California Water Service Company

2010 Urban Water Management Plan

Chico-Hamilton City 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 1.7 million Californians through 435,000 connections. Its 24 separate water systems serve 63 communities from Chico in the North to the Palos Verdes Peninsula in Southern California. California Water Service Group, Cal Water's parent company, is also serving communities in Washington, New Mexico, and Hawaii. Rates and operations for districts located in California are regulated by the California Public Utilities Commission (CPUC). Rates are set separately for each of the systems. Cal Water incorporated in 1926 and has provided water service to the Chico-Hamilton City (Chico) community since 1926.

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

Cal Water conducted a formal public meeting to present information on its Chico District UWMP on May 11, 2011 from 2:00-4:00 p.m. at the following location:

California Water Service Company
Chico District Customer Service Center
2222 Dr. Martin Luther King Jr. Pkwy
Chico, CA 95928

Proof of the public meeting is presented in Appendix A.

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 Chico				✓	✓	✓	
City of Hamilton City				✓	✓	✓	
Butte County Department of Water and Resources	✓		✓	✓	✓	✓	
Glenn County Planning Division				✓	✓	✓	
Glenn County Water Advisory Committee				✓	✓	✓	

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

1.4 Water Management Tools

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

- Computerized Hydraulic Model for analysis of various operating conditions within the water distribution network and for planning operational and facility improvements. For smaller systems, a simple model is maintained that only models trunk lines, key sources, and major delivery points.

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

1.5 Plan Organization

This plan is organized as described in the following outline. The corresponding provisions of the California Urban Water Management Planning Act are included as references. Tables in this plan have cross-references to the tables as listed in the "Guidebook to Assist Water Suppliers to Prepare a 2010 Urban Water Management Plan" prepared by the California Department of Water Resources.

Section	Table 1.5-1: Plan Organization	Act Provision
Contact Sheet	List of Contact Persons	-
Section 1	Plan Preparation This section describes the requirement and the purpose of the Urban Water Management Planning Act, coordination, plan adoption, schedule, and management tools.	§10620 (d)(2) §10621(a -b) §10635(b) §10642 §10643 §10644 (a) §10645

Section	Table 1.5-1: Plan Organization	Act Provision
Section 2	System Description This section describes the District service area and includes area information, population estimate, and climate description.	§10631 (a)
Section 3	System Demands This section describes the water supply projection methodology used to estimate water demands and supply requirements to 2040. It also includes a discussion of SBx7-7 baselines and targets.	§10631 §10608.20(e)
Section 4	System Supplies This section includes a detailed discussion of the water supply sources.	§10631 §10633 §10634
Section 5	Water Supply Reliability and Water Shortage Contingency Planning This section includes a discussion of the water supply reliability and describes the District's planning for water shortages during drought and emergency situations.	§10620 §10631 (d) §10632 §10634 §10635 (a)
Section 6	Demand Management Measures This section describes Cal Water's conservation programs.	§10631
Section 7	Climate Change This section contains a discussion of climate change.	
Section 8	DWR Checklist This section includes the completed DWR UWMP Checklist.	
Appendix A	Resolution To Adopt The Urban Water Management Plan This section includes the following: 1) Resolution 2) Letters to and comments from various agencies 3) Minutes from the public meeting 4) Correspondence between Cal Water and participating agencies.	§10621 (b) §10642 §10644 (a)
Appendix B	Service Area Map This appendix includes the service area map of the District as filed with the Public Utilities Commission.	-
Appendix C	Water Supply, Demand, And Projection Worksheets This section includes the spreadsheets used to estimate the water demand for the District.	-
Appendix D	DWR Groundwater Bulletin 118 Sections from the Department of Water Resources Bulletin 118 are included as reference and provide details of the basin for the District.	§10631 (b)(1-4)
Appendix E	Tariff Rule 14.1 Water Conservation And Rationing Plan This section contains the tariff rule for reference.	-
Appendix F	Water Efficient Landscape Guidelines This section contains the Guideline for Water Efficient Landscape that Cal Water uses at its properties, including renovations.	-
Appendix G	Conservation Master Plan This section contains the District's Conservation Master Plan.	§10631 (j)
Appendix H	Butte County Groundwater Management Plan This section contains the Management Plan.	§10631 (b)(1-4)

1.6 Implementation of Previous UWMP

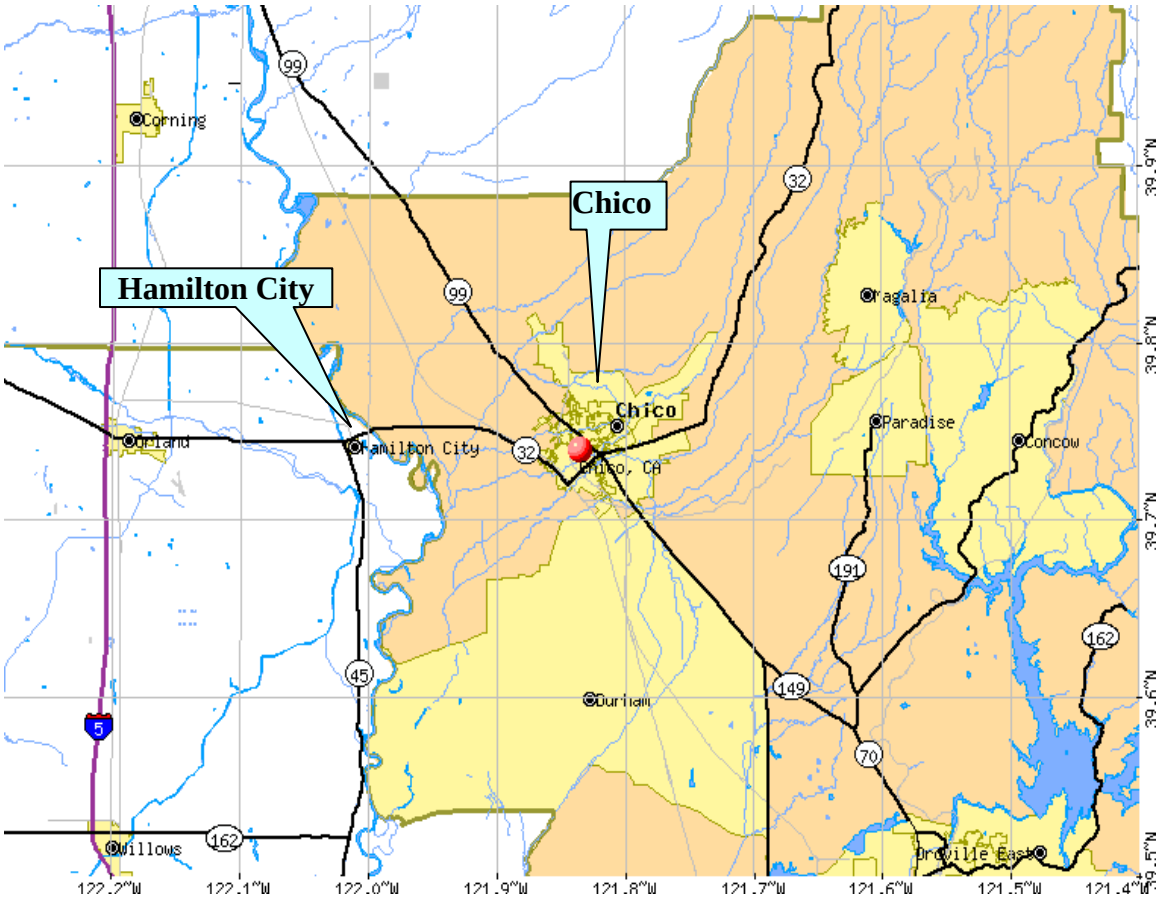
Cal Water will follow the California Water Code and file an UWMP at least once every five years on or before December 31, in years ending in five and zero. Since Cal Water operates 24 separate service districts the UWMP for each district has historically been submitted every third year to coincide with 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 Chico was last submitted as part of the 2007 grouping. Cal Water has since eliminated these groupings and will now file a GRC for all districts every third year and a UWMP every fifth year.

2 System Description

2.1 Service Area Description

The Chico-Hamilton City District is located in both Butte and Glenn Counties; Chico in Butte and Hamilton City in Glenn County. The District is situated in the Sacramento River hydrologic region, within the Northeast Valley sub-area. The District is approximately 80 miles north of the City of Sacramento. Figure 2.1-1 shows a general location map of the District[1].

Figure 2.1-1: General Location of Chico-Hamilton City District – Butte/Glenn Counties

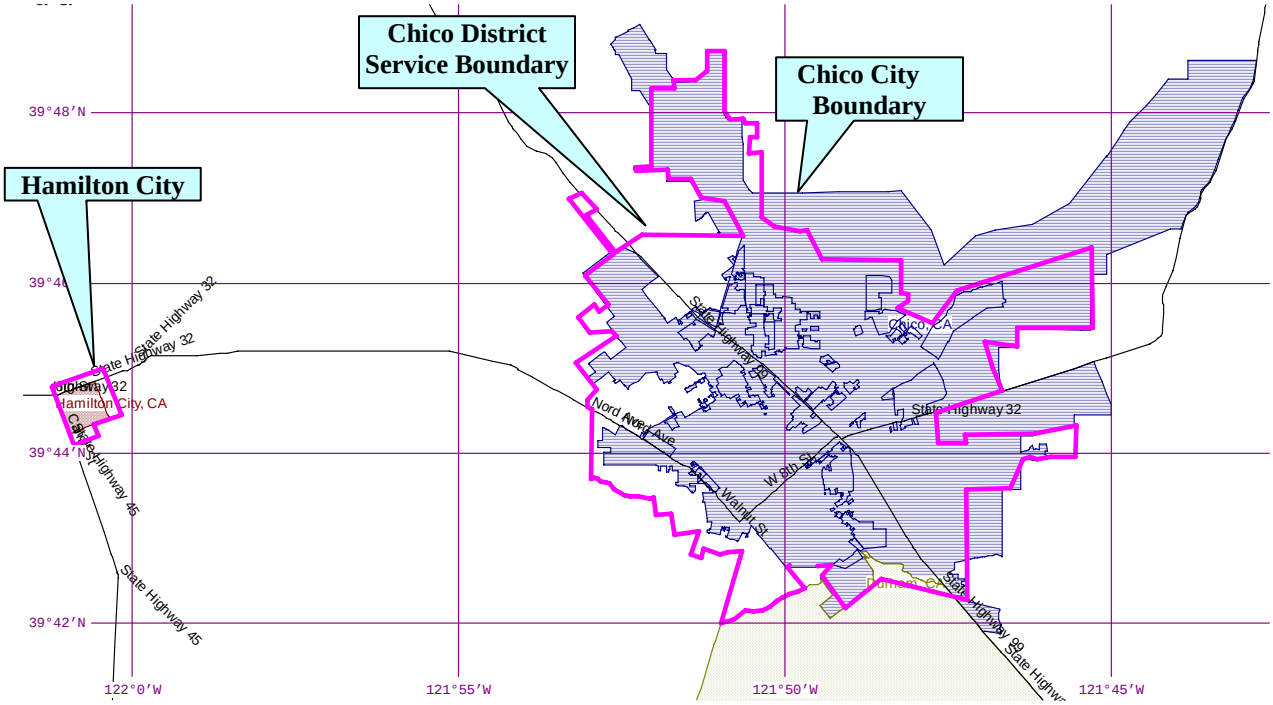


[1] Source: http://www.city-data.com/city/Chico-California.html

The service area is built upon the alluvium of the Sacramento River flood plain, near the confluence of Big Chico Creek and the Sacramento River. The area's climate is mild, with an average temperature of 61.0° F and an average rainfall of 25.7 inches.

The District serves the City of Chico, Hamilton City, and portions of unincorporated Butte County. Unincorporated properties of Butte and Glenn counties surround the District. The Hamilton City system is a small isolated system located approximately ten miles to the west of the City of Chico. There is no hydraulic connection between the two systems. For the purposes of this UWMP, the data for these two systems has been combined. The service area boundary is shown in Figure 2.1-2.

Figure 2.1-2: General Service Area

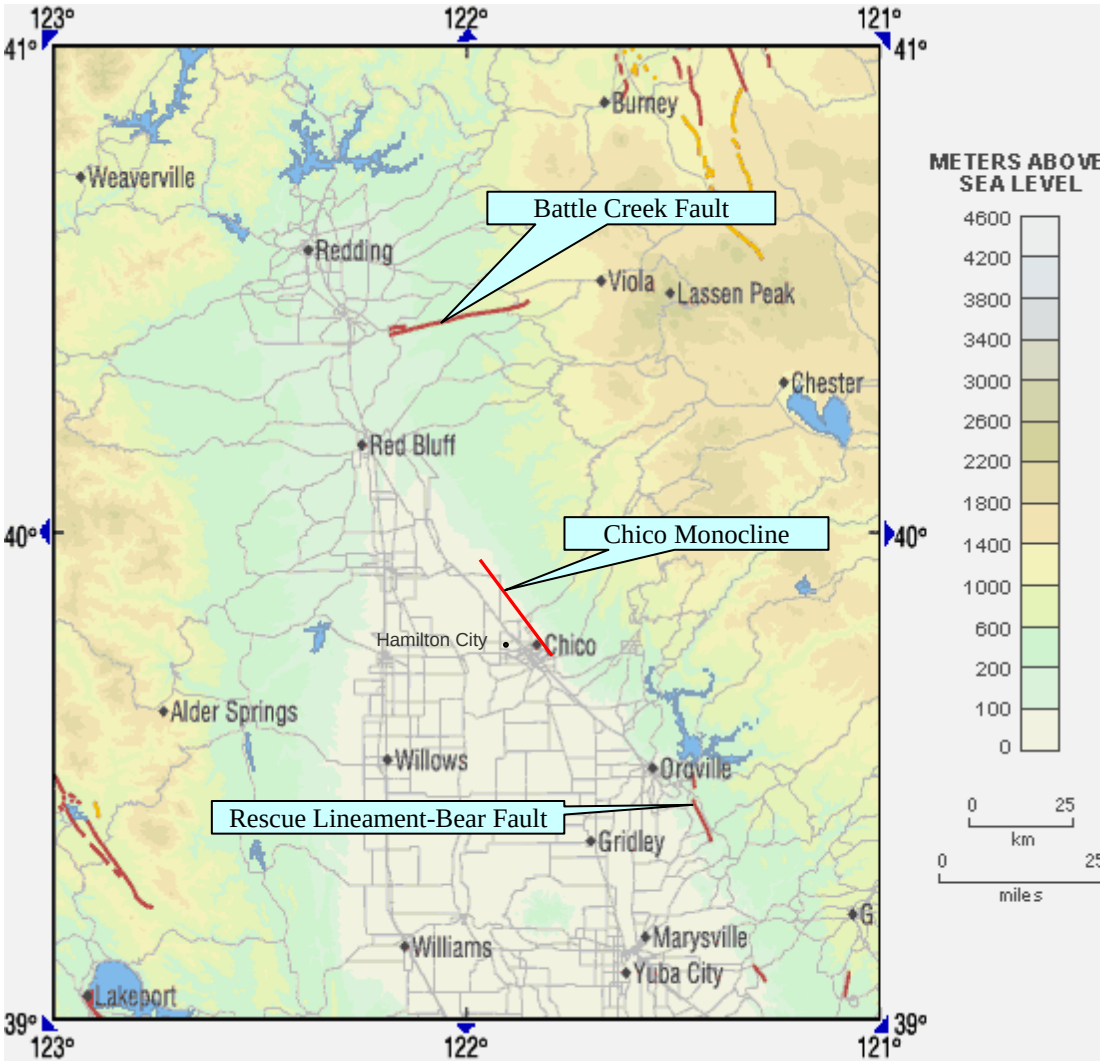


Major transportation links in the District include the Golden State Highway (State Route 99) and State Route 32. The Southern Pacific Railroad provides rail service to the region; it runs through Chico parallel to State Route 99. The Chico Municipal Airport is located to the north of the City.

