California Water Service Company

2010 Urban Water Management Plan

Redwood Valley District

ADOPTED

June 2011

Table of Contents

TABLE OF CONTENTS 3
LIST OF FIGURES 5
LIST OF TABLES 6
CONTACT SHEET 9
1 PLAN PREPARATION 11
1.1 PURPOSE 11
1.2 COORDINATION 11
1.3 PLAN ADOPTION 12
1.4 WATER MANAGEMENT TOOLS 13
1.5 PLAN ORGANIZATION 14
1.6 IMPLEMENTATION OF PREVIOUS UWMP 15
2 SYSTEM DESCRIPTION 17
2.1 SERVICE AREA DESCRIPTION 17
2.2 SERVICE AREA POPULATION 21
2.3 SERVICE AREA CLIMATE 26
3 SYSTEM DEMANDS 31
3.1 DISTRIBUTION OF SERVICES 31
3.2 HISTORICAL AND CURRENT WATER DEMAND 32
3.3 WATER DEMAND PROJECTIONS 36
3.3.1 Senate Bill No. 7 Baselines and Targets 39
3.3.2 Low Income Housing Projected Demands 44
3.4 TOTAL WATER USE 45
4 SYSTEM SUPPLIES 47
4.1 WATER SOURCES 47
4.2 PURCHASED WATER 47
4.3 PURCHASED SURFACE WATER 47
4.4 GROUNDWATER 49
4.4.1 Basin Boundaries and Hydrology 50
4.4.2 Groundwater Management Plan 51
4.5 RECYCLED WATER 52
4.5.1 Wastewater Collection 52
4.5.2 Estimated Wastewater Generated 53
4.5.3 Potential Water Recycling 54
4.6 DESALINATED WATER 54
4.7 TRANSFER OR EXCHANGE OPPORTUNITIES 54
4.8 WATER SUPPLY PROJECTS 55
5 WATER SUPPLY RELIABILITY AND WATER SHORTAGE CONTINGENCY PLANNING 57
5.1 WATER SUPPLY RELIABILITY 57
5.2 DROUGHT PLANNING 66
5.2.1 Normal-Year Comparison 67
5.2.2 Single Dry-Year Comparison 68
5.2.3 Multiple Dry-Year Comparison 68
5.3 FACTORS AFFECTING RELIABILITY OF SUPPLY 70
5.4 WATER QUALITY 70

5.5 WATER SHORTAGE CONTINGENCY PLAN 72
5.5.1 Water Shortage Contingency Plan Scope 72
5.5.2 Water Conservation/Water Supply Team....73
5.5.3 Water Supply Allocation Plan....74
5.5.4 Allocation Methodology and Customer Information 75
5.5.5 Drought Stages 76
5.5.6 Water Supply Conditions and Trigger Levels....80
5.5.7 Water Use Restriction Enforcement....81
5.5.8 Analysis of Revenue and Expenditure Impacts 81
5.5.9 Catastrophic Water Supply Interruption....83

6 DEMAND MANAGEMENT MEASURES....85

6.1 STATEWIDE URBAN WATER DEMAND REDUCTION POLICIES....85
6.2 CONSERVATION MASTER PLANS....87
6.3 WATER SAVINGS REQUIREMENTS....88
6.4 CONSERVATION PROGRAM ANALYSIS....91
6.5 CONSERVATION PROGRAM PORTFOLIO....93

7 CLIMATE CHANGE....97

7.1 INTRODUCTION....97
7.2 STRATEGY....97
7.3 POTENTIAL CLIMATE CHANGE EFFECTS....98
7.4 HISTORICAL CLIMATE DATA SUMMARY....98
7.5 CLIMATE CHANGE GUIDANCE....102

8 COMPLETED UWMP CHECKLIST....103

8.1 REVIEW CHECKLIST....103

APPENDIX A-1: RESOLUTION TO ADOPT UWMP....111

APPENDIX A-2: CORRESPONDENCES....113

APPENDIX A-3: PUBLIC MEETING NOTICE....115

APPENDIX B: SERVICE AREA MAP....117

APPENDIX C: WATER SUPPLY, DEMAND, AND PROJECTION WORKSHEETS....119

APPENDIX D: DWR'S GROUNDWATER BULLETIN 118....121

APPENDIX E: TARIFF RULE 14.1 WATER CONSERVATION AND RATIONING PLAN....123

APPENDIX F: WATER EFFICIENT LANDSCAPE GUIDELINES....125

APPENDIX G: CONSERVATION MASTER PLAN....127

APPENDIX H-1: SWEETWATER PURCHASE AGREEMENT....129

APPENDIX H-2: YOLO COUNTY PURCHASE AGREEMENT....131

List of Figures

Figure 2.1-1: General Location of Redwood Valley District 18
Figure 2.1-2: General Service Areas 19
Figure 2.1-3: Major Fault Lines near Redwood Valley District 20
Figure 2.2-1: Approximated SAM with US Census 2000 Tract Map 22
Figure 2.2-2: Historical & Projected Services 24
Figure 2.2-3: Estimated Population and Projection 25
Figure 2.2-4: Estimated Housing Unit Projection 26
Figure 2.3-1: Average Monthly Temperature and Rainfall (Clearlake 4 SE) 27
Figure 2.3-2: Average Monthly Temperature and Rainfall (Graton) 28
Figure 2.3-3: Monthly Average ETo Values (Clearlake 4 SE) 28
Figure 2.3-4: Monthly Average ETo Values (Graton) 29
Figure 3.1-1: Distribution of Services (2010) 31
Figure 3.2-1: Historical Sales 32
Figure 3.2-2: Historical Service Counts 33
Figure 3.2-3: Historical Demand per Service 34
Figure 3.2-4: Percent of Total Demand by Type of Use (2010) 35
Figure 3.3-1: Historical & Projected Demand 37
Figure 3.4-1: Historical & Projected Sources 46
Figure 4.5-1: Estimated District Annual Wastewater Generated 53
Figure 5.1-1: Comparison of Annual Rainfall to Mean Discharge 58
Figure 5.1-2: Comparison of Mean Annual Discharge in Kelsey Creek 58
Figure 5.1-3: Comparison of Annual Russian River Flows to Historic Average 61
Figure 5.1-4: Comparison of Annual Rainfall to Historic Average 62
Figure 5.1-5: Groundwater Level Trends in the Santa Rosa Valley Basin 64
Figure 5.1-6: Groundwater Level Trend at Monitoring Well 07N08W35K001M 65
Figure 7.4-1: The Climate Regions of California 99
Figure 7.4-2: Maximum Temperature Departure for Sacramento-Delta Region 100
Figure 7.4-3: Mean Temperature Departure for Sacramento-Delta Region 101
Figure 7.4-4: Minimum Temperature Departure for Sacramento-Delta Region 101
Figure 7.4-5: Annual Precipitation in Sacramento-Delta Region 102

List of Tables

Table 1.2-1: Coordination with Appropriate Agencies (Table 1) 12
Table 1.5-1: Plan Organization 14
Table 2.2-1: Summary of Census 2000 Data 21
Table 2.2-2: Population - Current and Projected (Table 2) 24
Table 3.3-1: Actual 2005 Water Deliveries – AF (Table 3) 37
Table 3.3-2: Actual 2010 Water Deliveries – AF (Table 4) 38
Table 3.3-3: Projected 2015 Water Deliveries – AF (Table 5) 38
Table 3.3-4: Projected 2020 Water Deliveries - AF (Table 6) 38
Table 3.3-5: Projected 2025 and 2030 Water Deliveries - AF (Table 7) 39
Table 3.3-6: Projected 2035 and 2040 Water Deliveries - AF (Table 7) 39
Table 3.3-7: Cal Water Districts Sorted by Hydrologic Region 40
Table 3.3-8: Base Period Ranges (Table 13) 42
Table 3.3-9: Daily Base Per Capita Water Use-10-Year Range (Table 14) 42
Table 3.3-10: Daily Base Per Capita Water Use-5-Year Range (Table 15) 43
Table 3.3-11. Redwood Valley District SBx7-7 Targets 43
Table 3.3-12: Low-income Projected Water Demands (Table 8) 44
Table 3.4-1: Additional Water Uses and Losses - AFY (Table 9 and 10) 45
Table 3.4-2: Total Water Use – Actual and Projected AFY (Table 11) 45
Table 4.1-1: Planned Water Supplies (Table 16) 47
Table 4.3-1: Monthly Prescriptive Credit 49
Table 4.4-1: Amount of Groundwater Pumped – AFY (Table 18) 49
Table 4.4-2: Amount of Groundwater projected to be pumped – AFY (Table 19) 50
Table 4.5-1: Wastewater Collection and Treatment AFY (Table 21) 54
Table 4.5-2: Disposal of wastewater (non-recycled) AFY (Table 22) 54
Table 5.1-1: Basis of Water Year Data (Table 27) 59
Table 5.1-2: Supply Reliability - Lake Storage (Feet Rumsey) (Table 31) 59
Table 5.1-3: Basis of Water Year Data (Table 27) 61
Table 5.2-1: Basis of Water Year Data (Table 27) 66
Table 5.2-2: Supply Reliability – gal/service/yr (Table 28) 66
Table 5.2-3: Supply Reliability – Current Water Sources - AFY (Table 31) 67
Table 5.2-4: Supply and Demand Comparison - Normal Year - AF (Table 32) 67
Table 5.2-5: Supply and Demand Comparison – Single Dry Year - AF (Table 33) 68
Table 5.2-6: Supply And Demand Comparison - Multiple Dry Year Events – AFY (Table 34) . 69
Table 5.3-1: Factors Resulting In Inconsistency of Supply (Table 10) 70
Table 5.5-1: Demand Reduction Stage 1 (Table 36) 77
Table 5.5-2: Demand Reduction Stage 2 (Table 36) 78
Table 5.5-3: Demand Reduction Stage 3 (Table 36) 79
Table 5.5-4: Demand Reduction Stage 4 (Table 36) 80
Table 5.5-5: Water Supply Triggering Levels (Table 35) 81
Table 6.1-1: MOU Best Management Practices 86
Table 6.3-1: SBx7-7 and MOU Gross Water Savings Requirements 88
Table 6.3-2: Adjusted Baseline Demand Projection 90
Table 6.3-3: New Program Savings Required for SBx7-7 and MOU Compliance 90
Table 6.4-1: Cal Water Conservation Programs 92

Table 6.5-1: Recommended Program Levels.. 94
Table 6.5-2: Projected Water Savings by Program... 95
Table 7.4-1: Cal Water Districts Sorted by Climate Region 99
Table 8.1-1: Urban Water Management Plan Checklist (organized by legislation number)...... 103

California Water Service Company
2010 Urban Water Management Plan
Contact Sheet

This plan was prepared by the Water Resource Planning Group in California Water Service Company's Engineering Department. Thomas A. Salzano, Water Resources Planning Supervisor, is responsible for the plan's preparation and can be reached at the address and telephone number listed below:

General Office: **California Water Service Company**
1720 North First Street
San Jose, CA 95112

E-mail address: **tsalzano@calwater.com**

Phone: **(408) 367-8340**

Fax: **(408) 367-8427**

District Office: **Redwood Valley District**
6125 East Highway 20
Lucerne, CA 95458

District Manager: **Gay Guidotti**

District Phone: **(707) 869-0050**

1 Plan Preparation

California Water Service Company (Cal Water) is an investor-owned public utility supplying water service to 1.7 million Californians through 435,000 connections. Its 24 separate water systems serve 63 communities from Chico in the North to the Palos Verdes Peninsula in Southern California. California Water Service Group, Cal Water'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). Rates are set separately for each of the systems. Cal Water incorporated in 1926 and has provided water service to the Redwood Valley community since 2001.

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 (UWMP), no later than 30 days after adoption. 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 UWMP. The Redwood Valley District is below this threshold. However, Cal Water completed an UWMP for the District due to CPUC requirements, and as benefit to the agencies, cities and counties listed in Table 1.2-1.

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 Coordination

Cal Water completed a draft of the UWMP for the District on April 1, 2011. The draft was sent to the agencies listed in Table 1.2-1 for review and comment. Copies of the draft plan are available at Cal Water's corporate office in San Jose, and District office for public review and comment.

Table 1.2-1: Coordination with Appropriate Agencies (Table 1)							
Agency	Participated in developing the plan	Commented on the draft	Attended public meetings	Was contacted for assistance	Was sent a copy of the draft plan	Was sent a notice of intention to adopt	Not involved/ No information
City of Santa Rosa				✓	✓	✓	
Sonoma County Water Agency				✓	✓	✓	
Marin County				✓	✓	✓	
Lake County Water Resources Division				✓	✓	✓	

Cal Water conducted a formal public meeting to present information on its Redwood Valley UWMP on June 27, 2011, from 6:00-8:00 p.m. at the following location:

Lucerne Alpine Senior Center
3985 Country Club Drive
Lucerne, CA 95458

Proof of the public meeting is presented in Appendix A.

1.3 Plan Adoption

The deadline for final comments was June 15, 2011. The final plan was adopted by the Vice President of Engineering & Water Quality on June 24, 2011 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. 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.
- Correspondence between Cal Water and participating agencies.

The agencies listed in Table 1.2-1 and the California State Library will be sent a copy of the final version of this report.

1.4 Water Management Tools

Cal Water uses the following water management tools to optimize management of water resources for the District:

- Computerized Hydraulic Model for analysis of various operating conditions within the water distribution network and for planning operational and facility improvements. For smaller systems, a simple model is maintained that only models trunk lines, key sources, and major delivery points.
- Supervisory Control and Data Acquisition (SCADA) system that provides information as to how the water system is operating, provides operational control functions, and maintains a historical record of selected data.
- Revenue Management Solutions (RMS) is an information system that Cal Water uses to maintain detailed historical records including the water sales and customer service connections.
- District Report on Production (DROP) is a database that maintains water production data for wells and purchased amounts from wholesale service connections.
- Geographical Information Systems (GIS) that combines multiple sources of information and allows data to be electronically mapped for analysis and understanding of growth and constraints on land development and water use.
- Laboratory Information Management System (LIMS) provides water quality data for detailed constituent analysis of raw and finished water, determination of compliance with state and federal drinking water standards, and trends in water quality changes.
- Water Supply and Facilities Master Plan for identification of near and long term capital improvement projects for water system facilities and equipment using all of the above tools and Cal Water experience in design and construction.
- Computerized Maintenance Management System (CMMS) is a computerized database system that tracks asset data, assigns and schedules maintenance work orders, and reports on maintenance related activities. A CMMS allows a business to manage maintenance work more effectively and is a stepping stone towards Asset Management (AM).
- Groundwater Level Monitoring Program tracks groundwater fluctuations over time and is used to inform resource management and well maintenance decisions.

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 to Prepare a 2010 Urban Water Management Plan" prepared by the California Department of Water Resources.

Section	Table 1.5-1: Plan Organization	Act Provision
Contact Sheet	List of Contact Persons	-
Section 1	Plan Preparation This section describes the requirement and the purpose of the Urban Water Management Planning Act, coordination, plan adoption, schedule, and management tools.	§10620 (d)(2) §10621(a -b) §10635(b) §10642 §10643 §10644 (a) §10645
Section 2	System Description This section describes the District service area and includes area information, population estimate, and climate description.	§10631 (a)
Section 3	System Demands This section describes the water supply projection methodology used to estimate water demands and supply requirements to 2040. It also includes a discussion of SBx7-7 baselines and targets.	§10631 §10608.20(e)
Section 4	System Supplies This section includes a detailed discussion of the water supply sources.	§10631 §10633 §10634
Section 5	Water Supply Reliability and Water Shortage Contingency Planning This section includes a discussion of the water supply reliability and describes the District's planning for water shortages during drought and emergency situations.	§10620 §10631 (d) §10632 §10634 §10635 (a)
Section 6	Demand Management Measures This section describes Cal Water's conservation programs.	§10631
Section 7	Climate Change This section contains a discussion of climate change.	
Section 8	DWR Checklist This section includes the completed DWR UWMP Checklist.	
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) Correspondence with participating agencies	§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 the spreadsheets used to estimate the water demand for the District.	-

Section	Table 1.5-1: Plan Organization	Act Provision
Appendix D	DWR Groundwater Bulletin 118 Sections from the Department of Water Resources Bulletin 118 are included as reference and provide details of the basin for the District.	§10631 (b)(1-4)
Appendix E	Tariff Rule 14.1 Water Conservation And Rationing Plan, and Local Water Conservation Ordinances This section contains the tariff rule and ordinances for reference.	-
Appendix F	Water Efficient Landscape Guidelines This section contains the Guideline for Water Efficient Landscape that Cal Water uses at its properties, including renovations.	-
Appendix G	Conservation Master Plan This section contains the District's Conservation Master Plan.	§10631 (j)

1.6 Implementation of Previous UWMP

Cal Water will follow the California Water Code and file an UWMP at least once every five years on or before December 31, in years ending in five and zero. Since Cal Water operates 24 separate service districts the UWMP for each district has historically been submitted every third year to coincide with its California Public Utilities Commission (CPUC) general rate case (GRC) schedule. This method divided the districts into three sets that followed an established three-year schedule. Cal Water has since eliminated these groupings and will now file a GRC for all districts every third year and a UWMP every fifth year.

2 System Description

2.1 Service Area Description

The Redwood Valley District is a collection of six individual water systems spread throughout northern California. The Coast Springs system serves a portion of the coastal community of Dillon Beach on the southern end of Bodega Bay in northwest Marin County. The service area consists primarily of single family residential homes and a few commercial services. Land use in the surrounding area is mainly pasture and single family homes with large lots.

The Armstrong Valley, Noel Heights, and Rancho del Paradiso systems serve rural communities surrounding Guerneville along State Highway 116. These communities have historically consisted mostly of seasonal vacation homes and supporting commercial properties. But more recently there has been a shift towards an increasingly permanent population due to year-round residency. This trend will likely continue because of the relative affordability of housing in these areas compared to the rest of Sonoma County.

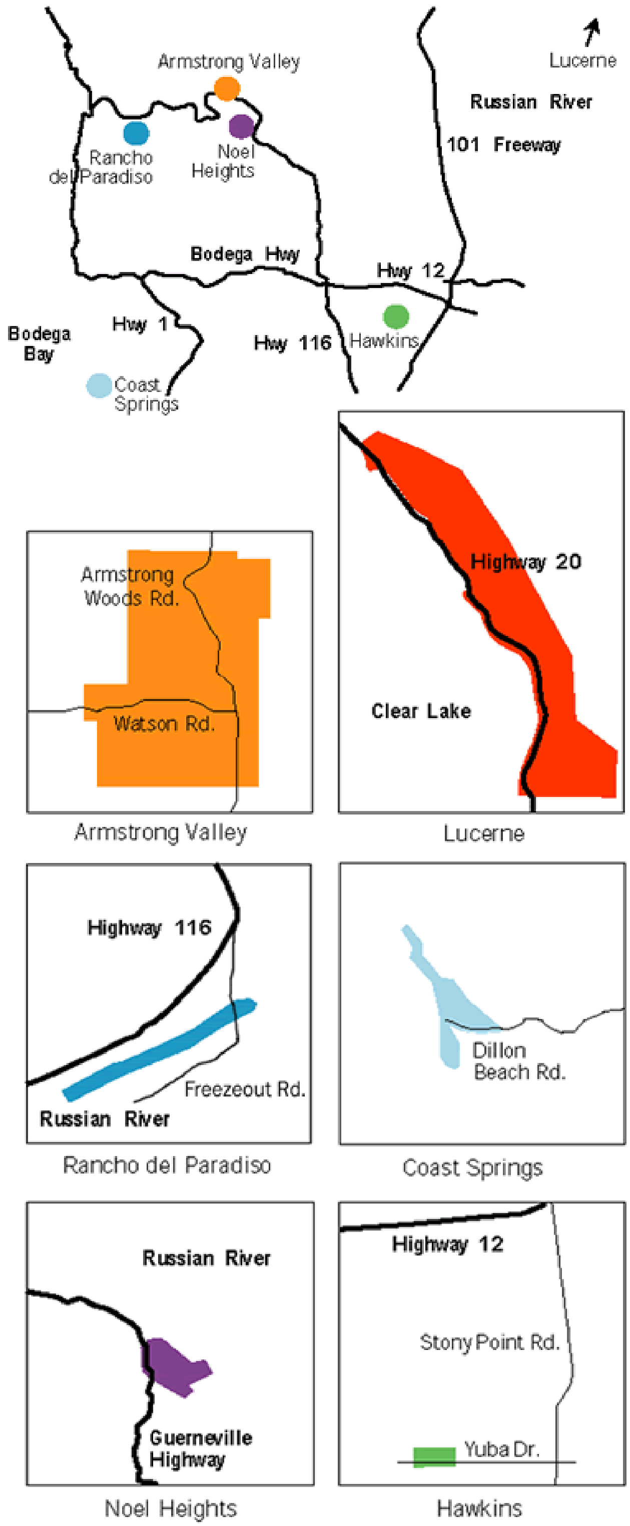
The Hawkins system is located in the southern portion of the City of Santa Rosa. It serves a subdivision of approximately 50 single family residential services. And the Lucerne system serves the community of Lucerne along State Highway 20 adjacent to Clear Lake. Lucerne is the largest water system in the Redwood Valley District and shows a more typical distribution of service connection types including single and multifamily residential, commercial, and governmental services. There are no industrial service connections in the Redwood Valley District

Major transportation routes within the service area include State Highways 1, 12, 20, 101, and 116. Figure 2.1-1 shows a general location map of the district in relation to other cities in the area. Figure 2.1-2 shows the approximated service areas of each system within the District.

Figure 2.1-1: General Location of Redwood Valley District[1]

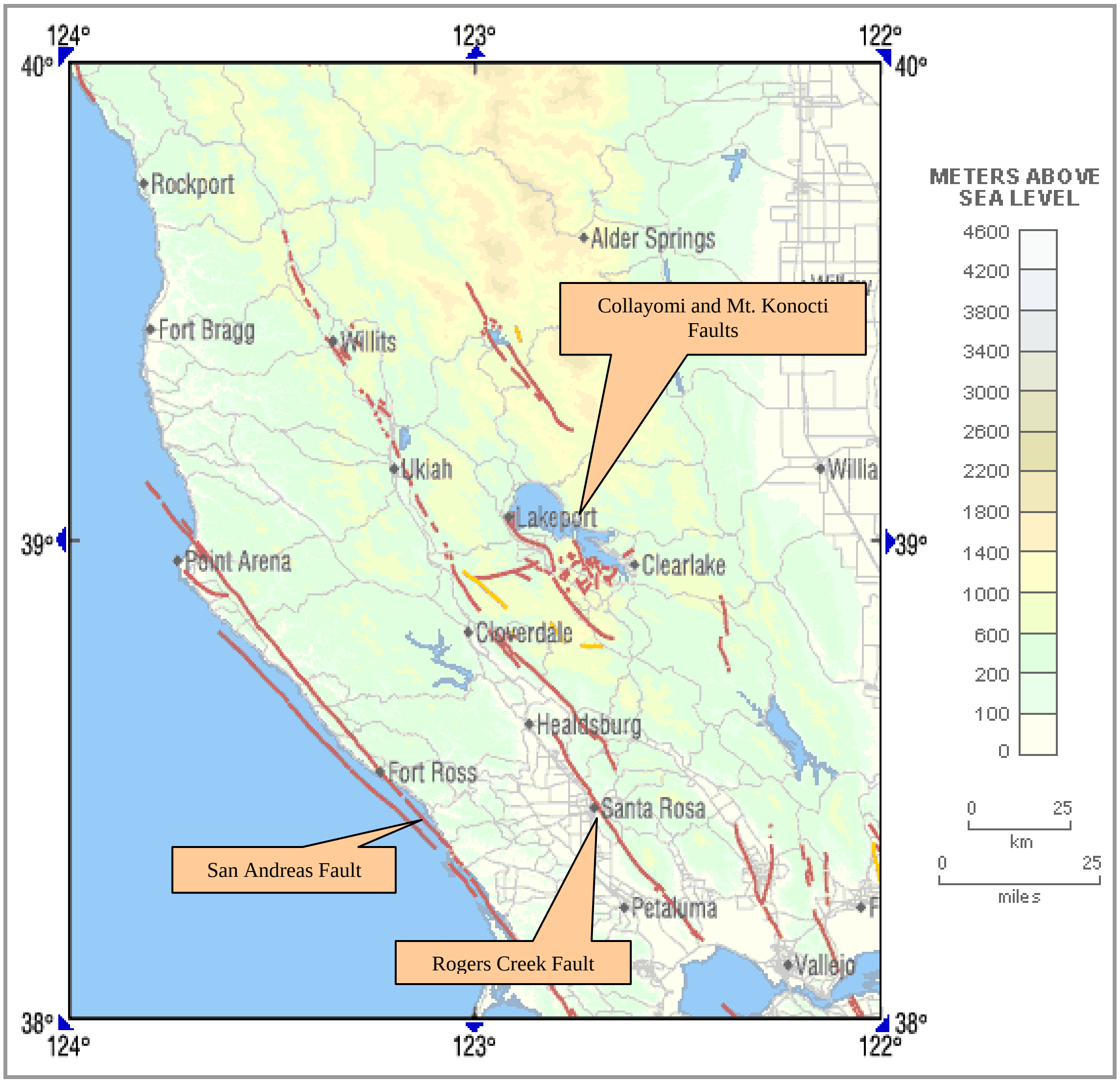
[1] www.lizmartin.com

Figure 2.1-2: General Service Areas



The Redwood Valley District water systems are spread over a large area and some are located near significant geologic features. Coast Springs is within several miles of the San Andreas Fault Zone, which runs southeast to northwest through Bodega Bay. The Rogers Creek Fault is located just east of the Hawkins system in Santa Rosa and the Mt. Konocti and Collayomi Faults line the west side of Clear Lake near Lucerne. Figure 2.1-3 shows the location of the major faults in the Redwood Valley District.[2]

Figure 2.1-3: Major Fault Lines near Redwood Valley District



Source: USGS

[2] United State Geological Service, Earthquake Hazards Program, Downloaded from: http://quake.wr.usgs.gov/info/faultmaps/119-35.html

2.2 Service Area Population

Cal Water's Redwood Valley District growth rate has seen moderate fluctuations in the past but remains relatively stable. Because it is a smaller District, sudden increases or decreases in service counts have a larger impact on observed growth rates. Over the past five years growth in total services has averaged 0.25 percent. The three year average growth rate is -0.02 percent. Growth in the Redwood Valley District is primarily attributed to infill development within the existing service areas.

Cal Water estimates that the District's population in 2009 was approximately 3,133, based on the 2000 U.S. Census data and considering current average annual service connections (assuming that the density has remained unchanged). A density of 1.54 persons per residential service (single family services plus multifamily units) was used for this estimate.

