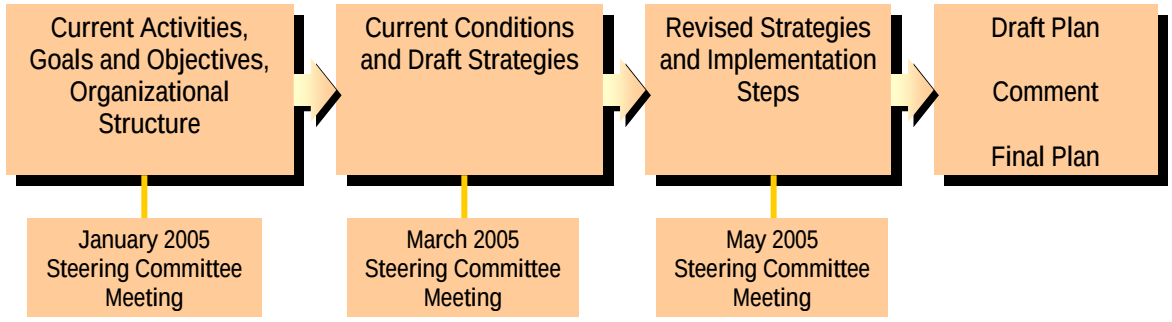


Figure 1-1
Plan Development Process

An initial project activity involved the collection, synthesis, and reporting of information related to current water quality-related programs and activities in each of the participating counties, within the region, and at the State level. Additionally, the physical characteristics of the Four County area have been summarized. The result of this activity provided the Four Counties with baseline information describing current water quality programs and activities at the county, regional, and statewide level. Using this information, the Four Counties were able to better understand common linkages and were able to begin assessing challenges and opportunities associated with drinking water quality across the Four County area.

The steering committee then proceeded with the development of project objectives with a basic understanding of county, regional, and statewide water quality programs and activities. The objectives were developed such that they are applicable to this effort and could continue to be valid during future Four County efforts. The project objectives include:

- Protect local source water quality;
- Increase the understanding of local and regional drinking water sources and threats;
- Coordinate county and local management efforts and share information about water related activities;
- Protect third parties, including the environment;
- Understand statewide drinking water concerns; and
- Provide technical assistance.

Various potential organizational structures were presented and considered that would serve the Four County participants currently and in the future consistent with the types of activities considered by the participants. Potential organizational structures considered ranged from a low to high level of organization, including 1) informal agreement, 2) memorandum of understanding, 3) joint powers authority, and 4) nonprofit mutual benefit corporation. County water resource managers and steering committee participants agreed that a memorandum of understanding would serve their current and future needs. A draft memorandum of understanding was prepared and is being considered by county officials to support the continued collaboration and cooperation between the Four Counties.

Concurrent with the development of project objectives and consideration of an organizational structure, the project team prepared information summarizing current drinking water conditions, including: drinking water systems, drinking water sources, drinking water contaminants of concern present in local ground and surface water bodies, and existing water quality monitoring in the Four County region. Results of this analysis, included in Section 6, indicate that high quality groundwater serves as the source of drinking water for the majority of residents in the Four County area. Groundwater and surface water quality is impacted by local contamination in some areas, but only a small percentage of groundwater purveyors and no surface water purveyors have needed to provide additional treatment or alternative drinking water sources due to contamination.

Future drinking water sources will be developed in response to an observed paradigm shift in development patterns in recent years from single home "ranchettes" to subdivisions. Subdivisions are currently being proposed or are in the process of development in all four counties. The shift will be characterized by a transition from current conditions where a single, shallow well supplies drinking water to a single residence to future conditions where a smaller number of deeper, more productive groundwater wells supply subdivisions. The deeper wells provide a more reliable supply and will be part of a public water system that is regulated by DHS or the county's health department. An associated trend will include a transition from single residence septic systems to subdivision wastewater treatment facilities.

Based on information gained during initial project activities, the project team and steering committee then developed regional water quality strategies to address:

- Objectives established for the Northern Sacramento Valley Drinking Water Quality Strategy Program;
- Development of the Central Valley drinking water quality policy; and
- Implementation of the CALFED Water Quality Plan using the ELPH diagram as the framework.

The strategies are based on: the project objectives and the suggested organizational structure; an understanding of physical and intuitional similarities and differences across the Four County area; and information describing water quality sources, contamination, and monitoring. Strategy concepts were synthesized into five strategy categories, including:

- Drinking Water Protection – Groundwater
- Drinking Water Protection - Surface Water
- Regional Collaboration
- Funding
- Outreach & Education

A description of each strategy category is included in Section 7. Under each strategy category, a number of potential implementation activities and an associated implementation schedule have been developed. Table 1-1 lists the identified potential implementation activities.

Four County officials, water resource managers, and participating steering committee members recognize that the physical linkage of their drinking water supplies and the common county activities across the Four County region will benefit from the coordination and collaboration shown during completion of this project.

Table 1-1
Draft Implementation Schedule for Northern Sacramento Valley Drinking Water Quality Strategy Actions

	Description of Action	Implementation Schedule
I.	**Drinking Water Protection – Groundwater**	
1	Investigate groundwater recharge areas	2006/2007
2	Evaluate how future agriculture, municipal, and domestic water use may affect water quality and yield	2006/2007
3	Coordinate monitoring activities	2005/2006
4	Support remediation of known contaminated sites	Ongoing
5	Reduce groundwater contamination associated with domestic septic tanks	Ongoing
6	Support the underground storage tank management program	Ongoing
7	Develop and implement common stormwater management practices such as clean neighborhood and business programs	2006/2007
II.	**Drinking Water Protection – Surface Water**	
1	Evaluate how future agriculture, municipal, and domestic water use may affect water quality and yield	2006/2007
2	Keep abreast of TMDLs being developed for surface waters in the Four County area	Ongoing
3	Encourage the continued coordination among the surface water quality monitoring programs to avoid duplication of effort	Ongoing
4	Keep abreast of results and future monitoring plans by attending meetings or reviewing minutes	Ongoing

Table 1-1 *(Continued)*
Draft Implementation Schedule for Northern Sacramento Valley Drinking Water Quality Strategy Actions

	Description of Action	Implementation Schedule
5	Implement common stormwater management practices such as clean neighborhood and business programs, new development ordinances, reduction of irrigated runoff volumes	Ongoing
6	Support the management of waste discharges through the NPDES program	Ongoing
III.	**Regional Collaboration**	
1	Development of an organization or group comprised of representatives of the Four County area	2005
2	Convene a regional subcommittee to coordinate with other organizations	2005/2006
3	Coordinate efforts relating to the collection and dissemination of collected water resource-related data	2005/2006
IV.	**Funding**	
1	Pursue and secure funding for implementation and continuation of the Northern Sacramento Valley Regional Drinking Water Quality Strategy Program	Ongoing
2	Locate funding to increase staffing that can devote a portion of their time to drinking water quality issues	Ongoing
3	Coordinate with funding agencies to receive information on grant/loan projects funded in the Four County area	2005/2006
4	Identify county funding for continuation of regional collaboration	Ongoing
V.	**Outreach and Education**	
1	County water resource leaders should lead intra-county collaboration with environmental health, planning, public works, and other agencies	2005/2006
2	Develop web-based communication for information on current water resource activities, programs, projects, and events in the Four County area	2006
3	Develop an annual regional status report for distribution to the interested public	2006
4	Develop Power Point presentation template on the program, one that can be modified to target different audiences	2006
5	Publish what information is available on water resources in the Four County area and where that information can be located	2005/2006
6	Expand public education activities such as convening an annual public meeting and producing brochures on drinking water quality	2006

Section 2
Introduction

2.1 Background

Drinking water quality protection and improvement is just as important as the development of reliable drinking water supplies. Good quality drinking water is required to protect the health of the public. The natural environment and water-dependent businesses such as agriculture also benefit from good quality water.

The protection and improvement of drinking water quality has evolved toward regional coordination and collaboration due mainly to physical links among water sources. For example, the Sacramento River and its tributaries flow through 19 counties in northern California with a portion of this flow then sent to southern California. Upstream areas have a direct impact on the quality of water that passes through downstream areas. The same is true for groundwater. Groundwater aquifers may underlie several communities, counties, or states. Drinking water quality protection and improvement involves a combination of actions at local, regional, state, and Federal levels. Therefore, regional drinking water quality management is being encouraged by the various water resource agencies.

County water resource managers from Butte, Colusa, Glenn, and Tehama Counties (Four Counties), shown in Figure 2-1, facilitate activities in areas such as water resource studies, groundwater management, data and information management, county ordinance oversight, public education, and stakeholder interaction within their own counties. Although county water managers regularly meet to discuss issues and share ideas, formal regional coordination and collaboration between counties has been limited.

These four counties are linked by both sources of water as well as institutional operations. The primary water sources that link the four counties include the Sacramento River that flows through each county, shallow alluvial aquifers, and the deeper Lower Tuscan aquifer that underlies a portion of each county. Further discussion of these water bodies is presented in Section 3. Operational links include such commonalities as groundwater monitoring programs, public outreach and education activities, and oversight of water transfer activities under existing ordinance, policy, or programs.

The Four County Team recognizes that residents of their counties would benefit from improved regional collaboration and cooperation in areas where they currently share common operational practices and physical linkage.

With this understanding, water managers in Butte, Colusa, Glenn, and Tehama Counties are initially pursuing efforts that could lead to the development of the required framework and technical information necessary for successful regional drinking water quality planning

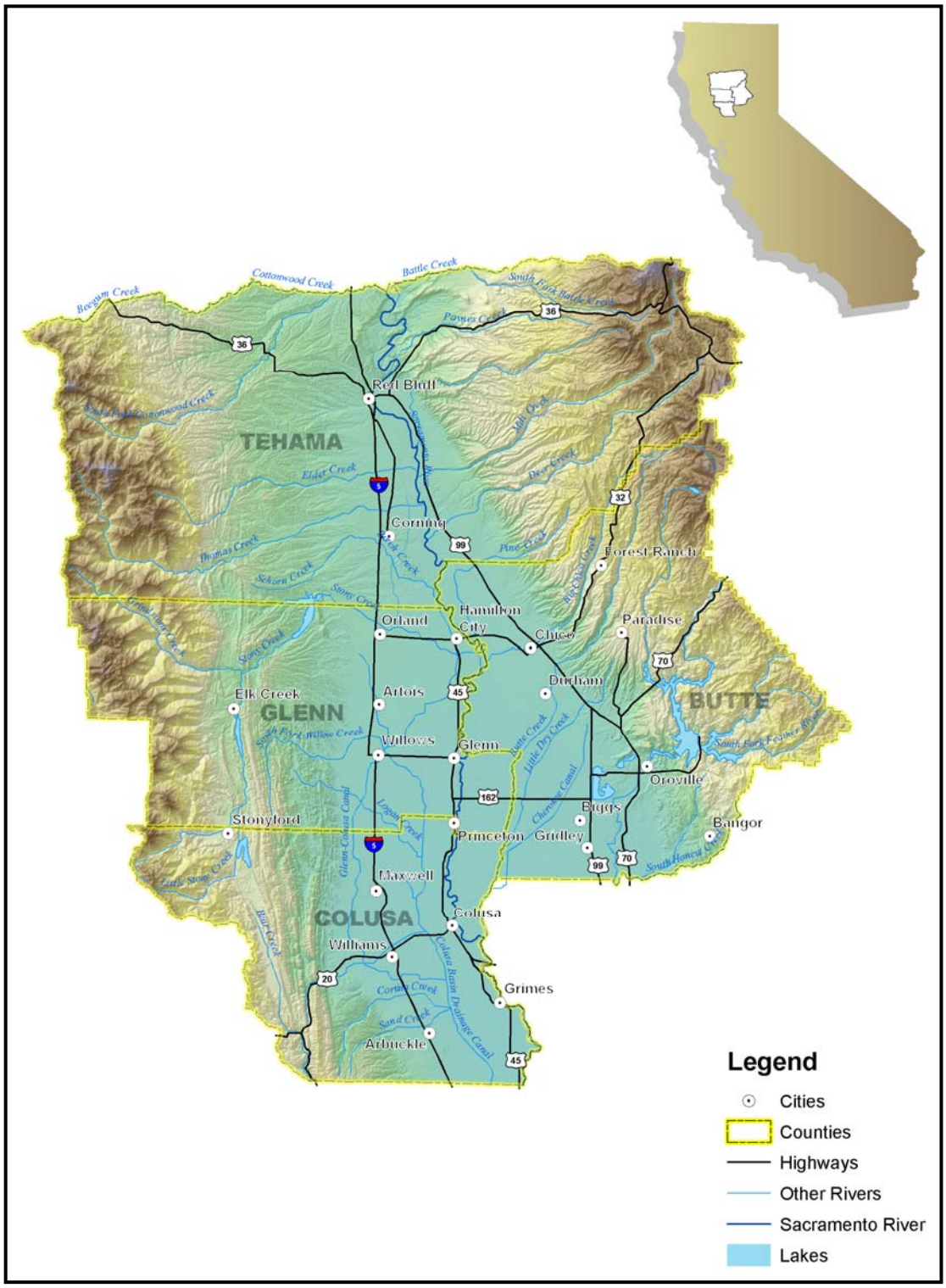


Figure 2-1
Four County Location

activities. This Four County Team recognizes that residents of their counties would benefit from improved regional collaboration and cooperation in areas where they currently share common operational practices and physical linkage. In turn, this regional program will assist multiple state and Federal agencies.

2.2 Overview of Drinking Water Quality in Central Valley

A number of state and Federal programs oversee drinking water quality throughout the state of California. They cover both surface and ground waters. However, there are two programs that specifically address drinking water quality in the Central Valley. These two programs are:

- CALFED Drinking Water Quality Program (DWQP); and
- Central Valley Drinking Water Policy.

The CALFED DWQP has a goal of achieving an equivalent level of public health protection (ELPH) for all users of water from the Sacramento-San Joaquin Delta. The CALFED Drinking Water Subcommittee is developing a framework, which is comprised of a series of tools that can be applied to aid in water quality planning. These tools when applied will collectively generate drinking water at a quality that meets ELPH requirements (CBDA 2005). These tools focus on:

- Delta Sources (improvement, conveyance/operations, storage);
- Other Local Sources (improvement, operations, storage, use efficiency);
- CVP/SWP (operations and storage);
- Source water exchanges (out of the Delta);
- Local/regional exchanges (including use efficiency);
- Treatment options (including use efficiency); and
- Distribution system management.

Figure 2-2 presents a graphical representation of the framework and how the various tools will be implemented.

The Four County area is connected to the DWQP through Source Improvement and Storage in the tributaries upstream of the delta. These two categories of tools are circled in red in Figure 2-2.

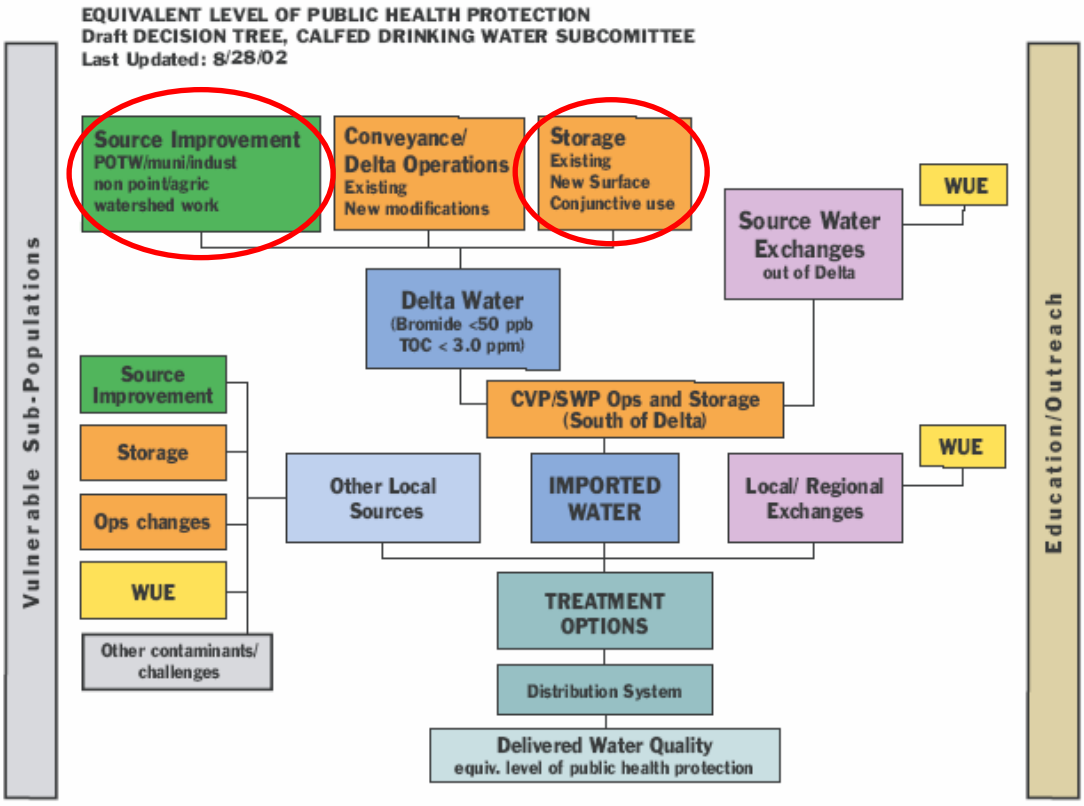


Figure 2-2
ELPH Framework Diagram

Improvement in source water quality and development of storage upstream of the Delta can contribute to meeting the ELPH goals. Improving the water quality of the source waters to the Delta may also be accomplished through the use of other sources of water with lower concentrations of target-related constituents. These sources could be used instead of or blended with Delta water for drinking purposes. There is also a recognition that these other sources of water may be provided through the development of new storage, including the conjunctive use of groundwater basins.

The Central Valley Regional Water Quality Board (Central Valley RWQCB) is developing a drinking water policy for surface waters in the Central Valley. The goals of the program are to establish both water quality objectives for all known drinking water constituents of concern and implementation strategies to provide effective source water protection (CVRWQCB 2005b).

Details of both programs are presented in Section 5.

Both programs will have a direct impact on the four counties of Butte, Colusa, Glenn, and Tehama. Each of the counties contains water sources to the Delta and surface waters which are sources of drinking water in the Central Valley. Strategies that are

developed by the Four County Team for the protection of drinking water quality will need to address the local goals, as well as, goals for the region and Central Valley.

2.3 Purpose of Document

The purpose of this document is to present:

- Regional drinking water quality objectives for the four-county area of Butte, Colusa, Glenn, and Tehama counties;
- Drinking water strategies that are common to all four counties;
- Specific implementation activities; and
- An organization structure that will support implementation of the strategies by each of the four counties.

The document also summarizes:

- Current county water-quality activities including similarities and differences between counties;
- Statewide and regional water quality management programs, which affect the Northern Sacramento Valley region and offer opportunities for collaboration; and
- An initial assessment of water quality conditions including current drinking water suppliers and sources, future trends in drinking water demand, contamination issues, and monitoring programs with a water quality focus.

2.4 Content of Document

This document includes the following sections:

- Section 3 – Provides a description of the Four County area included in this study;
- Section 4 - Presents the objectives of this regional strategy for drinking water quality protection and the process applied to develop the management strategies;
- Section 5 - Summarizes current drinking water activities being performed by local, regional, state, and Federal agencies, as well as, non-government organizations;
- Section 6 – Provides an overview of current conditions in terms of drinking water suppliers and sources, contamination issues, and monitoring programs;
- Section 7 – Presents the strategies for protecting drinking water quality in the Four County area and recommendations for how these strategies should be implemented

- Section 8 - References; and
- Section 9 - Acronyms.

Section 3
Study Area Description

Protecting drinking water quality requires an understanding of how water moves through the hydrologic cycle in a given region and the small percentage that is diverted for drinking water. Physical and cultural characteristics exert impacts on the hydrologic cycle and the water available for drinking water supplies. Understanding the relative impact of each characteristic will allow managers to identify those that are the most important for the protection of drinking water quality. This section reviews the physical and cultural characteristics in the Four County area and their impact on drinking water quality.

The four counties of Butte, Colusa, Glenn, and Tehama are located in the northern portion of the Sacramento Valley as shown in Figure 2-1. Both surface water and extracted groundwater are used as sources of drinking water within the Four County area.

3.1 Topography

The Four County area straddles a portion of the Sacramento Valley with the foothills and mountain areas of the Sierra Nevada Mountains and Cascade Mountain Range forming the eastern boundary and the Coastal Range Mountains forming the western boundary. Figure 3-1 illustrates the Four County area topography.

The valley floor dips gently from the north to the south, with elevations ranging from approximately 300 feet above mean sea level (msl) near Red Bluff in Tehama County to less than 30 feet at the southern end of Colusa County. The foothill region ranges in elevation from approximately 300 feet msl to approximately 4,000 feet msl where it transitions into the mountain area. The mountain areas range in elevation from approximately 4,000 feet to over 9,000 feet near Mt. Lassen.

Topography of the Four County area is important because it dictates the flow pattern of both surface and groundwater. The topography impacts the climate with both orographic and rain shadow effects from the mountains. All four counties have similar topographic characteristics as shown in Figure 3-1 which forms the basis for regional planning and allows for the consideration to expand this management strategy to surrounding counties that share the same characteristics such as Shasta, Yuba, Sutter, and Yolo. Finally the topography has dictated the pattern of development with most of the agricultural and urban development occurring on the valley floor.

3.2 Climate

The Four County area has a Mediterranean-like climate with cool, wet winters and hot, dry summers. Precipitation is strongly seasonal, occurring generally in the period October through March or April, with about half of the total annual precipitation generally occurring from November through mid-February. The prevailing weather pattern is from west or northwest to the east or southeast.

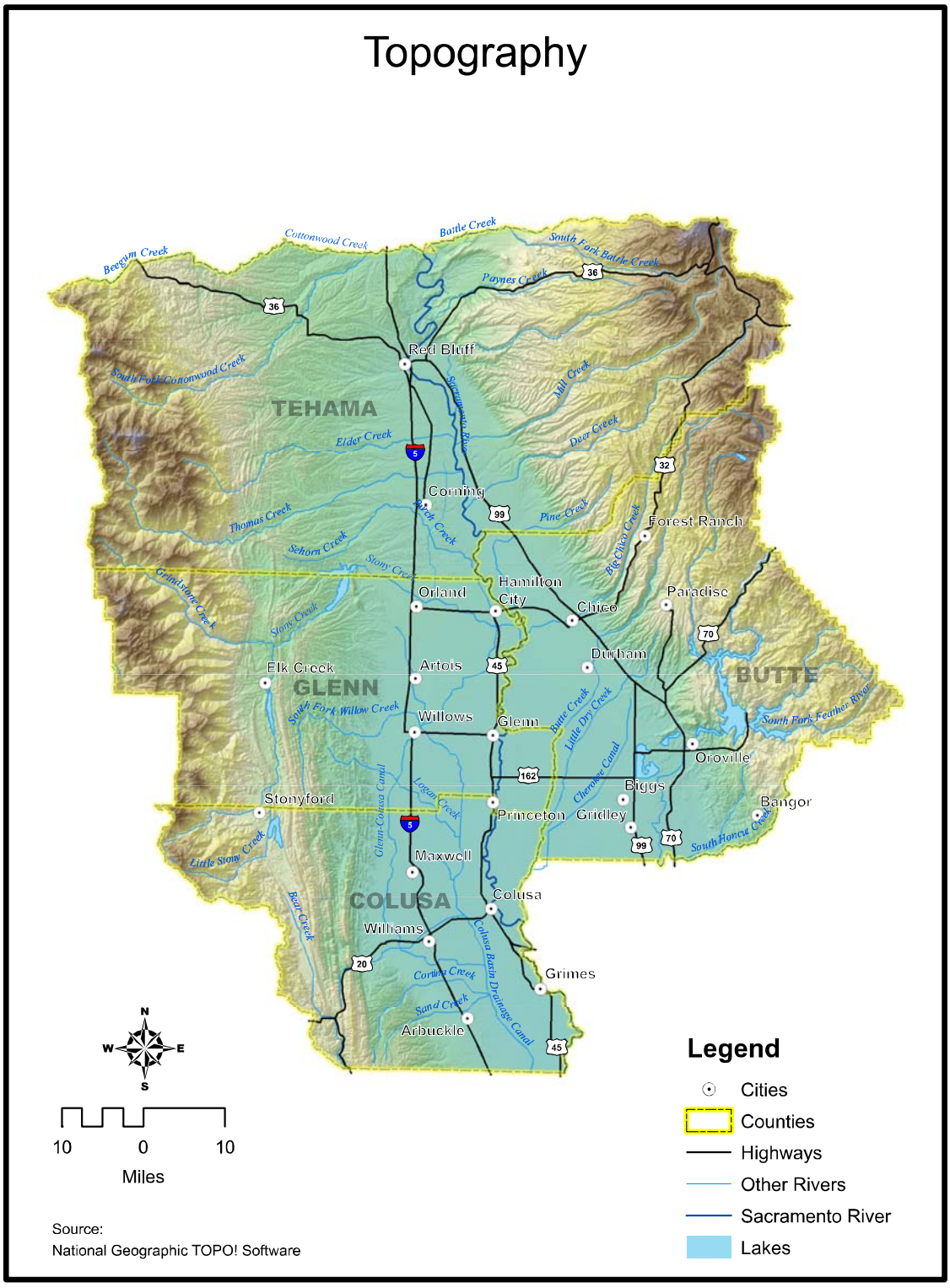


Figure 3-1
Topography

Precipitation amounts vary within the Four County area with areas at higher elevations typically receiving more precipitation than the valley floor. The annual rainfall zones for the Four County area are shown on Figure 3-2. The precipitation contours shown on the figure demonstrate the orographic effect of the mountains on rainfall amounts.

Table 3-1 presents minimum, average and maximum values of annual precipitation and snowfall for eight stations located within the Four County area. Each station represents a different location and elevation.

Table 3-1
Annual Precipitation and Snowfall at Eight Locations

	Chico Univ. Farm (CES)	Paradise (PRD)	Harrison Gulch R.S. (HRR)	Red Bluff (RBF)	Mineral (MNR)	Orland (ORL)	Stony Gorge Res. (STG)	Williams (WLM)
Location	Valley Floor	Foothills	Coastal Range	Valley Floor	Cascade Range	Valley Floor	Foothills	Valley Floor
Elevation	185 ft	1,750 ft	2,750 ft	341 ft	4,880 ft	250 ft	800 ft	80 ft
Precipitation								
	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches
Average	25.0	54.0	36.7	23.7	53.4	20.7	21.2	16.4
Maximum	46.0	100.0	81.4	53.6	99.7	48.4	49.5	38.2
Minimum	10.0	18.0	17.6	9.0	22.1	7.7	8.8	8.2
Snowfall								
Average	0.1	3.0	38.7	2.1	152	0.4	1.9	0.1
Maximum	4.3	32.0	171	15.5	309	7.0	17.8	3.0
Minimum	0.0	0.0	0.0	0.0	71.1	0.0	0.0	0.0

Source: Climate data Western Regional Climate Center, Reno Nevada, Western U.S. Climate Historical Summaries Available at http://www.wrcc.dri.edu/summary/climsmsca.html

The temperature varies within the Four County area by season and elevation; temperatures are warmer in the valley and cooler in the foothill and mountain areas. Table 3-2 shows the monthly mean air temperatures at the same eight locations discussed in Table 3-1.

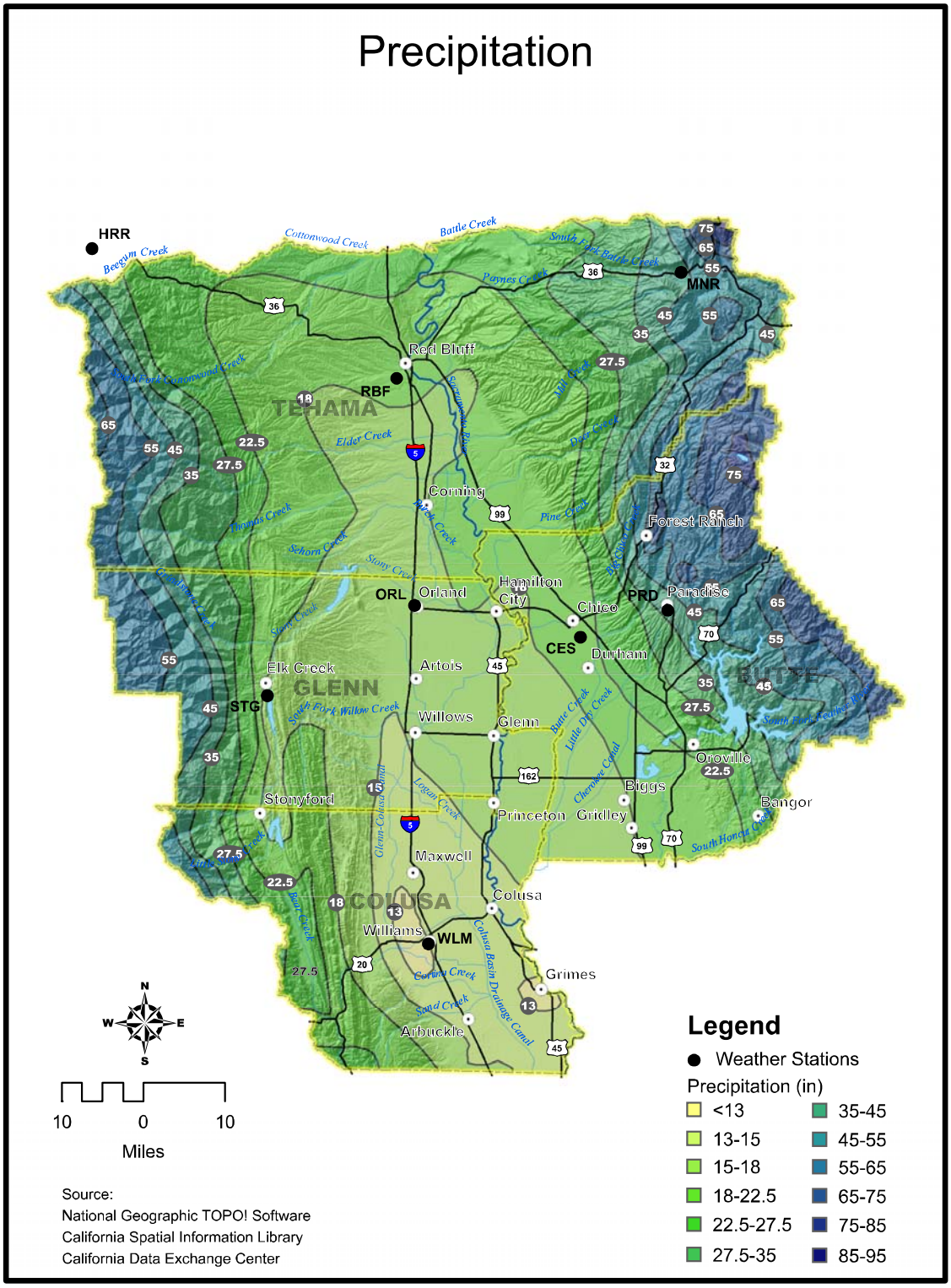


Figure 3-2
Precipitation

Table 3-2
Monthly Mean Air Temperatures at Eight Locations

	Chico Univ. Farm (CES)	Paradise (PRD)	Harrison Gulch R.S. (HRR)	Red Bluff (RBF)	Mineral (MNR)	Orland (ORL)	Stony Gorge Res. (STG)	Williams (WLM)
Location	Valley Floor	Foothills	Coastal Range	Valley Floor	Cascade Range	Valley Floor	Foothills	Valley Floor
Elevation	185 ft	1,750 ft	2,750 ft	341 ft	4,880 ft	250 ft	800 ft	80 ft
Month	° F	° F	° F	° F	° F	° F	° F	° F
January	44.8	45.6	N/A	45.8	31.2	45.1	44	45.2
February	49.5	48.4	36.9	50.2	33.3	49.9	47.8	49.9
March	53.3	50.7	44.1	53.9	35.8	53.7	50.9	53.6
April	58.7	55.8	48.7	59.5	40.9	59.3	56.1	59.0
May	65.8	62.9	54.5	67.8	48.0	66.9	64.1	67.1
June	73.0	71.2	63.8	75.8	55.5	74.2	72.4	74.7
July	78.3	77.6	69.8	81.6	61.8	78.5	78.3	78.5
August	76.4	76.6	68.4	79.5	60.8	76.6	76.7	76.5
September	71.8	71.9	62.6	74.9	56.1	72.9	72.0	72.0
October	63.0	63.0	52.8	64.9	47.6	64.2	62.7	63.8
November	52.5	51.7	44.4	53.1	37.9	52.9	51.1	52.6
December	45.4	45.7	N/A	46.6	32.5	45.6	44.8	46.0

Source: Climate data Western Regional Climate Center, Reno Nevada, Western U.S. Climate Historical Summaries Available at http://www.wrcc.dri.edu/summary/climsmsca.html

The climate of the Four County area has a strong impact the availability of water. In the western portion of the Four County area where less rain falls, groundwater is a more reliable source, therefore, the protection of groundwater quality for drinking water should be a priority. Discharge of contaminates will have more of impact on low volume streams and aquifers, resulting in higher concentrations. All four counties have similar climatic characteristics as shown in Figure 3-2 and Tables 3-1 and 3-2, which is another basis for developing drinking water strategies on a regional basis.

3.3 Geology and Soils

Understanding geology and soils is critical when evaluating water resources. Some subsurface geologic units can act as an aquifer to store groundwater, while other units prevent or restrict the flow of groundwater. Certain surface soils and rock units are permeable, allowing for percolation of water to recharge groundwater. Others have low permeability, which restricts infiltration and generates surface runoff. DWR Northern District recently completed an evaluation of the geology and hydrogeology of the northern Central Valley. The following discussion summarizes the findings of DWR's recent effort (DWR 2000).

The Four County area covers several geologic regions. The Sacramento Valley basin is a structural basin filled with up to 19,000 feet of sediment along the valley axis, west of the present day Sacramento River. These marine and continentally derived sediments have been deposited almost continuously from Late Jurassic time to the present. A geologic map of the Four County area is presented in Figure 3-3.

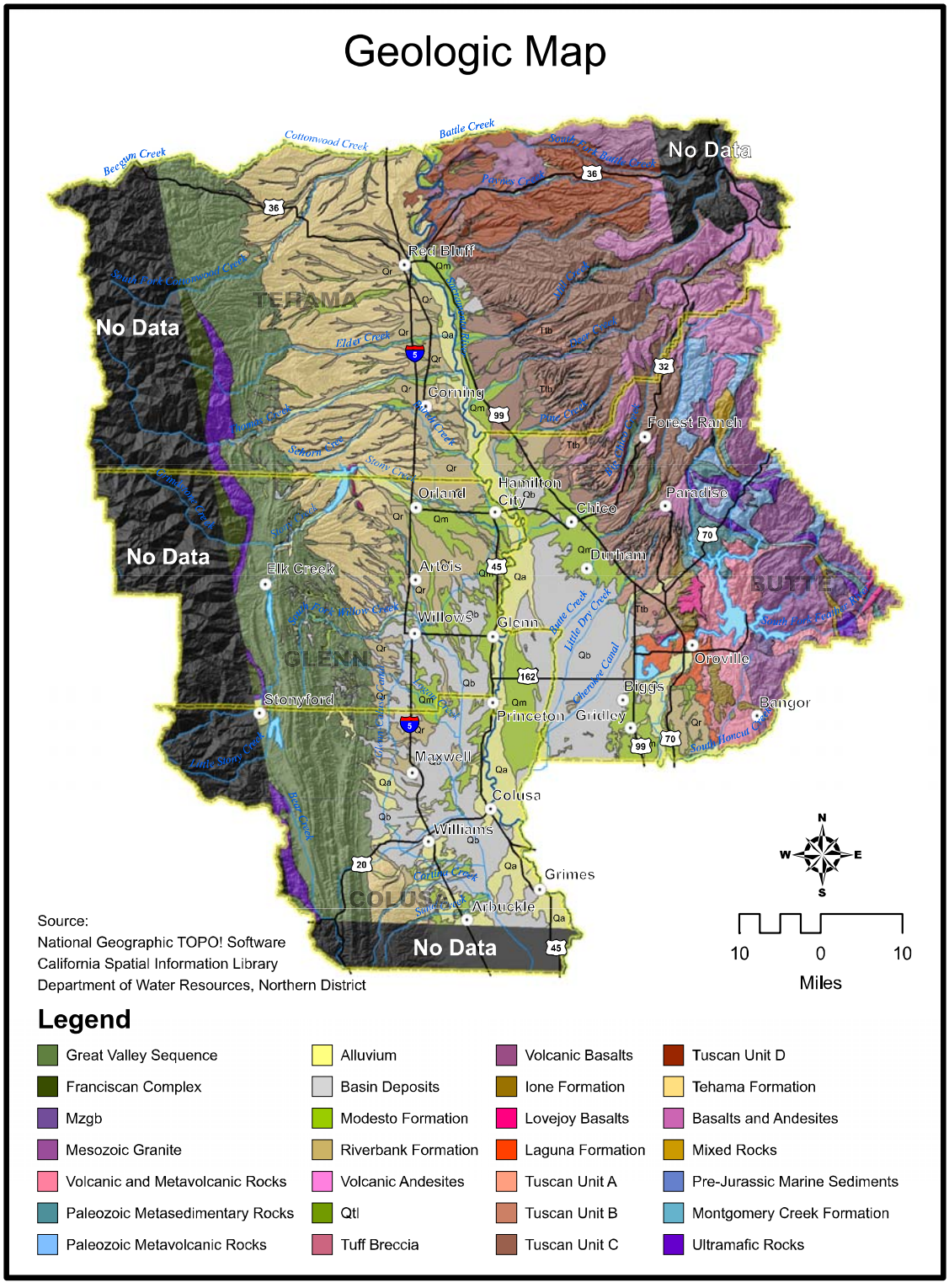


Figure 3-3
Geologic Map

The surface geology of the Sacramento Valley is comprised primarily of alluvial deposits whose source area is the eroded material derived from surrounding mountain ranges along with fine silts and clays of the Basin deposits. Quaternary Alluvium was recently deposited by modern streams and rivers. Quaternary Alluvium is found near the Sacramento River, Thomes Creek, and Stony Creek. Fine silts and clays of the Basin are seen primarily in southern Butte County and in Glenn and Colusa Counties.

Along the front of eastern foothills, older alluvial fan and terrace deposits of the Riverbank and Modesto Formations mark the edge of the valley sedimentary units. Along western foothills, the Tehama Formation marks the edge of the valley.

Older sediments in the basin were emplaced in a marine environment and usually contain saline or brackish groundwater. Younger sediments were deposited under continental conditions and generally contain fresh groundwater. Sediments thin near the margins of the basin exposing the older metamorphic and granitic rocks underlying and bounding the Sacramento Valley sediments.

The geology of the Four County area will impact drinking water quality management because a wide range of water-bearing units will need to be protected. Each unit will have unique geologic features that may make them more or less susceptible to contamination. Permeable surface units will need to be protected as will units that act as recharge zones for deeper formations. In addition, geologic and soil formations occur on a regional basis and do not follow government boundaries. Regional planning efforts can incorporate the entire formation.

3.4 Hydrogeology

The mixture of geologic units in the Four County area, as shown in Figure 3-3, range from very productive water-bearing sedimentary units, to non-water-bearing plutonic and metamorphic rocks. The deeper fresh groundwater-bearing units include the Tuscan, Laguna, and Tehama Formations. Shallower fresh groundwater-bearing units include Quaternary Alluvium, Basin Deposits, and the Modesto and Riverbank Formations.

As a general rule, the direction of groundwater flow generally follows the local topography, but groundwater always flows from areas with higher hydraulic head to areas of lower hydraulic head.

The following sections describe the principle water bearing units, water levels and trends in storage within the Four County area.

3.4.1 Fresh Water-Bearing Units

On a regional scale, freshwater is defined by water with a specific conductance of less than 3,000 micromhos per centimeter. Water with a specific conductance that exceeds

3,000 micromhos per centimeter is considered to be saline. The approximate depth of freshwater in the Four County area can vary by location:

- Near Corning 1,200 feet
- Near Orland 1,200 feet
- Near Maxwell 1,400 feet
- Near Chico 1,100 feet
- Near Gridley 1,100 feet

Deeper freshwater-bearing formations include the Tuscan, Laguna, and Tehama Formations. These formations are the sources of water for deep irrigation and municipal wells.

Shallower freshwater-bearing formations include the Riverbank Formation, the Modesto Formation, Quaternary Alluvium, and Basin Deposits (Dudley 2005). These formations yield water to shallow domestic wells. Figure 3-4 shows the recharge area for the shallow aquifers. The recharge area for the shallow aquifer includes much of the valley floor.

Tuscan Formation

The Tuscan Formation extends from Redding to Oroville, and from the base of the Cascade Range and Sierra Nevada into the subsurface about five miles west of the Sacramento River. It is comprised of four units, A, B, C and D. Units A and B are referred to as the "Lower Tuscan". The permeable layers of the Unit A and Unit B sediments compose the main aquifer material for deep groundwater storage in the valley. The fine-grained, consolidated lahars of Unit C form thick, low permeability confining layers for groundwater contained in the more permeable sediments of Units A and B. Recharge areas for the Lower Tuscan aquifer (Units A and B), as they are currently understood, are shown in Figure 3-4. Ground surveys indicate the recharge areas are in the foothills on the east side of the Sacramento Valley in Tehama and Butte Counties.

Laguna Formation

The Laguna Formation is discontinuous and extends generally from Oroville to Lodi. Estimates of the maximum thickness range from 180 feet (Helley and Harwood 1985) to 1,000 feet (Olmsted and Davis 1961). Wells completed in the finer-grained sediments of the Laguna Formation yield only moderate quantities of water. In areas where sand dominates, well yields are higher.