Geologically, the area is primarily part of the flood plain for the Sacramento River. A concealed fault system known as the Chico Monocline is located to the east of town as shown in Figure 2.1-3. While this fault is inactive and shows only minor signs of offset, it appears to be a major tectonic boundary. Lassen Peak, a dormant volcano that last erupted in 1914, is located approximately 50 miles to the northeast.

As they flow through the center of Chico, the Big Chico and Little Chico Creeks provide drainage basin outlets for the northwestern Sierra Nevada Mountains. The Sacramento River channel lies between Chico and Hamilton City, located about one mile east of Hamilton City.

Figure 2.1-3: Major Fault Lines near the Chico-Hamilton City District[2]



[2] http://earthquake.usgs.gov/earthquakes/recenteqscanv/FaultMaps/122-40.html

2.2 Service Area Population

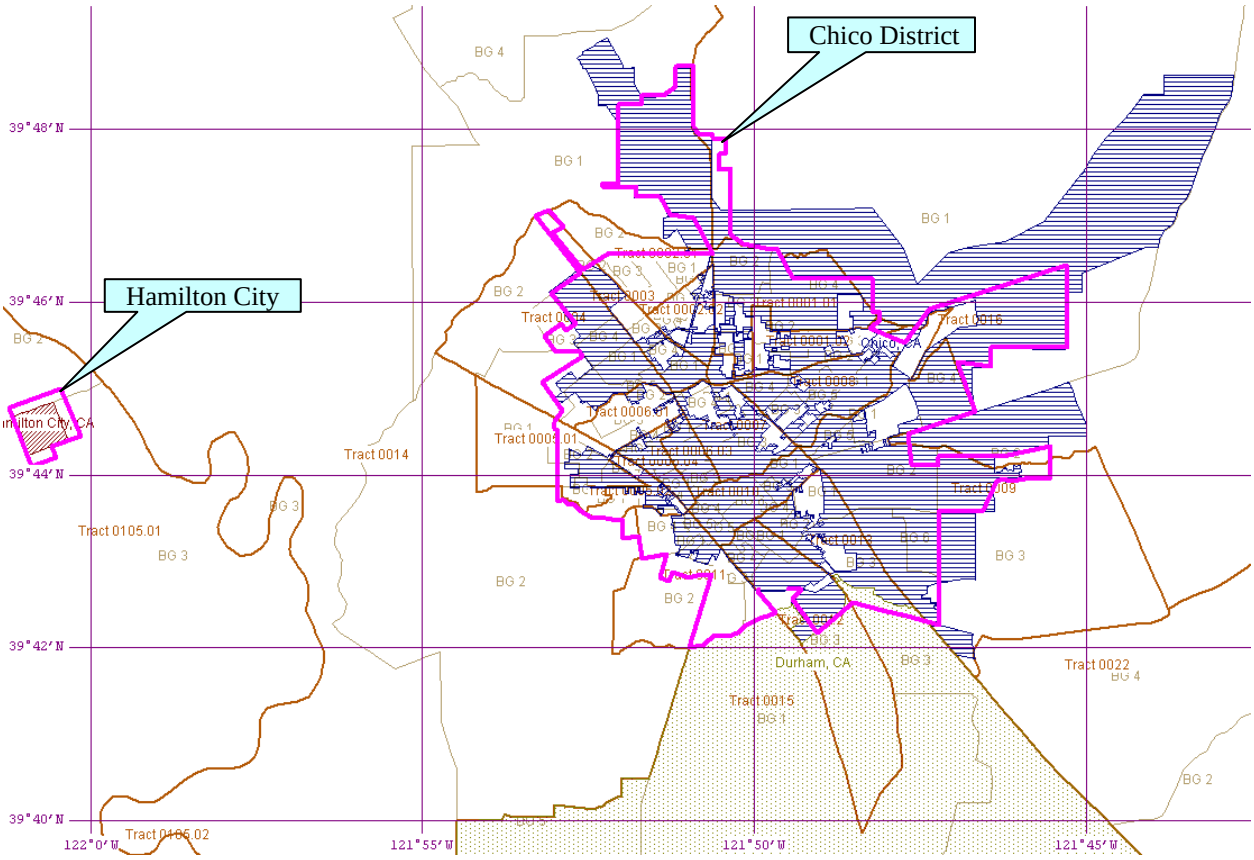
Cal Water's Chico District is growing at a rate of 1.39 percent based on growth in total services over the past five years. Based on available space and past experiences a similar rate of growth is expected to continue into the future. The ten year average growth rate is 2.00 percent.

The Chico and Hamilton City systems are surrounded by and include large undeveloped parcels. Many of these have been used for agricultural functions, but as urban development encroaches, the use of this land for agriculture diminishes. The City of Chico has established a Green Line prohibiting development to the west, protecting fertile agricultural lands.

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 99,630. A density of 3.1 persons per residential service (single family services plus multifamily units) was used for this estimate.

The process for estimating population in the Chico 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 Map



A summary of the census data for the year 2000 is shown in Table 2.2-1. LandView 5 and MARPLOT ® software were used to generate the data[3].

Table 2.2-1: Summary of Census 2000 Data			
	Census Blocks	**Population**	**Housing Units**
Chico Service Area	1,040	83,005	34,460
Hamilton City	35	2,066	589

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

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

density value. This density was then multiplied by the number of Cal Water services in each future year.

To establish a range of future service counts the five-year, ten year, and Master Plan projected growth rates for each service type were continued through 2040. The five-year average is the short-term growth rate, calculated from 2005 to 2009, which has an overall annual average growth rate of 1.39 percent. The ten-year average, the long-term growth rate calculated from 2000 to 2009 exhibits an overall annual average growth rate of 2.00 percent. As shown in Figure 2.2-2, the five-year growth rate has the strongest correlation with the historical trend.

Figure 2.2-2: Historical & Projected Services

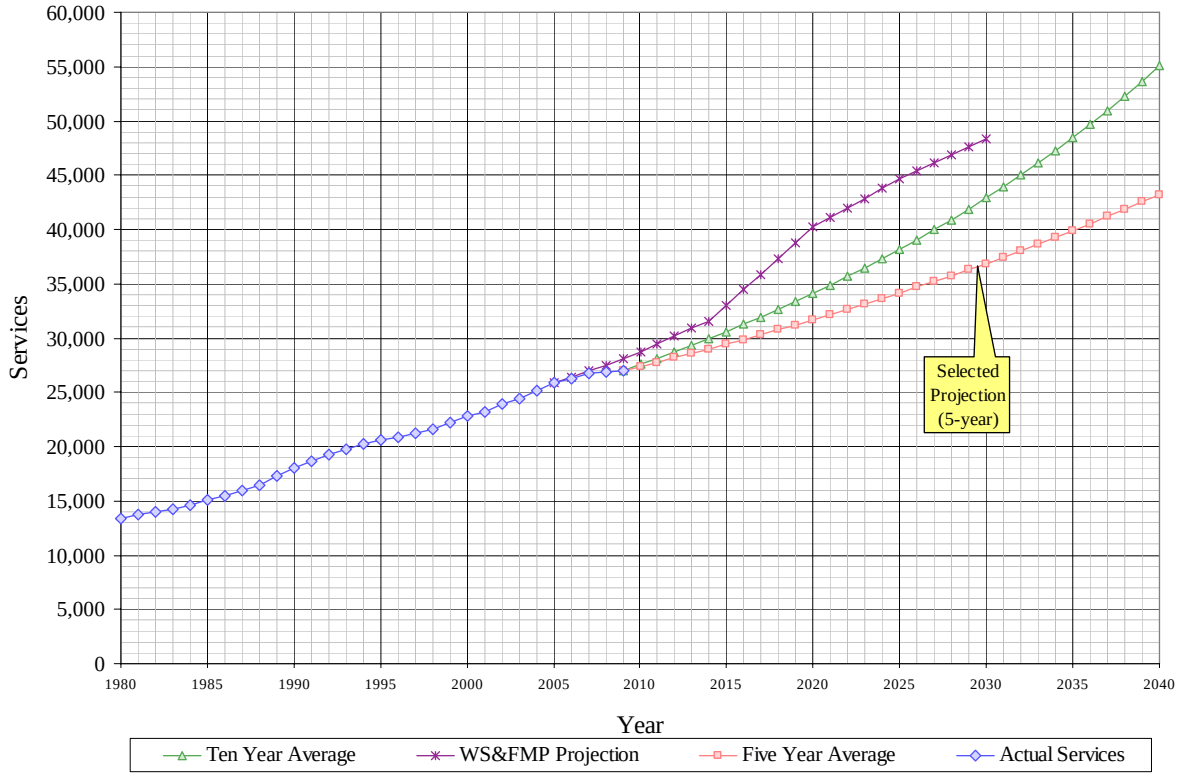


Figure 2.2-2 also shows the projected services that were estimated based on the Water Supply and Facilities Master Plan. The Master Plan shows the projected services to be more similar with the selected 5-year average projections until 2015. The Master Plan assumed a more aggressive schedule from 2015 to 2020, afterwards the two projections become more in-line.

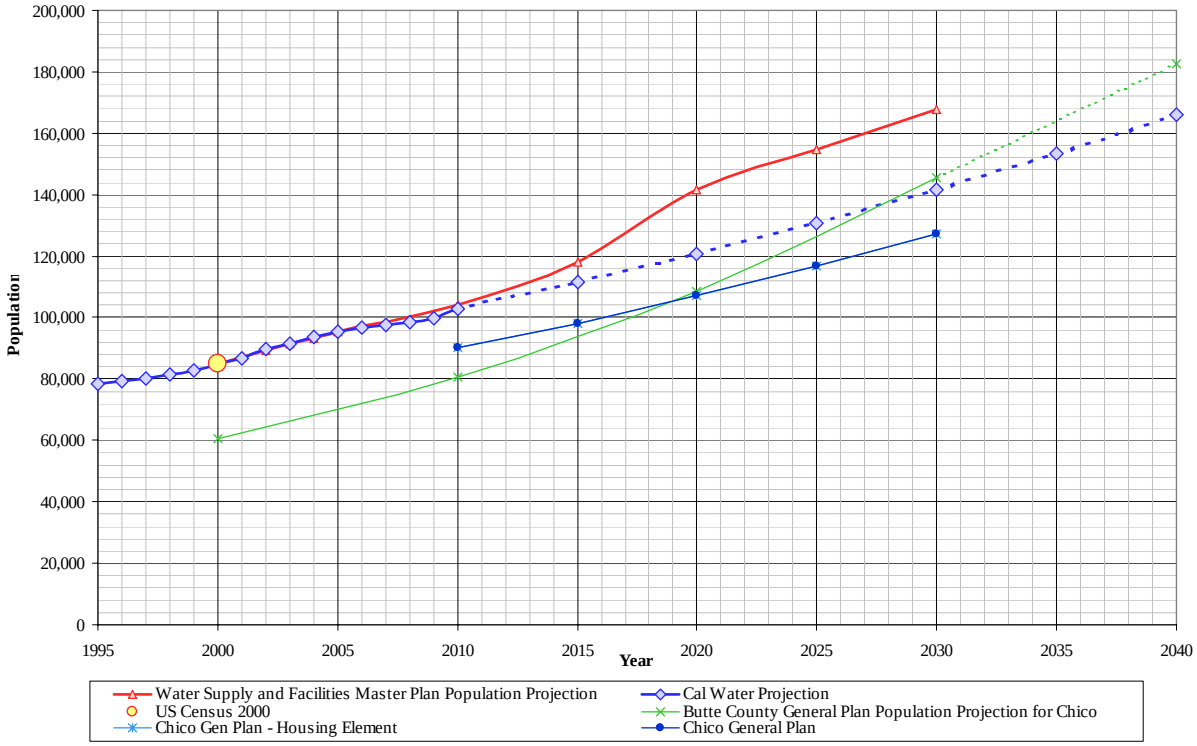
Based on this information, Cal Water estimates the service area's population could reach 165,880 by 2040. Table 2.2-2 lists the population growth in 5-year increments.

Table 2.2-2: Population - Current and Projected (Table 2)

	2005	2010	2015	2020	2025	2030	2035	2040
Service Area Population	95,350	102,840	111,410	120,670	130,680	141,510	153,220	165,880

Cal Water's population projection is compared to the projections presented in Butte County's General Plan, the City of Chico's General Plan, and to those in Cal Water's Chico District Water Supply and Facilities Master Plan, as shown in Figure 2.2-3.

Figure 2.2-3: Estimated Population Comparison



From the graph above, we can see that the growth rate projected by Cal Water is very similar the projected rate of increase estimated by the City of Chico. However, Cal Water's estimate includes Hamilton City, which is located in Glenn County and not included in Butte County's population projection. Cal Water's service area also includes unincorporated parts of Butte County outside Chico's city limits. As a result Cal Water's total population figures are greater, but the rate of increase is similar.