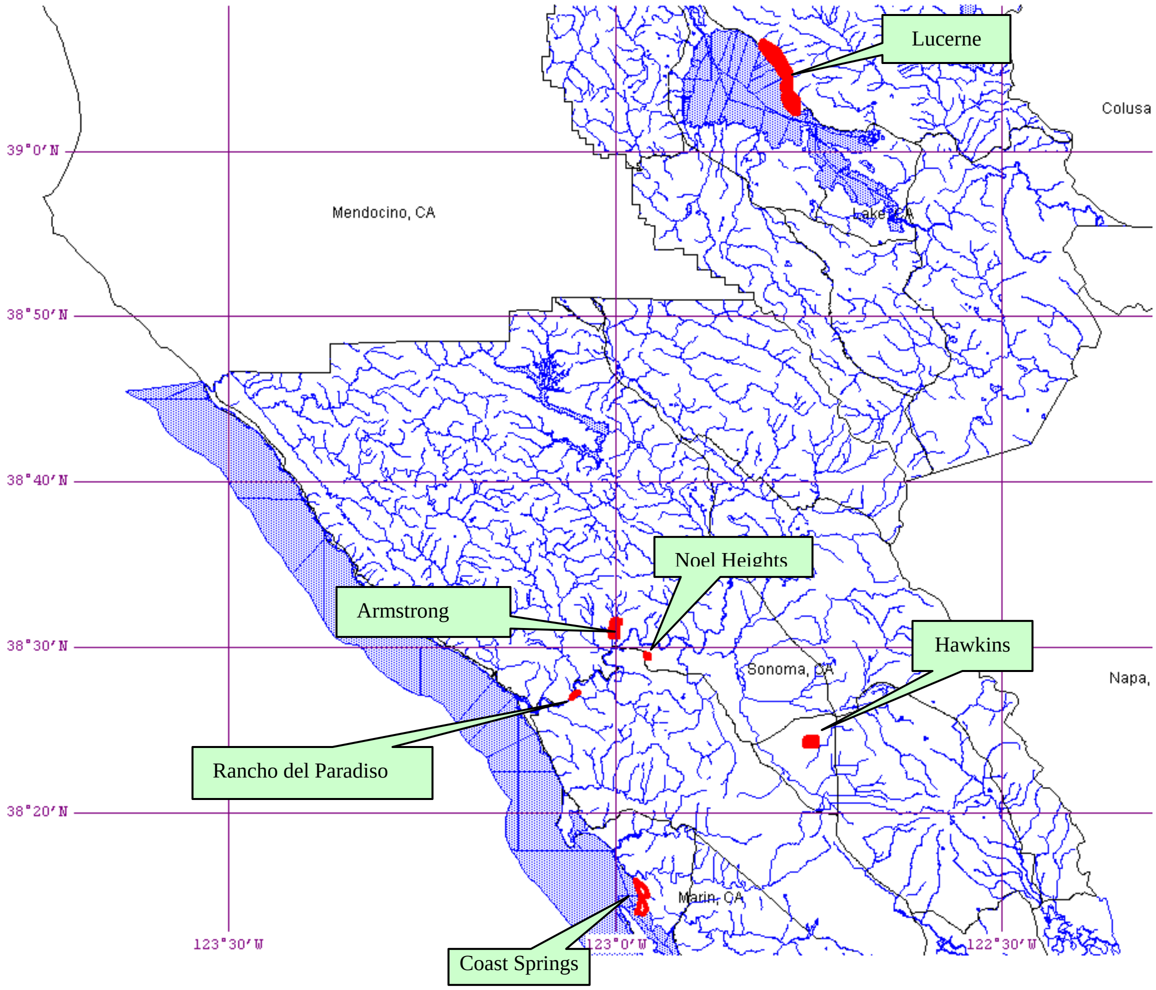
Estimate of the population serviced by Cal Water is based on overlaying the U.S. Census 2000 Block data with the service area map (SAM), as shown in Figure 2.2-1. A summary of the census data for the Year 2000 is shown in Table 2.2-1. LandView 5 and MARPLOT ® software were used to generate the data[3].

Table 2.2-1: Summary of Census 2000 Data

	Census Blocks	Population	Housing Units	Density
Lucerne	76	2,407	1,477	1.63
Armstrong Valley	11	283	147	1.92
Noel Heights	1	47	35	1.34
Rancho del Paradiso	1	14	5	2.8
Coast Springs	16	250	324	0.77
Hawkins	2	126	47	2.68
Redwood Valley Service Area	107	3,127	2,035	1.54

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

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



Armstrong Valley, Noel Heights, and Rancho del Paradiso Systems have restricted growth potential due to difficulty in attaining septic permits. Sonoma County will not allow new septic tanks to be constructed unless a large parcel of land is available and the system has been properly engineered. The only significant change in recent years is that the houses, which were once mostly used as summer homes, have become year-round residences. These three systems are each expected to grow at a rate of 1 service every 5 years based on discussions with the District.

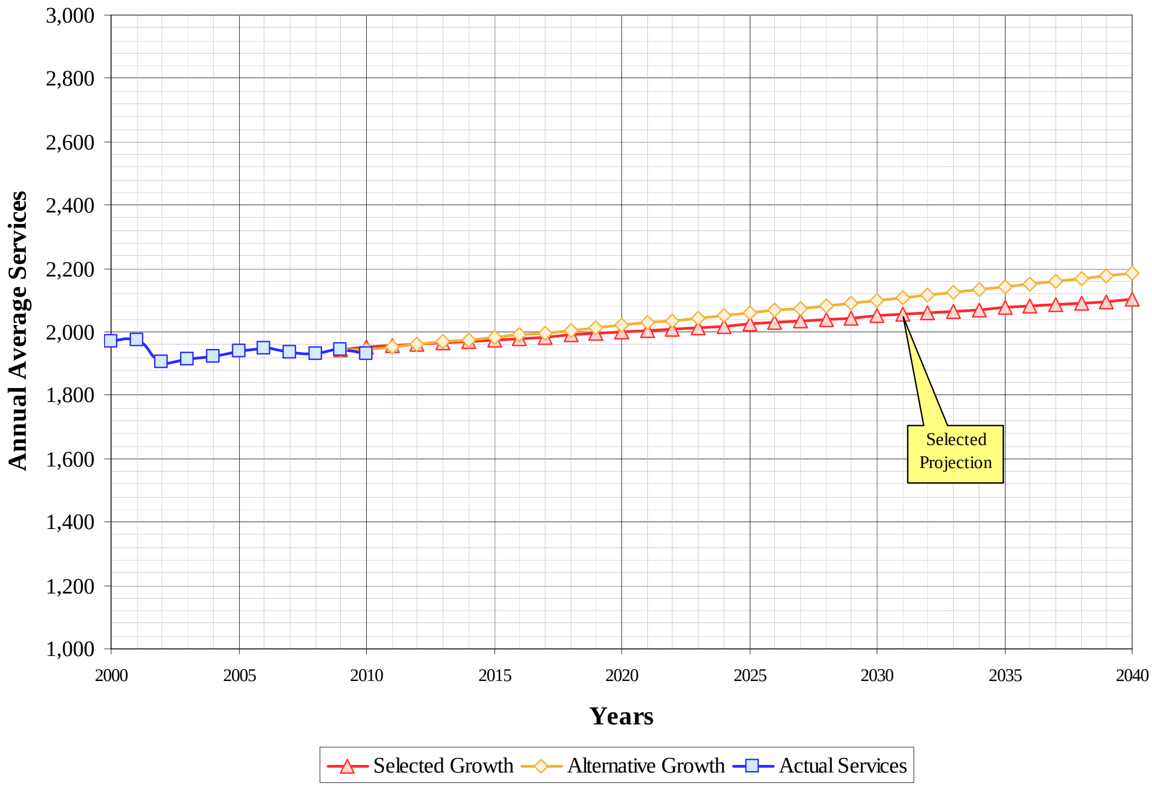
The Coast Springs Systems is under moratorium by DPH unless additional water supply can be secured. Cal Water has conducted a feasibility study to investigate the costs to add more supply from several potential sources. Cal Water is negotiating with the California Public Utilities Commission to determine the best and most cost-effective solution. If the CPUC allows some of the costs for the supply projects, the moratorium could be lifted. The service growth for the next three years would be zero. Currently, there is a waiting list of 10-12 properties interested in service when the moratorium is lifted. One service per year is expected as the growth rate after the moratorium is lifted.

Growth is only allowed in the Hawkins System if a property owner splits their lot or adds a "granny" unit. A growth rate of 1 service every 10 years is the assumed. Growth is also limited due to environmental consideration of salamander species in the area. The California tiger Salamander (Ambystoma californiense) is an endangered species that inhabits the Santa Rosa Plain. The Santa Rosa Plain encompasses 17,400 acres mostly west of Highway 101 from the City of Cotati north to the Town of Windsor. The Hawkins System is located in the center of this habitat area.

Based on discussions with the District personnel, the Lucerne System is the most likely system in the Redwood Valley District to have any significant growth. The Lucerne System was under a moratorium until 2008 due to water supply limitations. Large development in this system is unlikely due to the limit in capacity of the new 1 mgd WTP (commissioned in 2008). Any significant housing development beyond this capacity would need to be financed by the developer for the expansion of the WTP. An expected growth of 5 new services per year for Lucerne is assumed.

To establish a range of future service counts two projected growth rates for each service type were continued through 2040. The first was the growth rate developed in the Master Plan and the second is based on past service growth trends. The Master Plan rate is the result of a detailed analysis of the service area and is thought to be the most likely to occur. It was therefore used to calculate future demands. A comparison of service connection growth rates is shown in Figure 2.2-2.

Figure 2.2-2: Historical & Projected Services

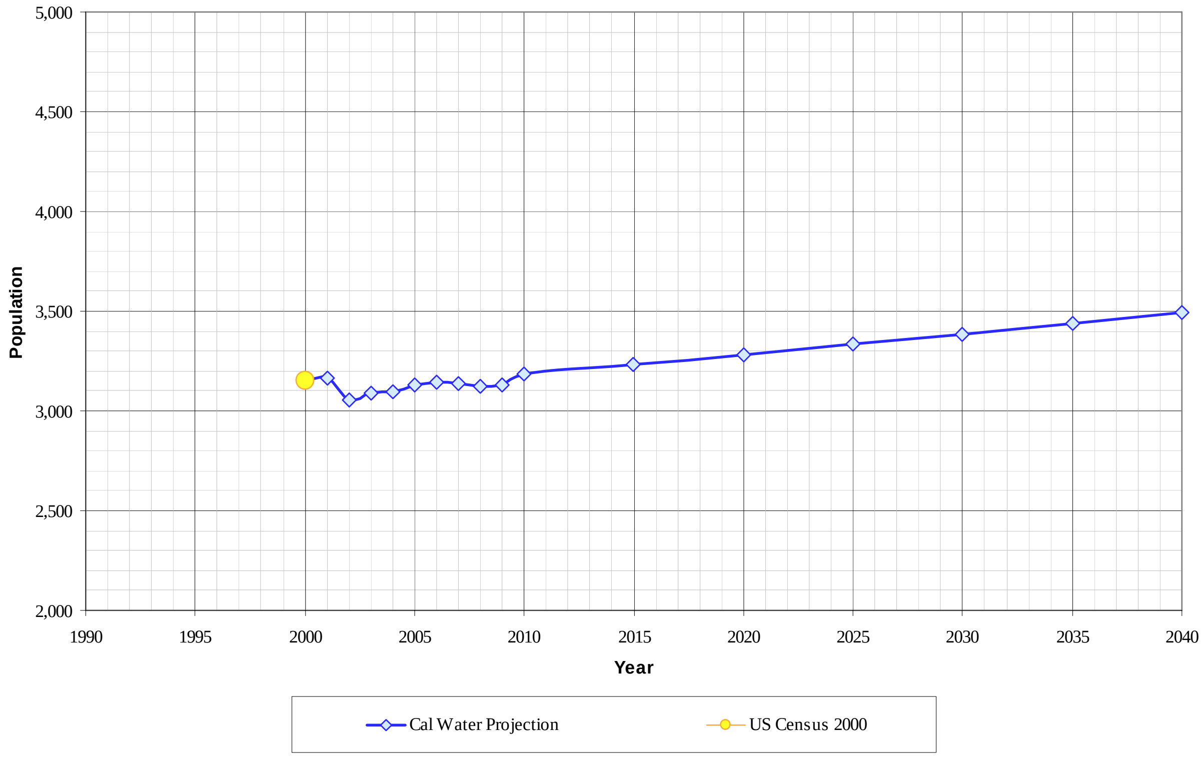


Cal Water estimates the service area's population could reach 3,494 by 2040. Table 2.2-2 lists the population growth in five year increments.

Table 2.2-2: Population - Current and Projected (Table 2)							
	2010	2015	2020	2025	2030	2035	2040
Service Area Population	3,183	3,233	3,283	3,334	3,387	3,440	3,493

The population estimate and projection for the District is shown in Figure 2.2-3.

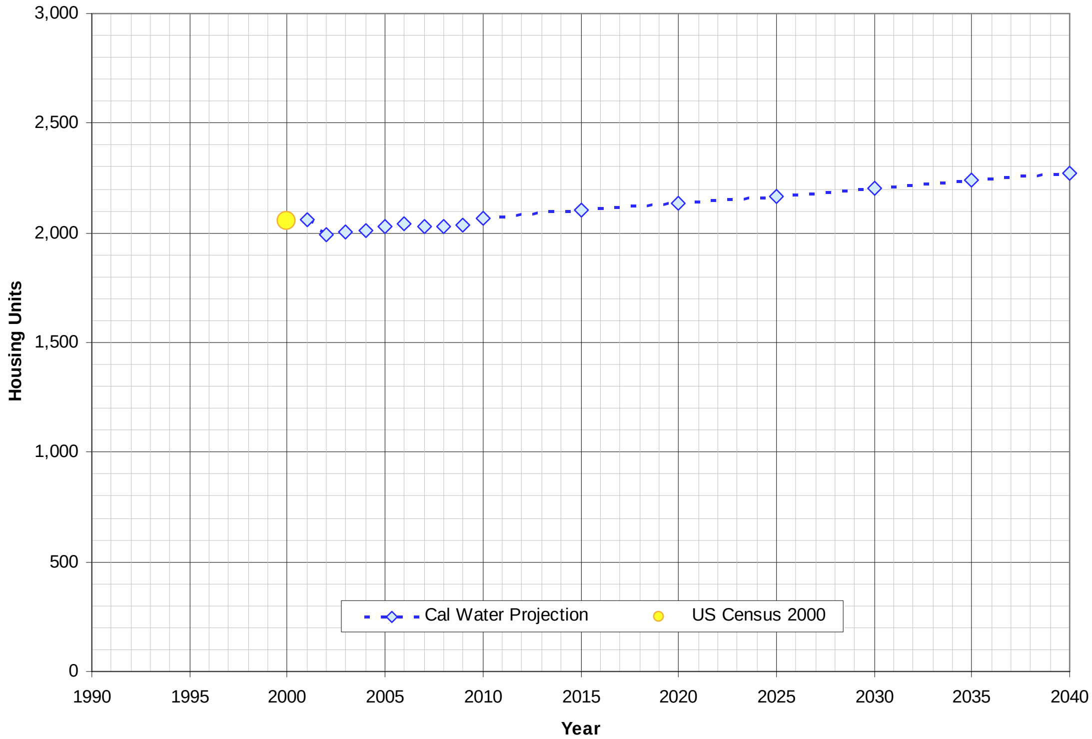
Figure 2.2-3: Estimated Population and Projection



The Cal Water population projection is based on projected services over the planning horizon. The estimated population was calculated by multiplying the total projected dwelling units by the number of people per dwelling unit for each year. This reflects the growth rate used in the Water Supply and Facilities Master Plan, which was picked for the analysis.

Similarly, the housing count was estimated by comparing the US Census 2000 data and the service counts for the Redwood Valley District, Figure 2.2-4. The Cal Water service count for the year 2000 is roughly equivalent but slightly higher than the US Census 2000 housing units estimate. This is the result of Census Blocks including nearby neighborhoods that are not served by Cal Water's systems. The US Census 2000 housing units was established by summarizing the individual census blocks enclosed within the service area of the District.

Figure 2.2-4: Estimated Housing Unit Projection



2.3 Service Area Climate

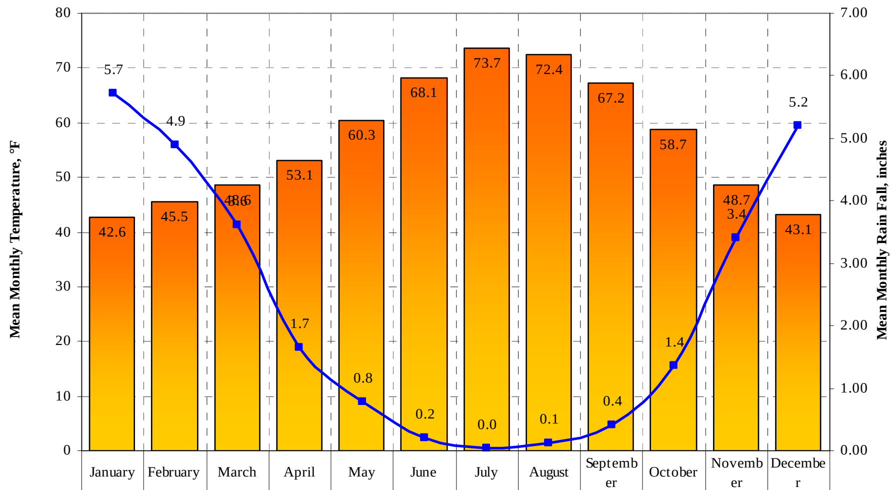
The climate in the Redwood Valley District varies depending on the location. For the purposes of this Plan two different weather stations were considered. The first is Clearlake Station 4 SE, which represents the bulk of the services, and is located near Lucerne. The second is the Graton Station which is closest to the Guerneville area water systems and covers the majority of the remaining services. The climate in Coast Springs is described in section 5.

The climate for the Redwood Valley District is moderate with warm dry summers and cool winters. The majority of precipitation falls during late autumn, winter, and early spring. Table 2.3-1 lists the average annual conditions for the weather stations described above. Additional climate data is provided in the Appendix C, worksheet 18.

Table 2.3-1: Average Annual Climate (Table 3)			
Station	**Average Temperature (°F)**	**Average Rainfall (inches)**	**Annual Total Evapotranspiration (in)**
Clearlake 4 SE	56.9	27.4	49.4
Graton	56.6	41.5	33.0
Muir Woods	58.5	37.2	49.4

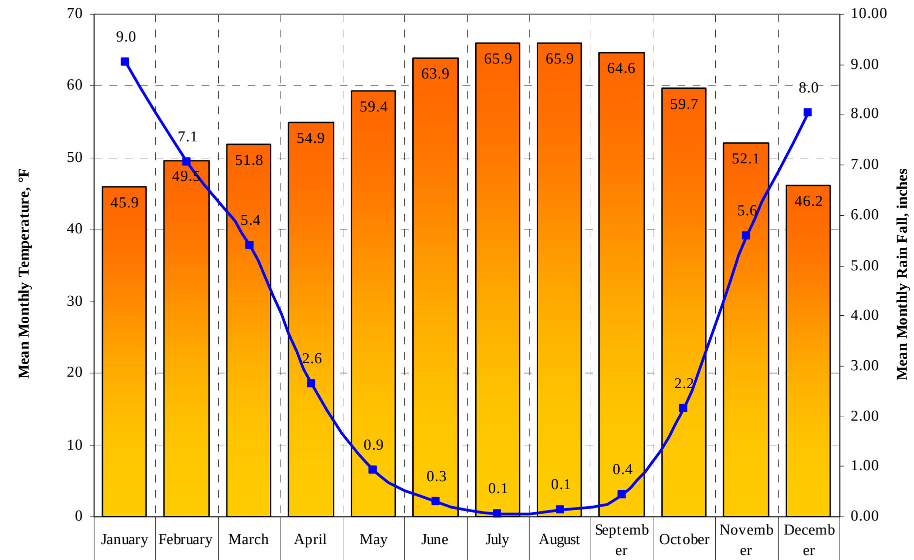
Figure 2.3-1 displays the average monthly temperature and rainfall at the Clearlake weather station and Figure 2.3-2 displays the average monthly temperature and rainfall at the Graton station[4].

Figure 2.3-1: Average Monthly Temperature and Rainfall (Clearlake 4 SE)



	January	February	March	April	May	June	July	August	September	October	November	December
Temperature	42.6	45.5	48.6	53.1	60.3	68.1	73.7	72.4	67.2	58.7	48.7	43.1
Rainfall	5.72	4.89	3.62	1.66	0.78	0.2	0.04	0.12	0.42	1.36	3.41	5.2

Figure 2.3-2: Average Monthly Temperature and Rainfall (Graton)



	January	February	March	April	May	June	July	August	September	October	November	December
Temperature	45.9	49.5	51.8	54.9	59.4	63.9	65.9	65.9	64.6	59.7	52.1	46.2
Rainfall	9.04	7.05	5.39	2.63	0.92	0.29	0.05	0.14	0.44	2.16	5.58	8.03

Figure 2.3-3 displays the monthly average evapotranspiration values for the Clearlake Station and Figure 2.3-4 displays the monthly average evapotranspiration values for the Graton Station. Evapotranspiration values estimate the amount of water loss by the combination of two separate processes: evaporation from soil surface and transpiration by plants.

Figure 2.3-3: Monthly Average ETo Values (Clearlake 4 SE)

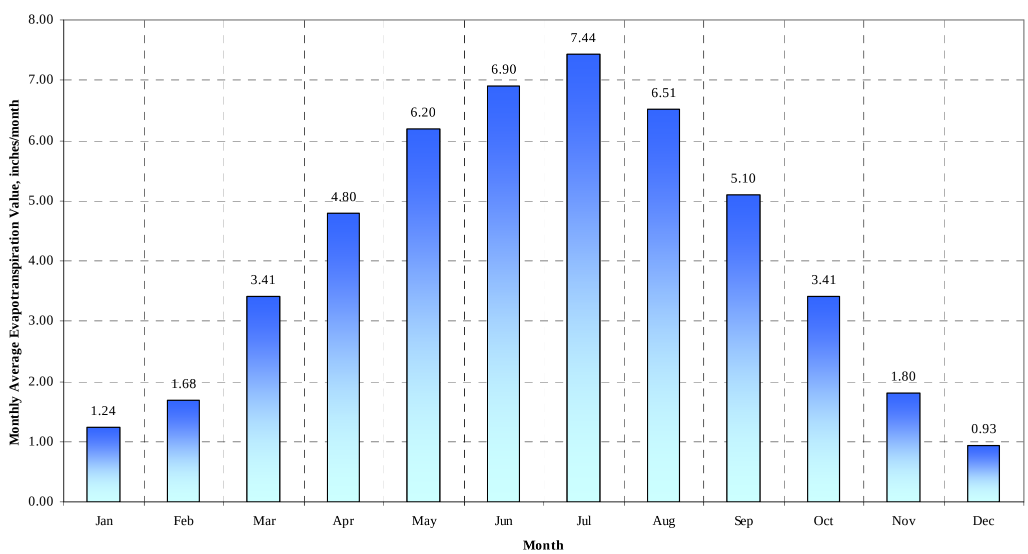
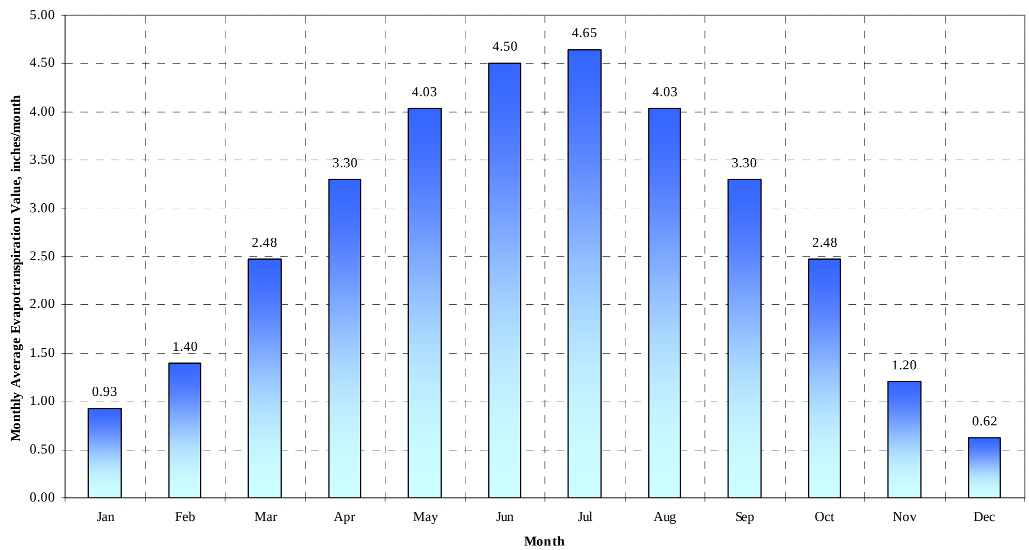


Figure 2.3-4: Monthly Average ETo Values (Graton)



3 System Demands

3.1 Distribution of Services

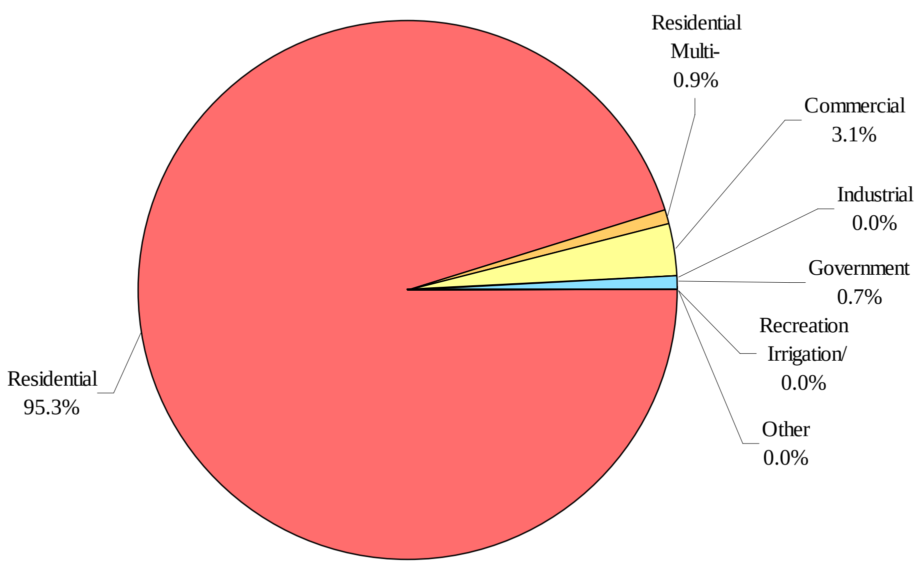
Cal Water designates the different customer classifications as follows:

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

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

The average annual service count for the calendar year 2010 was 1,931 total services. Single family residential services represent 95.3 percent of all services with 1,841 connections and multi family residential connections represent 0.9 percent of total services with 17 connections. The 59 commercial service connections represent 3.1 percent, and the 14 governmental services account for 0.7 percent. The distribution of services for 2010 is shown graphically in Figure 3.1-1.

