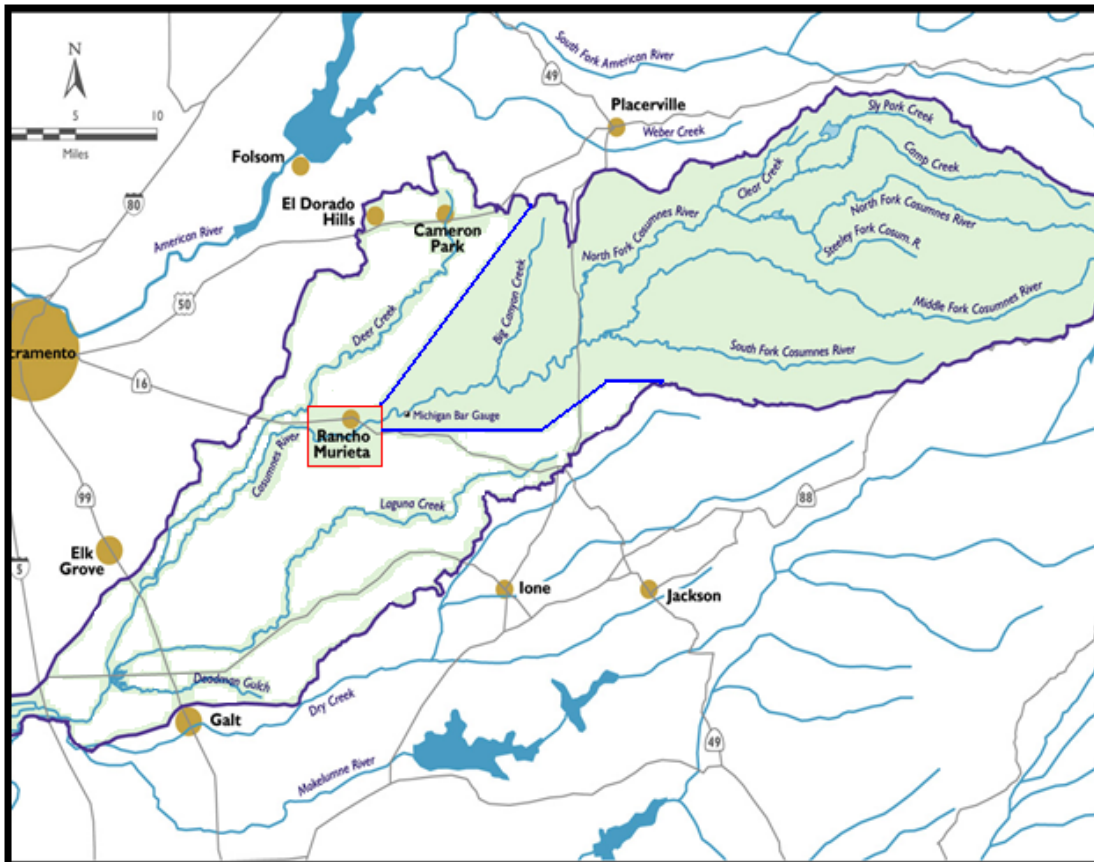




RANCHO MURIETA COMMUNITY SERVICES DISTRICT

Cosumnes River Sanitary Survey



Update - December 2011

Table of Contents

REPORT ORGANIZATION

This report contains six chapters in the format recommended by the guidance manual prepared by the California/Nevada Section of the American Water Works Association.

Executive Summary

Chapter 1 Purpose and Objective, Conduct of the Study, and Report Organization

Chapter 2 Watershed and Water Supply System

Chapter 3 Activities Detrimental to Water Quality

Chapter 4 Watershed Control and Management Practices

Chapter 5 Water Quality Assessment

Chapter 6 Conclusion and Recommendations

EXECUTIVE SUMMARY

Rancho Murieta Community Services District (District) serves the community of Rancho Murieta, on Highway 16 in southeastern Sacramento County, providing water, sewer, drainage, solid waste, and security services. This Watershed Sanitary Survey meets the requirements of the State of California Surface Water Treatment Regulations (SWTR), in Title 22, Article 7, Section 64655 of the State Code of Regulations.

It has been five (5) years since the last update of the Watershed Sanitary Survey was completed in December 2006. Since that time, the District has experienced minimal growth increasing its water service since 2005 by 41 connections to over 2,600 active water connections and serving a population of approximately 5,500. The District's primary water right, Application Number 23416, has not been perfected as the community is only approximately at half build out as per its original master plan. This water right allows for seasonal diversions from the Cosumnes River at its Granlees Diversion Dam each year, between November 1 and May 31, when flows are greater than 70 feet³/second measured at the Michigan Bar gauging station here: <http://cdec.water.ca.gov/cgi-progs/queryF?mhb>

There have been no significant activities or changes within the watershed that could adversely affected the water quality delivered to the point of diversion from the Cosumnes River by the District. There has been minimal growth and activity outside of the District along the watershed. Logging, wineries and recreation are the primary businesses along the watershed, which are closely monitored by State and County regulatory agencies.

This Watershed Sanitary Survey is to comply with the Title 22 requirements of the State of California Surface Water Treatment Regulations. Also, areas of concern can be found and addressed to improve the quality of the surface water before it is treated at the water plant. The Watershed Sanitary Survey meets the State of California Surface Water Treatment Regulations requirements by:

1. Surveying and assessing the potential contaminants of the District's surface water supply source, the Cosumnes River;
2. Identifying management practices that are both economically and legally implementable by the District.

The Cosumnes River watershed is one of the major watersheds of El Dorado, Amador and Sacramento counties. The watershed begins at the western slopes of the Sierra Nevada Mountains at an elevation of 7600 feet near the common El Dorado and Amador county lines. Flowing westerly, the Cosumnes River drops in elevation to 130 feet as it passes Rancho Murieta. The Cosumnes River is virtually a wild river with only four percent (4%) of its approximately 536 square mile watershed upstream from Rancho Murieta controlled by dams or reservoirs. As a result, the vast majority of the runoff flows through the watershed uncontrolled.

Annual yield of the Cosumnes River is highly variable and significantly influenced by the amount of the winter snow pack in the watershed. Due to its low elevation, the watershed does not receive as heavy a snow pack as the other mountain regions located further to the east, north, and south. Springtime snow melts account for the majority of the river's annual yield. Mean annual precipitation of the watershed is 38 inches.

The U.S.G.S. stream gauge at Michigan Bar has recorded the annual yield of the river since 1907. This gauging station is located two miles upstream of Rancho Murieta at an elevation of 168.09 feet. The minimum annual yield recorded, since 1908, was 15,670 acre-feet (AF) occurring in 1977. The maximum annual yield was 1,221,000 AF, which occurred in 1983. The mean annual yield is 274,000 AF. The highest flow event recorded a maximum discharge, 93,000 ft³/s, Jan. 2, 1997, gage height, 18.54 ft, from rating curve extended above 34,000 ft³/s on basis of slope-area determination of peak flow; no flow at times in many years.

MANAGEMENT PRACTICES

Our management practices for diverting from the river will remain the same as they have always been. In order to divert the best quality water that we can, we adjust our diversion out of the river by not diverting right after a rain event. We also allow the flush from the first couple of storms to pass the diversion structure before we start to divert. We accomplish a number of things by doing the following:

1. We do not divert the more turbid water that is running off from the lower elevations.
2. We allow runoff contaminated with anything that had settled on the soil surface in the watershed during the previous year to pass by the diversion structure.
3. The majority of organic matter that enters the river system from fall plant die-off also is allowed to pass the diversion structure.
4. The water we divert is then made up mainly of snowmelt from the upper elevations of the watershed where there is little human activity.

We will continue to monitor the watershed throughout the year for any activity that may affect the quality or quantity of water that reaches our diversion structure.

CHAPTER 1

PURPOSE OF THE STUDY

REGULATORY REQUIREMENT

Title 22 §64665. Watershed Requirements.

(a) All suppliers shall have a sanitary survey of their watershed(s) completed at least every five (5) years. The first survey shall be completed by January 1, 1996.

(b) A report of the survey shall be submitted to the Department not later than 60 days following completion of the survey.

(c) The survey and report shall include physical and hydrogeological description of the watershed, a summary of source water quality monitoring data, a description of activities and sources of contamination, a description of any significant changes that have occurred since the last survey which could affect the quality of the source water, a description of watershed control and management practices, an evaluation of the system's ability to meet requirements of this chapter, and recommendations for corrective actions.

The Drinking Water Source Assessment and Protection Program (DWSAP) was prepared in response to the 1996 reauthorization of the federal Safe Drinking Water Act, which included an amendment requiring states to develop a program to assess sources of drinking water and encouraging states to establish protection programs. The drinking water source assessment is the first step in the development of a complete drinking water source protection program. The assessment includes a delineation of the area around a drinking water source through which contaminants might move and reach that drinking water supply. In addition, it includes an inventory of activities that might lead to the release of microbiological or chemical contaminants within the delineated area. This enables a determination to be made as to whether the drinking water source might be vulnerable to contamination. Although California Department of Health Services Division of Drinking Water and Environmental Management is responsible for performing the assessments, the Department will charge each agency that does not complete the assessment themselves the cost the Department incurs in completing the assessment.

District personnel completed the assessment of the drinking water source for the District in 1996 and subsequently in 2001. Each activity and its location to the diversion point are given a numerical ranking. After performing the assessment, the item with the highest numerical ranking that the water source is considered most vulnerable to was identified as historic mining activities.

Additional information about safety and standards can be found here:

<p>California Department of Public Health Office of Drinking Water, 1616 Capitol Avenue PO Box 997377, MS 7400 Sacramento, CA 95899-7377</p> <p>http://www.cdph.ca.gov/certlic/drinkingwater/Pages/Chemicalcontaminants.aspx</p> <p>Headquarters Office (916) 449-5600</p>	<p>Safe Drinking Water Hotline (800) 426-4791 http://www.epa.gov/safewater/ (General drinking water information)</p>
<p>U.S. Environmental Protection Agency Office of Ground and Drinking Water (4601) Ariel Rios Building 1200 Pennsylvania Avenue, NW Washington, DC 20460-0003</p>	<p>http://www.epa.gov/safewater/standard/index.html (Information on how drinking water standards are established)</p>

PURPOSE AND OBJECTIVES

“Sanitary survey” means an on-site review of a public water system for the purpose of evaluating the adequacy of the water source, facilities, equipment, operation and maintenance for producing and distributing safe drinking water. The purpose of this Watershed Sanitary Survey is to comply with the requirements of the State of California Surface Water Treatment Regulations (SWTR), in Title 22, Article 7, Section 64655 of the State Code of Regulations, requires every public water system using surface water to conduct a comprehensive sanitary survey of its watershed every five years. The last sanitary survey completed by the Rancho Murieta Community Services District (District) was completed in December 2006. This sanitary survey meets the five (5) year update for SWTR requirements by:

1. Surveying and assessing the actual and potential contaminants of the District’s surface water supply source, the Cosumnes River; or, identifying any other watershed-related factor, which might adversely affect the quality of water used for domestic drinking water;
2. Identifying management practices that are both economically and legally implementable by the District in order to protect the quality of the surface waters entering the reservoirs.

Information contained in this report was obtained in the following manner:

1. Collection of available published data on the watershed;
2. Identification of natural and man-made possible source of contaminants through personal contacts with individuals knowledgeable of the areas of concern;
3. Identification of activities, both past and present that may pose a threat of contamination.
4. Collection of information relative the Cosumnes River watershed.

CONDUCT OF THE STUDY

This is the update of the Water Shed Sanitary Update last completed five (5) years ago and will serve as a basis for future watershed management and planning efforts. This sanitary survey of the Cosumnes River, from its tributaries to the point of diversion for the District's water supply, to the treatment facility was completed entirely by District personnel. District staff either met with or conducted telephone interviews with agencies to gather information presented in this report. A review of various reports was done and some information was obtained over the "internet". A complete list is included in the bibliography.

