California Water Service Company

2005 Urban Water Management Plan

Marysville District

FINAL

November 10, 2005

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California Water Service Company
2005 Urban Water Management Plan
Contact Sheet

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1 Introduction

California Water Service Company is an investor-owned public utility supplying water service to 1.7 million Californians through over 440,000 connections. Its 25 separate water systems serve over 50 communities from Chico in the north to the Palos Verdes Peninsula in Southern California. In 2000, California Water Service Company merged with the Dominguez Services Corporation incorporating several northern and southern California water systems. California Water Service Group, California Water Service Company's parent company, is also serving communities in Washington, New Mexico and Hawaii. Rates and operations for districts located in California are regulated by the California Public Utilities Commission (CPUC) and are set separately for each of the systems. California Water Service Company incorporated in 1926 and has provided water service to the Marysville community since 1930.

1.1 Purpose

California Water Code §10644(a) requires urban water suppliers to file with the Department of Water Resources, the California State Library, and any city or county within which the supplier provides water supplies, a copy of its Urban Water Management Plan, no later than 30 days after adoption. California Water Service Company will follow the California Water Code and file an Urban Water Management Plan at least once every five years on or before December 31, in years ending in five and zero.

The 2005 Urban Water Management Plans are due December 31, 2005. All urban water suppliers as defined in Section 10617 (including wholesalers), either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet annually are required to prepare an Urban Water Management Plan.

This UWMP is a foundation document and source of information for a Water Supply Assessment and a Written Verification of Water Supply. An UWMP also serves as:

- A long-range planning document for water supply,
- Source data for development of a regional water plan, and
- A source document for cities and counties as they prepare their General Plans.
- A key component to Integrated Regional Water Management Plans.

1.2 Public Review

California Water Service Company completed a draft of the Urban Water Management Plan for Marysville district on August 8, 2005. The first draft was sent to the City of Marysville and County of Yuba for review and comment. Copies of the draft plan were available at the Agency office for public review and comment.

California Water Service Company conducted a formal public meeting to present information on its general rate case request to the CPUC. Presentation of the Urban Water Management Plan is included in the proceedings and serves as a public review of

the Urban Water Management Plan. A public hearing was scheduled for October 28, 2005 at the following location:

Marysville City Hall Council Chambers
526 "C" Street
Marysville, CA 95901

At 2:00 p.m. and 7:00 p.m.
Room was reserved from 1:00 p.m. to 10:00 p.m.

The second draft was sent to the City of Marysville and County of Yuba for review and comment.

Proof of the public hearing is presented in Appendix A

1.3 Plan Adoption

Final comments were received by November 4, 2005. The final plan was adopted by the Vice President of Engineering & Water Quality on November 10, 2005 and was submitted to California Department of Water Resources within 30 days of approval. Appendix A presents a copy of the signed Resolution of Plan Adoption.

Table 1.3-1 summarizes California Water Service Company's level of activity to include various agencies in the planning process of this Urban Water Management Plan

Table 1.3-1: Coordination with Appropriate Agencies (Table 1)

	Commented on the draft	Was sent a copy of the draft plan	Was sent a notice of intention to adopt
City of Marysville	✓	✓	✓
Yuba County Water Agency	✓	✓	✓
District Manager	✓	✓	✓

The agencies listed in Table 1.3-1 have also been sent a copy of the final version of this report.

In addition to the resolution, Appendix A also contains the following:

- Any comments received during the public review of this plan.
- Minutes from the public hearing.
- The review sheet check list from Department of Water Resources.

1.4 Water Management Tools

California Water Service Company uses the following water management tools to maximize water resources for the Marysville District:

- Hydraulic analysis will be used to identify limitations in the water distribution network and provide recommendations if main replacement is required.
- SCADA/Water measurement provides information as to how the district is operating and gives a historical record of district, including water levels. California Water Service Company maintains detailed records including the water sales and the customer service connection by sector and used this information for future projections.
- Geographical Information Systems (GIS) will be used to combine several sources of information and allow land usage management tools to provide insight into the growth of the district.
- Water quality data analysis provides a detailed compositional analysis of the water and provides information on potential supply shortfalls that can result from mineral intrusion or contamination.
- Water Supply and Facilities Master Plan provided details into the district from a global perspective and evaluates the major equipment and facilities replacement schedule, and identifies long term projects.

1.5 Plan Organization

This plan is organized as described in the following outline. The corresponding provisions of the California Urban Water Management Planning Act are included as references. Tables in this plan have cross references to the tables as listed in the "Guidebook to Assist Water Suppliers in the Preparation of a 2005 Urban Water Management Plan" prepared by the California Department of Water Resources.

Section	Executive Summary	Act Provision
Contact Sheet	List of Contact Persons	
Chapter 1	Introduction This chapter describes the requirement and the purpose of the Urban Water Management Planning Act, plan adoption, schedule, and management tools.	§10620 (d) §10620 (f) §10621(a-b) §10635 (a) §10642 §10644 (a) §10645
Chapter 2	Service Area Information This chapter describes the district service area and includes area information, population estimate, and climate description.	§10631 (a)
Chapter 3	Water Sources This section includes a detail discussion of the water supply sources including a section on the water quality	§10631 (b-c) §10633 (a - f) §10634
Chapter 4	Water Shortage Contingency Plan This chapter describes the District's planning during water shortages during drought and emergency situations.	§10631 (d) §10632

Section	Executive Summary	Act Provision
Chapter 5	Water Use Provisions This chapter describes the water supply projection methodology used to estimate water demand and supply requirements to 2030 in five year increments.	§10631 (e)
Chapter 6	Supply And Demand Comparison This chapter discusses the water supply outlook for the district under different hydrologic conditions in accordance with DWR guidelines. Specifically, supply and demand comparisons in five year increments to 2030 under normal, dry year and multiple dry year conditions are presented in this section.	§10631 (h-i)
Chapter 7	Water Demand Management Demand management measures used to benchmark conservation methods is described in this chapter.	§10631 (j) §10631 (g)
References	References The source of any information used in this plan is listed in this section	-
Appendix A	Resolution To Adopt The Urban Water Management Plan This section includes the following: 1) Resolution 2) Letters to and comments from various agencies 3) Minutes from the public hearing 4) DWR Checklist	§10621(b) §10642 §10644 (a)
Appendix B	Service Area Map This appendix includes the service area map of the district as filed with the Public Utilities Commission.	-
Appendix C	Water Supply, Demand, And Projection Worksheets This section includes spreadsheet used to estimate the water demand for the district.	-
Appendix D	Yuba County Water Agency Ground Water Management Plan A copy of the UWMP for Yuba county is included as reference.	§10631 (b)(1-4)
Appendix E	California's Ground Water Bulletin 118 Sections from the Department of Water Resources Bulletin 118 are included as a reference and detail the basin for the district.	-
Appendix F	Tariff Rule 14.1 Water Conservation And Rationing Plan This section contains the tariff rule for reference.	-
Appendix G	CUWCC Annual Reports This section contains the reports filled with the California Urban Water Conservation Council.	§10631 (j)
Appendix H	Water Efficient Landscape Guidelines The guideline for water efficient landscape that California Water Service Company uses at its properties, including renovations, is contained in this section.	-
Appendix I	BMP Economic Analysis Assumptions Worksheets for each BMP are presented in this section.	-

1.6 Implementation of Previous UWMP

California Water Service Company has 25 separate water service districts and maintains separate plans for each district. The plans have been divided into 3 groups, which each group being updated on a 3 years cycle, as approved by the Public Utilities Commission. The last Urban Water Management Plan for Marysville District was published in 1997 as part of the general rate case.

The BMP programs outlined in that plan and the status of each program as of 2004 is listed in Table 1.6-1.

Table 1.6-1: Proposed 1997 Conservation Programs

Program	Program Implemented
BMP 01 Residential Survey	Cost benefit analysis shows BMP-01 is not cost effective to implement in the Marysville District
BMP 02 Plumbing Retrofit	Implemented since 1994
BMP 07 Public Education	On-going
BMP 08 School Education	Implemented since 1996
BMP 09 CII Programs	Cost benefit analysis shows BMP-09 is not cost-effective to implement in Marysville District.
BMP 14 ULFT Rebate	On-going

2 Service Area Information

2.1 District Description

The Marysville District is located in Yuba County. It is situated in the Sacramento River hydrologic region, part of the North Yuba Sub-basin. The district is approximately 40 miles north of the City of Sacramento. Major transportation links to the district include State Highway 70 and State Route 20, and the Southern Pacific and Western Pacific Railroads provide rail service to the region. The location and general area map is shown in Figure 2.1-1.

The service area is built at the confluence of the Feather and Yuba Rivers. The system serves the City of Marysville. Figure 2.1-2 shows the approximate service area in relation to the city limits and adjacent cities. A service area map filed with the California Public Utilities Commission is presented in Appendix B. California Water Service Company serves within the levee system that protects the City of Marysville. The city limits extend beyond this levee; however, development has not been approved outside the levees. Development is possible to the north of town, but because of the major flood potential, costly levees would have to be constructed prior to development.

The Feather River provides an outlet for a major drainage basin in the northern Sierra Nevada Mountains. Oroville Dam is located on the Feather River about 30 miles up stream of Marysville. This 3,537,600 acre-foot (AF) reservoir, owned and operated by the DWR, is the principal source of water for the State Water Project (SWP). Several reservoirs are located on the Yuba River and its tributaries. The largest of these is Bullards Bar, a 970,000 acre-foot reservoir owned by the Yuba County Water Agency.

Major active earthquake fault lines are shown on Figure 2.1-3. The Rescue Lineament - Bear Mountains fault zone lies to the east and the Dunnigan Fault lies to the southwest (ref. 1). The Lineament - Bear Mountains fault zone is responsible for the uplift of base rock that forms the Sierra Foothills. A major earthquake on either of these faults may affect water service.