Similarly, the housing count was estimated by comparing the US Census 2000 data and the service counts for the Chico District, Figure 2.2-4. The service count for the year 2000 is lower than the US Census 2000 housing units estimate. This is most likely the result of District service connections including one meter that serves several housing units, such as duplexes or apartments, whereas the US Census data combines all of the housing units (single and multifamily residences). The US Census 2000 housing unit figure 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

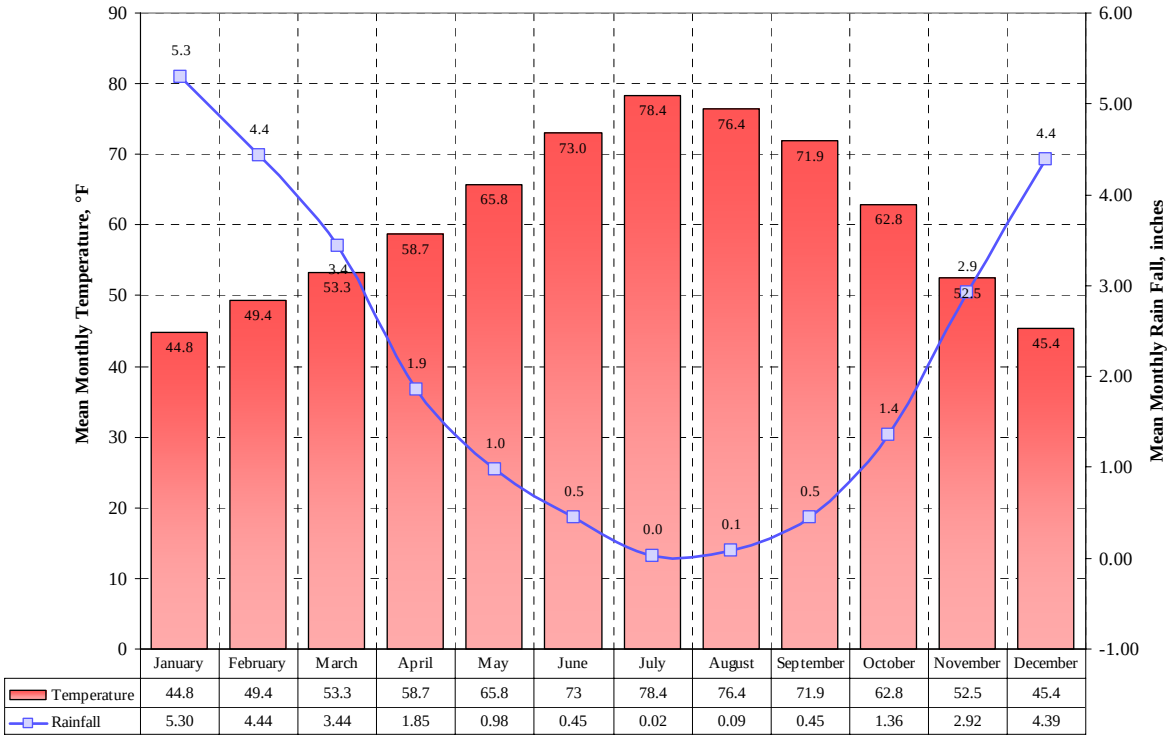
The climate for the Chico District is moderate with warm dry summers and cool winters. The majority of precipitation falls during late autumn, winter, and early spring. Table 2.3-1 lists the average annual conditions for the closest weather stations to the Chico District, which are located at the Chico Experiment Station, and in Orland for Hamilton City. Additional climate data is provided in the Appendix C, worksheet 18.

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

Station	Average Temperature	Average Rainfall	Annual Total Evapo-transpiration
Chico	61.0°F	25.7 inches	53.4 inches
Orland	62.1°F	19.9 inches	53.4 inches

Figure 2.3-1 displays the average monthly temperature and rainfall[2].

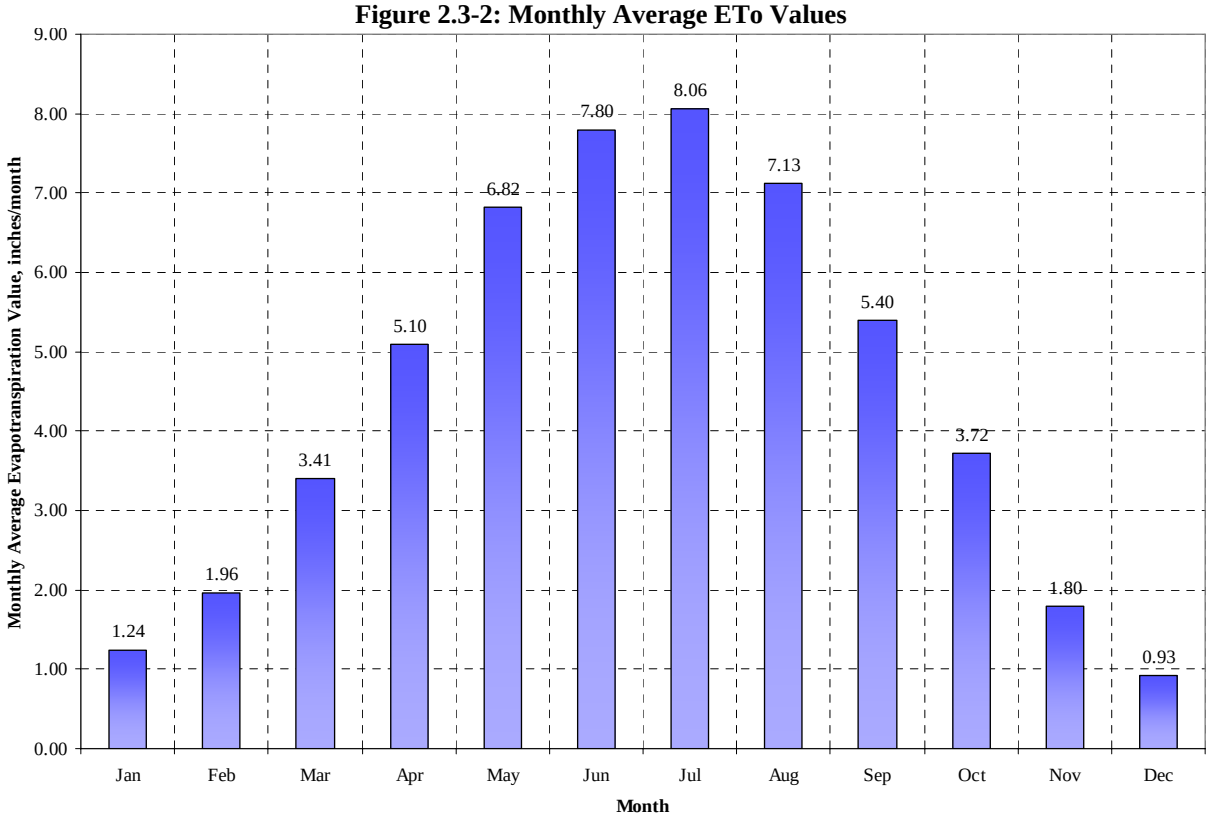
Figure 2.3-1: Average Monthly Temperature and Rainfall for Chico



[2] Western Regional Climate Center, http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?cachic+nca,

Figure 2.3-2 displays the monthly average evapotranspiration values for the area of the District[3]. 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 Chico and Hamilton City is 53.4 inches. The average annual rainfall of 25.7 inches is only 48 percent of the annual total evapotranspiration value.

Figure 2.3-2: Monthly Average ETo Values



[3] California Irrigation Management Information System (CIMIS)

3 System Demands

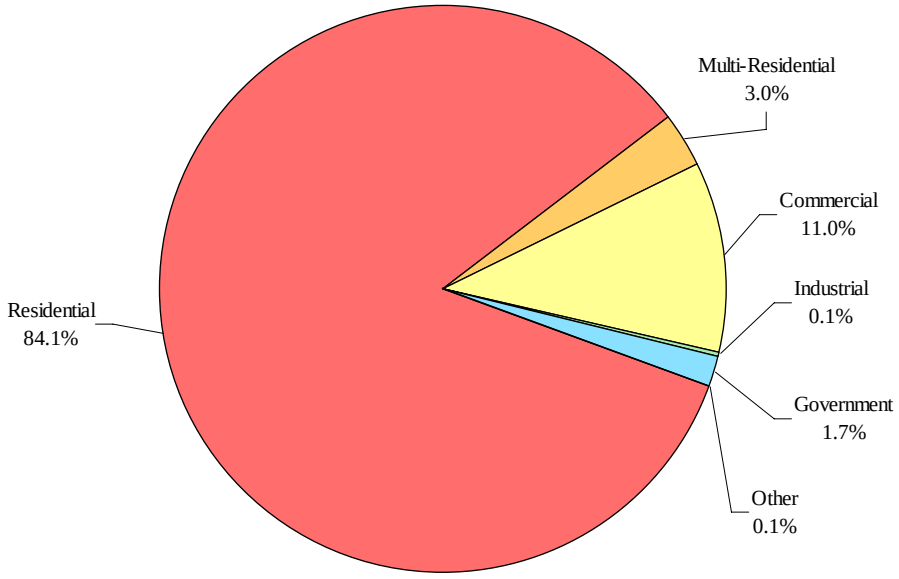
3.1 Distribution of Services

Cal Water classifies customer service connection categories as follows:

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

Land use in the Chico District is dominated by residential and commercial activities, as seen in the service count of the District, Figure 3.1-1. Single-family residential services account for 84.1 percent of all services; multifamily residential services represent 3.0 percent, and commercial services 11.0 percent. Thus, 98.1 percent of all services are for residential and commercial properties. The remaining 1.9 percent includes industrial, governmental uses, and other functions such as temporary construction meters.

Figure 3.1-1: Distribution of Services (2010)



3.2 Historical and Current Water Demand

Historical sales values are illustrated in Figure 3.2-1. Historical service counts are illustrated in Figure 3.2-2.

Figure 3.2-1: Historical Sales

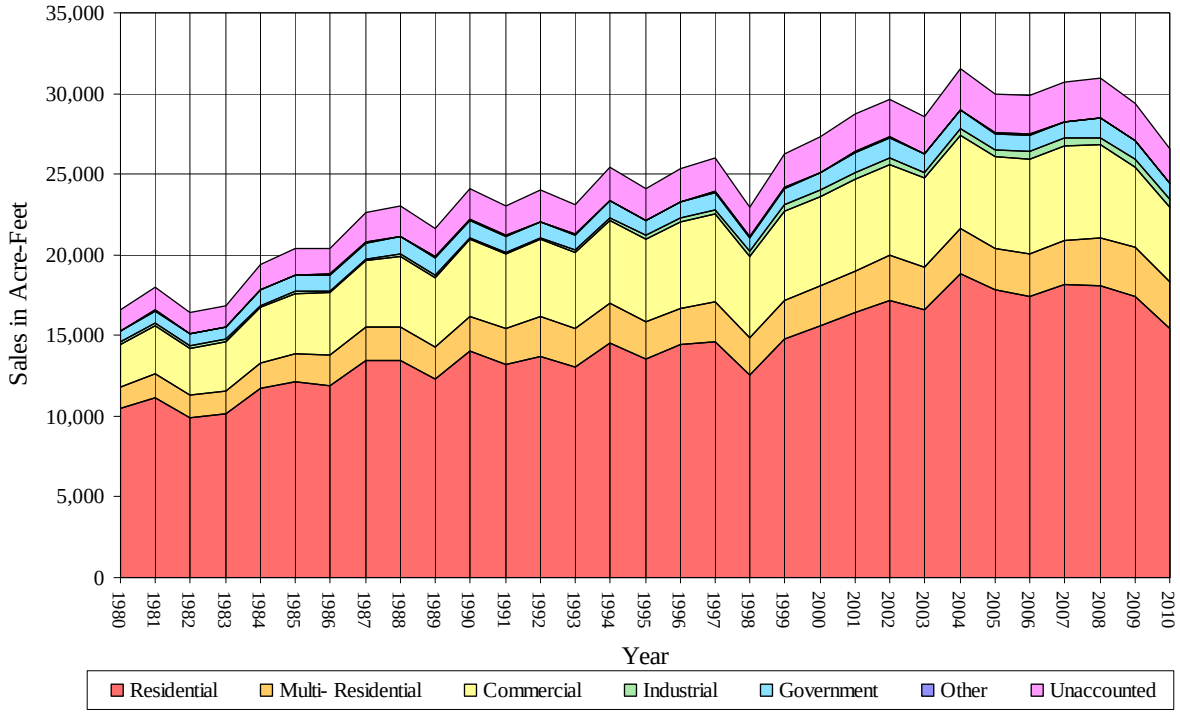
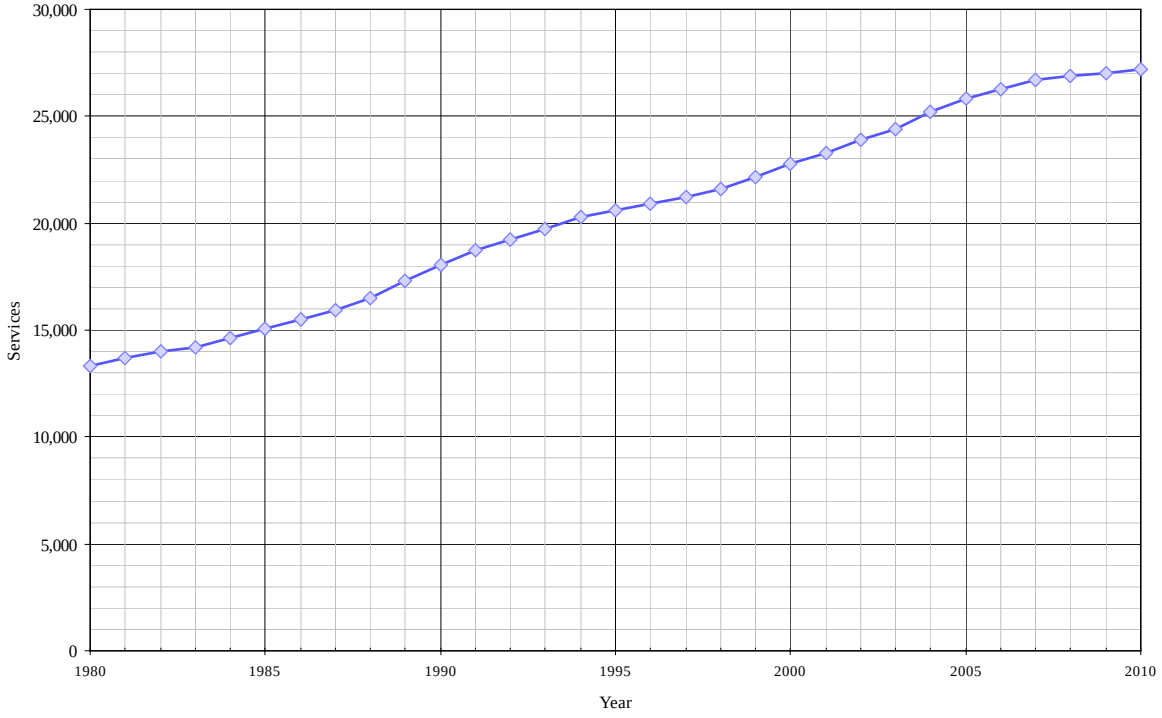
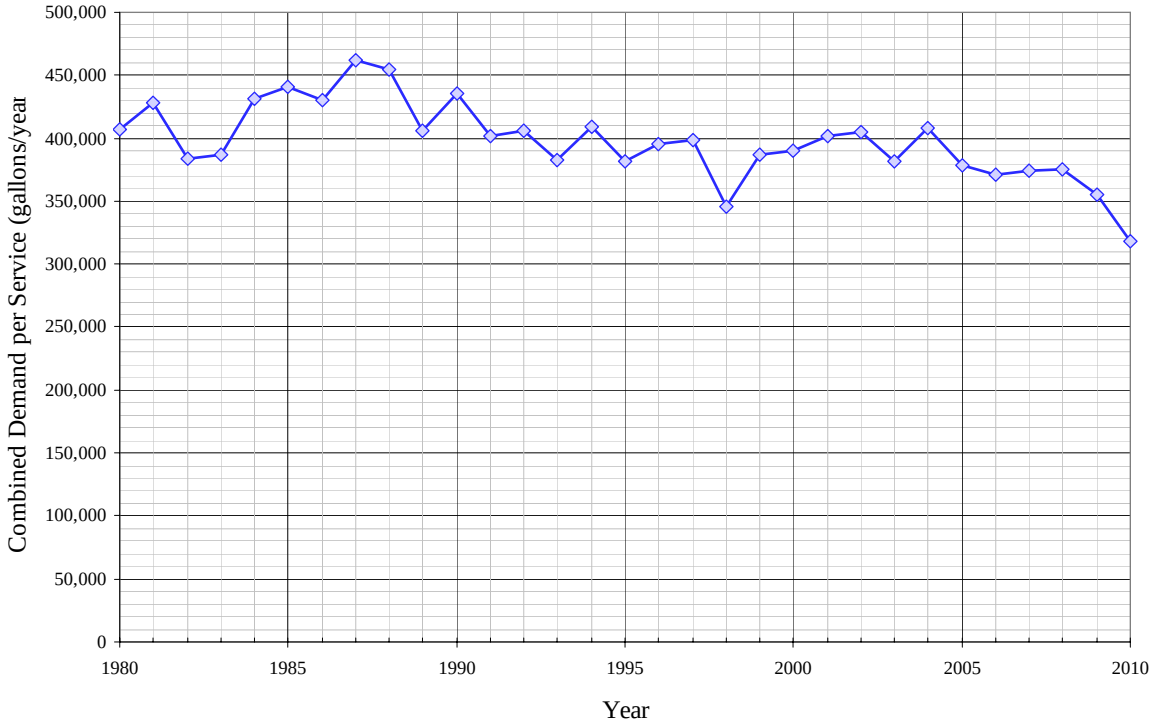


Figure 3.2-2: Historical Service Counts



Demand per service was established as a function of historical sales and service data. The combined demand for all services has decreased slightly over time but generally fluctuates between 370,000 to 400,000 gallons per service per year, as shown in Figure 3.2-3.