CHAPTER 2

WATERSHED AND WATER SUPPLY SYSTEM

INTRODUCTION

This section describes the watershed in terms of soils, vegetation, climate, major features, water quality and special hydrologic elements. The overall watershed flowing past the District is comprised of four (4) smaller watersheds:

- North Fork Cosumnes River (North Fork)
- Middle Fork Cosumnes River (Middle Fork)
- South Fork Cosumnes River (South Fork)
- Lower River

Information presented in this section was obtained from published reports from federal, state, county and local administrative and planning agencies, as well as previous studies of the watersheds and the internet.

GENERAL DESCRIPTION OF THE WATERSHED

The Cosumnes River watershed is one of the major watersheds of El Dorado, Amador and Sacramento counties. The watershed begins at the western slopes of the central Sierra Nevada Mountains. The watershed begins at elevation 7600 feet near the common El Dorado and Amador County lines. It has been modified by human development for over 150 years by logging, fires, mining, grazing and diversion of water for agricultural use. Flowing westerly, the Cosumnes River drops to an elevation of 150 feet at the District's point of diversion and 130' as it runs through Rancho Murieta. The Cosumnes River is virtually a wild river with only 4% of its approximately 536 square mile watershed upstream from Rancho Murieta controlled by dams or reservoirs. As a result, the vast majority of the runoff flows through the watershed uncontrolled.

Precious metal lode mines are located in the northern fork watershed, at elevations below the normal snow line. All of the mines have not operated for many, many years. Historically these lode mines used mercury and arsenic to separate the gold and other precious metals from the quartz. Acid drainage, mercury and arsenic contamination potential exists, although no known contamination has been identified. Because of their location, size and long-term inactivity, these mines pose very little, if any, threat to our drinking water.

The U.S. Fish and Wildlife Service listed the Cosumnes River as an area for the potential removal of irrigation dams in its Anadromous Fish Restoration Plan. It has been estimated that under proper conditions, the Cosumnes could potentially support a run of more than 17,000 Chinook salmon. Some work has been done under this plan has been downstream of our diversion facility. There have been low flow barriers removed and structures to help the fish navigate sections of the river during low flow periods. The fish ladder, at the South Granlees Dam, was

improved in 2001 and the North Side one was extended this past year by the Fishery Foundation of California, as seen in Figure 1.

Under the California Unified Watershed Assessment, the Cosumnes River has been identified as a Priority Category I Watershed. Category I Watersheds are candidates for increased restoration activities due to impaired water quality or other impaired natural resource goals (emphasis on aquatic systems).



Figure 1 - Granlees North Fish Ladder

LAND OWNERSHIP

The following table summarizes land ownership, in acres, within the Cosumnes river watershed.

Ownership	Lower Fork	North Fork	Middle Fork	South Fork	TOTAL
National Forest	0	61,900	48,100	2,200	112,200
BLM	1,500	7,200	300	0	9,000
Private	84,300	61,400	37,300	38,800	221,800
TOTAL	85,800	130,500	85,700	41,000	343,000

HYDROLOGIC DATA

Annual yield of the Cosumnes River is highly variable and significantly influenced by the amount of the winter snow pack in the watershed. Due to its low elevation, the watershed does not receive as heavy a snow pack runoff as the other mountain regions located further to the east. Spring snow melt accounts for the majority of the river's annual yield. Mean annual precipitation of the watershed is 38 inches.

The U.S.G.S. stream gauge at Michigan Bar has recorded the annual yield of the river since the early 1900's. This gauging station is located two miles upstream of Rancho Murieta. The minimum annual yield recorded, since 1908, was 15,670 acre-feet (AF) occurring in 1977. From the Department of Water Resources data from 1902-present, the maximum annual yield was 1,221,000 AF which occurred in 1983; the mean annual flow is 6273, mean yield is 274,000 AF; and mean flow is 492 cfs.

GEOLOGY/GEOGRAPHY

The Cosumnes River is derived from three forks, North, Middle, and South, which meet up prior to the point of diversion for the District. Below is a description of each.

NORTH FORK WATERSHED

Geography

The general location of the North Fork watershed west of Highway 49 and east of Silver Lake. Iron Mountain Ridge road traverses the watershed in a west to east direction along the divide between the Cosumnes River and the American River watersheds. Rural communities of Grizzly Flat and Somerset are located in the watershed. Jenkinson Lake (Sly Park) is also in the watershed on Camp Creek. Camp Creek, the major tributary, is controlled by Jenkinson Lake and ultimately meets the North Fork near Somerset. The North Fork watershed, including Camp Creek, contains approximately 224 square miles.

Topography

The watershed ranges in elevation from over 7600 feet at Leek Springs to about 1800 feet at the confluence with the Middle Fork. The gradient is steep in the upper reaches of Camp Creek and the North Fork.

Geology

Geology of the watershed is comprised of two types of geologic formations: Tertiary Andesitic Volcanic rock and Pilliken Granitic and Ledmont Andesitic soils. Primary soils in the watershed consist of the McCarthy and Waca series which are generally gravely sandy loam with subsoils of very brown gravely and cobbly loam. Water holding capacity of these soils is characterized as low with moderately rapid permeability.

Vegetation

Tree growth consists of stands of hardwood and conifer. At the highest elevations, conifers exist in scattered stands. Undergrowth consists mainly of brush. As elevations drop, oak tends to dominate tree stands and the brush is replaced with grass rangeland. Erosion potential is reduced in the lower elevations by the presence of grass range lands and flatter terrain.

MIDDLE FORK WATERSHED

Geography

The Middle Fork watershed traces its beginning at near Leek Springs south of Plumber Ridge. Major creek tributaries to the Middle Fork include the Sopiago and Dogtown Creeks. Mt. Aukum, Outingdale and Omo Ranch are rural communities in the watershed. This watershed totals about 134 square miles.

Topography

Elevations range from approximately 1,800 at the westerly confluence with the North Fork to approximately 7,600 at Leek Springs.

Geology

The Middle Fork watershed is very similar to the North Fork watershed. Both watersheds begin in their upper reaches in the Merhten formations comprised of Andesitic Conglomerate, Sandstone and Breccia. Flowing west the river and its tributaries traverse Pazeolic rocks and near the confluence enter Mesozoic Granitic rock formations.

Soil attributes consist mainly of Cohasset, McCarthy, Ledmont and Choix series. As in the North Fork, the Middle Fork contains the McCarthy and Ledmont soils which are characterized by low water absorption and rapid permeability. The Cohasset series soil is dark grayish brown, cobbly sandy loams. Surface runoff is medium to rapid and the erosion potential is medium to high.

Similarly, the Choix soils are well drained and underlain by weathered granitic rock. The surface layer is comprised of dark grayish sandy coarse loams. In steeper slope areas, the soil has a very high erosion potential whereas in the more moderate slopes the soil has medium to rapid runoff with high erosion potential.

Vegetation

Conifers and hardwoods are the primary tree growth. Undergrowth is comprised of brush and grass. As the elevation drops, conifers are replaced with more oak stands and the grass rangelands become more dominant. Erosion potential is reduced as the elevation drops and the grass rangeland area is increased.

SOUTH FORK WATERSHED

Geography

This watershed begins its upper reaches near Cooks Station. The watershed encompasses the communities of River Pines and Indian Diggings. The South Fork merges with the North Fork near Briarcliff Mines. At 64 square miles, the South Fork is the smallest watershed of the four watersheds.

Topography

The upper reaches beginning at Cooks Station begin at elevation 5500 feet then drop rapidly to about 3500 below Farnham Ridge. The remaining downstream sections are moderately flat with steep sections, dropping to about 1800 feet at the confluence with the North Fork.

Geology

In the upper reaches the South Fork match the morphology of the other forks with the Merhten type formations being present. Traversing west, the South Fork enters a more complex mix of geologic formations of undifferentiated Paleozoic, Calaveras Complex Volcanic and Calaveras Metasedimentary rock formations. As the elevation drops along the El Dorado and Amador county line, the watershed is predominately comprised of Mariposa-Josephine and Auburn-Exchequer formations. The upper Mariposa-Josephine series is characterized by reddish brown to yellow-red loam. These soils are well drained with moderate permeability. Erosion potential is moderate to very severe depending on the slopes of the surrounding terrain. The Auburn-Exchequer series is dark brown, grayish brown or reddish brown very rocky silty loam. These soils too are well drained with moderate permeability. Similarly this soil has a moderate to severe erosion potential.

Vegetation

The upper reaches of the watershed are comprised of hardwood timbers and conifers interspersed with grass and brush. This tends to prevent surface erosion if left undisturbed and

in areas of slopes less than 50 percent. As the watershed traverses west, the Exchequer soils tend to dominate allowing brush, grass and rangeland to form the backbone vegetative balance. Hardwood, of the oak variety, is the dominate tree. Erosion potential is moderate in the shallower land slopes, in the 3-30 percent range.

LOWER RIVER WATERSHED

Geography

This watershed has its eastern most boundary about 5 miles east of Fiddletown and continues west to Rancho Murieta. Its northern most limits are at Shingle Springs. Included in the watershed are the communities of Fiddletown, Plymouth, and Latrobe. Highway 49 bisects the watershed at its northeast limit, and continues south through Plymouth. Shenandoah Valley, among the best known local areas for vineyards, is near the eastern edge of the watershed. The watershed comprises approximately 135 square miles.

Topography

At its easternmost edge the watershed begins at elevation 2800 and drops to about 130 as it reaches Rancho Murieta. Shingle Springs at its northern most limit is elevation 1200.

Geology

Since this watershed encompasses such a wide range, its geologic morphology is quite diverse. At its eastern limits it is comprised of a combination of the Merhten, Mesozoic granitic rock, and Calaveras Complex rock formations. As it slopes west, it passes through bands of volcanic and metavolcanic rock formations, Copper Hill Volcanics, Gopher Ridge Volcanics, and Jurassic metavolcanic rocks. Soils of the watershed are predominately Auburn-Argonaut and Serpentine-Delpiedra associations. These soils are characterized as well to excessively drained silt and gravelly loams derived from weathered basic and metasedimentary rocks.

Geologic Map of the Sacramento Quadrangle showing Cosumnes River watershed upstream from District intake at Granlees North Dam.