Figure 2.1-1: General Location of Marysville District

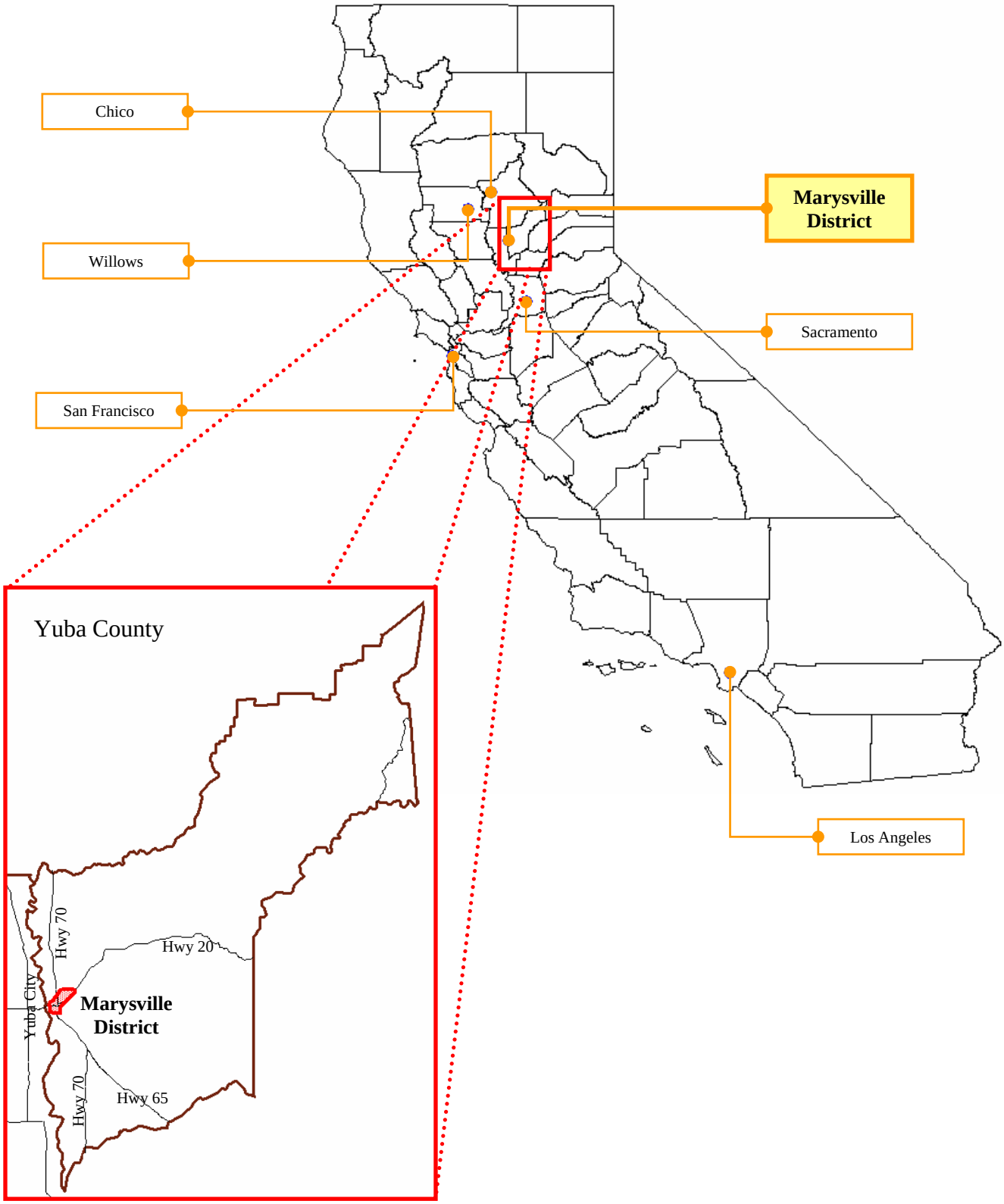


Figure 2.1-2: General Service Area

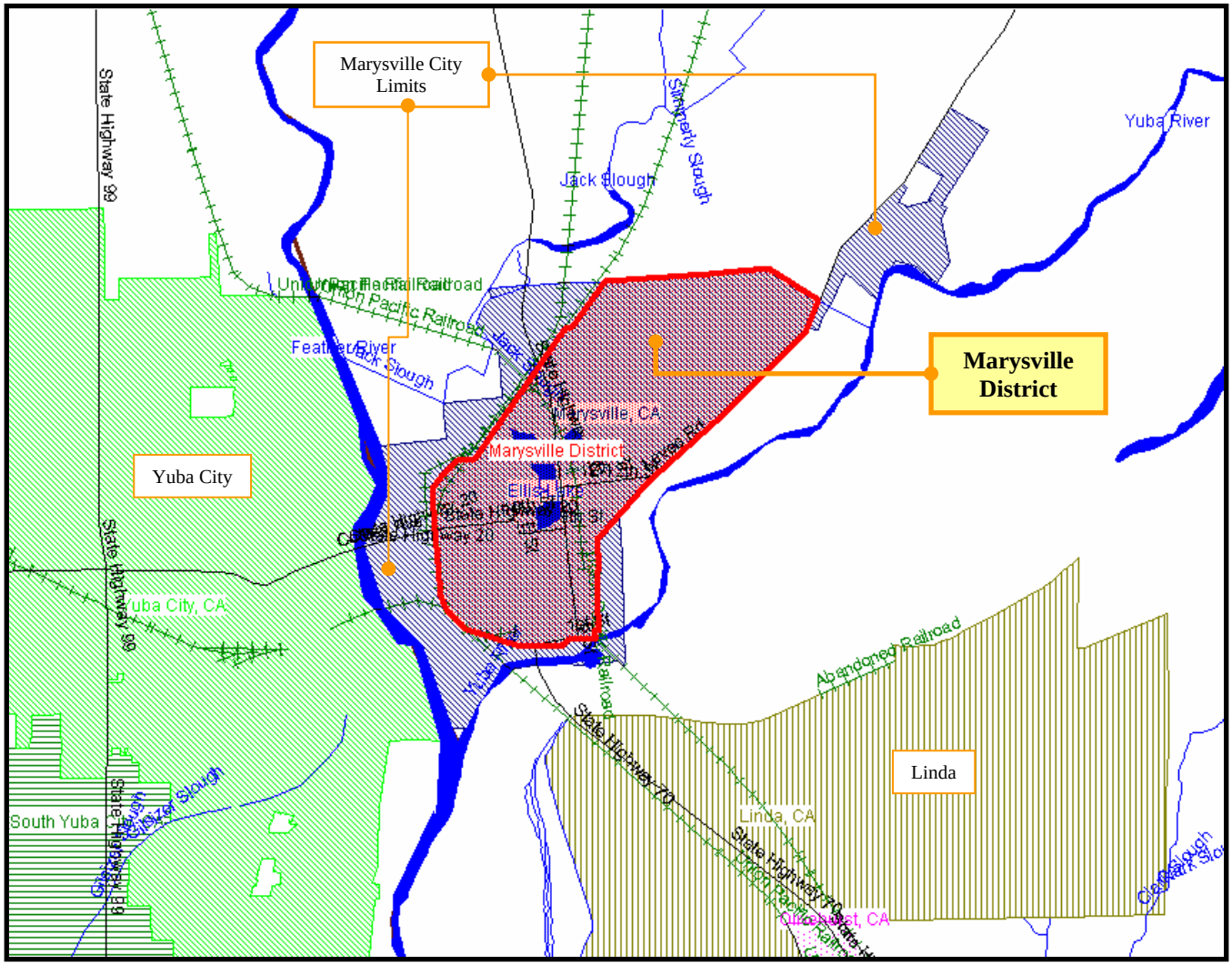
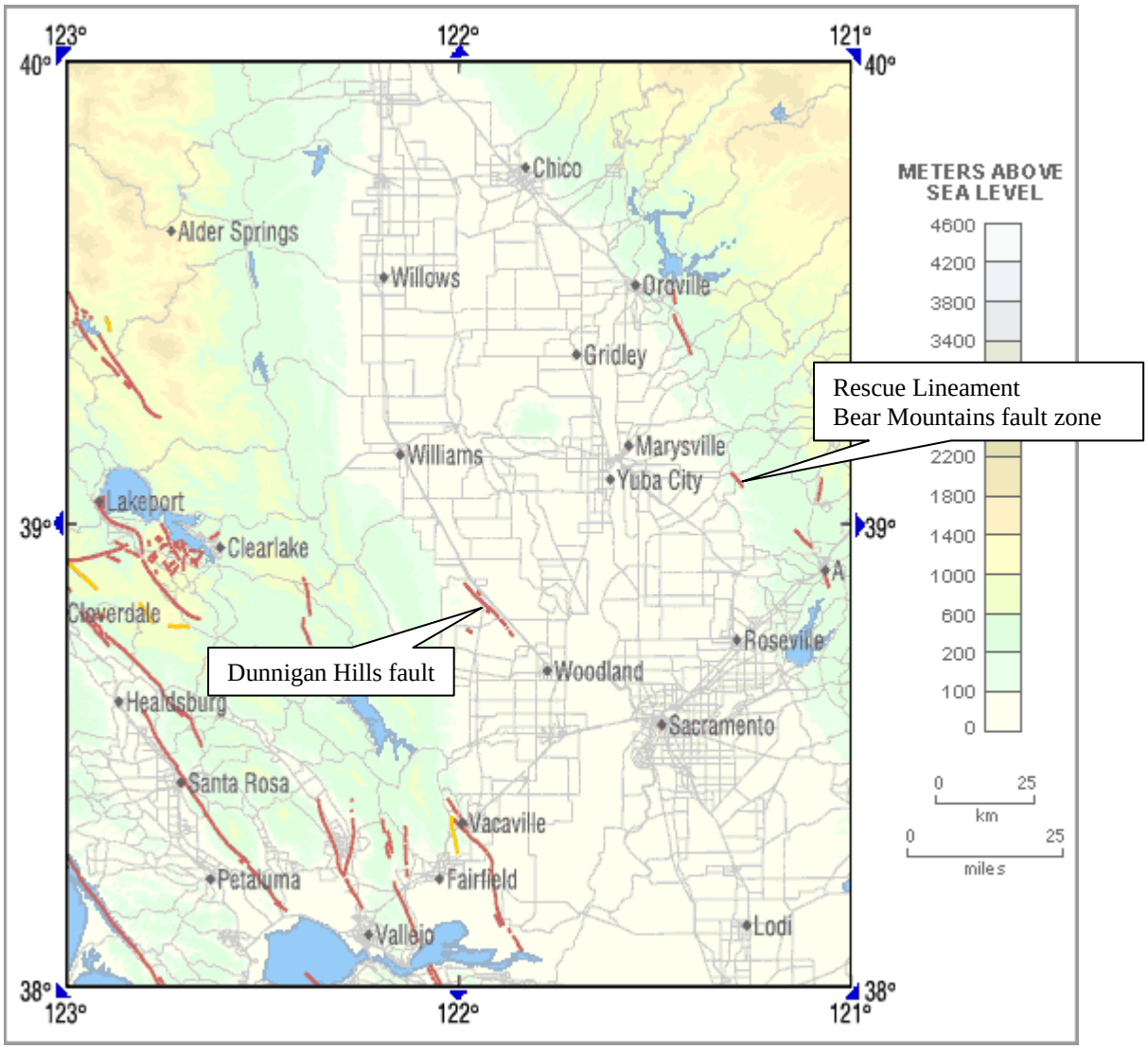


Figure 2.1-3: Active Fault Lines



Source: USGS

2.2 Service Area Population

Estimate of the population serviced by California Water Service Company is based on overlaying the 2000 U.S. Census Tract Block data with the service area map (SAM), as shown in Figure 2.2-1. A summary of the census data for the Year 2000 is shown in Table 2.2-1. LandView 5 and MARPLOT ® software were used to generate the data (ref. 7)

Figure 2.2-1: Approximated SAM with US Census 2000 Tract Map

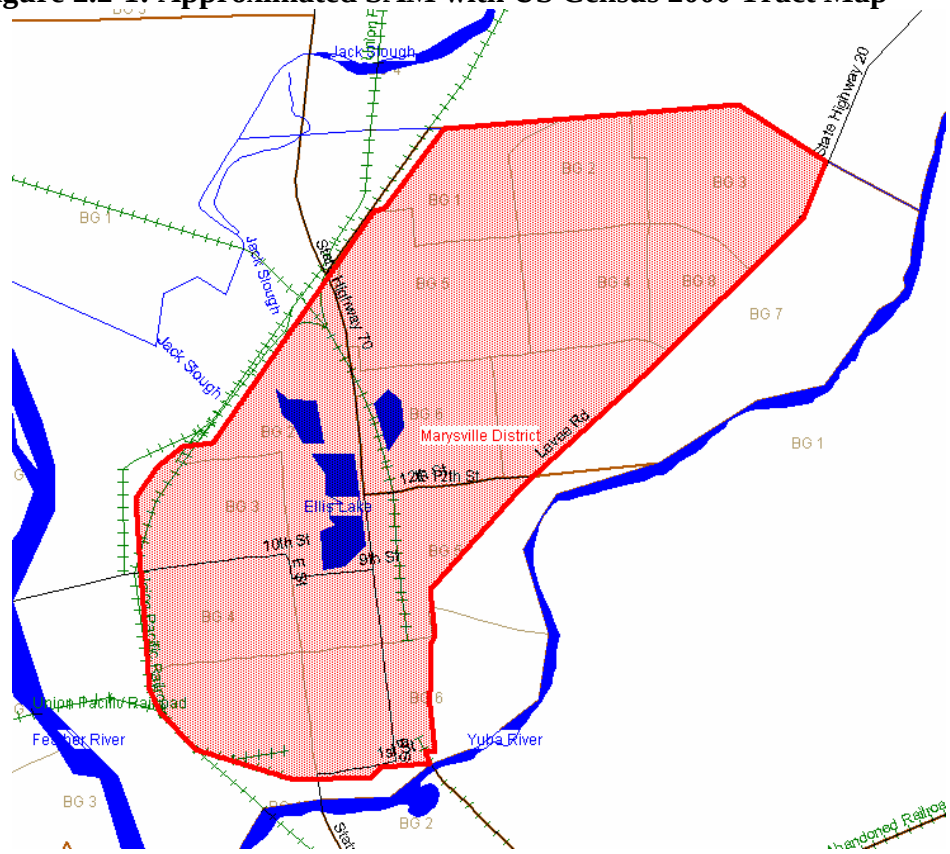


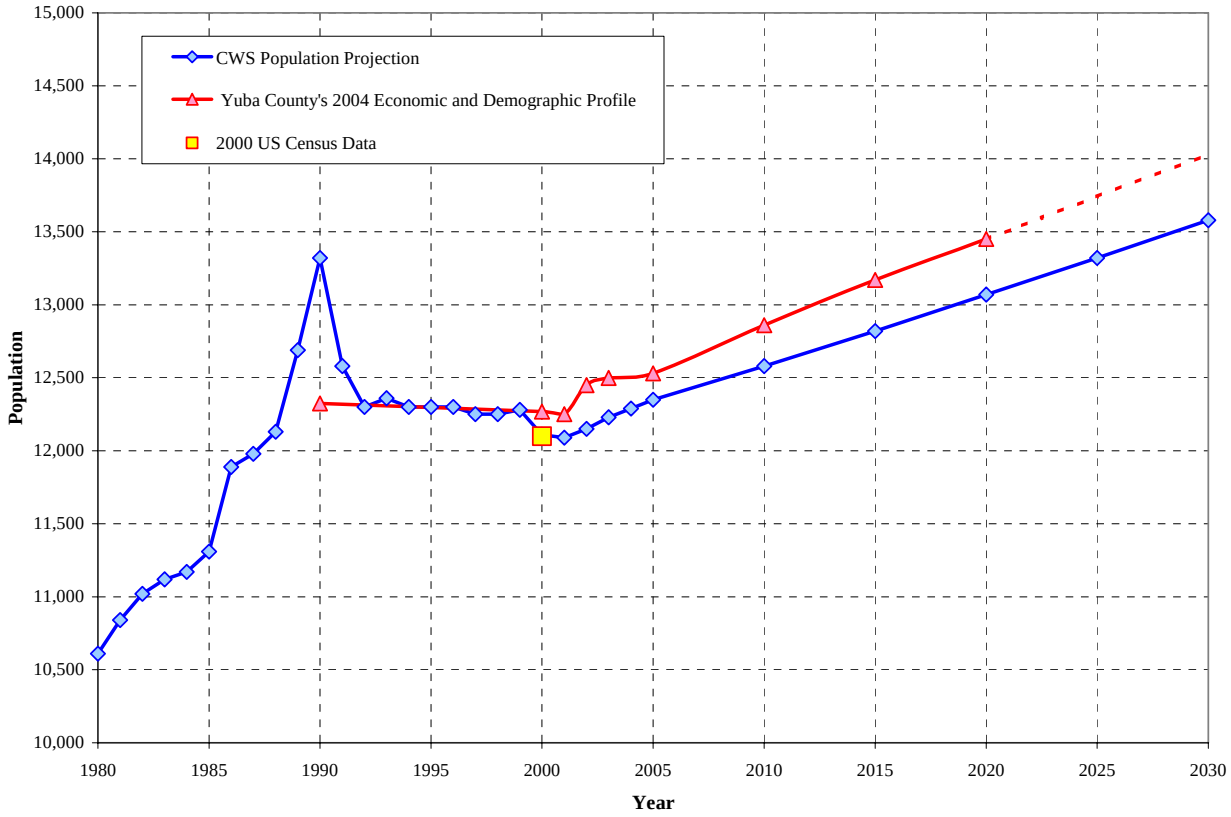
Table 2.2-1: Summary of Census 2000 Data			
	Census Tract Blocks	**Population**	**Housing Units**
Marysville Service Area	279	12,099	4,956

The service count for district was 4,324 for single family and multifamily residences. Using the ratio of given population and the service count yield a population density of 2.8 persons per residential service (single family residential services and multifamily units). During 2003 and 2004 a reclassification from commercial to multifamily residential transpired. This resulted in a population density to be reduced to 2.00

Based on the 2000 census and district service connection growth, California Water Service Company estimates the population in the Marysville District is approximately 12,290 at the end of year 2004. Table 2.2-2 presents the current and projected population growth for the City of Marysville in five year increments. The population projections based on district service counts and 2004 Yuba County Census Data (Ref. 2) are presented in Figure 2.2-2

Table 2.2-2: Population - Current and Projected (Table 2)						
	2005	2010	2015	2020	2025	2030
Service Area Population	12,350	12,580	12,820	13,070	13,320	13,580

Figure 2.2-2: Estimated Population Comparison

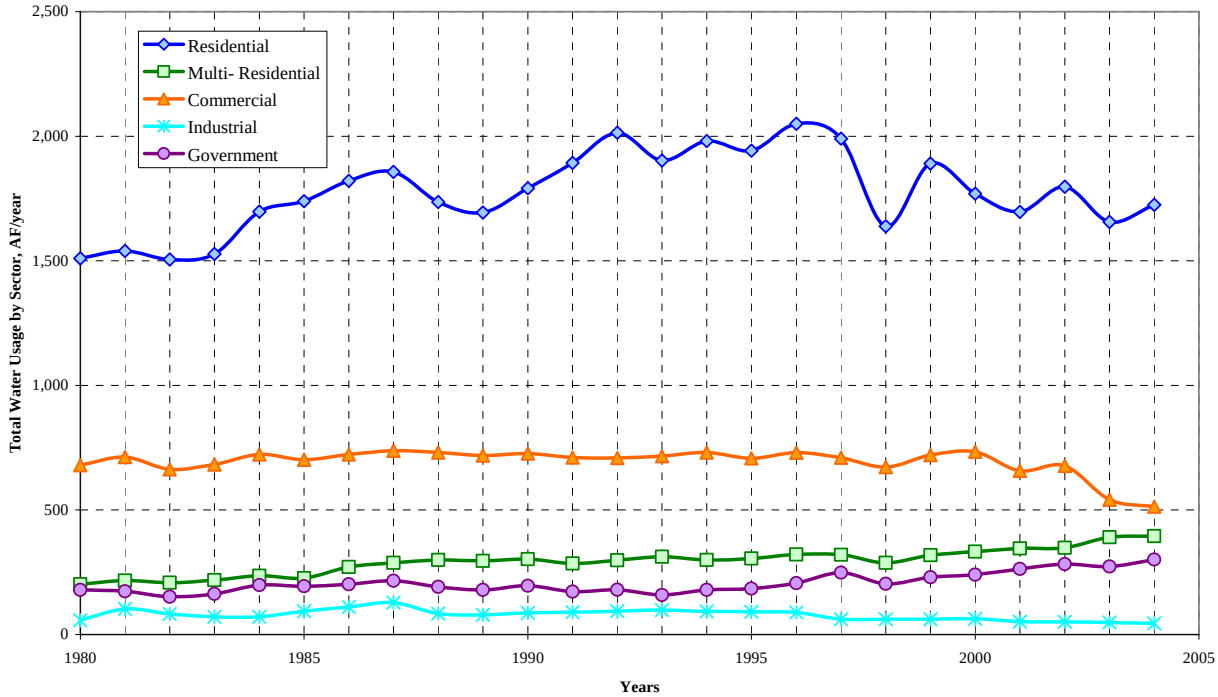


From the graph above, it is shown that the growth rate projected by California Water Service Company is similar to that the projected rate of increase for the data source from Yuba County for the City of Marysville.

2.2.1 Other Demographic Factors

The demographic makeup of the district is mainly residential, commercial, and multi-residential as shown in Figure 2.2-3. The residential sectors, single and multi-family, have remained at a fairly constant growth. The commercial sector has remained constant since 1980, but shows signs of decline in the past two years. The governmental sector, such as public schools and parks, has remained at a steady slow growth. Industrial sector is the least water user and has been declining since the 1990. Individual growth rates for each sector were used to project the future demand unless the individual growth rate was determined to be erroneous, then the overall growth rate was used. Additional discussion is provided in Section 5.

Figure 2.2-3: Water Usage by Sector



2.3 Climate

The climate for the Marysville District is a mild climate with dry summers and cool winters. The majority of precipitation falls during late autumn, winter, and early spring.