Figure 3.2-3: Historical Demand per Service



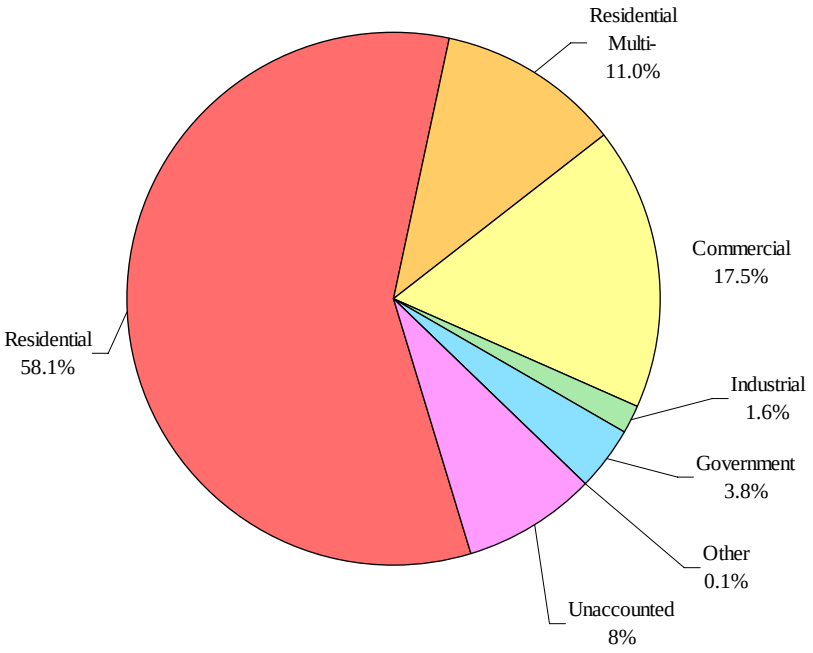
Demand began declining in 1988 in response to the last drought. Since 1991 demand has remained relatively constant. A notable exception is 1998, where demand was reduced significantly. This coincided with an unusually high rainfall year. Demand also decreased dramatically in response to the more recent drought from 2006-2009.

Assembly Bill No. 2572, adopted in September, 2004 requires conversion of all flat rate meters to metered service by January 1, 2025. When completed, Cal Water's Flat Rate Conversion Program will eliminate all flat rate residential services. According to the current schedule, the Flat Rate to Meter Program will convert 1,176 meters per year until all residential services are metered. As of January 1, 2011, 37 percent of single family residential services were still unmetered.

Single family residential water use represents the smallest demand per service segment in the district with a 5 year average of 258,700 gallons per service per year, as a result this category uses only 58.1 percent of the total demand. The multifamily residential use was 11.0 percent of the total demand with a demand per service that has a 5 year average of 1,815,440 gallons per service per year. The combined residential sector component of demand is equal to 69.1 percent of total demand.

Because the Chico 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. The distribution of demand from each service category is shown in Figure 3.2-4.

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 276 gpcd.

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

Figure 3.3-1: Historical & Projected Demand

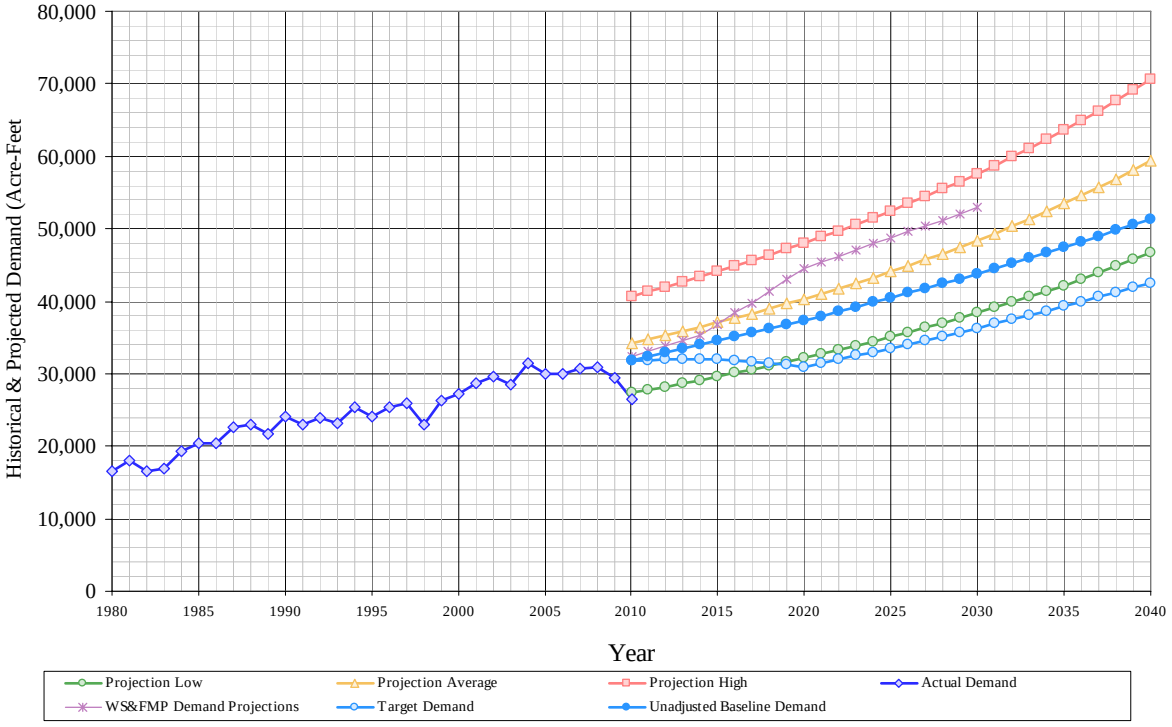


Figure 3.3-1 also shows the demand projection which was developed in Cal Water's Water Supply and Facilities Master Plan for the Chico District. In this case water demands were projected through full buildout of the Chico District using a unit demand methodology based on land uses in the City's General Plan. It is included here to provide a comparison to demands calculated for the purposes of SBx7-7 compliance.

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

Table 3.3-1: Actual 2005 Water Deliveries – AF (Table 3)

	2005				
	Metered		Not Metered		Total
Water Use Sectors	# of accounts	Volume	# of accounts	Volume	Volume
Single family	10,579	6,667	11,182	11,144	17,811
Multi-family	426	2,595	-	-	2,595
Commercial	3,217	5,684	-	-	5,684
Industrial	35	419	-	-	419
Institutional/government	342	1,000	-	-	1,000
Landscape	-	-	-	-	-
Recycled	-	-	-	-	-
Other	50	83	-	-	83
Total	14,649	16,449	11,182	11,144	27,592

Table 3.3-2: Actual 2010 Water Deliveries – AF (Table 4)

	2010				
	Metered		Not Metered		Total
Water Use Sectors	# of accounts	Volume	# of accounts	Volume	Volume
Single family	14,292	7,953	8,564	7,481	15,433
Multi-family	827	2,911	-	-	2,911
Commercial	2,999	4,638	-	-	4,638
Industrial	23	422	-	-	422
Institutional/government	459	1,011	-	-	1,011
Landscape	-	-	-	-	-
Recycled	-	-	-	-	-
Other	23	31	-	-	31
Total	18,623	16,965	8,564	7,481	24,446

Table 3.3-3: Projected 2015 Water Deliveries – AF (Table 5)					
	2015				
	Metered		Not Metered		Total
Water Use Sectors	# of accounts	Volume	# of accounts	Volume	Volume
Single family	24,632	18,365	-	-	18,365
Multi-family	832	4,027	-	-	4,027
Commercial	3,281	4,856	-	-	4,856
Industrial	27	171	-	-	171
Institutional/government	632	2,092	-	-	2,092
Landscape	-	-	-	-	-
Recycled	-	-	-	-	-
Other	31	48	-	-	48
Total	29,436	29,560	-	-	29,560

Table 3.3-4: Projected 2020 Water Deliveries - AF (Table 6)					
	2020				
	Metered		Not Metered		Total
Water Use Sectors	# of accounts	Volume	# of accounts	Volume	Volume
Single family	26,366	17,426	-	-	17,426
Multi-family	891	3,825	-	-	3,825
Commercial	3,515	4,612	-	-	4,612
Industrial	29	162	-	-	162
Institutional/government	848	2,486	-	-	2,486
Landscape	-	-	-	-	-
Recycled	-	-	-	-	-
Other	34	45	-	-	45
Total	31,683	28,556	-	-	28,556

Table 3.3-5: Projected 2025 and 2030 Water Deliveries - AF (Table 7)				
	2025		2030	
	Metered		Metered	
Water Use Sectors	# of accounts	Volume	# of accounts	Volume
Single family	28,223	18,485	30,209	19,515
Multi-family	955	4,060	1,023	4,290
Commercial	3,765	4,896	4,034	5,173
Industrial	31	172	33	182
Institutional/government	1,136	3,302	1,523	4,366
Landscape	-	-	-	-
Recycled	-	-	-	-
Other	36	48	39	51
Total	34,146	30,964	36,861	33,576

Table 3.3-6: Projected 2035 and 2040 Water Deliveries - AF (Table 7)				
	2035		2040	
	Metered		Metered	
Water Use Sectors	# of accounts	Volume	# of accounts	Volume
Single family	32,336	20,488	34,613	21,369
Multi-family	1,096	4,507	1,174	4,705
Commercial	4,321	5,435	4,629	5,673
Industrial	36	191	38	200
Institutional/government	2,041	5,739	2,736	7,496
Landscape	-	-	-	-
Recycled	-	-	-	-
Other	41	53	44	56
Total	39,872	36,414	43,234	39,498

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 Chico District Conservation Master Plan is included as Appendix G.

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

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

The law provides each water utility several ways to calculate its interim 2015 and ultimate 2020 water reduction targets. In addition, water suppliers are permitted to form regional alliances and set regional targets for purposes of compliance. Under the regional

compliance approach, water suppliers within the same hydrologic region can comply with SBx7-7 by either meeting their individual target or being part of a regional alliance that meets its regional target. For all Cal Water districts falling within the same hydrologic region, Cal Water intends to enter regional alliances as listed in Table 3.3-7. The Chico District lies within the Sacramento River hydrologic region, along with Dixon, Marysville, Oroville, and Willows Districts.

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

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

District-specific and regional targets for Cal Water districts within the Sacramento River hydrologic region are shown in Table 3.3-8. The 2015 and 2020 district-specific targets for Chico District are 257 and 229 gpcd, respectively. Over the last five years district demand has averaged about 276 gpcd. Thus, per capita demand needs to fall by about 7 percnet by 2015 and by about 17 percent by 2020 in order for Chico District to meet its district-specific targets. Alternatively, demand for the five Cal Water districts within the Sacramento River hydrologic region can average no more than 250 gpcd in 2015 and 223 gpcd in 2020.

Table 3.3-8: Regional SBx7-7 Targets for Cal Water Districts in Sacramento River Hydrologic Region

District	Population	2015 Target	2020 Target
Chico	99,630	257	229
Dixon	8,840	168	164
Marysville	12,285	225	200
Oroville	9,620	301	268
Willows	7,130	223	198
Regional Targets[1]		**250**	**223**

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

The following analysis presents the individual SBx7-7 compliance targets for the Chico 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 Chico District, the 10-year base period 1999-2008 yielded the maximum target under this method. The 2015 target is 257 gpcd and a 2020 target is 229 gpcd. Table 3.3-9 summarizes the base period ranges and Table 3.3-10 lists the per capita demand over the ten-year base period.

Table 3.3-9: Base Period Ranges (Table 13)

Base	Parameter	Value	Units
10-15-year base period	2008 total water deliveries	28,492	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	2004	
	Year ending base period range	2008	

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	83,000	23.5	283
Year 2	2000	85,070	24.4	287
Year 3	2001	86,790	25.6	295
Year 4	2002	89,680	26.5	295
Year 5	2003	91,540	25.5	279
Year 6	2004	93,640	28.1	301
Year 7	2005	95,350	26.8	281
Year 8	2006	96,890	26.7	275
Year 9	2007	97,440	27.4	281
Year 10	2008	98,310	27.6	281
			Base Daily Per Capita Water Use	286

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 Chico District is located in the Sacramento River hydrologic region the Chico District's 2015 target is 227 gpcd and the 2020 target is 167 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 Chico District is 284 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	2004	93,640	28.1	301
Year 2	2005	95,350	26.8	281
Year 3	2006	96,890	26.7	275
Year 4	2007	97,440	27.4	281
Year 5	2008	98,310	27.6	281
			Base Daily Per Capita Water Use	284

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

Table 3.3-12. Chico-Hamilton City District SBx7-7 Targets

Maximum Allowable Target	
Base Period:	2004-2008
Per Capita Water Use:	284
Maximum Allowable 2020 Target:	270
Method 1: 80% of Baseline Per Capita Daily Water Use	
Base Period:	1999-2008
Per Capita Water Use:	286
2015 Target:	257
2020 Target:	229
Method 3: 95% of Hydrologic Region Target	
Hydrologic Region:	Sac River
2015 Target:	227
2020 Target:	167
Selected District Target	
2015 Target:	257
2020 Target:	229

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.

