Golden State
Water Company
A Subsidiary of American States Water Company

Final Report

2010 Urban Water Management Plan
Cordova

Corporate Office
630 E. Foothill Blvd.
San Dimas CA 91773

July 2011

Kennedy/Jenks Consultants

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Notice of Adoption

A meeting to solicit public comments on the 2010 Urban Water Management Plan for the Golden State Water Company Cordova System was held on June 9, 2011 at 6 p.m. at the Region I Headquarters in Rancho Cordova, California. Notice of this meeting was published in accordance with Section 6066 of the Government Code in the Sacramento Bee on April 5, 2011.

Copies of the Urban Water Management Plan were made available to the public at the Golden State Water Company Customer Service Office in Rancho Cordova, California at least 1 week prior to the public hearing.

Golden State Water Company, hereby, adopts the 2010 Urban Water Management Plan for the Cordova System.

William C. Gedney
Vice President, Asset Management
Golden State Water Company

July 1, 2011

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Abbreviations

µg/L	micrograms per liter
ac-ft	acre-feet
ac-ft/yr	acre-feet per year
Act	Urban Water Management Planning Act
ACWA	Association of California Water Agencies
AMR	automatic meter reading
AWWA	American Water Works Association
BMPs	best management practices
Cal EMA	California Emergency Management Agency
ccf	hundred cubic feet
CCR	California Code of Regulations
CCSCE	Center for the Continuing Study of the California Economy
CDPH	California Department of Public Health
cfs	cubic feet per second
CII	commercial, industrial, and institutional
CIMIS	California Irrigation Management Information System
COG	Council of Governments
Council or CUWCC	California Urban Water Conservation Council
CPUC	California Public Utilities Commission
CSA	customer service area
CSCGF	Central Sacramento County Groundwater Forum
CVP	Central Valley Project
D-DBP	disinfectant and disinfection by-product
DMM	Demand Management Measure
DOF	Department of Finance

DRU	Demographic Research Unit
DWF	dry weather flow
DWR	Department of Water Resources (California)
DWR Guidebook	Guidebook to Assist Water Suppliers in the Preparation of a 2010 Urban Water Management Plan
ERP	Emergency Response Plan
ETo	evapotranspiration
GET	Groundwater Extraction and Treatment
GIS	Geographic Information System
gpcd	gallons per capita day
gpd	gallons per day
gpm	U.S. gallons per minute
GSWC	Golden State Water Company
H2S	hydrogen sulfide
HCD	Housing and Community Development
HECW	high efficiency clothes washer
HET	high efficiency toilet
MCL	maximum contaminant level
MF	multi-family
mgd	million gallons per day
MIE	Media in Education
MOU	Memorandum of Understanding (Regarding Urban Water Conservation in California)
MTP2035	Metropolitan Transportation Plan
N/A	not available, not applicable
NAICS	North American Industry Classification System
NDMA	N-nitrosodimethylamine
NIE	Newspapers in Education
O&M	operation and maintenance

pCi/L	picoCuries per liter
RHNA	Regional Housing Needs Allocation
RWA	Regional Water Authority
RWEP	Regional Water Efficiency Programs
SACOG	Sacramento Area Council of Governments
SACSIM	Regional Activity-Based Simulation Model
SASD	Sacramento Area Sewer District
SAWWA	Sacramento Area Water Works Association
SBX7-7	Senate Bill X7-7, The Water Conservation Act of 2009
SCWA	Sacramento County Water Agency
SD	Science Discover
SF	single-family
SMUD	Sacramento Municipal Utility District
SRCSD	Sacramento Regional County Sanitation District
SRWTP	Sacramento Regional Wastewater Treatment Plant
TAZ	traffic analysis zone
USEPA	U.S. Environmental Protection Agency
UWMP	Urban Water Management Plan
VOC	volatile organic compound
WAP	Water Action Plan
WRCC	Western Regional Climate Center
WROS	Water Recycling Opportunities Study
WSS	WaterSense Specification
WTP	Water Treatment Plant
WY	water year

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Definitions

Chapter 2, Part 2.6, Division 6 of the California Water Code provides definitions for the construction of the Urban Water Management Plans. Appendix A contains the full text of the Urban Water Management Planning Act.

CHAPTER 2. DEFINITIONS

Section 10611. Unless the context otherwise requires, the definitions of this chapter govern the construction of this part.

Section 10611.5. "Demand management" means those water conservation measures, programs, and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies.

Section 10612. "Customer" means a purchaser of water from a water supplier who uses the water for municipal purposes, including residential, commercial, governmental, and industrial uses.

Section 10613. "Efficient use" means those management measures that result in the most effective use of water so as to prevent its waste or unreasonable use or unreasonable method of use.

Section 10614. "Person" means any individual, firm, association, organization, partnership, business, trust, corporation, company, public agency, or any agency of such an entity.

Section 10615. "Plan" means an urban water management plan prepared pursuant to this part. A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, and reclamation and demand management activities. The components of the plan may vary according to an individual community or area's characteristics and its capabilities to efficiently use and conserve water. The plan shall address measures for residential, commercial, governmental, and industrial water demand management as set forth in Article 2 (commencing with Section 10630) of Chapter 3. In addition, a strategy and time schedule for implementation shall be included in the plan.

Section 10616. "Public agency" means any board, commission, county, city and county, city, regional agency, district, or other public entity.

Section 10616.5. "Recycled water" means the reclamation and reuse of wastewater for beneficial use.

Section 10617. "Urban water supplier" means a supplier, 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 of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems subject to Chapter 4 (commencing with Section 116275) of Part 12 of Division 104 of the Health and Safety Code.

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Chapter 1: Plan Preparation

1.1 Background

This Urban Water Management Plan (UWMP) has been prepared for the Golden State Water Company (GSWC) Cordova System in compliance with Division 6, Part 2.6, of the California Water Code, Sections 10608 through 10657 as last amended by Senate Bill No. 7 (SBX7-7), the Water Conservation Act of 2009. The original bill requiring preparation of an UWMP was enacted in 1983. SBX7-7, which became law in November 2009, requires increased emphasis on water demand management and requires the state to achieve a 20 percent reduction in urban per capita water use by December 31, 2020.

Urban water suppliers having more than 3,000 service connections or supplying more than 3,000 acre-feet per year (ac-ft/yr) for retail or wholesale uses are required to submit a UWMP every 5 years to the California Department of Water Resources (DWR). The UWMP typically must be submitted by December 31 of years ending in 0 and 5 however SBX7-7 extended the UWMP deadline to July 1, 2011 to provide for development by DWR of required evaluation methodologies for determining water demand reduction targets. GSWC prepared an UWMP for the Cordova System in 1985, 1990, 1995, 2000, and 2005. This 2010 UWMP is an update to the 2005 plan.

GSWC water use reduction targets for the Cordova System were developed based on Compliance Method 1 as described by SBX7-7 and supplemental guidance from DWR.

The portion of the Urban Water Management Planning Act (Act) that describes the purpose and intent of the UWMP states and declares the following:

Section 10610.2.

(a) The Legislature finds and declares all of the following:

(1) The waters of the state are a limited and renewable resource subject to ever-increasing demands.

(2) The conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level.

(3) A long-term, reliable supply of water is essential to protect the productivity of California's businesses and economic climate.

(4) As part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry water years.

(5) Public health issues have been raised over a number of contaminants that have been identified in certain local and imported water supplies.

(6) Implementing effective water management strategies, including groundwater storage projects and recycled water projects, may require specific water quality and salinity targets for meeting groundwater basins water quality objectives and promoting beneficial use of recycled water.

(7) Water quality regulations are becoming an increasingly important factor in water agencies' selection of raw water sources, treatment alternatives, and modifications to existing treatment facilities.

(8) Changes in drinking water quality standards may also impact the usefulness of water supplies and may ultimately impact supply reliability.

(9) The quality of source supplies can have a significant impact on water management strategies and supply reliability.

(b) This part is intended to provide assistance to water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies to meet existing and future demands for water.

Section 10610.4. The Legislature finds and declares that it is the policy of the state as follows:

(a) The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.

(b) The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions.

(c) Urban water suppliers shall be required to develop water management plans to actively pursue the efficient use of available supplies.

1.2 System Overview

GSWC is an investor-owned public utility company, which owns 38 water systems throughout California, regulated by the California Public Utilities Commission (CPUC). This UWMP has been prepared for the Cordova System.

Located in Sacramento County within the Sacramento metropolitan area, the Cordova System serves a portion of the City of Rancho Cordova and the unincorporated community of Gold River. Figure 1-1 illustrates the location of the Cordova System.

1.3 Notice of Document Use

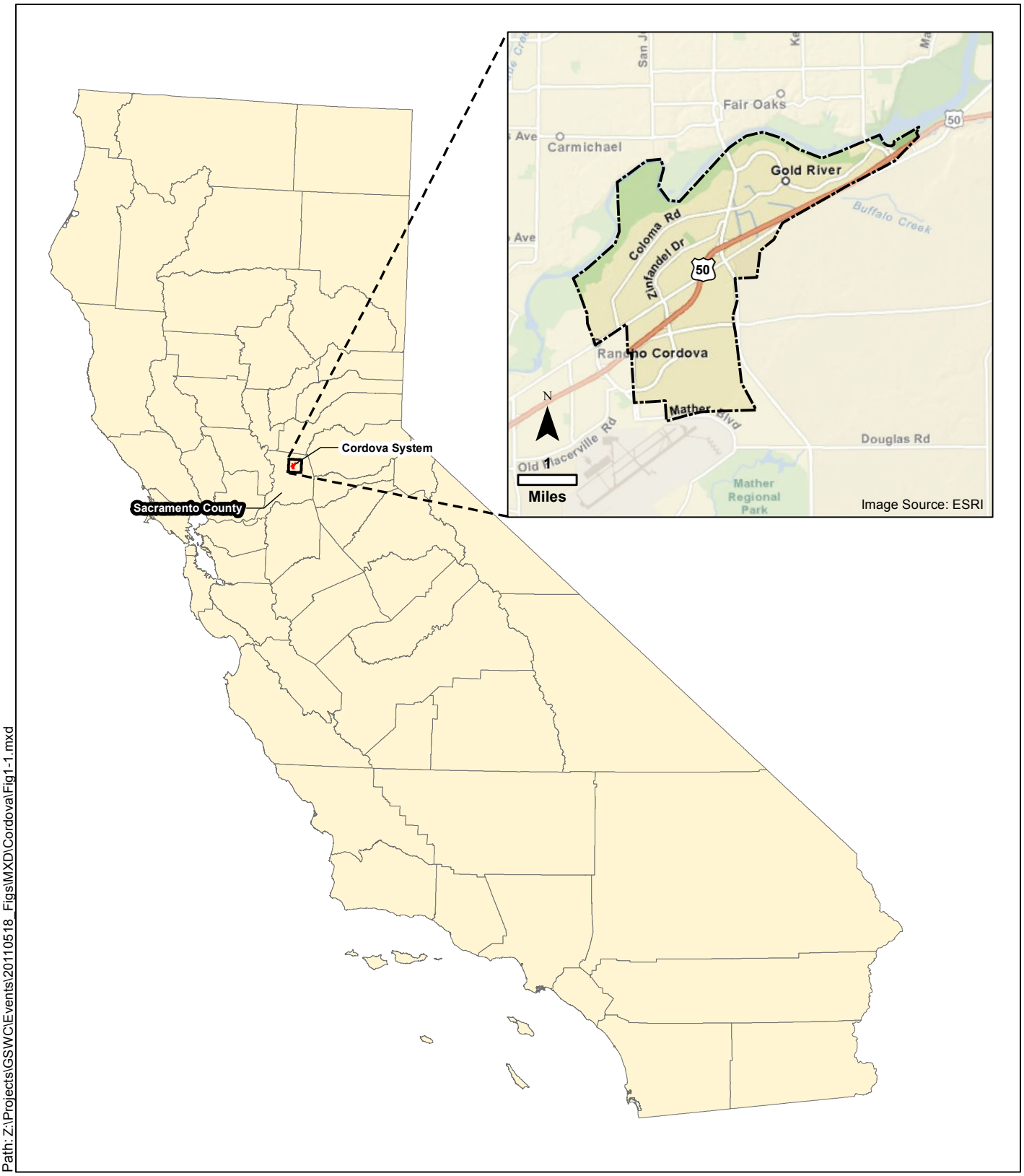
GSWC is committed to implementation of the projects, plans, and discussions provided within this document. However, it is important to note that execution of the plan is contingent upon the regulatory limitations and approval of the CPUC and other state agencies. Additionally, this document merely presents the water supply, reliability, and conservation programs known and in effect at the time of adoption of this plan.

1.4 Public Utility Commission 2010 Water Action Plan

The CPUC adopted the 2005 Water Action Plan (WAP) in December 2005, and an updated 2010 WAP in October 2010. The WAP is a general policy document. Specific implementation of policies and programs, along with modifications to CPUC ratemaking policies, and other programs including conservation, long-term planning, water quality and drought management programs are ongoing.

The purpose of the 2010 WAP update was to establish renewed focus on the following elements:

1. Maintain the highest standards of water quality;
2. Promote water infrastructure investment;
3. Strengthen water conservation programs to a level comparable to those of energy utilities;
4. Streamline CPUC regulatory decision-making;
5. Set rates that balance investment, conservation, and affordability; and
6. Assist low-income ratepayers.



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Golden State Water Company
2010 Urban Water Management Plan

Cordova System
Location Map

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Figure 1-1

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GSWC has been actively involved with the CPUC in suggesting optimal approaches to the WAP. In particular, the GSWC has suggested specific implementation measures and modifications to certain CPUC rate setting practices so that regulated utilities are able, as a practical matter, to achieve the policy objectives of the WAP. These efforts are intended to include further investment in local resource optimization, reduced reliance on imported supplies, enhanced conservation, and intensification of company-wide efforts to optimize water resource mix, including planned water supply projects and programs to meet the long-term water supply needs of GSWC's customers.

1.5 Agency Coordination

The 2010 UWMP requirements for agency coordination include specific timetables and requirements as presented in this chapter. The required elements of the Act are as follows:

Section 10620.

(d) (2) 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.

Section 10621.

(b) 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.

Section 10635.

(b) 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.

Section 10642. 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. 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.

Table 1-1 lists the agencies with which coordination occurred while preparing this 2010 UWMP. The initial coordination began in July 2010, which included the distribution of letter notifications and requests for information. Each notification letter was followed up with a telephone call as necessary to obtain supporting data and coordinate preparation of the UWMP. Table 1-1 also provides a list of agencies that were provided public hearing notifications and access to the draft UWMP.

Table 1-1: Coordination with Agencies							
Agency	**Contacted for Assistance**	**Participated in UWMP Development**	**Commented on the Draft**	**Attended Public Meetings**	**Received Copy of the Draft**	**Sent Notice of Intent to Adopt**	**Not Involved/ No Information**
California American Water Company	✓				✓		
City of Folsom	✓	✓			✓	✓	
City of Rancho Cordova	✓					✓	
County of Sacramento	✓					✓	
Sacramento Regional County Sanitation District	✓	✓				✓	
Sacramento County Water Agency, Zone 41	✓	✓			✓		
Sacramento Area Council of Governments (SACOG)	✓	✓					

Note:
This table is based on DWR's *Guidebook to Assist Water Suppliers in the Preparation of a 2010 Urban Water Management Plan* (DWR Guidebook) Table 1.

1.6 Plan Adoption and Submittal

Public participation and plan adoption and submittal requirements are detailed in the following sections of the Act:

Section 10621.

(c) 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)

Section 10642. After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

Section 10644.

(a) 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.

Section 10645. 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.

A public hearing to review the 2010 Cordova System UWMP was held on June 9, 2011 at the GSWC Region 1 Headquarters located in Rancho Cordova, California. This public session was held for review and comment on the draft UWMP before adoption by GSWC. Legal public notices for the public hearing and availability of the plan for review and comment were published in advance in the local newspapers in accordance with Government Code Section 6066. Notifications were also posted to GSWC's website (www.gswater.com).

In addition, notifications of preparation of the plan were provided to cities and counties within which GSWC provides water at least 60 days in advance of the public hearing as required by the Act. Copies of the draft plan were available to the public for review at GSWC's Cordova office and posted on GSWC's website. Appendix B contains the following:

- Copy of the public hearing notice from the local newspaper,
- Screen capture of website posting of public hearing notice,
- Notifications and follow-up correspondence provided to cities and counties, and
- Meeting minutes from the public hearing pertaining to the UWMP.

The final UWMP, as adopted by GSWC, will be submitted to DWR, the California State Library, and cities and counties within which GSWC provides water within 30 days of adoption. Likewise, copies of any amendments or changes to the plan will be provided to the aforementioned entities within 30 days. This plan includes all information necessary to meet the requirements of California Water Code Division 6, Part 2.6 (Urban Water Management Planning). Adopted copies of this plan will be made available to the public at GSWC's Cordova Customer Service Office no later than 30 days after submitting the final UWMP to DWR.

1.7 UWMP Preparation

GSWC prepared this UWMP with the assistance of its consultant, Kennedy/Jenks Consultants, as permitted by the following section of the Act:

> *Section 10620.*
> *(e) The urban water supplier may prepare the plan with its own staff, by contract, or in cooperation with other governmental agencies.*

During the preparation of the UWMP, documents that have been prepared over the years by GSWC and other entities were reviewed and information from those documents incorporated, as applicable, into this UWMP. The list of references is provided in Chapter 9.

The adopted plan is available for public review at GSWC's Cordova Office as required by Section 10645. Copies of the plan were submitted to DWR, cities and counties within the service area, the State Library, and other applicable institutions within 30 days of adoption as required by Section 10644. Appendix H includes copies of the transmittals included with the adopted plan as supporting documentation.

1.8 UWMP Implementation

Section 10643. An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.

GSWC is committed to the implementation of this UWMP concurrent with the scheduled activities identified herein as required by Section 10643 of the Act. Each system is managed through GSWC District offices and is afforded staff with appropriate regulatory approval to properly plan and implement responses identified in this document and other key planning efforts to proactively address water supply reliability challenges. Furthermore, each region of GSWC has a conservation coordinator that oversees the implementation of Demand Management Measures (DMMs) through GSWC participation in the California Urban Water Conservation Council's (Council or CUWCC) Memorandum of Understanding (MOU).

1.9 Content of the UWMP

This UWMP addresses all subjects required by Section 10631 of the Act as defined by Section 10630, which permits "levels of water management planning commensurate with the numbers of customers served and the volume of water supplied." All applicable sections of the Act are discussed in this UWMP, with chapters of the UWMP and DWR Guidebook Checklist cross-referenced against the corresponding provision of the Act in Table 1-2. Additionally, a completed copy of the 2010 UWMP Checklist organized by subject is included as Appendix J.

Table 1-2: Summary of UWMP Chapters and Corresponding Provisions of the California Water Code

Chapter	Corresponding Provisions of the Water Code		DWR Guidebook Checklist No.
Chapter 1: Plan Preparation	10642	Public participation	55 and 56
	10643	Plan implementation	58
	10644	Plan filing	59
	10645	Public review availability	60
	10620 (a)–(e)	Coordination with other agencies; document preparation	4
	10621 (a)–(c)	City and county notification; due date; review	6 and 54
	10621 (c)	UWMP adoption	7 and 57
	10620 (f)	Resource optimization	5
Chapter 2: System Description	10631 (a)	Area, demographics, population, and climate	8-12
Chapter 3: Water Use	10608	Urban water use targets	1
	10631 (e), (k)	Water use, data sharing	25 and 34
	10631 (k)	Data to wholesaler	33

Table 1-2: Summary of UWMP Chapters and Corresponding Provisions of the California Water Code			
Chapter	**Corresponding Provisions of the Water Code**		**DWR Guidebook Checklist No.**
Chapter 4: Water Supply	10631 (b)–(d), (h), (k)	Water sources, reliability of supply, transfers and exchanges, supply projects, data sharing	13-21, 24, 30, 33
	10631 (i)	Desalination	31
	10633	Recycled water	44-51
Chapter 5: Water Quality	10634	Water quality impacts on reliability	52
Chapter 6: Water Supply Reliability	10631 (c) (1)	Water supply reliability and vulnerability to seasonal or climatic shortage	22
	10631 (c) (2)	Factors resulting in inconsistency of supply	23
	10635 (a)	Reliability during normal, dry, and multiple-dry years	53
Chapter 7: Conservation Program and Demand Management Measures	10631 (f)–(g), (j), 10631.5, 10608.26 (a), 10608.36	Conservation Program, DMMs, and SBX7-7 water use reduction plan	2, 26-29, 32
Chapter 8: Water Shortage Contingency Plan	10632	Water shortage contingency plan	35-43

1.10 Resource Optimization

Section 10620(f) of the Act asks urban water suppliers to evaluate water management tools and options to maximize water resources and minimize the need for imported water from other regions. GSWC understands the limited nature of water supply in California and is committed to optimizing its available water resources. This commitment is demonstrated through GSWC's use of water management tools throughout the company to promote the efficient use of water supplies from local sources, wherever feasible. Additionally, GSWC takes efforts to procure local reliable water supplies wherever feasible and cost effective. GSWC is a regular participant in regional water resources planning efforts, and has developed internal company water resource plans and water conservation programs.

GSWC has implemented a water conservation program, deployed through each region of the company. In an effort to expand the breadth of offered programs, GSWC partners with wholesale suppliers, energy utilities, and other agencies that support water conservation programs.

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Chapter 2: System Description

Chapter 2 summarizes the Cordova System's service area and presents an analysis of available demographics, population growth projections, and climate data to provide the basis for estimating future water requirements.

The water system description requirements are detailed in the following section of the Act:

> *Section 10631.*
>
> *(a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. 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 and shall be in five-year increments to 20 years or as far as data is available.*

2.1 Area

The Cordova System is located in Sacramento County and serves a portion of the City of Rancho Cordova and the unincorporated Sacramento County community of Gold River. The service area is bounded by Sunrise Boulevard and the Folsom South Canal to the east, Mather Field Airport to the south, Mather Field Road to the west, and the American River to the north. The Sunrise area also includes the Nimbus Aquatic Center and commercial area between Highway 50 and Nimbus Dam.

Figure 2-1 illustrates the boundaries for the Cordova System. The service area is primarily characterized by residential land use, with some commercial and industrial land use.

2.2 Demographics

The City of Rancho Cordova was chosen as demographically representative of the Cordova System service area. According to 2000 US Census Data, the median age of Cordova's residents is 31.9 years. Cordova has an average household size of 2.68 and a median household income of approximately $40,095 in 1999 dollars, or $52,364 in 2010 dollars.

The Cordova System map indicates that there is potential land area available for new development. This was verified by information GSWC obtained regarding upcoming development projects within the Cordova service area.

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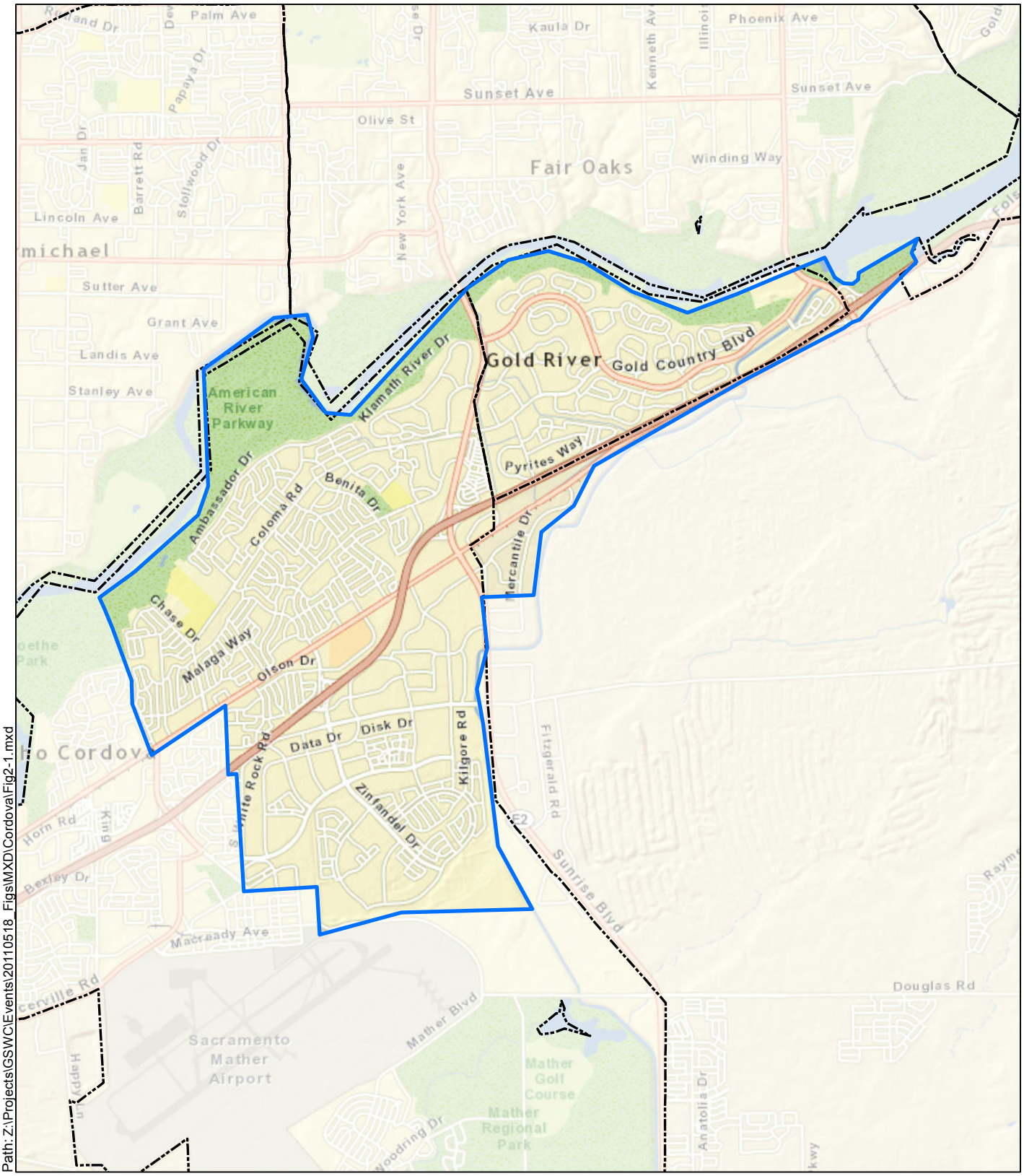

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Legend

- Cordova System Boundary
- City Boundary

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Kennedy/Jenks Consultants

Golden State Water Company
2010 Urban Water Management Plan

Cordova System Service Area

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July 2011

Figure 2-1

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2.3 Population, Housing and Employment

Population, housing, and employment projections were developed for the Cordova System using the Sacramento Area Council of Governments (SACOG) population, housing and employment data. SACOG's methodology is described below, followed by the derivation of population projections for the Cordova System. The projections provided in this report are the final projections used in the Metropolitan Transportation Plan for 2035 (MTP2035), adopted by SACOG in 2008. The current population projections differ from previous projections developed in 2005 by the use of new software. SACOG now projects demographic information for the 5-year, 10-year, and approximately 25-year increment, while 5-year increments were previously used. Both the previous and current projections use 2000 U.S. Census Data.

2.3.1 SACOG Population Projection Development Methodology

The population, housing, and employment data are derived from the 2000 U.S. Census which forms a baseline for local data projections. Several methodologies including the Demographic Model, Economic Model, Trend Base, Land Use Model and General Plan Model were used in developing the projections at various geographical categories. The methodology for these projections incorporates regional growth targets provided by the Center for the Continuing Study of the California Economy (CCSCE) and DB Consulting. Projection data sources include: the U.S. Census Bureau's 2000 census of population and housing, annual housing and population estimates from the California State Department of Finance (DOF), Demographic Research Unit (DRU) Info USA employment data, regional growth targets data from the CCSCE, and the General Plan from the Sacramento Region Blueprint Project.

Year 2005 is the new socio-economic baseline, which represents the most important departure from the previous projection set in methodology and results. The projection methodology employed in previous projections (in 2000) is different from the current recent projections (2008). The major difference is that household population estimates and projections are now generated through a population synthesis process run by a regional travel demand forecasting model, the Sacramento Regional Activity-Based Simulation Model (SACSIM).

A detailed explanation of the population, household and employment projection process employed by SACOG can be found in the document *Projections of Employment, Population, Households, and Household Income in the SACOG Region for 2000-2050*.

2.3.2 Historical and Projected Population

The Cordova System boundaries contain multiple traffic analysis zones (TAZs), many of which have boundaries that do not coincide exactly with service area boundaries. The population projection analysis consisted of superimposing service area boundaries over TAZ boundaries, identifying the applicable overlapping TAZ, and developing a percentage estimate for each overlapping area. For a TAZ 100 percent within the service area boundaries, it was assumed that 100 percent of the associated TAZ population data was applicable to the Cordova System. For areas where the overlap was not exact, the area of overlap as a percentage was applied to the data to develop an estimate of applicable population. Appendix G Table G-1 lists the TAZs with a corresponding estimate of what percent of each TAZ lies within the Cordova System.

It was typically assumed that the various types of housing and employment within a TAZ are distributed uniformly within all parts of that TAZ unless maps indicated non-uniform

concentrations. In these cases, population estimates were either increased or decreased as applicable to match the existing land use. This report uses SACOG demographic data to determine population, household, and employment growth rate projections for the years 2015 to 2035. Since the SACOG projections were provided for the years 2013, 2018, and 2035, growth rates were applied over the closest applicable time interval. For example, the projected 50,388 population in 2025 was estimated by applying a 3 percent growth rate between 2018 and 2035 and a 4 percent growth rate between 2013 and 2018 to the projected 2015 population. Appendix G, Table G-2 contains all of the SACOG's historic and projected demographic data for each TAZ for those years. Figure 2-2 details the TAZs within the Cordova System.

Annual estimates of historical population between 1999 and 2010 required for SBX7-7 are provided in Table 2-1. The population estimates were developed using DWR *Technical Methodology 2: Service Area Population* (DWR 2011). GSWC is considered a Category 2 water supplier because they maintain a Geographic Information System (GIS) of their service area. The per-connection methodology described in Appendix A of *Technical Methodology 2* was used since annual estimates of direct service area population form SACOG or other local government agencies were not available. This method estimates annual population by anchoring the ratio of year 2000 residential connections to the year 2000 U.S. Census population. This ratio was then linearly scaled to active residential connections data to estimate population for the non-census years in which water supply data were available: 1999 through 2010. The residential billing category includes traditional single-family residential and multi-family connections. However, since GSWC does not have a specific multi-family billing category that only encompasses apartment complexes and other types of multi-family housing units, the ratio of year 2000 U.S. Census total population per residential connection was used for projecting population growth.

Table 2-1: Cordova System Historical Population

Year	Service Area Population
1999	38,571
2000	38,249[1]
2001	39,276
2002	40,862
2003	42,402
2004	43,049
2005	44,329
2006	45,091
2007	45,601
2008	45,926
2009	46,093
2010	46,154

Note:
1. Population for year 2000 from 2005 UWMP.

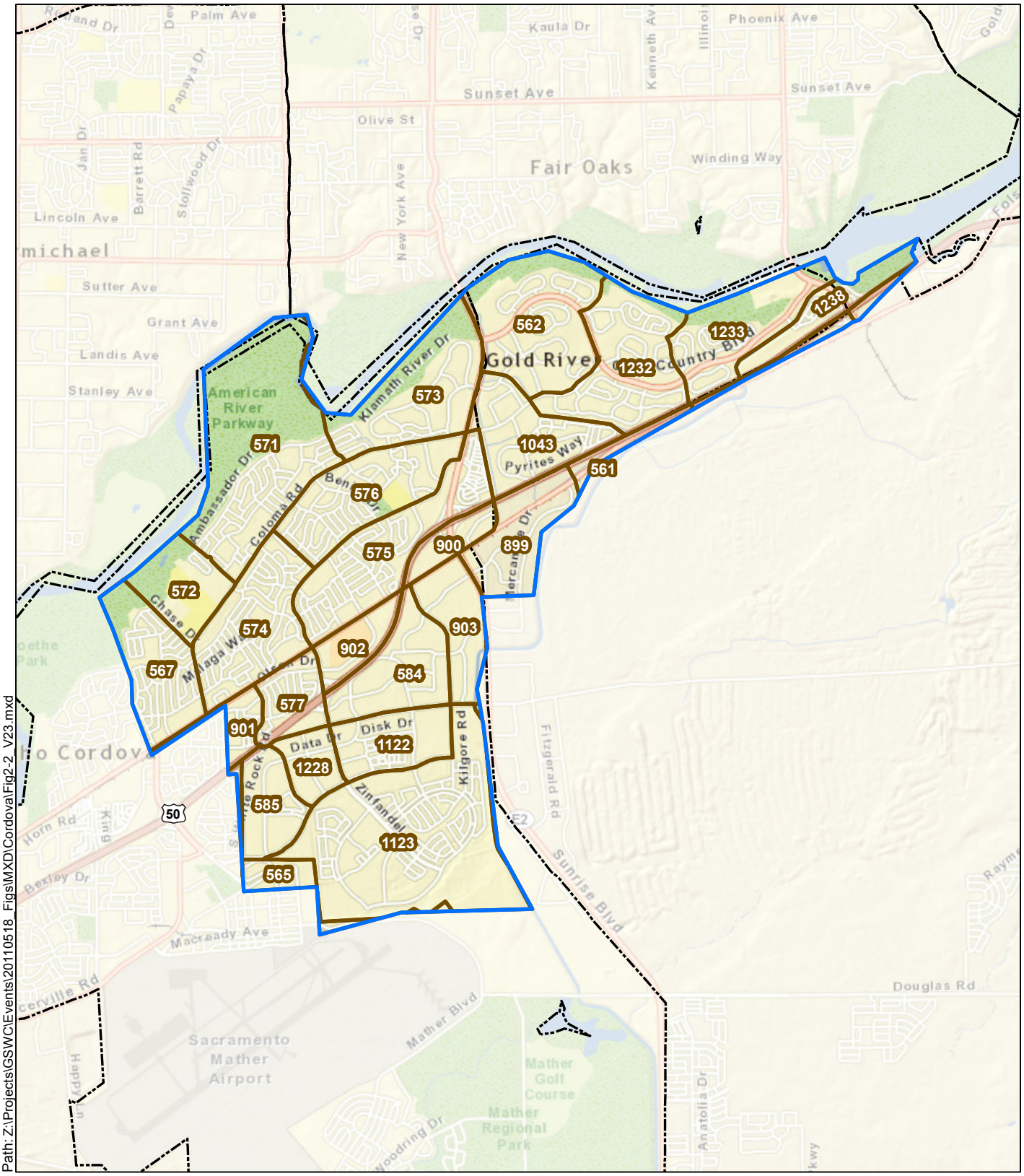

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Image Source: ESRI

Legend

- Cordova System Boundary
- TAZ Boundary within Service Area
- City Boundary

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Kennedy/Jenks Consultants

Golden State Water Company
2010 Urban Water Management Plan

Cordova System Service Area with TAZ Boundary

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July 2011

Figure 2-2

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To ensure consistency between the historical and projected population data required for this plan, projections for 2015 through 2035 were adjusted relative to the 2010 population benchmark using the applicable SACOG percentage growth rates in each category. For this reason, SACOG projections after 2000 for the TAZs do not correlate precisely with the estimates included in this plan.

A summary of historic and projected population, households, and employment within the Cordova System (based on SACOG data) is presented in Table 2-2 and illustrated in Figure 2-3. By 2035, population is expected to increase by a total of 13 percent, from 46,154 in 2010 to 52,094, which translates to a 0.5 percent growth rate per year. The number of households is expected to grow 13 percent during the same period, which equates to an annual household growth rate of 0.5 percent. Employment is expected to grow 21 percent during the same period, which equates to an annual employment growth rate of 0.8 percent.

Table 2-2: Cordova System Historical and Projected Population

Year	Service Area Population	Service Area Household	Service Area Employment	Data Source
2005	44,329	17,819	43,766	SACOG
2010	46,154	19,704	47,411	SACOG
2015	49,009	20,903	50,542	SACOG
2020	49,536	21,164	52,578	SACOG
2025	50,388	21,559	54,126	SACOG
2030	51,241	21,954	55,673	SACOG
2035	52,094	22,348	57,221	SACOG

Notes:
1. This table is based on the DWR Guidebook Table 2.
2. Dashed line represents division between historic and projected data.
3. Growth rates for population, household and employment are based on SACOG projections.

The 2005 UWMP indicated that buildout would be reached within the Cordova System by 2015. However, this projection has changed significantly as it was based on information available at the time including: anticipated developments, available SACOG and City of Rancho Cordova projections, and a GSWC analysis of the remaining vacant lots within the service area. 2010 projections reveal a prolonged buildout period, expected to occur by 2035 or later as indicated by SACOG projected growth through this planning horizon. The City of Rancho Cordova 2006 General Plan projects build out by 2030, however, portions of the Cordova System are not within the existing City boundary.

Household growth projections were confirmed by completing an updated vacant lot analysis and inventory of inactive service connections within the Cordova System. 2006 General Plan land use and approved subdivision maps were compared and show a potential buildout growth of 2,629 (minimum density) to 6,861 (maximum density) dwelling units. The results of the analysis support the SACOG projections, which estimate an increase of 2,604 households (single-family or multi-family) by 2035.

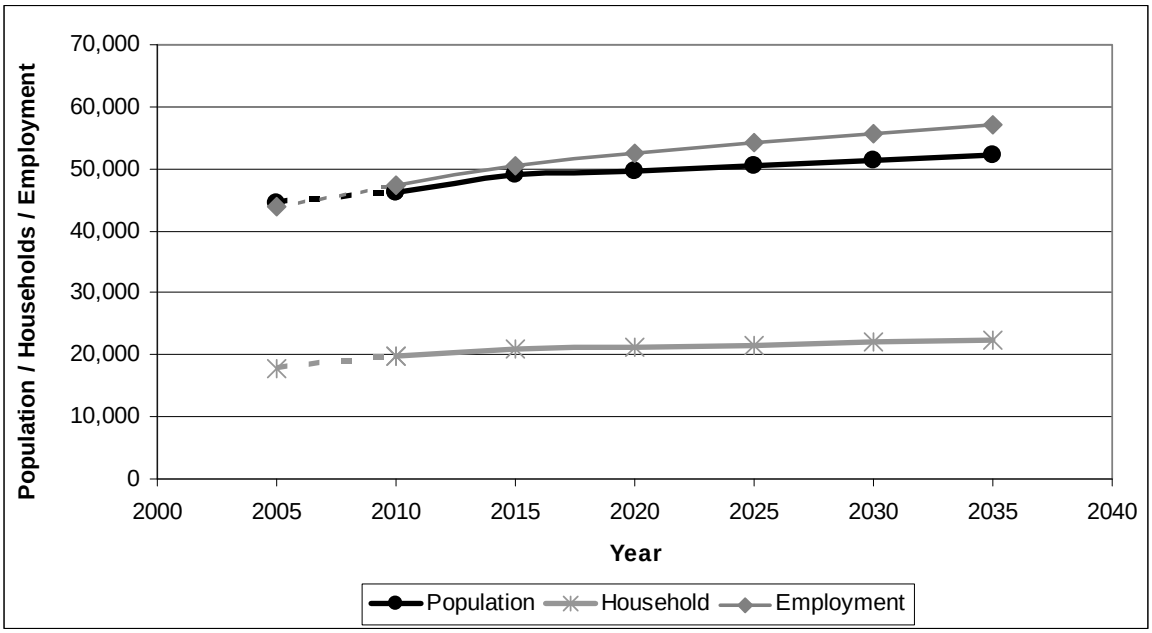

Figure 2-3: Historical and Projected Population, Household and Employment Growth within the Cordova System

2.4 Climate

The Cordova System has cool, humid winters and hot, dry summers. The Western Regional Climate Center (WRCC) maintains historic climate data for selected cities throughout the West. WRCC does not have a station in the Cordova System, however, the Sacramento station, 7 miles from the City of Rancho Cordova, has 130 years of climate data on record. Data obtained from the WRCC website (www.wrcc.dri.edu) for the Sacramento station was utilized for this climate data analysis. Table 2-3 presents the monthly average climate summary based on the 130-year historical data.

In the winter, the lowest average monthly temperature is approximately 40 degrees Fahrenheit. The highest average monthly temperature reaches approximately 92 degrees Fahrenheit in the summer. Figure 2-4 presents the monthly average precipitation based on 130-year historical data. The rainy season is typically from November to March. Monthly precipitation during the winter months ranges from 2 to 4 inches. Low humidity occurs in the summer months from May to October. The moderately hot and dry weather during the summer months typically results in moderately high water demand.

Similar to the WRCC in the Cordova area, the California Irrigation Management Information System (CIMIS) website tracks and maintains records of evapotranspiration (ETo) for select cities. ETo statistics used for this system come from the Fair Oaks station, which is the closest station (7 miles) to the Cordova System that maintains ETo records. ETo is a standard measurement of environmental parameters that affect the water use of plants. ETo is given in inches per day, month, or year and is an estimate of the ETo from a large field of well-watered, cool-season grass that is 4- to 7-inches tall. The monthly average ETo is presented in inches in Table 2-3. As the table indicates, a greater quantity of water is evaporated during June, July and August in correlation to high temperatures and low humidity, which may result in high water demand.

Table 2-3: Monthly Average Climate Data Summary for Cordova System				
Month	Standard Monthly Average ETo[2] (inches)	Average Total Rainfall (inches)	Average Temperature (degrees Fahrenheit)	
			Max	Min
January	1.0	3.67	53.4	39.5
February	1.6	3.21	59.7	43.1
March	3.4	2.63	64.9	45.7
April	4.3	1.40	71.1	48.4
May	6.5	0.62	78.3	52.5
June	7.5	0.16	85.9	56.8
July	8.0	0.01	91.6	59.2
August	7.1	0.03	90.5	58.7
September	5.2	0.30	86.2	57.0
October	3.4	0.93	76.7	51.6
November	1.6	1.98	64.1	44.5
December	1.0	3.18	54.0	39.9

Notes:
1. Data presented are from the Sacramento station, approximately 7 miles from Rancho Cordova.
2. Evapotranspiration (ETo) from http://www.cimis.water.ca.gov/cimis/welcom.jsp.

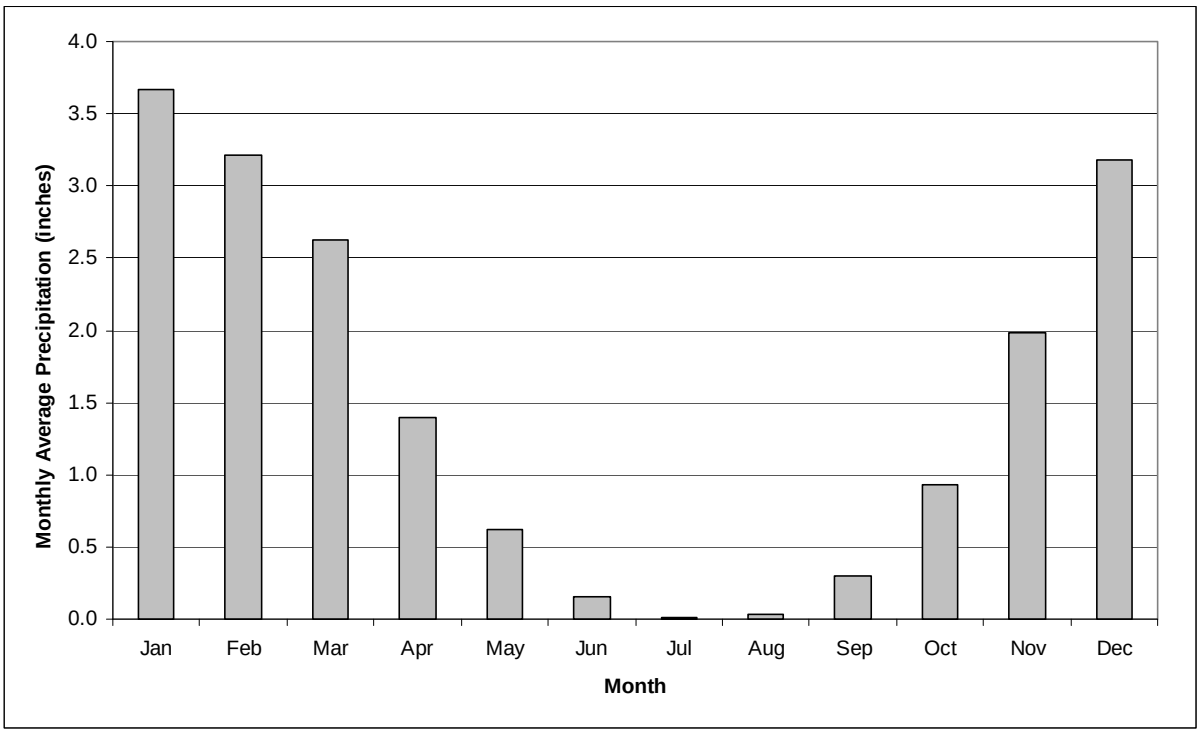

Figure 2-4: Monthly Average Precipitation at Sacramento Station Based on 130-Year Historical Data

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Chapter 3: Water Use

Section 10631(e) of the Act requires that an evaluation of water use be performed for the Cordova System. The Act states the following:

> *Section 10631.*
>
> *(e) (1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, 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.*
>
> *(2) The water-use projections shall be in the same five-year increments described in subdivision (a).*

In addition, Section 10631(k) directs urban water suppliers to provide existing and projected water-use information to wholesale agencies from which water deliveries are obtained. The Act states the following:

> *Section 10631.*
>
> *(k) 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).*

In conjunction with projecting total water demand, each urban water retail supplier must develop urban water use targets and an interim urban water use target in accordance with SBX7-7. SBX7-7 amends the Act and requires statewide urban demand reduction of 20 percent by the year 2020. The bill sets specific methods for calculating both baseline water usage and water use targets in gallons per capita day (gpcd).

Section 10608.20(e) states the following:

> *Section 10608.20.*
>
> *(e) An urban retail water supplier shall include in its urban water management plan required pursuant to Part 2.6 (commencing with Section 10610) due in 2010 the 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.*

This chapter presents an analysis of water use data with the resulting projections for future water needs and water use targets in accordance with SBX7-7 for the Cordova System.

3.1 Historical Water Use

Historical water use data from 1999 to 2010 were analyzed in order to provide an overview of historical water use trends for the Cordova System. In the Cordova System, a large number of connections are unmetered; however GSWC is currently implementing a meter retrofit program with expected final completion by 2025. Figure 3-1 shows the historical number of service connections including metered and unmetered and the total water use for the Cordova System from 1999 through 2010.

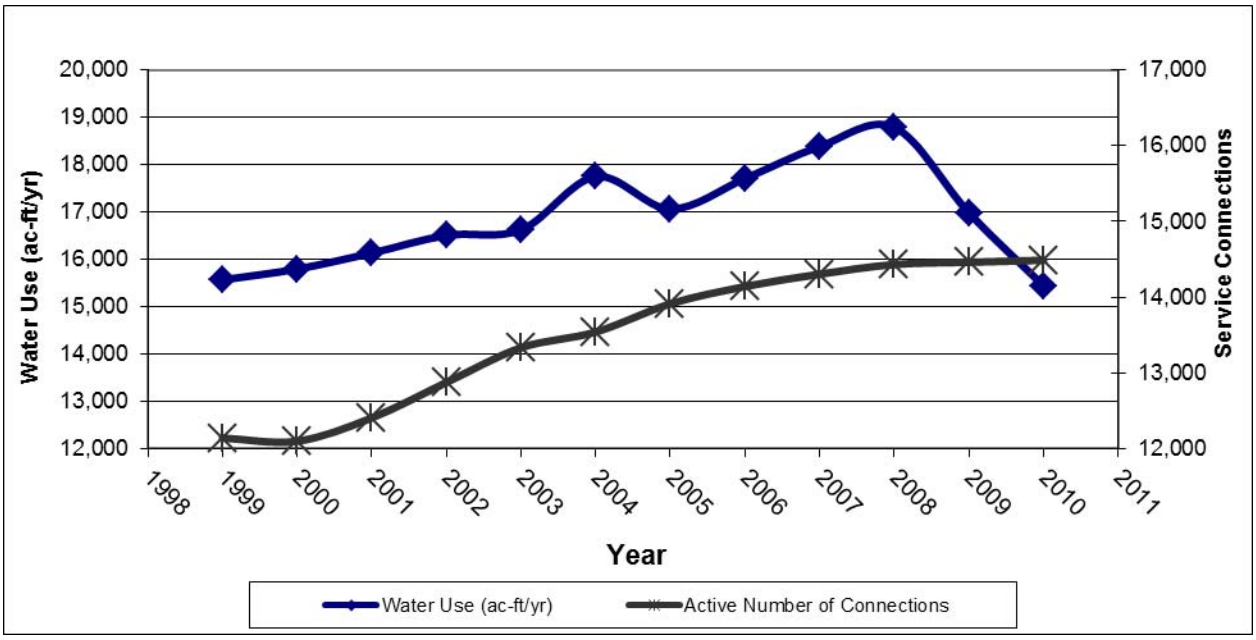

Figure 3-1: Historical Number of Service Connections and Water Use

Figure 3-1 shows a decline in water use beginning in 2008 with an approximate 20 percent decrease from 2008 to 2010. Review of similar data from other systems suggests the decline in water use has been widespread and is not isolated to the Cordova System. The recent decline in water use is not yet fully understood, but may be a result of several factors including: continued implementation of the meter retrofit program, several years of cool mild summers, a statewide drought that forced mandatory water reductions and voluntary water conservation,

and an economic downturn that has caused many businesses to close and increased housing vacancies.

The customer billing data for the system consists of annual water sales data. The water sales data was sorted by customer type using the assigned North American Industry Classification System (NAICS) codes. Then, the sorted water sales data were further grouped into the following seven categories: single-family, multi-family, industrial, commercial, institutional/government, landscape, and others. Table 3-1 shows the historical water use by customer type for metered and unmetered connections from 1999 through 2010.

Table 3-1: Historical Water Use (ac-ft/yr) by Customer Type

Year	Single-Family		Multi-Family		Commercial		Industrial		Institutional/ Government		Landscape		Other		Total
	Metered	Un-metered	Metered	Un-metered	Metered	Un-metered	Metered	Un-metered	Metered	Un-metered	Metered	Un-metered	Metered	Un-metered	
1999	645	8,396	1,327	0	3,509	0	102	0	439	0	1,132	0	16	0	15,566
2000	563	7,752	1,446	0	4,041	0	116	0	476	0	1,396	0	5	0	15,795
2001	592	7,470	1,494	0	3,794	0	144	0	476	0	2,162	0	0	0	16,132
2002	582	8,344	1,545	0	3,804	0	118	0	397	0	1,717	0	0	0	16,507
2003	903	8,267	1,531	0	3,491	0	115	0	359	0	1,956	0	1	0	16,623
2004	1,168	8,966	1,583	0	3,727	0	119	0	421	0	1,765	0	0	0	17,749
2005	1,275	8,397	1,586	0	3,561	0	130	0	434	0	1,681	0	0	0	17,064
2006	1,444	9,232	1,464	0	3,538	0	123	0	457	0	1,450	0	0	0	17,708
2007	1,782	9,238	1,552	0	3,631	0	122	0	546	0	1,514	0	0	0	18,385
2008	2,482	9,702	1,511	0	3,181	0	93	0	527	0	1,293	0	0	0	18,789
2009	2,272	8,828	1,256	0	2,964	0	85	0	502	0	1,075	0	0	0	16,982
2010	2,121	8,022	1,080	0	2,759	0	91	0	310	0	1,055	0	0	0	15,438

3.2 Water Use Targets

This section includes documentation of the water use targets commensurate with enactment of SBX7-7. The 2010 UWMP update is the first in which such targets have been required to be documented. The projected water use for each urban water supplier is required to be reduced by a total of up to 20 percent by the year 2020 from a calculated baseline gpcd as required by SBX7-7. The steps described throughout this section follow the guideline methodologies developed by DWR over the past year, as documented in Section D of the *Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan* (DWR Guidebook) issued March 2011. The three overall steps to determine the 2020 water use target are as follows:

- Step 1 – Calculate the baseline per capita water use, using the required methodologies.
- Step 2 – Calculate the per capita reduction using at least one of the four methodologies (including the minimum reduction target – which is a provision included to ensure all agencies achieve a minimum level of water savings).
- Step 3 – Select the target reduction methodology and set interim (2015) and compliance (2020) water use targets. The chosen methodology is the responsibility of the water supplier and may be changed in 2015.

The Act now stipulates that the state shall review the progress made towards reaching the statewide water savings targets as reported in the 2015 UWMP updates. Currently, no single urban water supplier is required to conserve more than 20 percent; however, there are provisions in the law that could require additional conservation after 2015 if it is found that the program is not on track to reach 20 percent statewide water savings by 2020.

3.2.1 Baseline Per Capita Water Use

The first step in the process of determining the water use target is calculation of the baseline per capita water use (baseline gpcd). In order to calculate the baseline gpcd, service area population within the Cordova System was estimated and compared to actual water use records. The following three baseline gpcd calculations identified in SBX7-7 were evaluated for the Cordova System:

- Baseline Method 1 – Average water use over a continuous 10-year period ending no earlier than December 31, 2004 and no later than December 31, 2010.
- Baseline Method 2 – For retailers with at least 10 percent of 2008 demand served by recycled water (either retail-or wholesale-provided), this calculation may be extended to include an additional 5 years ending no earlier than December 31, 2004 and no later than December 31, 2010.
- Baseline Method 3 – Estimate of average gross water use reported in gpcd and calculated over a continuous 5-year period ending no earlier than December 31, 2007 and no later than December 31, 2010.

The Baseline Methods 1 and 3 were evaluated using water supply data for the years ending December 31, 1999 through December 31, 2010. The base water use was calculated for each year commencing with 1999 as this was the first year with production data records available. The Cordova system does not currently receive any recycled water; therefore Baseline

Method 2 is not applicable. Table 3-2 below presents the base period ranges, total water deliveries and the volume of recycled water delivered in 2008; these data are used to determine the number of years that can be included in the base period range. Also shown are the actual start and end years for the selected base period range.

Table 3-2: Base Period Ranges

Base	Parameter	Value	Units
10-year base period	2008 total water deliveries	18,789	Ac-ft
	2008 total volume of delivered recycled water	0	Ac-ft
	2008 recycled water as a percent of total deliveries	0	Percent
	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	

Note:
Table format based on DWR Guidebook Table 13.

The average annual daily per capita water use in gpcd from 1999 through 2010 is provided in Table 3-3. The gallons per day calculation includes potable water entering the distribution system.

Table 3-3: 1999-2010 Base Daily Use Calculation

Calendar Year	Distribution System Population	Gallons/day	Annual Daily per Capita Water Use, gpcd
1999	38,571	14,535,452	377
2000	38,249	14,099,780	369
2001	39,276	14,616,152	372
2002	40,862	14,950,870	366
2003	42,402	14,988,133	353
2004	43,049	16,351,237	380
2005	44,329	15,776,453	356
2006	45,091	16,546,267	367
2007	45,601	17,292,981	379

Table 3-3: 1999-2010 Base Daily Use Calculation			
Calendar Year	**Distribution System Population**	**Gallons/day**	**Annual Daily per Capita Water Use, gpcd**
2008	45,926	16,918,694	368
2009	46,093	15,779,966	342
2010	46,154	14,710,131	319

Note:
Table format based on DWR Guidebook Tables 14 and 15.

The 10-year averages available for GSWC to select are presented in Table 3-4; and the 5-year averages are shown in Table 3-5. The 1999-2008 10-year and the 2004-2008 5-year average base daily usages of 369 and 370 gpcd respectively were selected.

Table 3-4: 10-Year Average Base Daily Per Capita Water Use	
10-Year Period	**Average Base Daily Per Capita Water Use (gpcd)**
1999-2008	369
2000-2009	365
2001-2010	360

Table 3-5: 5-Year Average Base Daily Per Capita Water Use	
5-Year Period	**Average Base Daily Per Capita Water Use (gpcd)**
2003-2007	367
2004-2008	370
2005-2009	363
2006-2010	355

3.2.2 Urban Water Use Targets

Retail suppliers must identify their urban water use reduction targets by utilizing one of four compliance methods identified in SBX7-7. The four urban water use target development methods are as follows:

- Compliance Method 1 – 80 percent of baseline gpcd water use.
- Compliance Method 2 – The sum of the following performance standards: indoor residential use (provisional standard set at 55 gpcd); plus landscape use, including dedicated and residential meters or connections equivalent to the State Model Landscape Ordinance (70 percent of reference ETo; plus 10 percent reduction in baseline commercial, industrial, and institutional (CII) water use by 2020.
- Compliance Method 3 – 95 percent of the applicable state hydrologic region target as identified in the 2020 Conservation Plan (DWR, 2010).
- Compliance Method 4 – A provisional method identified and developed by DWR through a public process released February 16, 2011, which aims to achieve a cumulative statewide 20 percent reduction. This method assumes water savings will be obtained through metering of unmetered water connections and achieving water conservation measures in three water use categories: (1) indoor residential, (2) landscape, water loss and other water uses, and (3) CII.

GSWC elected to evaluate Compliance Methods 1 and 3 for selecting urban water use targets for the 2010 plan. The following section provides an explanation of the target calculations and summary of the interim and compliance water use targets.

Compliance Method 1 Calculation Summary

The Method 1 2020 water use target was calculated by multiplying the base daily gpcd by 80 percent. A 20 percent reduction in baseline water use would require a reduction of 74 gpcd by 2020 as shown in Table 3-6. The 2015 interim target would be 332 gpcd with a 2020 water use target of 295 gpcd.

Table 3-6: 2020 Water Use Target Method 1 Calculation Summary

Description	Baseline	2015 Interim Target	2020 Compliance Target
Per Capita Water Use (gpcd)	369	332	295
Percent Reduction	N/A	10%	20%

Compliance Method 3 Calculation Summary

The Method 3 2020 water use target was calculated by multiplying the respective hydrologic region target by 95 percent. The Cordova System is located in the Sacramento River Region (Region 5), which has a hydrologic region target of 176 gpcd and a baseline water use of 253 gpcd. Ninety-five (95) percent of the Region 5 hydrologic region target results in a 2020 water use target of 167 gpcd. Since the baseline of 369 gpcd is greater than 95 percent of the

hydrologic regional target of 167 gpcd, a review of the minimum reduction target is not triggered per the DWR methodologies.

Table 3-7 presents the results of the Method 3 calculation:

Table 3-7: 2020 Water Use Target Method 3 Calculation Summary			
Description	**Baseline**	**2015 Interim Target**	**2020 Compliance Target**
Per Capita Water Use (gpcd)	369	268	167
Percent Reduction	N/A	27%	55%

Minimum Compliance Reduction Target

Systems with a baseline per capita water use of greater than 100 gpcd must calculate a minimum water use reduction, which the 2020 water use target cannot exceed. The minimum water use reduction compliance target is 95 percent of the 5-year average base daily per capita water use (ending no earlier than December 31, 2007, and no later than December 31, 2010). By this method, the minimum 2020 water use target for the Cordova System is 352 gpcd as presented in Table 3-8 below:

Table 3-8: Minimum 2020 Reduction Calculation Summary			
Description	**5-Yr Average**	**2015 Interim Target**	**2020 Compliance Target**
Minimum Allowable 2020 Target (gpcd)	370	361	352

3.2.3 Interim and Compliance Water Use Targets

The interim and compliance water use targets are provided per Section 10608.20(e) of the Act. Since both the Method 1 and 3 compliance targets are less than the minimum reduction; compliance Method 1 was selected by GSWC for the Cordova System. As a result, the 2020 SBX7-7 compliance target for the Cordova System is 295 gpcd and the 2015 interim water use target is 332 gpcd. The implementation plan for achieving these targets is described in Section 4.8, Recycled Water and Chapter 7, Demand Management Measures.

Table 3-9: SBX7-7 Water Use Reduction Targets (gpcd)		
Baseline	**2015 Interim Target**	**2020 Compliance Target**
369	332	295

3.3 Projected Water Use

Growth projections for the number of service connections and volume of future water use were calculated for the year 2015 through 2035, in 5-year increments. Future water demands were estimated using two different methods, a population-based approach and a historical-trend approach in order to present a projection range reflecting the inherent uncertainty in growth trends. Additionally, demand projections are provided showing a scenario where the Cordova System fully meets water use target reductions by 2020 for comparison to current per capita water use trends. GSWC has opted to use the population-based projections for future water demand estimates.

The customer billing data for the system consists of annual water sales data. The water sales data were sorted by customer type using the assigned NAICS codes. Then, the sorted water sales data were further grouped into the following nine (9) categories: unmetered, single-family (metered), single-family (meter retrofits and future connections), multi-family, commercial, industrial, institutional/government, landscape, and other.

Water use factors were then developed for the projection of future water use. For a given customer type, the unit water use factor is calculated as the total water sales for the category divided by the number of active service connections for that category, with the exception of new and retrofitted single-family connections; the derivation of this water use factor is provided below. The 2007 calendar year was determined to be representative of a typical water use year in the Cordova System and was used for developing water use factors by customer type. The water use factor calculated for each customer category is provided in Table 3-10.

Table 3-10: Water Use Factors for the Cordova System

	Account Category								
	Unmetered	Existing Single-Family (Metered)	Future Single-Family/Meter Retrofits	Multi-Family	Commercial	Industrial	Institutional/ Government	Landscape	Other(2)
Water Use Factor(1)	1.08	0.46	0.84	8.48	3.20	1.79	5.88	3.88	0.00

Notes:
1. Based on customer water use data for calendar year 2007.
2. Other accounts for any service connections not included in any other category, including idle or inactive connections.
3. Future single-family water use factors are used for existing accounts retrofitted with meters as well as new single-family service connections.

Water use data were analyzed to develop the water use factor of 0.84 ac-ft/yr per service connection for future/meter retrofit single-family accounts. This new category was required to reflect differences in the water use projected for new connections and meter retrofits as compared to existing single-family metered data. The modified water use factor was determined using the following approach:

- Estimate unmetered water use with the following formula: Unmetered Water Use = (Total Supply) – (Total Metered Sales) – (Water used in Operations) – (Unaccounted for water).

Unaccounted-for water is assumed to be five (5) percent of the total Cordova System supply (see Section 3.5 for more on unaccounted-for water).

- Develop a metered water use factor for new or retrofitted residential connections. GSWC recently tracked water usage data for approximately 500 connections retrofitted with meters and concluded that retrofits achieved, on average, 15 percent in water savings. This estimate is comparable with CUWCC literature which assumes a 20 percent savings is realized from meter retrofits (CUWCC, 2010). Therefore, new projected residential connections and converted metered connections are assumed to have a water use factor of 0.84 ac-ft/yr: 15 percent less than the 1.08 ac-ft/yr unmetered water use factor after adjustment for estimated unaccounted-for water.

- The proposed water use factor (0.84 ac-ft/yr) provides a reliable measure of projected long-term water use and accounts for both new single-family and multi-family metered connections in the system. GSWC has found that while connections converted to metered usage initially decrease water use significantly, over time customers tend to become acclimated and revert to previous water use patterns.

The population-based water use projections are based on SACOG projected population and housing growth rates described in Chapter 2. SACOG household projections were used to determine the growth in single-family and multi-family service connections for the years 2015, 2020, 2025, 2030, and 2035. For example, the ratio between the household projections for the year 2015 and the year 2010 was multiplied by the number of service connections in 2010 to obtain a projection of the number of connections in the year 2015. Similarly, employment growth projections were used to determine the growth for commercial, industrial, institutional/government, and landscape service connections. The population-based projected water use was then calculated by multiplying the number of projected active service connections for each customer category by the corresponding customer average water use factor calculated above.

The historical-trend water use projections are based on a linear projection of the historical number of metered service connections. The average growth rate established by this historical trend was applied to the number of connections in each customer category to project the future number of service connections. The historical-trend projected water use was then calculated by multiplying the number of projected active service connections for each customer category with the corresponding customer average water use factor calculated above.

All existing unmetered connections in the Cordova System were assumed to be single-family accounts. This is a reasonable assumption since approximately 97 percent of the unmetered connections are single-family. The anticipated schedule that will be instituted for retrofitting existing unmetered connections is presented in Table 3-11 and includes the breakdown of the single-family projections for existing metered, unmetered, meter retrofit, future, and total projected single-family connections.

Table 3-11: Projected Single-Family Connections					
Year	Existing SF Metered Connections (0.46 ac-ft/yr)	2010 Unmetered SF Connections		New SF Connections (0.84 ac-ft/yr)	Total Single-Family Connections
		Unmetered Connections (1.08 ac-ft/yr)	Meter Retrofits (0.84 ac-ft/yr)		
2010	4,458	8,129	--	--	12,587
2015	4,458	2,129	6,000	767	13,354
2020	4,458	1,000	7,129	934	13,521
2025	4,458	0	8,129	1,186	13,773
2030	4,458	0	8,129	1,439	14,026
2035	4,458	0	8,129	1,691	14,278

Figure 3-2 shows the historical and projected number of service connections for the Cordova System from 2000 through 2035, employing the population-based and historical trend methods. Figure 3-3 shows the historical and projected water use for the Cordova System from 1999 through 2035.