Figure 3.1-1: Distribution of Services (2010)



3.2 Historical and Current Water Demand

Demand per service was established as a function of historical sales and service data. Historical sales values are illustrated in Figure 3.2-1. Historical service counts are illustrated in Figure 3.2-2.

Figure 3.2-1: Historical Sales

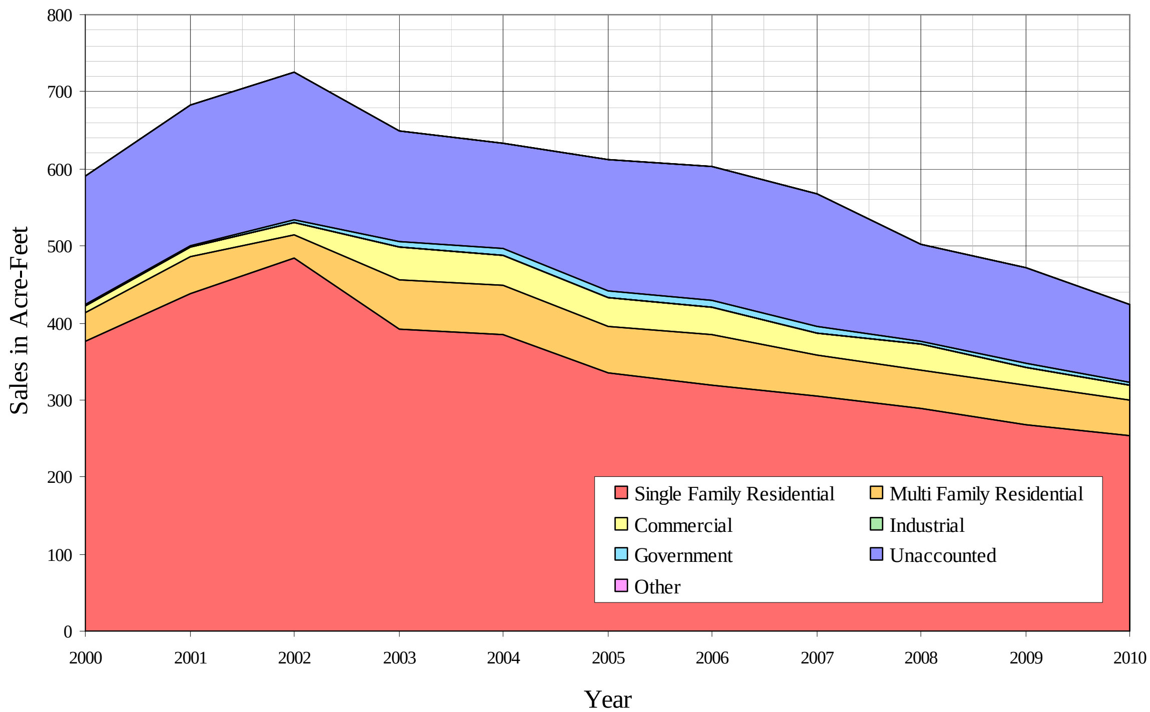
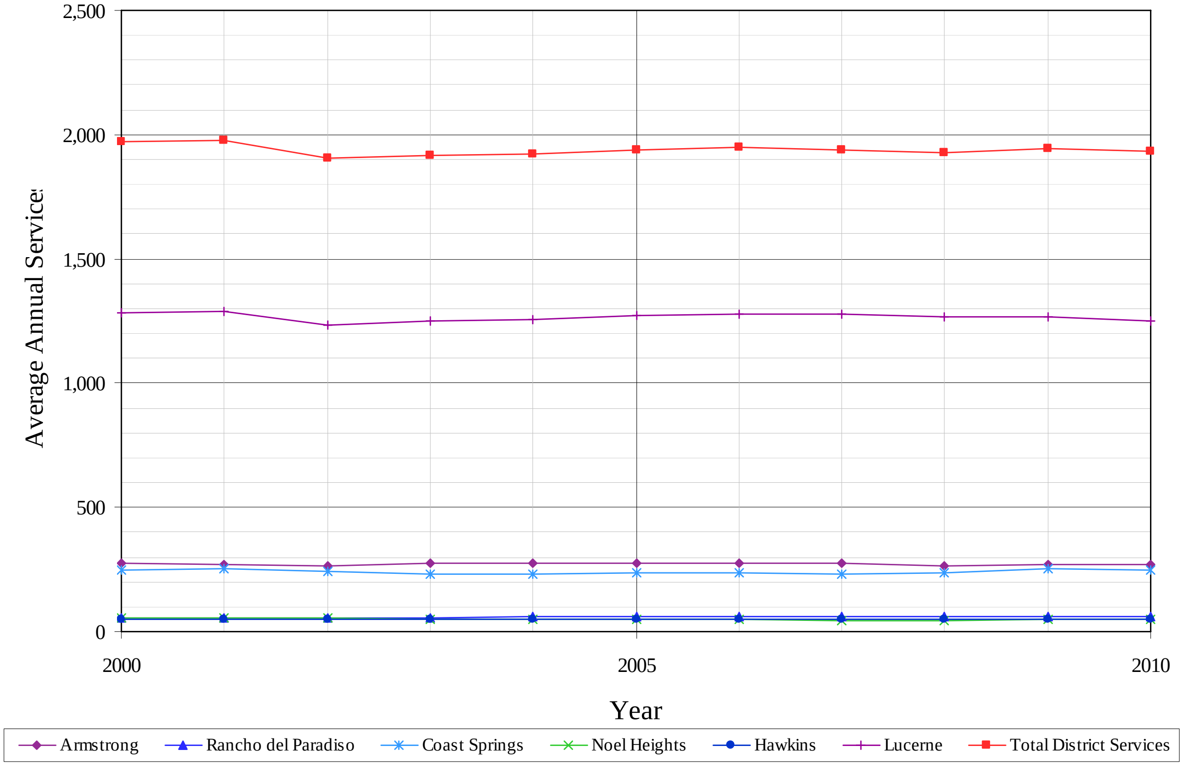
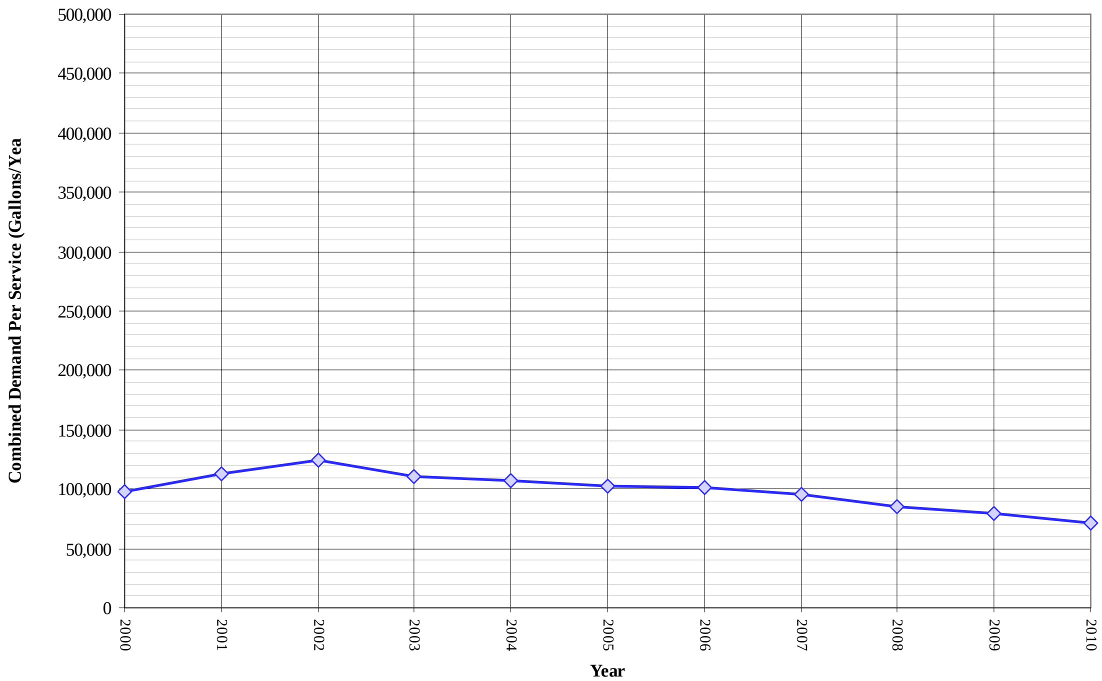


Figure 3.2-2: Historical Service Counts



The combined demand for all services fluctuates between 70,000 to 125,000 gallons per service per year, Figure 3.2-3.

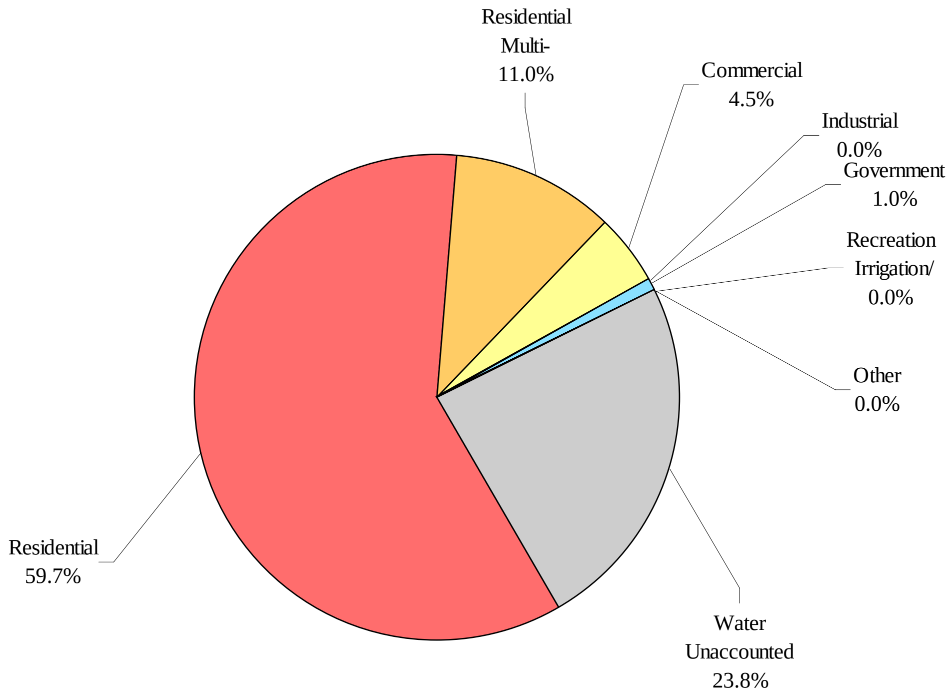
Figure 3.2-3: Historical Demand per Service



The total demand per service peaked in 2002 at about 122,000 gallons per service per year; two years after Cal Water acquired the Redwood Valley systems and began taking records. It has steadily declined since then and the five-year average is approximately 92,600 gallons per service per year.

Single family residential water use represents one of the smallest demand per service segments in the District with a five-year average of 53,500 gallons per service per year, yet this category uses 59.7 percent of the total demand. The multi family residential use was 11.0 percent of the total demand with a demand per service that has a five-year average of over 1,000,000 gallons per service per year. The combined residential sector component of demand is equal to 70.7 percent of total demand. Figure 3.2-4 displays the percent of total demand by type of use.

Figure 3.2-4: Percent of Total Demand by Type of Use (2010)



When Cal Water acquired the Redwood Valley water systems in 2000, many of them consisted of aging infrastructure and were in poor condition. Because of this water loss has been an issue in the District. In 2010 unaccounted water made up approximately 24 percent of the total supply.

Much of this can be attributed to Lucerne, which has the largest distribution system and a history of main leaks. All known leaks have since been repaired. Another source of water loss is backwash from the treatment plant. About 2-3 percent of the water pulled from Clear Lake is lost during the treatment process and is disposed of in the sanitary sewer. Customer meters are also old have never been replaced or calibrated. This could be artificially inflating the value for unaccounted for water by underestimating the actual consumption quantities.

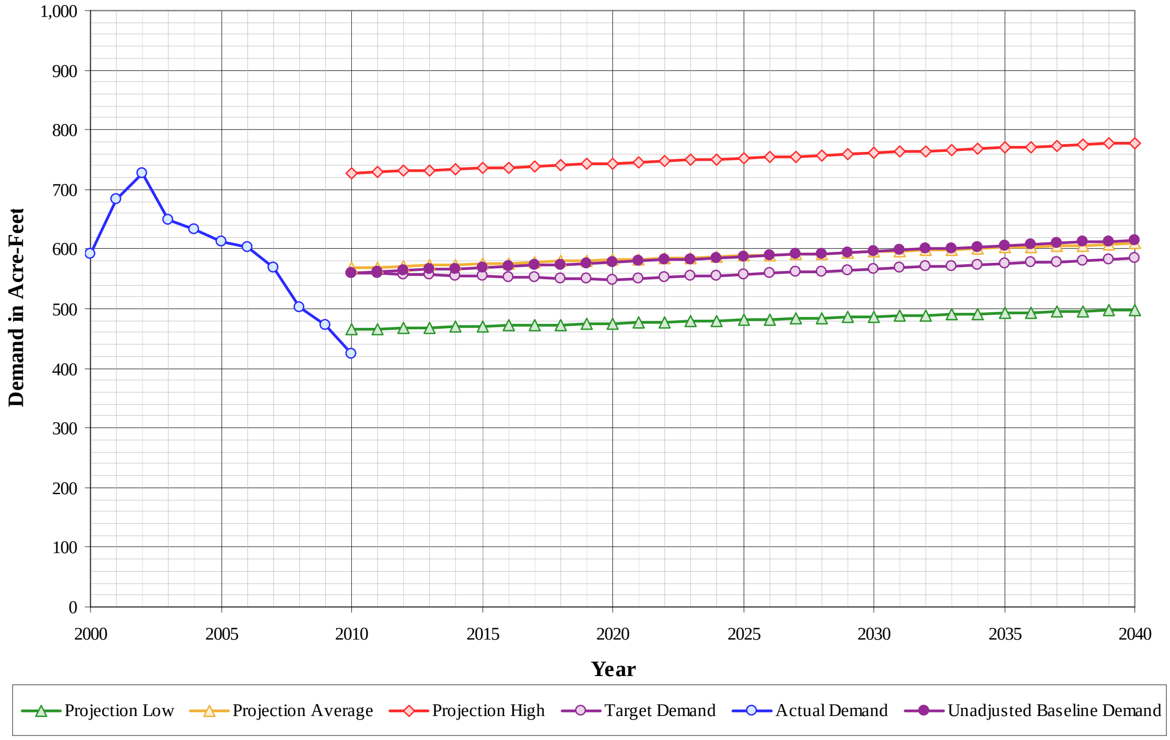
3.3 Water Demand Projections

Cal Water has historically made its water demand projections by first calculating individual growth rates for each of its service connection types. These growth rates were based on five or ten year averages of service count data, and were extended over the planning horizon resulting in projected service counts. In this case these growth rates were developed in Cal Water's Water Supply and Facilities Master Plan for the Redwood Valley District. A set of three demand per service values (low, average, high), which were based on past customer usage records, were then applied to the projected service counts to calculate projected water demands for each service type. Due to the passage of Senate Bill 7 (SBx7-7) this method is no longer used as the primary method for calculating projected demands. However, these calculations are still used as the basis for calculating projected services, population, and the distribution of demand amongst service connection types.

The method used in this UWMP to determine future water demands is a response to SBx7-7 requirements. It results in two demand projections; the unadjusted baseline demand, and the target demand. The unadjusted baseline water demand projection is the total demand expected without any achieved conservation. It is equal to forecasted population multiplied by the 2005-09 average, or 157 gpcd.

The target water demand projection includes conservations savings due to both passive and active demand management, which are described in Section 6. The target demand is calculated by multiplying SBx7-7 target gpcd values and projected population. These conservation savings are illustrated in the comparison of projected demands shown in Figure 3.3-1.

Figure 3.3-1: Historical & Projected Demand



The water demand projection calculation used for SBx7-7 compliance relies only on future population and gpcd target values. Projected water deliveries separated by customer type can not be determined by this method alone. To get a breakdown of future deliveries Cal Water used the ratio of individual deliveries for each class to the total amount that was developed for the previously used water demand projection. This ratio was applied to the total adjusted baseline demand, which resulted in the projected deliveries listed in Tables 3.3-1 through 3.3-6. These demands include the conservation savings associated with the demand management measures described in Section 6.

Table 3.3-1: Actual 2005 Water Deliveries – AF (Table 3)					
	2005				
	Metered		Not Metered		Total
Water Use Sectors	# of accounts	Volume	# of accounts	Volume	Volume
Single family	1,848	335	-	-	335
Multi-family	18	62	-	-	62
Commercial	62	37	-	-	37
Industrial	-	-	-	-	0
Institutional/government	13	8	-	-	8
Landscape	-	-	-	-	-
Recycled	-	-	-	-	-
Other	-	-	-	-	0
Total	1,941	442	0	0	442

Table 3.3-2: Actual 2010 Water Deliveries – AF (Table 4)					
	2010				
	Metered		Not Metered		Total
Water Use Sectors	# of accounts	Volume	# of accounts	Volume	Volume
Single family	1,841	253	-	-	253
Multi-family	17	46	-	-	46
Commercial	59	19	-	-	19
Industrial	-	-	-	-	-
Institutional/government	14	4	-	-	4
Landscape	-	-	-	-	-
Recycled	-	-	-	-	-
Other	-	-	-	-	-
Total	1,931	323	0	0	323

Table 3.3-3: Projected 2015 Water Deliveries – AF (Table 5)					
	2015				
	Metered		Not Metered		Total
Water Use Sectors	# of accounts	Volume	# of accounts	Volume	Volume
Single family	1,882	321	-	-	321
Multi-family	17	56	-	-	56
Commercial	61	33	-	-	33
Industrial	-	-	-	-	-
Institutional/government	15	8	-	-	8
Landscape	-	-	-	-	-
Recycled	-	-	-	-	-
Other	-	-	-	-	-
Total	1,975	417	-	-	417

Table 3.3-4: Projected 2020 Water Deliveries - AF (Table 6)					
	2020				
	Metered		Not Metered		Total
Water Use Sectors	# of accounts	Volume	# of accounts	Volume	Volume
Single family	1,904	317	-	-	317
Multi-family	18	55	-	-	55
Commercial	62	33	-	-	33
Industrial	-	-	-	-	-
Institutional/government	15	8	-	-	8
Landscape	-	-	-	-	-
Recycled	-	-	-	-	-
Other	-	-	-	-	-
Total	1,999	413	-	-	413

Table 3.3-5: Projected 2025 and 2030 Water Deliveries - AF (Table 7)				
	2025		2030	
	Metered		Metered	
Water Use Sectors	# of accounts	Volume	# of accounts	Volume
Single family	1,927	322	1,951	327
Multi-family	18	56	18	57
Commercial	63	34	64	34
Industrial	-	-	-	-
Institutional/government	16	8	17	8
Landscape	-	-	-	-
Recycled	-	-	-	-
Other	-	-	-	-
Total	2,024	419	2,050	426

Table 3.3-6: Projected 2035 and 2040 Water Deliveries - AF (Table 7)				
	2035		2040	
	Metered		Metered	
Water Use Sectors	# of accounts	Volume	# of accounts	Volume
Single family	1,974	331	1,998	336
Multi-family	18	58	19	59
Commercial	65	35	67	36
Industrial	-	-	-	-
Institutional/government	17	8	18	8
Landscape	-	-	-	-
Recycled	-	-	-	-
Other	-	-	-	-
Total	2,076	433	2,102	439

3.3.1 Senate Bill No. 7 Baselines and Targets

Cal Water is in the process of expanding current conservation programs and developing new programs for its 24 service districts. Over the next five years, Cal Water conservation program expenditures are likely to increase significantly due in large measure to recently adopted state policies requiring significant future reductions in per capita urban water use. These include the passage of Senate Bill No. 7 (SBx7-7) in November 2009, which mandated a statewide 20 percent reduction in per capita urban water use by 2020, as well as recent decisions by the California Public Utilities Commission (CPUC) directing Class A and B water utilities to adopt conservation programs and rate structures designed to achieve reductions in per capita water use, and the *Memorandum of Understanding Regarding Urban Water Conservation in California* (MOU), of which Cal Water has been a signatory since 1991. In preparing for this program expansion, Cal Water has spent the past year developing five-year conservation program plans for each of its service districts. The complete Redwood Valley District Conservation Master Plan is included as Appendix G.

SBx7-7, which was signed into law in November 2009, amended the State Water Code to require a 20 percent reduction in urban per capita water use by December 31, 2020. Commonly known as the 20x2020 policy, the new requirements apply to every retail urban water supplier subject to the Urban Water Management Planning Act (UWMPA).

The state is required to make incremental progress toward this goal by reducing per capita water use by at least 10 percent on or before December 31, 2015. SBx7-7 requires each urban retail water supplier to develop interim and 2020 urban water use targets in accordance with specific requirements. They will not be eligible for state water grants or loans unless they comply with those requirements.

The law provides each water utility several ways to calculate its interim 2015 and ultimate 2020 water reduction targets. In addition, water suppliers are permitted to form regional alliances and set regional targets for purposes of compliance. Under the regional compliance approach, water suppliers within the same hydrologic region can comply with SBx7-7 by either meeting their individual target or being part of a regional alliance that meets its regional target. For all Cal Water districts falling within the same hydrologic region, Cal Water intends to enter regional alliances as listed in Table 3.3-7. Because Redwood Valley District is the only Cal Water district in the North Coast hydrologic region, regional compliance is not an option for it.

Table 3.3-7: Cal Water Districts Sorted by Hydrologic Region

Hydrologic Region	Cal Water Districts in Region
North Coast	**Redwood Valley**
San Francisco Bay Area	Bear Gulch, Livermore, Los Altos, Mid- Peninsula, South San Francisco
Central Coast	King City, Salinas
South Coast	Dominguez, East LA, Hermosa-Redondo, Palos Verdes, Westlake
Sacramento River	Chico, Dixon, Marysville, Oroville, Willows
San Joaquin	Stockton
Tulare Lake	Bakersfield, Kern River Valley, Selma, Visalia
North Lahontan	None
South Lahontan	Antelope Valley
Colorado River	None

The following analysis presents the individual SBx7-7 compliance targets for the Redwood Valley District.

Under SBx7-7, an urban retail water supplier may adopt one of four different methods for determining the 2020 gpcd target:

1. Set the 2020 target to 80 percent of average GPCD for any continuous 10-year period ending no earlier than December 31, 2004, and no later than December 31, 2010.

2. Set the 2020 target as the sum of the following:

a. 55 GPCD for indoor residential water use.

b. 90 percent of baseline CII water uses, where baseline CII GPCD equals the average for any contiguous 10-year period ending no earlier than December 31, 2004, and no later than December 31, 2010.

c. Estimated per capita landscape water use for landscape irrigated through residential and dedicated irrigation meters assuming water use efficiency equivalent to the standards of the Model Water Efficient Landscape Ordinance set forth in Section 2.7 of Division 2 of Title 23 of the California Code of Regulations.

3. Set the 2020 target to 95 percent of the applicable state hydrologic region target, as set forth in the state's draft 20x2020 Water Conservation Plan (dated April 30, 2009).

4. A method determined by DWR through the urban stakeholder process.

For district-specific SBx7-7 compliance, targets were set to either 80 percent of baseline gpcd (Method 1) or 95 percent of the District's hydrologic region target (Method 3), whichever was greater. An analysis for Method 2 was not performed due to a lack of data necessary for this method. Method 4 was also not considered because it was not available when the Conservation Master Plan process began.

Under Method 1, the 2015 and 2020 targets are set to 90 percent and 80 percent of baseline water use, respectively. Baseline water use is the average water use for any continuous 10-year period ending between 2004 and 2010. For the Redwood Valley District, the 10-year base period 1999-2008 yielded the maximum target under this method. The 2015 target is 159 gpcd and a 2020 target is 142 gpcd. Table 3.3-9 summarizes the base period ranges and Table 3.3-10 lists the per capita demand over the ten-year base period.

Table 3.3-8: Base Period Ranges (Table 13)			
Base	**Parameter**	**Value**	**Units**
10-15-year base period	2008 total water deliveries	376	AF
	2008 total volume of delivered recycled water	0	AF
	2008 recycled water use as a percent of total deliveries	0	%
	Number of years in base period	9	years
	Year beginning base period range	2000	
	Year ending base period range	2008	
5-year base period	Number of years in base period	5	years
	Year beginning base period range	2003	
	Year ending base period range	2007	

Table 3.3-9: Daily Base Per Capita Water Use-10-Year Range (Table 14)				
Base Period Year		**Distribution System Population**	**Daily System Gross Water Use (mgd)**	**Annual Daily Per Capita Water Use (gpcd)**
Sequence Year	**Calendar Year**			
Year 1	2000	0.5	3,153	157
Year 2	2001	0.6	3,164	190
Year 3	2002	0.6	3,052	209
Year 4	2003	0.6	3,088	184
Year 5	2004	0.6	3,096	181
Year 6	2005	0.6	3,128	178
Year 7	2006	0.5	3,142	174
Year 8	2007	0.5	3,136	153
Year 9	2008	0.4	3,125	136
Year 10				
			Base Daily Per Capita Water Use	177

Under Method 3, the 2015 and 2020 targets are set to 95 percent of the 2015 and 2020 targets for the hydrologic region in which the district is located. Because the Redwood Valley District is located in the North Coast hydrologic region the Redwood Valley District's 2015 target is 188 gpcd and the 2020 target is 157 gpcd.

The SBx7-7 target for 2020 cannot exceed 95 percent of the District's five-year baseline water use, where the baseline period ends no earlier than December 31, 2007 and no later than December 31, 2010. The District's 2020 target cannot exceed this level, regardless of which method is used to calculate it. The maximum allowable target in the Redwood Valley District is 167 gpcd, as shown in Table 3.3-11. In this case, neither target calculation method results in a target exceeding the maximum allowable target, so no adjustment is necessary.

Table 3.3-10: Daily Base Per Capita Water Use-5-Year Range (Table 15)				
Base Period Year		Distribution System Population	Daily System Gross Water Use (mgd)	Annual Daily Per Capita Water Use (gpcd)
Sequence Year	Calendar Year			
Year 1	2007	3,088	0.6	184
Year 2	2004	3,096	0.6	181
Year 3	2005	3,128	0.6	178
Year 4	2006	3,142	0.5	174
Year 5	2007	3,136	0.5	153
			Base Daily Per Capita Water Use	176

Based on the results of this analysis as shown in Table 3.3-11, the Method 3 targets were chosen for the Redwood Valley District.