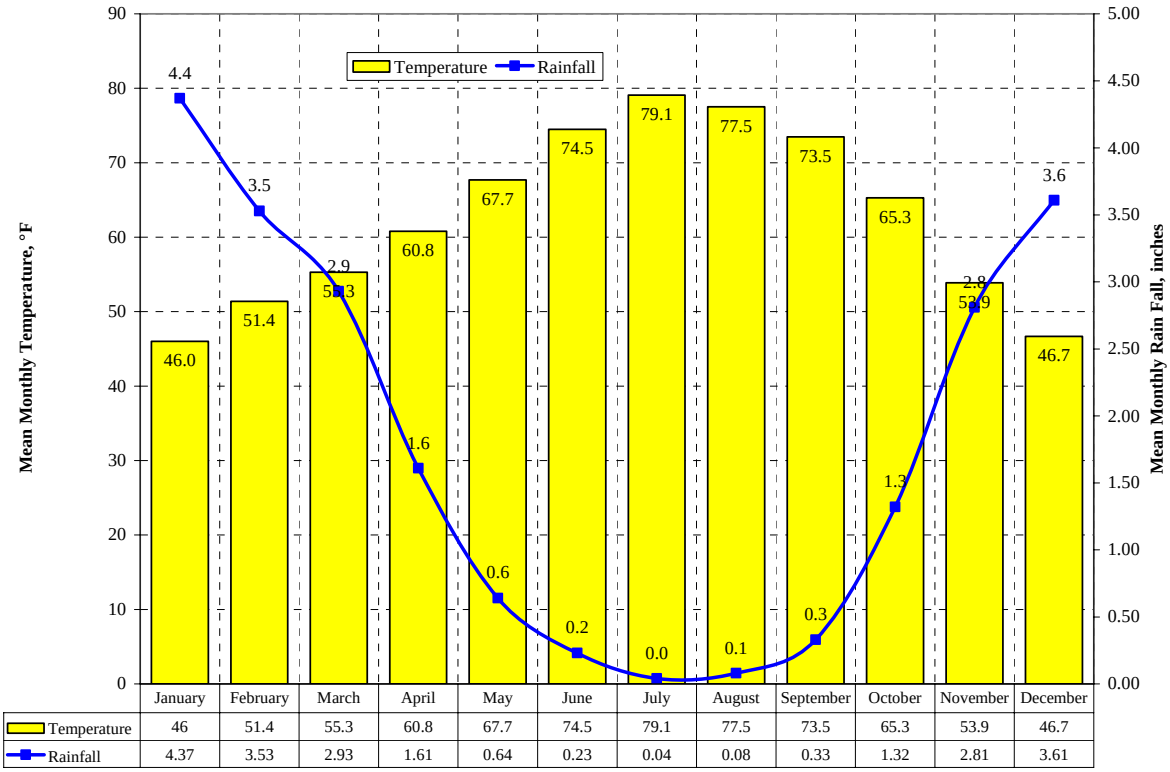
The following table, Table 2.3-1, lists the average annual conditions for the closest weather station to Marysville District. The average rainfall for the district is 40% of the annual total evapo-transpiration value.

Table 2.3-1: Average Annual Climate (Table 3)

Average Temperature	Average Rainfall	Annual Total Evapo-transpiration
62.6°F	21.52 inches	57.04 inches/month

Figure 2.3-1 displays the average monthly temperature and rainfall (Ref. 3).

Figure 2.3-1: Average Monthly Temperature and Rainfall (Table 3)

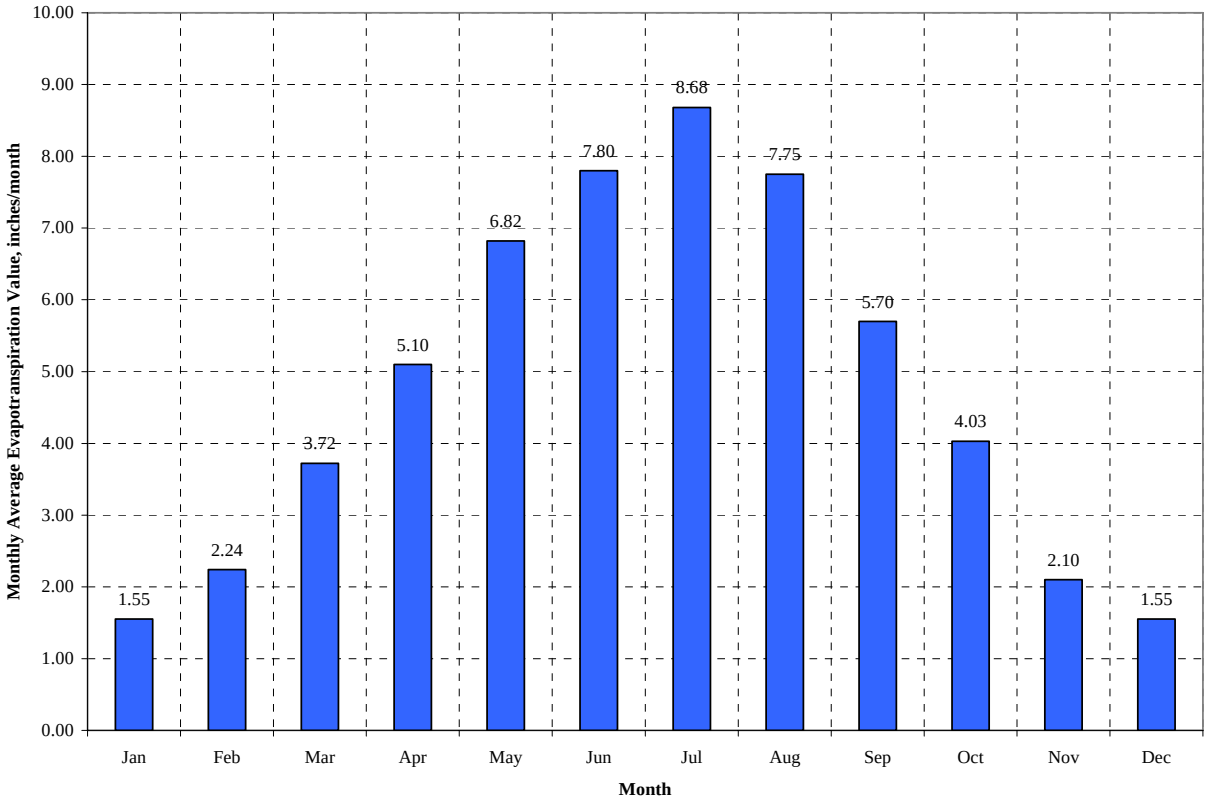


	January	February	March	April	May	June	July	August	September	October	November	December
Temperature	46	51.4	55.3	60.8	67.7	74.5	79.1	77.5	73.5	65.3	53.9	46.7
Rainfall	4.37	3.53	2.93	1.61	0.64	0.23	0.04	0.08	0.33	1.32	2.81	3.61

Figure 2.3-2 displays the monthly average evapotranspiration values for the area of the district (Ref. 4). Evapotranspiration values estimate the amount of water loss by the combination of two separate processes: evaporation from soil surface and transpiration by plants.

Additional climate data is provided in the Appendix C, worksheet 18.

Figure 2.3-2: Monthly Average ETo Values (Table 3)



3 Water Sources

The Marysville District relies entirely on groundwater extracted from the aquifers of the Yuba River fan that underlies the district. Groundwater extraction is accomplished using eight active wells located throughout the district service area. Table 3-1 lists the current and planned water supplies for Maryville District.

Table 3-1: Current and Planned Water Supplies (Table 4) (AFY)

Water Supply Sources	2005	2010	2015	2020	2025	2030 - opt
Water purchases	0	0	0	0	0	0
Supplier produced groundwater	3,573	3,619	3,678	3,728	3,794	3,849
Supplier surface diversions	0	0	0	0	0	0
Transfers in or out	0	0	0	0	0	0
Exchanges In or out	0	0	0	0	0	0
Recycled Water (projected use)	0	0	0	0	0	0
Desalination	0	0	0	0	0	0
Total	**3,573**	**3,619**	**3,678**	**3,728**	**3,794**	**3,849**

3.1 Groundwater

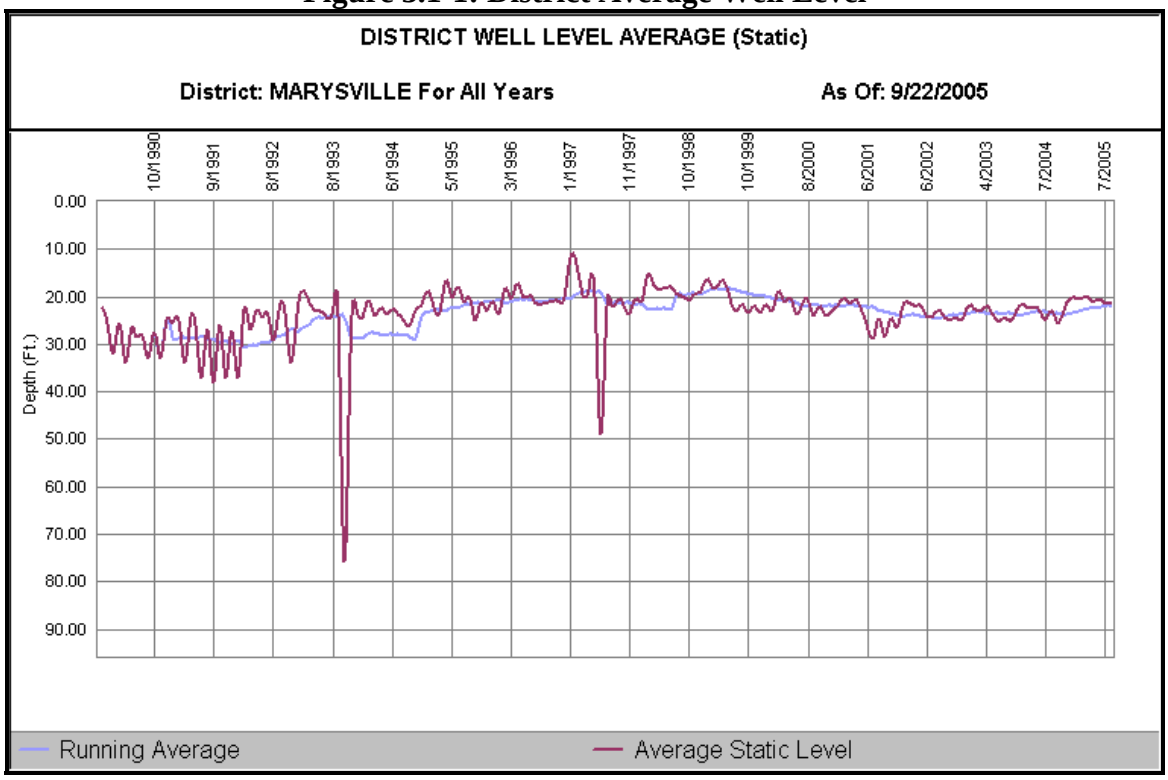
California Water Service Company solely depends on groundwater wells to supply water for the Marysville District. The district is situated on the following region:

- Sacramento Hydrologic Region
- Sacramento Valley Groundwater basin
- North Yuba sub-basin
- Ground water Basin Number: 5-21.60

The basin is not adjudicated and is managed by the Yuba County Water Agency (Ref. 5). A copy of the Management plan has been attached in Appendix D.

The YCWA (Agency) was created to develop and promote the beneficial use and regulation of the water resources of Yuba County. The YCWA Groundwater Management Plan was adopted by the YCWA Board of Directors in March 2005. Through the YCWA Act, which formed the Agency in 1959, the Agency can wholesale water to entities authorized to purvey water. The Agency currently has water service agreements with local irrigation and water districts, water companies, and several pre-existing river diverters. The Agency has practiced groundwater conjunctive use activities since the 1990s and participates in close monitoring of the groundwater basin. The basin is not in overdraft conditions as per the YCWA and DWR. Figure 3.1-1 shows the average groundwater level for the District has remained within 20-30 feet since 1990.

Figure 3.1-1: District Average Well Level



A listing of the district active wells, the design capacity, and the well depth is provided in Table 3.1-1.

Table 3.1-1: Active Wells for District		
Well Number	Design Capacity (GPM)	Well Depth (feet)
7-01	600	114
8-01	900	123
9-01	750	138
10-01	900	114
11-01	1,000	140
12-01	1,000	140
13-01	450	132
15-01	800	135
Total	**6,400**	-

The amount of groundwater currently being and projected to be pumped is shown in Table 3.1-2 and 3.1-3.

Table 3.1-2: Amount of Groundwater pumped – AFY (Table 6)					
Basin Name (s)	2000	2001	2002	2003	2004
Sacramento Valley Groundwater Basin, North Yuba Sub-basin	3,414	3,277	3,432	3,163	3,238
% of Total Water Supply	100%	100%	100%	100%	100%

Table 3.1-3: Amount of Groundwater projected to be pumped – AFY (Table 7)					
Basin Name(s)	2010	2015	2020	2025	2030 - opt
Sacramento Valley Groundwater Basin, North Yuba Sub-basin	3,619	3,678	3,728	3,794	3,849
% of Total Water Supply	100%	100%	100%	100%	100%

3.1.1 Basin Boundaries and Hydrology

The North Yuba sub-basin lies in the eastern central portion of the Sacramento Groundwater Basin. It is bounded on the north by Honcut Creek, the Feather River on the west, on the south by the Yuba River, and on the east by the Sierra Nevada. Based on an analysis of hydrographs the Yuba River and Feather Rivers create a groundwater divide, which act as flow barriers in the shallow subsurface. Stream channel and floodplain deposits along the Yuba and Feather Rivers are highly permeable and provide for large amount of groundwater recharge (Ref. 6).

A detailed description of the basin is given in the California's Ground Water Bulletin 118, see Appendix E.

3.2 Imported Water

California Water Service Company does not import water from other sources for the Marysville District.

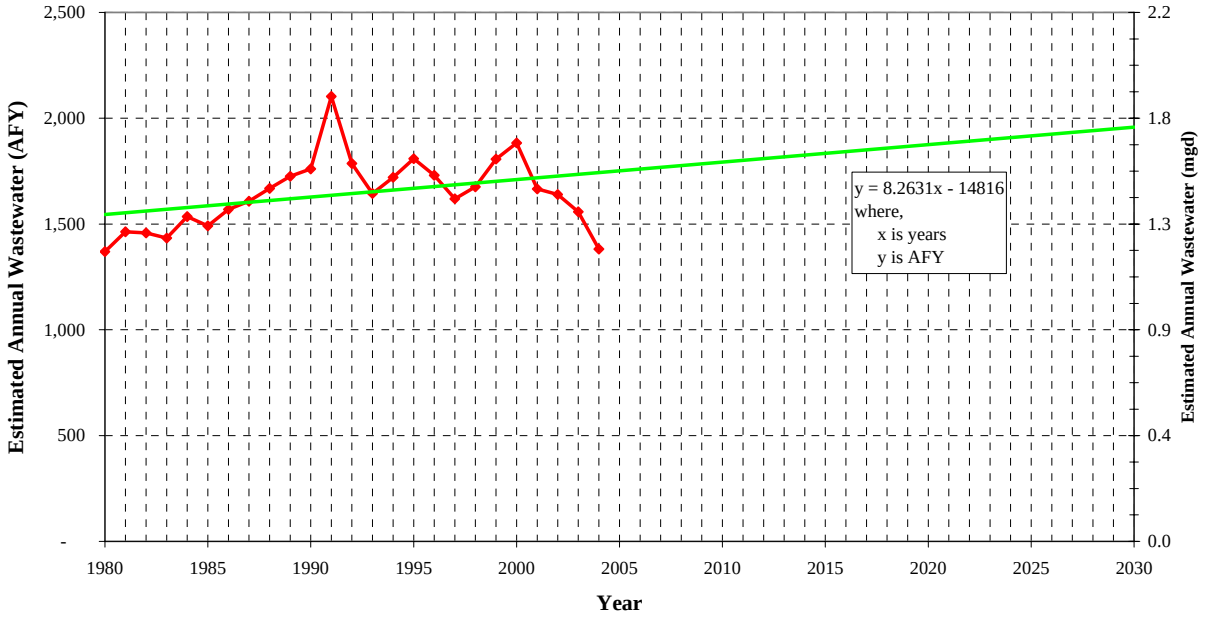
3.3 Recycled Water

Municipal wastewater is generated in the Marysville service area by residential and commercial sources. Agencies that provided information for the wastewater generation in the area are listed in Table 3.3-1.

Table 3.3-1: Participating agencies (Table 32)	
Agency	**Participated**
Water agencies	-
Wastewater agencies	City of Marysville – provided information on generation and use of recycled water from WWTP
Groundwater agencies	-
Planning Agencies	-

The quantity of wastewater generated is proportional to the population and the water use in the service area. The volume of wastewater generation was obtained by annualizing 90 percent of January water use for Cal Water's residential and commercial customers. The historical data from 1980 to the present for each year is shown in Figure 3.3-1. A linear extrapolation of the historical data was performed to estimate the volume to the year 2030.

Figure 3.3-1: Estimated District Annual Wastewater Generated



Estimates of the wastewater flows for the future conditions are presented in Table 3.3-2.

Table 3.3-2: Wastewater Collection and Treatment - AF Year (Table 33)							
Type of Wastewater	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**
Wastewater collected & treated in service area	1,710	1,752	1,793	1,834	1,875	1,917	1,958
Volume that meets recycled water standard	-	-	-	-	-	-	-

3.3.1 Wastewater Collection

The City of Marysville owns and operates the sewer system consisting of gravity sewers less than 24 inches in diameter, pumping stations, and force mains to collect wastewater from residential and commercial customers. The collected wastewater is discharged to trunk sewers and interceptors owned and operated by the City of Marysville and conveyed to the Marysville Wastewater Treatment Plant for treatment.