The City of Chico's Housing Element estimates that 15.9 percent of the households are in the lowest income group for the City of Chico.[4] The Hamilton City Housing Element is part of Glenn County General Plan, which does not provide an estimate of the number of households allotted to any particular income groups.[5] For the purposes of estimating projected demand from low income households in the Chico-Hamilton City District, Chico's percentage of 15.9 percent was applied to the total projected residential demand for both cities, and is listed in Table 3.3-13.

Table 3.3-13: Low-income Projected Water Demands (Table 8)

Low Income Water Demands	2015	2020	2025	2030	2035	2040
Single-family residential	2,920	2,771	2,939	3,103	3,258	3,398
Multi-family residential	640	608	646	682	717	748
Total	3,560	3,379	3,585	3,785	3,974	4,146

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.

[4] "Chico General Plan, Appendix A - Housing Needs Assessment", City of Chico, January 2011, Page 8a-9
[5] "Glenn County General Plan, 2007 – 2027", County of Glenn, 2007, website: http://www.gcplanupdate.net/general_plan/topic/affordable_housing/ahmonitor.htm

3.4 Total Water Use

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

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

Water Use	2010	2015	2020	2025	2030	2035	2040
Sales to Other Agencies	-	-	-	-	-	-	-
Saline barriers	-	-	-	-	-	-	-
Groundwater recharge	-	-	-	-	-	-	-
Conjunctive use	-	-	-	-	-	-	-
Raw water	-	-	-	-	-	-	-
Recycled	-	-	-	-	-	-	-
Unaccounted-for system losses	2,354	2,510	2,395	2,557	2,723	2,889	3,052
Total	2,354	2,510	2,395	2,557	2,723	2,889	3,052

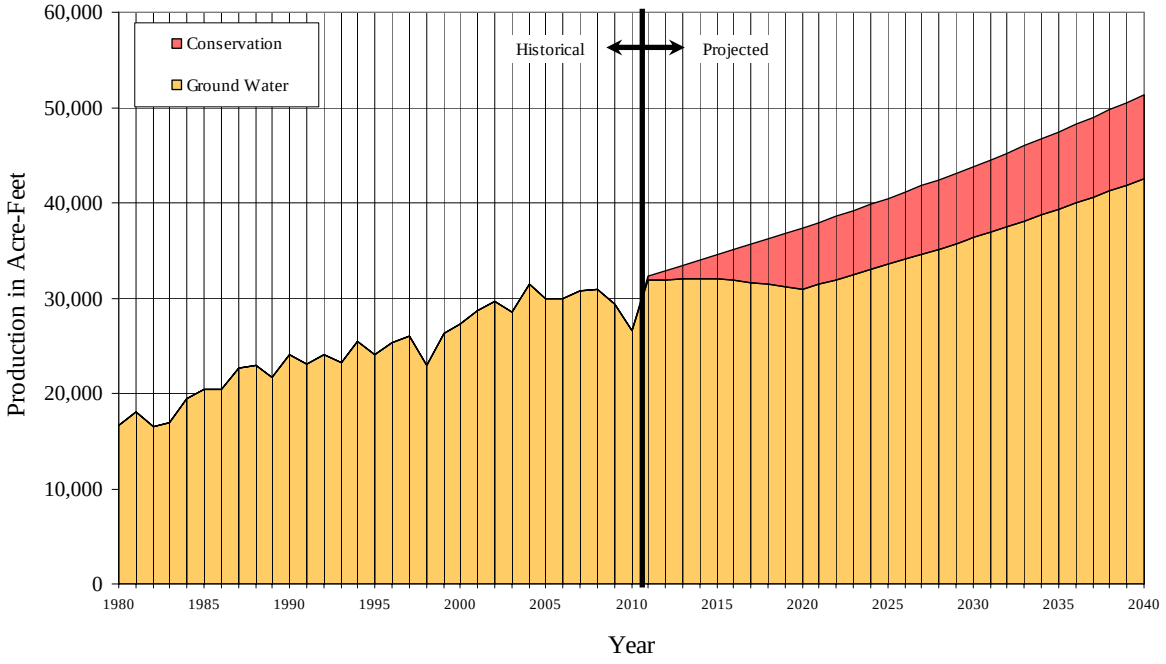
Actual and projected water use through 2040 is shown in Table 3.4-2. The values represent the total target demand projection based on SBx7-7 gpcd targets, including unaccounted for water.

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

	2005 (Actual)	2010 (Actual)	2015	2020	2025	2030	2035	2040
Water Use	30,115	26,800	32,069	30,951	33,521	36,299	39,303	42,550

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 sole source of water supply for the customers of the Chico District is groundwater, and will likely continue to be for the near term. 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 comprehensive hydrogeologic investigation of the basin to define its safe yield. Nor has there been a legal adjudication of groundwater rights for basin pumpers. This is partly due the relative abundance of groundwater resources in this region of the Sacramento Valley. Although there has been a general decline on groundwater levels over the long term, this decline has not been significant enough to warrant immediate concern. The aquifers beneath the Chico District contain large volumes of stored groundwater, and groundwater levels have recovered quickly after past drought events. These issues are discussed further in Section 4.4.

Because of the difficulty in defining an exact supply quantity available to the Chico 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 90,288 AFY. A more conservative estimate may be 80 percent of this capacity, which is 72,230 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. 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 Butte and Glenn Counties. 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 sources and volumes based on the SBx7-7 target demand are summarized in Table 4.1-1.

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

Water Supply Sources	2010	2015	2020	2025	2030	2035	2040
Cal Water Groundwater Wells	26,572	32,069	30,951	33,521	36,299	39,303	42,550
Transfers – Active Leases	-	-	-	-	-	-	-
Banked Groundwater	-	-	-	-	-	-	-
Recycled Water (projected use)	-	-	-	-	-	-	-
Desalination	-	-	-	-	-	-	-
Total	26,572	32,069	30,951	33,521	36,299	39,303	42,550

4.2 Purchased Water

Cal Water does not currently purchase imported water to meet supply requirements in its Chico District. However, Butte County has a Table A entitlement to the State Water Project (SWP) approximately 27,000 AFY. Historically, Butte County has not made full use of the majority of this entitlement; currently there is a surplus in excess of 20,000 AFY. The Butte County Department of Water and Resource Conservation, with Cal Water's financial assistance, is currently developing a feasibility study to determine the most appropriate and economical way to make full use of this entitlement in the Chico area. At this time it is not clear whether SWP water can be made available in an economic manner for purchase by Cal Water.

4.3 Surface Water

The Chico District does not impound or divert surface water as a means to meet supply requirements. However, surface water would ultimately be the source of any purchased water that becomes available.

4.4 Groundwater

The groundwater used by the Chico - Hamilton City District is extracted from the aquifers of the Sacramento River Valley that underlie the District. The District has 69 wells in total located throughout the service area; 66 in Chico (including one leased well) and three in Hamilton City.

Current design capacity for the operational wells (including standby wells) is 61,305 GPM, equivalent to 88.3 MGD. The design production capacity represents 180 percent of the ten-year average maximum day demand and 337 percent of the ten-year average, average day demand. Currently there are 8 surface storage structures, enabling the groundwater wells to pump to storage during non-peak demand periods. The measured average day demand and maximum day demand in 2009 were 26.3 MGD and 44.7 MGD, respectively. The District has sufficient groundwater production capacity to supply all of the current annual average day and maximum day demand.

Average static groundwater elevations in the Chico District have remained relatively constant over the past thirty-seven years. Over the fifty-seven years that water levels in Cal Water wells have been recorded, the level has declined about forty feet. Short periods of groundwater elevation decline and recovery have occurred during this period. The extended multi-year drought from 1987-1992 reduced the availability of replenishment water, and coupled with the high growth rate, caused a 15-foot decline in static groundwater elevation. Drought recovery began to become apparent in 1995, with a 15-foot increase in the average static groundwater elevation by 2000, as shown in Figure 4.4-1. Groundwater levels have also declined in response to the more recent drought that occurred between 2007 and 2009. When precipitation returns to pre-drought levels there should be a corresponding recovery in groundwater levels.

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

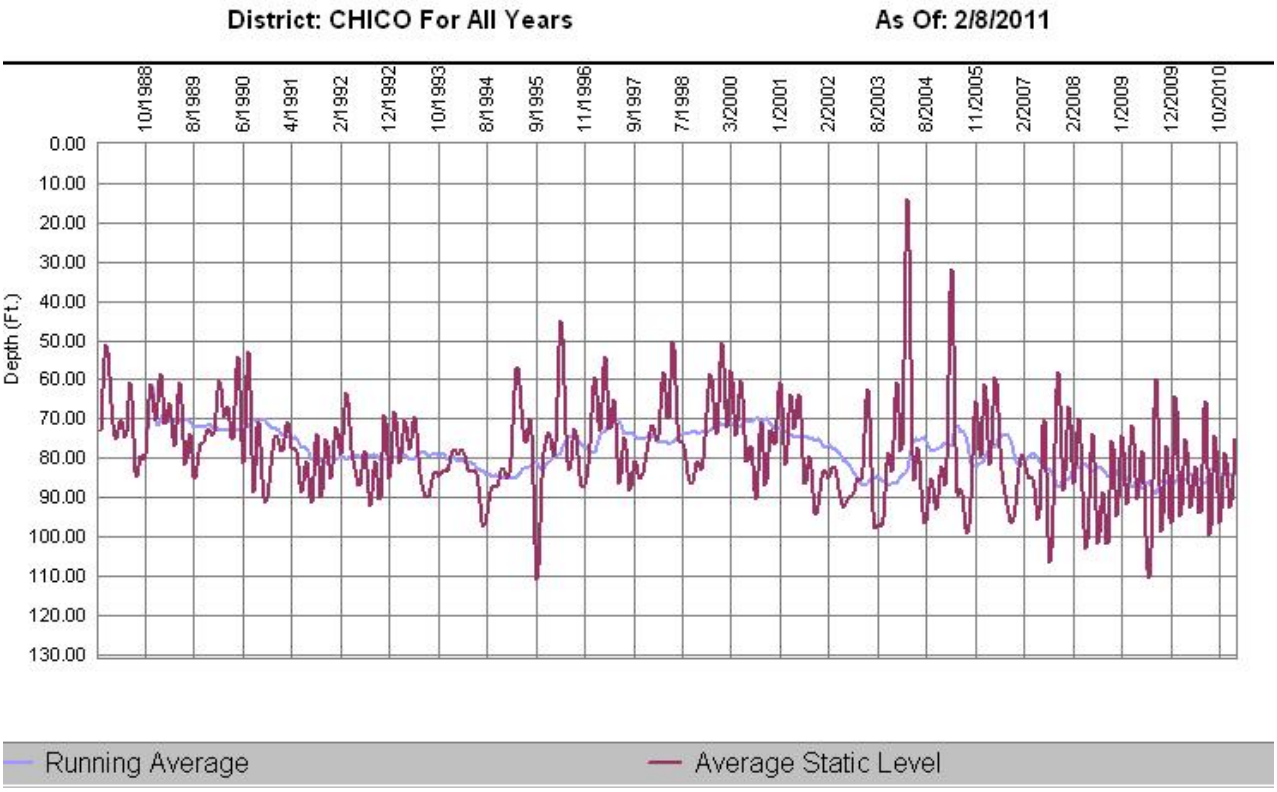
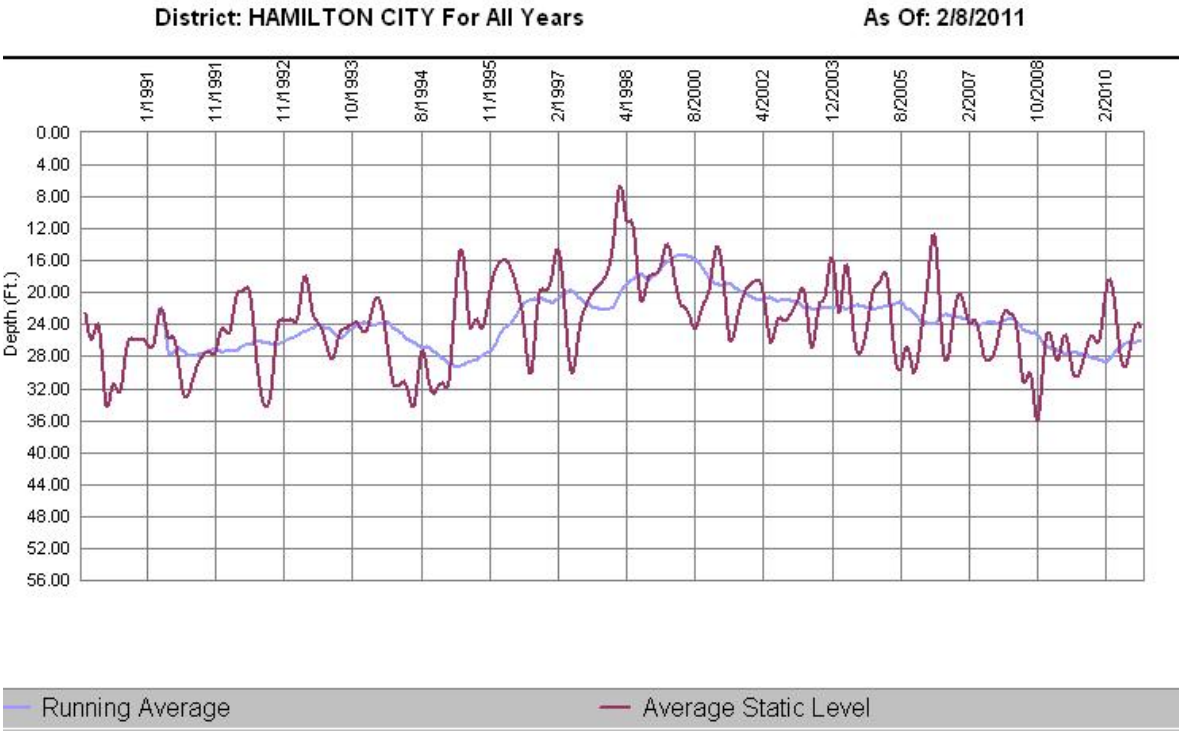


Figure 4.4-2 displays the groundwater level for Hamilton City from 1990 to 2009. The water level had remained fairly consistent during the drought condition from 1987 to 1992 with a sharp increase during the recovery period after the drought ended. Since this period, water levels have remained relatively consistent until the most recent drought in 2007 to 2009.

Figure 4.4-2: Hamilton City District Well Level Average (Static)



The Butte Basin Water Users Association (BBWUA) has prepared a groundwater model of the basin and is developing a plan to manage the quantity of water stored in the groundwater aquifers. This regional management will help perpetuate the availability of this resource. However, with increasing demand will come greater production and reliance on groundwater resources. In January 1997, Hydrologic Consultants Inc. (HCI) completed a run of the model to consider the impacts of projected growth in the City of Chico on groundwater availability. HCI's conclusions were that, "Groundwater resources within Butte Basin are entirely sufficient to support the growth in water consumption expected in the Chico Urban Area (Chico) to the year 2012. Chico will experience a decline in groundwater levels of approximately 8 feet by the year 2012. Corresponding to this decline, there will be a reduction of approximately 10,450 AF of groundwater stored in the aquifer beneath Chico. The average saturated thickness of the aquifer beneath Chico is approximately 1,200 feet."[4] Currently, Butte County has taken the lead role in regional management; as well as, maintaining the groundwater model.

