

California Water Service Company

2010 Urban Water Management Plan

Selma District

ADOPTED



June 2011

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**California Water Service Company
2010 Urban Water Management Plan
Contact Sheet**

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1 Plan Preparation

California Water Service Company (Cal Water) is an investor-owned public utility supplying water service to approximately 1.7 million Californians through 435,000 connections. Its 24 separate water districts 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 Selma community since 1962.

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.

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 held several joint planning meetings with the City of Selma and Consolidated Irrigation District during development of this UWMP. 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 were available at the Cal Water corporate office in San Jose and District office in Selma 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 Selma	✓		✓	✓	✓	✓	
Consolidated Irrigation District	✓			✓	✓	✓	
Fresno County				✓	✓	✓	
King's River Conservation District				✓	✓	✓	

Cal Water conducted a formal public meeting to present information on its Selma District UWMP on May 25, 2001, from 10:00 a.m. to 12:00 p.m., at the following location:

Selma, CA 93662

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.

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

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	<u>List of Contact Persons</u>	-
Section 1	<u>Plan Preparation</u> 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	<u>System Description</u> This section describes the District service area and includes area information, population estimate, and climate description.	§10631 (a)
Section 3	<u>System Demands</u> 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	<u>System Supplies</u> This section includes a detailed discussion of the water supply sources.	§10631 §10633 §10634
Section 5	<u>Water Supply Reliability and Water Shortage Contingency Planning</u> 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	<u>Demand Management Measures</u> This section describes Cal Water's conservation programs.	§10631
Section 7	<u>Climate Change</u> This section contains a discussion of climate change.	
Section 8	<u>DWR Checklist</u> This section includes the completed DWR UWMP Checklist.	
Appendix A	<u>Resolution To Adopt The Urban Water Management Plan</u> 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	<u>Service Area Map</u> This appendix includes the service area map of the District as filed with the Public Utilities Commission.	-
Appendix C	<u>Water Supply, Demand, And Projection Worksheets</u> This section includes the spreadsheets used to estimate the water demand for the District.	-

<u>Section</u>	<u>Table 1.5-1: Plan Organization</u>	<u>Act Provision</u>
Appendix D	<u>DWR Groundwater Bulletin 118</u> 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	<u>Tariff Rule 14.1 Water Conservation And Rationing Plan and Local Water Conservation Ordinance</u> This section contains the tariff rule and ordinance for reference.	-
Appendix F	<u>Water Efficient Landscape Guidelines</u> This section contains the Guideline for Water Efficient Landscape that Cal Water uses at its properties, including renovations.	-
Appendix G	<u>Conservation Master Plan</u> 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. The Plan for Selma was last submitted as part of the 2006 grouping. Cal Water has since eliminated these groupings and will now file a GRC for all districts every third year and an UWMP every fifth year.

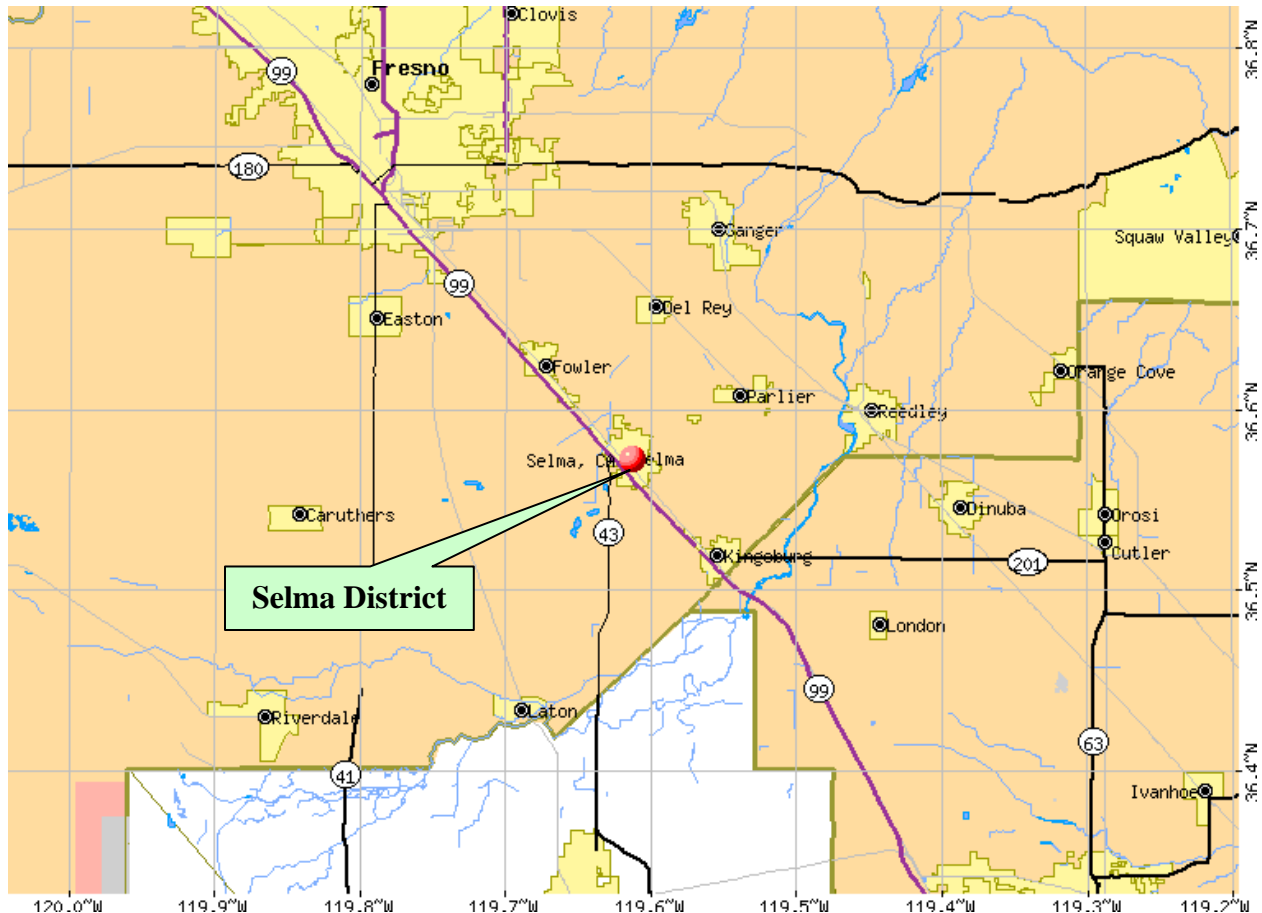
2 System Description

2.1 Service Area Description

The Selma District is located in Fresno County. It is situated in the Tulare Lake hydrologic region, part of the Kings River fan within the King-Kaweah-Tule Rivers sub-area. The District is approximately 20 miles southeast of the City of Fresno and 90 miles north of the City of Bakersfield. The service area is about 300 feet above seal level, built upon the alluvium of the Kings River flood plain. Figure 2.1-1 shows a general location map of the District in relation to other cities in the area¹.

Major transportation links in the District include the Golden State Highway (State Route 99) and State Route 43. The Southern Pacific Railroad provides rail service to the region; it runs through town parallel to State Route 99.

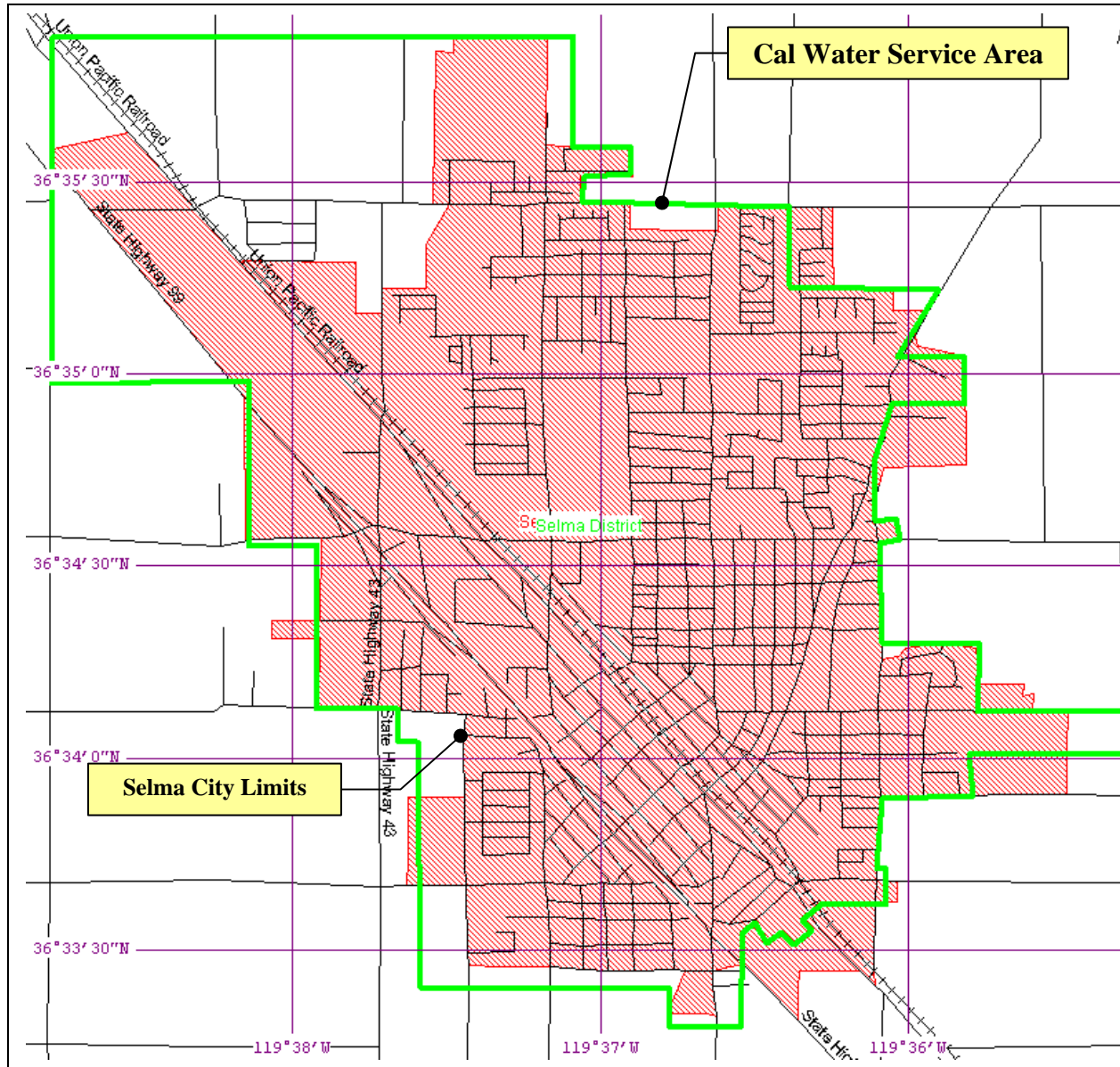
Figure 2.1-1: General Location of Selma District



¹ City Data Website, Downloaded from: <http://www.city-data.com/city/Selma-California.html>

Figure 2.1-2 shows the approximated service area of the District in relation to the City boundary. The system serves the City of Selma. Unincorporated property of Fresno County surrounds the District.

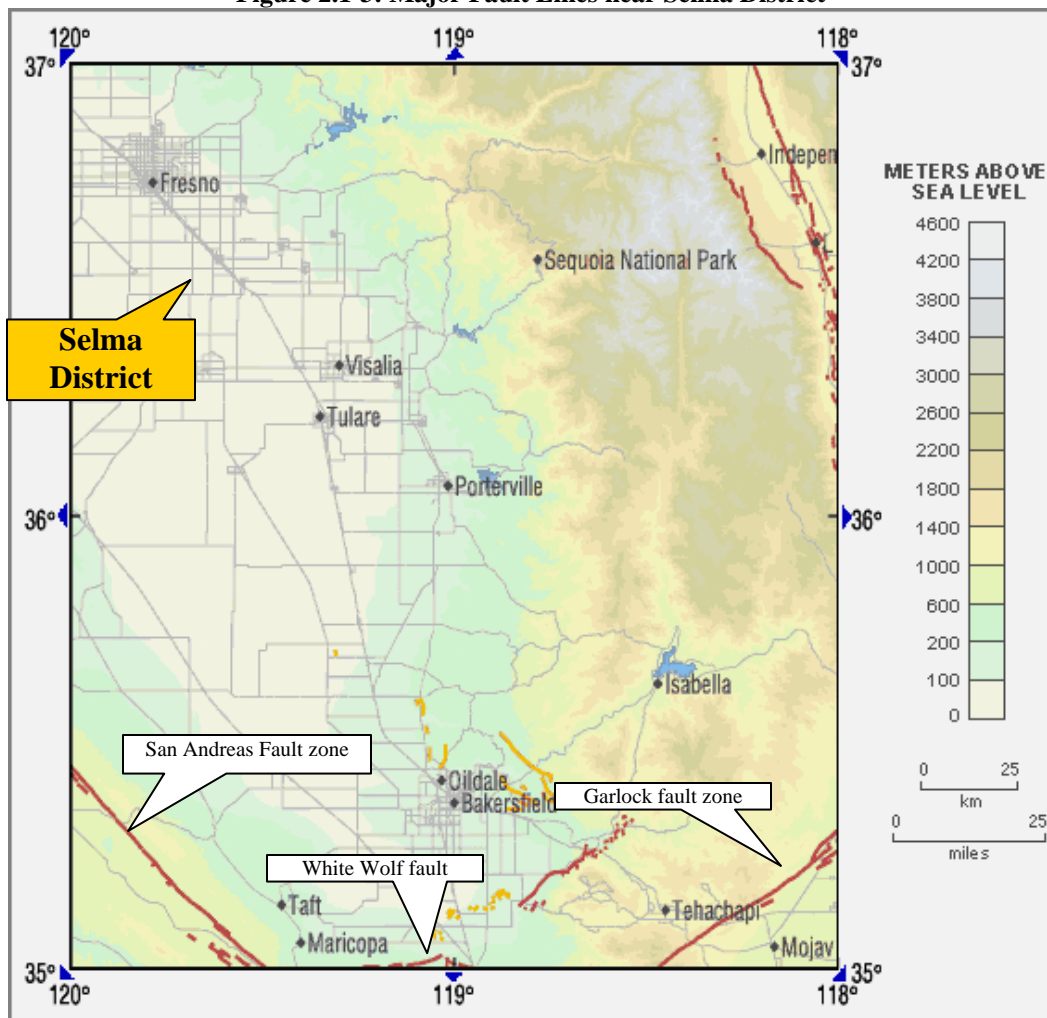
Figure 2.1-2: General Service Area



No major geologic features are located in the Selma region. However, the San Andreas Fault Zone lies approximately 75 miles to the west-southwest; the Garlock Fault Zone lies 125 miles to the south-southeast², as shown in Figure 2.1-3. In combination, these faults are responsible for the uplift of base rock that forms the Transverse Mountain Range that separates the Tulare Lake Basin from the Los Angeles Basin.

The Kings River lies approximately six miles to the southeast of town and provides an outlet for a drainage basin in the southern Sierra Nevada Mountains. Pine Flat Reservoir is located on the Kings River about thirty miles up stream of the city. This 1,000,000 AF reservoir is operated by the U.S. Army Corps of Engineers and provides both flood control and water supply storage. The Kings River flows to the intermittent Tulare Lake Bed.