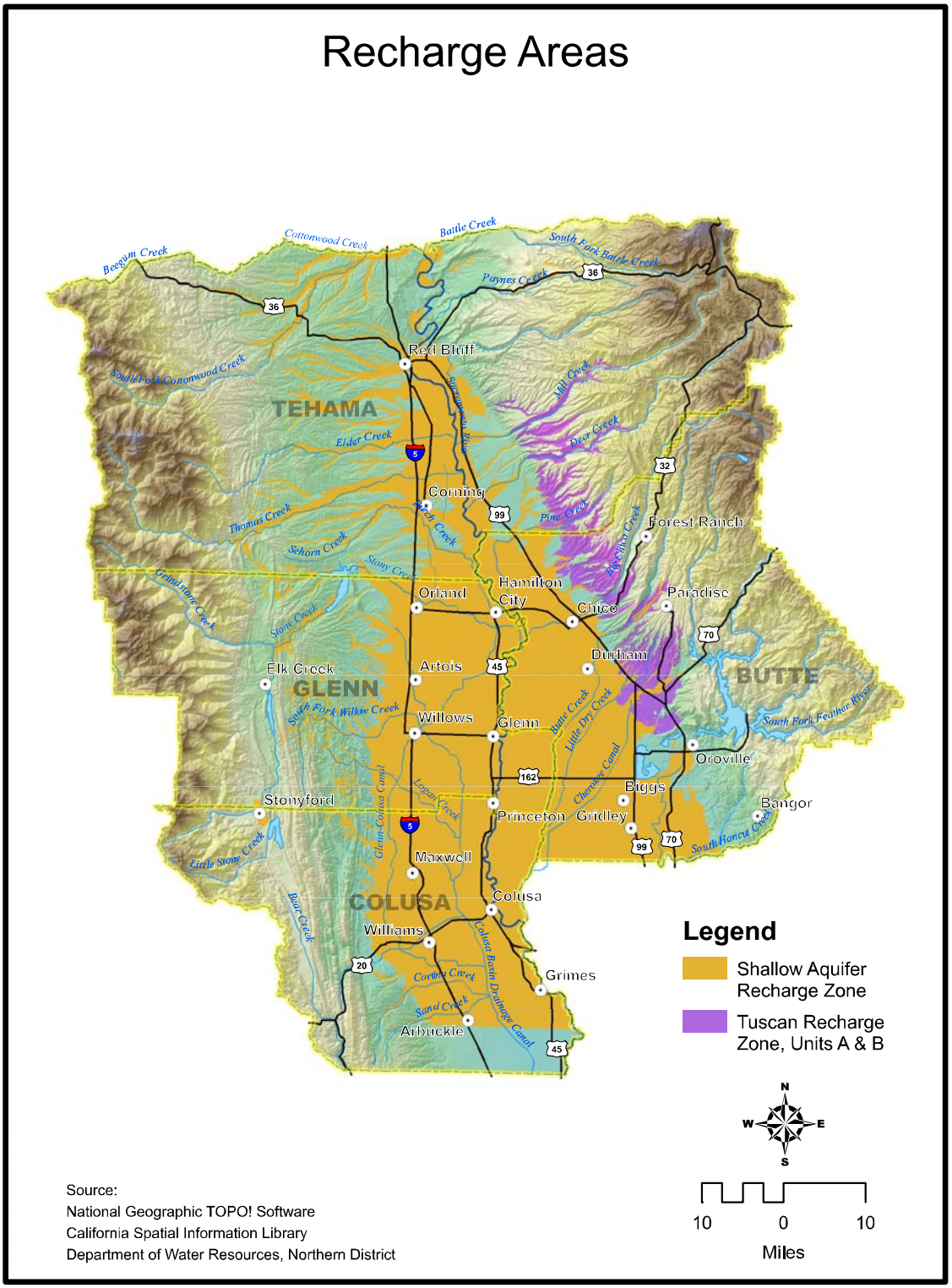


Figure 3-4
Recharge Areas

Tehama Formation
The Tehama Formation is exposed from Redding in the north to Willows in the south, and from the western edge of the Sacramento Valley east to near the Sacramento River, with the majority of exposures in the west-central portion of Tehama County. The Tehama Formation ranges in thickness from 100 feet on the edge of the valley to 3,000 feet in the south-central part of the valley (Olmsted and Davis 1962). The Tehama Formation consists of massive amounts of sandy-silt, silty-clay and lenses of poorly consolidated sand and gravel, with low to moderate permeability, and localized areas of high permeability.

Riverbank Formation
The Riverbank Formation consists of gravel, sand, and silt. Exposures of the Riverbank Formation occur west of the Sacramento River from Red Bluff to Maxwell. Thickness of the Riverbank Formation ranges from less than one foot to over 200 feet depending on location. The Riverbank Formation is moderately too highly permeable and yields moderate quantities of water to domestic and shallow irrigation wells. Groundwater occurs generally under unconfined conditions.

Modesto Formation
The Modesto Formation consists of gravel, sand, and silt. The most notable occurrences are found along the Sacramento and Feather Rivers. The Modesto Formation ranges in thickness from less than ten feet in terraces and along the margins of the valley to nearly two hundred feet across the valley floor (Helley and Harwood 1985). The Modesto Formation deposits provide water to domestic and shallow irrigation wells as well as to deeper wells with multiple zones of perforations. Groundwater occurs generally under unconfined conditions.

3.4.2 Groundwater Levels and Movement

Figure 3-5 is a groundwater elevation contour map developed by the DWR (2003) for the spring of 1997. Spring groundwater levels are commonly the highest of the year and, in areas unaffected by municipal use of groundwater, reflect the natural groundwater table distribution and direction of movement. Spring groundwater levels vary from an elevation of about 40 feet above msl near the city of Colusa, to 260 feet above msl near the city of Red Bluff.

The direction of groundwater movement is illustrated in Figure 3-5 by a series of arrows perpendicular to the groundwater elevation contours. The overall pattern of groundwater movement is toward the Sacramento River. North of the Glenn-Colusa county border, the Sacramento River is a gaining river with net inflow from the valley aquifer system. In this reach, the river acts as a drain being recharged by groundwater from the valley aquifer system. South of Glenn-Colusa border, surface-water flows from the Sacramento River recharge the groundwater system along most of its course through the southern Sacramento Valley. As indicated in Figure 3-5, there is a

groundwater mound west of Orland that is associated with recharge from Stony Creek.

The hydrogeologic characteristics of the Four County area will impact drinking water quality by dictating where recharge zones are located as shown in Figure 3-4 and the movement of contaminates in groundwater as shown in Figure 3-5. To protect drinking water quality, recharge zones will need to be protected from discharges of pollutants of concern. If groundwater becomes contaminated with pollutants such as nitrates and bacteria, the migration path it follows will need to be identified to protect downstream supplies. Groundwater also travels across county boundaries and regional planning will be required to management any associated drinking water quality issues.

3.5 Surface Water Hydrology

In the Sacramento Valley, rainfall in the Sierra Nevada, Coast Range, and Cascade Mountains contribute to surface water flow and groundwater recharge. The general direction of surface water flow is toward the center of the valley, and then in a southerly direction. Figure 3-1 shows the major surface water bodies in the Four County area.

The Sacramento River is the largest river in the Four County area, which is aligned in a north-south direction. The Sacramento River passes through the area on its way to the Delta and San Francisco Bay. Many tributary streams flow from the mountains on either side of the valley and then across the valley floor to the Sacramento River. These tributaries provide much of the surface water supply within the Four County area. The major tributary streams in terms of flow volume in the Four County Area that originate west of the Sacramento River include Cottonwood Creek, Elder Creek, Thomes Creek, Sehorn creek, Stony Creek, Willow Creek, Logan Creek, Cortina Creek, and Sand Creek. Major tributary streams in the Four County area that originate east of the Sacramento River include Battle Creek, Paynes Creek, Antelope Creek, Mill Creek, Deer Creek, Pine Creek, Big Chico Creek, Butte Creek, and Little Dry Creek. Canals in the Four County area include the Tehama Colusa Canal, the Glenn Colusa Canal, Colusa Basin Drainage Canal, Cherokee Canal, Western Canal, and the Corning Canal.

Monthly mean daily flows in the Sacramento River near Red Bluff in northern Tehama County range from 6,900 to 20,400 cfs for the period 1964-2003. Monthly mean daily flows in the Sacramento River near Grimes in Southern Colusa County range from 6,500 to 16,900 cfs for the period 1946-2003 (USGS 2003). Water diversions, groundwater recharge discussed in Section 3.4, and evaporation reduce flows in the river as it passes through the Four County area even with the inflows from the various tributaries. Peak flow typically occurs in January, February and March, while minimum flow occurs in September, October, and November.

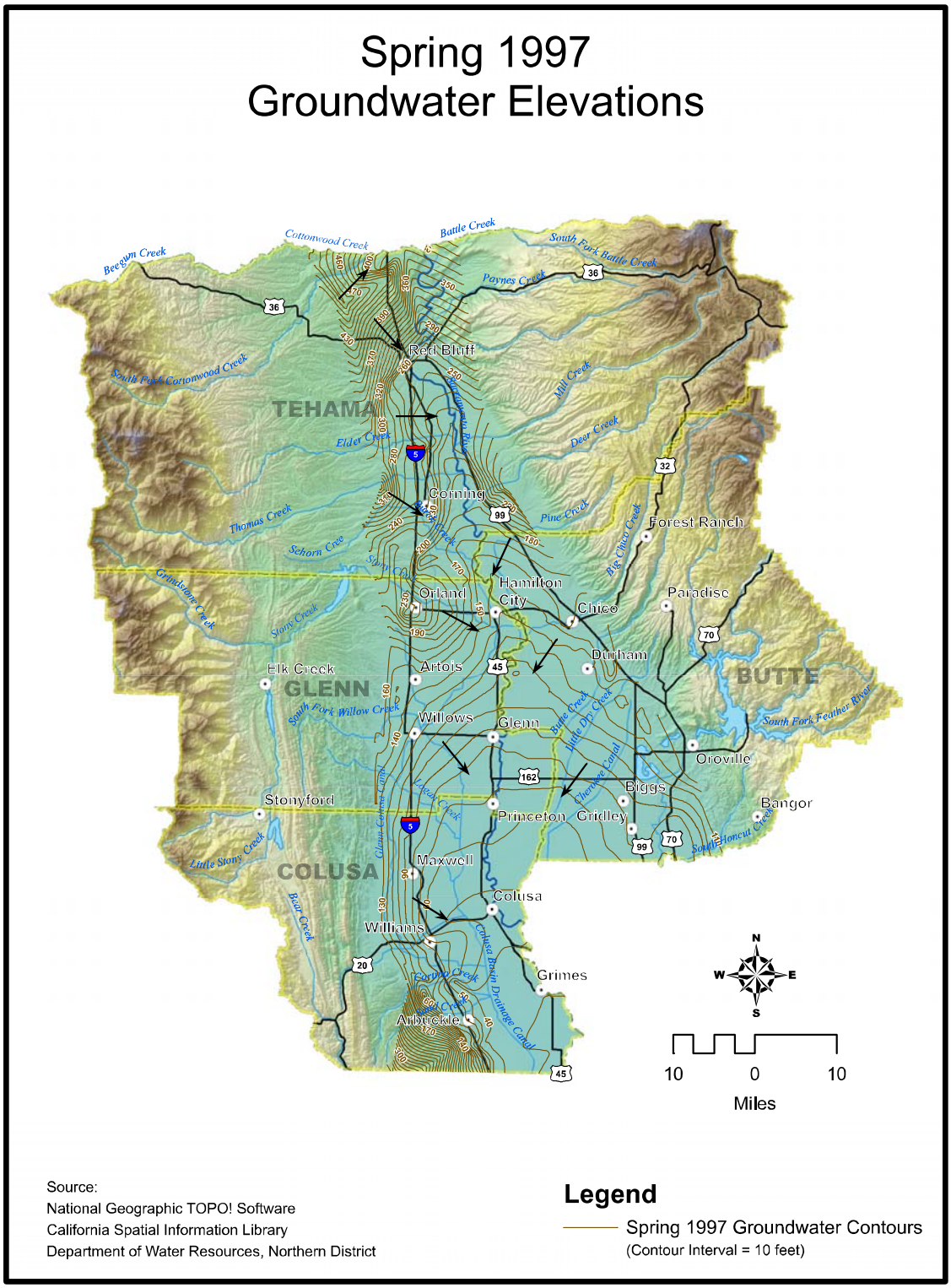
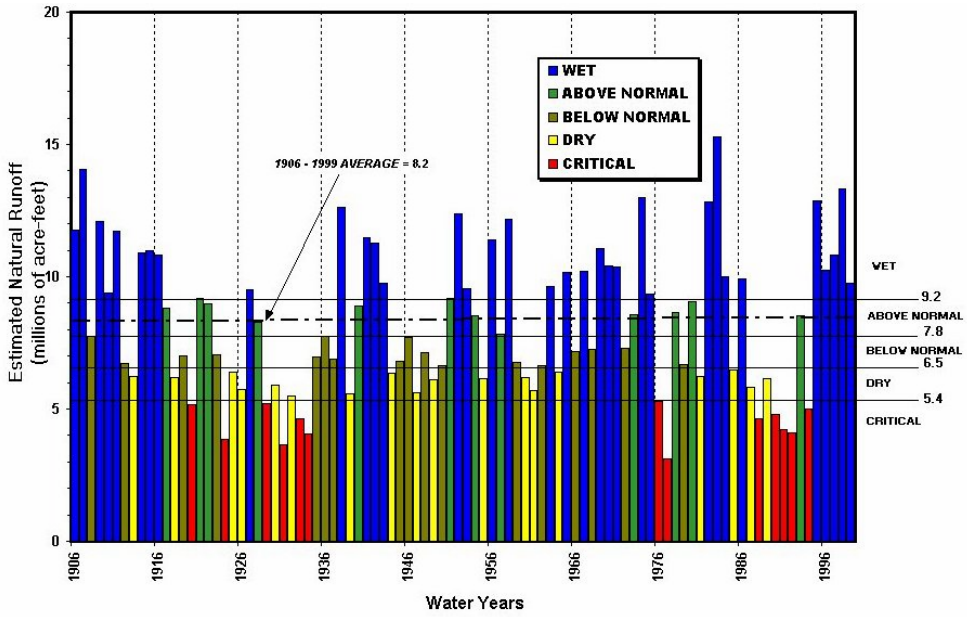


Figure 3-5
Groundwater Elevations

The Sacramento River Water Supply Index illustrates the variability in natural runoff from year to year. Based on the calculated runoff in million acre-feet, each year of the index is classified as wet, above normal, below normal, dry or critical. Figure 3-6 shows the Sacramento River Water Supply Index annually since 1906 and the classification range for each type-year. From Figure 3-6, it can be seen that flows have varied from dry and critical during the 1976-77 and 1988-95 droughts to very wet during the 19983-84 and 1997-98 (El Nino) seasons.

Although surface water is not the primary source of drinking water in the Four County area, as will be discussed in Section 6, it is a major source for portions of Butte County and to downstream users that rely of water from the Sacramento River and the Delta. Protection of surface water quality is a major goal of the CALFED program. Water resource managers in the Four County area need to understand any action that degrades surface water quality in their area, such as the discharge of waste to the Sacramento River or Bear Creek, will contribute to lower water quality in the Delta. They will need to incorporate this downstream impact in their regional drinking water strategies. As with groundwater, surface water hydrology does not follow manmade boundaries. For example, the Sacramento River watershed includes portions of 19 counties. Regional planning is essential with a focus on watersheds.



(Source: Department of Water Resources)

Figure 3-6
Sacramento River 40-40-30 Water Supply Index

3.6 Land Use

Land use in the Four County area can be divided into three major categories: native, agriculture, and urban uses. Native generally occurs in the foothills and mountainous

portions. Agriculture generally occurs in the valley portion. Urban use occurs in smaller areas of the valley dispersed along the major transportation routes.

Table 3-3 shows the percentage of land use by major category for each of the four counties. Native land makes up the majority of land use, agricultural land use is second most prevalent, and urban land use accounts for the smallest portion.

Table 3-3
Land Use Data in the Four County Area

County	Native	Agriculture	Urban
Butte County	67%	28%	5%
Colusa County	52%	46%	2%
Glenn County	65%	33%	2%
Tehama County	87%	10%	3%

Source: Department of Water Resources

Figure 3-7 identifies the locations of land use types within the Four County area.

In Butte County, the majority of agricultural land is in the western portion of the county. Major crops include rice (shown as mint green), and deciduous orchards (shown as pink). The largest urban areas are the cities of Oroville, Chico, Paradise, Biggs, and Gridley.

In Colusa County, the majority of agricultural land is in the eastern portion of the county. Major crops include rice, truck crops (shown as brown), field crops (shown in dark green), and deciduous orchards. The largest urban areas are the cities of Colusa and Williams.

In Glenn County, the majority of agricultural land is in the eastern portion of the county. Major crops include rice, deciduous orchard, and field crops. The largest urban areas are the cities of Willows and Orland.

In Tehama County, the majority of agricultural land is in the south central portion of the county. Major crops include deciduous orchard and subtropical (such as citrus, olives and eucalyptus; shown as red). The largest urban areas are the cities of Red Bluff and Corning.

Land use can be used to protect water quality by locating where urban developments, field crops, and orchards exist in the Four County area. These land use types not only represent potential source of contaminates but tend to modify the natural order. Large contiguous areas will have more impact than smaller areas. Large contiguous areas of native areas will protect water quality.

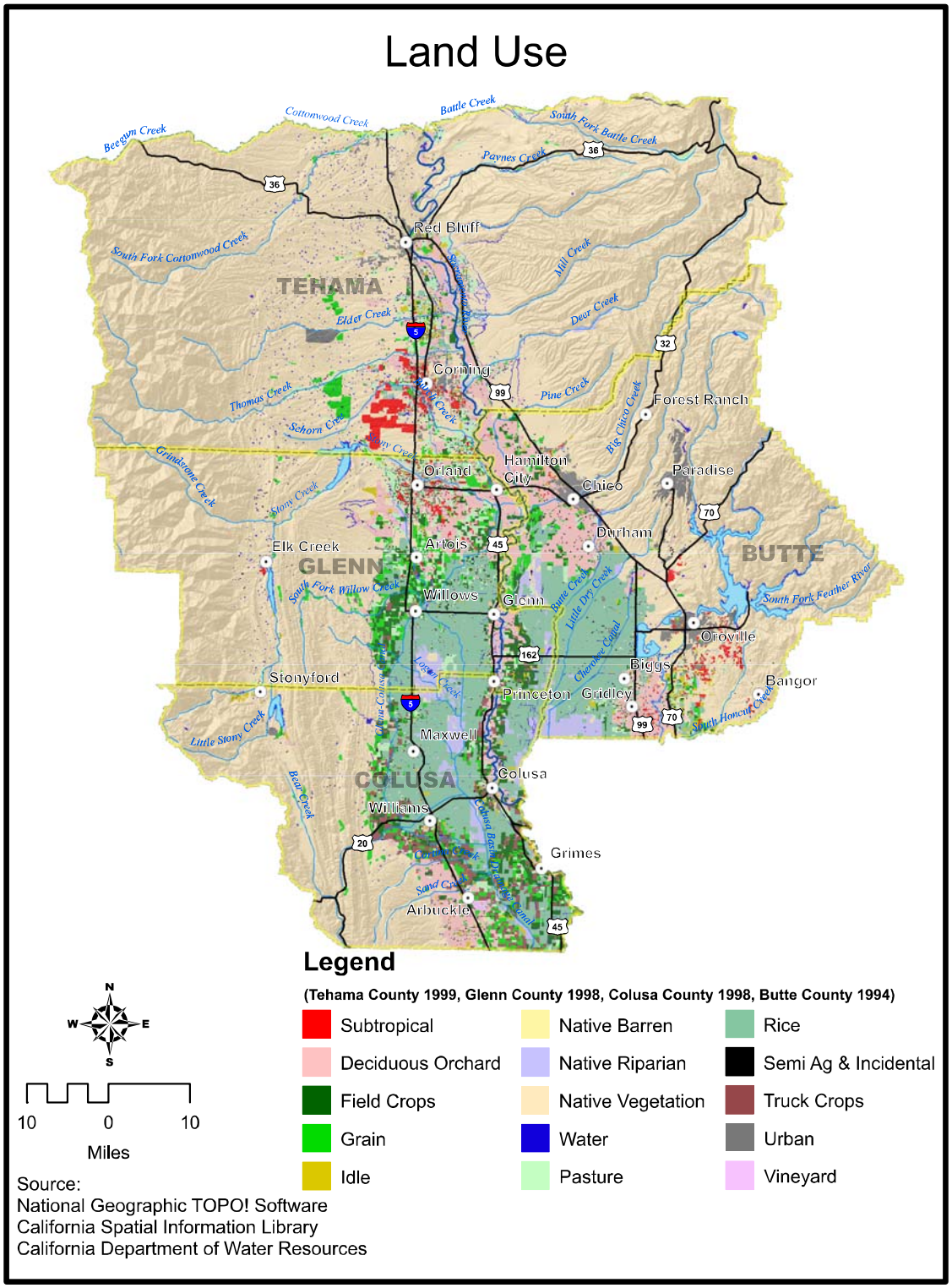


Figure 3-7
Land Use

3.7 Zoning

Zoning in the Four County area is important for county water resources planners because it dictates the location of current and future land use. Individual county governments determine county zoning areas and codes. Three counties have provided zoning in a digital format and are included in this document. Colusa County maintains its zoning information in a hardcopy format so this information is not included. Butte County has approximately 100 zoning classifications, Glenn County has approximately 25 classifications, and Tehama County has approximately 80 zoning classifications. Appendix A contains the current zoning maps and keys for Butte, Glenn, and Tehama Counties.

To facilitate comparison of zoning information from the three counties, zoning classifications were consolidated into 13 general zoning groups. Zoning groups included: agriculture, commercial, floodplain, forestry, government/public agency, industrial, open space, open space/planned development, recreation, residential estates, residential/city, timber preserve/resource conservation, and unclassified.

Figure 3-8 presents a map of the Four County area with the locations of the different generalized zoning groups. The zones associated with urban development (residential, planned development, commercial, city, government/public agency, and industrial) are of interest because of their potential to impact water quality through the discharge of wastewater, stormwater, or spills of pollutants. Most of these zones are along the transportation corridors for I-5, S.R. 99, and S.R. 70 or near the cities of Red Bluff, Chico, and Oroville.

Another important consideration is the relationship between zoning and groundwater recharge zones (shown in Figure 3-4). Recharge zone protection is an important consideration because groundwater is very susceptible to contamination at this interface with the surface. Limiting development (or certain kinds of development) within recharge zones is one method to prevent negative impacts on groundwater quality.

In the case of Four County area, limiting development within the shallow aquifer recharge zone is difficult because of the extensive area it covers. Still, county and city planning departments need to be aware of these zones.

The possible recharge zone for the Lower Tuscan formation is located along the eastern edge of the Central Valley as shown in Figure 3-4. The cities of Chico and Oroville are located nearby. County and city planners should be made aware of its location relative to current and future activities.

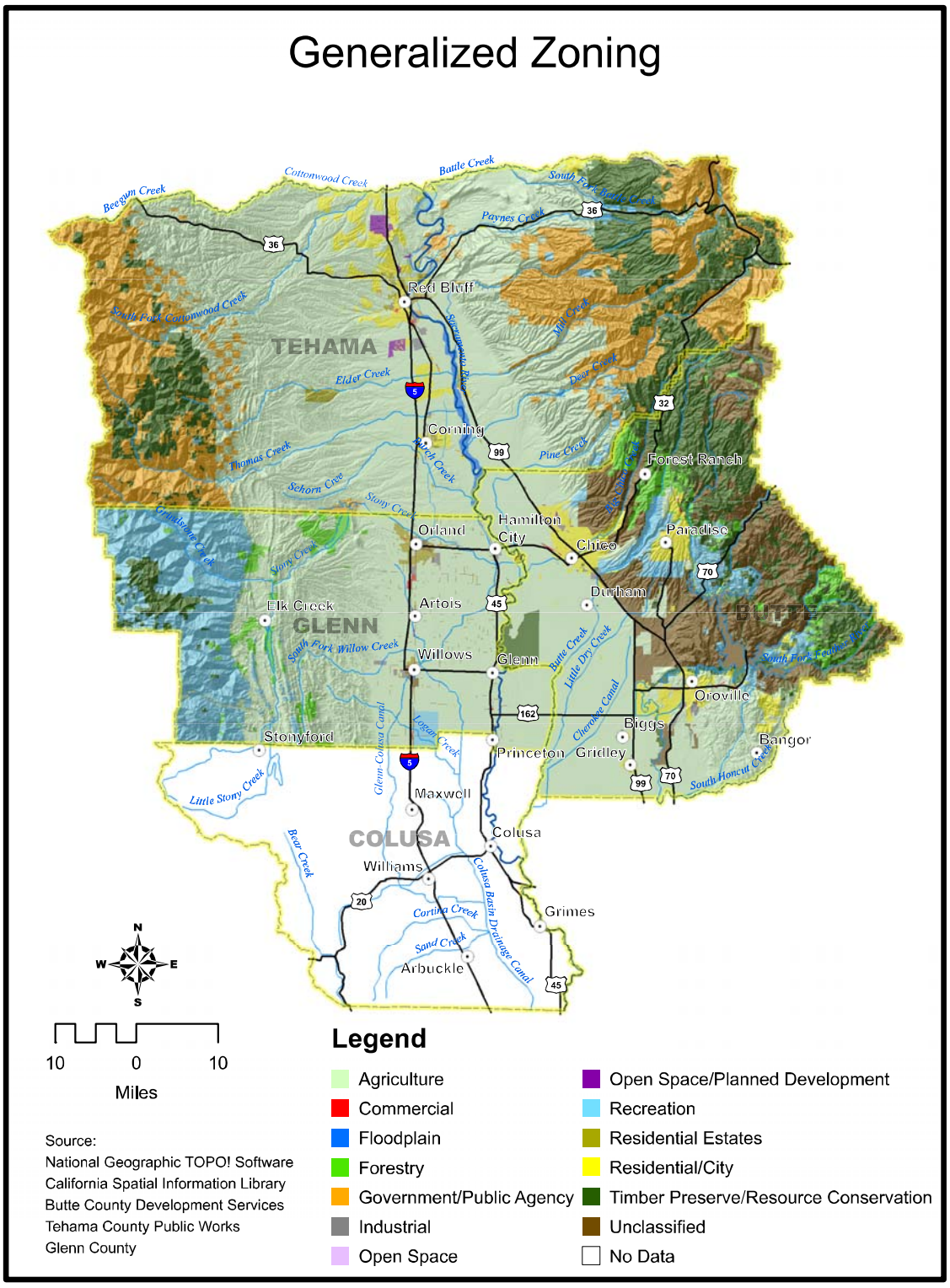


Figure 3-8
Generalized Zoning

3.8 Population

Table 3-4 includes census data for the year 2000 for each of the four counties. Population in the four counties is distributed between urban areas and rural areas, with Butte County having the highest percentage of its population in urban areas, and Tehama County having the lowest percentage of its population in urban areas.

Table 3-4
Year 2000 Census Data in the Four County Area

County	Population	Percent of Population in Urban	Percent of Population in Rural	Housing Units	Population per sq. mi	Housing Units per sq. mi
Butte	203,200	75%	25%	85,500	124	52
Colusa	18,800	55%	45%	7,000	16	6
Glenn	26,500	50%	50%	10,000	20	8
Tehama	56,000	45%	55%	23,500	19	8

Source: US Census Bureau

Table 3-5 shows the estimated growth in population in the Four County area. Butte County is expected to see an 11% growth in population from 2000 to 2010, with the county's population changing from 203,500 to 228,000. Colusa County is expected to see a 20% growth in population from 2000 to 2010, with the county's population changing from 18,800 to 22,600. Glenn County is expected to see a 10% growth in population over the same period, with population changing from 26,500 to 29,300. Tehama County is expected to see an 11% growth in population over the same period, with population changing from 56,000 to 62,400.

Table 3-5
Population Growth Estimates in the Four Counties

County	2000	2010	2020	2030	2040	2050
Butte	203,500	228,000	260,700	278,800	282,400	287,100
Colusa	18,800	22,600	26,300	29,300	32,400	35,500
Glenn	26,500	29,300	31,900	34,300	37,100	40,100
Tehama	56,000	62,400	68,300	74,100	80,600	88,000

Source: California Department of Finance

Population statistics and distribution can be used to protect drinking water by identifying drinking water resource needs, future needs, and locations of potential contamination. In the Four County area, population centers will require large volumes of high quality water. Emphasis should be placed on protecting nearby sources of reliable water. This is true for areas where populations are expected to increase in the future. Where people are located, the potential for contamination increases. Higher densities increase the volume of both wastewater and stormwater, along with the opportunities for spills to occur.

Section 4
Strategy Development Process

Project activities were designed to provide both information and conclusions that assist in the development of water quality management strategies and implementation actions. Project activities are discussed below and include the following:

- Outreach and public involvement;
- Overview of water quality activities;
- Project objectives;
- Organizational structure;
- Water quality conditions; and
- Program strategy and implementation activities.

The Four County effort is intended to develop and promote regional collaboration among Butte, Colusa, Glenn, and Tehama counties to effectively coordinate drinking water resources and contribute to local, regional, and statewide water quality goals. The overall project planning process, as shown in Figure 4-1, included work elements that were completed with input from a project steering committee comprised of the water resource leaders from each of the participating counties and individuals from each county with local water resource and water quality knowledge.

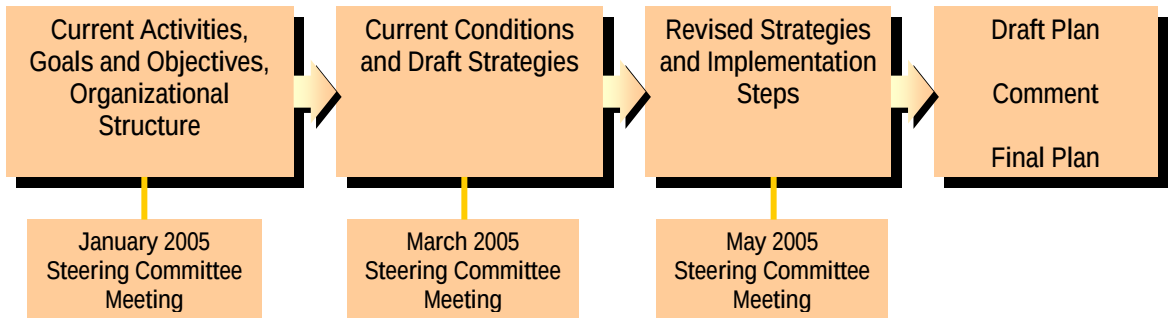


Figure 4-1
Plan Development Process

4.1 Outreach and Public Involvement

Prior to initiation of the planning process, the project *Outreach and Public Involvement Plan* was developed and finalized. The plan is included in Appendix B. Implementation activities focused on outreach to the general public and project participation by steering committee representatives from each of the counties.

Three meetings were held with steering committee members to provide information and solicit input and feedback. The project steering committee was comprised of water resource leaders from each participating county and individuals from each county with local water resource and water quality knowledge. Each of the project tasks afforded county representatives and steering committee members the opportunity to share information, priorities, successes, and observations relating to current and future activities, programs, and projects that have the potential to affect water quality. The steering committee provided valuable input on many issues. As an example, the need to consider potential impacts associated with an observed shift in development from rural "ranchette" to large subdivision was brought forth in steering committee meetings. Also, the need was highlighted for continued inter-county collaboration and intra-county communication between water resource managers and other county departments, such as Public Works, Building, Planning, and Environmental Health. Each of these county departments were identified to have the potential to impact drinking water quality through their actions.

The project team presented updates to county governing boards on two occasions, one early in the project to describe the overall project scope and at a second meeting late in the project to present results and recommendations. Presentations were completed in Butte, Colusa, and Glenn counties with the County Board of Supervisors. In Tehama County, project updates were provided to the Flood Control and Water Conservation District Board, with includes the same representation as the County Board of Supervisors. Additionally, the Colusa County Groundwater Commission and Butte County Water Commission were formally presented project updates. Announcement of the presentations was included in Board and Commission agendas.

A project update was also provided at the April 1, 2005 California Bay-Delta Authority Drinking Water Quality Subcommittee meeting.

A public meeting was held on February 9, 2005 in Willows, California. The presentation included: an overview of Northern Sacramento Valley (Four County) Drinking Water Quality; a presentation by each of the four county water resource managers on current programs and projects; a presentation on regional issues by representatives of the Sacramento Valley Water Quality Coalition and the Colusa Basin Drainage District; and a presentation on current University of California Cooperative Extension activities in the Sacramento Valley.

4.2 Overview of Water Quality Activities

The initial technical task involved the collection, synthesis, and reporting of information related to current water quality-related programs and activities in each of the participating counties, within the region, and at the State level. As a result, each county entered the subsequent planning process with a clear understanding of current water quality programs and activities at the county, regional, and statewide

level. Each county's current roles and responsibilities related to water quality, along with associated activities, were summarized. Section 5 includes much of the current water quality activities information compiled and presented during the plan development process.

4.3 Project Objectives

The steering committee proceeded with the development of project objectives with a basic understanding of county, regional, and statewide water quality programs and activities. The objectives were developed such that they are applicable to this effort and will continue to be valid during future Four County efforts. The project objectives include:

- Protect local source water quality;
- Increase the understanding of local and regional drinking water sources and threats;
- Coordinate county and local management efforts and share information about water related activities;
- Protect third parties, including the environment;
- Understand statewide drinking water concerns; and
- Provide technical assistance.

4.4 Organizational Structure

Various potential organizational structures were presented and considered that would serve the Four County participants currently and into the future consistent with the types of activities considered by the participants. Potential organizational structures were considered that generally range from a low to high level of organization. Organizational structures considered included 1) informal agreement, 2) memorandum of understanding, 3) joint powers authority, and 4) nonprofit mutual benefit corporation. County water resource managers and steering committee participants agreed that a memorandum of understanding would serve their current and future needs.

4.5 Water Quality Conditions

Concurrent with the development of project objectives and consideration of an organizational structure, the project team prepared information summarizing current drinking water conditions, including: drinking water systems, drinking water sources, drinking water contaminants of concern present in local ground and surface water bodies, and existing water quality monitoring in the Four County region. The results of this effort are included in Section 6.

4.6 Program Strategy and Implementation Activities

The project team and steering committee then developed water quality strategies based on the project objectives and information presented. Strategy concepts, presented in Section 7, were synthesized into five strategy categories, including:

- Drinking Water Protection – Groundwater
- Drinking Water Protection - Surface Water
- Regional Collaboration
- Funding
- Outreach & Education

Associated with each strategy are implementation activities that the Four County partners can pursue under each strategy. The strategies and implementation activities are discussed in Section 7.

Section 5
Overview of Water Quality Activities in the Four County Area

The regional drinking water quality strategy for the four-county area of Butte, Colusa, Glenn, and Tehama counties needed to identify the various drinking water quality activities of the associated agencies and groups, and incorporate them into the overall plan. The purpose of this exercise was to:

- Compile each county's current drinking water quality and associated water resource philosophies, authorities, policies, programs, and projects;
- Identify similarities and differences in water quality-related activities between counties; and
- Compile statewide and regional programs, which focus on water quality management and affect the Northern Sacramento Valley region.

This information was used to:

- Identify opportunities for collaboration;
- Provide a common "baseline" of information among counties that will form the basis of this collaborative regional effort; and
- Support public education activities.

5.1 County Activities

Each county within the Four County area as responsible for ensuring that safe drinking water is provided to their residents. This section:

- Identifies the various county authorities and agencies that play a role in drinking water quality in the four-county region;
- Describes the agency's mission and responsibilities regarding drinking water and water resource protection;
- Discusses relevant programs and projects being implemented by the given agency; and
- Compares activities between the counties.

A summary of agencies responsible for drinking water quality in each individual county are summarized below. Detail discussions of each county's activities are presented in Appendix C.

5.1.1 Butte County Activities

Both groundwater and surface water are utilized as a source for drinking water in Butte County (USEPA 2005). In general, groundwater is predominantly used within the basin area of the county. Butte County has 65 community water systems that serve residents year round (EPA 2004). Butte County has 130 small water systems that deliver water to smaller groups of users in Butte County.[1] Several county agencies have responsibilities or are involved in programs that relate to drinking water quality. Butte County Water and Resource Conservation Department (DW&RC), Butte County Department of Public Health (BCDPH), Butte County Resource Conservation District (BCRCD), and Butte Basin Water Users Association (BBWUA) each are involved in efforts that have a relationship to drinking water quality.

5.1.2 Colusa County Activities

Groundwater is the primary source for drinking water in County (USEPA 2005). Drinking water purveyors that deliver water to over 500 connections include the City of Williams and Arbuckle Public Utility District. There are an additional 61 small water systems that deliver water to smaller groups of users in Colusa County. The Colusa County Department of Planning and Building (CCDPB), the Colusa County Resource Conservation District (CCRCD), and the Colusa County Department of Environmental Health (CCDEH) are the primary agencies that have responsibilities for drinking water quality or are involved in activities related to drinking water quality.

5.1.3 Glenn County Activities

Groundwater is the primary source for drinking water in Glenn County (USEPA 2005). Larger drinking water purveyors in Glenn County are Cal Water-Willows, Cal Water-Hamilton City, and the City of Orland Public Works. Glenn County has 89 small water systems that deliver water to smaller groups of users in the county.[2] Drinking water purveyors are responsible for adhering to water quality regulations and county guidelines. Glenn County Department of Agriculture (GCDA), Glenn County Department of Environmental Health (GCDEH), Glenn County Resource Conservation District (GCRCD), and Glenn County Flood Control Department (GCFCD) regulate drinking water quality or participate in activities to improve drinking water quality.

5.1.4 Tehama County Activities

Groundwater is the primary source for drinking water in Tehama County (USEPA 2005). Drinking water purveyors that deliver water to over 500 connections include:

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1 The 130 small water systems include community water systems, non-transient non-community water systems (water systems that serve the same people, but not year round), and transient non-community water systems (water systems that do not consistently serve the same people) (EPA 2004).

2 The 89 small water systems include community water systems, non-transient non-community water systems (water systems that serve the same people, but not year round), and transient non-community water systems (water systems that do not consistently serve the same people) (EPA 2004).

the City of Red Bluff, the City of Corning, and Rio Alto Water District. There are an additional 149 small water systems delivering water to smaller groups of users. Tehama County Flood Control and Water Conservation District (FCWCD), the Tehama County Department of Environmental Health (TCDEH), and the Tehama County Resource Conservation District (TCRCD) oversees drinking water quality protection or participate in activities to improve drinking water quality.

5.1.5 Similarities and Differences in Agencies and Water Quality Management in the Four Counties

Each of the four counties has implemented an agency structure to regulate and promote high quality drinking water. Table 5-1 describes the water quality activities and the primary responsible agency for each county. Each county has an agency responsible for water management and public or environmental health. The agencies perform similar tasks across all counties; however, several county agencies have implemented more projects or programs relative to others.

Butte County has developed and implemented several water resources planning projects or activities, including a Groundwater Management Plan (GMP), a groundwater model, a water inventory and analysis, and an integrated water resources plan. Tehama County maintains a GMP and has conducted an inventory and analysis of county water resources. Glenn County also maintains a GMP that includes an active BMO process. Colusa County does not have a GMP but is beginning water resource planning.

Each county has public or environmental health agencies that regulate underground storage tank installation and removal, on-site sewage systems, and small state water systems. In Butte and Tehama counties, the environmental health agencies also regulate public small water systems (less than 200 connections). In Glenn and Colusa counties, California DHS regulates small water systems.

Table 5-1
Four County Water Quality Activities Summary

Role/Activity	Butte County	Colusa County	Glenn County	Tehama County
	Primary Department	Primary Department	Primary Department	Primary Department
Water Management				
Groundwater Supply	Dept. of Water and Resource Conservation	Dept. of Planning and Building	Dept. of Agriculture	Flood Control and Water Conservation District
AB3030 Plan Implementation	Dept. of Water and Resource Conservation	Groundwater Management Commission	Dept. of Agriculture	Flood Control and Water Conservation District
Conjunctive Management	Dept. of Water and Resource Conservation	Groundwater Management Commission	Water Advisory Committee	Flood Control and Water Conservation District
Watershed	Resource Conservation District	Resource Conservation District	Resource Conservation District	Resource Conservation District

Table 5-1 *(Continued)*
Four County Water Quality Activities Summary

Role/Activity	Butte County	Colusa County	Glenn County	Tehama County
	Primary Department	Primary Department	Primary Department	Primary Department
Drinking Water Quality Management				
Public Large Systems	California Dept. of Health Services	California Dept. of Health Services	California Dept. of Health Services	California Dept. of Health Services
Public Small Systems	Dept. of Public Health	California Dept. of Health Services	California Dept. of Health Services	Dept. of Environmental Health
State Small Systems	Dept. of Public Health	Dept. of Environmental Health	Dept. of Environmental Health	Dept. of Environmental Health
Permits				
On-site Sewage Disposal	Dept. of Public Health	Dept. of Environmental Health	Dept. of Environmental Health	Dept. of Environmental Health
Underground Storage Tanks	Dept. of Public Health	Dept. of Environmental Health	Dept. of Agriculture	Dept. of Environmental Health

5.2 Regional Activities

Several organizations/districts within and around the Four County area are participating in activities with the goal of improving drinking water quality on a regional basis. Improvements in source water quality within the Four Counties can improve water quality downstream. These water quality benefits spread as far as the Sacramento-San Joaquin Delta and to those agencies that rely on water exported from the Delta.

5.2.1 Northern California Water Association

The Northern California Water Association (NCWA) represents agricultural water suppliers, individual farmers and landowners, and counties in Northern California. NCWA's purpose is to protect the region's water rights and supplies through coordination with Federal and state legislatures and agencies, and other stakeholders. Butte, Glenn and Tehama counties are members of NCWA, as well as many water and irrigation districts within the Four County area.

NCWA is leading efforts to implement the Sacramento Valley Water Management Program (Program), which was developed in response to Decision 1641 Delta Water Quality Standards. Under the Program, NCWA members are proposing short- and long-term projects to protect water rights, implement groundwater management, water use efficiency, conjunctive use, and surface water re-operations. Groundwater planning is an integral part of the Program. The Four County region has received several AB303 grants to develop projects for groundwater monitoring, data collection, evaluation and analysis, pilot projects, and capital improvements.

NCWA also organized the Sacramento Valley Water Quality Coalition (Coalition) to protect and improve water quality in the Sacramento Region. The Coalition consists of

agricultural and wetland interests, and local agencies and districts in the region. In October 2003, the Coalition submitted the General Report for the Coalition with a Notice of Intent (NOI) to meet the *Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands* (Conditional Waiver for Irrigated Lands). The NOI outlines a regional strategy to address water quality, including evaluating water quality parameters in the entire watershed and managing the region to meet objectives of the Porter-Cologne Water Quality Control Act.

In February 2004, the Central Valley RWQCB approved the NOI. Since then, the Coalition has prepared the 1) *Sacramento River Watershed Evaluation Report (WER)* and 2) *Sacramento River Watershed Monitoring and Reporting Plan (MRP)*. These plans provide a coordinated approach to manage water quality in the long-term and satisfy the requirements of the Conditional Waiver for Irrigated Lands. The WER divides Sacramento River watershed into 10 subwatersheds and presents a technical watershed assessment for each subwatershed. The WER identifies major drainages and prioritizes them based on amount and type of irrigated crops, pesticide use, impaired waterbodies and other factors (Coalition 2004). The MRP develops a plan to monitor and evaluate the causes of toxicity in receiving waters. The MRP monitoring will help determine the water quality effects of irrigated agriculture and managed wetland operations in the Sacramento River watershed.