[4] Hydrologic Consultants, Inc., General Plan Study 1993 – 2012 Groundwater Budget, January 29, 1997.

As noted earlier, groundwater has been the only source of supply for the Chico District. Table 4.4-1 lists the amount of groundwater pumped by Cal Water in the Sacramento Valley Basin from 2005 to 2010.

Table 4.4-1: Amount of Groundwater Pumped – AFY (Table 18)					
Basin Name	**2006**	**2007**	**2008**	**2009**	**2010**
Sacramento Valley	29,897	30,718	30,970	29,427	26,572
% of Total Water Supply	100%	100%	100%	100%	100%

Unless Cal Water enters into an agreement with Butte County to supply Chico with a portion of its SWP allotment, groundwater will continue to be the only source available. For the purposes of this UWMP Cal Water assumes that groundwater will continue to be the sole source of supply. Based on this assumption, the amount of groundwater projected to be pumped is shown in Table 4.4-2.

Table 4.4-2: Amount of Groundwater projected to be pumped – AFY (Table 19)						
Basin Name	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Sacramento Valley	32,069	30,951	33,521	36,299	39,303	42,550
% of Total Water Supply	100 %	100 %	100 %	100%	100 %	100 %

4.4.1 Basin Boundaries and Hydrology

The following description and additional details of the basin are given in the DWR's Groundwater Bulletin 118[5], see Appendix D:

Table 4.4-3: Characteristics of Groundwater Sub-basins Underlying the Chico-Hamilton City District			
Groundwater Basin Name	Sub-basin Name	Portion of Chico-Hamilton City District Served	DWR Basin
Sacramento Valley	Vina	City of Chico	5-21.57
	West Butte	City of Chico	5-21.58
	East Butte	City of Chico	5-21.59
	Corning	Hamilton City	5-21.51

[5] California's Ground Water Bulletin 118, 2003; Sacramento Valley Hydrologic Region; West Butte Subbasin; Groundwater Basin Number: 5-21.58

The Vina Subbasin is bounded on the west by the Sacramento River, on the north by Deer Creek, on the east by the Chico Monocline and on the south by Big Chico Creek. Deer Creek and Big Chico Creek serve as hydrologic boundaries in the near surface.

The West Butte Subbasin is bounded on the west and south by the Sacramento River, on the north by Big Chico Creek, on the northeast by the Chico Monocline, and on the east by Butte Creek. The subbasin is hydrologically contiguous with the Vina and East Butte subbasins at depth. The Chico Monocline forms a geographic boundary; however, a component of recharge to the subbasin appears east of the fault structure. Groundwater flow is southwesterly toward the Sacramento River north to the city of Princeton. South of Princeton groundwater flows away from the Sacramento River to recharge the groundwater system.

The East Butte Subbasin is bounded on the west and northwest by Butte Creek, on the northeast by the Cascade Ranges, on the southeast by the Feather River and the south by the Sutter Buttes. The northeast boundary along the Cascade Ranges is primarily a geographic boundary with some groundwater recharge occurring beyond that boundary.

Hamilton City is located within the Corning Subbasin which comprises the portion of the Sacramento Valley Groundwater Basin bounded on the west by the Coast Ranges, on the north by Thomes Creek, on the east by the Sacramento River, and on the south by Stony Creek.

4.4.2 Groundwater Management Plan

The groundwater basin that Cal Water pumps from is an un-adjudicated basin. In Glenn County, where Hamilton City is located, there has been ongoing discussion as to how to actively manage the groundwater basin. However, conflicts between surface water and groundwater interests have prevented a legislated adjudication of the basin. Instead, the Glenn County Water Advisory Committee was formed and the Basin Management Objective (BMO) concept was instituted as local ordinance. The BMO became the groundwater management plan for the County.

The Butte County Department of Water and Resource Conservation developed a groundwater management plan[6]. Again, no safe yield has been established but policy decisions were made in an attempt to maintain groundwater levels and water quality. A copy of the management plan is attached in Appendix H.

[6] Groundwater Management Plan, Butte County Water Commission 2005, downloaded from http://buttecounty.net/waterandresource/groundwater_mgmt_plan.htm

4.5 Recycled Water

The recycling of wastewater offers several potential benefits to Cal Water and its customers. Perhaps the greatest of these benefits is to help maintain a sustainable groundwater supply either through direct recharge, or by reducing potable supply needs by utilizing recycled water for appropriate uses (e.g., landscape, irrigation) now being served by potable water. Currently, no wastewater is recycled for direct reuse in the Chico District. The potential amount of recycled water that can be produced is proportional to the amount of wastewater that is generated by District, and is discussed in the following sections.

4.5.1 Wastewater Collection

The Chico Water Pollution Control Plant is owned by the City of Chico and provides the wastewater treatment for Cal Water's Chico service area. The wastewater at the treatment plant undergoes secondary treatment followed by chlorination and dechlorination prior to disposal into the Sacramento River. Oxidation ponds are also available for backup. The Chico treatment plant has a capacity to treat 9 MGD but currently receives 7.0 MGD from Cal Water's Chico service area. Treated wastewater from the Chico Wastewater Treatment Plant is not recycled at this point.

Hamilton City Community Services District provides treatment for Cal Water's Hamilton City's service area. The facility is located a quarter of a mile from the city. The system is operating at approximately one-half of its design capacity. This facility can serve an additional 2,500 residences before expansion will be necessary[7]. The facility has a 0.5 MGD capacity with an influent rate of 0.222 to 0.230 MGD during summer months. Hamilton City has approximately 8.5 miles of collection mains. The wastewater at the treatment plant undergoes a primary treatment before being discharged to settling ponds, where the liquid is allowed to infiltrate and or evaporate.

4.5.2 Estimated Wastewater Generated

Estimates for the District's wastewater production quantity since 1980 are shown in Figure 4.5-1 and were calculated by annualizing 90 percent of January water use in Cal Water's service area. The future quantity of waste generation is based on a linear projection of the historical estimates. The estimated volume of wastewater generated for the District in five-year increments to the year 2040 is presented in Table 4.5-1.

[7] Glenn County, General Plan, 2007 - 2027 downloaded from:
http://www.gcplanupdate.net/general_plan/process/issues_opportunities_constraints/sfissues/sf3wastewater.htm

Figure 4.5-1: Estimated District Annual Wastewater Generated

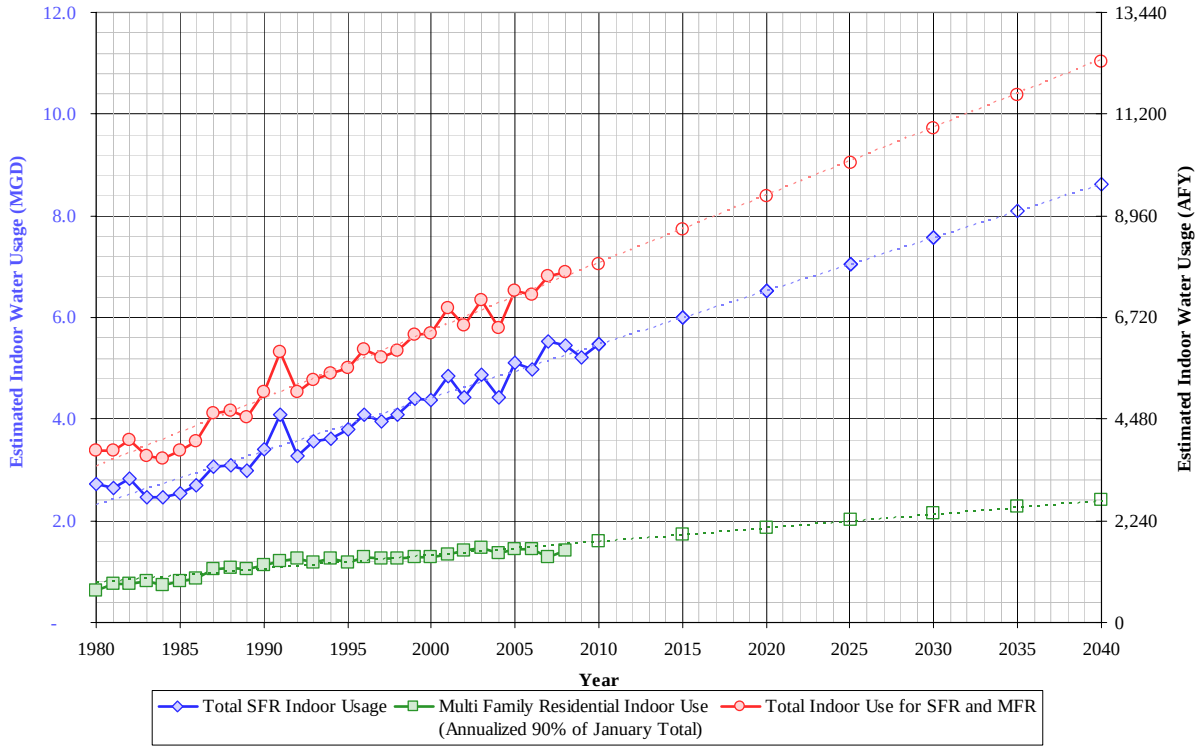


Table 4.5-1: Disposal of wastewater (non-recycled) AFY (Table 34)								
Method of Disposal	**Treatment Level**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Discharged to Sacramento River or settling ponds	Secondary	7,907	8,650	9,394	10,137	10,880	11,624	12,367

4.5.3 Potential Water Recycling

Cal Water has begun discussing the feasibility of offering recycled water to customers in the Chico District or to farmers between the City and the Water Pollution Control Plant. At this time it is too early to tell if this will be possible. So for the purposes of this UWMP it has not been considered as a possible future supply source. The treatment plant would also require an upgrade to include filtration as one of the treatment processes in order to provide suitable water quality for unrestricted reuse. Although there are 8,600 acres of farmland near the treatment plant, the nearest potential customer is more than a mile away. Serving this and other potential customers would entail large costs for construction of transmission lines. Using recycled water for any other purpose (e.g., commercial/residential irrigation and toilet flushing) is not considered economically viable during the next 30 years because the City of Chico is five miles east of the treatment plant. The cost of production, transmission, and distribution of recycled water could not be justified based on current and anticipated costs of water and of wastewater

disposal. Therefore, the projected recycled water supply for Cal Water's Chico 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.

4.6 Desalinated Water

There are no opportunities for the development of desalinated water in the District. Chico and Hamilton City are located in the central part of the Sacramento Valley, many miles from the nearest source of saline water.

4.7 Transfer or Exchange Opportunities

As noted earlier, Butte County has a 27,000 AFY entitlement to SWP water. It is possible that Cal Water could enter into an agreement that would make this water available to the customers in the Chico District. This SWP water could be treated and delivered directly to Cal Water customers, or could be used for groundwater replenishment.

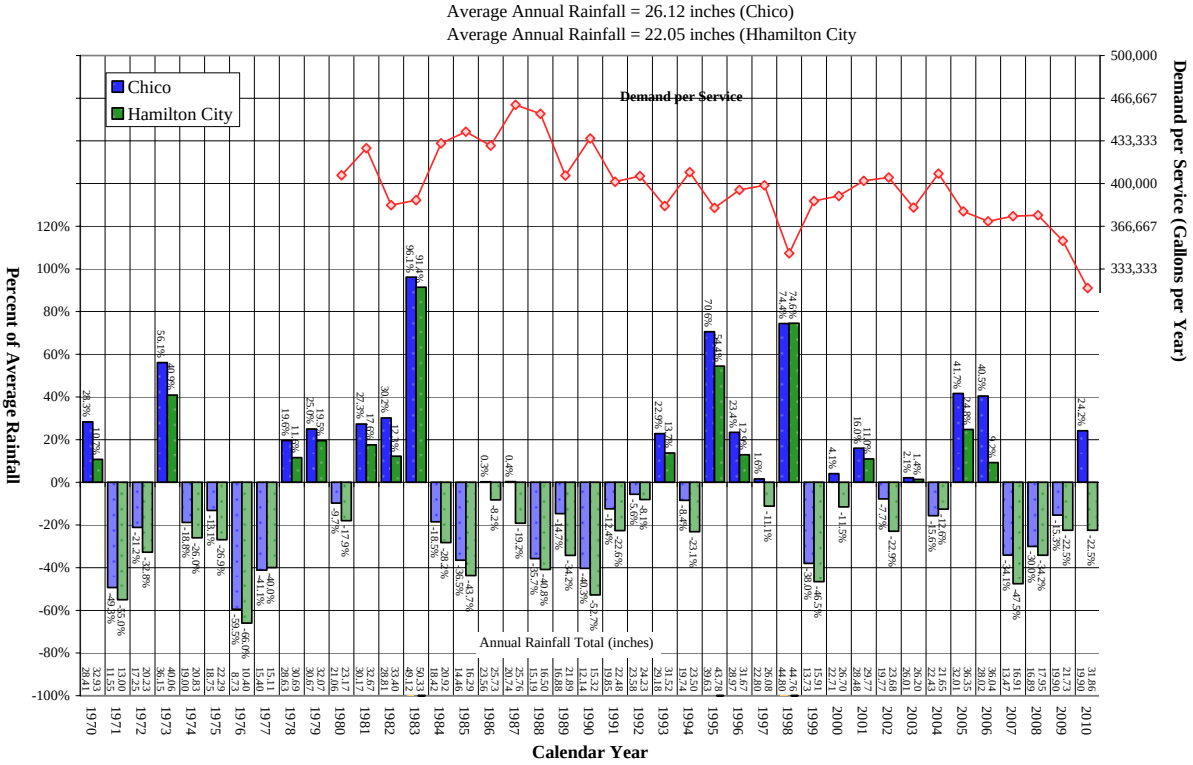
5 Water Supply Reliability and Water Shortage Contingency Planning

5.1 Water Supply Reliability

Because the Chico-Hamilton City 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.

A chart comparing annual rainfall since 1970 to the historic average is shown in Figure 5.1-1. It also displays the demand per service values for each year since 1980. You can see that water use usually increases in the first years of a drought. Afterwards, conservation efforts are increased and the demand per service decreases accordingly. The statewide drought of 1987-1992 is a good example of these trends. The data shows that in the Chico-Hamilton City area the drought began as far back as 1984, with a corresponding increase in demand per service in the early years and a drop as the drought persisted. Water use has remained below pre-drought levels since this time.

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



5.2 Drought Planning

For the purposes of this analysis 2003 was chosen as the most recent normal hydrologic year when rainfall was 2 percent (26.0 in) above average. 1999 was chosen as the single dry year because preceded and followed by wet years, and had a rainfall of 38.1 percent (13.7 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.

Table 5.2-1: Basis of Water Year Data (Table 27)

Water Year Type	Base Year (s)
Average Water Year	2003
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 Chico 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.

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. The values shown in Table 5.2-2 represent the actual overall demand per service numbers in each type of hydrologic year.

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
381,255	386,433	454,508	406,286	435,309	401,313
% of Normal	101%	119%	107%	114%	105%

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 SBx7-7 target demand projection for those years.