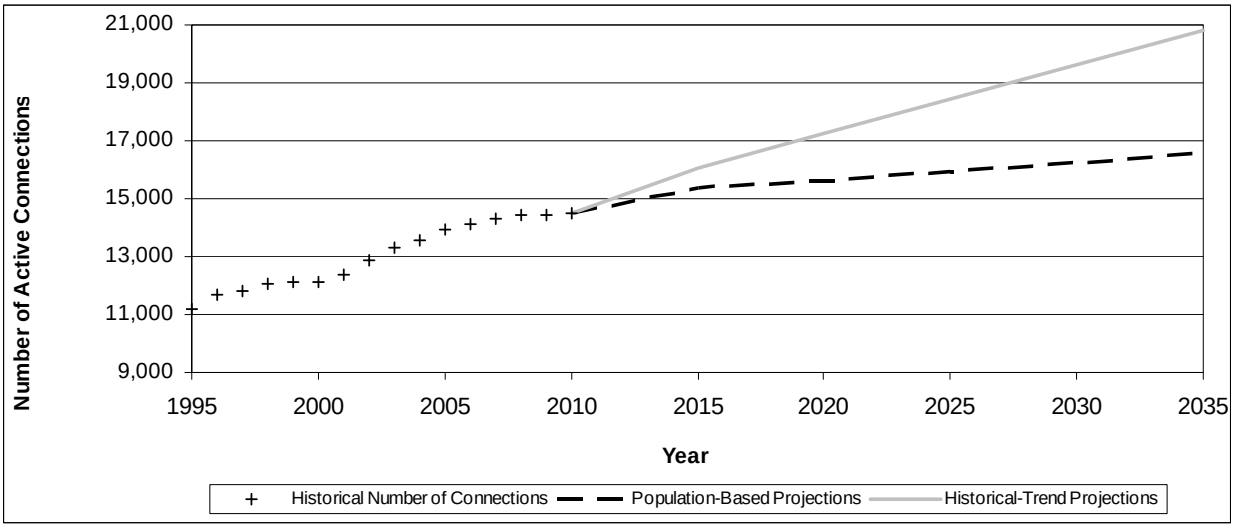

Figure 3-2: Historical and Projected Number of Service Connections

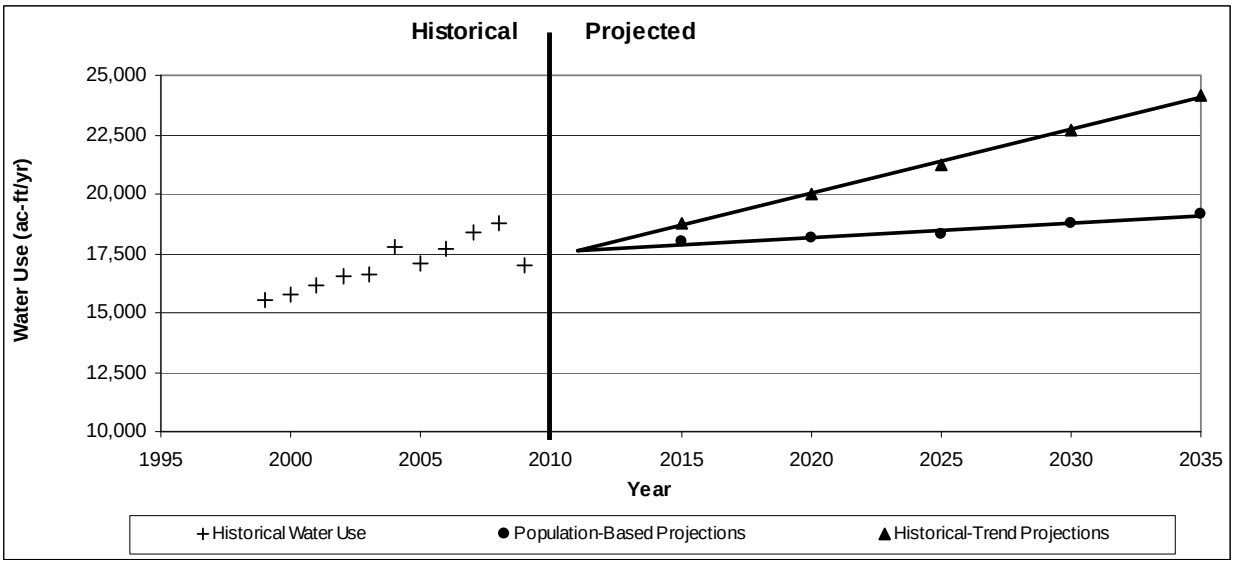

Figure 3-3: Historical Water Use and Future Water Use Projections

Figure 3-4 shows the population based water use projections by customer type. The population-based projections of the number of service connections and the resulting water demand are provided in Table 3-12.

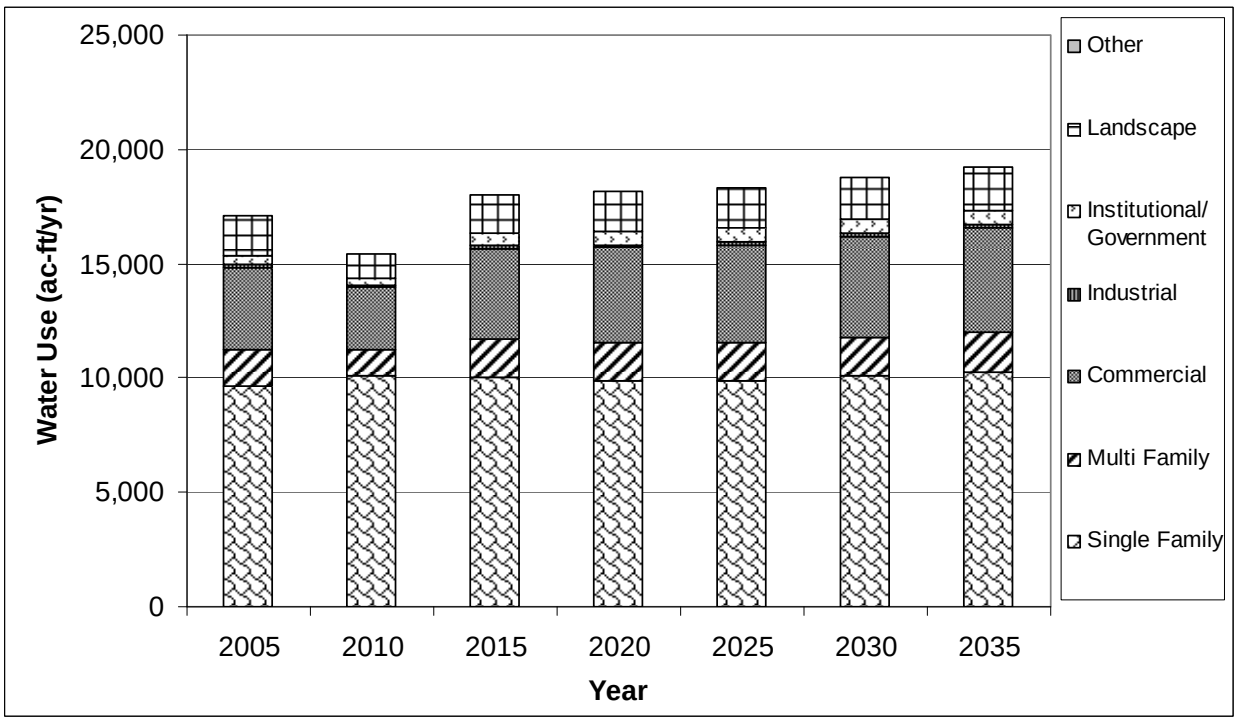

Figure 3-4: Projected Water Use by Customer Type

Table 3-12: Projections of the Number of Metered Service Connections and Water Use for the Cordova System										
		Accounts by Type								
Year	Projection Type	Single-Family (Metered)	Unmetered	Multi-Family	Commercial	Industrial	Institutional/ Government	Landscape	Other[3]	Total
2005[2]	*No. of Accounts*	3,202	8,886	176	1,123	68	93	363	1	13,912
	Water Use (ac-ft)	1,275	8,397	1,586	3,561	130	434	1,681	0	17,064
2010	*No. of Accounts*	4,458	8,129	182	1,168	65	93	392	1	14,488
	Water Use (ac-ft)	2,121	8,022	1,080	2,759	91	310	1,055	0	15,438
2015	*No. of Accounts*	11,225	2,129	194	1,246	70	100	418	2	15,384
	Water Use (ac-ft)	7,735	2,286	1,645	3,982	125	588	1,623	0	17,984
2020	*No. of Accounts*	12,521	1,000	196	1,296	73	104	435	2	15,627
	Water Use (ac-ft)	8,808	1,080	1,662	4,142	131	611	1,689	0	18,123
2025	*No. of Accounts*	13,773	0	200	1,334	75	107	448	2	15,939
	Water Use (ac-ft)	9,859	0	1,696	4,264	134	629	1,739	0	18,321
2030	*No. of Accounts*	14,026	0	203	1,372	77	110	461	2	16,251
	Water Use (ac-ft)	10,071	0	1,721	4,385	138	646	1,790	0	18,751
2035	*No. of Accounts*	14,278	0	207	1,410	79	113	474	2	16,563
	Water Use (ac-ft)	10,283	0	1,755	4,506	141	664	1,840	0	19,189

Notes:
1. This table is based on the DWR Guidebook Tables 3 through 7.
2. Based on calendar year.
3. Other accounts for any service connections not included in any other category, including idle or inactive connections.
4. All connections are metered.

3.4 Sales to Other Agencies

The Cordova System has sold treated water to Sacramento County Water Agency (SCWA) to offset water lost due to contamination in the past; however, GSWC does not anticipate additional sales to SCWA at this time. The historical and projected sales to other agencies are shown in Table 3-13.

Table 3-13: Sales to Other Agencies in ac-ft/yr

Water Distributed	2005[2]	2010	2015	2020	2025	2030	2035
SCWA	425.7	0.20	0	0	0	0	0

Notes:
1. This table is based on the DWR Guidebook Table 9.
2. Based on calendar year.

3.5 Other Water Uses and System Losses

In order to estimate total water demand, other water uses, as well as any water lost during conveyance, must be added to the customer demand. California regulation requires water suppliers to quantify any additional water uses not included as a part of water use by customer type. There are no other water uses in addition to those already reported in the Cordova System.

System losses must be incorporated when projecting total water demand. System losses (also known as non-revenue water) are defined as the difference between annual water production and annual sales. Included are system losses due to leaks, reservoir overflows, or inaccurate meters, and other water used in operations such as system flushing and filter backwashing. GSWC does not tabulate system losses separately from other water uses such as operations. In the Cordova System, because there are unmetered connections and a meter retrofit program underway, the actual amount of system losses is not quantifiable for the Cordova System. It is assumed that system water losses comprise 10 percent of the total production. Table 3-14 provides a summary of projected system losses in the Cordova System.

Note: For the purpose of estimating unmetered water use (see Section 3.3), GSWC has historically used an unaccounted-for water loss of 5 percent. In order to generate conservative projections of future water demand, however, unaccounted-for water is assumed to comprise 10 percent of the total production.

Table 3-14: Additional Water Uses and Losses in ac-ft/yr

Water-Use Type	2005[2]	2010	2015	2020	2025	2030	2035
Other Water Uses	N/A	N/A	N/A	N/A	N/A	N/A	N/A
System Losses[3]	1,034	1,040	1,798	1,812	1,832	1,875	1,919
Total	1,034	1,040	1,798	1,812	1,832	1,875	1,919

Notes:
1. This table is based on the DWR Guidebook Table 10.
2. Based on calendar year.
3. Includes system losses due to leaks, reservoir overflows, and inaccurate meters.

3.6 Total Water Demand

As described above, other water uses, as well as any water lost during conveyance, must be added to the customer demand in order to project total water demand for the Cordova System. Although there are no other water uses contributing to the total water demand in the Cordova System, other water uses and system water losses must be incorporated into the total water demand. Table 3-15 summarizes the projections of water sales, other water uses and system losses, and total water demand through the year 2035.

The projected water sales and system losses were added to estimate the total baseline water demand shown in Table 3-15. The baseline demand projections below do not include water use reductions due to additional implementation of future DMMs or other conservation activities. Baseline demands are used for supply reliability evaluation purposes throughout this UWMP for estimates of water supplies that may be required for the next 25 years. Figure 3-5 shows the projected total water demand through 2035.

Projected water demands assuming full compliance with the SBX7-7 interim and 2020 water use reduction targets are also provided in the Table 3-15 and Figure 3-5 for reference purposes. SBX7-7 compliance water demands were calculated by multiplying the projected population by the applicable water use target. Future water use that is exempt from SBX7-7, such as industrial process water or direct reuse recycled water is not included in this projection.

Table 3-15: Projected Total Water Demand and SBX7-7 Compliance Projections in ac-ft/yr

Year[2]	Projected Water Sales	Other Water Uses and System Losses	Total Baseline Water Demand	SBX7-7 Compliance Projections	
				Water Savings	Total Water Demand with Savings
2005	17,064	1,034	18,098	0	N/A
2010	15,438	1,040	16,479	0	N/A
2015	17,984	1,798	19,782	1,556	18,226
2020	18,123	1,812	19,936	3,567	16,369
2025	18,321	1,832	20,153	3,502	16,650
2030	18,751	1,875	20,626	3,694	16,932
2035	19,189	1,919	21,108	3,894	17,214

Notes:
1. This table is based on the DWR Guidebook Table 11.
2. Based on calendar year.

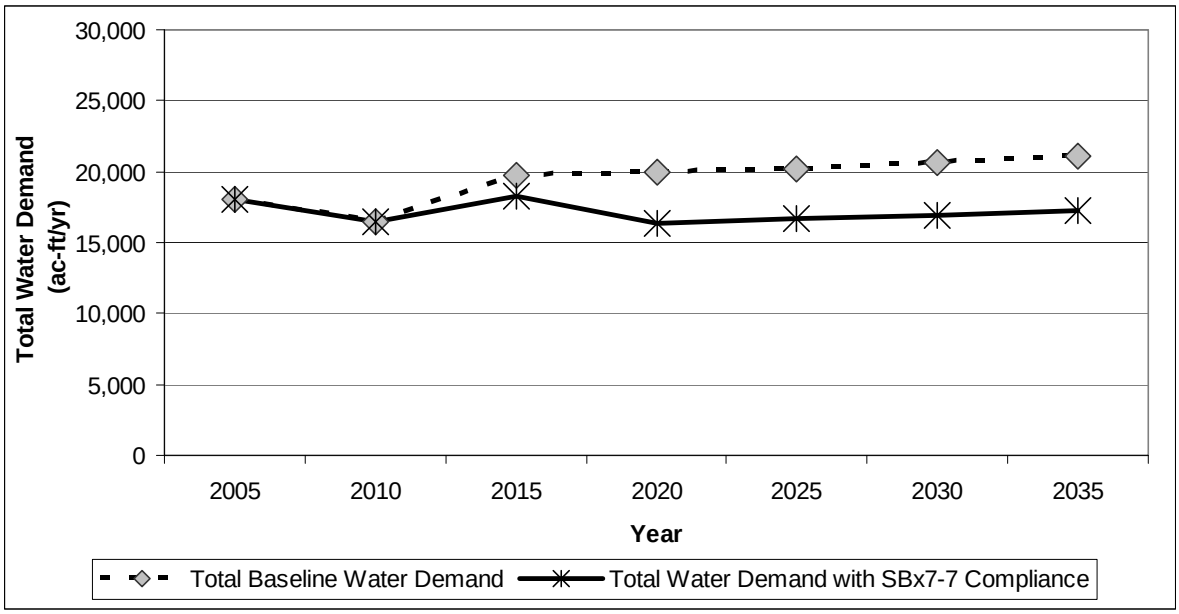

Figure 3-5: Total Water Demand

3.7 Data Provided to Wholesale Agency

GSWC does not currently obtain water from any wholesale agency for supply to the Cordova System; therefore Table 3-16 has intentionally been left blank.

Table 3-16: Summary of Cordova System Data Provided to Wholesaler in ac-ft/yr

Wholesaler	Contracted Volume	2010	2015	2020	2025	2030	2035
None	None	N/A	N/A	N/A	N/A	N/A	N/A

Note:
This table is based on the DWR Guidebook Table 12.

3.8 Disadvantaged Community Water Use Projections

Section 10631.1.

(a) Include projected water use for single-family and multi-family residential housing needed for lower income households, as identified in the housing element of any city, county, or city and county in the service area of the supplier.

Senate Bill 1087 requires that the water use projections of an UWMP include the projected water use for single-family and multi-family residential housing for lower income households as identified in the housing element of any city, county, or city and county in the service area of the supplier.

Housing elements rely on the Regional Housing Needs Allocation (RHNA) generated by the State Department of Housing and Community Development (HCD) to allocate the regional need for housing to the regional Council of Governments (COG) (or a HCD for cities and counties not covered by a COG) for incorporation into housing element updates. Before the housing element is due, the HCD determines the total regional housing need for the next planning period for each region in the state and allocates that need. The COG then allocates to each local jurisdiction its "fair share" of the RHNA, broken down by income categories; very low, low, moderate, and above moderate, over the housing element's planning period.

Sacramento County last updated its housing element in 2006. A lower income house is defined as 80 percent of median income, adjusted for family size. The County's housing element identifies the target number of low income households in the County from 2006 to 2013 as 15.1 percent very low-income households as 22 percent. However, it is unknown what percentage of the low-income households are within GSWC's Cordova service area. For this reason, it is not possible to project water use for lower income households separately from overall residential demand. However, to remain consistent with the intent of the SB-1087 legislation and to comply with the UWMP Act, an effort has been made to identify those water use projections for future single and multi-family households based on the aggregate percentage of both the low-income and very low-income categories. 37 percent was used to estimate the lower income demand projections as shown in Table 3-17 below.

Table 3-17: Low-Income Projected Water Demands in ac-ft/yr

	2015	2020	2025	2030	2035
Single-Family Residences	245	298	378	459	539
Multi-Family Residences	210	216	229	238	251
Total	454	514	607	697	790

Note:
This table is based on the DWR Guidebook Table 8.

GSWC will not deny or conditionally approve water services, or reduce the amount of services applied for by a proposed development that includes housing units affordable to lower income households unless one of the following occurs:

- GSWC specifically finds that it does not have sufficient water supply.
- GSWC is subject to a compliance order issued by the State Department of Public Health that prohibits new water connections.
- The applicant has failed to agree to reasonable terms and conditions relating to the provision of services.

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Chapter 4: Water Supply

A detailed evaluation of water supply is required by the Act. Sections 10631 (b) through (d) and (h) of the Act state the following:

Section 10631.

(b) 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). If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:

(1) 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.

(2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For basins that have not been adjudicated, 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.

(3) 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.

(4) 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.

(c) (1) 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.

(2) 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.

(d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

(h) Include a description of 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.

This chapter addresses the water supply sources of the Cordova System. The following chapter provides details in response to those requirements of this portion of the Act.

4.1 Water Sources

GSWC obtains its water supply for the Cordova System from a combination of surface water diverted from the American River and groundwater pumped from the Central Sacramento Basin. Regional contamination has resulted in the loss of high quality groundwater. As a result of litigation filed by GSWC against the Gencorp/Aerojet Corporation (Aerojet), a Master Settlement Agreement and Release (Settlement Agreement) was entered between Aerojet and GSWC in 2004. The Settlement Agreement obligates Aerojet to supply GSWC with 5,000 ac-ft/yr of replacement water to offset contaminated groundwater (referred to herein as "Granted Water") as well as an additional 10,200 ac-ft/yr of contingent replacement water if necessary to satisfy system demands.

GSWC's temporary water transfer agreement with the Sacramento Municipal Utility District (SMUD) allows GSWC to divert up to 6,000 ac-ft/yr from the Folsom South Canal through December 31, 2012 under SMUD's Central Valley Project (CVP) contract entitlement. SMUD has a water service contract with the United States Bureau of Reclamation (Contract No. 14-06-200-5198A) for delivery of as much as 60,000 ac-ft/yr of municipal and industrial water from CVP.

American River water withdrawn from the Folsom South Canal is treated at the Coloma Water Treatment Plant (Coloma WTP) and the Pyrites Water Treatment Plant (Pyrites WTP) for a combined treatment capacity of approximately 14.4 million gallons per day (mgd). The Coloma WTP has a maximum reliable daily treatment capacity of approximately 7,140 gallons per minute (gpm). The Pyrites WTP has a maximum reliable daily treatment capacity of about 3,150 gpm.

Currently, groundwater is pumped from a total of 8 active wells in the Central Sacramento Basin for the Cordova System. These wells have a current total active capacity of 20,751 ac-ft/yr (12,865 gpm). Between 2005 and 2009, the actual production averaged 10,576 ac-ft/yr.

Table 4-1 summarizes the current and planned water supplies available to GSWC for the Cordova System that will meet the projected water demands under normal water years. This water supply summary is based on analysis of supplies from surface water, groundwater, and granted and contingency replacement Aerojet water. Surface water from the American River is based on GSWC's pre-1914 water rights not currently leased to the City of Folsom (see Chapter 4.2). The Aerojet Granted Water source is currently under negotiation and relies on wheeling a new supply of up to 5,000 ac-ft/yr of discharged remediated groundwater through existing or future facilities which may include increased diversions from the Folsom South Canal, a new point of diversion and treatment off the American River, or SCWA's Freeport diversion on the Sacramento River and the newly constructed SCWA Vineyard WTP.

There is currently no projected recycled water supply available for this system (see Chapter 4.8 for details).

Table 4-1: Current and Planned Water Supplies for the Cordova System in ac-ft/yr						
Source	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Surface Water from American River	9,827	5,000	5,000	5,000	5,000	5,000
Groundwater(1)	6,651	26,641	14,850	14,850	14,850	14,850
Aerojet Granted Water	0	5,000	5,000	5,000	5,000	5,000
Recycled water	0	0	0	0	0	0
Total	16,479	36,641	24,850	24,850	24,850	24,850

Notes:
1. Based on projected use in the Central Sacramento Groundwater Basin.
2. 2010 water supplies are based on actual production records.
3. Table format based on DWR Guidebook Table 16.

GSWC's water demands are projected to increase from 2010 to 2035 with corresponding projected water supply increases to meet demands. The projected increase in demand will be met by reliance on GSWC's appropriative right to groundwater, Aerojet Granted Water supplies, and if necessary, additional replacement water to which GSWC is entitled under the Settlement Agreement. Water demand projections are documented in Chapter 3. Details of the groundwater supply are presented in the following section including a discussion of the reliability of both sources of water supply.

4.2 Surface Water

GSWC possesses a pre-1914 appropriative right to divert up to 10,000 ac-ft/yr from the American River via the Folsom South Canal at a maximum withdrawal rate of 20 cubic feet per second (cfs) or 13 mgd. Appropriative surface water rights initiated prior to 1914 are not subject to the Water Commission Act and successor laws relating to water right permitting requirements, and therefore do not require a permit from the State Water Resources Control Board. The point of diversion for this right has been changed since its initiation, so that the water is now diverted from the American River through the Folsom South Canal, which is operated by the United States Bureau of Reclamation. The Folsom South Canal is part of the Folsom Unit of the CVP. In 1994 GSWC entered into an "Agreement for Reallocation of Water under Co-Tenancy Agreement" with the City of Folsom to lease 5,000 ac-ft/yr of water rights in perpetuity. The company retained 5,000 ac-ft/yr of its right, which is diverted from the Folsom South Canal for use within the Cordova System. In addition to the 5,000 ac-ft/yr obtained from GSWC's pre-1914 water right to the American River, GSWC's temporary water transfer agreement with SMUD allows GSWC to divert up to an additional 6,000 ac-ft/yr from the Folsom South Canal under SMUD's CVP contract entitlement. The SMUD agreement became effective in 2008 and expires on December 31, 2012, unless renewed pursuant to a request by GSWC. As explained in the Reliability of Replacement Water section in Chapter 6, after the expiration of the SMUD water transfer, GSWC will receive 5,000 ac-ft/yr replacement water pursuant to the terms of the Settlement Agreement with Aerojet.

The Cordova System's distribution facilities also have been designed with several interconnections to neighboring water purveyors for emergency purposes. GSWC maintains three 6-inch interconnections with the California-American Water Company's distribution system in the west side of the Cordova System, and a 12-inch interconnection with the City of Folsom at

the eastern edge of the Cordova System. In addition, the Cordova System has five reservoirs with a total capacity of 14.5 million gallons.

4.3 Groundwater

The Cordova System is supplied by groundwater from seven (7) active production wells located in the Central Sacramento Basin (also known as the South American Subbasin). The Central Sacramento Basin is a subbasin of the Sacramento Valley Groundwater Basin.

4.3.1 Central Sacramento Basin

The Central Sacramento Basin (Basin) has a surface area of approximately 248,000 acres (388 square miles) and is drained by the American, Cosumnes, and Sacramento Rivers and their tributaries. The Central Sacramento Basin is bounded by the Sierra Nevada Mountains on the east, the Sacramento River on the west, the American River on the north, and the Cosumnes and Mokelumne Rivers on the south. These perennial rivers create a groundwater divide in the shallow subsurface. At greater depths, groundwater interaction with the adjacent subbasins occurs (DWR, 2003).

The water-bearing units in the Central Sacramento Basin consist of Late Tertiary to Quaternary age continental deposits that include:

- Younger alluvium consisting of flood basin deposits, dredge tailings, and Holocene stream channel deposits. The flood basin deposits consist primarily of silts and clays (resulting in low permeability and low well yields), and occur along the western margin of the basin adjacent to the Sacramento River. The dredge tailings consist of gravel, cobbles, boulders, sand, and silt along the American River in the northeast corner of the basin, resulting from gold dredging operations. The stream channel deposits consist primarily of unconsolidated silt, fine- to medium-grained sand, and gravel deposited in the active channels along the Sacramento, American, and Cosumnes Rivers and the major tributaries. Sand and gravel zones are highly permeable and yield significant quantities of water to wells.

- Older alluvium consisting of loosely to moderately compacted sand, silt, and gravel deposited in alluvial fans during the Pliocene and Pleistocene. The older alluvium ranges in thickness from 100 to 650 feet, is moderately permeable, and has a calculated specific yield of approximately 7 percent.

- Miocene/Pliocene volcanics consisting of the Mehrten Formation, a sequence of fragmental volcanic rocks, composed of intervals of “black sands”, stream gravels, silt, and clay interbedded with intervals of dense tuff breccia. The thickness ranges between 200 and 1,200 feet, with the sand and gravel intervals having high permeability and high well yields. The tuff breccia intervals act as confining layers.

The total groundwater storage capacity of the Central Sacramento Basin is approximately 4,816,000 ac-ft (DWR, 2005). The basin is estimated to have approximately 260,000 ac-ft of recharge per year and a subsurface outflow of 30,000 ac-ft (DWR, 2003).

Historically, groundwater levels have fluctuated in the Central Sacramento Basin. From 1960 to 1980 groundwater levels declined by approximately 20 feet from 1960 levels, and then recovered by 10 feet from 1980 to 1983. Groundwater levels were steady until the period from

1987 to 1995 when water levels declined by approximately 15 feet. Since 1995, water levels have increased up to 20 feet to just below pre-1960 levels (DWR, 2003).

There are several municipal and industrial water purveyors that extract groundwater from the Central Sacramento Basin besides GSWC, including: California-American Water Company, City of Folsom, City of Sacramento, Elk Grove Water Works, Florin County Water District, Fruitridge Vista Water Company, Omochumne-Hartnell Water District, Rancho Murieta Community Services District, SCWA, and Tokay Park Water Company. In addition, there are numerous private parties, including ranchers and farmers that use groundwater from the Central Sacramento Basin. These users are concentrated in the southern portion of the Basin.

Several groundwater studies have been conducted in the Central Sacramento Basin. None of these studies, performed by DWR or any other entity, indicate that the Basin has been or is in a general state of overdraft. Local depressions have occurred in some areas. However, no GSWC wells are present at these locations. DWR has not projected that the Basin will become overdrafted if present management conditions continue. Therefore, GSWC's appropriative groundwater rights may be safely and reliably exercised in the future, and surplus groundwater within the Central Sacramento Basin might also make increased extraction by GSWC or others possible.

4.3.2 Basin Management

The Central Sacramento Basin is not adjudicated, but there is a voluntary groundwater management effort being undertaken by a large group of stakeholders south of the American River called the Central Sacramento County Groundwater Forum (CSCGF). The CSCGF was formed in 2002 to provide a reliable and safe water supply for the stakeholders of the Basin through the year 2030. As part of this process, GSWC identified 13,372 ac-ft/yr as the peak reliable groundwater extraction capacity which corresponds to the October 2005 to September 2006 Fiscal Year water use within the Cordova system. The Central Sacramento County Groundwater Management Plan was last updated in 2006 and is included in Appendix F of this UWMP.

Table 4-2 lists the existing wells and well capacities for the Cordova System. The Cordova System currently has a total active normal year capacity of 12,865 gpm (20,751 ac-ft/yr).

Table 4-2: Wells and Well Capacity in the Cordova System

Well Name	Current Well Capacity (gpm)[1]	Current Well Capacity (ac-ft/yr)
Agnes Circle No. 8	615	990
Capital No. 23	1,950	3,150
Coloma Road No. 20	0	0
Gold Country No. 21	Standby	Standby
Dolecetto No. 6	840	1,350
Mather No. 18	1,920	3,100
Negrara No. 10	0	0
Park No. 17	1,540	2,480

Table 4-2: Wells and Well Capacity in the Cordova System		
Well Name	**Current Well Capacity (gpm)(1)**	**Current Well Capacity (ac-ft/yr)**
South Bridge Street No. 22-A	3,000	4,840
South Bridge Street No. 22-B	3,000	4,840
Wood Cliff No. 12	0	0
Total Capacity	**12,865**	**20,751**

Note:
1. Estimated annual average current well production capacity is provided; actual and design instantaneous pumping capacity may be greater for each well.

The GSWC service area's groundwater has been impacted by contamination of volatile organic compounds (VOCs), perchlorate, and N-nitrosodimethylamine (NDMA) from Aerojet's manufacturing and testing facility located immediately to the east of the Cordova System. The effects of changes in water quality on the water supply are discussed in further detail in the reliability evaluation completed in Chapter 6.

The pumping history for the Cordova System is shown in Table 4-3 for calendar years (January 1 – December 31) 2005 to 2010.

Table 4-3: Groundwater Pumping History in Cordova System (2005 to 2009) in ac-ft							
Basin Name	**Metered or Unmetered**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Central Sacramento	Metered	12,639	13,128	9,754	9,162	8,197	6,651
Percent of Total Water Supply		70	71	50	48	46	40

Notes:
1. Table format based on DWR Guidebook Table 18.
2. Years are reported in calendar years (January 1 – December 31).

Table 4-4 shows the projected groundwater pumping amounts by the Cordova System. As a result of changes in water quality, the groundwater supply for the Cordova System may require treatment in order to maintain the projected extraction through 2035. The changes in groundwater supply are discussed in detail in the Reliability of Supply (Chapter 6).

Table 4-4: Projected Groundwater Pumping Amounts by Cordova System to 2035 in ac-ft/yr						
Basin Name	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Central Sacramento	6,651	24,947	24,947	24,947	24,947	24,947
Percent of Total Water Supply	40%	49%	50%	50%	52%	53%

Notes:
1. Table format based on DWR Guidebook Table 19.
2. Years are reported in calendar years (January 1 – December 31).

4.4 Transfers and Exchanges

GSWC has entered into a temporary water transfer agreement with SMUD to allow GSWC to divert up to an additional 6,000 ac-ft/yr from the Folsom South Canal under SMUD's CVP contract entitlement. The contract term is 5 years, from 2008 through December 31, 2012. GSWC can request a contract extension for additional years; however, GSWC plans to utilize only 5,000 ac-ft/yr of this entitlement if necessary due to limited surface water treatment capacity.

In addition, GSWC may be able to purchase additional water supplies from SCWA through the Freeport Project on the Sacramento River in the future.

Table 4-5 presents planned transfer and/or exchange opportunities in the Cordova System.

Table 4-5: Transfer and Exchange Opportunities

Source Transfer Agency	Transfer or Exchange	Short Term	Proposed Quantities	Long-Term	Proposed Quantities
SMUD	Transfer	5,000 ac-ft/yr	5,000 ac-ft/yr	N/A	N/A

Note:
Table format based on DWR Guidebook Table 20.

4.5 Planned Water Supply Projects and Programs

There are several planned water supply projects in the Cordova System at this time as follows:

- Paseo Well 24 – New 1,050 gpm water supply well to be constructed in 2010-2011.
- New Well 22 C – 1,500 to 3,000 gpm water supply well to provide supply redundancy as required under the California Code of Regulations (CCR) Title 22 Water Works Standards.
- Granted Water Supply Project – This project or projects will result in securing the Aerojet commitments to replacement water supplies. This work is subject to the successful resolution of settlement negotiations and may result in a significant multi-year project to implement.

Table 4-6 provides a summary of the future water supply project.

GSWC assumes the existing supply sources will remain active or be replaced in kind through utilization of other revenue sources such as special facility fees, new business and/or Aerojet. Also, GSWC as a part of its normal maintenance and operations will construct replacement wells, pipelines, and treatment systems as needed as a part of its ongoing Capital Improvement Program to maintain its supply and meet distribution system requirements.

Table 4-6: Future Water Supply Projects in ac-ft/yr							
Project Name	Projected Start Date	Projected Completion Date	Normal Year	Single-Dry Year	Multiple-Dry Years		
					Year 1	Year 2	Year 3
Paseo Well No. 24	2011	2012	1,700	1,700	1,700	1,700	1,700
South Bridge Street Well No. 22-C	2011	2012	2,400	2,400	2,400	2,400	2,400
Aerojet Granted Water Supply	2012	2015	5,000	5,000	5,000	5,000	5,000
Total			9,100	9,100	9,100	9,100	9,100

Note:
This table is based on the DWR Guidebook Table 26.

4.6 Wholesale Agency Supply Data

As discussed above, one possible outcome of the Settlement Agreement may be the wheeling of replacement water supply through SCWA. However, because several replacement water supply options are being evaluated, there are no wholesale water supplies planned in the Cordova System at this time; therefore, Table 4-7, Table 4-8 and Table 4-9 have been intentionally left blank.

Table 4-7: Existing and Planned Wholesale Water Sources in ac-ft/yr							
Wholesaler Sources	Contracted Volume	2010	2015	2020	2025	2030	2035
None	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note:
This table is based on DWR Guidebook Table 17.

Table 4-8: Reliability of Wholesale Supply for Year 2035 in ac-ft/yr					
			Multiple-Dry Water Years		
Wholesaler	Average / Normal Water Year Supply	Single-Dry	Year 1	Year 2	Year 3
None	N/A	N/A	N/A	N/A	N/A
Percent Normal		N/A	N/A	N/A	N/A

Note:
Table format based on DWR Guidebook Table 31.

Table 4-9: Factors Affecting Wholesale Supply				
Name of Supply	Legal	Environmental	Water Quality	Climatic
None	N/A	N/A	N/A	N/A

Note:
Table format based on DWR Guidebook Table 29.

4.7 Desalination

Section 10631 (i) of the Act requires an evaluation of desalination opportunities within the Cordova System. The Act states the following:

Section 10631.

(i) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

The Cordova System is located in California's Central Valley and does not have access to seawater or brackish water sources. There are no opportunities identified for using desalinated water as a source of water supply for the Cordova System. Therefore, Table 4-10, has been intentionally left blank.

Table 4-10: Summary of Opportunities for Water Desalination

Source of Water	Yield (ac-ft/yr)	Start Date	Type of Use	Other
None	None	N/A	N/A	N/A

4.8 Recycled Water Plan

This chapter covers Section 10633 which details the requirements of the Recycled Water Plan that are included in the Act. The Act states the following:

Section 10633. The plan shall 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 and shall include all of the following:

(a) A description of 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.

(b) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

(c) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(d) 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.

(e) A description of 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.

(f) 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.

4.8.1 Coordination

Table 4-11 summarizes the role of the agencies that participate in the development of recycled water plans affecting the Cordova System for GSWC.

Table 4-11: Role of Participating Agencies in the Development of the Recycled Water Plan

Participating Agencies	Role in Plan Development
Water agencies	GSWC works closely with the Sacramento Regional County Sanitation District (SRCSD) in planning a potential recycled water distribution system and identifying potential recycled water customers. The SRCSD, acting as the recycled water wholesaler, would lead the way in implementing the recycled water plan and distribution network.
Wastewater agencies	The SRCSD provides a reliable supply of recycled water that meets California recycled water quality standards set forth in Title 22 of the CCR.
Groundwater agencies	Not applicable for this System.
Planning agencies	The SRCSD, in conjunction with the affected city governments, plays a key role in conducting data and customer assessments, as well as analyzing community and economic impacts.

4.8.2 Wastewater Quantity, Quality, and Current Uses

Wastewater in the Cordova System is collected by gravity in a series of main, trunk, and interceptor sewers owned and operated by the Sacramento Area Sewer District (SASD). Collected wastewater is transported to the Sacramento Regional Wastewater Treatment Plant (SRWTP), operated by the Sacramento Regional County Sanitation District (SRCSD), in Elk Grove.

The SRWTP provides primary and secondary wastewater treatment for an average dry weather flow (DWF) of 141 mgd. The treatment plant has a design capacity of 181 mgd and is capable of treating up to 5 mgd to meet Title 22 Recycled Water requirements. Approximately 3.5 mgd of recycled water is used for both SRWTP demand and landscape irrigation throughout the Sacramento region; however, there are no existing recycled water uses in the Cordova System. The remaining treated wastewater (137.5 mgd) is discharged into the Sacramento River near the town of Freeport.

Because the SRWTP treats wastewater for a larger population than exists in the Cordova System, an estimated per capita wastewater generation factor was used to calculate the volume of wastewater generated by the customers in the service area. The wastewater generation factor is based on the total population served and the average DWF for the SRWTP. The plant serves approximately 1.3 million residents and treats an average of 141 mgd, making the average per capita wastewater generation factor for SRWTP 109 gallons per day (gpd).

Table 4-12 summarizes the estimates of existing and projected wastewater volume collected and treated in the service area, based on the average generation factor. Of the total 141 mgd treated at SRWTP, 3.5 mgd (2.5 percent) meets recycled water quality standards; the same percentage was used to estimate the fraction of the Cordova System wastewater that is treated

to meet recycled water quality standards. The remainder (97.5 percent) is discharged into the Sacramento River (refer to Table 4-13). Table 4-14 was intentionally left blank as there are no existing uses of recycled water within the Cordova System.

Table 4-12: Estimates of Existing and Projected Wastewater Collection and Treatment in ac-ft/yr (mgd) for the Cordova System

	2005[2]	2010[2]	2015	2020	2025	2030	2035
Projected population in service area	44,329	46,154	49,009	49,536	50,388	51,241	52,094
Wastewater collected & treated in service area [3]	5,412 (4.83)	5,635 (5.03)	5,984 (5.34)	6,048 (5.40)	6,152 (5.49)	6,256 (5.59)	6,360 (5.68)
Quantity that meets recycled water standard [4]	135 (0.12)	141 (0.13)	150 (0.13)	151 (0.13)	154 (0.14)	156 (0.14)	159 (0.14)

Notes:
1. This table is based on the DWR Guidebook Table 21.
2. Based on actual year.
3. Values of wastewater collected and treated are estimated by multiplying the projected population by the average per capita wastewater generation factor (109 gal/day).
4. The quantity meeting recycled water standards is estimated as 2.5% of the total wastewater treated.

Table 4-13: Estimates of Existing and Projected Disposal of Non-Recycled Wastewater in ac-ft/yr (mgd) for the Cordova System

Method of Disposal	Treatment Level	2005[2]	2010[2]	2015	2020	2025	2030	2035
River Discharge	Secondary	5,277 (4.71)	5,494 (4.91)	5,834 (5.21)	5,897 (5.26)	5,998 (5.36)	6,100 (5.45)	6,201 (5.54)

Notes:
1. This table is based on the DWR Guidebook Table 22.
2. Based on actual year.
3 Volumes of effluent discharged are estimated as 97,5% of the total wastewater treated.

Table 4-14: Existing Recycled Water Use in the Cordova System

Type of Use	Treatment Level	2009 Use (ac-ft/yr)
None	N/A	None

4.8.3 Potential and Projected Use

In 2007, SRCSD completed the Water Recycling Opportunities Study (WROS), which included a goal to “increase water recycling through the Sacramento region on the scale of 30 to 40 mgd over the next 20 years.” The WROS identified 5 target areas with 18 potential projects for water recycling. However, the WROS did not recommend any potential recycled water projects for short-term implementation within the Cordova System. Since no projected future recycled water

uses have been identified by SRCSD within the Cordova System, Table 4-15, Table 4-16 and Table 4-17 have intentionally been left blank.

Table 4-15: Potential Future Recycled Water Uses in ac-ft/yr

Type of Use	Treatment Level	Description	Feasibility	2010(2)	2015	2020	2025	2030	2035
None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:
1. This table is based on the DWR Guidebook Table 23.
2. Based on actual year.

Table 4-16: Projected Future Recycled Water Use in Cordova System in ac-ft/yr

Type of Use	2010	2015	2020	2025	2030	2035
None	N/A	N/A	N/A	N/A	N/A	N/A

Table 4-17: Comparison of Recycled Water Uses—Year 2000 Projections versus 2005 Actual

Type of Use	2005 Projection for 2010	2010 Actual Use
None	None	None

Note:
This table is based on the DWR Guidebook Table 24.

4.8.4 Optimization and Incentives for Recycled Water Use

As the owner and operator of the SRWTP, the SRCSD is responsible for determining the technical and economic feasibility of supplying recycled water to the Cordova System. Because the SRCSD is still in the initial planning stages, there are no actions in place at this time by which GSWC is encouraging the use of recycled water in the service area. Therefore, Table 4-18 is not applicable for this service area and has been intentionally left blank.

However, if and when the SRCSD decides to implement a recycled water project, GSWC will support the project by encouraging recycled water use among its customers where feasible.

Table 4-18: Methods to Encourage Recycled Water Use and the Resulting Projected Use in ac-ft/yr

Actions	2010	2015	2020	2025	2030	2035
None	N/A	N/A	N/A	N/A	N/A	N/A

Note:
This table is based on the DWR Guidebook Table 25.

Chapter 5: Water Quality

Section 10634 of the Act requires an analysis of water quality issues and their impact to supply reliability. The Act states as follows:

> *Section 10634. 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.*

5.1 GSWC Measures for Water Quality Regulation Compliance

To facilitate full compliance with water quality laws and regulations, GSWC maintains an Environmental Quality Department that has independent lines of reporting authority within the organization. The Environmental Quality Department is headed by a company officer specifically assigned to oversee and manage the company's environmental and water quality programs. The Vice President of Environmental Quality has a staff of three managers, including two Water Quality Managers. The Water Quality Managers, in turn, manage a staff of Water Quality Engineers and Technicians that are assigned to district offices. Each district office is assigned one Water Quality Engineer and at least one Water Quality Technician to provide direct support to the local drinking water systems within the district.

The District Water Quality Engineer is the main point of contact for the California Department of Public Health (CDPH) as well as other regulatory agencies. The Water Quality Engineer also is responsible for coordinating compliance measures through scheduling required sample collection, preparing water quality related plans, maintaining a water quality database, providing training to operations, maintaining a cross connection control program, and preparing and submitting monitoring reports, permit applications and other regulatory related correspondence.

As a whole, the Environmental Quality Department monitors and participates in the implementation of new water quality related laws and regulations. Through routine department meetings and training, the District Water Quality Engineers are kept up to date with changing water quality regulations and related technology. These efforts contribute towards maintaining a pool of trained water quality professionals that can be utilized throughout the company. This provides the company the ability to respond to a wide variety of water quality issues or emergencies.

5.2 Water Quality Issues

5.2.1 Surface Water Quality

The water system is supplied surface water from the American River, via the Folsom South Canal. Overall, this supply is characterized as excellent quality water with low turbidity and alkalinity. The raw water can be treated to meet all drinking water standards using conventional, direct, and alternative treatment processes. No persistently present constituents have been identified in the river water requiring additional treatment processes, with one exception. Recreational activity at the mouth of the Folsom South Canal has lead to abnormal increases in

waterfowl populations and have in turn increased the coliform concentration of the surface water supply. Additional disinfection processes have been instituted at the water system's treatment facilities to counteract this rise in microbial contamination occurrences.

The Cordova system has two surface water treatment facilities, each classified as using alternative technologies in the treatment of the American River water supply. The Coloma WTP consists of coagulation, flocculation, sedimentation, filtration and disinfection treatment processes. Likewise, the Pyrites WTP employs a ballast sand pretreatment technique to enhance settling while utilizing treatment processes consisting of coagulation, injection, maturation, clarification, filtration, and disinfection. Water produced by both plants meets existing drinking water standards. Water production by both plants is not expected to be impacted by future regulations currently proposed. The effects of other future chemical contaminant regulations for disinfection by-products, endocrine disrupters, and pharmaceutical chemicals entering the surface water supply have been discussed but are unknown at this time.

5.2.2 Groundwater Quality

The groundwater wells in the Cordova System meet all current California Title 22 drinking water standards before water is delivered to customers. Table 5-1 summarizes water quality issues and recommendations for wells within the Cordova System. The following discussion relates to contaminants with maximum contaminant levels (MCLs) that are either existing or have been proposed by the U.S. Environmental Protection Agency (USEPA) and/or CDPH.

Drinking water regulations pertaining to emerging contaminants of concern, such as chromium (VI), nitrosamines, and VOCs; as well as potential revisions to existing regulations are closely monitored by GSWC's Environmental Quality Department. The appropriate sampling and action will be taken on any affected water supply sources as monitoring requirements, and new or an revised MCLs are promulgated by the USEPA or CDPH. It is anticipated that it will take approximately 2 to 5 years from official adoption of a new or revised MCL to implement wellhead treatment or alternative approach for a source, including all steps from procuring CPUC funding approval to planning, permitting, design, and construction. There is typically adequate time allotted from regulatory approval to promulgation of a new drinking water standard to address localized treatment requirements; therefore no direct impacts to water supply reliability from future water quality regulations are anticipated at this time.

The Cordova System's wells draw groundwater from the Central Sacramento County Subbasin of the Sacramento Groundwater Basin. The Subbasin underlies the central portion of Sacramento County and is bounded by the American River on the north, by the Sacramento River on the west, by the Cosumnes River on the south and by the basement rocks of the Sierra Nevada on the east, which run roughly parallel to the county line. These perennial rivers provide recharge to the groundwater aquifers and serve as convenient boundaries for groundwater management purposes.

Portions of the Subbasin within the Cordova System service area boundary are severely impacted by groundwater contamination, caused primarily by historical improper waste disposal by Gencorp/Aerojet Corporation at its rocket propellant manufacturing and testing facility located immediately up gradient and to the east of the water system. The contaminants consist primarily of VOCs, perchlorate, and NDMA. VOCs were discovered in the local groundwater supply in the early 1980s. Aerojet mitigated the impacts of the VOC contamination at the time by installing wellhead granular activated carbon filtration systems at affected wells of the water system.

The presence of perchlorate and NDMA in the groundwater was first reported to the water system in January 1997, and March 1998, respectively. This contamination has caused the GSWC to destroy or suspend operation of several wells. The water system has been able to compensate for the loss of the contaminated wells and maintain its extractions from the Subbasin by drilling new wells in unaffected areas, installing wellhead treatment equipment at existing well sites, increasing surface water supply, conservation, and other system improvements.

GSWC currently owns a total of 11 wells, with seven (7) operational, one (1) standby, and three (3) inactive in the Cordova System providing a combined production capacity of 15,465 gpm. Three of the wells have been inactivated due to groundwater contamination and are planned to be destroyed. An additional six wells were previously destroyed due to the contamination.

Hydrogeological consultants have predicted four of the eight existing operational wells will not experience contamination levels that would cause their inactivation. Additionally, Well 24 is planned for installation in an area of the Cordova System that hydrogeologic modeling indicates will not be impacted by contamination. These five (5) wells have a total estimated production capacity of 9,205 gpm (14,850 ac-ft/yr).This protection of groundwater supply has been made possible through the installation and operation of several Groundwater Extraction and Treatment (GET) systems by Aerojet. The GET facilities have been specifically designed to intercept and capture contaminants before they reach GSWC's remaining municipal wells. The groundwater extracted for treatment at the GET facilities is discharged to the American River by Aerojet.

Three of the remaining operational wells, Wells 6, 18, and 23, were predicted to remain in service through at least 2020 when they may experience contaminant levels requiring deactivation of the supplies. In 2010, Wells 6, 18 and 23 were equipped with wellhead treatment systems for the removal of perchlorate contamination which exceeded the trigger limit established by the USEPA's Record of Decision for the portion of the contaminant plume underlying the Cordova System issued to Aerojet requiring treatment at 4 µg/L. Ion Exchange pressure vessel treatment equipment was installed in 2010 and is expected to be operational in 2011. The wellhead treatment systems are considered a short-term solution.

Future groundwater supply loss by the water system due to these contaminants will be replaced by Aerojet under its granted water obligations. Under the obligation, Aerojet will deliver the first 5,000 ac-ft/yr of replacement water by discharging treated groundwater at the Aerojet site into the American River, which will create surface water entitlement that will be delivered to GSWC at its turnout from the Folsom South Canal. According to the obligation, up to an additional 10,200 ac-ft/yr of replacement water will be delivered to GSWC if needed to meet demands.

Additionally, radon levels in the groundwater supply have been reported in the range of 288 to 965 pCi/L. The USEPA has proposed a radon MCL at 300 pCi/L, with an alternative standard of 4,000 pCi/L if the state has an approved Multimedia Mitigation program to reduce the indoor radon risk from soil and rocks underneath homes and buildings. It is expected the state will develop an approved Multimedia Mitigation program thus allowing the alternative MCL standard.

Table 5-1 summarizes water quality issues and recommendations for wells within the water system.

Table 5-1: Summary of Assessment					
Well	**Current Well Capacity (gpm)[1]**	**Status**	**Water Quality Issue/Concern**	**Existing Treatment**	**Recommendations**
Agnes Circle No. 8	615	Active	Perchlorate, VOCs, NDMA, Radon	None	Plan for Treatment or replacement; Future Multimedia Mitigation (radon)
Capital No. 23	1,950	Active	Perchlorate, VOCs, NDMA, Radon	Perchlorate Treatment	Operate treatment system, plan for additional treatment or replacement; Future Multimedia Mitigation (Radon)
Dolecetto No. 6	840	Active	Perchlorate, VOCs, NDMA, Radon	Perchlorate Treatment	Operate treatment system, plan for additional treatment or replacement; Future Multimedia Mitigation (Radon)
Coloma Road No. 20	0	Inactive	Manganese, H2S, Perchlorate, VOCs, NDMA, Radon	Manganese Treatment	Operate treatment system, plan for additional treatment or replacement; Future Multimedia Mitigation (Radon)
Gold Country No. 21	0	Standby	Perchlorate, VOCs, NDMA, Radon	Manganese Treatment	Plan for Treatment or replacement; Future Multimedia Mitigation (Radon)
Mather No. 18	1,920	Active	Perchlorate, VOCs, NDMA, Radon	Perchlorate Treatment	Operate treatment system, plan for additional treatment or replacement; Future Multimedia Mitigation (Radon)
Negrara No. 10	0	Inactive	Perchlorate, VOCs, NDMA, Radon	Manganese Treatment	Plan for Treatment or replacement; Future Multimedia Mitigation (Radon)
Park No. 17	1,540	Active	Perchlorate, VOCs, NDMA, Radon	None	Plan for Treatment or replacement; Future Multimedia Mitigation (Radon)
S. Bridge St No. 22A	3,000	Active	Perchlorate, VOCs, NDMA, Radon	None	Plan for Treatment or replacement; Future Multimedia Mitigation (Radon)
S. Bridge St No. 22B	3,000	Active	Perchlorate, VOCs, NDMA, Radon	None	Plan for Treatment or replacement; Future Multimedia Mitigation (Radon)
Wood Cliff No. 12	0	Inactive	Perchlorate, VOCs, NDMA, Radon	Manganese Treatment	Plan for Treatment or replacement; Future Multimedia Mitigation (Radon)

Note:

1. Estimated annual average current well production capacity is provided; actual and design instantaneous pumping capacity may be greater for each well.

5.2.3 Distribution System Water Quality

Distribution system water quality monitoring is performed for several water quality parameters in the Cordova System, including general physical parameters, presence of coliform bacteria, disinfectant and disinfection by-product (D-DBP) levels, and corrosivity of the water by monitoring lead and copper levels at customers' water taps. All monitoring parameters and levels currently meet drinking water standards. The ability to continue to meet these standards is not expected to change in the foreseeable future. Along with the increase in disinfection by-product precursors in the treated groundwater supplies, the water system will become dependent on water storage facilities to maintain peak hour water demands with the loss of wells. As a result, water age of the treated groundwater will inadvertently increase. This increase in water age and increase in disinfection by-products precursors will certainly increase disinfection by-product levels. It is unknown at this time if the increased levels of disinfection by-products will be at levels of concern.

5.3 Projected Water Quality Impacts

Water quality will impact the supply of both surface water and groundwater to the water system in several ways. After December 31, 2012 the water system will begin replacing 5,000 ac-ft/yr of SMUD appropriated surface water transfer water with GET water that has been discharged to the American River by Aerojet, as it becomes available. This change will in essence change the designation of water usage from surface water to groundwater. However, the treated groundwater from Aerojet will be discharged into and commingle with other water in the American River, flow down either the Folsom South Canal or American River, and be withdrawn by the water system at either its current surface water point-of-diversion location along the Folsom South Canal or another location. The quality of the water is not expected to change the ability to treat the water due to this water transfer. As the water system loses additional wells due to groundwater contamination beyond 5,000 ac-ft/yr, the water system's infrastructure will require alternative means to deliver water to its customers. Aerojet will replace the additional contaminated groundwater supply with treated groundwater including the required water transmission improvements.

The quantity of water transferred in this method is not to exceed 10,200 ac-ft/yr. Several options for this replacement water supply are being considered, including construction of facilities locally to divert water from the American River or Folsom South Canal, or obtaining water from the SCWA via the Sacramento River Freeport diversion and Vineyard WTP. GSWC would be responsible for ensuring drinking water standards are met for the local diversion options, but if the water is delivered from a SCWA project, water would be treated to drinking water standards by the SCWA, and there will be no water quality impact to the water system for this water supply.

Table 5-2 summarizes the projected impact on water supply due to water quality issues with water sources in the water system.

Table 5-2: Summary of Projected Water Supply Changes Due to Water Quality Issues in ac-ft/yr						
Water Source Projected Change	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Surface Water - American River (Water system's pre 1914 Water Rights)	0	0	0	0	0	0
Surface Water - American River (SMUD Water Transfer)	0	(5,000)	0	0	0	0
Groundwater (Untreated)	0	6,533	(7,662)	0	0	0
Aerojet Granted Water	0	5,000	0	0	0	0
Aerojet Replacement Water	0	0	0	0	0	0

Note:
Table format based on DWR Guidebook Table 30.

Chapter 6: Water Supply Reliability

Sections 10631 and 10635 of the Act require that an assessment of water supply reliability for various climatic conditions be undertaken. The Act states:

> *Section 10631.*
>
> *(c) (1) 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.*
>
> *(2) 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.*
>
> *Section 10635.*
>
> *(a) 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.*

This chapter provides a water supply and demand assessment for the Cordova System for a normal year, a single-dry year, and multiple-dry years. The following is a summary of the water supply sources and reliability of those sources for the Cordova System. The details of water supply sources are provided in Chapter 4 and the water demand projections are documented in Chapter 3.

6.1 Reliability of Supply

The Cordova System obtains its water supply from three sources: surface water, local groundwater, and replacement water under the Settlement Agreement with Aerojet (discussed above). Therefore, conditions in local areas can impact the reliability of supplies. In general, GSWC's overall supply quantity is expected to be 100 percent reliable through 2035. This reliability is a result of:

- a highly reliable surface water supply from the American River,
- the Settlement Agreement, and
- historically reliable groundwater supply from the Central Sacramento Basin.

Following is a summary of the basis of this reliability.

6.1.1 Reliability of Surface Water

As mentioned earlier, the Cordova System has pre-1914 appropriative right of up to 10,000 ac-ft/yr from the American River, including 5,000 ac-ft/yr that are currently leased by the City of Folsom. Appropriative surface water rights initiated prior to 1914 are not subject to the Water Commission Act and successor laws relating to the water right permitting requirements, and thus do not require a permit from the State Water Resources Control Board. Because appropriative rights are granted priority based upon the year of initiation, the early priority date of GSWC's American River right (1851) provides this right a high priority, which in turn makes the right highly reliable even during drought periods.

6.1.2 GSWC's Groundwater Supply Reliability

Since 1995 GSWC has reliably extracted an average of 11,753 ac-ft/yr of groundwater from the Central Sacramento Basin. GSWC's highest historical production occurred in 2005-2006 Fiscal Year, when GSWC pumped 13,372 ac-ft/yr. Groundwater use has declined significantly since 2001 with the encroachment of groundwater contamination on existing wells and loss of supply shifting GSWC reliance to temporary surface water supplies and critical balancing to maintain adequate system pressure.

As mentioned above, portions of the Basin from which the Cordova System produces groundwater are severely impacted by groundwater contamination. This contamination is primarily the result of waste disposal methods previously used by Aerojet at its rocket propellant manufacturing and testing facility located immediately to the east of the Cordova System. The contaminants consist primarily of VOCs, perchlorate and NDMA. VOCs were discovered in the local groundwater supply in the early 1980s. Aerojet mitigated the impacts of the VOC contamination by installing granular activated carbon filtration systems at the wellhead of several affected GSWC wells. The presence of perchlorate in the groundwater was first reported to GSWC in January of 1997, and the presence of NDMA was reported to GSWC shortly thereafter. This contamination has caused GSWC to suspend the operation of several wells.

As a result of the contamination, GSWC filed litigation against both Aerojet and the State of California. GSWC settled its action against the State in January 2003 and settled with Aerojet in October 2004. Under the Settlement Agreement, Aerojet guarantees that replacement water supplies (Replacement Water) will be made available to offset lost groundwater production in the Cordova System, up to a maximum of 15,200 ac-ft/yr. Accordingly, when combined with GSWC's 5,000 ac-ft/yr of Folsom Canal surface water rights, the Cordova System is ensured of a perpetual reliable water supply of at least 20,200 ac-ft/yr.

It is anticipated that in the future, more of GSWC's wells may become affected by contamination. As a result, as GSWC wells are removed from service, the replacement water, as discussed below, will be used to offset any losses in groundwater pumping capacity. Groundwater production from remaining wells is expected to produce up to 14,850 ac-ft/yr through at least 2035.

The reliability of the existing groundwater supply, in part, is also ensured through Aerojet's operational GET facilities, which are designed to intercept and remove contaminants before they reach the five GSWC municipal wells projected to remain in service. Aerojet also has the ability to "stress" the GET facility pumping rates to increase extraction from the contaminated aquifers, if it is determined this will help further protect the reliability of GSWC's drinking water supply.

6.1.3 Reliability of Replacement Water

As previously stated, the Settlement Agreement with Aerojet guarantees that replacement water supplies will be made available to offset lost groundwater production in the Cordova System, up to a maximum of 15,200 ac-ft/yr.

Aerojet establishes replacement water rights from its extraction and treatment of contaminated groundwater at several GET facilities. The facilities extract and treat the contaminated groundwater and then discharge the treated water into several tributaries of the American River. When needed, GSWC will divert up to 5,000 ac-ft/yr of the granted water via the Folsom South Canal.

In addition, the Settlement Agreement entitles GSWC to receive the remaining 10,200 ac-ft/yr of replacement water from Aerojet, if needed to satisfy system demands. Replacement water diversion alternatives are currently being evaluated, but include options such as increased diversions from the Folsom South Canal, direct diversions from the American River, or the Freeport Project Sacramento River diversion. In the third option, surface water would be treated by SCWA and delivered to GSWC's Cordova System.

6.1.4 Overall Assessment of Cordova System Water Supply Reliability

Supply reliability for the Cordova System depends upon the reliability of the surface water rights, groundwater production, granted and replacement water supplied from the Settlement Agreement. The combination of replacement water measures to be undertaken by Aerojet pursuant to the Settlement Agreement will ensure that GSWC has the supplies necessary to meet its water demands through 2035. Five production wells are expected to remain operational until at least 2035 (assuming successful operation of Aerojet's GET facilities), which will produce up to 14,850 ac-ft/yr of groundwater (Table 4-4). Combined with 5,000 ac-ft/yr of surface water rights from the American River and up to 15,200 ac-ft/yr of replacement water from Aerojet, a sufficient water supply of 24,850 ac-ft/yr exists to meet all of the water demands in the Cordova System. It should be noted that the supplies available (Table 4-1) exceed the supplies needed to meet the projected demands (Table 3-15). Buffer (excess available supply) serves to increase reliability of supplies.

Table 6-1: Projected Normal Year Supply Reliability for the Cordova System in ac-ft/yr

Water Supply Source	2010	2015	2020	2025	2030	2035
GSWC American River Rights (1)	5,000	5,000	5,000	5,000	5,000	5,000
SMUD Water Transfer (2)	4,827	0	0	0	0	0
Aerojet Granted Water (3)	0	5,000	5,000	5,000	5,000	5,000
GSWC Untreated Groundwater (4)	6,651	26,641	14,850	14,850	14,850	14,850
Total Supplies	**16,479**	**36,641**	**24,850**	**24,850**	**24,850**	**24,850**

Table 6-1: Projected Normal Year Supply Reliability for the Cordova System in ac-ft/yr						
Water Supply Source	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Replacement Water Contingency - Additional Supplies (5) (6)	10,200	10,200	10,200	10,200	10,200	10,200

Notes:

1. GSWC American River Rights refers to that portion of the GSWC pre-1914 appropriative rights in the American River that have been previously dedicated to public use in the Rancho Cordova service area and not re-allocated by GSWC to the City of Folsom.
2. Under this water transfer from SMUD, GSWC is entitled to divert up to 6,000 ac-ft/yr from the American River through December 31, 2012, and for additional years upon request. However, GSWC plans to utilize only 5,000 ac-ft/yr of this entitlement due to limited surface water treatment capacity and its desire to maintain its groundwater rights through the Aerojet Replacement Water operations described in (3) below.
3. Under its Replacement Water obligation, Aerojet will deliver the first 5,000 ac-ft/yr of groundwater treated and discharged into the American River to GSWC at GSWC's existing diversion point on the Folsom South Canal through an exchange. Aerojet, and GSWC have agreed that this water will be deemed a recapture of groundwater under GSWC's existing groundwater rights. As soon as this supply is available, GSWC will reduce its reliance upon the SMUD water transfer. Aerojet is required to supply 5,000 ac-ft/yr of Replacement Water without regard to other supplies available to GSWC and without regard to whether GSWC loses additional wells to contamination.
4. GSWC's maximum annual extractions prior to 2010 were equal to approximately 13,250 ac-ft/yr. Under GSWC's appropriative rights to groundwater, GSWC would be able to and would continue to increase its groundwater production commensurate with water supply demands, were it not for the Aerojet groundwater contamination. For years from 2015-2025, it is assumed that all of GSWC's existing groundwater wells other than Wells 8, 17, 22-A, 22-B, and 24 will be inactivated, even though this may not occur. As GSWC's other wells close, its rights to additional Replacement Water will increase to cover any losses that occur, up to a maximum of 10,200 ac-ft/yr.
5. In addition to the 5,000 ac-ft/yr of Replacement Water described in (3) above and diverted by GSWC from the Folsom South Canal, Aerojet will provide GSWC up to an additional 10,200 ac-ft/yr of surface water to which Aerojet is entitled by virtue of its discharge of treated groundwater into the American River. The amount of water that GSWC receives will depend on whether GSWC loses additional wells to contamination. If GSWC does not lose additional wells, this water supply will remain in reserve.
6. The Contingency Plan obligates Aerojet to cure any shortage that follows from delays in securing Replacement Water via the Folsom South Canal ((3) above) or other methods((5) above). Contingent upon GSWC's approval, Aerojet may elect to cure any shortages through additional groundwater extractions, treatment technologies or future water transfers or purchases.

In addition, conservation measures including requirements to comply with SBX7-7 implemented within the Cordova System are expected to reduce demands. Importantly, GSWC's reliable water supplies will be able to meet the demands of the Cordova System even without any of the expected reduction in demands due to water conservation.

Moreover, the system's distribution facilities also have been designed with several interconnections to neighboring water purveyors for emergency purposes. Additional water supplies also could be obtained by GSWC through a transfer or purchase agreement with another water supply provider. GSWC may also be able to purchase additional water supplies from SCWA through the Freeport Project on the Sacramento River.

Table 6-2 presents water supply projections for surface water, replacement water, and groundwater sources during a normal year, single-dry year, and multiple-dry years for the Cordova System. The normal-year supply represents the expected supply under average hydrologic conditions, the dry-year supply represents the expected supply under the single driest hydrologic year, and the multiple-dry year supply represents the expected supply during a period of three consecutive dry years.

Table 6-2: Supply Reliability for the Cordova System for Year 2035 in ac-ft/yr					
Source	Normal Water Year	Single-Dry Water Year	Multiple-Dry Water Years		
			Year 1	Year 2	Year 3
Surface Water from American River	5,000	5,000	5,000	5,000	5,000
Aerojet Granted Water	5,000	5,000	5,000	5,000	5,000
Groundwater	14,850	14,850	14,850	14,850	14,850
Total	24,850	24,850	24,850	24,850	24,850
Percent of Normal		100%	100%	100%	100%

Note:
Table format based on DWR Guidebook Table 28.

Since GSWC began operating the Cordova System in 1964, it has satisfied the system's water demands, in both wet and dry cycles, including the droughts of 1976-1977 and 1987-1992. Because groundwater availability is not immediately susceptible to drought conditions and because GSWC's pre-1914 American River surface water rights are of a high priority, the Cordova System's water supply has historically remained consistent and has experienced no change in supply during drought conditions.

With the Settlement Agreement in place, GSWC will be able to reliably maintain a consistent water supply to satisfy current and anticipated future demands within the Cordova System despite the potential that migration of existing contamination may impact more of GSWC's wells. As explained above, the provision of Replacement Water, as set forth in the Settlement Agreement, ensures a Replacement Water supply of up to 15,200 ac-ft/yr, which, when combined with GSWC's 5,000 ac-ft/yr of pre-1914 American River water rights and continued groundwater production of 14,850 ac-ft/yr, will ensure a consistent supply of up to 24,850 ac-ft/yr of water through 2035 conditions.

In addition to the sufficient and reliable supplies discussed above, there are additional possible supplies available to the Cordova System if there were unexpected restrictions on GSWC's other water supplies. The measures for augmentation of current supplies include further treatment of groundwater, entering into water transfer or purchase agreements, or use of GSWC's Water Shortage Contingency Plan.