The Four Counties are participants in the Coalition's activities. Implementation of the Coalition's plans will increase water quality monitoring in the Sacramento Region and help determine problem areas and opportunities for water quality improvements. Through these activities, the Four Counties can coordinate to improve source water quality and contribute to statewide drinking water quality goals.

5.2.2 Colusa Basin Drainage District

State Legislature formed the Colusa Basin Drainage District (CBDD) in 1987 to address flooding, drainage, and subsidence problems in the Colusa Basin. The Colusa Basin extends into Colusa, Glenn, and Yolo counties and is primarily used for agricultural production. CBDD developed a programmatic EIR/EIS to evaluate the broad impacts of alternatives that reduce potential flood damages and improve the environment within the Colusa Basin. CBDD has since commissioned several site- and project-specific studies, in various phases of completion, to further address flooding and environmental issues. CBDD efforts to restore the environment primarily relate to soil erosion, sedimentation, habitat and water supply. Increased sediment production rates associated with the Basin's annual flooding can affect regional water quality. Sediment is deposited into the Sacramento River, which degrades the water quality for downstream water users.

CBDD commissioned the *Integrated Watershed Management Plan* to reduce flood damage in the City of Willows and surrounding agricultural lands and improve the environment in Willow and Wilson Creek sub-basins in Glenn County. CBDD

identified several water quality-related methods to enhance the environment including 1) improve water quality through improved erosion control measures and practices, and 2) improve water quality through filtering and trapping nutrients/sediments in spreading basins (CBDD 2004).

5.3 Federal and State Legislation and Activities

Multiple Federal and state legislation and agencies are responsible for protecting and managing drinking water throughout the United States and California. This section reviews the various legislative drinking water quality authorities that affect the Four County area and discusses individual programs and projects being implemented by Federal and state agencies.

5.3.1 Federal Legislation and Activities

The primary Federal laws that oversee drinking water are the Safe Drinking Water Act, the Clean Water Act, and Reclamation, Recycling, and Water Conservation Act. The primary agency involved with the management of drinking water is the United States Environmental Protection Agency (USEPA). Other agencies involved with programs on a regional and local basis include the United States Geological Survey (USGS) and the Bureau of Reclamation (BOR).

Safe Drinking Water Act

The Safe Drinking Water Act (SDWA), passed in 1974, is the initial Federal legislation passed to ensure the quality of drinking water. In 1996, the SDWA was amended with changes emphasizing sound science and risk-based standard setting, small water supply system flexibility and technical assistance, community-empowered source water assessment and protection, public right-to-know, and water system infrastructure assistance (CDM 2001). SDWA does not regulate private wells, which serve fewer than 25 individuals.

Clean Water Act Reauthorization

The Clean Water Act (CWA) is a 1977 amendment to the Federal Water Pollution Control Act of 1972, which set up the basic structure for regulating discharges of pollutants to waters of the United States (CDM 2001). Its focus is on surface water quality protection; it does not deal directly with groundwater or water quantity.

The CWA "employs a variety of regulatory and nonregulatory tools to sharply reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff." Key CWA tools include the following:

- National Pollutant Discharge Elimination System (NPDES) permit program - Covers point and nonpoint sources of pollution discharging into a surface waterbody;

- Section 319 - Addresses nonpoint sources of pollution, such as most farming and forestry operations, largely through grants;
- Section 404 - Regulates the placement of dredged or fill materials into wetlands and other Waters of the United States;
- Section 401 - Requires federal agencies to obtain certification from the state, territory, or Indian tribes before issuing permits that would result in increased pollutant loads to a waterbody. The certification is issued only if such increased loads would not cause or contribute to exceedances of water quality standards; and
- State Revolving Funds (SRF) - Provides large amounts of money in the form of loans for municipal point sources, nonpoint sources, and other activities.

Reclamation, Recycling, and Water Conservation Act

The Reclamation, Recycling, and Water Conservation Act was passed in 1996 (CDM 2001). It authorized 25 percent federal cost sharing for higher-level wastewater treatment plants. Higher-level wastewater treatment plants treat the water to a higher standard so it can be used in reclamation or recycling projects.

United States Environmental Protection Agency

The USEPA administers both the SDWA and the CWA. SDWA authorizes the USEPA to set national health-based standards for drinking water (USEPA 2005). The USEPA works with states (through the Department of Health Services) and water suppliers to make sure that these standards are met.

Under the CWA, the USEPA is authorized to implement pollution control programs and set water quality standards for all contaminants in surface waters (USEPA 2005). The USEPA administers the programs and standards through partnership with the State of California (State Water Resources Control Board and Regional Water Quality Control Boards).

Other drinking water related programs implemented by the USEPA include:

- Technical assistance to water suppliers;
- Legal action against systems that fail to provide water that meets state and EPA standards;
- Protection of drinking water by safeguarding watersheds and regulating the release of pollutants into the environment;
- Water conservation;

- Development of local contingency plans for source contamination and other water emergencies;
- Grants to states to establish revolving loan funds (Drinking Water State Revolving Fund) to assist public water systems with infrastructure improvements and activities needed for source water protection and enhanced water systems management; and
- Federal lead for the CALFED Bay-Delta Program.

United States Geological Survey

The mission of the USGS is to investigate the occurrence, quantity, quality, distribution, and movement of surface and underground waters and disseminate the data to the public, State and local governments, public and private utilities, and other Federal agencies involved with managing water resources (USGS 2005).

At selected sites in California including the Four County area, the USGS measures:

- Water flow and levels in streams, lakes, and springs (including a number in the Four County area);
- Water levels in wells (including several in the Four County area);
- Chemical and physical data for streams, lakes, springs, and wells (including a number in the Four County area); and
- Compiles data and maintains a database with a web-based data retrieval system. Available data collected in Butte, Colusa, Glenn, and Tehama Counties can be retrieved from this system.

The USGS implements the National Water Quality Assessment Project (NWQA) and assists the SRWRCB with implementation of the Ground-Water Ambient Monitoring and Assessment program (GAMA). In the Sacramento Valley, these studies focus on the quality of groundwater and surface-water resources, to address of variety of water-quality issues of concern including:

- Elevated concentrations of trace metals, especially from abandoned mines near Lake Shasta;
- Pesticide contamination of surface water and potential contamination of groundwater; and
- Nitrate contamination of groundwater.

In the Four County area, NAWQA had one monitoring station on the Sacramento River near Colusa. Implementation of the GAMA field program is expected to begin later this year.

The USGS also conducts local contract research programs including a number under CALFED. Other than the monitoring program mentioned earlier, no other USGS programs with a drinking water quality component have been identified in the Four County area.

Bureau of Reclamation

The Bureau of Reclamation focuses on water supply reliability for the environment and agriculture in California and Four County area (BOR 2005). Reclamation is implementing a water quality monitoring and recirculation study in the Central Valley Project (CVP) under CALFED. It is also involved with the Integrated Resources Management Program for Flood Control in the Colusa Basin.

Regional drinking water quality programs will need to coordinate with any of the local BOR water supply programs.

5.3.2 State Legislation and Activities

The primary state law that oversees surface water and groundwater quality is the Porter-Cologne Water Quality Control Act. The primary state agencies involved with the management of water quality in the state are State Water Resources Control Board, the Department of Health Services, and the Department of Water Resources.

Porter-Cologne Water Quality Control Act

The California Legislature enacted the Porter-Cologne Water Quality Control Act (Cal. Water Code § 13000 *et seq.*) to implement the Federal CWA and SDWA that require classification of state waters by intended use, adoption of water quality standards to ensure the intended uses were being met, and formulation of plans to achieve the adopted standards (LWA 2003). The Porter-Cologne Act applies to point and nonpoint discharge sources to surface and ground waters, and to waste discharges to land. The Porter-Cologne Act creates a water quality control program administered regionally yet overseen through statewide coordination and policy. The Porter-Cologne Act also requires the state to adopt a "State Policy for Water Quality Control," including water quality objectives directly affecting water projects.

The Porter-Cologne Act provides the state with additional enforcement powers to address unauthorized discharges, discharges violating Waste Discharge Requirements (WDR) or prohibitions of discharge, violations of reporting or monitoring requirements, or other activities that threaten water quality. The state may use its water rights authority to enforce requirements for the protection of water quality (LWA 2003).

Public Health Goals

Regulations are becoming increasingly sensitive to the limitations of knowledge on exposure effects from drinking water contaminants. As a result, there is pressure begun to adopt standards, or goals, for contaminant reduction to a level at which no harm is known to occur. Under California Health and Safety Code Section 116365, later amended by the Calderon-Sher Safe Drinking Water Act of 1996, the Office of Health Hazard Assessment (OEHHA) develops and adopts Public Health Goals (PHGs) for chemicals currently regulated or proposed to be regulated by DHS in drinking water, and for any contaminant MCLs under revision by DHS. Unlike MCLGs, PHGs are always non-zero as they correspond to a particular risk level. Unlike MCLs, PHGs are not enforceable standards. They differ from MCLs in that PHGs are developed based only on public health considerations quantified by risk assessments , and not on feasibility or cost/benefit like MCLs. For instance, there are a number of PHGs which are an order of magnitude or more lower than the most sensitive analytical detection limits achievable for the respective contaminants. By the same token, there are a number of contaminants where there is no currently available treatment technology which can remove the given contaminant to levels below the PHG.

OEHHA must develop and adopt PHGs for both drinking water contaminants for which MCLs already exist as well as for contaminants proposed to be regulated or revised by DHS. When adopting a new MCL or revising an existing one, DHS is required to set the MCL as close to the PHG as technically feasible, taking costs of compliance and other factors into account.

PHGs and the MCLG federal counterparts are similar but not identical. Both are non-enforceable standards. They are health-based without regard to cost - benefit considerations or technical feasibility. Both are used in the MCL standard setting process as a conservative measure of “safety”. The major difference is that EPA sets MCLGs for carcinogens at zero, whereas OEHHA sets PHGs for carcinogens at the theoretical concentration that would result in 1 excess cancer death in a population of one-million people drinking 2 liters of water a day for 70 years. In California, revising a primary drinking water standard or setting an new MCL for an unregulated contaminant requires developing a PHG first, upon which the primary standard is based taking into account non-health risk criteria, such as best available treatment technology, feasibility and cost.

Each year, public water systems must provide their customers with information regarding contaminants found in their drinking water supplies in a report known as the Consumer Confidence Report (CCR). This information must include a comparison of detected contaminant levels with established MCLs and, if applicable, PHGs. Also, every three years water systems must issue a report to the local governing body comparing levels of detected contaminants with the PHGs set for those contaminants.

The report must address the feasibility of removing the contaminants in the water below the respective PHGs and the cost to provide such treatment.

It is important to note that not all regulated chemicals currently have an assigned PHG level because OEHHA has not completed its assessment of all the chemicals regulated in California drinking water. Arsenic and gross alpha radioactivity are examples of regulated chemicals that do not have a PHG yet.

Also, there are several chemicals regulated in California drinking water, such as 1,3-dichloropropane and Methylmethyl-tert-butyl ether (MTBE), which have a California PHG but no corresponding federal MCLG because these chemicals are not regulated nationwide by USEPA. These chemicals represent the case where California has more stringent drinking water regulations.

Recent Legislative Actions

The sections below summarize selected state legislation affecting drinking water quality. Many of these legislative actions provide state funding for actions to encourage local areas to undertake projects previously found to be cost prohibitive. By offering financial assistance to fund local water initiatives, the government is raising awareness of these issues while helping to work towards solutions. Anyone of the four counties could apply for funds from these sources to complete local water resource projects.

Proposition 50

In November 2002, California voters approved the "Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002" (CDM 2003). The Act authorizes $3.4 billion general obligation bonds to fund a variety of water projects to improve water use efficiency, water quality, water systems security, and to restore wetlands. The bond allocates the following drinking water related funds, subject to appropriation by the legislature, through the State Budget process:

- Water Quality $955 million
- CALFED Bay-Delta Program $825 million
- Regional Projects $710 million

Competitive grants and loans will be available for the appropriated funds from multiple agencies, including the State Water Resources Control Board (SWRCB), the California Resources Agency, CALFED, and DWR.

Proposition 13

In March 2000, California voters also approved Proposition 13 (2000 Water Bond), which authorizes the state to sell $1.97 billion of general obligation bonds to support safe drinking water, water quality, flood protection and water reliability projects

throughout the state (CDM 2003). The following drinking water quality areas received allocations:

- Watershed protection $468 million
- Clean water and water recycling $355 million
- The Safe Drinking Water Program $70 million

This money is allocated through grants and loans to local water districts through multiple state agencies, including the SWRCB, Department of Health Services, DWR, and CALFED.

AB 303

The objective of AB 303, the "Local Groundwater Management Assistance Act of 2000," is to assist local public agencies better understand effective management of groundwater resources to ensure the safe production, quality, and proper storage of groundwater in California (DWR 2003). It authorizes grants for local public agencies to conduct groundwater studies or to implement groundwater monitoring and management activities that contribute to basin and subbasin management objectives.

Only local public agencies, including city, county, water district, regional agency, board, commission or other political subdivisions of the State, may apply for funding under AB 303.

AB 3030 - Groundwater Management Plans

In September 1992, the California Legislature passed AB 3030, the "Groundwater Management Act," which became law in January 1993 (CDM 2003). The law addressed the lack of coordinated groundwater management in California and enabled local agencies to produce a groundwater management plan, or "AB 3030 plan," if their service area includes all or part of a groundwater basin. The plan outlines the agency's proposed management activities and encourages coordinated management of the groundwater basin. Participation in this voluntary program allows local public agencies greater management authority over local groundwater issues.

Groundwater management is defined in AB 3030 from DWR's Bulletin 118-80 as:

- "Protection of natural recharge and use of artificial recharge;
- Planned variation in amount and location of pumping over time;
- Use of groundwater storage conjunctively with surface water from local and imported sources; and

- Protection and planned maintenance of groundwater quality."

AB 599

In October 2001, the Governor approved AB 599 establishing the "Groundwater Quality Monitoring Act of 2001" (SWRCB 2002). The goal of AB 599 is to improve comprehensive groundwater monitoring and increase the availability of information about groundwater quality to the public. AB 599 requires that the SWRCB, in coordination with an Interagency Task Force and Public Advisory Committee, integrate existing monitoring programs and design new program elements, as necessary, to establish a comprehensive statewide groundwater quality-monitoring program.

The Comprehensive Water Quality Monitoring Program presents a plan for monitoring and assessing the quality of groundwater basins/subbasins in the state. The plan includes the following five integrated elements:

- Acceleration of the monitoring and assessment program already established by the State Water Resource Control Board pursuant to the Budget Act of 1999.

- A monitoring and assessment program that will be implemented in accordance with the prioritization of basins/subbasins. Priority is based on water use; basins most heavily used for drinking water are highest priority.

- Increased coordination among groundwater agencies. Multiple agencies and departments monitor groundwater; efforts must be made to coordinate their roles and share data.

- Maintenance of groundwater information from monitoring and assessments in a single depository that uses the SWRCB's Geotracker database.

- Provides useful access of database information by the public while maintaining appropriate security measures.

State Water Resources Control Board and Central Valley Regional Water Quality Control Board

The State Water Resources Control Board (SWRCB) is the primary agency in California responsible for implementing the Federal CWA and Porter-Cologne Water Quality Control Act (SWRCB 2005). Regional authority for planning, permitting, and enforcement is delegated to the nine Regional Water Quality Control Boards. The Central Valley RWQCB has the authority for the majority of the four-county area.

The SWRCB and Regional Boards carry out their water protection authority through specific Water Quality Control Plans or "Basin Plans" which (1) designate beneficial uses, (2) set water quality objectives to protect beneficial uses, and (3) establish programs to achieve these objectives (LWA 2003). Such plans may include

prohibitions against the discharge of certain types of waste in specified areas under specified conditions. Discharge prohibitions may be adopted for nonpoint sources, such as surface runoff or waste discharge to land, or for direct discharges to surface or ground water. The Central Valley Basin Plan covers the majority of the four-county area with the exception of western Glenn County, which is located in the North Coast Region.

The SWRCB and Regional Boards regulate activities affecting water quality and implement water quality control plans through the issuance of WDRs (LWA 2003). Any person discharging waste or proposing to discharge waste that could affect the quality of waters of the State, other than discharge into a community sewer system, must submit a Report of Waste Discharge to the Regional Boards unless the Regional Boards waive the filing of a report.

The SWRCB and Regional Boards identify impaired water bodies for inclusion on the USEPA's 303d list. They are also responsible for developing TMDLs for these impaired water bodies.

Other relevant programs implemented by the SWRCB and Regional Boards include:

- Basin planning;
- Irrigated land (conditional waivers);
- Rice pesticides;
- Surface water ambient monitoring program (SWAMP) (SWRCD 2005b);
- GAMA Program, a comprehensive groundwater quality monitoring program for California, with USGS (SWRCB 2002);
- Waste discharges to land and surface water;
- Watershed management; and
- Water quality studies and improvement projects.

The SWRCB is the State's co-lead with DHS on CALFED Bay-Delta Program. The Central Valley RWQCB is in charge of Program's source protection efforts. It is also assisting CALFED with the development of a Central Valley Drinking Water Policy for surface waters (CVRWQCB 2005b).

Department of Health Services

The Department of Health Services (DHS) Division of Drinking Water and Environmental Management's mission statement is to maintain a physical, chemical, and biological environment that contributes positively to health, prevents illness, and

assures protection of the public. The main water quality component of the division is the Drinking Water Program (DWP). (DHS 2005)

The DHS DWP consists of two branches in the Four County area, the Drinking Water Field Operations Branch (DWFOB), and the Drinking Water Technical Programs Branch (DWTBP). The DWFOBs are responsible for the enforcement of the SDWA and the regulatory oversight of public water systems to assure the delivery of safe drinking water to citizens. The DWTPB is responsible for maintaining the scientific expertise of the drinking water program and for administering the Drinking Water Safe Drinking Water State Revolving Fund. (DHS 2005)

The DWFOB's activities include field inspections of water systems, issuance of operating permits, reviewing plans and specifications for new facilities, taking enforcement actions for non-compliance with laws and regulations, and reviewing water quality monitoring results. DWFOBs work with county health departments, planning departments, and boards of supervisors. In Glenn and Colusa counties, DWFOBs provide regulatory oversight of small water systems. In Butte and Tehama counties, DWFOBs provide oversight, technical assistance and training for health department staff. DWFOBs are also conducting portions of the Drinking Water Source Assessment and Protection (DWSAP) Program.

Required by the amendments, California became the first state to receive unconditional approval of its source water assessment program. Implemented by DHS, California's DWSAP Program will evaluate contamination threats to over 16,000 public supply wells. The DWSAP Program will address groundwater and surface water sources. The DWSAP Program will include a delineation of the areas around drinking water sources through which contaminants might move and reach the drinking water sources. It will also include an inventory of potential sources of microbiological or chemical contaminants within the delineated areas. This information will be used to make a determination as to whether individual sources might be vulnerable to contamination. DHS is responsible for the completion of all assessments by May 2003.

DWFOBs work with the USEPA and the SWRCB, and other parties interested in the protection of drinking water supplies.

The DWTPB administers its programs through a number of units including: The Operator Certification Unit, The Policy Development Unit, The Drinking Water State Revolving Fund (DWSRF) Unit, and The Monitoring and Evaluation Unit.

The Operator Certification Unit administers a certification program for water treatment plant operators and distribution operators. The Operator Certification Unit administers approximately 9,000 tests each year (DHS 2005). The Policy Development Unit is the administrator for the Drinking Water Treatment and Research Fund Program, which provides financial assistance to public water systems to mitigate

water system contamination from gasoline related chemicals such as MTBE, benzene, xylene, toluene, etc. The Policy Development Unit also provides technical assistance to the Drinking Water Additives Program regarding approval of chemical additives to drinking water.

The DWSRF Unit conducts activities associated with Safe Revolving Fund programs. (DHS 2004) The Safe Revolving Fund program goal is to provide funding to correct water system deficiencies based on a prioritized system. Higher priority projects include:

- Public water system projects addressing public health risk problems.
- Public water system projects needed to comply with the Safe Drinking Water Act.
- Projects assisting public water systems most in need on a per household affordability basis (DHS 2004).

The Monitoring and Evaluation Unit evaluates, collects, compiles, and reports public water system drinking water quality data. The Monitoring and Evaluation Unit disseminates data to DWFOB staff, prepares reports on findings, and carries out special studies related to drinking water quality.

Department of Water Resources

The Department of Water Resources (DWR) activities focus on providing a reliable water supply to the state. DWR operates the State Water Project (SWP) that delivers surface water for urban and agricultural uses to the Central Valley, San Francisco Bay Area, the central coast, and southern California. DWR's Office of Water Quality monitors water quality throughout the SWP for drinking water, recreation, and fish and wildlife uses. One of the Office of Water Quality's objectives is to "determine and examine the sources of constituents that effect drinking water quality of the Sacramento-San Joaquin Delta, and to provide information necessary for planning Delta water quality improvements." To achieve this, the Office of Water Quality implements the Municipal Water Quality Investigations Program that collects and analyzes data from sampling stations in or near the Delta. Major constituents examined include organic carbon, bromide, salinity, regulated organic and inorganic constituents in drinking water, and several unregulated constituents of concern (DWR 2003b).

DWR does not have any statutory authority to protect or regulate groundwater use in California. DWR, however, does assist local agencies to manage groundwater, primarily through technical and financial assistance. DWR's technical assistance focuses on groundwater level monitoring, and conjunctive management and storage studies. DWR published the California's Groundwater Bulletin 118 Update 2003, which summarizes technical information for the state's groundwater basins and groundwater management programs (DWR 2003a). To assist groundwater

management, DWR has also developed the Conjunctive Water Management Program (CWMP) to increase coordinated management of groundwater and surface water resources. The CWMP established a partnership with 30 local agencies to provide technical and financial assistance and facilitate broad stakeholder involvement in regional water management planning processes. DWR has distributed over $240 million in loans and grants for groundwater monitoring and management projects (DWR 2004).

In the Four County area, DWR Northern District monitors groundwater levels and maintains an electronic database to store and manage data. The Northern District monitors groundwater quality by collecting groundwater samples to analyze general chemical characteristics, including heavy metal concentrations, organic and bacterial contamination. The Northern District has published several past studies on the local groundwater quality:

- *Butte County Groundwater Pollution Investigation*;
- *Antelope Groundwater Study, April 1987*; and
- *Study of Nitrates in the Ground Water of the Chico Area, Butte County, January, 1984.*

DWR maintains the Water Data Library, which includes hydrologic, surface water quality, and groundwater level data. The data is available online at http://wdl.water.ca.gov/.

5.4 CALFED Bay-Delta Program

The CALFED Bay-Delta Program, established in 1994, is a collaborative effort of over 20 Federal and state agencies to improve water supplies in California and the health of the Bay-Delta watershed (CALFED 2005, CBDA 2003). These agencies started by signing the Framework Agreement, which identified the need to address three issues: water quality standards formulation; coordination of State Water Project (SWP) and

Central Valley Project (CVP) operations with existing Federal Endangered Species Act and Clean Water Act regulatory requirements; and long-term solutions to problems in the Bay-Delta estuary. The agencies formed the CALFED Bay-Delta Program to address this last issue.

The CALFED Program includes the entire Delta watershed (including the Sacramento and San Joaquin River watersheds) as well as the areas that receive water supply from the Delta; Figure 5-1 shows the CALFED study area. The four-county area is within the Sacramento River Region as shown in the figure.

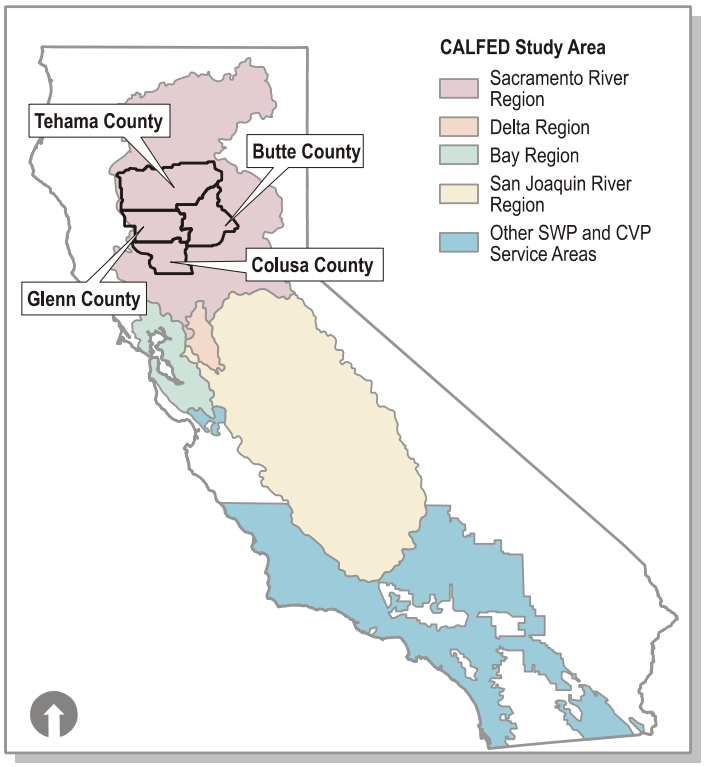

Figure 5-1
CALFED Study Area

CALFED identified four primary objectives to help address long-term solutions to Bay-Delta problems (CALFED 2002):

- **"Ecosystem Quality –** Improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species.
- **Water Supply –** Reduce the mismatch between Bay-Delta water supplies and the current and projected beneficial uses dependent on the Bay-Delta system.
- **Water Quality –** Provide good water quality for all beneficial uses.
- **Vulnerability of Delta Functions –** Reduce the risk to land use and associated economic activities, water supply, infrastructure, and the ecosystem from catastrophic breaching of levees."

The CALFED Program is following a three-phase process to achieve long-term goals. Phase I, concluded in September 1996, included the development of a range of alternatives for achieving long-term solutions to the problems of the Bay-Delta estuary. During Phase II, the CALFED agencies conducted a comprehensive programmatic environmental review process. Phase II completed with the release of the final Programmatic Environmental Impact Statement/Environmental Impact Report (EIS/EIR) in July 2000, followed by the Record of Decision (ROD) on August 28, 2000. The CALFED Program is now in Phase III, implementation of the preferred alternative. CALFED agencies intend to implement the Preferred Alternative over a 30-year timeframe.

In the implementation phase, the CALFED agencies aim to reduce conflicts and achieve objectives. To address these objectives, CALFED agencies developed eleven program elements: Science, Storage, Conveyance, Water Management, Water Use Efficiency, Water Transfers, Ecosystem Restoration Program, Environmental Water

Account, Watershed Management, Drinking Water Quality, and Levee System Integrity (CALFED 2003).

On January 1, 2003 the California Bay Delta Authority Act (Senate Bill (SB) 1653) established the California Bay-Delta Authority (CBDA), housed within the California Resources Agency. The Authority consists of state and federal agencies, public members, and members of the State and Assembly water committees and Legislature. Prior to the Authority, the Program functioned under a group of state and federal agencies operating under their independent statutory authorities to implement various elements of the CALFED Plan. Under the Authority, the agencies have a more formalized role in carrying out the programs, projects, and activities necessary to implement the CALFED Bay-Delta Program (California Bay-Delta Authority 2003).

The Programmatic EIS/EIR established a Drinking Water Quality Program. The purpose of the program is the "development of a source water protection program that includes a comprehensive drinking water policy for the Delta and its upstream tributaries." The CALFED Drinking Water Subcommittee is developing a series of tools based on the goals set for under the ROD. These tools when applied will collectively generate drinking water at a quality that meets the Equivalent Level of Public Health Protection or ELPH. These tools focus on:

- Delta Sources (improvement, conveyance/operations, storage);
- Other Local Sources (improvement, operations, storage, use efficiency);
- CVP/SWP (operations and storage);
- Source water exchanges (out of the Delta);
- Local/regional exchanges (including use efficiency);
- Treatment options (including use efficiency); and
- Distribution system management.

Refer to Figure 2-2 for the framework for implemention of the tools.

The development of regional drinking water quality management plans is being encouraged. CALFED believes "drinking water quality improvement involves a combination of actions that occur at state, regional, and local levels." In response, the Central Valley RWQCB, along with a technical work group, is developing a drinking water policy for the Central Valley (CBDA 2005, CVRWQCB 2005b). A grant from CALFED is funding the development of this regional drinking water quality plan for the four-county area. The Four County and Central Valley programs will need to stay in contact to ensure both programs are compatible.

Other CALFED program elements that may affect drinking water quality and water resources of the Four County area include:

- Ecosystem Restoration Program (ERP): the ERP is working to restore anadromous fisheries, and several waterways;
- Environmental Water Program (EWP): the EWP is purchasing water rights to meet the flow-related objectives within the ERP; and the
- Environmental Water Account (EWA): the EWA is taking actions to reduce conflicts between fish and water users in the Delta.

CALFED funding is available for county and local governments and water agencies in Butte, Colusa, Glenn, and Tehama to implement programs to achieve CALFED goals. A number of programs implemented in these counties have been funded by CALFED.

Section 6
Current Conditions

This section of the report summarizes the current state of drinking water resources with the emphasis on water quality in the Four County area. Topics covered in this section include:

- Suppliers of drinking water;
- Current and future sources;
- Contamination issues; and
- Monitoring programs.

6.1 Drinking Water Systems

Drinking water is delivered to water users by public water systems and private domestic systems. Private domestic water systems typically serve an individual home or small business.

In the Four County area, the majority of the population receives their drinking water from public systems. Table 6-1 shows the distribution of population served by public and domestic systems. Glenn County has the highest percentage of the population served by private domestic systems (estimated to be around 30%), while Butte County has the highest percentage of the population served by public systems (estimated to be around 95%).

Table 6-1
Population Served by Public and Private Water Systems

County	2003 U.S. Census County Population	Percent Population Served by Water Systems	Percent Population Served by Domestic Wells
Glenn	27,300	70%	30%
Colusa	19,700	80%	20%
Butte	211,000	95%	5%
Tehama	58,600	85%	15%

The public water systems in the Four County area are located on the map in Figure 6-1. The size of the dot indicates the size of the population served and the color of the dot indicates the source of the water (groundwater or surface water). The majority of public water systems are located near cities and towns.

An inventory of public drinking water systems shown on Figure 6-1 is presented in Appendix D. The inventory provides the system's name, population served, the water system's source of water, the database the system is listed in, and the system type.

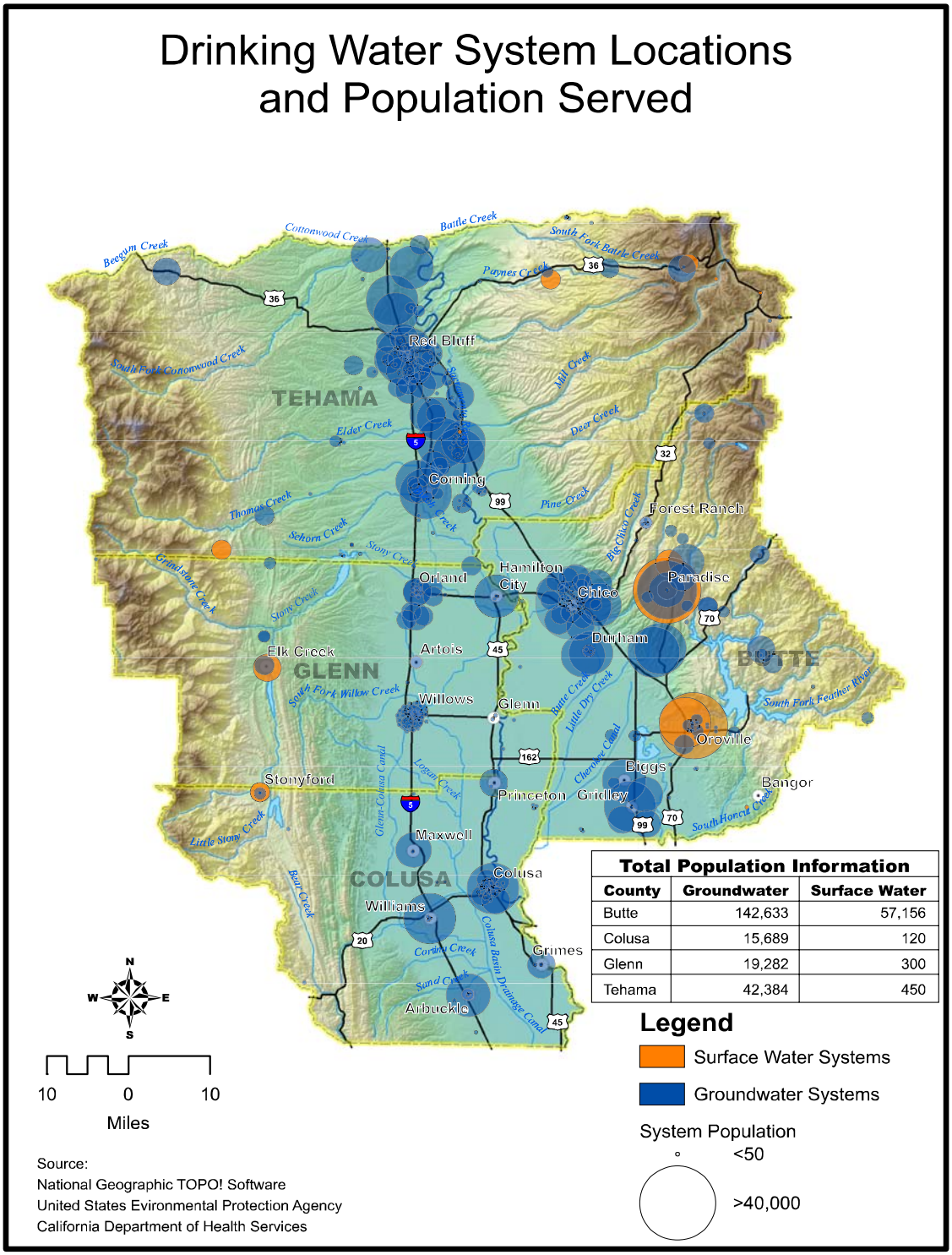

Figure 6-1
Drinking Water System Locations and Population Served

The system name is the name of the public water system on file with Environmental Protection Agency (EPA), DHS, or Tehama County for their Small Water System database. Population served is the number of people served by the public water system. The water system's source of water is identified as either groundwater or surface water. The database is the database or databases that the public water system is listed in. The public water systems are broken into different types:

- State Small Water System: System consists of 5-14 service connections or serves less than 25 persons year round (apartment, subdivision);
- Community Water System: System serves residential areas with 15 or more service connections or 25 or more persons (apartment, mobile home park, cities, larger water suppliers);
- Non-Transient Non-Community Water System: System serves non-residential areas, but routinely serves the same population for 25 or more persons, or 15 or more connections (schools, workplaces); and
- Transient Non-Community Water Systems: System serves 25 or more persons, or 15 or more connections for non-residential areas with a changing population (rest stops, campgrounds)

Installation of either a public or domestic system requires a permit from the county of residence, but only the public water systems are regulated after operations begin by county environmental health agencies or the DHS. Private domestic systems are not.

Identifying the types of drinking water systems in the Four County area is important because each type of system generally relies on different water sources as will be discussed in Section 6.2. Each source will require different methods to protect water quality. The priority of protection programs may depend on the type of system, the population served, and its location to other systems.

6.2 Drinking Water Sources

Approximately 80% of the population served by public systems in the Four County area receives drinking water from groundwater sources. The remaining 20% receive water from surface water sources. Table 6-2 shows the distribution for each of the four counties.

Table 6-2
Sources of Drinking Water Used By Public Systems

	Percentage of Population Served				
County	**Tehama**	**Glenn**	**Butte**	**Colusa**	**All Counties**
% Surface Water	2%	2%	29%	1%	21%
% Groundwater	98%	98%	71%	99%	79%

The following sections summarize information on the sources of drinking water in the Four County area. These sources include groundwater, surface water, and future sources.

6.2.1 Groundwater Sources

Groundwater is used by both public system and private domestic systems. Public systems extract the water from deeper aquifers, while the private domestic systems extract water from shallow aquifers. Table 6-3 summarizes well depths in the Four County area for both public and private domestic systems. The table presents median depths (e.g., well depth for 50% of the wells on a cumulative frequency curve) and the well depth representing 80% of the wells on the cumulative frequency curve. Cumulative frequency curves are presented in Appendix E.

Table 6-3
Groundwater Well Depths for Public and Private Domestic Systems

	Public System Wells		Private Domestic Wells	
County	Median Depth (50%), in feet	Well Depth for 80% of the Wells, in feet	Median Depth (50%), in feet	Well Depth for 80% of the Wells, in feet
Glenn	200	475	100	150
Butte	525	625	150	225
Tehama	200	450	150	200
Colusa	275	475	175	275

Public system wells have similar depths in Glenn, Tehama, and Colusa counties. Well depths are substantially deeper in Butte County because Cal Water Service Company - Chico, which operates approximately 60 wells, extracts its water from deeper intervals. Private domestic wells are at similar depths in all four counties, with wells in Colusa being slightly deeper. Private wells are substantially shallower than public wells.

6.2.2 Surface Water Sources

Only in Butte County is surface water used to supply drinking water to a relatively large portion of the population. Table 6-4 lists the surface water sources in the Four County area. The table is arranged in order of the population served, starting with the highest. There are 15 public systems that use surface water as their drinking water source. Eight of the systems are located in the Butte County, representing 98% of the population served by surface water systems in the Four County area.

Table 6-4
Surface Water Sources for Public Drinking Water Systems

System Name	Source	City	County	Population Served
Paradise Irrigation District	Little Butte Creek	Paradise	Butte	26,300
South Feather Water and Power - Miner's Ranch	Feather River	Oroville	Butte	21,500
Thermalito Irrigation District	Feather River	Oroville	Butte	8,700

Table 6-4 *(Continued)*
Surface Water Sources for Public Drinking Water Systems

System Name	Source	City	County	Population Served
Del Oro Water Company - Stirling Bluffs	West Branch Feather River	Stirling	Butte	460
Elk Creek Community Service District	Stony Gorge Reservoir	Elk creek	Glenn	300
Mineral County Water District	Battle Creek and Springs	Mineral	Tehama	300
Lassen Volcanic National Park	Unknown		Tehama	140
Fouts Springs Youth Facility	Stony Creek	Stonyford	Colusa	120
Paskenta Community Services District	Thomes Creek	Paskenta	Tehama	120
Salt Creek Conservation Camp	Salt Creek	Paskenta	Tehama	120
Del Oro Water Company - Lime Saddle Marina	Little Butte Creek	Paradise	Butte	114
South Feather Water and Power - Bangor	Feather River	Bangor	Butte	60
Far View Ranch Camp	Wilson Creek	Bangor	Butte	50
James Siding - Western pacific	Unknown	Oroville	Butte	25
USFS, Mendocino National Forest	Unknown		Glenn	25

6.2.3 Future Drinking Water Sources

Future drinking water sources are driven largely by urban and residential development patterns in the Four County area. There has been an observed shift in development patterns in recent years from single home "ranchettes" to subdivisions. This paradigm shift will likely results in the use of a smaller number of deeper, more productive groundwater wells. The deeper wells provide a more reliable supply and will be part of a public water system that is regulated by DHS or the county's health department.

However, the deeper wells may potentially use the same aquifer as agricultural wells in the area, thus creating potential conflicts. Table 6-5 shows the similarities in well depths between public systems and agricultural irrigation systems in each of the four counties. Details on wells serving agriculture are presented in Appendix E.

Table 6-5
Groundwater Well Depths for Public and Agricultural Systems

	Public System Wells		Agricultural Wells	
County	Median Depth (50%), in feet	Well Depth for 80% of the Wells, in feet	Median Depth (50%), in feet	Well Depth for 80% of the Wells, in feet
Glenn	200	475	225	375
Butte	525	625	250	475
Tehama	200	450	200	400
Colusa	275	475	325	625

Subdivisions will likely install a sewage treatment system to manage the wastewater. Wastewater treatment will minimize impacts on the receiving water and protect the

water quality for downstream users. Single homes constructed in unincorporated areas typically rely of septic systems to treat their wastewater. Effluent from the septic systems is a potential source of nitrate and bacteria contamination in groundwater.

Future subdivisions are currently being proposed or in the process of development in all four counties. The following paragraphs summarize development in Tehama, Colusa, Glenn, and Butte counties.

In Tehama County, Sun City Tehama is currently being developed north of Red Bluff. Sun City is currently developing two drinking water wells to supply homes, businesses, and a golf course. Additional groundwater wells will be developed with subsequent phases of development.

Colusa County is experiencing an increase in housing development. From 2000 to 2003, Colusa County issued 97 building permits for residences. In 2004, a subdivision of 74 residences was permitted. Currently there are six subdivisions with more than 280 residences in the permitting process. Colusa County planners expect additional subdivision growth of more than 4,000 residences in the future (Hackney 2005). The Colusa County General Plan housing element was updated in December 2004 to reflect this increase level of development.

Glenn County is also experiencing an increase in housing development. In the past few years, Glenn County authorized approximately 100 new residences a year. In 2005, the county expects to be authorize 200 new residences. Glenn County planners expect more new development and a number of new subdivisions in the future including:

- 1500 residences in and around the City of Orland over the next five to 10 years;
- 60 residences in Hamilton City in the next two years;
- 1100 residences and 40 acres of commercial development over 10 years in a new urban area between Orland and Artois; and
- 600 units adjacent to the City of Artois over seven years. (Obermeyer 2005)

New Glenn County development will utilize groundwater as the primary drinking water source. The Glenn County General Plan is in the process of being updated and is expected to be completed in 2007.

Butte County is not experiencing a substantial increase in housing development. Most development pressure in Butte County is in and around the City of Chico. Development in Chico is constrained by an agriculture greenline on the west, endangered species habitat to the east, and the airport to the north. Butte County Planning Department staff does not see a major change in development in the

immediate future. A 500 unit development is planned in and around the town of Gridley and another development is in the planning stage near the City of Oroville. The Butte County general plan is in the process of being updated and is expected to be completed by 2008 (Breedon, 2005).

Drinking water purveyors and individual homeowners extract groundwater from a number of aquifers and divert water from a number of surface water bodies in the Four County area. Management strategies will need to recognize this diversity. A prioritization process will most likely need to be performed to identify the sources of greatest importance for protection and most susceptible to impacts from pollutants. Deeper aquifers are the major sources that supply drinking water to the highest percentage of the population and this trend appears to be continuing under future development. Deeper aquifers tend to cross county boundaries so regional planning will be required. For example, the recharge zones for these aquifers may be located in another county.