Figure 2.1-3: Major Fault Lines near Selma District



² United States Geological Service, Earthquake Hazards Program, Downloaded from: <http://quake.wr.usgs.gov/info/faultmaps/119-36.html>

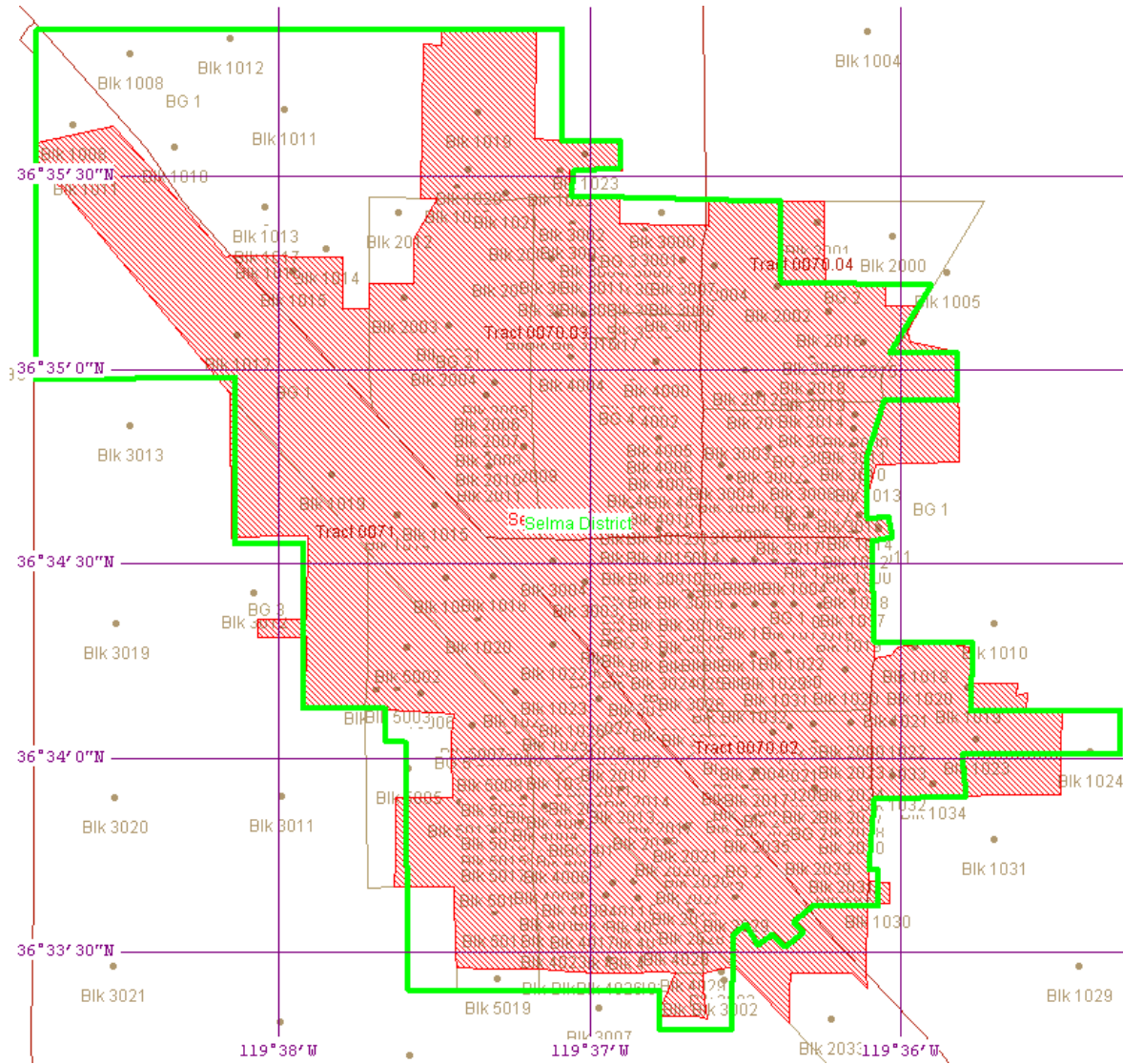
2.2 Service Area Population

Cal Water's Selma District growth rate has diminished in recent years but has remained fairly consistent over a longer time period. Growth in total services has averaged 1.18 percent in the past five years, and 1.78 percent for the past 10 years.

Based on 2000 U.S. Census data, considering actual service connection growth, and assuming that density has remained unchanged since the census was conducted, Cal Water estimates that, as of December 2009, the District's population is approximately 24,260. A density of 3.8 persons per residential service (single-family services plus multifamily units) was used for this estimate.

The process for estimating population in the Selma District began by overlaying the U.S. Census 2000 Block data with the Cal Water service area map (SAM), as shown in Figure 2.2-1.

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



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 data³.

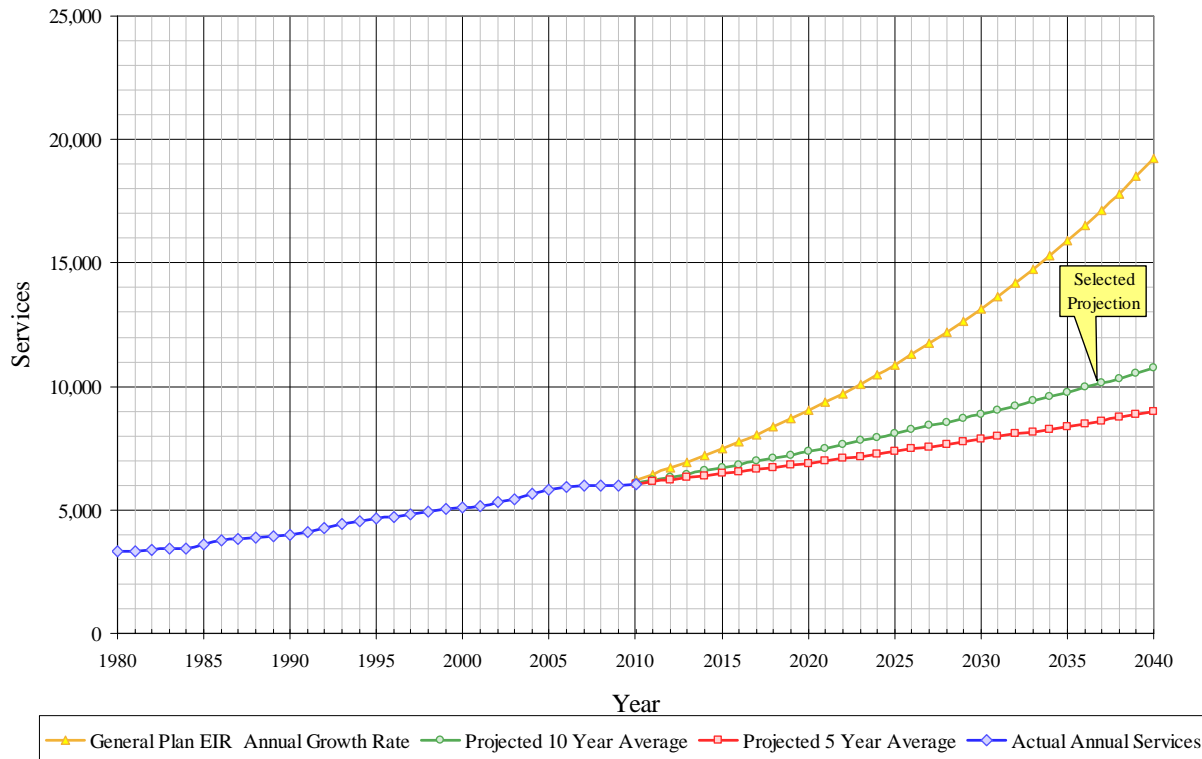
Table 2.2-1: Summary of Census 2000 Data			
	Census Blocks	Population	Housing Units
Selma Service Area	278	20,370	6,050

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/comeo/marplot.htm>

This data was used as a baseline for estimating population starting in 2000. To calculate estimated population after 2000, the Census 2000 population was then divided by the total number of dwelling units served by Cal Water in 2000 to produce a population density value. This value was then multiplied by the number of Cal Water dwelling units in each future year.

To establish a range of future service counts the five-year, ten year, and City of Selma General Plan Update EIR projected growth rates for each service type were continued through 2040. A comparison of service connection growth rates is shown in Figure 2.2-2.

Figure 2.2-2: Historical & Projected Services



Projected service connections based on past service counts are labeled 5-year average, 10-year average, and General Plan EIR growth rate. The 5-year average is the short-term growth rate calculated from 2005 to 2009, which has an overall annual average growth rate of 1.18 percent. The 10-year average is long-term growth rate calculated from 2000 to 2009, which exhibits an overall annual average growth rate of 1.78 percent. The General Plan rate includes the known housing developments submitted to the City of Selma and represents a 4.0 percent annual growth rate. Due to the economic downturn, Cal Water has not seen and does not expect to see growth progressing at this rapid rate. The 5-year growth rate has been strongly influenced by recent economic events and is not thought to be a good indication of what will happen in the future. The ten year growth rate has the strongest correlation with the historic trend and was selected to determine projected services.

Based on these service projections Cal Water estimates the service area's population could reach 47,730 by 2040. Table 2.2-2 lists the population growth in 5-year increments.

	2005	2010	2015	2020	2025	2030	2035	2040
Service Area Population	23,500	25,650	28,420	31,510	34,930	38,750	43,000	47,730

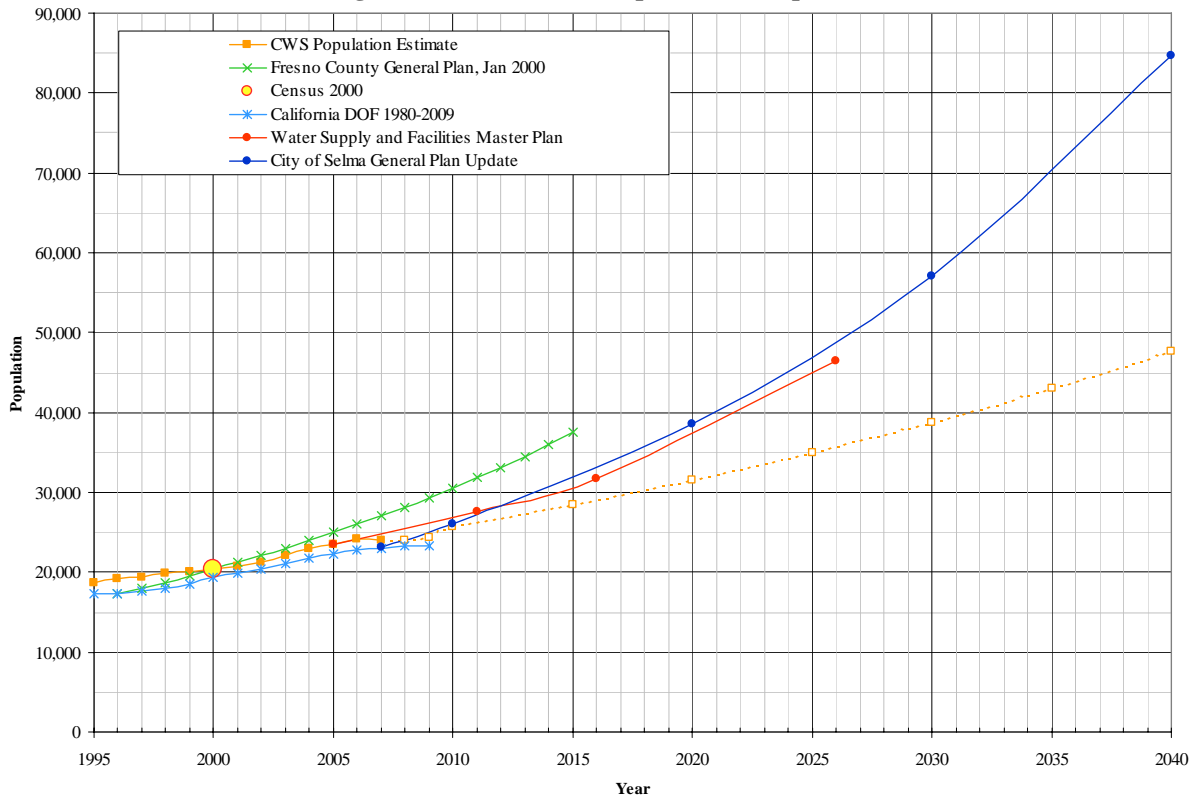
Cal Water's population estimates for the District are compared to projections made by other governmental agencies, as shown in Figure 2.2-3. The Cal Water population estimate is made based on extending the past 10-year growth of 1.78 percent. The second projection is based on the projection in the EIR for the City of Selma General Plan Update. These two projections are compared to the following government projections from the following sources:

- ◆ Fresno County General Plan, January 2000³
- ◆ California Department of Finance 1980-2009⁴
- ◆ 2008 Water Supply and Facilities Master Plan
- ◆ City of Selma General Plan Update

³ Fresno County General Plan Background Report, October 3, 2000. County of Fresno Website, downloaded from: http://www.co.fresno.ca.us/4510/4360/General_Plan/Background_Report_June04.pdf

⁴ California Department of Finance, 1980-2009, City of Selma

Figure 2.2-3: Estimated Population Comparison



The City of Selma’s projection is based on the annual 4 percent increase as stated in the EIR for the current General Plan Update. This growth rate was chosen for the EIR so that all development under this amount would not require further environmental documentation. Several years ago the real estate market was in a boom cycle and the City had several major developments in the permitting process. At this time it was thought that growth could occur at this increased rate for a long period of time. Since this estimate was developed there has been a major slowdown in the real estate market and these previously planned developments are not likely to occur, at least in the near future. However, this growth projection was included to represent the high end of what could reasonably be expected.

Cal Water’s Water Supply and Facilities Master Plan (WSFMP) also used a high rate of growth for its population projection. A land use based population projection was conducted during development of the WSFMP and was based on development information available with the City of Selma’s Planning Department at the time. To be conservative the WSFMP also assumed that all the planned developments were to be constructed within the next 10 to 15 years.

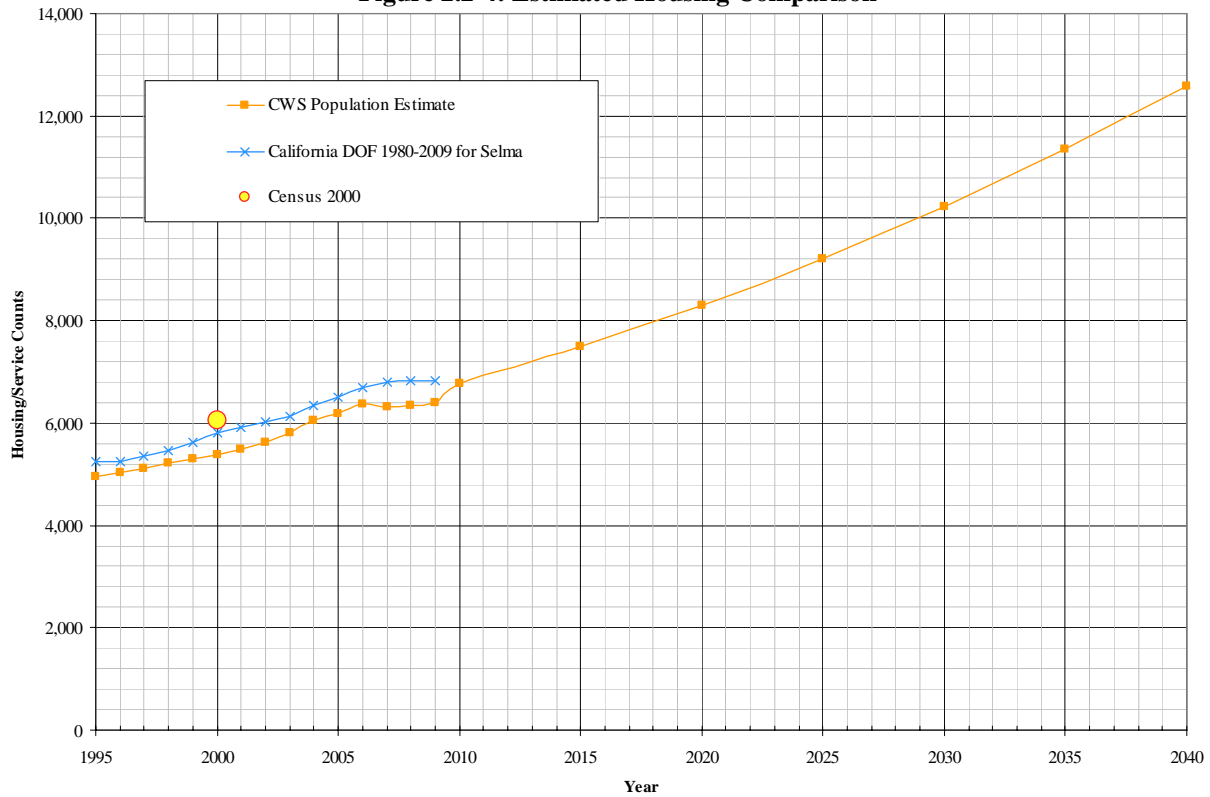
Two additional population growth scenarios were analyzed for the UWMP. The first was continuation of the five year average service connection growth rate and the second was a continuation of the ten year average growth rate. Because of the abrupt slowdown in

growth that Selma has seen over the last three years, the five year average shows a slow pace of development. This rate represents the low end of expected development.