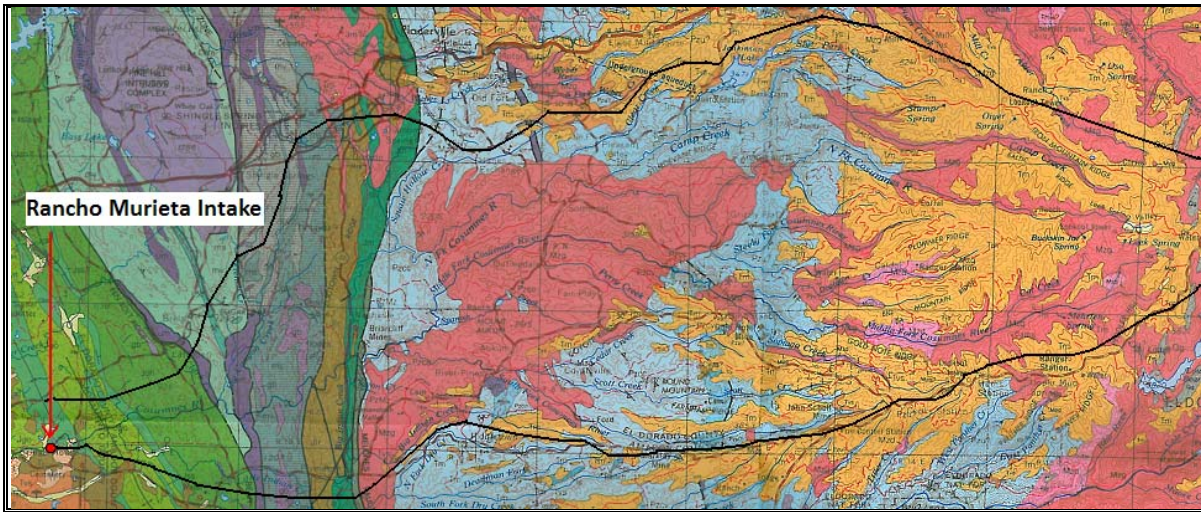
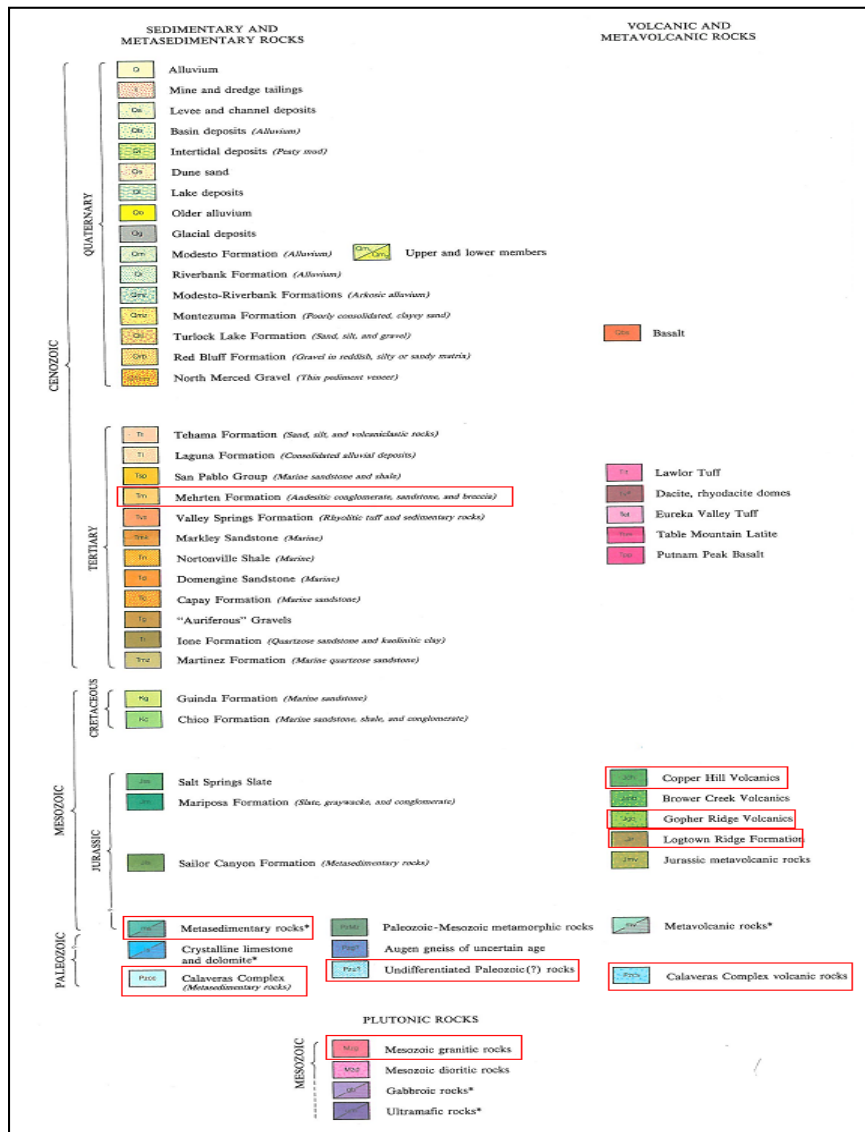


Figure 2 - Geologic Map of Cosumnes Watershed Upstream from Rancho Murieta

Legend for Geologic Map with watershed formations outlined in red.



WATER SUPPLY SYSTEM

GENERAL

The major source of the Rancho Murieta domestic water system is the Cosumnes River, with a small part from surface runoff. Appropriative water rights assigned to the District allow diversion only in winter months, when river flows are expected to be high enough to satisfy permit requirements. Diversion supplies, in most instances will be adequate to replace annual consumption. Maximum diversion, under Permit 16762, for direct consumption and storage is 6,368 acre feet.

The District updated its 2006 Integrated Water Master Plan (IWMP) October 2010, outlining an evaluation of the District's existing and future water supply, potable water, treated effluent, and recycled water assets, as well as updating the 2006 water balance. It also provided an expanded the analysis to assess more options for maximizing the beneficial use of all of District's water resources by evaluating more alternatives for drought augmentation as well as:

- Update the water supply and potable/recycled water needs based on three growth scenarios and projected reductions in potable water demand due to the recent legislation. A comprehensive background on SB7 and District plans to address these new water conservation requirements are presented in the 2020 Compliance Plan (Brown and Caldwell, July 2010).
- Analyze potential higher water supply potential shortfalls in times of drought due to the observed and forecasted changes in water supply availability due to climate change. (This requires evaluating shifts in runoff hydrology due to climate change impacts on the natural variability of flows on the Cosumnes River. These shifts may affect the District's raw water pumping to the reservoirs in the future due to more limited withdrawals from the Cosumnes River based on climate change hydrology scenarios provided by the University of California, Davis.)
- Amend the policy recommendations from 2006 IWMP prepared by HDR, as a comprehensive plan for maximizing the use of District water resources while simultaneously addressing the community's needs during drought conditions and with reservoir draw downs.
- Explain the potential impacts of state requirements for greenhouse gas emissions regulations (e.g., California Assembly Bill (AB) 32) on utility operations.

Based off of District Policy 90-2 regarding water supply, the District has sufficient raw water capacity for present and future uses.

WATER DIVERSION AND STORAGE

Water collected or diverted is stored in three reservoirs within the District: Chesbro, Clementia and Calero. The three primary storage reservoirs (Chesbro, Calero and Clementia) have an estimated combined usable storage volume of 4,225 acre-ft without flashboards and dead storage included, 4,732 of useable volume with flashboards, and overall total storage capacity is

5,132 acre-ft. Calero's useable volume is 2,541.1 acre feet and Chesbro 1,181.1 acre feet together maintain 3,722.2 acre feet of useable storage.

Calero Reservoir is at the highest elevation of the three reservoirs and is usually the first to be drawn down as it is used to keep Chesbro filled. It is drawn down by transferring raw water via a 30-inch siphon pipeline to Chesbro Reservoir. Raw water needed to meet the community's needs is drawn from Chesbro Reservoir to the water treatment plants through a gravity-driven 36-inch raw water supply pipeline, which may also be used to discharge water into Clementia. In addition to raw water storage, Clementia Reservoir can be used to route water to a number of other areas within the community. Clementia Reservoir is also used for irrigation supply and recreational uses. Clementia Reservoir is currently not authorized to be used as a source of public drinking water without first restricting body contact as approved by the California Department of Public Health.

Water is withdrawn for the lakes for treatment for domestic and industrial/ commercial uses. Treatment, distribution and storage is provided on a daily demand basis. Continued review of consumption patterns reflects extensive outdoor irrigation of residential properties. Summer consumption significantly exceeds the winter consumption rates.

Treated water is distributed throughout the system in mains sized for peak domestic usage and to maintain fire flows. Two finished water tanks, one for the gravity side (Van Vleck) and the second for the pressure side (Rio Oso) of the distribution system are used to maintain minimum supply for domestic and fire flows.

WATER RIGHTS

The District's water supply consists of seasonal diversions from the Cosumnes River that are normally diverted to three storage reservoirs (Calero, Chesbro and Clementia). The District's water rights permit, 16762, states the following:

- Between the dates of the allowable diversion period (November 1 and May 31), surface water can be diverted from the Cosumnes River at Granlees Dam into the District's water storage reservoirs.
- Diversions are limited as follows:
 1. No water may be diverted when river flows are less than 70 cubic feet per second (cfs) at Michigan Bar gauging station.
 2. For river flows between 70 and 175 cfs, a maximum diversion rate of 6 cfs is allowed provided this diversion does not reduce downstream flow below 70 cfs.
 3. When river flows exceed 175 cfs, diversion of up to 46 cfs is allowed for direct use plus an additional 3,900 acre-ft for storage as follows:
 - a. 1,250 acre-ft to Chesbro Reservoir.
 - b. 2,610 acre-ft to Calero Reservoir.
 - c. 850 acre-ft to Clementia Reservoir.
 - d. 40 acre-ft to South Course Lake 10.

4. The combined amount of items b, c, and d above cannot exceed 2,650 acre-ft./year
5. The maximum allowable diversion rate to storage is 46 cfs.
6. If at least 400 acre-ft has not been diverted by February 1st, up to 46 cfs may be diverted during February if the river flow is above 70 cfs.
7. If on March 1st at least 2,000 acre-ft has not been diverted; up to 46 cfs may be diverted during the month of March if the river flow is above 70 cfs.
8. If on April 1st at least 4,400 acre-ft has not been diverted; up to 46 cfs may be diverted for the rest of the season if the river flow is above 70 cfs.
9. The equivalent of the continuous flow allowance by direct diversion for any 7-day period may be diverted in a shorter time if there is no interference with vested rights.
10. No water shall be diverted during the allowable period (November 1-May 31) except during such time as there is visible surface flow in the bed of the Cosumnes River from point of diversion to the McConnell gauging station at Highway 99.
11. The total amount of water taken from the river cannot exceed 6,368 acre-ft per year from October 1 to September 30.

Water right permit 16762 was issued in 1969 and amended in 1980. In 2001, the permit was renewed and extended with no new permit requirements through 2020 in consideration that the community was not at full build-out. It now appears likely that in 2020, the community will not have reached full build-out and the permit will need to be extended again through 2030.

DIVERSION FACILITIES

The Granlees North Dam and Pump Station are equipped with two 125 HP pumps (minor capacity) and three 500 HP pumps (major capacity). Maximum diversion capacity is 6 cfs (2,693 gpm) for each 125 HP pump and 15 cfs (6,885 gpm) for the 500 HP units. Typical diversions utilize the minor capacity pumps. However, if the river flows have not been sufficient until later in the diversion season and the District needs to divert its allocation of water, the major capacity pumps are used. The forebay diverts Cosumnes River water through a collection system of 12 screening elements consisting of 3/32" mesh intake screens, cleaned annually by staff prior to its diversion season, as well as being backflushed by an air-purge system when in operation. Although the electrical power facilities are sized to operate the three 500 hp units at once, hydraulic capacities do not allow operation of all five pumps simultaneously. A maximum of three major capacity pumps can be used at one time. Flow rates diverted by the pump station are recorded by a totalizer on the discharge piping.



Granlees Diversion structure on North side of Cosumnes River in Rancho Murieta

A 33" diameter pipeline conveys water from Granlees pump station to Calero reservoir, which is the highest altitude lake. From the 33" pipeline, a 20" branch tee pipeline and valve can also divert water directly into Lake Chesbro. A separate 21" pipeline runs from the Granlees Pump Station to the Clementia reservoir with 131' of head. This line maintains the lake elevation independent of the elevation of lakes Calero or Chesbro.

A 30" siphon line allows transfer of stored water from Calero into Chesbro the intermediate level lake. Lake Chesbro supplies water directly to the treatment plant. Air diffusers are used in Chesbro, near the inlet to the pump station, to precipitate iron and manganese before transfer to the treatment plant. A pump station on Clementia with two 60 HP pumps with a capacity of 2,250 gpm total can also feed water to the treatment plant at Chesbro.