6.3 Contamination of Potential Drinking Water Sources

Contamination of potential sources of drinking water in the Four County area is not widespread. Source water quality is of very high quality. Some groundwater and surface water bodies have elevated levels of one or more parameters of concern. This section discusses the contamination issues in the Four County area for groundwater and then surface waters.

Contaminated groundwater or surface water may spread over substantial areas, including several counties, because of their respective hydrological properties. The negative impact on beneficial uses caused by the contamination may not occur in close proximity to the source of the contamination. Regional strategies will be required to address these issues.

The pathways contaminates can enter groundwater are different from the pathways contaminates enter surface water bodies. Strategies for protecting drinking water quality need to recognize these differences and incorporate them into specific implementation activities.

6.3.1 Groundwater

Information on groundwater contamination is limited. A single source of information or database was not located. Consequently, interviews were conducted with representatives from municipal, county and state agencies, as well as with water purveyors. This information was compiled and it is summarized for the Four County area in the Table 6-6. Figure 6-2 shows the location of each impacted area. The numbers on the map next to the dots correspond to the numbers by each listing in Table 6-6. The percentage of the current water supply represented in Table 6-6 has not been determined but could be applied to prioritize corrective actions.

Table 6-6
Groundwater Contamination Issues in Four County Area

Map No.	County	Issue	Area	Source(s)
1	Butte	Nitrate plume in Chico, some small water systems closed and or re-connected to Cal Water. Cal Water had to shut down one well due to nitrates	Chico	Butte Co., CVRWQCB, DWR, DHS
2	Butte	PCE/TCE plume (Drycleaner releases) in Chico. 20% of Cal Water's wells have low level detections or need to be treated for PCE	Chico	CVRWQCB, DWR, DHS
3	Butte	Petroleum plume in south Chico	Chico	CVRWQCB, DWR,
4	Butte	Solvents in Oroville related to wood treatment	Oroville	CVRWQCB, DWR, SFWP
5	Butte	Arsenic levels in south Butte County (Biggs/Gridley area) may exceed new federal standards for arsenic of 10 ppb.	South Butte County	DHS
6	Colusa	Elevated Arsenic in Grimes. There was a federal program to install filters on connections. Current federal standard is 19 ppb, measured levels were 200ppb	Grimes	Colusa County
7	Colusa	Saline water around Maxwell	Maxwell	DWR
8	Colusa	Stoneyford CSD Treatment issue. They have a shallow well in a creek, the water needs treatment as if it were surface water.	Stoneyford Ranch	DHS, Colusa Co.
9	Colusa	Customer complaints on iron/manganese in the water in City of Williams and City of Colusa	Williams and Colusa	DHS
10	Glenn	Nitrates in northern portion of Glenn County	North Glenn County	Glenn County
11	Glenn	TCE Plume in Orland	Orland	Glenn County
12	Tehama	Chlorinated solvent plume from former Dudley Truck stop in Corning	Corning	Tehama Co., CVRWQCB
13	Tehama	Nitrate plume in Antelope, this area is considered impaired by the Tehama County Environmental Health Dept	Red Bluff/Antelope	Tehama Co., CVRWQCB, DWR
14	Tehama	Methane in groundwater near Fluornoy, methane potentially seeps out of the Great Valley Sequence shales and can be a fire hazard in unventilated pump houses	Southwestern Tehama County	Tehama Co., DWR
15	Tehama	Elevated levels of arsenic found in a deep aquifer (>1000 depth)	Sun City	DWR

The table reflects a wide variety of contamination issues. Several involve high level of nitrates. Others involve high levels of arsenic and organic compounds such as solvents, TCE, and petroleum products. The source of these constituents is generally effluent from septic systems (nitrate), leaking underground storage tanks (petroleum) and mismanagement of products and waste (solvents and TCE).

Elevated arsenic concentrations are generally due to natural conditions. A recent monitoring study by DWR found arsenic levels in groundwater ranged from <1 µg/L to over 10 µg/L. The highest levels were in the southern portion of the Four County area and the lowest levels were in the northern portion. Figure 6-3 reflects the distribution of arsenic levels in the Four County area. Sample results from individual

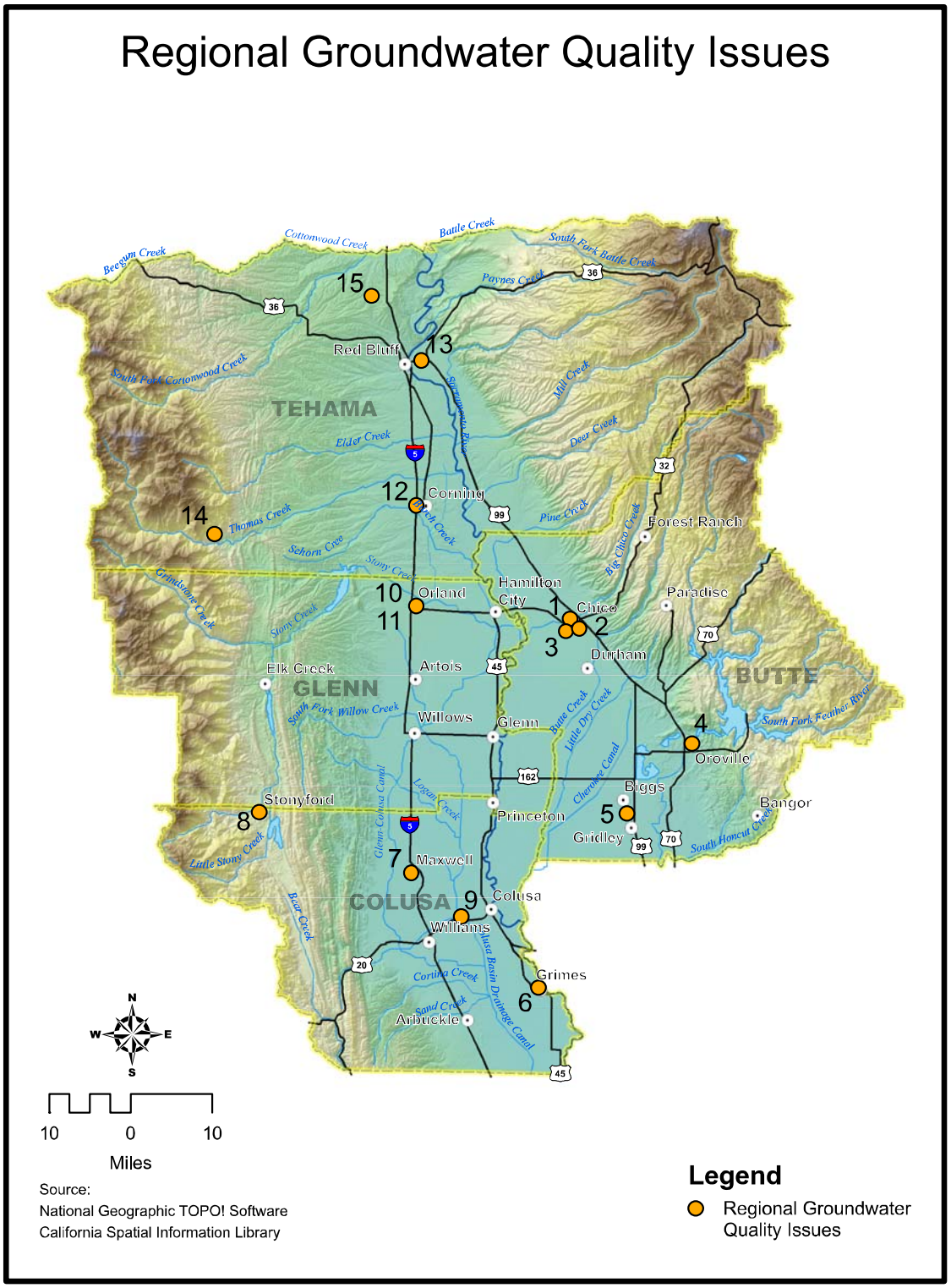

Figure 6-2
Regional Groundwater Quality Issues

wells (shown as black dots on Figure 6-3) indicate the elevated concentrations occur throughout this portion of the Sacramento Valley.

No bacteria contamination issues were identified during interviews. DHS requires that all drinking water distributed to the public be treated to remove bacteria and pathogens.

Other potential sources of groundwater contamination are leaking underground fuel tanks (LUFT) and Spills-Leaks-Investigations-Cleanups (SLIC) sites. The locations of LUFT and SLIC sites in the Four County area are shown in Figure 6-4. These sites tend to be located in and around the cities and towns. Potential pollutants include organic compounds such as solvents and petroleum products like MTBE.

6.3.2 Surface Water Contamination

Several surface water bodies in the Four County area are unable to meet water quality standards for drinking water because of substances present at elevated levels. These water bodies are identified on the State of California's 303(d) list for the year 2002 (SWRCB 2003). The 2002 list represents the most up-to-date listing. Section 303(d) of the CWA requires all states to identify surface waters that do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology.

Table 6-7 lists the five water bodies in the Four County area impacted by drinking water quality contaminates of concern. Figure 6-5 shows their location. Elevated levels of mercury impact Sulphur and Bear Creeks in Colusa County and Black Butte Reservoir in Glenn and Tehama Counties. The source may be from historical mining activities. High levels of diazinon and several other pesticides impact Colusa Basin Drain in Glenn and Colusa Counties. A potential source is agricultural activities. High levels of diazinon and several other pesticides, along with mercury, impact the Lower Feather River in Butte County. Agriculture, urban runoff, and historic mining are three potential sources.

In response to identified contamination and associated impacts on the beneficial uses of these water bodies, the SWRCB will develop total maximum daily loads (TMDLs) for each surface water body and each contaminate. The TMDLs will establish loading requirements for all sources to reduced instream levels and restore the beneficial use. Only the development of the diazinon TMDL for the Lower Feather River has begun. The Lower Feather River is the only water body in the Four County area with a "high" TMDL priority rating as shown in Table 6-7.

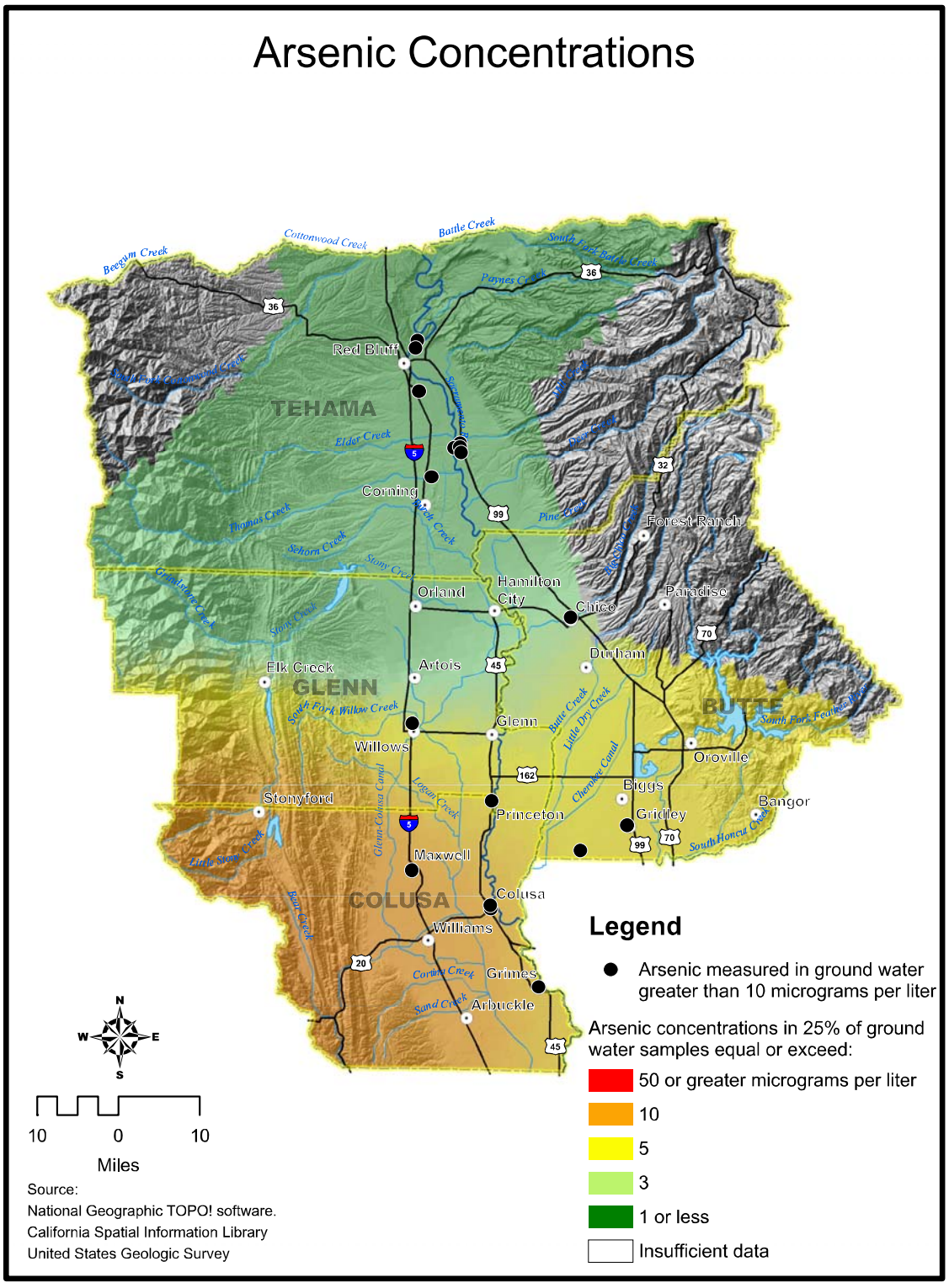

Figure 6-3
Arsenic Levels in the Four County Area

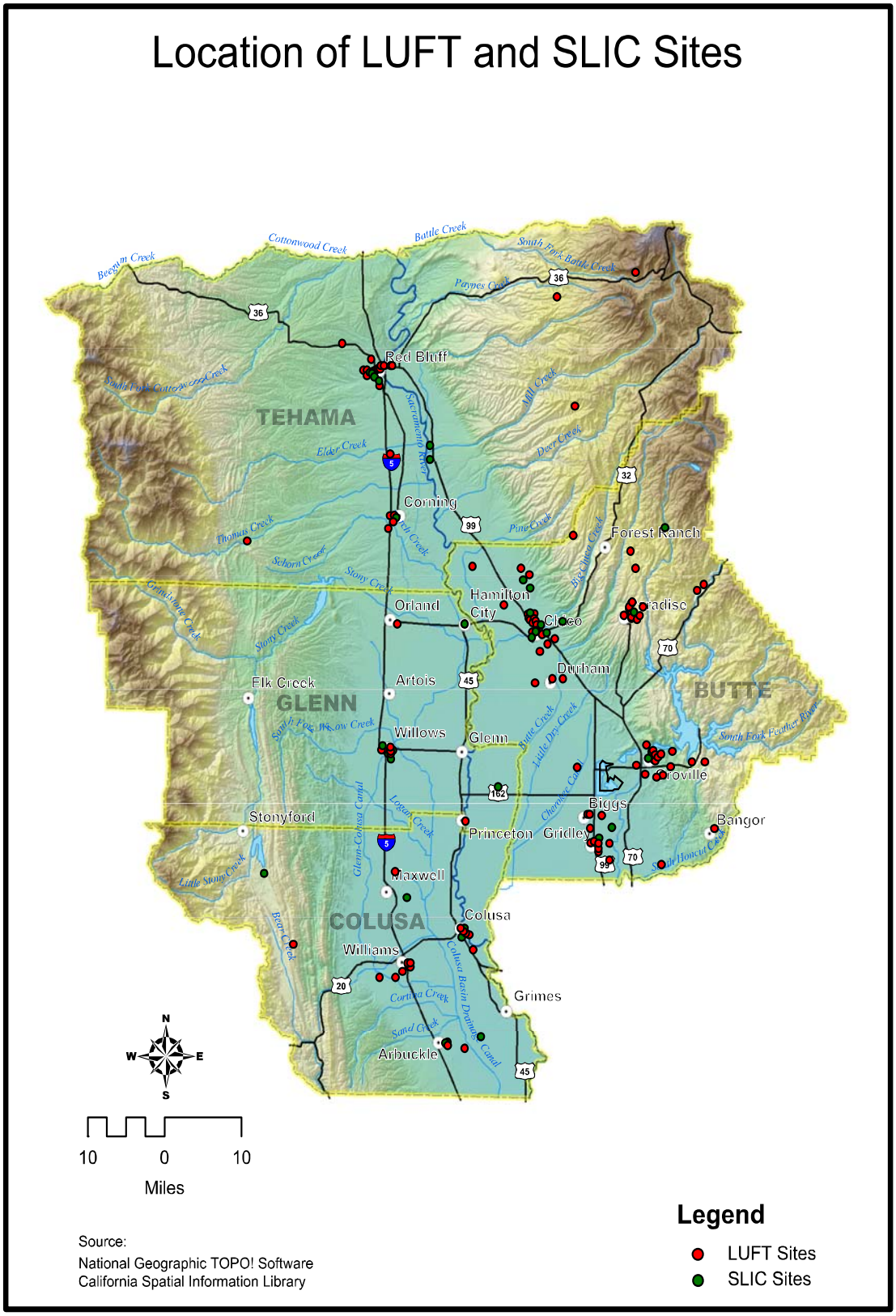

Figure 6-4
Location of LUFT and SLIC Sites

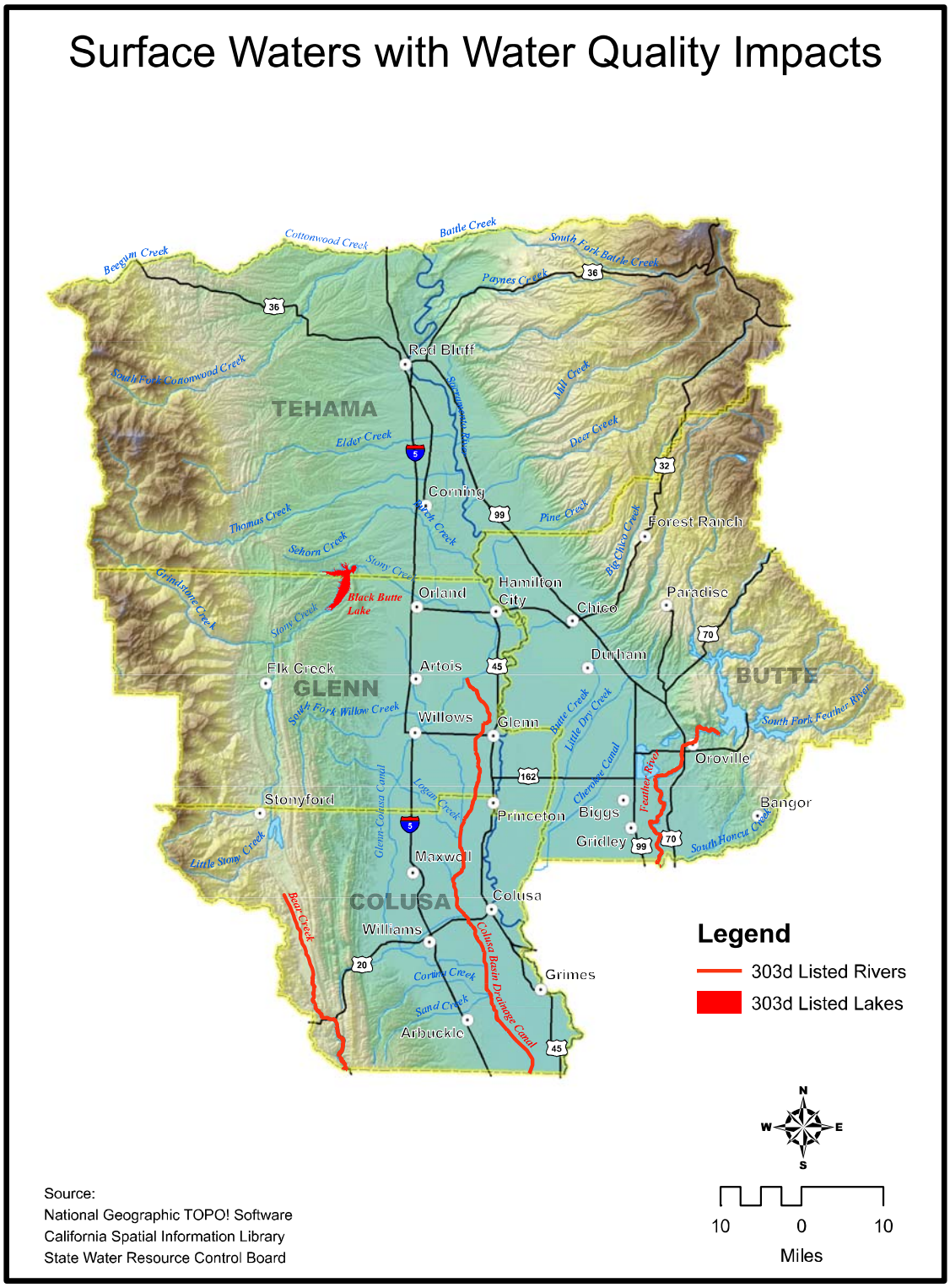

Figure 6-5
Surface Waters with Water Quality Impacts

Table 6-7
Surface Water Bodies Impacted by Drinking Water Contaminates

Water Body Name	Pollutant/Stressor	Potential Sources	TMDL Priority
Sulphur and Bear Creeks	Mercury	Resource Extraction	Medium
Black Butte Reservoir	Mercury	Resource Extraction	Medium
Colusa Basin Drain	Diazinon Azinphos-methyl Carbofuran/Furadan Malathion Methyl Parathion Molinate/Odram Group A pesticides *	Agriculture	Medium Medium Low Low Low Low Low
Lower Feather River	Diazinon Group A pesticides * Mercury	Agriculture Urban runoff Agriculture Resource Extraction	High Low Medium

Source: 2002 SWRCB Region 5 303(d) list
* Group A pesticides include aldrin, chlordane, dieldrin, endrin, endosulfan, heptachlor, heptachlor epoxide, hexachlorocyclohexane, toxaphene

A qualitative review of data contained in the existing DHS database and comparison to established maximum contamination levels (MCLs) did not indicate any current contamination issues with surface waters used for drinking water supplies. Parameters that were reviewed included arsenic, manganese, iron, nitrite, nitrate, TDS and the solvent, TCE.

6.4 Drinking Water Monitoring Programs

Water quality monitoring programs are conducted throughout the Four County area for the purposes of:

- Establishing baseline conditions;
- Identifying water quality concerns; and
- Demonstrating compliance with regulations or permits.

In the future, monitoring can be use to:

- Track new parameters to anticipate future environmental problems before they occur; and
- Demonstrate effectiveness of programs designed to manage contamination and pollutant sources.

Monitoring is most effective on a regional basis that addresses the entire aquifer or watershed. Most current programs are now implementing monitoring at these scales.

Federal, state, county, and municipal agencies, along with non-profit organizations, conduct groundwater and surface waters monitoring programs. Monitoring focuses on drinking water supplies (groundwater and surface water), receiving waters (surface water), and discharges of treated effluent, urban stormwater runoff, and agricultural runoff/drainage.

Monitored parameters of interest include conventional substances, oxygen-demanding substances, minerals, nutrients, trace metals and other elements, pathogens and indicator organisms, pesticides and herbicides, organic compounds and PCBs, and disinfection byproduct precursors. Parameters of interest to the CVRWQCB for the development of drinking water quality policy for the Central Valley are listed in Table 6-8.

Table 6-8
Parameters of Interest for Drinking Water Quality Supplies and Sources

Conventionals	
Cyanide	Hardness [1]
Temperature [1]	Salinity [1]
Dissolved oxygen (DO) [1]	Percent sand/silt/clay [1]
pH [1]	Turbidity [3]
Dissolved Minerals	
Total dissolved solids (TDS)	Conductivity
Chloride	
Nutrients	
Ammonia	Nitrate
Total nitrogen	Nitrite
Total Kjehdahl nitrogen (TKN)	Phosphorus
Organic nitrogen	Orthophosphate
Pathogens and Indicator Organisms	
Giardia	Fecal coliform
Cryptosporidium	Enterococcus
Total coliform	*E. coli*
Disinfection Byproducts Precursors	
Total organic carbon (TOC)	Specific UVA (SUVA)
Dissolved organic carbon (DOC)	Trihalomethane Formation Potential (THMFP)
Bromide	Chlorophyll a [3]
Ultraviolet Absorbance at 254 nm (UVA254)	
Pesticides	
Chlorpyrifos	Cyhalothrin [2]
Diazinon	Difluebenzuron [2]
Molinate	Fenoxaprop [2]
Thiobencarb	Glyphosate [2]
2,4-D [2]	Malathion [2]
Azoxystrobin [2]	MCPA [2]
Bensulfuron [2]	Methyl parathion [2]
Carbaryl [2]	Pendimethalin [2]
Carfentrazone [2]	Triclopyr [2]
Copper sulfate [2]	Trifluralin [2]
Cyhalofop-butyl [2]	Cyhalothrin [2]

Table 6-8 *(Continued)* Parameters of Interest for Drinking Water Quality Supplies and Sources	
Trace Elements	
Arsenic	
Hydrology	
Flow	Groundwater level

Source: LWA 2004
(1) Added due to potential use as "signature" or surrogate parameter for modeling
(2) Added due to widespread use as rice pesticide (based on application to at least 5000 acres in 2001)
(3) Turbidity and chlorophyll *a* added due to relevance to drinking water treatment issues and THMFP

This section presents an overview of the monitoring programs being conducted in the Four County area for the protection of drinking water supplies and sources. Groundwater monitoring programs are presented first, followed by surface water and NPDES monitoring programs. Overviews include program goals, parameters, monitoring locations, period of record, and future plans.

6.4.1 Overview of Groundwater Monitoring Programs

Groundwater monitoring programs in the Four County area include statewide programs implemented by DWR or overseen by DHS, along with local Basin Management Objective (BMO) programs implemented by individual counties. The major programs include water level and quality, public water supplies, and BMO monitoring. Programs are listed in Table 6-9. Figure 6-6 highlights groundwater monitoring locations that have been documented in the Four County area. The intent of the figure is to demonstrate the distribution of groundwater monitoring, the agencies involved, and potential for coordination.

The DWR monitoring program focuses on water level at a defined network of groundwater wells. DWR also conducts short-term specialty groundwater quality studies. Data and reports are available from DWR's regional and field offices.

Under California Title 22 regulations, all drinking water supplied to the public must meet established standards of quality. DHS oversees the monitoring program to ensure drinking water supplied to residents in the Four County area meet these standards. Data from individual suppliers are sent to DHS. A portion of the data is now available electronically. Data sharing occurs between the DWR and DHS programs with some monitoring coordination to avoid duplication of efforts.

Butte and Glenn counties have implemented BMO monitoring programs. These programs monitor a standard network of stations on a regular basis. Results are used to assist with management of local groundwater resources.

Table 6-9
Groundwater Monitoring Programs in the Four County Area

Program	Agency/ Organization	Purpose	Parameters of Interest from Table 1	Number of Stations in Four County Area [(1)]	Period of Record	Future Plans
DWR ground water level and quality monitoring (DWR 2005)	DWR	Groundwater basins are monitored to determine: (1) Amount of groundwater that can safely be withdrawn for use; and (2) Water quality and related factors affecting beneficial uses	Water level and selected conventionals, minerals, nutrients, pathogens, byproducts precursors, pesticides, and trace elements	467	1930s - present	Monitoring water levels will continue 2 to 3 times per year along the established grid to maintain a comprehensive, long-term database; specialty water quality studies will be performed on an as-needed basis.
California drinking water quality monitoring program (Dinh 2005)	DHS	DHS oversees the monitoring of public water supplies to ensure safe drinking water is provided to the public	Focus is on bacteria, turbidity, and nitrites/nitrates with selected conventionals, minerals, nutrients, pathogens, byproducts precursors, pesticides, and trace elements	496	19>0s to present	Monitoring of all public water supply systems will continue as defined by the regulations; chemical constituents to be monitored may change as more data are collected and evaluated.
County Basin Management Objectives (Newlin 2003, Messina 2005b)	Butte Co. Glenn Co.	To detect changes to groundwater elevations and quality	Water elevation, pH, total dissolved solids, electrical conductivity, and temperature	10 - Butte 22 - Glenn	2002-present	Monitoring wells in the established grid will continue once per year.
Groundwater Ambient Monitoring and Assessment Program (GAMA) (SWRCB 2002)	USGS CVRWQCB	Comprehensive assessment of statewide groundwater quality to better understand and identify risks to groundwater resources	Selected conventionals, minerals, nutrients, pathogens, byproducts precursors, pesticides, and trace elements	Volunteer domestic wells		Monitoring at volunteer domestic wells will begin in Tehama County in 2005. Basin program will not monitor Four County area until 2007 or after.

Notes:
[(1)] Locations of stations are shown on Figure 6.6.

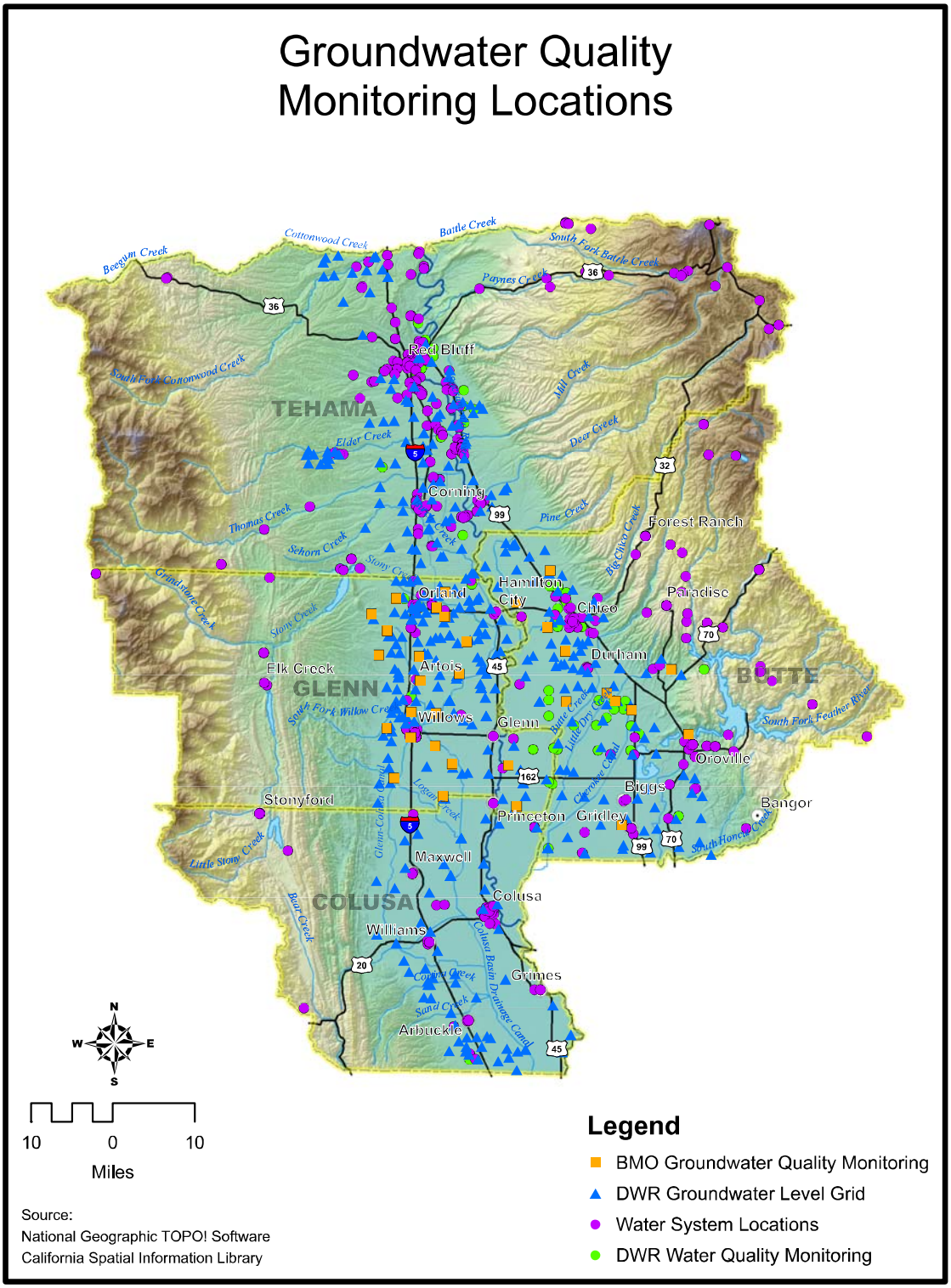

Figure 6-6
Surface Waters with Water Quality Impacts

The USGS and CV RWQCB are implementing the Groundwater Ambient Monitoring and Assessment (GAMA) program. The primary objective of the GAMA program is to assess statewide water quality and relative susceptibility of groundwater resources. The GAMA program has two sampling components: the groundwater basin assessment program and the Voluntary Domestic Well Assessment Project, which addresses private drinking water wells. The GAMA Program is also focused on an effort to identify and centralize the many sources of groundwater data and information available. As part of this effort, groundwater agencies have created the Groundwater Resources Information Sharing Team. The team will make various groundwater data sets accessible to the public and interested agencies through a Groundwater Resources Information Database (GRID).

The Voluntary Domestic Well Assessment Project is currently being implemented in Tehama County. The groundwater basin assessment program is scheduled to begin monitoring in the Four County area after 2007 (SWRCB 2005c).

6.4.2 Overview of Surface Water Monitoring Programs

Surface water monitoring programs in the Four County area have been part of regional efforts studying the Sacramento River and its watershed. The major programs are listed in Table 6-10. Figure 6-7 shows the location of stations from six of the programs as well as the location of stations with historical data in the California Data Exchange Center (CDEC) database. Detailed summaries for eight programs are presented in the Appendix F. These summaries come from the Central Valley Drinking Water Policy Workgroup study on the identification of existing data (LWA 2004).

The monitoring programs that are currently active include the DWR rice pesticide, State Water Project, Sacramento River Watershed Program (SRWP), DWR's tributaries, and Agricultural Waiver Program. Coordination occurs amongst the SRWP, DWR tributaries, SWAMP, and NAWQA monitoring programs to:

- Avoid duplication of efforts; and
- Generate comparable data in terms of quality and reporting.

Monitoring required for TMDL development is also coordinated with these programs. The various agencies and coalitions conducting monitoring for the Agricultural Waiver Programs are also coordinating efforts amongst themselves.

The Central Valley Drinking Water Policy Workgroup is developing an inventory of existing surface water quality data for drinking water parameters (LWA 2004). The purpose of collecting these data is to use them for developing drinking water policy and specific numeric objectives. Data gaps will need to be identified along with the additional monitoring required to fill the gaps. The inventory from this initial phase should be ready in 2005.

Table 6-10
Surface Water Monitoring Programs in the Four County Area

Program	Agency/ Organization	Purpose	Parameters of Interest from Table 1	Number of Stations in Four County Area	Period of Record	Future Plans
State Water Project Water Quality Monitoring [1]	DWR	Characterize water quality in the SWP system	Selected conventionals, minerals, nutrients, pathogens, byproducts precursors, pesticides, and elements	3 [3]	1968 - present	Ongoing with daily and monthly sampling at sites in Lake Oroville and Thermalito forebay and afterbay.
Sacramento River Watershed Program (SWRP) Watershed Monitoring [1]	SWRP	Track environmental quality trends throughout the Sacramento River Watershed	Selected conventionals, minerals, nutrients, pathogens, byproducts precursors, pesticides, and flow	17 [2]	1994 to present	Continue with varying levels depending on availability of funding.
National Water Quality Assessment Program (NAWQA), Sacramento River Basin [1]	USGS	Evaluate the condition of the nation's streams and groundwater and impacts affecting them	Selected conventionals, minerals, nutrients, byproducts precursors, pesticides, and elements	5 [2]	1994-1995	NAWQA current monitoring does not include the four county area.
Rice Pesticide Monitoring Program [1]	DWR	Characterize the presence of pesticides applied to rice fields in surface waters	Selected conventionals and pesticides	1 [2]	1995 to present	Continue to monitor at designated stations to verify compliance with performance goals and to identify any need for programmatic changes.
DWR Offstream Storage Investigation (OSI) [1]	DWR	Evaluate offstream storage options upstream of the Delta	Selected conventionals and minerals	20 [3]	1997 - 1999	No future monitoring is planned.
DWR Northern District Tributaries Monitoring [1]	DWR	Characterize tributaries of the Sacramento River and other watersheds	Selected conventionals, minerals, nutrients, and pathogens	19 [2]	1998 – present	Ongoing monthly monitoring.
USFWS/UCDavis Nutrient Project [1]	USFWS USBR	Characterize nutrient cycling in the Sacramento river basin	Selected nutrients, mineral, conventionals, and byproducts precursors	8 [3]	1999 - 2001	No future monitoring is planned.
Irrigated Lands Monitoring Program Phase I (UCD 2005)	CVRWQCB/ UC Davis	To understand the relationship between water quality in agricultural drains and irrigation runoff using toxicity testing.		4 [2]	2003	Phase II will be started in 2004.
Diazinon TMDL Storm Season Monitoring (CVRWQCB 2005c)	CVRWQCB	To support the implementation of Total Maximum Daily Loads (TMDL's) for diazinon in the Sacramento River Basin	Diazinon and Chlorpyrifos	1 [4]	2003-2004	No future monitoring is planned.
Conditional Waiver for Irrigated Agriculture Monitoring Program Phase II (AEAL 2005)	CVRWQCB	Evaluation of water quality by using chemical analysis and toxicity testing, identification of the causes, and determination of the sources	Selected conventionals, minerals, nutrients, byproducts precursors, pesticides, and elements	8 [2]	2004	Phase III is planned to start at least 24 months after the start of Phase II and include more monitoring.
Surface Water Ambient Monitoring Program (SWAMP) [1]	CVRWQCB	Assess the conditions of surface water throughout California	Selected conventionals, minerals, nutrients, pathogens, byproducts precursors, and pesticides	7 [3]	2004-2005	One year at sites on Big Chico Creek (3), Little Chico Creek (3), and Mud Creek (1).
Irrigated Lands Waiver Monitoring (Sacramento Valley Water Quality Coalition, 2004b)	SVWQC	Characterize the relationship between water quality in agricultural drains and irrigation runoff.	Selected conventionals, minerals, nutrients, pathogens, byproducts precursors, pesticides, elements, and flow	6-8 [5]	2005	Phase 2 monitoring will be performed at individual sites found to have significant toxicity within 2 years of Phase 1 results.

Notes:
[1] Detailed program summaries from Central Valley Drinking Water Policy Workgroup study on the identification of existing data (LWA 2004) are provided in Appendix F.
[2] Locations of stations are shown on Figure 6-7.
[3] A description each station's location is found in the detailed summaries provided in Appendix F.
[4] Sacramento River at Colusa.
[5] Stations are located on Burch Creek, Stony Creek, Colusa Drain (2), Logan Creek, Rough and Ready P.S., Butte Creek, and Pine Creek

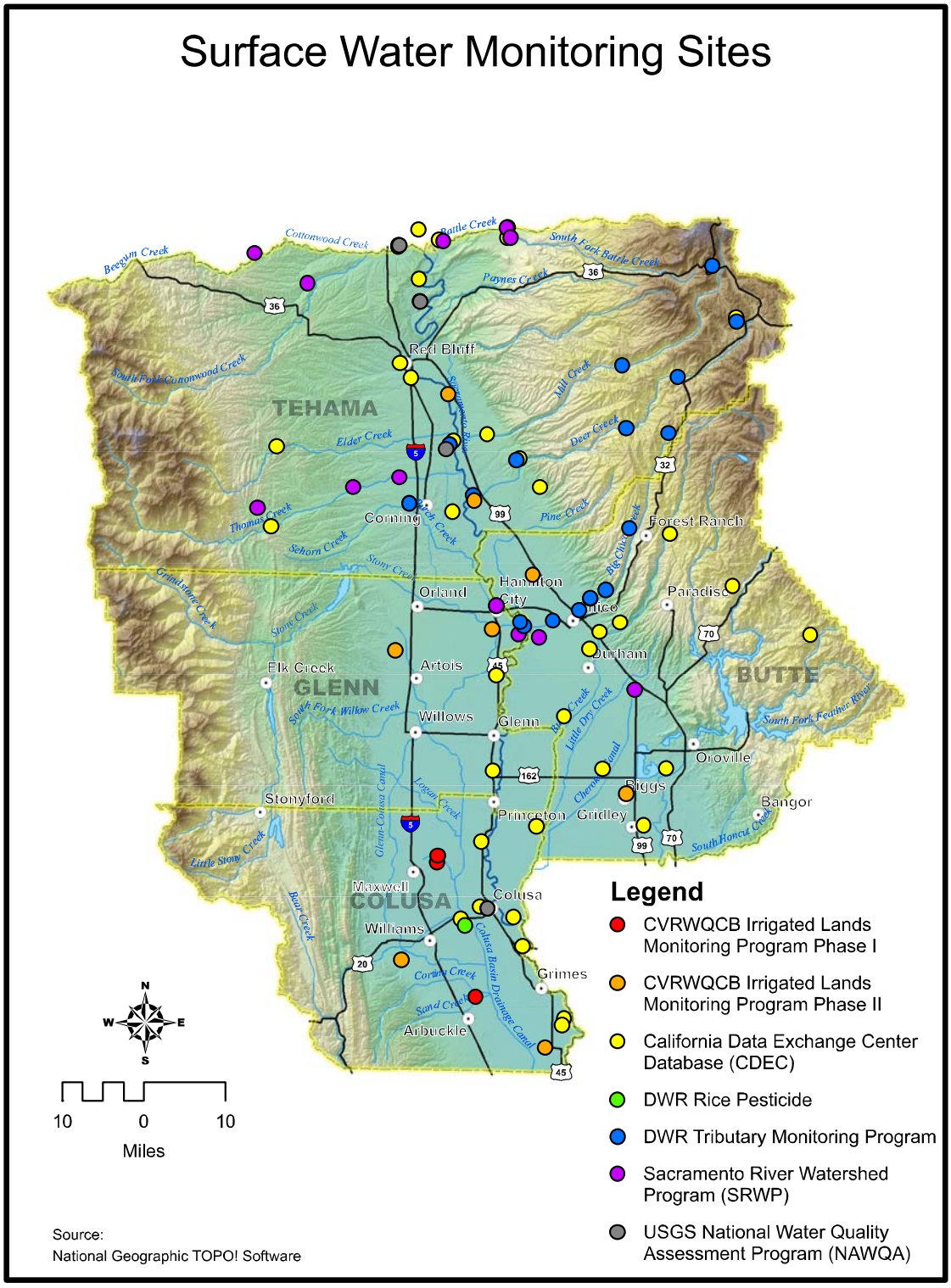

Figure 6-7
Surface Water Monitoring Sites

The inventory found that data quality for the major regional monitoring programs of the Sacramento River is typically very good, and appears more than adequate to support drinking water policy development for most constituents of interest shown in Table 6-8 (LWA 2004). However, additional monitoring is needed to provide geographic coverage, indicators of long-term trends, and variability to support the conceptual modeling for initial policy development. Continuation of the monitoring programs conducted by the SRWP and DWR should provide these data over the long-term. Lesser tributaries and agricultural drains do not appear to be adequately represented for many constituents of interest. However, the monitoring efforts for the Agricultural Waiver Program are expected to fill many of the gaps in the agricultural drain database and at least some of the gaps in the lesser tributary database.