Cal Water’s ten year average growth rate of 1.78 percent was ultimately chosen for the population projections. The ten year average is consistent with the long term development trend for the City of Selma, and is thought to be most likely to occur as the pace of development increases and the economy improves.

Similarly, the housing count was estimated by comparing the US Census 2000 data and the service counts for the Selma District, Figure 2.2-4. The service count for the year 2000 is slightly lower than US Census 2000 housing units estimate. This is a result of District service connections including one meter that serves several housing units, such as duplexes or apartments, whereas the US Census combines all of the housing units (single and multifamily residences). The US Census 2000 housing unit value was established by summarizing the individual census blocks enclosed within the service area of the District.

Figure 2.2-4: Estimated Housing Comparison

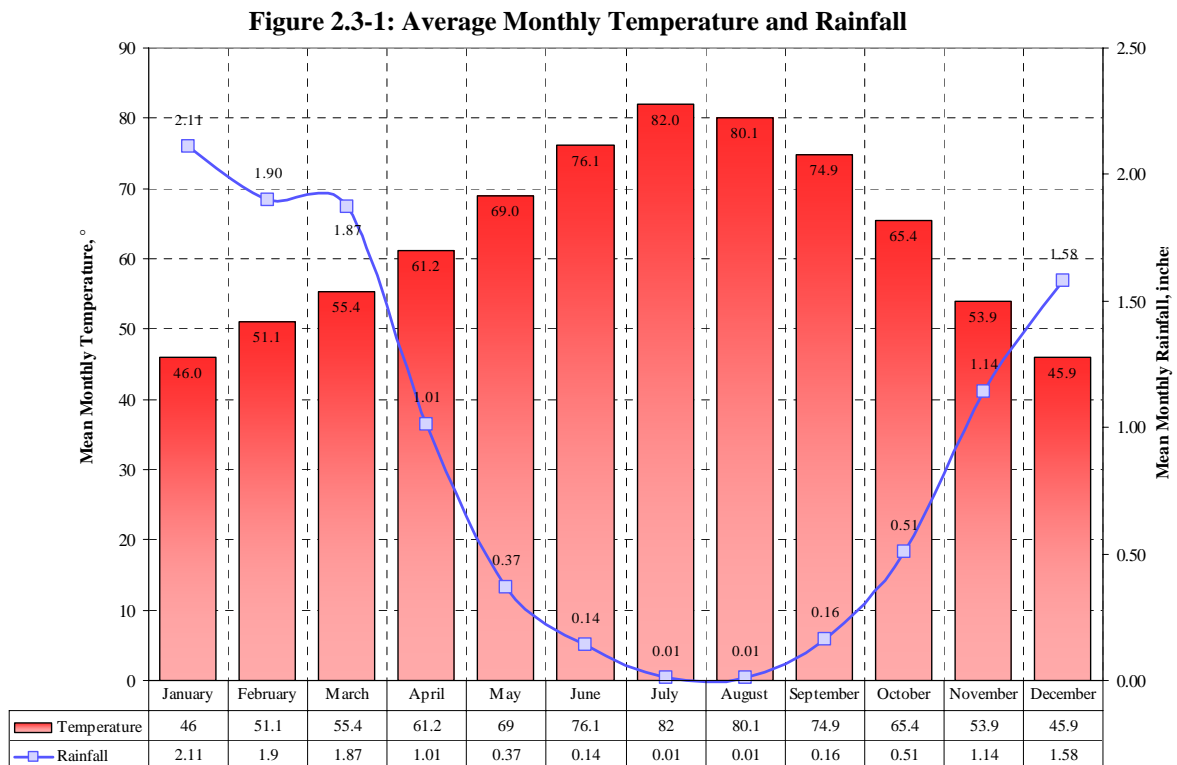


2.3 Service Area Climate

The climate for the Selma District is moderate with hot and 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 closest weather station to the Selma District, which is located at the Fresno Airport.

Table 2.3-1: Average Annual Climate (Table 3)		
Average Temperature	Average Rainfall	Annual Total Evapotranspiration
63.4°F	10.8 inches	53.4 inches

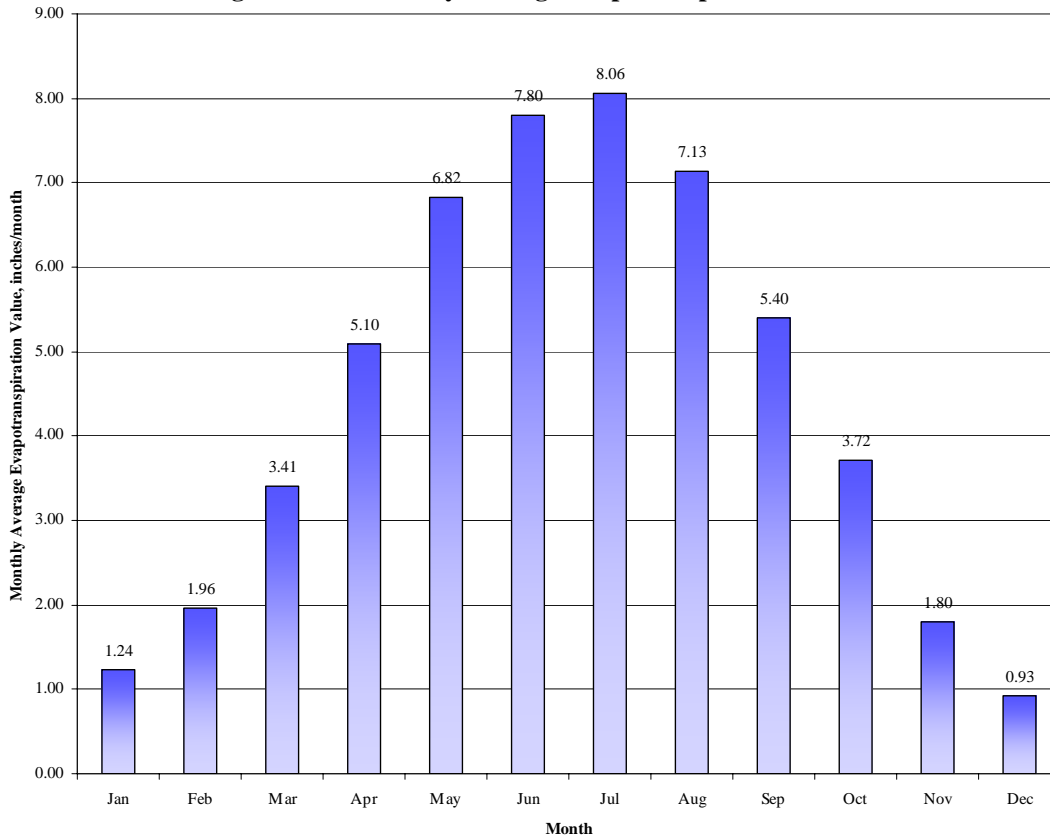
Figure 2.3-1 displays the average monthly temperature and rainfall⁶. Additional climate data is provided in the Appendix C, worksheet 18.



⁶ Western Regional Climate Center, Selma WSO Airport Weather Station, <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?caking+sca>

Figure 2.3-2 displays the monthly average evapotranspiration values for the area of the District⁷. Evapotranspiration is the sum of water loss from a watershed because of the processes of evaporation from the earth’s surface and transpiration from plant leaves. The annual estimated transpiration for Selma is 53.4 inches. The average annual rainfall of 10.8 inches is only 20 percent of the annual total evapotranspiration value. This indicates that the Selma District is located in a water-deficient environment.

Figure 2.3-2: Monthly Average Evapotranspiration Values



⁷ California Irrigation Management Information System (CIMIS), EvapoTranspiration (Eto) Zones Map - Zone 15, <http://www.cimis.water.ca.gov/cimis/welcome.jsp>

3 System Demands

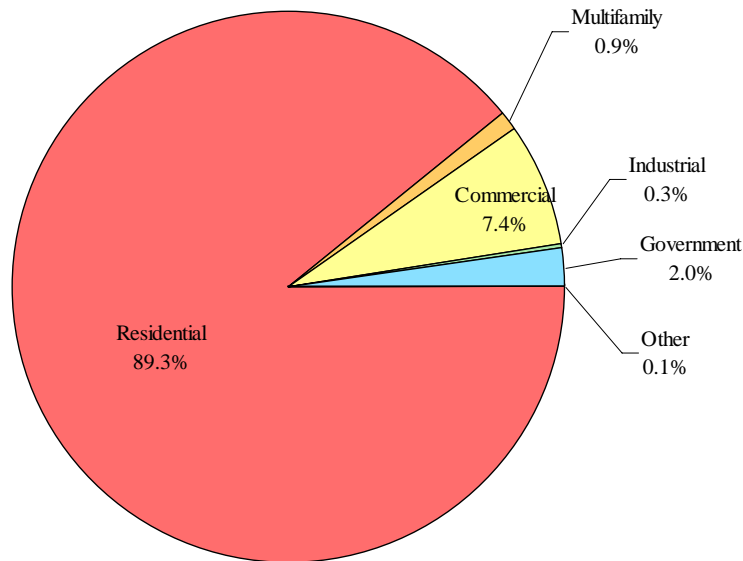
3.1 Distribution of Services

Cal Water classifies the different customer connection categories as follows:

- ◆ Residential
- ◆ Multifamily
- ◆ Commercial
- ◆ Industrial
- ◆ Government
- ◆ Other

The average annual service count for calendar year 2010 was 6,031. Single-family residential services with 5,386 represent 89.3 percent of all services, multifamily residential services with 52 represent 0.9 percent, and commercial with 444 services represents 7.4 percent, with all other service connection classes comprising 2.4 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 demand values are illustrated in Figure 3.2-2.

Figure 3.2-1: Historical Sales

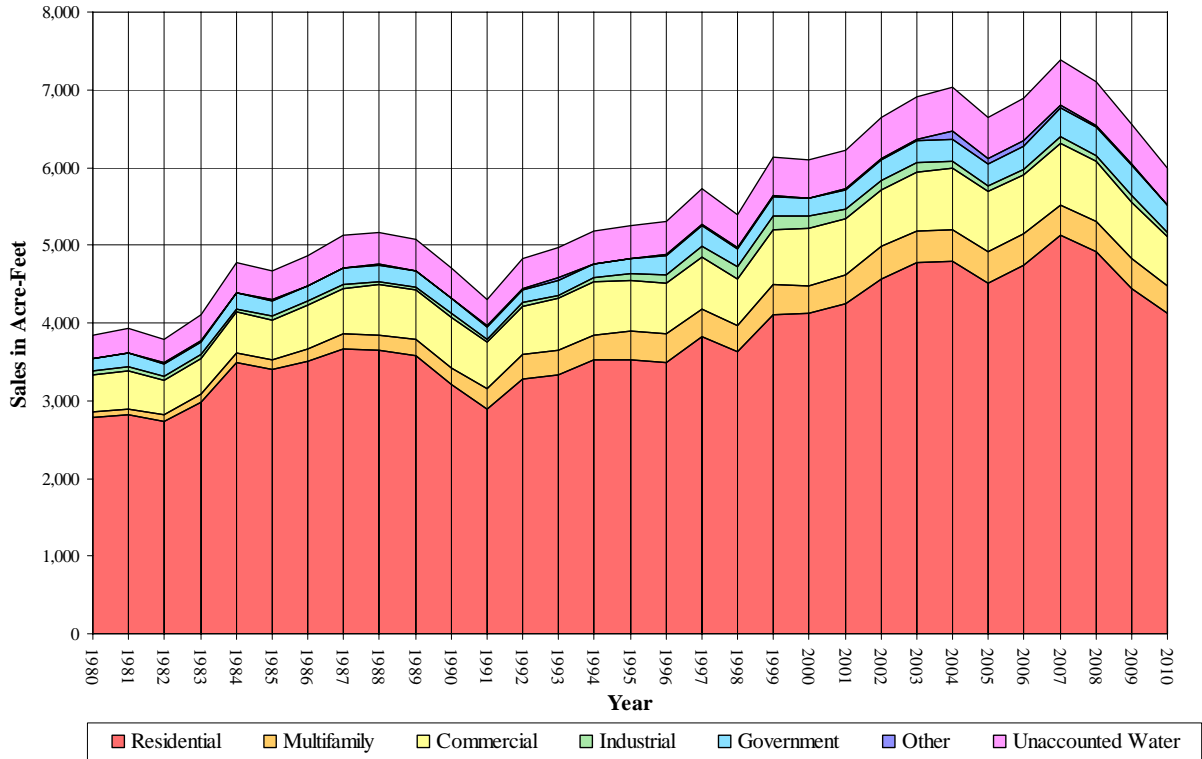
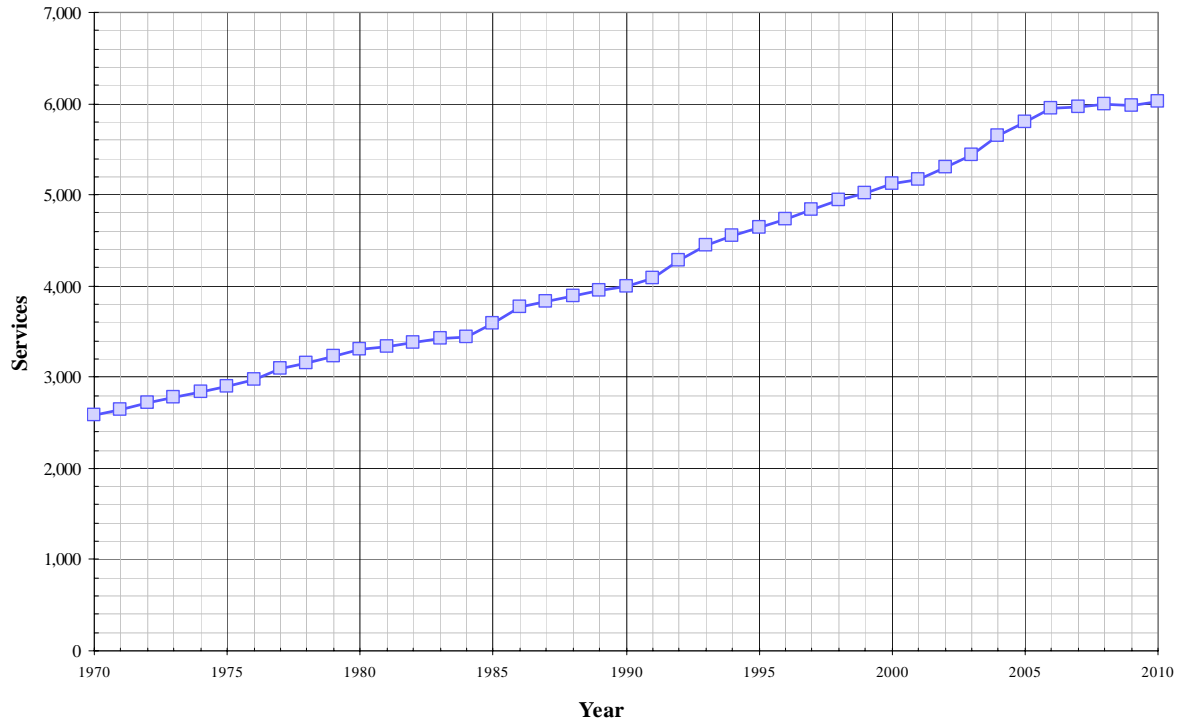
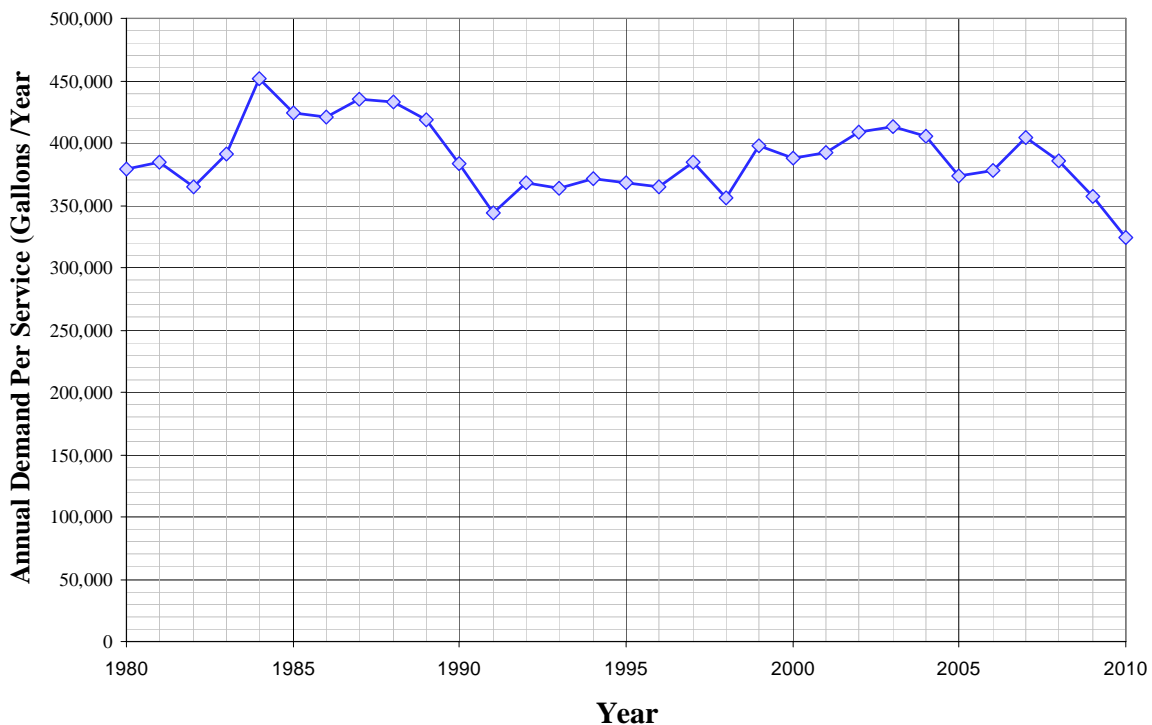