As described above, surface water supplies from the American River and groundwater supplies are expected to be 100 percent reliable to meet demands through 2035. Therefore, the water supply projections for a normal, single-dry year, and multiple-dry years are taken as the 2035 projection, which is equivalent to the water demand projected for 2035. It is assumed that the single-dry year and multiple-dry year supplies are the same as those for the normal years because the available supplies are in excess of the demands.

The reliability of groundwater is dependent on local hydrologic conditions and availability of other water for augmented recharge. For the groundwater reliability analysis, precipitation data from 1956 through 2010 were reviewed. Data for the water year basis for Table 6-3 were reported by the WRCC (WRCC, 2011). The WRCC reported precipitation at the Folsom Dam

from Water Year (WY) 1956 through WY 2004 (WY October 1 through September 30). WY 1994 (October 1, 1993 - September 30, 1994) was the single driest year with 9.27 inches of precipitation. The normal water year was based on DWR's description of the median water year over the period of record. The median annual precipitation between WY 1956 and WY 2004 at Folsom Dam was 19.91 inches. Based on the median precipitation, the normal water year was 1991. The multiple-dry year period of WY 2002 through WY 2004 recorded the lowest 3-year total of precipitation. Historically, GSWC has produced an annual maximum of 13,257 ac-ft/yr of groundwater from the Central Sacramento Basin. The Cordova System has pumped between 6,651 ac-ft/yr and 13,128 ac-ft/yr for the past 5 years. It is projected the Cordova System will pump annual amounts ranging from 8,846 ac-ft/yr to 10,108 ac-ft/yr between 2010 and 2035.

Table 6-3: Basis of Water Year Data

Water Year Type	Base Year(s)	History Sequence
Normal Water Year	1991	1956 – 2004
Single-Dry Water Year	1994	1956 – 2004
Multiple-Dry Water Years	2002 – 2004	1956 – 2004

Notes:
1. Data used was from the WRCC record of precipitation at the Folsom Dam on water year basis.
2. Normal Water Year calculated from median precipitation from WY 1956 -WY 2004.
3. Table format based on DWR Guidebook Table 27.

6.1.5 Factors Resulting in Inconsistency of Supply

Table 6-4 presents factors that could potentially result in inconsistency of supply for the Cordova System. The System's surface water supply is limited to its current 5,000 ac-ft of unallocated water rights for American River water. Due to the pre-1914 seniority of the water right, no constraints to use are anticipated.

As discussed above, GSWC anticipates the groundwater supply for the Cordova System will be reduced as a result of groundwater contamination. Under the Settlement Agreement, Aerojet will supply replacement water to augment the water supply and cover any losses in the groundwater supply.

Table 6-4: Factors Resulting in Inconsistency of Supply

Name of Supply	Legal	Environmental	Water Quality	Climatic
Surface Water from American River	N/A	N/A	N/A	N/A
Groundwater, Central Sacramento Groundwater Basin	N/A	N/A	See Chapter 5 for details.	N/A

Notes:
1. Table format based on DWR Guidebook Table 29.
2. N/A – Not Applicable.

6.2 Normal Water Year Analysis

Table 6-5 summarizes the supply reliability assessment for a normal water year based on water supply and water demand projections. The available supplies exceed the supplies needed to meet the projected demands. The excess supply ranged between 18 and 85 percent of the projected demand.

Table 6-5: Comparison of Projected Normal Year Supply and Demand

	2015	2020	2025	2030	2035
Water Supply Total (ac-ft/yr)	36,641	24,850	24,850	24,850	24,850
Water Demand Total (ac-ft/yr)	19,782	19,936	20,153	20,626	21,108
Difference (supply minus demand)	16,859	4,914	4,697	4,224	3,742
Difference as Percent of Supply	46%	20%	19%	17%	15%
Difference as Percent of Demand	85%	25%	23%	20%	18%

Note:
Table format based on DWR Guidebook Table 32.

6.3 Single-Dry-Year Analysis

Under the Settlement Agreement, GSWC has worked to ensure supply reliability over a range of hydrologic conditions. All the projected available supplies will be provided to meet the needs of a growing population even under recurrences of the worst historical hydrologic conditions. With 5,000 ac-ft/yr of available surface water rights from the American River , groundwater, and up to 15,200 ac-ft/yr of Replacement Water from Aerojet, a sufficient water supply exists to meet all of the water demands in the Cordova System.

Table 6-6 demonstrates the reliability of water supplies to meet projected annual water demands for the Cordova System in a single-dry year. It is assumed that the single-dry year supplies are the same as those for the normal years because surface water, groundwater, and Replacement Water will meet projected water demands under all anticipated hydrologic conditions. It should be noted that the supplies available exceed the supplies needed to meet the projected demands (see Chapter 4 for details). The excess available supply serves to increase reliability of supplies.

Table 6-6: Comparison of Projected Supply and Demand for Single-Dry Year

	2015	2020	2025	2030	2035
Supply Total (ac-ft/yr)	36,641	24,850	24,850	24,850	24,850
Demand Total (ac-ft/yr)	19,782	19,936	20,153	20,626	21,108
Difference (supply minus demand)	16,859	4,914	4,697	4,224	3,742
Difference as Percent of Supply	46%	20%	19%	17%	15%
Difference as Percent of Demand	85%	25%	23%	20%	18%

Note:
Table format based on DWR Guidebook Table 33.

6.4 Multiple-Dry-Year Analysis

Table 6-7 presents the projected multiple-dry year water supply and demand assessment. It is assumed that the multiple-dry year water supplies are the same as those for the normal years because surface water, groundwater, and Replacement Water will meet projected water demands under all anticipated hydrologic conditions. The third year of the multiple-dry year water supply projection represents the end of each 3-year multiple-dry year period as required for the multiple-dry year analysis. It is assumed that the water demand for the preceding two years (of the 3-year multiple-dry year period) will be the same as those in the third year.

Table 6-7 demonstrates that the available water supplies exceed the supplies needed to meet the projected demands for each multiple-dry year period. Therefore, the supplies are expected to be 100 percent reliable to meet the projected demands through 2035.

Table 6-7: Projected Multiple-Dry Year Water Supply and Demand Assessment

Year	Supply (ac-ft/yr)	Demand (ac-ft/yr)	Difference	Difference as Percent of Supply	Difference as Percent of Demand
2011					
2012					
2013	31,641	17,523	14,118	45%	81%
2014	31,641	18,913	12,728	40%	67%
2015	36,641	19,782	16,859	46%	85%
2016					
2017					
2018	24,850	19,856	4,994	20%	25%
2019	24,850	19,905	4,945	20%	25%
2020	24,850	19,936	4,914	20%	25%
2021					
2022					
2023	24,850	20,040	4,810	19%	24%
2024	24,850	20,110	4,740	19%	24%
2025	24,850	20,153	4,697	19%	23%
2026					
2027					
2028	24,850	20,380	4,470	18%	22%
2029	24,850	20,531	4,319	17%	21%
2030	24,850	20,626	4,224	17%	20%
2031					

Table 6-7: Projected Multiple-Dry Year Water Supply and Demand Assessment					
Year	**Supply (ac-ft/yr)**	**Demand (ac-ft/yr)**	**Difference**	**Difference as Percent of Supply**	**Difference as Percent of Demand**
2032					
2033	24,850	20,857	3,993	16%	19%
2034	24,850	21,012	3,838	15%	18%
2035	24,850	21,108	3,742	15%	18%

Notes:

1. This assessment is based on the 3-year multiple-dry year period ending in 2015, 2020, 2025, 2030, and 2035.
2. Table format based on DWR Guidebook Table 34.

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Chapter 7: Conservation Program and Demand Management Measures

This Chapter addresses the water conservation requirements of the Act for the Cordova System and includes a summary of current and planned DMM implementation and an overview of the proposed program for compliance with SBX7-7 which requires 20 percent statewide reduction in urban water use by 2020. The DMM portions of the Act state the following:

Section 10631.

(f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) A description of 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 (ULF) toilet replacement programs.

(2) A schedule of implementation for all water demand management measures proposed or described in the plan.

(3) 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.

(4) 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.

(g) 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.

(j) For purposes of this part, urban water suppliers that are members of the California Urban Water Conservation Council shall be deemed in compliance with the requirements of subdivisions (f) and (g) by

complying with all the provisions of the "Memorandum of Understanding Regarding Urban Water Conservation in California," dated December 10, 2008, as it may be amended, and by submitting the annual reports required by Section 6.2 of that memorandum.

7.1 Conservation Program Background

In 1991, GSWC became a signatory to the MOU regarding water conservation in California and a member of the CUWCC, establishing a firm commitment to the implementation of the Best Management Practices (BMPs) or DMMs. The CUWCC is a consensus-based partnership of agencies and organizations concerned with water supply and conservation of natural resources in California. By becoming a signatory, GSWC committed to implement a specific set of locally cost-effective conservation practices in its service areas. In order to facilitate efficient BMP reporting for GSWC across service areas spread throughout California, several BMP "Reporting Units" were established. The Arden-Cordova BMP Reporting Unit covers conservation activities for both the Arden and Cordova Systems (Arden-Cordova Customer Service Area [CSA]). Because of this, this chapter includes an evaluation of water conservation for both systems in the Arden-Cordova CSA.

As an investor-owned utility, GSWC's ability to obtain funding and implement conservation programs is contingent on approval of the General Rate Case by the CPUC. GSWC is currently in the process of reviewing and revising its existing conservation program as follows:

- In 2011, GSWC will be submitting a General Rate Case with the CPUC which will facilitate further development of cost-effective conservation programs, including compliance with SBX7-7.

- Subject to funding approval for each rate making area, GSWC will conduct a baseline water use efficiency assessment of each of its districts to identify opportunities for cost-effective conservation. Results of the baseline assessment will be available by 2013 and will enable GSWC to define programs that target water savings in specific areas and meet DMM requirements.

- To the extent practicable, a companywide conservation program will then be implemented. Varying levels of program implementation will be scaled as appropriate for each district depending on funding availability, local wholesaler and regional participation levels, and SBX7-7 targets.

The MOU and associated BMPs were revised by the CUWCC in 2008, which is equated to the DMMs per Section 10631(j) of the Act. The revised BMPs now contain a category of "Foundational BMPs" that signatories are expected to implement as a matter of their regular course of business. These include Utility Operations (metering, water loss control, pricing, conservation coordinator, wholesale agency assistance programs, and water waste ordinances) and Public Education (public outreach and school education programs). The remaining BMPs are generally quantifiable (the water savings achieved from implementation can be directly calculated) and are called "Programmatic BMPs." Programmatic BMPs are divided into Residential, Large Landscape, and CII categories. These revisions are reflected in the CUWCC's BMP reporting database starting with reporting year 2009. The revised BMP organization is also reflected in the 2010 UWMP's DMM compliance requirements. A summary of the DMMs described in the Act and the current CUWCC BMP organization is presented in Table 7-1 for reference.

Table 7-1: CUWCC BMP and UWMP DMMs Organization and Names					
CUWCC BMP Organization and Names (2009 MOU)				**UWMP DMMs**	
Type	Category	BMP #	BMP name	DMM #	DMM name
Foundational	Operations Practices	1.1.1	Conservation Coordinator	L	Water conservation coordinator
		1.1.2	Water Waste Prevention	M	Water waste prohibition
		1.1.3	Wholesale Agency Assistance Programs	J	Wholesale agency programs
		1.2	Water Loss Control	C	System water audits, leak detection, and repair
		1.3	Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections	D	Metering with commodity rates for all new connections and retrofit of existing connections
		1.4	Retail Conservation Pricing	K	Conservation pricing
	Education Programs	2.1	Public Information Programs	G	Public information programs
		2.2	School Education Programs	H	School education programs
Programmatic	Residential	3.1	Residential assistance program	A	Water survey programs for single-family residential and multi-family residential customers[(1)]
				B	Residential plumbing retrofit
		3.2	Landscape water survey	A	Water survey programs for single-family residential and multi-family residential customers[(1)]
		3.3	High-Efficiency Clothes Washing Machine Financial Incentive Programs	F	High-efficiency washing machine rebate programs
		3.4	WaterSense Specification (WSS) toilets	N	Residential ultra-low-flush toilet replacement programs
	Commercial, Industrial, and Institutional	4	Commercial, Industrial, and Institutional	I	Conservation programs for commercial, industrial, and institutional accounts
	Landscape	5	Landscape	E	Large landscape conservation programs and incentives

Note:

1. Components of DMM A (Water survey programs for single-family residential and multi-family residential customers) applies to both BMP 3.1 (Residential assistance program) and BMP 3.2 (Landscape water survey).

7.2 Implementation of BMPs/DMMs

This section provides a description of the various programs and conservation activities implemented in the Arden-Cordova CSA. Signatories to the MOU are permitted by Water Code Section 10631(j) to include their biennial CUWCC BMP reports in an UWMP to meet the requirements of the DMMs sections of the UWMP Act if the agency is meeting all provisions of the MOU. The Arden-Cordova System CUWCC BMP coverage report for 2009 through 2010 is attached as Appendix C and supplements the summary of BMP implementation activities provided in this chapter.

GSWC is progressing towards implementing all Foundational BMPs required in the revised MOU and UWMP Act. In order to maintain consistency with the SBX7-7 planning process, GSWC has chosen to comply with the remainder of the CUWCC MOU through the gpcd compliance option for the Arden-Cordova Reporting Unit. The gpcd compliance option allows MOU signatories to employ any conservation program approach that attains a two percent per year per capita savings, for a total reduction of 18 percent by 2018. Since the CUWCC water savings goal is consistent with the 20 percent water savings requirement for SBX7-7, the CUWCC MOU and SBX7-7 compliance strategies are the same and the terms are used interchangeably throughout this chapter. Although current and planned implementation of programmatic BMPs need not be demonstrated under the gpcd compliance approach, a discussion of conservation programs and accomplishments in the Arden-Cordova CSA is provided for information.

GSWC also partners with a number of other municipalities and agencies in order to provide its Arden-Cordova CSA customers with High Efficiency Clothes Washer (HECW) rebates, High Efficiency Toilet (HET) rebates and educational programs. GSWC has partnered with SMUD, Regional Water Authority's (RWA) Regional Water Efficiency Programs (RWEP), and Sacramento Regional County Sanitary District (SRCSD).

GSWC is a member of the RWA, which supports many of the conservation-related outreach and education activities in the area. RWA is a joint powers authority that serves and represents the interests of 21 water providers in the greater Sacramento region. The purpose of RWA is to help its members protect and enhance the reliability, availability, affordability and quality of water resources through customer outreach/program education.

7.3 Foundational DMMs

7.3.1 Utility Operations

7.3.1.1 Conservation Coordinator

This BMP is implemented. GSWC maintains a fully staffed Conservation Department with a companywide Water Use Efficiency Manager, Water Conservation Analyst and one Water Conservation Coordinator for each of the three regions to administer conservation programs and support wholesaler programs. GSWC also employs a number of consultants to support program development and implementation.

7.3.1.2 Water Waste Prevention

Although GSWC does not have rule-making authority, it supports member agencies and local cities in efforts to adopt ordinances that will reduce water waste. This BMP is implemented

through CPUC-approved rules provided in Appendix D, including: Rule No. 14.1, the Water Conservation and Rationing Plan, Rule 11, Discontinuance and Restoration of Service.

CPUC's methodology for water utilities to implement Rule 14.1 is documented in Standard Practice U-40-W, "Instructions for Water Conservation, Rationing, and Service Connection Moratoria." Rule No. 14.1 sets forth water use violation fines, charges for removal of flow restrictors, and the period during which mandatory conservation and rationing measures will be in effect. Water conservation restrictions include:

- Use of potable water for more than minimal landscaping.
- Use through a broken or defective water meter.
- Use of potable water which results in flooding or runoff in gutters or streets.
- Use of potable water for washing private cars or commercial aircrafts, cars, buses, boats, or trailers, except at a fixed location where water is properly maintained to avoid wasteful use.
- Use of potable water for washing buildings, structures, driveways, street cleaning or other hard-surfaced areas.
- Use of potable water to irrigate turf, lawns, gardens or ornamental landscaping.
- Use of potable water for construction purposes.
- Use of potable water for filling or refilling of swimming pools.

Rule No. 20 (approved in 1978) discourages wasteful use of water and promotes use of water-saving devices. The stated purpose of the rule is to "ensure that water resources available to the utility are put to a reasonable beneficial use and that the benefits of the utility's water supply and service extend to the largest number of persons." Together, Rules 11, 14.1 and 20 prohibit negligent or wasteful use of water, create a process for mandatory conservation and rationing, and promote the use of water-saving devices.

7.3.1.3 Water Loss Control

GSWC is in the process of completing its residential meter retrofit program for the Arden Cordova CSA, therefore water losses cannot be quantified at this time and this BMP is not fully implemented. However, GSWC has implemented a number of measures in the Arden-Cordova CSA to reduce unaccounted for water including:

- Annual testing and calibration of water production meters and large consumer meters (3 inches and above) coupled with the annual consumer meter replacement programs targeting manifold installations and 2-inch and smaller meters;
- Increasing water main and service line replacements;
- Replacing older small meters, in accordance with CPUC General Order No. 103-A, as well as replacement of stuck meters;
- Metering of GSWC's WTPs for accurate reporting;

- Requiring use of fire hydrant meters by contractors, and monitoring of fire hydrants to reduce or prevent theft of water;
- Changing existing antiquated Hersey large Dual Purpose Fire Meters with newer state of the art Neptune Compound meters to ensure all water being used is accounted for;
- Conducting leak detection and repair programs - locating system leaks and repairing leaks; and
- Performing system surveys where water loss is considered high or out of the norm.

Implementation Steps and Schedule

GSWC will continue to implement its residential water meter retrofit program, with anticipated completion by 2025. Once the meter retrofit program is completed, GSWC will implement the American Water Works Association (AWWA) M36 Water Loss Control Protocol to satisfy the requirements of the Water Loss Control BMP.

7.3.1.4 Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections

Currently, GSWC is in the process of installing meters on all service connections as required by AB 2572. Once meters are installed, service connections are billed volumetrically. In 2008, GSWC applied for and received federal grant funding for meter installation. In addition, GSWC follows the requirements of CPUC General Order 103-A which prescribes minimum water system design, operation and maintenance (O&M) standards for water utilities includes requirements for calibrating, testing frequency, and replacing water meters.

Implementation Steps and Schedule

GSWC is on track to retrofitting all service connections the Arden-Cordova CSA with meters by 2025.

7.3.1.5 Retail Conservation Pricing

All metered customers in the Arden-Cordova CSA are billed volumetrically. In addition, effective December 16, 2010 GSWC implemented a three-tiered conservation pricing rate structure for residential customers as approved by the CPUC for the Arden-Cordova CSA. The current rate structure (included as Appendix E) for residential customers has a fixed charge as well as volumetric escalating price tiers, depending on customer usage. Non-residential customers are billed based on a fixed plus a uniform volumetric charge. Non-metered customers continue to be charged on a flat rate basis. Implementation of this revised pricing policy is the result of GSWC's collaboration with CPUC to implement conservation tiered rates for residential customers of investor-owned utilities. Tiered rates are consistent with the CPUC's Water Action Plan.

Implementation Steps and Schedule

2009 and 2010 volumetric and fixed price revenue data for the Arden-Cordova Reporting Unit are summarized in the BMP Coverage Report located in Appendix C. Since 2010, GSWC has been adding third tier pricing structures and increasing volumetric charges. In 2010, volumetric

revenue consisted of 66.5 percent of the Arden Cordova Reporting Unit's total revenue which is on track to meet the 2012 MOU goal of 70 percent.

GSWC will be submitting a General Rate Case filing to the CPUC in 2011, which includes a proposed rate increase for volumetric charges for Region I customers. If approved, this rate increase will allow GSWC to increase volumetric revenues and progress towards fulfilling the requirements of the Retail Conservation Pricing BMP.

7.3.1.6 Education

Public Information Programs

GSWC administers public information programs for the Arden-Cordova CSA customers. GSWC offers free conservation literature and brochures in the CSA office, runs bi-annual water conservation ads in the local paper, and participates in various conservation events. Notably, GSWC also participates in RWA's RWEP Public Information Campaign. The RWEP has a regional outreach program coordinated with support from a Public Outreach and School Education Committee comprised of RWEP member conservation coordinators and Public Information Officers.

In 2005, the RWEP developed a new logo and theme for the "Be Water Smart" public information campaign. To kick off the campaign, RWA undertook a host of outreach activities including a region-wide "Ultimate Garden Makeover Contest" in 2008 and 2009. Overall, goals of the Be Water Smart program are to:

- Increase the number of Water-Wise House Call requests
- Increase visibility for RWA's water conservation messages in the local media
- Drive traffic to the RWA website and Be Water Smart hotline

In 2010, the RWA and 19 local water providers announced a new public outreach and advertising campaign called "Blue Thumb." The campaign is designed to help residents use less water outdoors. With the Sacramento region's hot, dry climate and long summer season, more than 65 percent of a household's yearly water consumption typically goes toward landscape irrigation. Of that, 30 percent is lost due to overwatering or evaporation, and is the target of the campaign messaging with the call for customer behavioral changes in watering practices.

<u>Goals for RWA's Public Information Campaign</u>

- Raise awareness about the need to use water efficiently outdoors.
- Motivate target audience to undertake key behaviors that are most likely to reduce outdoor water use.

<u>Target Audience for the Regional Public Information Campaign</u>

- Residential water customers within the RWEP participant area.
- In particular, RWA and Association of California Water Agencies (ACWA) surveys show women over age 50 are most willing to adopt water-efficient behaviors

The ongoing regional campaign shows residents how to use water efficiently outdoors through every-day tasks such as adjusting their irrigation system according to the season or using a shut-off nozzle on their hose. It stars well-known community influencers, including Sacramento

Mayor Kevin Johnson, Meteorologist Elissa Lynn and Dinger of the Sacramento River Cats, plus six local residents showing off their "Blue Thumb" and demonstrating how they made a personal commitment to use water wisely.

The Blue Thumb Campaign has a website (BeWaterSmart.info) where visitors can take the pledge to use water wisely and view video clips from spokespersons, such as Sacramento Mayor Kevin Johnson, and campaign participants explaining how they earned their Blue Thumb. The website has been expanded to be a more comprehensive water conservation related site.

Outreach activities completed between 2006 and 2010 are summarized in Table 7-2.

Table 7-2: Outreach Activities

Item	2006	2007	2008	2009	2010
Paid Advertising	10	2	13	24	14
Public Service Announcement	3	2	823	2	6
Bill Inserts / Newsletters / Brochures	6	2	2	5	2
Bill showing water usage in comparison to previous year's usage	Yes	No	Yes	Yes	Yes
Demonstration Gardens	5	0	1	0	0
Special Events, Media Events	5	1	3	2	3
Speaker's Bureau	5	0	8	0	0
Program to coordinate with other government agencies, industry, public interest groups and media	Yes	Yes	Yes	Yes	Yes

Implementation Steps and Schedule

The general schedule for the regional public information campaign follows the annual calendar with the following seasonal activities:

- Winter – planning for upcoming year's activities, continue to promote participation in GSWC's programs, such as high efficiency toilet and clothes washer rebates.

- Spring – ramping up messaging and strong focus in soliciting media coverage and paid advertising in support of May as Water Awareness Month. Messaging surrounds the traditional spring planting season and checking of irrigation systems as they are turned on and taking the "Blue Thumb Pledge" to lower outdoor water use this season.

- Summer – key messaging hits on the issues of efficient irrigation techniques, avoiding water waste, and lowering peak demands on hot summer days.

- Fall – participating in local Harvest day events and providing efficient landscape irrigation trainings for professionals that focus on selecting more water efficient plants and irrigation equipment, and when the weather cools and rains return, then messaging calls for shutting down irrigation systems for the winter months.

The implementation schedule for 2011-2015 includes plans to continue to promote water conservation through the RWEP's outreach program supplemented by GSWC's outreach efforts. The RWEP annual budget for direct expenses to continue with the regional outreach campaign is planned for 2011-2015 to be $160,000 each fiscal year.

In addition, GSWC will continue to support community events similar to those conducted in the past as described above.

School Education Programs

There are two public school programs available to customers in the Arden-Cordova CSA; one program is through a GSWC partnership with SMUD to sponsor the LivingWise school education program, and the other is RWA's RWEP.

The LivingWise school program is administered in Arden-Cordova CSA elementary schools, as implemented by its vendor, Resource Action Programs. Students learn about conservation practices and receive a free conservation kit that includes a water survey, 1.5 gpm low-flow shower head, 1.5 gpm kitchen sink and 1.0 gpm bathroom aerators, leak detection dye tablets, a watering gauge, and step-by-step instructions. The students are given a homework assignment to complete a water audit form and replace inefficient showerheads and aerators with water-saving devices provided in the kit. The program has been an effective way for GSWC to reach a large number of customers and educate students companywide, who in turn educate their parents about water efficiency practices and low-flow plumbing devices.

Results from the program are tracked, and a comprehensive Program Summary Report is generated at the end of each school year. This report documents the estimated reduction in water usage that was achieved through the retrofits and provides data on the percentage of students who participated in the program. Table 7-3 provides a summary of program participation results between 2006 and 2010 (data provided in Fiscal Year).

Table 7-3: School Education Activities

	2006	2007	2008	2009	2010
Presentations	12	0	4	17	5
Grade	K – 8th	N/A	K – 6th	K – 8th	6th
Number of students	480	0	300	617	364

In addition, GSWC also fully participates in the RWEP School Education Program. The RWEP program has focused mainly on K-8 programs. RWEP has continued to use the legacy Sacramento Bee Newspapers in Education (NIE), now called Media in Education (MIE) program that originated back in the mid-1990s as part of the Sacramento Area Water Works Association (SAWWA) program in order to meet the baseline requirements for school education outreach. It includes an annual Water Conservation Pledge and Quiz Contest. It is estimated that a total of 33,932 students have been educated since inception.

Between 2004 and 2008, RWEP also sponsored the Great Water Mystery School Assembly program that was co-funded with the Sacramento Stormwater Quality Partnership. Over the years, a total of 60,208 students in Grades 3-6 were educated about benefits of better water

management practices at home to save water resources and reduced polluted stormwater runoff.

In Fiscal Year 2011, RWEP embarked on a new program, in partnership with the Bureau of Reclamations' American River Water Education Center, and the Water Education Foundation to include sponsorship of Project WET school teacher workshops. A total of 25 teachers attended the first workshop in April 2011.

Implementation Steps and Schedule

GSWC recognizes the value in increased customer awareness of the various conservation programs that are available. To that end, GSWC will review opportunities to enhance its outreach program over the next 2 years to augment RWA's public outreach efforts. Public information measures that will be evaluated include additional direct mail fliers, increased outreach participation at community functions, and an improved conservation website.

During the 2009/2010 school year, GSWC conducted school conservation education programs to an estimated 15,525 students throughout the company. Going forward, GSWC plans to continue to use Resource Action Programs (RAP), Discovery Science Center (DSC), Science Discover (SD) and internal staff to conduct its school conservation programs. RAP and DSC's school conservation education programs include annual reports, classroom education and the distribution and installation of conservation kits that are part of the school education program.

For RWA, the RWEP is in the process of evaluating whether a more effective school program that will reach more students is warranted. Working with the RWEP members and local educators, RWA plans to: (1) evaluate the existing program; (2) evaluate the success of other programs in the region and around the state; (3) develop objectives and a target audience (e.g., grade level); (4) materials; and (5) an implementation strategy for the school education program into the future.

RWEP plans to continue with regional school education program activities along with distribution of school-age educational materials and Project WET Workshops. The school schedule dictates when participation in the RWEP school education program occurs and follows the months that schools are in session from August to the following May. The annual budgeted direct expenses for the regional school education program have been $20,000 and will continue at this level for the foreseeable future.

7.3.1.7 Methods Used to Evaluate the Effectiveness and Water Savings from Foundational BMPs

Effective implementation of the Foundational BMPs is critical to ensuring the long-term success of GSWC's conservation efforts. GSWC will utilize quantitative methods to assess the effectiveness of each BMP, to the extent practicable. For example, GSWC will continue to implement its meter retrofit program and will accelerate the program where practicable. In 2009, GSWC began installation of more than 6,000 residential meters in the Cordova system after receiving $9 million in principal forgiveness and loan funding from the American Recovery and Reinvestment Act. GSWC will track the impact of new conservation pricing by using its upgraded billing system to carefully monitor consumption of residential customers.

The effectiveness of implementing Public Education BMPs will be measured by tracking the number of public outreach events and education programs where customers receive information on conservation. A successful public information program should encourage customers to take

advantage of conservation incentives being offered by GSWC and RWA as Programmatic DMMs.

There are no quantifiable estimates of water savings applicable to the Foundational BMPs; however, by encouraging conservation, these measures will continue to contribute to reducing the Arden-Cordova CSA's water use.

7.4 Programmatic DMMs

GSWC intends to continue to comply with the MOU using the gpcd compliance approach for the Arden-Cordova CSA. The baseline gpcd is equal to the average annual potable water gpcd for the years 1997 through 2006. This approach requires the purveyor to submit biennial gpcd target reports to the CUWCC. The biennial targets are computed by multiplying the GSWC's baseline gpcd by the applicable reduced target, as a percentage. The targets gradually decrease to 82 percent of the baseline in 2018. This approach allows GSWC to choose which programs they would like to implement, as long as the combined water savings attributable to these programs is sufficient to meet their biennial gpcd targets. The gpcd compliance option water savings are comparable to those required by SBX7-7, as detailed in Section 7.5.

Once the pending rate case is approved by the CPUC, GSWC will develop a prioritized water use efficiency program and implementation schedule for all CSAs in the company, focusing on systems with the highest SBX7-7 water use reduction targets, and those where specific conservation activities that are most locally cost-effective.

The gpcd compliance option does not require specific implementation plans for each programmatic BMP, therefore the following descriptions of current program offerings are provided for information purposes only. Water savings estimates are also not available for each program, as implementation levels have not been defined under the gpcd compliance option requirements. GSWC plans to continue to partner with SMUD and RWA to support incentive programs.

7.4.1 Residential DMMs

7.4.1.1 Residential Assistance Programs

Prior to 2009, RWA estimated that it provided outreach and audit program information to 113,907 water customers in addition to those already accounted for. The 113,907 water customers are not counted in the survey offers because it is unknown specifically how many of the 113,907 are GSWC customers. For the 2009/2010 fiscal year GSWC implemented a direct mailer program and tracked customer surveys.

GSWC identifies high use customers based on billing data and contacts them to offer free audits. Audits are also offered to walk-in customers at the local CSA office. Additional home audits are conducted as part of the school education program (Section 7.3.1.6). Low-flow devices are available for free to customers at the GSWC office and are distributed to students as part of the free conservation kits they receive in the school education program. Additional home audits are facilitated through the school education program (Section 7.3.1.6).

7.4.1.2 Landscape Water Surveys

GSWC offers free landscape audits to all single-family (SF) and multi-family (MF) customers throughout the company's service area. GSWC conducted one landscape audit in 2009 and two audits in 2010.

7.4.1.3 High-Efficiency Clothes Washers

GSWC customers are eligible to participate in the HECW rebate program administered by SMUD, which has been available since 2007. GSWC contributes over two thirds of funds ($125 per rebate) for the HECW rebate program, while SMUD provides the rest ($50 per rebate). The GSWC webpage for Arden-Cordova advertises the rebates and provides a link to the SMUD website for full program details.

7.4.1.4 WaterSense Specification (WSS) Toilets

GSWC customers have been eligible to participate in the 1.28 gallon per flush HET exchange program since 2007. GSWC offers its single-family residential customers a free HET (Maximum of 2) in exchange for toilets that flush greater than 3.5 gallons per flush. These exchange events are usually held on two different Saturdays – One for the distribution and the other (two weeks later) to return the older toilet. The return is performed to ensure that the customer installed the toilet and that the new HET replaced a high-flush toilet. GSWC conducts these distributions in areas where partnerships are available (to help offset program costs) and where it is economically feasible (larger customer base) and have partnered with RWA RWEP and SRCSD.

7.4.1.5 WaterSense Specification for Residential Development

Integration of WSS fixtures for new development will be accelerated by the 2010 California Green Building Standards Code (CAL Green Code), which became effective in January 2011. The CAL Green Code sets mandatory green building measures, including a 20 percent reduction in indoor water use, as well as dedicated meter requirements and regulations addressing landscape irrigation and design. Local jurisdictions, at a minimum, must adopt the mandatory measures; the CAL Green Code also identifies voluntary measures that set a higher standard of efficiency for possible adoption.

GSWC is not able to implement of the WSS specification for new developments due to lack of legal authority. As an investor-owned utility, GSWC is not a regulatory authority and cannot adopt ordinances or regulations; however, it does support standards that will achieve a reduction in indoor water use including implementation and use of WSS fixtures as well as adoption of the CAL Green Code by local jurisdictions, including Sacramento County. GSWC will continue to support incentive programs for water efficient devices and standards.

7.4.1.6 Commercial, Industrial, and Institutional DMMs

GSWC is not currently implementing any conservation programs for CII customers in the Arden-Cordova CSA. However, SMUD provides rebate incentives and financing for certain energy efficiency measures for commercial, industrial, agricultural, and multi-family customers. GSWC intends to participate in SMUD's CII conservation programs in the future and will evaluate development of CII programs that support achieving conservation targets.

7.4.1.7 Large Landscape

GSWC offers free large landscape audits to all of its customers. Past programs consisted of identifying and contacting high-use customers, providing information and offering water use surveys, voluntary water use budgets, and landscape training. GSWC conducted two large landscape audits in 2009 and four audits in 2010. An increase in conservation pricing rates in 2011 is expected to generate increased program participation.

7.5 SBX7-7 and CUWCC MOU Compliance Strategy

The SBX7-7 water use baseline for the Cordova system is 369 gpcd. The 2020 compliance goal requiring 20 percent water use reduction is 295 gpcd, as documented in Chapter 3. The CUWCC gpcd compliance option requires 18 percent water use reduction by 2018 (see Appendix C for detailed calculations), which is consistent with the SBX7-7 20 percent water savings targets shown in Table 7-4. For this reason, the same compliance strategy will be implemented to meet both SBX7-7 and the MOU targets.

Table 7-4: SBX7-7 and CUWCC MOU Compliance Targets

		Targets		
	Baseline	**2015**	**2018**	**2020**
SBX7-7	369	332	---	295
CUWCC MOU – gpcd compliance option	356	--	292	--

Several factors have contributed to a rapid reduction in gpcd over the past few years including the economic recession, recent mild climate conditions, implementation of a residential tiered conservation pricing structure, and other conservation measures. Overall, these factors have contributed to a 13 percent reduction in per capita water use over the past 3 years: from 368 gpcd in 2008 to an estimated 319 gpcd in 2010. The Cordova System currently is on track to satisfy its SBX7-7 and MOU goals and GSWC will focus on maintaining these savings over the next 10 years.

However, if the gpcd begins to increase to previous levels, GSWC's ongoing commitment to complying with the CUWCC MOU and implementation of all BMPs should provide sufficient water savings to meet the 74 gpcd water savings objective. GSWC will assess implementation of a suite of programs over the next 2 to 3 years to meet conservation targets companywide, potentially providing further reductions. Implementation levels and specific program offerings will vary by system depending on system goals, existing programs, demographics, and hydrologic characteristics.

GSWC is developing a companywide approach that will include assessment of options such as accelerating the current programs, and adding additional programmatic, regulatory and information-based activities to meet the requirements of SBX7-7. This systematic approach may allow GSWC to do more with less, in essence, administering over all conservation program operations from a centralized location while allowing local resources for direct implementation of BMPs and other water savings practices. Funding for all conservation activities is subject to approval by the CPUC before programs can be implemented. A number of the programs that will be considered by GSWC to meet SBX7-7 requirements combine financial incentives,

regulations, and information elements that build on current activities. Specific programs that may be implemented by 2014 on a company-wide basis include:

Conservation Pricing

GSWC is in the process of filing a General Rate Case application to increase volumetric charges for residential and CII metered customers in its systems. If approved, increased tiered rates for residential and uniform rates for CII accounts are expected to significantly increase water savings and participation in conservation incentive programs in many of GSWC's systems.

Financial Incentives

Ongoing and/or additional financial incentives may be offered directly to customers by GSWC or in partnership with other agencies:

1. HECW rebates: Clothes washer rebates are already being implemented by SMUD on behalf of GSWC and will continue to provide measurable water savings.

2. Zero and low-flow urinal rebates: Rebates would include CII fixtures such as zero consumption and ultra-low volume urinals as well as CII specific HETs.

3. Expansion of fixture rebates to CII and multi-family customers in all systems: currently, the toilet rebate programs are only available to CII and MF customers in select systems. GSWC will evaluate expansion of the programs to all customers and there will be increased focus on marketing to large Home Owner Association accounts.

4. Larger variety of fixture rebates: This may include hot water distribution tanks, pressurized water brooms and high-pressure spray nozzles.

5. Cash-for-grass rebates: Customers will be provided with an incentive of up to $0.5 per square-foot of turf removed and replaced with landscape appropriate plants. The program is being considered for both residential and CII customers; it is currently being offered in select GSWC systems.

6. Expansion of large landscape program: GSWC will evaluate the effectiveness of the current landscape program and making adjustments depending on the results. If the program is found to be successful at meeting reduction targets, the program may be accelerated and more devices will be offered, such as precision nozzles.

Building Code/New Standards

Although it does not have regulatory authority, GSWC supports adoption of new building standards, beyond those currently in code to enhance conservation. If all current code changes that improve the efficiency of fixtures and design are implemented, it could account for up to 60 percent of the expected reduction in demand. Some of the changes proposed will be captured in the CAL Green Building Code, adopted January 2011 as well as SB407 (Plumbing Retrofit on Resale) and standard updates for toilets and washers that are being phased in.

Information/Tracking

Information and tracking represents a new element to the existing programs focusing on collecting and processing information and ensuring that the programs are on track to meet the goals. These activities will also help in program design by providing more robust information about customers and their water use patterns. The immediate priorities include:

1. Automatic Meter Reading (AMR): GSWC will continue to implement and utilize AMR in its systems as a priority to obtain real time data for water usage and identify customer-side leaks. This information can also help GSWC monitor the impacts of existing programs, make adjustments where necessary and develop new programs.

2. Water Use Tracking Tools: Another priority, GSWC will consider plans to design and develop database tracking tools for water savings associated with its conservation plans and increase flexibility in adding or changing program elements.

7.5.1 Consideration of Economic Impacts

Since funding for all conservation activities is subject to approval by the CPUC before programs can be implemented, the economic impacts of complying with SBX7-7 have not yet been fully determined. However, an economic analysis to help develop programs that avoid placing disproportionate burdens on any single sector will be prepared during development of the SBX7-7 water use efficiency program. The annual costs associated with implementing all traditional CUWCC programmatic BMPs cannot be determined because it represents the combined efforts of RWA and GSWC, where funding levels, incentives and particular measures change from year to year. To continue benefiting customers, GSWC will take advantage of applicable partnership programs that will make conservation programs more efficient and cost effective.

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Chapter 8: Water Shortage Contingency Plan

Section 10632 of the Act details the requirements of the water-shortage contingency analysis. The Act states the following:

> *Section 10632. The plan shall provide an urban water-shortage contingency analysis that includes each of the following elements that are within the authority of the urban water supplier:*
>
> *(a) 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.*
>
> *(b) 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.*
>
> *(c) 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.*
>
> *(d) 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.*
>
> *(e) 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.*
>
> *(f) Penalties or charges for excessive use, where applicable.*
>
> *(g) 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.*
>
> *(h) A draft water shortage contingency resolution or ordinance.*
>
> *(i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.*

This chapter documents GSWC's Water Shortage Contingency Plan for the Cordova System per requirements of Section 10632 of the Act. The Water Shortage Contingency Plan is based on Rule No. 14.1 Mandatory Water Conservation, Restrictions and Ratings Program adopted by GSWC and on file with CPUC. Appendix D contains the full text of the rule.

The purpose of the Water Shortage Contingency Plan is to provide a plan of action to be followed during the various stages of a water shortage. The plan includes the following elements: action stages, estimate of minimum supply available, actions to be implemented during a catastrophic interruption of water supplies, prohibitions, penalties and consumption reduction methods, revenue impacts of reduced sales, and water use monitoring procedures.

8.1 Action Stages

The Act requires documentation of actions to be undertaken during a water shortage. GSWC has developed actions to be undertaken in response to water supply shortages, including up to a 50 percent reduction in water supply. Implementation of the actions is dependent upon approval of the CPUC, especially for implementing mandatory water use restriction. CPUC has jurisdiction over GSWC because GSWC is an investor-owned water utility. Section 357 of the California Water Code requires that suppliers subject to regulation by the CPUC secure its

approval before imposing water consumption regulations and restrictions required by water supply shortage emergencies.

GSWC has grouped the actions to be taken during a water shortage into four stages, I through IV, that are based on the water supply conditions. Table 8-1 describes the water supply shortage stages and conditions. The stages will be implemented during water supply shortages according to shortage level, ranging from 5 percent shortage in Stage I to 50 percent shortage in Stage IV. A water shortage declaration will be made by the American States Water Company Board. The water shortage stage determination during a water supply shortage will be made by the Regional Vice President Customer Service.

Table 8-1: Water Supply Shortage Stages and Conditions

Stage No.	Water Shortage Supply Conditions	Shortage Percent
I	Minimum	5 -10
II	Moderate	10 - 20
III	Severe	20 - 35
IV	Critical	35 - 50

Note:
This table is based on the DWR Guidebook Table 35.

The actions to be undertaken during each stage include, but are not limited to, the following:

Stage I (5 - 10 percent shortage) – Water alert conditions are declared and voluntary conservation is encouraged. The drought situation is explained to the public and governmental bodies. GSWC explains the possible subsequent water shortage stages in order to forecast possible future actions for the customer base. The activities performed by GSWC during this stage include, but are not limited to:

- Public information campaign consisting of distribution of literature, speaking engagements, website updates, bill inserts, and conversation messages printed in local newspapers
- Educational programs in area schools
- Conservation Hotline, a toll-free number with trained Conservation Representatives to answer customer questions about conservation and water use efficiency

Stage II (10 - 20 percent shortage) – Stage II will include actions undertaken in Stage I. In addition, GSWC may propose voluntary conservation allotments and/or require mandatory conservation rules. The severity of actions depends upon the percent shortage. The level of voluntary or mandatory water use reduction requested from the customers is also based on the severity. It needs to be noted that prior to implementation of any mandatory reductions, GSWC must obtain approval from CPUC. If necessary, GSWC may also support passage of drought ordinances by appropriate governmental agencies.

Stage III (20 - 35 percent shortage) – Stage III is a severe shortage that entails or includes allotments and mandatory conservation rules. This phase becomes effective upon notification by the GSWC that water usage is to be reduced by a mandatory percentage. GSWC implements mandatory reductions after receiving approval from CPUC. Rate changes are implemented to penalize excess usage. Water use restrictions are put into effect, i.e. prohibited uses can include restrictions of daytime hours for watering, excessive watering resulting in gutter flooding, using a hose without a shutoff device, use of non-recycling fountains, washing down sidewalks or patios, unrepaired leaks, etc. GSWC monitors production weekly for compliance with necessary reductions. Use of flow restrictors is implemented if abusive practices are documented.

Stage IV (35 - 50 percent shortage) – This is a critical shortage that includes all steps taken in prior stages regarding allotments and mandatory conservation. All activities are intensified and production is monitored daily by GSWC for compliance with necessary reductions.

8.2 Minimum Supply

The Act requires 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 GSWC's water supply.

Table 8-2 summarizes the minimum volume of water available from each source during the next three years based on multiple-dry water years and normal water year. The driest three-year historic sequence is provided in Table 6-3. The water supplies for 2010 and 2015 are presented in Chapter 4. It is assumed that the multiple-dry year supplies will be the same as those for the normal years because the supplies from the American River and local groundwater will meet projected water demands under all anticipated hydrologic conditions.

In general, GSWC's supply is expected to be 100 percent reliable through 2035. This reliability is a result of: 1) highly reliable surface water supplies from the American River, 2) the Settlement Agreement, and 3) historically reliable groundwater supply from the Central Sacramento Basin (see Chapters 4 and 6 for details).

Table 8-2: Three-Year Estimated Minimum Water Supply in ac-ft/yr

Source	2011	2012	2013	2010 Average Year
Surface Water from American River	5,000	5,000	5,000	3,827
SMUD Water Transfer	6,000	6,000	0	6,000
Granted Water	0	0	0	0
Groundwater	24,947	26,641	26,641	24,947
Recycled water	0	0	0	0
Total	35,947	37,641	31,641	40,774

Note:
This table is based on the DWR Guidebook Table 31.

8.3 Catastrophic Supply Interruption Plan

The Act requires documentation of actions to be undertaken by the water supplier to prepare for, and implement during, a catastrophic interruption of water supplies. A catastrophic interruption constitutes a proclamation of a water shortage and could result from any event (either natural or man-made) that causes a water shortage severe enough to classify as either a Stage III or Stage IV water supply shortage condition.

In order to prepare for catastrophic events, GSWC has prepared an Emergency Response Plan (ERP) in accordance with other state and federal regulations. The purpose of this plan is to design actions necessary to minimize the impacts of supply interruptions due to catastrophic events.

The ERP coordinates overall company response to a disaster in any and 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. The ERP also provides details on actions to be undertaken during specific catastrophic events. Table 8-3 provides a summary of actions cross-referenced against specific catastrophes for three of the most common possible catastrophic events: regional power outage, earthquake, and malevolent acts.

In addition to specific actions to be undertaken during a catastrophic event, GSWC performs maintenance activities, such as annual inspections for earthquake safety, and budgets for spare items, such as auxiliary generators, to prepare for potential events.

Table 8-3: Summary of Actions for Catastrophic Events	
Possible Catastrophe	**Summary of Actions**
Regional power outage	• Isolate areas that will take the longest to repair and/or present a public health threat. Arrange to provide emergency water. • Establish water distribution points and ration water if necessary. • If water service is restricted, attempt to provide potable water tankers or bottled water to the area. • Make arrangements to conduct bacteriological tests, in order to determine possible contamination. • Utilize backup power supply to operate pumps in conjunction with elevated storage.
Earthquake	• Assess the condition of the water supply system. • Complete the damage assessment checklist for reservoirs, water treatment plants, wells and boosters, system transmission and distribution. • Coordinate with Cal EMA utilities group or fire district to identify immediate fire fighting needs. • Isolate areas that will take the longest to repair and/or present a public health threat. Arrange to provide emergency water. • Prepare report of findings, report assessed damages, advise as to materials of immediate need and identify priorities including hospitals, schools and other emergency operation centers. • Take actions to preserve storage. • Determine any health hazard of the water supply and issue any “Boil Water Order” or “Unsafe Water Alert” notification to the customers, if necessary. • Cancel the order or alert information after completing comprehensive water quality testing. • Make arrangements to conduct bacteriological tests, in order to determine possible contamination.
Malevolent acts	• Assess threat or actual intentional contamination of the water system. • Notify local law enforcement to investigate the validity of the threat. • Get notification from public health officials if potential water contamination • Determine any health hazard of the water supply and issue any “Boil Water Order” or “Unsafe Water Alert” notification to the customers, if necessary. • Assess any structural damage from an intentional act. • Isolate areas that will take the longest to repair and or present a public health threat. Arrange to provide emergency water.

8.4 Prohibitions, Penalties, and Consumption Reduction Methods

The Act requires an analysis of mandatory prohibitions, penalties, and consumption reduction methods against specific water use practices which may be considered excessive during water shortages. Given that GSWC is an investor-owned entity, it does not have the authority to pass any ordinance enacting specific prohibitions or penalties. In order to enact or rescind any prohibitions or penalties, GSWC would seek approval from CPUC to enact or rescind Rule No. 14.1, Mandatory Conservation and Rationing, which is included in Appendix D. When Rule No. 14.1 has expired or is not in effect, mandatory conservation and rationing measures will not be in force.

Rule No. 14.1 details the various prohibitions and sets forth water use violation fines, charges for removal of flow restrictors, as well as establishes the period during which mandatory conservation and rationing measures will be in effect. The prohibitions on various wasteful water uses, include, but are not limited to, the hose washing of sidewalks and driveways using potable water, and cleaning for filling decorative fountains. Table 8-4 summarizes the various prohibitions and the stages during which the prohibition becomes mandatory.

Table 8-4: Summary of Mandatory Prohibitions

Examples of Prohibitions	Stage When Prohibition Becomes Mandatory
Uncorrected plumbing leaks	II, III, IV
Watering which results in flooding or run-off in gutters, waterways, patios, driveway, or streets	II, III, IV
Washing aircraft, cars, buses, boats, trailers, or other vehicles without a positive shut-off nozzle on the outlet end of the hose	II, III, IV
Washing buildings, structures, sidewalks, walkways, driveways, patios, parking lots, tennis courts, or other hard-surfaced areas in a manner which results in excessive run-off	II, III, IV
Irrigation of non-permanent agriculture	II, III, IV
Use of water for street watering with trucks or for construction purposes unless no other source of water or other method can be used	II, III, IV
Use of water for decorative fountains or the filling or topping off of decorative lakes or ponds	II, III, IV
Filling or refilling of swimming pools	II, III, IV

Note:
This table is based on the DWR Guidebook Table 36.

In addition to prohibitions during water supply shortage events requiring a voluntary or mandatory program, GSWC will make available to its customers water conservation kits as required by GSWC's Rule No. 20. GSWC will notify all customers of the availability of conservation kits.

In addition to prohibitions, Rule No. 14.1 provides penalties and charges for excessive water use. The enactment of these penalties and charges is contingent on approval of Rule 14.1 implementation by the CPUC. When the rule is in effect, violators receive one verbal and one written warning after which a flow-restricting device may be installed in the violator's service for a reduction of up to 50 percent of normal flow or 6 ccf per month, whichever is greater.

Table 8-5 summarizes the penalties and charges and the stage during which they take effect.

Table 8-5: Summary of Penalties and Charges for Excessive Use

Penalties or Charges	Stage When Penalty Takes Effect
Penalties for not reducing consumption	III, IV
Charges for excess use	III, IV
Flat fine; Charge per unit over allotment	III, IV
Flow restriction	III, IV
Termination of service	III, IV

Note:
This table is based on the DWR Guidebook Table 38.

In addition to prohibitions and penalties, GSWC can use other consumption reduction methods to reduce water use up to 50 percent. Based on the requirements of the Act, Table 8-6 summarizes the methods that can be used by GSWC in order to enforce a reduction in consumption, where necessary.

Table 8-6: Summary of Consumption Reduction Methods		
Consumption Reduction Method	**Stage When Method Takes Effect**	**Projected Reduction Percentage**
Demand reduction program	All Stages	N/A
Reduce pressure in water lines; Flow restriction	III, IV	N/A
Restrict building permits; Restrict for only priority uses	II, III, IV	N/A
Use prohibitions	II, III, IV	N/A
Water shortage pricing; Per capita allotment by customer type	II, IV	N/A
Plumbing fixture replacement	All Stages	N/A
Voluntary rationing	II	N/A
Mandatory rationing	III, IV	N/A
Incentives to reduce water consumption; Excess use penalty	III, IV	N/A
Water conservation kits	All Stages	N/A
Education programs	All Stages	N/A
Percentage reduction by customer type	III, IV	N/A

Note:
This table is based on the DWR Guidebook Table 37.

8.5 Revenue Impacts of Reduced Sales

Section 10632(g) of the Act requires an analysis of the impacts of each of the actions taken for conservation and water restriction on the revenues and expenditures of the water supplier. Because GSWC is an investor-owned water utility and, as such, is regulated by the CPUC, the CPUC authorizes it to establish memorandum accounts to track expenses and revenue shortfalls caused by both mandatory rationing and voluntary conservation efforts. Utilities with CPUC-approved water management plans are authorized to implement a surcharge to recover revenue shortfalls recorded in their drought memorandum accounts. Table 8-7 provides a summary of actions with associated revenue reductions; while Table 8-8 provides a summary of actions and conditions that impact expenditures. Table 8-9 summarizes the proposed measures to overcome revenue impacts. Table 8-10 provides a summary of the proposed measures to overcome expenditure impacts.

Table 8-7: Summary of Actions and Conditions that Impact Revenue	
Type	**Anticipated Revenue Reduction**
Reduced sales	Reduction in revenue will be based on the decline in water sales and the corresponding quantity tariff rate
Recovery of revenues with CPUC-approved surcharge	Higher rates may result in further decline in water usage and further reduction in revenue

Table 8-8: Summary of Actions and Conditions that Impact Expenditures	
Category	**Anticipated Cost**
Increased staff cost	Salaries and benefits for new hires required to administer and implement water shortage program
Increased O&M cost	Operating and maintenance costs associated with alternative sources of water supply
Increased cost of supply and treatment	Purchase and treatment costs of new water supply

Table 8-9: Proposed Measures to Overcome Revenue Impacts	
Names of Measures	**Summary of Effects**
Obtain CPUC-approved surcharge	Allows for recovery of revenue shortfalls brought on by water shortage program
Penalties for excessive water use	Obtain CPUC approval to use penalties to offset portion of revenue shortfall

Table 8-10: Proposed Measures to Overcome Expenditure Impacts	
Names of Measures	**Summary of Effects**
Obtain CPUC-approved surcharge	Allows for recovery of increased expenditures brought on by water shortage program
Penalties for excessive water use	Obtain CPUC approval to use penalties to offset portion of increased expenditures

8.6 Water-Use Monitoring Procedures

The Act asks for an analysis of mechanisms for determining actual reduction in water use when the Water Shortage Contingency Plan is in effect. Table 8-11 lists the possible mechanisms used by GSWC to monitor water use and the quality of data expected.

Table 8-11: Water-Use Monitoring Mechanisms

Mechanisms for Determining Actual Reductions	Type and Quality of Data Expected
Customer meter readings	Hourly/daily/monthly water consumption data for a specific user depending on frequency of readings
Production meter readings	Hourly/daily/monthly water production depending on frequency of readings; correlates to water use plus system losses

In addition to the specific actions that GSWC can undertake to verify level of conservation, GSWC can monitor long-term water use through regular bi-monthly meter readings, which give GSWC the ability to flag exceptionally high usage for verification of water loss or abuse.

Chapter 9: References

California Department of Water Resources (DWR). 2011. *Guidebook to Assist Water Suppliers to Prepare a 2010 Urban Water Management Plan (DWR Guidebook)*. March 2011.

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SACOG Projections. 2004. *Projections Update Metropolitan Transportation Plan 2027*. <http://www.sacog.org/demographics/projections/Projections%20Doc.pdf>

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Appendix A

Urban Water Management Planning Act

CALIFORNIA WATER CODE DIVISION 6
PART 2.6. URBAN WATER MANAGEMENT PLANNING

All California Codes have been updated to include the 2010 Statutes.

CHAPTER 1.	GENERAL DECLARATION AND POLICY	10610-10610.4
CHAPTER 2.	DEFINITIONS	10611-10617
CHAPTER 3.	URBAN WATER MANAGEMENT PLANS	
Article 1.	General Provisions	10620-10621
Article 2.	Contents of Plans	10630-10634
Article 2.5.	Water Service Reliability	10635
Article 3.	Adoption and Implementation of Plans	10640-10645
CHAPTER 4.	MISCELLANEOUS PROVISIONS	10650-10656

WATER CODE
SECTION 10610-10610.4

10610. This part shall be known and may be cited as the "Urban Water Management Planning Act."

10610.2. (a) The Legislature finds and declares all of the following:

(1) The waters of the state are a limited and renewable resource subject to ever-increasing demands.

(2) The conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level.

(3) A long-term, reliable supply of water is essential to protect the productivity of California's businesses and economic climate.

(4) As part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry water years.

(5) Public health issues have been raised over a number of contaminants that have been identified in certain local and imported water supplies.

(6) Implementing effective water management strategies, including groundwater storage projects and recycled water projects, may require specific water quality and salinity targets for meeting groundwater basins water quality objectives and promoting beneficial use of recycled water.

(7) Water quality regulations are becoming an increasingly important factor in water agencies' selection of raw water sources, treatment alternatives, and modifications to existing treatment facilities.

(8) Changes in drinking water quality standards may also impact the usefulness of water supplies and may ultimately impact supply reliability.

(9) The quality of source supplies can have a significant impact

on water management strategies and supply reliability.
(b) This part is intended to provide assistance to water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies to meet existing and future demands for water.

10610.4. The Legislature finds and declares that it is the policy of the state as follows:
(a) The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.
(b) The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions.
(c) Urban water suppliers shall be required to develop water management plans to actively pursue the efficient use of available supplies.

WATER CODE
SECTION 10611-10617

10611. Unless the context otherwise requires, the definitions of this chapter govern the construction of this part.

10611.5. "Demand management" means those water conservation measures, programs, and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies.

10612. "Customer" means a purchaser of water from a water supplier who uses the water for municipal purposes, including residential, commercial, governmental, and industrial uses.

10613. "Efficient use" means those management measures that result in the most effective use of water so as to prevent its waste or unreasonable use or unreasonable method of use.

10614. "Person" means any individual, firm, association, organization, partnership, business, trust, corporation, company, public agency, or any agency of such an entity.

10615. "Plan" means an urban water management plan prepared pursuant to this part. A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities. The components of the plan may vary according to an individual community or area's characteristics and its capabilities to efficiently use and conserve water. The plan shall address measures for residential, commercial, governmental, and industrial water demand management as set forth in Article 2 (commencing with Section 10630) of Chapter 3. In addition, a strategy and time schedule for implementation shall be included in the plan.

10616. "Public agency" means any board, commission, county, city

and county, city, regional agency, district, or other public entity.

10616.5. "Recycled water" means the reclamation and reuse of wastewater for beneficial use.

10617. "Urban water supplier" means a supplier, 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 of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems subject to Chapter 4 (commencing with Section 116275) of Part 12 of Division 104 of the Health and Safety Code.

WATER CODE
SECTION 10620-10621

10620. (a) Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640).

(b) Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.

(c) An urban water supplier indirectly providing water shall not include planning elements in its water management plan as provided in Article 2 (commencing with Section 10630) that would be applicable to urban water suppliers or public agencies directly providing water, or to their customers, without the consent of those suppliers or public agencies.

(d) (1) An urban water supplier may satisfy the requirements of this part by participation in areawide, regional, watershed, or basinwide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use.

(2) 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.

(e) The urban water supplier may prepare the plan with its own staff, by contract, or in cooperation with other governmental agencies.

(f) 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.

10621. (a) Each urban water supplier shall update its plan at least once every five years on or before December 31, in years ending in five and zero.

(b) 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.

(c) 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).

WATER CODE
SECTION 10630-10634

10630. It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied.

10631. A plan shall be adopted in accordance with this chapter that shall do all of the following:

(a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. 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 and shall be in five-year increments to 20 years or as far as data is available.

(b) 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). If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:

(1) 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.

(2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For basins that have not been adjudicated, 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.

(3) 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.

(4) 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.

(c) (1) 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.

(2) 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.

(d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

(e) (1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, 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.

(2) The water use projections shall be in the same five-year increments described in subdivision (a).

(f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) A description of 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.
(2) A schedule of implementation for all water demand management measures proposed or described in the plan.
(3) 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.
(4) 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.
(g) 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.
(h) Include a description of 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.
(i) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.
(j) For purposes of this part, urban water suppliers that are members of the California Urban Water Conservation Council shall be deemed in compliance with the requirements of subdivisions (f) and (g) by complying with all the provisions of the "Memorandum of Understanding Regarding Urban Water Conservation in California,"

dated December 10, 2008, as it may be amended, and by submitting the annual reports required by Section 6.2 of that memorandum.

(k) 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).

10631.1. (a) 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.

(b) It is the intent of the Legislature that the identification of projected water use for single-family and multifamily residential housing for lower income households will assist a supplier in complying with the requirement under Section 65589.7 of the Government Code to grant a priority for the provision of service to housing units affordable to lower income households.

10631.5. (a) (1) Beginning January 1, 2009, the terms of, and eligibility for, a water management grant or loan made to an urban water supplier and awarded or administered by the department, state board, or California Bay-Delta Authority or its successor agency shall be conditioned on the implementation of the water demand management measures described in Section 10631, as determined by the department pursuant to subdivision (b).

(2) For the purposes of this section, water management grants and loans include funding for programs and projects for surface water or groundwater storage, recycling, desalination, water conservation, water supply reliability, and water supply augmentation. This section does not apply to water management projects funded by the federal American Recovery and Reinvestment Act of 2009 (Public Law 111-5).

(3) Notwithstanding paragraph (1), the department shall determine that an urban water supplier is eligible for a water management grant or loan even though the supplier is not implementing all of the water demand management measures described in Section 10631, if the urban water supplier has submitted to the department for approval a schedule, financing plan, and budget, to be included in the grant or loan agreement, for implementation of the water demand management measures. The supplier may request grant or loan funds to implement the water demand management measures to the extent the request is consistent with the eligibility requirements applicable to the water management funds.

(4) (A) Notwithstanding paragraph (1), the department shall

determine that an urban water supplier is eligible for a water management grant or loan even though the supplier is not implementing all of the water demand management measures described in Section 10631, if an urban water supplier submits to the department for approval documentation demonstrating that a water demand management measure is not locally cost effective. If the department determines that the documentation submitted by the urban water supplier fails to demonstrate that a water demand management measure is not locally cost effective, the department shall notify the urban water supplier and the agency administering the grant or loan program within 120 days that the documentation does not satisfy the requirements for an exemption, and include in that notification a detailed statement to support the determination.

(B) For purposes of this paragraph, "not locally cost effective" means that the present value of the local benefits of implementing a water demand management measure is less than the present value of the local costs of implementing that measure.

(b) (1) The department, in consultation with the state board and the California Bay-Delta Authority or its successor agency, and after soliciting public comment regarding eligibility requirements, shall develop eligibility requirements to implement the requirement of paragraph (1) of subdivision (a). In establishing these eligibility requirements, the department shall do both of the following:

(A) Consider the conservation measures described in the Memorandum of Understanding Regarding Urban Water Conservation in California, and alternative conservation approaches that provide equal or greater water savings.

(B) Recognize the different legal, technical, fiscal, and practical roles and responsibilities of wholesale water suppliers and retail water suppliers.

(2) (A) For the purposes of this section, the department shall determine whether an urban water supplier is implementing all of the water demand management measures described in Section 10631 based on either, or a combination, of the following:

(i) Compliance on an individual basis.

(ii) Compliance on a regional basis. Regional compliance shall require participation in a regional conservation program consisting of two or more urban water suppliers that achieves the level of conservation or water efficiency savings equivalent to the amount of conservation or savings achieved if each of the participating urban water suppliers implemented the water demand management measures. The urban water supplier administering the regional program shall provide participating urban water suppliers and the department with data to demonstrate that the regional program is consistent with this clause. The department shall review the data to determine whether the urban water suppliers in the regional program are meeting the eligibility requirements.

(B) The department may require additional information for any determination pursuant to this section.

(3) The department shall not deny eligibility to an urban water supplier in compliance with the requirements of this section that is participating in a multiagency water project, or an integrated regional water management plan, developed pursuant to Section 75026 of the Public Resources Code, solely on the basis that one or more of

the agencies participating in the project or plan is not implementing all of the water demand management measures described in Section 10631.

(c) In establishing guidelines pursuant to the specific funding authorization for any water management grant or loan program subject to this section, the agency administering the grant or loan program shall include in the guidelines the eligibility requirements developed by the department pursuant to subdivision (b).

(d) Upon receipt of a water management grant or loan application by an agency administering a grant and loan program subject to this section, the agency shall request an eligibility determination from the department with respect to the requirements of this section. The department shall respond to the request within 60 days of the request.

(e) The urban water supplier may submit to the department copies of its annual reports and other relevant documents to assist the department in determining whether the urban water supplier is implementing or scheduling the implementation of water demand management activities. In addition, for urban water suppliers that are signatories to the Memorandum of Understanding Regarding Urban Water Conservation in California and submit biennial reports to the California Urban Water Conservation Council in accordance with the memorandum, the department may use these reports to assist in tracking the implementation of water demand management measures.

(f) This section shall remain in effect only until July 1, 2016, and as of that date is repealed, unless a later enacted statute, that is enacted before July 1, 2016, deletes or extends that date.

10631.7. The department, in consultation with the California Urban Water Conservation Council, shall convene an independent technical panel to provide information and recommendations to the department and the Legislature on new demand management measures, technologies, and approaches. The panel shall consist of no more than seven members, who shall be selected by the department to reflect a balanced representation of experts. The panel shall have at least one, but no more than two, representatives from each of the following: retail water suppliers, environmental organizations, the business community, wholesale water suppliers, and academia. The panel shall be convened by January 1, 2009, and shall report to the Legislature no later than January 1, 2010, and every five years thereafter. The department shall review the panel report and include in the final report to the Legislature the department's recommendations and comments regarding the panel process and the panel's recommendations.

10632. (a) The plan shall provide an urban water shortage contingency analysis that includes each of the following elements that are within the authority of the urban water supplier:

(1) 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 that are applicable to each stage.

(2) 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.

(3) 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.

(4) 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.

(5) 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.

(6) Penalties or charges for excessive use, where applicable.

(7) An analysis of the impacts of each of the actions and conditions described in paragraphs (1) to (6), 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.

(8) A draft water shortage contingency resolution or ordinance.

(9) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

(b) Commencing with the urban water management plan update due December 31, 2015, for purposes of developing the water shortage contingency analysis pursuant to subdivision (a), the urban water supplier shall analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas, as defined in subdivision (a) of Section 115921 of the Health and Safety Code.

10633. The plan shall 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, and shall include all of the following:

(a) A description of 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.

(b) A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

(c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

(d) A description and quantification of 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.

(e) 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.

(f) A description of 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.

(g) 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.

10634. 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.

WATER CODE SECTION 10635

10635. (a) 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.

(b) 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.

(c) Nothing in this article is intended to create a right or entitlement to water service or any specific level of water service.