3.3.2 Wastewater Treatment and Recycling

California Water Service Company is the main water purveyor for the City of Marysville. The Marysville Wastewater Treatment Plant, which is owned by the City of Marysville, provides the wastewater treatment for the City of Marysville. The wastewater at the treatment plant undergoes secondary treatment with trickling filters prior to discharge to percolation/evaporation ponds. The effluent is not disinfected. The treatment plant has completed installation of a tertiary treatment unit, using a Microfloc Trident filter followed by chlorine disinfection. This unit has the capacity to generate 0.8 mgd of tertiary, at maximum capacity, which has been approved for reuse on the soccer fields in Riverfront Park. The Marysville Wastewater Treatment Plant has a design capacity of 1.7 mgd (1900 AFY), but currently receives approximately 1.5 mgd (1,680 AFY). Majority of the influent is from residential and commercial customers from Marysville. A limited amount of recycling is occurring in California Water Service Company's Marysville service area. Three to four times per year, 100 percent of un-disinfected secondary effluent is used for three days on walnut orchards near the plant. The approximate recycled water use in the Marysville service area has been approximately 1 percent of the current demand for the district.

Table 3.3-3: Disposal of wastewater (non-recycled) AF Year (Table 34)

Method of disposal	Treatment Level	2005	2010	2015	2020	2025	2030
Percolation Ponds	Secondary	1,652	1,443	0	0	0	0
River	Enhanced Secondary	0	0	1,484	1,525	1,567	1,608
	Total	1,652	1,443	1,484	1,525	1,567	1,608

3.3.3 Potential Water Recycling in District

The tertiary treatment is in place and the reclaimed water is to be utilized for irrigation in the 100 acre Riverfront Park. Riverfront Park is not included in California Water Service Company's service area, but is currently irrigated with well water. Therefore, using reclaimed water to irrigate Riverfront Park will decrease the amount of groundwater pumping by others in the area. The only reclaimed water pipelines for the Marysville Wastewater Treatment Plant currently supply River Front Park. Recycled water transmission lines will need to be constructed for other uses. Other potential uses of recycled water in the service area include street landscaping and park irrigation. The City of Marysville has not currently identified other uses for the recycled water produced at the WWTP, either currently served by California Water Service Company or by irrigation wells. Since the potential recycled water customers are not currently served by California

Water Service Company, the projected recycled water supply for California Water Service Company's Marysville service area through the year 2030 is 0 acre-feet per year. California Water Service Company has not implemented any incentive programs to encourage recycled water use because California Water Service Company does not own or operate the wastewater system. The projected recycled water volumes to areas outside of the Marysville District service area is shown in Table 3.3-4.

Table 3.3-4: Recycled Water Uses - Actual and Potential (AFY) (Table 35)

User type	Treatment Level	2005	2010	2015	2020	2025	2030
Agriculture	-	0	0	0	0	0	0
Landscape	Tertiary	100	100	100	100	100	100
Wildlife Habitat	-	0	0	0	0	0	0
Wetlands	-	0	0	0	0	0	0
Industrial	-	0	0	0	0	0	0
Groundwater Recharge	-	0	0	0	0	0	0
Irrigation	Tertiary	0	250	250	250	250	250
Total		100	350	350	350	350	350

3.4 Water Supply Reliability

The only water source for the Marysville district is ground water wells. Dropping water level (overdraft condition) and contamination are the only reasons for the main water source to become unreliable.

Percentage of rainfall since 1970 is shown in Figure 3.4-1 with the average annual rainfall for the district of 21.6 inches. The most recent driest year occurred in 1999 when the rainfall was 40% below average (13.1 inches). This is taken as the Single Dry Year shown in the following Table 3.4-1. The Multiple Dry-Water Years used in the following table are based on the most recent and consecutive lowest annual rainfall totals which occurred from 1988 to 1990. The lowest rainfall total for that period was 40% below average (13.1 inches). This period coincides with the drought conditions that California experienced during 1987-1992. The Normal Year is taken as 1991, when the annual rainfall was approximately equal to the average rainfall totals.

Table 3.4-1: Basis of Water Year Data (Table 9)

Water Year Type	Base Year (s)
Average Water Year	1991
Single-Dry Water Year	1999
Multiple-Dry Water Years	1988, 1989, 1990

Figure 3.4-1: Comparison of Annual Rainfall to Historical Average

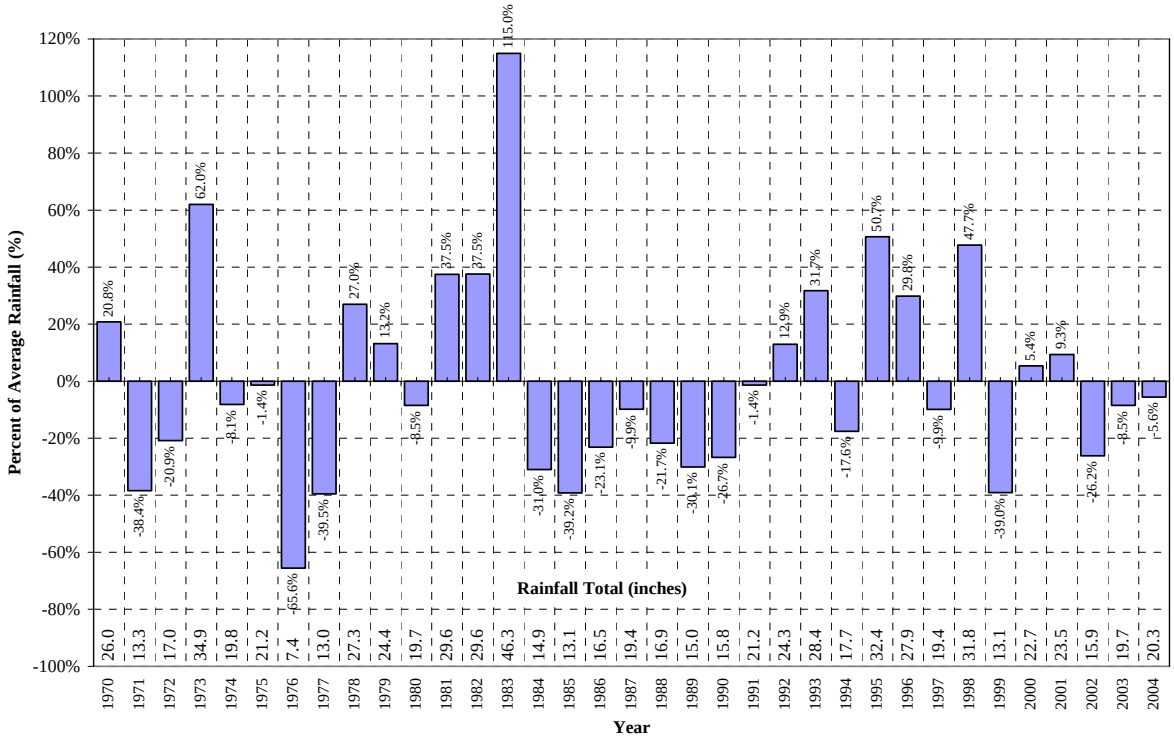


Table 3.4-2 shows that during single dry years, the demand increased by 2.02%; and during multi-dry year, the demand decreased by 7.2%.

The ground water aquifer is supplied by rainfall and mountain runoff. Historical records show that seasonal or climatic shortages have little or no effect on the supply. This can be seen during the period of 1984 to 1990. The rainfall totals were below average, the district had a steady increase in demand, and the static water levels still increased. As discussed before, the water level has remained with 20-30 feet for the past fifteen years. Similarly, the Yuba County Ground Water Management Plan (Appendix D, Figure 4, Page 19) shows that historical groundwater surface elevations within the western portion of the North Yuba Sub-basin, which serves the Marysville area, has remained relatively stable since the 1950s. Well data compiled in hydrographs by the State DWR show that groundwater surface elevations have only mildly fluctuated from a mean sea level of approximately 50 feet.

Table 3.4-2: Supply Reliability - AF Year (Table 8)

Average / Normal Water Year	Single Dry Water Year	Multiple Dry Water Years		
		Year 1	Year 2	Year 3
3,425	3,501	3,179	3,215	3,400
% of Normal	102.2%	92.8%	93.9%	99.3%

Water quality is the second concern for California Water Service Company for the Marysville District. Table 3.4-3 lists the water sources that have or may become unreliable. California Water Service Company has anticipated this problem and will outline a plan to mitigate well contamination and to maintain a reliable water supply in its Water Supply and Facilities Master Plan.

Table 3.4-3: Factors Resulting In Inconsistency of Supply (Table 10)

Name of supply	Legal	Environ-mental	Water Quality	Climatic
Well 8-01			✓	
Well 10-01			✓	
Well 15-01			✓	

3.4.1 Water Quality

Water delivered to customers in the Marysville District meets all federal and state drinking water regulations. The U.S. Environmental Protection Agency under the authorization of the Federal Safe Drinking Water Act of 1974 sets drinking water standards. The California Department of Health Services (DOHS), which can either adopt the USEPA standard or establish state standards that are more stringent, enforces the EPA mandated drinking water regulations.

There are two types of drinking water standards: Primary and Secondary. Primary standards are designed to protect public health by establishing Maximum Contamination Levels (MCLs) for substances in water that are determined to be harmful to human health. The MCLs are established conservatively for each contaminant based on health effects that may occur if a person were to drink two liters of the water per day for 70 years. Secondary standards are based on the aesthetic qualities of the water, such as taste, odor, color, and mineral content. These standards, established by the State of California, specify limits for substances that may affect the aesthetics and consumer acceptance of the water.

Several water quality issues exist in the Marysville system. Methyl tertiary butyl ether (MTBE) recently caused the shut-down and inactivation of well 3-01 and threatened wells 8-01 and 10-01. Well 10-01 is not currently being used for production purposes because pumping causes the MTBE plume to migrate towards the well. The well is turned on once a month for monitoring. In addition to MTBE concerns, manganese, arsenic, and hydrogen sulfide occur naturally in the area and have been detected at elevated levels in several sources. Arsenic levels are currently under the new federal standard of 10 parts per billion (ppb) that goes into affect in January 2006. However, the State of California has not established their new standard for arsenic. They could adopt the 10 ppb standard set by the EPA or set the standard below 10 ppb. Three wells in Marysville currently have arsenic concentrations between 5 and 10 ppb.

The Marysville water system utilizes three types of treatment. All active sources are disinfected continuously using either sodium hypochlorite or calcium hypochlorite. The other two types of treatment are for the sequestering and removal of manganese. Manganese is regulated by the State of California with a secondary maximum

contaminant level (SMCL). Manganese can be identified in water by its distinct color; it causes water to turn black. A polyphosphate chemical made by Aqua-mag is injected at well 15-01 to sequester manganese and pyrolusite adsorbing media is used at well 11-01 for the removal of manganese.

4 Water Shortage Contingency Plan

California Water Service Company's Marysville District has sufficient water sources to meet all forecasted demands. The groundwater is from an un-adjudicated basin, and since a safe yield for the basin has not been established, the Company will be able to produce supplies sufficient to its customer's full service demand, even during dry and critically dry conditions; however, the possibility exists for disruption in service due to unforeseen failures or forces of nature, such as earthquakes or regional power failures. During such events, significant shortages in water supply may occur. As such, a contingency plan for significant shortages is described in the following section.

4.1 Stages of Action

California Water Service Company has developed a four-stage rationing plan. The plan includes voluntary and mandatory stages. Approval from the CPUC must be obtained prior to implementation of mandatory restrictions.

Table 4.1-1: Consumption Reduction Methods (Table 27)

Consumption Reduction Methods	Stage When Method Takes Effect	Projected Reduction (%)	Shortage
Voluntary	1	10	Minimum 5 - 10%
Voluntary or Mandatory	2	20	Moderate 10 - 20%
Mandatory	3	35	Severe 20 - 35%
Mandatory	4	50	Critical 35 - 50%

The conditions for the stages to occur are dictated by the Yuba County Water Agency or the Department of Water Resource during a regional or state wide drought emergency

4.1.1 Actions to Be Undertaken By California Water Service Company

The following outline list the actions to be taken during periods when a reduction in consumption is required:

Stage 1

- California Water Service Company maintains an ongoing public information campaign consisting of distribution of literature, speaking engagements, monthly bill inserts, and conservation messages printed in local newspapers.
- Educational programs in area schools are also ongoing.

Stage 2

- California Water Service Company will aggressively continue its public information and education programs.
- Ask consumers for 10 to 20 percent voluntary or mandatory water use reductions.
- Prior to implementation of mandatory reductions, obtain approval from CPUC.

- Lobby for passage of drought ordinances by appropriate governmental agencies.

Stage 3

- Implement mandatory reductions after receiving approval from CPUC.
- Maintain rigorous public information campaign explaining water shortage conditions.
- Water use restrictions go into effect; prohibited uses can include watering resulting in gutter flooding, using a hose without shutoff device, filling of pools or fountains, etc.
- Limiting landscape irrigation by restricting the hours of the day and or days of the week during which water for irrigation can be used.
- Monitor production weekly for compliance with necessary reductions.
- Installation of a flow restrictor on the service line of customers who consistently violate water use restrictions.

Stage 4

- All of steps taken in prior stages intensified.
- Discontinuance of water service to customers who consistently violate water use restrictions.
- Monitor production daily for compliance with necessary reductions.
- More restrictive conditions for, or a prohibition of, landscape irrigation.

4.1.2 Mandatory Prohibitions

Due to California Water Service Company's investor-owned status, it is not authorized to pass any ordinances. Should conditions warrant mandatory reductions, California Water Service Company will request authority to add Tariff Rule 14.1, Mandatory Water Conservation Plan (see Appendix F), to existing tariffs for a district. Included in Rule 14.1 is Section A. Conservation -- Nonessential or Unauthorized Water Use which prohibits use of water for filling or refilling of swimming pools, use of water that results in flooding or run-off in gutters, etc.

4.1.3 Consumption Limits

California Water Service Company maintains extensive water use records on individual metered customer accounts. These records are reviewed in the districts on a daily basis to identify potential water loss problems.

In order to protect itself against serious and unnecessary waste or misuse of water, California Water Service Company may meter any flat rate service and apply the regularly established meter rates where the customer continues to misuse or waste water beyond five days after California Water Service Company has given the customer written notice to remedy such practices.

In September 2004, the California State Governor signed into law AB2572, which mandates that urban water suppliers install, on or before January 2025, water meters on all municipal and industrial water service connections that are located in its service area. California Water Service Company is currently investigating the most cost effective method to accomplish this installation. In the Marysville District, Cal Water has, as of 2004, a total of 3,744 service connections, of which 2,591 or nearly seventy percent are

currently not metered. The legislation authorizes recovery of the costs to purchase, install and operate these additional meters. Once Cal Water determines the most cost effective method to comply with this legislation, it will seek appropriate rate relief from the California Public Utilities Commission.

4.1.4 Monitoring Procedure during Periods of Water Shortages

During all stages of water shortages, production figures are reported to and monitored by the district managers on a daily basis. Consumption will be monitored through these daily production figures in the district for compliance with necessary reductions (see Table 4.1-1).

4.1.5 Penalties or Charges for Excessive Use

California Water Service Company, after one written warning, shall install a flow-restricting device on the service line of any customer observed by California Water Service Company personnel to be using water for any non-essential or unauthorized use defined in Section A of Tariff Rule 14.1 (see Appendix F). Repeated violations of unauthorized water use will result in discontinuance of water service.

Table 4.1-2: Penalties and Charges (Table 28)

Penalties or Charges	Stage When Penalty Takes Effect
Written warning	1
Flow-restricting device	3
Discontinuance of water service	4

4.1.6 Analysis of Revenue and Expenditure Impacts

California Water Service Company is an investor-owned water utility and, as such, is regulated by the CPUC. On March 8, 1989, the Commission instituted an investigation to determine what actions should be taken to mitigate the effects of water shortages on the State's regulated utilities and their customers. In decision D. 90-07-067, effective July 18, 1990, the Commission authorized all utilities to establish memorandum accounts to track expenses and revenue shortfalls caused both by mandatory rationing and by voluntary conservation efforts. Subsequently, D. 90-08-55 required each class A utility (more than 10,000 connections) seeking to recover revenues from a drought memorandum account to submit for Commission approval, a water management program that addresses long-term strategies for reducing water consumption. Utilities with approved water management programs were authorized to implement a surcharge to recover revenue shortfalls recorded in their drought memorandum accounts.