Figure 3.2-2: Historical Service Counts



A large portion (40% as of March, 2011) of the single-family residential services in the Selma District is unmetered. The number of flat rate services has declined as all new construction is metered and some historical flat rate services have converted to metered service. Cal Water has accelerated its meter conversion program and expects to have all services metered in six to ten years. In order to estimate the demand by the residential sector, unaccounted for water was fixed at eight percent of total production. This amount along with all metered sales was subtracted from total production to estimate the deliveries to the flat rate residential customers. This process resulted in a combined demand per service for all services that fluctuates between 320,000 and 450,000 gallons per service per year, as shown in Figure 3.2-3.

Figure 3.2-3: Historical Demand per Service



The Selma District responded to the state-wide drought conditions from 1987-1991 by reducing demand per service values from a pre-drought high of 450,000 gallons per service per year to about 370,000 gallons per service per year. Since this time demand has rebounded to near pre drought levels but has remained below the historic highs. During the more recent drought that California experienced from 2007-2009, customers in the Selma District were able to reduce water use below historic low levels. Over the past five years the combined demand per service for all customer categories has averaged 379,300 gallons per service per year.

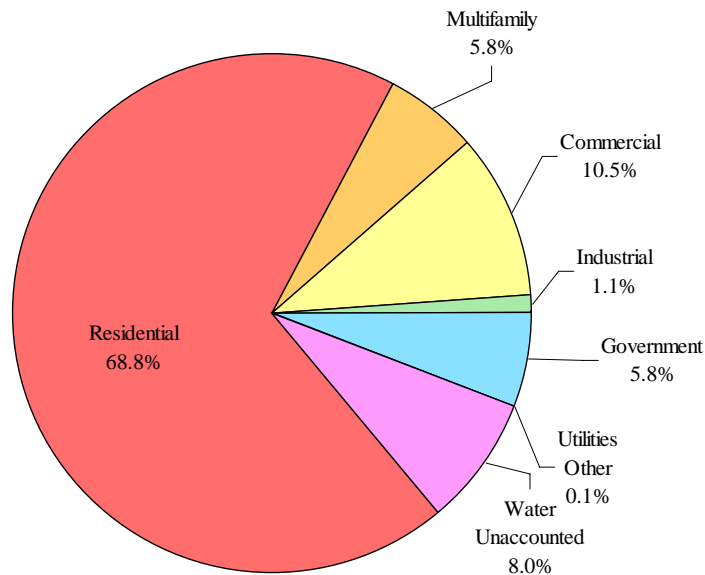
While overall sales have gradually increased as a result of increases in services, the demand per service on a customer class basis has fluctuated considerably. Curbing the

increase in demand per service that has taken place will require the implementation of conservation activities. Cal Water’s conservation plan will be discussed in Section 6 of this UWMP.

Single-family residential water use represents the smallest demand per service segment in the District with a five year average of 291,822 gallons per service per year, yet this category uses 68.8 percent of the total demand. The multifamily residential use was 5.8 percent of the total demand with an average demand per service of 2,935,012 gallons per service per year. The combined residential sector component of demand is equal to 74.6 percent of total demand. Figure 3.2-4 displays the percent of total demand by type of use.

Because the Selma District still has some unmetered services it is difficult to estimate unaccounted for water. For the purposes of this UWMP unaccounted for water was fixed at 8 percent of total demand, which is below industry standard practices but above similar Cal Water districts. Once all the unmetered services have been retrofitted with meters over the next few years it will be possible to determine a better estimate of this value.

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



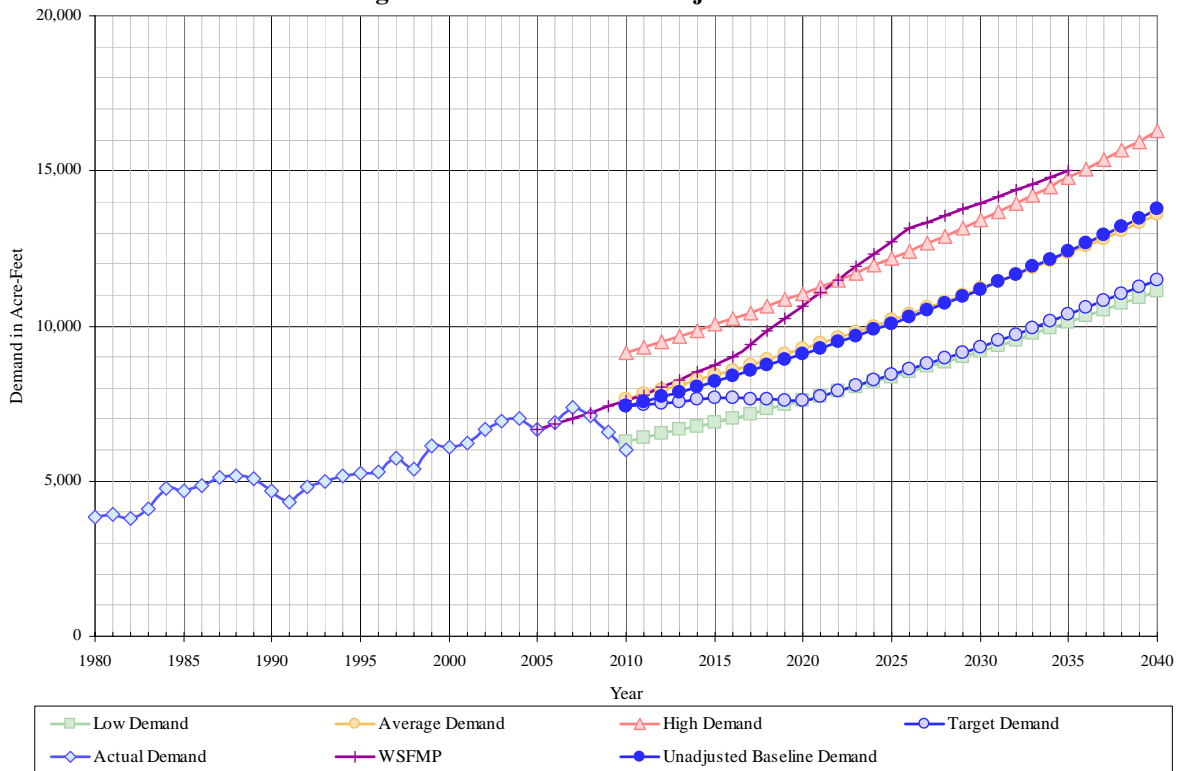
3.3 Water Demand Projections

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. 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 258 gpcd.

The target water demand projection includes conservation savings due to both passive and active demand management. 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)					
Water Use Sectors	2005				
	Metered		Not Metered		Total
	# of accounts	Volume	# of accounts	Volume	Volume
Single family	2,389	1,653	2,771	2,853	4,506
Multi-family	41	418	-	-	418
Commercial	469	760	-	-	760
Industrial	17	70	-	-	70
Institutional/government	97	290	-	-	290
Landscape	-	-	-	-	-
Recycled	-	-	-	-	-
Other	10	72	-	-	72
Total	3,023	3,263	2,771	2,853	6,116

Table 3.3-2: Actual 2010 Water Deliveries – AF (Table 4)					
Water Use Sectors	2010				
	Metered		Not Metered		Total
	# of accounts	Volume	# of accounts	Volume	Volume
Single family	2,851	1,795	2,535	2,332	4,127
Multi-family	52	349	-	-	349
Commercial	444	628	-	-	628
Industrial	19	64	-	-	64
Institutional/government	122	345	-	-	345
Landscape	-	-	-	-	-
Recycled	-	-	-	-	-
Other	8	6	-	-	6
Total	3,496	3,187	2,535	2,332	5,520

Table 3.3-3: Projected 2015 Water Deliveries – AF (Table 5)					
Water Use Sectors	2015				
	Metered		Not Metered		Total
	# of accounts	Volume	# of accounts	Volume	Volume
Single family	5,985	5,420	-	-	5,420
Multi-family	60	373	-	-	373
Commercial	491	580	-	-	580
Industrial	20	87	-	-	87
Institutional/government	136	532	-	-	532
Landscape	-	-	-	-	-
Recycled	-	-	-	-	-
Other	8	96	-	-	96
Total	6,700	7,088	-	-	7,088

Table 3.3-4: Projected 2020 Water Deliveries - AF (Table 6)					
Water Use Sectors	2020				
	Metered		Not Metered		Total
	# of accounts	Volume	# of accounts	Volume	Volume
Single family	69	5,353	-	-	5,353
Multi-family	537	386	-	-	386
Commercial	22	569	-	-	569
Industrial	148	85	-	-	85
Institutional/government	9	522	-	-	522
Landscape	-	-	-	-	-
Recycled	-	-	-	-	-
Other	-	94	-	-	94
Total	785	7,009	-	-	7,009

Table 3.3-5: Projected 2025 and 2030 Water Deliveries - AF (Table 7)

Water Use Sectors	2025		2030	
	Metered		Metered	
	# of accounts	Volume	# of accounts	Volume
Single family	80	5,927	92	6,566
Multi-family	586	447	640	519
Commercial	24	626	26	690
Industrial	162	94	177	103
Institutional/government	9	575	10	633
Landscape	-	-	-	-
Recycled	-	-	-	-
Other	-	103	-	114
Total	861	7,773	945	8,624

Table 3.3-6: Projected 2035 and 2040 Water Deliveries - AF (Table 7)

Water Use Sectors	2035		2040	
	Metered		Metered	
	# of accounts	Volume	# of accounts	Volume
Single family	106	7,272	122	8,058
Multi-family	699	602	764	698
Commercial	28	759	31	836
Industrial	193	114	211	125
Institutional/government	11	697	12	767
Landscape	-	-	-	-
Recycled	-	-	-	-
Other	-	125	-	138
Total	1,038	9,569	1,140	10,623

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 Selma 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. Cal Water intends to enter regional alliances with other Cal Water districts falling within the same hydrologic regions as listed in Table 3.3-7. The Selma District lies within the Tulare Lake hydrologic region, along with Bakersfield, Kern River Valley, and Visalia Districts.

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

District-specific and regional targets for Cal Water districts within the Tulare Lake hydrologic region are shown in Table 3.3-8. The 2015 and 2020 district-specific targets for Selma District are 242 and 215 gpcd, respectively. Over the last five years District demand has averaged about 258 gpcd. Thus, per capita demand needs to fall by about 6 percent by 2015 and by about 17 percent by 2020 in order for Selma District to meet its district-specific targets. Alternatively, demand for the four Cal Water districts within the Tulare Lake hydrologic region can average no more than 250 gpcd in 2015 and 222 gpcd in 2020.

District	Population	2015 Target	2020 Target
Bakersfield	252,010	268	239
Kern River Valley	6,359	190	179
Selma	24,260	242	215
Visalia	132,930	219	194
Regional Targets¹		250	222

¹ Regional targets are the population-weighted average of the district targets.

The following analysis presents the individual SBx7-7 compliance targets for the Selma 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 Selma District, the 10-year base period 1999-2008 yielded the maximum target under this method. The 2015 target is 242 gpcd and a 2020 target is 215 gpcd. Table 3.3-9 summarizes the base period ranges and Table 3.3-10 lists the per capita demand over this 10-year base period.

Table 3.3-9: Base Period Ranges (Table 13)			
Base	Parameter	Value	Units
10-15-year base period	2008 total water deliveries	6,532	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	10	years
	Year beginning base period range	1999	
	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 3.3-10: 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	1999	20,080	5.47	272
Year 2	2000	20,370	5.45	267
Year 3	2001	20,780	5.56	268
Year 4	2002	21,300	5.94	279
Year 5	2003	22,050	6.17	280
Year 6	2004	22,950	6.28	274
Year 7	2005	23,500	5.93	253
Year 8	2006	24,170	6.15	255
Year 9	2007	23,980	6.60	275
Year 10	2008	24,010	6.34	264
Base Daily Per Capita Water Use				269

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 Selma District is located in the Tulare Lake hydrologic region the Selma District’s 2015 target is 225 gpcd and the 2020 target is 179 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 Selma District is 254 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 3.3-11: 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	2003	22,050	6.17	280
Year 2	2004	22,950	6.28	274
Year 3	2005	23,500	5.93	253
Year 4	2006	24,170	6.15	255
Year 5	2007	23,980	6.60	275
Base Daily Per Capita Water Use				267

Based on the results of this analysis as shown in Table 3.3-12, the Method 1 targets were chosen for the Selma District.

Table 3.3-12. Selma District SBx7-7 Targets	
Maximum Allowable Target	
Base Period:	2003-2007
Per Capita Water Use:	267
Maximum Allowable 2020 Target:	254
Method 1: 80% of Baseline Per Capita Daily Water Use	
Base Period:	1999-2008
Per Capita Water Use:	269
2015 Target:	242
2020 Target:	215
Method 3: 95% of Hydrologic Region Target	
Hydrologic Region:	Tulare Lake
2015 Target:	225
2020 Target:	179
Selected District Target	
2015 Target:	242
2020 Target:	215

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.

To estimate projected demands from low income housing, Al Water used information from the City of Selma's Housing Element. According to the Housing Element, 22.1 percent of the future housing needs will be for the lowest income category.⁵ This percentage was applied to the total projected residential demands, as shown in Table 3.3-13.

Low Income Water Demands	2015	2020	2025	2030	2035	2040
Single-family residential	1,198	1,183	1,310	1,451	1,607	1,781
Multi-family residential	82	85	99	115	133	154
Total	1,280	1,268	1,409	1,566	1,740	1,935

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 "City of Selma, Housing Element", City of Selma, May 21, 1997, Page 41 (Page 234/636)

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.