Table 6-11 summarizes the findings of the CVWRCB existing data inventory and evaluation. The results are grouped by the eight parameters groups listed in Table 6-8. The surface waters in the watershed are divided into mainstem of the Sacramento River, lesser tributaries, and agricultural drains. Adequacy of the data to represent current conditions and support drinking water policy was rated on a scale of 0% to 100% with 100% indicating complete representation.

According to the inventory, the majority of conventional parameters are included in monitoring programs conducted in the Sacramento watershed. The exceptions are cyanide and salinity. The majority of the nutrients, bacteria/pathogens, and disinfection byproduct precursors has not been included in monitoring programs on tributaries and the ag drains but are included in monitoring conducted along the mainstem of the Sacramento River. On the mainstem, the exceptions have been viruses (pathogen) and bromide (byproduct precursor). The only pesticides that have been monitored on a regular basis have been chlorpyrifos and diazinon, and only on the mainstem.

Table 6-11
Adequacy of Water Quality Data to Represent Current Conditions

Parameter Group	Mainstem	Tributaries	Ag Drains
Conventional (9)	81% (0-100%)	56% (0-92%)	42% (0-100%)
Dissolved Minerals (3)	100%	73% (67-81%)	52% (44-56%)
Nutrients (9)	89% (29-100%)	33% (0-61%)	39% (0-56%)
Bacteria/Pathogens (7)	69% (0-100%)	6% (0-25%)	19% (0-33%)
Disinfection Byproducts Precursors (8)	77% (43-100%)	16% (3-36%)	35% (11-56%)
Pesticides (24)	27% (0-86%)	7% (0-42%)	18% (0-33%)
Arsenic	86%	53%	44%
Flow	100%	75%	11%

Source: LWA 2004

6.4.3 Overview of NPDES Monitoring Programs

In the Four County area, there are 29 facilities that are permitted through the NPDES program to discharge treated wastewater (Larson 2005). These facilities are required to monitor their effluent that is discharged to the receiving environment.

These facilities are listed in Table 6-12. Ten are located in Butte County, three are in Colusa County, one is in Glenn County and 15 are in the Tehama County. Twelve of the facilities are publicly owned treatment works (POTWs). The remaining 17 facilities are associated with commercial and industrial operations. Of these 17, nine facilities are either fish hatcheries run by the State of California or private fish farms. Major dischargers based on average flow volume include Chico Regional WTF, Oroville WWTP, Willows WWTP, Corning Industrial/Domestic WWTF, PACTIV Molded Pulp Mill, and Red Bluff Wastewater Reclamation Plant. No permits have been issued for urban stormwater discharges in the Four County area.

Monitoring requirements are established for each facility depending on the characteristics of wastewater that is treated and specific parameters of interest. Parameters typically monitored by POTWs that are of interest to drinking water (as shown in Table 6-8) include pH, temperature, total dissolved solids, ammonia, bacteria, and priority pollutants that include selected pesticides and trace elements. Monitoring requirements for facilities treating wastewater from commercial and industrial operations will vary with the type of operations. Fish hatcheries and farms are typically required to monitor drinking water parameters such as pH and turbidity, along with toxicity. Certain facilities may also need to include nutrients. Results of all monitoring are reported to the CVRWQCB.

The permits may also require facilities to monitor the water body that receives the effluent. Monitoring stations are established upstream and downstream of the discharge point. Receiving water monitoring programs in the Four County area were not identified beyond those listed for surface waters in Section 6.3.2.

Table 6-12
Facilities in the Four County Area with NPDES Permits

Agency Name	Facility Name	NPDES No.	County	Facility Type	Major Minor Facility	Type of Facility	Average Flow (MGD)
Biggs, City of	Biggs WWTP	CA0078930	Butte	MUN	Minor	POTW	0.38
Chico, City of	Chico Regional WWTF	CA0079081	Butte	MUN	Major	POTW	7.2
Kinder Morgan & SFPP LP	Chico Terminal	CA0083810	Butte	IND	Minor	WTP (GW)	0.0006
CA Dept of Fish & Game	Feather River Hatchery	CA0004570	Butte	AGR	Minor	Aquaculture	
Yuba CWD	Forbestown N WTP	CA0084824	Butte	OTH	Minor	POTW	
CA Dpet of Forestry	Magalia Nursery / Butte Fire Center	CA0084379	Butte	OTH	Minor	Misc	
Oroville Wyandotte ID	Miners Ranch WTP	CA0083143	Butte	OTH	Minor	Misc	0.24
Sewer Comm – Oroville Region	Oroville WWTP	CA0079235	Butte	MUN	Major	POTW	3
Paradise ID	Paradise WTP	CA0083488	Butte	OTH	Minor	POTW	0.32
CA Dept of Fish & Game	Thermalito Annex Hatchery	CA0082350	Butte	AGR	Minor	Aquaculture	7.8
Colusa, City of	Colusa WWTP	CA0078999	Colusa	MUN	Minor	POTW	0.66
Maxwell P.U.D.	Maxwell PUD WWTF	CA0079987	Colusa	MUN	Minor	POTW	0.14
Williams, City of	Williams WWTP	CA0077933	Colusa	MUN	Minor	POTW	0.3 / 0.5
Willows, City of	Willows WWTP	CA0078034	Glenn	MUN	Major	POTW	0.89
Bell Carter Olive Company Inc.	Bell Carter Industrial WWTP	CA0083721	Tehama	IND	Minor	Food	0.38
Corning, City of	Corning Industrial/Domestic WWTF	CA0004995	Tehama	MUN	Major	POTW	1.38 / 6
Mt Lassen Trout Farms	Dales Facility	CA0080381	Tehama	AGR	Minor	Aquaculture	2.4
CA Dept of Fish & Game	Darrah Springs Hatchery	CA0004561	Tehama	AGR	Minor	Aquaculture	18.7
Mt Lassen Trout Farms	Jeff Coat Facility	CA0082104	Tehama	AGR	Minor	Aquaculture	2
Mt Lassen Trout Farms	Jeff Coat West Facility	CA0082813	Tehama	AGR	Minor	Aquaculture	4.5
Brunello, Pete	Lassen Forest Products	CA0084301	Tehama	IND	Minor	Paper Mill	
Mt Lassen Trout Farms	Meadowbrook Facility	CA0080373	Tehama	AGR	Minor	Aquaculture	2.76
Tehama County SD #1	Mineral WWTP	CA0084069	Tehama	MUN	Minor	POTW	
PACTIV Corp	PACTIV Molded Pulp Mill	CA0004821	Tehama	IND	Major	Paper Mill	1.9
Bell Carter Olive Company Inc.	Plant 1	CA0081639	Tehama	IND	Minor	Food	
Red Bluff, City of	Red Bluff WW Reclamation Plan	CA0078891	Tehama	MUN	Major	POTW	1.4 / 6.1 (1.25)
Mt Lassen Trout Farms	Volta Facility	CA0083879	Tehama	AGR	Minor	Aquaculture	1.9
Wal Mart Stores Inc	Wal Mart Distribution Center 26	CA0083186	Tehama	IND	Minor	Misc	0.006
Mt Lassen Trout Farms	Willow Springs Facility	CA0082163	Tehama	AGR	Minor	Aquaculture	3

Source: Larson 2005

Section 7
Regional Drinking Water Quality Strategies

Regional strategies have been developed to address:

- Objectives established for the Northern Sacramento Valley Regional Drinking Water Quality Strategy Program, which include
    - Protect local source water quality
    - Increase understanding of local and regional drinking water sources and threats
    - Coordinate county and local management efforts and share information about water-related activities
    - Protect third parties, including the environment
    - Understand statewide drinking water concerns
    - Provide technical assistance
- Development of the Central Valley drinking water quality policy
- Implementation of the CALFED Water Quality Plan using the ELPH diagram as the framework

The strategies were based on:

- Water resources and physical attributes found in the Four County area (Section 3)
- Organization structure under which the each of the four counties will work together (Section 4)
- Drinking water activities conducted by local, county, regional, state, and Federal groups in the area (Section 5)
- Current drinking water quality conditions and future potential impacts (Section 6)

The individual strategies are organized under these five headings:

- Drinking Water Protection – Groundwater
- Drinking Water Protection - Surface Water
- Regional Collaboration

- Funding
- Outreach & Education

The remaining sections discuss each strategy, its relevance to this and other drinking water quality programs, potential implementation activities, and general implementation schedule of these activities.

7.1 Drinking Water Protection – Groundwater

Strategy: Cooperating counties will continue to work in a collaborative manner to:

- *Study, understand, and protect groundwater that serves as a drinking water source; and*
- *Identify and support the management of activities that may adversely impact groundwater quality.*

This strategy directly addresses the two goals of protecting local source water quality and understanding drinking water sources and threats. Protecting groundwater quality as a drinking water source will protect third parties that also require good quality water. Technical assistance will be required to implement management activities. Protecting groundwater quality will contribute to protecting source water under the CALFED ELPH framework.

Specific activities that can be implemented under this strategy include:

- Investigate groundwater recharge areas
    - Develop GIS layer of groundwater recharge zones, with appropriate descriptions
    - Link water quality in public wells to aquifers at a regional level
    - Identify and prioritize important or susceptible areas
    - Link land uses and zoning to priority areas
    - Protect priority areas through zoning
    - Protect priority areas through management of waste discharges
- Evaluate how future agriculture, municipal, and domestic water use may affect water quality and yield by monitoring changes in:
    - Development practices (residential, commercial, agriculture)
    - Drinking water supplies

  - Drinking water quantity requirements
  - Wastewater disposal practices
- Coordinate monitoring activities
  - Encourage coordination among groundwater programs (suppliers/DHS, DWR, BMOs, GAMA) to avoid duplication of effort
  - Keep abreast of results and future monitoring plans by attending meetings or reviewing minutes
  - Encourage and/or participated in the development of a regional database
  - Standardize monitoring QA/QC procedures
  - Standardize reporting and attribute information
  - Identify questions to be answered with data, types of data to be collected, and data gaps
- Support remediation of known contaminated sites
- Reduce groundwater contamination associated with domestic septic sytems
  - Review adequacy of current ordinances for septic systems and update as needed to minimize impacts
  - Track complaints and investigations
  - Perform a study to investigate cumulative impacts of multiple on-site facilities, density requirements, and criteria to switch over to sewer systems
- Support the underground storage tank management program
- Develop and implement common stormwater management practices such as clean neighborhood and business programs to reduce the release of fertilizers, pesticides/herbicides, oil and grease, and irrigated runoff

7.2 Drinking Water Protection - Surface Water

Strategy: Cooperating counties will continue to work in a collaborative manner to:

- *Study, understand and protect surface water that serves as a drinking water source; and*
- *Identify and support the management of activities that may adversely impact surface water quality*

This strategy directly addresses the goals of protecting local source water quality, understanding drinking water sources and threats, and protecting water sources for third parties. Technical assistance will be required to implement management activities.

Studying surface water quality will assist in the development of the Central Valley water quality policy. Protecting surface water quality will contribute to protecting source water under the CALFED ELPH framework.

Specific activities that can be implemented under this strategy include:

- Evaluate how future agriculture, municipal, and domestic water use may affect water quality and yield by monitoring changes in:
    - Development practices (residential, commercial, agriculture)
    - Drinking water supplies
    - Drinking water quantity requirements
    - Wastewater disposal practices
- Keep abreast of TMDLs being developed for surface waters in the Four County area
- Encourage the continued coordination among the surface water quality monitoring programs to avoid duplication of effort
- Keep abreast of results and future monitoring plans by attending meetings or reviewing minutes
- Implement common stormwater management practices to reduce pollutant loads by developing and implementing:
    - Clean neighborhood and business programs to reduce the release of fertilizers, pesticides/herbicides, oil and grease, and irrigated runoff
    - Guidelines and ordinances to reduce the volume of urban runoff from new developments
    - Practices to reduce runoff volumes from irrigated lands
- Support the management of waste discharges through the NPDES program
    - POTWs

- Industrial
- Stormwater
- Agricultural

7.3 Regional Collaboration

Strategy: Cooperating county water resource representatives will promote collaboration leading to an improved understanding and management of drinking water sources among:

- *Intra-county departments, agencies, districts, and water resource-related interests*
- *Inter-county water resource interests*
- *Regional water resource interests*
- *State and Federal agencies*

This strategy directly addresses the goals of coordinating county and local management efforts, sharing information about water related activities, and understanding statewide drinking water concerns. Regional collaboration will maximize protection of third party users by identifying their needs. This strategy directly addresses the collaborative basis of both the Central Valley drinking water quality policy and the CALFED drinking water plan.

Specific activities that can be implemented under this strategy include:

- Development of an organization or group comprised of representatives of the Four County area
  - Focus on water quality planning
  - Define the role of counties
  - Complete list of plan implementation steps and schedule
  - Define long term organization structure
  - Hold regular meetings (monthly or quarterly)
  - Foster collaborative county relationships that are complementary with activities under the Sacramento Valley Water Management Program
  - Expand geographic coverage by involving Sutter, Yuba, Yolo, and Shasta counties

- Convene a regional subcommittee to coordinate with other organizations
    - CVRWQCB and CUWA on the Basin Plan amendment progress
    - CALFED Drinking Water Group on implementing the Water Quality Plan
    - Funding agencies to receive information on grant/loan projects funded in the Four County area
    - Local and regional water quality monitoring programs to avoid duplication of effort
- Coordinate efforts relating to the collection and dissemination of collected water resource-related data
    - Development of a standardized format for information management and information reporting
    - Develop a consistent annual water resource report format to facilitate an annual regional status report

7.4 Funding

Strategy: Cooperating counties will work in a collaborative manner to pursue funding opportunities that will result in the improved understanding and protection, and public education associated with groundwater and surface water drinking water sources.

This strategy directly addresses the goal of coordinating county and local management efforts. The pursuit of funding opportunities will require an understanding of statewide and national drinking water quality concerns.

Specific activities that can be implemented under this strategy include:

- Pursue and secure funding for implementation and continuation of the Northern Sacramento Valley Regional Drinking Water Quality Strategy Program
    - For the short-term, acquire another year of funding to support development of regional collaboration, monthly meetings, consultant to facilitate, meetings with board of supervisors
- Locate funding to increase staffing that can devote a portion of their time to drinking water quality issues
- Coordinate with funding agencies to receive information on grant/loan projects funded in the Four County area

- Identify county funding for continuation of regional collaboration

7.5 Outreach & Education

Strategy: Cooperating counties will work in a collaborative manner to support outreach and educational activities that will result in the protection of groundwater and surface water drinking water sources.

Outreach and education are essential elements to the Northern Sacramento Valley Drinking Water Quality Program. Both elements are required to maximize collaboration with the public, stakeholders, intra-county agencies, inter-county agencies, and state and Federal agencies. This strategy addresses the goals of coordinating county and local management efforts, sharing information, and understanding drinking water concerns. This strategy directly addresses the collaborative basis of both the Central Valley drinking water quality policy and the CALFED drinking water plan.

Specific activities that can be implemented under this strategy include:

- County water resource leaders should lead intra-county collaboration with environmental health, planning, public works, and other agencies that are involved with water resource-related activities
- Develop web-based communication for information on current water resource activities, programs, projects, and events in the Four County area
- Develop an annual regional status report for distribution to the interested public
- Develop Power Point presentation template on the program, one that can be modified to target different audiences
- Publish what information is available on water resources in the Four County area and where that information can be located
- Expand public education activities
    - Convene an annual public meeting to provide information and discuss regional water resource activities
    - Produce brochures on drinking water quality and other water-related activities

7.6 Draft Implementation Schedule

A schedule has been developed for the implementation of each activity listed above under Sections 7.1-7.5. The implementation schedule is based on the need to complete

priority actions to protect and enhance local and downstream drinking water quality with consideration of funding required and available to complete activities. This schedule should be considered draft as an activity under activity III.1, regional organization, will be to finalize the list of activities and implementation schedule.

The draft schedule is presented in Table 7-1. The table lists the activities associated with each of the five strategy categories.

Table 7-1
Draft Implementation Schedule for Northern Sacramento Valley Drinking Water Quality Strategy Actions

	Description of Action	Implementation Schedule
I.	**Drinking Water Protection – Groundwater**	
1	Investigate groundwater recharge areas	2006/2007
2	Evaluate how future agriculture, municipal, and domestic water use may affect water quality and yield	2006/2007
3	Coordinate monitoring activities	2005/2006
4	Support remediation of known contaminated sites	Ongoing
5	Reduce groundwater contamination associated with domestic septic tanks	Ongoing
6	Support the underground storage tank management program	Ongoing
7	Develop and implement common stormwater management practices such as clean neighborhood and business programs	2006/2007
II.	**Drinking Water Protection – Surface Water**	
1	Evaluate how future agriculture, municipal, and domestic water use may affect water quality and yield	2006/2007
2	Keep abreast of TMDLs being developed for surface waters in the Four County area	Ongoing
3	Encourage the continued coordination among the surface water quality monitoring programs to avoid duplication of effort	Ongoing
4	Keep abreast of results and future monitoring plans by attending meetings or reviewing minutes	Ongoing
5	Implement common stormwater management practices such as clean neighborhood and business programs, new development ordinances, reduction of irrigated runoff volumes	Ongoing
6	Support the management of waste discharges through the NPDES program	Ongoing
III.	**Regional Collaboration**	
1	Development of an organization or group comprised of representatives of the Four County area	2005
2	Convene a regional subcommittee to coordinate with other organizations	2005/2006
3	Coordinate efforts relating to the collection and dissemination of collected water resource-related data	2005/2006
IV.	**Funding**	
1	Pursue and secure funding for implementation and continuation of the Northern Sacramento Valley Regional Drinking Water Quality Strategy Program	Ongoing
2	Locate funding to increase staffing that can devote a portion of their time to drinking water quality issues	Ongoing
3	Coordinate with funding agencies to receive information on grant/loan projects funded in the Four County area	2005/2006
4	Identify county funding for continuation of regional collaboration	Ongoing
V.	**Outreach and Education**	
1	County water resource leaders should lead intra-county collaboration with environmental health, planning, public works, and other agencies	2005/2006
2	Develop web-based communication for information on current water resource activities, programs, projects, and events in the Four County area	2006
3	Develop an annual regional status report for distribution to the interested public	2006
4	Develop Power Point presentation template on the program, one that can be modified to target different audiences	2006
5	Publish what information is available on water resources in the Four County area and where that information can be located	2005/2006
6	Expand public education activities such as convening an annual public meeting and producing brochures on drinking water quality	2006

Section 8
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Section 9
Acronyms

BCDPH	Butte County Department of Public Health
BCGMP	Butte County AB3030 Groundwater Management Plan
BCPD	Butte County Planning Department
BCRCD	Butte County Resource Conservation District
BCWAC	Butte County Water Advisory Committee
BCWC	Butte County Water Commission
BMO	Basin Management Objective
BOR	Bureau of Reclamation
CBDA	California Bay-Delta Authority
CCDEH	Colusa County Department of Environmental Health
CCDPB	Colusa County Department of Planning and Building
CCRCD	Colusa County Resource Conservation District
CDM	Camp Dresser & McKee
CVP	Central Valley Project
CVRWQCB	Central Valley Regional Water Control Board
CWA	Clean Water Act
DHS	Department of Health Services
DWFOB	Drinking Water Field Operations Branch
DWP	Drinking Water Program
DWR	Department of Water Resources
DW&RC	Butte County Department of Water and Resource Conservation
DWSAP	Drinking Water Source Assessment and Protection

DWSRF	Drinking Water State Revolving Fund
DWTBP	Drinking Water Technical Programs Branch
DWQP	Drinking Water Quality Program
EIS/EIR	Environmental Impact Statement/ Environmental Impact Report
ELPH	Equivalent Level of Public Health Protection
ERP	Ecosystem Restoration Program
EWA	Environmental Water Account
EWP	Environmental Water Program
FCWCD	Tehama County Flood Control and Water Conservation District
GAMA	Groundwater Ambient Monitoring and Assessment Program
GCDA	Glenn County Department of Agriculture
GCDEH	Glenn County Department of Environmental Health
GCGMP	Glenn County Groundwater Management Plan
GCRCD	Glenn County Resource Conservation District
GCWAC	Glenn County Water Advisory Committee
GPS	Global Positioning Satellite
LUFT	Leaking underground fuel tanks
NCWA	Northern California Water Association
NRCS	Natural Resources Conservation Service
NPDES	National Pollutant Discharge Elimination System
NWQA	National Water Quality Assessment Program
RWQCB	Regional Water Quality Control Board
SDWA	Safe Drinking Water Act
SLIC	Spills-Leaks-Investigations-Cleanups

SRF	State Revolving Fund
SWAMP	Surface Water Ambient Monitoring Program
SWP	State Water Project
SWRCB	State Water Resources Control Board
SWS	Small Water System
TCDEH	Tehama County Department of Environmental Health
TCGMP	Tehama County AB3030 Groundwater Management Plan
TCRCD	Tehama County Resource Conservation District
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
USGS	United State Geological Survey

Appendix A

Individual County Zoning Maps

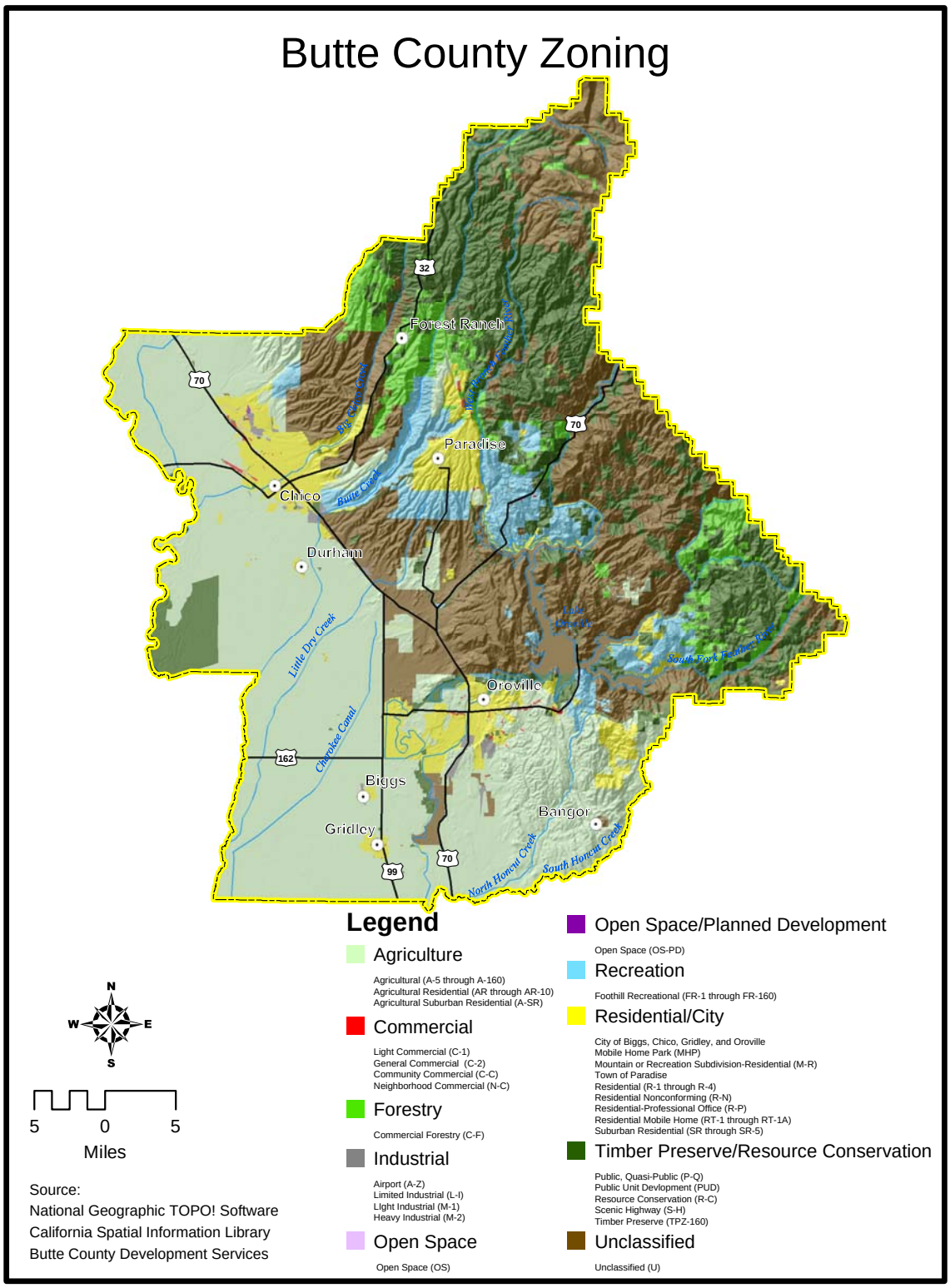
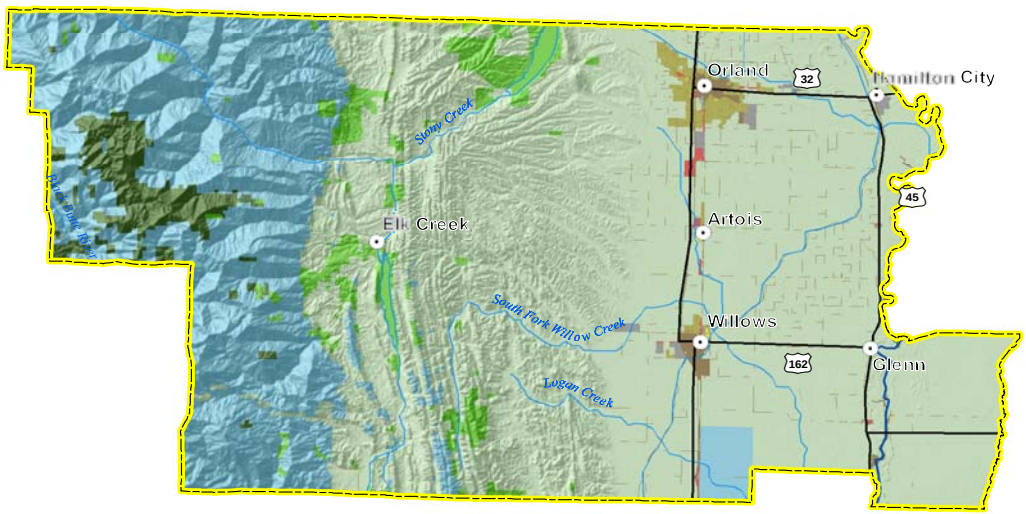


Figure A-1
Butte County Zoning

Glenn County Zoning



Legend

- **Agriculture**
  Exclusive Agriculture (AE-20 through AP-80)
  Agricultural Preserve (AP-80 through AP-160)
  Agricultural Transitional (AT-10)
  Intensive Agriculture
  Farmland Security (FS-80)
- **Commercial**
  Community Commercial (CC)
  Highway and Visitor Commercial (HVC)
  Local Commercial (LC and LC/AE-40)
  Service Commercial (SC)
- **Forestry**
  Foothill Agricultural/Forestry
- **Industrial**
  Airport (AV)
  Industrial (M)
  Industrial Park (MP)
- **Residential Estates**
  Residential Estates (RE-1 through RE-10 and RE-NW)
- **Residential/City**
  Single Family Residential (R-1)
  City of Orland
  Multiple Residential (R-M)
- **Timber Preserve/Resource Conservation**
  Timberland Preserve (TPZ-160)
- **Unclassified**
  (NL)

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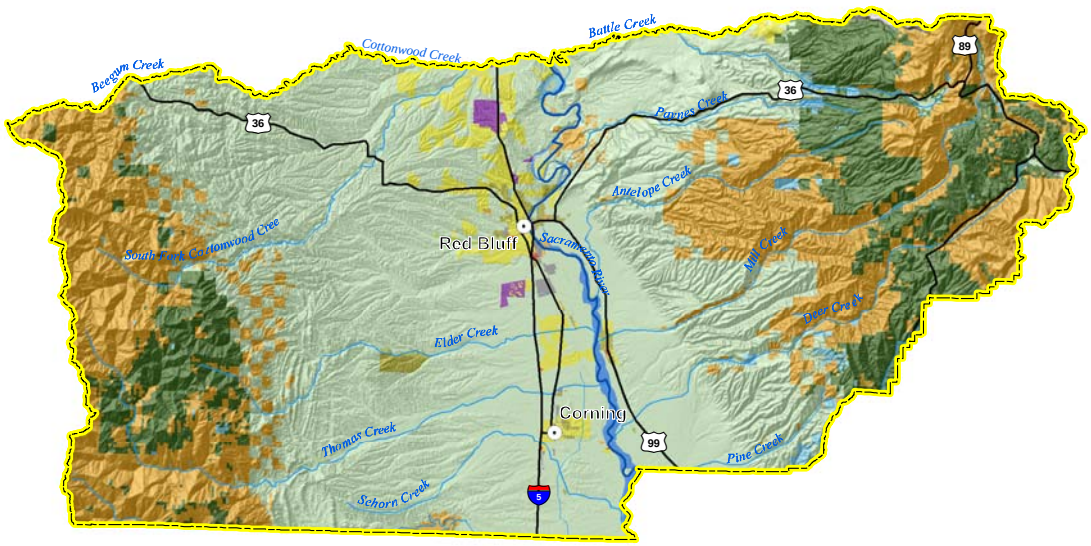
5 0 5
Miles

Source:
California Spatial Information Library
Glenn County

Figure A-2
Glenn County Zoning

Tehama County Zoning



Legend

Agriculture
Exclusive Agriculture (EA)
Upland Agriculture (U-A)

Commercial
Neighborhood Commercial (C1)
Community Commercial (C2)
General Commercial (C3)
Local Convenience Center Commercial (C4)

Floodplain
Primary Floodplain (PF)

Government/Public Agency
Government (GOV)
Public Agency (PA)

Industrial
Airport (AV)
Light Industrial (M1)
General Industrial (M2)

Open Space
Open Space (OS)

Open Space/Planned Development
Planned Development (PD)

Recreation
General Recreation (GR)

Residential Estates
Residential Estates (RE)

Residential/City
One-Family Residential (R1)
Two-Family Residential (R2)
Neighborhood Apartment (R3)
General Apartment District (R4)

Timber Preserve/Resource Conservation
Timber Preserve (TPZ)

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Miles

Source:
California Spatial Information Library
Tehama County Public Works

Figure A-3
Tehama County Zoning

Appendix B

Public Outreach Plan

Regional Drinking Water Quality Management Project in the Northern Sacramento Valley

Outreach and Public Involvement Plan

Section 1 – Introduction

1.1 Project Description

This document is the Outreach and Public Involvement Plan for the Regional Drinking Water Quality Management Project in the Northern Sacramento Valley counties of Butte, Colusa, Glenn, and Tehama (Four County Project).

The CALFED Drinking Water Quality Conceptual Framework document identifies a recommended strategy focused on four integrated opportunity categories: source water quality, storage, exchanges, and treatment. Improvement in source water quality and development of storage upstream of the Delta can contribute to Drinking Water Quality Program (DWQP) goals, objectives, and targets.

County water resource managers in Butte, Colusa, Glenn, and Tehama Counties (Four Counties) are currently facilitating activities in areas such as water resource studies, groundwater management, data and information management, county regulation and ordinance oversight, public education, and stakeholder interaction. The Four County Team understands that common drinking water resources can best be studied, evaluated and managed by extending their proactive county-level activities in a collaborative and cooperative fashion to the regional level.

With this understanding, water managers in Butte, Colusa, Glenn, and Tehama Counties are initiating the Four County Project that will lead to the development of the required framework and technical information necessary for successful regional drinking water quality planning activities.

1.2 Project Context

Regional Outreach and Public Involvement Plan (Outreach Plan) activities, as described in the following sections, will support completion of each project task. Outreach Plan implementation will facilitate both the collection of relevant information through stakeholder participation and will allow for dissemination of project-related information and status information. Project tasks supported through implementation of the Outreach Plan include the following:

- Current County and Regional Activities Comparison and Documentation;
- Regional Goals and Objectives Development;
- Regional Organizational Structure Development;
- Assessment of Current Water Quality Conditions; and

- Regional Water Quality Management Strategy Development.

1.3 Public Outreach Objectives

The Four Counties' public outreach objectives include:

- Develop and implement a process whereby the public remains informed of Four County activities; and

- Provide the opportunity for the public to share ideas and input on the development and implementation of regional collaboration.

1.4 Document Overview

This memorandum describes the groups and people identified for outreach and involvement (Section 2), outreach methods to be used during Project development (Section 3), and outreach tasks and schedule (Section 4).

Section 2 - Groups Targeted for Outreach

2.1 Categories of Targeted Groups

The Four County Team will direct outreach at variety of groups and individuals, including organized stakeholder groups, public agencies, non-profit organizations, and individuals with an interest in the planning process and its results.

The groups and individuals targeted by this Outreach Plan have a range of potential outreach needs. The three categories below present the range of information needs that this Outreach Plan will seek to address.

- Information Group – This group may want to learn about Project goals and approach, need to see formal progress reports, be notified that deliverables have been made, and should be notified when the Project is complete.

- Input Group – This group may wish to provide suggestions regarding Project development, and should be given opportunities to learn about - and provide comments on - planning elements, methods, and documents.

- Participatory Group –This group contains groups and individuals with specific knowledge or experience the Project goals, and should participate in decisions regarding development of planning elements, methods, and documents.

The categories at higher levels of involvement are inclusive of those at more minimal levels of involvement. Those in the input group, for example, would have access to public information received by the information group.

2.2 Four County Contact Groups

This Outreach Plan identifies three key contact groups for the Four County Project. The groups are identified with the above categories.

- General public with interest in regional water resource activities (information group);
- Four Counties' Board of Supervisors (input group); and
- Four County Stakeholder Group (participation group). The Four County Stakeholder Group will consist of two representatives from each county. The Stakeholder Group members could represent a county's water resource-related commission, a water district or drinking water purveyor. [1]

These groups will be contacted through various outreach methods during Project implementation. Section 3 describes outreach methods specific to each group.

Section 3 – Outreach Methods

3.1 Outreach Method Characteristics

Just as public participants in Project development have a range of outreach needs, so too is there a range of methods for meeting those needs. The Four County Project Team can: make information available to the public; share information in a unidirectional manner; ask for public response; and can interact with public representatives in group settings. The range of outreach methods extends from "one-way" outreach methods to highly interactive decision-making.

At the "one-way" end of the range are outreach methods that seek merely to make information available and accessible. These methods allow any interested party to obtain information and do not require any special access privileges, memberships, or fees. These methods do not include any provisions for public response, but may inform the public regarding opportunities to provide input. One-way methods typically provide an inexpensive means for reaching broad audiences. One-way outreach methods may also be targeted to specific groups, either to limit access to the provided information, or to ensure that the targeted groups have been notified. Posting information on a website or through a newsletter is an example of a one-way outreach method.

Two-way communication methods allow for interested parties and groups to provide feedback and input. Two-way outreach methods allow those with an interest in the

[1] Water resource related committees include the Butte County Water Commission, Colusa County Groundwater Management Commission, Glenn County Water Advisory Committee, and Tehama County Flood Control and Water Conservation District.

process to make their concerns known, and to contribute suggestions. These methods can provide a basic means for documenting stakeholder concerns, and to allow input that has been carefully crafted, if members of the public so desire. As an example, adding an "email the Project Team" feature to an informational website turns a one-way method into a two-way method.

Settings that provide interaction with interested parties and groups allow for both one-way and two-way communication, enhanced by discussion. These methods provide opportunities for extensive involvement through focused education and participatory decision-making. A stakeholder workshop, featuring informational presentations and discussion, is an example of an interactive method.

3.2 Planned Outreach Methods

A variety of potential methods are appropriate for the Four County Project, and a combination of the methods will help to provide the right information to the right people at the right time. This Outreach Plan identifies methods that are planned; in order for the Outreach Plan to be effective, however, it must be adaptable based upon needs that may be identified during the planning process. Monitoring the effectiveness of the outreach methods will provide the Four County Project team guidance in evaluating and adjusting Outreach Plan implementation to meet the Project's objectives. Monitoring methods include brief telephone surveys, interviews, discussions during workshops and other meetings, and web-based surveys to assess the effectiveness of outreach efforts. Table 3-1 describes the outreach methods that may be employed during the Project.

Table 3-1
Outreach Methods

Method	***Description***
Web Page	Upload documents on existing websites – Glenn County Water Advisory Committee, Butte County Department of Water Resource Conservation, and Tehama County Flood Control and Water Conservation District. Include meeting announcements, planning documents and other information.
Newsletter	Prepare and incorporate Four County Project news in existing newsletters.
Press Releases	Provide written information to local newspapers for publication; take out ads announcing events, or post public notices of upcoming events in the "calendar" section of local publications.
Public Meetings	Prepare and conduct a meeting that is open to the public and which provides informational presentations on the Project goals, approach, and progress. Include opportunities for the public to ask questions offer suggestions, either at the meeting or thereafter.
Briefings	Prepare and provide an informational presentation describing Project goals, approach, elements, and/or progress.
Workshops	Prepare and conduct structured, interactive "working meetings," in which participants hear presentations, engage in brainstorming and problem solving sessions, and discuss concerns and issues with the Project Team and with other participants. Workshop participants are tasked with representing the interests of their organizations and with reporting back to their organizations regarding Project process.
Mailings	Prepare and send information to those interested in the planning process, via postal mail or email. Develop specific mailing lists to meet topical and general information distribution needs.

3.4 Targeted Group Coverage

Table 3-2 lists the key groups (from Section 2) and methods that may be used to meet each group's outreach needs.

Table 3-2
Outreach Groups and Methods

Group	***Outreach Needs***	***Anticipated Outreach Methods***					
		Web Page	Press Release	Public Meetings	Briefings	Workshops	Mailings
General Public	Information	●	●	●			●
Board of Supervisors	Input	●	●	●	●		●
Stakeholder Group	Participation	●	●	●		●	●

Section 4 – Tasks and Documents

4.1 Outreach Tasks

The Four County Project Team will perform the tasks below as part of Outreach Plan implementation. Tasks that require the development of materials (Section 4.2, below) are marked with an asterisk (*).

- Identify target groups and outreach methods. Sections 2 and 3 of this memorandum contain the results of this task. As noted previously, adaptation of outreach methods during Project development, in response to monitoring and evaluation, will be required to implement an effective outreach program.

- Identify Stakeholder Group members. Each of the Four Counties will elect two people to serve on the Stakeholder Group. Stakeholder Group members could be representatives of water-resource related commissions, water districts, or a drinking water purveyor.

- Provide meeting announcements, progress updates, and Project materials through existing media.* This task includes distribution of Project information to the target groups. The Four County Project Team will post meeting announcements on existing county websites (Glenn County WAC, Butte County DWRC, and Tehama County FC&WCD), newsletters (Butte County DWRC), and local newspapers. Meetings will also be announced during water resource-related commission meetings. The Four Counties will provide progress updates at water resource-related commission meetings. Project documents and progress updates will be posted on existing websites. Dissemination of Project information will be adjusted according to responses of the target groups.

- Schedule and conduct informational public meeting.* This task includes selection of a meeting date and location; coordination of meeting logistics (directions, equipment, parking, refreshments, etc.); development of agendas, presentation materials, visual aids and handouts; selection of and coordination with speakers; meeting notification via various media (See Section 3); facilitation of the meeting; preparation of a meeting summary; and posting/distribution of meeting materials. The public meeting for the Program is anticipated in early 2005.

- Schedule and conduct up to two Board of Supervisors briefings.* The Project Team will provide two briefings to each Four Counties' Board of Supervisors. The briefings will be identical for each county's Board of Supervisors. This task includes coordination of briefing dates, locations and logistics with organizational representatives; development of presentation materials, visual aids and handouts; and selection of and coordination with speakers. The Project Team anticipates the first briefing to be in February 2005 and the second briefing to be in April 2005.

- Perform evaluative monitoring of Outreach Plan implementation. Conduct brief telephone surveys, interviews, discussions during workshops and other meetings, or web-based surveys to assess the effectiveness of outreach efforts. Develop and implement changes to outreach approach, if necessary.

- Schedule and conduct up to four Stakeholder Group meetings.* Schedule, prepare materials for, and provide progress updates to the Stakeholder Group. This task involves similar activities as described for briefings, above.

4.2 Outreach Materials

Execution of the tasks in Sections 4.1 and 4.2 will require preparation of a variety of materials. Table 4.1 lists and describes these materials. The responsibility for development of these materials will rest primarily with CDM. CDM will collaborate closely with the Four Counties during materials preparation.

Table 4-1
Outreach Materials

Type	*Anticipated Number*	*Description*
Agenda	6-10	Identifies the topics of discussion for public or Stakeholder meetings. May include a schedule or time allotments for topics.
Notice	Up to 2	A simple text advertisement that gives the date, location, and topic of an upcoming Project event.
Presentation	Up to 8	A set of visual aids and/or PowerPoint slides, which a speaker may use to give an oral presentation at a meeting or briefing.
Visual Aids	As needed	Maps, charts, handouts and other graphics that display data relevant to the Project.
Meeting Summary	2	A brief, clear recounting of a meeting, describing the topics of discussion, comments, and conclusions reached.

Appendix C

County Drinking Water Quality Activities

C.1 Butte County Activities

Both groundwater and surface water are utilized as a source for drinking water in Butte County based on water purveyor information listed on the EPA website (USEPA 2005). In general, groundwater is predominantly used within the basin area of the county. Both surface water and groundwater serve as a source of drinking water in the foothill and mountain areas of the county. Several county agencies have responsibilities or are involved in programs that relate to drinking water quality. Butte County Water and Resource Conservation Department (DW&RC), Butte County Department of Public Health (BCDPH), Butte County Resource Conservation District (BCRCD), and Butte Basin Water Users Association (BBWUA) each are involved in efforts that have a relationship to drinking water quality.

Drinking water purveyors are responsible for adhering to water quality regulations and county guidelines. Butte County has 65 community water systems that serve residents year round (EPA 2004). Larger water purveyors (delivering water to over 500 connections) include: Cal Water Service Company-Chico, Cal Water Service Company-Oroville, Paradise Irrigation District, South Feather Water and Power, South Feather Water and Power Miner's Ranch, Del Oro Water Company, Thermalito Irrigation District, City of Gridley, and the City of Biggs. Butte County has 130 small water systems that deliver water to smaller groups of users in Butte County.[1] The small water systems rely on groundwater sources.