However, the Commission's Decision 94-02-043 dated February 16, 1994, states:

> *10. Now that the drought is over, there is no need to track losses in sales due to residual conservation.*
> *11. The procedures governing voluntary conservation memorandum accounts (see D.92-09-084) developed in this Drought Investigation will*

no longer be available to water companies as of the date of this order.
12. Procedures and remedies developed in the Drought Investigation that are not specifically authorized for use in the event of future drought in these Ordering Paragraphs will no longer be available to water companies as of the date of this order except upon filing and approval of a formal application.
(CPUC Decision 94-02-043, Findings of Fact, paragraphs 10-12)

It was at this time that Cal Water significantly curtailed conservation activities in its districts. At the time that triggers for voluntary or mandatory reductions should occur in the future, Cal Water will determine if a filing to the CPUC is necessary to enforce the reductions and to begin tracking lost sales from the required reductions.

4.1.7 Implementing the Plan

Section 357 of the Water Code requires that suppliers that are subject to regulation by the CPUC shall secure its approval before imposing water consumption regulations and restrictions required by water shortage emergencies.

4.2 Three-Year Minimum Water Supply

Table 4.2-1 lists the minimum water supply for the next three year based on current trends of the supply. The normal volume is based on the average demand that is projected for 2005. The three year minimum volume is based on the projected low demand for the year 2005.

Table 4.2-1: Three-Year Estimated Minimum Water Supply (Table 24) AFY

Source	Normal	Multi Dry Years		
		Year 1	Year 2	Year 3
Ground Water Wells	3,573	2,927	2,927	2,927

4.3 Catastrophic Water Supply Interruption

During an emergency, the Marysville District can only rely on its own production facilities to serve its customers. There are currently no interconnections with either neighboring irrigation district.

California Water Service Company has a Emergency Response Plan in place that coordinates overall company response to a disaster in any or all of its districts. In addition, the Emergency Response Plan requires each district to have a local disaster plan that coordinates emergency responses with other agencies in the area.

California Water Service Company also inspects its facilities annually for earthquake safety. To prevent loss of these facilities during an earthquake, auxiliary generators and improvements to our water storage facilities have been budgeted for and installed as part of our annual capital improvement process.

The following table lists the stations with on-site power generating capabilities. Portable generators can be transported to stations without on-site power, to provide power if the duration of the power outage is expected to last a significant time.

Table 4.3-1: On-site Generators for Wells

Station	On-site Generators
7-01	Yes
8-01	No
9-01	No
10-01	No
11-01	No
12-01	Yes
13-01	Yes
15-01	Yes

4.4 Transfer or Exchange Opportunities

California Water Service Company is not pursuing water transfers or exchanges at this time.

5 Water Use Provisions

5.1 Distribution of Services

California Water Service Company designates the different customers as follows:

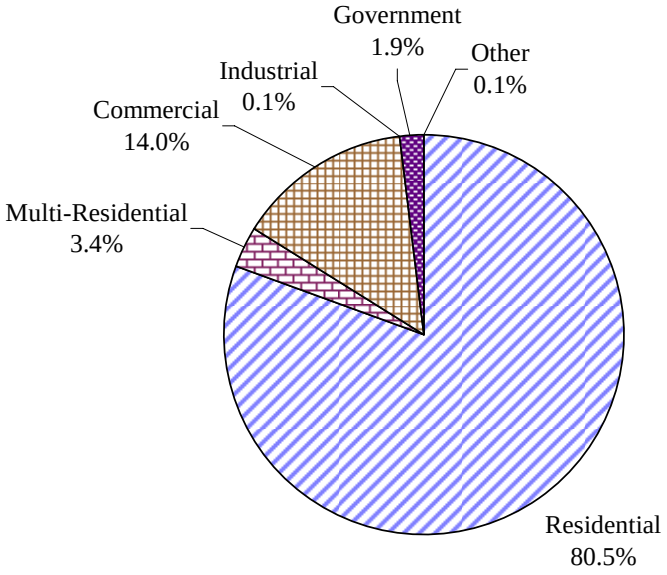
- Single Family Residential
- Multifamily Residential
- Commercial
- Industrial
- Government
- Other

The residential sector of CWS water service customers includes permanent single and multifamily residents. Service for seasonal customers was not considered.

The dominant land use in the Marysville District is residential and commercial. California Water Service Company's service counts indicate that 98 percent of all services are for residential and commercial facilities. The remaining two percent include industrial, governmental uses, and other functions such as temporary construction meters.

The average annual number of services for calendar year 2004 was 3,744. Single-family residential services at 3,014 represent 80.5 percent of all services, multifamily residential at 127 represents 3.4 percent and commercial at 526 represents 14 percent, with all other service connection classes comprising 2.1 percent. The distribution of services for the Year 2004 is shown in Figure 5.1-1.

Figure 5.1-1: Distribution of Services (2004)



5.2 Historical and Current Water Demand

Demand per service was established as a function of historical sales and service data. Projected demand is the mathematical product of total projected services and demand per service. Historical sales values are illustrated in Figure 5.2-1. Historical service count is illustrated in Figure 5.2-2.

The combined demand per service for all services combined has ranged from 270,000 to 320,000 for the past ten years, see Figure 5.2-3.

Figure 5.2-1: Historical Sales

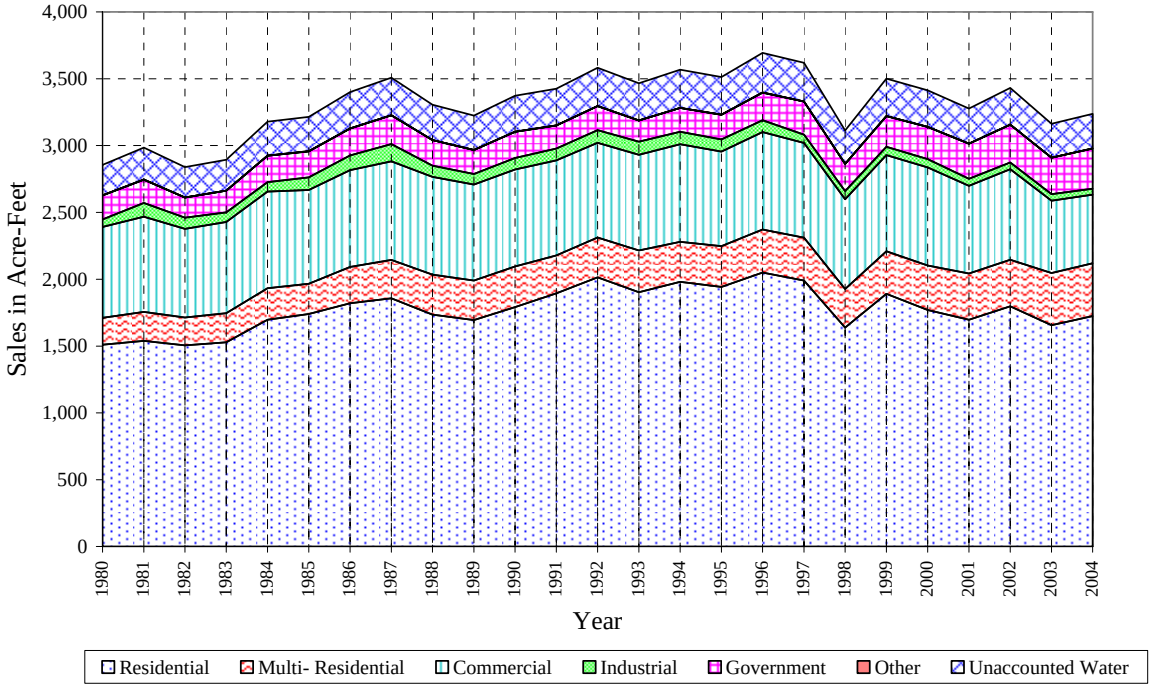


Figure 5.2-2: Historical Service Counts

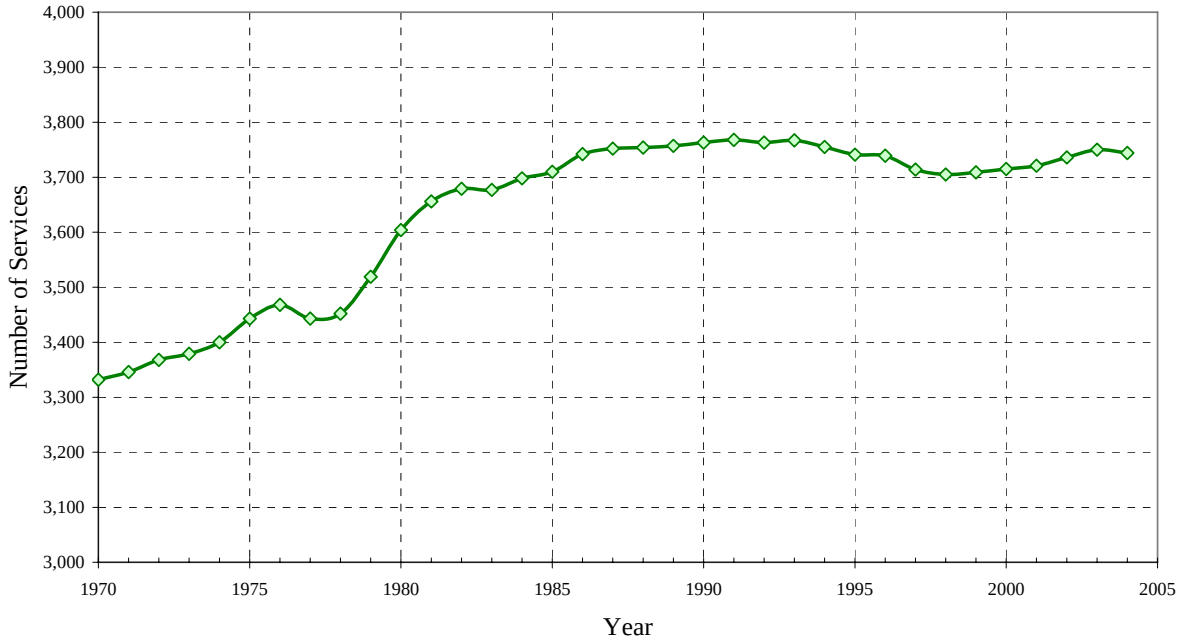
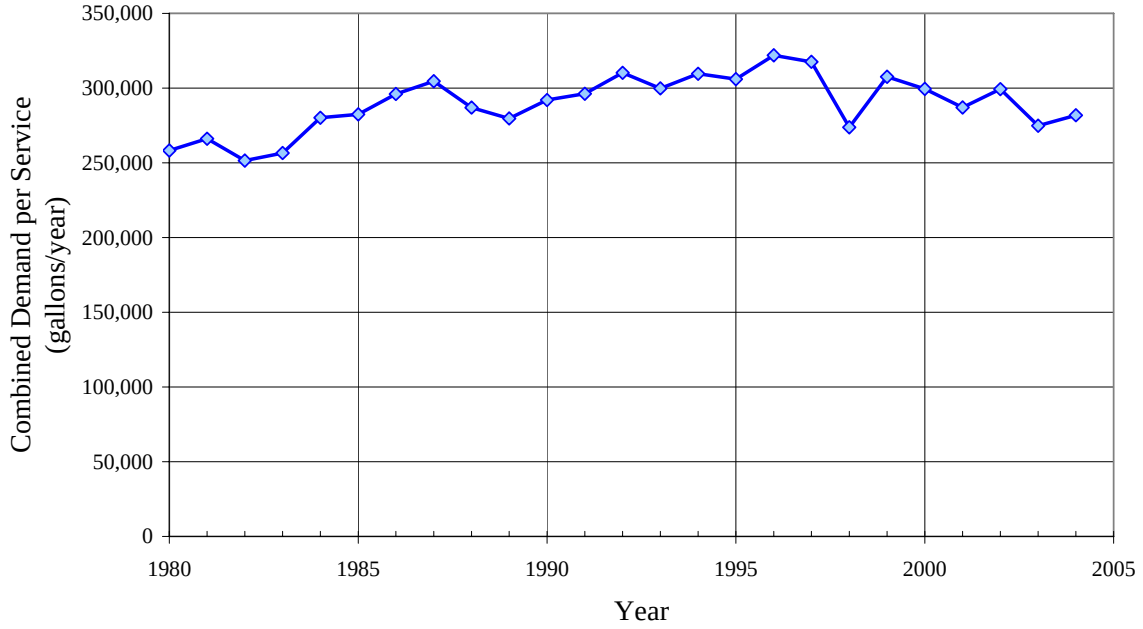


Figure 5.2-3: Historical Demand per Service



5.3 Per Capita Water Demand

Based on the end of year 2004 total demand, the per-capita water use in the district is summarized in Table 5.3-1. In comparison, the 1990 state wide all uses value was 190 gallons per-capita per day, while the Sacramento River Hydrological Region value was 301 gallons per-capita per day for all uses and 169 for residential.

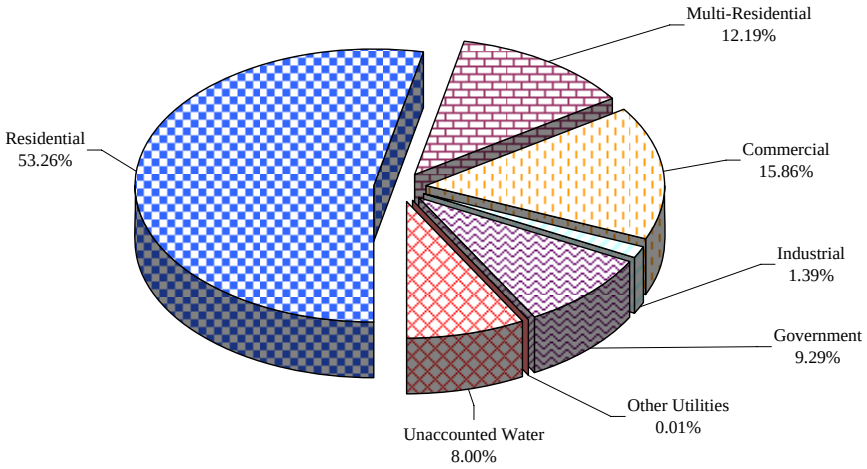
Table 5.3-1: Per Capita Water Demand (2004)

Units	All Users	Residential
Million Gallons	1,055.0	690.5
Estimated Population	12,290	12,290
Gallons/Person in Year	85,840	56,183
Gallons Per Capita Per Day	235.2	153.9
Gallons Per Capita Per Minute	0.163	0.107

Single-family residential water use represents the lowest demand segment in the district with 186,423 gallons per service per year. The multifamily residential use of 1,012,668 gallons per service per year represented 12 percent of the total demand. Although residential services have the lowest demand per service, they represent 53.26 percent of the total combined demand. There were four industrial services in 2004 with a demand per service of 3,659,470 gallons per year. The distribution of the total demand by type of use is shown in Figure 5.3-1.

Unaccounted for water was fixed at eight percent of total production for the estimation of the demand placed by the residential sector. This amount, along with all metered sales, was subtracted from total production to estimate the deliveries to the flat rate residential customers.

Figure 5.3-1: Percent of Total Demand by Type of Use (2004)

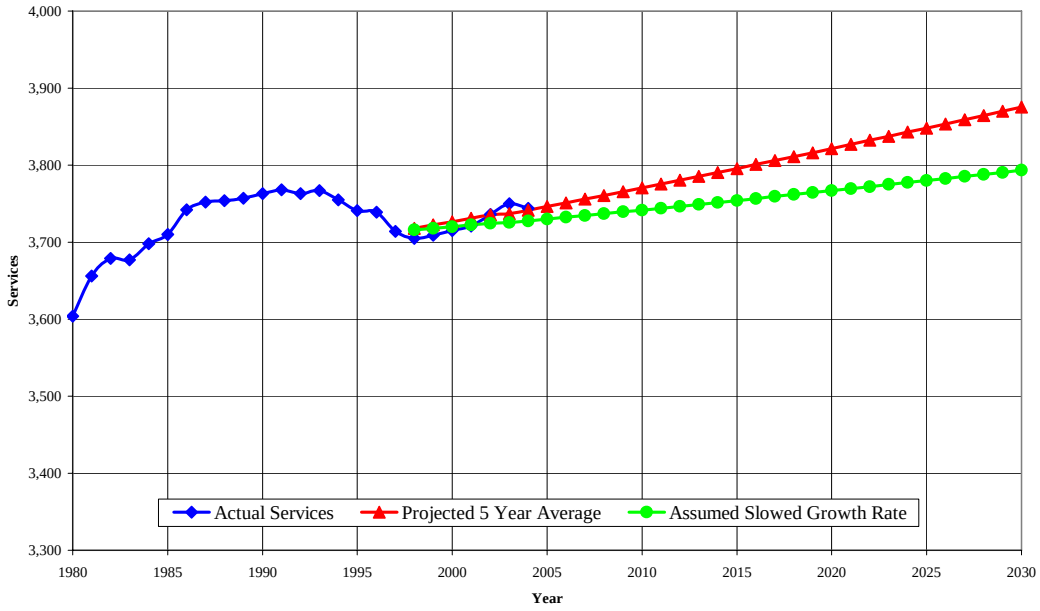


5.4 Historical and Projected Water Demand

Growth in the Marysville District is remaining steady. Over the past five years, California Water Service Company experienced an average change in total services of 0.12 percent. This is attributed to the confining nature of the levee. The ten-year average growth pattern was calculated as -0.07 percent. Due to the negative growth rate for the ten-year average, a slowed growth rate of 0.06 percent was chosen as a comparison.