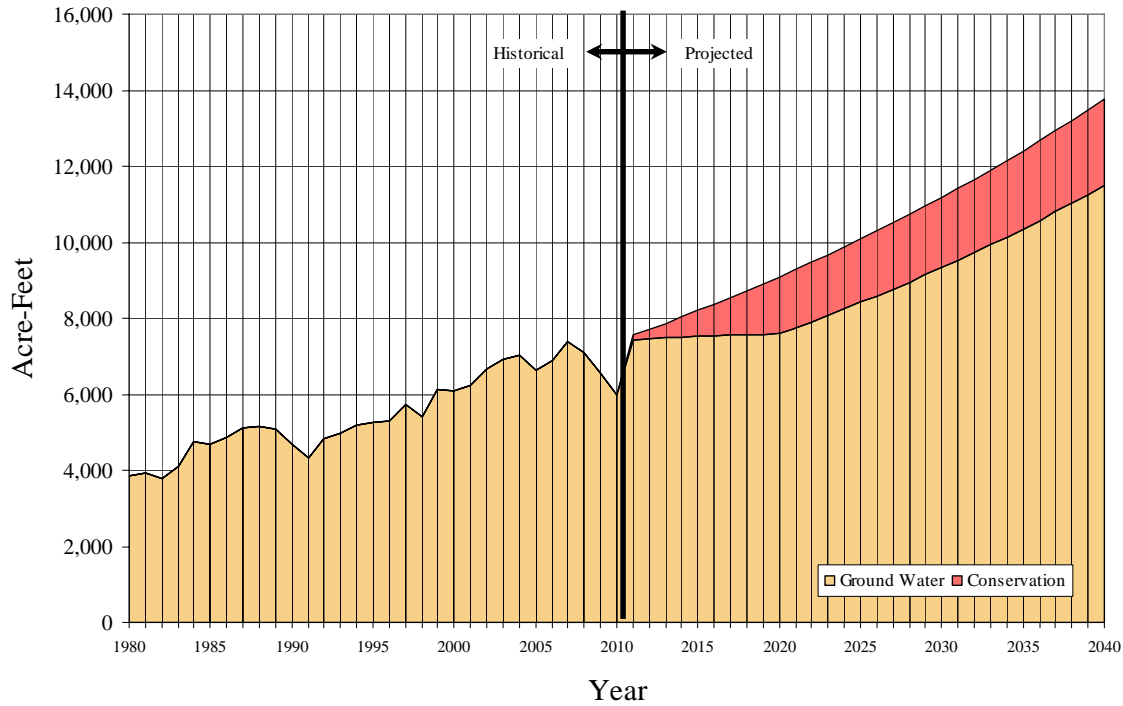
Water Use	2010	2015	2020	2025	2030	2035	2040
Sales to Other Agencies	-	-	-	-	-	-	-
Saline barriers	-	-	-	-	-	-	-
Groundwater recharge	-	-	-	-	-	-	-
Conjunctive use	-	-	-	-	-	-	-
Raw water	-	-	-	-	-	-	-
Recycled	-	-	-	-	-	-	-
Unaccounted-for system losses	480	587	579	641	710	787	872
Total	480	587	579	641	710	787	872

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.

	2005 (Actual)	2010 (Actual)	2015	2020	2025	2030	2035	2040
Water Use	6,648	6,000	7,675	7,589	8,415	9,335	10,356	11,495

Figure 3.4-1 shows the planned sources of supply based on these demands through 2040. At this time only groundwater and conservation are included as sources of supply. 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 Selma District is completely reliant on groundwater as the sole water source. The Water Supply and Facilities Master Plan (WSFMP) for the District included an analysis of potential alternative sources. These alternative sources are discussed in more detail in the following sections. The results of this analysis indicated that groundwater will likely continue to be the only source available over the planning horizon.

Determining the actual supply available to Cal Water in any given year is complicated by several factors. The first of which is that there has not been a legal adjudication of groundwater rights for basin pumpers. The second is that there has not been a comprehensive hydrogeologic study to estimate the safe yield specifically within the City of Selma's sphere of influence. The value of this type of study would be to determine the magnitude of overdraft that can reasonably be contributed to Cal Water's use of the basin. A broader analysis of the entire King's Basin is discussed in Section 4.4.

Consolidated Irrigation District (CID) has historically managed groundwater through the conjunctive use of surface water from the Kings River and imported Central Valley Project (CVP) water from the Friant-Kern Canal. CID delivers surface water to agricultural customers through a network of ditches and canals, which allows for the in-lieu use of surface water while supplies are available. Groundwater is used as an alternate source when surface supplies are not available, and is the sole source in areas within CID's jurisdiction that don't have access to surface water. CID also operates 46 dedicated artificial recharge ponds with a total area of 1,300 acres specifically for the purpose of groundwater replenishment. Normal operation of CID facilities provides both the direct and indirect groundwater recharge of the basin in the form of conveyance losses and from agricultural applications of surface water that percolate into the aquifer.

According to its charter, CID cannot deliver surface water directly to municipal customers in any significant volumes. As land uses shift from agricultural to urban use, the developed land is de-annexed from CID. However, the source for municipal and industrial water continues to be groundwater. At least partly due to increased urban pumping, there has been a general decline in groundwater levels over the past 20 years, indicating basin overdraft. This decline has been relatively minor in the Selma area to date, but still warrants concern over the long term. The aquifers beneath the Selma District contain large volumes of stored groundwater, and groundwater levels have generally recovered quickly after past drought events. A more detailed discussion of groundwater overdraft is found in Section 3.4.

Because of the difficulty in defining an exact supply quantity available to the Selma District, the theoretical supply could be considered the amount that Cal Water has the ability to pump. The design capacity of all the active wells is currently 18,870 AFY.

However, this value greatly exceeds the projected water demand throughout the planning horizon of this UWMP, and it may be unrealistic to characterize this quantity as the available supply. A more conservative estimate of firm supply could be considered the total well capacity minus the largest well, and assuming 80 percent loading, yields a supply of 8,320 AFY. Based on 2009 operating records, these wells produced 6,562 AF. This brings the total supply much closer to actual demands. The excess production capacity between the design capacity and the actual annualized production is necessary in order to meet maximum day demand, peak demands, and fire flows. Above ground storage tanks are also used to satisfy peak demands.

Cal Water recognizes the need for responsible management of groundwater resources and will remain committed to implementing conservation programs to minimize its pumping in the basin, and will remain supportive of the management efforts of CID. Cal Water will only pump enough water to meet the needs of its customers. So for the purposes of this UWMP the available supply in future years is considered to be equal to the projected demand. The projected water supply source and volumes based on the SBx7-7 target demand are summarized in Table 4.1-1.

Water Supply Sources	2010	2015	2020	2025	2030	2035	2040
Supplier produced groundwater	6,000	7,675	7,589	8,415	9,335	10,356	11,495
Transfers in or out	-	-	-	-	-	-	-
Exchanges in or out	-	-	-	-	-	-	-
Recycled Water (projected use)	-	-	-	-	-	-	-
Desalination	-	-	-	-	-	-	-
Total	6,000	7,675	7,589	8,415	9,335	10,356	11,495

4.2 Purchased Water

Cal Water does not have access to purchased water through CID. And because of water rights limitations CID can only provide a very small portion of the surface water it receives to municipal customers. At this time it is unclear as to whether this limitation can be overcome so that Cal Water could secure a reliable surface supply for direct use by its customers.

If a surface supply could be obtained it would come from two possible sources. The first is from Section 215 of the Reclamation Reform Act (RRA) of 1982 which allows for water designated as unstorable irrigation water to be released due to flood control criteria or unmanaged flood flows. CID has access to this water but doesn't have the funding

necessary to acquire it, nor do they have adequate recharge facilities to handle excess flows.

The second source would be to work directly with agricultural users to obtain a water transfer or exchange. These agricultural transfers can be permanent or interruptible. Permanent agricultural transfers involve the permanent acquisition of agricultural water rights, the cessation of irrigation on formerly irrigated lands, and the transfer or change of a water right to municipal and industrial uses. CID owns the water rights to all surface waters distributed in its service area and retains them as land use shifts from agriculture to urban uses. Any surface water formerly used by these agricultural properties will either be distributed to other agricultural customers or will be used for groundwater recharge. As a result, the permanent sale and transfer of water rights from CID to Cal Water is unlikely.

Interruptible agricultural transfers consist of temporary agreements where agricultural water rights can be used for other purposes. The agreement with agricultural users allows for the temporary cessation of irrigation so that the water can be used to meet Selma's municipal needs. Temporary purchases of water contracts from CID customers, or increased diversion of flood flows in wet years are the most likely source of any surface water that would be available to Cal Water from within CID's service area. According to CID uncaptured flood flows occur approximately four out of every ten years.

Water transfers from outside the local area are also possible with individuals or agencies that own surface water rights on the King's River or along the Friant-Kern Canal. In this scenario an agreement with CID may be required to bring water in through their facilities to Selma.

Although these sources are available it is unlikely that Cal Water will purchase imported water directly from CID for delivery to municipal and industrial customers in Selma. The feasibility analysis for each water supply alternative listed in the WSFMP indicated that any increased acquisition of surface flows by CID would most likely be used for aquifer recharge, and would be available to Cal Water through groundwater pumping.

4.3 Surface Water

Cal Water does not have surface water rights in the Selma District. CID supplies surface water to agricultural users from both the Kings River and the Friant-Kern Canal of the federally funded Central Valley Project (CVP). A portion of this surface water is also diverted to CID's recharge ponds when adequate supplies are available. Cal Water's access to this recharged water will be discussed further in the following section.

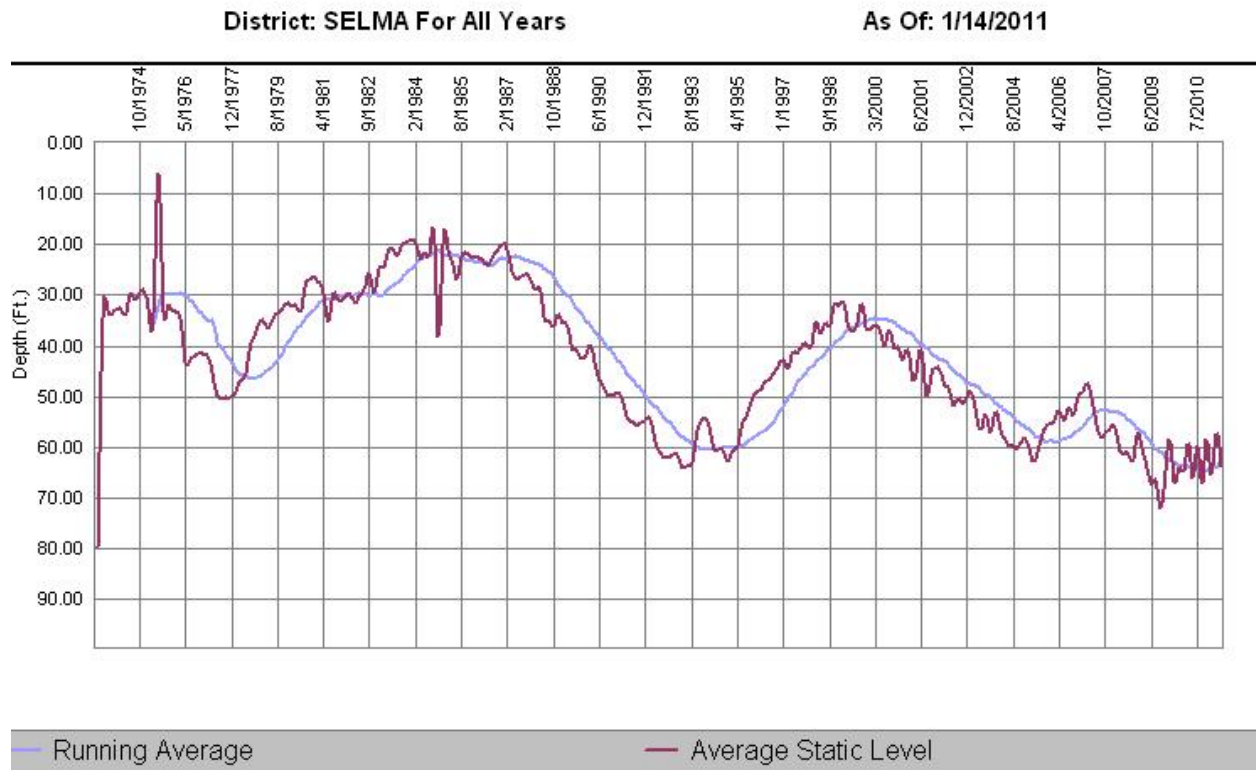
4.4 Groundwater

Groundwater is the sole source of water furnished to Selma District customers. Since the beginning of irrigated agriculture and the initial conjunctive use of surface water in the area, groundwater levels remained very close to land surface in the Selma area.

Groundwater levels fell to about 20 feet below land surface in the late 1940's and 1950's and then remained relatively stable for several decades. Since then there have been significant fluctuations. During the drought in the 1990's the groundwater level declined an average of 40 to 50 feet. The extended multi-year drought reduced the availability of replenishment water. Reduced in lieu supply caused an increase in agricultural pumping, and coupled with a growing urban demand resulted in a decline in static groundwater elevation. The abundant storm runoff of the subsequent winters enabled an increase in groundwater recharge by CID. As a result, the average static water level in Cal Water's wells rose to within ten feet of pre-drought elevations, as shown in Figure 4.4-1.

The more recent drought lasting from 2007 to 2009 has had a similar effect and ultimately has reduced water levels to 30 year lows. Managing the quantity of water stored in the groundwater aquifers in the region will help perpetuate the availability of this resource. However, with increasing demands, will come greater production and reliance on groundwater resources.

Figure 4.4-1: District Well Level Average (Static)



A recent study of the Kings Basin evaluated overdraft under potential future development conditions⁶. For 2030 conditions, an additional 6 feet of decline from present conditions is predicted for the Selma area. Although the analysis was regional in nature, the estimate for the Selma area is likely understated, because the study only considered additional urban development within Selma's current Sphere of Influence. As noted in Section 2, much of planned development is outside of the City's existing Sphere of Influence, and the City is currently preparing an environmental impact report on its General Plan Update, which includes expansion of the City's Sphere of Influence.

The downward trend of static water levels indicates that the Kings Basin is in overdraft. In the near term, the groundwater basin appears to be adequate to meet demands; however, in the long term, the groundwater basin yield will further decline making it more difficult to meet increased future demand without offsetting actions. To date, declining water levels have had only a minor effect on well yields and production costs in the Selma District, but further declines in groundwater basin storage and levels are expected and these may negatively affect Selma well yields and pumping costs.

Groundwater management has been practiced by a number of agencies within the basin, dating back to the 1930's. Historically, groundwater management efforts in the basin have been independent efforts by individual water agencies within the region. However, more recently, a collaborative approach has been used. In 2001, four agencies, the Kings River Conservation District, Alta Irrigation District, Consolidated Irrigation District, and Fresno Irrigation District, formed a Basin Advisory Panel, and signed a Memorandum of Understanding defining a cooperative effort to manage existing supplies and obtain new supplies.

In 2004, the Upper Kings Water Forum (Forum), a group of 24 agencies with interest in the basin, was formed to provide wider stakeholder participation in basin management activities. The Forum has completed an Integrated Water Resources Management Plan that identifies and defines different water management scenarios, and evaluates alternatives to determine the most economical and best use of the water resources of the region.

Within Selma, the City of Selma currently maintains a network of storm water detention basins and associated conveyance systems that provide groundwater recharge. While the City only has about 14 acres of detention ponds currently, the stormwater master plan for the City, completed in 2006, shows an extensive network of proposed detention ponds spread throughout the City. These future ponds total about 360 acres. Of these proposed ponds, approximately 250 acres are in close proximity to existing CID canals, and their use could potentially be expanded.

⁶ Groundwater Impact Analysis, Memorandum from WRIME to Mark Gilke, Consolidated Irrigation District, July 5, 2007.

CID, formed in 1921, supplies surface water to agricultural areas in its 145,000 acre service area surrounding Selma. CID has an extensive recharge program. CID acquired its first percolation basin in 1932, and currently operates 46 recharge basins, covering 1,300 acres. CID also owns and operates about 350 miles of unlined canals that provide recharge to the Kings Basin.