Table 3.3-11. Redwood Valley District SBx7-7 Targets	
Maximum Allowable Target	
Base Period:	2003-2007
Per Capita Water Use:	176
Maximum Allowable 2020 Target:	167
Method 1: 80% of Baseline Per Capita Daily Water Use	
Base Period:	1999-2008
Per Capita Water Use:	177
2015 Target:	159
2020 Target:	142
Method 3: 95% of Hydrologic Region Target	
Hydrologic Region:	N. Coast/Sac Riv.
2015 Target:	188
2020 Target:	157
Selected District Target	
2015 Target:	188
2020 Target:	157

3.3.2 Low Income Housing Projected Demands

California Senate Bill No. 1087 (SB 1087), Chapter 727, was passed in 2005 and amended Government Code Section 65589.7 and Water Code Section 10631.1. SB 1087 requires local governments to provide a copy of their adopted housing element to water and sewer providers. In addition, it requires water providers to grant priority for service allocations to proposed developments that include housing units for lower income families and workers. Subsequent revisions to the Urban Water Management Planning Act require water providers to develop water demand projections for lower income single and multi-family households.

Cal Water does not maintain records of the income level of its customers and does not discriminate in terms of supplying water to any development. Cal Water is required to serve any development that occurs within its service area, regardless of the targeted income level of the future residents. It is ultimately the City's or County's responsibility to approve or not approve developments within the service area.

For the purposes of estimating projected demands for low income housing, Cal Water used housing information from the Housing Elements of the communities served by the Redwood Valley District. The Lake County regional housing needs assessment states that 31 percent of the households are in the lowest income category.[5] In Sonoma County, the Housing Element states that 23.4 percent of the households in unincorporated Sonoma County are in the lowest income category.[6] The Marin County Housing Element estimates that 10 percent of households are in the lowest income category.[7]

Cal Water applied an average value of 21.5 percent to its total projected residential demands to estimate low income projected demands, as shown in Table 3.3-12.

Table 3.3-12: Low-income Projected Water Demands (Table 8)

Low Income Water Demands	2015	2020	2025	2030	2035	2040
Single-family residential	69	68	69	70	71	72
Multi-family residential	12	12	12	12	13	13
Total	81	80	81	83	84	85

As a benefit to our customers, Cal Water offers its Low Income Rate Assistance Program (LIRA) in all of its service districts. Under the LIRA Program qualified customers are able to receive a discount on their monthly bills.

[5] "Draft Lake County General Plan Background Report", Lake County, February 2003, Page 4-24
[6] "Sonoma County Housing Element Update", Economic & Planning Systems, Inc., February 21, 2008, Page 72
[7] "Marin County Draft Housing Element", Marin County Community Development Agency, November 2009, Page II-9

3.4 Total Water Use

Cal Water does not currently sell water to other agencies, nor does it provide water for saline barriers, groundwater recharge, conjunctive use, or recycling. The potential additional water uses within Cal Water's service area are discussed and quantified in Section 4. For the purposes of this UWMP it is assumed that the only water sales to customers and distribution system losses are included in the total demand. The system losses are summarized in Table 3.4-1.

Table 3.4-1: Additional Water Uses and Losses - AFY (Table 9 and 10)

Water Use	2010	2015	2020	2025	2030	2035	2040
Sales to Other Agencies	-	-	-	-	-	-	-
Saline barriers	-	-	-	-	-	-	-
Groundwater recharge	-	-	-	-	-	-	-
Conjunctive use	-	-	-	-	-	-	-
Raw water	-	-	-	-	-	-	-
Recycled	-	-	-	-	-	-	-
Unaccounted-for system losses	101	138	136	138	141	143	145
Total	101	138	136	138	141	143	145

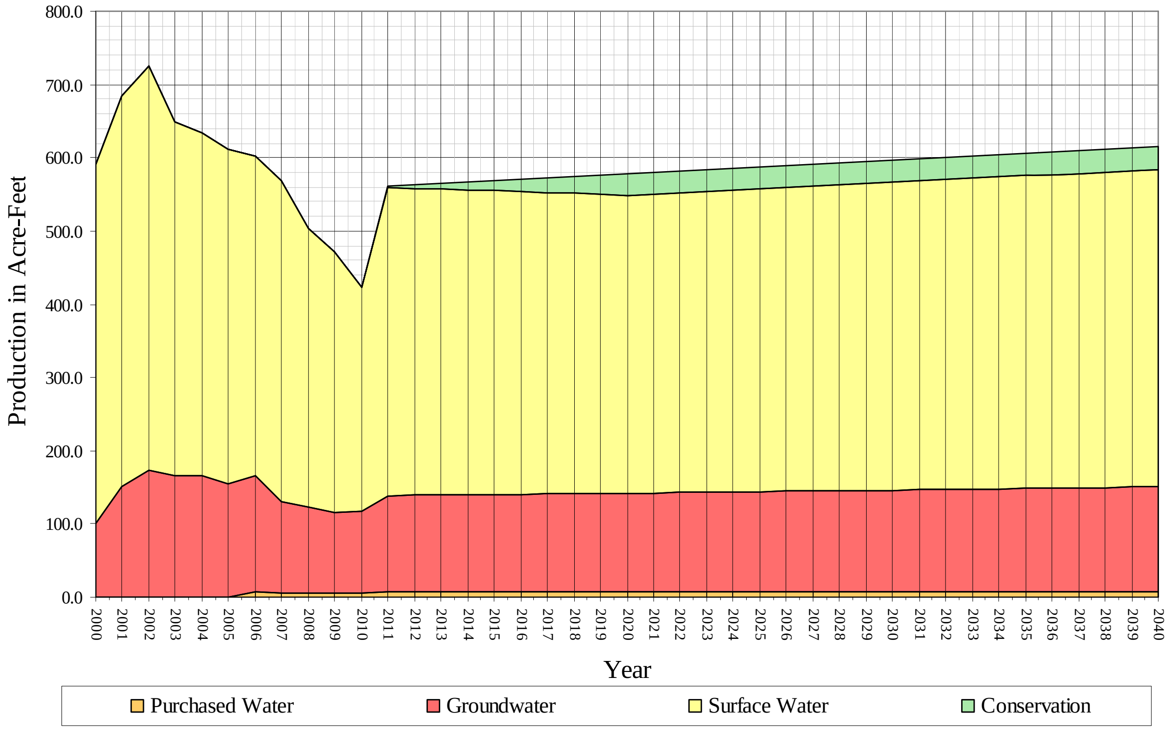
Actual and projected water use through 2040 is shown in Table 3.4-2. The values represent the total target demand projection based on SBx7-7 gpcd targets, including unaccounted for water.

Table 3.4-2: Total Water Use – Actual and Projected AFY (Table 11)

	2005 (Actual)	2010 (Actual)	2015	2020	2025	2030	2035	2040
Water Use	612	424	555	549	558	566	575	584

Figure 3.4-1 shows the planned sources of supply based on these demands through 2040. Cal Water's efforts to secure alternative supplies are discussed in the following section.

Figure 3.4-1: Historical & Projected Sources



4 System Supplies

4.1 Water Sources

The water supply for the customers of the Redwood Valley District is a combination of groundwater and purchased water. The projected water supply source and amount based on the SBx7-7 target demand is summarized in Table 4.1-1.

Table 4.1-1: Planned Water Supplies (Table 16) (AFY)

Water Supply Sources	2010	2015	2020	2025	2030	2035	2040
Supplier Produced Groundwater	111	133	135	136	138	140	142
Purchased Surface Water	307	415	407	413	420	427	434
Purchased Water	6	8	8	8	8	8	8
Transfers in or out	-	-	-	-	-	-	-
Exchanges In or out	-	-	-	-	-	-	-
Recycled Water (projected use)	-	-	-	-	-	-	-
Desalination	-	-	-	-	-	-	-
Total	**424**	**555**	**549**	**558**	**566**	**575**	**584**

4.2 Purchased Water

In November of 2005 Cal Water began purchasing water for the Rancho del Paradiso system from the Sweetwater Springs Water District. Sweetwater Springs operates two wells in its Monte Rio water system and supplies the Rancho del Paradiso system through an interconnection at the southern end of its service area. These wells pump groundwater that is under influence of the Russian River. 100 percent of the supply for the Rancho del Paradiso system comes from this source. Cal Water has been purchasing approximately 7 acre-feet annually from Sweetwater Springs. Growth in the Rancho del Paradiso service area is expected to be minimal with only minor increases in services as vacant lots are developed as infill or as seasonal homes are converted to year-round residences. Because of this, total supplies from this source are not expected to increase significantly over time.

4.3 Purchased Surface Water

The Lucerne system purchases surface water from the Yolo County Flood Control and Water Conservation District (Yolo County). This water is pumped from Clear Lake and is treated in the Lucerne Water Treatment Plant before entering the distribution system. Purchased surface water accounts for 100 percent of the supply in Lucerne and 75 percent of the total water supply for the Redwood Valley District. However, this source is only available to Lucerne customers. Cal Water generally pumps between 400 and 500 AF/yr from Clear Lake to meet demand. Total supplies from this source are expected to increase to approximately 500 AF/yr by 2040 if current growth trends continue.

Although Clear Lake is located in Lake County, Yolo County holds the water rights to excess flows leaving the Lake through Cache Creek. Clear Lake Dam flows are regulated by the Gopcevic Decree of 1920 and the Solano Decree of 1978. Winter Lake levels are controlled by the schedule outlined in the Gopcevic Decree, which is designed to prevent flooding by allowing releases from the dam as storage increases due to winter storms. The schedule defines specific dates and corresponding maximum lake levels. If these levels are exceeded then the water must be released by the Dam.

Lake levels are measured in units of feet Rumsey, named for Captain DeWitt Rumsey, an important historical figure in the area. Zero Rumsey is the natural low lake level under which there are no releases to Cache Creek and is equivalent to 1318.256 feet (1929 NGVD). Before construction of the Dam the Lake level was controlled by the Grigsby Riffle, which is a rock sill located at the junction of Cache Creek and Seigler Creeks. The Lake is now considered full when it reaches 7.56 feet Rumsey. Yolo County has rights to all the water stored in the Lake between 0 and 7.56 Rumsey.

The Solano Decree defines the amount of water available to Yolo County. If the Lake is at 7.56 feet Rumsey on May 1 then 150,000 acre-feet can be released over the summer months. If winter rains fail to fill the Lake to a level of 3.22 feet Rumsey by May 1, no releases are available to Yolo County. The Solano Decree also outlines a schedule of lake levels with corresponding dates that is designed to maintain storage at safe levels and insure that the Lake stays above zero Rumsey.

The 1912 court decision that granted Yolo County rights to water in Clear Lake recognized that communities already existing along Clear Lake had prescriptive rights to a certain quantity of water. These prescriptive rights are still available to these communities at no cost. Lucerne's portion is subtracted from the total withdrawals from the Lake and Cal Water only pays for water used above this amount. The schedule of prescriptive rights usage for Lucerne is outlined in Table 4.3-1.

Table 4.3-1: Monthly Prescriptive Credit		
Month	**Cubic Feet**	**Acre Feet**
October	175,800	4.05
November	80,500	1.85
December	73,200	1.68
January	49,000	1.12
February	41,000	0.94
March	62,000	1.42
April	85,000	1.95
May	97,000	2.23
June	211,000	4.84
July	286,000	6.57
August	392,000	9.00
September	271,000	6.27
Total	1,823,500	41.92

4.4 Groundwater

The Coast Springs, Armstrong Valley, Noel Heights, and Hawkins water systems are completely reliant on locally pumped groundwater as a source of supply. Each is supplied by wells owned and operated by Cal Water. Several of these wells are located along creeks and are considered under the influence of surface water by the California Department of Public Health. The details of groundwater usage specific to each water system will be discussed further in section 5.

The Redwood Valley District uses an average of 150 AF/yr of groundwater to meet demand. Growth in these systems is expected to be slow and demand met by this source will increase at the same pace as development. The communities served by these systems exhibit an overall slow growth rate and are located in areas that have many seasonal residential services.

Table 4.4-1 lists the amount of groundwater pumped by the Redwood Valley District from 2006-2010.

Table 4.4-1: Amount of Groundwater Pumped – AFY (Table 18)					
Basin Name	**2006**	**2007**	**2008**	**2009**	**2010**
Bodega Bay, Lower Russian River Valley, Santa Rosa Plain Sub-basins	159	125	117	110	111
% of Total Water Supply	26%	22%	23%	23%	26%

The amount of water projected to be pumped by the Redwood Valley District is shown in Table 4.4-2.

Table 4.4-2: Amount of Groundwater projected to be pumped – AFY (Table 19)						
Basin Name	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Bodega Bay, Lower Russian River Valley, Santa Rosa Plain Sub-basins	133	135	136	138	140	142
% of Total Water Supply	24%	24%	24%	24%	24%	24%

4.4.1 Basin Boundaries and Hydrology

Coast Springs: Bodega Bay Area Groundwater Basin, No. 1-57

The Coast Springs system is located on the border of the Bodega Bay Area, Sand Point Area, and Wilson Grove Highlands Groundwater Basins. For the purposes of this plan the Bodega Bay Area Groundwater Basin is described because it best represents geologic conditions in Coast Springs. The Bodega Bay Area extends approximately 4 miles along the mainland from the area of Salmon Creek to the north to below Cheney gulch on the south. This are extends inland up to about a mile from Bodega Harbor. The Bodega Bay Area Groundwater Basin is defined by the areal extent of Quaternary alluvium, sand dunes, and terrace deposits, but also contains some Cretaceous granitic rocks exposed on Bodega Head. On the mainland side, the groundwater basin is bounded by bedrock of the Franciscan Complex. This basin is bounded on the north by the fort Ross Terrace Area Groundwater Basin near Salmon Creek. The San Andreas Fault Rift Zone trends northwest through the area of Bodega Bay.

Lucerne: Long Valley Groundwater Basin, No. 5-31

Long Valley Groundwater Basin is located within a narrow elongated valley northeast of Clear Lake. The basin is bounded on most sides by the Franciscan Formation. A small portion of the southern boundary consists of Quaternary volcanic rocks. The valley is drained by Long valley Creek which is tributary to North Fork Cache Creek.

Armstrong Valley, Noel Heights, Rancho Del Paradiso: Lower Russian River Valley Groundwater Basin, No. 1-60

The Lower Russian River Valley Groundwater Basin is a narrow, meandering river canyon located in the Mendocino Range within west-central Sonoma County. The valley begins approximately 2.5 miles east of Mirabell Heights and extends west and southwest for approximately 23 miles until it exits into the Pacific Ocean near Jenner. The canyon ranges in width from about 0.1 to 0.5 miles and has an average width of 0.25 miles. The valley is defined by the areal extent of alluvial and river-channel deposits that are bounded by bedrock of the Franciscan Complex.

Mark West Creek discharges into the upper reaches of the lower Russian River Valley near Mirabell Heights. Other significant tributaries to the lower Russian River include: Green Valley near Rio Dell; Fife Creek and Pocket Canyon near Guerneville; Dutch Bill Creek near Monte Rio; Austin Creek near St. Joseph Camp; and Willow and Sheephouse Creeks east of the river mouth near Jenner.

The principal water-bearing units in the lower Russian River Valley are the alluvium and river channel deposits. The Franciscan Complex that underlies the lower Russian River Valley is considered essentially non water-bearing and therefore, does not yield significant quantities of water to wells.

Hawkins: Santa Rosa Valley, Santa Rosa Plain Sub basin, No. 1-55.01

The Santa Rosa Valley occupies a northwest-trending structural depression in the southern part of the Coast Ranges of northern California. This depression divides the Mendocino Range on the west from the Mayacamas and Sonoma Mountains on the east. The Santa Rosa Plain sub basin is approximately 22 miles long and 0.2 miles wide at the northern end; approximately 9 miles wide through the Santa Rosa area; and about 6 miles wide at the southern end of the valley near the city of Cotati. The Santa Rosa Plain Sub Basin is bounded on the northwest by the Russian River plain approximately one mile south of the City of Healdsburg and the Healdsburg Sub basin; mountains of the Mendocino Range flank the remaining western boundary. The southern end of the sub basin is marked by a series of low hills, which form a drainage divide that separates the Santa Rosa Valley from the Petaluma Valley basin south of Cotati. The eastern sub basin boundary is flanked by the Sonoma Mountains south of Santa Rosa and the Mayacamas Mountains north of Santa Rosa. The Rincon Valley sub basin is situated east of the City of Santa Rosa and is separated from the Santa Rosa plain sub basin by a narrow constriction formed in the rocks of the Sonoma Volcanics.

The Santa Rosa Plain sub basin is drained principally by the Santa Rosa and Mark West Creeks that flow westward and collect into the Laguna de Santa Rosa. The Laguna de Santa Rosa flows northward and discharges into the Russian River.

- The above descriptions and additional details of the basins are given in the DWR's Groundwater Bulletin 118, see Appendix D.

4.4.2 Groundwater Management Plan

The groundwater basins that Cal Water pumps from in the Redwood Valley District are un-adjudicated and are spread throughout northern California. Most of the communities served by these systems are small and have minimal impact on local groundwater resources. Lucerne serves a significant population but the source of supply is purchased surface water and not groundwater. Because of this, groundwater management plans for the District have not been developed.

4.5 Recycled Water

The recycling of wastewater offers several potential benefits to Cal Water and its customers. Perhaps the greatest of these benefits is to help maintain a sustainable groundwater supply either through direct recharge, or by reducing potable supply needs by utilizing recycled water for appropriate uses (e.g., landscape, irrigation) now being served by potable water.

Currently, no wastewater is recycled for direct reuse by retail customers in the District. However, a small portion of backwash water from the Lucerne Water Treatment Plant is used to irrigate Cal Water's property. The majority of service connections in the Redwood Valley District are single family residential homes, and not larger industrial or irrigation customers that would be more likely to use recycled water. The potential amount of recycled water that can be produced is proportional to the amount of wastewater that is generated by District, and is discussed in the following sections.

In Hawkins wastewater is collected by the City's wastewater system and delivered to the Santa Rosa Subregional Water Reuse Plant for recycling. The Subregional System produces approximately 11 MGD of tertiary treated water, about half of which is used to generate geothermal electricity in underground steam fields in The Geysers electric power facility. The remaining amount is used for landscaping, industrial processes, and fire suppression systems.

In Lucerne, a large portion of the wastewater from the Lake County Sanitation District's Northwest Regional Wastewater Collection and Treatment System is also reused and is sent to the Geysers. In 2004 approximately 85 percent of the total effluent from this system was used for electric power generation. The Lake County Sanitation District also has constructed wetlands where recycled wastewater is used for ecological restoration.

4.5.1 Wastewater Collection

Wastewater service is available to all of Cal Water's Hawkins', most of Lucerne's, and a portion of Coast Springs' customers. The City of Santa Rosa operates a Sewer System with two treatment plants. The Laguna Wastewater Treatment Plant provides tertiary treatment and has an average dry weather flow of 17.5 MGD. The Laguna Plant provides recycled water to the Subregional Water Reuse Plant. Santa Rosa's Oakmont Treatment Plant operates between April and October with an average flow of 0.5-0.6 MGD.

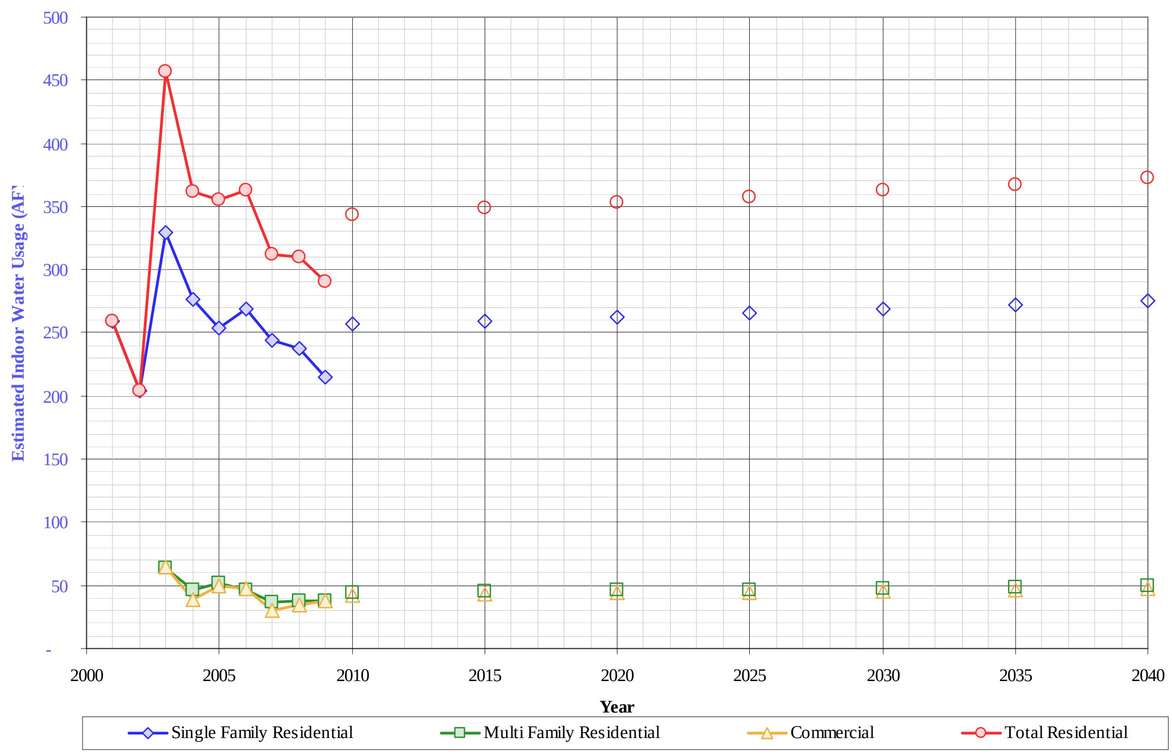
The Northwest Regional Wastewater Collection and Treatment System provides wastewater service to Lucerne and several surrounding communities. The Northwest System is old and in need of several infrastructure improvements. Because it is located adjacent to Clear Lake it is susceptible to seasonal inflow and infiltration, which leads to overuse of lift stations and frequent spills. A Master Plan including an aggressive infrastructure improvement plan was completed in 2005 and the Northwest System is moving to address these problems.

In Coast Springs, the Oceana Marin subdivision and part of the old Dillon Beach community have wastewater service provided by the Oceana Marin Wastewater system. The remaining properties use septic systems for disposal of wastewater. The wastewater system is a pressurized subsurface irrigation disposal system that was constructed by the North Marin Water District in 1981. The wastewater is treated in an aerated treatment pond before entering the disposal system.

4.5.2 Estimated Wastewater Generated

Estimate for the District wastewater quantity since 2000 are shown in Figure 4.5-1 and were calculated by annualizing 90 percent of January water use in Cal Water's service area. The future quantity of waste generation is based on a linear equation of the historical estimates. The estimated volume of wastewater generated for the District in five-year increments to the year 2040 is presented in Table 4.5-1.

Figure 4.5-1: Estimated District Annual Wastewater Generated



The quantity of wastewater disposed in the Redwood Valley District is shown in Table 4.5-1. According to the Lake County Sanitation District, approximately 85 percent of the effluent produced at the Northwest Regional Treatment Plant is recycled. And it is assumed that 100 percent of the wastewater produced in Hawkins is recycled. The remaining systems use septic systems for wastewater disposal. For the purposes of this UWMP Cal Water assumes that 80 percent of the total wastewater generated is reused.

Table 4.5-1: Wastewater Collection and Treatment AFY (Table 21)							
Method of treatment	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
See above	275	279	282	286	290	294	298
Total	275	279	282	286	290	294	298

The remaining wastewater that is not recycled is disposed of in septic tanks. An estimate of this amount is listed in Table 4.5-2.

Table 4.5-2: Disposal of wastewater (non-recycled) AFY (Table 22)							
Method of Disposal	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Septic Systems	69	70	71	72	72	73	74
Total	69	70	71	72	72	73	74

4.5.3 Potential Water Recycling

The development of recycled water to offset potable supply is not likely in the Redwood Valley District. Using recycled water is not considered economically viable given the anticipated extra costs for treatment and distribution, given the limited demand for this type of service. Therefore, the projected recycled water supply for Cal Water's Redwood Valley service area through the year 2040 is 0 acre-feet per year. Cal Water has not implemented any incentive programs to encourage recycled water use because Cal Water does not own or operate the wastewater system.

4.6 Desalinated Water

There are no plans for the development of desalinated water in the District. The Coast Springs system is located in close proximity to the Pacific Ocean but because of the low demand and high cost it is unlikely to develop desalination as a source of supply.

4.7 Transfer or Exchange Opportunities

There are few transfer or exchange opportunities in the Redwood Valley District. With the exception of the Lucerne system each individual water system is small and isolated, which limits the use of transfers or exchanges.

4.8 Water Supply Projects

The source of the water supply delivered to the customers of Cal Water's Redwood Valley District is not likely to change considerably. The future water demand will be satisfied by well production and surface water treatment. Based on projected demand scenarios, it is anticipated that future demand within the District could require production of as much as 650 acre-feet per year. Cal Water will construct additional wells and distribution facilities to meet the anticipated increases in future demand and to offset losses in supply sources resulting from water quality constraints.

Cal Water recently completed a Water Supply and Facilities Master Plan for the District. This Master Plan developed a recommended operational strategy for redistribution of our available supplies to the segments of the system where the demand is located and will identify the infrastructure needed to accomplish this strategy. This Master Plan includes a prioritized and scheduled capital improvement development plan to assure long-term supply and system reliability.

5 Water Supply Reliability and Water Shortage Contingency Planning

5.1 Water Supply Reliability

Because the local climate and source of supply vary significantly throughout the Redwood Valley District, each water system is considered separately for a supply reliability analysis.

Lucerne:

The water supply in Lucerne has been quite reliable. Total supply is dependent on annual rainfall and inflows into Clear Lake. Because of the operational schedule of the Clear Lake Dam, an adequate supply is available in all but the most severe droughts. In 1976 and 1977 the Clear Lake area experienced the equivalent of two 50-year droughts in successive years. In 1977 the Lake level reached a low of -3.39 and a high of -0.30 Rumsey, and Yolo County did not receive discharges from the Lake. Cal Water did not own the Lucerne system at this time and does not know how demand was met in 1977. The treatment plant's intake structure is set at a depth of 12 feet below Lake level, which gives Cal Water the ability to pump water from the Lake even during severe droughts. According to Cal Water's purchase agreement, in the event of a water shortage, municipal customers will be given priority over other users.

The relationship between total annual rainfall and Lake storage is shown in the following graphs. Figure 5.1-1 compares the total annual rainfall to mean annual stream discharge in Kelsey Creek, which is a tributary of Clear Lake. It indicates the predictable pattern of increasing mean annual discharge with increasing rainfall. Figure 5.1-2 compares the mean Kelsey Creek discharge to average lake level. It shows that in wet years the average lake level increases in response to the rain. During the prolonged drought between 1987 and 1992 storage in the Lake decreased as the drought continued. But the controlled operation of Clear Lake Dam maintained lake levels and insured adequate supply.