(d) Nothing in this article is intended to change existing law concerning an urban water supplier's obligation to provide water service to its existing customers or to any potential future customers.

WATER CODE
SECTION 10640-10645

10640. Every urban water supplier required to prepare a plan pursuant to this part shall prepare its plan pursuant to Article 2 (commencing with Section 10630).

The supplier shall likewise periodically review the plan as required by Section 10621, and any amendments or changes required as a result of that review shall be adopted pursuant to this article.

10641. An urban water supplier required to prepare a plan may consult with, and obtain comments from, any public agency or state agency or any person who has special expertise with respect to water demand management methods and techniques.

10642. 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. 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. After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

10643. An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.

10644. (a) 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.

(b) The department shall prepare and submit to the Legislature, on or before December 31, in the years ending in six and one, a report summarizing the status of the plans adopted pursuant to this part. The report prepared by the department shall identify the exemplary elements of the individual plans. The department shall provide a copy of the report to each urban water supplier that has submitted its plan to the department. The department shall also prepare reports and provide data for any legislative hearings designed to consider the effectiveness of plans submitted pursuant to this part.

(c) (1) For the purpose of identifying the exemplary elements of the individual plans, the department shall identify in the report those water demand management measures adopted and implemented by specific urban water suppliers, and identified pursuant to Section

10631, that achieve water savings significantly above the levels established by the department to meet the requirements of Section 10631.5.

(2) The department shall distribute to the panel convened pursuant to Section 10631.7 the results achieved by the implementation of those water demand management measures described in paragraph (1).

(3) The department shall make available to the public the standard the department will use to identify exemplary water demand management measures.

10645. 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.

WATER CODE
SECTION 10650-10656

10650. Any actions or proceedings to attack, review, set aside, void, or annul the acts or decisions of an urban water supplier on the grounds of noncompliance with this part shall be commenced as follows:

(a) An action or proceeding alleging failure to adopt a plan shall be commenced within 18 months after that adoption is required by this part.

(b) Any action or proceeding alleging that a plan, or action taken pursuant to the plan, does not comply with this part shall be commenced within 90 days after filing of the plan or amendment thereto pursuant to Section 10644 or the taking of that action.

10651. In any action or proceeding to attack, review, set aside, void, or annul a plan, or an action taken pursuant to the plan by an urban water supplier on the grounds of noncompliance with this part, the inquiry shall extend only to whether there was a prejudicial abuse of discretion. Abuse of discretion is established if the supplier has not proceeded in a manner required by law or if the action by the water supplier is not supported by substantial evidence.

10652. The California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) does not apply to the preparation and adoption of plans pursuant to this part or to the implementation of actions taken pursuant to Section 10632. Nothing in this part shall be interpreted as exempting from the California Environmental Quality Act any project that would significantly affect water supplies for fish and wildlife, or any project for implementation of the plan, other than projects implementing Section 10632, or any project for expanded or additional water supplies.

10653. The adoption of a plan shall satisfy any requirements of state law, regulation, or order, including those of the State Water Resources Control Board and the Public Utilities Commission, for the preparation of water management plans or conservation plans; provided, that if the State Water Resources Control Board or the Public Utilities Commission requires additional information concerning water conservation to implement its existing authority, nothing in this part shall be deemed to limit the board or the commission in obtaining that information. The requirements of this part shall be satisfied by any urban water demand management plan prepared to meet federal laws or regulations after the effective date of this part, and which substantially meets the requirements of this part, or by any existing urban water management plan which includes the contents of a plan required under this part.

10654. An urban water supplier may recover in its rates the costs incurred in preparing its plan and implementing the reasonable water conservation measures included in the plan. Any best water management practice that is included in the plan that is identified in the

"Memorandum of Understanding Regarding Urban Water Conservation in California" is deemed to be reasonable for the purposes of this section.

10655. If any provision of this part or the application thereof to any person or circumstances is held invalid, that invalidity shall not affect other provisions or applications of this part which can be given effect without the invalid provision or application thereof, and to this end the provisions of this part are severable.

10656. An urban water supplier that does not prepare, adopt, and submit its urban water management plan to the department in accordance with this part, is ineligible to receive funding pursuant to Division 24 (commencing with Section 78500) or Division 26 (commencing with Section 79000), or receive drought assistance from the state until the urban water management plan is submitted pursuant to this article.

Appendix B

Public Hearing Notices, Notifications, and Meeting Minutes

Golden State
Water Company
A Subsidiary of American States Water Company

19 July 2010

Paul Junker
Planning Director
City of Rancho Cordova
2729 Prospect Park Drive
Rancho Cordova, CA 95670

Subject: Golden State Water Company - Cordova System
2010 Urban Water Management Plan Preparation Notification and Information Request
K/J 1070001*00

Dear Paul Junker:

Golden State Water Company (GSWC) is currently in the process of preparing its 2010 Urban Water Management Plan (UWMP) for the Cordova system as required by State of California Law through the Urban Water Management Planning Act. The UWMP Act requires that Urban Water Retailers document water supply, reliability and other issues through the year 2035. This letter is provided as your official notice of UWMP preparation and request for information since your agency has governmental jurisdiction, possibly including land use planning over the Cordova system area. The UWMP process is intended to be a collaborative effort between all project stakeholders to the extent practicable.

Please review the enclosed figure showing the Cordova system service area and advise whether there are any issues that should be considered by GSWC in preparation of this UWMP. Items for consideration may include land developments anticipated between 2010 and 2035 within or immediately adjacent to the water system. Please also provide any pertinent supporting documentation. We will be happy to provide you with an electronic copy of the 2005 UWMP at your request.

We appreciate timely attention to the information requested above and ask you to provide a response no later than **3 August 2010**. Kennedy/Jenks Consultants is preparing the UWMP under contract with GSWC and will be contacting you directly within the next few weeks to follow up on this request. In the meantime, should you have any questions or concerns please feel free to contact Sean Maguire with Kennedy/Jenks Consultants at seanmaguire@kennedyjenks.com or (916) 858-2700.

Very truly yours,

GOLDEN STATE WATER COMPANY

Dan W. Talaga

Dan W. Talaga, P.E.
Sr. Civil Engineer

Enclosure

3035 Prospect Park Drive, Ste. 60, Rancho Cordova, CA 95670
Tel: (916) 853-3600 Fax: (916) 852-0171 www.aswater.com

Golden State
Water Company
A Subsidiary of American States Water Company

19 July 2010

Robert Sherry
Director Planning and Community Development
County of Sacramento
827 7th Street
Sacramento, CA 95814

Subject: Golden State Water Company - Cordova System
2010 Urban Water Management Plan Preparation Notification and Information Request
K/J 1070001*00

Dear Robert Sherry:

Golden State Water Company (GSWC) is currently in the process of preparing its 2010 Urban Water Management Plan (UWMP) for the Cordova system as required by State of California Law through the Urban Water Management Planning Act. The UWMP Act requires that Urban Water Retailers document water supply, reliability and other issues through the year 2035. This letter is provided as your official notice of UWMP preparation and request for information since your agency has governmental jurisdiction, possibly including land use planning over the Cordova system area. The UWMP process is intended to be a collaborative effort between all project stakeholders to the extent practicable.

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Very truly yours,

GOLDEN STATE WATER COMPANY

Dan W. Talaga

Dan W. Talaga, P.E.
Sr. Civil Engineer

Enclosure

3035 Prospect Park Drive, Ste. 60, Rancho Cordova, CA 95670
Tel: (916) 853-3600 Fax: (916) 852-0171 www.aswater.com

Golden State
Water Company
A Subsidiary of American States Water Company

April 28, 2011

City of Rancho Cordova
Paul Junker
Planning Director
2729 Prospect Park Drive
Rancho Cordova, CA 95670

Subject: Notification of Public Hearing for the 2010 Urban Water Management Plan (UWMP)
Golden State Water Company – Cordova System

Dear Paul:

Golden State Water Company (GSWC) is providing you this reminder of our July 19, 2010 notice pursuant to Water Code, section 10621, subdivision (b) of the Act, which requires an urban water supplier to notify any city or county within which it provides water that it is reviewing its plan and considering changes to the plan for the following water system: Cordova. We anticipate the UWMP will be available for public review one week prior to the public hearing and can be reviewed during normal business hours. **Please call 1-800-999-4033 to make an appointment to view the plan at:**

Rancho Cordova Customer Service Office
3035 Prospect Park Drive
Rancho Cordova, CA 95670

A public hearing to solicit comments on the draft UWMP will be held at 6:00 p.m., on Thursday, June 9, 2011 and take place at:

Golden State Water Company - Region I- Headquarters Office
Region I- Headquarters Office
3035 Prospect Park Drive
Rancho Cordova, CA 95670

If you have any questions please contact me at (916) 853-3612.

Very truly yours,

GOLDEN STATE WATER COMPANY

Ernest A Gisler
Planning Manager

Golden State
Water Company
A Subsidiary of American States Water Company

April 28, 2011

County of Sacramento
Robert Sherry
Director of Planning and Community Development
827 7th Street
Sacramento, CA 95814

Subject: Notification of Public Hearing for the 2010 Urban Water Management Plan (UWMP)
Golden State Water Company – Cordova System

Dear Robert:

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Rancho Cordova, CA 95670

If you have any questions please contact me at (916) 853-3612.

Very truly yours,

GOLDEN STATE WATER COMPANY

Ernest A Gisler
Planning Manager

The Sacramento Bee

P.O. Box 15779 • 2100 Q Street • Sacramento, CA 95852

CALIFORNIA NEWSPAPER SERVICE
915 E. FIRST ST
LOS ANGELES, CA 90012

DECLARATION OF PUBLICATION
(C.C.P. 2015.5)

COUNTY OF SACRAMENTO
STATE OF CALIFORNIA

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interest ed in the above entitled matter. I am the printer and principal clerk of the publisher of The Sacramento Bee, printed and published in the City of Sacramento, County of Sacramento, State of California, daily, for which said newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Sacramento, State of California, under the date of September 26, 1994, Action No. 379071; that the notice of which the annexed is a printed copy, has been published in each issue thereof and not in any supplement thereof on the following dates, to wit:

April 5, 2011

I certify (or declare) under penalty of perjury that the foregoing is true and correct and that this declaration was executed at Sacramento, California, on **April 5, 2011**

(Signature)

Golden State Water Company

Notice of Public Hearing

In conformance with the California Urban Water Management Planning Act, Golden State Water Company is hosting a public hearing on June 9 from 6 to 7 p.m. at the Golden State Water Company, Region I Headquarters office, 3035 Prospect Park Drive, Suite 60, Rancho Cordova, to solicit comments on the Urban Water Management Plan (UWMP) for the company's Cordova Water System.

The UWMP is available for public review prior to the public hearing and can be reviewed during normal business hours. Please call 1-800-999-4033 to make an appointment to view the plan at:

Cordova Customer Service Office
3035 Prospect Park Drive, Suite 50
Rancho Cordova, CA 95670

For more information, visit www.gswater.com.

CNS#2074802

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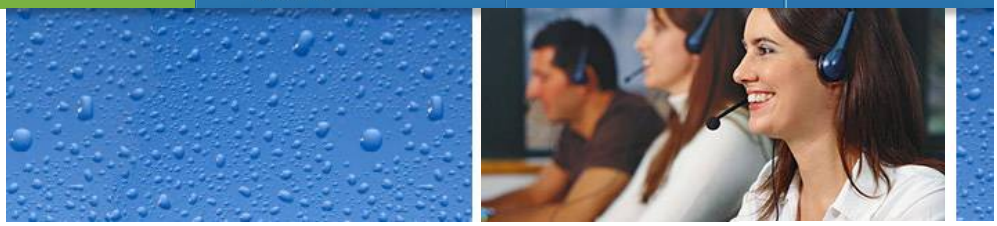

Customer Service Home Page
Find Local Office Information
Payment Options
Understanding Your Bill
How to Read Your Meter
Definitions and Terminology
Frequently Asked Questions
New Customer Brochure

For 24-hour customer service or emergency please call

1-800-999-4033
24 hours, 7 days a week

877-933-9533
TTY (hearing impaired)

Find Local Office Information » Arden Cordova

Arden Cordova Customer Service Area

Areas Serviced
The Arden Cordova Customer Service Area serves approximately 16,000 customers in Arden Manor, Gold River, Rancho Cordova, and Sacramento

Office Location
Arden Cordova CSA
3035 Prospect Park Drive, Suite #50
Rancho Cordova, CA 95670

24 hour Customer Service and Emergency
800-999-4033 (24 hours, 7 days a week)
877-933-9533 (TTY hearing impaired)
Email: customerservice@gswater.com

WATER CONSERVATION TIPS

Shorten your showers by one or two minutes and save 5 gallons per day.

Notice of Potential Settlement

Golden State Water Company (GSWC) is notifying customers in its Region I, which includes the Arden Cordova Customer Service Area, about a potential settlement conference with the California Public Utility Commission's Division of Water & Audits. See more information here.

Free Landscaping Seminar
Saturday June 11

Landscaping the river-friendly way. Learn more about conserving water while sustaining a healthy landscape. Click here for more information.

Urban Water Management Plan
Public Meeting Notice

Golden State Water Company (GSWC) is in the process of updating its Rancho Cordova Urban Water Management Plan and is seeking public input. To review the plan, please click here.

See public notice for more information.

GSWC Files a Cost of Capital Application

A Cost of Capital application was filed May 2, 2011 with the the California Public Utilities Commission (CPUC). The CPUC regulates GSWC to ensure adequate levels of service are provided at the lowest reasonable costs.

In this filing, GSWC is requesting for the CPUC to review and authorize an increase in the cost of capital reflected in rates for 2012, 2013, and 2014. A decision is expected in December 2011.

A copy of the application is here.

New Rates Established in Arden Cordova Customer Service Area for 2011 and 2012

The CPUC approved a final decision on the company's 2010 General Rate Case (GRC) on Dec. 16, 2010. The decision established rates for GSWC to charge customers for 2011 and 2012 in its Arden-Cordova Customer Service Area.

Fact Sheet

RATES, SCHEDULES & TARIFFS

General Metered Service
Bi-Monthly Flat Rate
Water Conservation

CLICK HERE to view all our rates, tariffs and advice letters

LOW INCOME PROGRAM
California Alternate Rates for Water (CARW)

You may qualify for a discount on your water bill. Qualified participants receive a $3 discount per month for metered service in Arden-Cordova, which is approximately a 15 percent discount for a customer who uses 15 Ccf (11,220 gallons), or a $7 discount per month for flat rate service.

The California Public Utility Commission's Division of Ratepayer Advocates and GSWC agreed the monthly CARW credits for qualifying customers be equal to a 15 percent discount for a customer who uses 15 Ccf of water in each of the Customer Service Areas.

Qualifications are based on the number of people living in your home and your total household income, including wages, government checks and benefits, and other financial support you and members of your family receive.

For further information, please review the application below or contact our CARW hotline at (866) 360-CARW (2279).

Application (English)
Application (Spanish)

Rancho Cordova Water Meter Installation Update

In 2004, the state enacted a law (AB 2572) requiring all water suppliers to install water meters on all customer connections by January 1, 2025. The use of meters promotes water conservation by informing customers how much water they use over time. They also help customers identify water leaks and save money.

Prior to September 2010, GSWC had approximately 5160 customers in the Rancho Cordova area with water meters, while approximately 8,300 customers were without meters. To accelerate the meter installation program, GSWC applied for and was awarded $9 million in federal assistance.

From now through much of 2011, GSWC's contractor, Marques Pipeline, will be installing meters on single and multi-family residential service lines in Rancho Cordova.

Customers notifications will occur on four separate occasions: 30 days before work begins in their area; 48 hours prior to the start of work; approximately one week after the meter is installed; and one billing period prior to the customer receiving their first bill on metered rates.

Do you have a Blue Thumb?

Make a "Blue Thumb" personal pledge to use water efficiently. You'll save money and earn a prize. This program is sponsored by Golden State Water Company and other members of the Regional Water Authority. Just fill out a Blue Thumb pledge form.

WATER CONSERVATION REBATE PROGRAMS

Golden State Water Company partners with other agencies to offer various rebate programs as an incentive for customers to purchase water-efficient products. Here are some programs created for the Arden Cordova Customer Service Area. Funding is limited.

High-Efficiency Clothes Washer (HECW) Rebates
Residential, multi-family property owners are eligible.
Rebates up to $225, depending on the efficiency of the clothes washer.
Contact SMUD at 1-888-742-7683 for program requirements prior to purchase.

High-Efficiency Toilet (HET) Rebates
Single-family homes are eligible.
Must be an approved EPA WaterSense HET with 1.28 gallons per flush or less.
Rebates up to $175.
Call our customer service center at 1-800-999-4033 for rebate information prior to purchase.
Rebate Application

ADDITIONAL WATER CONSERVATION RESOURCES

Regional Water Authority

WATER QUALITY ANNUAL REPORT

Arden
Cordova

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For 24-hour emergency and customer service, please call: 1-800-999-4033 or 877-933-9533 TTY (hearing impaired)
customerservice@gswater.com

Website design by NetPilot Web Solutions

No Meeting Minutes were taken since there was no attendance by the public.

Appendix C

Council Annual Reports for Demand Management Measures

Appendix D

CPUC Water Conservation and Rationing Rules and Regulations

Rule No. 11

DISCONTINUANCE AND RESTORATION OF SERVICE

A. Customer's Request for Discontinuance of Service

1. A customer may have service discontinued by giving not less than two day's advance notice thereof to the utility. Charges for service may be required to be paid until the requested date of discontinuance or such later date as will provide not less than the required two days' advance notice.

2. When such notice is not given, the customer will be required to pay for service until two days after the utility has knowledge that the customer has vacated the premises or otherwise has discontinued water service.

B. Discontinuance of Service by Utility

1. For Nonpayment of Bills

a. Past-Due Bills. When bills are rendered monthly or bimonthly, they will be considered past due if not paid within 19 days from the date of mailing. The utility shall allow every residential customer at least 19 days from the date of mailing its bill for services, postage prepaid, to make payment of the bill. The utility may not discontinue residential service for nonpayment of a delinquent account unless the utility first gives notice of the delinquency and impeding discontinuance, at least 10 days prior to the proposed discontinuance, by means of a notice mailed, postage prepaid, to the customer to whom the service is provided if different than to whom the service is billed, not earlier than 19 days from the date of mailing the utility's bill for services. The 10-day discontinuance of service notice shall not commence until five days after the mailing of the notice. (T)

b. When a bill for water service has become past due and a 10-day discontinuance of residential service notice or a 7-day discontinuance of residential service notice for nonpayment has been issued, service may be discontinued if bill is not paid within the time required by such notice. The customer's service, however, will not be discontinued for nonpayment until the amount of any deposit made to establish credit for that service has been fully absorbed.

(Continued)

Rule No. 11

DISCONTINUANCE AND RESTORATION OF SERVICE
(Continued)

B. Discontinuance of Services by Utility (Continued)

1. For Nonpayment of Bills (Continued)

c. Any customer, residential as well as nonresidential, who has initiated a billing complaint or requested an investigation within 5 days of receiving a disputed bill or who has, before discontinuance of service made a request for extension of the payment period of a bill asserted to be beyond the means of the customer to pay in full within the normal period for payment, shall not have residential water service discontinued for nonpayment during the pendency of an investigation by the utility of such customer complaint or request and shall be given an opportunity for review of the complaint, investigation, or request by a review manager of the utility. The review shall include consideration of whether a residential customer shall be permitted to make installment payments on any unpaid balance of the delinquent account over a reasonable period of time, not to exceed 12 months. Such service shall not be discontinued for nonpayment for any customer complying with an installment payment agreement entered into with the utility, provided the customer also keeps current his account for water service as charges accrue in each subsequent billing period. If a residential customer fails to comply with an installment payment agreement, the utility will give a 10-day discontinuance of service notice before discontinuing such service, but such notice shall not entitle the customer to further investigation by the utility.

d. Any customer whose complaint or request for an investigation pursuant to subdivision (c) has resulted in an adverse determination by the utility may appeal the determination to the Commission. Any subsequent appeal of the dispute or complaint to the Commission shall be in accordance with the Commission adopted Rules of Practice and Procedure.

e. Service to a residential water customer will not be discontinued for nonpayment when the customer has previously established to the satisfaction of the utility that:

(Continued)

Rule No. 11

DISCONTINUANCE AND RESTORATION OF SERVICE
(Continued)

B. Discontinuance of Services by Utility (Continued)

1. For Nonpayment of Bills (Continued)

e. (Continued)

(1) The customer is elderly (age 62 or over) or handicapped,* or upon certification of a licensed physical or surgeon that to discontinue water will be life threatening to the customer; and

*Proof of age must be supported by certificate of birth, driver's license, passport or other reliable document. Proof of handicap must be by certification from a licensed physician, surgeon, public health nurse or social worker.

(2) The customer is temporarily unable to pay for such service in accordance with the provisions of the utility's tariffs; and

(3) The customer is willing to arrange installment payments satisfactory to the utility, over a period not to exceed 12 months, including arrangements for prompt payment of subsequent bills.

However, service may be discontinued to any customer who does not comply with an installment payment agreement or keep current his account for water service as charges accrue in each subsequent billing period.

(f) A customer's residential service may be discontinued for nonpayment of a bill for residential service previously rendered him at any location served by the utility.

A nonresidential service may be discontinued for nonpayment of a bill for residential as well as nonresidential service previously rendered him at any location served by the utility.

The discontinuance of service notice as set forth in subdivision (b) will be given in both cases stated above before discontinuance of service takes place.

(Continued)

Rule No. 11

DISCONTINUANCE AND RESTORATION OF SERVICE
(Continued)

B. Discontinuance of Services by Utility (Continued)

1. For Nonpayment of Bills (Continued)

f. (Continued)

Residential services will not, however, be discontinued for nonpayment of bills for separate nonresidential service.

g. Service will not be discontinued by reason of delinquency in payment for service on any Saturday, Sunday, legal holiday, or at any time during which the business offices of the utility are not open to the public.

h. Where water service is provided to residential users in a multi-unit residential structure, mobilehome park, or permanent residential structures in a labor camp, where the owner, manager, or operator is listed by the utility as the customer of record, the utility will make every good faith effort to inform the users, when the account is in arrears, that service will be dicontinued. Notice will be in as prescribed in subdivision (a) above, and in Rules Nos. 5 and 8. (T)

(T)

(1) Where said users are individually metered. (N)

The utility is not required to make service available to these users unless each user agrees to the terms and conditions of service and meets the requirement of the law and the utility's rules and tariffs. However, if one or more users are willing and able to assume responsibility for subsequent charges by these users to the account to the satisfaction of the utility, and if there is a practical physical means, legally available to the utility of selectively providing services to these users who have met the requirements of the utility's rules and tariffs, the utility will make service available to these users. For these selected users establishment of credit will be as prescribed in Rule No. 6, except that where prior service for a period of time is a condition for establishing credit with the utility, proof that is acceptable to the utility of residence and prompt payment of rent or other credit obligation during that period of time is a satisfactory equivalent.

(N)

(Continued)

Rule No. 11

DISCONTINUANCE AND RESTORATION OF SERVICE
(Continued)

B. Discontinuance of Services by Utility (Continued)

1. For Nonpayment of Bills (Continued)

h. (Continued)

(2) Where said users are master metered. (N)

The utility is not required to make service available to these users unless each user agrees to the terms and conditions of service, and meets the requirements of the law and the utility's rules and tariffs and the following:

The same Rule 11, item B.1.h. (1) above which applies to individually metered users also applies to master metered users, except a representative may act on the behalf of a master metered user, and the utility will not discontinue service in any of the following situations:

(a) During the pendency of an investigation by the utility of a master-meter customer dispute or complaint.

(b) When the master-metered customer has been granted an extension of the period for repayment of a bill.

(c) For an indebtedness owned by the master metered customer to any other person or corporation or when the obligation represented by the delinquent account or any other indebtedness was incurred with a person or corporation other than the utility demanding payment therefor.

(d) When a delinquent account relates to another property owned, managed, or operated by the master-metered customer.

(e) When a public health or building officer certifies that determination would result in a significant threat to the health or safety of the residential occupants or the public. Proof of age or handicap are described in Rule 11.B.1.e. (N)

(Continued)

Rule No. 11

DISCONTINUANCE AND RESTORATION OF SERVICE
(Continued)

B. Discontinuance of Services by Utility (Continued)

1. For Nonpayment of Bills (Continued)

i. A reasonable attempt must be made by the utility to personally contact an adult person on the residential customer's premises either by telephone, or in person, at hours prior to discontinuance. For elderly or handicapped residential customers, the utility shall provide at least 48 hours' notice by telephone or in person. For these customers, if telephone or personal contact cannot be made, a notice of discontinuance of service shall be posted in a conspicuous location at the service address at least 48 hours prior to discontinuance. Such notice shall be independent of and in addition to, other notices(s) as may be prescribed in the utility's tariffs. (C) (N) (N) (N)

j. Residential Customer's Remedies Upon Receipt of Discontinuance Notice.

(1) If upon receipt of a 10 day discontinuance notice, a residential customer is unable to pay, he must contact the utility before discontinuance of service to make payment arrangements to avoid discontinuance of service.

(2) If, after contacting the utility, the residential customer alleges to the Commission an inability to pay and that he is unable to make payment arrangements with the utility he should write to the Commission's Consumer Affairs Branch (CAB) to make an informal complaint. This action must be taken within the 10-day discontinuance of service notice.

(3) The CAB's resolution of the matter will be reported to the utility and the residential customer within ten business days after receipt of the informal complaint. If the customer is not satisfied with such resolution, he must file, within ten business days after the date of the CAB's letter, a formal complaint with the Commission under Public Utilities Code Section 1702 on a form provided by the CAB.

(Continued)

Rule No. 11

DISCONTINUANCE AND RESTORATION OF SERVICE
(Continued)

B. Discontinuance of Services by Utility (Continued)

1. For Nonpayment of Bills (Continued)

j. Residential Customer's Remedies Upon Receipt of Discontinuance Notice.

(4) Failure of the residential as well as the nonresidential customer to observe these time limits shall entitle the utility to insist upon payment or, upon failure to pay, to discontinue the customer's service.

k. Designation of a Third-Party Representative (Elderly or Handicapped only)

(1) Customer must inform utility if he desires that a third party receive discontinuance or other notices on his behalf.

(2) Utility must be advised of name, address and telephone number of third party with a letter from third party accepting this responsibility.

(3) Only customers who certify that they are elderly or handicapped are entitled to third-party representation.*

2. For Noncompliance with Rules

The utility may discontinue service to any customer for violation of these rules after it has given the customer at least five days' written notice of such intention. Where safety of water supply is endangered, service may be discontinued immediately without notice.

3. For Waste of Water

a. Where negligent or wasteful use of water exists on customer's premises, the utility may discontinue the service if such practices are not remedied within five days after it has given the customer written notice to such effect.

(Continued)

* Proof of age must be supported by certificate of birth, driver's license, passport or other reliable document. Proof of handicap must be by certification from a licensed physician, public health nurse or social worker.

Rule No. 11

DISCONTINUANCE AND RESTORATION OF SERVICE
(Continued)

B. Continuance of Services by Utility (Continued)

3. For Waste of Water (Continued)

b. In order to protect itself against serious and unnecessary waste or misuse of water, the utility 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 the utility has given the customer written notice to remedy such practices.

4. For Unsafe Apparatus or Where Service is Detrimental or Damaging to the Utility or its Customers

If an unsafe or hazardous condition is found to exist on the customer's premise, or if the use of water thereon by apparatus, appliances, equipment or otherwise is found to be detrimental or damaging to the utility or its customers, the service may be shutoff without notice. The utility will notify the customer immediately of the reasons for the discontinuance and the corrective action to be taken by the customer before service can be restored.

5. For Fraudulent Use of Service

When the utility has discovered that a customer has obtained service by fraudulent means, or has diverted the water service for unauthorized use, the service to that customer may be discontinued without notice. The utility will not restore service to such customer until that customer has complied with all filed rules and reasonable requirements of the utility and the utility has been reimbursed for the full amount of the service rendered and the actual cost to the utility incurred by reason of the fraudulent use.

C. Restoration of Service

1. Reconnection Charge

Where service has been discontinued for violation of these rules or for nonpayment of bills, the utility may charge $25.00 for reconnection of service during regular working hours or $37.50 (I)
for reconnection of service at other than regular working hours when the customer has requested that the reconnection be made at other than regular working hours.

(Continued)

Rule No. 11

DISCONTINUANCE AND RESTORATION OF SERVICE
(Continued)

C. Restoration of Service (Continued)

2. To be Made During Regular Working Hours

The utility will endeavor to make reconnections during regular working hours on the day of the request, if the conditions permit; otherwise reconnections will be made on the regular working day following the day the request is made.

3. To Be Made at Other Than Regular Working Hours

When a customer has requested that the reconnection be made at other than regular working hours, the utility will reasonably endeavor to so make the reconnection if practicable under the circumstances.

4. Wrongful Discontinuance

A service wrongfully discontinued by the utility, must be restored without charge for the restoration to the customer within 24 hours.

D. Refusal to Serve

1 Conditions for Refusal

The utility may refuse to serve an applicant for service under the following conditions:

a. If the applicant fails to comply with any of the rules as filed with the Public Utilities Commission.

b. If the intended use of the service is of such a nature that it will be detrimental or injurious to existing customers.

c. If, in the judgment of the utility, the applicant's installation for utilizing the service is unsafe or hazardous, or of such nature that satisfactory service cannot be rendered.

(Continued)

Rule No. 11

DISCONTINUANCE AND RESTORATION OF SERVICE
(Continued)

C. Restoration of Service (Continued)

1. Conditions for Refusal (Continued)

d. Where service has been discontinued for fraudulent use, the utility will not serve an applicant until it has determined that all conditions of fraudulent use or practice has been corrected.

2. Notification to Customers

When an applicant is refused service under the provisions of this rule, the utility will notify the applicant promptly of the reason for the refusal to service and of the right of applicant to appeal the utility's decision to the Public Utilities Commission.

RULE 14.1
WATER CONSERVATION AND RATIONING PLAN

GENERAL INFORMATION

(N)

1. If water supplies are projected to be insufficient to meet normal customer demand, and are beyond the control of the utility, the utility may elect to implement voluntary conservation using the portion of this plan set forth in Section A of this Rule, after notifying the Director of the Commission's Division of Water and Audits of its intent, via a letter in both hard-copy and e-mailed formats.

2. Prior to declaration of mandatory rationing, a utility may request authorization of a Schedule 14.1 – Staged Mandatory Water Conservation and Rationing tariff, via a Tier 2 advice letter.

3. If, in the opinion of the utility, more stringent water measures are required, the utility shall request Commission authorization to implement the staged mandatory conservation and rationing measures set forth in Sections B through E.

4. The utility shall file a Tier 1 advice letter to request activation of a particular stage of Schedule 14.1 – Staged Mandatory Water Conservation and Rationing tariff.

a. If a Declaration of Mandatory Rationing is made by utility or governing agency, or

b. If the utility is unable to address voluntary conservation levels set by itself, supplier, or governing agency, or

c. If the utility chooses to subsequently activate a different stage

5. When Schedule 14.1 is in effect and the utility determines that water supplies are again sufficient to meet normal demands, and mandatory conservation and rationing measures are no longer necessary, the utility shall seek Commission approval via a Tier 1 advice letter to de-activate the particular stage of mandatory rationing that had been authorized.

(N)

(Continued)

RULE 14.1
WATER CONSERVATION AND RATIONING PLAN

GENERAL INFORMATION (Continued) (N)

6. In the event of a water supply shortage requiring a voluntary or mandatory program, the utility shall make available to its customers water conservation kits as required by its version of Rule 20. The utility shall notify all customers of the availability of conservation kits via a bill insert or direct mailers.

A. CONSERVATION - NON-ESSENTIAL OR UNAUTHORIZED WATER USE

No customer shall use utility-supplied water for non-essential or unauthorized uses, including but not limited to:

1. Use of potable water for more than minimal landscaping, as defined in the landscaping regulated of the jurisdiction or as described in Article 10.8 of the California Government Code in connection with new construction;
2. Use through any meter when the company has notified the customer in writing to repair a broken or defective plumbing, sprinkler, watering or irrigation system and the customer has failed to effect such repairs within five business days;
3. Use of potable water which results in flooding or runoff in gutters or streets;
4. Individual private washing of cars with a hose except with the use of a positive action shut-off nozzle. Use of potable water for washing commercial aircraft, cars, buses, boats, trailers, or other commercial vehicles at any time, except at commercial or fleet vehicle or boat washing facilities operated at a fixed location where equipment using water is properly maintained to avoid wasteful use;
5. Use of potable water washing buildings, structures, , driveways, patios, parking lots, tennis courts, or other hard-surfaced areas, except in the cases where health and safety are at risk;
6. Use of potable water to irrigate turf, lawns, gardens, or ornamental landscaping by means other than drip irrigation, or hand watering without quick acting positive action shut-off nozzles, on a specific schedule, for example: 1) before 8:00 a.m. and after 7:00 p.m.; 2) every other day; or 3) selected days of the week; (N)

(Continued)

RULE 14.1
WATER CONSERVATION AND RATIONING PLAN

GENERAL INFORMATION (Continued)

(N)

7. Use of potable water for watering streets with trucks, except for initial wash-down for construction purposes (if street sweeping is not feasible), or to protect the health and safety of the public;
8. Use of potable water for construction purposes, such as consolidation of backfill, dust control, or other uses unless no other source of water or other method can be used.
9. Use of potable water for construction purposes unless no other source of water or other method can be used;
10. Use of potable water for street cleaning;
11. Operation of commercial car washes without recycling at least 50% of the potable water used per cycle;
12. Use of potable water for watering outside plants, lawn, landscape and turf areas during certain hours if and when specified in Schedule No. 14.1 when the schedule is in effect;
13. Use of potable water for decorative fountains or the filling or topping off of decorative lakes or ponds. Exceptions are made for those decorative fountains, lakes, or ponds which utilize recycled water;
14. Use of potable water for the filling or refilling of swimming pools.
15. Service of water by any restaurant except upon the request of a patron; and
16. Use of potable water to flush hydrants, except where required for public health or safety.

B. STAGED MANDATORY RATIONING OF WATER USAGE

1. Prior to declaration of mandatory rationing, a utility may request authorization of a Schedule 14.1 – Staged Mandatory Water Conservation and Rationing tariff, via a Tier 2 advice letter, with full justification. The utility may not institute Schedule 14.1 until it has been authorized to do so by the Commission.

(N)

(Continued)

RULE 14.1
WATER CONSERVATION AND RATIONING PLAN

(N)

STAGED MANDATORY RATIONING OF WATER USAGE (Continued)

a. A staged Schedule 14.1 that has been authorized by the Commission shall remain dormant until triggered by specific conditions detailed in the Schedule 14.1 tariff and utility has requested and received authorization for activating a stage by Commission.

b. Notice of the Tier 2 advice letter (example shown in Appendix C) and associated public participation hearing shall be provided to customers under General Order (GO) 96-B rules.

c. Utility shall comply with all requirements of Sections 350-358 of the California Water Code.

d. The Tier 2 advice letter requesting institution of a Schedule 14.1 shall include but not be limited to:

   i. Proposed Schedule 14.1 tariff, which shall include but not be limited to:

      1. Applicability,
      2. Territory applicable to,
      3. A detailed description of each Stage of Rationing,
      4. A detailed description of the Trigger that Activates each Stage of Rationing,
      5. A detailed description of each water use restriction for each stage of rationing.
      6. Water use violation levels, written warning levels, associated fines, and exception procedures,

(N)

(Continued)

RULE 14.1
WATER CONSERVATION AND RATIONING PLAN

STAGED MANDATORY RATIONING OF WATER USAGE (Continued) Page 5

7. Conditions for installation of a flow restrictor, (N)
8. Charges for removal of flow restrictors, and
9. Special Conditions

ii. Justification for, and documentation and calculations in support of plan, including but not limited to each item in B.1.d.i above.

2. Number of Stages requested by each utility/district may vary, depending on specifics of water shortage event.
3. The utility shall file a Tier 1 advice letter to request activation of a particular stage of Schedule 14.1 – Staged Mandatory Water Conservation and Rationing tariff.
   a. If a Declaration of Mandatory Rationing is made by utility or governing agency,
   b. If the utility is unable to address voluntary conservation levels set by itself or governing agency, or
   c. If the utility chooses to subsequently activate a different stage.
   d. The Tier 1 advice letter requesting activation of a Schedule 14.1 shall include but not be limited to:
      i. Justification for activating this particular stage of mandatory rationing, as well as period during which this particular stage of mandatory conservation and rationing measures will be in effect.
      ii. When the utility requests activation of a particular Stage, it shall notify its customers as detailed in Section E, below.
4. All monies collected by the utility through water use violation fines shall not be accounted for as income.
5. All expenses incurred by utility to implement Rule 14.1 and Schedule 14.1 that have not been considered in a General Rate Case or other proceeding, shall be recoverable by utility if determined to be reasonable by Commission. (N)

(Continued)

RULE 14.1
WATER CONSERVATION AND RATIONING PLAN

(N)

a. These monies shall be accumulated by the utility in a separate memorandum account for disposition as directed or authorized from time to time by the Commission.

C. ENFORCEMENT OF STAGED MANDATORY CONSERVATION AND RATIONING

1. The water use restrictions of the conservation program, in Section A of this rule, become mandatory when the authorized Schedule 14.1-Staged Mandatory Rationing Program is triggered, the utility files a Tier 1 advice letter requesting activation of a particular stage, and authorization is received from the Commission.
   a. In the event a customer is observed to be using water for any nonessential or unauthorized use as defined in Section A of this rule, the utility may charge a water use violation fine in accordance with Schedule No. 14.1.

2. The utility may, after one written warning and one non-essential or unauthorized use violation notice , install a flow-restricting device on the service line of any customer observed by utility personnel to be using water for any non-essential or unauthorized use as defined in Section A above.

3. A flow restrictor shall not restrict water delivery by greater than 50% of normal flow. The restricting device may be removed only by the utility, only after a three-day period has elapsed, and only upon payment of the appropriate removal charge as set forth in Schedule No. 14.1.

4. After the removal of the restricting device, if any non-essential or unauthorized use of water shall continue, the utility may install another flow-restricting device. This device shall remain in place until water supply conditions warrant its removal and until the appropriate charge for removal has been paid to the utility.

5. Any tampering with flow restricting device by customer can result in fines or discontinuation of water use at the utility's discretion.

(N)

(Continued)

RULE 14.1
WATER CONSERVATION AND RATIONING PLAN

ENFORCEMENT OF STAGED MANDATORY CONSERVATION AND RATIONING
(Continued)

6. If, despite installation of such flow-restricting device pursuant to the provisions of the previous enforcement conditions, any such non-essential or unauthorized use of water shall continue, then the utility may discontinue water service to such customer. In such latter event, a charge as provided in Rule No. 11 shall be paid to the utility as a condition to restoration of service.

7. All monies collected by the utility through water use violation fines shall not be accounted for as income. All expenses incurred by utility to implement Rule 14.1 and Schedule 14.1 that have not been considered in a General Rate Case or other proceeding, shall be recoverable by utility if determined to be reasonable by Commission. These additional monies shall be accumulated by the utility in a separate memorandum account for disposition as directed or authorized from time to time by the Commission.

8. The charge for removal of a flow-restricting device shall be in accordance with Schedule No. 14.1.

D. APPEAL PROCEDURE

1. Any customer who seeks a variance from any of the provisions of this water conservation and rationing plan shall notify the utility in writing, explaining in detail the reason for such a variation. The utility shall respond to each such request in writing.

2. Any customer not satisfied with the utility's response may file an appeal with the staff of the Commission. The customer and the utility will be notified of the disposition of such appeal by letter from the Executive Director of the Commission.

(N)

(Continued)

RULE 14.1
WATER CONSERVATION AND RATIONING PLAN

APPEAL PROCEDURE (Continued) Page 8

(N)

3. If the customer disagrees with such disposition, the customer shall have the right to file a formal complaint with the Commission. Except as set forth in this Section, no person shall have any right or claim in law or in equity, against the utility because of, or as a result of, any matter or thing done or threatened to be done pursuant to the provisions of this water conservation and rationing plan.

E. PUBLICITY

1. As stated under Section B.1.b and c, when a utility requests authorization of a Schedule 14.1 – Staged Mandatory Water Conservation and Rationing tariff, via a Tier 2 advice letter, it shall provide notice of the Tier 2 advice letter (example shown in Attachment C) and associated public meeting provided to customers, under General Order (GO) 96-B rules, and shall comply with all requirements of Sections 350-358 of the California Water Code (CWC), including but not limited to the following:

   a. In order to be in compliance with both the GO and CWC, the utility shall provide notice via both newspaper and bill insert/direct mailing.

   b. Utility shall file one notice for each advice letter filed, that includes both notice of the filing of the Tier 2 advice letter as well as the details of the public meeting (date, time, place, etc).

   c. The public meeting shall be held after the utility files the Tier 2 advice letter, and before the Commission authorizes implementation of the tariff.

   d. Utility shall consult with Division of Water and Audits staff prior to filing advice letter, in order to determine details of public meeting.

2. In the event that a Schedule 14.1-Staged Mandatory Rationing Plan is triggered, and an utility requests activation through the filing of a Tier 1 advice letter, the utility shall notify its customers and provide each customer with a copy of Schedule 14.1 by means of bill insert or direct mailing. Notification shall take place prior to imposing any fines associated with this plan.

(N)

(Continued)

RULE 14.1
WATER CONSERVATION AND RATIONING PLAN

PUBLICITY (Continued) Page 9

(N)

3. During the period that a stage of Schedule 14.1 is activated, the utility shall provide customers with updates in at least every other bill, regarding its water supply status and the results of customers' conservation efforts.

(N)

Rule No. 20

WATER CONSERVATION (N)

A. Purpose

The purpose of this rule is to ensure that water resources available to the utility are put to a reasonable beneficial use and that the benefits of the utility's water water supply and service extend to the largest number of persons.

B. Waste of Water Discouraged

Refer to Rule 11 B. (3).

C. Use of Water-Saving Devices and Practices

Each customer of the utility is urged to install devices to reduce the quantity of water to flush toilets and to reduce the flow rate of showers.
Each customer is further urged to adopt such other water usage and reusage practices and procedures as are feasible and reasonable.

D. Water-Saving Kits

The utility will make available, without initial cost to the customer, for use in each residence receiving water service from the utility, a water-saving kit containing the following:

(1) A device or devices for reducing toilet flush water requirements;

(2) A device or devices for reducing shower flow rates;

(3) A dye tablet or tablets for determining if a toilet tank leaks;

(4) Other devices from time to time approved by the utility;

(5) Installation and other instructions and information pertinent to conservation of water. (N)

Appendix E

DMM Supporting Documents

Schedule No. AC-2
Arden-Cordova District

FLAT RATE SERVICE

APPLICABILITY

Applicable to all flat rate water service. This schedule is closed to new installations.

TERRITORY

Arden Manor area located approximately six miles northeast of Sacramento and Rancho Cordova and vicinity, Sacramento County.

RATES	Per Service Connection Per Month	
For a single unit of occupancy, including premises not exceeding 12,000 sq. ft. in area.....	$ 49.40	(I)
For a duplex including premises not exceeding 12,000 sq. ft. in area.....	$ 97.50	(I)
a. For each additional detached unit of occupancy on the same premises and served from the same service connection.....	$ 49.30	(I)
b. For each swimming pool equipped with a re-circulating filter system, on the same premises and served from the same service connection.....	$ 10.80	(I)

SPECIAL CONDITIONS

1. The above flat rates apply to service connections not larger than one inch in diameter.
2. For service covered by the above classification, if either the utility or the customer so elects, a meter shall be installed and service provided under Schedule No. AC-1, General Metered Service.
3. All bills are subject to the reimbursement fee set forth on Schedule No. UF.
4. As authorized by the California Public Utilities Commission in Decision 04-03-039, all bills are subject to a surcredit $2.19 per month for a 9-year amortization period, beginning May 6, 2004, the effective date of Advice Letter 1150-W.This surcredit will refund the ratepayer portion of the revenues collected from the City of Folsom for the period of July 1, 1994 through March 16, 2004.
5. Pursuant to Decision 05-07-045, to recover the balance as of January 31, 2005 in the Water Quality Litigation Memorandum Account, a surcharge of $5.42 is to be added to the monthly service connection charge for 20 years. The surcharge amount will be recalculated once in every rate cycle, or more frequently if in any year the receipt of Water Availability Fee (WAF) monies will permit a reduction of $0.50 or more in the monthly bill under this tariff schedule. (I)
6. Pursuant to Decision No. 10-12-059, a surcharge of $1.00 per customer, per month will be applied to all flat rate customer bills excluding customers that are receiving the CARW credit. This surcharge will offset the CARW credits and CARW administrative program costs recorded in the CARW Balancing Account. (R)
7. As authorized by the California Public Utilities Commission, a surcredit of $0.70 per month is to be applied to the bill through April 29, 2011, 12-month from the effective date of Advice Letter 1392-WA on April 30, 2010. This credit is to refund the MCBA Balancing Accounts as of December 31, 2009. (D)

Schedule No. AC-1
Arden-Cordova District
GENERAL METERED SERVICE

APPLICABILITY

Applicable to all general metered water service.

TERRITORY

Arden Manor area located approximately six miles northeast of Sacramento and Rancho Cordova and vicinity, Sacramento County.

RATES

Quantity Rate:

For all water delivered, per 100 cu. ft.....	$ 0.961	(I)

Service Charges:	Per Meter Per Month	
For 5/8 x 3/4-inch meter.....	$ 8.25	(I)
For 3/4-inch meter.....	12.35	(I)
For 1-inch meter.....	20.60	(I)
For 1 1/2 inch meter.....	41.15	(I)
For 2-inch meter.....	65.85	(I)
For 3-inch meter.....	123.00	(I)
For 4-inch meter.....	206.00	(I)
For 6-inch meter.....	412.00	(I)
For 8-inch meter.....	659.00	(I)
For 10-inch meter.....	947.00	(I)

The Service Charge is a readiness-to-serve charge applicable to all metered service and to which is added the charge for water used computed at the Quantity Rate.

SPECIAL CONDITIONS

1. All bills are subject to the reimbursement fee set forth on Schedule No. UF.
2. Service with 5/8 x 3/4-inch meters and 3/4-inch meters is available only to customers served with 5/8 x 3/4-inch and 3/4-inch meters as of May 31, 1995.
3. As authorized by the California Public Utilities Commission in Decision 04-03-039, all bills are subject to a surcredit of $0.0788 per Ccf for a 9-year amortization period, beginning May 6, 2004 on the effective date of Advice Letter 1150-W. This surcredit will refund the ratepayer portion of the revenues collected from the City of Folsom for the period of July 1, 1994 through March 16, 2004.
4. Pursuant to Decision 05-07-045, to recover the balance as of January 31, 2005 in the Water Quality Litigation Memorandum Account, a surcharge of $0.155 per Ccf is to be added to the quantity rate for 20 years. The surcharge amount will be recalculated once in every rate cycle, or more frequently if in any year the receipt of Water Availability Fee (WAF) monies will permit a reduction of $0.50 or more in the monthly bill under Tariff AC-2. (I)
5. Pursuant to Decision No. 10-12-059, a surcharge of $0.033 per Ccf will be applied to all metered Customer bills excluding customers that are receiving the CARW credit. This surcharge will offset the CARW credits and CARW administrative program costs recorded in the CARW Balancing Account. (R)
6. For the benefit of the customer, GSWC will delay the billing conversion from flat-rate to consumptive rate for one annual seasonal cycle of water use. After one annual seasonal cycle of water use, GSWC will convert the account to consumptive rate during the first billing cycle immediately following the one annual season unless the customer requests an earlier conversion. (D)
7. As authorized by the California Public Utilities Commission, an amount of $0.0335 per Ccf is to be added to the Quantity Rate until the balance in the "WCMA" is fully recovered, approximately 12 months, beginning on the effective date of Advice Letter 1352-WA, which is October 2, 2010. This surcharge will recover the net revenue loss as a result of the Governor's declared drought on June 4, 2008 (N)
8. As authorized by the California Utilities Commission, an amount of $0.080 per Ccf is to be added to the quantity rate through April 29, 2011, 12-month from the effective date of Advice Letter 1392-WA on April 30, 2010. This surcharge will recover the WRAM/MCBA Balancing Accounts as of December 31, 2009.

Appendix F

Groundwater Basin Water Rights Stipulation/Judgment

CENTRAL SACRAMENTO COUNTY

GROUNDWATER MANAGEMENT PLAN

FEBRUARY 2006

MWH

WATER FORUM

SACRAMENTO COUNTY WATER AGENCY

Members of the Central Sacramento County Groundwater Management Plan Task Force

The following participants are thanked for generously giving their time and effort in the oversight and preparation of the Central Sacramento County Groundwater Management Plan:

Agricultural Interests:

Denny Lewis *(Sacramento County Farm Bureau)*

Ronald Lowry (*Omochumne-Hartnell Water District)*

Larry Rodriguez (*Omochumne-Hartnell Water District)*

Agricultural/Residential Interests:

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Business Interests:

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Environmental/Community Organizations Interests:

Mike Eaton *(The Nature Conservancy)*

Rick Bettis *(League of Woman Voters)*

Local Governments/Public Agencies Interests:

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Executive Summary

Executive Summary

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Executive Summary

FOREWORD

The Central Sacramento County Groundwater Basin stakeholders, in coordination with the Sacramento County Water Agency and the Water Forum Successor Effort have developed the Central Sacramento County Groundwater Management Plan (CSCGMP). The CSCGMP represents a critical step in establishing a framework for maintaining a sustainable groundwater resource for the various users overlying the basin in Sacramento County between the American and Cosumnes Rivers. It includes specific goals, objectives, and an action plan to provide a "road map" for the governance body as the steps necessary to manage the basin are taken in coordination with the various stakeholders. This Executive Summary is an outreach component of the CSCGMP that brings forth the essence of the CSCGMP in a similar format but in a condensed manner that still allows a basic level of understanding. The reader is encouraged to refer to the larger CSCGMP document if additional detail is needed.

INTRODUCTION

The CSCGMP is the result of over a decade of negotiations and agreements between stakeholders in the region. In 2000, the Water Forum Agreement (WFA) was signed by regional stakeholders, and the Water Forum Successor Effort (Successor Effort) was formed to continue forward in regional water supply planning.

The WFA laid the foundation for the Successor Effort. One of the responsibilities of the Successor Effort was to facilitate negotiations among stakeholders in the Central Sacramento County Groundwater Basin (Central Basin) that would lead to the creation of a groundwater basin governance body. This governance body would be responsible for the protection, health and long-term viability of the underlying groundwater as a sustainable resource for both current and future users. **Figure ES-1** shows the locations of the groundwater basins within Sacramento County.

Under the aegis of the Successor Effort, the Central Sacramento County Groundwater Forum (CSCGF) was formed in February 2002 to provide recommendations on a basin governance body to the Successor Effort. Following concurrence by the Successor Effort, this recommendation would be adopted by the appropriate agencies.

The CSCGF stakeholder interest groups included representatives in the following areas:

- Agricultural
- Agricultural Residential Groundwater Users
- Business Interests
- Environmental/Community Organizations
- Local Government/Public Agencies
- Water Purveyors

The total number of stakeholder representatives was approximately 40 people. These representatives met monthly for approximately three years at which time a decision was made to create an Advisory Committee, composed of CSCGF stakeholders, to develop a groundwater management plan for the Central Basin. The Advisory Committee spent approximately one year in developing the CSCGMP for adoption by the full CSCGF.

PURPOSE OF GMP

A Groundwater Management Plan (GMP) is a planning tool that assists overlying water providers in maintaining a safe, sustainable and high quality groundwater resource within a given groundwater basin. This CSCGMP is intended to be adaptive to changing conditions within the groundwater basin and will be updated and refined over time to reflect progress made in achieving the CSCGMP's objectives.

What is required in a GMP?

The GMP is a tool used to help ensure a long-term reliable water supply for rural domestic, agricultural, urban, business/industrial, environmental, and development uses in the region. The California Water Code (CWC) requires that a GMP contain numerous technical provisions which are briefly summarized as follows:

- An inventory of water supplies and a description of water uses within a given region. This information is summarized in a water balance showing overall water demands and available water supplies.
- Basin Management Objectives (BMOs) that are designed to protect and enhance the groundwater basin.
- Monitoring and management programs that ensure the BMOs are being met.
- Description of stakeholder involvement and public information plan and programs for the groundwater basin.

How does a GMP benefit the basin stakeholders?

The CSCGMP provides information related to planning activities currently taking place in the Central Basin. This information serves the following purposes:

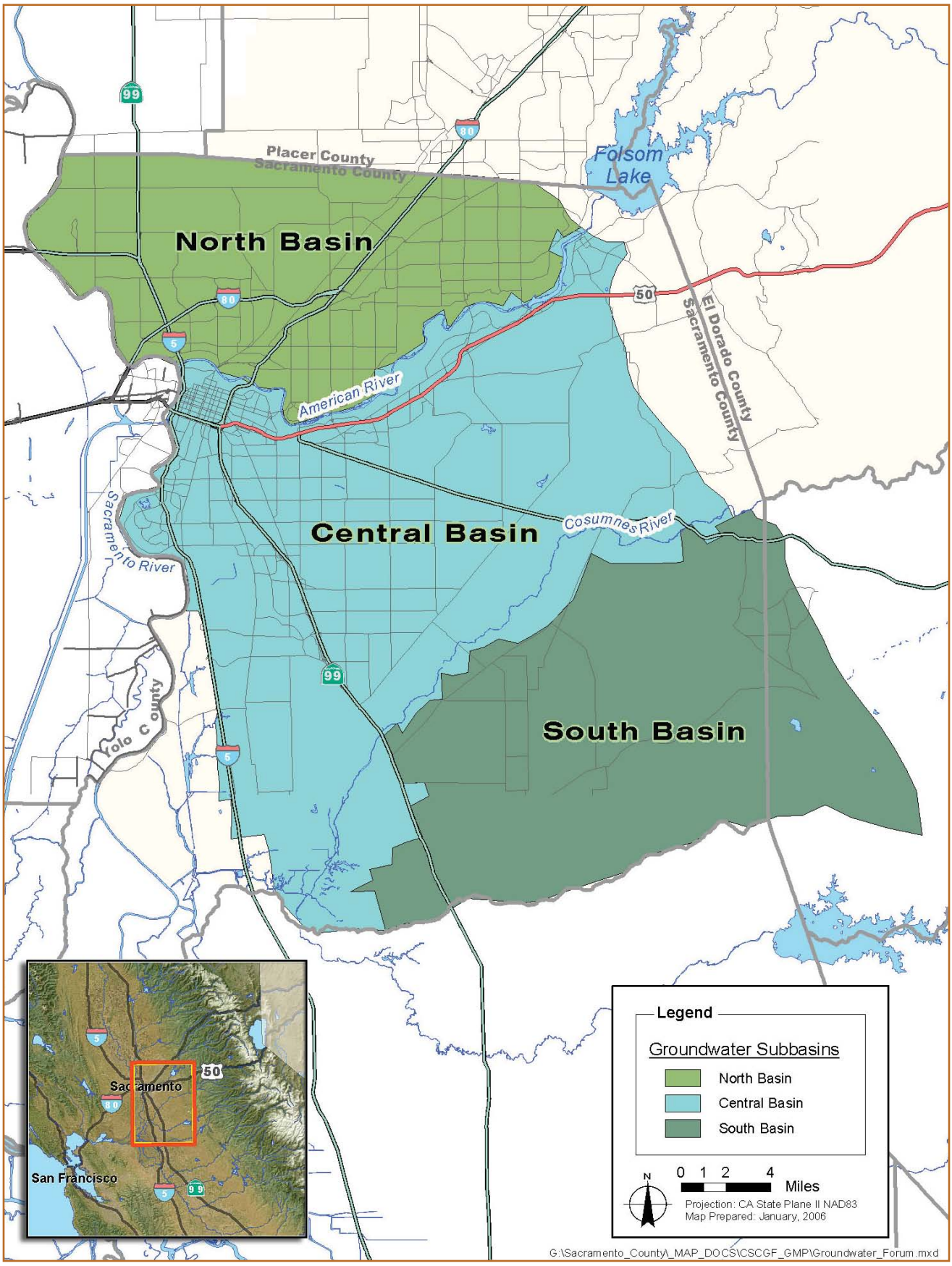
- It provides a management plan for the protection and preservation of groundwater resources.
- It underscores stakeholder interests and objectives.
- It ensures protection of groundwater quantity and quality.
- It assists in monitoring and maintaining groundwater elevations.

WATER RESOURCES SETTING

Physical Setting

Unique to Sacramento County are three major rivers each acting as a major source of recharge for the groundwater basin underlying the county. In some instances, the recharge process creates natural dividing lines along the rivers that can be used to delineate

Figure ES-1. Sacramento County Groundwater Basins



the individual sub-basins (i.e., North, Central, and South Basin as shown in **Figure ES-1**). Groundwater underlying the North Basin is currently managed by the Sacramento Groundwater Authority. Efforts are underway in the South Basin, led by the Southeast Sacramento County Agricultural Water Authority, to develop a groundwater management plan in accordance with the CWC and the provisions of the WFA.

The Central Basin

The Central Basin is made up of a variety of groundwater users (i.e., agriculture, agricultural residential, urban, and environmental). The Central Basin boundary was defined by the Sacramento County groundwater model that was used in the Water Forum process and took into account the hydrogeologic boundaries and the political boundaries of organized water purveyors/districts, cities (where they retail water within their boundaries), and the County of Sacramento.

In October 2004, the Sacramento County Water Agency (SCWA) adopted a GMP for the portion of the Central Basin that is served water through Zone 40 of the SCWA. The Zone 40 GMP was done to measure the effectiveness of the conjunctive use program outlined in the Zone 40 Water Supply Master Plan and for the purpose of seeking state grant funding to help finance large infrastructure projects that would benefit groundwater underlying the Central Basin. At the time of its adoption, the Zone 40 GMP recognized that a Central Basin GMP was necessary to meet the needs and interests of all the stakeholders in the Central Basin.

Groundwater underlying the Central Basin is contained within a shallow aquifer (Modesto Formation) and in a deep aquifer (Mehrten Formation). Groundwater is located from 20 to 100 feet below the ground surface depending on when and where the measurement is taken. The shallow aquifer is typically used for private domestic wells and typically requires no treatment. The deep aquifer is separated from the shallow aquifer by a discontinuous clay layer that serves as a semi-confining layer. The deep aquifer typically requires treatment for iron and manganese, which may cause mineral deposits and affect the taste of water. **Figure ES-2** contains a conceptual diagram of the aquifer.

Intensive use of groundwater over the past 60 years has resulted in a general lowering of groundwater elevations. Over time isolated groundwater depressions have grown and coalesced into a single cone of depression that is centered in the southwestern portion of the Central Basin (see **Figure ES-3** for Sacramento County Groundwater Elevations).

How does the CSCGMP address groundwater contamination problems in the Central Basin?

There are several sources of groundwater contamination within the Central Basin. These sources include: Mather Field, Aerojet, Boeing, the former Sacramento Army Depot, the Union Pacific railyards, and present and former landfills. The known extent of groundwater contamination and landfill sites are shown on **Figure ES-4**. The CSCGMP addresses the concerns well owners have regarding the potential for groundwater contamination threatening their wells.

Supply and Demand

The CSCGMP identifies available water supplies to meet the water demands of users within the basin. Water supplies include surface water, groundwater, recycled water, and remediated groundwater. Water demand is a result of rural, agricultural, private industrial, environmental, and urban activities. Demand reduction is being accomplished through water conservation measures identified in the WFA.

How much water supply does the Central Basin have?

Water supplies have been quantified in some detail in the CSCGMP. Availability and reliability of surface water is dependent on the particular contract or water right and the hydrologic year type (e.g., wet or dry years). **Figure ES-5** summarizes surface water supplies available to each of the surface water purveyors and

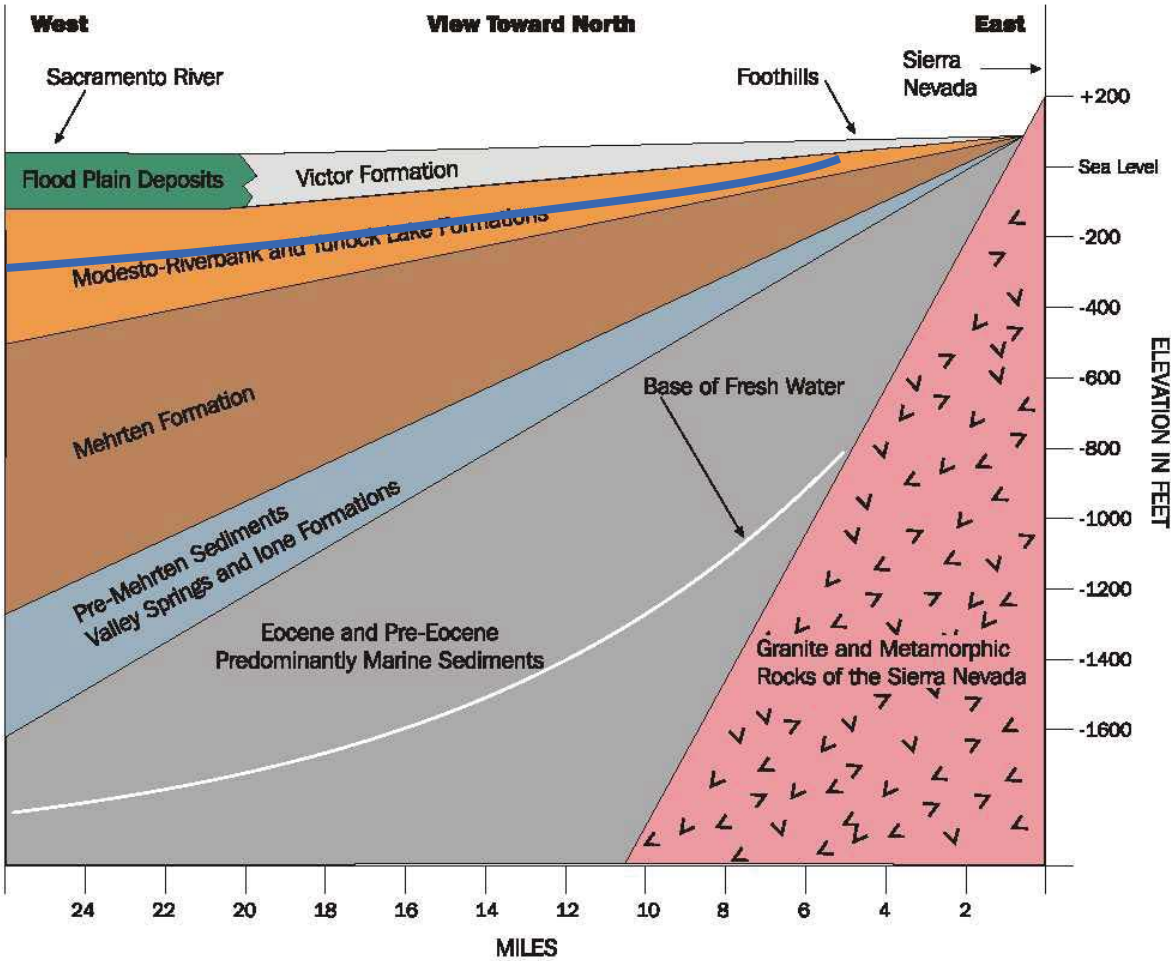
identifies the river source from which they originate. Based on existing and projected contract and water right entitlements, the total surface water supply available to the Central Basin is approximately 350,000 AF/year.

In addition to surface water supplies, the Water Forum determined the estimated long term average annual sustainable yield of groundwater from the Central Basin to be 273,000 acre-feet per year (AF/year). Currently, groundwater extractions are estimated to be 250,000 AF/year.

Recycled water use in the Central Basin is planned for up to 4,400 AF/year by 2030. The Sacramento Regional County Sanitation District is currently developing a Recycled Water Master Plan that will evaluate the feasibility of increased recycled water use in the County.

Water that is extracted for purposes of groundwater contamination clean-up activities is included in the overall sustainable yield of the Central Basin aquifer. In-basin use of remediated groundwater is an objective of the CSCGMP. This issue is addressed more fully in the Groundwater Contamination Monitoring and Collaboration Program summarized in the Plan Implementation section.