CID's overall groundwater management objective is to protect and maintain a sustainable supply for users in the CID service area. Due to declining groundwater levels, CID is very interested in increasing the volume of recharge, both through infrastructure modifications (conveyance network improvements, additional recharge capacity); and obtaining additional supply for infiltration (surplus Kings River water per Section 215 of the federal Reclamation Reform Act, and/or non-dry year water transfers). Increasing its recharge efforts will require CID to invest in capital improvements that don't currently have the necessary level of funding. CID owns and operates three canals in or near Selma: Fowler Switch Canal; Walnut Ditch; and, the Selma Branch Ditch of the C&K Canal. CID's Ward Drainage Branch and Kingsburg Branch of the C&K Canal are just east of Selma.

The majority of CID's total water delivery capacity is divided between the Fowler Switch and C&K Canals (of which the Selma Branch is a part). Most of CID's current recharge ponds are located off of the Fowler Switch Canal. In 2007, CID prepared an Urban Impacts Study to evaluate effects of planned development, and identify potential recharge projects that could be implemented to offset development impacts. The study identified the best opportunities for regional recharge as new ponds along the C&K Canal. Several potential recharge projects were identified that would mitigate impacts from urban development to CID.

In a Draft Proposed Agreement CID has suggested collaboration between Cal Water, Selma, CID and Kings River Conservation District to collect and use funds for the purchase of land for additional recharge pond locations to be used to capture flood flows. Cal Water is considering an initial pilot phase prior to full negotiations with CID.

One source of revenue for CID is the levying of an assessment based on land area, which is to be used for actions that promote recharge. Cal Water pays a fee based on the acreage within the Selma District for this recharge activity. A potential solution for securing funding for additional recharge and creating a sustainable groundwater supply for both agricultural and municipal users, would be to re-evaluate this fee.

As noted earlier, groundwater has been the only source of supply for the Selma District. Table 4.4-1 lists the amount of groundwater pumped by Cal Water from the King's Basin from 2006 to 2010.

Basin Name	2006	2007	2008	2009	2010
King's Basin	6,893	7,391	7,101	6,563	6,000
% of Total Water Supply	100%	100%	100%	100%	100%

As noted above, Cal Water expects to meet all its projected demand for the Selma District with groundwater. Based on this assumption, the amount of groundwater projected to be pumped is shown in Table 4.4-2.

Basin Name	2015	2020	2025	2030	2035	2040
King's Basin	7,675	7,589	8,415	9,335	10,356	11,495
% of Total Water Supply	100%	100%	100%	100%	100%	100%

4.4.1 Basin Boundaries and Hydrology

Selma's aquifer is within the Kings Basin, located in the southern part of the San Joaquin Valley groundwater basin in the Central Valley. Primary sources of surface water for the Kings Basin are the Kings River and the San Joaquin River via Friant-Kern Canal, a facility of the federal Central Valley Project.

The City of Selma is located along the eastern side of the Central Valley in a geologic setting that has favorable properties in terms of water supply. The eastern side of the Central Valley is comprised of a thick basin-fill sequence of materials derived from erosion of the Sierra Nevada. These deposits are coarse-grained near the foothills and near where the river canyons draining the Sierra Nevada enter the basin, and become finer grained to the west.

The deposits beneath Selma are mostly from a sedimentary alluvial fan unit deposited by the Kings River and are characterized by unconsolidated sand, gravel and cobbles with minor lenses of fine sand, silt and clay. These materials have a large surface infiltration rate and they are able to transmit water very readily. The majority of good quality groundwater and most of the water wells in the Selma area are screened in the upper 300 feet of this coarse alluvial deposit.

Groundwater in the Selma area generally flows in a southwesterly direction away from the foothills. The rate and direction of flow is influenced locally by pumping from Fresno

and other nearby municipalities, by seepage into or out of the Kings River, and by local variation in aquifer properties.

The above description and additional details of the basin is given in the DWR's Groundwater Bulletin 118, see Appendix D⁸.

4.4.2 Groundwater Management Plan

The groundwater basin that Cal Water pumps from is an un-adjudicated basin. Cal Water had signed a Memorandum of Understanding with the City of Selma to implement a Groundwater Management Plan under the provisions of Assembly Bill 3030. This MOU expired in 2007 and CID and the City of Selma are working on a new MOU under the terms of by Senate Bill 1938.

CID has historically focused on the conservation of flood flows of the Kings River for groundwater recharge and agricultural irrigation deliveries. The plan calls for annual reviews of groundwater conditions and as conditions dictate additional supplies will be acquired to augment current groundwater recharge operations. A copy of the Ground Water Management Plan is attached in Appendix H.

CID, along with other water agencies and local governments in the Kings River region, are coordinating efforts to manage groundwater and expand conjunctive use in an area that stretches over 1.2 million acres and includes more than 850,000 residents and water users. This effort is maintained by the Kings River Conservation District (KRCDD)⁹.

4.5 Water Supply Alternatives

Cal Water's 2008 Water Supply and Facilities Master Plan identified a range of potential water supply alternatives and performed a feasibility analysis of these alternatives. They are discussed in detail in the following sections.

4.5.1 Description of Supply Options

A variety of potential water supply options were considered as part of this evaluation. Based on discussions with Cal Water, CID and Selma-Kingsburg-Fowler County Sanitation District (SKF) along with knowledge of the water supply conditions in the region, the following short list of options were identified. These options can meet projected demands to varying degrees and have a different range of benefits, implementation issues, and costs. The supply options include:

1. Additional wells

⁸ California's Ground Water Bulletin 118, 2003; Central Coast Hydrologic Region; Salinas Valley Groundwater Basin; Upper Valley Aquifer Subbasin; Groundwater Basin Number: 3-4.05

⁹ King River Conservation District website, downloaded from http://www.krcdd.org/pdf/groundwater_brochure_03_04.pdf

2. Increased aquifer recharge
 - Section 215 water
 - Agricultural water transfers and exchanges
3. Enhanced water conservation
4. Reclaimed water
5. Other

Each of these is described in the following subsections.

Additional Wells

This option involves siting new wells and drilling, installing and equipping them for use. New wells would be installed in locations of projected growth. The depth, construction and cost of recent wells provide an accurate estimate of these issues for the installation of new wells. In addition, an ongoing testing program to evaluate changes in production of older wells should be evaluated. Planned rehabilitation of older wells should be augmented due to the potential for catastrophic failures of older wells.

Increased Aquifer Recharge

Recharging the aquifer with surface water involves using water from the Kings River and/or Kern-Friant canal when surface supplies are available. Recharge would occur in existing and new CID recharge ponds, and possibly also in some of the City's stormwater detention basins. Two means of obtaining water are available.

First, under Section 215 of the Reclamation Reform Act (RRA) of 1982 water can be designated as unstorable irrigation water to be released due to flood control criteria or unmanaged flood flows. CID is in a position to obtain such water but currently lacks a funding mechanism for obtaining it.

Second, work directly with agricultural users for some type of water transfer or exchange. Agricultural transfers can be permanent or interruptible. Permanent agricultural transfers involve the permanent acquisition of agricultural water rights, the cessation of irrigation on the historically irrigated lands (dry up), and the transfer or change of a water right to M&I uses. Interruptible agricultural transfers consist of temporary arrangements where agricultural water rights can be used for other purposes. The agreement with agricultural users allows for the temporary cessation of irrigation so that the water can be used to meet Selma's municipal needs.

In addition, improvements in irrigation efficiency could free up water. Cal Water could fund the capital costs for improved irrigation equipment or techniques and then would gain the benefits from the conserved water. However, this may not be a realistic source of water given that any efficiency gain in agricultural water use would most likely result

in increased recharge. This would provide Cal Water an indirect benefit but may not free up water in the quantities necessary to develop a reliable surface supply for urban use.

Enhanced Water Conservation

Water conservation programs result in improved water use efficiency. Water savings occur through the modification of water-using fixtures (e.g., showers, landscapes, cooling towers) and behaviors (e.g., showering time, irrigation schedules, maintenance schedules, etc.). The effects of conservation on water demand are the result of both passive and active water conservation efforts. These conservation efforts, though somewhat unpredictable in their rate of success since they require changes in consumer behavior, can be effective means of reducing water supply needs, with little cost to the community.

Cal Water has an ongoing water conservation program as part of its commitment to achieving more efficient water uses. Currently, Cal Water promotes water conservation through educational, informational, and customer assistance activities. Its programs include distribution system water audits and leak detection, promotion of water efficient landscape guides, residential surveys, plumbing retrofits, high efficiency washing machine rebates, public education, school education and toilet retrofits. Cal Water also participates in cooperative conservation activities with area water suppliers through the Central Valley Water Awareness Committee. Committee members include the cities of Fresno, Clovis, and Kerman and the Westlands and Fresno Irrigation Districts.

Cal Water's requests voluntary participation in its conservation programs at present. However, during periods of water shortages, conservation programs can be expanded and may include more restrictive measures such as mandatory reductions, rationing, and penalties. Recently, there have been significant changes to Cal Water's approach to conservation. These are discussed in more detail in Section 6 of this UWMP.

Reclaimed Water

Water reclamation is the process by which wastewater is treated to levels suitable for reuse (i.e., Title 22 standards). It would help offset demands for potable water. For planning purposes, water reclamation is evaluated as an option to offset only non-potable demands in the City. Non-potable reuse involves the use of reclaimed water for the irrigation of urban landscapes or for industrial uses such as cooling or process water. It is anticipated that opportunities to partner with SKF as they consider adding additional facilities to their wastewater plant, located approximately 5 miles south of Selma, would be advantageous to Cal Water only if other partners join so as to reduce the cost of treatment and conveyance. As of 2004, agricultural users have expressed negative interest in participation (public perception issues cited). Recycled water is discussed in more detail in Section 4.6 of this UWMP.

Other

Other options include increasing system storage to help meet maximum daily demands during the hot summer months when demands are highest. Water would be supplied during off-peak times by existing wells.

4.5.2 Screening of Supply Options

Table 4.5-1 summarizes the screening of each of the supply options, summarizing their benefits, potential implementation issues, and a qualitative assessment of the relative cost for implementation.

<i>Name</i>	<i>Benefits</i>	<i>Implementation Issues</i>	<i>Costs</i>
Additional Wells	<ul style="list-style-type: none"> • Proven technology • Requires no new types of water treatment • Can be installed and brought on-line when needed, so costs are incremental • Requires minimal land 	<ul style="list-style-type: none"> • Further decline in groundwater levels and increased costs • Higher pumping can induce existing contamination into wells and require additional treatment • More wells decrease yield of individual wells due to overlapping cones of depression, leading to higher unit costs 	Low
Aquifer Recharge through Purchase of Surface Water (Section 215 Water)	<ul style="list-style-type: none"> • Increases groundwater levels • No additional treatment costs • Existing CID canals and recharge ponds can be used for recharge • Potential to use City stormwater detention basins • Relatively low capital and operating costs due to gravity-fed water flow • The alluvial aquifer and surface soils have a high recharge rates • Significant volumes of potential aquifer storage are available 	<ul style="list-style-type: none"> • Surface water supplies must be available for recharge (e.g., 215 water) • Infrastructure improvements are needed by CID to increase existing levels of recharge • The City and CID need to coordinate efforts to increase recharge • The water quality may be degraded during recharge as additional salts and minerals may be leached during the infiltration 	Low
Agricultural Transfers and Exchanges for Aquifer Recharge	<ul style="list-style-type: none"> • Provides a new source of water to the City and reduces the need to pursue other water sources • Permitting may be simpler for such transfers than for development of a new surface water supply project, since the agricultural water to be acquired has already been diverted from the stream system and a portion consumed. • A better or more stable income to agricultural users can be assured 	<ul style="list-style-type: none"> • Localized socio-economic impacts result from retirement of agricultural lands for permanent transfers • Dry land has a substantially lower assessed value than irrigated agricultural land. Potential loss of tax base to the local governments and school districts. • Potential impact on groundwater tables and wells in the area unless historical returns are made in the same location. Many domestic and irrigation wells are kept viable by the return flows from irrigation. • Determination of transferable amount • Concerns about degraded water quality under urban 'first-use' scenario • Water rights issues 	Low to Medium
Conservation	<ul style="list-style-type: none"> • Reduce the need to develop new water supplies and water and wastewater treatment, distribution, collection, capital, and operations and maintenance costs • Improve aquifer water levels and supply reliability and mitigate impacts of future droughts. • Permits are not required for implementation 	<ul style="list-style-type: none"> • Cal Water's current conservation efforts depend upon voluntary compliance. Mandatory measures may be required in the future • Conservation more complex and gains more difficult to predict • Reduced consumption may increase customer costs due to the many fixed-cost elements of the municipal supply system 	Low to Medium

Table 4.5-1: Summary of Water Supply Alternatives			
<i>Name</i>	<i>Benefits</i>	<i>Implementation Issues</i>	<i>Costs</i>
Reclaimed Water Use	<ul style="list-style-type: none"> Increases the available supply, reducing the need for other sources Improves dry-year reliability Does not use higher quality drinking water for irrigation The SKF facility is already operating and potentially available 	<ul style="list-style-type: none"> Public acceptance of the reuse of effluent for landscape irrigation must be obtained Distribution system infrastructure needed, so cost will be high Must have storage to regulate year round effluent flows and meet demands during irrigation season. Concerns about water quality impacts to underlying aquifer 	High
Additional Surface Storage	<ul style="list-style-type: none"> Reduces the number of wells needed to meet maximum day demands Improves reliability of the overall water supply system by having a short-term backup source 	<ul style="list-style-type: none"> Construction costs may be large compared to aquifer recharge and subsurface storage Water quality impacts may be associated with impounded water 	High

Based on the preliminary screening, two options were screened from the supply strategy: reclaimed water use; and, additional surface storage. Reclaimed water use was screened from consideration given the distance of the SKF plant from the City of Selma, and the lack of existing reclaimed water distribution system infrastructure. Given these factors, use of reclaimed water would not be cost-effective for Cal Water to pursue.

Additional surface storage was screened from further consideration because it would be more expensive than providing wells. While storage is a cost-effective means of meeting diurnal variations in demand, when used to meet longer-duration demand, it quickly becomes cost-prohibitive.

Future supply options should center on installation of new groundwater wells, coupled with continuing water conservation efforts. Because the groundwater basin is in overdraft, aquifer recharge also needs to be an integral part of ongoing water supply development.

4.5.3 Water Supply Strategy

The water supply strategy recommended in the WS&FMP includes the following:

- a) Installing additional wells in Selma growth areas,
- b) Increasing aquifer recharge in the greater Selma area including obtaining additional surface water through transfer or exchange agreements with agricultural irrigation districts, and
- c) Implementing conservation measures to achieve the savings required under SB-7.

Each of these elements is discussed below.

New Supply Wells

Additional supply wells appear to be the most effective and reasonable means to meet increased future demand. Future well capacities in the Selma area are estimated to range from 600 gpm in the south part of the system to 800 gpm or more in the north part of the system. Estimates were developed based on 2005 well yield data. An analysis of the 2005 data found significant variability in pumping rates in individual wells, with a range in 2005 production from 400 to 1089 gpm. The analyses indicated that this variation is not related to well construction, age, depth, or efficiency, or to proximity to canals. Thus it is most likely related to local variations in aquifer properties. For planning purposes, new wells were assumed to have a yield of 700 gpm (i.e., 1 mgd).

Due the favorable hydrogeology, no major constraints exist for siting of wells. Four points are worth noting. First, projected growth areas will determine future well locations. Second, areas of potential contamination do exist, so wells should not be sited close to and down gradient from known contaminated sites. Third, preference should be given to siting additional wells near existing canals and infiltration facilities due to the recharge benefits. Fourth, due to draw-down considerations, wells should be sited tangentially to the ground water gradient.

Increased Aquifer Recharge

Increased aquifer recharge is vitally needed since aquifer water levels are expected to continue to decline over time. Increasing aquifer recharge will require assessment of additional infrastructure needs in the CID system (e.g., conveyance and percolation capacity) and evaluation of the availability of water sources for recharge (e.g., Section 215 water and water transfers). Potential use of planned stormwater detention ponds within the City should also be evaluated for their recharge potential.