The two growth rates along with the historical service count for the district is shown in Figure 5.4-1. The five-year average growth rate was chosen to forecast the demand because it better reflects actual growth in the community as shown in the graph. Due to the individual growth patterns for each customer class (i.e. residential, commercial, government, and industrial) individual growth rates were used for projecting service connection growth. These rates were applied to the average annual services in 1998 to forecast future year service counts.

Figure 5.4-1: Historical & Projected Services

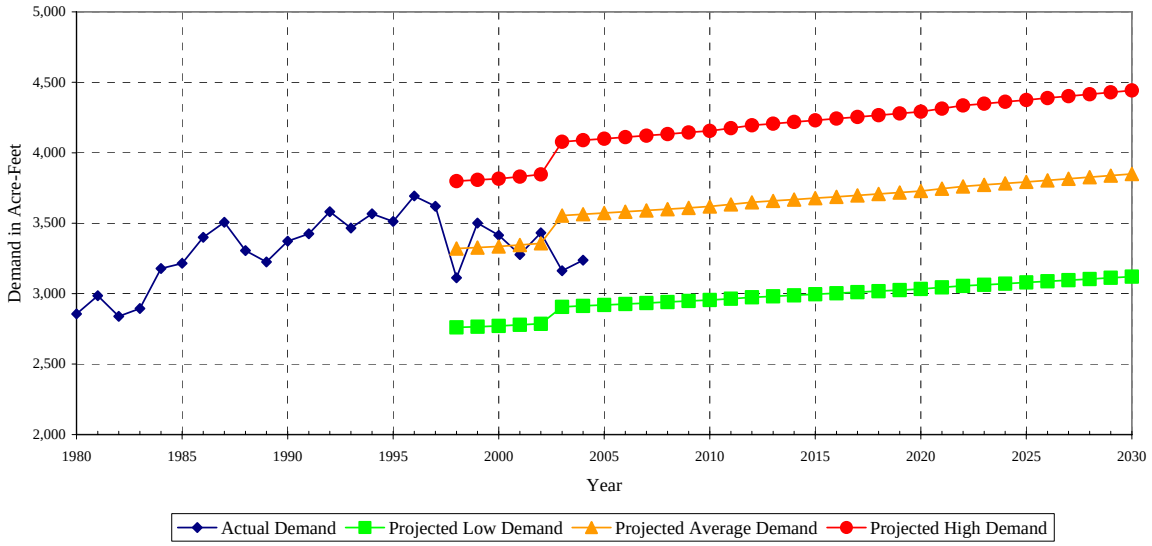


Three scenarios were used to forecast a range of potential demands for the Marysville District using the previously discussed five-year average service connection growth rate as applied to three sets of demand per service data. A comparative demand graph for the resulting three scenarios is presented Figure 5.4-2. The starting point for each projection was the annual average number of services in 1998. This provides a comparison of projected values to actual values over a seven-year period.

A reclassification of accounts occurred in 2003 for the customer classes of residential, multi-residential, and commercial. The step increase in the projected demand during 2002-2003 is a result of the reclassification.

The individual customer class annual demands per service values in the Marysville District are not always consistent with the combined demand per service value. The highest recorded value in one class may occur in a year of low demand values in other classes. Therefore, the low, average, high customer class demand per service values used in the forecasts were selected individually without consideration for the year in which they occurred.

Figure 5.4-2: Historical & Projected Demand



5.4.1 Scenario 1

The district's five-year average growth pattern was applied to the lowest recorded demand per service values from each customer class. Scenario 1 forecasts a total demand for the year 2030 at 2,881 AF (without system losses). This scenario provides a valid bottom end for the projected demand range and is summarized in Table 5.4-1.

5.4.2 Scenario 2

The district's five-year average growth pattern was combined with the average demand per service for each customer class to project the most probable demand values through the year 2030, see Table 5.4-2. This scenario forecasts total demand for the year 2030 at 3,573 AF (without system losses). Scenario 2 represents the normal position of the demand range that should most likely occur provided the ten percent conservation goal established by the Company is achieved and maintained. To accomplish this level of demand it will be essential to effectively promote and implement appropriate conservation programs.

5.4.3 Scenario 3

The district's five-year average growth pattern was combined with the highest recorded demand per service value for each customer class. Scenario 3 forecasts demand for the year 2030 at 4,136 AF (without system losses), see Table 5.4-3. This scenario provides a valid top end for the projected demand range.

Table 5.4-1: Past, Current, and Projected Water Deliveries for Scenario 1 (Table 12a)

		Water Use Sectors	Single family	Multi-family	Commercial	Industrial	Institutional/Gov.	Landscape	Agriculture	Other	Total
2000	metered	# of accounts	352	67	613	4	67	-	-	3	1,106
		Deliveries AFY	157	333	734	63	241	-	-	1	1,529
	unmetered	# of accounts	2,609	-	-	-	-	-	-	-	2,609
		Deliveries AFY	1,612	-	-	-	-	-	-	-	1,612
2005	metered	# of accounts	3,004	127	535	3	75	-	-	2	3,746
		Deliveries AFY	1,543	394	522	39	190	-	-	-	2,688
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2010	metered	# of accounts	3,021	131	531	3	81	-	-	2	3,770
		Deliveries AFY	1,552	407	519	39	205	-	-	-	2,722
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2015	metered	# of accounts	3,039	135	528	4	88	-	-	2	3,796
		Deliveries AFY	1,561	419	516	44	221	-	-	-	2,761
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2020	metered	# of accounts	3,057	139	525	4	94	-	-	2	3,821
		Deliveries AFY	1,571	432	512	45	238	-	-	-	2,798
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2025	metered	# of accounts	3,075	143	521	5	102	-	-	2	3,848
		Deliveries AFY	1,580	446	509	51	256	-	-	-	2,842
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2030	metered	# of accounts	3,093	148	518	5	109	-	-	2	3,875
		Deliveries AFY	1,589	459	506	51	276	-	-	-	2,881
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-

Table 5.4-2: Past, Current, and Projected Water Deliveries for Scenario 2 (Table 12b)

		Water Use Sectors	Single family	Multi-family	Commercial	Industrial	Institutional/Gov.	Landscape	Agriculture	Other	Total
2000	metered	# of accounts	352	67	613	4	67	-	-	3	1,106
		Deliveries AFY	157	333	734	63	241	-	-	1	1,529
	unmetered	# of accounts	2,609	-	-	-	-	-	-	-	2,609
		Deliveries AFY	1,612	-	-	-	-	-	-	-	1,612
2005	metered	# of accounts	3,004	127	535	3	75	-	-	2	3,746
		Deliveries AFY	1,801	579	599	77	249	-	-	1	3,305
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2010	metered	# of accounts	3,021	131	531	3	81	-	-	2	3,770
		Deliveries AFY	1,812	597	595	77	268	-	-	1	3,350
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2015	metered	# of accounts	3,039	135	528	4	88	-	-	2	3,796
		Deliveries AFY	1,822	615	591	88	289	-	-	1	3,407
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2020	metered	# of accounts	3,057	139	525	4	94	-	-	2	3,821
		Deliveries AFY	1,833	634	588	88	311	-	-	1	3,455
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2025	metered	# of accounts	3,075	143	521	5	102	-	-	2	3,848
		Deliveries AFY	1,844	654	584	101	335	-	-	1	3,519
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2030	metered	# of accounts	3,093	148	518	5	109	-	-	2	3,875
		Deliveries AFY	1,855	674	580	102	361	-	-	1	3,573
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-

Table 5.4-3: Past, Current, and Projected Water Deliveries for Scenario 3 (Table 12c)

		Water Use Sectors	Single family	Multi-family	Commercial	Industrial	Institutional/Gov.	Landscape	Agriculture	Other	Total
2000	metered	# of accounts	352	67	613	4	67	-	-	3	1,106
		Deliveries AFY	157	333	734	63	241	-	-	1	1,529
	unmetered	# of accounts	2,609	-	-	-	-	-	-	-	2,609
		Deliveries AFY	1,612	-	-	-	-	-	-	-	1,612
2005	metered	# of accounts	3,004	127	535	3	75	-	-	2	3,746
		Deliveries AFY	2,064	660	640	117	320	-	-	2	3,803
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2010	metered	# of accounts	3,021	131	531	3	81	-	-	2	3,770
		Deliveries AFY	2,077	680	636	118	344	-	-	2	3,857
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2015	metered	# of accounts	3,039	135	528	4	88	-	-	2	3,796
		Deliveries AFY	2,089	702	632	135	371	-	-	2	3,931
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2020	metered	# of accounts	3,057	139	525	4	94	-	-	2	3,821
		Deliveries AFY	2,101	723	628	135	400	-	-	2	3,989
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2025	metered	# of accounts	3,075	143	521	5	102	-	-	2	3,848
		Deliveries AFY	2,114	746	624	155	431	-	-	2	4,072
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-
2030	metered	# of accounts	3,093	148	518	5	109	-	-	2	3,875
		Deliveries AFY	2,126	769	620	155	464	-	-	2	4,136
	unmetered	# of accounts	-	-	-	-	-	-	-	-	-
		Deliveries AFY	-	-	-	-	-	-	-	-	-

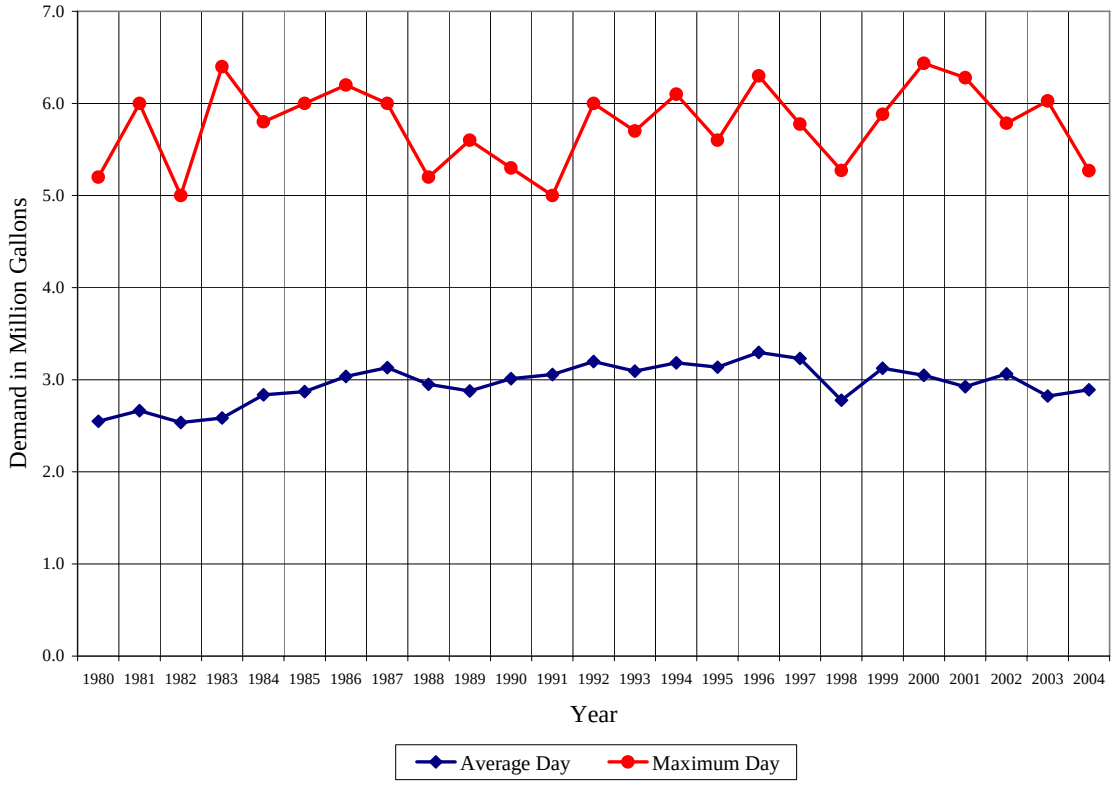
5.5 Water System Demand

To determine if the water system can accommodate maximum demands, peaking factors are calculated. The three factors generally required are: Average Day, Maximum Day, and Peak Hour. Historical data best determines these factors; however, engineering guidelines can be used.

- Average Day. This value represents the total annual water usage divided by 365 and is used to calculate the additional values.
- Maximum Day. This value is the highest water usage during any 24-hour period and can range from 1.2 to 2.5 times the average day
- Peak hour is the highest water demand during any one-hour period and can range from 1.2 to 2.5 times the maximum day or 1.5 to 6 times average day

A historical graph of the average and maximum day demand is shown on Figure 5.5-1. The ten year mean value for the average and maximum day demand is 3.0 MG and 5.9 MG, respectively. The ratio of the maximum to average is 2.0, the maximum day peaking factor. The peak hour demand is assumed to be 1.5 times the maximum day or 3.0 times the average day.

Figure 5.5-1: Average Day & Maximum Day



The average day demand in the Marysville District to the year 2030 is estimated using the projected demand and anticipated service connection counts for each scenario. The resulting values are shown in Table 5.5-1.

Table 5.5-1: Water System Demand Values

Projected Year	Projected Annual Demand		Average Day			Maximum Day			Maximum Hour Demand	
			Demand		Use Per	Demand		Use Per		
	(AFY)	(MGY)	(MGD)	(gpm)	Service (gal)	(MGD)	(gpm)	Service (gal)	(MG/h)	(gpm)
2005										
Scenario 1	2,920	951	2.61	1,810	696	5.27	3,658	1,406	0.33	5,431
Scenario 2	3,573	1,164	3.19	2,215	851	6.44	4,476	1,720	0.40	6,645
Scenario 3	4,100	1,336	3.66	2,542	977	7.40	5,136	1,974	0.46	7,625
2010										
Scenario 1	2,954	963	2.64	1,832	700	5.33	3,701	1,414	0.33	5,495
Scenario 2	3,619	1,179	3.23	2,243	857	6.53	4,533	1,731	0.40	6,730
Scenario 3	4,155	1,354	3.71	2,576	984	7.50	5,206	1,988	0.46	7,729
2015										
Scenario 1	2,996	976	2.67	1,857	705	5.40	3,753	1,424	0.33	5,572
Scenario 2	3,678	1,198	3.28	2,280	865	6.63	4,607	1,748	0.41	6,840
Scenario 3	4,230	1,378	3.78	2,623	995	7.63	5,299	2,010	0.47	7,868
2020										
Scenario 1	3,034	988	2.71	1,881	709	5.47	3,800	1,432	0.34	5,642
Scenario 2	3,728	1,215	3.33	2,311	871	6.73	4,671	1,760	0.42	6,934
Scenario 3	4,292	1,398	3.83	2,661	1,003	7.74	5,376	2,026	0.48	7,982
2025										
Scenario 1	3,079	1,003	2.75	1,909	714	5.56	3,858	1,444	0.34	5,727
Scenario 2	3,794	1,236	3.39	2,352	880	6.84	4,752	1,778	0.42	7,056
Scenario 3	4,375	1,426	3.91	2,712	1,015	7.89	5,481	2,051	0.49	8,137
2030										
Scenario 1	3,121	1,017	2.79	1,935	719	5.63	3,910	1,453	0.35	5,805
Scenario 2	3,849	1,254	3.44	2,386	887	6.94	4,822	1,792	0.43	7,159
Scenario 3	4,443	1,448	3.97	2,754	1,023	8.01	5,566	2,068	0.50	8,263

Current design capacity for the operational wells is 6,400 GPM, equivalent to 9.2 MGD. By dividing the design capacity of the wells by the water system demand values, an estimate can be made at what point the system will start undersupplying the demand. The amount of well capacity exceeding the demand is calculated using the following relationship and summarized in Table 5.5-2:

$$1 - \frac{\text{Well Capacity}}{\text{System Demand}}$$

The design production capacity exceeds 100% for all scenarios for the average day flow rate, which means that on an average day basis, a sufficient margin exists for the system to maintain flow rate to the customers. However, on the maximum day basis, the flow rate margins are less than 100%. During periods when the system is operating at maximum day demands, the margin for the system to maintain flow rate is reduced significantly. With the maximum hour value, the margin for the system to maintain flow is not existent.