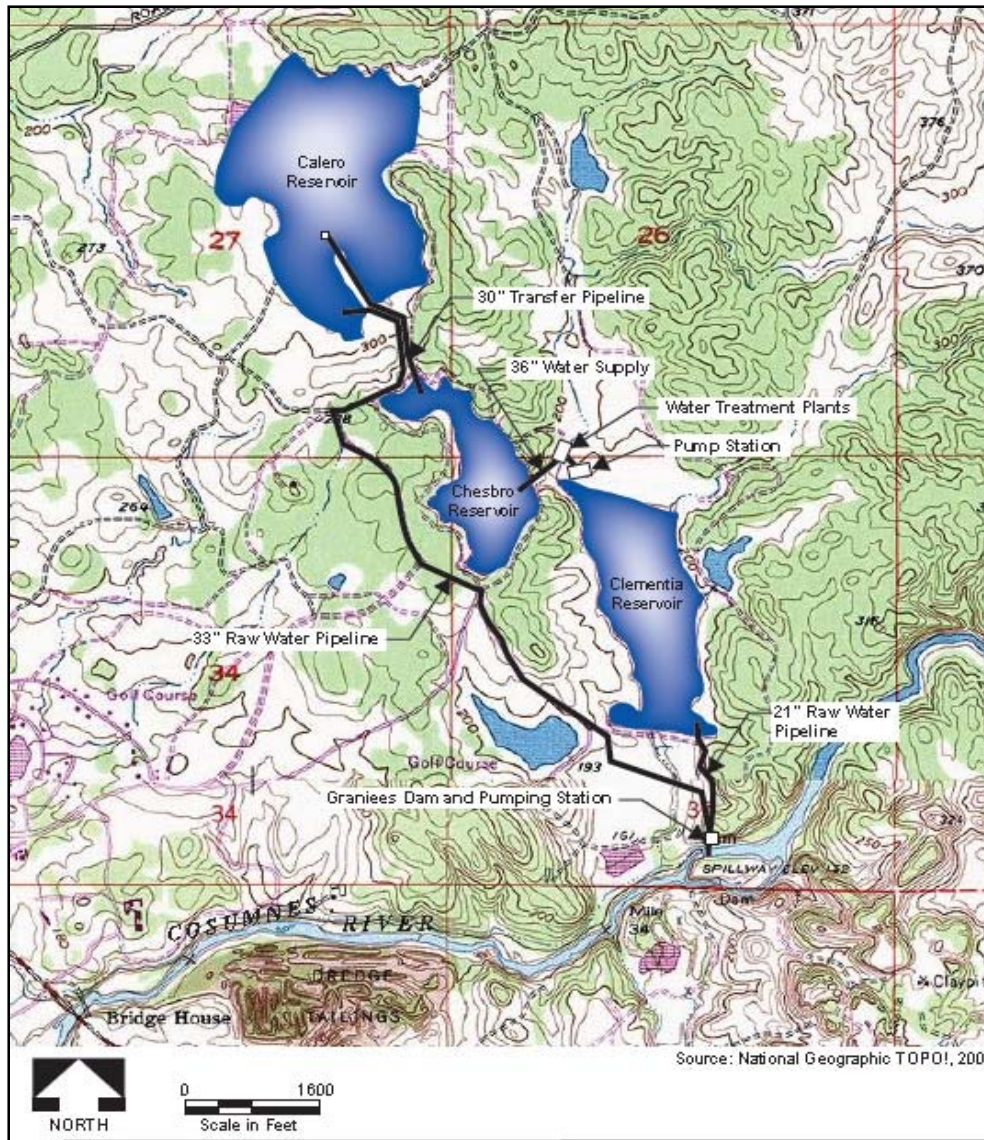


Figure 3 - Raw Water Infrastructure

Raw Water Storage

The storage capacities of the lakes (not including flashboards) are:

Lake	Capacity (acre feet)		
	Total	With StopLogs	Usable
Calero	2,622	2,832	2,541
Chesbro	1,131	1,334	994
Clementia	907	1,000	857
Total	4,660	5,166	4,174

The Department of Water Resources Division of Safety of Dams has granted the District Certificates of Approval for the use of flashboards between April 15 and October 1 of each year. Flashboards can be installed at the spillways of all the reservoirs adding approximately two feet

of elevation to the lake levels. The increased volume of about 500 acre feet replaces water lost through evaporation and seepage.

All three (3) lakes are used for recreation, with Calero and Chesbro for non-body contact uses only. Swimming is permitted at only Clementia because this lake is not used as a supply for the treatment plant at this time. Gasoline powered boats are not permitted on any of the lakes. Lake Clementia may be used for water to the treatment plant in years when full replenishment of one season's consumption is not possible from the river, once permitted again by CDPH. To use water from Clementia on a regular basis may require changes to the plant operations due to higher suspended solids concentrations in Lake Clementia caused by shallow lake depths and recreational activities.

Treatment Process

Most of the water diverted to the lakes is of high water quality requiring little treatment. Winter only diversions, in addition to first flow bypasses, insure that essentially "snow melt" water is diverted and stored. The relative long storage in the reservoirs, up to almost two years, may also serve to improve the water quality by allowing settling of solids of the water entering the treatment plant. Water from Chesbro to the plant typically has the following constituent analysis:

<u>Parameter</u>	<u>Units</u>	<u>Average Value</u>
Acidity	pH	7.2
Total solids	NTU	0.5
Hardness	mg/l	40.0
Bacteria	MPN	<2.2

Treatment Plant Facilities

At buildout, the District may require up to 8.3 mgd of capacity at its treatment plants. Current plans entail all the required capacity will be provided in four phases, with the remaining two phases generally on the order of 2.5-3 mgd per phase. Two (2) phases of conventional treatment are on line now totaling 3.5 mgd. The original phase has a capacity of 1.5 mgd while the second phase, constructed in 1990, has a capacity of 2.0 mgd. Both phases were upgraded in 1994 to meet newer surface water treatment rules.

Common facilities at both plants include:

- Chemical storage and feed systems for alum, potassium permanganate, powdered activated carbon (PAC), sodium hydroxide, zinc orthophosphate, and gaseous chlorine. Handling and storage facilities enable truck and trailer type deliveries.
- Sludge disposal performed by sludge drying beds that have been sized and built for the full current capacity needs.
- Standby power, provided by an engine generator set installed with the second phase facilities. Currently, backup power only has capacity to operate only plant #1 and facility instrumentation.

- Laboratory facilities for the full four phases were constructed with the second phase. Inlet and outlet turbidity and outlet chlorine residual are measured continuously for each plant unit. Other parameters, i.e. bacteria, DBP monitoring, etc. are measured on samples taken at regular intervals. Periodic analyses are also made and reported as required by the CDPH.
- Plant control and electrical switchgear including Programmable Logic Controllers (PLCs), indicators, and digital chart recorders are located in the control room. Operators can set the functions of each plant from the main control room PLCs to operate either or both plants automatically. In normal operation, each plant is operated in *auto* and start/stop is determined by the level of the storage reservoirs.
- Flow into each phase is metered and controlled at a rate set by the operator to match the daily consumption patterns. Flow into the plant is screened by a 3/8" mesh self cleaning rotating drum screen. This screening is primarily used to remove any solids such as aquatic life and vegetation from entering the treatment process.
- A central chemical feed room, with supply tanks and mixers, serves both plants. In this building, the polymer, PAC and permanganate are stored. Chemical metering pumps feed solutions of alum, polymer, lime and potassium permanganate into the untreated water. An isolated building contains the bulk tanks which store zinc orthophosphate and alum. Another separate room, next to the chemical feed room, contains the chlorine equipment used for mixing gaseous chlorine and water while metering the feed rate.

Overall chemical feed rates are set by the operator based on the results of daily review of incoming raw water quality. Based on jar testing and the experience with the plant daily adjustments in chemical feed rate, plant operators maintain the finished water within state mandated finished water standards.

The treatment flow process is as follows:

1. Raw water is aerated in Chesbro around the intake to oxidize iron and manganese and to "freshen up" the raw water. Potassium permanganate is fed at the entrance of raw water into plants for pre-oxidation, along with the chemicals alum & polymer at their respective flash mix chambers containing a high energy turbine mixer.
2. The reaction of particulates in the water with alum and polymer form larger settleable flocs, which require longer, less turbulent reaction times. The flow from the rapid mix enters two or three larger chambers equipped with low speed, low energy mixers where the floc is formed.
3. The "flocculated" water enters a sedimentation chamber where the floc slowly settles to the bottom of the basin. Settled floc is then swept, counter current to

the flow, back into a sludge collection sump from where it is discharged to drying beds. The clarified flow overflows over surface weirs into the filtration room.

4. Final solids removal after sedimentation is provided by gravity through conventional filtration beds consisting of sand and anthracite. These plants are known as “traveling bridge” type filters because of their backwash equipment design and operation. Total area of each filter is approximately 700 square feet. Each filter bed is divided into 81 cells, each about 8 inches wide and their length of 12 feet is equal to the bed width. Normal filtration takes place through every cell over the entire area of the bed. In 1994, both filters were upgraded to meet the new surface treatment rules. The retrofit increased the filter beds to the following depths:

<u>Filter</u>	<u>Sand</u>	<u>Anthracite</u>
Plant 1	12 inches	10 inches
Plant 2	14 inches	10 inches

5. As solids build up in the filters causing the flow of water to backup, a backwash is automatically initiated performed on each cell independently. The traveling bridge is centered over a cell where a pump forces water up through the cell to dislodge accumulated solids. A second pump removes the backwash water which is then discharged into the wash water recover basin. Backwash cycle time is automatically controlled by the pressure drop through the filter, real time clock, daily set schedule, or water level set points.
6. Final filtered water is chlorinated at the end of the filter gallery before discharge into the chlorine contact chamber. Chlorine dosage is set to maintain residual levels so that by the time the water is distributed to the system from the storage reservoirs, the CDPH minimum residual is maintained at all points in the distribution system. Also, zinco-orthophosphate is added for corrosion control. If needed, additional chlorine can be added to the Van Vleck reservoir utilizing a sodiumhypochlorite feed system.

Distribution

Treated water is pumped from clearwells at the treatment plants to two above grade finished water tanks. The tanks are sized to meet the maximum daily domestic demands, reserves, and fire flows at full build out. A welded steel, 1.2 million gallon tank (Rio Oso tank or Reservoir 1) serves about 670 residents in the north side of the community in development units 3, 3B, and 4 in a pressurized zone; while an above ground, prestressed concrete tank (Van Vleck tank or Reservoir #2) serves the remainder of the District via gravity feed. Reservoir 2 is located east, outside the District. This 3.0 million gallon tank, constructed in 1991, is also used to provide makeup water for Reservoir 1 through a check valve located at its site.

Water mains are sized primarily for fire flows and domestic requirements. The system is primarily looped to insure minimum flow and pressure is maintained throughout the system. District staff systematically flushes portions of the system annually to ensure water quality as

wells as functionality of distribution valving. All residential and commercial customers are metered.

EMERGENCY PLANS

The District maintains emergency response plans for the system. These plans are reviewed by staff upon hire and annually to insure personnel are current on emergency procedures. Contact names and phone numbers of the operators are part of the plans.

A general list of District Emergency, Operations, and Management Plans are as follows:

- Emergency Response Program for Chlorine Releases
- Risk Management Plan
- Process Safety Management Plan
- Hazardous Materials Plans
- Consolidated Contingency Plans
- Spill Prevention, Control and Countermeasure Plans
- Sanitary Sewer Overflow Prevention and Response Plan
- Sewer System Management Plan (SSMP)
- Best Management Practices for Sanitary Sewer Overflow (SSO) Reduction Strategies
- Power Outage Response Plan
- Respiratory Protection Plan
- Storm Water Management Program (Phase II MS4)
- Wastewater Reclamation Plant Operations Manual
- Water Plant Operations Manual
- Bacteriological Sample Site Plan
- Lake Management Plan
- Vulnerability Assessment
- Code Red – reverse auto-dialer notification system
- Crisis Communication Plan
 - Crisis Communications Overview
 - Critical Emergency Communications – First Response
 - Critical Information Log
 - Command Center Team
 - District Emergency Phone List
 - CDPH Water Quality Emergency Notification Plan
 - Sacramento County Emergency Operations Phone List
 - Emergency Notification Plan
 - Unsafe Water Alert
 - Boil Water Order
 - Emergency Disinfection Plan
 - Cancellation of Boil Water Order
 - Division of Safety of Dams Emergency Procedures
 - Non-Critical Emergency Communications – First Response

- Media Contacts
- Media Interview
- District Background

Facility alarms are automatically forwarded to the District's South Gate security guard station, where the on duty gate officer calls the on-call operations or utility operator.