A four-phased approach is recommended for Cal Water to partner with CID to implement a groundwater recharge program. Table 4.5-2 summarizes these phases, and an anticipated timeline. Each phase would include an evaluation and assessment by Cal Water as to the success in meeting program goals, and whether Cal Water should continue to pursue implementation.

Table 4.5-2: Recommended Approach for Developing Groundwater Recharge Program
<p>Phase 1 Conduct Feasibility Analysis to define options. Analysis would:</p> <ul style="list-style-type: none"> • Assess amount of water available • Determine conveyance and recharge alternatives ⁽¹⁾ • Estimate cost of water and conveyance • Identify preferred alternative(s)
<p>Phase 2 – Develop Provisional Agreement for Pilot Testing</p> <ul style="list-style-type: none"> • Agreement should identify funding, duration of testing, limitations, performance, monitoring and evaluation
<p>Phase 3 – Conduct Pilot Testing (CID)</p> <ul style="list-style-type: none"> • This phase would more clearly define the amount of water CID can obtain and its price, and assess impacts on groundwater levels in the Selma area. • Program elements would include obtaining, conveying and recharging the water; monitoring groundwater levels; determining potential yields; identifying constraints; refining costs and benefits for larger-scale

<p>program.</p> <ul style="list-style-type: none"> • Estimated duration – 3 to 5 years
<p>Phase 4 – Develop Agreement for and Implement Larger-Scale Program</p> <ul style="list-style-type: none"> • Agreement should identify funding, duration of program, limitations, performance, monitoring and evaluation. • Implementation, per agreement

⁽¹⁾ Projects identified in a 2007 Consolidated Irrigation District Urban Impacts study provide an initial basis for possible projects.

Conservation

For the near-term, Selma can increase the level of both residential and commercial/industrial water conservation through a variety of incentives and educational methods. Given that water conservation should be considered in the larger context of sound water management, water conservation planning needs to be integrated into as many aspects of local water resources planning as possible.

4.6 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 from the domestic or industrial wastewater streams in the District. Indirect recycling occurs through the recharge of groundwater. The potential amount of recycled water that can be produced is proportional to the amount of wastewater that is generated by the District, and is discussed in the following sections.

4.6.1 Wastewater Collection

The Selma-Kingsburg-Fowler County Sanitation District (SKF) operates and maintains the sewer system consisting of gravity sewers and pumping stations. The residential, commercial, and industrial wastewater is all conveyed to the SKF Wastewater Treatment and Disposal Facilities.

4.6.2 Estimated Wastewater Generated

In 2006 the Selma-Kingsburg-Fowler County Sanitation District performed a Sanitary Sewer Flow Monitoring and Inflow/Infiltration Study. According to this study Selma contributes 2.3 MGD, or 53 percent, of the average dry weather inflow to the treatment plant. To estimate projected wastewater flows this 2.3 MGD was escalated at the same rate as the rate of service connection growth and converted to acre-feet. Cal Water assumes that Selma will continue to contribute the same percentage of inflows over time. Using this calculation, the estimated volume of wastewater generated for the District in five-year increments to the year 2040 is presented in Table 4.6-1. Total inflows from the Selma area will likely be greater due to rain events, but for this UWMP only direct inputs from Cal Water customers were considered.

Table 4.6-1: Disposal of wastewater (non-recycled) AF Year (Table 34)

Method of Disposal	Treatment Level	2010	2015	2020	2025	2030	2035	2040
Percolation/evaporation ponds	Secondary treatment	2,955	3,266	3,612	3,994	4,419	4,891	5,415

4.6.3 Potential Water Recycling

It is anticipated that opportunities to partner with Selma-Kingsburg-Fowler County Sanitation District SKF as they consider adding additional facilities to their wastewater plant, located approximately 5 miles south of Selma, would be advantageous to Cal Water only if other partners join so as to reduce the cost of treatment and conveyance. As of 2004, agricultural users have expressed negative interest in participation citing public perception issues.

Cal Water does not anticipate acquiring recycled water customers for the Selma Wastewater Treatment and Disposal Facilities in the near future. Using recycled water is not considered economically viable given the anticipated extra costs for treatment and distribution. Therefore, the projected recycled water supply for Cal Water's Selma 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 they do not own and operate the wastewater system. The implementation of a recycled water program here will need to involve longer-term measures and require regional participation by other agencies.

4.7 Desalinated Water

There are no opportunities for the development of desalinated water in the District. Selma is located in the Central San Joaquin Valley at a great distance from any potential sources of saline water.

4.8 Transfer or Exchange Opportunities

As noted in Section 4.2, Cal Water could enter into either permanent or interruptible transfer agreements with farmers or agencies outside of CID. This could secure additional supplies for the Selma District and increase the reliability of overall supply in the system. Permanent transfers from local farmers are not possible because CID retains the water rights.

4.9 Water Supply Projects

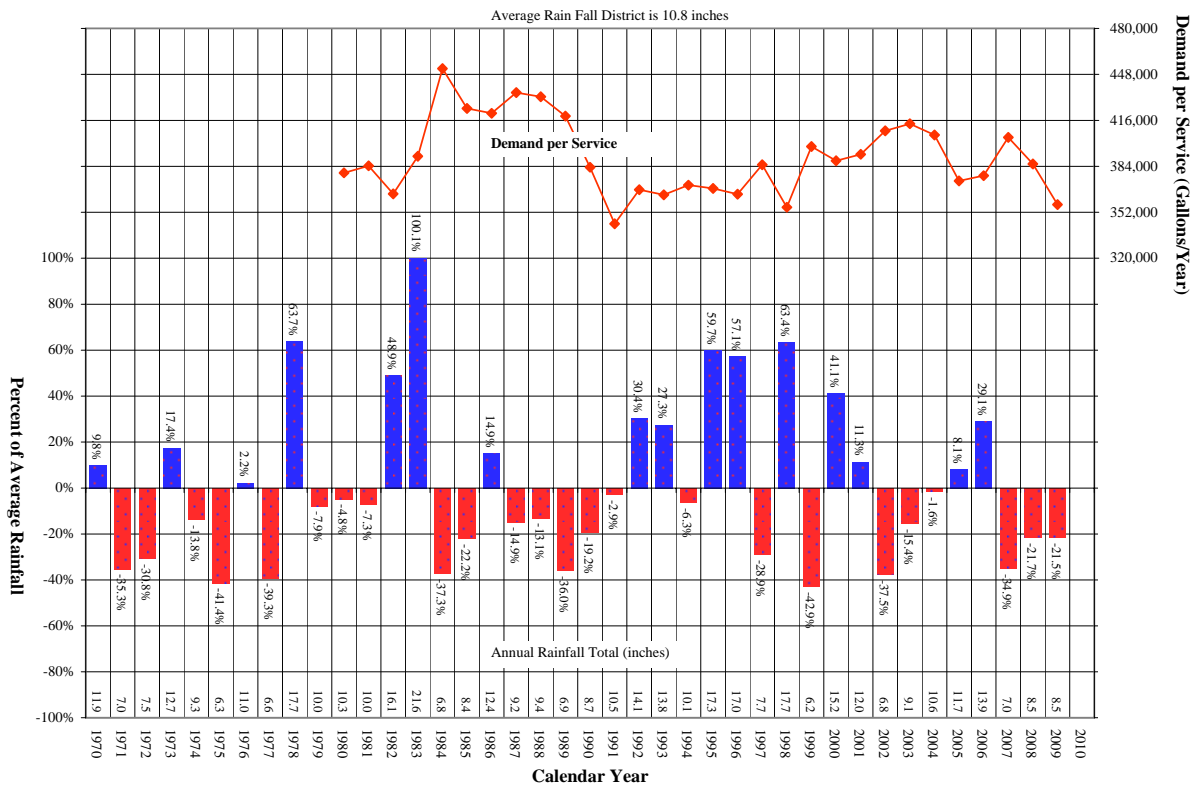
The makeup of the water supply delivered to the customers of Cal Water's Selma District is not expected to change considerably in the future. Based on the previously discussed water supply strategy, groundwater will likely continue to be the only source over the planning horizon of this UWMP. Cal Water will construct additional wells and distribution facilities to meet the anticipated increases in future demand as needed. However, no new sources that would require additional projects are planned.

5 Water Supply Reliability and Water Shortage Contingency Planning

5.1 Water Supply Reliability

Because the Selma District relies only on groundwater it is difficult to define an exact supply available in any given type of hydrologic year. Storage in the groundwater basin will provide a buffer against years with decreased precipitation while wetter years will recharge natural supplies. As a result Cal Water can not compare total supply volumes as it would in areas that are supplied either by local reservoirs or by imported surface water. Because we have made the assumption that the total supply will equal demand, the annual hydrologic variation can be discussed in terms of overall demand. In general, water use tends to increase during drier years as potable water is used for purposes that would normally be supplied by natural precipitation, such as outdoor landscape irrigation. The variation in annual rainfall since 1970 is shown in Figure 5.1-1. The average annual rainfall for the District is 10.8 inches.

Figure 5.1-1: Comparison of Annual Rainfall to Historical Average



The rainfall totals shown in the graph above can be compared with the water level measurements in Figure 4.4-1 to show the effect of rainfall trends on the water levels in wells. The drought of 1987 to 1992 showed a 40 foot decline in water levels for the District. Following this period, average to above average rainfall totals results in water levels approaching near pre-drought levels. However, from 2006-2009, below average

precipitation and increasing pumping has resulted in declining water levels in the wells. The result has been an overall downward trend over the past 30 years. Historically, water levels had remained relatively constant as extended drought events were tempered by later wet years, which replenished groundwater supplies. Moving forward, increased recharge will likely be necessary to provide a sustainable groundwater supply.

5.2 Drought Planning

For the purposes of this analysis 2004 was chosen as the most recent normal hydrologic year when rainfall was 2 percent (10.6 in) below average. 1999 was chosen as the single dry year because preceded and followed by wet years, and had a rainfall of 42.9 percent (6.2 in) below average. The multiple dry year range used in this analysis was from 1988-1991, which coincides with the extended drought California experienced during this time.

Water Year Type	Base Year (s)
Average Water Year	2004
Single-Dry Water Year	1999
Multiple-Dry Water Years	1988-1991

The normal method of comparing dry year supply to average conditions doesn't work as well in an area supplied only by groundwater as it would in areas with a surface supply. Because groundwater is the sole source the Selma District's dry year supply is buffered by the relatively large amounts of storage present in the basin. If the assumption that the total available supply will equal the total demand in any year is made, comparing the supplies in past years doesn't usually provide meaningful results. The primary reason for this is that growth within the service area leads to increased demands over time, regardless of hydrologic conditions. And because the Selma District is growing at a relatively rapid rate, demand has increased dramatically over short time periods.

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 increases at the beginning of the drought and 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
405,834	397,845	432,484	418,916	383,392	343,979
% of Normal	98%	107%	103%	94%	85%

For the reasons described above, groundwater supplies are not limited during dry hydrologic years. An adequate supply to meet customer demands is expected to be available 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 minimum supplies that would be available in a multiple dry year event from 2011-2013, starting with a normal year in 2010. The supply amounts were calculated by applying the percentages from years 1-3 in Table 5.2-2 to the 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
Groundwater	7,400	7,916	7,697	7,066
% of Normal Year	100%	107%	104%	95%

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.

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, therefore groundwater is the only supply source. Table 5.2-4 indicates that groundwater will be reliable throughout the planning horizon of this UWMP and that no supply deficiencies are expected.

	2015	2020	2025	2030	2035	2040
Supply totals	7,675	7,589	8,415	9,335	10,356	11,495
Demand totals	7,675	7,589	8,415	9,335	10,356	11,495
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

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. The supply and demand values shown in Table 5.2-5 were calculated by increasing the target demand projection in each year by the percentage listed for the single dry year in Table 5.2-2. In this case, water use in the single dry year was lower than in the normal year. Again, Cal Water assumes that the total supply will equal the demand in all future years. Therefore, the supply is 100 percent reliable in single dry years.

	2015	2020	2025	2030	2035	2040
Supply totals	7,524	7,439	8,249	9,151	10,152	11,269
Demand totals	7,524	7,439	8,249	9,151	10,152	11,269
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 SBx7-7 target demand projection for that year by the percentages listed in Table 5.2-2 for the multiple dry year scenario. Again, no supply deficiency is expected.

		2015	2020	2025	2030	2035
Multi-dry year first year supply	Supply Totals	8,063	8,087	8,967	9,948	11,036
	Demand Totals	8,063	8,087	8,967	9,948	11,036
	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	Supply Totals	7,912	7,997	8,867	9,837	10,916
	Demand Totals	7,912	7,997	8,867	9,837	10,916
	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	Supply Totals	7,228	7,472	8,286	9,192	10,199
	Demand Totals	7,228	7,472	8,286	9,192	10,199
	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 record shows that the demand can be met by the supply, several factors that could negatively affect the reliability are listed in Table 5.3-1.

Name of supply	Legal	Environmental	Water Quality	Climatic
Groundwater	✓		✓	✓

If overdraft solutions are not agreed upon it is possible that basin adjudication could occur. At this point it is impossible to know how this would affect Cal Water's ability to pump groundwater. But limitations could be imposed. Also, any legal objection to the City of Selma's growth would likely prohibit Cal Water's ability to serve additional customers.

Any water quality impairment could impact Cal Water's operations and reduce pumping in certain wells until treatment could be installed or new wells were constructed. Specific water quality issues are addressed in the following section.

Any climatic variation that causes a reduction in the amount of groundwater replenishment will negatively affect water levels in the basin. A long term reduction would eventually either necessitate the lowering of pumps, the loss of wells, or the installation of new wells, and might ultimately reduce the amount of water available for pumping.

5.4 Water Quality

The drinking water delivered to customers in the Selma District, whether its source was groundwater or imported water, 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 quality of the groundwater produced by the District's active wells can vary depending on location. Nitrates are a concern as well as Dibromochloropropane (DBCP). Water produced from several wells has been tested to contain concentrations that exceed the MCL for DBCP. However, in all cases these wells were either taken out of service or treatment facilities were installed to remove the contaminant. The presence of this organic chemical contaminant in District wells raises a concern regarding the future availability of other wells not currently impacted. Contaminant migration of this pesticide with groundwater movement could force the closure of other wells.

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

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

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

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

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
<p>4. Critical</p> <p>35 to 50+ Percent Shortage</p> <p>Up to and above a 50 percent Reduction Goal</p> <p>Mandatory Reductions</p>	<p>Cal Water will:</p> <p>Increase or continue all actions from previous stages.</p> <p>Discontinue service for repeat offenders.</p> <p>Monitor water use weekly for compliance with reduction targets.</p> <p>Prohibit potable water use for landscape irrigation.</p>

5.5.6 Water Supply Conditions and Trigger Levels

In many of Cal Water’s service districts at least a portion of the supply is provided by purchased water imported through a wholesale water agency. In these cases the wholesaler generally sets reduction targets based on their supply portfolio for the year, and Cal Water’s Water Shortage Allocation Plan will be triggered by these agencies. The Selma District does not receive any purchased water from wholesale agencies and instead must rely on groundwater as the sole source of supply. As a result setting triggering mechanisms is more difficult. Because of the large storage capacity of the aquifers surrounding the Selma District acute water shortages during droughts are unlikely.

However, Cal Water recognizes that prudent management of groundwater 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.

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. The City of Selma has passed a water conservation ordinance, which is also 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.

Because of Visalia's relative geographical isolation, Cal Water does not currently have the ability to form inter-connections with neighboring water utilities for emergency purposes. Several small mutual water companies exist in the area but none have sufficient supply capacities to meet the demand requirements of Cal Water's customers

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 Selma 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 Selma District has a gross savings requirement of 504 AF from 2011-2015, as shown in Table 6.3-1.