Table 5.5-2: Flow Rate Margins

Projected Year	Average Day (%)	Maximum Day (%)	Maximum Hour (%)
2005			
Scenario 1	254%	75%	18%
Scenario 2	189%	43%	-4%
Scenario 3	152%	25%	-16%
2010			
Scenario 1	249%	73%	16%
Scenario 2	185%	41%	-5%
Scenario 3	148%	23%	-17%
2015			
Scenario 1	245%	71%	15%
Scenario 2	181%	39%	-6%
Scenario 3	144%	21%	-19%
2020			
Scenario 1	240%	68%	13%
Scenario 2	177%	37%	-8%
Scenario 3	141%	19%	-20%
2025			
Scenario 1	235%	66%	12%
Scenario 2	172%	35%	-9%
Scenario 3	136%	17%	-21%
2030			
Scenario 1	231%	64%	10%
Scenario 2	168%	33%	-11%
Scenario 3	132%	15%	-23%

The historical high maximum day of 6.4 MGD occurred in 1983 and again in 2000. The district had sufficient groundwater production capacity to supply all of the current and the forecasted annual average day and maximum day demand during those peak flow rates. However, operating the water system with small safety margins can cause system pressures to reduce to very low values. Additional facilities will need to be developed to augment production capacity to meet peek demands and forecasted demand conditions in

case the well capacity reduces or is required to be taken offline due to maintenance or quality issues

5.6 Summary of Purchases

California Water Service Company does not provide water to other agencies nor has any plans to due so in the future. Additional water uses such as saline barriers, or groundwater recharge are not currently being or planned to occur.

Table 5.6-1 lists other water uses in the district not discussed in Table 5.4-1 to 5.4-3. The projected values are based on average conditions.

Table 5.6-1: Additional Water Uses and Losses - AF Year (Table 14)

Water Use	2000	2005	2010	2015	2020	2025	2030
Saline barriers	-	-	-	-	-	-	-
Groundwater recharge	-	-	-	-	-	-	-
Conjunctive use	-	-	-	-	-	-	-
Raw water	-	-	-	-	-	-	-
Recycled	-	-	-	-	-	-	-
Unaccounted-for system losses	273	268	269	271	273	275	277
Total	273	268	269	271	273	275	277

The past, current, and projected water deliveries based on average projected consumption rate are presented in Table 5.6-2.

Table 5.6-2: Total Water Use - AF Year (Table 15)

Water Use	2000	2005	2010	2015	2020	2025	2030 - opt
Total of Tables 12, 13, 14	3,414	3,573	3,619	3,678	3,728	3,794	3,849

6 Supply and Demand Comparison

6.1 Normal-Year Comparison

Tables 6.1-1, 6.1-2, and 6.1-3 compare the current and projected water supply and demand based on average demand (Scenario 2). The tables indicate that the California Water Service Company has sufficient water to meet the demand of the customer through 2030.

Table 6.1-1: Projected Normal Water Supply - AF Year (Table 40)					
(from table 4)	2010	2015	2020	2025	2030 – opt
Supply	3,619	3,678	3,728	3,794	3,849
% of year 2005	101%	103%	104%	106%	108%

Table 6.1-2: Projected Normal Water Demand - AF Year (Table 41)					
(from table 15)	2010	2015	2020	2025	2030 - opt
Demand	3,619	3,678	3,728	3,794	3,849
% of year 2005	101%	103%	104%	106%	108%

Table 6.1-3: Projected Supply and Demand Comparison - AF Year (Table 42)					
	2010	2015	2020	2025	2030 - opt
Supply totals	3,619	3,678	3,728	3,794	3,849
Demand totals	3,619	3,678	3,728	3,794	3,849
Difference	0	0	0	0	0
Difference as % of Supply	0%	0%	0%	0%	0%
Difference as % of Demand	0%	0%	0%	0%	0%

6.2 Single Dry-Year Comparison

During a dry year and multi-dry years, the water supply was able to meet the demand for the Marysville District.

Examining the operational record of the district, the district demand would increase during a single-dry year when compared to a normal year. The water demand would increase due to maintenance of landscape and other high water use that would normally be supplied by precipitation.

Tables 6.2-1, 6.2-2, and 6.2-3 compare the current and projected water supply and demand based on high consumption rate (Scenario 3).

Table 6.2-1: Projected Single Dry-year Water Supply - AF Year (Table 43)					
(from table 4)	2010	2015	2020	2025	2030
Supply	4,155	4,230	4,292	4,375	4,443
% of projected normal	114.8%	115.0%	115.1%	115.3%	115.4%

Table 6.2-2: Projected Single Dry-year Water Demand - AF Year (Table 44)					
(from table 15)	2010	2015	2020	2025	2030
Demand	4,155	4,230	4,292	4,375	4,443
% of projected normal	114.8%	115.0%	115.1%	115.3%	115.4%

Table 6.2-3: Projected Single Dry-year Supply and Demand Comparison - AF Year (Table 45)					
	2010	2015	2020	2025	2030
Supply totals	4,155	4,230	4,292	4,375	4,443
Demand totals	4,155	4,230	4,292	4,375	4,443
Difference	0	0	0	0	0
Difference as % of Supply	0.0%	0.0%	0.0%	0.0%	0.0%
Difference as % of Demand	0.0%	0.0%	0.0%	0.0%	0.0%

6.3 Multiple Dry-Year Comparison

During a multiple dry-year, demand will be curtailed by stricter enforcement of conservation methods as outlined in Section 4.

Tables 6.3-1, 6.3-2, and 6.3-3 compare the projected water supply and demand based on low consumption rate (Scenario 1) occurring between 2006-2010 with a comparison to the average annual consumption projection (Scenario 2).

Table 6.3-1: Projected Supply During Multiple Dry Year To 2010 (Table 46) AFY					
	2006	**2007**	**2008**	**2009**	**2010**
Supply	2,927	2,934	2,940	2,947	2,954
% of projected normal	81.7%	81.7%	81.7%	81.7%	81.6%

Table 6.3-2: Projected Demand Multiple Dry Year To 2010 (Table 47) AFY					
	2006	**2007**	**2008**	**2009**	**2010**
Demand	2,927	2,934	2,940	2,947	2,954
% of projected normal	81.7%	81.7%	81.7%	81.7%	81.6%

Table 6.3-3: Projected Supply And Demand Comparison To 2010 (Table 48) During Multiple Dry Year Period - AFY					
	2006	**2007**	**2008**	**2009**	**2010**
Supply totals	2,927	2,934	2,940	2,947	2,954
Demand totals	2,927	2,934	2,940	2,947	2,954
Difference	0	0	0	0	0
Difference as % of Supply	0.0%	0.0%	0.0%	0.0%	0.0%
Difference as % of Demand	0.0%	0.0%	0.0%	0.0%	0.0%

Tables 6.3-4, 6.3-5, and 6.3-6 compare the projected water supply and demand based on low consumption rate (Scenario 1) occurring between 2011-2015 with a comparison to the average annual consumption projection (Scenario 2).

Table 6.3-4: Projected Supply During Multiple Dry Year To 2015 (Table 49) AFY					
	2011	2012	2013	2014	2015
Supply	2,964	2,974	2,981	2,988	2,996
% of projected normal	81.6%	81.5%	81.5%	81.5%	81.5%

Table 6.3-5: Projected Demand Multiple Dry Year To 2015 (Table 50) AFY					
	2011	2012	2013	2014	2015
Demand	2,964	2,974	2,981	2,988	2,996
% of projected normal	81.6%	81.5%	81.5%	81.5%	81.5%

Table 6.3-6: Projected Supply And Demand Comparison To 2015 (Table 51) During Multiple Dry Year Period - AFY					
	2011	2012	2013	2014	2015
Supply totals	2,964	2,974	2,981	2,988	2,996
Demand totals	2,964	2,974	2,981	2,988	2,996
Difference	0	0	0	0	0
Difference as % of Supply	0.0%	0.0%	0.0%	0.0%	0.0%
Difference as % of Demand	0.0%	0.0%	0.0%	0.0%	0.0%

Tables 6.3-7, 6.3-8, and 6.3-9 compare the projected water supply and demand based on low consumption rate (Scenario 1) occurring between 2016-2020 with a comparison to the average annual consumption projection (Scenario 2).

Table 6.3-7: Projected Supply During Multiple Dry Year To 2020 (Table 52) AFY					
	2016	2017	2018	2019	2020
Supply	3,003	3,011	3,018	3,026	3,034
% of projected normal	81.4%	81.4%	81.4%	81.4%	81.4%

Table 6.3-8: Projected Demand Multiple Dry Year To 2020 (Table 53) AFY					
	2016	2017	2018	2019	2020
Demand	3,003	3,011	3,018	3,026	3,034
% of projected normal	81.4%	81.4%	81.4%	81.4%	81.4%

Table 6.3-9: Projected Supply And Demand Comparison To 2020 (Table 54) During Multiple Dry Year Period - AFY					
	2016	2017	2018	2019	2020
Supply totals	3,003	3,011	3,018	3,026	3,034
Demand totals	3,003	3,011	3,018	3,026	3,034
Difference	0	0	0	0	0
Difference as % of Supply	0.0%	0.0%	0.0%	0.0%	0.0%
Difference as % of Demand	0.0%	0.0%	0.0%	0.0%	0.0%

Tables 6.3-10, 6.3-11, and 6.3-12 compare the projected water supply and demand based on low consumption rate (Scenario 1) occurring between 2011-2015 with a comparison to the average annual consumption projection (Scenario 2).

Table 6.3-10: Projected Supply During Multiple Dry Year To 2025 (Table 55) AFY					
	2021	2022	2023	2024	2025
Supply	3,044	3,055	3,063	3,071	3,079
% of projected normal	81.3%	81.2%	81.2%	81.2%	81.2%

Table 6.3-11: Projected Demand Multiple Dry Year To 2025 (Table 56) AFY					
	2021	2022	2023	2024	2025
Demand	3,044	3,055	3,063	3,071	3,079
% of projected normal	81.3%	81.2%	81.2%	81.2%	81.2%

Table 6.3-12: Projected Supply And Demand Comparison To 2025 (Table 57) During Multiple Dry Year Period - AFY					
	2021	2022	2023	2024	2025
Supply totals	3,044	3,055	3,063	3,071	3,079
Demand totals	3,044	3,055	3,063	3,071	3,079
Difference	0	0	0	0	0
Difference as % of Supply	0.0%	0.0%	0.0%	0.0%	0.0%
Difference as % of Demand	0.0%	0.0%	0.0%	0.0%	0.0%

6.4 Water Supply Projects

California Water Service Company will continue its annual main replacement program to upgrade and improve the distribution system of the Marysville District. Because the growth potential is limited in the Marysville area, no major facilities other than main replacements and upgrading equipment is planned for the district. Storage facilities and new wells will be added as needed to meet the average day and maximum day requirements for our customers.

Water Quality issues require treatment and replacement of existing wells. To address peak demand, California Water Service Company plans to install two new storage tanks

and booster stations to take advantage of existing production capacity during off-peak periods.

Future water supply projects are summarized in Table 6.4-1.

Table 6.4-1: Future Water Supply Projects (Table 17)

Project Name	Projected Start Date	Projected Completion Date
0.5 MG Tank and booster (1)	In design	2005
Replace Old Well	Planning stage	2006
0.5 MG Tank and booster (2)	Planning stage	2007

6.4.1 Desalinated Water

There are no opportunities for the development of desalinated water in Marysville.

7 Water Demand Management

7.1 California Urban Water Conservation Council

California Water Service Company is a CUWCC member. Annual reports are attached in Appendix G. The reports are considered completed by CUWCC website.

7.2 Water Conservation Best Management Practices

Water conservation is a method available to reduce water demands, thereby reducing water supply needs for the Marysville District. This chapter presents an analysis of water conservation best management practices (BMPs) and a description of the methods and assumptions used to conduct the analysis.

The unpredictable water supply and ever increasing demand on California's complex water resources have resulted in a coordinated effort by the Department of Water Resources (DWR), water utilities, environmental organizations, and other interested groups to develop a list of urban BMPs for conserving water. This consensus-building effort resulted in a Memorandum of Understanding Regarding Urban Water Conservation in California (MOU), as amended September 16, 1999, among parties, which formalizes an agreement to implement these BMPs and makes a cooperative effort to reduce the consumption of California's water resources. Table 7.2-1 presents the BMPs as defined by the MOU. The MOU is administered by the California Urban Water Conservation Council (CUWCC).

Table 7.2-1: Water Conservation Best Management Practices

No.	BMP Name
1	Water survey programs for single-family residential and multi-family residential connections.
2	Residential plumbing retrofit.
3	System water audits, leak detection and repair.
4	Metering with commodity rates for all new connections and retrofit of existing connections.
5	Large landscape conservation programs and incentives.
6	High-efficiency washing machine rebate programs.
7	Public information programs.
8	School education programs.
9	Conservation programs for commercial, industrial, and institutional accounts.
10	Wholesale agency assistance programs.
11	Conservation pricing.
12	Conservation coordinator.
13	Water waste prohibition.
14	Residential ULFT replacement programs.

The MOU requires that a water utility implement only the BMPs that are economically feasible. If a BMP is not economically feasible, the water utility may request an economic exemption for that BMP. The BMPs as defined in the MOU are generally recognized as standard definitions of water conservation measures. California Water Service Company (Cal Water) is a signatory of the MOU. As a signatory of the MOU, Cal Water has agreed to implement the BMPs as defined in Exhibit 1 of the MOU that are cost beneficial and complete such implementation in accordance with the schedule assigned each BMP. Cal Water must submit to the CUWCC a report every two years describing BMP implementation.

7.3 Economic Analysis Methodology and Assumptions

An economic analysis was conducted for seven of the 14 BMPs that are described in the MOU (i.e. BMP nos. 1, 2, 4, 5, 6, 9, and 14). Economic analyses were not done for BMPs 3, 7, 8, 10, 11, 12, and 13 because they are essentially non-quantifiable, but essential to the success of those BMPs that are quantifiable.

Assumptions used in the economic analysis for each BMP are described in Appendix I. Directly beneath each assumption is a brief description of the rationale and/or supporting evidence for that assumption. Common assumptions for all BMPs are the value of conserved water ($350/ac-ft), the real discount rate (6.15%), and the overhead rate (13%). The real discount rate is calculated from the assumed real cost of money (8.82%) and the assumed long-term inflation rate (2.52%) using the precise conversion method (A&N Technical Services 2000, pg A-2). Housing information and a breakdown of the number of connections for each connection category used for the economic analysis are presented in Table 7.3-1 and 7.3-2.

Table 7.3-1: Housing Estimates And Projections

Year	Single family dwelling units	Multi-family dwelling units
1991	3,001	1,456
1997	2,964	1,351
2000	2,971	--
2005	2,955	--
2010	2,939	--
2015	2,923	--
2020	2,907	--

Table 7.3-2: Connections By Classification, Year 1997	
Classification	**Connections**
Single family	2,964
Multi-family	65
Commercial	613
Industrial	3
Institutional	67
Irrigation/landscaping	0
Total	3,712

The economic analysis was performed using a spreadsheet model. A separate, customized worksheet for each BMP is presented in Appendix I. Each BMP economic analysis spreadsheet projects, on an annual basis, the number of interventions and the dollar values of the benefits and costs that would result from implementing a particular BMP. Terms and formulas that are common to all the worksheets are defined in Table 7.3-3.

Table 7.3-3: Definition of Terms Used in the Economic Analysis		
Term	Definition	Comments
BENEFITS:		
Avoided Capital Costs	Capital costs that are avoided by implementing the BMP.	An example is the cost of a well that would not have to be installed due to implementation of the BMP.
Avoided Variable Costs	Variable costs that are avoided by implementing the BMP.	An example is the cost of electricity that would be saved if the BMP were implemented.
Avoided Purchase Costs	Purchase costs that are avoided by implementing the BMP.	An example is the cost of purchasing water that would not be needed due to implementation of the BMP.
Total Undiscounted Benefits	The sum of avoided capital costs, avoided variable costs and avoided purchase costs.	
Total Discounted Benefits	The present value of the sum of avoided capital costs, avoided variable costs and avoided purchase costs.	An annual percentage rate consisting of the cost of borrowing money minus the inflation rate.
COSTS:		
Capital Costs	Capital costs incurred by implementing the BMP.	For example, the cost to purchase and install meters for BMP 4.
Financial Incentives	The cost of financial incentives paid to connections.	Copay or distribution for purchasing low-flow plumbing devices or washing machines are examples of financial incentives.
Operating Expenses	Operational expenses incurred during implementation of the BMP.	
Total Undiscounted Costs	The sum of capital costs, financial incentives, and operating expenses.	
Total Discounted Costs	The present value of the sum of capital costs, financial incentives, and operating expenses.	The discount rate is used to calculate discounted costs from undiscounted costs.
NET PRESENT VALUE	Total discounted benefits minus total discounted costs.	A value greater than zero indicates an economically justifiable BMP.
RESULTS:		
Benefit / Cost Ratio	The sum of the total discounted benefits divided by the sum of the total discounted costs.	A ratio greater than one indicates an economically justifiable BMP.
Simple Pay-Back Period	The number of years required for the benefits to pay back the costs of the BMP, calculated as the sum of the total discounted costs divided by the average annual total discounted benefits.	A low value is considered economically attractive.
Discounted Cost / Water Saved	The present-value cost to save one acre-foot of water, calculated as the sum of the total discounted costs divided by the total acre-feet of water saved over the study period.	A low value is considered economically attractive because it indicates a low implementation cost. Value must be less than the marginal cost of new water to be cost effective.
Net Present Value / Water Saved	The net value of saving one acre-foot of water, calculated as the sum of the net present value divided by the total acre-feet of water saved over the study period.	A high value is considered economically attractive.