Figure ES-2. Hydrogeologic Cross Section



Modified from DWR Bulletin 118-6, 1978

Figure ES-3. Spring 2004 Sacramento County Groundwater Elevation Contour Map

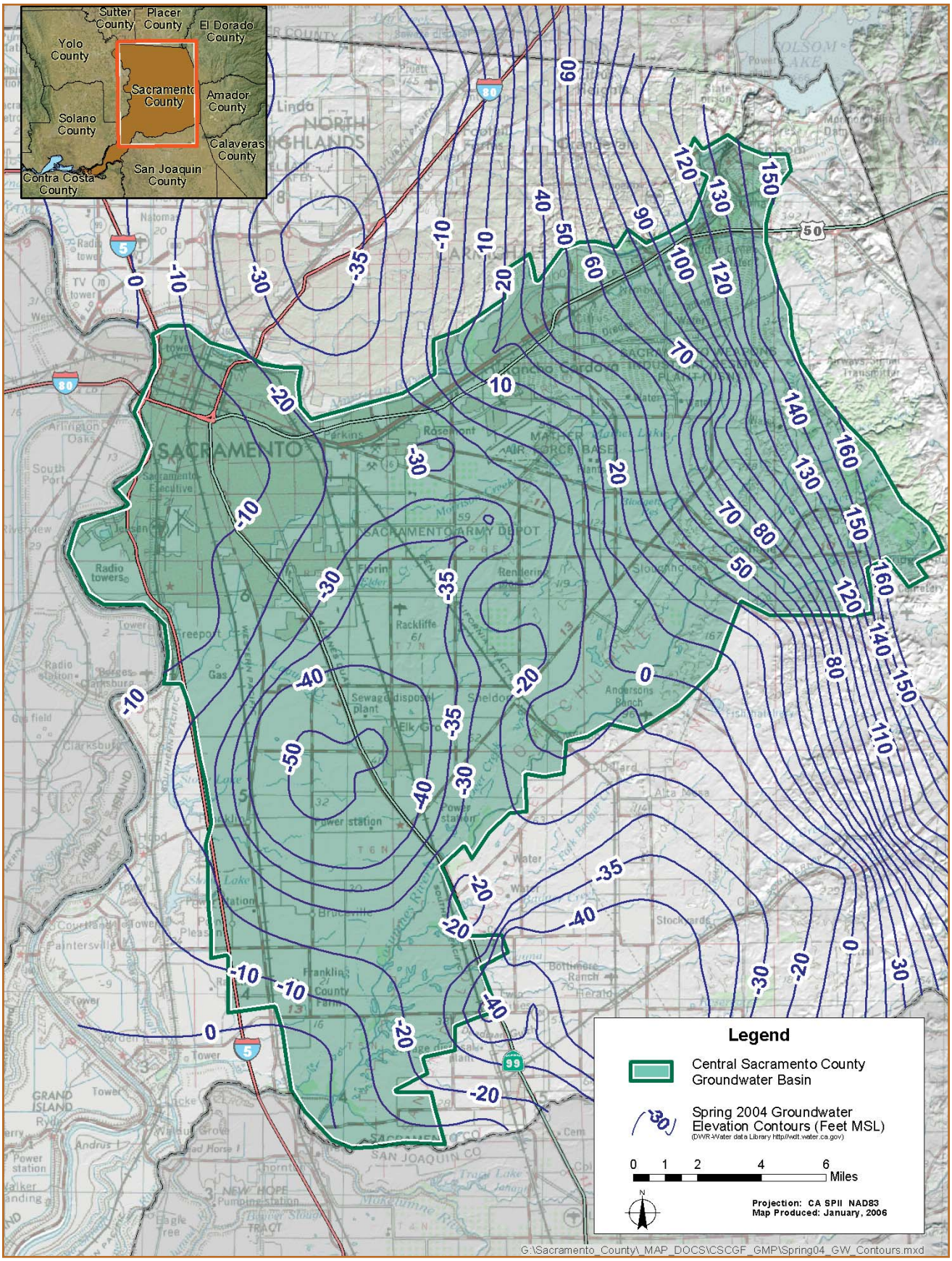
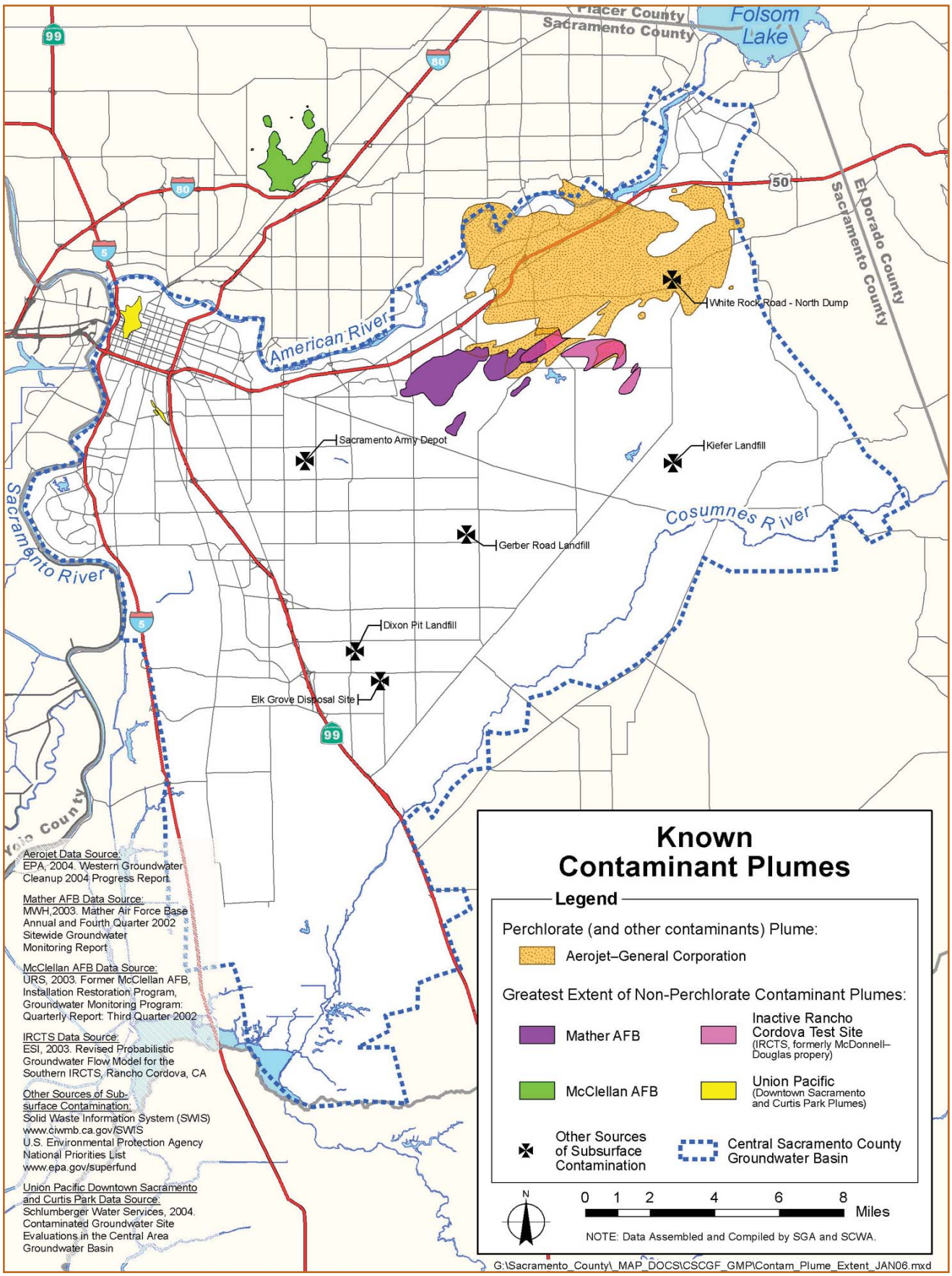


Figure ES-4. Known Extent of Contamination



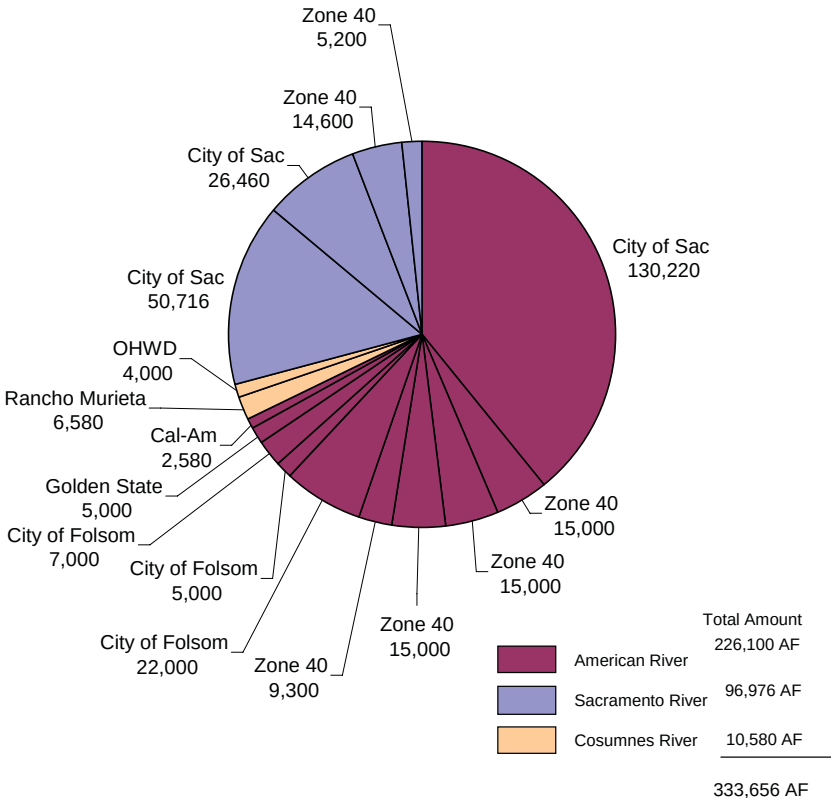
How are water demands calculated?

Water demands are determined using various methods based on identified uses of water. For instance, agricultural demands can vary significantly based on crop type. For agricultural-residential water users, demands are based on indoor usage, the amount of landscaped area around the home, and the amount of irrigated pasture for parcels that maintain livestock or other farm animals. Urban water demands are typically based on land use and zoning. Private industry and park district water demands are specific to the type of activity taking place at each site. Existing and future average annual water supply and demand is summarized in **Figure ES-6a and ES-6b** below. The graphs indicate that supplies meet demands and fluctuate depending on dry and wet hydrologic conditions, reflecting the conjunctive use of groundwater and surface water over the Central Basin by the various water purveyors and urban demand reductions during dry years. (In **Figure ES-6b**, conditions in 2030 demonstrate more clearly the results of existing and planned conjunctive use programs in full effect at that time). These demands also reflect the implementation of Best Management Practices (BMPs) for water conservation that are described in the WFA.

MANAGEMENT PLAN ELEMENTS

A goal of the CSCGMP is to ensure a viable groundwater resource for beneficial uses including water for purveyors, agricultural, agricultural residential, industrial, and municipal supplies that support the WFA's coequal objectives of providing a reliable and safe water supply and preserving the fishery, wildlife, recreational, and aesthetic values of the lower American River. In addition, the CSCGMP recognizes the need to maintain and enhance flows in the Cosumnes River because of its ecological significance.

Figure ES-5. Summary of Surface Water Rights and Contracts



Basin Management Objectives

Basin Management Objectives (BMOs) are used to help achieve groundwater basin goals. Five BMOs provide the foundation for the CSCGMP:

1) Maintain a long-term average groundwater extraction rate of 273,000 AF/year.
2) Establish specific minimum groundwater elevations within all areas of the basin consistent with the Water Forum "Solution."
3) Protect against any potential inelastic land surface subsidence.
4) Protect against any adverse impacts to surface water flows.
5) Develop specific water quality objectives for several constituents of concern.

Each of these objectives is fully described in **Section 3** of the CSCGMP.

Program Component Action Items

The Program Components listed below provide specific action items that will be implemented to help achieve the Basin Management Objectives.

Stakeholder involvement - several means of achieving broad stakeholder participation in the management of the Central Basin will be used, including: 1) involving the public, 2) involving other agencies within and adjacent to the Central Basin, 3) using advisory committees, 4) developing relationships with state and federal agencies, and 5) pursuing a variety of partnership opportunities.

Monitoring program - a good monitoring program is capable of assessing the current status of the basin and predicting responses in the basin as a result of future management actions. The CSCGMP includes actions related to monitoring of groundwater elevations, groundwater quality, the potential for land surface subsidence resulting from groundwater extraction, and developing a better understanding of the relationship between surface water and groundwater along the American, Cosumnes, and Sacramento Rivers.

Groundwater quality protection - groundwater quality protection is critical to ensuring a sustainable groundwater resource. Groundwater quality protection includes: 1) the prevention of contamination from entering the groundwater basin, and 2) the remediation of existing contamination.

Groundwater sustainability - the CSCGMP seeks to maintain or increase the amount of groundwater stored in the basin over the long-term. The WFA's groundwater management element provides a framework by which the groundwater resource in the Sacramento County-wide basin can be protected and used in a sustainable manner.

Planning integration - it is important to integrate water management planning on a regional scale (i.e., the development of an Integrated Regional Water Management Plan). The WFA provides a regional conjunctive use framework with commitments from individual purveyors concerning groundwater and surface water operations, including limitations on surface water diversions from the lower American River during dry years.

Figure ES-6a. 2005 Annual Average Water Balance

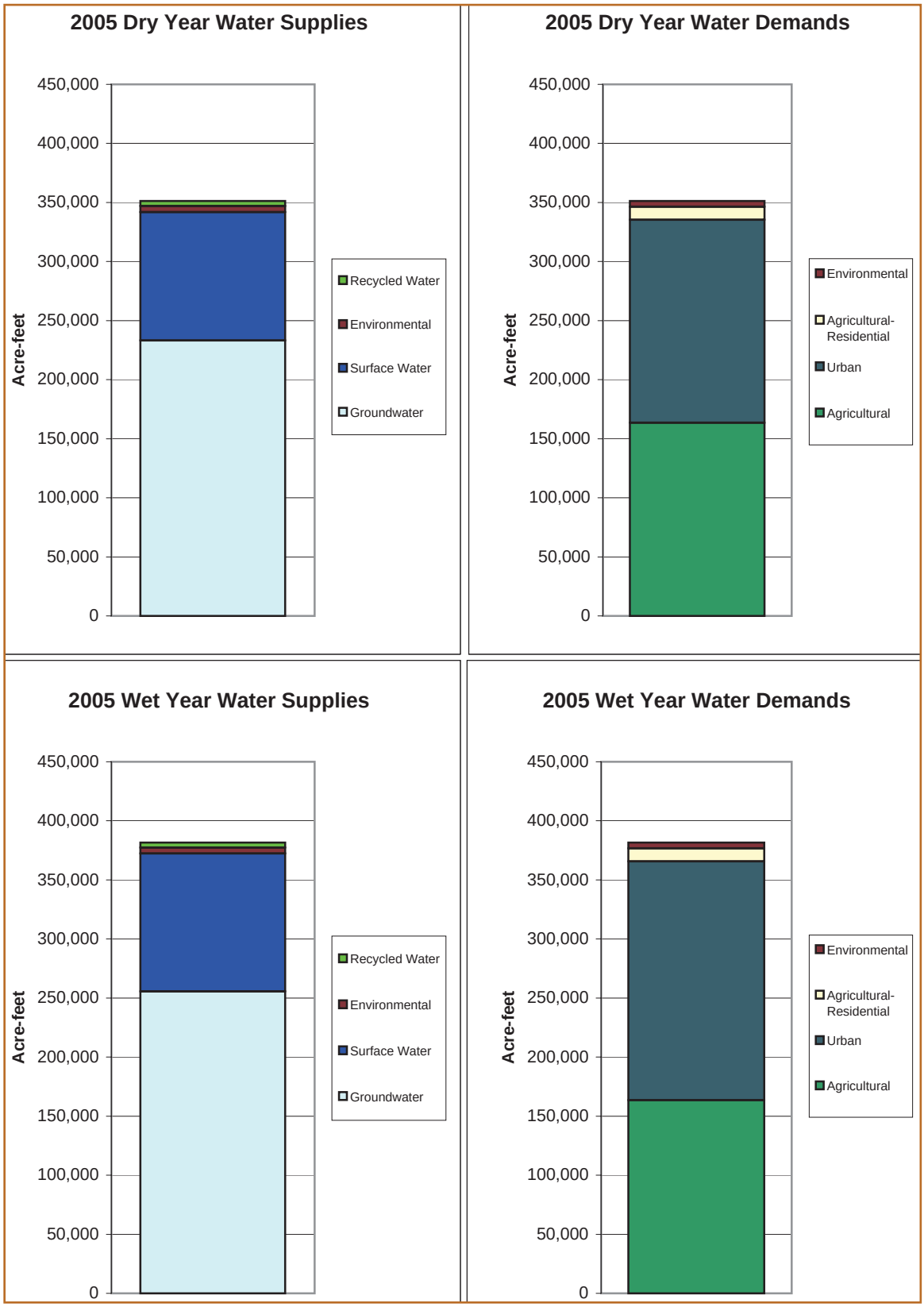
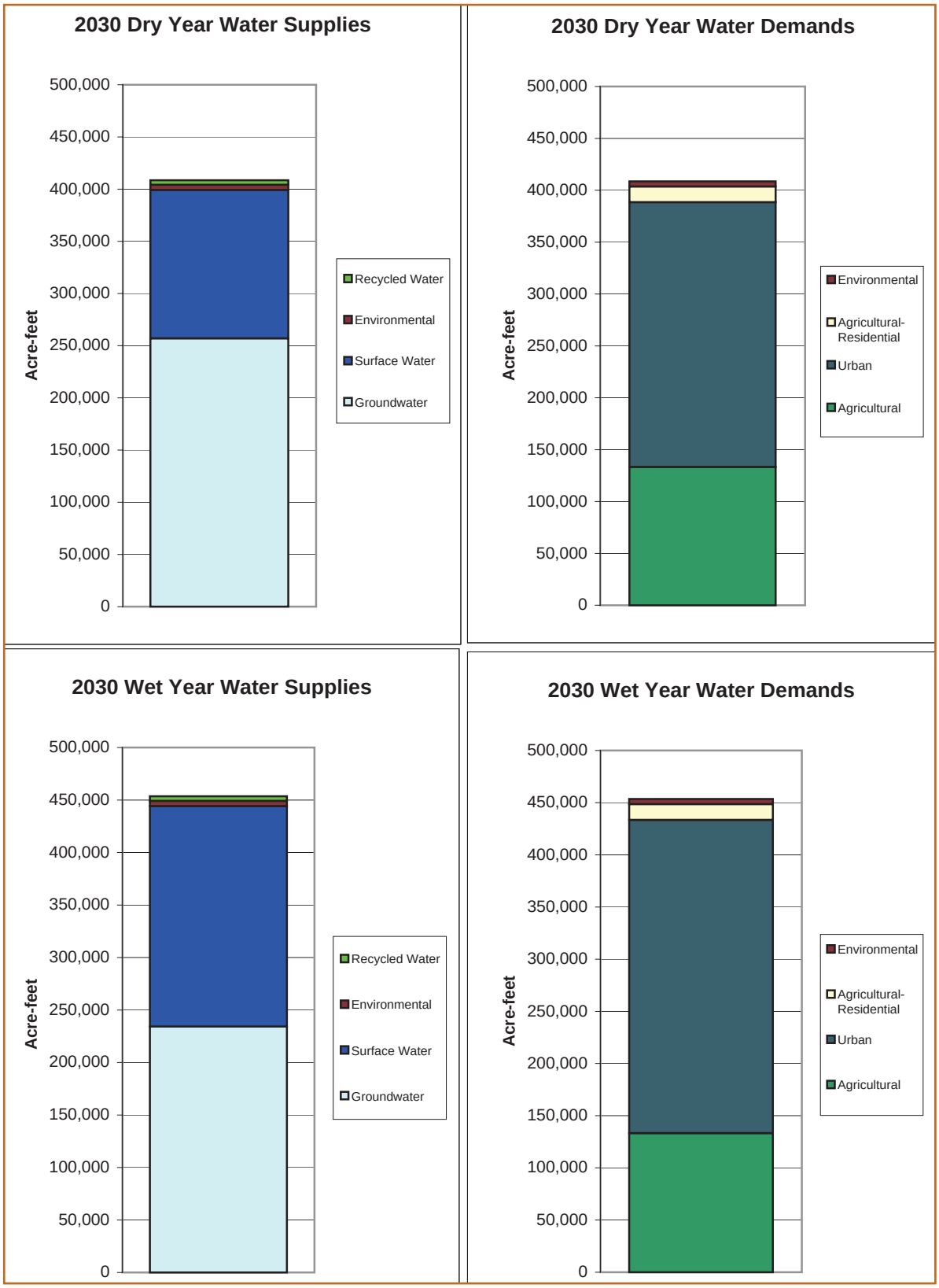


Figure ES-6b. 2030 Annual Average Water Balance



PLAN IMPLEMENTATION

An important element of a GMP is the establishment of trigger points and remedies necessary to fully implement the BMOs. Many of the remedies set forth in this GMP involve coordination with other local, state, and federal agencies. This coordination will begin upon adoption of the CSCGMP by the governance body.

BMO Trigger Point Activities

Trigger Point activities involve monitoring and assessing trends in the basin to determine the adequacy of the monitoring network for meeting the goals and objectives of the CSCGMP. These assessments will be made as new monitoring data become available for review by the basin governance body and results documented in an annual State of the Basin report. As mentioned in the introduction, this GMP is adaptive and relies on monitoring data, evaluation of remedies based on monitoring data and input from basin stakeholders. It requires that the basin be managed in a manner that makes the most practical sense in light of on-going collection and analysis of data.

Protection of Privately Owned Wells

The CSCGMP includes two programs that were negotiated by the stakeholders in the Central Sacramento County Groundwater Forum: the Well Protection Program and the Groundwater Contamination Monitoring and Collaboration Program.

How is an existing private well protected?

The Well Protection Program grew out of discussions that took place in the CSCGF and stems from the need to protect domestic and agricultural irrigation wells. Protection of existing privately owned wells is of fundamental importance to the stakeholders of the CSCGF. As part of this program, a trust fund will be put in place to cover costs of deepening or replacing any existing well that provides water for agricultural or domestic use that may be impacted by future development. The trust fund revenue will be generated from a fee assessed on every new building permit and permit to drill a new well. In 2005, the fee is estimated to be less than $100 per equivalent dwelling unit (e.g. single family home) within the basin.

How is the private well owner kept notified of groundwater contamination clean-up efforts?

The Groundwater Contamination Monitoring and Collaboration Program is focused on maintaining a clear line of communication between the designated Responsible Parties for groundwater contamination clean-up activities and private well owners. The program encourages the use of remediated groundwater in urbanized areas to keep the groundwater in the basin. This program also envisions the Regional Water Quality Control Board requiring designated Responsible Parties to survey private wells within 2,000 feet of any identified contamination plume. Assistance will also come from the Sacramento County Environmental Management Department (EMD). EMD is encouraged to exercise the strictest vigilance to ensure that all permitting

requirements are enforced and that, if requirements are not met, EMD will undertake whatever rigorous enforcement actions are effective.

Basin Governance Body

The governance body is responsible for implementing the actions contained within this CSCGMP. The governance body will initiate the trust fund of the Well Protection Program, take over its administration, and provide annual reporting on the program. In addition, it will pursue any grant opportunities available to the Central Basin and participate in the Integrated Regional Water Management Plan that is currently underway. This is a regional planning document that is a prerequisite if a region is to pursue Proposition 50 implementation grant monies. Lastly, the governance body will collect, evaluate, and report on all of the data and management activities that have been taken in the Central Basin once a year in a State-of-the-Basin Report.

Plan Implementation Costs

First year program startup costs are estimated at $280,000. This is essentially 1.2 full-time people working throughout the year on setting up monitoring programs, taking measurements, compiling data, and reporting data. Future program costs will be evaluated on an annual basis by the basin governance body.

GROUNDWATER MANAGEMENT PLAN

Foreword

The genesis of the Central Sacramento County Groundwater Management Plan (CSCGMP) stems from events that began in the early 1990s and continues to the present day. Foremost among these was the formation of the Sacramento Area Water Forum (Water Forum). At the culmination of the Water Forum process (1993 to 2000), a Water Forum Agreement (WFA) was signed by participating agencies (described in more detail in Section 1). After signing the WFA the Water Forum Successor Effort (Successor Effort) was formed to carry forward the work outlined in the WFA.

One of the objectives of the Successor Effort was the formation of a basin governance body for the Central Sacramento County Groundwater Basin (Central Basin). See **Figure 1-1** for the geographic location of the Central Basin and **Figure 1-2** for the location of existing organized water purveyors in the Central Basin. As a result, the Central Sacramento County Groundwater Forum (CSCGF) was established; each member or stakeholder of the CSCGF has an interest in the groundwater underlying the Central Basin (details of CSCGF membership are described further below). The stakeholders are listed as follows:

1. Local Government/Public Agencies Interests
2. Business Interests
3. Agricultural Interests
4. Agricultural/Residential Interests
5. Environmental/Community Organizations Interests
6. Water Purveyor Interests

In order to assist in the development of the basin governance body a recommendation was made to the CSCGF to first develop a groundwater management plan for the Central Basin. The stakeholders recognized that development of a groundwater management plan would help them focus on an appropriate structure for the basin governance body once they had an understanding of the responsibilities and requirements for implementing a groundwater management program. The CSCGF agreed by consensus to act on this recommendation and formed a smaller group of CSCGF stakeholders (GMP Task Force) that were tasked with developing the CSCGMP.

The CSCGMP is a tool that is designed to ensure a long-term reliable groundwater supply for beneficial use within the Central Basin. It should be noted that the CSCGMP is not a land use policy tool. However, it is understood that

a groundwater management plan may effect land use decisions simply through its influence on water use in a groundwater basin.

The structure of the CSCGMP is described below:

Section 1. Introduction. Describes the political and geographic setting and the activities taking place by water purveyors and interested stakeholders in the Central Basin.

Section 2. Water Resources Setting. Prior to managing a basin available water supplies have to be identified and quantified. In this section information is presented to assist the reader in understanding the availability of different water supplies and how they can be used within the Central Basin. This section provides a primer on the unique hydrogeology and setting within the Central Basin, it also provides an understanding of water quality issues and the groundwater and surface water infrastructure that is currently in-place. The relationship between water demands, water supplies, and land use are considered in the development of a water balance that examines current and future (2030) water supply needs.

Section 3. Components of the Groundwater Basin Management Plan. This section identifies the six components that constitute a groundwater management plan as described in the California Groundwater Management Guidelines (Groundwater Resources Association of California, Second Edition 2005). An important aspect of this section is the identification of Basin Management Objectives (BMOs) and the elements necessary for their implementation.

Section 4. Plan Implementation. Using the BMOs a set of threshold criteria (trigger points) have been developed to assist in reviewing and analyzing monitoring actions throughout the year. Once a trigger point is exceeded a recommended action takes place. Because the CSCGMP is based on adaptive management, trigger points and recommended actions can be changed by the basin management body. The section also includes a Well Protection Program that provides for the protection of domestic and agricultural and a Groundwater Contamination Collaboration Program to assist private well owners in understanding the risk of groundwater contamination to their wells.

Section 5. References. This section provides a compilation of references used in the development of the CSCGMP.

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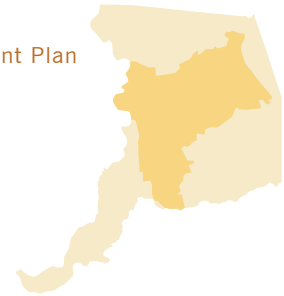
ABBREVIATIONS AND ACRONYMS

μg/L	micrograms per liter
AB	Assembly Bill
Aerojet	Aerojet-General Corporation
AF	acre-feet
AF/year	acre-feet per year
AFB	Air Force Base
AFRPA	Air Force Real Property Agency
ag/res	agricultural/residential
Agency Act	State of California Sacramento County Water Agency Act
ARWRI	American River Water Resources Investigation
ASR	aquifer storage and recovery
bgs	below ground surface
BMO	Basin Management Objective
BMP	best management practice
BVID	Brown's Valley Irrigation District
Cal-Am	California-American Water Company
CALFED	CALFED Bay-Delta Program
CCR	California Code of Regulations
Central Basin	Central Sacramento County Groundwater Basin
CEQA	California Environmental Quality Act
cfs	cubic feet per second
City	City of Sacramento
CMP	Sacramento Coordinated Water Quality Monitoring Program
COC	contaminant of concern
Cooperating Agencies	American River Basin Cooperating Agencies
CSCGF	Central Sacramento County Groundwater Forum
CSCGMP	Central Sacramento County Groundwater Management Plan
CSD	Community Service District
CSUS	California State University, Sacramento
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CWC	California Water Code
DAU	Data Analysis Unit
Delta	Sacramento/San Joaquin Delta
DHS	California Department of Health Services
DMS	Data Management System
DTSC	State of California Department of Toxic Substance Control

DWR	California Department of Water Resources
DWSAP	Drinking Water Source Assessment and Protection Program
EBMUD	East Bay Municipal Utility District
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EMD	Sacramento County Environmental Management Department
EPA	United States Environmental Protection Agency
FMS	Flow Management Standard
Folsom	City of Folsom
FRCD/EGWS	Florin Resource Conservation District/Elk Grove Water Service
GMP	Groundwater Management Plan
gpm	gallons per minute
GSWC	Golden State Water Company
GWNT	Groundwater Negotiation Team
ID	irrigation district
IGSM	Integrated Groundwater and Surface Water Model
InSAR	Interferometric Synthetic Aperture Radar
IRTCS	Inactive Rancho Cordova Test Site
JPA	Joint Powers Authority
LSCE	Luhdorff & Scalmanini Consulting Engineers
LUFT	leaking underground fuel tank
LUST	leaking underground storage tank
M&I	municipal and industrial
Mather AFB	Mather Air Force Base
McClellan AFB	McClellan Air Force Base
MCL	maximum contaminant level
MFP	Middle Fork Project
MG	million gallons
mg/L	milligrams per liter
mgd	million gallons per day
msl	mean sea level
NAWQA	National Water Quality Assessment
NCMWC	Natomas Central Mutual Water Company
NDMA	n-nitrosodimethylamine
NEPA	National Environmental Policy Act
NGS	National Geodetic Survey
NPDES	National Pollutant Discharge Elimination System
PBE	physical barrier effectiveness
PCA	potentially contaminating activities
PCE	tetrachloroethene

PCWA	Placer County Water Agency
PL	Public Law
PMT	Project Management Team
POU	Place of Use
PSA	Purveyor-Specific Agreement
Reclamation	United States Department of the Interior, Bureau of Reclamation
RWA	Regional Water Authority
RWQCB	Regional Water Quality Control Board
SACOG	Sacramento Area Council of Governments
SCWA	Sacramento County Water Agency
SCWC	Southern California Water Company
SGA	Sacramento Groundwater Authority
SMUD	Sacramento Municipal Utility District
SMWA	Sacramento Metropolitan Water Authority
SOP	standard operating procedure
SRCSD	Sacramento Regional County Sanitation District
SSCAWA	Southeast Sacramento County Agricultural Water Authority
SWRCB	State Water Resources Control Board
SWTR	Surface Water Treatment Rule
TDS	total dissolved solids
Title 22	California Code of Regulations, Title 22
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
Water Forum	Sacramento Area Water Forum
WD	water district
WEP	Water Efficiency Program
WFA	Water Forum Agreement
WPP	Well Protection Program
WSMP	Water Supply Master Plan
WTP	water treatment plant
WWTP	wastewater treatment plant
Zone 40	area within the Central Basin that includes Laguna, Vineyard, Elk Grove, and Rancho Cordova

Introduction



Section 1

Introduction

This section describes the CSCGMP, provides relevant background information, describes activities in the North, Central, and South Sacramento County groundwater basins, summarizes ongoing master planning in the context of various regional planning efforts taking place throughout the Sacramento County area, discusses the authority under which the CSCGMP is being prepared, and lists required and voluntary components of the CSCGMP.

1.1 THE CENTRAL SACRAMENTO COUNTY GROUNDWATER MANAGEMENT PLAN

In order to maintain a sustainable, high-quality groundwater resource for the users of the groundwater basin underlying the Central Basin (see **Figure 1-1**) the CSCGMP has been prepared to inform and guide the basin governance body, stakeholders and other interested parties in the management of the basin.

It is the intent of this document to quantify as much as practicable every aspect of the Central Basin including but not limited to: the historical context of the CSCGMP, a description of each stakeholders interest, projects and programs being implemented within the Central Basin by various stakeholders and regional partners, and the management and monitoring strategy to achieve a long-term sustainable yield from the basin. The CSCGMP also contains a Well Protection Program (WPP). The WPP is designed to protect private wells from going dry or becoming non-operable as a result of CSCGMP related activities. The Trial Balloon on Well Protection developed by the CSCGF outlines the premise of the WPP. The WPP is described in more detail in **Section 4**.

Described in the subsections below is the historical context of the CSCGMP. The reader will quickly understand that the concept of groundwater management of the Central Basin is not a new concept to this basin. Beginning from the time when wells were first dug by hand and then drilling technologies allowed for deeper and higher capacity yields from the basin, there has been data showing a consistent decline in groundwater elevations, spurring on management efforts at different stages in time and in different forums than that used in the development of this GMP. Because of the lengthy history, a synopsis of the more recent and more relevant events that have taken place is provided below.

Figure 1-1. Groundwater Basins in Sacramento County

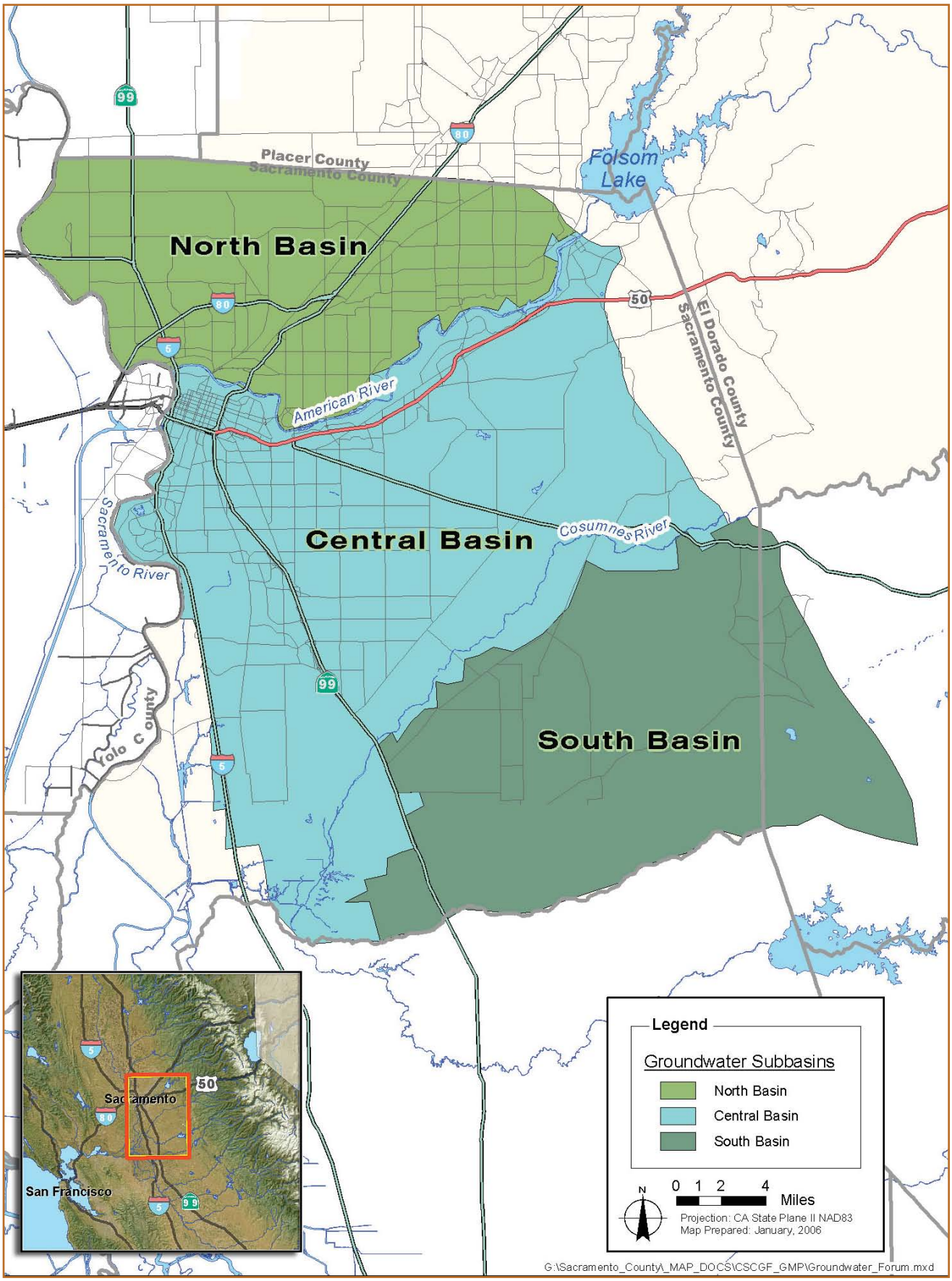
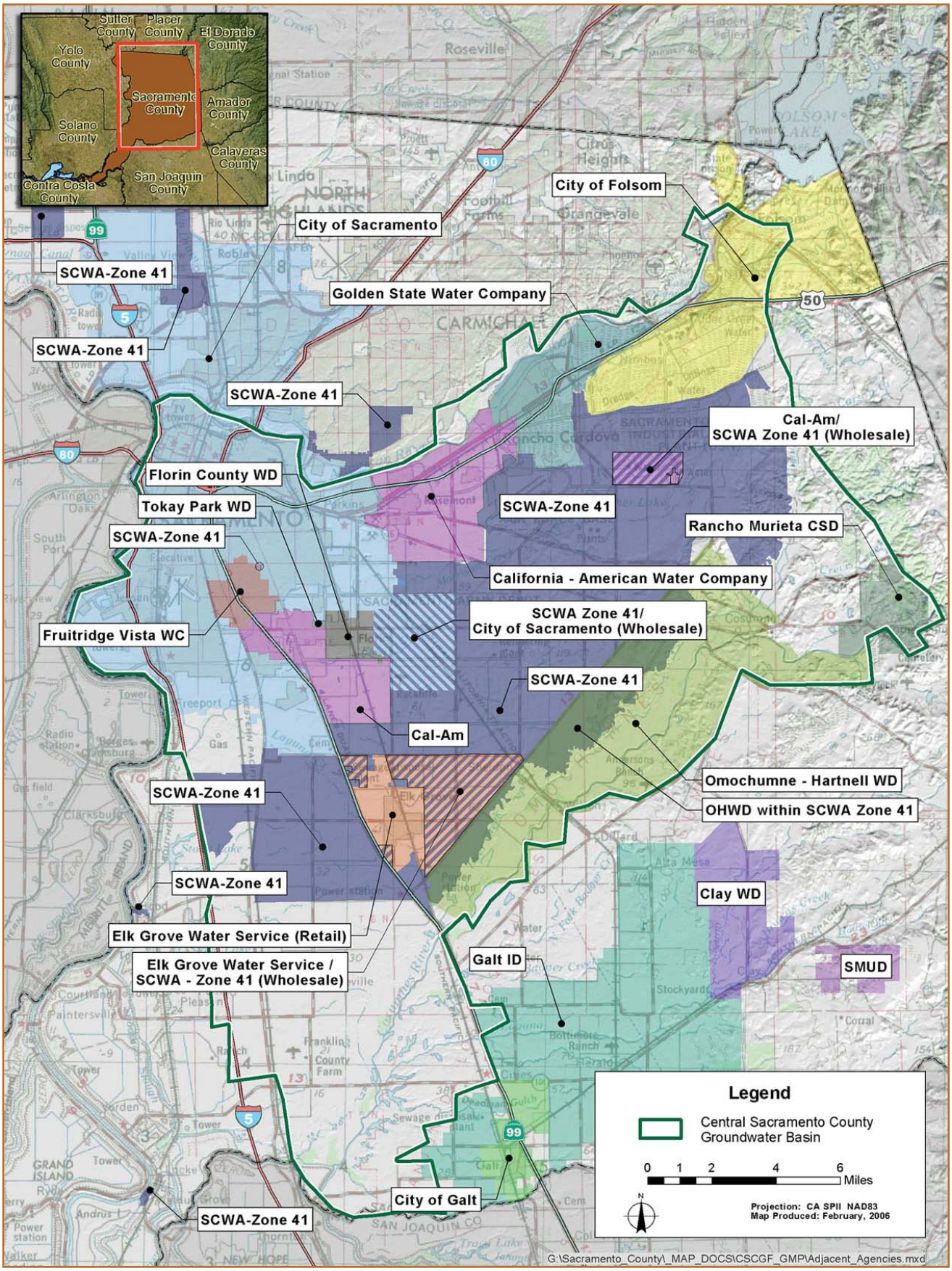


Figure 1-2. Water Purveyors In the Central Basin



1.1.1 Water Forum as the Basis for the Central Sacramento County Groundwater Management Plan

Beginning in 1993, the Water Forum process brought together a diverse group of stakeholders comprising business and agricultural leaders, citizens' groups, environmentalists, water managers, and local governments to evaluate available water resources and the future water needs of the Sacramento region, including communities from Sacramento, Placer and El Dorado counties. These stakeholders identified two coequal objectives to guide in the development of the WFA:

- Provide a reliable and safe water supply for the region's economic health and planned development through the year 2030
- Preserve the fishery, wildlife, recreational, and aesthetic values of the lower American River

After a six year consensus-based stakeholder process, the WFA was completed. The WFA prescribes a regional conjunctive use program for the lower American River and connected groundwater basin. The Water Forum also completed an "Environmental Impact Report for the Water Forum Proposal" (State of California Clearinghouse Number 95082041). This document was certified by the two lead agencies of the Water Forum, the City and County of Sacramento, in December 1999.

One of the seven elements of the WFA is groundwater management. Implementation of this element includes adherence to an agreed-on long-term average annual pumping limit (sustainable yield) for each of the three geographic subareas of the groundwater basin within Sacramento County (see **Figure 1-1**): 131,000 acre-feet (AF) for the North Basin (north of the American River); 273,000 AF for the Central Basin (between the American and Cosumnes rivers); and 115,000 AF for the Galt or South Basin (south of the Cosumnes River). Any proposed water supply project or groundwater management structure must satisfy the groundwater conditions specified in the WFA for the 2030 projected level of development based on the 1993 Sacramento County General Plan.

In 2005, the County of Sacramento Planning Department, in partnership with the Sacramento Area Council of Governments (SACOG), released to the public conceptual land use plans for the next General Plan Update that will take development beyond 2030 and include the General Plans for the City of Sacramento, City of Folsom, City of Elk Grove, and the City of Rancho Cordova. This GMP recognizes that this effort is taking place and that it has direct and significant implications on groundwater management in the Central Basin; however, it is assumed that until the General Plan Update is adopted by the Sacramento County Board of Supervisors, this GMP will continue to reflect the current General Plan.

The WFA includes Purveyor-Specific Agreements (PSA) which define the benefits each water purveyor will receive as a stakeholder and actions each must take to receive these benefits. PSAs for the County of Sacramento/SCWA, City of Sacramento, and the Sacramento Municipal Utility District (SMUD) also describe commitments by the City of Sacramento, SMUD, and SCWA to address issues related to wheeling and wholesaling of surface water, Central Valley Project (CVP) water transfers, and dry year water supply.

1.1.1.1 Central Basin Signatories to the Water Forum Agreement

Excerpts from the WFA PSAs for Central Basin Water Purveyors signatory to the WFA follow (in some PSAs certain activities are or have already taken place or are included in adopted programs by the individual agencies.):

1.1.1.1.1 County of Sacramento/Sacramento County Water Agency

The **Sacramento County Water Agency (SCWA)** is responsible for providing wholesale water to an area within the Central Basin that includes the Laguna, Vineyard, Elk Grove and Rancho Cordova communities, and is commonly referred to as Zone 40. SCWA will divert firm and intermittent surface water from at, or near, the mouth of the American River or from the Sacramento River. SCWA will use groundwater and surface water conjunctively to meet water system demands.

A portion of Zone 40 is situated within the Place of Use (POU) for the City of Sacramento's American River water entitlements (see **Figure 1-3**). It is assumed that these entitlements would be used to serve significant portions, entirely or by conjunctive use, of this portion of Zone 40. Conditions for the use of this water will be consistent with the conditions outlined in the City of Sacramento's PSA related to diversions of American River water.

All signatories to the WFA endorse SCWA's PSA, which provides for constructing SCWA's water supply facilities identified in their Zone 40 Water Supply Master Plan. These facilities include a diversion structure at or near the mouth of the American River or on the Sacramento River, water treatment plants (WTP), pumping stations, wells, storage facilities, and transmission pipelines.

Stakeholder support is contingent on project-specific compliance with the California Environmental Quality Act (CEQA), and where applicable, the National Environmental Policy Act (NEPA), federal Endangered Species Act, California Endangered Species Act, and California Public Utilities Commission, and Local Area Formation Commission (LAFCO) approval.

1.1.1.1.2 City of Sacramento

The City of Sacramento (City) has rehabilitated its Fairbairn Water Treatment Plant (WTP) diversion facility and expanded its Fairbairn WTP treatment capacity by another 100 million gallons per day (mgd). This will allow the City to divert and treat an additional 155 cfs consistent with the terms described below. Concurrent with the expansion of the Fairbairn WTP, the City has also constructed other facilities such as expansion/rehabilitation of the Sacramento River WTP and river intake to assure that a reliable alternative supply (groundwater, pump-back, and/or diversion from the Sacramento River) is available when it is needed.

During periods when lower American River flows are sufficient (i.e., above the "Hodge" criteria, the City could fully use its increased diversion capacity at the Fairbairn WTP. In drier periods when lower American River flows are not sufficient (i.e., below the "Hodge" criteria), the City could not divert water from the American River for the full capacity of the Fairbairn WTP.

Additional diversions from the Sacramento River, and/or groundwater in the North Basin, also may be used by the City to meet 2030 demands.

Stakeholder support is contingent on project-specific compliance with the California Environmental Quality Act (CEQA), and where applicable, the National Environmental Policy Act (NEPA), federal Endangered Species Act, California Endangered Species Act, and California Public Utilities Commission, and Local Area Formation Commission (LAFCO) approval.

1.1.1.1.3 California-American Water Company (formerly Citizens Utility Company of California)

California-American Water Company (Cal-Am) has a number of service areas within the metropolitan area of Sacramento County. These service areas are located within the North Basin (identified as the North Area in the PSA) and the Central Basin (identified as the South County municipal and industrial (M&I) area and the City's American River water rights POU area in the PSA).

Cal-Am has contracted with the City to use 2,580 AF annually from the City's Fairbairn WTP and the Sacramento River WTP for use in its Southgate service area, which also is within the City's POU.

For other Cal-Am service areas within the POU (including the Arden area, portions of the suburban Rosemont

areas, and a portion of the Parkway area), when a contract with the City for delivery of surface water beyond the existing contract for the Southgate area is proposed, signatories to the WFA will meet in good faith with the objective of developing mutually acceptable provisions consistent with the two coequal objectives of the WFA.

Cal-Am will contract for use of a portion of the surface water provided through the County of Sacramento/SCWA for its service area in the south portion of Sacramento County. In addition, Cal-Am will continue to use groundwater to meet water supply needs in each of its service areas.

Stakeholder support is contingent on project-specific compliance with the California Environmental Quality Act (CEQA), and where applicable, the National Environmental Policy Act (NEPA), federal Endangered Species Act, California Endangered Species Act, and California Public Utilities Commission, and Local Area Formation Commission (LAFCO) approval.

1.1.1.1.4 City of Folsom

The City of Folsom (Folsom) will increase its average and wet year American River diversions from an agreed upon baseline amount of 20,000 AF to a 2030 level of 34,000 AF. In drier years, Folsom will divert and use a decreasing amount of surface water from 34,000 AF to 22,000 AF (or the equivalent, as described in the example below), in a three-stage stepped and ramped reduction in proportion to the decrease in the March through November unimpaired inflow (unimpaired inflow implies that there is no upstream storage occurring prior to water entering Folsom Reservoir) to Folsom Reservoir of 950,000 AF to 400,000 AF.

Under stage 1, Folsom will divert a decreasing amount, from 34,000 AF to 30,000 AF, in proportion to the decrease in March through November when the unimpaired inflow to Folsom Reservoir is greater than 870,000 AF but less than 950,000 AF.

Under stage 2, Folsom will divert a fixed amount of 27,000 AF when the March through November unimpaired inflow to Folsom Reservoir is greater than 650,000 AF but less than or equal to 870,000.

Under stage 3, Folsom will divert a fixed amount of 22,000 AF when the March through November unimpaired inflow to Folsom Reservoir is equal to or greater than 400,000 AF but less than or equal to 650,000 AF.

In the driest years, when the March through November unimpaired inflow to Folsom Reservoir is less than 400,000 AF, Folsom will reduce diversions (or the equivalency, as described in the example below) to 20,000 AF. Also, Folsom will reduce diversions in the driest years by encouraging additional, extraordinary conservation to reduce diversions to 18,000 AF.

As an example of how Folsom will meet its needs during drier and driest years, Folsom will reduce diversions by imposing additional conservation levels, and will continue to divert water from Folsom Reservoir for the balance of its needs. However, Folsom will enter into agreements with other suppliers that have access to both surface water and groundwater for an equivalent exchange of the amount of reduction in diversion needed by Folsom, as outlined above in the three stages of reduction. Under these arrangements, suppliers located north and possibly south of the American River will use groundwater in lieu of surface water equivalent to the amount that Folsom will continue to divert.

Stakeholder support is contingent on project-specific compliance with the California Environmental Quality Act (CEQA), and where applicable, the National Environmental Policy Act (NEPA), federal Endangered Species Act, California Endangered Species Act, and California Public Utilities Commission, and Local Area Formation Commission (LAFCO) approval.

1.1.1.1.5 Florin County Water District

Florin County Water District (FCWD) will use groundwater to meet its 2030 water demands. When a contract between the City and FCWD for delivery of surface water is proposed, signatories to the WFA will meet in good faith with the objective of developing mutually acceptable provisions consistent with the two coequal objectives of the WFA. FCWD is located within the POU for the City's American River entitlement.

Negotiations on specific conditions for delivery of surface water under this contract will be undertaken by the Water Forum Successor Effort and FCWD.

1.1.1.1.6 Omochumne-Hartnell Water District

At this time, the **Omochumne-Hartnell Water District (OHWD)** does not purvey water within the boundaries of the district. Private groundwater wells provide almost all of the water demands for the agricultural and rural residential community within OHWD. Surface water supplies are available to only a small number of agricultural users located adjacent to the Cosumnes River or Deer Creek. The unpredictable and limited nature of these waterways precludes the development of any significant surface water supplies.

Historically, OHWD has imported supplemental surface water from the Sly Park Unit of the CVP. Imports ranged from 800 to 5,300 AF per year (AF/year) from 1966 to 1974. After the completion of the Folsom South Canal (in the early 1970's) OHWD was only able to acquire supplemental water on an interim basis. Over the past 20 years, no reliable supplemental water has been made available from the Folsom South Canal.

OHWD currently maintains and operates four flashboard dams on the Cosumnes River to facilitate increased groundwater recharge from the river channel. The flashboard dams, which were historically operated to facilitate diversions, are now put in place in the early summer months when flows are receding to increase the wetted perimeter of the river channel and increase percolation to groundwater.

1.1.1.1.7 Golden State Water Company (formally Southern California Water Company)

Groundwater constitutes about 70 percent of the water supply for the portion of **Golden State Water Company (GSWC)**, south of the American River. Available groundwater supplies are conjunctively used with surface water with 5,000 AF of American River water entitlements diverted from the Folsom South Canal. GSWC has a Pre-1914 water right to 10,000 AF of American River water with 5,000 AF currently leased to the City of Folsom.

1.1.1.1.8 Aerojet-General and Other Self-Supplied Industries Through Business Interests

Aerojet-General Corporation (Aerojet) and other privately supplied industries have demonstrated a commitment to supporting reliable water supplies that will attract new industries and development to the community. The business community, as a signatory to the WFA, has agreed that they play a pivotal role in the region's water supply solution and should contribute to and support efforts that meet WFA goals.

1.2 NORTH SACRAMENTO COUNTY GROUNDWATER BASIN ACTIVITIES

The Water Forum process led to the establishment of the Sacramento Groundwater Authority (SGA). As an example of how a groundwater management plan is implemented, SGA is a governing body formed through a joint powers agreement. SGA uses the police powers of the cities of Sacramento, Citrus Heights, and Folsom, and the County of Sacramento to implement its adopted groundwater management plan. SCWA is a member

of SGA through SCWA's Zone 41 service area located north of the American River; the cities of Sacramento and Folsom and California-American and Golden State water companies also are SGA members.

1.3 CENTRAL SACRAMENTO COUNTY GROUNDWATER BASIN ACTIVITIES

As discussed previously, the WFA calls for an interest-based negotiation process to provide all segments of the community an opportunity to participate in developing a groundwater management structure for the Central Basin. This stipulation in the WFA led to the creation of CSCGF under the auspices of the Successor Effort.

Acting on behalf of the Successor Effort, the Sacramento City-County Office of Metropolitan Water Planning signed a Memorandum of Understanding with the California Department of Water Resources (DWR) and initiated the CSCGF. The CSCGF supports discussion among stakeholders representing all segments of the community with an interest in developing a groundwater basin management body and ultimately a groundwater management plan for the Central Basin. Stakeholders were selected through an area-wide assessment performed by the Successor Effort to identify concerns and develop a process for stakeholders to work together. Interviews were held with 94 stakeholders, resulting in the establishment of six interest groups: agriculture, agriculture/residential, business, environmental/community organizations, local governments/public agencies, and water purveyors. Each interest group is represented by five individuals who participate in the collaborative process known as the CSCGF.

1.4 SOUTH SACRAMENTO COUNTY GROUNDWATER BASIN ACTIVITIES

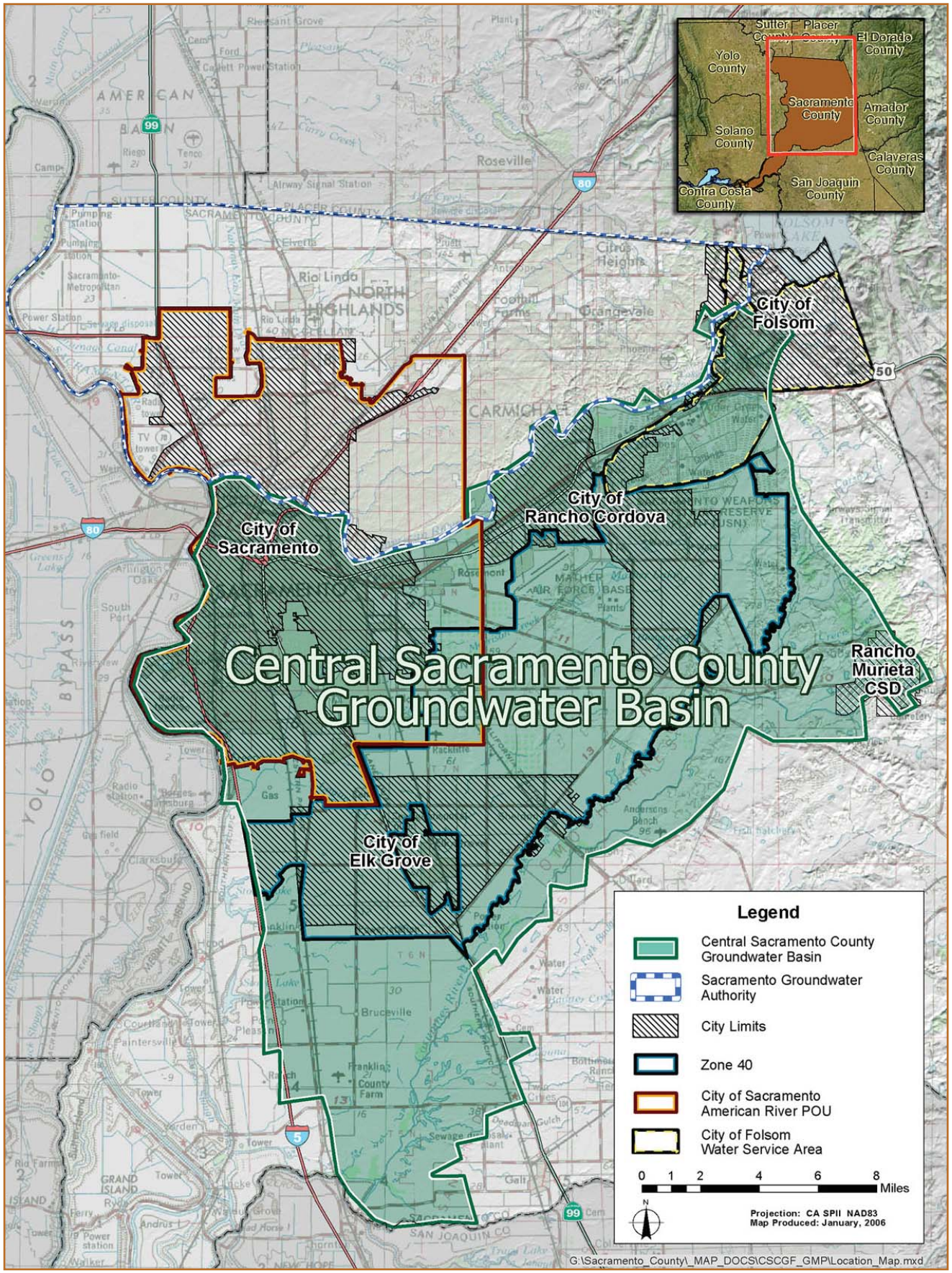
Groundwater-related activities south of the Cosumnes River are guided predominantly by the Southeast Sacramento County Agricultural Water Authority (SSCAWA). SSCAWA is a joint powers agency comprising three agricultural districts: OHWD, Galt Irrigation District, and Clay Water District.

The delineation of the Central Basin as determined by the WFA (see **Figure 1-3**) and the South Basin as reflected in SSCAWA's AB 3030 groundwater management plan adopted in 2002 (2002 GMP) are recognized as conflicting in the area of OHWD, which lies in both the Central and South Basins. Through cooperative participation in both groundwater basins, OHWD has acknowledged that activities which may take place within its boundaries can have a direct effect on both Central and South basins.

SSCAWA is working on updating the 2002 GMP to include additional local partners and to complete a more comprehensive groundwater management plan (South Sacramento County Groundwater Management Plan or SSCGMP) that can be integrated with the CSCGMP for the development of an Integrated Regional Water Management Plan (IRWMP) for the region south of the American River. New partners in the South Basin groundwater management plan include the City of Galt, Rancho Murieta Community Services District (also in the Central Basin), The Nature Conservancy (TNC), and SCWA. One of the primary objectives of the SSCGMP will be the development of a conjunctive use program that utilizes 15,000 AF of SMUD's CVP entitlement allocated to south Sacramento County agriculture through the WFA.

It has been demonstrated through real-time monitoring and scientific analysis that groundwater management programs adopted in the SSCAWA region and along the Cosumnes River corridor will have beneficial effects on the Central Basin (TNC and UC Davis, 2005). Recognizing this, a close working relationship between SSCAWA and the CSCGF has been developed to ensure that the interests and objectives of both basins are considered while developing their respective groundwater management plans. As a result of this relationship, SSCAWA, TNC, and SCWA have executed an agreement that actively investigates opportunities for flow restoration, conjunctive management, and enhanced recharge within the Cosumnes River corridor.

Figure 1-3. Location Map of Central Basin



1.5 ROLE OF THE TWO PRIMARY WATER RESOURCES MANAGERS IN THE CENTRAL BASIN

To understand how the CSCGMP fits into the various programs described in the following sections it is necessary to describe the role of the two primary water resources managers, the City of Sacramento and SCWA, and their respective goals.

1.5.1 Sacramento County Water Agency

SCWA was formed in 1952 by a special legislative act of the State of California: the Sacramento County Water Agency Act (Agency Act). The Agency Act defines SCWA's purposes including, but not limited to:

- Making water available for any beneficial use of lands and inhabitants
- Producing, storing, transmitting, and distributing groundwater in accordance with an approved Master Plan

SCWA's boundaries include all of Sacramento County (excluding the Cities of Folsom, Galt, Isleton, and Sacramento), and the agency is governed by a Board of Directors (ex officio, the Sacramento County Board of Supervisors). Under the Agency Act, the Board may contract with the federal government under reclamation laws with the same powers as irrigation districts, and may contract with the State of California and federal government with respect to the purchase, sale, and acquisition of water. SCWA also may construct and operate any required capital facilities.

Currently, several benefit zones exist within SCWA that are related to both water supply (Zone 13, Zone 40, Zone 41, and Zone 50) and drainage (Zone 11, Zone 12, and Zone 13). Each has a unique purpose and generates revenue internally for carrying out that purpose. Zone 40 is discussed in more detail in the following sections.

1.5.1.1 Zone 40

Historically, Zone 40 has relied on the underlying groundwater basin for agricultural, industrial, and residential water supplies. Over the past 10 years, Zone 40 has supplemented the use of groundwater supplies with surface water, recycled water, and education on and enforcement of water conservation. To address increasing demands for water in the region, SCWA updated and approved its Zone 40 Water Supply Master Plan (WSMP) in February 2005. As indicated in the WSMP, a primary role of Zone 40 is to meet growing urban water demands in a way that protects and maintains the groundwater basin and existing groundwater users. Through a policy that requires construction of groundwater wells to target portions of the underlying aquifer that are not used by private domestic wells, Zone 40 has developed approximately 40 mgd of groundwater capacity. All groundwater production is treated before distribution to retail and wholesale customers. Through firm surface water contracts with the US Bureau of Reclamation (Reclamation) and wheeling agreements with the City, Zone 40 currently has the ability to deliver 12,350 AF/year) of surface water. Zone 40 also delivers approximately 3 mgd of recycled water from SRCSD's Sacramento Regional Wastewater Treatment Plant (WWTP) to customers in the City of Elk Grove.

Zone 40 with its conjunctive use program (use of groundwater in conjunction with surface water) and recycled water from the Sacramento Regional County Sanitation District (SRCSD) is pivotal to the success of groundwater management in the Central Basin.

1.5.2 City of Sacramento

The City is a regional partner in that they provide surface water to areas within the Central Basin that are both inside and outside City boundaries. Through its American River water rights permit and settlement contract with Reclamation, the City's ability to deliver surface water extends to the American River POU boundary, as shown in **Figure 1-3**.

Through partnerships with retail purveyors the City wholesales its American River water to areas that historically have been solely dependent on groundwater. In the case of SCWA, the City currently provides surface water treatment and conveyance of a portion of SCWA's CVP contract water to the Laguna area of Zone 40. In

the future, the City plans to provide American River water to areas of Zone 40 located within the American River POU (see **Figure 1-3**).

The City's commitment to deliver surface water in a timely manner is and will continue to be critical in meeting the Central Basin's groundwater management objectives as described in **Section 3**. Maximizing the ability of the City to deliver surface water by establishing relationships with groundwater purveyors within the City's American River POU also is a critical goal of the CSCGMP.

1.6 OTHER REGIONAL MANAGEMENT EFFORTS

Over the past several decades, regional water supplies have been affected by the following:

- Extended drought and wet periods
- Increased push to dedicate surface water for environmental purposes
- Groundwater contamination cleanup efforts ordered by the United States Environmental Protection Agency (EPA), Central Valley Regional Water Quality Control Board (RWQCB), and California Department of Toxic Substance Control (DTSC)
- Declining groundwater levels
- Ongoing and potential impacts to surface water quality and groundwater quality

At the same time, demand for water in the region has continued to grow. To address these challenges, water purveyors in the region have invested substantial time and resources in a series of regional planning efforts. Planning efforts and agencies most relevant to CSCGMP include the following:

- Completion of the Zone 40 Water Supply Master Plan (SCWA, February 2005) and the Draft Environmental Impact Report for the 2002 Zone 40 Water Supply Master Plan (EDAW, November 2003)
- Creation and Implementation of the Freeport Regional Water Authority (FRWA)
- The Nature Conservancy (TNC)
- Southeast Sacramento County Agricultural Water Authority (SSCAWA)
- Regional Water Authority (RWA)
- Sacramento Groundwater Authority (SGA)
- Other ongoing activities related to groundwater cleanup and monitoring

These regional planning efforts are discussed further in the following subsections.

1.6.1 Zone 40 Water Supply Master Plan and Environmental Documentation

The Zone 40 WSMP identifies a study area (2030 study area) within Zone 40 that consists of existing and developing industrial, commercial, office, and residential land uses consistent with the City of Elk Grove and Rancho Cordova General Plans, and the Sacramento County 1993 General Plan.

Based on these General Plans, water demand is expected to be concentrated within the identified 2030 study area. However, developments can be proposed and approved anywhere within Zone 40 where they are consistent with the framework and requirements provided in the various General Plans, Community Plans, Comprehensive Plans, Specific Plans, and zoning and subdivision ordinances.

Three retail water purveyors provide service within Zone 40, these include: SCWA Zone 41, Florin Resource Conservation District (FRCD)/Elk Grove Water Service (EGWS), and Cal-Am. Zone 40 currently provides wholesale water to a portion of the FRCD/EGWS service area under the terms of the First Amended and Restated Master Water Agreement. It has been assumed that Cal-Am will purchase wholesale water supplies from Zone 40 to serve its Security Park franchise area located in the northern portion of Zone 40.

1.6.2 The Freeport Regional Water Authority (FRWA)

FRWA, a joint powers authority (JPA) developed between SCWA and East Bay Municipal Utilities District (EBMUD), is currently pursuing a project that will design and construct a diversion structure on the Sacramento River and a raw water pipeline between the diversion

structure and the Folsom South Canal. FRWA's efforts are focused in the following five areas: (1) formal state and federal environmental review; (2) public information and outreach; (3) detailed engineering studies and project design; (4) permitting and land acquisition; and (5) construction. The implementation process is expected to take up to four to five years, with actual construction beginning in 2006 and a target operational date of 2009.

While planning, design, and construction activities move forward on the FRWA facilities, Zone 40 will continue work on the surface water treatment plant, groundwater wells, groundwater treatment, raw and treated water transmission pipelines, and storage facilities necessary to fully implement SCWA's conjunctive use plan in the Central Basin.

1.6.3 The Nature Conservancy

The lower Cosumnes River watershed has been a major focus of conservation efforts in the Central Valley and is identified as a priority for ecosystem protection and restoration by both the California Bay-Delta Authority (formerly CALFED) and the USFWS Anadromous Fish Recovery Program, as well as in the Sacramento County General Plan.

The Cosumnes River channel and its associated floodplains are a major source of recharge for the Central Basin, and declining groundwater levels have adversely affected the river's salmon fishery and other environmental values. One of the goals of the WSMP environmental documentation was to assess the extent of impairment of Cosumnes River flows and aquatic values that has resulted from historic and ongoing groundwater pumping (both M&I and agricultural), and to explore programmatic opportunities for restoring and maintaining these aquatic values through integrated water management. The supporting documentation for this effort is included in the environmental documentation for the WSMP and subsequent studies included as a separate effort under the Water Forum Successor Effort and the Sacramento County Water Agency (WRIME, December 2005b).