Figure 5.1-1: Comparison of Annual Rainfall to Mean Discharge from Kelsey Creek

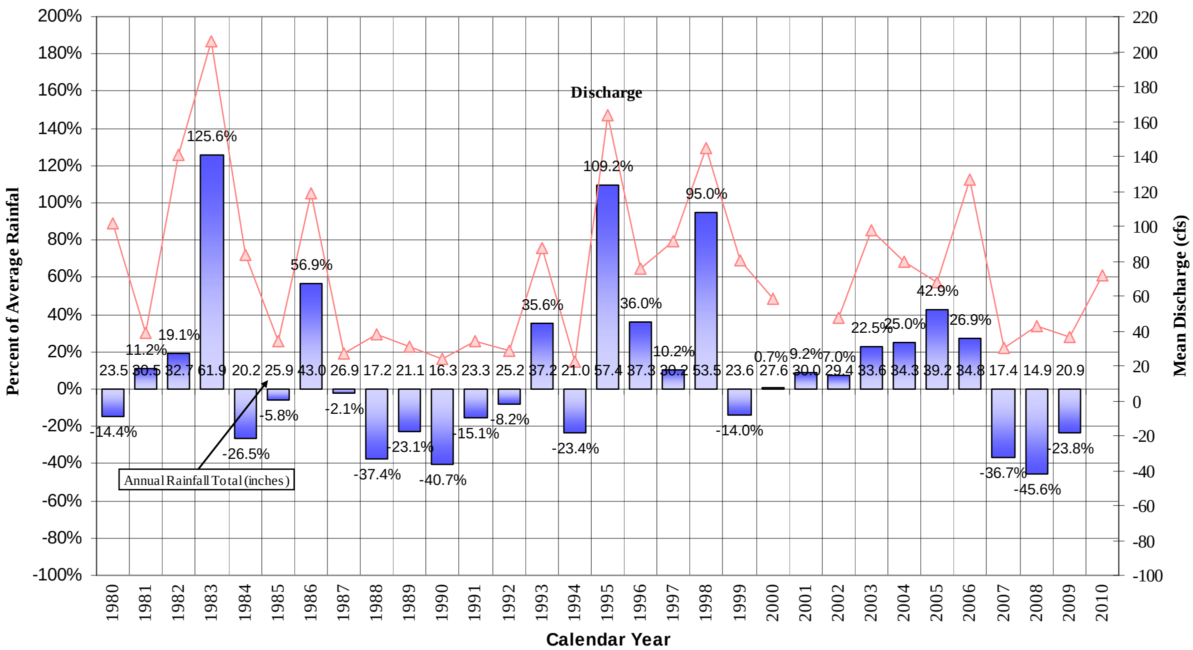
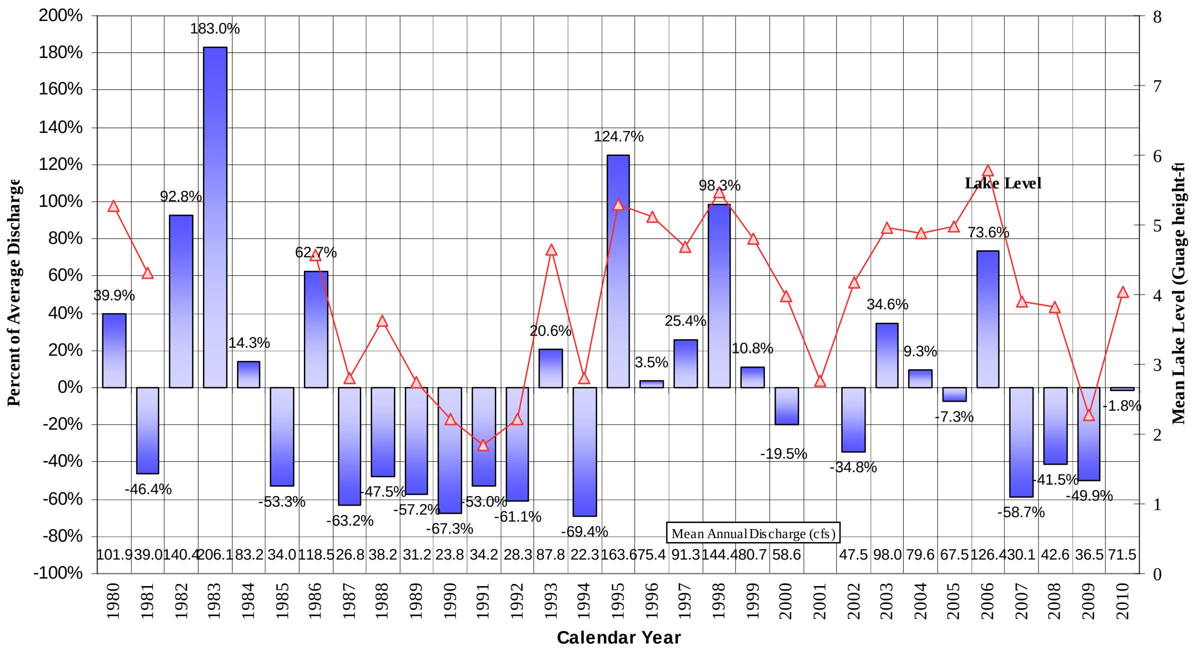


Figure 5.1-2: Comparison of Mean Annual Discharge in Kelsey Creek with Mean Annual Lake Level



The average annual rainfall for the Clear Lake area is 27.4 inches. The most recent driest year occurred in 1990 when the rainfall was 41 percent below average (16.3 inches). This is taken as the single dry year shown in Table 5.1-1. The three multiple dry years used are based on the most recent and consecutive lowest annual rainfall totals which occurred in 1988, 1989, and 1990. This period coincides with the drought conditions that California experienced during this time.

Table 5.1-1: Basis of Water Year Data (Table 27)	
Water Year Type	**Base Year (s)**
Average Water Year	2000
Single-Dry Water Year	1990
Multiple-Dry Water Years	1988, 1989, 1990

The reliability of supply for Lucerne is determined here by comparing annual mean lake levels among years of varying rainfall. A measurement in feet Rumsey is substituted for a volume of water, and represents available storage in Clear Lake. In the normal and single dry year the mean annual lake levels are 3.97 and 2.21 feet Rumsey, respectively. During the multi dry year event the lake level declined as the drought persisted. The three years chosen here are part of a six year period of below average precipitation. During this time the lake level reached a low of 1.85 feet Rumsey in year five, which is roughly 24 percent of the total storage available to Yolo County. This margin indicates that the supply in Lucerne is reliable even during prolonged droughts. In an extreme drought or during emergency conditions, water below the natural lake level of zero Rumsey could also be pumped to meet minimum demands.

Table 5.1-2: Supply Reliability - Lake Storage (Feet Rumsey) (Table 31)				
Average / Normal Water Year	**Single Dry Water Year**	**Multiple Dry Water Years**		
		Year 1	**Year 2**	**Year 3**
3.97	2.21	3.63	2.74	2.21
% of Normal	56%	91%	69%	56%

Armstrong Valley, Noel Heights, Rancho Del Paradiso:

The wells in Armstrong Valley are not considered under the influence of surface water but are located near Fife Creek. Well 1 is an older well that is shallow and pumps from the alluvial sediments of the creek. Because of this the reliability of supply is more dependent on rainfall and creek flow. Well 2 is a deep well that pulls water both from the alluvial sedimentary deposits of the Creek and also from deeper aquifer zones. These deeper zones are recharged by deep infiltration from the Fife Creek and from inflow from aquifers in the surrounding hills. As a result they exhibit a slower response to climatic conditions. Long term trends in water availability are inferred because water level data for these wells is not recorded. But there has never been a supply shortage due to natural conditions in these wells. Cal Water is confident that a reliable supply exists in Armstrong Valley with these two wells.

The Noel Heights system is supplied by one well that is located in a depression along Pocket Canyon Creek. This area remains wet and water levels in the well are consistent. The well is shallow and pulls water from alluvial deposits of the Creek. The California Department of Public Health considers this well to be under the influence of surface water. Water produced by this well is treated as surface water for turbidity. There have been no known water supply shortages in Noel Heights. However, there is only one source of supply and if the well is out of service for any reason water would need to be trucked in.

Rancho del Paradiso is supplied by wells that are under the influence of surface water and are more directly impacted by annual variation in rainfall amounts. But these wells are located along the Russian River, which is a large perennial river that has flows even during prolonged droughts. Therefore the supply is considered reliable. The old source of supply was a gallery infiltration well located along the Russian River. This well was abandoned when Cal Water began purchasing water from Sweetwater Springs and water from this source is no longer available. In an emergency there is a nearby well owned by a local farmer that could be used to supply the Rancho del Paradiso system. This well was formerly used when turbidity in the other well was too high.

Climate data from the Graton weather station was used for the analysis of supply reliability for the systems along the Russian River because it is the closest station with a complete record and is located in a similar environment. The average annual rainfall for the lower Russian River area is 41.7 inches.

Because of the influence of surface water flows on groundwater in this area, the annual discharge in the Russian River was used as a measure of reliability for this analysis. Figure 5.1-3 shows the variation in Russian River discharge at Guerneville by comparing the annual flows to the historic average. The most recent driest year occurred in 2001 when the rainfall was 61.9 percent below average (875 cfs). This is taken as the single dry year shown in Table 5.1-3. The three multiple dry years used are based on the most recent and consecutive lowest annual rainfall totals which occurred in 2000, 2001, and 2002. This period coincides with the drought conditions that California experienced during this time.

Figure 5.1-3: Comparison of Annual Russian River Flows to Historic Average

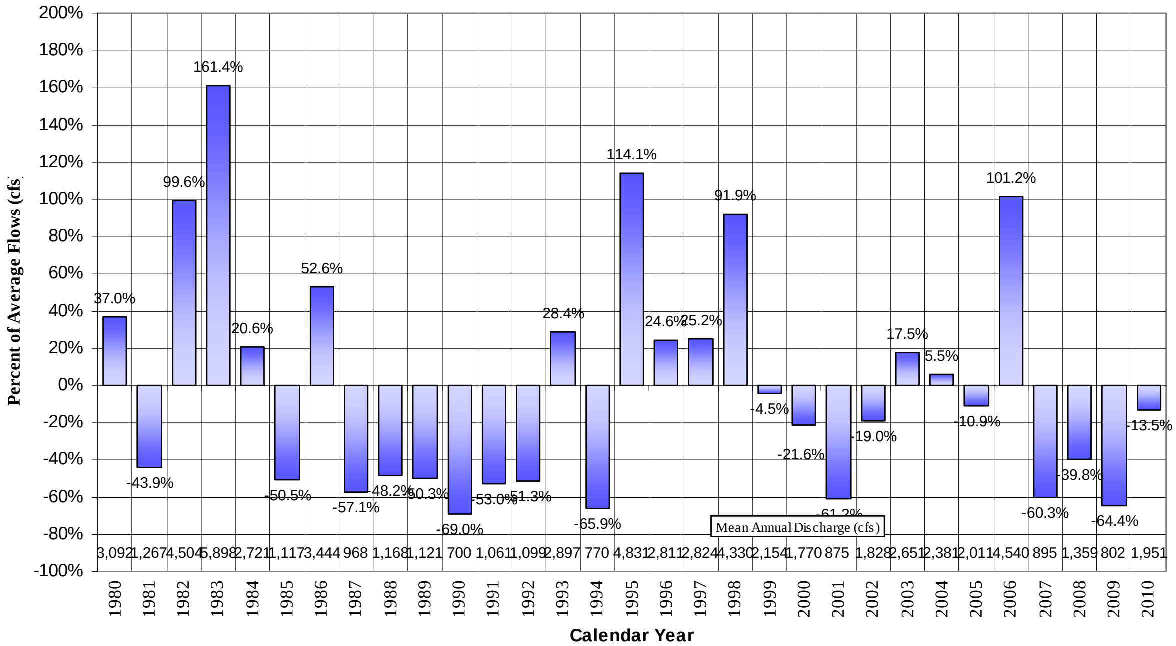


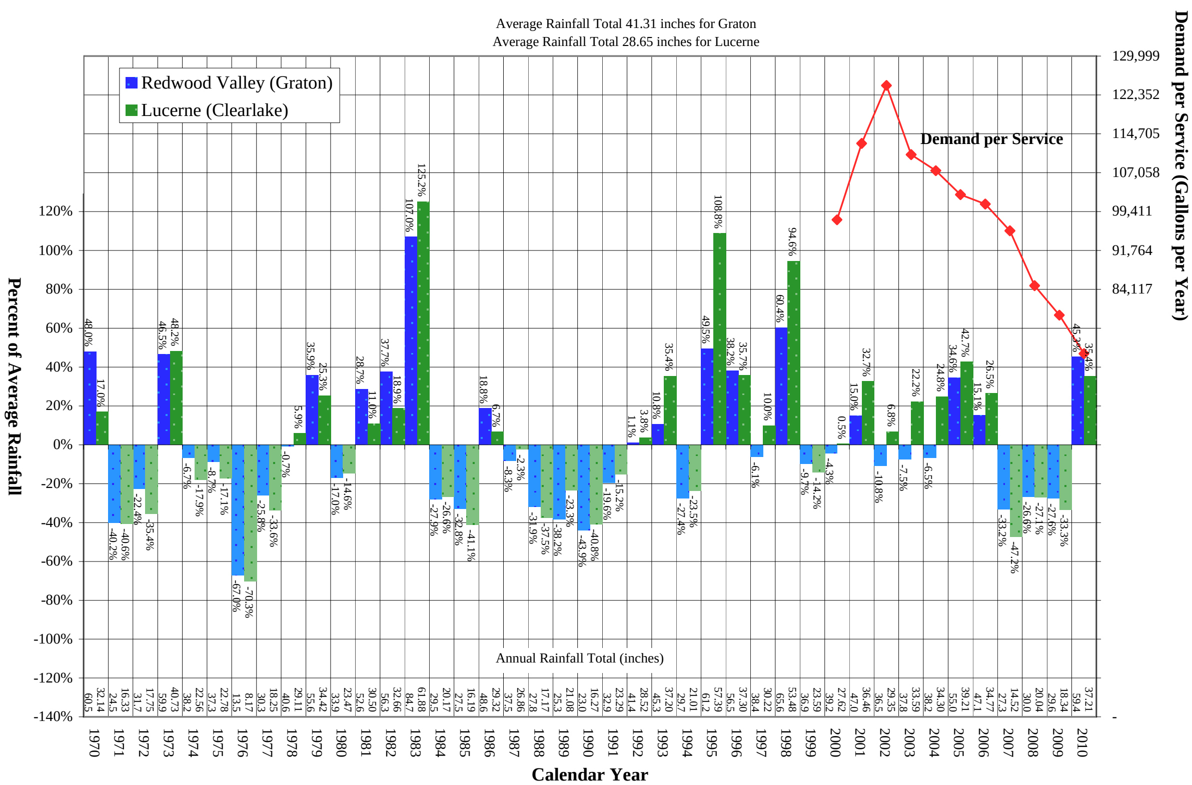
Table 5.1-3: Basis of Water Year Data (Table 27)	
Water Year Type	**Base Year (s)**
Average Water Year	2004
Single-Dry Water Year	2001
Multiple-Dry Water Years	2000, 2001, 2002

<u>Coast Springs:</u>

The groundwater used in Coast Springs comes from two sources. Approximately 75 percent of the total supply comes from Well 4-01, which is a gallery infiltration well and is under the influence of surface water from Dillon Creek, which drains the local Dillon Creek Watershed. Well 4-01 is located in an alluvial aquifer at the mouth of Dillon Creek. The second source is a series of “Hill” wells, which are deep bedrock wells in the nearby Mesa Watershed. Water from the hill wells is also considered under the influence of surface water and is regulated by the Surface Water Treatment Rule. These wells are low producing and are used more often in the summer months when demand is greatest. All raw water produced in Coast Springs is pumped to a storage tank and treated with membrane filtration before entering the distribution system.

Dillon Creek is a small perennial stream with year-round flows. The flow rate at Well 4-01 is highly dependent on weather conditions and upstream diversions. The rate of recharge is dependent on the flow rate in the Creek, and aquifer storage is a function of the recharge rate and the pumping rate in Well 4-01. Cal Water does not have records of well level trends over time and can not compare available supply in the bedrock wells with variation in annual precipitation. But because the primary source of supply depends on surface water flows, the amount of annual rain has a direct impact on surface water availability for Well 4-01. Past rainfall amounts are shown in Figure 5.1-4.

Figure 5.1-4: Comparison of Annual Rainfall to Historic Average



Cal Water performed a water supply investigation to determine the sustainable yield of this aquifer at the Well 4-01 location. The results of this investigation showed that the long term average sustainable pumping rate is between 11-16 gpm. From 2000-2005 the average production required in the peak demand month of July was approximately 12 gpm, indicating that some excess capacity may exist, even in dry months. Peak pumping capacity in the well is 23 gpm. The study showed that peak pumping capacity could be maintained over the short term for up to 8 days, at which time aquifer storage was completely depleted. The recharge rate was measured at 13 gpm during this investigation.

In 2000 Cal Water performed pump tests on the bedrock Hill Wells. The capacities ranged between 0.5 and 2.6 gpm and had an overall combined capacity of 10.6 gpm.

Together, the two supply sources offer approximately 20-25 gpm in sustainable production and a peak production capacity of 33 gpm. This is an adequate margin of supply over demand provided all sources are available. However, if Well 4-01 was out of service for any reason peak demand could not be met by the Hill Wells alone. Cal Water is currently exploring options for adding an additional source of supply to prevent water shortages due to drought events or equipment failure.

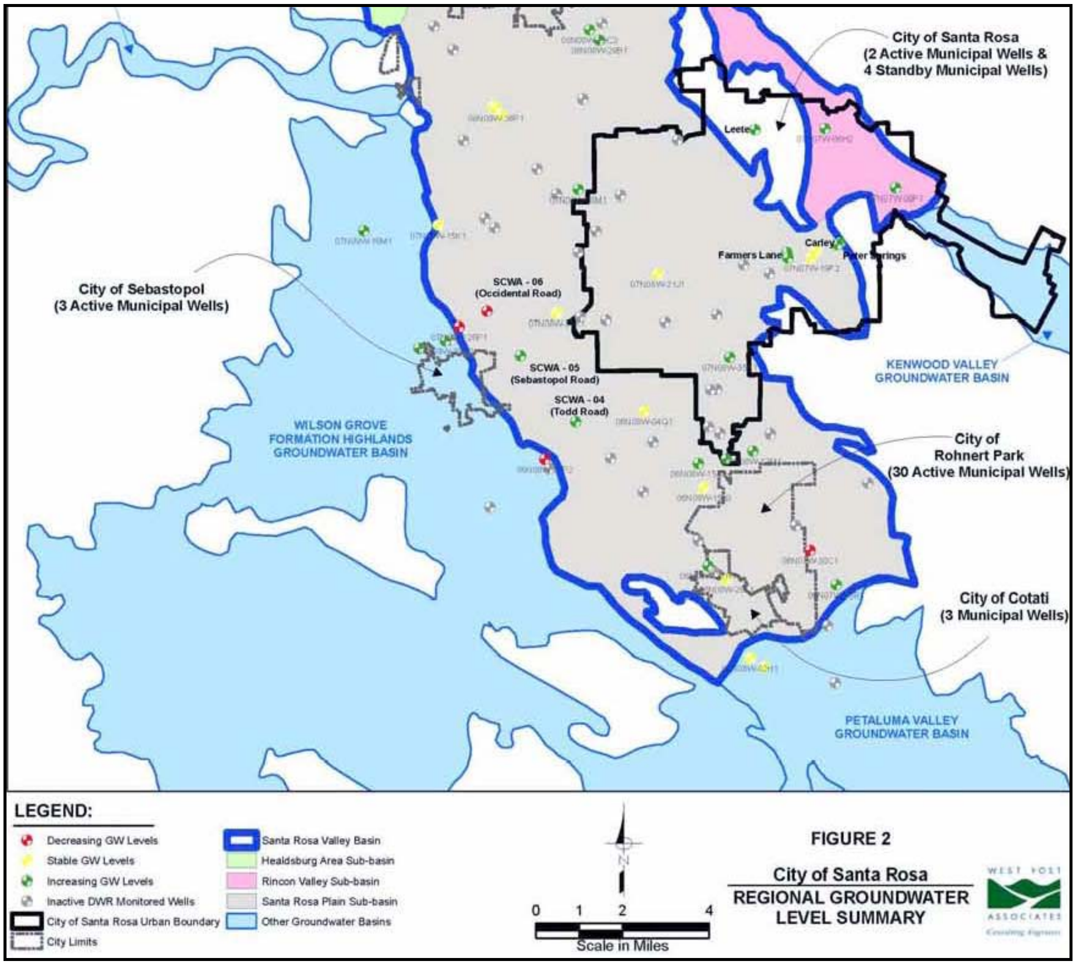
Hawkins:

The wells in the Hawkins system produce water from the Santa Rosa Valley SubBasin of the Santa Rosa Plain Groundwater Basin. In 2006 the City of Santa Rosa performed Water Supply Assessment (WSA) for its Downtown Station Area Specific Plan. According to the WSA, a water budget analysis performed in 1982 showed that the Basin was in a state of balance or minimal overdraft. Since then Santa Rosa has switched its primary water source from locally pumped groundwater to the Sonoma County Water Agency's (SCWA) imported supply from the Russian River, which mostly comes from surface water. As a result, total pumping from the Basin has decreased in the Santa Rosa area.

According to the SCWA Urban Water Management Plan, surface water supplies will be adequate during dry years and groundwater will not be relied on to supplement normal demand. Shortfalls will be made up through demand side management efforts as outlined in its Water Shortage Contingency Plan. However, SCWA does maintain several wells within the Santa Rosa Valley Basin that can be used during droughts or emergency conditions.

The WSA analyzed groundwater level trends in monitoring wells throughout the basin and found that overall, the depth to water was holding steady or increasing, as shown in Figure 5.1-5. In the Figure monitoring wells are coded green for increasing, yellow for static, and red for decreasing groundwater elevations.

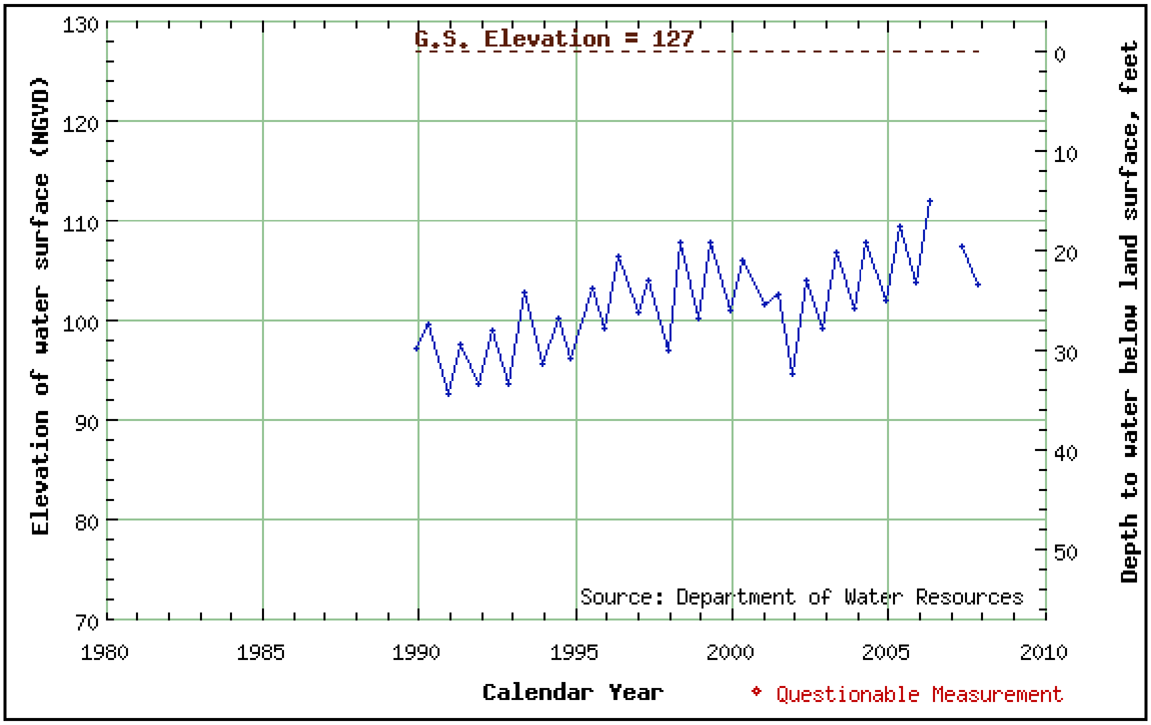
Figure 5.1-5: Groundwater Level Trends in the Santa Rosa Valley Basin



Source: City of Santa Rosa Downtown Station Area Specific Plan

Monitoring Well 07N08W35K001M was the closest well to the Hawkins system included in the WSA and is used to represent groundwater level trends for Hawkins. As you can see in Figure 5.1-6 the groundwater level has steadily increased by approximately 10 feet over the period of record. This indicates that a reliable source is available to the Hawkins system.

Figure 5.1-6: Groundwater Level Trend at Monitoring Well 07N08W35K001M



Source: California Department of Water Resources

Although the quantity of water available in Hawkins is adequate, there are water quality issues in that reduce the reliability of this groundwater source. Wells in Hawkins produce water that is high in iron and manganese, causing one of the two wells to be placed on standby status. In the winter of 2010/2011, Cal Water installed a 50 gallon per minute treatment plant at the existing well site. It is able to treat water from either well 1 or well 2. The plant removes iron and manganese. The water from the plant flows into a concrete clearwell tank and then is pumped to the distribution system. As a result of this treatment, water produced by the active well meets MCLs for iron and manganese.

5.2 Drought Planning

The reliability of each individual system within the Redwood Valley District was discussed in the previous section. As stated before, the systems are not hydraulically connected and have various supply sources and limitations. But for the purposes of this UWMP the supplies of each have been combined. Table 5.1-3 lists the years chosen for this analysis.

Table 5.2-1: Basis of Water Year Data (Table 27)	
Water Year Type	**Base Year (s)**
Average Water Year	2000
Single-Dry Water Year	2007
Multiple-Dry Water Years	2006-2009

Because of the wide range of weather patterns in the Redwood Valley District, perhaps a better indication of annual variability would be the variation in customer demand between normal and single dry or multiple dry years. This can be seen in the overall average demand per service values for the District, as shown in Table 5.2-2. The data suggests a typical pattern where demand is gradually reduced as dry conditions persist. This reduction generally happens as a result of increased conservation requests by water providers and a general awareness of the problem by customers.