CHAPTER 3

ACTIVITIES DETRIMENTAL TO WATER QUALITY

INTRODUCTION

Information in this chapter was obtained from many sources including checks of documents, reports, meetings and conversations with staff of various public agencies within the watershed. These agencies and contact persons are listed in the appendix. In addition, web pages, reports and data relevant to the watershed and activities in the watershed were reviewed.

Natural watershed characteristics and human activities detrimental to the water quality are reviewed below.

NATURAL CHARACTERISTICS

Most common among natural characteristics affecting the watershed is erosion which adds sediments. Causes of naturally occurring erosion include fires and high intensity storm events. Sediment laden runoff caused by erosion increases turbidity which hampers the treatment process by reducing the plant's ability to detect and chlorinate organisms. While erosion may be a problem at other water plants, first flow bypass operations by the District allow high turbidity water to flow past the diversion works. District staff monitors the turbidity of the river and diverts only at times of low turbidity. High rate pumping capacity allows the diversion flexibility to divert when snow melt runoff dominates river flows.

HUMAN ACTIVITIES

By far, human activities pose a greater problem to water quality than natural watershed characteristics due to the chemicals used and the waste produced. As the population in the watershed continues to grow, the greater the potential is for detrimental activities. Detrimental activities to the watershed are reviewed and listed below.

Wastewater Collection and Treatment

Several small private or semi-private sewage collection systems are within the watersheds. These include the Gold Ridge Forest community leach field, Gold Beach Park, and the Leoni Meadows Retreat Camp. Characteristics of the systems are provided in the following table:

<u>System</u>	<u>Est. Daily flow</u>	<u>Treatment Process</u>	<u>Discharge</u>
Gold Ridge	9,000 gpd	Septic tank	Leach field
Gold Beach	4,000 gpd	Septic tank and evaporation pond	Leach field
Leoni Meadows	18,000 gpd	Septic tanks	Leach field

Most of the remaining communities are served by individual septic tank/leach field systems operated by individual homeowners. The fairly old Outingdale community had problems in the past with failing leach fields, but has since repaired the problem areas. This area is monitored by the El Dorado County Environmental Health Department to insure future leach field

problems are identified and repaired in their early stages, reported as typically fixed within 90 days.

River Pines and Plymouth are two (2) communities served by municipal type systems. These systems include gravity collection to pump stations, secondary treatment via aerated lagoons and pond systems, and spray irrigation disposal systems. Both systems meet water quality discharge requirements.

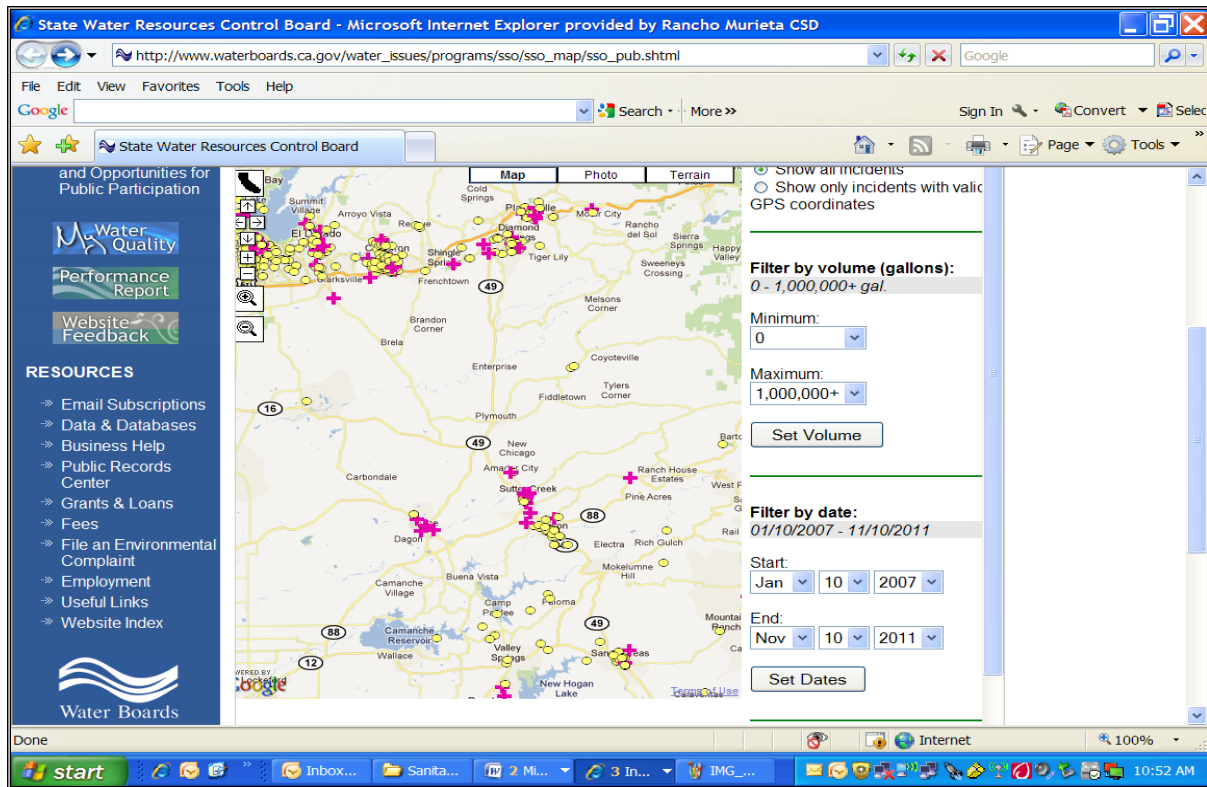
The City of Plymouth operates a Wastewater Treatment facility located on Old Sacramento Rd. approximately two miles west of Plymouth. The facility treats and disposes of wastewater from residential and commercial units in the City of Plymouth, Far Horizons 49er Village RV Resort, and Amador County Fairgrounds. The WWTF consists of a collection system, two aerated ponds (Ponds 1 and 3), one unaerated pond (Pond 2), chlorination facilities, a storage reservoir, and the land application areas (LAAs). All of the ponds and the reservoir are unlined.

Little Indian Creek is located topographically down gradient from the LAAs and an unnamed tributary passes through the LAAs. Sludge is hauled off site to a permitted landfill. Wastewater is applied to approximately 85 acres of the 125-acre site. The LAAs are divided into six fields designated Field 1 through 6. They have installed earthen berms in Fields 2, 3 and 6 along a portion of Little Indian Creek and the unnamed tributary to contain tail water and storm water. To prevent tail water and stormwater runoff from the LAAs entering surface water courses, only these three (3) fields with berms can be used for year-round land application. Fields 1, 4 and 5 currently do not have berms, thus application of wastewater is limited to the period of 1 April to 1 November. However, if they build berms or ditches around these fields, upon approval by the Regional Board Executive Officer, the land application on Fields 1, 4 and 5 may occur throughout the wet season.

The Eldorado County Operated Union Mine wastewater treatment plant currently processes septic tank waste (septage), portable toilet waste and liquid waste from the landfill (leachate). The landfill has three leachate collection systems and the landfill gas collection system. The WWTF consists of aerobic digesters, a sludge centrifuge, a disinfection system, an effluent storage tank, and spray fields. More information about this facility is listed in the landfill section below.

A past five (5) year check of Regional Board CIWQS SSO spill reporting system shows there have been two <1,000 gallon spills at the River Pines system since the last update.

A sanitary sewer overflow (SSO) is any overflow, spill, release, discharge or diversion of untreated or partially treated wastewater from a sanitary sewer system. SSOs often contain high levels of pollutants and may threaten public health, adversely affect aquatic life, and impair the recreational use of surface waters.



Screenshot from Regional Water Quality Control Board CIWQS spill mapper

The data displayed in this map represents SSO reports for individual locations where sewage was discharged from a sanitary sewer system enrolled under the [Statewide General Waste Discharge Requirements for Sanitary Sewer Systems Order, WQO No. 2006-0003-DWQ](#) (the Statewide Sanitary Sewer Order). SSO incidents from a sanitary sewer system may result in discharges from multiple locations and have more than one SSO report in the database.

The data used to display the SSO reports on these maps is based on the latest information for SSO reports from individual agencies enrolled under the Statewide Sanitary Sewer Order. The State Water Resources Control Boards provide a hosting service of all SSO reports and have "view only" access to this information. For specific questions related to SSO incidents or SSO reports, the appropriate indicated reporting agency or responsible party may be contacted.

Landfills

Refuse collection within the watershed is provided by private companies who haul to landfills outside the watershed. However, one formally active landfill, the Union Mine Landfill, exists off of the North Fork of the Cosumnes in the watershed. It was closed in 2007 by Eldorado County. This former landfill is regulated by the CVRWQCB by a Waste Discharge Requirement (WDR) ORDER NO. R5-2006-0020 for the Landfill and has another WDR ORDER NO. R5-2006-0019 for its septage and leachate facility. The County's Union Mine landfill has installed 18 groundwater monitoring wells around the site which must be tested periodically for potential contamination. Run-off around and adjacent to the Union Mine landfill including Martinez Creek is also monitored and tested periodically for chemical contamination and biological and fisheries impact. The original portion of the landfill has undergone final closure. The remaining active area receives only sludge cake from the on-site wastewater treatment plant.

Recreational use

Recreation uses in the watersheds include hunting, fishing, hiking, camping and off road vehicles. Off road vehicles include 4-wheel drive vehicle trailing on unimproved roads and trails in the El Dorado National Forest (ENF). Typically these uses are in undeveloped and remote areas in the basins' watersheds. Boating and camping is allowed at Jenkinson Lake at Sly Park.

Jenkinson Lake at Sly Park was constructed by the U. S. Bureau of Reclamation in 1955 and is operated and managed by El Dorado Irrigation District. It feeds the North fork of the Cosumnes River. Sly Park, located 17 miles East of Placerville in the Sierra foothills, offers many recreational opportunities including water sports, hiking, camping and boating. Water is supplied to the lake from Hazel Creek, Park Creek, and Camp Creek. Camping facilities include eleven campgrounds containing 205 camp sites and group sites for 500 people. Forty eight (48) concrete pit toilets serve the camping and day use facilities. One equestrian campground is located outside the watershed.

A boating plan is in place to enhance the overall safety of the lake. This plan also minimizes turbidity of the lake waters by reducing wave action induced at the shoreline. Sly Park's Jenkinson Lake also supplies drinking water to El Dorado County. The lake was formed by Sly Park Dam, and has a storage capacity of 41,000 acre-feet with a surface area of 650 acres.

Yearly attendance at the park averages 177,000 through the gates although approximately 20,000 people enter the park free. There are no plans to limit the number of campers at the lake.

Improved campgrounds at Pipi Valley and at the USFS Middle Fork campground area accounted for 11,000 and 2,400 visitors respectively in 1994. These areas have pit toilets and running water but do not have dump stations. In the Upper North Fork, dispersed off road vehicle camping is allowed. This type of camping is at its most basic level with no facilities or campsites available. Where camping of this sort has occurred unrestricted for years, many areas need restoration work. However, currently there are no controls on the use or the number of campers in the area. The ENF approach to limit camping is to place rocks or barriers across roads and near creek crossings. The intent is to prevent access to desirable locations, although creative campers find alternative access routes or find new camping areas nearby. In areas damaged by camping or vehicle travel, ENF uses subsoiling to decrease compaction and mulching and planting to reduce erosion potential.

Traffic accidents and spills

Environmental health for Amador and Eldorado Counties, Hazardous Material and Public Works Departments in addition to California Highway Patrol office, indicate there has been no known traffic and/or hazardous material spills that reached waters of the watershed. The watersheds are crossed by several highways and major roads. Highway 16 is aligned generally west to east from Rancho Murieta and Highway 49 is located generally north to south from Placerville. Highway 88 parallels the South Fork in the higher elevations of the watershed beginning at

Cooks Station. Iron Mountain Road crosses the Camp Creek watershed while Latrobe Road lies in the North Fork watershed. Many other minor roads connect the rural residential areas.