Butte County has several localized water quality concerns as expressed by county water resource and public health staff. Nitrate contamination in the City of Chico, the Paradise Irrigation District, and Del Oro Water Company service areas is a concern for the long-term continued use of groundwater supply for residents. The Chico Urban Area Nitrate Compliance Plan concluded that septic tank discharge is the primary source of groundwater nitrate, and identifies specific regions that must be sewered to eliminate contamination. The Plan proposes transferring approximately 65 percent of the Chico's 12,000 septic tank users to sewer connections. Other proposed actions include public education for owners of septic systems and the limiting of new residential development on septic systems.

Another water quality concern is in the Lime Saddle Marina Area of Lake Oroville. Recently, the issue has focused on the fuel additive MTBE used in motorized watercraft.

Butte County Department Water and Resource Conservation

The DW&RC mission statement is "to manage and conserve water and other resources for the citizens of Butte County" (BCDPH 2005). The DW&RC is managing several water related policies and programs including: the AB3030 groundwater management plan,

Butte County Department of Water and Resource Conservation
http://www.buttecounty.net/waterandresource/
Ed Craddock
1 County Center Drive, Oroville, CA 95965-3398
(530) 538-3804

[1] The 130 small water systems include community water systems, non-transient non-community water systems (water systems that serve the same people, but not year round), and transient non-community water systems (water systems that do not consistently serve the same people) (EPA 2004).

a countywide water inventory study, an integrated water resources plan, Chapter 33 groundwater protection ordinance implementation including groundwater surface elevation (WSE) monitoring, and water demand forecasts.

The DW&RC was formally directed to proceed with the development of a *Butte County Groundwater Management Plan (BCGMP)* by the Butte County Board of Supervisors on August 26, 2003. The *BCGMP* supports the long-term maintenance of high quality groundwater resources within the *BCGMP* area for agricultural, environmental, rural domestic, and urban needs. *BCGMP* objectives include the minimization of long-term drawdown of groundwater levels, protection of groundwater quality, prevention of inelastic land subsidence occurring as a result of groundwater pumping, and facilitation of groundwater replenishment and cooperative management projects (DW&RC 2004).

The DW&RC coordinated development of the *Butte County Water Inventory and Analysis*. The Water Inventory and Analysis provides a summary of Butte County's water resources including an estimation of the county's urban, agricultural and environmental water needs during normal and drought conditions (DW&RC 2001).

An IWRP objective is to improve overall water quality in the county; and, the IWRP identifies several potential projects to achieve the objective.

The DW&RC developed the *Integrated Water Resources Plan (IWRP)* to improve water management in the county, maintain agricultural viability, meet urban and environmental needs, ensure a future groundwater supply to overlying users, and enhance the economy and protect the citizens and natural resources of Butte County. An *IWRP* objective is to improve overall water quality in the county; and, the *IWRP* identifies several potential projects to achieve the objective. The plan includes recommendations for future water management policies and associated descriptions of programs and projects that can be facilitated by the Butte County Board of Supervisors (DW&RC June 2004). For the IWRP, the DW&RC developed urban and agricultural water demand forecasts. The forecasts' purpose is to develop a set of reasonable scenarios for agricultural and urban use into the future.

Another responsibility of the DW&RC is the implementation of the County's Groundwater Protection Ordinance. Butte County voters approved the Groundwater Protection Ordinance as the means to conserve local groundwater supplies by regulating the transfer of groundwater outside of the county. The initial phase of implementation requires the development of Basin Management Objectives (BMOs). The DW&RC is working with local residents to establish objectives for groundwater levels, groundwater quality, and surface subsidence. Objectives are being established on a countywide basis and for individual subregions. Each objective is designed to be compatible with all other objectives. The DW&RC maintains BMO information on their website. DW&RC also conducts groundwater surface elevation monitoring at six wells as part of the Department of Water Resources' (DWR)'s monitoring grid.

Butte County Department of Public Health

The BCDPH mission statement is: "to protect the public through promoting individual, community and environmental health" (BCDPH 2004). The BCDPH performs a number of activities involving public water systems[2], underground storage tanks, and on-site sewage disposal. BCDPH also issues permits for: (1) drinking water well construction and well destruction, and (2) operation and removal of underground storage tanks, and (3) on-site sewage disposal systems (septic systems) that discharge less than 1,000 gallons per day. Groundwater contamination caused by leaking underground storage tanks falls under the jurisdiction of the CVRWQCB (SWRCB 2003). Sewage dischargers with volumes larger than 1000 gallons per day typically work with the CVRWQCB to determine their method of waste treatment (Severin 2004). BCDPH works with the CVRWQCB to determine the minimum lot size for an on-site sewage disposal system. BCDPH also provides assistance to HAZMAT teams in Butte County for spill mitigation.

Butte County Department of Public Health
http://www.buttecountypublichealth.org/default.asp
Vance Severin
202 Mira Loma, Oroville, CA 95965
(530) 538-7581

Butte County Resource Conservation District

The BCRCD's mission is "to conserve the resources of Butte County for the benefit of its citizens, its environment, and its economy" (BCRCD 2005). The BCRCD's long-term plan outlines several water quality related goals, including protecting the quality, supply and availability of groundwater; researching water quality monitoring data and data interpretation from appropriate local, state, and federal agencies; encouraging the agricultural community to work with the Natural Resources Conservation Service (NRCS) to develop Best Management Practices; and promoting water conservation practices (BCRCD 2003). The BCRCD also acts as the umbrella agency for four County watershed groups: Big Chico Creek Watershed Alliance, Butte Creek Watershed Conservancy, Cherokee Watershed Alliance, and Little Chico Creek Watershed Group.

Butte County Resource Conservation District
http://www.buttecounty.net/rcd/
150 Chuck Yeager Way, Suite A
Oroville, CA 95965
(530) 534-0112 x5

The BCRCD organizes two programs that affect water quality: landowner education and citizen monitoring programs. The BCRCD conducts an education and outreach program for landowners, concentrating on agricultural irrigators. The BCRCD has partnered with the NRCS to hold workshops on integrated pest management programs. The BCRCD is developing a citizen-monitoring program that will allow landowners to monitor water bodies on their property without direct BCRCD involvement.

[2] Regulation of public water systems is limited to public systems that serve between 15 and 200 public connections. Regulation includes licensing systems for operation, including requirements for systems to conduct water quality sampling. Water is sampled for primary drinking water standards, including microorganisms, disinfection byproducts, disinfectants, inorganic chemicals, organic chemicals and radionuclide contaminants as detailed in the safe drinking water act (EPA 2002).

Butte Basin Water Users Association
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Butte Basin Water Users Association

BBWUA strives to keep its membership informed of current and potential future changes in local, state, and federal policies that could affect water supplies. The BBWUA was formed in 1992, in response to several factors: the 1987-92 drought, the publicly expressed opinion that Butte Basin groundwater basin was an underutilized resource, and the need to manage Butte Basin's surface and ground water resources to ensure that water transfers in or out the basin do not adversely affect the supplies of other water users. The BBWUA is not a county agency, but was formed by a Memorandum of Understanding between various water suppliers and users in the Butte-Sutter area including:

- Biggs-West Gridley Water District;
- Richvale Irrigation District;
- County of Butte;
- California Water Service Company;
- Western Canal Water District;
- Butte-Sutter Basin Area Groundwater Users Corporation;
- City of Biggs;
- City of Gridley; and
- Durham Mutual Water Company.

BBWUA has developed a groundwater model for the service area of the membership. The model will be applied to assess the basin groundwater resources, quantify the resources of the basin, and assess the hydrologic impacts on the groundwater system for various water management alternatives (Hydrologic Consultants, Inc. 1996).

C.2 Colusa County Activities

Groundwater is the primary source for drinking water in County based on water purveyor information listed on the EPA website (USEPA 2005). The Colusa County Department of Planning and Building (CCDPB), the Colusa County Resource Conservation District (CCRCD), and the Colusa County Department of Environmental Health (CCDEH) are the primary agencies that have responsibilities for drinking water quality or are involved in activities related to drinking water quality. Drinking water purveyors that deliver water to over 500 connections include the City of Williams and Arbuckle Public Utility District. There are an additional 61 small water systems that deliver water to smaller groups of users in Colusa County.

Colusa County Department of Planning and Building, Groundwater Management Commission

Colusa County Department of Planning and Building
Steve Hackney
220 12th Street, Colusa, CA 95932
(530) 458-0480

The Groundwater Management Commission (CCGMC) operates under the CCDPB. The CCGMC vision statement is "to serve the public interest in a fiscally responsible manner by providing efficient, cost effective customer service, promoting public health and safety while creating new possibilities through quality land use and economic development, while protecting the physical environment, and enhancing agricultural resources." (Hackney 2005)

The CCGMC is managing the water supply for two county service areas, Century Ranch and Stonyford. The Stonyford service area generally has unproductive groundwater wells, and the existing groundwater well and supply system had an *Escherichia coli* bacteria outbreak in the past due to an unknown cause. Changing well locations may not be feasible; therefore, the CCGMC is pursuing funding to install a new filtration system. The CCGMC is also pursuing funding to develop an AB3030 Groundwater Management Plan.

Colusa County Department of Environmental Health
Kevin Back
144 Market Street, Colusa, CA 95932
530-458-0396

Colusa County Department of Environmental Health

The CCDEH oversees the regulation of state small water systems[3] located in the county. CCDEH also issues permits for drinking water well construction and well destruction. CCDEH works with the Central Valley RWQCB and DHS to fulfill these roles.

CCDEH issues permits for the operation and removal of underground storage tanks. Underground storage tanks that have contributed to groundwater contamination are

[3] Regulation of state small water systems is limited to systems that serve between 5 and 15 connections. Regulation includes licensing systems for operation, including requirements for systems to conduct water quality sampling. Water is sampled for primary drinking water constituents, including microorganisms, disinfection byproducts, disinfectants, inorganic chemicals, organic chemicals and radionuclide contaminants as detailed in the Safe Drinking Water Act (EPA 2002).

under the jurisdiction of the Central Valley RWQCB (SWRCB 2003). CCDEH regulates the permitting of on-site sewage disposal systems (septic systems) that have less than 100 connections. Owners of systems with more connections coordinate with the Central Valley RWQCB to determine their waste treatment method (Back 2005).

Colusa County Resource Conservation District

The CCRCD's mission statement is to "assist local landowners to protect, conserve and restore natural resources through information, education and access to technical assistance programs. In doing so the CCRCD will always take measures to protect the individual landowner's rights and fully support 'from the ground up' conservation planning that promote local, social, and economic sustainability through wise land use" (Turner 2005).

Colusa County Resource Conservation District
100 Sunrise Boulevard Suite B,
Colusa, CA 95932
530-458-2931 ext 101

The CCRCD is currently conducting watershed assessments, soil surveys, and public outreach. The CCRCD is working on a watershed assessment of the Colusa Basin Watershed that is funded through a CALFED grant. The watershed assessment program may lead to a watershed management plan. The soil surveys are performed through a partnership with the United States Forest Service. The outreach programs include the CCRCD working with the NRCS. Another potential partner is the Colusa County Farm Bureau.

C.3 Glenn County Activities

Groundwater is the primary source for drinking water in Glenn County based on water purveyor information listed on the EPA website (USEPA 2005). Glenn County Department of Agriculture (GCDA), Glenn County Department of Environmental Health (GCDEH), Glenn County Resource Conservation District (GCRCD), and Glenn County Flood Control Department (GCFCD) regulate drinking water quality or participate in activities to improve drinking water quality. Drinking water purveyors are responsible for adhering to water quality regulations and county guidelines. Larger drinking water purveyors in Glenn County are Cal Water-Willows, Cal Water-Hamilton City, and the City of Orland Public Works. Glenn County has about 89 small water systems that deliver water. Glenn County has 89 small water systems that deliver water to smaller groups of users in the county.[4]

Glenn County Department of Agriculture

GCWAC vision statement is: "It is the desire of the people of Glenn County that sufficient and affordable water of good quality be available on a sustainable basis to meet the needs of agricultural, industrial, recreational, environmental, residential and municipal users within the county, both now and in the future" (GCDA 2004). The GCDA is involved in the management of a number of water related policies and programs, including Ordinance 1115, groundwater level monitoring, AB303-funded projects, and underground storage tank regulation. The GCDA provides implementation support for Ordinance 1115, which adopted the *Glenn County Groundwater Management Plan (GCGMP)*. The goal of the *GCGM*P is "to ensure the continued availability of groundwater and that extraction of groundwater does not exceed safe yield" (Messina 2005). The GCDA administers the Water Advisory Committee (GCWAC), which developed the GCGMP and oversees implementation. *GCGMP* objectives include:

Glenn County Department of Agriculture
www.glenncountywater.org
Lester Messina
720 North Colusa Street, Willows, CA 95988
(530) 934-6501

- Establish a monitoring program that addresses groundwater levels, groundwater quality, and land subsidence;
- Establish an effective policy concerning groundwater that will assure that the overall economy and environment of Glenn County is protected;
- Foster prudent groundwater management practices to avoid significant adverse environmental, social, and economic impacts; and
- Work cooperatively with interested local agencies to further develop and implement joint groundwater management practices (Messina 2005).

[4] The 89 small water systems include community water systems, non-transient non-community water systems (water systems that serve the same people, but not year round), and transient non-community water systems (water systems that do not consistently serve the same people) (EPA 2004).

GCDA has obtained four AB303 grants from DWR to perform the following projects:

- Install eight multiple-completion monitoring wells;
- Conduct two large scale aquifer performance tests;
- Support installation of Global Positioning Satellite (GPS)-based subsidence monitoring; and
- Analyze water supplies and needs, along with developing a comprehensive water distribution infrastructure map.

GCDA issues permits for the operation and removal of underground storage tanks. Groundwater contamination caused by leaking underground storage tanks falls under the jurisdiction of the Central Valley RWQCB (SWRCB 2003). Soil contamination from underground storage tanks is within GCDA jurisdiction.

Glenn County Department of Environmental Health

Glenn County Department of Environmental Health
http://www.countyofglenn.net/Environmental_Health/home_page.asp
Don Holm
257 North Villa Avenue, Willows, CA 95988
(530) 934-6102

The GCDEH mission statement is "to promote the mental and physical health of individuals, families, and communities in Glenn County through education prevention and intervention" (Holm 2005). The GCDEH issues permits for drinking water well construction, well destruction, and underground storage tanks. GCDEH also issues permits for small food establishments that serve less than 25 people a day for 60 days a year. These small commercial water systems are regulated under the California Uniform Retail Food Facility Law.

GCDEH issues permits for on-site sewage disposal systems for non-commercial systems (Holm 2005). GCDEH established a ½ acre minimum lot size limit for septic systems as the means to minimize impacts on ground and surface waters.

Glenn County Resource Conservation District

Glenn County Resource Conservation District
http://www.carcd.org/wisp/glenn/
132 North Enright Street #B, Willows, CA 95988
(530) 934-4601

The GCRCD mission statement is "to provide leadership, to help people conserver improve and sustain our natural resources, environment and the county's economic viability" (Horney 2005). The GCRCD encourages practices that reduce soil erosion and sustain agricultural production.

The GCRCD works with the watershed groups for the Colusa Basin Drainage and the Stony Creek Watershed. The Stony Creek study will include water quality and vegetation monitoring, and will utilize a technical advisory committee.

Glenn County Flood Control Department

Glenn County Flood Control Department
http://www.countyofglenn.net/Flood_Control/home_page.asp
Bob Johnson
777 N. Colusa Street, Willows, CA 95988
(530) 934-6501

The GCFCD's principle functions are: flood protection on major streams, water conservation, and storm drain maintenance. The GCFCD clears streams of accrued sediment and vegetation using hand crews and excavators. The GCFCD also removes debris from culverts and around bridges (Johnson 2005).

C.4 Tehama County Activities

Groundwater is the primary source for drinking water in Tehama County based on water purveyor information listed on the EPA website (USEPA 2005). Tehama County Flood Control and Water Conservation District (FCWCD), the Tehama County Department of Environmental Health (TCDEH), and the Tehama County Resource Conservation District (TCRCD) oversees drinking water quality protection or participate in activities to improve drinking water quality. Drinking water purveyors are responsible for adhering to water quality regulations and county guidelines. Drinking water purveyors that deliver water to over 500 connections include: the City of Red Bluff, the City of Corning, and Rio Alto Water District. There are an additional 149 small water systems delivering water to smaller groups of users.

Tehama County's primary groundwater quality concern relates to increased levels of fecal coliform[5] and nitrates[6] in the Antelope area. Farms and ranches in this area have been converted to residential development, including some areas of fairly dense development. Twelve public systems supply water to area residents, but these systems serve only a fraction of the area. The remaining residents have individual groundwater wells. No wastewater collection and treatment systems exist in this area; therefore, residents typically have septic systems for individual wastewater disposal (DWR 2003).

Tehama County Flood Control and Water Conservation District

The FCWCD is involved in the management of a number of water-related policies and programs including the AB3030 groundwater management plan, export ordinance 1617, a countywide water inventory study, a small water system study, stream and river levee maintenance, and participation in water quality-related forums.

Tehama County Flood Control and Water Conservation District
http://tehamacountypublicworks.ca.gov/Flood%20Control/
Ernie Ohlin
9380 San Benito Avenue, Gerber CA, 96035-9701
(530) 385-1462 ext 3014

The District Board of Directors formally directed the FCWCD to proceed with the preliminary development of a *Coordinated AB3030 Groundwater Management Plan (TCGMP)* on April 25, 1995. The *TCGMP* lists the following objectives:

- Prevent long-term overdraft of groundwater within the planning area;
- Balance long-term average annual replenishment with extraction and other losses to the basin as may be consistent with the public interest of the planning area population;
- Develop a comprehensive groundwater basin management program, which protects the groundwater resources of Tehama County in order to provide local users with a reliable long term water supply;

[5] Fecal coliform is one of several organisms found in the waste of warm-blooded animals, and is generally used as an indicator that constituents from wastewater may be present (DWR 2003).

[6] DWR sampled for nitrate because the human body turns nitrate into nitrite, which can prevent blood from carrying oxygen from the lungs to the rest of the body. This condition can be particularly dangerous to infants (DWR 2003).

- Implement the groundwater management plan through the development of countywide consensus wherever possible; and

- Develop a plan to protect basin groundwater quality (FCWCD 1996).

FCWCD coordinates and provides technical support for Tehama County Ordinance No. 1617. Ordinance 1617 "restricts the use of groundwater wells to prevent groundwater mining, extraction of groundwater for use off-parcel, and operating wells that influence other wells beyond the owner's parcel" (Tehama County 1994).

FCWCD performs oversight for the Deer Creek Water Exchange project, and maintains some of the waterways in Tehama County. FCWCD maintains rock revetment in 20 different sites along the Sacramento River (over 66,000 linear feet) and levees on portions of Deer Creek, Elder Creek, and Clear Creek (Ohlin 2004).

FCWCD developed the Tehama County *Water Inventory and Analysis*. The *Water Inventory and Analysis* includes information on Tehama County water use history, geology and hydrogeology, water management, land and water use, and water quality and environmental activities (FCWCD 2003). The *Water Inventory and Analysis* includes recommendations for future water-related activities for the FCWCD to pursue.

FCWCD prepared the *Small Water System Drought Vulnerability Assessment* to inventory small water systems in Tehama County and to evaluate the relative degree small water systems reliant on groundwater are at risk of supply shortages or impacts during droughts. By developing a better understanding of the potential drought impacts to individual small water systems, the FCWCD is better situated to manage water resources in Tehama County (FCWCD 2005).

FCWCD participates in water quality-related forums including Northern California Water Association (NCWA), along with coordinating issues with the Environmental Water Account, DWR, and conducting a public outreach and involvement program. FCWCD developed and maintains a department website to disseminate information.

Tehama County Department of Environmental Health

Tehama County Department of Environmental Health
Lee Mercer
633 Washington Street, Room 36, Red Bluff, CA 96080
(530) 587-8020

The TCDEH mission statement is "to protect public health and the environment" (Mercer 2004). The TCDEH oversees public water systems located in the county, as well as, issues permits for drinking water well construction and well destruction,

TCDEH issues permits for the operation and removal of underground storage tanks. Groundwater contamination caused by leaking underground storage tanks falls under the jurisdiction of the Central Valley RWQCB (SWRCB 2003). TCDEH issues permits for on-site sewage disposal systems (septic systems) that discharge less than 1,500 gallons per day. Owners of systems that discharge more than 1,500 gallons per day coordinate with the Central Valley RWQCB

to determine their waste treatment method (Mercer 2004). TCDEH also works with the Central Valley RWQCB to determine the minimum lot size for an on-site sewage disposal system.

Tehama County Resource Conservation District

Tehama County Resource Conservation District
http://www.tehamacountyrcd.org/
2 Sutter Street Suite D, Red Bluff, CA 96080
(530) 527-3013 x120

The TCRCD's mission is "to assist citizens with managing conserving and improving the natural resources of Tehama County." The TCRCD works to conserve the natural resources within Tehama County by promoting watershed management and health and conducting applied assistance. (McCubbins 2004)

To maintain and improve watershed management and health, the TCRCD has sought and received funding for two projects: the Tehama West Watershed Management Plan, and the Department of Conservation Watershed Coordinator Grant for work in Tehama West watersheds and eastern Tehama County watersheds that are without a watershed group. TCRCD works with other conservation groups in Tehama County including: Western Shasta RCD, Cottonwood Creek Watershed Group, Battle Creek Watershed Conservancy, Mill Creek Watershed Conservancy, Deer Creek Watershed Conservancy, and Sacramento River Trust.

Current and completed TCRCD activities include:

- Operate the irrigation mobile lab, which helps irrigators evaluate irrigation systems;
- Organize a citizens monitoring program in the Reeds Creek and Red Bank Creek watersheds;
- Hire a watershed coordinator for public education and outreach, invasive species control, and funding acquisition; and
- Conduct GIS mapping, workshops, local school outreach, and watershed restoration projects in the Reeds Creek and Red Bank Creek watersheds.

In partnership with NRCS, the TCRCD has:

- Written conservation plans for 3,356 acres;
- Provided technical assistance to over 300 county landowners; and
- Planted 88 acres of range and restored or enhanced 20 acres of wetlands (TCRCD 2004).

Appendix D

Public Drinking Water Systems Inventory

Water System Name	Population Served	System Type	Principal County Served	Primary Source of Water	Database Listed
CAL-WATER SERVICE CO.-CHICO	84840	Community Water System	BUTTE	Ground water	EPA and DHS
PARADISE IRRIGATION DISTRICT	26266	Community Water System	BUTTE	Surface water	EPA and DHS
SFWP-MINERS RANCH	21480	Community Water System	BUTTE	Surface water	EPA and DHS
DEL ORO WATER CO.-PARADISE PINES	11180	Community Water System	BUTTE	Ground water	EPA and DHS
BUTTE-GLENN COMMUNITY COLLEGE DIST	9900	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA and DHS
CAL-WATER SERVICE CO.-OROVILLE	9630	Community Water System	BUTTE	Ground water	EPA and DHS
THERMALITO I.D.	8700	Community Water System	BUTTE	Surface water	EPA and DHS
City of Live Oak	6229	unknown	BUTTE	unknown	DHS
CITY OF GRIDLEY	5800	Community Water System	BUTTE	Ground water	EPA and DHS
CHICO CHRISTIAN SCHOOL	2500	Transient Non-Community Water Systems	BUTTE	Ground water	EPA and DHS
CITY OF BIGGS	1794	Community Water System	BUTTE	Ground water	EPA and DHS
DURHAM UNIFIED SCHOOL DISTRICT	1400	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA and DHS
DURHAM IRRIGATION DISTRICT	1300	Community Water System	BUTTE	Ground water	EPA
MEADOWS MOBILE HOME PARK	848	Community Water System	BUTTE	Ground water	EPA
DEL ORO WATER CO.-LIME SADDLE	834	Community Water System	BUTTE	Purchased surface water	EPA and DHS
CROSSROADS RESTAURANT, THE	750	Transient Non-Community Water Systems	BUTTE	Ground water	EPA
DEL ORO WATER CO.-MAGALIA	743	Community Water System	BUTTE	Ground water	EPA and DHS
PLEASANT VALLEY BAPTIST CHURCH	500	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA
FARM LABOR HOUSING	500	Community Water System	BUTTE	Ground water	EPA and DHS
CHICO EASTSIDE LITTLE LEAGUE	500	Transient Non-Community Water Systems	BUTTE	Ground water	EPA
PACIFIC MOTEL	486	Transient Non-Community Water Systems	BUTTE	Ground water	EPA and DHS
DEL ORO WATER CO.-STIRLING BLUFFS	458	Community Water System	BUTTE	Surface water	EPA and DHS
BUTTE CRK EST MUTUAL WATER CO	399	Community Water System	BUTTE	Ground water	EPA and DHS
PLEASANT GROVE MHP	327	Community Water System	BUTTE	Ground water	EPA
BIDWELL GOLF COURSE	325	Transient Non-Community Water Systems	BUTTE	Ground water	EPA and DHS
LAKE MADRONE WATER DISTRICT	297	Community Water System	BUTTE	Ground water	EPA and DHS
CYPRESS ACRES	282	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA and DHS

Water System Name	Population Served	System Type	Principal County Served	Primary Source of Water	Database Listed
CHICO MOBILE COUNTRY CLUB	250	Community Water System	BUTTE	Ground water	EPA and DHS
ALMOND GROVE MOBILE PARK	250	Community Water System	BUTTE	Ground water	EPA and DHS
MOUNTAIN VIEW MOBILE ACRES	230	Community Water System	BUTTE	Ground water	EPA and DHS
MANZANITA SCHOOL	225	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA and DHS
THE OUTPOST	200	Transient Non-Community Water Systems	BUTTE	Ground water	EPA and DHS
SHADY REST-REST AREA E OF	200	Transient Non-Community Water Systems	BUTTE	Ground water	EPA
GRAN MUTUAL WATER CO	200	Community Water System	BUTTE	Ground water	EPA and DHS
SILVER DOLLAR FAIRGROUNDS	195	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA and DHS
SPRING VALLEY SCHOOL	185	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA and DHS
FOOTHILL MOBILE HOME PARK	180	Community Water System	BUTTE	Ground water	EPA and DHS
BERRY CREEK SCHOOL	180	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA and DHS
GREEN ACRES MUTUAL WATER CO	161	Community Water System	BUTTE	Ground water	EPA and DHS
YOUTH WITH A MISSION	150	Community Water System	BUTTE	Ground water	EPA
DEJA VU MINING CO	150	Transient Non-Community Water Systems	BUTTE	Ground water	EPA
CAMP OKIZU	150	Transient Non-Community Water Systems	BUTTE	Ground water	EPA
B. S. OF AMERICA - CAMP LASSEN	150	Transient Non-Community Water Systems	BUTTE	Ground water	EPA and DHS
FOREST RANCH SCHOOL	146	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA and DHS
SUNSET MOULDING, CHICO	130	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA
SMUCKERS QUALITY BEVERAGES	130	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA and DHS
RIVER REFLECTIONS RV &	125	Transient Non-Community Water Systems	BUTTE	Ground water	EPA and DHS
Nuestro School	120	unknown	BUTTE	unknown	DHS
CONCOW ELEMENTARY SCHOOL	115	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA and DHS
DEL ORO WATER CO.-LIME SADDLE MARINA	114	Community Water System	BUTTE	Surface water	EPA and DHS

Water System Name	Population Served	System Type	Principal County Served	Primary Source of Water	Database Listed
PSEA CAMP - DESABLA	108	Transient Non-Community Water Systems	BUTTE	Ground water	
MERRY MOUNTAIN MUTUAL	100	Community Water System	BUTTE	Ground water	EPA and DHS
LUNDBERG RICE PRODUCTS	100	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA and DHS
FEATHER RIVER REC & PARKS	100	Transient Non-Community Water Systems	BUTTE	Ground water	EPA
DESABLA - CAMP 1	100	Transient Non-Community Water Systems	BUTTE	Ground water	EPA and DHS
ANDERSON'S BUTTE CREEK MHP LLC	100	Community Water System	BUTTE	Ground water	EPA and DHS
BERRY CREEK COMMUNITY SER DIST	99	Community Water System	BUTTE	Ground water	EPA and DHS
KEEFER CREEK ESTATES MUTUAL	95	Community Water System	BUTTE	Ground water	EPA and DHS
FOREST RANCH MUTUAL WATER SYS	92	Community Water System	BUTTE	Ground water	EPA and DHS
LASSEN MOBILE HOME PARK	90	Community Water System	BUTTE	Ground water	EPA
HIDDEN VALLEY MOBILEHOME PARK	90	Community Water System	BUTTE	Ground water	EPA and DHS
GOLDEN OAKS MOBILE ESTATES	86	Community Water System	BUTTE	Ground water	EPA
SLY CREEK CAMPGROUND	85	Transient Non-Community Water Systems	BUTTE	Ground water	EPA and DHS
BIG BEND MOBILEHOME PARK	85	Community Water System	BUTTE	Ground water	EPA and DHS
DURHAM DAYTON INDUSTRIAL PARTN	80	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA and DHS
COHASSET SCHOOL	79	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA and DHS
BOB & NANCY RUSSELL	79	Community Water System	BUTTE	Ground water	EPA
SUNDOWN MOBILE HOME PARK	76	Community Water System	BUTTE	Ground water	EPA and DHS
STRAWBERRY CAMPROUND	75	Transient Non-Community Water Systems	BUTTE	Ground water	EPA and DHS
JESSYS DOOR	75	Transient Non-Community Water Systems	BUTTE	Ground water	EPA
PACIFIC HEIGHTS MHP	74	Community Water System	BUTTE	Ground water	EPA
PONDEROSA MOBILE ESTATES	70	Community Water System	BUTTE	Ground water	EPA
NORD ELEMENTARY SCHOOL	66	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA and DHS
RICHVALE ELEMENTARY SCHOOL	63	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA and DHS
SFWP-BANGOR	63	Community Water System	BUTTE	Surface water	EPA and DHS

Water System Name	Population Served	System Type	Principal County Served	Primary Source of Water	Database Listed
NORFIELD INDUSTRIES	62	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA
BUTTE FIRE CENTER	60	Community Water System	BUTTE	Ground water	EPA
QUAIL RIDGE	60	unknown	BUTTE	unknown	DHS
Encinal Elementary School	60	unknown	BUTTE	unknown	DHS
RAMSEY CONSTRUCTION, INC	51	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA and DHS
WILD GOOSE DUCK CLUB	50	Transient Non-Community Water Systems	BUTTE	Ground water	EPA and DHS
VISTA MUTUAL WATER SYSTEM	50	Community Water System	BUTTE	Ground water	EPA
MEADOWBROOK OAKS	50	Community Water System	BUTTE	Ground water	EPA and DHS
HUMBOLDT WOODLANDS MUTUAL	50	Community Water System	BUTTE	Ground water	EPA and DHS
HUMBOLDT HIGHLANDS MUTUAL	50	Community Water System	BUTTE	Ground water	EPA and DHS
FEATHER RIVER SCHOOL	50	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA and DHS
FEATHER FALLS SCHOOL	50	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA and DHS
FALLING ROCK R V PARK	50	Transient Non-Community Water Systems	BUTTE	Ground water	EPA and DHS
DURHAM PARK	50	Transient Non-Community Water Systems	BUTTE	Ground water	EPA and DHS
DINGERVILLE USA PARK	50	Community Water System	BUTTE	Ground water	EPA and DHS
CEDAR GROVE BIDWELL PARK	50	Transient Non-Community Water Systems	BUTTE	Ground water	EPA
BIDWELL PARK--- CAPER ACRES	50	Transient Non-Community Water Systems	BUTTE	Ground water	EPA and DHS
FAR VIEW RANCH CAMP	50	Transient Non-Community Water Systems	BUTTE	Surface water	EPA
Live Oak Child Care Center	50	unknown	BUTTE	unknown	DHS
FEATHER WEST TRAVEL TLR PARK	48	Transient Non-Community Water Systems	BUTTE	Ground water	EPA and DHS
COHASSET INDUSTRIAL PARK	47	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA and DHS
FOREST KNOLLS MUTUAL WATER CO	41	Community Water System	BUTTE	Ground water	EPA and DHS
PG&E - PHILBROOK CAMPGROUND	40	Transient Non-Community Water Systems	BUTTE	Ground water	EPA
MOUNTAIN VILLAGE HOMEOWNER'S	40	Community Water System	BUTTE	Ground water	EPA and DHS

Water System Name	Population Served	System Type	Principal County Served	Primary Source of Water	Database Listed
LLANO SECO RANCHO	40	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA and DHS
DOUG FRENCH PUB WORKS	40	Transient Non-Community Water Systems	BUTTE	Ground water	EPA
NICHOLS POINT MOBILE HOME PK	40	unknown	BUTTE	unknown	DHS
COVE ISLAND RESORT	40	unknown	BUTTE	unknown	DHS
HONCUT ELEMENTARY SCHOOL	36	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA and DHS
CONCOW CAMPGROUND	36	Transient Non-Community Water Systems	BUTTE	Ground water	EPA
KOPPERS CO INC	35	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA
EAGLE CREST ESTATES	35	Community Water System	BUTTE	Ground water	EPA
EASY LIVING MHP	34	Community Water System	BUTTE	Ground water	EPA
BRUSH CREEK RANGER STATION	34	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA and DHS
RANCHO VILLA MOBILE ACRES	32	Community Water System	BUTTE	Ground water	EPA
NORTHWOODS MUTUAL WATER SYSTEM	31	Community Water System	BUTTE	Ground water	EPA and DHS
THIARA LABOR CAMP	30	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA
MOUNTAIN HOUSE	30	Transient Non-Community Water Systems	BUTTE	Ground water	EPA
MOUNTAIN HOUSE	30	Transient Non-Community Water Systems	BUTTE	Ground water	EPA
G & J PROPERTIES	30	NonTransient Non Community Water Systems	BUTTE	Ground water	EPA
GENETIC RESOURCE CENTER	29	Transient Non-Community Water Systems	BUTTE	Ground water	EPA and DHS
MCGRATH'S FISHING & DIVING	26	Transient Non-Community Water Systems	BUTTE	Ground water	EPA and DHS
GRAY LODGE CHECK STATION	26	Transient Non-Community Water Systems	BUTTE	Ground water	EPA and DHS
SCOTTYS TRAILER PARK	25	Community Water System	BUTTE	Ground water	EPA and DHS
PALERMO MOBILE HOME PARK	25	Community Water System	BUTTE	Ground water	EPA
ONE MILE DAM REC AREA	25	Transient Non-Community Water Systems	BUTTE	Ground water	EPA and DHS
LAKE OROVILLE - CRAIG CAMP	25	Transient Non-Community Water Systems	BUTTE	Ground water	EPA

Water System Name	Population Served	System Type	Principal County Served	Primary Source of Water	Database Listed
HOOKER OAK REC AREA	25	Transient Non-Community Water Systems	BUTTE	Ground water	EPA
GLENN MCDEVITT	25	Transient Non-Community Water Systems	BUTTE	Ground water	EPA
FOREST RANCH MOBILE PARK	25	Community Water System	BUTTE	Ground water	EPA and DHS
FEATHER RIDGE ESTATES WATER CO	25	Community Water System	BUTTE	Ground water	EPA and DHS
DWR-MONUMENT HILL RESTROOMS	25	Transient Non-Community Water Systems	BUTTE	Ground water	EPA and DHS
CSP CALIFORNIA STATE PARKS	25	Transient Non-Community Water Systems	BUTTE	Ground water	EPA
CHICO ROD & GUN CLUB	25	Transient Non-Community Water Systems	BUTTE	Ground water	EPA and DHS
CHERRY HILL CAMPGROUND	25	Transient Non-Community Water Systems	BUTTE	Ground water	EPA
BUZZTAIL MUTUAL WATER COMPANY	25	Community Water System	BUTTE	Ground water	EPA and DHS
JAMES SIDING - WESTERN PACIFIC	25	Community Water System	BUTTE	Surface water	EPA
Pasquini's (Micheli) WS	25	unknown	BUTTE	unknown	DHS
California Prune Packing Co.	25	unknown	BUTTE	unknown	DHS
BAMBI INN	22	Transient Non-Community Water Systems	BUTTE	Ground water	EPA and DHS
ROBINSON'S CORNER MHP	20	Community Water System	BUTTE	Ground water	EPA
COHASSET MOBILE ESTATES	20	Community Water System	BUTTE	Ground water	EPA and DHS
BIGGERS GLEN MUTUAL WATER COMP	10	Community Water System	BUTTE	Ground water	EPA and DHS
BUTTE MEADOWS CAMP		Transient Non-Community Water Systems	BUTTE	Ground water	EPA and DHS
CITY OF COLUSA	5492	Community Water System	COLUSA	Ground water	EPA and DHS
CITY OF WILLIAMS	4300	Community Water System	COLUSA	Ground water	EPA and DHS
ARBUCKLE PUBLIC UTILITY DISTRICT	1800	Community Water System	COLUSA	Ground water	EPA and DHS
MAXWELL PUBLIC UTILITY DISTRICT	850	Community Water System	COLUSA	Ground water	EPA and DHS
PRINCETON WATER DISTRICT	356	Community Water System	COLUSA	Ground water	EPA and DHS
COLUSA CO. W.D. #1 - GRIMES	350	Community Water System	COLUSA	Ground water	EPA and DHS
COLUSA INDUSTRIAL PROPERTIES	250	NonTransient Non Community Water Systems	COLUSA	Ground water	EPA and DHS
WALNUT RANCH WATER COMPANY	231	Community Water System	COLUSA	Ground water	EPA
COLUSA CO. SERVICE AREA #2-STONYFORD	200	Community Water System	COLUSA	Ground water	EPA and DHS

Water System Name	Population Served	System Type	Principal County Served	Primary Source of Water	Database Listed
COLUSA MOBILE TRAILER PARK	140	Community Water System	COLUSA	Ground water	EPA
CRUISE N TARRY	135	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
COLUSA CO. SERVICE AREA #1-CENTURY RANCH	120	Community Water System	COLUSA	Ground water	EPA and DHS
FOUTS SPRINGS YOUTH FACILITY	120	NonTransient Non Community Water Systems	COLUSA	Surface water	EPA and DHS
SUN VALLEY RICE COMPANY	90	NonTransient Non Community Water Systems	COLUSA	Ground water	EPA
ARBUCKLE RICHMOND HUNTING CLUB	53	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
WADHAM ENERGY	50	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
TERHEL FARMS TRAILER PARK #2	50	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
LA ESCONDIDA	50	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
COPA CABANA	50	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
BRADLEY'S WATER SUPPLY	50	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
AMERICAN RICE, INC.	50	NonTransient Non Community Water Systems	COLUSA	Ground water	EPA
BUTTE LODGE DUCK CLUB	41	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
NORTHERN CALIFORNIA DUCK CLUB	40	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
LODOGA INN	40	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
MORNING STAR PKG. CO.-WMS.	39	NonTransient Non Community Water Systems	COLUSA	Ground water	EPA and DHS
COLUSA COUNTY CANNING CO.	31	NonTransient Non Community Water Systems	COLUSA	Ground water	EPA
SK Foods-Colusa Canning	31	unknown	COLUSA	unknown	DHS
PORTER INDEPENDENT ENTERPRISES	30	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
GOLD RIVER MILLS	30	NonTransient Non Community Water Systems	COLUSA	Ground water	EPA
CINTI & SCHRAMM DUCK CLUB	30	Transient Non-Community Water Systems	COLUSA	Ground water	EPA

Water System Name	Population Served	System Type	Principal County Served	Primary Source of Water	Database Listed
WILDERNESS UNLIMITED	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
WILBUR HOT SPRINGS	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA and DHS
WHITE MALLARD DUCK CLUB	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
WARD'S BOAT LANDING	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA and DHS
VILLA ALMENDRA	25	NonTransient Non Community Water Systems	COLUSA	Ground water	EPA
VANN BROTHERS LABOR CAMP	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
TERNEL FARMS INC	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
TERHEL FARMS TRAILER PARK 01	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA and DHS
SQUAW CREEK WATER SYSTEM	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA and DHS
RON BARNES	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
RIVER VISTA FARMS	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA and DHS
NORTHERN TRUCK INC	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
MIRAMONTES CAMP	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
MENF-LETTS LAKE CG	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA and DHS
MENF-FOUTS SPRINGS CG	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA and DHS
MAYBERRY WATER SYSTEM	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA and DHS
LAMBERTVILLE	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
KINGDOM HALL OF JEHOVAH'S WITNESS-WMS	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
HALSEY WATER SUPPLY	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
GRIMES BOAT AND LANDING	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA and DHS

Water System Name	Population Served	System Type	Principal County Served	Primary Source of Water	Database Listed
FOUR CORNERS STATION	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
COLUSA TRACTOR COMPANY	25	NonTransient Non Community Water Systems	COLUSA	Ground water	EPA and DHS
COLUSA AIRPORT	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
CLARKVILLE	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
CALTRANS-MAXWELL RESTSTOPS	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA and DHS
BUTTE VIEW RAQUET CLUB	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA and DHS
BERT'S STEELHEAD MARINA	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA and DHS
ARBUCKLE GOLF CLUB	25	Transient Non-Community Water Systems	COLUSA	Ground water	EPA and DHS
ZUMALT I G REESE ORCHARD	15	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
I G ZUMWALT	15	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
KALFSBEEK LABOR CAMP	10	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
SUNDOWN DRIVE-IN THEATER	1	Transient Non-Community Water Systems	COLUSA	Ground water	EPA
CAL-WATER SERVICE CO.-WILLOWS	6660	Community Water System	GLENN	Ground water	EPA
CITY OF ORLAND	6281	Community Water System	GLENN	Ground water	EPA and DHS
CAL-WATER SERVICE CO.-HAMILTON CITY	1603	Community Water System	GLENN	Ground water	EPA
WILLOWS HIGH SCHOOL	500	Transient Non-Community Water Systems	GLENN	Ground water	EPA
ELK CREEK COMMUNITY S.D.	300	Community Water System	GLENN	Surface water	EPA and DHS
BLACK BUTTE WATER CO.	249	Community Water System	GLENN	Ground water	EPA and DHS
Z & M TRUCKSTOPS	225	Transient Non-Community Water Systems	GLENN	Ground water	EPA
JOHNS MANVILLE	200	Transient Non-Community Water Systems	GLENN	Ground water	EPA and DHS
GOLDEN PHEASANT INN	200	Transient Non-Community Water Systems	GLENN	Ground water	EPA and DHS
CAPAY JOINT UNION ELEM. SCHOOL	172	Transient Non-Community Water Systems	GLENN	Ground water	EPA and DHS