Table 5.2-2: Supply Reliability – gal/service/yr (Table 28)					
Average / Normal Water Year	**Single Dry Water Year**	**Multiple Dry Water Years**			
		Year 1	**Year 2**	**Year 3**	**Year 4**
91,478	90,501	102,643	90,501	80,578	74,369
% of Normal	99%	112%	99%	88%	81%

When considered as a whole, the Redwood Valley District has an adequate supply to meet customer demands during multiple-dry year events. During future dry periods customer water use patterns are expected to be similar to past events. Table 5.2-3 shows the supplies that would be available in a multiple dry year event from 2011-2013, with a normal supply for 2010. The supply amounts were calculated by applying the percentages from years 1-3 in Table 5.2-2 to the SBx7-7 target demand projection for those years.

Table 5.2-3: Supply Reliability – Current Water Sources - AFY (Table 31)				
Water Supply Source	Average / Normal Water Year Water Supply	Multiple Dry Water Year Water Supply		
		2011	2012	2013
Purchased	6	8	7	7
Surface	111	135	129	114
Groundwater	444	434	410	362
Total	560	577	546	483
% of Normal Year	100%	103%	97%	86%

5.2.1 Normal-Year Comparison

Water supply and demand patterns change during normal, single dry, and multi dry years. To analyze these changes, Cal Water relies on historical usage to document expected changes in future usage in water demand; such as, assuming increasing demand due to increased irrigation needs or a decrease in demand due to awareness of drought conditions.

The Redwood Valley District is made up of several hydraulically disconnected systems, and not all systems have access to both supply sources. However, for the purposes of this UWMP, the systems have been combined. The water supply analysis in Cal Water's Water Supply and Facilities Master Plan found supplies to be adequate to meet all expected demands, with minor capital improvements needed for redundancy and future growth. The supply is therefore 100 percent reliable.

For this analysis the normal supply is considered equal to the SBx7-7 target water demand projection. Conservation savings is already incorporated into this projection. Table 5.2-4 indicates that supplies will be reliable throughout the planning horizon of this UWMP and that no supply deficiencies are expected.

Table 5.2-4: Supply and Demand Comparison - Normal Year - AF (Table 32)						
	2015	2020	2025	2030	2035	2040
Purchased	8	8	8	8	8	8
Surface	133	135	136	138	140	142
Groundwater	415	407	413	420	427	434
Supply totals	555	549	558	566	575	584
Demand totals	555	549	558	566	575	584
Difference	0	0	0	0	0	0
Difference as % of Supply	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Difference as % of Demand	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

5.2.2 Single Dry-Year Comparison

With exception of the Coast Springs system, water supplies are expected to be adequate during single dry years. As discussed earlier, Cal Water is working towards a permanent solution to ensure reliability in Coast Springs. This is expected to happen in the next two years, after which the supply will be 100 percent reliable. The Armstrong Valley, Noel Heights, and Rancho del Paradiso systems supplies have proven to be adequate in dry years. And in Lucerne, surface water levels will not fall below the threshold that would cause a water shortage as a result of the agreements mentioned in Section 4. For the purposes of this analysis, all the systems have been considered together. As a result, the supply is reliable in single dry years.

In general, and from operational records, the District's demand has shown to increase during a single-dry years as compared to normal years. The water demand increases due to maintenance of landscape and other high water uses that would normally be supplied by precipitation. In this case water demands were reduced in the single dry year. The supply and demand values shown in Table 5.2-5 were calculated by increasing the SBx7-7 target demand projection in each year by the percentage listed for the single dry year in Table 5.2-2.

Table 5.2-5: Supply and Demand Comparison – Single Dry Year - AF (Table 33)

	2015	2020	2025	2030	2035	2040
Purchased	7	8	8	8	8	8
Surface	130	132	133	135	137	139
Groundwater	405	398	404	411	417	424
Supply totals	543	537	545	554	563	571
Demand totals	543	537	545	554	563	571
Difference	0	0	0	0	0	0
Difference as % of Supply	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Difference as % of Demand	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

5.2.3 Multiple Dry-Year Comparison

As noted earlier, water demand generally increases early in a multiple dry year period then gradually decreases as the drought persists and customers respond to conservation messaging. This pattern is evident in Table 5.2-6 where demands at the beginning of each five year period are higher than in the normal year scenario, and demands decrease each year thereafter. The supplies and demands shown here are calculated by multiplying the target demand projection for that year by the percentages listed in Table 5.2-2 for the multiple dry year period. Again, no supply deficiency is expected.

Table 5.2-6: Supply And Demand Comparison - Multiple Dry Year Events – AFY (Table 34)						
		2015	**2020**	**2025**	**2030**	**2035**
Multi-dry year first year supply	Purchased	8	8	8	8	8
	Surface	137	139	141	143	145
	Groundwater	428	420	426	433	440
	Supply Totals	572	566	575	584	593
	Demand Totals	572	566	575	584	593
	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%
Multi-dry year second year supply	Purchased	7	8	8	8	8
	Surface	130	132	134	136	138
	Groundwater	404	399	406	412	419
	Supply Totals	542	539	547	556	564
	Demand Totals	542	539	547	556	564
	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%
Multi-dry year third year supply	Purchased	7	7	7	7	7
	Surface	116	117	119	121	123
	Groundwater	357	355	361	367	373
	Supply Totals	480	479	487	495	502
	Demand Totals	480	479	487	495	502
	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%

5.3 Factors Affecting Reliability of Supply

Although the historical climatic record shows that the demand can be met by the supply, future climatic changes may present an obstacle. In addition, other factors which may threaten the reliability of these sources are listed in Table 5.3-1.

Table 5.3-1: Factors Resulting In Inconsistency of Supply (Table 10)				
Name of Supply	**Legal**	**Environmental**	**Water Quality**	**Climatic**
Groundwater			✓	✓
Surface Water	✓		✓	✓

The Redwood Valley District's groundwater sources are from un-adjudicated ground water basins. Cal Water does not anticipate any legal issues dealing with adjudication of the basins. Cal Water has a long term agreement with Yolo County for the purchase of surface water from Clear Lake and no interruptions of this source are anticipated.

Water quality concerns will continue to be an issue for the groundwater produced by a few of the wells in the Redwood Valley District and could impact supply availability from this source in the future. Specific concerns will be discussed in the following section.

Environmental factors are not thought to be a threat to reliability of supply in Redwood Valley.

5.4 Water Quality

The drinking water delivered to customers in the Redwood Valley District meets or surpasses all federal and state regulations. The U.S. Environmental Protection Agency as authorized by the Federal Safe Drinking Water Act of 1974 sets drinking water standards. A state can either adopt the USEPA standard or set state standards that are more stringent than those set by the federal government.

There are two types of drinking water standards: Primary and Secondary. Primary Standards are designed to protect public health by establishing Maximum Contamination Levels (MCL) for substances in water that may be harmful to humans. MCLs are established very conservatively for each contaminant and are generally based on health effects which may occur if a person were to drink three 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 certain mineral content. These standards, established by the State of California, specify limits for substances that may affect consumer acceptance of the water.

The Lucerne surface water treatment plant operates at optimal performance with potential water quality concerns varying based on surface water supply conditions. In the summer season when Clearlake algae blooms are evident, there is a higher occurrence of taste and odor issues identified by customer complaints. Subsequently, the increased amount of Total Organic Carbon (TOC) resulting from the algae blooms coupled with chlorination in the treatment plant result in historically high concentrations of Total Trihalomethanes (TTHM) in the distribution system.

Currently Lucerne is under Stage 1 Disinfection Byproducts Rule (DBP) which cites that the average of the sum of total distribution system compliance sites meet compliance for TTHM. Consequently the Stage 2 Disinfection Byproducts Rule will be implemented in Fall 2012 and will depend on an average of DBP's for each site to achieve compliance. It is suspected (based on historic TTHM data) that the distribution system sites will be out of compliance.

In an effort to address the Stage 2 DBP issue for TTHM's Cal Water is working with to resolve the issue within the treatment operations. Options will include a study of TOC reduction at the source and generation / removal of TTHM's in the clarifier. Application of treatment technologies is scheduled for early 2012.

Noel Heights treatment operations have been expanded to include a finished water aeration system. The aeration system was installed to address the low pH issue which had an effect on the Lead and Copper compliance in the customer's piping. The California Department of Public Health has recognized the benefit of this installation as 2010 Lead and Copper Rule sampling has resulted in compliance. It is possible that the operations will discontinue the use of SeaQuest Corrosion Control Inhibitor injection, as the aeration system has resolved the overall Lead and Copper compliance issue.

Hawkins completed the installation of an ATEC Iron and Manganese treatment plant in October 2010 and is operating to the distribution system with 100% removal of Iron and Manganese. An added benefit of this treatment operation is the reduction of background Arsenic to levels approximately ½ of the 10 ug/L Maximum Contaminant Level (MCL). The short duration of operation of this system has so far been successful, and properly maintained should have consistent compliance.

Coast Springs has expanded the water production provided to the treatment plant with the addition of the Kline well, which is adjacent to well 4. Although there is background Manganese in the Kline well, the ATEC Iron and Manganese treatment unit is equipped to remove the manganese prior to introduction into the distribution system.

The Coast Springs operations are evaluating potential production expansion by accessing existing privately owned wells. At this point the water quality issues and production capacity are unknown. In the event of production expansion using additional sources, treatment plant effectiveness and capacity will need to be evaluated.

5.5 Water Shortage Contingency Plan

This section contains an updated version of Cal Water's Water Shortage Contingency Plan. The Water Shortage Contingency Plan was last revised in response to the drought that California experienced between 1987 and 1992. The first version of the Plan was included in each subsequent UWMP update.

California's most recent drought event that began in the spring of 2006, coupled with the Delta pumping restrictions, brought increased awareness to the importance of drought preparedness. By the spring of 2008 it became apparent that several of Cal Water's service districts had the potential for water supply shortages and potential wholesaler allocations in the following year. In response, a Conservation/Supply Team was formed to develop a plan for addressing these potential issues. Through this process Cal Water learned valuable lessons and is better prepared for extended droughts or other long term water shortages. The results of this planning process are summarized in this Water Shortage Contingency Plan.

5.5.1 Water Shortage Contingency Plan Scope

The Water Shortage Contingency Plan is a unique document designed to address specific conditions that may occur from time to time in Cal Water's service areas. It can be triggered by several types of events but is primarily used as a response to longer term drought conditions. The Water Shortage Contingency Plan provides a comprehensive company-wide strategy for approaching water supply shortages that may last from several months to several years in duration.

Other triggers may include a partial loss of supply due to a mechanical failure of either Cal Water or wholesale supplier facilities resulting from natural disasters, chemical contamination, or other water quality issues. These two types of triggers are unlikely in larger districts where operational changes can more easily be made in one part of the system to overcome supply shortages in other parts of the system. However, in smaller isolated systems that rely heavily on one source of supply, a partial loss of this supply could necessitate the implementation of the Water Shortage Contingency Plan. Generally, this type of water supply shortage would not last as long as those caused by drought.

There are some important distinctions that should be made between the Water Shortage Contingency Plan and other programs and plans that Cal Water has for each district. Cal Water also maintains an Emergency Response Plan (ERP) for each service area. The ERP is similar to the Water Shortage Contingency Plan in that it may include a loss of supply and inability to serve our customers with normal quantities of water. However, the ERP is designed to manage crises that occur more suddenly and are caused by events such as natural disasters, technological failures, chemical contamination, or national security emergencies.

The ERP provides a guide for district and general office personnel to follow in response to one of these emergencies. It includes the policies, responsibilities, and procedures to be used to protect public safety and includes the setup of an Emergency Operations Center and implementation of the Standardized Emergency Management System. The ERP also describes the necessary inter-jurisdictional coordination and provides the communications and notification plan to insure an efficient response to the emergency.

The ERP for each district was completed in 2004 in response to the Public Health and Safety and Bioterrorism and Response Preparedness Act (H.R. 3448) of 2002. They were then updated in May of 2008. Cal Water is planning to rewrite the ERPs in the next few years. These new Plans will include more detailed district-specific information and will be designed to be used as a manual for Cal Water personnel during emergency situations.

Cal Water is also in the process of developing Water Conservation Master Plans for each district. These Water Conservation Master Plans are different from the Water Shortage Contingency Plans in that they are designed to permanently reduce per capita water use by Cal Water's customers. The Water Conservation Master Plans are not associated with any short or long term loss of supply but will have the effect of making existing supplies last further into the future. In the short term, this will also provide increased supply reliability.

The water use targets selected by Cal Water for each service area are consistent with current regulations. In general, this will mean a reduction in per capita demand. Specific reductions will vary by service area and are contained in the service-area specific Water Conservation Master Plans. The annual level of funding for these programs will be determined through each General Rate Case filed with the California Public Utilities Commission (CPUC). The Water Conservation Master Plan will be discussed in more detail in Section 5 of this UWMP.

5.5.2 Water Conservation/Water Supply Team

As mentioned earlier, Cal Water formed a Conservation/Supply Team in response to the water shortage conditions that were forecasted for 2009. This Team consisted of an interdepartmental group of personnel that guided the planning process for the company-wide response to the drought. Members of the Conservation/Supply Team include:

- Vice President of Regulatory and Corporate Communications
- Vice President of Customer Service, Human Resources, and Information Technology
- Director of Corporate Communications
- Director of Customer Service
- Conservation Manager
- Chief Engineer
- Water Resources Planning Supervisor
- Manager of Rates
- Manager of Operations
- Maintenance Manager

- Billing Manager
- Regulatory Accounting Manager
- Meter Operations Supervisor
- Support Staff

The Conservation/Supply Team held regular meetings to discuss strategies for all aspects of drought preparation such as water supply monitoring, public communications, wholesale and customer allocations, information technology improvements, and financial impacts. Additional staff participated as needed as the planning process progressed.

5.5.3 Water Supply Allocation Plan

During the most recent drought several of Cal Water's districts were faced with the possibility of reduced wholesale allocations of imported water. If implemented, Cal Water would need to reduce its use of this supply proportionally in order to meet regional conservation targets and avoid wholesaler imposed penalties for overuse. Cal Water would have to request customers to reduce water use, usually to the same level as required by the wholesaler.

These reductions could either be voluntary or mandatory depending on the severity of the cutback required. If mandatory rationing is deemed necessary, retail customer allocations would need to be implemented. To determine the methodology used for customer allocations a cross-functional Water Allocation Team was formed. The Water Allocation Team consisted of a subset of the Conservation/Supply Team and was tasked with developing the details of how the allocation process would be handled internally by Cal Water. The Water Allocation Team reported back to the Conservation/Supply Team at the regular meetings.

The Water Allocation Team meetings resulted in a comprehensive strategy that is summarized in Cal Water's Water Supply Allocation Plan. The Water Supply Allocation Plan details the methodology used for determining customer allocations, conducting public communications, tracking water use, assessing penalties, and processing appeals.

The Water Supply Allocation Plan also outlines regulatory actions that must be taken in order to implement mandatory allocations. If it is determined that mandatory allocations are likely to be necessary in a particular district Cal Water will file a Tier 2 advice letter with the CPUC that describes the need for mandatory allocations as well as our methodology and plan for implementation. A public hearing is required during the 30 days following this filing and all customers in the affected district will be notified of the hearing. If, after the 30 day period, it is determined that mandatory allocations are necessary, Cal Water will file a Tier 1 advice letter with the CPUC, which would make mandatory allocations effective 5 days following the filing.

Cal Water has the legal authority to implement mandatory allocations only after requesting from the CPUC that Tariff Rule 14.1, Mandatory Conservation Plan, be added to existing tariffs. *Section A. Conservation – Nonessential or Unauthorized Water Use* of

Tariff Rule 14.1 identifies specific water use prohibitions. Prior to implementing mandatory allocations Cal Water will communicate details of the Plan to all customers.

5.5.4 Allocation Methodology and Customer Information

The Water Allocation Team's methodology for determining customer allocations was decided through careful consideration of all available information. Throughout this process the Team tried to maintain fairness to all customers and develop a plan that was easy to understand and communicate. Secondary concerns included impacts to Cal Water such as the ease of implementation and revenue shortfalls.

Customer allocations will be calculated on a monthly basis for each "premise", or customer location. The required cutback will be a percent reduction from prior use compared to baseline time period. The percentage reduction and baseline that Cal Water uses will be consistent with those used by the regional wholesaler. This will be done to ensure regional coordination between agencies and to offer a clear message to the public. In districts that do not have an imported supply and therefore no wholesaler, Cal Water will choose the percent reduction depending on the severity of the water shortage.

In most cases the percent reduction will be kept constant on an annual basis. It will be reviewed and adjusted as necessary in the spring of each year after the water supply picture becomes clear for the following dry season. In most districts Cal Water does not have direct control over long term storage of imported water and will rely on the California Department of Water Resources, U.S. Bureau of Reclamation, and regional water wholesalers to manage carryover storage between years. In some cases it may be necessary to adjust these percentages mid-year, if, for example, a district is not meeting its reduction target. The allocation period will end when Cal Water determines that the water shortage no longer exists and ample supplies are available on an ongoing basis.

A minimum allocation will be given to single-family residential customers whose monthly allocation would fall below a level that is considered necessary for health and safety. These minimum allocations will be calculated for each district and will include water for indoor consumption on a per capita basis and also a percentage of normal water for outdoor use such as landscape irrigation. Multi-family, commercial, industrial, government, and other service connection categories will not be subject to minimum allocations.

Cal Water will provide customers the opportunity to bank unused water that has been allocated in a billing period. A customer will bank their unused allocation in a given billing period which can then be used to offset a future month where the customer exceeds their allocation. There is no limit to the amount of water that can be banked by a customer. All banked water will expire once allocations are determined to no longer be needed.

As a deterrent to exceeding monthly allocations and to offset penalties that Cal Water may incur from wholesale agencies, a penalty rate will be applied to a customer's water use that is in excess of their allocation. This penalty rate will be charged in addition to the normal tiered rate for every unit (Ccf) above the allocation during a billing period.

If a customer feels that their allocation does not represent their current need, or to dispute penalties assessed to their account, customers can file an appeal with their local district. The appropriate personnel will review the appeal and issue a judgment in writing. The appeals will be reviewed according to rules outlined in the Water Supply Allocation Plan.

During a water shortage priority will be given to uses that promote public health and safety. These uses include residential indoor use and other sanitary purposes. On a case by case basis Cal Water will decide that certain services are seen as essential, such as hospitals, and may exempt the customer from allocations. The second priority will be given to commercial and industrial water use in an effort to minimize financial impacts to local businesses. And finally, outdoor irrigation has the lowest priority.

If Cal Water requests voluntary reductions, all customer categories will be asked to make the same percent reduction. If mandatory reductions are required, which in general means a reduction of greater than 15 percent, Cal Water may develop different demand reduction targets for each connection category. This will be done to enforce the priorities listed above and to ensure that the correct mix of targets are chosen so that the overall district demand reduction goal is reached.

5.5.5 Drought Stages

Cal Water has developed a four stage approach to drought response that corresponds to specific levels of water supply shortage. At each higher stage Cal Water will become more aggressive in requiring water use reductions from its customers. The decision to enter a new stage will be made by careful consideration of a variety of factors including wholesale supply, availability of alternative supplies, time of year, and regional coordinated activities. These stages are designed to guide Cal Water personnel in making informed decisions during water shortages. A certain amount of flexibility is built in to the stages to allow for the unique characteristics of each water shortage event and the unique characteristics within each of Cal Water's districts. In each progressive stage the actions taken in earlier stages will be carried through to the next stage either at the same or at an increased intensity level, thereby becoming more restrictive.

When the water conditions in a district appear to warrant the activation of the Shortage Contingency Plan's Demand Reduction Stages, whether that be via implementing Stage 1, the movement from one Stage to a higher stage, the movement from a higher stage back down to a lower stage, or deactivating the use of Demand Reduction Stages altogether; the Water Conservation /Water Supply Team will consider those conditions at hand and prepare a recommendation on the appropriate action to be taken by the Company. The Team's recommendation will be presented by the Chief Engineer to the Vice President of Engineering and Water Quality. If the Vice President of Engineering and Water Quality concurs with the WC/WS Team recommendation, then he or she will take that recommendation to the President and Chief Executive Officer. The President &

CEO will make the final determination as to whether or not the recommended action is to be taken by the Company.

If it is determined that the Company will implement or change the active Demand Reduction Stage for a given District, then a press release will be made in a manner that advises the customers served by that district of this determination. This press release will explain the desired outcome of the action to implement the appropriate stage. Upon making that determination Cal Water will immediately begin implementing the specific actions identified for the determined stage as outlined in the reminder of this section of the Shortage Contingency plan.

Stage 1 covers water shortages of up to 10 percent and can be used to address annual variations in precipitation and mild drought events that may last only a year or two. All reductions in Stage 1 are voluntary and impacts to customers are minimal. The actions to be taken by Cal Water in Stage 1 are listed in Table 5.5-1.

Table 5.5-1: Demand Reduction Stage 1 (Table 36)

Stage	Water Supplier Actions
1. Minimal 5 to 10 percent Shortage Up to 10 percent Reduction Goal Voluntary Reductions	**Cal Water will:** Request voluntary customer conservation as described in CPUC Rule 14.1. Maintain an ongoing public information campaign. Maintain conservation kit distribution programs. Maintain school education programs. Maintain incentive programs for high efficiency devices. Coordinate drought response with wholesale suppliers and cities. Lobby cities for passage of drought ordinances. Discontinue system flushing except for water quality purposes. Request that restaurants serve water only on request.

Stage 2 includes water shortages of between 10 and 20 percent. Stage 2 will be entered during prolonged water shortages of moderate severity such as those caused by a multi-year drought. Reduction methods can either be voluntary or mandatory depending on the severity of the water shortage. Allocations would likely be implemented when the shortage exceeds 15 percent. Customers will begin to notice moderate impacts to normal water use and companies may begin to have financial impacts. In Stage 2 Cal Water will intensify its conservation efforts by implementing the actions listed in Table 5.5-2. All actions from Stage 1 will be carried through or intensified in Stage 2.

Table 5.5-2: Demand Reduction Stage 2 (Table 36)

Stage	Water Supplier Actions
2. Moderate 10 to 20 Percent Shortage Up to 20 Percent Reduction Goal Voluntary or Mandatory Reductions	**Cal Water will:** Increase or continue all actions from Stage 1. Implement communication plan with customers, cities, and wholesale suppliers. Request voluntary or mandatory customer reductions. File Schedule 14.1 with CPUC approval if necessary. Request memorandum account to track penalty rate proceeds and other drought related expenses. Lobby for implementation of drought ordinances. Monitor water use for compliance with reduction targets.

Stage 3 represents a severe water shortage emergency with a reduction in supply of between 20 and 35 percent. This stage can be triggered by the most severe multi-year droughts, major failures in water production and distribution facilities, or by water quality concerns, especially in smaller isolated systems. A shortage of this magnitude may begin to seriously impact public health and safety, and cause significant financial hardships on local businesses. All reductions will be mandatory and customer allocations would be necessary. During Stage 3 Cal Water will take the following actions listed in Table 5.5-3, which includes all the actions from Stage 2.

Table 5.5-3: Demand Reduction Stage 3 (Table 36)

Stage	Water Supplier Actions
3. Severe 20 to 35 Percent Shortage Up to 35 Percent Reduction Goal Mandatory Reductions	**Cal Water will:** Increase or continue all actions from previous stages. Implement mandatory conservation with CPUC approval. Install flow restrictors on repeat offenders. Require customers to have high efficiency devices before granting increased allocations. Require participation in survey before granting an increased allocation.

Stage 4 is a critical water shortage emergency with a reduction of supply of at least 35 and potentially above 50 percent. This represents an exceptional crisis that could be caused only by the most severe multi-year drought, natural disaster, or catastrophic failure of major water supply infrastructure. Impacts to public health and safety would be significant. In Stage 4 Cal Water will take the additional actions listed in Table 5.5-4 while also continuing or increasing actions from Stage 3.

Table 5.5-4: Demand Reduction Stage 4 (Table 36)	
Stage	**Water Supplier Actions**
4. Critical 35 to 50+ Percent Shortage Up to and above a 50 percent Reduction Goal Mandatory Reductions	**Cal Water will:** Increase or continue all actions from previous stages. Discontinue service for repeat offenders. Monitor water use weekly for compliance with reduction targets. Prohibit potable water use for landscape irrigation.

5.5.6 Water Supply Conditions and Trigger Levels

As described in Section 3, the water supply for the Redwood Valley District is a mix of groundwater and surface water. None of the groundwater basins that Cal Water pumps from are adjudicated. Therefore the groundwater supply is limited only by the pumping capacity of the wells and by natural conditions. Several of these systems with a groundwater supply have proven to be unreliable mainly due to aquifer characteristics but also because of water quality concerns.

Lucerne’s surface water supply is very reliable. Supply shortages from drought conditions may occur but are generally unlikely. Cal Water’s intake structure for the treatment plant is located at a depth of 12 feet below the water surface, which is below the known low lake level. However, Cal Water recognizes that prudent management of water resources is essential to the sustainability of long term supplies and may still ask for reductions in water use by its customers. The duration and degree of cutback required will be similar to those in other areas of the state that rely on imported water. These thresholds are shown in Table 5.5-5.

Table 5.5-5: Water Supply Triggering Levels (Table 35)	
Stage	Percent Shortage
Stage 1	5 to 10% supply reduction
Stage 2	10 to 20% supply reduction
Stage 3	20 to 35% supply reduction
Stage 4	35 to 50% supply reduction

5.5.7 Water Use Restriction Enforcement

Because of its investor owned status Cal Water has limited authority to enforce water use restrictions unless Rule 14.1 is enacted through CPUC approval. Restrictions on water use prior to enacting Rule 14.1 must be regulated by ordinances passed by the local governments in each community served. Cal Water has worked with municipalities to pass ordinances and will continue this effort on an ongoing basis. Rule 14.1 contains a detailed list of the water use restrictions common to many of these ordinances, and is included as Appendix E of this UWMP.

In the Redwood Valley District the City of Lucerne and the County of Sonoma have passed water conservation ordinances, which are included in Appendix E.

Cal Water maintains extensive water use records on individual metered customer accounts. These records are reviewed in the districts to identify potential water loss problems. In order to protect itself against serious and unnecessary waste or misuse of water, Cal Water 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 Cal Water has given the customer written notice to remedy such practices.

During all stages of water shortages, production figures are reported to and monitored by the district manager. Consumption will be monitored through these daily production figures in the district for compliance with necessary reductions.

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

5.5.8 Analysis of Revenue and Expenditure Impacts

Cal Water 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)*

In 2008 the CPUC allowed for the creation of a Water Revenue Adjustment Mechanism (WRAM) and Modified Cost Balancing Accounts (MCBA). The goals of the WRAM and MCBA are to sever the relationship between sales and revenue to remove the disincentive to implement conservation rates and conservation programs especially in times of drought. WRAM and MCBA are designed to ensure that the utilities and ratepayers are proportionally affected when conservation rates are implemented, so that neither party is harmed nor benefits. Because of these regulatory developments Cal Water expects to increase the implementation of conservation rates and conservation programs on a permanent basis.