Gross Water Savings Required by 2015	SBx7-7	MOU Flex Track
2015 Unadjusted Baseline Demand	8,199 AF	8,199 AF
2015 Target Demand	7,695 AF	8,189 AF
Gross Savings Requirement	504 AF	10 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. Because Selma District is part of a regional alliance, the amount of water savings needed for SBx7-7 compliance may turn out to be less than the amount shown in the table. Also, some of the reduction in baseline demand needed to achieve SBx7-7 and MOU compliance will come from efficiency codes, response to adjustments in rates, and savings from past program implementation. The remainder 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 Selma 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, meter conversions, and existing conservation programs are shown in Table 6.3-2.

Adjusted Baseline (AF)	2011	2012	2013	2014	2015
Unadjusted Baseline	7,553	7,712	7,871	8,035	8,199
Less Savings from					
Codes	10	20	29	38	51
Schedule Rate Increases	33	64	92	86	73
Existing Programs & Meter Conversion	97	126	179	231	284
Adjusted Baseline Demand	7,413	7,502	7,571	7,679	7,791
Per Capita (GPCD)	253	251	248	246	245

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 242 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 fall short of the 2015 gross savings requirement by about 96 AF and new program savings would need to reach this level to achieve district-specific SBx7-7 compliance in 2015. Approximately 2 AF of additional water savings are required by 2015 in order for the district to meet its MOU Flex Track target.

2015 Net Savings Requirement (AF)	SBx7-7	MOU Flex Track
Gross Savings Requirement	504	10
Less		
Savings from codes	51	NA
Savings from rates	73	NA
Savings from existing programs	<u>284</u>	<u>-8</u>
<i>Subtotal Expected Savings</i>	<i>-409</i>	<i>-8</i>
Savings Required from New Programs¹	96	2

¹Negative net savings indicates that no new program savings required for compliance

While the forgoing analysis indicates that Selma District requires only a modest amount of additional water savings for SBx7-7 or MOU compliance in 2015, this depends to a large extent on the realization of estimated water savings from converting flat rate customers to metered billing plus the scheduled changes in rates. If these savings turn out to be less than estimated, the district will require additional conservation program savings for compliance. Moreover, additional conservation is needed to help with groundwater overdraft. The next section describes the analyses undertaken to identify the best mix of new conservation programs to meet these district demand management objectives.

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 Selma 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 Selma 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 Selma 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, after accounting for water savings from existing water efficiency codes and ordinances, scheduled adjustments to water rates, and past investment in conservation programs, Selma District still needs an additional 96 AF of demand reduction to meet its 2015 SBx7-7 per capita water use target. It also showed that an additional 2 AF of water savings from new programs would be required to satisfy MOU compliance requirements in 2015. Moreover, in order to reach its 2020 SBx7-7 per capita water use target, 2020 demand will need to fall an additional 11 percent from the 2015 target. The program recommendations presented in this section are designed to both meet the district’s 2015 targets and position it to achieve the 2020 targets by establishing a set of programs that can be scaled up over time. For

the Selma 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	70	70	70	90	90
Toilets	60	60	60	60	60
Clothes Washers	0	0	0	0	0
Urinals	70	70	70	70	70
Customer Surveys/Audits	110	110	110	110	110
Conservation Kit Distribution	1,100	1,100	1,100	3,300	3,300
Pop-Up Nozzle Distribution					
NON-CORE PROGRAMS					
Direct Install Toilets/Urinals	140	140	140	130	130
Smart Irr. Controller Vendor Incentives	90	90	90	10	10
Large Landscape Water Use Reports	30	30	30	40	40
Large Landscape Surveys/Incentives	10	10	10	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. By 2015 projected water savings are approximately 117 AF. Programs impacting residential water demands account for approximately three-fourths of these savings, while programs impacting commercial, industrial, and irrigation demands account for one-fourth.

Table 6.5-2: Projected Water Savings by Program					
Program	Annual Water Savings (AF)				
	2011	2012	2013	2014	2015
CORE PROGRAMS					
Rebates/Vouchers					
Toilets	2.1	4.1	6.0	9.5	12.7
Clothes Washers	1.0	2.0	3.0	3.9	4.8
Urinals	0.0	0.0	0.0	0.0	0.0
Customer Surveys/Audits	2.5	4.7	6.7	8.5	10.1
Conservation Kit Distribution	1.7	3.1	4.4	5.5	6.5
Pop-Up Nozzle Distribution	4.4	8.8	13.2	26.4	39.6
Subtotal Core Programs	11.7	22.7	33.3	53.8	73.7
NON-CORE PROGRAMS					
Direct Install Toilets/Urinals	5.0	9.7	14.3	18.2	22.0
Smart Irr. Controller Vendor Incentives	2.9	5.7	9.1	9.1	9.1
Large Landscape Water Use Reports	2.8	2.8	2.8	4.5	4.5
Large Landscape Surveys/Incentives	0.5	1.0	1.5	2.0	2.4
Commercial Kitchen Rebates/Vouchers	0.0	0.0	0.0	2.5	4.9
Cooling Tower/Process Water Retrofit Incentives	0.0	0.0	0.0	0.0	0.0
Subtotal Non-Core Programs	11.1	19.2	27.6	36.2	42.9
Total Core and Non-Core Program Savings	22.7	41.9	61.0	90.0	116.7

Based on the above analysis the district is projected to achieve its district-specific 2015 SBx7-7 compliance target 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 there will be a linear reduction in GPCD from 2015-2020 to achieve the district-specific 2020 SBx7-7 compliance target. Programs required to achieve 2020 SBx7-7 compliance will be outlined in the next Conservation Master Plan for the district, which will be included in the 2015 UWMP. 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 Selma 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 adaptation 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.

Mitigation

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.

Adaptation

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

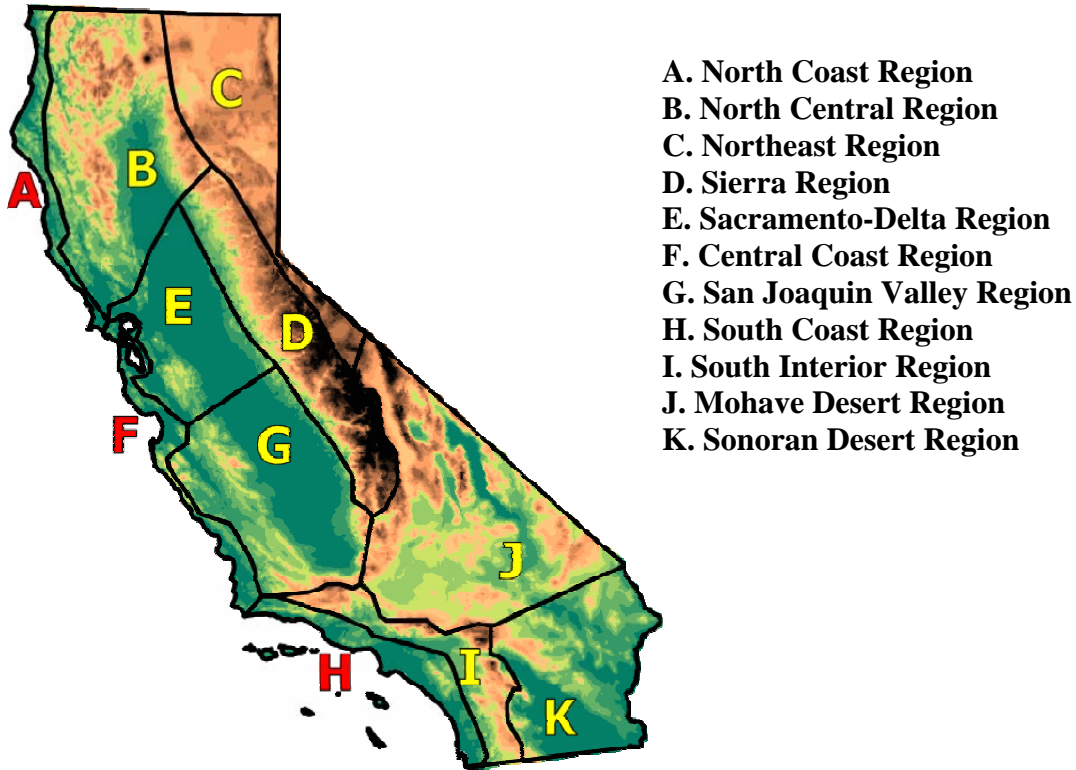
Even in the near term of the next 20 years, DWR has outlined potential climate change effects to water supplies, water demand, sea level, and the occurrence and severity of natural disasters. Some of these potential changes are presented below. Cal Water will investigate the following climate change 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 by unique characteristics, and is shown in Figure 7.4-1.

Figure 7.4-1: The Climate Regions of California⁷



Cal Water has water service districts in 7 out of 11 of the climate regions. The Selma District is located in the San Joaquin Valley 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
Mojave Desert Region	Antelope Valley
Sonoran Desert Region	None

⁷ http://www.wrcc.dri.edu/monitor/cal-mon/frames_versionSTATIONS.html

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 0.33°F, 2.42°F, and 1.37°F, respectively. More recently, since 1975, the maximum, minimum, and mean temperature departures have increased 2.70°F, 5.36°F, and 4.03°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 San Joaquin Valley

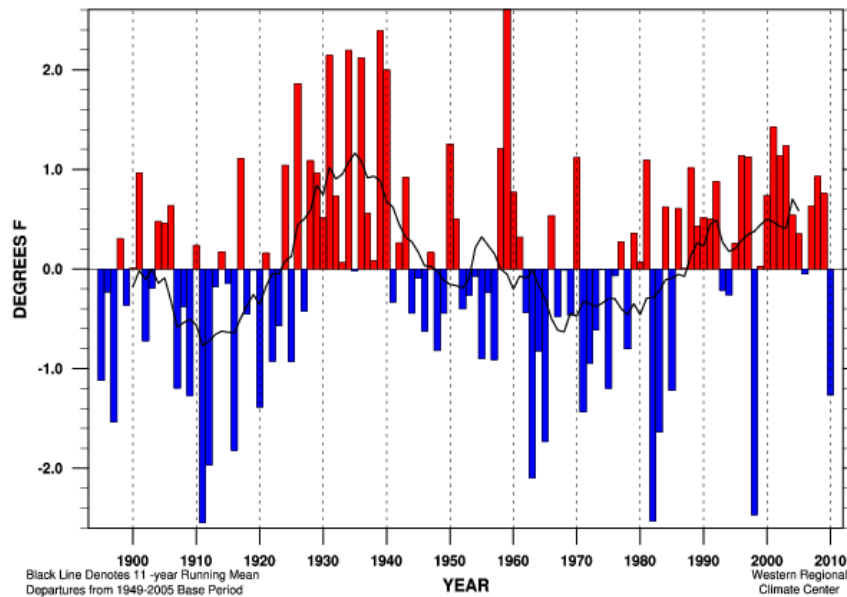


Figure 7.4-3: Mean Temperature Departure for San Joaquin Valley

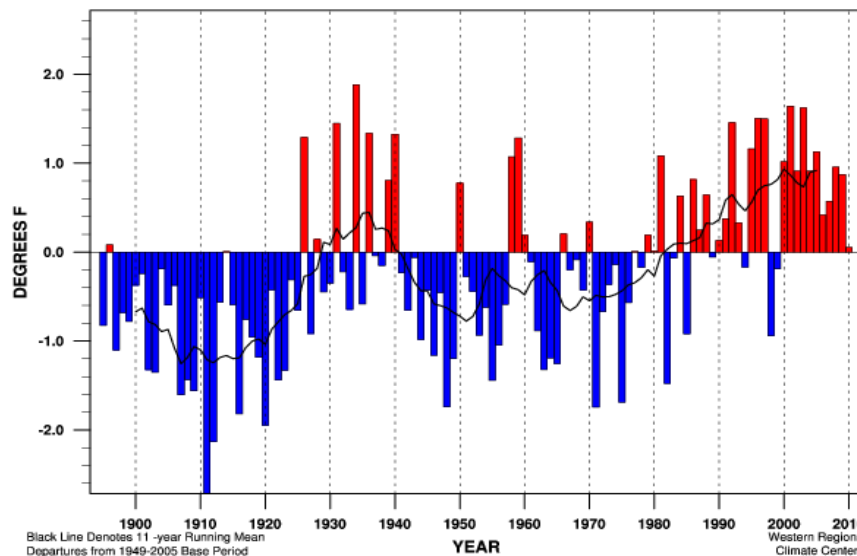
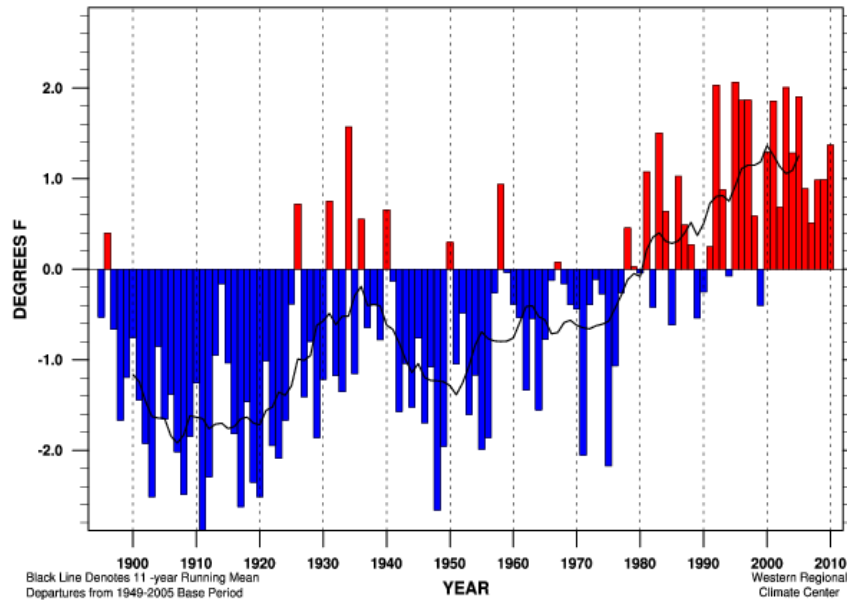
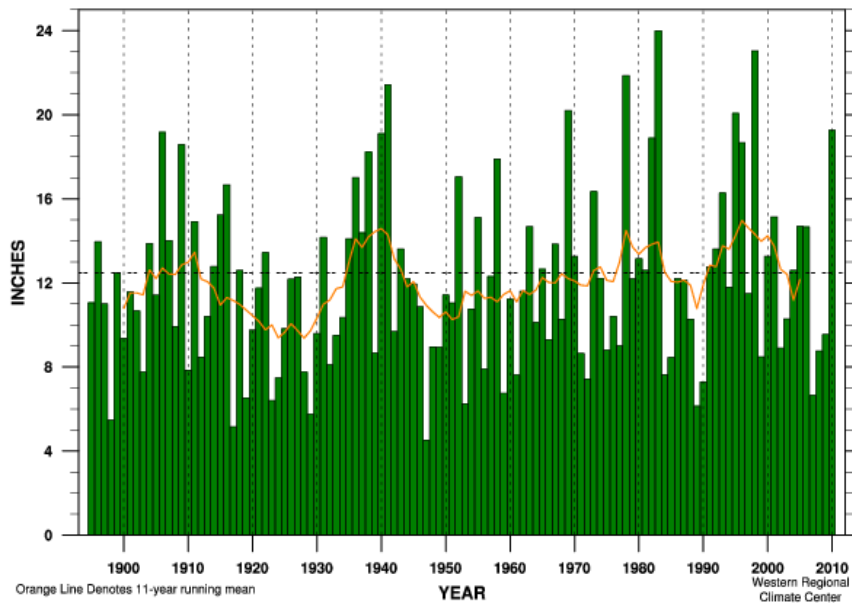


Figure 7.4-4: Minimum Temperature Departure for San Joaquin Valley



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 San Joaquin Valley



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 DWR 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)		4.5 & 4.8
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		6.4
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		4.7
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
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		4.6
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		4.6.1
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		4.6.2
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		4.6.3
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		4.6.3
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		4.6.3

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		4.6
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		4.6
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		5.2.4
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
<p>^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.</p>					
<p>^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.</p>					

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, AND LOCAL ORDINANCE**

APPENDIX F: WATER EFFICIENT LANDSCAPE GUIDELINES

APPENDIX G: CONSERVATION MASTER PLAN

APPENDIX H: CID GROUNDWATER MANAGEMENT PLAN