Water System Name	Population Served	System Type	Principal County Served	Primary Source of Water	Database Listed
WILLOW GLENN MOBILE H.P.	150	Community Water System	GLENN	Ground water	EPA
PLAZA ELEMENTARY SCHOOL	150	Transient Non-Community Water Systems	GLENN	Ground water	EPA and DHS
ORLAND ESTATES MOBILE H.P.	150	Community Water System	GLENN	Ground water	EPA
LAKE ELEMENTARY SCHOOL	150	Transient Non-Community Water Systems	GLENN	Ground water	EPA and DHS
VALLEY VIEW C.C	130	Transient Non-Community Water Systems	GLENN	Ground water	EPA and DHS
T&J MOBILEHOME PARK	100	Community Water System	GLENN	Ground water	EPA and DHS
MILL VALLEY CG - MENDOCINO NF	100	Transient Non-Community Water Systems	GLENN	Ground water	EPA
MENDOCINO NATL FOREST	100	Transient Non-Community Water Systems	GLENN	Ground water	EPA
BEACON ORLAND TRUCK STOP	100	Transient Non-Community Water Systems	GLENN	Ground water	EPA
ARTOIS COMMUNITY S.D.	100	Community Water System	GLENN	Ground water	EPA and DHS
ORLAND MOBILE H.P.	95	Community Water System	GLENN	Ground water	EPA
BLACK BUTTE MOBILE H.P.	94	Community Water System	GLENN	Ground water	EPA and DHS
USFS STONYFORD 08-53-1803	82	Community Water System	GLENN	Ground water	EPA
SITE STORE	65	Transient Non-Community Water Systems	GLENN	Ground water	EPA
J & L MARKET	65	Transient Non-Community Water Systems	GLENN	Ground water	EPA
RIVER VALLEY CHRISTIAN SCHOOL	60	Transient Non-Community Water Systems	GLENN	Ground water	EPA
EDDIE'S PLACE	60	Transient Non-Community Water Systems	GLENN	Ground water	EPA
River Valley Christian School	60	unknown	GLENN	unknown	DHS
SHADY OAKS TRAILER PARK	45	Community Water System	GLENN	Ground water	EPA
BAIRD TRAILER PARK	45	Transient Non-Community Water Systems	GLENN	Ground water	EPA
BUTTE CITY COMMUNITY S.D.	44	Community Water System	GLENN	Ground water	EPA and DHS
COUNTRY LEISURE MOBILE ESTATES	40	Community Water System	GLENN	Ground water	EPA

Water System Name	Population Served	System Type	Principal County Served	Primary Source of Water	Database Listed
PLASKETT MEADOWS, MENDOCINO NF	35	Transient Non-Community Water Systems	GLENN	Ground water	EPA
STONYFORD TRAILER PARK	30	Transient Non-Community Water Systems	GLENN	Ground water	EPA
HAIGH FIELD INDUSTRIAL PARK	30	Transient Non-Community Water Systems	GLENN	Ground water	EPA and DHS
WILLIAM CHARTER LABOR CAMP	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
WHITE MALLARD DUCK CLUB 2	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
VOYLES TRAILER PARK	25	Community Water System	GLENN	Ground water	EPA
USFS MENDOCINO NF	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
USFS MENDOCINO NF	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
USFS MENDOCINO NF	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
USFS MENDOCINO NF	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
USFS MENDOCINO NF	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
USFS MENDOCINO NF	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
USFS MENDOCINO NF	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
USFS MENDOCINO NF	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
USFS MENDOCINO NF	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
USFS MENDOCINO NF	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
USFS MENDOCINO NF	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
USFS MENDOCINO NF	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
USFS MENDOCINO NF	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
USFS MENDOCINO NF	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA

Water System Name	Population Served	System Type	Principal County Served	Primary Source of Water	Database Listed
USFS MENDOCINO NF	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
UNCLE CHONG'S CHINESE RESTAURANT	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
U S BUREAU OF RECLAMATION	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
THUNDERHILL SCCA-SFR	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA and DHS
SOUTH WILLOWS INDUSTRIAL PARK	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA and DHS
SACRAMENTO NAT. WILDLIFE REFUGE	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA and DHS
RIVER GLENN	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA and DHS
PAT'S GROCERY CORRAL	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
ORLAND LIVESTOCK COMM. YARD, INC.	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA and DHS
OLD ORCHARD R.V. PARK	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA and DHS
NORTH VALLEY HIGH SCHOOL	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
MAYFAIR RANCHES	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
LANGE WATER SUPPLY	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
KOEHNEN AND SONS	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
IRVINE FINCH RIVER ACCESS	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA and DHS
GYE UNIVERSITY	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
GROVE MOTEL	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
GRIFFIN LABOR CAMP	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
GREEN ACRES RV PARK	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
GOLDEN PHEASANT INN	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA

Water System Name	Population Served	System Type	Principal County Served	Primary Source of Water	Database Listed
GLENN GOLF & COUNTRY CLUB	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA and DHS
GARDNER'S FROSTY	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
CALTRANS-WILLOWS RESTSTOP-SB	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA and DHS
CALTRANS-WILLOWS RESTSTOP-NB	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA and DHS
BOBBS WATER SUPPLY	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
BLACK BUTTE LAKE, ORLAND BUTTE RA, USCOE	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA and DHS
BAYLISS STORE	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA
AFTON STORE	25	Transient Non-Community Water Systems	GLENN	Ground water	EPA and DHS
USFS MENDOCINO NF	25	Transient Non-Community Water Systems	GLENN	Surface water	EPA
Willow Creek M.W.C.-Lambertville	25	unknown	GLENN	unknown	DHS
Willow Creek M.W.C.-Clarkville	25	unknown	GLENN	unknown	DHS
Black Butte Lake, Headquarters, USCOE	25	unknown	GLENN	unknown	DHS
Black Butte Lake, Buckhorn RA, USCOE	25	unknown	GLENN	unknown	DHS
Black Butte Lake, Buckhorn Group, USCOE	25	unknown	GLENN	unknown	DHS
ARCH MOTEL	14	Transient Non-Community Water Systems	GLENN	Ground water	EPA
ALDER SPRINGS CAMP, MENDOCINO NF	4	Transient Non-Community Water Systems	GLENN	Ground water	EPA
CAPAY GROCERY & HARDWARE	3	Transient Non-Community Water Systems	GLENN	Ground water	EPA
WILLOWS AIRPORT	1	Transient Non-Community Water Systems	GLENN	Ground water	EPA
TEHAMA-COLUSA CANAL AUTHORITY	0	Transient Non-Community Water Systems	GLENN	Ground water	EPA
ORD BEND PARK	0	Transient Non-Community Water Systems	GLENN	Ground water	EPA
KELLER CABIN GROUP CAMP, MENDOCINO NF	0	Transient Non-Community Water Systems	GLENN	Ground water	EPA
HAMILTON UNION HIGH SCHOOL	0	Transient Non-Community Water Systems	GLENN	Ground water	EPA
COUNTRY CLUB COURTS	0	Community Water System	GLENN	Ground water	EPA

Water System Name	Population Served	System Type	Principal County Served	Primary Source of Water	Database Listed
SPORTSMAN MOTEL	varies	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
BAR 99	varies	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
WOODSON BRIDGE MART & DELI	unk	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
THE OAR HOUSE B & B	unk	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
RIO RANCH CSD	unk	Community Water System	TEHAMA	Ground water	Tehama Co SWS
MANTON TRAILER PARK	unk	Community Water System	TEHAMA	Ground water	Tehama Co SWS
BARRETT APARTMENTS	unk	Community Water System	TEHAMA	Ground water	Tehama Co SWS
WILLOW TRAILER PARK	?	Community Water System	TEHAMA	Ground water	Tehama Co SWS
WESTATES CARBON-ARIZONA INC	?	Non-Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
WALMART DISTRIBUTION CENTER	?	Non-Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
PONDEROSA AREA PROPERTY OWNERS	?	Community Water System	TEHAMA	Ground water	Tehama Co SWS
PANORAMA TRAILER PARK	?	Community Water System	TEHAMA	Ground water	Tehama Co SWS
OLIVE TREE MOTEL	?	Community Water System	TEHAMA	Ground water	Tehama Co SWS
LAZY ACRES WATER SYSTEM	?	Community Water System	TEHAMA	Ground water	Tehama Co SWS
KAER AVE APARTMENTS	?	Community Water System	TEHAMA	Ground water	Tehama Co SWS
HUNTER'S FISHING RESORT	?	Community Water System	TEHAMA	Ground water	Tehama Co SWS
HI & DRY MHP	?	Community Water System	TEHAMA	Ground water	Tehama Co SWS
GURNSEY AVE MUTUAL WATER CO	?	Community Water System	TEHAMA	Ground water	Tehama Co SWS
GOLDEN ACRES TRAILER PARK	?	Community Water System	TEHAMA	Ground water	Tehama Co SWS
GLENNA LANE WATER SYSTEM	?	Community Water System	TEHAMA	Ground water	Tehama Co SWS
FORTUNE HOUSING WATER SYSTEM	?	Community Water System	TEHAMA	Ground water	Tehama Co SWS
ELECTRIC AVE PROPERTIES	?	Community Water System	TEHAMA	Ground water	Tehama Co SWS
CRAIG CREEK LANE	?	Community Water System	TEHAMA	Ground water	Tehama Co SWS
COUNTRY LANE MOBILE ESTATES	?	Community Water System	TEHAMA	Ground water	Tehama Co SWS
BUCHER APARTMENTS	?	Community Water System	TEHAMA	Ground water	Tehama Co SWS
B & W RIVERVIEW ESTATES	?	Community Water System	TEHAMA	Ground water	Tehama Co SWS
CITY OF RED BLUFF	13277	Community Water System	TEHAMA	Ground water	EPA
CITY OF CORNING	6814	Community Water System	TEHAMA	Ground water	EPA and DHS

Water System Name	Population Served	System Type	Principal County Served	Primary Source of Water	Database Listed
Caltrans-Red Bluff Rest-SB	3410	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
Caltrans-Red Bluff Rest-NB	2450	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
Caltrans-Corning Rest-NB & SB	2420	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
Rio Alto Water District	1620	Community Water System	TEHAMA	Ground water	Tehama Co SWS
Los Molinos Comm. Services Dist. #2 north center	1250	Community Water System	TEHAMA	Ground water	Tehama Co SWS
Gerber Las Flores CSD #5	1200	Community Water System	TEHAMA	Ground water	Tehama Co SWS
Lassen VNP - Manzanita Lake	1175	Transient Non-community water system	TEHAMA	Surface water	Tehama Co SWS
EVERGREEN UNION SCH DIST	1000	Non-Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
GERBER UNION ELEM SCHOOL DIST	625	Non-Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
R -WILD HORSE RANCH	500	Community Water System	TEHAMA	Ground water	Tehama Co SWS
SIERRA PACIFIC INDUSTRIES-RB	450	Non-Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
LASSEN VIEW SCHOOL	350	Non-Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
SIERRA PACIFIC WINDOWS	330	Non-Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
SIERRA PACIFIC IND-RICHFIELD	330	Non-Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
BERRENDOS SCHOOL	325	Non-Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
VISTA GRANDE WATER SYSTEM	320	Community Water System	TEHAMA	Ground water	Tehama Co SWS
Lassen VNP - Butte Lake	306	Transient Non-community water system	TEHAMA	Surface water	Tehama Co SWS
Mineral County Water District	300	Community Water System	TEHAMA	Surface water	Tehama Co SWS
RIO VISTA MOBILE ESTATES	250	Community Water System	TEHAMA	Ground water	Tehama Co SWS
PACTIV CORPORATION	250	Non-Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
SNUG HARBOR MHP	225	Community Water System	TEHAMA	Ground water	Tehama Co SWS
RICHFIELD SCHOOL	220	Non-Transient Non-community water system	TEHAMA	Ground water	DHS and TCSWS
LAKE CALIFORNIA POA R.V. PARK	200	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS

Water System Name	Population Served	System Type	Principal County Served	Primary Source of Water	Database Listed
REEDS CREEK SCHOOL	160	Non-Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
TEHAMA CO.-WALNUT ST. COMPLEX	150	Non-Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
LAS FLORES WATER WORKS	150	Community Water System	TEHAMA	Ground water	Tehama Co SWS
FRIENDLY ACRES MHP	150	Community Water System	TEHAMA	Ground water	Tehama Co SWS
HOWELL'S LAKESIDE WATER CO.	147	Community Water System	TEHAMA	Ground water	Tehama Co SWS
MAYWOOD MHP	135	Community Water System	TEHAMA	Ground water	DHS and TCSWS
SURREY VILLAGE WATER CO., INC.	130	Community Water System	TEHAMA	Ground water	Tehama Co SWS
LARKSPUR MEADOWS WATER CO.	130	Community Water System	TEHAMA	Ground water	Tehama Co SWS
Ishi Conservation Camp	130	Non-Transient Non-community water system	TEHAMA	Surface water	Tehama Co SWS
MINERAL HOMEOWNER'S ASSN	125	Community Water System	TEHAMA	Ground water	Tehama Co SWS
WOODSON BRIDGE ESTATES	120	Community Water System	TEHAMA	Ground water	Tehama Co SWS
SKY RANCH WATER SYSTEM	120	Community Water System	TEHAMA	Ground water	Tehama Co SWS
Salt Creek Conservation Camp	120	Non-Transient Non-community water system	TEHAMA	Surface water	Tehama Co SWS
PASKENTA COMM. SERVICES DIST.	120	Community Water System	TEHAMA	Surface water	Tehama Co SWS
MIRA MONTE WATER CO.	100	Community Water System	TEHAMA	Ground water	Tehama Co SWS
COMMUNITY CHRISTIAN SCHOOL	90	Non-Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
BREESE SUBDIVISION 2	90	Community Water System	TEHAMA	Ground water	Tehama Co SWS
ANTELOPE CREEK MHP	90	Community Water System	TEHAMA	Ground water	Tehama Co SWS
VINA ELEMENTARY SCHOOL	85	Non-Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
LAZY CORRAL MHP	84	Community Water System	TEHAMA	Ground water	Tehama Co SWS
RANCHO TEHAMA ELEM. SCHOOL	82	Non-Transient Non-community water system	TEHAMA	Ground water	DHS and TCSWS
WILSON ACRES MUTUAL WATER	80	Community Water System	TEHAMA	Ground water	Tehama Co SWS
BOW RIVER MHP	80	Community Water System	TEHAMA	Ground water	Tehama Co SWS
BEND ELEMENTARY SCHOOL	80	Non-Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
PLUM VALLEY SCHOOL	70	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
GATEWAY MHP	65	Community Water System	TEHAMA	Ground water	Tehama Co SWS

Water System Name	Population Served	System Type	Principal County Served	Primary Source of Water	Database Listed
LASSEN VIEW WATER DISTRICT	60	Community Water System	TEHAMA	Ground water	Tehama Co SWS
JEHOVAH'S WITNESSES - CORNING	60	Transient Non-community water system	TEHAMA	Ground water	DHS and TCSWS
CORNING RV PARK	60	Transient Non-community water system	TEHAMA	Ground water	DHS and TCSWS
BEND MOBILEHOME & RV PARK	60	Community Water System	TEHAMA	Ground water	Tehama Co SWS
ABBEY OF NEW CLAIRVAUX W. S.	60	Community Water System	TEHAMA	Ground water	Tehama Co SWS
ORCHARD MHP	56	Community Water System	TEHAMA	Ground water	Tehama Co SWS
MILLSTREAM MHP	53	Community Water System	TEHAMA	Ground water	Tehama Co SWS
WOMACK SUBDIVISION M.W.C.	51	Community Water System	TEHAMA	Ground water	Tehama Co SWS
MODERN VILLAGE MWC	50	Community Water System	TEHAMA	Ground water	Tehama Co SWS
MANTON SCHOOL	50	Non-Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
LOUISIANA-PACIFIC CORPORATION	50	Non-Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
KOUNTRY KORNERS MHP	50	Community Water System	TEHAMA	Ground water	DHS and TCSWS
ANTELOPE-HOMEWOOD MHP #1	44	Community Water System	TEHAMA	Ground water	Tehama Co SWS
SADDLEBACK MUTUAL WATER CO.	40	Community Water System	TEHAMA	Ground water	Tehama Co SWS
RANCHO COLORADO WS	36	Community Water System	TEHAMA	Ground water	Tehama Co SWS
FLOURNOY SCHOOL	36	Non-Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
KIRKWOOD SCHOOL	35	Non-Transient Non-community water system	TEHAMA	Ground water	DHS and TCSWS
Lassen VNP - Headquarters	35	Community Water System	TEHAMA	Surface water	Tehama Co SWS
Caltrans-Cottonwood Truck Insp. Fac.	34	Non-Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
RIVER INN MHP	33	Community Water System	TEHAMA	Ground water	Tehama Co SWS
JUANITA COURT MUTUAL WATER	30	Community Water System	TEHAMA	Ground water	Tehama Co SWS
LITTLE AVENUE WATER SYSTEM	27	Community Water System	TEHAMA	Ground water	Tehama Co SWS
Woodson Bridge S.R.A.	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
WOODSON BRIDGE R.V. PARK	25	Transient Non-community water system	TEHAMA	Ground water	DHS and TCSWS
Wm. B. Ide Adobe	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS

Water System Name	Population Served	System Type	Principal County Served	Primary Source of Water	Database Listed
WILCOX OAKS GOLF CLUB	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
TEHAMA CO.-RIVER PARK	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
TEHAMA CO.-RIDGEWAY PARK	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
TEHAMA CO.-MILL CREEK PARK	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
TEHAMA CO.-CONE GROVE PARK	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
SAINT BERNARD LODGE	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
RED BLUFF STATE PRESCHOOL	25	Non-Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
Red Bluff Fish & Wildlife Office	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
OAK CREEK GOLF COURSE	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
NORCAL NURSERY	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
MOUNTAIN VALLEY APTS & RVP	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
MOOSE LODGE #2002	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
MILL CREEK SUMMER HOMES	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
MEYER MOTELS DIAMOND PROPERTY	25	Non-Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
MENF-LAKE RED BLUFF RA	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
Lassen VNP - Drakesbad	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
HIDDEN HARBOR MARINA & RVP	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
GOLDEN MEADOWS CSD	25	Community Water System	TEHAMA	Ground water	Tehama Co SWS
FOREST INN, THE	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
FIRE MOUNTAIN LODGE	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
DEER CREEK LODGE	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS

Water System Name	Population Served	System Type	Principal County Served	Primary Source of Water	Database Listed
CROSS PETROLEUM	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
CHILD'S MEADOWS RESORT	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
BOWMAN CENTER	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
BOONEDOCK HOMESTEADERS, INC.	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
Black Butte Lake, Headquarters, USCOE	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
Black Butte Lake, Buckhorn RA, USCOE	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
Black Butte Lake, Buckhorn Group, USCOE	25	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
BARTELS' GIANT BURGER	25	Transient Non-community water system	TEHAMA	Ground water	DHS and TCSWS
Lassen VNP - Summit Lake	25	Transient Non-community water system	TEHAMA	Surface water	Tehama Co SWS
Lassen VNP - Lost Creek	25	Transient Non-community water system	TEHAMA	Surface water	Tehama Co SWS
Lassen VNP - Chalet	25	Transient Non-community water system	TEHAMA	Surface water	Tehama Co SWS
DIBBLE CREEK STORE	10	Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
RANCHO TEHAMA ASSN REC HALL	0	Transient Non-community water system	TEHAMA	Ground water	DHS and TCSWS
VINA MKT & DELI		Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
THE DINER		Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
TEAHAMA CO.-CAMP TEHAMA		Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
REEDS CREEK ESTATES		Community Water System	TEHAMA	Ground water	Tehama Co SWS
RED BANK ALE & QUAIL		Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
PAYNES CREEK STORE		Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
NORTH VALLEY SERVICES		Non-Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
MANTON COMMUNITY MKT		Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS

Water System Name	Population Served	System Type	Principal County Served	Primary Source of Water	Database Listed
LASSEN STEAK HOUSE		Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
LA FORTUNA MARKET		Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
JILL'S FRESH STOP MKT & DELI		Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS
CROSSLANDS COUNTRY STORE		Transient Non-community water system	TEHAMA	Ground water	Tehama Co SWS

Appendix E

Cumulative Frequency Curves

A useful tool for determining the average depth of extraction of groundwater is the cumulative frequency graph. Cumulative frequency graphs show the total number of wells associated with 25-foot depth intervals for each county, and also show the percentage of wells that are shallower than a certain depth. For example the cumulative frequency graph in Figure E-1 shows 80 percent of the public system wells in Glenn County are less than 475 feet deep.