During water supply shortages Cal Water would expect to see a reduction in revenue. The amount of this reduction would depend on the total amount of water being conserved and the price (tier rate) at which the cutbacks were made for each customer. In other words, the reduction would be roughly equivalent to the quantity charge for the amount of water saved. Cal Water would still receive its monthly service charge fees.

Cal Water has adequate reserves to overcome this short term reduction. These reductions in revenue would also be recovered through the WRAM and MCBA. Through the WRAM and MCBA Cal Water will be able to track its revenue impacts and expenditures during water shortages and recover these losses through the CPUC rate case process in future years. Because of these new mechanisms Cal Water is assured that it will have adequate reserves available to operate normally under water shortage conditions.

Expenditures will not increase due to a mild water shortage condition. Any expenditure made during this time will come out of the normal conservation budget that has been approved by the CPUC. Actions that may be taken include public information campaigns that draw attention to the shortage and steer customers towards our other conservation programs (toilet rebates, washing machine rebates, home audits, etc) that are available. These programs will be paid for by money that is already budgeted. Therefore no additional expenditures will take place. If the water shortage warrants mandatory allocations, Cal Water would need to file an advice letter with the CPUC to seek approval to implement mandatory allocations. This process would include securing any additional funding necessary for the administration of this program. Again, these costs would be recovered through the MCBA and WRAM.

5.5.9 Catastrophic Water Supply Interruption

As mentioned earlier, Cal Water has an ERP in place that coordinates the overall company response to a disaster in any or all of its districts. In addition, the ERP requires each District to have a local disaster plan that coordinates emergency responses with other agencies in the area.

Cal Water also inspects its facilities annually for earthquake safety. To prevent loss of these facilities during an earthquake, auxiliary generators and improvements to the water storage facilities have been installed as part of Cal Water's annual budgeting and improvement process.

During an emergency situation, the District must rely mainly on its own production facilities to serve its customers. Most of the water systems in the Redwood Valley District are small and are isolated from neighboring communities, and only Rancho del Paradiso has an intertie with a neighboring system.

Rancho del Paradiso abandoned its primary production well when it began purchasing water from the Sweetwater Springs Water District. However, the secondary well is still available during emergencies. In Noel Heights, the closest potential water system is 2-3 miles away. The Armstrong Valley system has a neighboring system near the end of its main, and could be tied in during an emergency, but a supply interruption would occur until the necessary equipment could be installed. The Hawkins system is not tied into the City of Santa Rosa's distribution system and must rely on its own facilities during an emergency. The Estero Mutual Water Company is located close to the Coast Springs system and could be tied into temporarily, but the necessary equipment would need to be installed. The Lucerne system is also isolated from neighboring communities. The closest system is the Nice Water Company in the town to the west.

6 Demand Management Measures

6.1 Statewide Urban Water Demand Reduction Policies

As mentioned earlier, Cal Water is in the process of significantly expanding its conservation programs. Inter-related state-level policies and agreements aimed at reducing urban water use have provided much of the impetus for this change. The policies include: (1) recent decisions by the California Public Utilities Commission (CPUC) directing Class A and B water utilities to reduce per capita urban water demand; (2) state legislation mandating urban water suppliers to reduce per capita demand 20 percent by 2020; and (3) the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU). This section discusses these requirements, their relationship to one another, and their relationship to Cal Water's overall conservation strategy.

The CPUC's Decision 07-05-062 directed Class A and B water utilities to submit a plan to achieve a 5 percent reduction in average customer water use over each three-year rate cycle. This policy was refined under Decision 08-02-036, which established a water use reduction goal of 3 to 6 percent in per customer or service connection consumption every three years once a full conservation program, with price and non-price components, is in place. These decisions anticipated enactment of policies by the State legislature to reduce urban water use in California 20 percent by 2020.

SBx7-7 requires the state to achieve a 20 percent reduction in urban per capita water use by December 31, 2020. The state is required to make incremental progress toward this goal by reducing per capita water use by at least 10 percent on or before December 31, 2015. SBx7-7 requires each urban retail water supplier to develop interim and 2020 urban water use targets. Urban retail water suppliers will not be eligible for state water grants or loans unless they comply with SBx7-7's requirements.

There are three ways in which a water supplier can comply with the MOU. The first way is to implement a set of water conservation best management practices (BMPs) according to the requirements and schedules set forth in Exhibit 1 of the MOU. The second way, called Flex Track compliance, is to implement conservation programs expected to save an equivalent or greater volume of water than the BMPs. The third way, similar to SBx7-7, is to reduce per capita water use. Each of these compliance options is briefly described below.

Originally, the MOU established a set of BMPs that signatories agreed to implement in good faith. For each BMP, the MOU established the actions required by the water supplier (e.g. site surveys, fixture and appliance rebates, water use budgets, volumetric pricing and conservation rate designs), the implementation schedule, and the required level of effort (in the MOU this is referred to as the coverage requirement). Additionally, the MOU established the terms by which a water supplier could opt out of implementing a BMP.

BMPs are grouped into five categories. Two categories, Utility Operations and Education, are “Foundational BMPs” because they are considered to be essential water conservation activities by any utility and are adopted for implementation by all signatories to the MOU as ongoing practices with no time limits. The remaining BMPs are “Programmatic BMPs” and are organized into Residential, Commercial, Industrial, and Institutional (CII), and Landscape categories. Table 6.1-1 shows the BMPs by category. The requirements and coverage levels of each BMP are set forth in Exhibit 1 of the MOU. As of the date of this UWMP, Cal Water is in process of completing and submitting BMP reports to the CUWCC for the period 2009-2010. Submission was delayed due to delays in the CUWCC reporting forms being made available.

Table 6.1-1: MOU Best Management Practices

BMP Group	BMP Name
1. Utility Operations Programs (F)	Conservation Coordinator
	Water Waste Prevention
	Wholesale Agency Assistance Programs
	Water Loss Control
	Metering & Volumetric Rates
	Retail Conservation Pricing
2. Education Programs (F)	Public Information Programs
	School Education Programs
3. Residential (P)	Residential Assistance Program
	Landscape Water Surveys
	High Efficiency Clothes Washer Program
	Watersense Toilet Program
	Watersense Specifications for Residential Development
4. Commercial, Industrial, Institutional (P)	Reduce baseline CII water use by 10% in 10 years
5. Landscape (P)	Large Landscape Water Budget Programs
	Large Landscape Water Surveys

F = Foundational BMP, P = Programmatic BMP

Under Flex Track, a water supplier can estimate the expected water savings over the 10-year period 2009-2018 if it were to implement the programmatic BMPs in accordance with the MOU’s schedule, coverage, and exemption requirements, and then achieve these water savings through any combination of programs it desires. Thus, through the Flex Track compliance option, a water supplier agrees to save a certain volume of water using whatever it determines to be the best combination of programs. Because the savings target depends on the programmatic BMP coverage requirements, which in turn are functions of service area size and composition of demand, the volume of water to be saved under this compliance option must be calculated separately for each supplier. The methodologies and tools for water suppliers to implement these calculations are still being developed by the CUWCC.

Under the gpcd option, a water supplier can comply with the MOU by reducing its baseline gpcd by 18 percent by 2018. The baseline is the ten-year period 1997-2006. The MOU also establishes interim gpcd targets and the highest acceptable levels of water use deemed to be in compliance with this option. The MOU's gpcd option is similar to using Method 1 to set the SBx7-7 target, except that it uses a fixed baseline period and only runs through 2018. This compliance option may be difficult to achieve for Cal Water districts that are part of a regional alliance for purposes of SBx7-7 compliance because savings as a percent of demand will vary considerably among the districts in the alliance. It may also conflict with district-specific SBx7-7 targets set using method 3 (hydrologic region-based target). Because of these potential conflicts, this is not considered a viable MOU compliance option for Cal Water districts.

Cal Water plans to use Flex Track to comply with the MOU. This compliance option affords the most flexibility in selecting conservation programs suited to each Cal Water district and allows for more streamlined reporting. Because CUWCC tools for calculating a district's Flex Track savings target are not yet available, Cal Water developed its own target estimates for planning purposes. Cal Water will update these estimates as necessary following the release of the CUWCC Flex Track target calculator.

6.2 Conservation Master Plans

In an effort to address the statewide policies for urban water use reduction Cal Water developed Conservation Master Plans for each of its service districts. These Conservation Master Plans are designed to provide a framework for meeting these statewide policies and to chart a course for Cal Water's conservation programs over the next five years. The major tasks of the Conservation Master Plans include:

1. A complete review of State policies and development of a compliance strategy
2. Calculating all appropriate per capita targets
3. Determining water savings required from new programs
4. Performing an analysis of conservation programs
5. Developing a portfolio of conservation programs
6. Creating a plan for monitoring and update of Conservation Master Plans

Cal Water's Conservation Master Plans have a five year planning horizon and are designed to be updated in coordination with the UWMP for each district. The Conservation Master Plan for the Redwood Valley District is included in its entirety as Appendix G. A discussion of baseline and target water use can be found in Section 3 of this UWMP. A summary of the water savings requirements and program portfolio is summarized in the following section.

6.3 Water Savings Requirements

The gross water savings required under SBx7-7 can be determined with a simple calculation by subtracting the target water demand from the unadjusted baseline demand. According to this calculation the Redwood Valley District has a gross savings requirement of -31 AF from 2011-2015, as shown in Table 6.3-1.

Table 6.3-1: SBx7-7 and MOU Gross Water Savings Requirements		
Gross Water Savings Required by 2015	**SBx7-7**	**MOU Flex Track**
2015 Unadjusted Baseline Demand	575 AF	575 AF
2015 Target Demand	605 AF	558 AF
Gross Savings Requirement	**-31 AF**	**17 AF**

As discussed earlier, because CUWCC tools for calculating a district's Flex Track savings target are not yet available, Cal Water developed its own target estimates for planning purposes. The targets are based on the expected water savings from cost-effective programmatic BMPs over the ten-year period 2009-2018. The coverage requirements for the programmatic BMPs were used to calculate the Flex Track targets. Expected water savings and cost-effectiveness were based on the conservation program specifications and avoided water supply costs. The supporting data and calculations are provided in Appendix G.

The differences between the unadjusted baseline demand, district-specific SBx7-7 target, and MOU Flex Track target are shown in Table 6.3-1. This shows the maximum amount of water savings needed for SBx7-7 compliance, as well as the savings required for MOU compliance. In the case of Redwood Valley District, the unadjusted baseline demand in 2015 is less than the SBx7-7 target demand by 31 AF, but greater than the MOU Flex Track target demand by 17 AF. Thus no additional water savings is required to meet the 2015 SBx7-7 target. As will be discussed in the next section, some of water savings needed to achieve MOU compliance will come from previous conservation program investment. Any residual will need to come from new conservation program activity.

The unadjusted baseline demand described in Section 3 does not account for future changes in water demand due to the effects of plumbing fixture efficiency codes, changes in water rates, metering, and existing conservation programs. A portion of the gross savings requirements shown above are expected to come from these sources. The Conservation Master Plan includes an estimate of the volume of water saved as a result of these things. The results are used to adjust baseline demand so that the volume of water savings that will need to come from new conservation programs can be determined.

Two recent California laws are expected to accelerate the replacement of low efficiency plumbing fixtures – primarily toilets and showerheads – with higher efficiency alternatives.

- AB 715, passed in 2007, amended the California Building and Safety Code to require by January 1, 2014, that toilets sold or installed in California use no more than 1.28 gallons per flush. It also requires that urinals sold or installed use no more than 0.5 gallons per flush.
- SB 407, passed in 2009, amended the California Civil Code to require replacement of low efficiency plumbing fixtures with higher efficiency alternatives when a property undergoes alterations, improvements, or transfer. In the case of single-family residential properties, issuance of a certificate of final completion and occupancy or final permit approval by the local building department for building alterations or improvements will be conditional on the replacement of low efficiency plumbing fixtures beginning in 2014. Single-family property owners are required by law to replace any remaining non-compliant plumbing fixtures by no later than January 1, 2017. After this date, a seller or transferor of single-family residential real property must disclose in writing to the prospective purchaser or transferee whether the property includes any noncompliant plumbing fixtures. For multi-family and commercial properties non-compliant fixtures must be replaced by January 1, 2019. As with single-family properties, final permits or approvals for alterations or improvements are conditional on the replacement of low efficiency fixtures beginning in 2014.

The phase-in dates for AB 715 and SB 407 mean they will not greatly contribute to meeting the 2015 interim gpcd target under SBx7-7. But they will support meeting the 2020 target. Moreover, since the early 1990's, the sale and installation of toilets manufactured to flush more than 1.6 gallons, showerheads manufactured to have a flow capacity more than 2.5 gallons per minute, and interior faucets manufactured to emit more than 2.2 gallons per minute has been prohibited. These requirements will continue to improve the efficiency of plumbing fixtures in older residential and commercial buildings.

Water savings from expected rate adjustments in Redwood Valley District were also calculated. The estimates are based on inflation-adjusted changes in rates for 2011, 2012, and 2013, as contained in CPUC's proposed GRC decision. Short-run price elasticity estimates used to calculate potential changes in demand were drawn from the CUWCC's conservation rate guidebook.

In addition to savings from codes and rates, expected on-going water savings from conversion of flat rate customers to metered billing plus conservation activity occurring in 2009 and 2010 were also taken into account. The adjusted baseline demand and savings associated with code changes, rate changes, and existing conservation programs are shown in Table 6.3-2.

Table 6.3-2: Adjusted Baseline Demand Projection					
Adjusted Baseline (AF)	**2011**	**2012**	**2013**	**2014**	**2015**
Unadjusted Baseline	571	572	573	574	575
Less Savings from					
Codes	1	2	3	4	5
Schedule Rate Increases	4	9	13	13	12
Existing Programs	4	4	4	3	2
Adjusted Baseline Demand	**561**	**557**	**553**	**554**	**556**
Per Capita (GPCD)	156	154	153	153	153

The amount of water savings required from new conservation programs is not the same for SBx7-7 and MOU Flex Track compliance. In the case of SBx7-7, the objective is to reduce 2015 per capita water use at least to the target of 188 gpcd, and any expected savings from codes, rates, and existing conservation programs can be credited toward meeting this goal. This is not the case for MOU Flex Track compliance, where the objective is to implement conservation programs that would save at least as much as the Flex Track target. Unlike SBx7-7, water savings from codes and rates cannot be credited against the Flex Track target. Only savings from existing conservation programs can be deducted.

Savings required from new conservation programs to meet SBx7-7 and MOU Flex Track compliance requirements are summarized in Table 6.3-3. In the case of SBx7-7, expected savings from codes, rates, and existing programs results in an adjusted baseline demand that is 49 AF less than the SBx7-7 target demand. In the case of MOU Flex Track compliance, additional water savings of 15 AF are needed by 2015.

Table 6.3-3: New Program Savings Required for SBx7-7 and MOU Compliance		
2015 Net Savings Requirement (AF)	**SBx7-7**	**MOU Flex Track**
Gross Savings Requirement	**-31**	**17**
Less		
Savings from codes	5	NA
Savings from rates	12	NA
Savings from existing programs	2	2
Subtotal Expected Savings	*19*	*2*
Savings Required from New Programs[1]	**-49**	**15**
[1]*Negative net savings indicates that no new program savings required for compliance*		

6.4 Conservation Program Analysis

Cal Water engaged in a detailed, multi-step process to identify the best mix of programs to achieve the required savings. The process began with an inclusive range of potential program concepts. These concepts were qualitatively analyzed to eliminate those that were clearly inappropriate for each district and thereby narrow the analytical focus to those remaining programs that were potentially appropriate. Those programs were then subjected to detailed quantitative analysis. This Section describes the steps of the analytical process for Redwood Valley District, and the programs that emerged as potential components of a portfolio of programs for the district.

As a result of an exhaustive search of the literature, consultation with experts in the field, knowledge of conservation programming by other water suppliers, and the experience of the project team, a total of more than 75 conservation program concepts were defined. At this point in the process, the goal was to be as inclusive as possible. The list was therefore intentionally large to ensure that all possible program concepts were considered. Cal Water did not want to risk inadvertently excluding a program from consideration.

Once the range of program concepts was defined, the next step was to subject each program concept to a careful district-specific qualitative screen, the objective of which was to eliminate those program concepts that were clearly inappropriate.

A preliminary quantitative analysis was conducted on the programs that passed the qualitative screen. To do that, estimates were made of key savings and cost parameters for each of the programs. Where applicable, these estimates were based on prior Cal Water experience with similar programs. In the absence of such experience, the experience of other water suppliers, the expertise of the project team, consultation with national experts, and published figures, where available, were relied upon. In particular, estimates developed by the California Urban Water Conservation Council and the Alliance for Water Efficiency were utilized where such estimates were available. While in most cases, the savings assumptions for a program do not vary across districts, for several programs, they do due to district-specific characteristics of household size, climate, etc. Other than meter installation, program cost assumptions are uniform across districts, although in some cases, cost sharing with other water utilities reduce Cal Water’s share.

Using the results of the qualitative screening and preliminary quantitative analysis, Cal Water identified five core programs that it would run in every district over the next five years. In addition to the core programs, an additional set of non-core programs was selected. Unlike core programs, Cal Water may not offer non-core programs in every district or in every year. Implementation of non-core programs will depend on whether additional water savings are required for SBx7-7 compliance, MOU compliance, or to help address local supply constraints. Table 6.4-1 lists all Cal Water core and non-core conservation programs.

Table 6.4-1: Cal Water Conservation Programs		
Program Name	Description	Target Market
CORE PROGRAMS		
Rebate/Vouchers for toilets, urinals, and clothes washers	Provide customer rebates for high-efficiency toilets, urinals, and clothes washers	All customer segments
Residential Surveys	Provide residential surveys to low-income customers, high-bill customers, and upon customer request or as pre-screen for participation in direct install programs	All residential market segments
Residential Showerhead/Water Conservation Kit Distribution	Provide residential showerhead/water conservation kits to customers upon request, as part of residential surveys, and as part of school education curriculum	All residential market segments
Pop-Up Nozzle Irrigation System Distribution	Offer high-efficiency pop-up irrigation nozzles through customer vouchers or direct install.	All customer segments
Public Information/Education	Provide conservation messaging via radio, bill inserts, direct mail, and other appropriate methods. Provide schools with age appropriate educational materials and activities. Continue sponsorship of Disney Planet Challenge program.	All customer segments
NON-CORE PROGRAMS		
Toilet/Urinal Direct Install Program	Offer direct installation programs for replacement of non-HE toilets and urinals	All customer segments
Smart Irrigation Controller Contractor Incentives	Offer contractor incentives for installation of smart irrigation controllers	All customer segments
Large Landscape Water Use Reports	Expand existing Cal Water Large Landscape Water Use Report Program providing large landscape customers with monthly water use reports and budgets	Non residential customers with significant landscape water use and potential savings
Large Landscape Surveys & Irrigation System Incentives	Provide surveys and irrigation system upgrade financial incentives to large landscape customers participating in the Large Landscape Water Use Reports programs and other targeted customers	Non residential customers with significant landscape water use and potential savings
Food Industry Rebates/Vouchers	Offer customer/dealer/distributor rebates/vouchers for high-efficiency dishwashers, food steamers, ice machines, and pre-rinse spray valves	Food and drink establishments, institutional food service providers
Cooling Tower Retrofits	Offer customer/dealer/distributor rebates/vouchers of cooling tower retrofits	Non-residential market segments with significant HVAC water use
Industrial Process Audits and Retrofit Incentives	Offer engineering audits/surveys and financial incentives for process water efficiency improvement	Non-residential market segments with significant industrial process water uses

Core and non-core programs were then subjected to a detailed benefit cost analysis, the results of which were used to inform program portfolio development discussed in the next section. The first step in this process was to refine and finalize the savings and cost specifications of each program. The program savings and cost assumptions enable the calculation of program benefits and costs to the utility and its ratepayers, and comparisons of these costs in the form of benefit-cost ratios. The tool used to do this comparison was a simplified version of the Alliance for Water Efficiency Tracking Tool. Following are descriptions of how the model calculates and compares conservation program benefits and costs.

6.5 Conservation Program Portfolio

This section presents the recommended conservation program portfolio for the Redwood Valley District. The program analysis results described in the previous section provided the starting point for portfolio development. The next step was to determine the annual levels of program activity needed to, at minimum, meet Redwood Valley District's water savings targets and local demand management goals. Several considerations informed these decisions, including budgetary constraints included in the current GRC decision, Cal Water conservation program administrative capacity, program market and water savings potential, and the program benefit-cost results.

The water savings requirement analysis showed that water savings from existing water efficiency codes and ordinances, scheduled adjustments to water rates, and past investment in conservation programs are expected to be sufficient to meet Redwood Valley District's 2015 SBx7-7 per capita water use target. It also showed that an additional 15 AF of water savings from new programs would be required to satisfy MOU compliance requirements in 2015. This established the minimum Redwood Valley District, the programs selected and the activity level of each are shown in Table 6.5-1.

Table 6.5-1: Recommended Program Levels					
Program	**Recommended Annual Activity Levels**				
	2011	**2012**	**2013**	**2014**	**2015**
CORE PROGRAMS					
Rebates/Vouchers					
Toilets	10	10	10	60	60
Clothes Washers	10	10	10	10	10
Urinals	10	10	10	10	10
Customer Surveys/Audits	30	30	30	30	30
Conservation Kit Distribution	30	30	30	30	30
Pop-Up Nozzle Distribution	80	80	80	460	460
NON-CORE PROGRAMS					
Direct Install Toilets/Urinals	0	0	0	0	0
Smart Irr. Controller Vendor Incentives	0	0	0	10	10
Large Landscape Water Use Reports	0	0	0	0	0
Large Landscape Surveys/Incentives	0	0	0	10	10
Commercial Kitchen Rebates/Vouchers	0	0	0	10	10
Cooling Tower/Process Water Retrofit Incentives	0	0	0	0	0

The program levels for 2011-2013 reflect the funding level approved in Cal Water's most recent General Rate Case (GRC) settlement with the CPUC. Program levels for 2014 and 2015 will be dependent on the outcome of Cal Water's 2014-2016 GRC filing.

Table 6.5-2 shows projected water savings associated with the programs listed above. The projected savings exceed the 2015 SBx7-7 and MOU Flex Track targets but are needed for the district to meet its 2020 SBx7-7 target.

Table 6.5-2: Projected Water Savings by Program					
Program	**Annual Water Savings (AF)**				
	2011	**2012**	**2013**	**2014**	**2015**
CORE PROGRAMS					
Rebates/Vouchers					
Toilets	0.3	0.6	0.8	2.3	3.6
Clothes Washers	0.1	0.3	0.4	0.6	0.7
Urinals	0.1	0.2	0.2	0.3	0.3
Customer Surveys/Audits	1.0	1.8	2.6	3.2	3.8
Conservation Kit Distribution	0.3	0.6	0.8	1.0	1.2
Pop-Up Nozzle Distribution	0.3	0.6	0.9	2.7	4.5
Subtotal Core Programs	***2.1***	***4.0***	***5.8***	***10.1***	***14.2***
NON-CORE PROGRAMS					
Direct Install Toilets/Urinals	0.0	0.0	0.0	0.0	0.0
Smart Irr. Controller Vendor Incentives	0.0	0.0	0.0	0.0	0.0
Large Landscape Water Use Reports	0.0	0.0	0.0	0.0	0.0
Large Landscape Surveys/Incentives	0.0	0.0	0.0	0.0	0.0
Commercial Kitchen Rebates/Vouchers	0.0	0.0	0.0	6.5	13.1
Cooling Tower/Process Water Retrofit Incentives	0.0	0.0	0.0	0.0	0.0
Subtotal Non-Core Programs	***0.0***	***0.0***	***0.0***	***6.5***	***13.1***
Total Core and Non-Core Program Savings	**2.1**	**4.0**	**5.8**	**16.6**	**27.3**

Based on the above analysis the district is projected to achieve its district-specific 2015 and 2020 SBx7-7 compliance target in 2015 through a combination of passive and active savings. Appendix C, Worksheet 24, includes a comparison of conservation savings required to meet SBx7-7 compliance targets to the savings expected as a result of existing and planned programs, including passive savings due to code changes.

For the purpose of this analysis it is assumed that GPCD will remain flat from 2015 through 2020. However, it is likely that additional programs will be offered as part of Cal Water's ongoing conservation program. The activity level of each future program will depend on Cal Water's success in obtaining the necessary funding through the CPUC rate case process.

As part of the Conservation Master Plan development, one page program summaries, or fact sheets, were developed for each recommended program. These fact sheets provide a quick reference summarizing program design and marketing, expected level of customer participation, projected water savings, and proposed program expenditure for the period 2011 – 2015. The fact sheets for the Redwood Valley District are included in Appendix G.

7 Climate Change

7.1 Introduction

Investigating climate change brings the prospect of examining both model-predicted outcomes and unforeseen changes to the environment. These changes may physically affect the water districts that Cal Water serves. Climate change does not just mean a change in average temperature within any particular region, but a change in the climatic conditions that creates or results in an increase in extreme weather events. These potential changes include a more variable climate with risks of extreme climate events that are more severe than those in the recent hydrologic record, in addition to sea level rise, a hotter and drier climate, and the likelihood that more of the uplands precipitation will fall as rain and not as snow.

7.2 Strategy

Cal Water intends to prepare a Climate Assessment Report in 2013 that will examine the regional impacts on water supply for each of its 24 service areas. This report will review any supply changes that may occur due to climate change and will outline mitigation and adaption methods to meet the needs of the District's service area. The following section, adapted from DWR's *Guidebook to Assist Water Suppliers to Prepare a 2010 Urban Water Management Plan*, provides a range of topics to be examined in Cal Water's Climate Assessment Report.

Responding to climate change generally takes two forms: mitigation and adaptation. Mitigation is taking steps to reduce our contribution to the causes of climate change by reducing greenhouse gas (GHG) emissions. Adaptation is the process of responding to the effects of climate change by modifying our systems and behaviors to function in a warmer climate. Regardless if climate change is manmade or a result of natural climate cycles, investigating mitigation and adaptive methods to better manage possible uncertainties in climatic changes will have more immediate benefits such as: cutting carbon emissions, reducing energy usage, possible economic development at the local level, and financial savings for Cal Water and the ratepayers.

<u>Mitigation</u>

In the water sector, climate change mitigation is generally achieved by reducing energy use, becoming more efficient with energy use, and/or substituting fossil fuel based energy sources for renewable energy sources. Water requires energy to move, treat, use, and discharge, thus water conservation is energy conservation. One possible mitigation method is to calculate conserved energy and GHGs not-emitted as water conservation targets are being met.

<u>Adaptation</u>

Climate change means more than just hotter days. Continued warming of the climate system may have considerable impact on the operation of Cal Water Districts, even if indirectly. For example, snow in the Sierra Nevada provides 65 percent of California's water supply. Predictions indicate that by 2050 the Sierra snowpack will be significantly reduced. Much of the lost snow will fall as rain, which flows quickly down the mountains during winter and cannot be stored in the current water system for use during the summer. This change in water runoff may severely impact groundwater recharge and other water supply networks. The climate is also expected to become more variable, bringing more droughts and floods. Cal Water districts will have to adapt to these new and more variable conditions.