The Cosumnes River conservation partnership includes federal, state, and local government, nonprofit land owners, and local water purveyors and sanitation districts. TNC has represented the Cosumnes River conservation partnership in the CSCGF. Because the ecological values of the Cosumnes River corridor have statewide significance, and the river presents opportunities for integrated water management, goals of the CSCGMP include the recognition, enhancement, and maintenance of the ecological values of the Cosumnes River.

1.6.4 Southeast Sacramento County Agricultural Water Authority

The SSCAWA is in the process of updating its 2002 GMP to include the remaining water management entities in the South Basin: Rancho Murieta CSD (also included in the Central Basin) and the City of Galt. While they have no authority to implement groundwater or surface water management programs, TNC is being included in the SSCGMP for the same reasons that they are included in the CSCGMP. These entities are developing an MOU as the first step to jointly preparing the SSCGMP. The MOU and resulting groundwater management plan will be structured to facilitate integration with the CSCGMP and development of an IRWMP for the region south of the American River.

The SSCGMP will focus on developing a conjunctive use program that optimizes the utilization of natural recharge areas associated with the Cosumnes River and explores opportunities for utilizing supplemental water supplies for recharge. The development of a viable conjunctive use program by the SSCAWA and its partners that protects and enhances groundwater resources for

local users and the environment can also contribute to management objectives defined in the CSCGMP.

1.6.5 Regional Water Authority

Regional Water Authority (RWA) represents a number of water supply interests and assists members in protecting and enhancing the reliability, availability, affordability, and quality of water resources. One of the principal missions of RWA is to help implement the conjunctive use program prescribed by the WFA. The RWA currently has 18 member agencies and three associate members, spanning Placer, Sacramento, and El Dorado counties.

1.6.6 Sacramento Groundwater Authority

SGA is a JPA created to manage groundwater in the North Basin (see **Figure 1-1**). SGA's formation in 1998 was a result of a coordinated effort by the Sacramento Metropolitan Water Authority (now RWA) and the Water Forum to establish an appropriate management structure for the North Basin.

SGA draws its authority from a JPA signed by the cities of Citrus Heights, Folsom, and Sacramento, and the County of Sacramento to exercise their common police powers to manage the underlying groundwater basin. With this authority, SGA manages the basin through representatives of 14 local water purveyors and representatives from the agricultural and self-supplied pumpers who serve as the Board of Directors.

At the core of the SGA's management responsibility is a commitment to not exceed the long-term average annual sustainable yield of the North Basin, which was estimated to be 131,000 AF in the WFA. To accomplish this objective and to provide a safe, reliable water supply for the North Basin, SGA adopted a groundwater management plan in December 2003.

1.6.7 On-going Groundwater Cleanup and Monitoring Related Activities

A number of on-going groundwater cleanup and monitoring activities currently underway within or adjacent to the Central Basin. Coordination among these efforts will be discussed in more detail later in **Section 3** and **4**. Many of the activities are in various states of clean-up. Activities closely related to CSCGMP groundwater management efforts include, but are not limited to, the following:

- Groundwater contamination investigation and remediation activities related to the former Mather Air Force Base, now called Mather Field.
- Groundwater contamination investigation and remediation activities related to operations at the Aerojet and McDonnell-Douglas (Boeing) facilities.
- Groundwater contamination investigation and remediation activities related to operations at the Kiefer Landfill, and other abandoned landfills within the Central Basin.
- Monitoring of groundwater levels and quality through participation in the DWR Well Monitoring Program.
- Monitoring of groundwater levels and quality at California State University, Sacramento (CSUS).
- Monitoring of groundwater quality by the United States Geological Survey (USGS) as part of its National Water Quality Assessment Program.
- Monitoring of site investigations and remediation efforts at known leaking underground storage tanks (LUST) coordinated by the Sacramento County Environmental Management Department (EMD) and the RWQCB.

1.7 AUTHORITY TO PREPARE AND IMPLEMENT A GMP

In order to initiate development of the CSCGMP, SCWA's Board of Directors held a public hearing and adopted Resolution of Intent (ROI) WA-2590 on April 19, 2005. In accordance with provisions of the California Water Code (CWC § 10753.4(a)) the CSCGMP must be adopted by the basin governance body within two years of adoption of the ROI.

1.8 CSCGMP COMPONENTS

The CSCGMP includes both required and voluntary components. **Table 1-1** lists these components and indicates the section(s) in which each component is addressed.

Table 1-1. Location of GMP Components

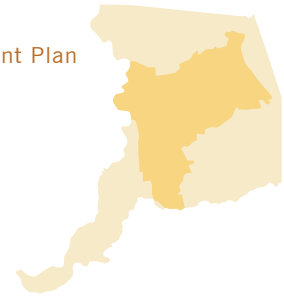
Description	Location in CSCGMP
A. CWC § 10750 et seq., Required Components[1]	
1. Documentation of public involvement statement.	Section 3.2.1.1
2. Basin management objectives (BMO).	Section 3.1
3. Monitoring and management of groundwater elevations, groundwater quality, inelastic land surface subsidence, and changes in surface water flows and quality that directly affect groundwater levels or quality or are caused by pumping.	Section 3.2.2
4. Plan to involve other agencies located within groundwater basin.	Section 3.2.1.2
5. Adoption of monitoring protocols by basin stakeholders.	Section 3.2.2.5
6. Map of groundwater basin showing area of agency subject to GMP, other local agency boundaries, and groundwater basin boundary as defined in DWR Bulletin 118.	Figures 1-1, 1-2, 1-3, 2-27
7. For agencies not overlying groundwater basins, prepare GMP using appropriate geologic and hydrogeologic principles.	N/A
B. DWR's Recommended Components[2]	
1. Manage with guidance of advisory committee.	Section 3.2.1.3
2. Describe area to be managed under GMP.	Sections 1, 2
3. Create link between BMOs and goals and actions of GMP.	Section 3.3.4.2
4. Describe GMP monitoring program.	Section 3.2.2
5. Describe integrated water management planning efforts.	Section 3.2.5
6. Report on implementation of GMP.	Section 4.5.1
7. Evaluate GMP periodically.	Section 4.6
C. CWC § 10750 et seq., Voluntary Components[3]	
1. Control of saline water intrusion.	Section 3.2.3.6
2. Identification and management of wellhead protection areas and recharge areas.	Sections 3.2.3.3, 3.2.3.4
3. Regulation of the migration of contaminated groundwater.	Section 3.2.3.5
4. Administration of well abandonment and well destruction program.	Section 3.2.3.2
5. Mitigation of conditions of overdraft.	Section 3.2.4
6. Replenishment of groundwater extracted by water producers.	Section 3.1
7. Monitoring of groundwater levels and storage.	Sections 3.2.2.1, 3.2.4
8. Facilitating conjunctive use operations.	Sections 3.2.1.2, 3.2.4, 3.2.5
9. Identification of well construction policies.	Section 3.2.3.1
10. Construction and operation by local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling, and extraction projects.	Sections 1.5, 1.6, 2.1, 2.2.3, 2.3.7, 2.3.9, 2.4, 3.2.4, 3.2.5, 4.3, 4.4
11. Development of relationships with federal and state regulatory agencies.	Section 3.2.1.4
12. Review of land use plans and coordination with land use planning agencies to assess activities that create reasonable risk of groundwater contamination.	Section 3.2.5

[1] CWC § 10750 et seq. (seven required components). Recent amendments to the CWC § 10750 et seq. require GMPs to include several components to be eligible for the award of funds administered by DWR for the construction of groundwater projects or groundwater quality projects. These amendments to the CWC were included in Senate Bill 1938, effective January 1, 2003.

[2] DWR Bulletin 118 (2003) components (seven recommended components).

[3] CWC § 10750 et seq. (12 voluntary components). CWC § 10750 et seq. includes 12 specific technical issues that could be addressed in GMPs to manage a basin optimally and protect against adverse conditions.

Water Resources Setting



Section 2

Water Resources Setting

This section provides an in-depth review of available water supplies, their origins, and usage within the Central Basin. The review of each water supply includes a brief description of the local, state, and federal policies governing how that supply of water is used in the basin, and how these policies affect how much water is available from year to year. The section then describes the water demands associated with the identified land uses in the basin. Lastly, the water balance between supply and demand is described along with an examination of the different growth and water use scenarios that could occur in the region.

2.1 WATER USE UNDER THE WATER FORUM AGREEMENT

As summarized in **Section 1.1.1**, the Water Forum was formed in 1993 by a diverse group of water managers, business and agricultural leaders, environmentalists, citizen groups, and local governments in Sacramento. Local governments in Placer and El Dorado counties joined later. In the context of water supply availability in the Central Basin, it is vital to reiterate the importance of the Water Forum and the WFA as they relate to how surface and groundwater supplies were allocated and the importance of water conservation.

2.1.1 Water Forum Agreement and Environmental Water

The WFA included stakeholders representing most of the water interests in the Central Basin (i.e., some water purveyors elected not to participate or be signatory to the WFA). In April 2000, these stakeholders adopted and agreed to the principles set forth in the WFA. The WFA describes a conjunctive use program for the Central Basin to meet the region's water demands, and includes an updated Flow Management Standard (FMS) for the lower American River. The FMS essentially provides environmental protection for the lower American River while at the same time providing for increased water diversions by municipal purveyors. The Cosumnes River, which flows through the Central Basin, was evaluated in the Water Forum technical studies but was not considered to be impacted significantly by the WFA. Therefore, discussion and negotiation of issues for the Cosumnes River was not included in the Water Forum (See **Section 1.1.1**). The importance of environmental water on the Cosumnes River and the river's connection with groundwater are explained later in this section. The CSCGMP does not overlook the environmental water concerns of the American River, but

goes forward with the understanding that the American River was adequately addressed in the WFA.

A programmatic EIR for the WFA was completed in October 1999. The EIR indicated that the Water Forum Plan was the environmentally preferred alternative with significant and potentially significant impacts to the lower American River and Folsom Reservoir, including effects on certain fisheries, recreational opportunities, and cultural resources. Potential mitigation measures were identified as a part of the Habitat Mitigation Element of the WFA.

The seven elements of the Water Forum Plan preferred alternative (included as Section 3 of the WFA) are as follows:

1. Increased surface water diversions
2. Actions (e.g., conjunctive use, and water conservation) to meet customer's needs while reducing diversion impacts (on the lower American River) in drier years
3. Support for improved pattern of fishery flow releases from Folsom Reservoir
4. Lower American River habitat management
5. Water conservation
6. Groundwater management
7. Water Forum Successor Effort

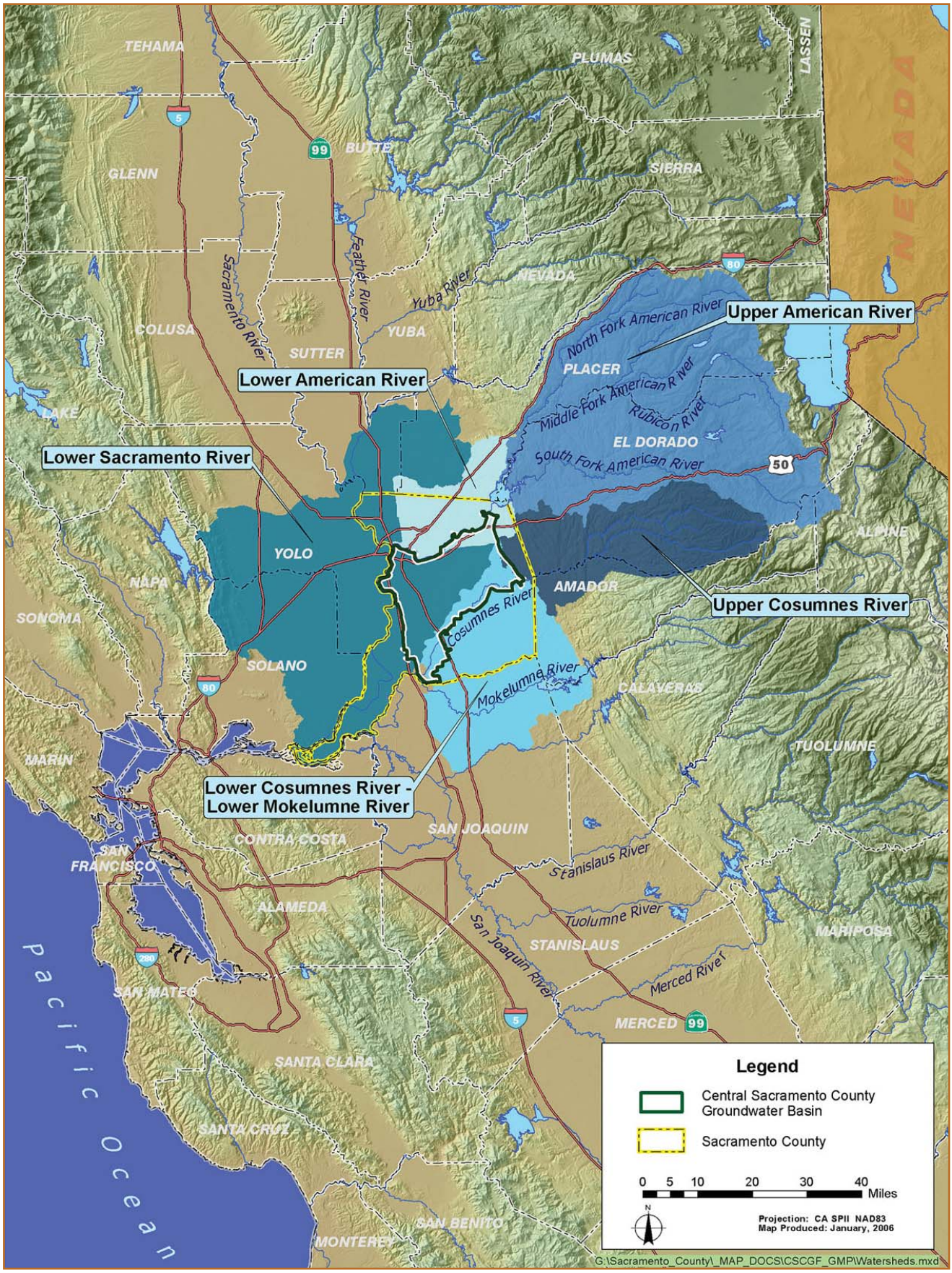
The following are examples of on-going regional projects/programs that are implementing parts of the WFA. These projects/programs are located primarily north of the American River.

1. **Placer County Water Agency (PCWA)/Sacramento Suburban Water District (SSWD) Groundwater Stabilization Project**. In August 1995, PCWA and SSWD entered into a 25-year contract to implement a groundwater stabilization project. PCWA agreed to supply Middle Fork of the American River Project (MFP) water to replace up to 29,000 AF/year of groundwater use by SSWD.
2. **American River Basin Cooperating Agencies (ARBCA) Regional Water Master Plan**. Water purveyors in southern Placer County and northern Sacramento County formed ARBCA and initiated work on implementing the type of regional conjunctive use program that was envisioned by the Water Forum. Under the auspices of this organization, conjunctive use pilot studies have been implemented and large-scale programs are being developed.
3. **PCWA American River Pump Station Project**. This project is a permanent pump station located near the former Auburn Dam site that provides year-round MFP water supply to PCWA. While the initial design capacity of the pump station is 100 cfs (maximum annual diversion of up to 35,500 AF), it has a potential ultimate diversion capacity of 225 cfs (100 cfs to accommodate additional PCWA demands of 35,000 AF and 25 cfs to meet Georgetown Divide Public Utility District's future needs).
4. **City of Sacramento Water Facilities Expansion Project**. The City has expanded its Fairbairn and Sacramento River WTPs to meet increasing demand in its service area. Expansion of the Sacramento River WTP will enable diversions to be shifted from the American River to the Sacramento River whenever the flow bypassing the expanded diversion at the Fairbairn WTP is less than the Hodge Flow criteria. While the City is not bound by Judge Hodge's 1990 decision, Environmental Defense Fund et al. v. East Bay Municipal Utility District, it has agreed to restrict diversions at the Fairbairn WTP when the Hodge Flow criteria apply as stipulated in the WFA.

2.2 SURFACE WATER SUPPLIES

Surface water for the Sacramento region comes from three major river watersheds; the Sacramento, American, and Cosumnes. The region also includes a portion of the Mokelumne River watershed south of the Cosumnes River (this area is technically not within the Central Basin). The Central Basin is roughly bound by the American River to the north, the Sacramento River to the west, the Cosumnes and Mokelumne Rivers to the south, and the Sierra foothills to the east (see **Figure 2-1**). The watershed areas for rivers identified on **Figure 2-1**, as well as the upland foothill regions, serve as the major source of groundwater recharge in the Central Basin. The role and mechanism of stream recharge to the aquifer is discussed more fully in **Section 2.3.3.1**.

Figure 2-1. Major River Watersheds in the Central Basin



2.2.1 River Systems

To understand the role of surface water as a major source of water in the Central Basin, it is important to have an overview of each surface water supply source. A description of each major river along with the current and future availability of water under different hydrologic conditions is provided below. Hydrologic conditions are an important consideration in determining the availability of surface water supplies. For example, in years when rainfall is low and snow pack is reduced, less surface water is available for storage behind dams. Lack of storage results in reduced availability of water for agriculture and urban supply requirements in dry months.

2.2.1.1 Exceedance Diagrams

The availability of surface water supplies often is presented in an exceedance diagram. In this type of diagram, the amount of water flowing in a particular surface water course is measured in terms of the percentage of time that a certain amount of water is expected to be present in that stream or river. Low flow or constrained conditions are most important; therefore, an interest always exists in how often a low-flow condition occurs during times of the year when high demands are expected (e.g., irrigation months). Exceedance curves represent average stream flows over the seasons of a particular year, and do not account for isolated storm events that produce instantaneous stream flow rates higher than the norm of any particular year.

2.2.1.2 Sacramento River Watershed

The Sacramento River watershed, upstream from the Central Basin, encompasses approximately 23,500 square miles and produces an average annual runoff of about 17,000,000 AF, as measured at the Freeport gauging station (below the confluence with the American River). Principal reservoirs regulating flows in the Sacramento River include Lake Shasta (storage capacity - 4,552,100 AF), located on the Sacramento River upstream from Redding; Trinity Lake (storage capacity - 2,448,000 AF), which regulates deliveries to the Sacramento River from the Trinity River watershed; Lake Oroville on the Feather River (storage capacity - 3,538,000 AF); and Folsom Reservoir on the American River (storage capacity - 975,000 AF).

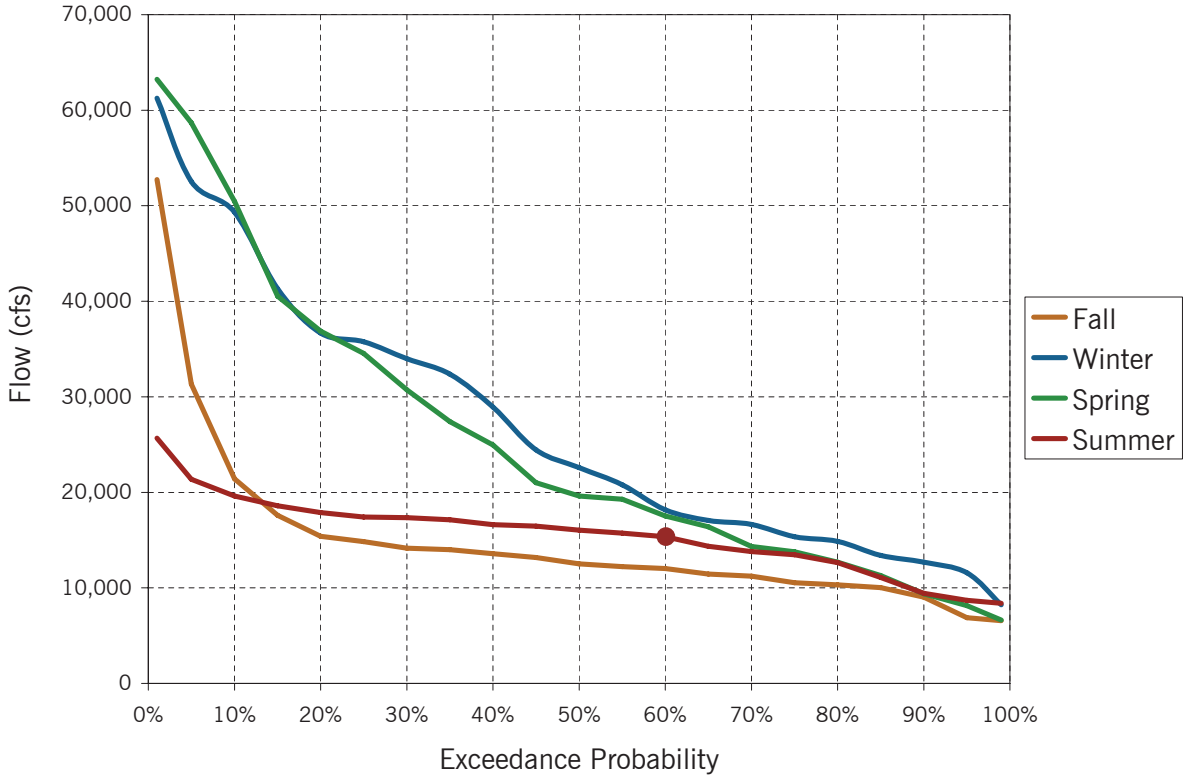
Based on 30 years of data records (1968 through 1998) and spanning a variety of water year types, individual monthly average flows in the Sacramento River have ranged from a low of 4,500 cfs in October 1978 to a maximum of 87,000 cfs in January 1997. Overall, average monthly flows for the 30 years of record range between 13,000 and 40,600 cfs, with the lowest flows occurring in October and highest flows in February. The 30-year average monthly flow during the wetter months of December through May is 32,200 cfs. During the typically drier months of June through November the average monthly flow is 16,500 cfs.

The exceedance diagram for the Sacramento River, based on 2020 forecasted conditions (this year is used in statewide surface water models), for each season is provided in **Figure 2-2**. Forecasted conditions project the operation of reservoirs and regulation of stream flows into the future while imposing 73 years of historical hydrology on this operational scheme. For example, **Figure 2-2** indicates that up to approximately 15,000 to 27,000 cfs of Sacramento River water flows through Freeport during the summer 60 percent of the time (see location of red dot on **Figure 2-2**). This is the general cutoff point for a dry year condition. The remaining 40 percent of the time, approximately 8,000 cfs to 15,000 cfs flows through Freeport. More important is that approximately 8,000 cfs is flowing in the Sacramento River in all seasons (100 percent of the time), even in the most critically dry conditions.

2.2.1.3 American River Watershed

The American River watershed encompasses approximately 1,900 square miles. Folsom Reservoir is the principal reservoir in the watershed with a capacity of 975,000 AF. Several smaller upstream reservoirs contribute 820,000 AF of storage capacity. Nimbus Dam impounds Lake Natoma, located immediately downstream from Folsom Dam, and regulates releases from Folsom Reservoir to the lower American River. The entrance facilities to the Folsom South Canal are located along the south shore of Lake Natoma immediately upstream from Nimbus Dam. The mean annual flow in the lower American River (1968 to 1998) is 3,300 cfs. The design capacity of the American River channel (for flood flows) is 115,000 cfs.

Figure 2-2. Seasonal Exceedance Diagram for the Sacramento River at Freeport



Two exceedance diagrams are provided for the American River (**Figure 2-3** and **Figure 2-4**). **Figure 2-3** relates to requirements in the WFA regarding where unimpaired inflow into Folsom Reservoir is evaluated. The WFA includes provisions for replacement water to the Lower American River in drier years from PCWA through reoperation of its MFP facilities to mitigate projected increases in American River diversions above the 1995 baseline condition. Replacement water is not needed when the projected March through November unimpaired inflow into Folsom Reservoir is more than 950,000 AF. When the projected unimpaired inflow is less than 400,000 AF, PCWA replacement water of 27,000 AF will be provided. When the projected unimpaired flow is between 950,000 AF and 450,000 AF, needed PCWA replacement water will be determined by linear interpolation between 0 and 27,000 AF. PCWA replacement water supplies cannot be diverted or stored until the replacement water flows through the lower reach of the American River to its confluence with the Sacramento River. **Figure 2-4** shows the lower American River at the Fairbairn WTP.

The resources of the lower American River and the land adjacent to the river (much of which is encompassed by the American River Parkway) are managed by a number of different agencies and organizations for a variety of purposes. One of the purposes of the WFA is to protect these resources and creatively partner with other resource managers to plan, fund, and implement projects that benefit the lower American River. The Water Forum monitors its success in five areas:

- Managing the lower American River to protect fish and river habitat
- Maintaining and/or improving habitats adjacent to the lower American River
- Meeting water quality goals and achieving regulatory standards for the lower American River
- Implementing lower American River levee stabilization and erosion control measures
- Communicating among lower American River stakeholders to inform and improve current and future management

Figure 2-3. Exceedance Diagram of Projected Volume of Water from March to November for American River Unimpaired Inflow into Folsom Reservoir

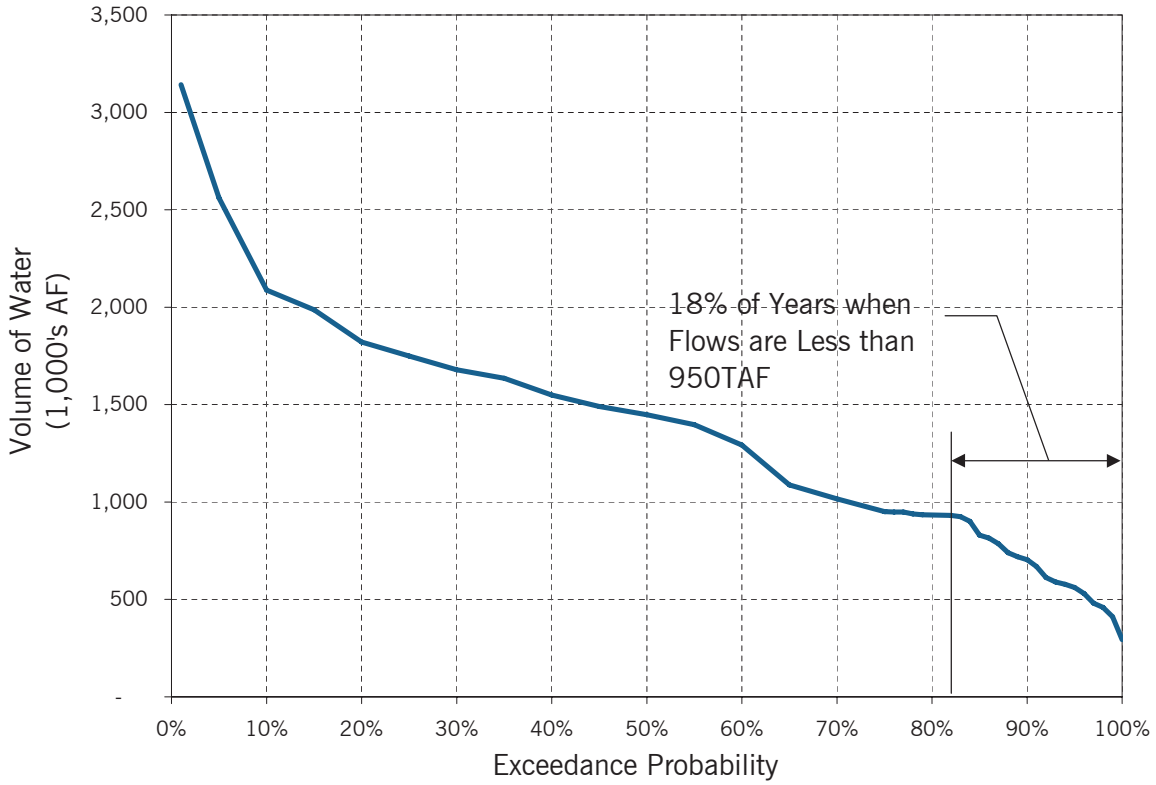
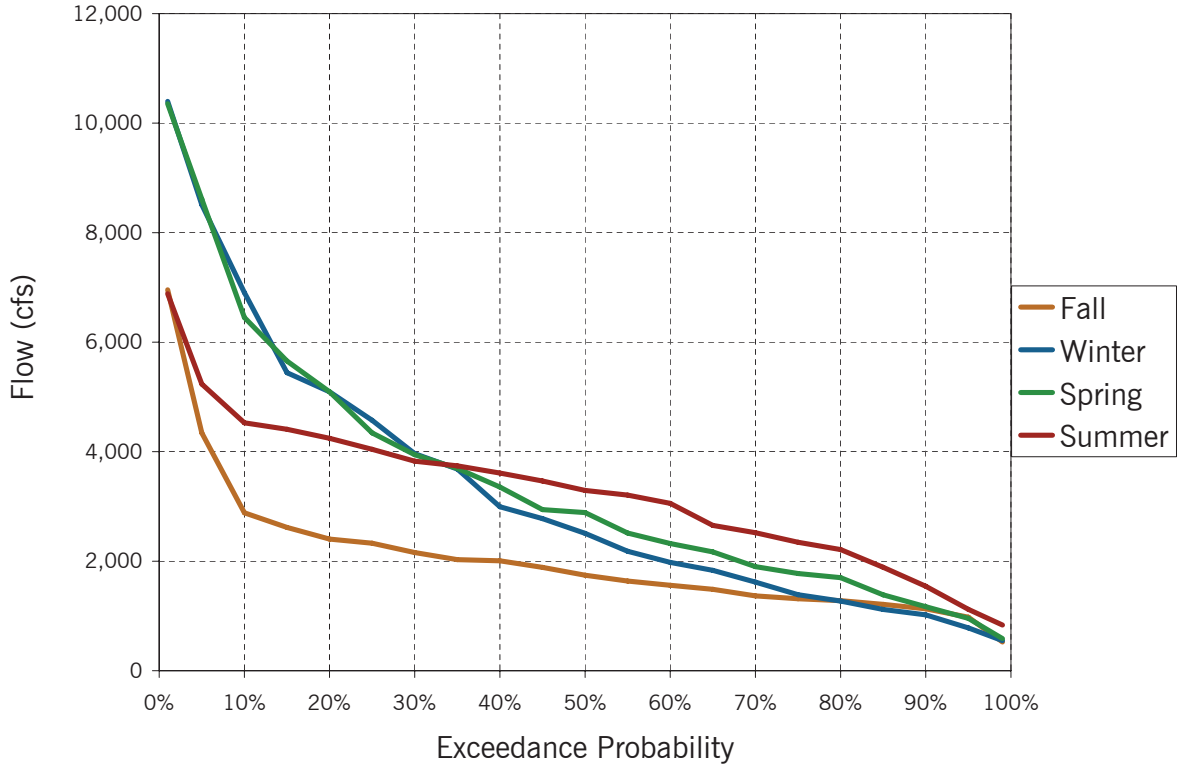


Figure 2-4. Seasonal Exceedance Diagram for Lower American River at Fairbairn Water Treatment Plant



2.2.1.4 Cosumnes River Watershed

The Cosumnes River watershed extends from its headwaters on the western slope of the Sierra Nevada to its confluence with the Mokelumne River. The Cosumnes River is one of the last major rivers in northern California with no major dam. Minor dams on the river are used more for recreational purposes than for water supply or flood control. The hydrology and use of the Cosumnes River have changed substantially over time. The river likely was the major source of surface water diversions for agriculture in the late 1800s prior to groundwater well technology becoming available and affordable. Until the 1940s, the Cosumnes River flowed year-round because it received a baseflow of water from an extensive floodplain aquifer (the aquifer was discharging water to the river). Historical data suggest that flow volumes in the lower reaches of the river decreased steadily from 1942 to 1982, with more frequent periods of very low or no flow. During September and October, flows in the river at Michigan Bar (the point which the river enters Sacramento County) are between 27 to 30 cfs. Currently, flows in the Cosumnes River cease in a 5- to 10-mile section of the river downstream from Michigan Bar (between Meiss Road and State Route 99) nearly every year at or before the end of the dry season (August through October). Studies using monitoring data and computer models have established a relationship between groundwater usage and river flows, leading to the conclusion that groundwater pumping is primarily responsible for the decline in fall river flows.

Since Cosumnes River flows are largely unregulated and considerable losses occur (in terms of percent of flow) to the groundwater system, the exceedance diagram in **Figure 2-5** is considerably different than those representing the Sacramento and American rivers. The diagram indicates a highly variable flow pattern for each season with flow primarily occurring in the winter and spring months and minimal flow in the summer and fall.

The ecological values of the Cosumnes River are of interest to many state, federal, and private institutions such as CALFED, Anadromous Fish Restoration Program, World Heritage Site, and TNC. Reduced flows in the Cosumnes River contribute to the degradation of fishery, wildlife, recreational, and aesthetic resources of the lower Cosumnes River. Water temperature also is an issue associated with flow impairment and poses a threat to the salmon fishery. These issues will be addressed more fully in the Basin Management Objectives outlined in **Section 3**.

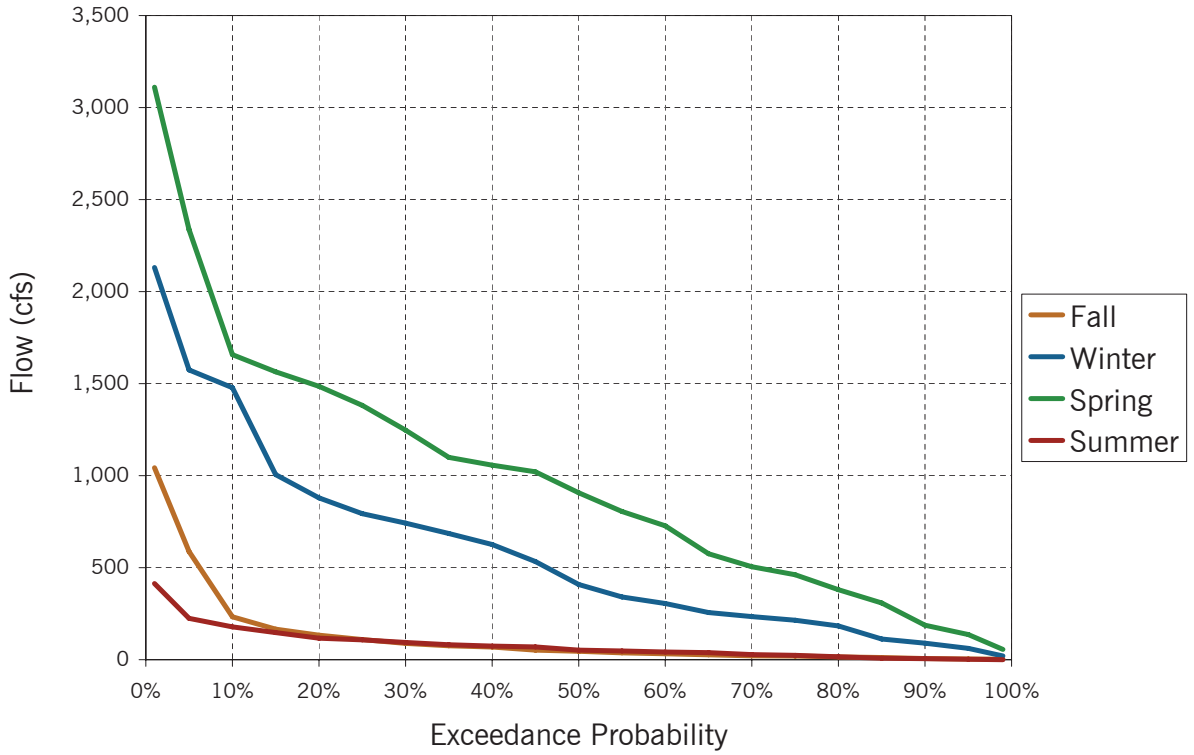
2.2.2 Surface Water Quality

The quality of surface water supplies is important when considering their use as a source of drinking water and agricultural supply. As a drinking water source, surface water must be of a high enough quality that it can be economically treated to meet all state and federal drinking water standards. For agriculture, past experience has shown that if certain constituents are present in applied surface water, such as salinity, these constituents can build up in the receiving soil over time, leaving the soil sterile and incapable of growing crops.

Based on the most current Watershed Sanitary Survey for the American and Sacramento rivers, both rivers are considered an excellent source of supply for drinking water in the Sacramento metropolitan area. These source waters can be readily treated to meet all California Code of Regulations (CCR) Title 22 drinking water standards using both conventional and direct filtration processes, including membranes. No persistent constituents are present in the raw water that require additional or more advanced water treatment processes. However, seasonal treatment requirements occur at times for rice herbicides found in the Sacramento River. These treatment requirements are addressed through chemical oxidation processes. High turbidities during storm events are a treatment challenge that can be managed by optimizing operations including adjusting chemical types and dosing schemes and by reducing plant flow (Montgomery Watson and Archibald & Wallberg, 2000).

Primary drinking water standards are set for constituents that cause adverse impacts to human health. Secondary drinking water standards are set for constituents that

Figure 2-5. Seasonal Exceedance Diagram for Lower Cosumnes River (at or near Highway 99 crossing)



cause unpleasing aesthetic impacts on water quality, and are not health-based standards. No chronic or persistent violations of primary or secondary drinking water standards have been reported in any treated surface water supply in the Sacramento area.

Like Sacramento area drinking water supplies, no known problems exist with surface water use for irrigation. No treatment or special considerations are typically given to agricultural diversions from rivers, with the exception of large river intakes and their ability to minimize fishery impacts. The subsections below address the drinking water aspects of each river and minor impacts associated with agricultural activities occurring upstream.

2.2.2.1 Sacramento River

Sacramento River water quality is largely influenced by a mass balance of water quality from upstream reservoir release operations, tributary flows (including the lower American River), agricultural runoff, subsurface drainage flows, and diversions with other impacts resulting from permitted discharges from M&I sources, urban runoff, and spills. In general, the quality of the Sacramento River is high in the vicinity of the Central Basin. Moderate amounts of alkalinity and minerals are present and low levels of disinfection by-product precursors. Turbidity levels in the Sacramento River are higher during the winter and early spring months, and are usually associated with reservoir releases or runoff from storm events. Very infrequent detections of organic chemicals occur, most of which are pesticides or herbicides from agricultural operations. Data collected to date indicate a low prevalence of *Giardia* and *Cryptosporidium* in the river, with protozoa only detected sporadically and at very low concentrations.

The characterization of Sacramento River water quality in the vicinity of the Central Basin is based on reports from the Sacramento River WTP (Sacramento River Watershed Sanitary Survey; 1995 Report and 2000 Update, prepared by MWH and Archibald & Wallberg).

The City diverts water from the Sacramento River at its Sacramento River WTP just downstream from the confluence with the American River. The City treats water using conventional treatment processes (i.e., flocculation, sedimentation, and filtration) with chlorine

disinfection. Treated water quality meets or exceeds all state and federal drinking water standards under current operations. The City includes corrosion control in its treatment of the water. Finished water is supplied to City customers both north and south of the American River (i.e., North Basin and Central Basin).

2.2.2.2 American River

Surface water quality in the American River is a function of the mass balance of water quality from tributary streams, diversions, minor agricultural return flows, subsurface drainage flows, with other impacts resulting from permitted discharges from M&I sources, urban runoff, and spills. In general, the quality of water in the American River is high from the river's headwaters to its confluence with the Sacramento River. It is low in alkalinity, low in disinfection by-product precursor materials, low in mineral content, and low in organic contamination. Limited data also indicate that the water is low in microbial contamination from *Giardia* and *Cryptosporidium*. Turbidity levels in the American River tend to be higher in the winter than summer because of higher flows associated with winter storms.

The City diverts water on the lower American River at the Fairbairn WTP just downstream from the Howe Avenue crossing. This water is also used by other water purveyors within the American River POU on a wholesale basis. The POU boundary in the Central Basin is shown in **Figure 1-3**. Water diverted at the plant undergoes conventional treatment and disinfection. The treated water meets or exceeds all state and federal drinking water standards under current operations (Archibald & Wallberg and MWH, 2003).

2.2.2.3 Cosumnes River

Water quality in the Cosumnes River watershed is affected primarily by land use and land cover. Monitoring data indicate that most of the river's nutrients and suspended sediments originate in the lower portion of the watershed below the Michigan Bar gauging station. Nutrient loading is strongly affected by a few point sources and non-point sources related to urbanized areas and agricultural activity (Ahearn and Dahlgren, 2000).

2.2.3 Major Surface Water Facilities Infrastructure

The distinction between surface water and groundwater facilities is sometimes difficult to make. In service areas that conjunctively use surface water and groundwater, the parts of the system that are attributed to surface water are the intake or diversion structure, the pipe that conveys the water from the intake structure to the WTP, the WTP itself, and the large conveyance pipelines that move treated surface water throughout the distribution system to the retail or wholesale customer.

The following sections describe existing and planned capital facilities that are, or will be, owned and operated by public and private water purveyors in the Central Basin. Major surface water diversions, untreated (raw) water conveyance, treatment, storage, and treated water conveyance systems are shown in **Figure 2-6**. The emphasis of this section will be on facilities that divert and convey surface water and on treatment capacity that is available today or in the near future that provides water to the Central Basin.

2.2.3.1 City of Sacramento

The City diverts surface water supply through two treatment plants, the Fairbairn WTP and the Sacramento River WTP. Both WTPs have recently been expanded. The Fairbairn WTP's treated water output capacity is 200 mgd and the Sacramento River WTP's output capacity is 160 mgd. Currently, the City maintains nine enclosed treated water storage reservoirs with a total storage capacity of 39 million gallons (MG), as shown in **Figure 2-6**.

2.2.3.2 SCWA Zone 40

Existing SCWA surface water facilities include the Franklin Intertie (see **Figure 2-6**), which supplies water to SCWA through the City. SCWA's wheeling agreement with the City provides up to 11 mgd of non-dedicated capacity that is diverted and treated at the City's Sacramento River WTP. SCWA's wheeling agreement with the City also provides for converting non-dedicated capacity to dedicated capacity in the

future (negotiations between SCWA and the City are currently taking place).

Planned SCWA diversions of surface water include a diversion structure located on the Sacramento River near the community of Freeport (see **Figure 2-6**), a raw water conveyance pipeline from the diversion structure to the central portion of Zone 40 (both constructed in partnership with EBMUD), a 100 mgd[4] (ultimate capacity) surface water treatment facility in the central portion of Zone 40, and appurtenant treated water conveyance pipelines. Other agreements currently in negotiation include expanded service from the City to the portion of Zone 40 that lies within the City's American River POU.

2.2.3.3 Golden State Water Company

Golden State Water Company provides water supply to its Cordova System in part with surface water treated at its 16 mgd Coloma and Pyrites WTPs. The Coloma and Pyrites WTPs divert American River water through a turnout on the Folsom South Canal.

2.2.3.4 City of Folsom

Folsom shares its surface water diversion facility at Folsom Reservoir with San Juan Water District and the City of Roseville. Folsom treats this water at the Folsom WTP, which is currently undergoing an expansion to a maximum capacity of 50 mgd. Folsom's water system includes eight treated water storage tanks with a total storage capacity of 19.5 MG and one raw water storage reservoir.

2.2.3.5 Rancho Murieta Community Services District (CSD)

Rancho Murieta CSD operates a surface water treatment plant located at the north end of Lake Clementia, with a total production rate of 3.5 mgd. The CSD relies on off-stream reservoirs using Cosumnes River water as their source of surface water. The majority of water is stored in the winter and spring months. The CSD also maintains two storage tanks with a total storage capacity of 4.2 MG.

2.2.3.6 Omochumne-Hartnell Water District

OHWD is the only organized agricultural water district with facilities to divert surface water within the Central Basin. While OHWD does not have surface water entitlements, they have historically operated four seasonal flashboard dams on the Cosumnes River to facilitate diversions by riparian water rights holders along the river. Diversions by riparian water rights holders are used on lands adjacent to the Cosumnes River and remain entirely within the Central Basin. The volume of water utilized by riparian users has decreased significantly over the past several decades. This is due to declining flows in the Cosumnes River during the irrigation season and the increasing use of drip irrigation for orchard and vineyards within the Cosumnes River and Deer Creek floodplain. As indicated previously, OHWD now operates their seasonal dams to facilitate groundwater recharge and only in limited instances are the impoundments formed by these dams used for diversions by riparian users.

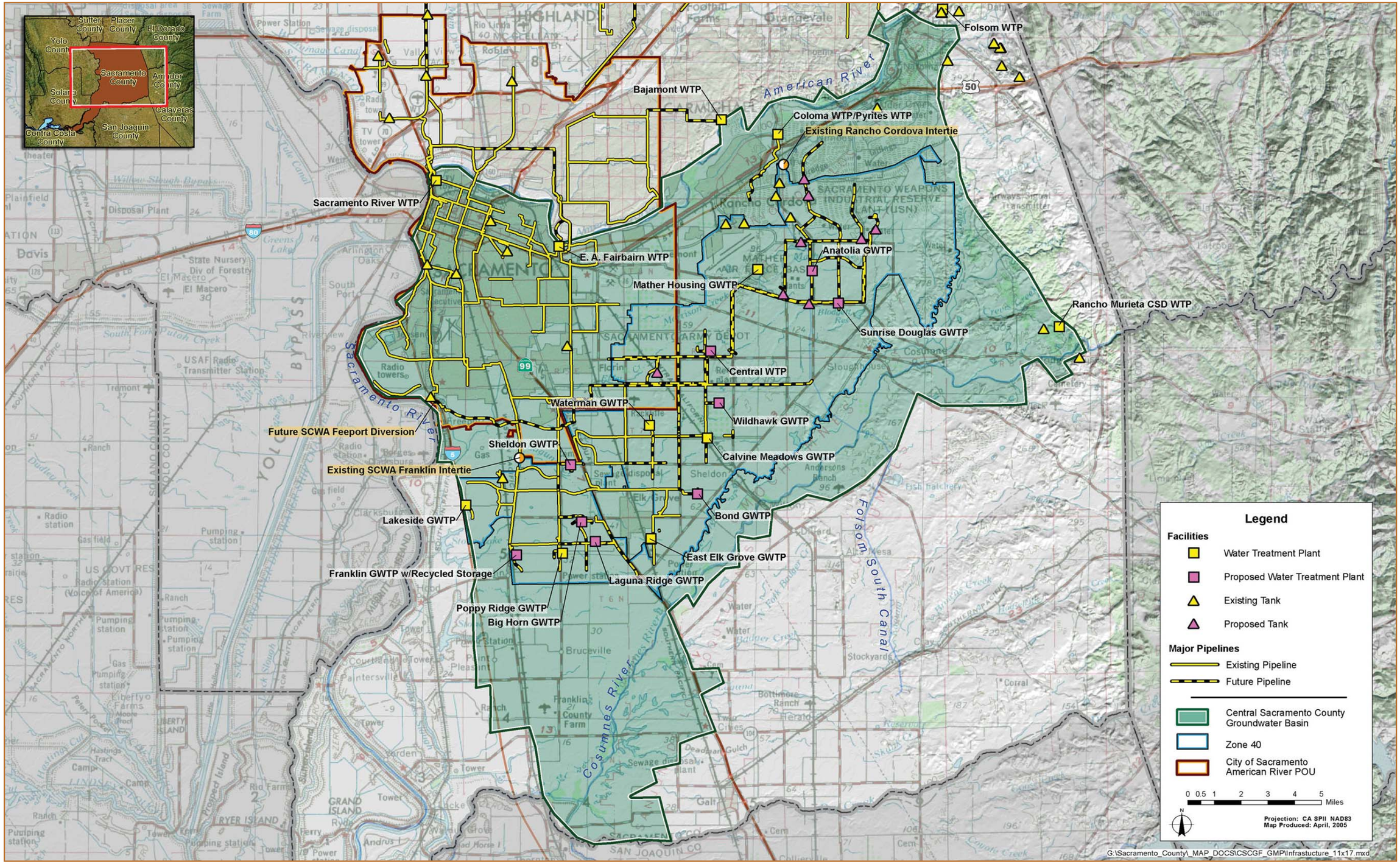
2.2.4 Surface Water Rights

The purpose of this section is to briefly discuss the different types of surface water rights as defined by state law. This section can be used as a resource when a water right is referred to in subsequent sections.

A surface water right is a legal right or contract entitlement to water that is generally not guaranteed in all hydrologic year types. In certain circumstances, water supply contracts are executed as a settlement proceeding which guarantee water supply availability, subject to certain stipulations, regardless of hydrologic year type. For this reason, it is important to understand which agencies have access to surface water, subject to certain constraints, as a component of groundwater management in the Central Basin. The different types of surface water rights and contract entitlements include the following:

[4] Fifteen mgd of this capacity is remediated groundwater discharged to the American River as part of the Eastern Sacramento County Replacement Water Supply Project, which is described more fully in the groundwater section.

Figure 2-6. Major Surface Water Infrastructure Facilities



Appropriative Right. This right is gained through diverting and using surface water for reasonable and beneficial use[5]. Because this right is not predicated on, and does not depend on, ownership of the land, the rights of an appropriator depend on actual physical control of the water (and since 1914, a permit for its beneficial use). The water stored by the state and Reclamation in reservoirs is through an appropriative water right. A CVP water contract is a contract with Reclamation that provides access to water that is stored and conveyed through CVP facilities. Typically, Reclamation allocates the water that is stored to municipal and agricultural water contract holders based on an estimate of the amount of water stored in Reclamation's reservoirs. This estimate is based on an estimate of watershed snow pack and potential runoff in the area tributary to Reclamation's reservoirs in March of every year.

Pre-1914 Water Right. The term "pre-1914 right" is often used in the context of a water right that is senior to most other water rights on a given stream.

USBR Settlement Water Contract. This water right is typically associated with riparian and Pre-1914 Water Right holders who settled under a contract agreement with Reclamation for water stored in a CVP reservoir that they normally would have received absent the reservoir.

Correlative Right. A correlative right has a mutual or reciprocal relationship to the rights of others, in the sense that the existence of one right necessarily implies the existence of the other right. For example, the rights of landowners adjacent to a stream (riparian) are correlative with all other landowners adjacent to the same stream.

Riparian Water Rights. Those who own property adjacent to a body of water possess the right to use the water from that body of water on the adjacent property for reasonable and beneficial uses. All riparian rights are correlative.

Area of Origin Water Rights. The California Water Code (CWC) contains a number of sections addressing certain rights, benefits, and obligations for upstream lands from which surface water originates. While discussed in a variety of informal venues, the "Area of Origin" provisions of the CWC have not yet been thoroughly tested and interpreted by the courts; therefore, no clear or definitive guidance exists regarding the application, interpretation, and functional operation of Area of Origin Statutes.

2.2.5 Surface Water Rights and Contract Entitlements Within the Central Basin

In **Section 2.2.4** the different types of surface water rights were briefly described. A basic understanding of surface water rights is important given the complexity of water right ownership, its quantity, and its reliability. The Integrated Groundwater Surface Water Model (IGSM) for Sacramento County is used to provide information on historical diversions (1968 to 1995) of surface water by each of the water providers. A graph of this usage is presented with each discussion. **Table 2-1** summarizes current water rights and contract entitlements in the Central Basin.

[5] Reasonable and beneficial use refers to Article X, Section 2, of the California Constitution, which requires that all water use be reasonable and beneficial. Beneficial uses include irrigation, domestic, M&I, hydroelectric power, recreation, and protection and enhancement of fish and wildlife. Reasonable use is more easily defined by what it is not: waste or unreasonable use. Reasonableness is determined based on circumstances and can vary, according to the California Supreme Court.

Table 2-1. Existing Surface Water Rights/Contract Entitlements

Surface Water Sources	Place of Use	Entitlements (AF/year)	Contracts from or to Other Purveyors (AF/year)
City of Sacramento (Amount Available to Central Basin) [1]			
Water Rights Permits/Reclamation Settlement Contract (American River)	American River POU	142,100	-2,580[1], -9,300[5]
Reclamation Settlement Contract (Sacramento River)	City of Sacramento	50,716	
Pre –1914 Water Right (Sacramento River)	Not Applicable	26,460	
SCWA Zone 40			
SMUD 1 Assignment (CVP Supply) [2]	Zone 40	15,000	-
SMUD 2 Assignment (CVP Supply) [3]	Zone 40	15,000	-
Fazio Water (PL 101-514 CVP Supply) [4]	Zone 40	22,000	-7,000[4]
Future Agreement with City of Sacramento (American River Settlement Contract)	American River POU (Zone 40)	-	9,300[5]
Future Appropriative Water Right [6] (American and/or Sacramento River)	Zone 40	14,600	-
Future Other Water Contract	Zone 40	5,200	
City of Folsom [7]			
Pre-1914 Water Right	City of Folsom	22,000	-
Agreement with GSWC (water right)	City of Folsom	-	5,000[8]
PL 101-514 contract with SCWA (CVP supply)	East area	-	7,000[4]
Golden State Water Company [8]			
Pre-1914 Water Right (American River)	Cordova System	10,000	-5,000[8]
California American Water Company [9]			
Reclamation Settlement Contract (American River)	American River POU (Southgate)	-	2,580[1]
Rancho Murieta Community Service District [10]			
Appropriative Water Right (Cosumnes River)	Rancho Murieta CSD	6,368	-
Omochumne – Hartnell Water District [11]			
Riparian Water Rights (Cosumnes River)	Agricultural Lands Along Cosumnes River	4,000	-
Total Surface Water Contracts in Central Basin	**Approximately**	**350,000**	

Sources: Sacramento River Water Reliability Study, Initial Alternatives Report, Main Report and Appendix A, Revised January 2005.

SCWA Zone 40 Groundwater Management Plan, adopted October 26, 2004.

Notes:

[1] The City has a Reclamation Settlement Contract for the American and Sacramento rivers for 245,000 and 81,800 AF/year (the amounts shown here indicate only what can be guaranteed; the actual water right is much higher), respectively, and a Pre-1914 Water Right for up to 54,000 AF/year (this amount is still under research). The amounts

Table 2-1. Existing Surface Water Rights/Contract Entitlements (continued)

shown in the table are the result of the total contract amounts being reduced in proportion to the area within the City Limits and the American River POU that are located within the Central Basin. These percentages amount to 58 and 62 percent, respectively. Also identified is a water sale contract with Cal-American (up to 2,580 AF/year) and a future water sale to SCWA's Zone 40 (up to 9,300 AF/year).

[2] SMUD 1 Assignment. Under the terms of a three-party agreement (SCWA, SMUD, and the City), and in accordance with SMUD's PSA, the City is providing surface water to SMUD for use at two of SMUD's cogeneration facilities. In turn, SMUD has assigned 15,000 AF/year of its CVP contract water to SCWA for M&I use. Because the cogeneration facilities are located within the City's American River POU, authorization by the State Water Resources Control Board (SWRCB) was not required.

[3] SMUD 2 Assignment. SMUD's PSA directs SMUD to assign a second 15,000 AF/year to SCWA and for SCWA to construct groundwater facilities necessary to meet SMUD's dry year water shortages of up to 10,000 AF/year. This CVP contract assignment is complete.

[4] CVP Water Public Law 101-514 ("Fazio" Water). In April 1999, SCWA obtained a CVP contract pursuant to PL 101-514 that provides a permanent water supply to SCWA Zone 40 of 15,000 AF/year and a 7,000 AF/year subcontract to Folsom.

[5] The City is committed to serving American River water to all areas located within the City's American River POU.

[6] Appropriative Water. SCWA has submitted an application to the SWRCB for appropriation of water from the American and Sacramento rivers (SCWA's Board authorized submittal of this application on May 30, 1995). The number shown is the expected long-term average use of the water and not the water right amount. This water is considered intermittent water that typically would be available during the winter months of normal or wet years.

[7] Does not include Section 215 water or water supplied by San Juan Water District.

[8] Golden State Water Company has access to Pre-1914 water through the Natomas Ditch Company and associated POU. A portion of this water is contracted to Folsom.

[9] Does not include a potential surface water supply for Rosemont Service Area.

[10] Rancho Murieta CSD's rights are governed by various appropriative rights and associated restrictions, maximum annual use, and maximum annual storage. The total contract yield varies from year to year.

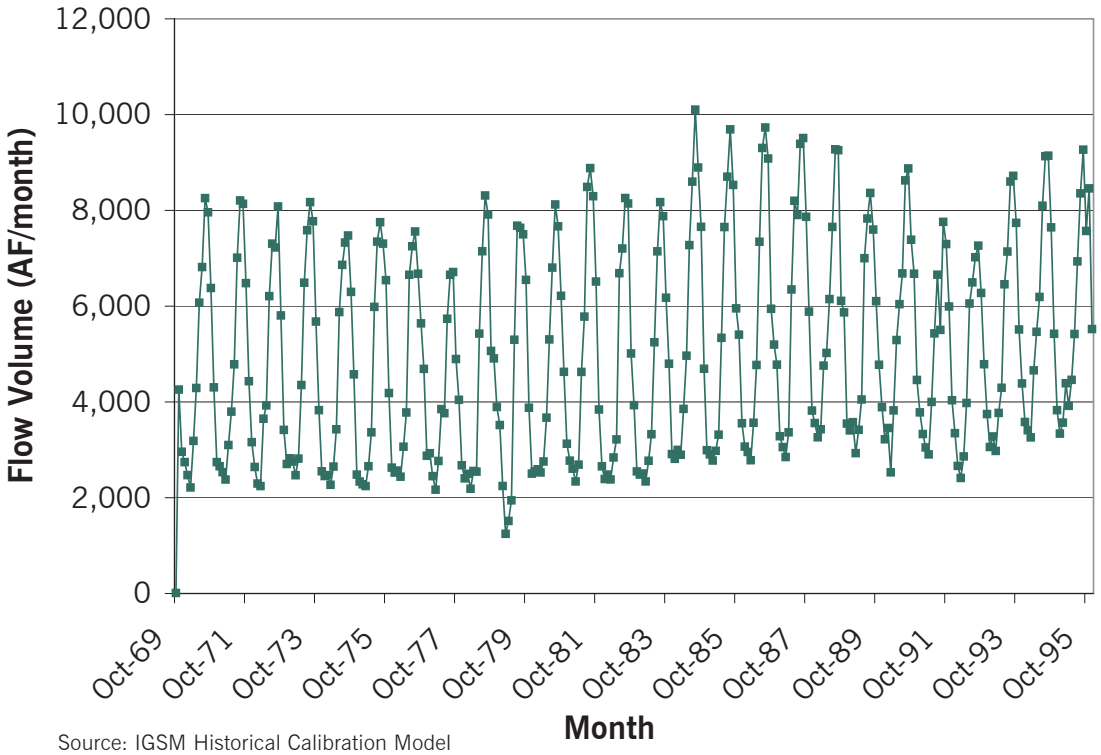
[11] OHWD contracted to the late 1970s with Reclamation for use of water stored at Sly Park Reservoir. Since the late 1970's OHWD has depended solely on riparian water supplies and infrequent supplemental purchase of spill water from the CVP, delivered through the Folsom South Canal. OHWD is assumed to continue to use riparian water rights of up to 4,000 AF/year (only because this value is assumed in the IGSM for diversions from the Cosumnes River to 1995, and because of the difficulty in accounting for riparian water use).

2.2.5.1 City of Sacramento

The City has water rights on both the Sacramento and American rivers. The City also has a settlement water contract with Reclamation that includes a delivery and storage schedule for use of their water entitlements. The City/Reclamation settlement agreement also incorporates an earlier SMUD contract with Reclamation. The City's current maximum water right/contract entitlements and existing surface water diversions are summarized in **Table 2-1**. Water available to the City's American River POU under its settlement contract is subject to a maximum annual diversion from the American River specified in the contract by a gradually increasing schedule. In 2030, the City's maximum diversion from the American River and Sacramento River is limited to 245,000 AF/year and 81,800 AF/year, respectively, under the City/Reclamation settlement contract. The City has agreed to limit its diversions under its settlement contract to not more than 225 cfs of Sacramento River water and not more than 675 cfs of American River water. In turn, Reclamation has guaranteed the availability of those amounts with no deficiencies in any hydrologic year-type.

As mentioned in **Section 2.1.1**, the WFA limits the City's American River diversions under certain flow conditions. The City may recover diversion reductions on the American River at its existing Sacramento River WTP. The City also may replace some of the water with Sacramento River water through a new intake at a future planned WTP located in North Natomas. The City's history of surface water use in the Central Basin is shown in **Figure 2-7**. Because the City's service area extends to both sides of the American River, and the water distribution system allows water to flow to either side, the information presented in this figure is only an approximation based on assumptions used in the IGSM. Based on the figure, very little change in the use of surface water has occurred over the period of record. Any change in surface water use would likely result in a change of the City's use of groundwater north of the American River, increased water conservation, and/or new growth.

Figure 2-7. City of Sacramento 1969 to 1995 Combined American River and Sacramento River Surface Water Diversion to Central Basin



Source: IGSM Historical Calibration Model

2.2.5.2 SCWA Zone 40

Currently, surface water meets approximately 12 percent of SCWA's Zone 40 water demands. SCWA's two CVP surface water contracts (termed "Fazio" and "SMUD" water) provide for two points of diversion, at or near the mouth of the American River, or just north of the community of Freeport on the Sacramento River.

SCWA has been diverting approximately 4,500 AF/year of surface water at the City's Sacramento River WTP. Under an existing wheeling agreement with the City this amount will increase to 12,350 AF/year. This water is treated and then wheeled through the City's conveyance facilities to a connection with Zone 40 facilities in Franklin Boulevard (Franklin Intertie) near the Sacramento Regional Waste Water Treatment Plant (WWTP) for use in the City of Elk Grove. Additionally, approximately 2,066 AF/year of interim surface water is used in the Mather/Sunrise portion of Zone 40; this interim surface water is purchased from Golden State Water Company as a short-term replacement for groundwater supplies lost as a result of groundwater contamination by Aerojet and Boeing. **Table 2-1** lists existing surface water supplies either acquired or currently being pursued. Each of the supplies is described in the table notes. Note that the CVP contracts have been acquired, whereas the appropriative water rights and other water rights or water contracts have not. **Table 2-2** summarizes water deliveries to Zone 40 through the Franklin Intertie with the City, beginning in 1995 with interim water supplies from Brown's Valley Irrigation District (BVID). After 1999 and into the future SCWA's "Fazio" water contract will be the sole supply of this water.

2.2.5.3 U.S. Bureau of Reclamation

U.S. Bureau of Reclamation (Reclamation), under contract with the United States Air Force and local farmers, supplied water from the Folsom South Canal to supply makeup water to a small lake located near the canal at Mather Field and for agricultural purposes. Diversions started in the late 1970s and ceased in the late 1980s because Reclamation restricted diversions as a result of the Central Valley Project Improvement Act[6] (CVPIA).

2.2.5.4 City of Folsom

Folsom's current water rights/contract entitlements are summarized in **Table 2-1**. Folsom has a Pre-1914 Water Right for up to 22,000 AF of American River water and a contract with Reclamation to deliver this water at a maximum rate of 38.8 mgd. An additional water entitlement is through a contract lease for 5,000 AF of Pre-1914 water rights with GSWC.

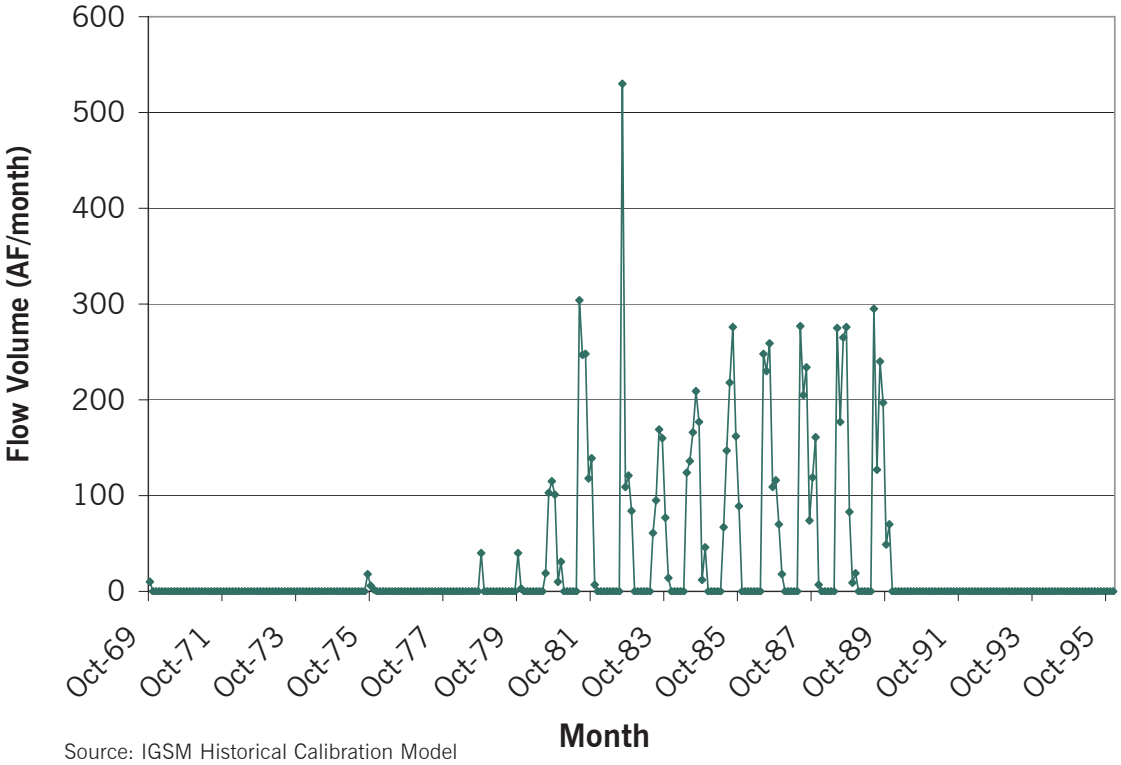
Folsom also has a subcontract with SCWA for 7,000 AF of American River water for delivery from Folsom Lake, as authorized by PL 101-514 (a portion of the "Fazio Water"). In addition, Folsom has a temporary contract with Reclamation for surplus water (often referred to as Section 215 water). Section 215 water is available on an intermittent basis only and is not storable in CVP facilities.