Highway 49 crossing Cosumnes River at Amador & Eldorado county line

Unauthorized activities

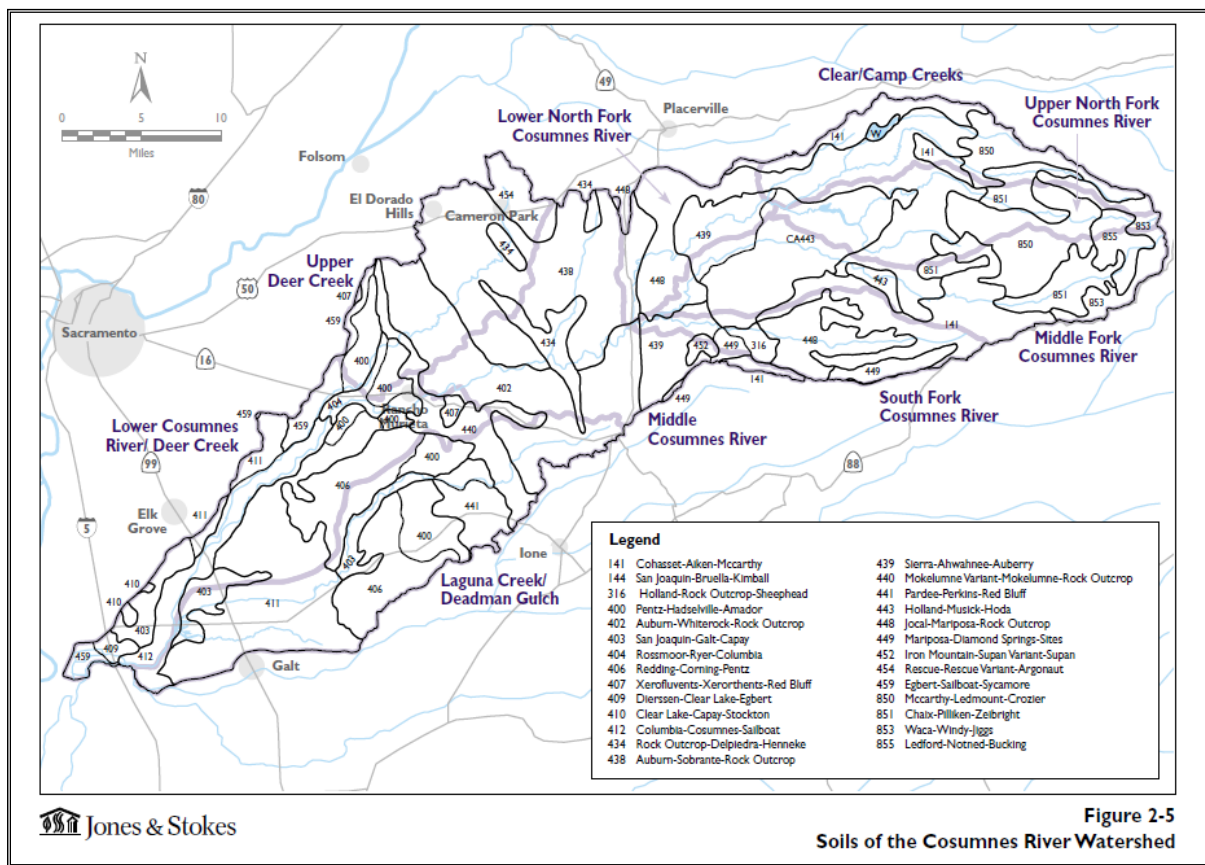
Local environmental health, hazardous material and public works departments in addition to Regional Water Quality Control Board and ENF offices indicate there have been no known unauthorized activities, such as illegal dump sites or other incidents that have resulted in water quality degradation to the watershed. However, there are very few areas that are strictly off limits even in the remotest portions of the watersheds. These areas are difficult to patrol although no evidence of illegal activities is apparent. As development increases throughout the watersheds, opportunities for unauthorized activities increase as visitors, tourists and campers using recreational facilities increase also.

Fires

California Department of Forestry (CDF) maintains records of fires on private lands. Records readily available back to 1984 were reviewed to determine the extent, location and cause of fires. Based on the previous Sanitary Survey, since 1984, over 6400 acres were burned by wildfires. Vegetation fire acres reported from California Department of Fire staff noted that from 2007 to present located in the Cosumnes watersheds above Rancho Murieta have totaled 284 acres in 2007, 160 acres in 2008, 214 acres in 2009, 211 acres in 2010, and 41 acres in 2011. Most of the fires were manmade and were located near population centers traditionally along roads or near recreation areas. From 2002-2011 there were no major fires within the watershed.

Surface Geology

The geologic formations in the watersheds are relatively stable. In recent research and data collection, no known mudslides or other geologic induced events caused deleterious effects to the watersheds. “The geology of the Western Slope of Eldorado County is principally hard crystalline or metamorphic rock that forms the land surface, or underlies a thin soil or isolated alluvial cover. (DWR 1989, 1990; USGS 1983)” Soils are reported as principally “shallow to very deep, coarse- to fine textured soils, formed from granitic, sedimentary, and volcanic rocks.” In regards to sediment production from the watershed at Michigan Burns and Cornwell (2002) monitored and assessed the variability of suspended watershed at the Michigan Bar gage station. The purpose of examining the suspended load was to help characterize both the erosion and deposition mechanisms acting within the sediment delivery system. The average annual discharge at the Michigan Bar stream gage station was between 200 and 400 cfs and approximately 1–3 tons of suspended sediment moves past the Michigan Bar.”



Soils Map from Cosumnes River Watershed Inventory & Assessment Phase II Final Report, September 2003

Logging (Timber Harvesting)

While I was out visually assessing the watershed on the North Fork of the Cosumnes, eight logging trucks hauling timber were observed within a four hour time frame. I have also observed a lot of logging trucks passing by the District office between spring and fall over the past three (3) years. These observations led me to believe that there could be the potential for considerable erosion within our watershed. However, upon investigating the various forks of

the Cosumnes for logging activity adjacent to it, none were observed. Also, utilizing the satellite imaging from Google Maps, only limited areas of clearings were seen.

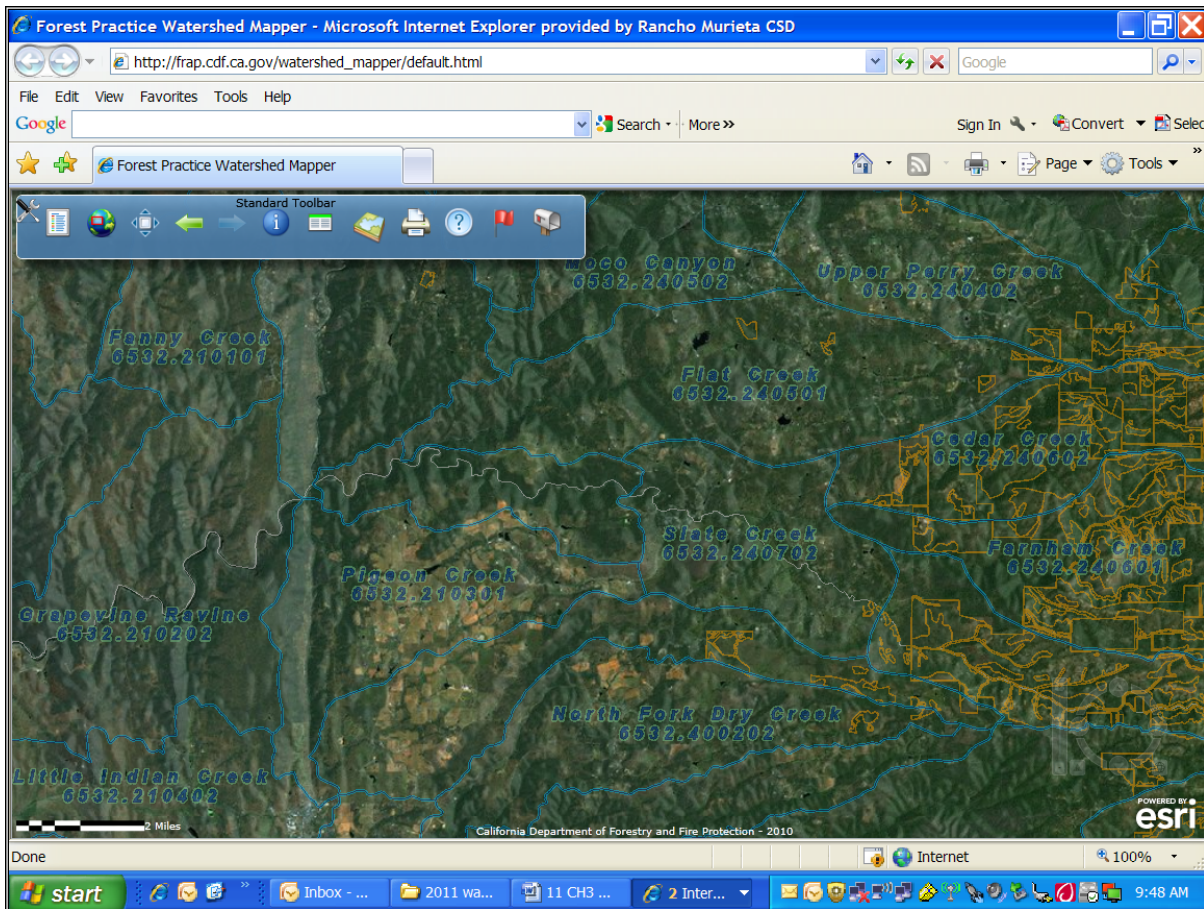


Sierra Pacific logging truck carrying timber from the Cosumnes Watershed

Logging is prevalent on the Eldorado National Forest (ENF) lands as well as on private lands on the watershed. On National Forest lands, the Forest service and harvesting companies are responsible for erosion control and watershed management practices and monitoring of watershed water quality. Guidelines and management practices used by the Forest Service are identified in the *El Dorado National Forest Land and Resource Management Plan* developed in 1988. This plan will be updated every 15 years or earlier if necessary.

On private lands, the California Department of Forestry & Fire Protection is the responsible agency for timber harvesting and erosion control during and after timber harvesting as required in its *California Forest Practice Rules*. This manual identifies specific guidelines and practice to prevent erosion. The intent of these rules is to lessen the harvesting impacts through implementation of mitigation efforts identified in a *Timber Harvest Plan* (THP) prepared by the harvesting contractor. The focus of each Timber Harvest Plan, as it relates to watershed integrity, involves a lot of detail which is the functional equivalent of a CEQA review including sediment transport, road construction, harvesting elements, erosion control, and required buffers to minimize erosion contamination into the watershed. Each plan is subject to multi-agency review such as by Cal-Fire, Department of Fish & Game, Central Valley Regional Water Quality Control Board, US Fish & Wildlife Services and local agencies.

Approved timber harvest plans (THPs) are on file at CDF offices and available on their website. A Forest Practice Watershed Mapper is also available on the California Department of Forestry & Fire Protection website which will outline areas (outlined in yellow on map below) for THPs. The website is: http://frap.cdf.ca.gov/watershed_mapper/default.html. Most of the THPs are on the higher portions of the watershed.



Screen shot from California Department of Forestry & Fire Protection Watershed Mapper showing THP areas outlined in yellow

The major private timber harvester in the watershed is Sierra-Pacific Industries (SPI), which bought lands from Georgia-Pacific, with approximately 8,400 acres available for logging in our watershed.

From Sierra Pacific's Website: Minimizing Soil Erosion

Forested lands are important links in California's water supply network because their large expanses of soil and leaf litter are relatively undisturbed, allowing them to serve as natural water filters. Approximately 75 percent of California's water comes from forested watersheds. That's why Sierra Pacific takes its responsibility to protect water quality so seriously.

One of Sierra Pacific's primary goals is to keep soil where it is needed to grow trees – and away from spots where it is detrimental to water quality or fish habitat. Although erosion is a natural process that can't be totally eliminated, SPI's foresters take precautions to keep management-related erosion to a minimum. Proper planning, careful installation of roadbeds and preventative maintenance are key factors. SPI employs registered professional foresters to determine the ability of the soil to grow trees and estimate the soil's susceptibility to erosion.