Table 5.2-3: Supply Reliability – Current Water Sources - AFY (Table 31)

Water Supply Source	Average / Normal Water Year Water Supply	Multiple Dry Water Year Water Supply		
		2011	2012	2013
Groundwater	31,840	38,025	34,049	36,533
% of Normal Year	100%	119%	107%	115%

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.

Table 5.2-4: Supply and Demand Comparison - Normal Year - AF (Table 32)

	2015	2020	2025	2030	2035	2040
Supply totals	32,069	30,951	33,521	36,299	39,303	42,550
Demand totals	32,069	30,951	33,521	36,299	39,303	42,550
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 SBx7-7 target demand projection in each year by the percentage listed for the single dry year in Table 5.2-2. 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.

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

	2015	2020	2025	2030	2035	2040
Supply totals	32,505	31,371	33,976	36,792	39,837	43,128
Demand totals	32,505	31,371	33,976	36,792	39,837	43,128
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 period. Again, no supply deficiency is expected.

Table 5.2-6: Supply And Demand Comparison - Multiple Dry Year Events – AFY (Table 34)

		2015	2020	2025	2030	2035
Multi-dry year first year supply	Supply Totals	38,231	36,898	39,962	43,274	46,854
	Demand Totals	38,231	36,898	39,962	43,274	46,854
	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	33,967	33,513	36,296	39,303	42,553
	Demand Totals	33,967	33,513	36,296	39,303	42,553
	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	36,159	36,484	39,513	42,784	46,325
	Demand Totals	36,159	36,484	39,513	42,784	46,325
	Difference	0	0	0	0	0
	Difference as % of Supply	0.0%	0.0%	0.0%	0.0%	0.0%
	Difference as % of Demand	0.0%	0.0%	0.0%	0.0%	0.0%

5.3 Factors Affecting Reliability of Supply

Although the historical climatic record shows that the demand can be met by the supply, other factors which may threaten the reliability of supply are listed in Table 5.3-1.

Table 5.3-1: Factors Resulting In Inconsistency of Supply (Table 10)

Name of supply	Legal	Environmental	Water Quality	Climatic
Groundwater			✓	✓

Cal Water has and will meet all state and federal water quality regulations. Chemicals of concern in the Chico District include arsenic and the volatile organic compounds tetrachloroethylene (PCE) and trichloroethylene (TCE). For Hamilton City, total petroleum hydrocarbons (TPH), methyl tertiary-butyl ether (MTBE), Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX) are a concern. None of these chemicals are expected to cause significant problems with the quality of water delivered to Cal Water's customers. Wells testing above MCLs for any contaminant are either taken out of service or are treated with wellhead remediation technologies to ensure compliance with all water quality regulations. Furthermore, any areas that have been found to be contaminated are currently being regulated by either the California Department of Toxic Substances Control (DTSC) or State Water Resources Control Board (SWRCB). Cal Water will avoid these contaminated areas when sighting any future groundwater wells.

As noted earlier, short-term drought events should not pose a serious threat to the reliability of supply in the Chico District. An extended drought could reduce the groundwater table significantly enough to limit groundwater supplies.

5.4 Water Quality

The drinking water delivered to customers in the Chico-Hamilton City District meets or surpasses all federal and state regulations. All drinking water standards are set by the U.S. Environmental Protection Agency under the authorization of the Federal Safe Drinking Water Act of 1974. In California, the state's Department of Public Health (CDPH) can either adopt the USEPA standard or set state standards that are more stringent than those set by the federal government.

There are two general 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. Water produced from several wells has been tested and found to contain concentrations that exceed the MCL for Trichloroethylene (TCE), Tetrachloroethylene (PCE), cis-1,2-Dichloroethylene (Cis 12 DCE), and 1,1-dichloroethylene (1,1 DCA). However, in all cases, these wells were either taken out of service or treatment facilities were installed to remove the contaminant.

The presence of these volatile organic chemical contaminants in District wells raises a concern regarding the future availability of other wells not currently impacted. Contaminant migration of these solvents with groundwater movement could force the closure or treatment of additional wells.

Ten wells in Chico have detected nitrate at greater than 22 ppm (1/2/ the MCL of 45 ppm) in nitrate concentrations. One has been identified as having nitrate concentrations over the MCL, and another has been identified as having nitrate concentrations within 5 mg/L of the MCL. As a result both of these wells are inactive. Zone testing has been completed and treatment with a packer is under investigation at the first well mentioned above.

5.5 Water Shortage Contingency Plan

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

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

5.5.1 Water Shortage Contingency Plan Scope

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

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

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

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

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

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

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

Commission (CPUC). The Water Conservation Master Plan will be discussed in more detail in Section 5 of this UWMP.

5.5.2 Water Conservation/Water Supply Team

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

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

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

5.5.3 Water Supply Allocation Plan

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

These reductions could either be voluntary or mandatory depending on the severity of the cutback required. If mandatory rationing is deemed necessary, retail customer allocations would need to be implemented. To determine the methodology used for customer allocations a cross-functional Water Allocation Team was formed. The Water Allocation Team consisted of a subset of the Conservation/Supply Team and was tasked with

developing the details of how the allocation process would be handled internally by Cal Water. The Water Allocation Team reported back to the Conservation/Supply Team at the regular meetings.

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

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

Cal Water has the legal authority to implement mandatory allocations only after requesting from the CPUC that Tariff Rule 14.1, Mandatory Conservation Plan, be added to existing tariffs. *Section A. Conservation – Nonessential or Unauthorized Water Use* of Tariff Rule 14.1 identifies specific water use prohibitions. Prior to implementing mandatory allocations Cal Water will communicate details of the Plan to all customers.

5.5.4 Allocation Methodology and Customer Information

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

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

In most cases the percent reduction will be kept constant on an annual basis. It will be reviewed and adjusted as necessary in the spring of each year after the water supply picture becomes clear for the following dry season. In most districts Cal Water does not have direct control over long term storage of imported water and will rely on the California Department of Water Resources, U.S. Bureau of Reclamation, and regional

water wholesalers to manage carryover storage between years. In some cases it may be necessary to adjust these percentages mid-year, if, for example, a district is not meeting its reduction target. The allocation period will end when Cal Water determines that the water shortage no longer exists and ample supplies are available on an ongoing basis.

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

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

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

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

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

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

5.5.5 Drought Stages

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

When the water conditions in a district appear to warrant the activation of the Shortage Contingency Plan's Demand Reduction Stages, whether that be via implementing Stage 1, the movement from one Stage to a higher stage, the movement from a higher stage back down to a lower stage, or deactivating the use of Demand Reduction Stages altogether; the Water Conservation /Water Supply Team will consider those conditions at hand and prepare a recommendation on the appropriate action to be taken by the Company. The Team's recommendation will be presented by the Chief Engineer to the Vice President of Engineering and Water Quality. If the Vice President of Engineering and Water Quality concurs with the WC/WS Team recommendation, then he or she will take that recommendation to the President and Chief Executive Officer. The President & CEO will make the final determination as to whether or not the recommended action is to be taken by the Company.

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

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

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

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

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

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

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

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

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

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

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

Table 5.5-4: Demand Reduction Stage 4 (Table 36)

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

5.5.6 Water Supply Conditions and Trigger Levels

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 Chico-Hamilton City 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 Chico-Hamilton City 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. The shortage thresholds are shown in Table 5.5-5.

Table 5.5-5: Water Supply Triggering Levels (Table 35)

Stage	Percent Shortage
Stage 1	5 to 10% supply reduction
Stage 2	10 to 20% supply reduction
Stage 3	20 to 35% supply reduction
Stage 4	35 to 50% supply reduction

5.5.7 Water Use Restriction Enforcement

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

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.

The Chico District has (13) backup power generators at its well sites that can be operated in the event of a system wide power outage. A complete loss of power has never been experienced but the generators have been used in the past to overcome localized outages. During this time Cal Water was able to supply water to customers at a normal level of service. If there was a total loss of power, with all (13) backup generators operating, Cal Water could deliver at least at a rate of 12,090 gpm, which is 71 percent of the average day demand.

Both the Chico and Hamilton City water systems are located in isolated communities that do not have interties with nearby cities. In both cases the closest cities are too far away to justify the expense of constructing these pipelines.

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 Chico 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 Chico District has a gross savings requirement of 2,402 AF from 2011-2015, as shown in Table 6.3-1.

Table 6.3-1: SBx7-7 and MOU Gross Water Savings Requirements

Gross Water Savings Required by 2015	SBx7-7	MOU Flex Track
2015 Unadjusted Baseline Demand	34,488 AF	34,488 AF
2015 Target Demand	32,086 AF	34,485 AF
Gross Savings Requirement	**2,402 AF**	**3 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 Chico 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 Chico 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.

Table 6.3-2: Adjusted Baseline Demand Projection					
Adjusted Baseline (AF)	**2011**	**2012**	**2013**	**2014**	**2015**
Unadjusted Baseline	32,349	32,872	33,401	33,940	34,488
Less Savings from					
Codes	38	75	111	145	192
Schedule Rate Increases	34	79	129	147	170
Existing Programs & Meter Conversion	714	942	1,170	1,392	1,615
Adjusted Baseline Demand	**31,564**	**31,777**	**31,991**	**32,256**	**32,511**
Per Capita (GPCD)	270	267	265	263	261

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 257 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, an additional 425 AF of savings is needed for SBx7-7 compliance in 2015. About 16 AF of savings are projected in 2015 from 2009-10 BMP implementation, 13 AF more than needed for MOU Flex Track compliance. Thus, no additional conservation is needed for MOU compliance.

Table 6.3-3: New Program Savings Required for SBx7-7 and MOU Compliance		
2015 Net Savings Requirement (AF)	**SBx7-7**	**MOU Flex Track**
Gross Savings Requirement	**2,402**	**3**
Less		
Savings from codes	192	NA
Savings from rates	170	NA
Savings from existing programs	1,615	16
Subtotal Expected Savings	*1,977*	*16*
Savings Required from New Programs[1]	**425**	**-13**

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

While the forgoing analysis indicates that Chico 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, district per capita water use will need to fall an additional 11 percent between 2015 and 2020 in order to meet the 2020 SBx7-7 target. The next two sections of the plan describe 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 Chico 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 Chico 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 Chico 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, Chico District still needs an additional 14 AF of demand reduction to meet its 2015 SBx7-7 per capita water use target. It also showed that an additional 5 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 Chico District, the programs selected and the activity level of each are shown in Table 6.5-1.

Table 6.5-1: Recommended Program Levels					
Program	**Recommended Annual Activity Levels**				
	2011	**2012**	**2013**	**2014**	**2015**
CORE PROGRAMS					
Rebates/Vouchers					
Toilets	150	160	160	350	430
Clothes Washers	90	90	90	90	90
Urinals	0	0	0	0	0
Customer Surveys/Audits	120	120	120	140	140
Conservation Kit Distribution	450	450	450	450	450
Pop-Up Nozzle Distribution	9,300	9,300	9,300	9,300	9,300
NON-CORE PROGRAMS					
Direct Install Toilets/Urinals	130	130	130	600	600
Smart Irr. Controller Vendor Incentives	10	10	10	10	10
Large Landscape Water Use Reports	90	90	90	90	90
Large Landscape Surveys/Incentives	10	10	10	60	60
Commercial Kitchen Rebates/Vouchers	0	0	0	50	50
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.

Table 6.5-2: Projected Water Savings by Program

Program	Annual Water Savings (AF)				
	2011	2012	2013	2014	2015
CORE PROGRAMS					
Rebates/Vouchers					
Toilets	5.2	10.5	15.7	29.1	44.2
Clothes Washers	1.5	2.9	4.3	5.9	7.4
Urinals	0.0	0.0	0.0	0.0	0.0
Customer Surveys/Audits	5.7	10.8	15.5	24.4	32.4
Conservation Kit Distribution	7.0	13.1	18.5	23.3	27.5
Pop-Up Nozzle Distribution	37.2	74.4	111.6	148.7	185.9
Subtotal Core Programs	***56.5***	***111.8***	***165.5***	***231.4***	***297.4***
NON-CORE PROGRAMS					
Direct Install Toilets/Urinals	4.6	9.0	13.2	42.7	70.9
Smart Irr. Controller Vendor Incentives	0.1	0.1	0.2	0.2	0.3
Large Landscape Water Use Reports	8.4	8.4	8.4	8.4	8.4
Large Landscape Surveys/Incentives	1.8	3.3	4.8	13.9	22.9
Commercial Kitchen Rebates/Vouchers	0.0	0.0	0.0	10.9	21.8
Cooling Tower/Process Water Retrofit Incentives	0.0	0.0	0.0	0.0	0.0
Subtotal Non-Core Programs	***14.9***	***20.8***	***26.6***	***76.1***	***124.3***
Total Core and Non-Core Program Savings	**71.4**	**132.6**	**192.1**	**307.4**	**421.7**

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 Chico 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 Cal Water Strategy

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

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

<u>Mitigation</u>

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

<u>Adaptation</u>

Climate change means more than just hotter days. Continued warming of the climate system may have considerable impact on the operation of Cal Water Districts, even if indirectly. For example, snow in the Sierra Nevada provides 65 percent of California's water supply. Predictions indicate that by 2050 the Sierra snowpack will be significantly

reduced. Much of the lost snow will fall as rain, which flows quickly down the mountains during winter and cannot be stored in the current water system for use during the summer. This change in water runoff may severely impact groundwater recharge and other water supply networks. The climate is also expected to become more variable, bringing more droughts and floods. Cal Water districts will have to adapt to these new and more variable conditions.