7.3 Potential Climate Change Effects

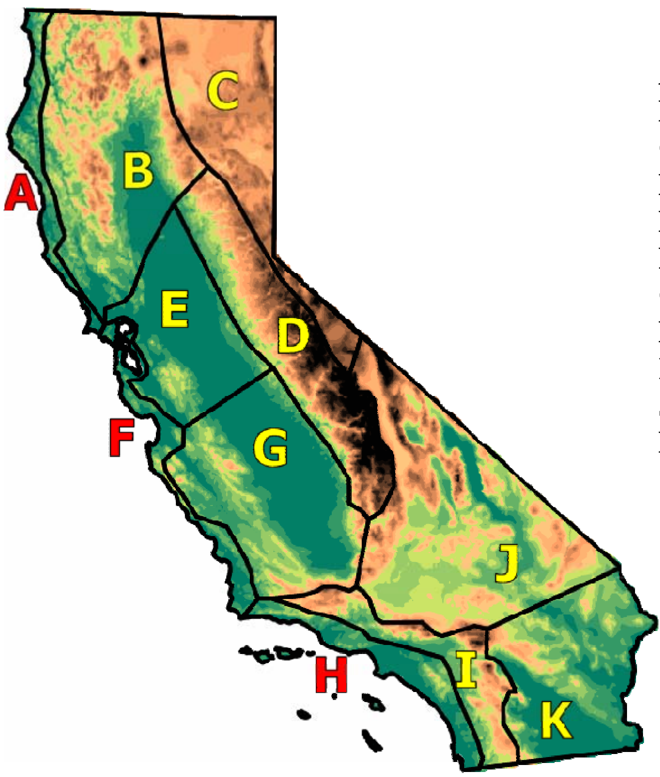
Even in the near term of the next 20 years, DWR has outlined potential climate change effects to water supplies, water demand, sea level, and the occurrence and severity of natural disasters. Some of these potential changes are presented below. Cal Water will investigate the following climate change and the effects on Cal Water's Districts:

- Water Demand — Hotter days and nights, as well as a longer irrigation season, will increase landscaping water needs, and power plants and industrial processes will have increased cooling water needs.
- Water Supply and Quality — Reduced snowpack, shifting spring runoff to earlier in the year, increased potential for algal bloom, and increased potential for seawater intrusion—each has the potential to impact water supply and water quality.
- Sea Level Rise — It is expected that sea level will continue to rise, resulting in near shore ocean changes such as stronger storm surges, more forceful wave energy, and more extreme tides. This will also affect levee stability in low-lying areas and increase flooding.
- Disaster — Disasters are expected to become more frequent as climate change brings increased climate variability, resulting in more extreme droughts and floods. This will challenge water supplier operations in several ways as wildfires are expected to become larger and hotter, droughts will become deeper and longer, and floods can become larger and more frequent.

7.4 Historical Climate Data Summary

The National Climatic Data Center (NCDC) has established 11 climate regions within California. Each region is defined be unique characteristics, and is shown in Figure 7.4-1.

Figure 7.4-1: The Climate Regions of California[8]



A. North Coast Region
B. North Central Region
C. Northeast Region
D. Sierra Region
E. Sacramento-Delta Region
F. Central Coast Region
G. San Joaquin Valley Region
H. South Coast Region
I. South Interior Region
J. Mohave Desert Region
K. Sonoran Desert Region

Cal Water has water service districts in 7 out of 11 of the climate regions. The Redwood Valley District is located in the North Coast Region, as listed in Table 7.4-1.

Table 7.4-1: Cal Water Districts Sorted by Climate Region	
Climate Region	**Cal Water Districts in Each Climate Region**
North Coast Region	None
North Central Region	Chico-Hamilton City, **Redwood Valley**
Northeast Region	None
Sierra Region	Kern River Valley
Sacramento-Delta Region	Dixon, Livermore, Marysville, Oroville, Stockton, Willows
Central Coast Region	Bear Gulch, Los Altos, Mid- Peninsula, Salinas , South San Francisco
San Joaquin Valley Region	Bakersfield, King City, Selma, Visalia
South Coast Region	Dominguez, East LA, Hermosa-Redondo, Palos Verdes, Westlake
South Interior Region	None

[8] http://www.wrcc.dri.edu/monitor/cal-mon/frames_versionSTATIONS.html

Mojave Desert Region	Antelope Valley
Sonoran Desert Region	None

The region has experience a general warming trend as indicated by the maximum, minimum, and mean temperature departure from average. Since 1895 these values have increased by 1.39°F, 2.61°F, and 2.00°F, respectively. More recently, since 1975, the maximum, minimum, and mean temperature departures have increased 2.09°F, 4.92°F, and 3.51°F, respectively. The historical data for these parameters are shown in Figures 7.4-2, 7.4-3, and 7.4-4.

Figure 7.4-2: Maximum Temperature Departure for Sacramento-Delta Region

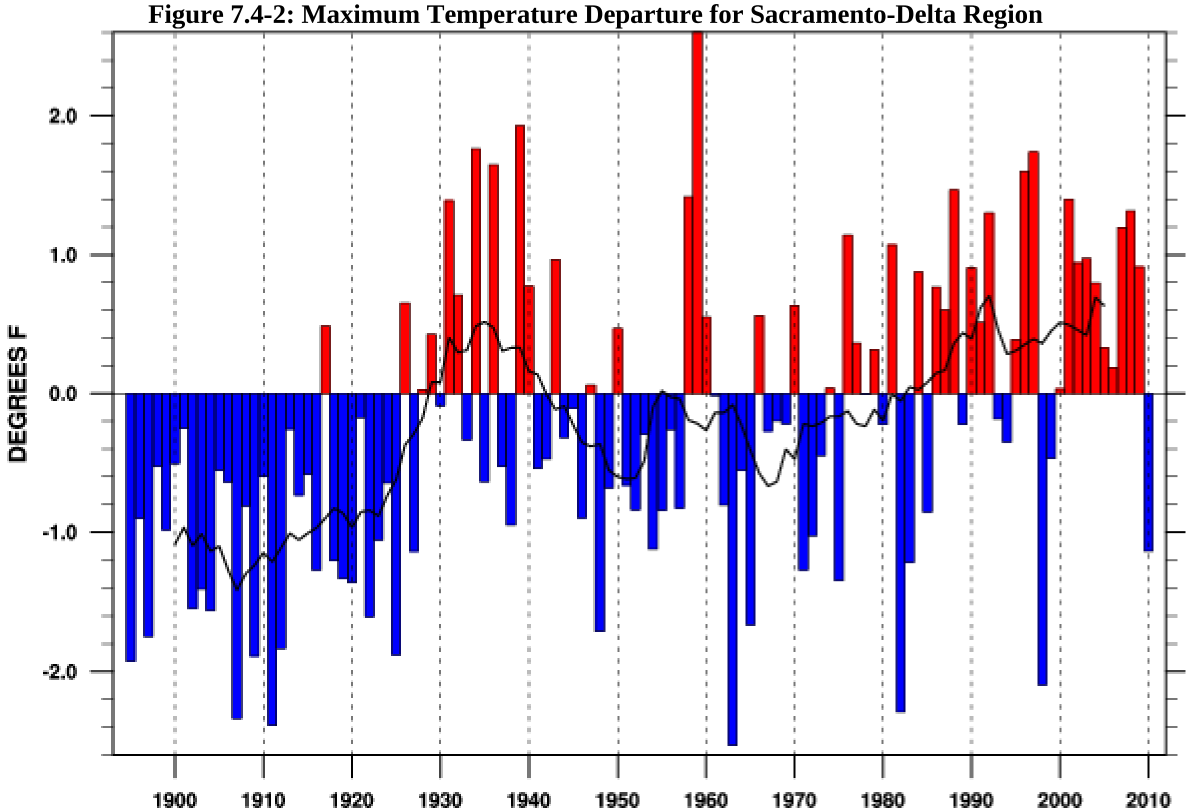


Figure 7.4-3: Mean Temperature Departure for Sacramento-Delta Region

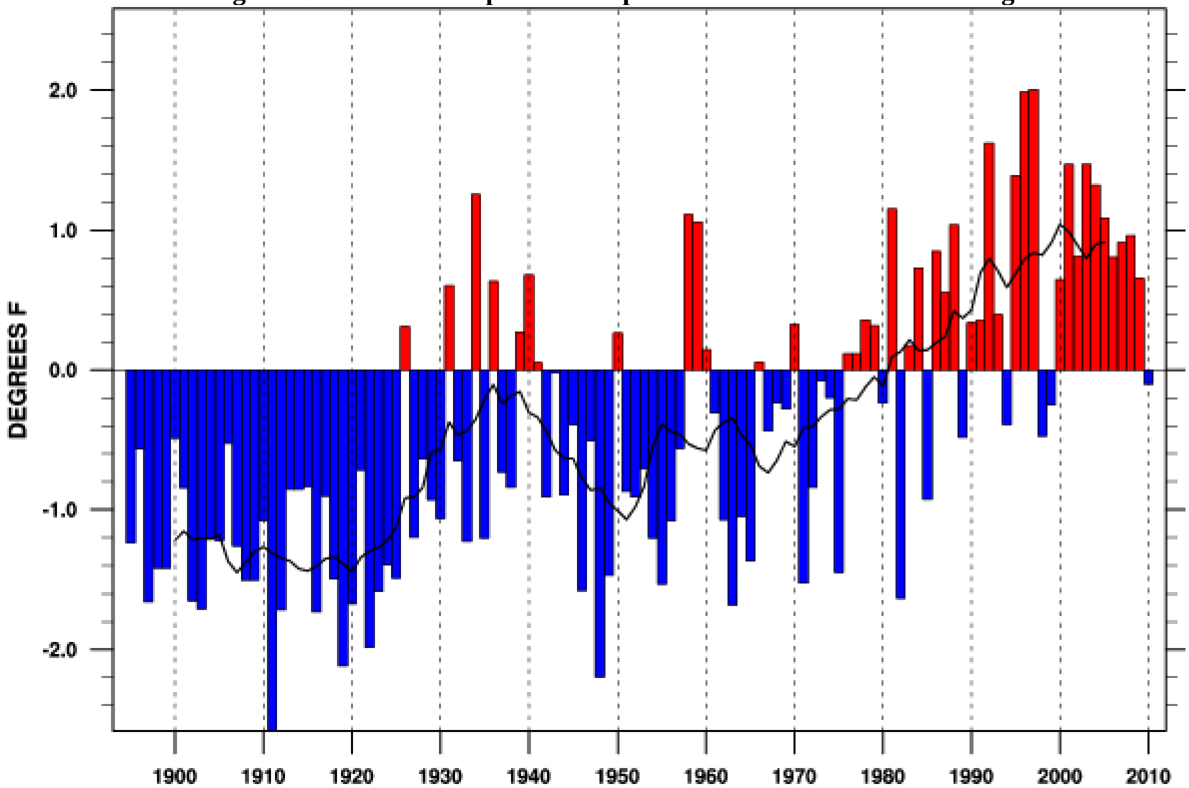
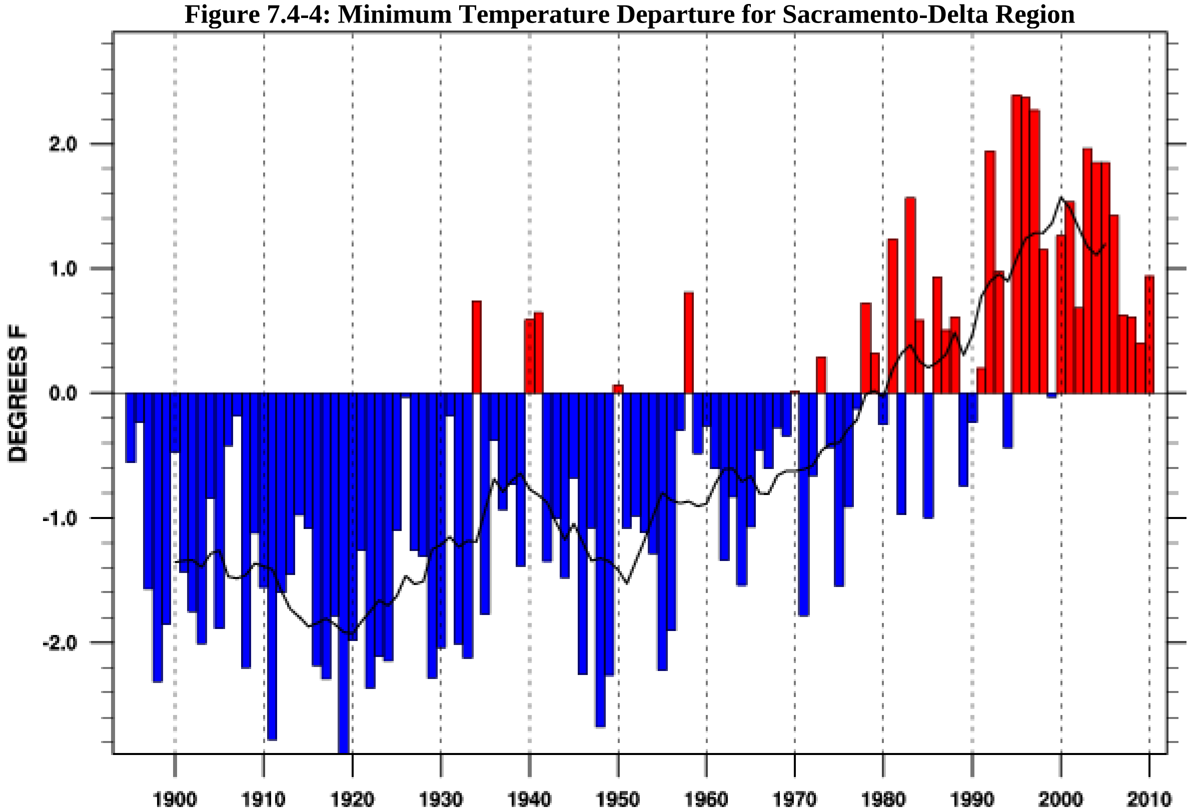
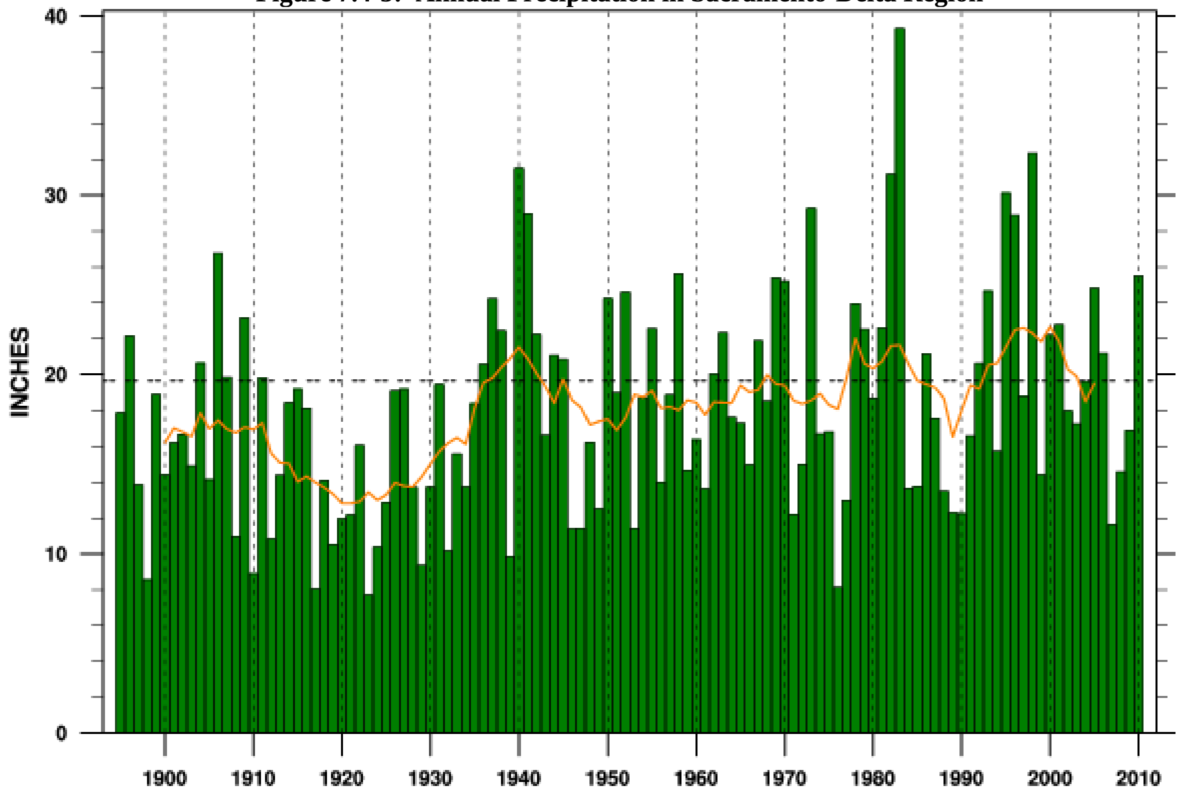


Figure 7.4-4: Minimum Temperature Departure for Sacramento-Delta Region



Variation in annual rainfall totals has also shown an increasing trend since 1900 with more deviation from average occurring in recent decades as compared to earlier part of the century.

Figure 7.4-5: Annual Precipitation in Sacramento-Delta Region



Historical data is showing a general correlation as to the general consensus for the different climate change scenarios. As stated above, a more comprehensive investigation will be prepared by Cal Water in 2013. The outcome of this report will outline mitigation and adaptation methods that will provide water supply reliability for Cal Water's service areas.

7.5 Climate Change Guidance

The California Department of Water Resources is currently in the process of compiling the potential actions and responses to climate change in the Integrated Regional Water Management (IRWM) climate change handbook. This handbook will provide guidance to water utilities for planning for the potential impacts of climate change and will offer a framework for responding to these impacts. Cal Water will review this handbook and other available literature when developing localized strategies for each of its water service districts.

8 Completed UWMP Checklist

8.1 Review Checklist

Table 8.1-1, adapted from DWR's *Guidebook to Assist Water Suppliers to Prepare a 2010 Urban Water Management Plan*, is included as a reference to assist DWR staff in review of this UWMP.

Table 8.1-1: Urban Water Management Plan Checklist (organized by legislation number)

No.	UWMP requirement [a]	Calif. Water Code reference	Subject [b]	Additional clarification	UWMP location
1	Provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	10608.20(e)	Water Conservation		3.3.1
2	Include an assessment of present and proposed future measures, programs, and policies to help achieve the water use reductions.	10608.36	Water Conservation		6.4
3	Report progress in meeting urban water use targets using the standardized form.	10608.4	Water Conservation		Appendix G
4	Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	10620(d)(2)	External Coordination and Outreach		1.2
5	An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.	10620(f)	Water Supply (Water Management)		1.4
6	Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days prior to the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.	10621(b)	External Coordination and Outreach		1.2
7	The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).	10621(c)	External Coordination and Outreach		1.2
8	Describe the service area of the supplier	10631(a)	Service Area		2.1
9	(Describe the service area) climate	10631(a)	Service Area		2.3
10	(Describe the service area) current and projected population. . . The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier . . .	10631(a)	Service Area	Provide the most recent population data possible. Use the method described in "Baseline Daily Per Capita Water Use." See Section M.	2.2

11	. . . (population projections) shall be in five-year increments to 20 years or as far as data is available.	10631(a)	Service Area	2035 and 2040 can also be provided to support consistency with Water Supply Assessments and Written Verification of Water Supply documents.	2.2
12	Describe . . . other demographic factors affecting the supplier's water management planning	10631(a)	Service Area		2.2
13	Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a).	10631(b)	Water Supply	The 'existing' water sources should be for the same year as the "current population" in line 10. 2035 and 2040 can also be provided to support consistency with Water Supply Assessments and Written Verification of Water Supply documents.	4.1
14	(Is) groundwater . . . identified as an existing or planned source of water available to the supplier . . .?	10631(b)	Water Supply	Source classifications are: surface water, groundwater, recycled water, storm water, desalinated sea water, desalinated brackish groundwater, and other.	4.4
15	(Provide a) copy of any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management. Indicate whether a groundwater management plan been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	10631(b)(1)	Water Supply		4.4.2
16	(Provide a) description of any groundwater basin or basins from which the urban water supplier pumps groundwater.	10631(b)(2)	Water Supply		4.4.1

17	For those basins for which a court or the board has adjudicated the rights to pump groundwater, (provide) a copy of the order or decree adopted by the court or the board	10631(b)(2)	Water Supply		N/A
18	(Provide) a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree.	10631(b)(2)	Water Supply		N/A
19	For basins that have not been adjudicated, (provide) 10631(b)(2) Water Supply information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.	10631(b)(2)	Water Supply		4.4.1
20	(Provide a) detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.	10631(b)(3)	Water Supply		4.4
21	(Provide a) detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.	10631(b)(4)	Water Supply	Provide projections for 2015, 2020, 2025, and	4.4
22	Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following: (A) An average water year, (B) A single dry water year, (C) Multiple dry water years.	10631(c)(1)	Reliability		5.3
23	For any water source that may not be available at a consistent level of use - given specific legal, environmental, water quality, or climatic factors - describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.	10631(c)(2)	Reliability		5.1
24	Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.	10631(d)	Water Supply (Transfers)		4.7
25	Quantify, to the extent records are available, past and current water use, and projected water use (over the same five-year increments described in subdivision (a)), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following uses: (A) Single-family residential; (B) Multifamily; (C) Commercial; (D) Industrial; (E) Institutional and governmental; (F) Landscape; (G) Sales to other agencies; (H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof;(I) Agricultural.	10631(e)(1)	Water Demands	Consider "past" to be 2005, present to be 2010, and projected to be 2015, 2020, 2025, and 2030. Provide numbers for each category for each of these years.	3.3

26	(Describe and provide a schedule of implementation for) each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following: (A) Water survey programs for single-family residential and multifamily residential customers; (B) Residential plumbing retrofit; (C) System water audits, leak detection, and repair; (D) Metering with commodity rates for all new connections and retrofit of existing connections; (E) Large landscape conservation programs and incentives; (F) High-efficiency washing machine rebate programs; (G) Public information programs; (H) School education programs; (I) Conservation programs for commercial, industrial, and institutional accounts; (J) Wholesale agency programs; (K) Conservation pricing; (L) Water conservation coordinator; (M) Water waste prohibition;(N) Residential ultra low-flush toilet replacement programs.	10631(f)(1)	DMMs	Discuss each DMM, even if it is not currently or planned for implementation. Provide any appropriate schedules.	6.5
27	A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.	10631(f)(3)	DMMs		6.2
28	An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand.	10631(f)(4)	DMMs		6.3
29	An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following: (1) Take into account economic and noneconomic factors, including environmental, social, health, customer impact, and technological factors; (2) Include a cost-benefit analysis, identifying total benefits and total costs; (3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost; (4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.	10631(g)	DMMs	See 10631(g) for additional wording.	6.4

30	(Describe) all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.	10631(h)	Water Supply		4.9
31	Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.	10631(i)	Water Supply		4.6
32	Include the annual reports submitted to meet the Section 6.2 requirement (of the MOU), if a member of the CUWCC and signer of the December 10, 2008 MOU.	10631(j)	DMMs	Signers of the MOU that submit the biannual reports are deemed	6.5
33	Urban water suppliers that rely upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (c). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (c).	10631(k)	Water Supply	Average year, single dry year, multiple dry years for 2015, 2020, 2025, and 2030.	N/A
34	The water use projections required by Section 10631 shall include projected water use for single-family and multifamily residential housing needed for lower income households, as defined in Section 50079.5 of the Health and Safety Code, as identified in the housing element of any city, county, or city and county in the service area of the supplier.	10631.1(a)	Water Demands		3.3.2
35	Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage.	10632(a)	Contingency		5.3.5
36	Provide an estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.	10632(b)	Contingency		5.2

37	(Identify) actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.	10632(c)	Contingency		5.3.9
38	(Identify) additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.	10632(d)	Contingency		5.3.7
39	(Specify) consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.	10632(e)	Contingency		5.3.5
40	(Indicated) penalties or charges for excessive use, where applicable.	10632(f)	Contingency		5.3.7
41	An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.	10632(g)	Contingency		5.3.8
42	(Provide) a draft water shortage contingency resolution or ordinance.	10632(h)	Contingency		5.3
43	(Indicate) a mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.	10632(i)	Contingency		5.3.7
44	Provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area	10633	Recycled Water		4.5
45	(Describe) the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.	10633(a)	Recycled Water		4.5.1
46	(Describe) the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	10633(b)	Recycled Water		4.5.2
47	(Describe) the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.	10633(c)	Recycled Water		4.5.3
48	(Describe and quantify) the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.	10633(d)	Recycled Water		4.5.3
49	(Describe) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.	10633(e)	Recycled Water		4.5.3

50	(Describe the) actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.	10633(f)	Recycled Water		4.5
51	(Provide a) plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.	10633(g)	Recycled Water		4.5
52	The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.	10634	Water Supply (Water Quality)	For years 2010, 2015, 2020, 2025, and 2030	5.2.4
53	Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.	10635(a)	Reliability		5.2
54	The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.	10635(b)	External Coordination and Outreach		1.2
55	Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan.	10642	External Coordination and Outreach		1.2
56	Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area.	10642	External Coordination and Outreach		1.2
57	After the hearing, the plan shall be adopted as prepared or as modified after the hearing.	10642	External Coordination and Outreach		1.3
58	An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.	10643	External Coordination and Outreach		1.6

59	An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.	10644(a)	External Coordination and Outreach		1.3
60	Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.	10645	External Coordination and Outreach		1.3

[a] The UWMP Requirement descriptions are general summaries of what is provided in the legislation. Urban water suppliers should review the exact legislative wording prior to submitting its UWMP.

[b] The Subject classification is provided for clarification only. A water supplier is free to address the UWMP Requirement anywhere with its UWMP, but is urged to provide clarification to DWR to facilitate review for completeness.

APPENDIX A-1: RESOLUTION TO ADOPT UWMP

APPENDIX A-2: CORRESPONDENCES

APPENDIX A-3: PUBLIC MEETING NOTICE

APPENDIX B: SERVICE AREA MAP

APPENDIX C: WATER SUPPLY, DEMAND, AND PROJECTION WORKSHEETS

APPENDIX D: DWR'S GROUNDWATER BULLETIN 118

APPENDIX E: TARIFF RULE 14.1 WATER CONSERVATION AND RATIONING PLAN

APPENDIX F: WATER EFFICIENT LANDSCAPE GUIDELINES

APPENDIX G: CONSERVATION MASTER PLAN

APPENDIX H-1: SWEETWATER PURCHASE AGREEMENT

APPENDIX H-2: YOLO COUNTY PURCHASE AGREEMENT