The State Water Resources Control Board enforces the Clean Water Act through the issuance of Orders such as the one below, to protect the water shed from erosion due to timber harvesting activities in our area.

STATE WATER RESOURCES CONTROL BOARD

DIVISION OF WATER QUALITY

ORDER WQ 2011-0014-DWQ

MODIFYING ORDER NO. R5-2010-0022

**MODIFICATION OF CONDITIONAL WAIVER OF WASTE DISCHARGE REQUIREMENTS FOR
DISCHARGES RELATED TO TIMBER HARVEST ACTIVITIES**

IN THE CENTRAL VALLEY REGION

*The California Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board), issued a conditional waiver of waste discharge requirements **for discharges related to timber harvest activities in the Central Valley Region** on January 30, 2003 (Waiver), and renewed the Waiver on January 27, 2005 and April 28, 2005. On March 18, 2010, the Central Valley Water Board issued [Order R5-2010-0022](#), which renewed the Waiver until March 31, 2015.*

Water Code section 13269 further provides that any such waiver of waste discharge requirements shall be conditional, may not exceed five years in duration, and may be terminated at any time by the board.

1. Water Code section 13269 includes the following provisions:

. The waiver shall include the performance of individual, group, or watershed-based monitoring, unless the board determines that the discharges do not pose a significant threat to water quality.

. Monitoring requirements shall be designed to support the development and implementation of the waiver program, including, but not limited to, verifying the adequacy and effectiveness of the waiver's conditions. In establishing monitoring requirements, the board may consider the volume, duration, frequency, and constituents of the discharge; the extent and type of existing monitoring activities, including, but not limited to, existing watershed-based, compliance, and effectiveness monitoring efforts; the size of the project area; and other relevant factors.

. Monitoring results must be made available to the public.

Pesticide and Herbicide Use

Agriculture provides the greatest potential for pesticide and herbicide contamination other than from private uses. Agriculture in the water shed is mainly limited to wineries. From utilizing Google maps, Eldorado and Amador County websites, I found that there are approximately sixty-four (64) wineries within the Cosumnes watershed. In the Shenandoah Valley, along the South Fork, vineyards use various pesticides and herbicides to increase crop yield. Fungicides include wettable sulfur, *Rubigan* and *Rally*. Herbicide use is typically limited to *Roundup* while soil sterilants are *Simazinone* and *Karmex*. These are normally administered in the dry season which minimizes the potential to reach water courses.

The Eldorado County Agriculture Department oversees the use of pesticides in Eldorado County and the Amador County Agriculture Department in Amador. They both noted that rather than have individual discharge permits for pesticide use, most of the wineries have joined a watershed coalition which formed after 2003 when the Central Valley Regional Water Quality Control Board adopted a "Conditional Waiver" for irrigated lands. The waiver contains the water quality requirements for agriculturists to help protect the watersheds from farm water runoffs (called wastewater discharges) that might pollute the surface water supply. As a part of the regulations, periodic sampling and testing of the watersheds is required. The Regional Board MRP can be found on the web here:

[Monitoring and Reporting Program, Order Nos. R5-2003-0826, R5-2005-0833, and R5-2008-0005 for Coalition Groups Under Resolution No. R5-2003-0105, Conditional Waiver of Waste Discharge Requirements for Discharges From Irrigated Lands Within the Central Valley Region](#)

ENF in the past used strychnine to control gophers although this practice was discontinued in the early '90s. Use of herbicides in young tree plantations includes glyphosphate, triclophyr and hexazinone. ENF felt the risk to receiving waters associated with the use these herbicides was low.

Mine Runoff

Precious metal lode mines are located in the North Fork watershed, but all of the mines have not operated for many, many years. Historically, these lode mines used mercury and arsenic to separate the gold and other precious metals from the quartz. Acid drainage, mercury and arsenic contamination potentially exists although no known contamination or leaching has been identified.

The County of El Dorado owns 271.44 acres at the Union Mine Disposal Site. The groundwater monitoring program at Union Mine is exceptionally complex because of the approx. 20,000 ft. of mine shafts dug during the 1,800's under and adjacent to the landfill site--the Union Mine area was historically one of the more active gold mine sites in the County. The mine workings about the Union Mine property have historically discharged mine wastewater which contains naturally occurring arsenic from the arsenic pyrite within the gold bearing quartz. The County has recently "plugged" the on-site mines to reduce and stop the uncontrolled discharges of groundwater passing through the mine openings. As noted in the Landfill section the Regional Board required El Dorado County to provide onsite treatment and reclamation of the mine discharge under a no discharge permit. The site maintains an operating permit with the Eldorado Irrigation District so that secondary treated effluent can be sent to the EID force main sewer line located near the town of El Dorado.

One rock quarry mine operates in the North Fork watershed and does not adversely affect water quality. Storm runoff is retained on site in settling ponds before discharge.

Grazing Animals

Cattle grazing occurs on private lands and in El Dorado National Forest and Bureau of Land Management (BLM) lands. While the amount of grazing on private land is very difficult to

establish, the ENF and BLM established allotments for specific areas for grazing. The BLM allows grazing on approximately 900 acres in the North Fork watershed near Somerset. ENF has allotments for nearly 5,700 acres to allow for limited seasonal cattle grazing of between 200-600 head. Grazing is generally located in three broad areas as follows: approximately 2800 acres along the upper North Fork and Camp Creek; approximately 1,200 acres in the Grizzly Flat area; and approximately 1,700 acres in the Middle Fork along Scott and Sopiago creeks.

On private lands most of the large scale grazing is located near to Crawford Ditch area and in the Clear Creek watershed. These grazing areas support between 300-400 head of cattle.



Michigan Bar gauging station



Cattle Ranch adjacent to Michigan Bar Gauging Station

Wild Animals

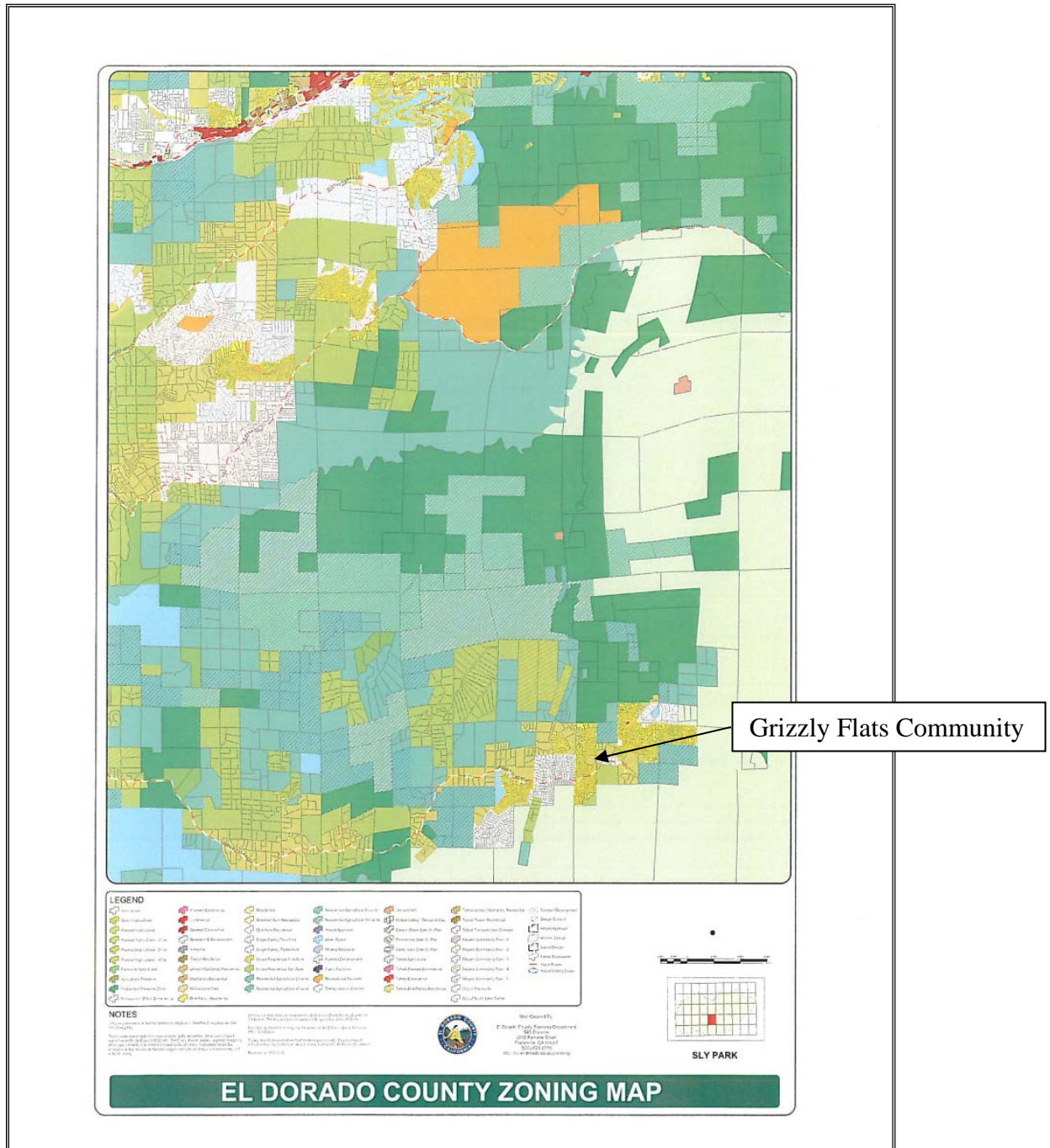
Wild animals in the watershed include bear, deer, gophers, opossums, raccoons, skunks, rabbits, mountain lions, coyotes, bobcats, and beavers. Information obtained from staff at ENF and F&G indicate there are no regular counts of any animals in the watersheds. In the past, F&G monitored the deer kill in areas that overlapped the watersheds. However due to resource constraints this practice was discontinued.

F&G revealed that deer herds tend to winter at elevations between 3,000-4,500 feet while they summer at elevations of 6,000 feet and above. Several resident herds live year round in the riparian oak woodlands in the foothill portions of the north and middle fork watersheds.

Anticipated Growth in the Watershed

The eastern portion of the watershed is predominately under federal ownership and thus not available for development. The central portion of the watersheds, generally west from Somerset, is zoned rural residential, low density residential, or timber reserve. County general plans have heretofore allowed development to occur in the context of lower density development consistent with a rural atmosphere. Current county general plans will continue with that development scenario. In general the smaller communities, both in El Dorado and Amador counties, have no plans for accelerated growth or plans to allow more growth than is already currently approved. Eldorado County Planning Services zoning maps and staff note that a increase in housing is occurring in the Grizzly Flats area.

El Dorado County recently approved a rural residential development entitled Cinnabar which is comprised of 589 lots on 7,868 acres for an average density of one unit per 13.8 acres. This development is located north of the South Fork immediately west of Highway 49. Water service will be provided by individual wells while sewer service will be provided by individual septic tanks and leach fields. El Dorado County Environmental Health Department will be the responsible agency for the monitoring of the septic tank and leach field installations.



Eldorado County Planning Services Zoning Map of Sly Park area

CHAPTER 4

WATERSHED CONTROL AND MANAGEMENT PRACTICES

INTRODUCTION

Rancho Murieta Community Services District comprises approximately 3500 acres of the 536 square mile watershed. The CSD diverts water at the lowest point of the watershed as the Cosumnes River flows past the community. As such, the CSD has no control of upstream water quality management practices. In fact, while researching this watershed study, the vast majority of the agencies and people contacted had no idea the Cosumnes River was the sole source of water for Rancho Murieta.

However, agencies involved in controlling operations in their respective sphere of influence recognize the almost pristine nature of the river. In light of this, those agencies have undertaken plans to protect the quality of the water shed.

The following agencies have specific water quality management plans for portions of the watershed as the river or tributary creeks pass through their spheres of influence.