7.3 Potential Climate Change Effects

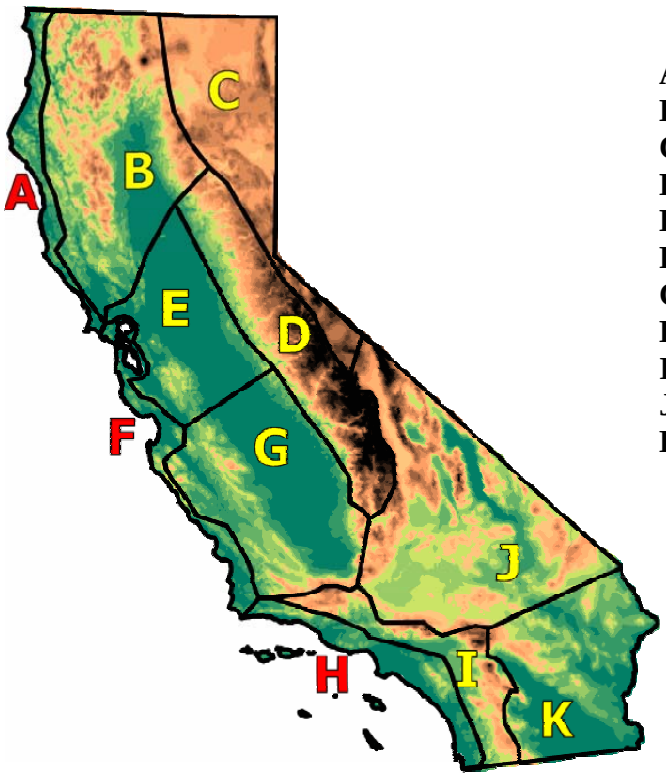
Even in the near term of the next 20 years, DWR has outlined potential climate change effects to water supplies, water demand, sea level, and the occurrence and severity of natural disasters. Some of these potential changes are presented below. Cal Water will investigate the following climate change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

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

7.4 Historical Climate Data Summary

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

Figure 7.4-1: The Climate Regions of California[6]



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

Cal Water has water service districts in 7 out of 11 of the climate regions. The Chico District is located in the North Central 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

[6] 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 0.82°F, 1.70°F, and 1.26°F, respectively. More recently, since 1975, the maximum, minimum, and mean temperature departures have increased 1.91°F, 3.62°F, and 2.76°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 North Central Region

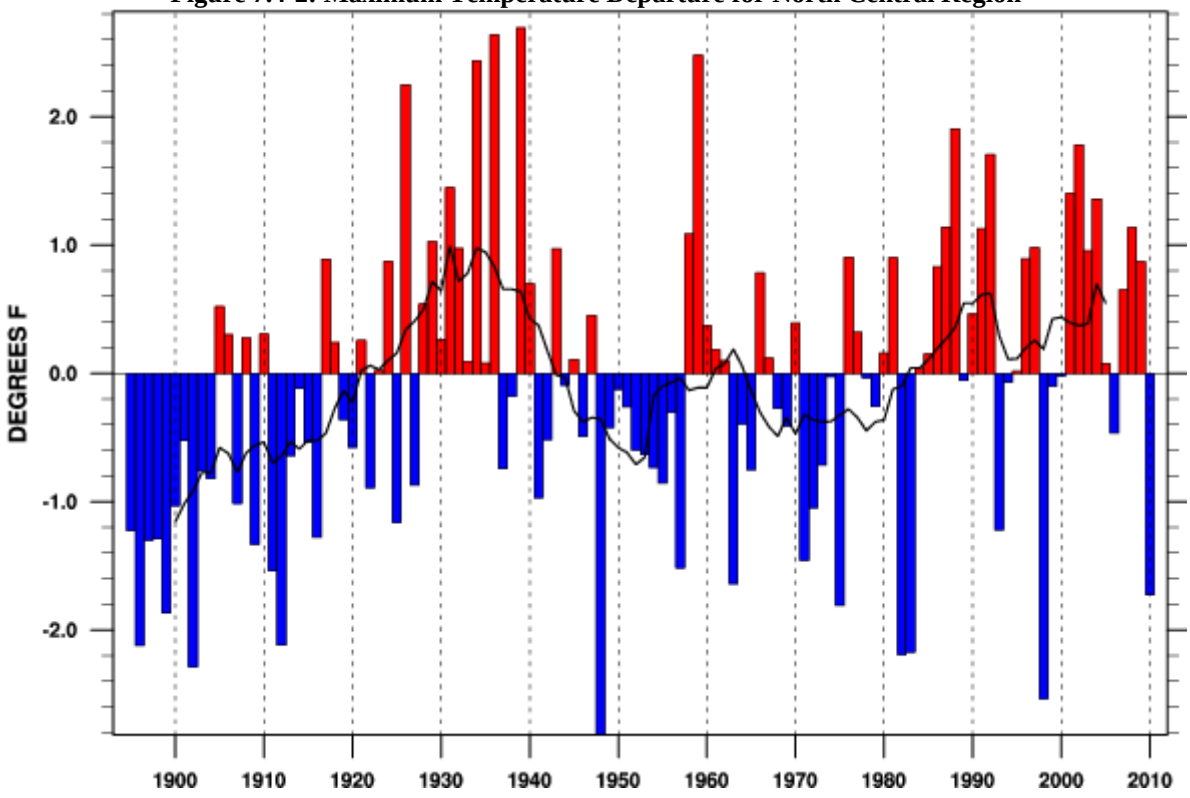


Figure 7.4-3: Mean Temperature Departure for North Central Region

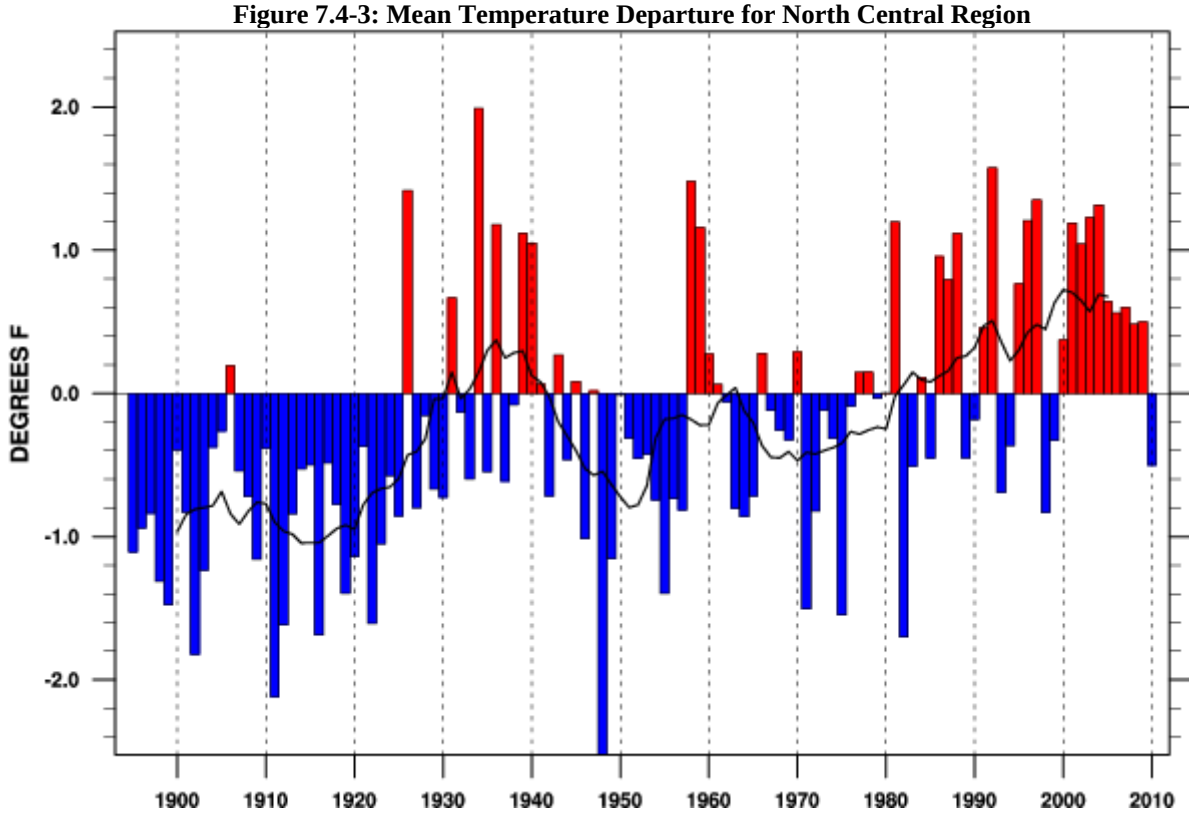
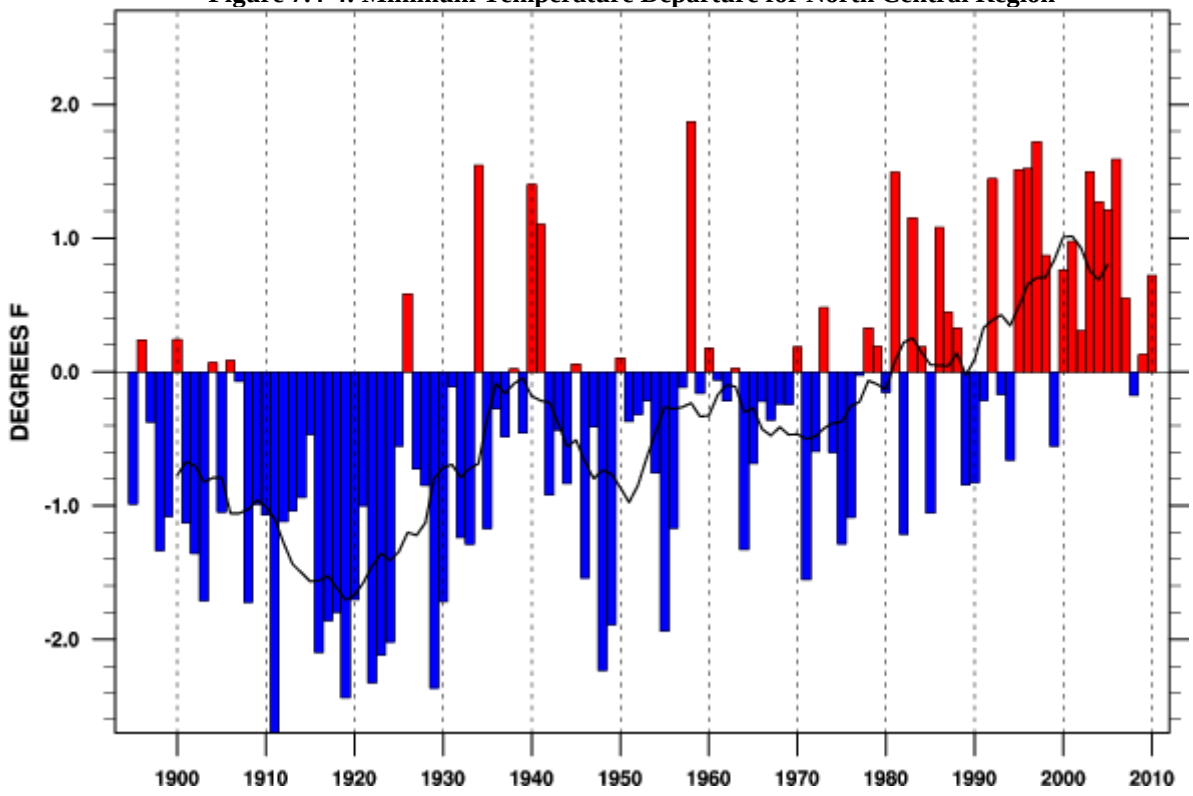
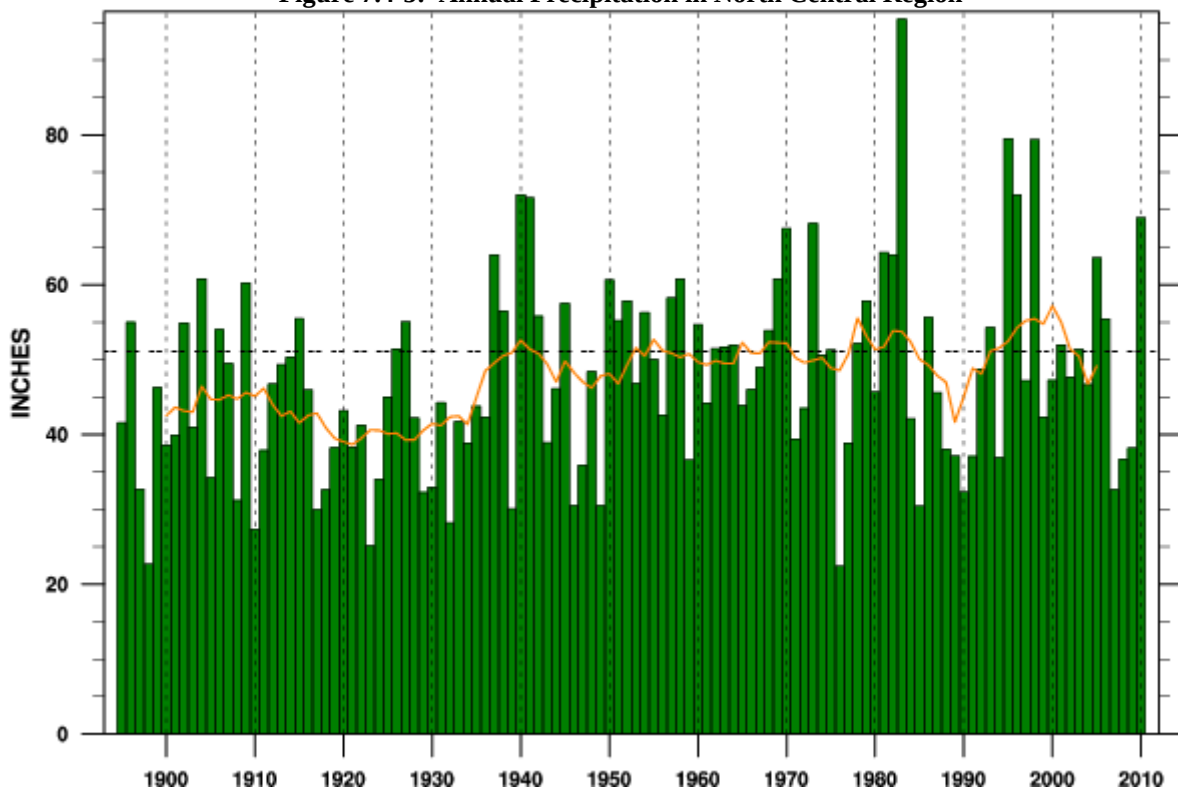


Figure 7.4-4: Minimum Temperature Departure for North Central Region



Variation in annual rainfall totals has also shown an increasing trend since 1895 with more deviation from average occurring in recent decades as compared to earlier part of the century.

Figure 7.4-5: Annual Precipitation in North Central Region



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

7.5 Climate Change Guidance

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

8 Completed UWMP Checklist

8.1 Review Checklist

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

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

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

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

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

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

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

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

51	(Provide a) plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.	10633(g)	Recycled Water		4.5
52	The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.	10634	Water Supply (Water Quality)	For years 2010, 2015, 2020, 2025, and 2030	5.2.4
53	Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.	10635(a)	Reliability		5.2
54	The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.	10635(b)	External Coordination and Outreach		1.2
55	Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan.	10642	External Coordination and Outreach		1.2
56	Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area.	10642	External Coordination and Outreach		1.2
57	After the hearing, the plan shall be adopted as prepared or as modified after the hearing.	10642	External Coordination and Outreach		1.3
58	An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.	10643	External Coordination and Outreach		1.6
59	An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.	10644(a)	External Coordination and Outreach		1.3

60	Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.	10645	External Coordination and Outreach		1.3

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

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

APPENDIX A-1: RESOLUTION TO ADOPT UWMP

APPENDIX A-2: CORRESPONDENCES

APPENDIX A-3: PUBLIC MEETING NOTICE

APPENDIX B: SERVICE AREA MAP

APPENDIX C: WATER SUPPLY, DEMAND, AND PROJECTION WORKSHEETS

APPENDIX D: DWR'S GROUNDWATER BULLETIN 118

APPENDIX E: TARIFF RULE 14.1 WATER CONSERVATION AND RATIONING PLAN

APPENDIX F: WATER EFFICIENT LANDSCAPE GUIDELINES

APPENDIX G: CONSERVATION MASTER PLAN

APPENDIX H: GLENN COUNTY GROUNDWATER MANAGEMENT PLAN