Table 2-2. Surface Water Diversions at the Franklin Intertie for Zone 40 from 1995 to 2003

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003
Contract Source	BVID	BVID	BVID	BVID	Fazio	Fazio	Fazio	Fazio	Fazio
Surface Water Use AF/year)	537	2,471	848	1,468	2,000	2,200	3,967	4,300	4,261

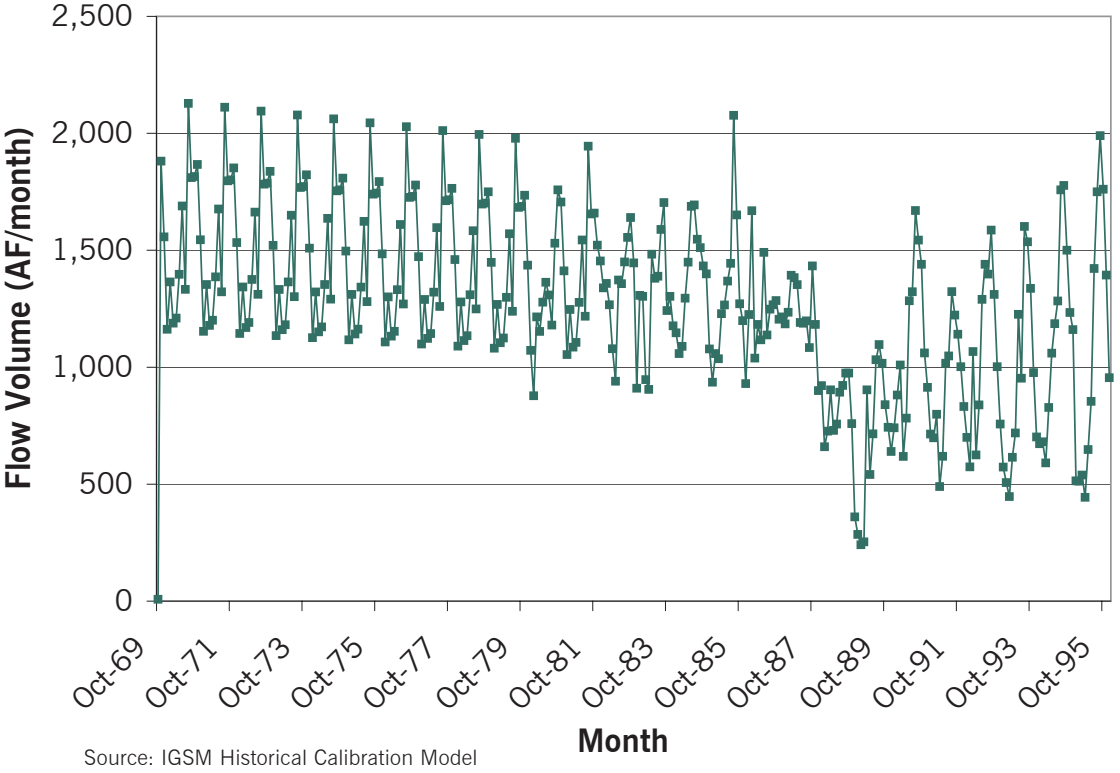
[6] The CVPIA made significant changes in the policies and administration of the project and redefined the purposes of the CVP to include the protection, restoration, and enhancement of fish, wildlife, and associated habitats, and to contribute to California's interim and long-term efforts to protect the San Francisco Bay/Sacramento-San Joaquin River Delta Estuary.

Figure 2-8. U.S. Bureau of Reclamation 1969 to 1995 Surface Water Usage in Central Basin



Source: IGSM Historical Calibration Model

Figure 2-9. City of Folsom 1969 to 1995 Surface Water Usage in Central Basin



Source: IGSM Historical Calibration Model

The WFA limits Folsom's surface water diversions under certain hydrologic conditions (see **Section 1.1.1.1.4**). **Figure 2-9** provides a trace of the use of surface water by Folsom from 1969 to 1995. This figure shows a relatively stable use of surface water with a reduction during the 1987 drought period. Much of the growth that has occurred in Folsom over the past 10 years is not shown in this graph.

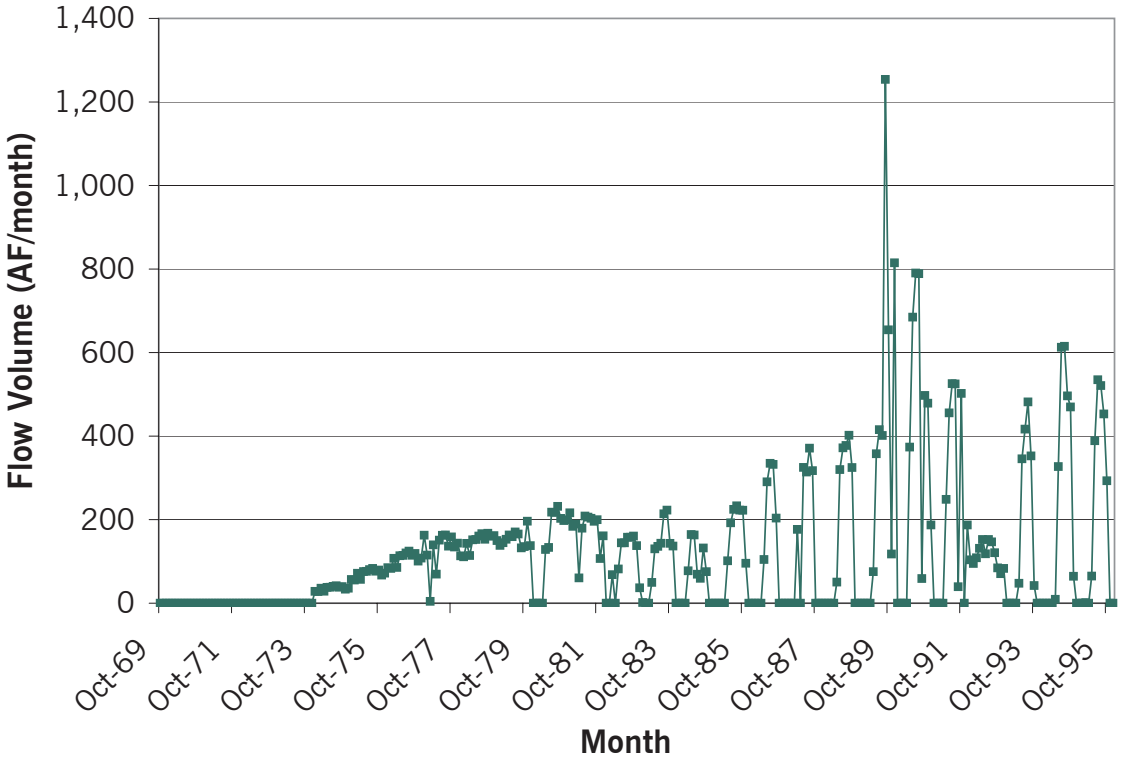
2.2.5.5 Golden State Water Company

GSWC has a 10,000 AF water right on the American River. This right and the Folsom's Pre-1914 Water Right for up to 22,000 AF of American River water are held in a co-tenancy agreement between the two purveyors. In 1994, Folsom and GSWC[7] entered into an agreement wherein GSWC agreed to sell Folsom 5,000 AF of water each year. GSWC diverts the remaining 5,000 AF/year of American River water from the Folsom South Canal for use in its Cordova System. GSWC's current water rights/contract entitlements are summarized in **Table 2-1**.

Figure 2-10 shows a buildup of surface water diversions to the Central Basin over the period of record due to growth and a higher reliance on surface water as a result of the loss of groundwater capacity from the contaminant plumes shown in **Figure 2-19**. Since 1995, GSWC has increased its capacity at the Coloma and Pyrites WTPs to 16 mgd to meet these higher demands.

SCWA purchases approximately 2,066 AF/year of interim surface water from GSWC for use in the Mather/Sunrise portion of Zone 40. This water serves as a short-term replacement for groundwater supplies lost as a result of groundwater contamination by Aerojet and Boeing.

Figure 2-10. Golden State Water Company 1969 to 1995 Surface Water Diversions in Central Basin



Source: IGSM Historical Calibration Model

[7] Southern California Water Company (SCWC), previously known as Arden-Cordova Water Service, held the water right at the time the agreement was signed. SCWC has since become Golden State Water Company.

2.2.5.6 California American Water Company

Cal-Am does not have direct access to surface water. SCWA has reached an agreement with Aerojet and Boeing to replace water supplies lost by SCWA, GSWC, and Cal-Am as a result of groundwater contamination caused by past operations. Once an agreement is signed with SCWA, the affected Cal-Am service areas could receive replacement water supplies as part of SCWA's East Sacramento County Replacement Water Supply Project. This replacement water will be considered a groundwater source of supply, which will be described further in **Section 2.3.9**. Additionally, the Cal-Am service area located within the City's POU has the potential to receive wholesale surface water supplies from the City of Sacramento.

2.2.5.7 Rancho Murieta Community Service District

Rancho Murieta CSD has appropriative water rights on the Cosumnes River of up to 6,368 AF/year for municipal and agricultural, recreational, industrial, environmental, and stock watering uses. However, because of various constraints, annual usage is only about 6,000 AF. Water is diverted from the Cosumnes River at Granlee's Dam and pumped into off-stream lakes Calero, Chesbro, and Clementia from November 1 until May 31 of each year. Minimum flows in the Cosumnes River must be 76 cfs at Michigan Bar before water can be diverted. Surface water use by Rancho Murieta over the time period of 1969 to 1995 is shown in **Figure 2-11**. This graph indicates the steep increase in diversions in relationship to increased development of the Rancho Murieta community and construction of residential development.

2.2.5.8 Omochumne-Hartnell Water District

Within OHWD landowners adjacent to the Cosumnes River and Deer Creek have riparian water rights. Agricultural diversions have fluctuated in the past, but more recently have stabilized at approximately 4,000 AF per year (riparian water usage is difficult to monitor given the number of diverters and unmonitored diversion points. The high variability of flows in both of these water ways cause a wide fluctuation in the volume of water diverted by riparian users. In some years the lack of stream flow during the irrigation season can reduce diversions to near zero.

Historically, riparian users have diverted water from either the Cosumnes River or Deer Creek. Supplemental water obtained from the CVP and conveyed to OHWD via the Folsom South Canal is released to either the Cosumnes River, where riparian users can make their diversions. **Figure 2-12** shows the historical deliveries to OHWD via the Folsom South Canal. **Figure 2-13** shows the historical diversion of surface water from the either the Cosumnes River or Deer Creek. The later years shown in **Figure 2-13** reflect the current level of diversions occurring within OHWD. Water demands for irrigation or other needs that are not met from surface water are met from groundwater sources.

2.2.6 Surface Water Supply Summary

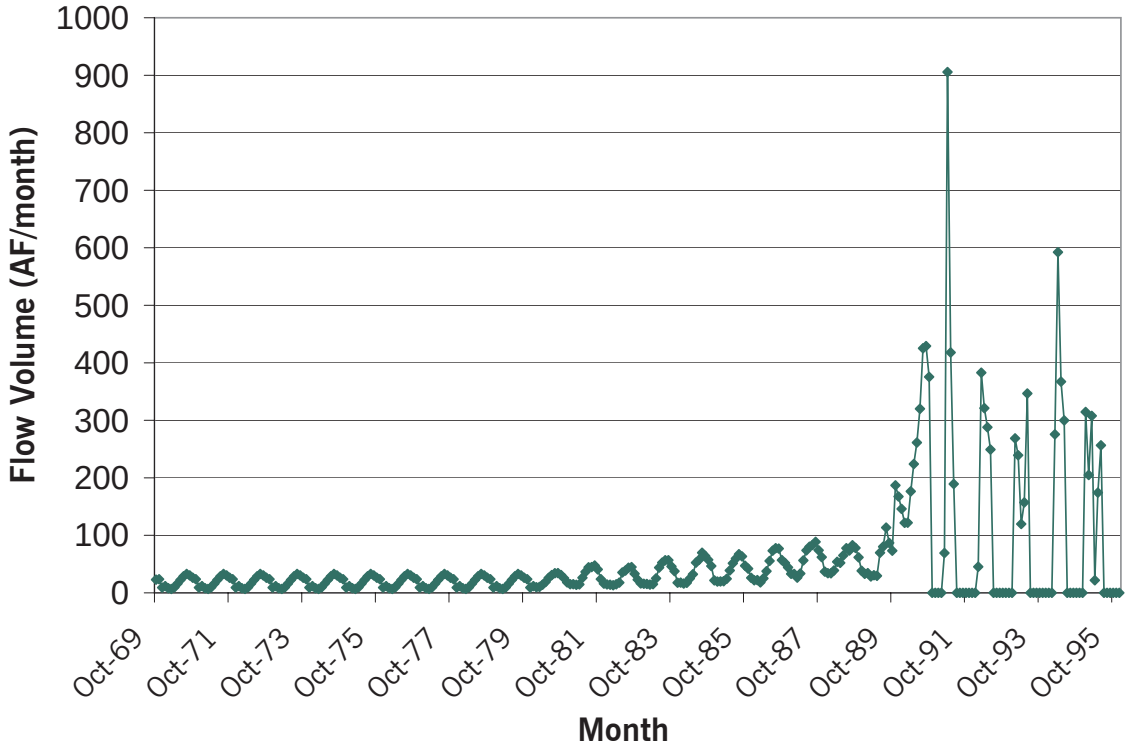
An overview of surface water supplies within the Central Basin is presented in a final water balance for the Central Basin on **Figures 2-25** and **2-26**. The figure shows that between 2005 and 2030, approximately 90,000 AF of additional surface water will be delivered to the Central Basin in wet years and approximately 30,000 AF in dry years.

The 2030 surface water supply shown in **Figure 2-26** should not be confused with the total amount of surface water available by contract to the basin given no curtailment in water contract amounts. Rather, the figure indicates the delivery of surface water based on municipal and agricultural demand patterns to meet the water demands of 2030. To make full use of all contract entitlements, would require above average rainfall, large offstream storage reservoirs to store the water for peak demand periods, and agreements to not use groundwater by purveyors who rely on groundwater to meet a portion or all of their water demands.

2.2.7 Other Available Surface Water Supplies

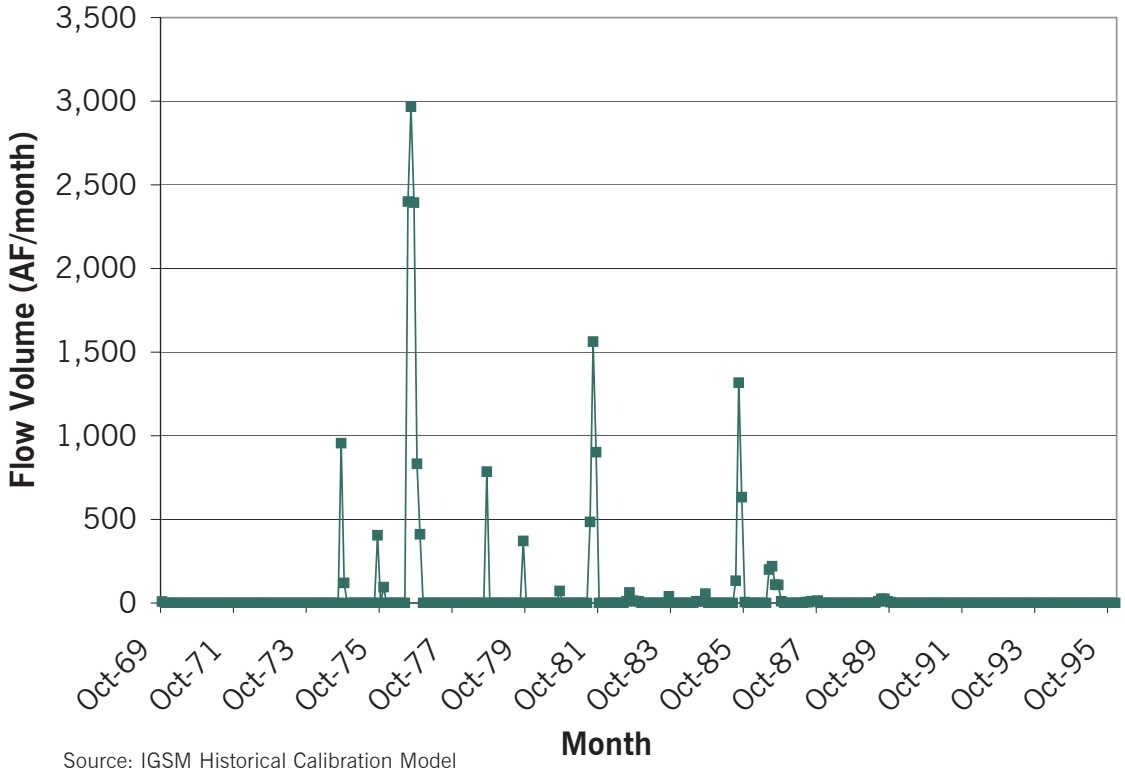
The availability of surface water supplies beyond those already under contract are not likely given the constraints and competition for water throughout the State of California. During critical year conditions, the

Figure 2-11. Rancho Murieta CSD 1969 to 1995 Surface Water Usage in Central Basin



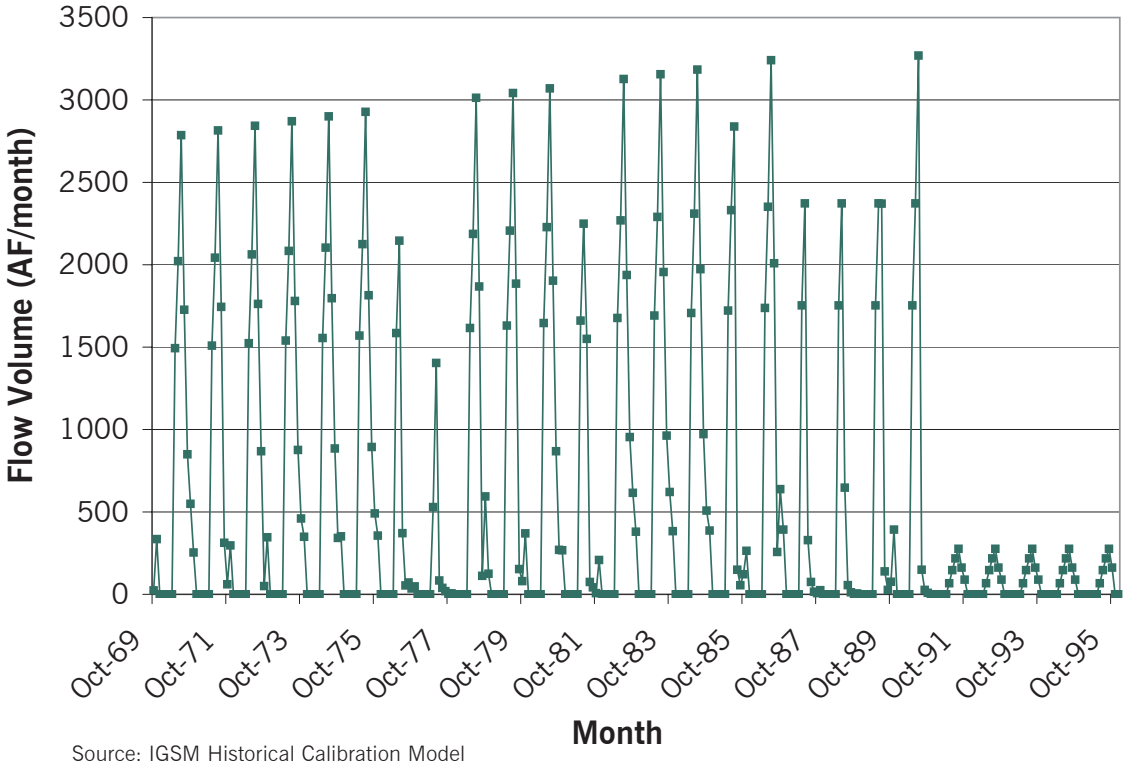
Source: IGSM Historical Calibration Model

Figure 2-12. OHWD 1969 to 1995 Surface Water Deliveries via the Folsom South Canal in Central Basin



Source: IGSM Historical Calibration Model

Figure 2-13. OHWD 1969 to 1995 Surface Water Usage from Cosumnes River and Deer Creek in Central Basin



Source: IGSM Historical Calibration Model

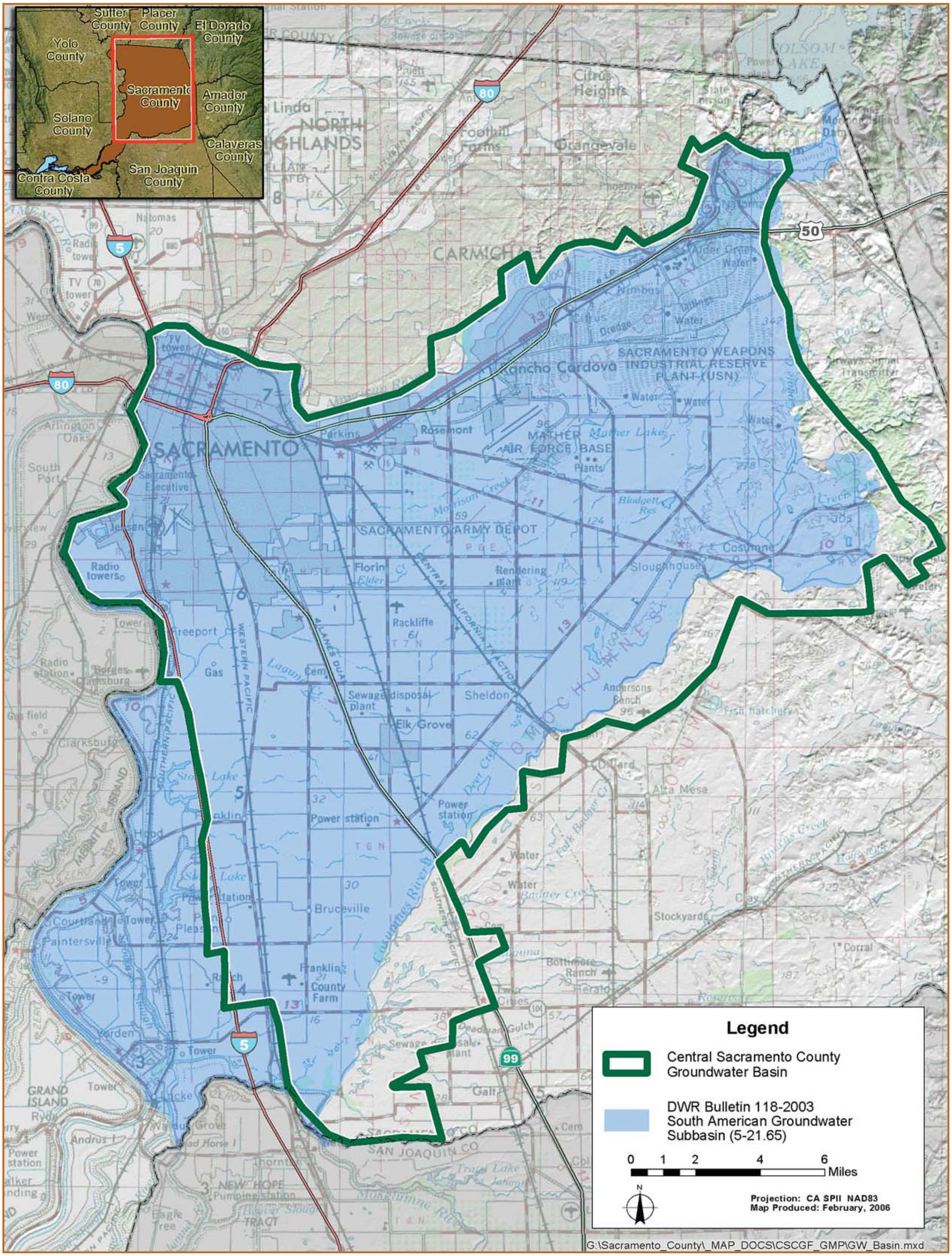
purchase of supplemental surface water from upstream Sacramento Valley water right holders may occur should those water right holders elect to fallow crops in return for compensation. SCWA has applied for an appropriative right on the Sacramento and American rivers for excess water. SCWA will most likely obtain this water right in 2008. Once appropriated, SCWA will use this water to meet municipal demands. SCWA also could potentially deliver water to agricultural areas that would have otherwise used groundwater, thus providing in-lieu recharge of the groundwater basin, or directly recharge the groundwater basin via recharge basins, and/or possibly treat and inject water with aquifer storage and recovery (ASR) wells. These options and strategies are discussed in later sections of this CSCGMP.

2.3 GROUNDWATER SUPPLIES

The groundwater basin underlying Sacramento County is divided into three subbasins, North, Central, and South, as shown in **Figure 1-1**. The Central Basin lies south of the American River, east of Interstate 5 and the Sacramento River, and north of the southern boundary of the OHWD and the Cosumnes and Mokelumne rivers. The eastern boundary of the Central Basin is approximately five to six miles west of the Sacramento County-El Dorado County boundary where the Sierra Nevada foothills begin to rise up from the Central Valley floor.

Essentially, the Central Basin boundary overlies State Department of Water Resources (DWR) South American Subbasin (DWR Bulletin 118-2003) (see **Figure 2-14**), however, the boundaries are slightly different because the Central Basin boundary was developed from the Sacramento County IGSM grid. An important artifact of this difference is that OHWD, which spans both sides of the Cosumnes River, lies entirely within the Central Basin for modeling purposes, but in fact half the district is in the Central Basin and the other half lies in the South Basin. This section provides a regional description of the geologic and hydrogeologic conditions of the underlying groundwater basin.

Figure 2-14. DWR Groundwater Subbasin



It is important to note that some municipal groundwater purveyors within the Central Basin did not actively participate in development of the CSCGMP. Rather than omit information relative to the Central Basin, the GMP Task Force obtained what information they could and have included it in this document. Because the CSCGMP is based on adaptive management, these stakeholders may participate, review, and provide data as part of the groundwater management plan program in the future.

2.3.1 Overview of Hydrogeologic Setting

The South American Subbasin, which the Central Basin is a portion, is defined as the area bounded on the west by the Sacramento River, on the north by the American River, on the south by the Cosumnes and Mokelumne rivers, and on the east by the Sierra Nevada Range. A full description about the South American Subbasin can be found on DWR's Web site (URL http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/basins/pdfs _ desc/5-21.65.pdf). A summary of more relevant information is provided below:

- Surface area: 388 square miles (Central Basin: 386 square miles).
- The perennial rivers that surround the subbasin generally create a groundwater divide in the shallow subsurface. It is clear that interaction occurs between groundwater of adjacent subbasins at greater depths.
- Average annual precipitation in the basin ranges from about 14 inches along the western boundary to greater than 20 inches along the eastern boundary.
- The eastern basin boundary is defined by the uprising foothills of the Sierra Nevada, and is a north-south line extending from Folsom Reservoir south to the small community of Rancho Murieta. This represents the approximate edge of the alluvial basin, where little groundwater flows into or out of the groundwater basin from the Sierra Nevada foothills. The western portion of the subbasin consists of nearly flat floodplain deposits from the Sacramento, American, and Cosumnes rivers, and several small east side tributaries.

2.3.2 Hydrostatigraphy of the Central Basin

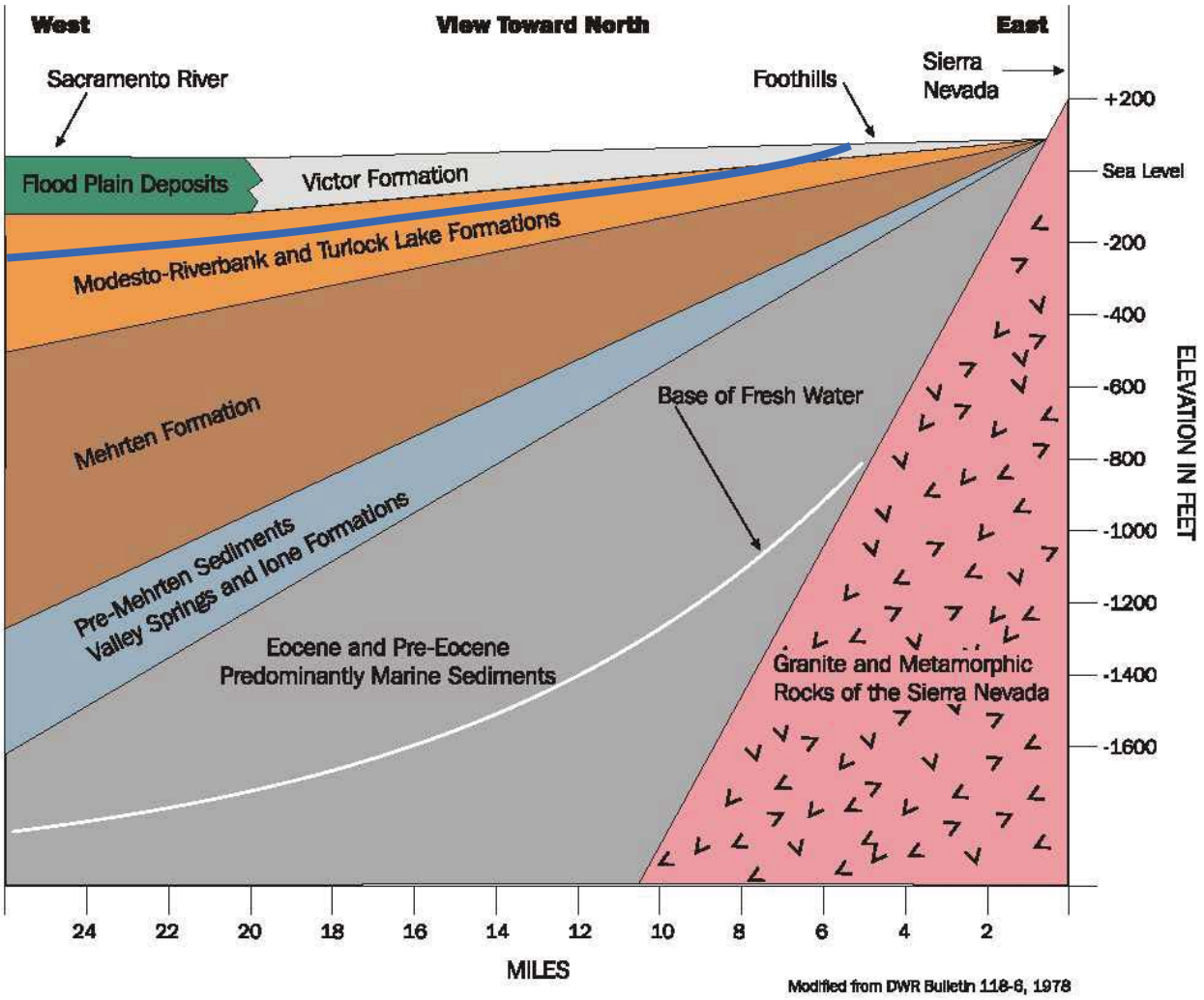
Bulletin 118-3 identifies and describes various geologic formations that constitute the water-bearing deposits underlying Sacramento County. These formations include an upper, unconfined aquifer system consisting of the Victor, Fair Oaks, and Laguna Formations (now known as the Modesto Formation), and a lower, semiconfined aquifer system consisting primarily of the Mehrten Formation, known for its fine black sands. These formations are shown in **Figure 2-15** and are typically composed of lenses of interbedded sand, silt, and clay, interlaced with coarse-grained stream channel deposits. **Figure 2-15** illustrates that these deposits form a wedge that generally thickens from east to west to a maximum thickness of about 2,500 feet under the Sacramento River. The Mehrten formation outcrops near the Sierra Foothills along the eastern Central Basin boundary and is typically characterized as a black sandy lens.

Groundwater in the Central Basin is generally classified as occurring in a shallow aquifer zone (Laguna or Modesto Formation) or in an underlying deeper aquifer zone (Mehrten Formation). Within the Central Basin, the shallow aquifer extends approximately 200 to 300 feet below the ground surface and, in general, water quality in this zone is considered to be good with the exception of arsenic detections in a few locations. The shallow aquifer is typically used for private domestic wells requiring no treatment unless high arsenic values are encountered, causing owners to possibly target other water-bearing strata.

The deep aquifer is separated from the shallow aquifer by a discontinuous clay layer that serves as a semiconfining layer for the deep aquifer. The base of the potable water portion of the deep aquifer averages approximately 1,400 feet below ground surface (bgs). Water in the deep aquifer typically has higher concentrations of total dissolved solids (TDS), iron, and manganese. Groundwater used in the Central Basin is supplied from both the shallow and deeper aquifer systems.

Older municipal wells and all domestic wells have been constructed in the shallow aquifer zone to avoid treatment.

Figure 2-15. Regional Geologic Cross Section



However, the policies and practices of SCWA in the Central Basin have led to the construction of larger municipal wells that target the Mehrten Formation where higher production rates can be achieved and less impact to private domestic wells would occur. This policy has in turn led to California Department of Health Services (DHS) requiring treatment of all municipal wells to meet primary and secondary drinking water quality standards.

2.3.3 Understanding Groundwater Changes in the Central Basin

Evaluating changes in aquifer conditions requires an understanding of the dynamic processes and interactions that are taking place as extractions and recharge of the aquifer occur. Conceptual models of the aquifer that describe induced recharge, aquifer storage, and differences between localized and regional effects on the aquifer are discussed below. These conceptual models are meant to clarify concepts; not all aspects of groundwater hydraulics are described. These models only apply to the Central Basin and adjoining basins within Sacramento County.

2.3.3.1 Groundwater Recharge Potential

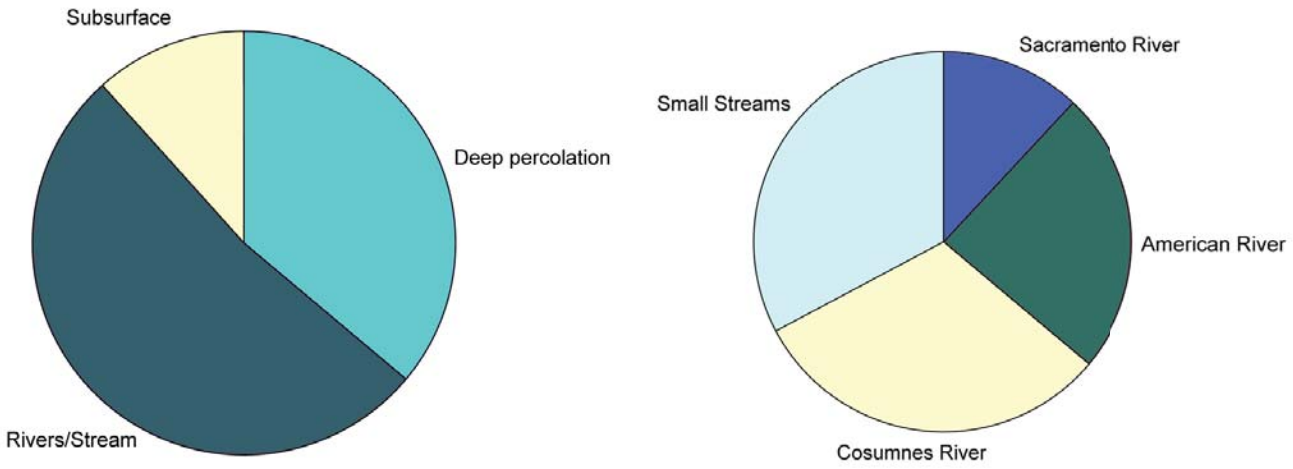
Groundwater in Central Sacramento County moves from sources of recharge to areas of discharge (as shown

in Figure 7 of the Conservation Element of the 1993 Sacramento County General Plan). Recharge of the local aquifer system occurs along active river and stream channels where extensive sand and gravel deposits exist, particularly along the American, Cosumnes, and Sacramento River channels. Additional recharge occurs along the eastern boundary of Sacramento County at the transition point from the consolidated rocks of the Sierra Nevada to the alluvial-deposited basin sediments. Recharge typically occurs through fractured granitic rock that makes up the Sierra Nevada foothills. This recharge is classified as subsurface recharge along with underground flow into and out of the Central Basin with adjacent groundwater basins. Other sources of recharge include deep percolation from applied surface water and precipitation. Induced recharge can occur from recharge basins and injection of water through ASR wells. The different sources of recharge and the approximate percentage that each provides to the Central Basin's overall natural recharge are provided in the pie chart shown in **Figure 2-16** below. The amount of natural recharge is important as it helps define when the basin is in a state of equilibrium and natural recharge roughly equals the amount of the groundwater extractions.

Changes in groundwater surface elevation (or piezometric surface) are a result of changes in groundwater extractions and can induce natural recharge at locations where rivers or streams and the aquifer are hydraulically connected. To the extent that a hydraulic connection exists, as groundwater conditions change, the slope or gradient of the groundwater surface may change as well. A steeper gradient away from the stream would induce higher recharge from the surface water source into the aquifer.

The rate of recharge from streams or rivers that are hydraulically disconnected from the groundwater surface is indifferent to changes in groundwater elevations or gradient. This is typically true with smaller streams where the groundwater surface is located far below the streambed. In such cases, surface water percolates through the unsaturated zone to the groundwater and its rate is a function of the aquifer materials underlying the streambed and the water level in the surface stream. The rate of infiltration under these conditions is not controlled by the change in elevation of the underlying groundwater. In the case of larger rivers, the American and Sacramento rivers are considered to be hydraulically connected and the Cosumnes River is considered to be hydraulically disconnected in the lower reaches of the

Figure 2-16. Central Basin Recharge Sources



river that flow through the Central Basin. The CSCGMP recognizes the importance of maintaining hydraulic connections with the larger river sources for sustainability of the groundwater supply, and the environmental benefits of keeping water flowing in the riverbed.

2.3.3.2 Localized Impacts of Groundwater Extraction

When extractions occur from a single well, a concentrated localized cone of depression is formed around the well. The shape and depth of the localized cone of depression depends on several factors including, but not limited to following: (1) the rate of extraction, (2) the presence of nearby sources of recharge and/or extraction, (3) aquifer transmissivity, (4) natural impervious barriers or earthquake faults, and (5) the "confined" or "unconfined" state of the aquifer, (i.e., storage coefficient). Over time, extraction from an unconfined aquifer can dewater the aquifer around the well. However, when extraction ceases, the water level within the aquifer can rebound to its preextraction condition over a relatively short period of time.

A confined or semi-confined aquifer behaves differently since the water is under pressure from a recharge source. Instead of dewatering the aquifer, a change in confining pressure occurs as a result of extractions; the aquifer remains saturated. In a confined aquifer, the pressure or piezometric surface elevation decline is more dramatic than in an unconfined aquifer; however, the recovery to pre-extraction conditions is typically much faster.

2.3.3.3 Regional Impacts of Groundwater Extraction

Large regional cones of depression can form in areas where multiple groundwater extraction wells are in operation. The location and shape of a regional cone of depression is influenced by the same factors as a single well. The regional cone of depression within the Central Basin is shown in **Figure 2-17**, as part of a water elevation contour map for spring 2004. This map was prepared using water elevation data from DWR's water data library available on-line at http://wdl.water.ca.gov. The map contours were determined using the Inverse Distance to a Power method.

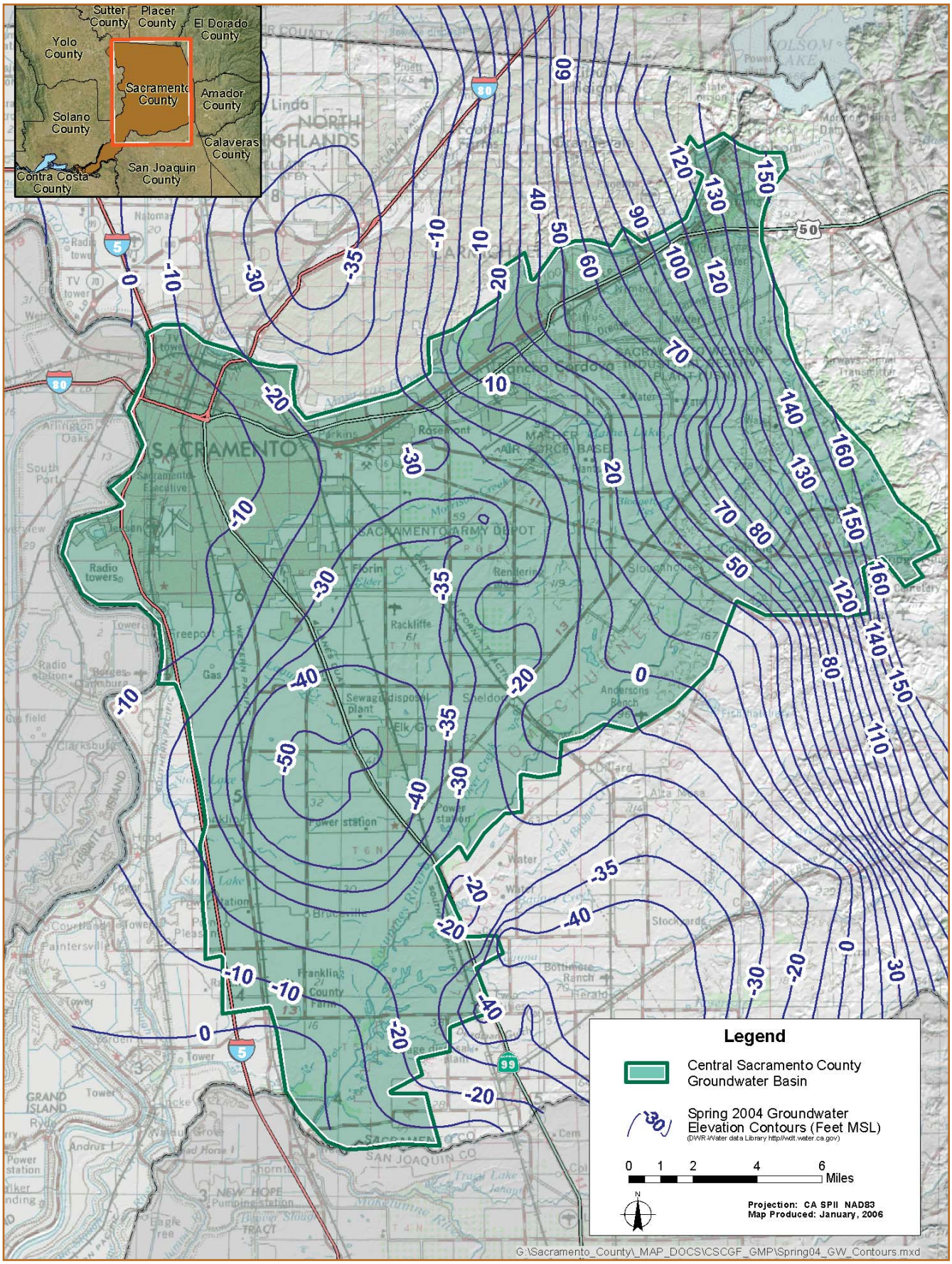
Fluctuations in regional cones of depression are measured over years and result from (1) changes in recharge and (2) changes in extractions from increasing and decreasing water demands. For example, a sequence of successive dry years can decrease the amount of natural recharge to the aquifer. If this is coupled with a coinciding increase in groundwater extraction, an imbalance is created between natural recharge and extractions. Consequently, groundwater elevations would decrease in response to this imbalance. Over time, the shape and location of the aquifer's regional cone of depression fluctuates.

Intensive use of the groundwater basin has resulted in a general lowering of groundwater elevations near the center (or centroid) of the basin away from the sources of recharge. As early as 1968, pumping depressions were evident in the Central Basin. These depressions have grown and coalesced into a single cone of depression centered in the southern portion of the Central Basin area, as shown in **Figure 2-17**.

2.3.4 Groundwater Level Trends

A review of 11 long-term hydrographs, shown in **Figure 2-18A** (within Zone 40) and **Figure 2-18B** (outside Zone 40), illustrates groundwater level trends through much of the Central Basin. Groundwater elevations generally declined consistently from the 1950s and 1960s to about 1980 on the order of 20 to 30 feet. From 1980 through 1983, water levels recovered by about 10 feet and remained stable until the beginning of the 1987 through 1992 drought. From 1987 until 1995, water levels declined by about 15 feet. From 1995 to 2003 most water levels recovered generally higher than levels prior to the 1987 through 1992 drought. Much of this recovery can be attributed to the increased use of surface water in the Central Basin, and the fallowing of previously irrigated agricultural lands transitioning into new urban development areas in accordance with the Sacramento County and City of Elk Grove General Plans. Below is a brief description of the hydrograph trends in different locations within the Central Basin (the geographic divisions were made to assist in the descriptions):

Figure 2-17. Spring 2004 Groundwater Elevation Contour Map



Southern Wells. The southern portion of the Central Basin extends from Interstate 5 to just east of Highway 99. Groundwater level trends in this area can be seen in hydrographs from DWR monitoring wells SWP-115, SWP-058, and SWP-054, shown in **Figure 2-18A**, and wells SWP-170, SWP-107, SWP-004, and SWP-063, shown in **Figure 2-18B**. The hydrographs for these wells show groundwater levels generally varying between 10 and 90 feet below mean sea level (msl).

Central Wells. The central portion of the Central Basin is the area between Highway 99 and Highway 16 (Jackson Highway). Groundwater level trends in this area can be seen in hydrographs from DWR monitoring wells SWP-121, SWP-124, SWP-125, SWP-128, SWP-188, shown in **Figure 2-18A**, and SWP-177, SWP-149, and SWP-154, shown in **Figure 2-18B**. The hydrographs for these wells show groundwater levels generally varying between 40 feet above to 40 feet below msl.

Northern Wells. The northern portion of the Central Basin is the area north of Highway 16 (Jackson Highway). The general trend of groundwater levels in this area is more stable than the other areas. Water level trends in this area can be seen in hydrographs from DWR monitoring wells SWP-255, SWP-202, and SWP-209, shown in **Figure 2-18A**, and SWP-185, SWP-250, and SWP-244, shown in **Figure 2-18B**. The hydrographs for these wells show declines of up to 40 feet since 1960.

2.3.5 Water Forum Groundwater Sustainable Yield

For each of the three groundwater subbasins in Sacramento County, the Water Forum Groundwater Negotiation Team (GWNT) developed an estimated long-term average annual pumping limit for meeting 2030 land and water use conditions (see **Section 1.1.1**). **Appendix A** provides a summary of the process used for developing the long-term average annual pumping limit of 273,000 AF/year that was negotiated for the Central Basin.

"Long-term average annual pumping limit" describes the hydrogeologic process under which groundwater can be pumped and not exceed average natural recharge over a long-term period of time. Under sustainable conditions, natural recharge is said to be able to make up for variations in the amount of pumping that occurs over the long-term, given wet and dry periods in the hydrologic record. As shown in **Figure 2-16**, natural recharge occurs primarily from streams, rainfall, and subsurface inflow.

To understand how the GWNT arrived at the 273,000 AF/year is a complex process that requires some discussion of the technical data that were developed to support that decision. Much of the data are based on evaluating future land and water use projections and describing the impacts associated with increased water demands, assuming that demand is met solely by groundwater. Comparing these results with existing conditions (1990 as the baseline) provided a level of impact that could be expected if groundwater pumping were increased beyond baseline conditions. In some cases, such as in the North Basin, the GWNT agreed that baseline levels of pumping were already at an acceptable level of impact.

Four quantifiable factors were used to determine the level of impact:

- Water quality degradation
- Dewatering of wells
- Higher cost of pumping
- Ground subsidence

Based on these four elements, a series of groundwater model runs quantified each condition in 10-year increments, beginning in 1990 and ending in 2030. Each model run was setup to reflect future land and water use conditions; then 70 years of historical hydrology were applied to each model run to determine how the aquifer might behave under wet and dry conditions.

After a comprehensive review and analysis of model data and real data, the GWNT concluded that using 2005 levels of groundwater pumping would provide the highest quantity of groundwater yield from the basin while minimizing impacts associated with the four elements of concern. By interpolating between 2000 and 2010, pumping at 2005 equates to a long-term average annual pumping limit of approximately 273,000 AF/year for the Central Basin.

2.3.6 Groundwater Quality

Water quality analysis of the aquifers underlying the Central Basin has shown that groundwater found in the upper aquifer system is of higher quality than that found in the lower aquifer system. This is principally because the lower aquifer system (specifically the Mehrten formation) contains higher concentrations of iron and manganese. The lower aquifer system also has higher concentrations of total dissolved solids (TDS), although this aquifer typically meets water quality standards as a potable water source. At depths of approximately 1,400 feet or greater (actual depth varies throughout the basin), the TDS concentration exceeds 2,000 milligrams per liter (mg/L) and groundwater is considered non-potable unless treated by reverse osmosis. Water from the upper aquifer (specifically the Laguna formation) generally does not require treatment (unless high arsenic values are encountered), other than disinfection for public drinking water systems.

2.3.6.1 Background Water Quality

Municipal wells meet all CCR Title 22 primary drinking water quality standards. A number of purveyor wells within the Central Basin exceed secondary drinking water standards for iron and manganese; many of these wells are treated to remove these constituents. Secondary standards were established for aesthetic concerns (e.g., staining of laundry and porcelain fixtures) and at elevated levels do not pose a health hazard. Arsenic concentrations in some wells exceed recently implemented (January 2006) federal drinking water standards of 10 micrograms per liter (μg/L); these regulations provide a timetable for compliance. Radon also has been detected in groundwater in the greater Sacramento area, although not at levels that exceed current drinking water standards.

This description of background water quality is based on data used to populate the Central Basin Data Management System (DMS). Groundwater quality data from monitoring activities between 1999 and 2003 were used to populate the DMS for portions of the Central Basin. The DMS can be used to query data and develop statistics and graphics for constituents of interest.

2.3.6.2 Total Dissolved Solids

TDS concentrations in most municipal wells are within secondary drinking water standards; therefore, TDS does not limit the potable use of groundwater.

2.3.6.3 Iron and Manganese

Iron and manganese are found in deeper municipal wells and treatment is required by DHS when a new well is constructed. Therefore, the presence of iron and manganese does not limit the potable use of groundwater. According to the DMS, iron concentrations range from nondetect (less than 10 μg/L) to 16,000 mg/L, although most wells have average values of less than 200 mg/L. Manganese concentrations range from nondetect (less than 2 mg/L) to 1,700 mg/L, although most wells have average values of less than 50 mg/L.

2.3.6.4 Arsenic

The U.S. Environmental Protection Agency (EPA) has adopted a revised MCL for arsenic of 0.010 mg/L, along with monitoring requirements, arsenic health effects language, and best available technologies for arsenic mitigation in public drinking water systems. The compliance date for the new MCL is January 23, 2006. Although DHS is in the process of adopting new regulations, it is unknown when the state regulations will be adopted. In the meantime, DHS plans to initiate implementation of the new federal requirements in January 2006.

DHS will require that untreated municipal wells that exceed the new arsenic standards be phased out of production or be treated to below the new 10 μg/L maximum concentration. The requirement does not apply to individual domestic wells. Water purveyor compliance through DHS will likely take place during 2006 within a set timeframe that the water purveyor can meet with DHS oversight. This provides for additional time to construct replacement facilities and close down existing wells that exceed the arsenic concentration, or, if needed, to meet the necessary treatment requirements.

Prior to the EPA ruling of 2004, arsenic concentrations of less than 50 μg/L were acceptable for potable

Figure 2-18A. Central Basin Groundwater Elevation Hydrographs Within SCWA Zone 40

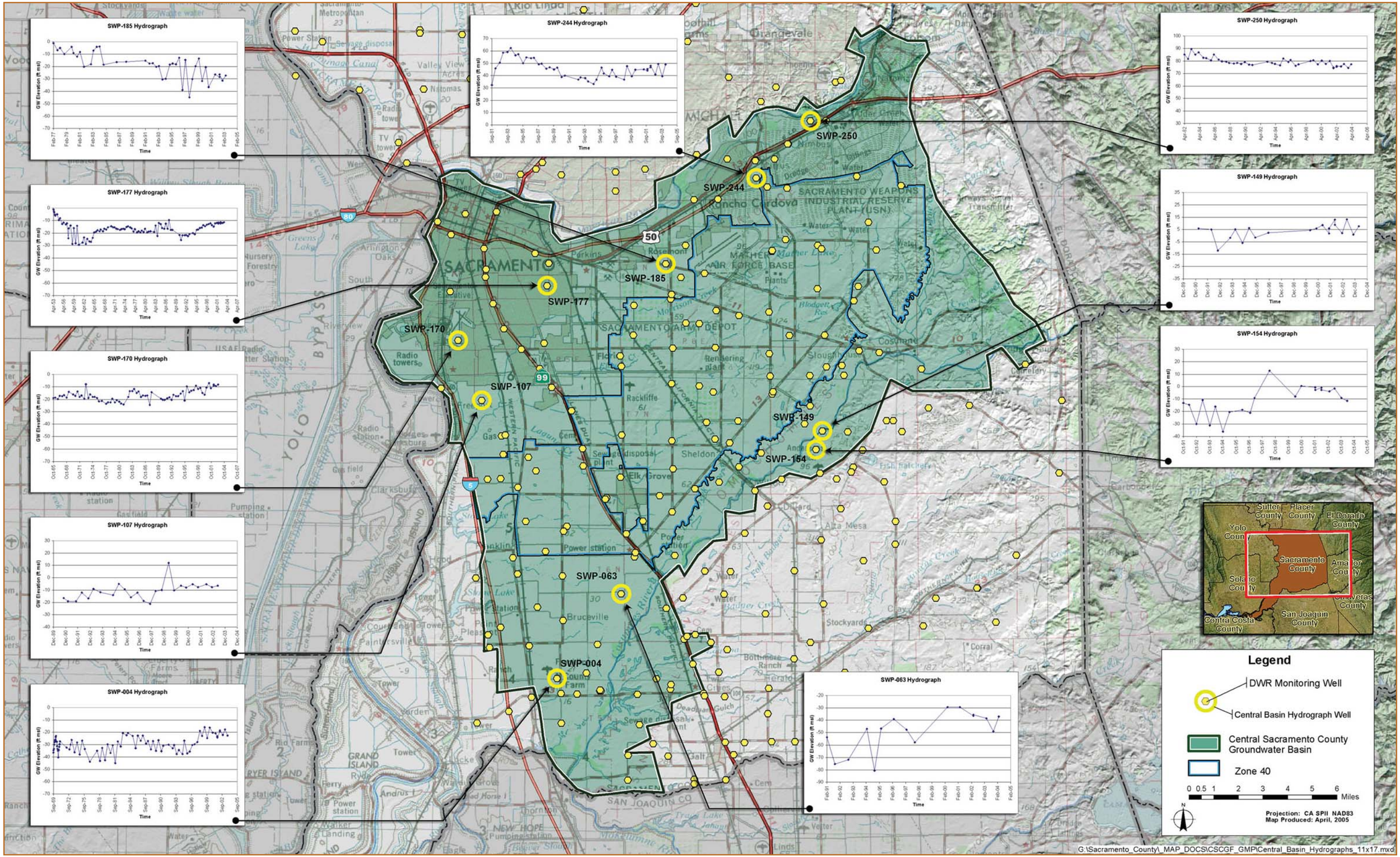
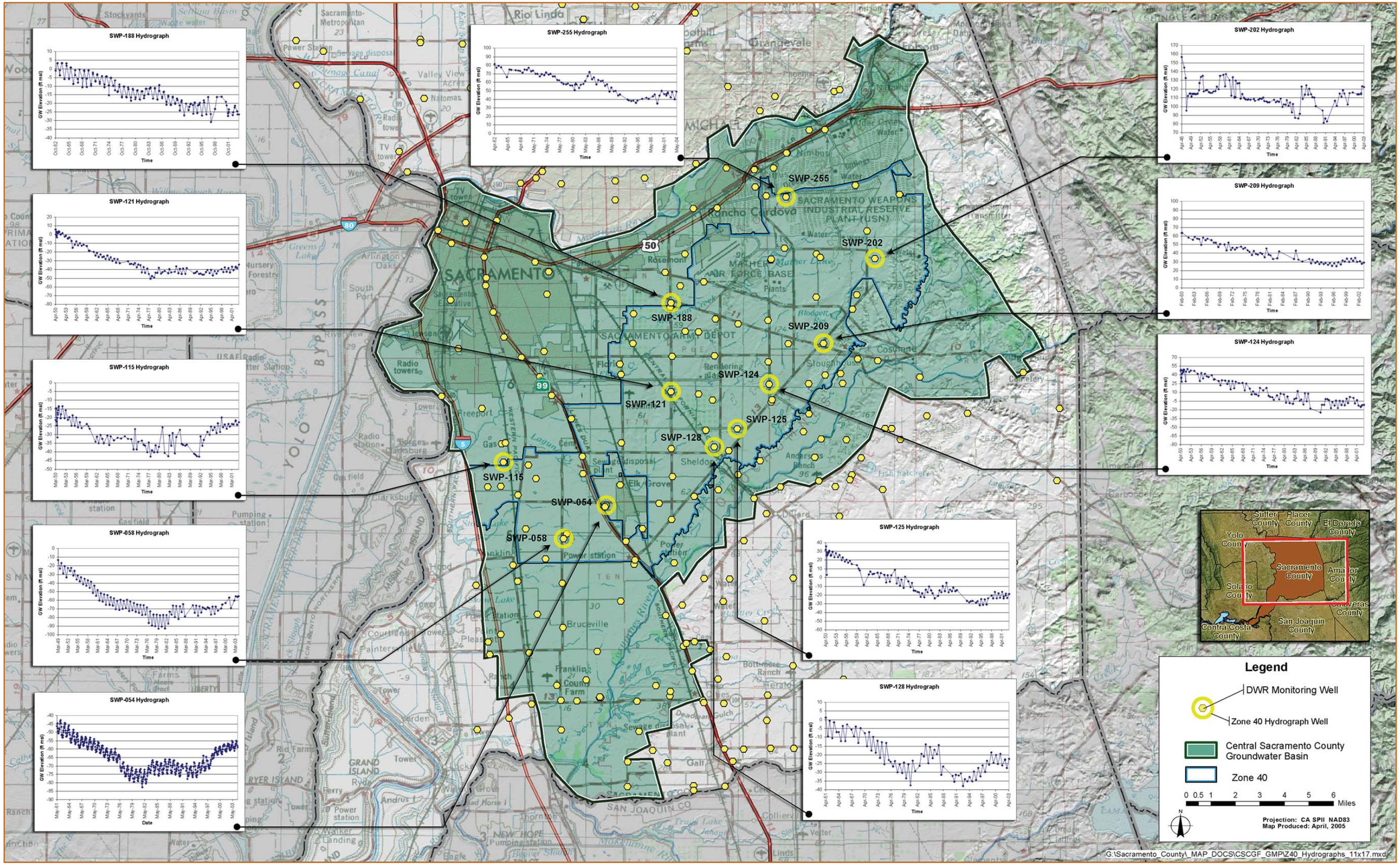


Figure 2-18B. Central Basin Groundwater Elevation Hydrographs Outside SCWA Zone 40



drinking water. Municipal wells within the Central Basin have historically met primary drinking water standards; therefore, arsenic has not limited the potable use of groundwater prior to December 2006.

2.3.6.5 Known "Principal" Contaminant Plumes

Principal groundwater contaminant plumes within or near the Central Basin are known to exist from source areas such as Mather Field, McClellan Air Force Base, Aerojet, Boeing, the former Army Depot, the former Southern Pacific and Union Pacific railyards, and various landfills. These plumes are shown on **Figure 2-19**. Contaminant plume data were collected from the following documents:

- MWH. Mather Air Force Base Annual and Fourth Quarter 2002 Sitewide Groundwater Monitoring Report. March 2003
- Aerojet Environmental Remediation. Aerojet General Corp Superfund Site Western Groundwater Cleanup 2004 Progress Report. 2004
- McDonnell Douglas/Boeing Environmental Remediation. McDonnell Douglas Sacramento Site, American River Study Area Groundwater Monitoring Results, April – June 2002. August 2002
- Disposal Sites. Integrated Waste Management Board.
- Environmental Simulations, Inc., Revised Probabilistic Groundwater Flow Model for the Southern IRCTS, Rancho Cordova, California. June 2003
- Groundwater Contamination Investigation for Central Basin 2004, Water Forum/Schlumberger Engineering)

Although other localized plumes exist in and around the Central Basin (e.g., small leaking under ground fuel tanks), the principal plumes shown in **Figure 2-19** are the largest and have the greatest current impact on existing groundwater use.

For the Mather Field plumes, the primary contaminants of concern (COC) are tetrachloroethylene (TCE), perchloroethylene (PCE), and carbon tetrachloride. The edges of Mather Field plume represent a composite COC concentration of 0.5 mg/L, which is one-tenth of the maximum contaminant level (MCL) for these constituents.

For the Aerojet and IRCTS plumes, the primary COCs are TCE, n-nitrosodimethylamine (NDMA), and perchlorate.

Leaking underground fuel tank (LUFT) sites also exist within the Central Basin. It is assumed that these sites can be fully remediated; however, an inventory of the number of sites, their locations, and their clean-up status is kept by the Sacramento County Environmental Management Department (EMD). The aggregate impact on groundwater quality from undetected contamination (e.g., MTBE) in the basin cannot be determined at this time and may ultimately be considerable. Methods to inventory these undetected contaminants will likely be done under the purview of EMD.

2.3.7 Groundwater Facilities

In municipal water systems that are "groundwater only," water is fed into the system by individual wells (direct feed wells) or by centralized groundwater treatment plant(s) (ranging in size from 1 mgd to 12 mgd) that treat water from several wells.