USFS- El Dorado National Forest

As part of the ENF's Land and Resource Management Plan, much attention is given to enhancing the existing water quality and preventing further degradation of the watershed. Specific best management practices are outlined in the plan covering such topics as logging, road clearing and erosion protection, pesticide and herbicide use and recreational activities. All these activities focus on erosion as the major source of detrimental activity to the watershed.

In addition, every five (5) years, each creek watershed is evaluated for water quality impacts and degradation. Specific recommendations resulting from these surveys are included in the Forest Management Plan.

California Department of Forestry & Fire Protection

California Department of Forestry (CDF) focuses on two (2) sources for water quality impacts: logging and fires. As part of their logging contracts, CDF requires each logging contractor to prepare a Timber Harvesting Plan (THP) for each area to be logged. This THP stipulates the methods the contractor will use to log, build roads, prevent erosion and ultimately revegetate the area as needed.

CDF uses control burns to remove understory growth, which when dry is tinder for the larger fires. By removing understory growth, the fire potential for an area is significantly reduced. In addition, if a fire were to occur in an area where a controlled burn was conducted, the ensuing fire would be less severe. CDF attempts to follow after fires and revegetate to prevent additional erosion and runoff of ash laden soils.

El Dorado County

The County Department of Public Works enacted a *Grading, Erosion and Sediment Control Ordinance* to regulate the grading on private property within the unincorporated area of the county. This ordinance sets forth the regulations to control excavation, grading, and earthwork construction for single parcel improvements.

The County Environmental Health Department is responsible for the approval and inspection of all septic tank and leach field installations. Likewise, the County has detailed permitting and inspection requirements for the use of septic tank systems.

Amador County

Similar to El Dorado County, Amador County has grading and septic tank system ordinances and permitting regulations. These regulations likewise strive to protect water quality of natural water courses throughout the county.

Sacramento County

Sacramento County is very concerned about sediment transport and erosion as evidenced by its NPDES permit requirements and Storm Water Best Management Practices guidelines for construction activities. In addition, the County has a strongly enforced grading ordinance in place. The Environmental Health Department in conjunction with the building department is responsible for the inspection and approvals of septic tank systems.

Central Valley Regional Water Quality Control Board

National Pollution Discharge Elimination System (NPDES) permits are issued by the Regional Board to the owner or operator of any facility or activity that discharges waste which may affect groundwater or reach surface waters. Waste discharge requirements are included as part of the NPDES permit. These discharge requirements define the required level of treatment, type of discharge allowed, if any, and the monitoring and reporting requirement of the facility. In addition, specific pollutant limits are set as a condition of approval of the permit.

CHAPTER 5

WATER QUALITY

INTRODUCTION

The Surface Water Treatment Rule sets treatment requirements to control microbiological contaminants in municipal and public water systems. EPA, in defining the rule, set the minimum of 3-log removal of *Giardia lamblia* cyst and a 4-log virus removal/inactivation for all surface waters, as well as a host of other water quality requirements. Any sampling that show concern due to results exceeding CDPH requirements, would be communicated to the CDPH and community as per stringent CDPH requirements.

SOURCE IDENTIFICATION NUMBERS

Raw (influent) - 3410005-001
 Plant #1 (effluent) - 3410005-002
 Plant #2 (effluent) - 3410005-003

MONITORING PROGRAM

The District monitors the raw and finished water as required by CDPH. The raw water sampling and testing is from the influent line from Lake Chesbro. The following is the sampling and testing program currently in place at the District. Some sampling has been waived by CDPH due to past results showing that it is very unlikely for a result of that constituent.

<u>Constituent</u>	Frequency	
	<u>Raw Water</u>	<u>Finished Water</u>
Turbidity	Continuously	Continuously
Coliform Bacteria	2x month	Weekly
Minerals	Annually	NA
Metals	Annually	NA
Inorganic Chemical	Every 3 years	NA*
Organic Chemicals	Annually	NA*
Radioactivity	Waived	Waived
Iron & Manganese	2x month	NA
Lead & Copper	NA	Every 3 years
THM/HAA5	NA	Quarterly
DBP precursors	Monthly	Monthly
Chlorine residual	NA	Continuously/Weekly

*see monitoring schedule

Details for the Drinking Water Monitoring Schedule for the District, System Number: 3410005, is up to date and available on the web: <http://www.cdph.ca.gov/certlic/drinkingwater/Pages/Monitoring.aspx> Under Sacramento District 9. It shows that the District complies with and is within required water quality monitoring standards.

LABORATORY TESTING

The District utilizes a third party laboratory for the testing of the majority of its laboratory samples. However, the District utilizes and maintains a laboratory at its Water Treatment Facility to optimize process control and ensure water quality. This lab is certified by the Environmental Laboratory Accreditation Program (ELAP).

“ELAP provides evaluation and accreditation of environmental testing laboratories to ensure the quality of analytical data used for regulatory purposes to meet the requirements of the State's drinking water, wastewater, shellfish, food, and hazardous waste programs. The State agencies which monitor the environment use the analytical data from these accredited laboratories. The ELAP-accredited laboratories have demonstrated capability to analyze environmental samples using approved methods.”

ABILITY TO MEET THE SWTR RULE

In 1995 the District’s two water plants were upgraded to comply with the SWTR requirements for *Giardia* removal. This upgrade included addition of a new anthracite layer above the sand filter. In addition at plant #1 additional sand was added to increase the bed depth to 12 inches. As part of the upgrade, new traveling bridges and instrumentation and controls were installed. To date results show both plants meet the SWTR rules.

The District met the CDPH Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) sampling requirements. The District sampled for, and continues to sample for, E. Coli and total coliforms instead of Cryptosporidium, showing that our source is not vulnerable to contamination and does not require additional treatment.

The District’s water also meets the requirements of the Stage 2 Disinfection Byproduct Rule (DBPR) as Total Trihalomethane & HAA5 (Haloacetic acid) levels are below the required levels, and have submitted their compliance and monitoring plan to the CDPH.

Quarterly TTHM Report for Disinfection Byproducts Compliance Based on Flow-Weighted Averages (in µg/L or ppb)																					
System Name: Rancho Murieta CSD										System No.: 34-10005				Year: 2011		Quarter: 4th					
Year: 2007					2008				2009				2010				2011				
Quarter:		1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):		1/26	4/19	9/7	10/2	1/9	4/4	7/9	10/9	1/6	4/8	7/10	10/7	1/14	4/14	7/14	10/15	1/14	4/14	7/14	10/14
Facility 1	Cantova	12.0	17.0	43.0	50.0	53.0	25.0	67.0	73.0	75.0	57.0	94.0	57.0	28.0	57.0	49.0	54.0	29.0	41.0	58.0	54.0
	CSD Warehouse	38.0	37.0	68.0	72.0	81.0	53.0	75.0	72.0	79.0	72.0	100.0	73.0	25.0	71.0	55.0	58.0	34.0	43.0	60.0	52.0
	Site 3																				
	Site 4																				
	Quarterly Average	25.0	27.0	55.5	61.0	67.0	39.0	71.0	72.5	77.0	64.5	97.0	65.0	26.5	64.0	52.0	56.0	31.5	42.0	59.0	53.0
Running Annual Ave.	53.3	42.0	36.4	42.1	52.6	55.6	59.5	62.4	64.9	71.3	77.8	75.9	63.3	63.1	51.9	49.6	50.9	45.4	47.1	46.4	
Meets Standard?*	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>
(check box)	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>
Number of Samples Taken	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Quarterly HAA5 Report for Disinfection Byproducts Compliance Based on Flow-Weighted Averages (in µg/L or ppb)																				
System Name: Rancho Murieta CSD										System No.: 34-10005				Year: 2011		Quarter: 4th				
2007					2008				2009				2010				2011			
Year	Quarter				1st Qtr.				2nd Qtr.				3rd Qtr.				4th Qtr.			
Sample Date (month/date)	1/26	4/19	9/7	10/2	1/9	4/4	7/9	10/9	1/6	4/8	7/10	10/7	1/14	4/14	7/14	10/15	1/14	4/14	7/14	10/14
Facility 1																				
Cantova	16.9	23.4	31.3	37.7	53.7	19.9	31.9	44.3	47.7	53.6	50.7	53.8	20.8	48.3	43.5	44.0	40.5	43.2	37.2	36.8
CSD Warehouse	38.3	41.9	34.8	41.0	56.5	35.9	38.2	43.9	51.4	55.0	48.4	62.3	23.2	47.7	49.5	39.1	40.3	44.8	38.8	33.1
Site 3																				
Site 4																				
Quarterly Average	27.6	32.7	33.1	39.4	55.1	27.9	35.1	44.1	49.6	54.3	49.6	58.1	22.0	48.0	46.5	41.6	40.4	44.0	38.0	35.0
Running Annual Ave.	33.2	33.2	33.2	33.2	40.0	38.9	39.4	40.5	39.2	45.8	49.4	52.9	46.0	44.4	43.6	39.5	44.1	43.1	41.0	39.3
Meets Standard?*	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>
(check box)	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>
Number of Samples Taken	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

OTHER SAMPLING OF INTEREST

Although there is no indication of potential contamination of District water by Chromium-6, due to its popularity in the news, the District sampled its raw and finished water for it which both came back as non-detected (ND). The District does not have fluoride naturally occurring in its raw water nor does it feed it into its water.

Due to a taste and odor (T/O) event this past summer of 2011, the District worked with various outside agencies to determine what the source of the taste and odor was. It was determined that species of blue-green algae, primarily *Phormidium*, had proliferated in the raw water holding reservoirs to a point where their byproducts, Geosmin & MIB(2-Methylisoborneol), could be tasted and smelled in the potable water delivered to the community. “Geosmin and MIB can be tasted in the water by humans at concentrations of 0.01 and 0.03 parts per billion (ppb).” *AWWA Research Foundation Report, 1996* District lab tests showed our raw water had MIB at 97 ng/L (0.097 ppb) and 3.5 ng/L (0.035 ppb). The District then hired HDR Engineering, Inc. to conduct a Raw Water Supply Assessment to further determine a plan to prevent T/O in the future.

ODOR OR TASTE CHARACTERIZATIONS AND POSSIBLE CAUSES		
CHARACTERIZATION	POSSIBLE CAUSE	LABORATORY TESTS
Metallic Taste	Metals in soil or rock	Iron and manganese
Sour, salty	From corrosive water	Lead and copper
Rotten eggs	Hydrogen sulfide	Hydrogen sulfide (need special bottle)
Musty	Algae	2 Methylisoborneol, chloroanisole
Earthy	Organic material	Geosmin

Taste & Odor in drinking water, AWWA research foundation report, ISN 0898678641, 1996.

*Lab testing in September-October 2011 revealed MIB from Phormidium algae

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The following conclusions were inferred from the preparation of this sanitary survey:

- Erosion is a major source of contaminant and it will continue to be a problem. Erosion will increase the turbidity thereby making the treatment process more difficult to meet SWTR rules.
- Growth in the watershed, while slow at present, will continue to increase as the rural lifestyle attraction increases human activities detrimental to the watershed. However, the responsible agencies acknowledge the apparent trend and have instituted programs to mitigate the impacts.

RECOMMENDATIONS

In conclusion, this sanitary survey recommends the following actions:

- The District should contact all the responsible agencies in the watershed and be listed with each agency for emergency notification of any activity that may potentially impact water quality of the Cosumnes River.
- To continue to monitor the activities detrimental to the watershed and document changes to the water quality, the District should implement a Cosumnes River raw water sampling and monitoring program before diverting into the District's storage lakes.
- It is recommended the District continue to follow and to meet the monitoring requirements set forth by the CDPH as well as implement an algae control program in its raw water supply reservoirs.

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<http://www.cdph.ca.gov/certlic/drinkingwater/Pages/default.aspx>

Timber harvesting GIS data and watershed maps are available for download at <ftp://ftp.fire.ca.gov/forest>

http://www.spi-ind.com/html/forests_watersheds.cfm

Government sites

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