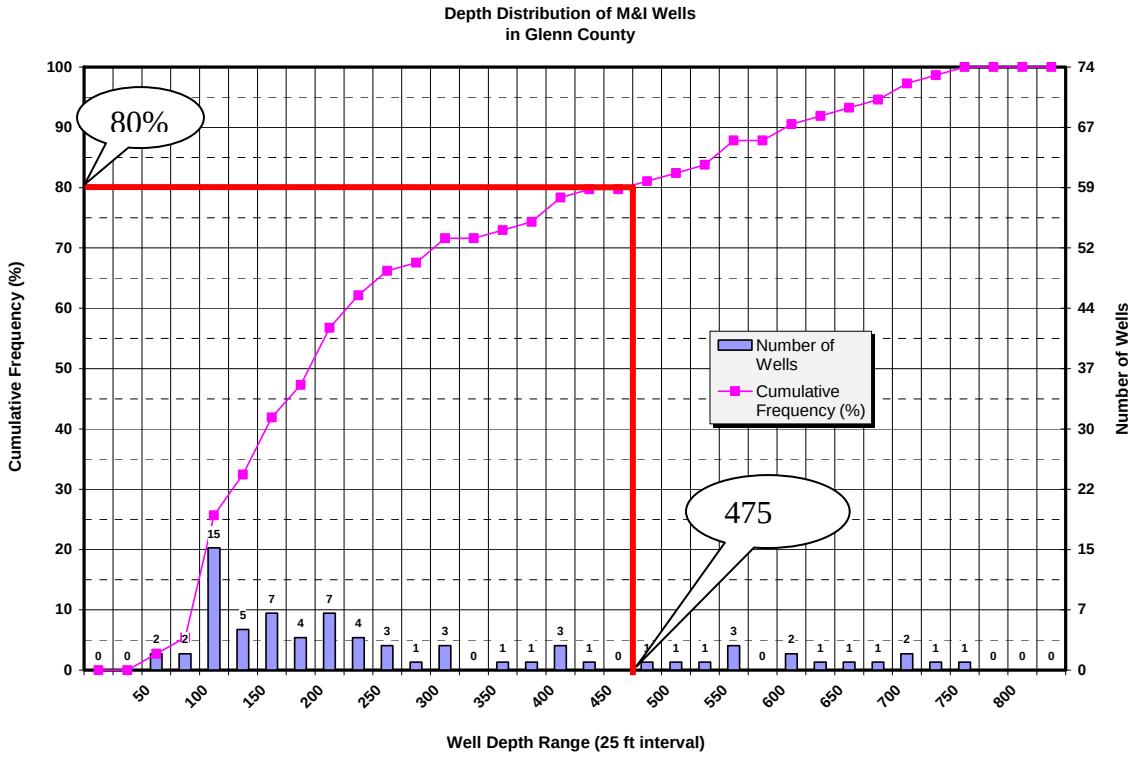

Figure E-1
Cumulative Frequency Curve for Glenn County Public System Wells

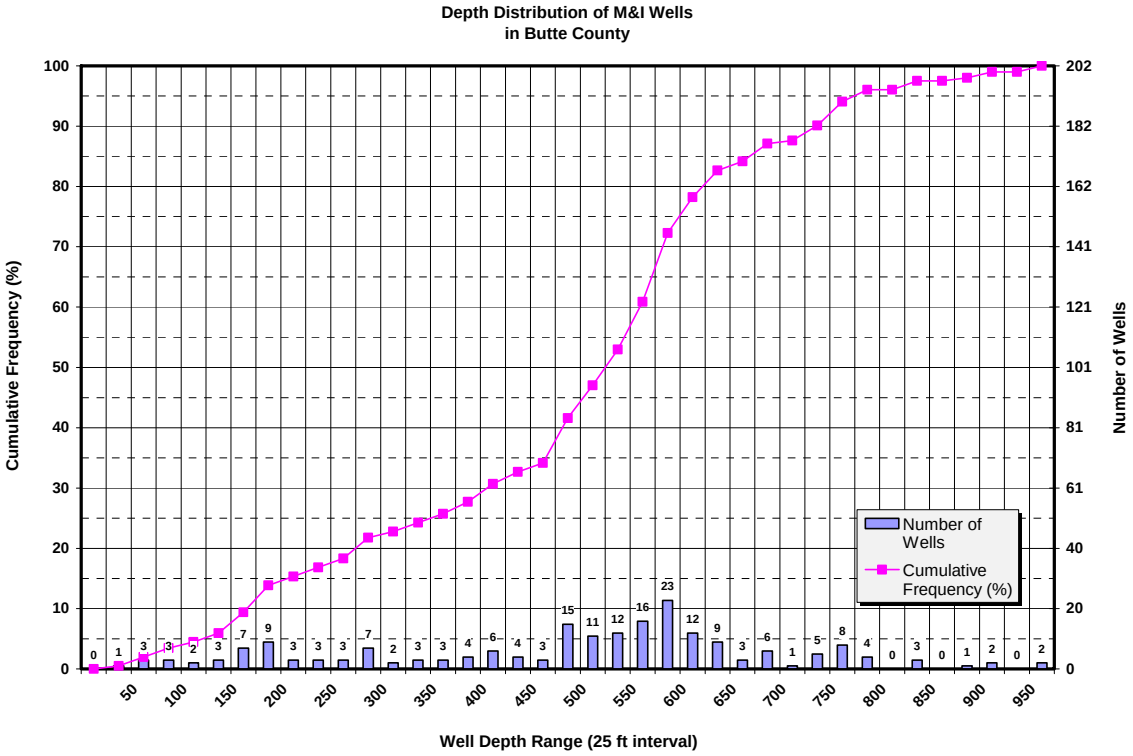

Figure E-2
Cumulative Frequency Curve for Butte County Public System Wells

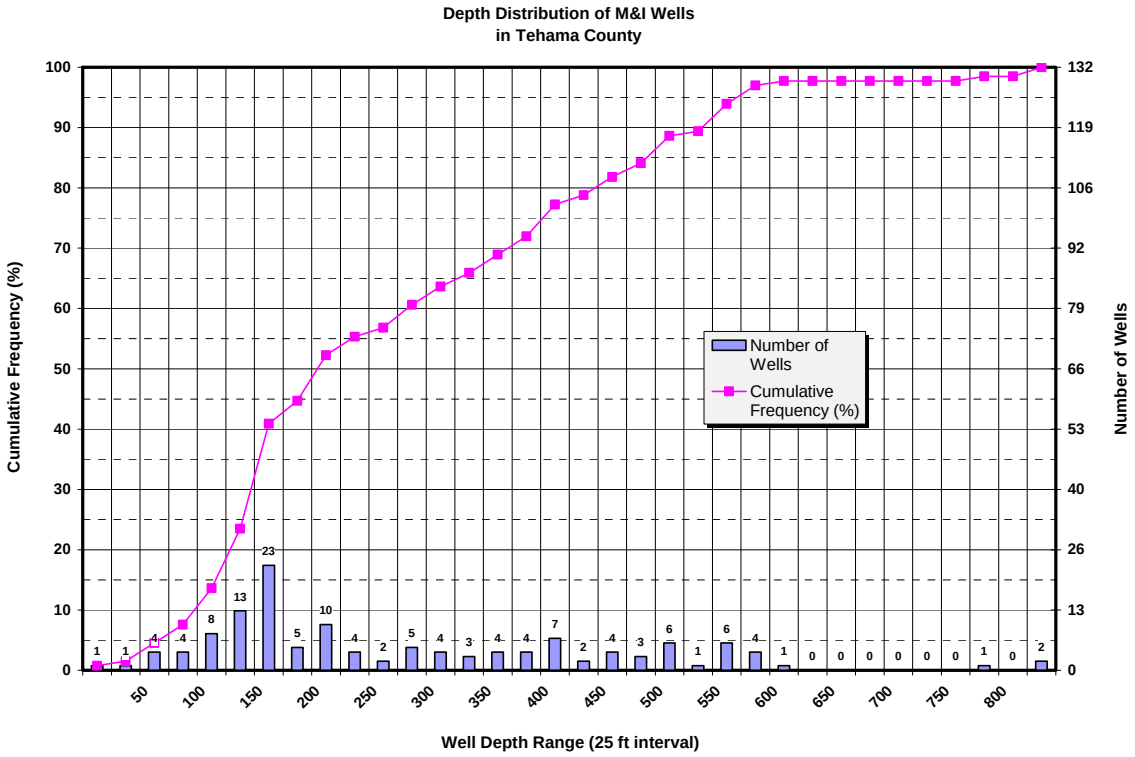

Figure E-3
Cumulative Frequency Curve for Tehama County Public System Wells

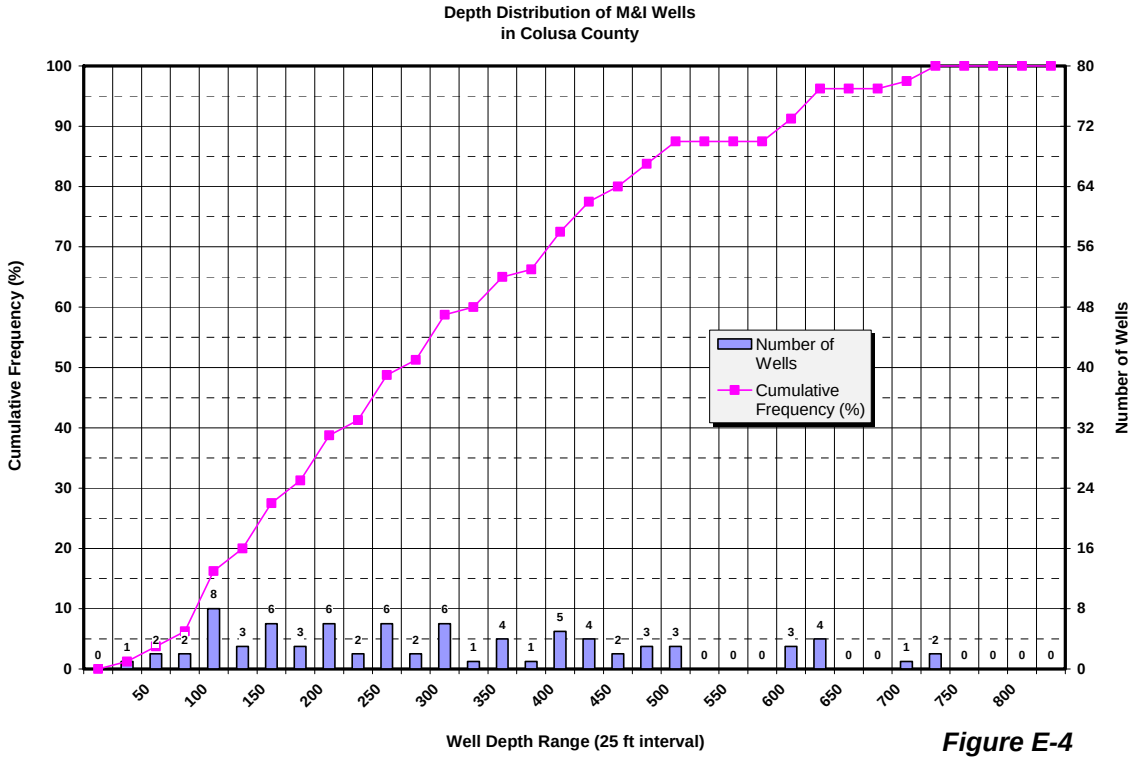

Figure E-4

Cumulative Frequency Curve for Colusa County Public System Wells

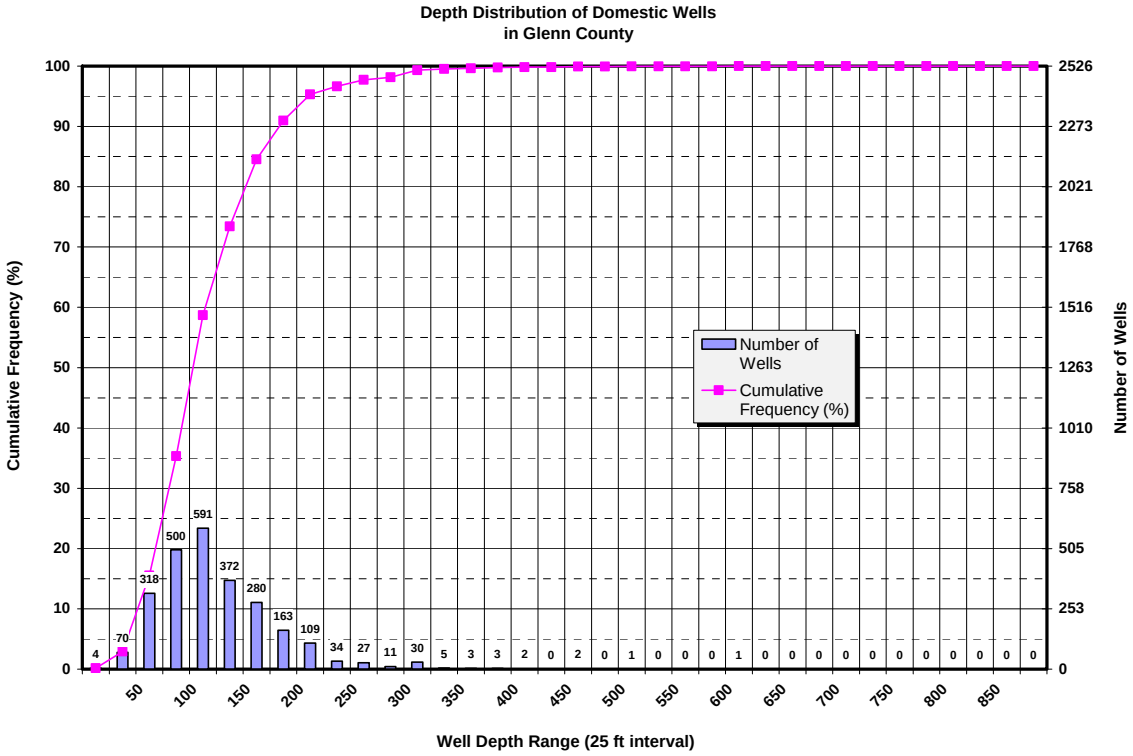

Figure E-5
Cumulative Frequency Curve for Glenn County Domestic Wells

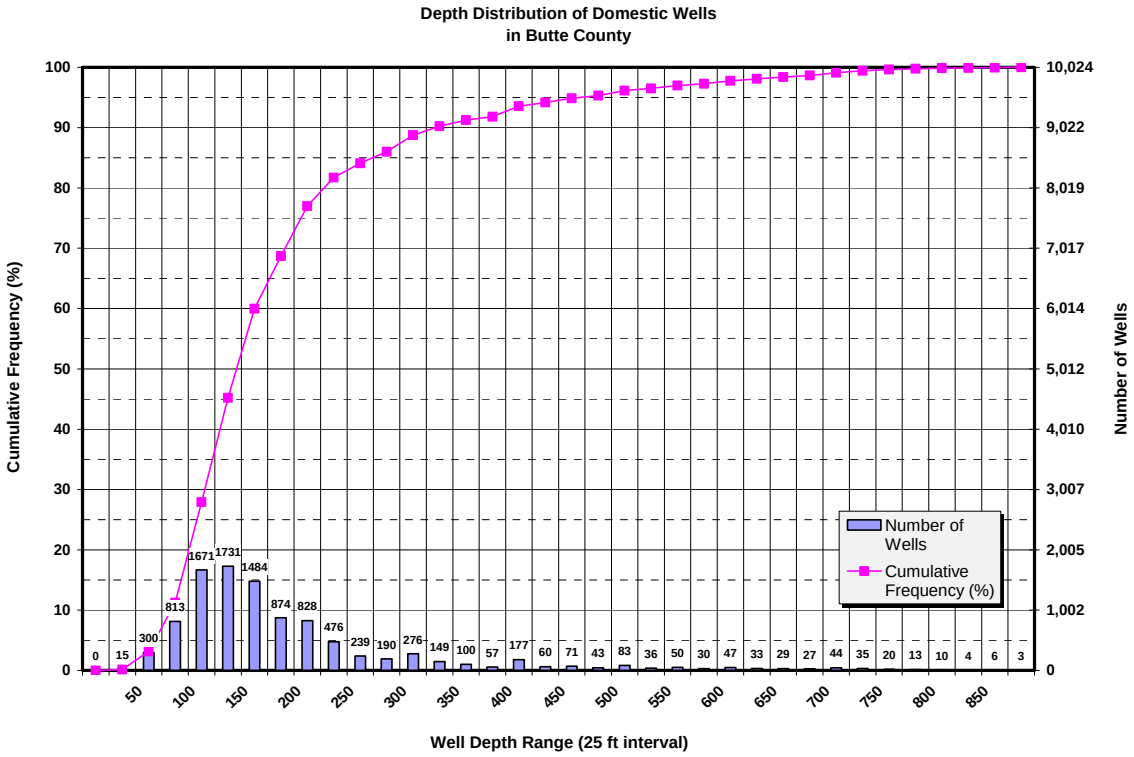

Figure E-6
Cumulative Frequency Curve for Butte County Domestic Wells

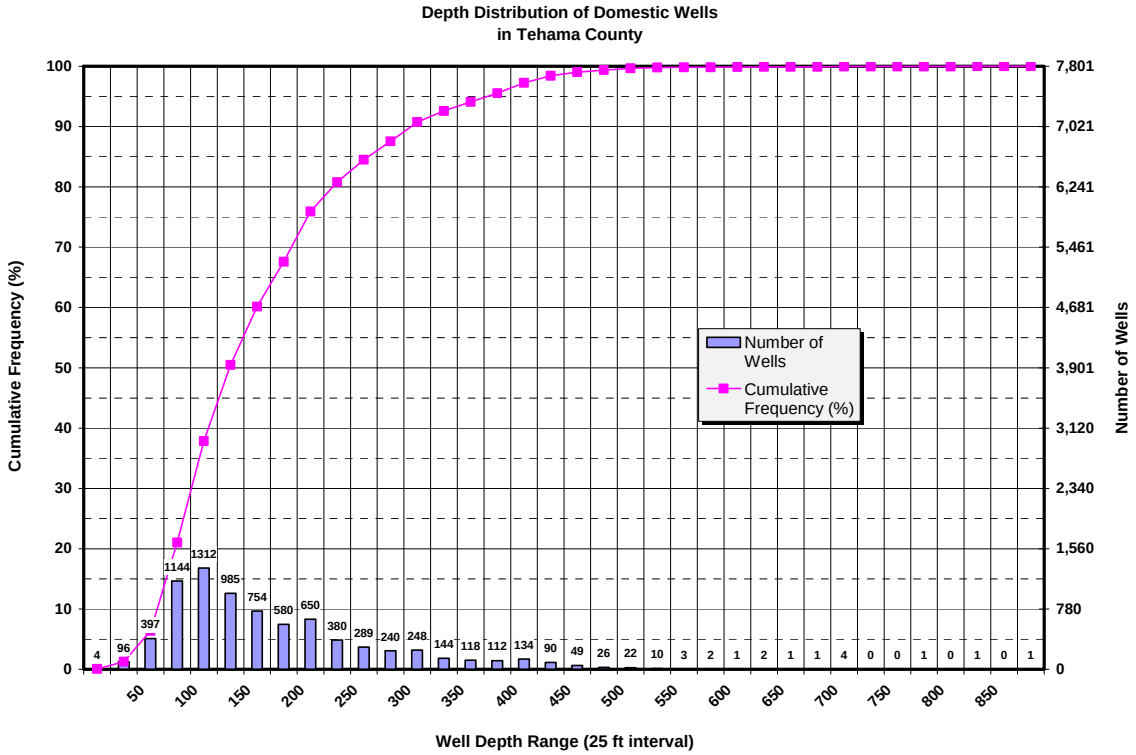

Figure E-7
Cumulative Frequency Curve for Tehama County Domestic Wells

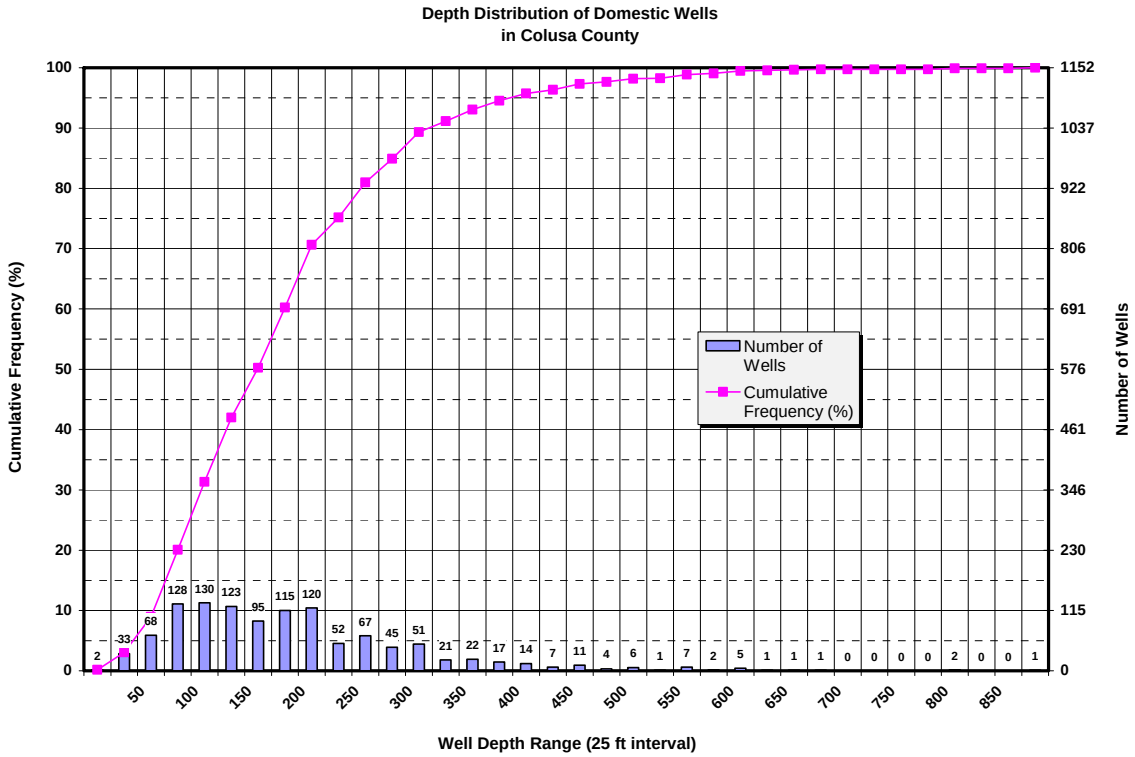

Figure E-8
Cumulative Frequency Curve for Colusa County Domestic Wells

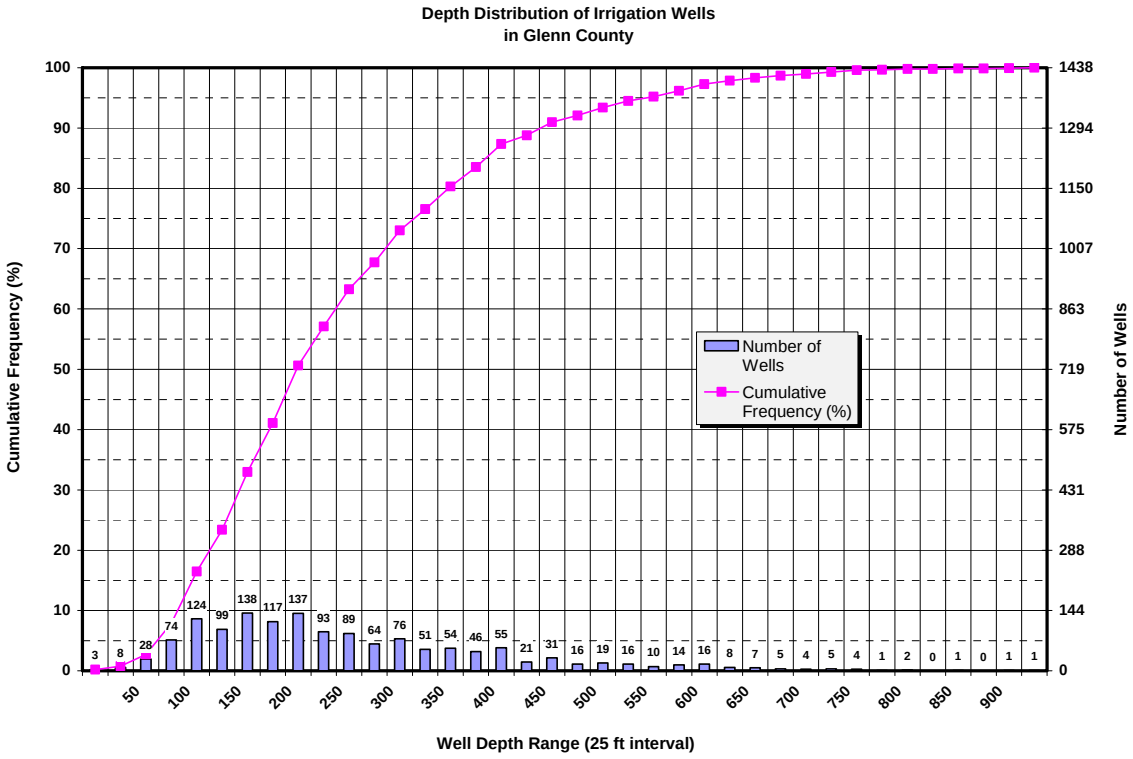

Figure E-9
Cumulative Frequency Curve for Glenn County Irrigation Wells

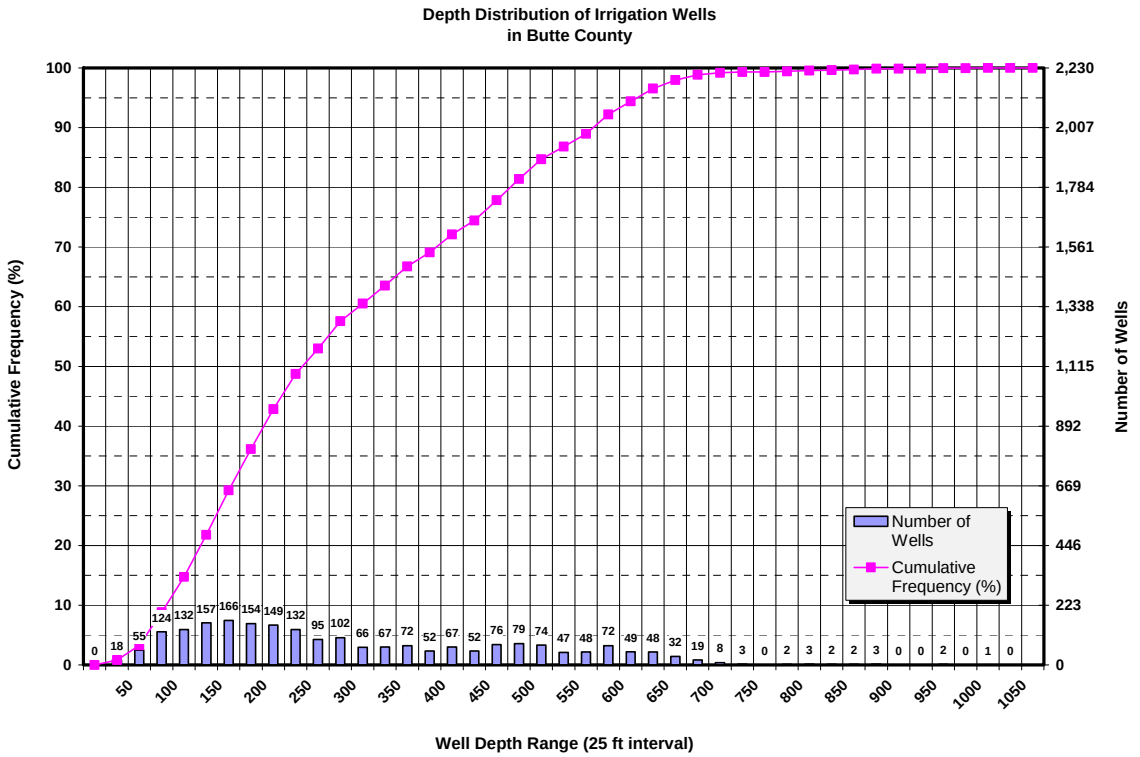

Figure E-10
Cumulative Frequency Curve for Butte County Irrigation Wells

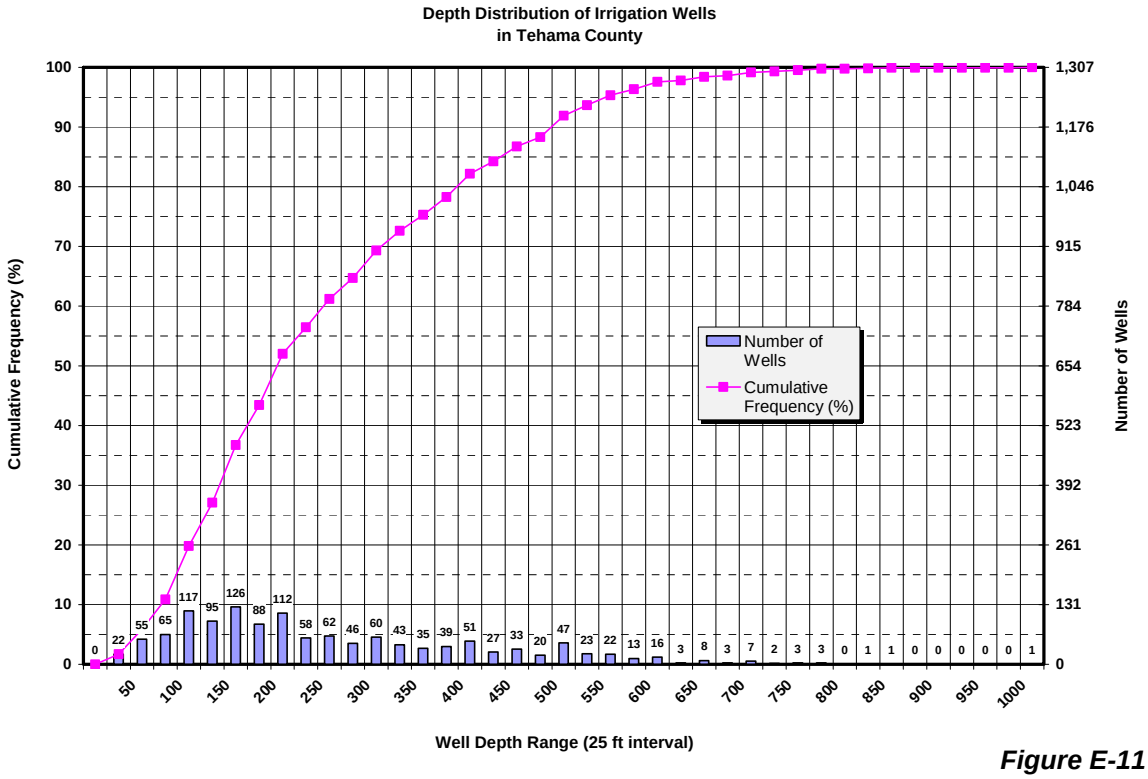

Figure E-11
Cumulative Frequency Curve for Tehama County Irrigation Wells

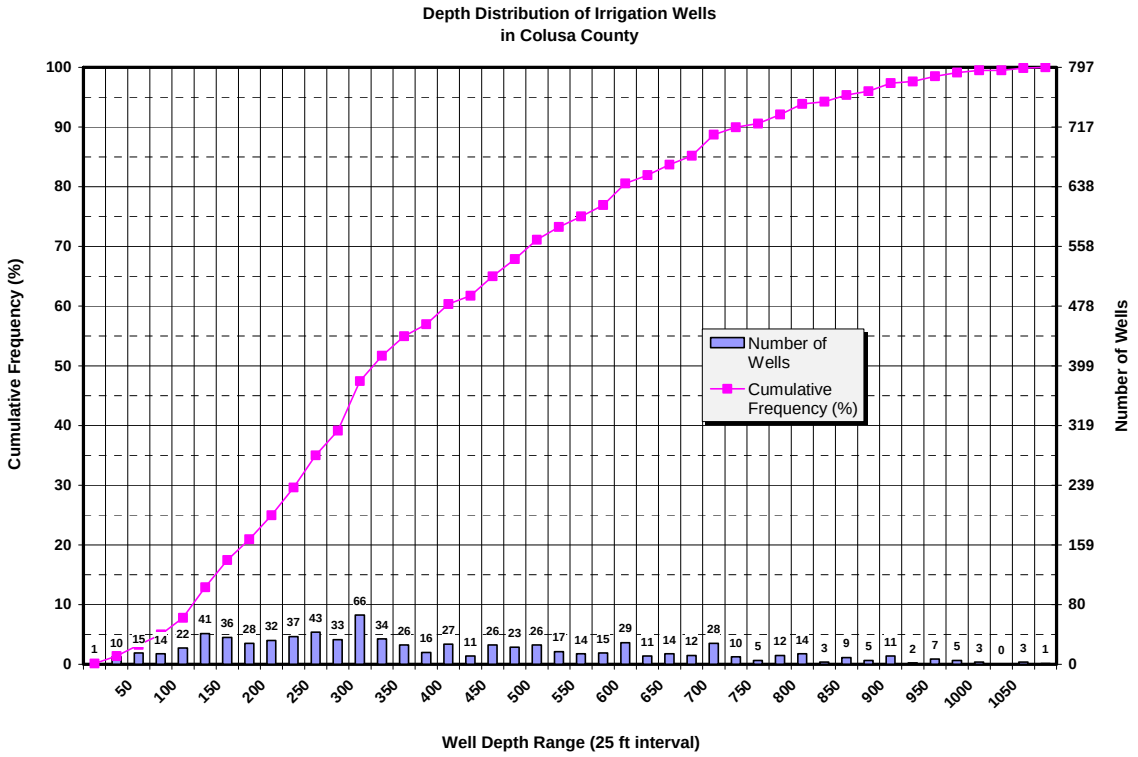

Figure E-12
Cumulative Frequency Curve for Colusa County Irrigation Wells

Appendix F

Detailed Summaries of Surface Water Quality Monitoring Programs

Source: LWA 2004

Program Name:	Rice Pesticide Monitoring Program
Program ID:	RPM
Agency or Group:	Department of Water Resources
Best Contact:	Kaylynn Newhart
Address:	1020 N Street, Room 161
	Sacramento, CA, 95814
Phone:	(916) 324-4190
Email:	knewhart@cdpr.ca.gov
Website:	
Program Info Document:	
Monitoring Strategy:	Scheduled/Event-Based (during rice field discharge season)
Sampling Method:	grab
Sampling Depth:	
QAPP/SAP Document:	
Data Management/Validation:	
QA Samples:	
Data Format(s):	Database (DPR's SWDB)
Update Frequency:	Annually
Data Start Date:	1995
Data End Date:	1998 (monitoring continues)
Date Available:	now
Method of Access:	Downloadable Data, Database on CD-ROM
Ease of Access:	Good

Sample Location	Site ID	Latitude	Longitude	Quality of Location	Sample Frequency
Colusa Basin Drain #5		39.18330	-122.0500	unknown	~2/week

Parameters of Interest	Sampled	Analytical Method	Lab	Reporting Limit	Units	RL Type	Start Date	End Date
Dissolved Oxygen	X						1995	1998
pH	X						1995	1998
Molinate	X					LOQ	1995	1998
Thiobencarb	X					LOQ	1995	1998
2,4-D	X					LOQ	1996	1998
Carbofuran	X					LOQ	1995	1998
Malathion	X					LOQ	1995	1998
MCPA	X					LOQ	1996	1998
Methyl Parathion	X					LOQ	1995	1998
Propanil	X					LOQ	1997	1998
Triclopyr	X					LOQ	1997	1998

Program Name:	California Data Exchange
Program ID:	CDEC
Agency or Group:	Multiple agencies provide data
Best Contact:	http://cdec.water.ca.gov/
Address:	NA. Access by WWW only
Phone:	
Email:	
Website:	http://cdec.water.ca.gov/
Program Info Document:	No single document. See website for additional data provider info
Monitoring Strategy:	Primarily Scheduled
Sampling Methods:	Grab, Time Composite
Sampling Depth:	
QAPP/SAP Document:	unknown. Specific for each data provider
Data Management/Validation:	unknown. Specific for each data provider
QA Samples:	unknown. Specific for each data provider
Data Format(s):	Web-based DB
Update Frequency:	Daily
Data Start Date:	Site and parameter specific.
Data End Date:	through present.
Date Available:	Now
Method of Access:	Website DB
Ease of Access:	Good

Sample Location	Site ID	Latitude	Longitude	Quality of Location	Sample Frequency
North Fork Battle Creek	BNF	40.4240	121.9860	GIS	
Balls Ferry Bridge	BSF	40.4170	122.1930	GIS	
South Fork Battle Creek near Manton	BAS	40.4060	121.9800	GIS	
Battle Creek	BAT	40.3990	122.1450	Dual	
Cottonwood Creek	COT	40.3870	122.2390	Dual	
Cottonwood Creek Auxiliary Gage	CWA	40.3850	122.2390	GIS	
Jellys Ferry	JLF	40.3290	122.1900	GIS	
Sacramento River @ Bend Bridge	BND	40.2890	122.1860	Dual	
Deer Creek @ Hwy 32	DCH	40.2710	121.4520	GIS	
Red Bluff (Alert)	RDF	40.1790	122.2290	Alert	
Sacramento River @ Red Bluff Diversion Dam	RDB	40.1530	122.2020	GIS	
Indian Creek below Indian Falls	ICR	40.0560	120.9620	GIS	
Mill Creek near Los Molinos	MLM	40.0550	122.0230	GIS	
Mill Creek below Hwy 99	MCH	40.0430	122.1010	GIS	
Elder Creek near Paskenta	ECP	40.0250	122.5090	GIS	
Deer Creek near Vina	DCV	40.0140	121.9470	GIS	
Deer Creek below Stanford Vina Dam	DVD	39.9640	121.8990	GIS	
Sacramento River @ Vina-Woodson Bridge	VIN	39.9170	122.1000	Dual	
BW-12 Import to Butte Creek	BBW	39.8850	121.5970	GIS	
Sacramento River @ Thomes Creek	THO	39.8830	122.5170	Dual	
North Fork Feather River @ Pulga	PLG	39.7940	121.4510	GIS	
Big Chico Creek near Chico	BIC	39.7680	121.7770	GIS	
Sacramento River @ Hamilton City	HMC	39.7520	121.9940	Dual	
Butte Creek near Chico	BCK	39.7260	121.7090	GIS	

Sample Location	Site ID	Latitude	Longitude	Quality of Location	Sample Frequency
Parrot Div from Butte Creek	BPD	39.7090	121.7550	GIS	
Feather River @ Merrimac	MER	39.7090	121.2700	Microwave	
Butte Creek near Durham	BCD	39.6780	121.7770	GIS	
Sacramento River @ Ord Ferry	ORD	39.6280	121.9910	Dual	
Butte Creek near Western Canal	BWC	39.5580	121.8330	GIS	
Feather River @ Mile 61.6	FRA	39.4680	121.5970	GIS	
Cherokee Canal near Richvale	CHC	39.4650	121.7420	GIS	
Sacramento River @ Butte City	BTC	39.4580	121.9930	GIS	
Feather River near Gridley	GRL	39.3670	121.6460	Dual	
Butte Creek near Gridley	BCG	39.3620	121.8920	GIS	
Sacramento River @ Moulton Weir	MLW	39.3330	122.0170	GIS	
Sacramento River @ Colusa Weir	CLW	39.2170	122.0170	GIS	
Sacramento River @ Colusa	COL	39.2140	121.9990	Dual	
Sacramento River @ Butte Slough	SBS	39.2000	121.9390	GIS	
Colusa Drain near Hwy 20	CDR	39.1950	122.0600	GIS	
Meridian Pumps	MPS	39.1480	121.9180	GIS	
Sacramento River @ Tisdale Weir	TIS	39.0220	121.8200	GIS	
Sacramento River @ Wilkins Slough	WLK	39.0100	121.8240	Dual	

Parameters of Interest	Sampled	Analytical Method	Lab	Reporting Limit	Units	RL Type	Start Date	End Date
Temperature	X							
Dissolved Oxygen	X							
pH	X							
Flow	X							
Conductivity	X							
Turbidity	X							
Organic Carbon, Dissolved	X							
Organic Carbon, Total	X							
UVA254	X							
Chlorophyll A	X							

Program Name:	USFWS/UCDavis Nutrient Project
Program ID:	USFWS NP
Agency or Group:	USFWS and USBR
Best Contact:	Randy Dahlgren
Address:	UC Davis
Phone:	(530) 752-2812
Email:	radahlgren@ucdavis.edu
Website:	
Program Info Document:	
Monitoring Strategy:	Scheduled
Sampling Method:	Grab, Time Composite, Cross-Sectional Composite, Flow Composite
Sampling Depth:	
QAPP/SAP Document:	
Data Management/Validation:	
QA Samples:	
Data Format(s):	Spreadsheets
Update Frequency:	None (project complete?)
Data Start Date:	10/12/99
Data End Date:	10/03/01
Date Available:	Now
Method of Access:	Request
Ease of Access:	Good

Sample Location	Site ID	Latitude	Longitude	Quality of Location	Sample Frequency	
Battle Creek @ Grover Road	USFWS029					2003
Cottonwood Creek @ Cottonwood	USFWS030					2003
Deer Creek @ Leiniger Road	USFWS032					2003
Sacramento River @ A9	USFWS033					2003
Sacramento River @ Bend Ferry Road	USFWS034					2003
Sacramento River @ Butte City	USFWS035					2003
Sacramento River @Court Road	USFWS036					2003
Stony Creek @ Orland	USFWS038					2003

Parameters of Interest	Sampled	Sample Method	Lab	Reporting Limit	Units	RL Type	Start Date	End Date
Temperature	X							
Dissolved Oxygen	X							
pH	X							
Conductivity	X							
Total Suspended Solids	X							
Turbidity	X							
Chloride	X							
Organic Carbon, Dissolved	X							
Chlorophyll A	X							
Nitrogen, Total	X							
Nitrogen, Organic	X							
Ammonia as N	X							
Nitrate as N	X							
Phosphorus, Total	X							
Phosphorus, Dissolved	X							
Orthophosphate, Dissolved	X							

Program Name:	Sacramento River Watershed Program
Program ID:	SRWP
Agency or Group:	Sacramento River Watershed Program
Best Contact:	Claus Suverkropp
Address:	509 Fourth Street
	Davis, CA 95616
Phone:	(530) 753-6400
Email:	clauss@lwa.com
Website:	www.sacriver.org
Program Info Document:	Website or Annual Reports
Monitoring Strategy:	Scheduled, Event-Based
Sampling Method:	Grab
Sampling Depth:	Mid-depth
QAPP/SAP Document:	Quality Assurance Project Plan (SRWP 2001)
Data Management/Validation:	Larry Walker Associates
QA Samples:	Field Blanks, Field Duplicates, Equipment Blanks, Method Blanks, Laboratory
	Control Samples, Laboratory Duplicates, Matrix Spikes/Matrix Spike Duplicates
Data Format(s):	Database
Update Frequency:	Annually
Data Start Date:	Jan-94
Data End Date:	Oct-02
Date Available:	Now
Method of Access:	Request, WWW access through IEP database
Ease of Access:	Good
General comments	Parameters and monitoring periods are site-specific

Sample Location	Site ID	Latitude	Longitude	Quality of Location
Sacramento River above Bend Bridge	SRABB	40.2886	-122.1856	GPS
Sacramento River near Hamilton City	SRHAM	39.7520	-121.9940	GPS
Sacramento River @ Colusa	SRCOL	39.2142	-121.9992	GPS
MF Cottonwood Creek near Ono	CTMON	40.3675	-122.5720	GPS
SF Cottonwood Creek @ Anderson Canal	CTSCW	40.3164	-122.4478	GPS
Cottonwood Creek near Cottonwood	CTCTW	40.3872	-122.2375	GPS
NF Battle Creek @ Manton Rd	BANFA	40.4230	-121.9878	GPS
SF Battle Creek @ Wildcat Rd	BASFA	40.4060	-121.9786	GPS
Battle Creek below Coleman Fish Hatchery	BACTW	40.3972	-122.1347	GPS
Mill Creek @ Mouth	MCMOU	40.0358	-122.1099	GPS
Thomes Creek @ Paskenta	THPSK	39.9150	-122.5500	GPS
Thomes Creek @ Henleyville	THHNL	39.9559	-122.3297	GPS
Thomes Creek @ Rawson Rd Bridge	THRRB	39.9756	-122.2245	GPS
Deer Creek @ Mouth	DCMOU	39.9303	-122.1989	GPS
Big Chico Creek @ Mouth	CHMOU	39.7008	-121.9414	GPS
Dry Creek above Cherokee Canal	DRACC	39.6078	-121.6717	GPS
Little Chico Creek below Chico	LCBCH	39.6971	-121.8935	GPS

Parameters of Interest	Sampled	Sample Method	Lab	Reporting Limit	Units	RL Type	Start Date	End Date	Sample Frequency
Arsenic	X	EPA 1632, EPA 1639		0.002-2.0	ug/L	MDL, RL			
Temperature	X						Jan-94	Jun-02	
Dissolved Oxygen	X						Jan-94	Jun-02	
pH	X						Jan-94	Jun-02	
Flow	X								
Conductivity	X						Jan-94	Jun-02	
Hardness	X	EPA 130.2		5.0	mg/L	RL	Jan-94	Jul-02	
Total Suspended Solids	X	EPA 160.2		5.0	mg/L	RL	Jan-94	Jul-02	4-12/year
Total Dissolved Solids	X	EPA 160.1		5.0	mg/L	RL	Feb-96	Jul-02	6/year
Turbidity	X	EPA 180.1		1.0	NTU	RL	Jun-98	Jul-02	
Chloride	X	EPA 300		1.0	mg/L	RL			
Organic Carbon, Dissolved	X	SM 5310C		0.2	mg/L	RL	Feb-96	Sep-02	6/year
Organic Carbon, Total	X	SM 5310C		0.2	mg/L	RL			6/year
UVA254	X	5910B		n/a			Sep-01	Oct-02	6/year
Nitrogen, Total Kjeldahl	X	EPA 351.3		0.5	mg/L	RL	Jun-96	Jul-02	6/year
Ammonia as N	X	EPA 350.3		0.2	mg/L	RL	Feb-96	Jul-02	6/year
Nitrate as N	X	EPA 300		0.05	mg/L	RL	Feb-96	Jul-02	6/year
Phosphorus, Total	X	EPA 365.3		0.02	mg/L	RL	Feb-96	Jul-02	6/year
Orthophosphate, Dissolved	X	EPA 300		0.01	mg/L	RL	Feb-96	Jul-02	6/year
Chlopyrifos	X	EPA 8141A		0.05	ug/L	RL	Sep-98	Aug-02	3-6/year
Diazinon	X	EPA 8141A		0.05	ug/L	RL	Sep-98	Aug-02	3-6/year
E.Coli	X	SM 9221B		2	MPN/100 mL	RL	Jun-00	Jul-02	6/year
Enterococcus	X	SM 9230C		1	colony/100 mL	RL	Sep-01	May-02	6/year
Fecal Coliform Bacteria	X	SM 9221E		2	MPN/100 mL	RL	Oct-96	Jul-02	6/year
Total Coliform Bacteria	X	SM 9221B		2	MPN/100 mL		Oct-96	Jul-02	6/year
Cryptosporidium	X	EPA 1623		1	per 10 L	RL	Jun-99	Sep-02	
Giardia	X	EPA 1623		1	per 10 L	RL	Jun-99	Jul-02	
Molinate	X	EPA 507		0.5	ug/L	RL			6/year
Thiobencarb	X	EPA 507		0.5	ug/L	RL			6/year
Carbaryl	X	EPA 8321		0.14	ug/L	RL	Sep-98	Jun-02	6/year
Carbofuran	X	EPA 8321		0.14	ug/L	RL	Sep-98	Jun-02	
Malathion	X	EPA 8141A		0.10	ug/L	RL	Sep-98	Aug-02	
Methyl Parathion	X	EPA 8141A		0.10	ug/L	RL			
Pendimethalin	X	EPA 8141A		0.10	ug/L	RL	Jun-99	Aug-02	6/year
Trifluralin	X	EPA 8141A		0.10	ug/L	RL			

Program Name:	Tributary Monitoring Program
Program ID:	DWR ND TRIBS
Agency or Group:	DWR
Best Contact:	Jerry Boles, DWR, Northern District
Address:	2440 Main Street
	Red Bluff, CA 96080
Phone:	530.529.7326
Email:	bolesj@water.ca.gov
Website:	http://wwwdpla.water.ca.gov/nd/
Program Info Document:	None available
Monitoring Strategy:	Scheduled
Sampling Method:	Grab
Sampling Depth:	
QAPP/SAP Document:	none (SRWP QAPP was used)
Data Management/Validation:	unkown
QA Samples:	field blanks, field duplicates,others not documented
Data Format(s):	spreadsheet?
Update Frequency:	NA, project is complete
Data Start Date:	7/1/1998
Data End Date:	6/31/2000
Date Available:	now (through SRWP)
Method of Access:	FOI Act request
Ease of Access:	difficult through DWR, more accessible through SRWP and eventually BDAT

Sample Location	Site ID	Latitude	Longitude	Quality of Location	Sample Frequency
Mill Creek at Mouth	MCMOU	40.0358	-122.1099		monthly
Deer Creek at Mouth	DCMOU	39.9303	-122.1989		monthly
Mill Creek at Black Rock	MCBLR	40.1833	-121.7137		monthly
Mill Creek at Highway 36	MCHWY	40.3619	-121.5095		monthly
Deer Creek at Highway 99	DCHWY	39.9470	-122.0529		monthly
Deer Creek at Upper Diversion Dam	DCUDD	40.0110	-121.9551		monthly
Deer Creek at Ponderosa Way	DCPON	40.0716	-121.7023		monthly
Deer Creek at A Line Road	DCALN	40.1642	-121.5850		monthly
Deer Creek below Childs Meadows	DCMDW	40.2642	-121.4508		monthly
Big Chico Creek above Mud Creek	CHMUD	39.7164	-121.9293		monthly
Mud Creek above Big Chico Creek	MUDCH	39.7237	-121.9377		monthly
Big Chico Creek at Chico (Rose Ave.)	CHCHI	39.7272	-121.8624		monthly
Big Chico Creek below Five-Mile Rec.	CHFIV	39.7467	-121.8031		monthly
Big Chico Creek at Golf Course above Five-Mile Rec.	CHGLF	39.7686	-121.7772		monthly
Big Chico Creek below Higgins Hole (Flow)	CHHGQ	39.8933	-121.6908		monthly
Big Chico Creek below Campbell Creek	CHCMP	40.9931	-121.6578		monthly
Big Chico Creek above Salmon	CHASH	39.78333333	-121.7426383		monthly
Big Chico Creek at Hwy 32	CHHWY	40.06375	-121.603695		monthly
Mill Creek at Highway 99	MCHYN	40.04283333	-121.0994667		monthly

Parameters of Interest	Sampled	Analytical Method	Lab	Reporting Limit	Units	RL Type	Start Date	End Date
Temperature	X						1998	2000
Dissolved Oxygen	X						1998	2000
pH	X						1998	2000
Conductivity	X						1998	2000
Hardness	X						1998	2000
Total Suspended Solids	X						1998	2000
Turbidity	X						1998	2000
Ammonia, as N	X						1998	2000
Phosphorus, Total	X						1998	2000
Orthophosphate, Dissolved	X						1998	2000
Fecal Coliform Bacteria	X						1998	2000

Program Name:	Offstream Storage Investigation
Program ID:	DWR ND OSI
Agency or Group:	DWR
Best Contact:	Jerry Boles, DWR, Northern District
Address:	2440 Main Street
	Red Bluff, CA 96080
Phone:	530.529.7326
Email:	bolesj@water.ca.gov
Website:	http://wwwdpla.water.ca.gov/nd/OffstreamStorageEvaluation/index.html
Program Info Document:	None available
Monitoring Strategy:	Scheduled
Sampling Method:	Grab
Sampling Depth:	
QAPP/SAP Document:	none
Data Management/Validation:	
QA Samples:	
Data Format(s):	spreadsheet?
Update Frequency:	NA, project is complete
Data Start Date:	5/15/1997
Data End Date:	4/7/1999
Date Available:	unknown
Method of Access:	FOI Act request
Ease of Access:	difficult

Sample Location	Site ID	Latitude	Longitude	Quality of Location	Sample Frequency
CBD at Maxwell Rd	A0-0354.00			Unknown	
Cottonwood C SF at Oxbow Bridge	A3-5820.00			Unknown	
East Park Reservoir North	A3R92222301			Unknown	
East Park Reservoir nr Lodoga	A3R91962296			Unknown	
Funks C ab Golden Gate	A0-0515.00			Unknown	
Grindstone C nr Elk C	A3-1300.00			Unknown	
Hunters C at Tehama-Colusa Canal	A0-0525.00			Unknown	
Logan C at Tehama-Colusa Canal	A0-0499.00			Unknown	
NF Red Bank C at Bell Rd	A3-4710.00			Unknown	
Red Bank C at Red Bank	A0-3464.00			Unknown	
Red Bank C nr Red Bluff	A0-3460.00			Unknown	
Sacramento R at Colusa	A0-2420.00			Unknown	
Stone Corral C nr Sites	A0-0435.00			Unknown	
Stony C at Hwy 99W	A3-3129.00			Unknown	
Stony C bl Stony Gorge Res	A3-1398.00			Unknown	
Stony C NF at Newville	A3-1175.00			Unknown	
Stony C NF nr Cemetery	A3-1169.00			Unknown	
Stony Gorge Reservoir at Launch Ramp	A3R93522318			Unknown	
Thomes C at Gage nr Paskenta	A0-3500.00			Unknown	
Thomes C at Paskenta	A3-2120.00			Unknown	

Parameters of Interest	Sampled	Analytical Method	Lab	Reporting Limit	Units	RL Type	Start Date	End Date
Temperature	X				˚C		5/15/1997	4/7/1999
pH	X				pH Unit		5/15/1997	4/7/1999
Conductivity	X				umhos/cm		5/15/1997	4/7/1999
Total Suspended Solids	X				mg/L		5/15/1997	4/7/1999
Total Dissolved Solids	X				mg/L		5/15/1997	4/7/1999
Turbidity	X				NTU		5/15/1997	4/7/1999

Program Name:	State Water Project Water Quality Program
Program ID:	SWP
Agency or Group:	Department of Water Resources
Best Contact:	Larry Joyce
Address:	P.O. Box 942836
	Sacramento, CA 94836
Phone:	(916) 653-7213
Email:	joyce@water.ca.gov
Website:	http://www.omwq.water.ca.gov/
Program Info Document:	Annual Report
Monitoring Strategy:	Scheduled
Sampling Methods:	Grab, Continuous
Sampling Depth:	Varies
QAPP/SAP Document:	Bryte Chemical Laboratory Quality Assurance Manual (April 2002)
Data Management/Validation:	Bryte Chemical Laboratory, contractors
QA Samples:	Field Blanks, Travel Blanks, Method Blanks, Laboratory Control Sample,
	Check Standards, Calibration Standards, Internal Standards, Surrogate
	Compounds, Sample Duplicates, Matrix Spike and Duplicates
Data Format(s):	Excel, Hard Copy, Website
Update Frequency:	Monthly
Data Start Date:	1960s
Data End Date:	Current
Date Available:	Now
Method of Access:	Request through Larry Joyce, Website
Ease of Access:	Good

Sample Location	Site ID	Latitude	Longitude	Quality of Location	Sample Frequency
Lake Oroville	OR001000				Quarterly
Thermalito Forebay	TF001000				Quarterly
Thermalito Afterbay	TA001000				Monthly

Parameters of Interest	Sampled	Analytical Method	Lab	Reporting Limit	Units	RL Type	Start Date	End Date	Sampling Frequency
Arsenic	X	EPA 206.3						Present	Monthly
Temperature	X	Automated					Jan-87	Present	Daily
pH	X	EPA 150.1	Bryte	0.1	pH Units	RL	Jan-87	Present	Daily
Conductivity	X	EPA 120.1	Bryte	1	umhos/cm	RL	Jan-87	Present	Daily
Hardness	X	SM			mg/L $CaCO_3$			Present	Monthly
Total Suspended Solids	X	EPA 160.2	Bryte	0.1	mg/L	RL		Present	Monthly
Total Dissolved Solids	X	EPA 160.1	Bryte	1	mg/L	RL		Present	Monthly
Turbidity	X	EPA 180.1	Bryte	1	NTU	RL	Jan-87	Present	Daily
Bromide	X	SM 4110B						Present	Monthly
Chloride	X	EPA 325.2						Present	Monthly
Organic Carbon, Dissolved	X							Present	Monthly
Organic Carbon, Total	X	EPA 415.1	Bryte	0.1	mg/L	RL		Present	Monthly
UVA254	X							Present	Monthly
THMFP	X	EPA 502.2						Present	Monthly
Nitrogen, Total	X							Present	Monthly
Nitrogen, Organic	X							Present	Monthly
Nitrogen, Total Kjeldahl	X	EPA 351.2	Bryte	0.1	mg/L	RL		Present	Monthly
Ammonia, as N	X	EPA 350.1	Bryte	0.01	mg/L	RL		Present	Monthly
Nitrate as N	X	EPA 353.2	Bryte	1	mg/L	RL		Present	Monthly
Phosphorus, Total	X	EPA 365.4	Bryte	0.01	mg/L	RL		Present	Monthly
Phosphorus, Dissolved	X							Present	Monthly
Orthophosphate, Dissolved	X	EPA 365.1	Bryte	0.01	mg/L	RL		Present	Monthly
Orthophosphate, Total	X							Present	Monthly
Chlopyrifos	X	EPA 614	Bryte	0.01	mg/L	RL	Mar-95	Present	3/year
Diazinon	X	EPA 614	Bryte	0.01	mg/L	RL	Mar-95	Present	3/year
Thiobencarb	X	EPA 608	Bryte	0.02	ug/L	RL	Mar-95	Present	3/year
2,4-D	X	EPA 615	Bryte	0.1	ug/L	RL	Mar-95	Present	3/year

Program Name:	National Water Quality Assessment Program, Sacramento River Basin
Program ID:	SR NAWQA
Agency or Group:	U.S. Geological Survey
Best Contact:	
Address:	
Phone:	
Email:	
Website:	http://water.usgs.gov/nawqa/
Program Info Document:	
Monitoring Strategy:	Scheduled
Sampling Methods:	
Sampling Depth:	
QAPP/SAP Document:	Shelton, L.R., 1994, Field guide for collecting and processing stream-water samples for the National Water-Quality Assessment Program, U.S. Geological Survey Open-File Report 94-455, 42 p
Data Management/Validation:	
QA Samples:	Standard Reference Materials, Laboratory Replicate, Blind
	Sampling, Laboratory Reagent Blank/Spike, Surrogate
Data Format(s):	Spreadsheets
Update Frequency:	
Data Start Date:	
Data End Date:	
Date Available:	Now
Method of Access:	Website
Ease of Access:	Good

Sample Location	Site ID	Latitude	Longitude	Quality of Location	Sample Frequency
Colusa Basin Drain @ Rd 99E	11390890	38.81250	121.77306		
Cottonwood Creek near Cottonwood	11376000	40.38722	122.23750		
Sacramento River above Bend Bridge	11377100	40.28861	122.18556		
Sacramento River @ Colusa	11389500	39.21417	121.99917		
Sacramento River @ Tehama	400139122070301	40.02750	122.11750		

Parameters of Interest	Sampled	Sample Method	Lab	Reporting Limit	Units	RL Type	Start Date	End Date
Arsenic	X			1	ug/L			
Temperature	X				deg C			
Dissolved Oxygen	X				mg/L			
pH	X				S.U.			
Flow	X				m^3/s			
Conductivity	X				uS/cm			
Hardness	X			1	mg/L			
Total Suspended Solids	X			1	mg/L			
Percent Sand/Silt/Clay	X							
Total Dissolved Solids	X			1	mg/L			
Turbidity	X							
Chloride	X			0.1	mg/L			
Organic Carbon, Dissolved	X			0.1	mg/L			
Organic Carbon, Particulate	X			0.2	mg/L			
Ammonia, as N	X			0.015	mg/L			
Phosphorus, Total	X			0.01	mg/L			
Phosphorus, Dissolved	X			0.01	mg/L			
Orthophosphate, Dissolved	X			0.01	mg/L			
Chlopyrifos	X			0.004	ug/L			
Diazinon	X			0.002	ug/L			
Molinate	X			0.004	ug/L			
Thiobencarb	X			0.002	ug/L			
2,4-D	X			0.035	ug/L			
Carbaryl	X			0.003-0.041	ug/L			
Carbofuran	X			0.003-0.031	ug/L			
Malathion	X			0.005	ug/L			
MCPA	X			0.05	ug/L			
Methyl Parathion	X			0.006	ug/L			
Pendimethalin	X			0.004	ug/L			
Propanil	X			0.004	ug/L			
Triclopyr	X			0.05	ug/L			
Trifluralin	X			0.002	ug/L			

Program Name:	Surface Water Ambient Monitoring Program
Program ID:	SWAMP
Agency or Group:	State Water Resources Control Board
Best Contact:	Dennis Heiman
Address:	CVRWQCB
	415 Knollcrest Drive, Suite 100
	Redding, CA
Phone:	530.224.4851
Email:	HEIMAND@rb5r.swrcb.ca.gov
Website:	http://www.swrcb.ca.gov/swamp/
Program Info Document:	CVRWQCB Surface Water Ambient Monitoring Program Work Plan July 2002
Monitoring Strategy:	Scheduled, with some event-based
Sampling Methods:	
Sampling Depth:	Varies
QAPP/SAP Document:	Quality Assurance Management Plan (Dec. 2002)
Data Management/Validation:	San Jose State University Foundation
QA Samples:	Travel Blanks, Equipment Blanks, Field Duplicates, Field Blanks,
	Matrix Spike/Duplicate, Internal Standards, Dual-Column
	Confirmation, Laboratory Method Blank/Replicates
Data Format(s):	Spreadsheet, Hard Copy interpretive reports (in progress), eventually in Database
Update Frequency:	
Data Start Date:	October 2005
Data End Date:	October 2006
Date Available:	January 2007 (projected)
Method of Access:	Request, www eventually
Ease of Access:	Difficult

Sample Location	Site ID	Latitude	Longitude	Quality of Location	Sample Frequency
Big Chico Creek site 1	SSCH001				8/year
Big Chico Creek site 2	SSCH002				8/year
Big Chico Creek site 3	SSCH003				8/year
Little Chico Creek site 1	SSCH004				8/year
Little Chico Creek site 2	SSCH005				8/year
Little Chico Creek site 3	SSCH006				8/year
Mud Creek	SSCH007				2

Parameters of Interest	Sampled	Analytical Method	Lab	Reporting Limit	Units	RL Type	Start Date	End Date
Arsenic	X	EPA 1639, Modified USGS 1996, EPA 200.8, EPA 6020		0.3	ug/L		10/1/2005	
Total Suspended Solids	X	EPA 106.2, SM2540D, APHA 1997		0.5	mg/L		10/1/2005	
Total Dissolved Solids	X	EPA 160.1, SM 2540C		1	mg/L		10/1/2005	
Turbidity	X	EPA 180.1, SM 2130B		0.5	NTU		10/1/2005	
Chloride	X	EPA 300.0A, SM4500 Cl		0.25	mg/L		10/1/2005	
Organic Carbon, Dissolved	X	EPA 415.1, EPA 415.2, SM 5310C		0.6	mg/L		10/1/2005	
Organic Carbon, Total	X	EPA 415.1, EPA 415.2, SM 5310C		0.6	mg/L		10/1/2005	
Nitrogen, Total Kjeldahl	X	EPA 351.1-.4, 4500 Norg, SM 4500 NH3		0.5	mg/L		10/1/2005	
Ammonia, as N	X	EPA 350.3, EPA 350.2, SM4500-NH3		0.1	mg/L		10/1/2005	
Nitrate as N	X	EPA 300.0A, EPA 353.3, SM 4500 MO3		0.01	mg/L		10/1/2005	
Phosphorus, Total	X	EPA 365.1-4, SM 4500P		0.05	mg/L		10/1/2005	

Parameters of Interest	Sampled	Analytical Method	Lab	Reporting Limit	Units	RL Type	Start Date	End Date
Orthophosphate, Dissolved	X	EPA 300.0A, EPA 365.3, SM 4500-P		0.01	mg/L		10/1/2005	
Chlopyrifos	X	EPA 8081A		0.02	ug/L		10/1/2005	
Diazinon	X	EPA 8081A		0.02	ug/L		10/1/2005	
Fecal Coliform Bacteria	X	SM 9221E, SM 9222D		2	MPN/100 ml		10/1/2005	
Total Coliform Bacteria	X	SM 9221B, SM 9222B		2	MPN/100 ml		10/1/2005	
Methyl Parathion	X	EPA 8081A, EPA 8141A		0.020	ug/L		10/1/2005	