7.4 Economic Analysis Results

Table 7.4-1 summarizes the results of the economic analysis in terms of the benefit/cost (B/C) ratio, the simple pay-back period, the discounted cost per ac-ft of water saved, and the net present value (NPV) per ac-ft of water saved for each BMP.

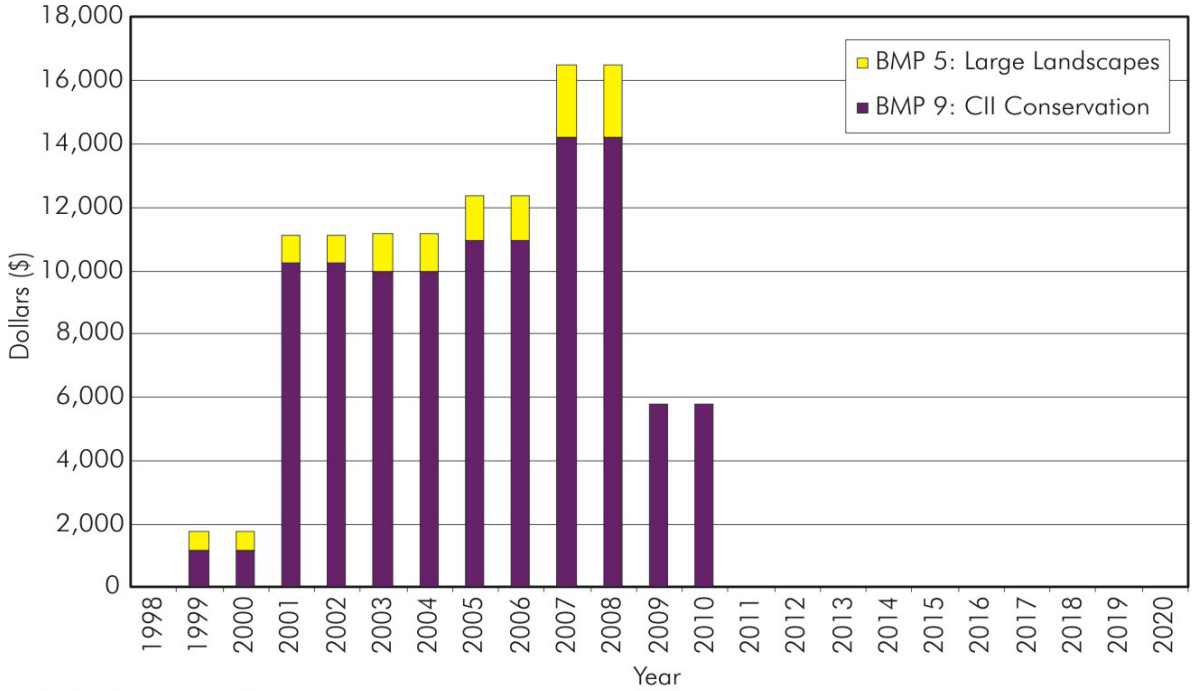
Table 7.4-1: Results Of Economic Analysis

BMP No.	BMP Name	Total discounted cost over study period ($)	Total water saved [a] (ac-ft)	Benefit / cost ratio	Simple payback period (years)	Discounted cost / water saved ($/ac-ft)	Net present value / water saved ($/ac-ft)
1	Water survey programs for single-family residential and multi-family residential connections.	110,226	439	1.9	7	251	224
2	Residential plumbing retrofits.	334,867	490	0.6	23	683	-262
5	Large landscape conservation programs and incentives.	20,871	291	6.2	2	72	375
6	High-efficiency washing machine rebate programs.	147,954	446	0.9	22	332	600
9	Conservation programs for commercial, industrial, and institutional (CII) accounts.	154,727	786	2.0	11	197	193
14	Residential ULFT replacement programs.	660,516	3,032	1.5	13	218	107

[a] Total water saved over study period.

Annual water costs and savings for each of the BMPs with a B/C ratio equal to or greater than one are presented graphically on Figures 7.4-1 and 7.4-2 and summarized in Table 7.4-2. Table 7.4-2 also presents the number of annual interventions required for each BMP for the water system to be in compliance with the MOU for all cost effective BMPs. Interventions and costs shown for BMPs for prior year of 1998, 1999, and 2000, if not completed, would have to be implemented in future years.

Figures 7.4-1 and 7.4-2 and Table 7.4-2 do not include the water savings and costs associated with BMPs 3, 7, 8, 10, 11, 12, and 13 since no specific level of effort is defined in the MOU for these BMPs. BMPs 4 and 11 are already implemented and, therefore, have no cost associated with them. BMP 13 is covered by CPUC General Order 103, and has no cost unless triggered by a water shortage condition.



Note: Costs are undiscounted costs.

Figure 7.4-1: Marysville BMP Implementation Costs

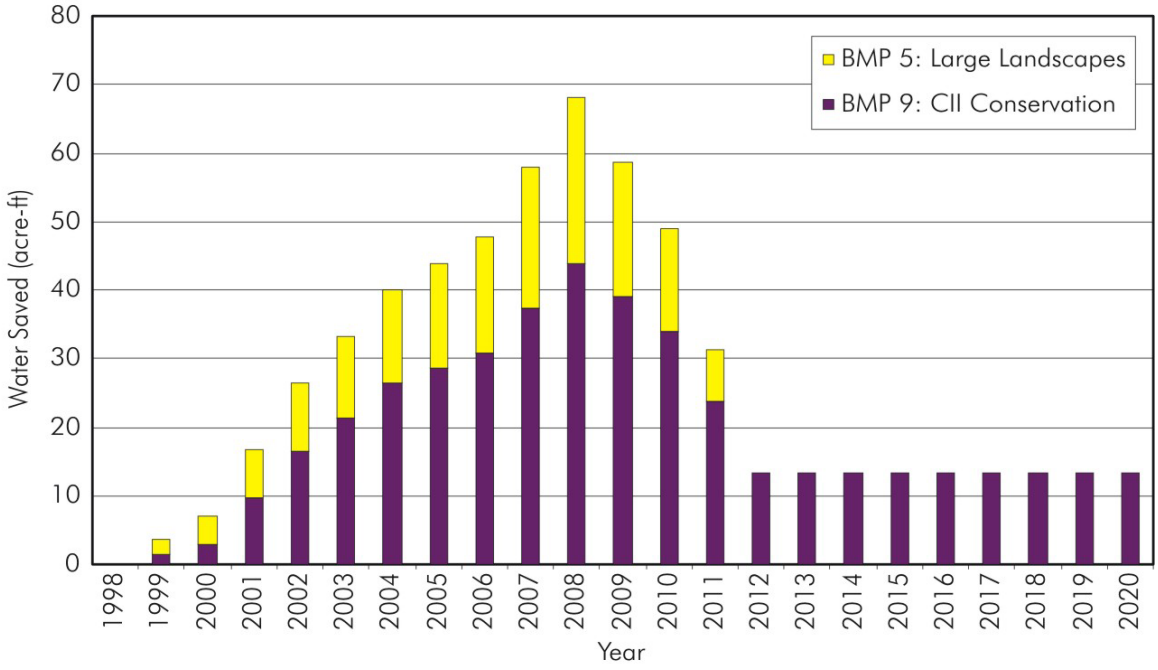


Figure 7.4-2: . Marysville BMP Water Savings

Note: Water costs and water savings from BMPs 7, 8, 10, 11, 12, and 13 not included. See text.

Table 7.4-2: Summary Of BMP Annual Interventions, Water Saved, Cost

	BMP 1: Residential water surveys			BMP 2: Residential plumbing			BMP 4: Install meters			BMP 5: Large landscapes		
Year	Interventions	Water saved	Cost	Interventions	Water saved	Cost	Interventions	Water saved	Cost	Interventions	Water saved	Cost
		(ac-ft/yr)	($/yr)		(ac-ft/yr)	($/yr)		(ac-ft/yr)	($/yr)		(ac-ft/yr)	($/yr)
1998	B/C<1	B/C<1	B/C<1	B/C<1	B/C<1	B/C<1	B/C<1	B/C<1	B/C<1	0	0	0
1999										5	2	640
2000										5	4	640
2001										7	7	896
2002										7	10	896
2003										9	12	1,153
2004										9	13	1,153
2005										11	15	1,409
2006										11	17	1,409
2007										18	21	2,305
2008										18	24	2,305
2009										0	20	0
2010										0	15	0
2011										0	8	0
2012										0	0	0
2013										0	0	0
2014										0	0	0
2015										0	0	0
2016										0	0	0
2017										0	0	0
2018										0	0	0
2019										0	0	0
2020										0	0	0
Total	0	0	0	0	0	0	0	0	0	102	168	12,806

Note: B/C<1 indicates a benefit to cost ratio less than one.

Table 7.4-2: Summary Of BMP Annual Interventions, Water Saved, Cost (continued)

	BMP 6: Washing machine rebates			BMP 9: CII conservation			BMP 14: Residential ULFT			Total		
Year	Interventions	Water saved	Cost	Interventions	Water saved	Cost	Interventions	Water saved	Cost	Interventions	Water saved	Cost
		(ac-ft/yr)	($/yr)		(ac-ft/yr)	($/yr)		(ac-ft/yr)	($/yr)		(ac-ft/yr)	($/yr)
1998	B/C<1	B/C<1	B/C<1	0	0	0	B/C<1	B/C<1	B/C<1	0	0	0
1999				8	7	5,609				13	9	6,250
2000				8	14	5,609				13	18	6,250
2001				52	20	9,993				59	27	10,889
2002				52	27	9,993				59	37	10,889
2003				53	27	10,928				63	39	12,080
2004				53	28	10,928				63	42	12,080
2005				58	35	14,200				69	50	15,608
2006				58	41	14,200				69	58	15,608
2007				46	36	5,786				64	57	8,091
2008				46	31	5,786				64	56	8,091
2009				46	22	5,786				46	42	5,786
2010				46	13	5,786				46	29	5,786
2011				0	13	0				0	21	0
2012				0	13	0				0	13	0
2013				0	13	0				0	13	0
2014				0	13	0				0	13	0
2015				0	13	0				0	13	0
2016				0	13	0				0	13	0
2017				0	13	0				0	13	0
2018				0	13	0				0	13	0
2019				0	13	0				0	13	0
2020				0	13	0				0	13	0
Total	0	0	0	527	437	104,602	0	0	0	630	604	117,408

Note: B/C<1 indicates a benefit to cost ratio less than one.

7.5 Additional Issues

This section describes additional issues required to be addressed by the Urban Water Management Planning Act. Non-economic factors, including environmental, social, health, customer impacts, and technological are not thought to be significant in deciding which BMPs to implement. No water supply projects are currently planned that would supply water at a higher unit cost. Cal Water has the legal authority to implement the BMPs. However, the costs of implementing these BMPs are subject to CPUC approval

7.6 Previous Water Management Programs

California Water Service Company has conducted conservation programs in the Marysville District for several years. The Company believes that managing demand is an important element in the overall management of water supply and has made efforts to promote conservation through educational, informational, and customer assistance activities.

7.6.1 External Measures to Achieve Public Support

The current status of conservation program activity in the Marysville District is reflected in Table 7.6-1:

Table 7.6-1: Status of Conservation Programs

Conservation Measure	Date Implemented	Program End Date
BMP 02 Plumbing Retrofit (Showerheads, kitchen aerators, hose nozzles)	1992	Ongoing
BMP 07 Public Information	1988	Ongoing
BMP 08, School Programs	1990	2004
BMP 14 ULFT Rebate Program	1992	Ongoing

7.6.2 Internal Measures to Achieve Efficient Water Management

California Water Service Company currently implements internal measures that are intended to achieve efficient water management; these are discussed below.

<u>Distribution System Water Audit and Leak Detection Program</u>

Annually, California Water Service Company completes a prescreening system audit to determine the level of unaccounted for water in each system and to evaluate whether a full-scale system audit is needed. California Water Service Company uses a simple method to calculate unaccounted for water, subtracting total sales from total water production, and then dividing the result by the total production amount to obtain the percentage of production that is lost. Unaccounted for water in 2004 was 8% of demand and has averaged 8% over the past ten years.

California Water Service Company is prepared to conduct full-scale system water audits in the event that unaccounted for water is 10% or more, providing that a full-scale system audit is cost-effective to implement. If cost-effective, a full-scale audit will be implemented using methodology consistent with that described in AWWA's Water Audit and Leak Detection Guidebook.

Water Efficient Landscape Guidelines

In 1992, water efficient landscape guidelines were developed (See Appendix H). These guidelines apply to all landscapes designed for California Water Service Company properties including renovations. For ease of adoption by districts with a multitude of climates and microclimates, the guidelines are generic and adhere to water efficient landscape (Xeriscape) principles.

7.7 Overall District Conservation Goals

California Water Service Company recognizes the importance of conservation in managing its own water resources. While economic and regulatory constraints of integrating conservation into supply management have proven challenging, California Water Service Company is participating in efforts to develop demand management strategies, standards, and criteria by working with the California Urban Water Conservation Council. This Council was formed as part of the MOU primarily to oversee the implementation of the BMPs and to improve water conservation practices and analyses. California Water Service Company is committed to this process and the development of an integrated resource plan.

California Water Service Company's conservation programs are intended to assist customers in their efforts to use water efficiently as well as to educate them about their water supply. This will lead them to make informed decisions concerning the efficient use of water and enable them to better respond to required reductions in water use should a water shortage or emergency occur. During periods of water shortages, the Company's conservation programs can be expanded and may include more restrictive measures such as mandatory reductions, rationing, and penalties.

7.8 Proposed Conservation Programs

California Water Service Company proposes to run seven conservation programs, Table 7.8-1, in the Marysville District at an annual cost of $49,702.00. Before implementing any conservation program, California Water Service Company must receive approval from the CPUC.

Table 7.8-1: Budget for Conservation Programs				
Program	**2005**	**2006**	**2007**	**Total**
BMP 02 Plumbing Retrofit	$3,100.00	$3,100.00	$3,100.00	$9,300.00
BMP 05 Large Landscape (ET Controller)	$11,250.00	$11,250.00	$11,250.00	$33,750.00
BMP 06 High Efficiency Washing Machine Rebate	$6,975.00	$6,975.00	$6,975.00	$20,925.00
BMP 07 Public Education	$6,237.00	$6,237.00	$6,237.00	$18,711.00
BMP 08 School Education	$6,750.00	$6,750.00	$6,750.00	$20,250.00
BMP 09 CII Programs	$7,560.00	$7,560.00	$7,560.00	$22,680.00
BMP 14 ULFT Rebate	$7,830.00	$7,830.00	$7,830.00	$23,490.00
Total per year	**$49,702.00**	**$49,702.00**	**$49,702.00**	**$149,106.00**

References

1. U.S. Geological Survey, Earthquake Hazards Program, URL http://quake.wr.usgs.gov/info/faultmaps/index.html

2. Yuba County's 2004 Economic and Demographic Profile, Yuba County Website: http://www.yubacounty.org/Demographics/demographics.htm

3. Western Regional Climate Center, Marysville Weather Station, http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?camary+nca

4. California Irrigation Management Information System (CIMIS), EvapoTranspiration (Eto) Zones Map - Zone 14, http://wwwcimis.water.ca.gov/cimis/welcome.jsp

5. California's Ground Water Bulletin 118, 2003:
    a. Sacramento River Hydrologic Region
    b. Sacramento Valley Groundwater Basin, North Yuba Sub-basin

6. Ground Water Management Plan, Yuba County Water Agency, March 2005

7. LandView 5 and MARPLOT ® software, US Census Bureau/Environmental Protection Agency, http://www.census.gov/geo/landview/lv5/lv5.html , http://www.epa.gov/ceppo/cameo/marplot.htm

Appendices