Large capacity municipal wells are shown in **Table 2-3** and **Figure 2-20**. Agricultural and private wells are not shown due to insufficient data on the location and size of each well. Typical municipal capital facilities for groundwater production capacity include groundwater extraction wells (including raw water piping from the wells to the treatment plant), treatment, at grade storage tanks, booster pumps, and transmission pipelines to the distribution system. Treatment plants typically remove iron, manganese, and some arsenic. Capacity of groundwater facilities by agencies participating in development of the CSCGMP are summarized below:

- The City currently operates two active municipal groundwater supply wells plumbed to its distribution system within the city limits south of the American River. These two wells represent about seven percent of the City's total groundwater pumping capacity of 30 mgd.
- SCWA has a combination of direct feed wells and groundwater treatment facilities. Groundwater treatment plant capacity ranges from approximately 2 mgd to 11 mgd.
- GSWC provides a portion of the water supply to its Cordova System with direct feed wells with a combined capacity of approximately 24 mgd. The Cordova System has been significantly impacted

Figure 2-19. Known Principal Contaminant Plumes

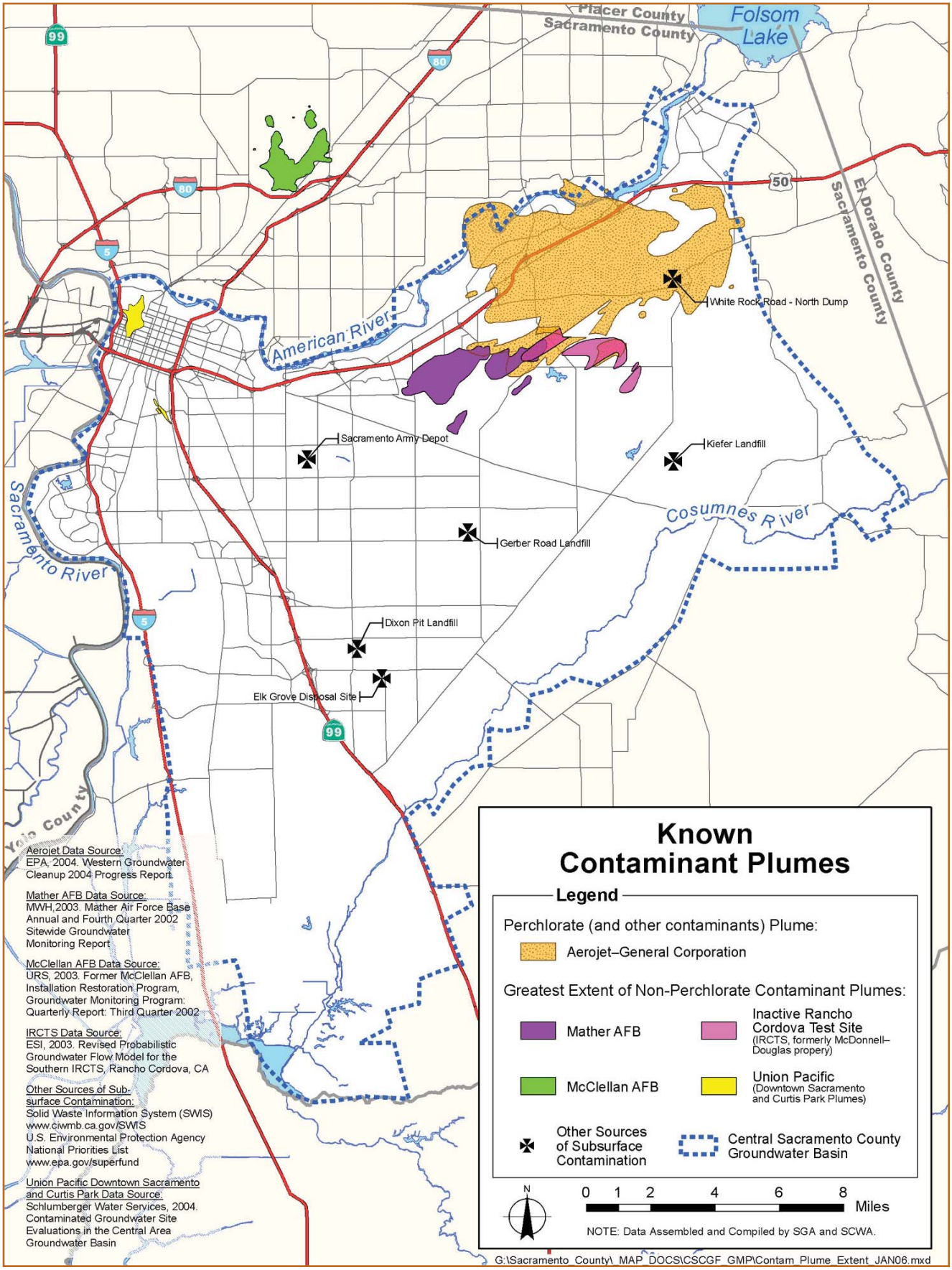
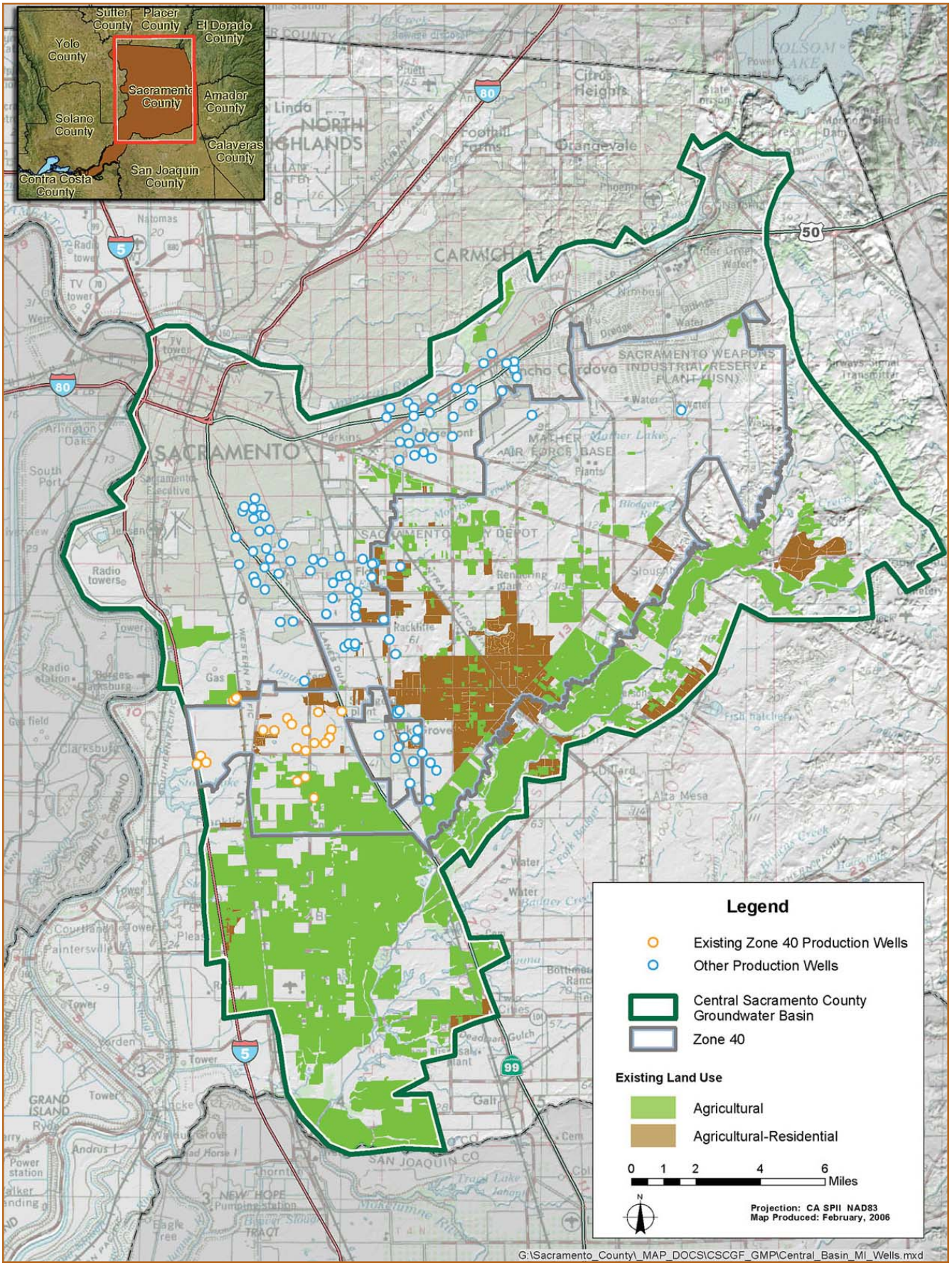


Table 2-3. Existing Purveyor "Larger" Production Wells

DMS Well ID	Well Name	State Well ID	Agency
134	WOODMAN	null	CAL-AM
135	SALMON F	null	CAL-AM
136	ROGUE RI	null	CAL-AM
137	WHITEWAT	null	CAL-AM
138	BUTTERFI	null	CAL-AM
139	FOLSOM/B	null	CAL-AM
153	CALDERA	null	CAL-AM
154	POINT REYES	null	CAL-AM
155	COLLEGE	null	CAL-AM
156	OAKEN BU	null	CAL-AM
157	SUTTERS	null	CAL-AM
158	WILDROSE	null	CAL-AM
159	TALLY HO #1	null	CAL-AM
160	SOUTHPORT	null	CAL-AM
161	WESTPORTER	null	CAL-AM
162	MOON BEAM	null	CAL-AM
163	TALLY HO #2	null	CAL-AM
164	SOUTHGATE	null	CAL-AM
165	A PARKWAY	null	CAL-AM
166	contaminated	null	CAL-AM
167	SKY PARKWAY	null	CAL-AM
168	contaminated	null	CAL-AM
169	abandoned	null	CAL-AM
170	STOCKER	null	CAL-AM
171	CONRAD D	null	CAL-AM
172	BRIGGS D	null	CAL-AM
173	LIPPI PARKWAY	null	CAL-AM
174	GERBER RD	null	CAL-AM
175	ROCKHURST	null	CAL-AM
177	ELSIE	null	CAL-AM
178	WILBUR #1	null	CAL-AM
179	WILBUR #2	null	CAL-AM
180	PARK SIT 2	null	CAL-AM
181	VINTAGEP #3	null	CAL-AM
182	LARCH CO SD #1	null	CAL-AM
183	LARCH CO #2	null	CAL-AM
244	CENTR	null	CAL-AM
246	CHETT	null	CAL-AM
249	COUNTRYSIDE1A	null	CAL-AM
250	COUNTRYSIDE #2	null	CAL-AM
255	EXPLO	null	CAL-AM
258	GOULD	null	CAL-AM
264	MALAG	null	CAL-AM
265	MARS	null	CAL-AM
266	MONTE	null	CAL-AM
267	NUT P	null	CAL-AM
273	ROCKI	null	CAL-AM
280	SWANS	null	CAL-AM
286	VINTAGE #1	null	CAL-AM
287	WEST	null	CAL-AM
289	WINCH	null	CAL-AM
436	FLORIN BOOSTER	null	CAL-AM
437	FLORINC	null	CAL-AM
438	FOLSOM-MH	null	CAL-AM
439	GOV CIRCLE	null	CAL-AM
440	RAFTCR	null	CAL-AM
441	ROSEMONT	null	CAL-AM
444	55TH ST	null	CAL-AM
448	PARKSITE#1(ELSIE1)	null	CAL-AM
477	POWER INN	null	CAL-AM
485	VINTAGE #2	null	CAL-AM
488	ISLETON #1	null	CAL-AM
489	ISLETON #2	null	CAL-AM
200	SAC-083	null	City of Sacramento
430	SAC-107	null	City of Sacramento
466	WELL	null	Elk Grove Fish and Habitat
467	WELL	null	Elk Grove Fish and Habitat
468	WELL	null	Elk Grove Fish and Habitat
303	MAIN	null	Elk Grove Water Service
304	MARVA	null	Elk Grove Water Service
305	WEBB	null	Elk Grove Water Service
306	EMERA	null	Elk Grove Water Service
307	EMERA	null	Elk Grove Water Service
308	PARKS	null	Elk Grove Water Service
309	WILLI	null	Elk Grove Water Service
310	POLHE	null	Elk Grove Water Service
311	FEICK	null	Elk Grove Water Service
312	DINO	null	Elk Grove Water Service
313	FALLB	null	Elk Grove Water Service
401	ADAMS	null	Elk Grove Water Service
492	HAMPTON VILLAGE	null	Elk Grove Water Service
321	DIANA	null	Florin County Water District
322	FLETC	null	Florin County Water District
323	FLORIN	null	Florin County Water District
324	FRENCH	null	Florin County Water District
325	KARA	null	Florin County Water District
326	MC COMBER	null	Florin County Water District
327	POWER INN	null	Florin County Water District
328	REESE #1	null	Florin County Water District
329	REESE #2	null	Florin County Water District
472	WEYAND	null	Florin County Water District
330	null	null	Fruitridg Vista Water District
331	null	null	Fruitridg Vista Water District
332	null	null	Fruitridg Vista Water District
333	null	null	Fruitridg Vista Water District
334	null	null	Fruitridg Vista Water District
335	null	null	Fruitridg Vista Water District
336	null	null	Fruitridg Vista Water District
337	null	null	Fruitridg Vista Water District
338	null	null	Fruitridg Vista Water District
339	null	null	Fruitridg Vista Water District
340	null	null	Fruitridg Vista Water District
341	null	null	Fruitridg Vista Water District
342	null	null	Fruitridg Vista Water District
343	null	null	Fruitridg Vista Water District
344	null	null	Fruitridg Vista Water District
452	AGGREGATE	null	Mather Air Force Base
184	VINTAGE PARK W-060	null	SCWA Zone 41
185	CAYMUS W-061	034/029-062	SCWA Zone 41
372	UNION INDUSTRIAL W-027	06N/06E-07Q02 M	SCWA Zone 41
373	SURVEY RD W-028	06N/06E-18A01 M	SCWA Zone 41
374	STOCKTON BL W-029	06N/06E-18J02 M	SCWA Zone 41
375	BRUCEVILLE W-040	06N/06E-18J02 M	SCWA Zone 41
376	SEASONS W-041	034/029-062	SCWA Zone 41
377	BANYON W-042	034/029-062	SCWA Zone 41
378	DUCK SLOUGH W-043	034/029-062	SCWA Zone 41
379	KILCONNELL W-044	034/029-062	SCWA Zone 41
380	ACROPOLIS W-045	034/029-062	SCWA Zone 41
381	ASHURST W-046	034/029-062	SCWA Zone 41
382	FEATHER CREEK W-047	034/029-062	SCWA Zone 41
383	WADENA W-048	034/029-062	SCWA Zone 41
384	SOARING OAKS W-049	034/029-062	SCWA Zone 41
385	BIG HORN SOUTH W-050	034/029-062	SCWA Zone 41
386	BIG HORN CENTER W-051	034/029-062	SCWA Zone 41
387	BIG HORN NORTH W-052	034/029-062	SCWA Zone 41
388	WHITE ROCK W-017	null	SCWA Zone 41
389	RECYCLE W-018	null	SCWA Zone 41
390	W-62 ANDAL	034/029-062	SCWA Zone 41
391	EQUINE W-063	034/029-062	SCWA Zone 41
396	3RD STREET W-019	06N/04E-14N01 M	SCWA Zone 41
397	HOOD-FRANKLIN RD (replace 398)	null	SCWA Zone 41
398	HOOD-FRANKLIN RD W-020	null	SCWA Zone 41
399	SWALE	null	SCWA Zone 41
447	OMEGA	null	SCWA Zone 41
483	WESTRAY W-064	034/029-062	SCWA Zone 41
484	SHELDON NORTH W-065	034/029-062	SCWA Zone 41
499	WATERMAN RD W-067	034/029-062	SCWA Zone 41
5172	null	null	SCWA Zone 41
5173	CALVINE MEADOWS W-066	null	SCWA Zone 41
5174	TILLOTSON W-068	null	SCWA Zone 41
5175	PERRY RANCH W-069	null	SCWA Zone 41
5176	DWIGHT RD RAW WATER WELL	null	SCWA Zone 41
5177	East Park W-073	null	SCWA Zone 41
5178	W. Stockton Blvd. W-074	null	SCWA Zone 41
5179	Legends W-076	null	SCWA Zone 41
5180	LW-78 POPPY RIDG	null	SCWA Zone 41
5181	LW-105 AZINGER	null	SCWA Zone 41
5182	LW-106 RODR CIR	null	SCWA Zone 41
5183	LW-109 TERRAZO	null	SCWA Zone 41
5184	LW-110 FERRAGAMO	null	SCWA Zone 41
5185	LW-113 BISHOP	null	SCWA Zone 41
5186	LW-114 WINDSOR D	null	SCWA Zone 41
5245	W-055	null	SCWA Zone 41
5246	W-056	null	SCWA Zone 41
5247	W-070	null	SCWA Zone 41
5248	W-075	null	SCWA Zone 41
5249	W-077	null	SCWA Zone 41
5250	W-007	null	SCWA Zone 41
5251	W-016	null	SCWA Zone 41
5252	W-020	null	SCWA Zone 41
5253	W-032	null	SCWA Zone 41
5254	W-081	null	SCWA Zone 41
5256	W-089	null	SCWA Zone 41
5257	W-099	null	SCWA Zone 41
5258	W-108	null	SCWA Zone 41
5259	W-B01	null	SCWA Zone 41
5260	W-B02	null	SCWA Zone 41
5261	W-B03	null	SCWA Zone 41
5262	W-DA	null	SCWA Zone 41
5263	W-M01	null	SCWA Zone 41
5264	W-T01	null	SCWA Zone 41
5265	W-T02	null	SCWA Zone 41
5266	W-T03	null	SCWA Zone 41
5267	W-T06	null	SCWA Zone 41

Note: "null" = no data

Figure 2-20. Existing Production Wells



by groundwater contamination from Aerojet and in some cases has installed well-head treatment to remove VOC contaminants prior to using groundwater as a potable supply.

- Cal-Am service areas are served primarily by direct feed groundwater wells within its service areas, but also has groundwater treatment facilities in its Parkway and Countryside systems. Cal-Am also is experiencing impacts from groundwater contamination from Mather, and in some cases, has installed well-head treatment such as carbon filters or air strippers to remove contaminants prior to using groundwater as potable supply. In addition, the Parkway and Countryside systems are believed to be potentially "at risk" of contamination due to past dry cleaner discharge of tetrachloroethene (PCE) into the sanitary sewer system.

2.3.8 Groundwater Rights

Since the groundwater basin underlying all of Sacramento County is not adjudicated, the rights to groundwater are based on the overlying water right of the property owner. Different types of groundwater rights are described more fully below.

Correlative Right. A correlative right has a mutual or reciprocal relationship to the rights of others, in the sense that the existence of one necessarily implies the existence of the other. For example, the rights of landowners in a given basin to extract groundwater are correlative with all other landowners in that basin.

Overlying Right. An overlying right is the right of a landowner to take water from the aquifer underneath their property for reasonable and beneficial use on the land overlying the aquifer. Overlying rights exist by virtue of land ownership.

Prescriptive right. A prescriptive right comes into existence only if a groundwater basin has no "surplus"[8] water available. Such a right is gained by appropriating nonsurplus water for a statutorily prescribed period.

Subordinate right. A subordinate right is one that is inferior to or secondary to a higher right.

Appropriative right. Appropriative rights to groundwater apply to pumpers who use water on nonoverlying lands. Most municipalities and agricultural water purveyors have appropriative rights to groundwater because they deliver groundwater to parcels they do not own, and in some cases to lands outside the basin. Appropriative use of groundwater is limited to water in excess of that required by overlying users. Unlike appropriative rights for use of surface water, no formal regulatory permitting process exists for appropriative use of groundwater.

Adjudication of a Groundwater Basin. Adjudication of a groundwater basin essentially removes the above mentioned rights to groundwater and the amount of water available to each groundwater pumper is allocated based on a court decision.

2.3.9 East Sacramento County Replacement Water Supply Project

Groundwater contamination emanating from the Aerojet project site, the Inactive Rancho Cordova Test Site (IRCTS), and the Mather Field site has significantly impacted groundwater resources in the Rancho Cordova area. In some instances, groundwater supplies have been impacted so severely that all wells within a purveyor's service area have been shut down. Typically, as an overlying appropriator, a municipal purveyor would use the underlying groundwater to serve homes and businesses that would be constructed within the purveyor's service area. However, because the underlying aquifer in much of the Rancho Cordova area is contaminated, this method of developing and delivering groundwater is unacceptable. Therefore, it is reasonable to consider a second approach to providing water. Aerojet and McDonnell-Douglas (Boeing) have been directed by various regulatory agencies to implement a groundwater remediation program that would stop the spread of contamination and perhaps remove it entirely. However, implementing the remedy will take a

[8] Surplus water is water in excess of environmental use and state and federal water projects.

significant amount of time and will not keep pace with the economic growth in the community.

Most of the current cleanup activities require extracting, treating, and discharging treated groundwater to a surface water body, primarily tributaries to the American River. This water then flows downstream through the Delta, resulting in a loss in the groundwater basin. A better use of this water would be to find a way to put it to beneficial use within the same groundwater basin that it is extracted from. The result would be that the overall impact of groundwater remediation would not affect the estimated long term average annual pumping limit of the basin. To achieve this objective, SCWA has entered into agreements with Aerojet and Boeing to ensure that the remediated groundwater does not leave the basin.

The project includes 1) extracting contaminated groundwater, 2) treating the contaminated groundwater to meet National Pollution Discharge Elimination System (NPDES) permit requirements, 3) discharging the treated groundwater to the American River, and 4) reusing the treated groundwater in the Central Basin. Reuse has been prioritized in the agreement as follows: 1) replacement of municipal groundwater supplies lost due to contamination, 2) water supply service to "Aerojet Lands," 3) new development in Zone 40, and 4) environmental uses.

Since the above agreements have been approved, additional agreements have been reached that more fully delineate how the replacement water will be used. These agreements include an agreement with EBMUD regarding use of the Folsom South Canal for delivery of replacement water supplies to GSWC and delivery of environmental water to the Cosumnes River, an agreement with SMUD on water quality in the Folsom South Canal, an agreement with GSWC for replacement water supply, and an agreement with TNC and SSCAWA on delivery of environmental water to the Cosumnes River. Currently, no agreement exists between SCWA and Cal-Am on how much water will be needed to meet their replacement water supply needs.

2.4 RECYCLED WATER SUPPLIES

Recycled water is a desirable source of water for outdoor landscape irrigation and other non-potable uses, especially in times of drought when surface water supplies are reduced and the groundwater system is being relied on more heavily to meet potable demands. For the Sacramento Region, use of recycled water provides an alternative to discharging treated wastewater from SRCSD's Sacramento Regional WWTP into the Sacramento River. Increasing use of recycled water may become a more cost-effective solution for SRCSD's 1.1 million ratepayers because wastewater regulations require ever higher treatment standards (and costs) for discharged effluent. Much of the need for higher quality water is because the background water quality of the river is already high in certain constituents from upstream agricultural and old mining activities. Significant discussion has occurred related to who "owns" the water once it is treated and discharged by SRCSD. The most current legal opinion is that the portion of wastewater stream that originated as groundwater in SRCSD's service area is owned by SRCSD and can be recycled (opinion referenced in Nolte, 2004). The surface water portion of the wastewater stream will likely continue to be discharged to the Sacramento River until further studies can be conducted to fully understand the impacts of a reduction in the amount of discharge

on downstream users and the Delta. However, since it is estimated that 50 percent of wastewater originates from a groundwater source, SRCSD will recycle up to 80 mgd, which is approximately half of the current average discharge flow to the Sacramento River, (SRCSD, 2005) This amount of recycled water is well above the SRCSD Board's adopted goal of recycling 30 to 40 mgd in the next 20 years.

The most commonly used recycled water is defined as wastewater that has been treated to tertiary standards that meet Title 22 of the California Code of Regulations (CCR). Recycled water treated to this level can be used for all outdoor irrigation demands in a community, including, parks, schools, street medians, residential front and backyard landscaping, public open space, and industrial uses such as cooling water. In addition, recycled water is commonly used for environmental purposes such as wetlands and habitat restoration.

In the Central Basin, SRCSD/SCWA have developed a recycled water pilot program that has been developed and is operational on a small scale. The 5 mgd project began as a pilot program to serve the communities of Laguna West, Lakeside, and Laguna Stonelake, and on-site needs of the Sacramento Regional WWTP. Recycled water is used in these communities for outdoor irrigation of public open space areas, commercial landscaping, schools, parks, and street medians. This pilot SRCSD Recycled Water Program is Phase 1 of a two-phase project.

Use of recycled water is regulated by DHS, SWRCB, RWQCB, and local EMD through a permitting process that minimizes the possibility for human contact either through cross connections with potable water supplies, or exposure to irrigation water from overspray or excess irrigation that drains off site.

Acceptance of recycled water as a source of water supply for the three communities has been very good. The future of recycled water in the Central Basin appears promising, especially because of the benefits recycled water brings to the region. SRCSD is currently developing a comprehensive Recycled Water Supply Master Plan that evaluates recycled water opportunities that could benefit the Central Basin, as well as other locations in the SRCSD service area. Recycled water can be provided to a community in one of two ways: first, through centralized treatment at the existing water recycling facility, or second, through satellite "polishing" plants that draw wastewater from large interceptor pipelines in the community, treat the wastewater to Title 22 standards, and provide the recycled water in the vicinity of the remote plant.

2.4.1 Recycled Water Facilities

Figure 2-21 depicts current and planned recycled water facilities in the Central Basin. A partnership between SCWA and SRCSD has led to construction and implementation of Phase 1 of the SRCSD Recycled Water Program. The Phase 1 service area consists of on-site uses at the Sacramento Regional WWTP complex and non-potable commercial and public landscape areas in the Laguna West, Lakeside, and Laguna Stonelake developments located within SCWA's service area immediately south of SRCSD's facility. The Phase 2 service area consists of the East Franklin and Laguna Ridge development areas located to the south and east of the Phase 1 system. Expansion of the SRCSD Recycled Water Program into the Phase 2 area requires a separate recycled water pipeline to be constructed from the Sacramento Regional WWTP to facilities owned and operated by SCWA. This work will be completed over the next several years. Much of the internal "purple" pipe distribution system is being constructed as part of new development.

2.4.2 Future Availability of Recycled Water Supplies

As mentioned, SRCSD is currently developing a comprehensive Recycled Water Master Plan as a future vision of recycled water in the community. Since much of the new growth taking place in Sacramento County is in the Central Basin, the opportunity appears favorable to expand the program in the Central Basin. The economic question of obtaining additional surface water supplies or making best use of recycled water supplies will be one of many factors in determining which areas are likely to move forward with recycled water. Other

factors include avoided cost of wastewater treatment, environmental benefits, long-term sustainability of regional water supplies, as well as other societal and long-term benefits. Areas with existing reliable surface water rights may not be as likely to use recycled water. However, installation of a recycled water distribution system with new development may be necessary in advance of recycled water availability to preserve the opportunity of using recycled water in the future. It has been shown that the "retrofit," or installation of a recycled water distribution system after development has occurred is likely to be economically infeasible. In areas where groundwater supplies are not readily available or constrained, recycled water often is seen as a long-term reliable source of supply.

Use of recycled water for agriculture and wetlands/habitat restoration to supplement groundwater supplies is being developed as another option. The resulting reduction in groundwater use may provide more sources of supply elsewhere in the Central Basin. Additional benefits can be achieved by placing recycled water infrastructure close enough to communities to bring recycled water to urban areas or for potential recharge basins.

2.5 WATER DEMAND AND LAND USE

Determining existing and future water demands is necessary to establish the adequacy of available water supplies (i.e., groundwater, surface water, and recycled water). In addition, raw, treated, and recycled water facility sizing and operation are directly influenced by projections of water demand. Water conservation also is an element of water demand and is considered in the development of demand estimates. This section describes land use and water demands in the Central Basin. Much of the information about land use and water demands is taken from the EIR for the Zone 40 WSMP, which developed land and water use data for 2000 and 2030 levels of development within the Central Basin. The WSMP EIR was used instead of earlier work done by the Water Forum because the WSMP EIR contains more recent land use surveys.

2.5.1 Land Use

Water demands are based on the type of use taking place on a piece of property. Based on the type of use, the amount of water considered for indoor uses and outdoor irrigation can vary. The groundwater aquifer is mostly affected by land use from the amount of rainfall and irrigation that is capable of deep percolating into the ground on the property versus what becomes surface water runoff leading to storm drain collection systems. Land uses within the Central Basin are classified into five categories:

- Agricultural land, consisting of areas greater than 5 acres and currently used for agricultural purposes.
- Agricultural-residential land, consisting of 2- to 5-acre parcels zoned for agricultural and residential uses.
- Urban land use, consisting of municipal, commercial, and industrial developed areas.
- Native vegetation/undeveloped land uses, consisting of areas that have not been developed. These areas also may be used in the spring and early summer as dry pasture for livestock grazing.
- Riparian vegetation land uses, consisting of areas along waterways that are typically within the floodplain of the waterway and are typically covered with dense native vegetation.

A graphical pie chart distribution of year 2000[9] and projected year 2030[10] land uses within the Central Basin is shown in **Figure 2-22** and described below. Spatial geographic distributions of 2000 and 2030 land uses in the basin are shown in **Figure 2-23** and **Figure 2-24**, respectively. Major anticipated changes in land use are the expansion of urban acreage by 64 percent, from 80,387 acres to 132,145 acres, while native vegetation/undeveloped acreage will decrease by 50 percent, from 101,692 acres to 50,440 acres (see **Figure 2-22**).

[9] Based on 2000 DWR land use survey for Sacramento County

[10] Based on 2000 DWR land use survey for Sacramento County, DWR detailed Analysis Unit (DAU) crop acreage estimates, and Sacramento County General Plan land use mapping, and 2002 Zone 40 WSMP EIR.

Figure 2-21. Recycled Water Facilities

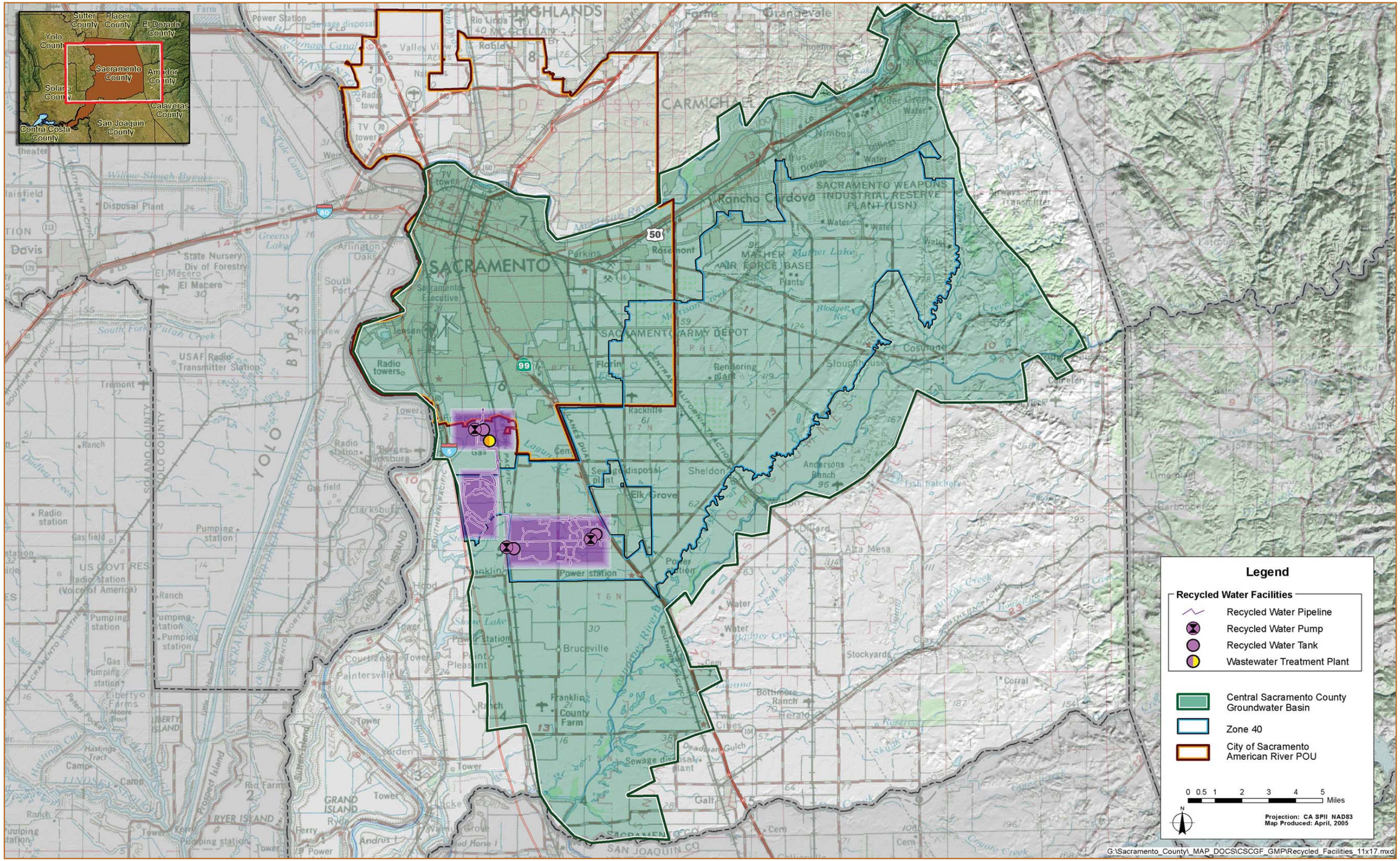
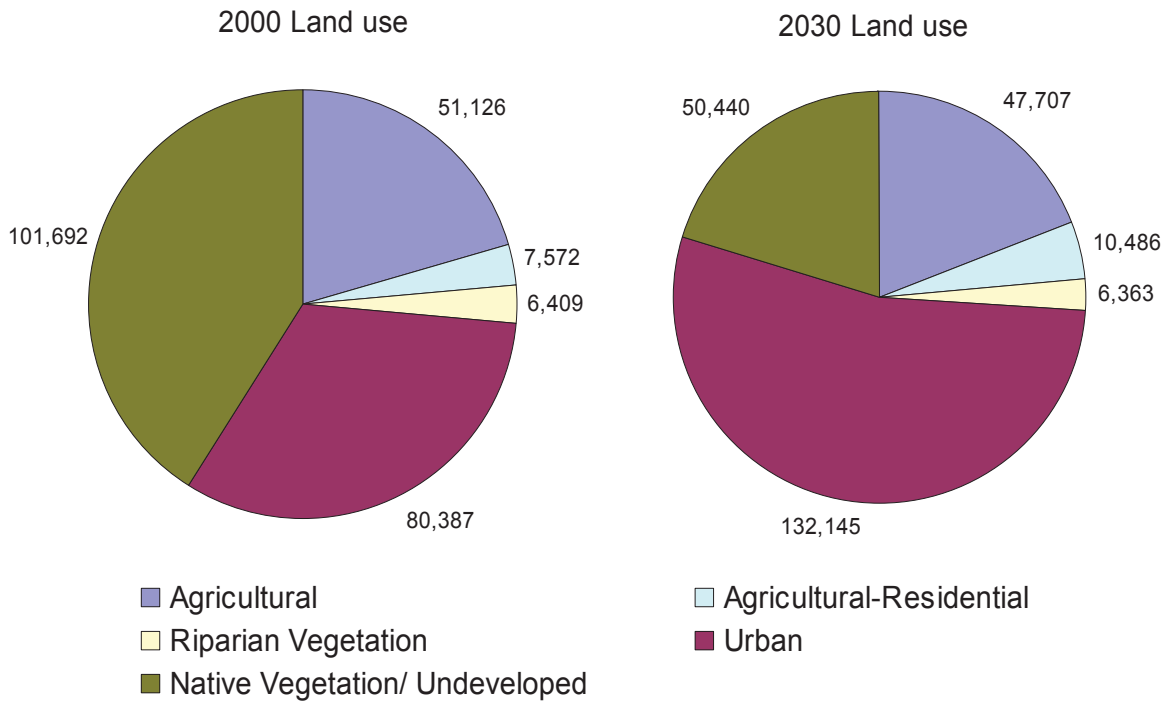


Figure 2-22. 2000 and 2030 Distribution of Land Uses in the Central Basin (acres)



2.5.2 Water Demands

Development of water demand information is important in describing the overall balance between available water supplies (i.e., surface water [see **Section 2.2**], groundwater [see **Section 2.3**], recycled water [see **Section 2.4**]) and demand. Water demand estimates are based on the land use data described above with refinements for land use differences in the urban category. These estimates are reported in four main categories: urban demands, agricultural demands, agricultural-residential demands, and environmental demands. Demands in these categories are calculated separately due to differences in land use and water application and the resulting variation in the amount of deep percolation and surface water runoff of applied irrigation and rainfall that can occur. **Figure 2-25** and **Figure 2-26** presents 2005 and 2030 estimated long-term average[11] water demands in the Central Basin. The bar chart shows an increase in annual water demands from 2005 to 2030 of approximately 70,000 AF in wet years and approximately 60,000 AF in dry years. Dry years have less of an increase due to water conservation.

2.5.2.1 Urban

An urban land use area is typically described being moderately to densely populated and provided with public services and infrastructure. In providing water service to an urban area, determining water demands includes the amount of water used both indoors and outdoors. In urban areas, water used indoors is discharged to a sewer collection system and then transported and treated at the Sacramento Regional WWTP. Treated effluent is then discharged either to the Sacramento River or diverted to the existing tertiary recycled water treatment plant to be reused to meet public and commercial irrigation needs in the Phase 1 recycled water service area.

Because water use practices change in urban areas as hydrologic conditions change over time, water use estimates require reviewing average water use over many

[11] Long-tern average estimates of water demand are developed based on a 74-year simulation using hydrologic condition data for the period 1922-1995. During each simulation run, land use remains unchanged at 2000 or 2030 levels of development.

years and then normalizing the water use to represent the design level of water use for water supply planning and facility designs.

Urban water demands also need additional refinement based on land use categories. Given the historical monitoring of water use for different land use categories, a separate water duty factor has been determined using statistical analysis of metered data for each of the major urban land use categories. Unit demand factors for each category are more fully described in a 1995 report completed for the Water Forum titled Estimate of Annual Water Demand within the Sacramento County-Wide Area (Boyle, 1995). This document is more commonly referred to as the Boyle Report.[12] The demand factors included in the Boyle Report are adjusted to reflect a 12 percent[13] conservation level in water demand for the 2000 level of development. The conservation factor used for 2030 urban water use is 25.6 percent, as per the WFA. After applying the conservation factors to each land use category, urban water demands at the 2005 (adjusted from the 2000 level of development are estimated as 202,292 AF/year, and 300,181 AF/year for the 2030 level of development. However in dry years, mandatory conservation efforts reduce these demands to 171,948 AF in 2005 and 255,154 AF in 2030.

2.5.2.2 Agricultural

No precise records of agricultural water demands in the Central Basin exist. However, agricultural water demands can be estimated through use of the Sacramento County IGSM, which can estimate consumptive crop water use. Using data for precipitation, crop acreage, soil moisture, field capacity, evapotranspiration, and irrigation efficiency, the Sacramento County IGSM calculates the estimated amount of applied water, how much water is consumptively used by the crop, and how much water enters the groundwater system. Long-term average annual water use is estimated at 163,454 AF per year for the 2005 level of development, which decreases to 133,275 AF per year for the 2030 level of development; this is a decrease in agricultural water use of an estimated 18 percent.

2.5.2.3 Agricultural-Residential

Agricultural-residential water demands are estimated using land use acreage and a demand factor of 1.44 AF/acre/year (Boyle Report, 1995). Since the Sacramento IGSM only reports urban and agricultural water uses, these two categories were used in combination to artificially reflect agricultural-residential uses by assigning 25 percent of the estimated agricultural-residential water demands to urban water use (2.7 AF/acre/year) and the remaining 75 percent to agricultural water use. The result for a typical 2-acre ranchette is approximately 1.4 AF/year assuming the agricultural portion is dry pasture (no applied water over 75 percent of the land area). Long-term average annual agricultural-residential water demands are estimated as 10,904 AF/year for the 2005 level of development, which increases to 15,100 AF/year for the 2030 level of development. Indoor water use is assumed to be a source of recharge to the groundwater basin through private septic and leach field systems.

2.5.2.4 Environmental Water

"Environmental water" has become a significant priority in the State's Water Supply Plan. One of the purposes of the CVPIA was to include water for the protection, restoration, and enhancement of fish, wildlife, and associated habitats. This effectively placed environmental water at the same level of priority as municipal, and possibly slightly higher than agricultural water uses.

While not discussed in the WFA, environmental water for the Cosumnes River is any water that provides ecosystem restoration or benefits along designated riparian areas. Discussions in previous sections described the interaction of the aquifer and the rivers, and the disconnect between the Cosumnes River and the regional aquifer. This disconnect caused late summer and fall flows in the river to recharge the groundwater basin, leaving no water in the river to support fisheries or riparian habitat. Unlike other water uses, environmental water use for the Cosumnes River is conceptual and

[12] Estimate of Annual Water Demand Within the Sacramento County-Wide Area (Boyle, May 1995)
[13] The 12 percent conservation value is prorated from the Water Forum's 25.6 percent level of conservation goal for 2030.

Figure 2-23. 2000 General Land Use in the Central Basin

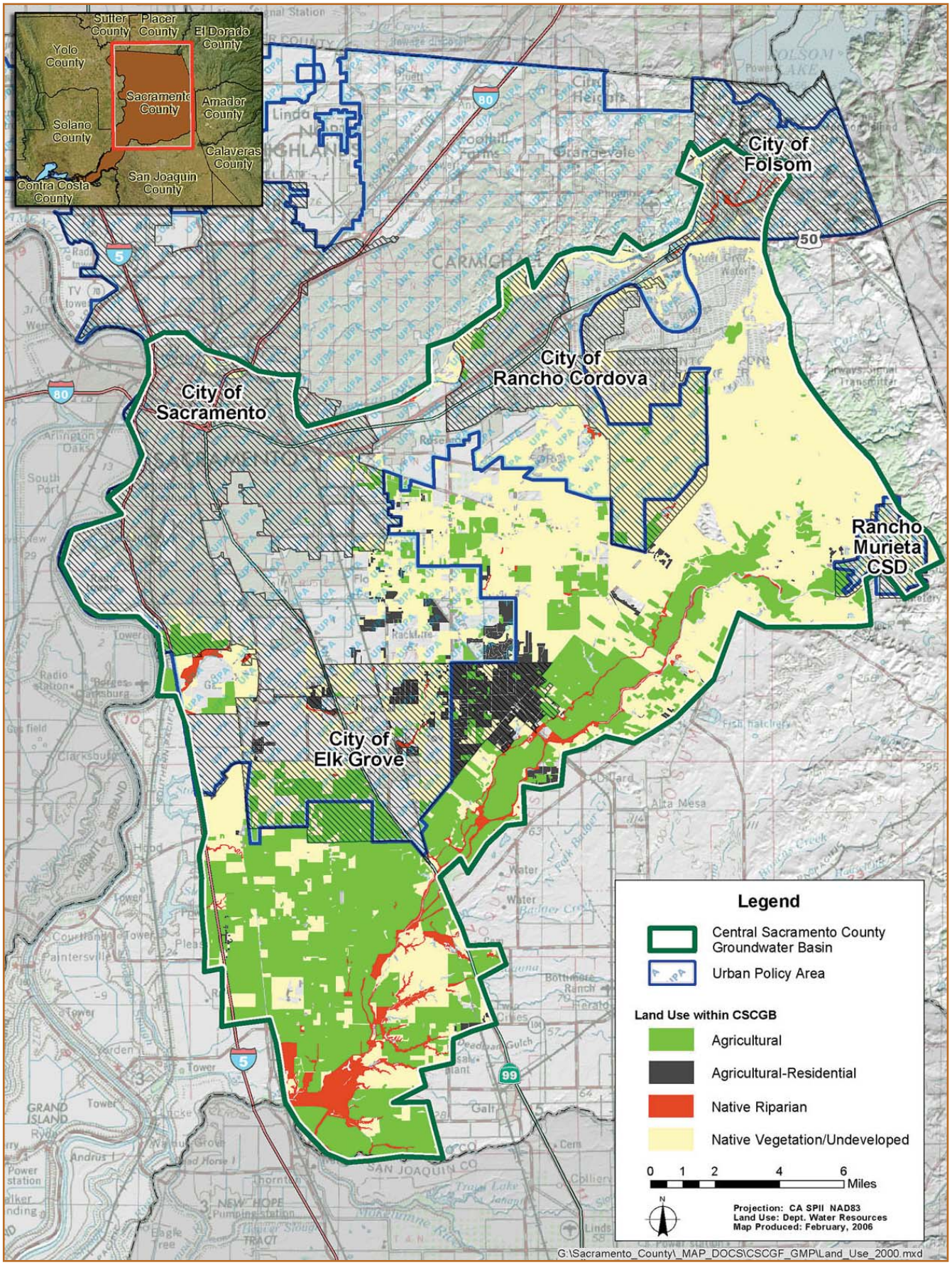
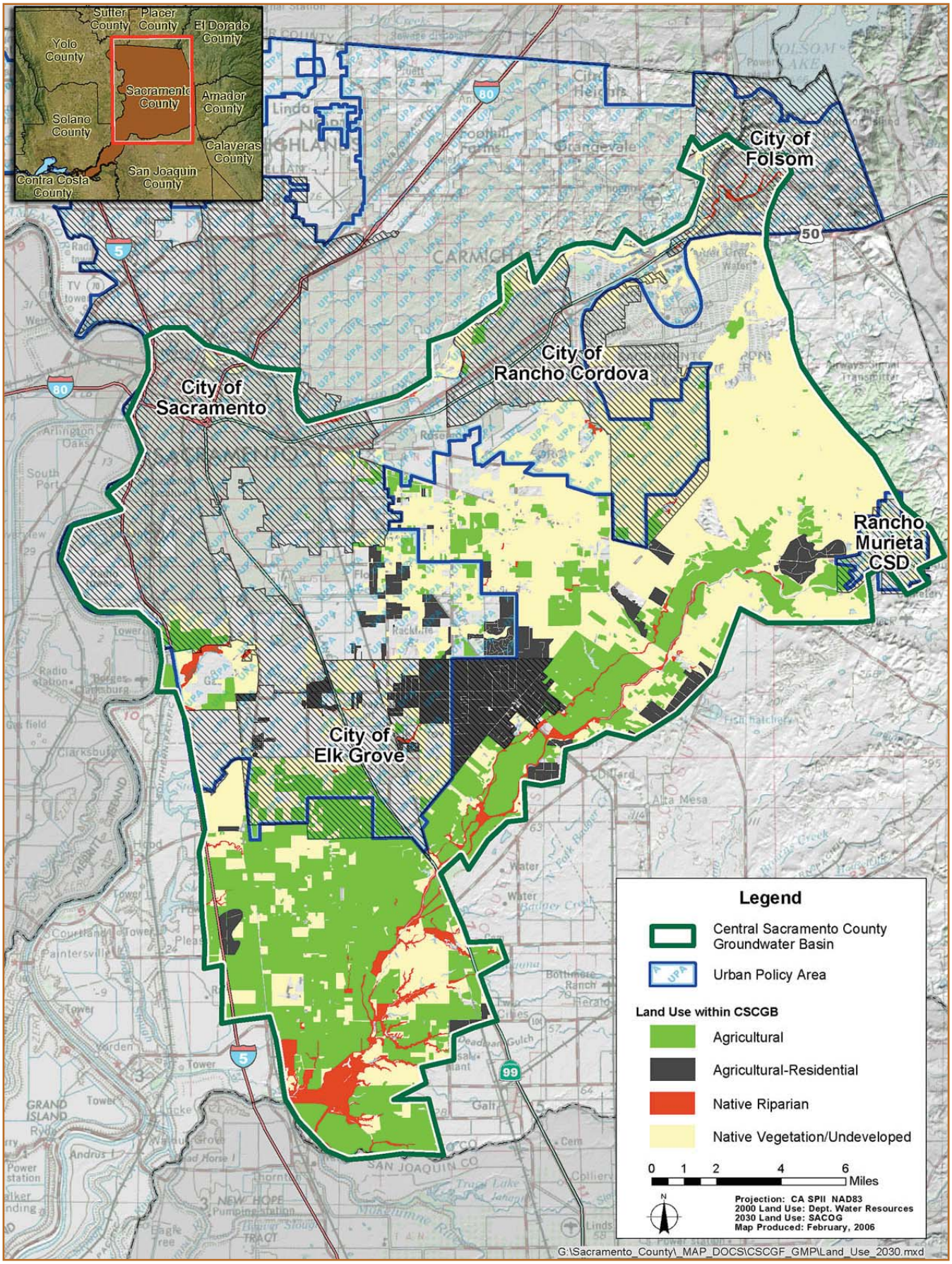


Figure 2-24. 2030 General Land Use in the Central Basin



subjective and is based on identifying problems and the amount of water needed to remedy the problems. For instance, water from the East Sacramento County Replacement Water Supply Project (see **Section 2.3.9**) provides a water supply during early fall to pre-wet the river prior to the first storm event to facilitate flow in the river when the first storm event occurs.

Environmental water requirements for other natural and restored streams in the area, such as the Upper Laguna Creek Multi-Functional Corridor, have not been defined. If environmental water needs are identified in the future they will be addressed by the basin governance body.

2.6 WATER BALANCE

In preceding sections, water supplies and demands were discussed based on information provided by participating water purveyors and information developed as part of the Water Forum process and the SCWA Zone 40 WSMP. Water supplies for the Central Basin come from surface water entitlements, groundwater, and recycled water. As shown in **Table 2-1**, the current estimated surface water entitlements for use in the Central Basin are 350,000 AF/year (assumes maximum availability of surface water in above normal to wet years, with no CVP reductions); the estimated long-term average groundwater pumping limit, as established by the WFA, is 273,000 AF/year; and the estimated recycled water supply is 4,400 AF/year. Therefore, the total estimated annual water supply for the Central Basin is 627,400 AF/year.

Current and projected future supplies and demands in the Central Basin also are shown in **Figure 2-25** and **Figure 2-26**. These demands are based on applied water for agriculture and delivered water for M&I use, which are greater than the actual amount of water consumed by these demand centers. For example, not all water applied to crops is used by the plants or evaporated – some of the water returns to the water supply, either through percolation to the groundwater table or through drainage return flow into the rivers. Similarly, not all of the water delivered to homes is consumed, as some of it flows through the sewer system (or leachfield) and some water used for landscaping percolates to the groundwater table. Although some modeling studies have been performed to help quantify the difference between applied/delivered water and consumed water, additional studies will be required (as discussed in the following sections of this report) prior to incorporating these data into Central Basin planning efforts.

Current and future water balances can be estimated by comparing supplies and demands for the Central Basin (**Figures 2-25** and **2-26**). Overall, the water balances show that supplies should be sufficient to meet both current and future demands to 2030. However, it is important to note that meeting water demands depends on more than simply having sufficient supplies. Meeting specific demands also requires the necessary infrastructure, as well as an appropriate institutional and political framework, to enable water resources in the Central Basin to be delivered and managed in a sustainable manner. In some cases, existing and future water wholesale agreements between various water purveyors will be necessary to move surface water supplies throughout the Central Basin[14]. Given the anticipated growth and potential environmental needs of the Central Basin, significant new infrastructure will be required as identified in the various water supply master plans for water purveyors with boundaries that lie within the Central Basin. The following chapters of this report present groundwater management objectives for the Central Basin and the programs and policies that will be developed to achieve these objectives.

[14] This specifically applies to purveyor areas within the City of Sacramento's American River POU and purveyor areas within Zone 40. See individual water supply master plans for the City of Sacramento and Zone 40 for specific information on how much water is planned for wholesale to affected water purveyors.

Figure 2-25. Annual Average Water Balance for the Central Basin - 2005 Water Balance

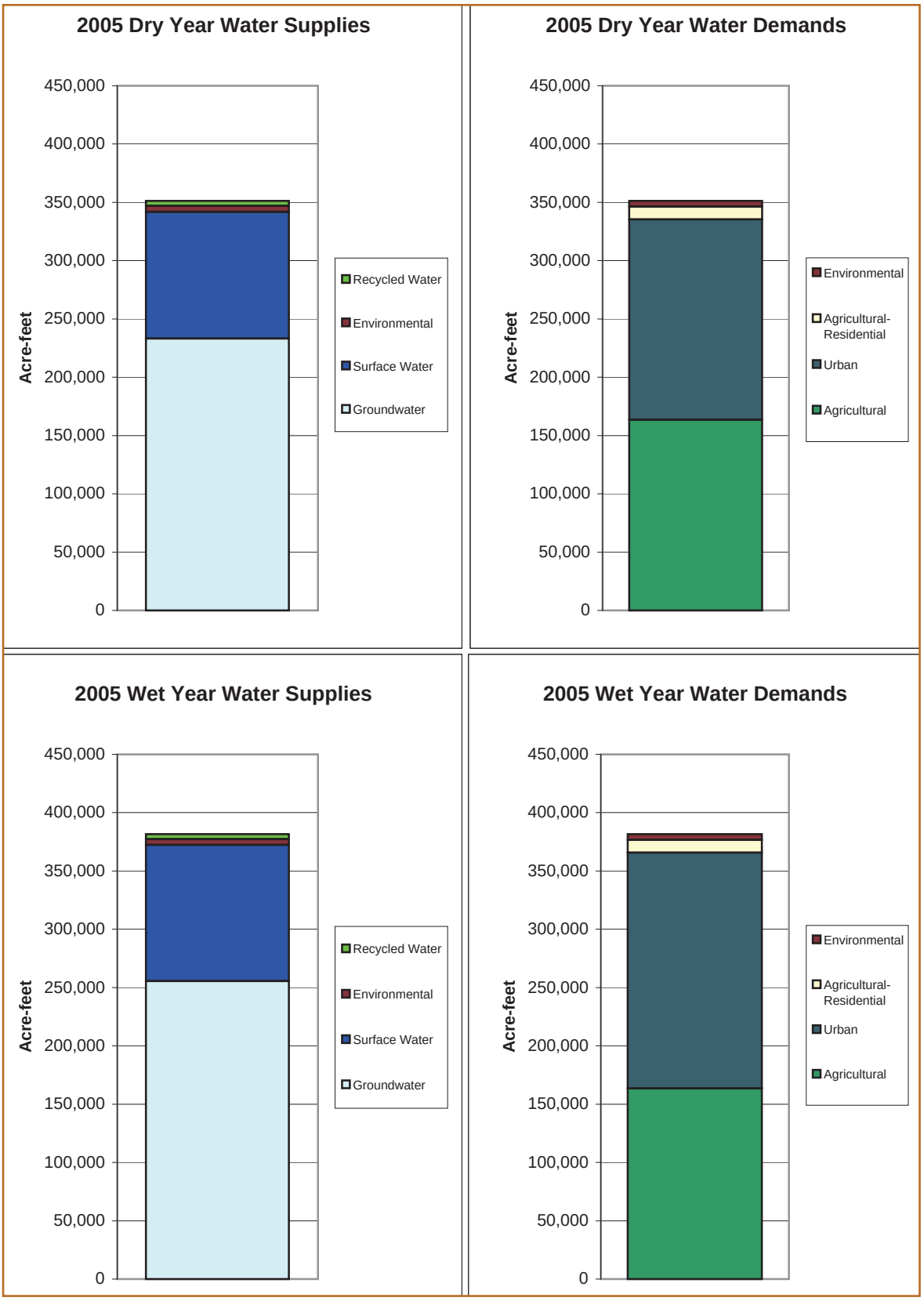
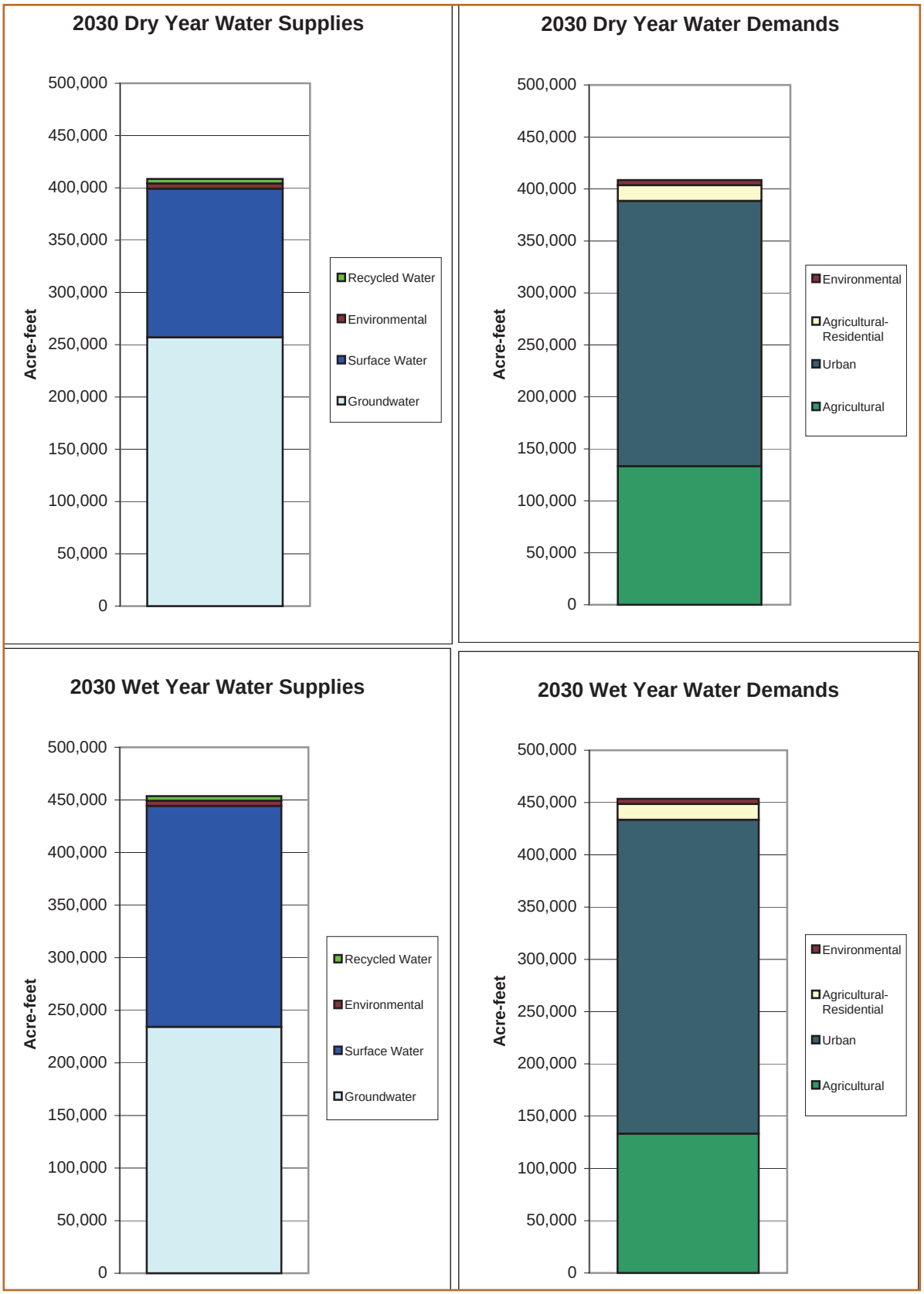


Figure 2-26. Annual Average Water Balance for the Central Basin - 2030 Water Balance



Management Plan Elements

Section 3

Management Plan Elements

This section discusses five BMOs proposed for the Central Basin based on feedback from basin stakeholders. Each BMO focuses on managing and monitoring the basin to benefit all groundwater users in the basin. The five BMOs are intended to be specific enough to result in numerical criteria for the basin, but also able to be modified or adapted to new information on groundwater basin behavior over time (as monitoring data are collected).

3.1 INTRODUCTION

A BMO has four main characteristics: 1) specific, measurable criteria that can be scientifically collected and established, 2) a clearly defined monitoring program that validates the BMO's performance, 3) a reporting method for monitoring data that identifies success or problems with the groundwater basin using early warning detection, and 4) programs that are available to remedy a problem in the groundwater basin, if one is determined to exist.

BMOs should have sufficiently specific numerical criteria so that implementation of the plan, through its monitoring and management programs, is scientifically defensible. For example, a BMO might have a criterion that groundwater elevations should not fall below 100 feet below ground surface in any location within a basin. A monitoring program could then be developed to measure groundwater elevations at key locations in the basin twice a year. These data would be entered into a database management system (DMS) that compares measured results to the BMO criterion to determine performance. A report would be generated to allow the governance body of the groundwater basin to evaluate the data, make a judgement on the level of concern, and, if needed, perform certain functions to remedy the problem (i.e., implement specific programs).

Because hydrologic and land use conditions change from year to year and exert differing stresses on aquifers, a remedy may or may not be applied in the area where a problem occurs. A good example is the regional cone of depression in the Central Basin. The regional cone is influenced by pumping throughout Sacramento County, including the North and South basins to a certain degree. Therefore, a problem in one management area may require actions in another management area(s) as a remedy.

3.1.1 BMO No. 1. Maintain the long-term average groundwater extraction rate at or below 273,000 AF/year.

The concept of "long-term average pumping limit" is discussed in **Section 2.3.5** and **Appendix A**. The CSCGMP defines "long-term average" as the average groundwater extraction from the basin calculated over a period of time. Said period of time commencing at the time of adoption of the CSCGMP to when the calculation is made. Each new year of data is added to the next and then averaged over the entire period of record. Agricultural groundwater extractions will be estimated based on land use and crop type every five years using DWR Land Use Surveys. Agricultural estimates remain constant for the five year period, unless specific information from this extraction amount is known during the respective 5-year intervals. An interpolation method also may be considered to adjust agricultural extractions in the intervening years.

For example, 2000 groundwater basin extraction data will be added to 2001 extraction data, which will be added to 2002 extraction data, etc., with urban extractions changing monthly and agricultural and other private well extractions likely changing only once every five years. The "long-term average" is the average of the total extraction over the period of record (i.e., 2000 to 2002 in this example).

The reason for using average groundwater extraction is that aquifer recharge varies depending on groundwater elevations. This variation stems from the effect the slope of the peizometric surface of the groundwater has on the natural recharge taking place from the rivers and subsurface inflow to the basin. The Water Forum recognized this variation when it selected 273,000 AF/year as an acceptable long-term average annual groundwater extraction rate. This decision recognized that the groundwater basin can be managed and maintained, on average, at an extraction rate that does not present undo risk to private and public well owners by dewatering wells, degrading water quality, creating ground subsidence, and adding cost to pumping groundwater from lower elevations.

3.1.2 BMO No. 2. Maintain specific groundwater elevations within all areas of the basin consistent with the Water Forum "solution"

Over time, extensive groundwater extraction by agriculture and more recently urbanization, have resulted in a persistent cone of depression in the southern Central Basin area. With the recent fallowing of some agricultural lands and importation of surface water into Zone 40, groundwater elevations at or near the cone of depression have stabilized and in some areas have recovered (see Hydrograph SWP-058 in **Figure 2-18A**). However, Water Forum studies indicate that with continued growth, coupled with dry hydrologic conditions, groundwater elevations can decrease to a point where adverse impacts may be seen. These impacts will occur to all groundwater users, ranging from increased energy costs to the need to deepen existing private and public wells or even constructing new wells.

As more surface water is delivered to users in the Central Basin by SCWA, the City of Sacramento, and other jurisdictions, groundwater elevations in the basin will rise in some areas of the basin more than others. Construction of SCWA Zone 40's Central WTP and interties with the City will provide the means to deliver more surface water to the basin and will allow the urbanized service area of Zone

40 to reduce groundwater extractions significantly. As urbanization proceeds according to the various land use authorities (the Cities of Sacramento, Elk Grove and Rancho Cordova and Sacramento County) General Plans, full implementation of the Zone 40 conjunctive use program will occur. As a conjunctive use program relies on the availability of surface water and groundwater during different hydrologic years full implementation of the program may result in a short-term drawdown in groundwater elevations below previous historical levels (this is a result of additional groundwater extraction during the drier and driest years). The intent of this BMO is to quantify overall groundwater elevations within the basin and to maintain an acceptable "operating range" for groundwater elevations throughout the basin.

A methodology for developing specific objectives to manage groundwater elevations requires a systematic, repeatable, and scientific basis. This methodology must define areas within the basin that are sufficiently distinct in hydrogeology, land use, groundwater and surface water use, and share some of the same institutional realities. The term "institutional reality" is defined as the ability of various jurisdictions or water purveyors to work together to develop and implement a program for a specific purpose. For example, an institutional reality might be the ability to implement a conjunctive use program involving all water purveyors having jurisdiction within the City's American River POU. Developing a program like this requires gaining the trust and commitment of the purveyors involved prior to establishing this area as a focus for management activities that would involve the higher use of POU water. The approach laid out below is intended to assist in the selection of areas that are sufficiently distinct and share many of the same goals and objectives.

An operating range for groundwater elevations in the basin has been developed by the Water Forum that define the upper and lower groundwater elevation threshold that will minimize the impacts stated above. For the range in values, two groundwater contour maps are provided in **Figure 3-1** and **Figure 3-2**. A polygon grid overlying the basin is used to implement and report on this BMO as shown in **Figure 3-3**. Each polygon is a 5 square mile management unit with lower and upper elevation attributes according to **Figure 3-1** and **Figure 3-2**, respectively. Monitoring wells are assigned to one or more polygons to compare actual groundwater elevations to the two reference points assigned to the polygon. In areas where there are insufficient wells to assign a single well to each polygon, a nearby well may be used as a surrogate until the basin governance body has either identified an existing monitoring well or constructs a new well for monitoring purposes. Achieving one well per polygon will take place over time as various priorities are satisfied and sufficient funding becomes available. A full discussion on the use of polygons is provided in **Appendix B**.

3.1.3 BMO No. 3. Protect against any potential inelastic land surface subsidence by limiting subsidence to no more than 0.007 feet per 1 foot of drawdown in the groundwater basin

Land subsidence can cause significant damage to essential infrastructure. Historic land surface subsidence within the Central Basin has been minimal, with no known significant impacts to existing infrastructure. Given historical trends, the potential for land surface subsidence from groundwater extraction in the Central Basin appears to be remote. However, the basin governance body intends to cooperate with adjacent groundwater management agencies such as SGA to monitor for potential land surface subsidence. If inelastic subsidence is documented in conjunction with declining groundwater elevations, the basin governance body will investigate and take appropriate actions to avoid adverse impacts. A limit of 0.007 feet per 1 foot of groundwater decline along survey control lines is considered to be the threshold at which implementation of mitigation programs may need to be implemented by the basin governance body.

Figure 3-1. Groundwater Elevation Contours for Lower Threshold

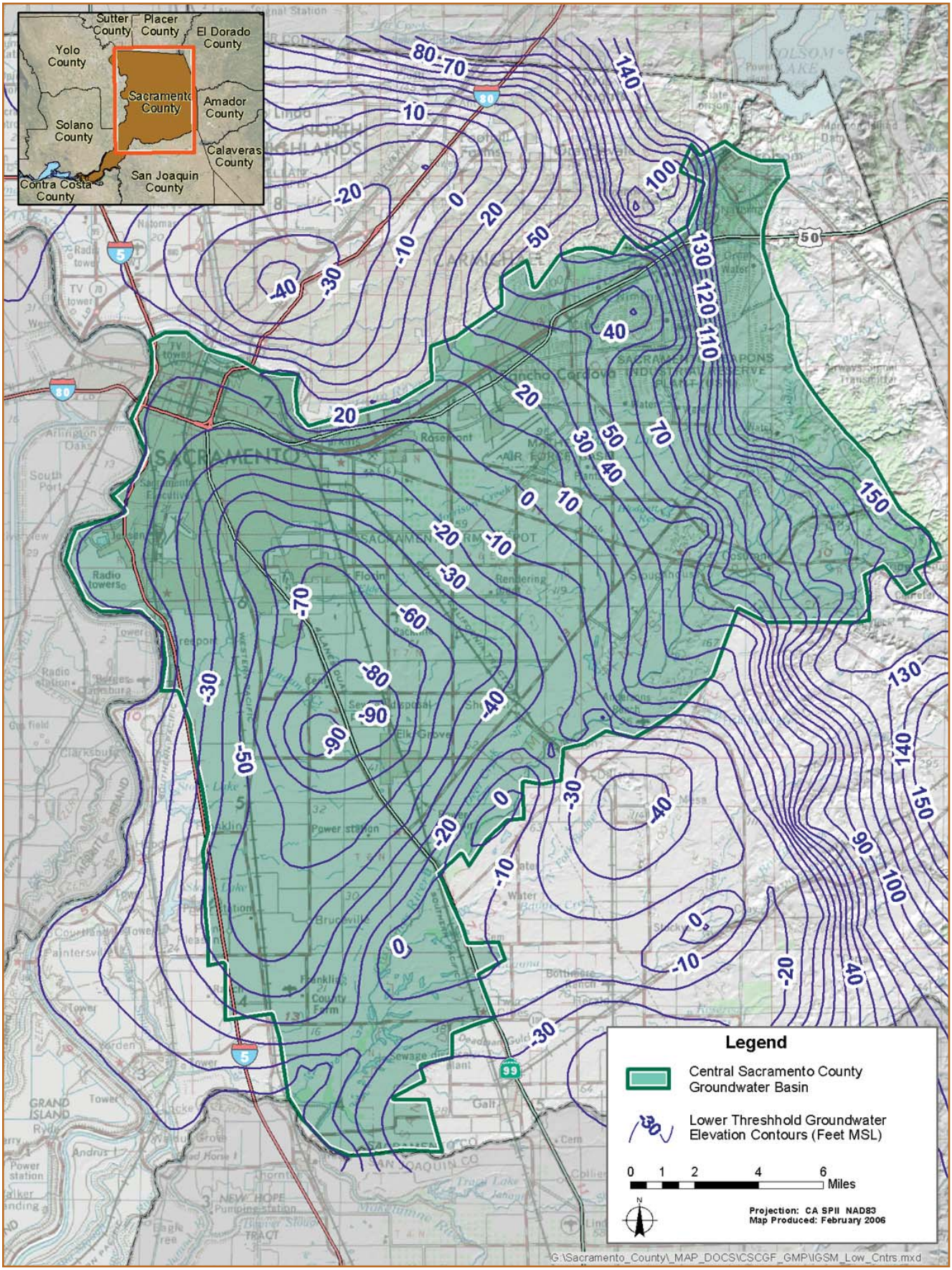


Figure 3-2 Groundwater Elevation Contours for Upper Threshold

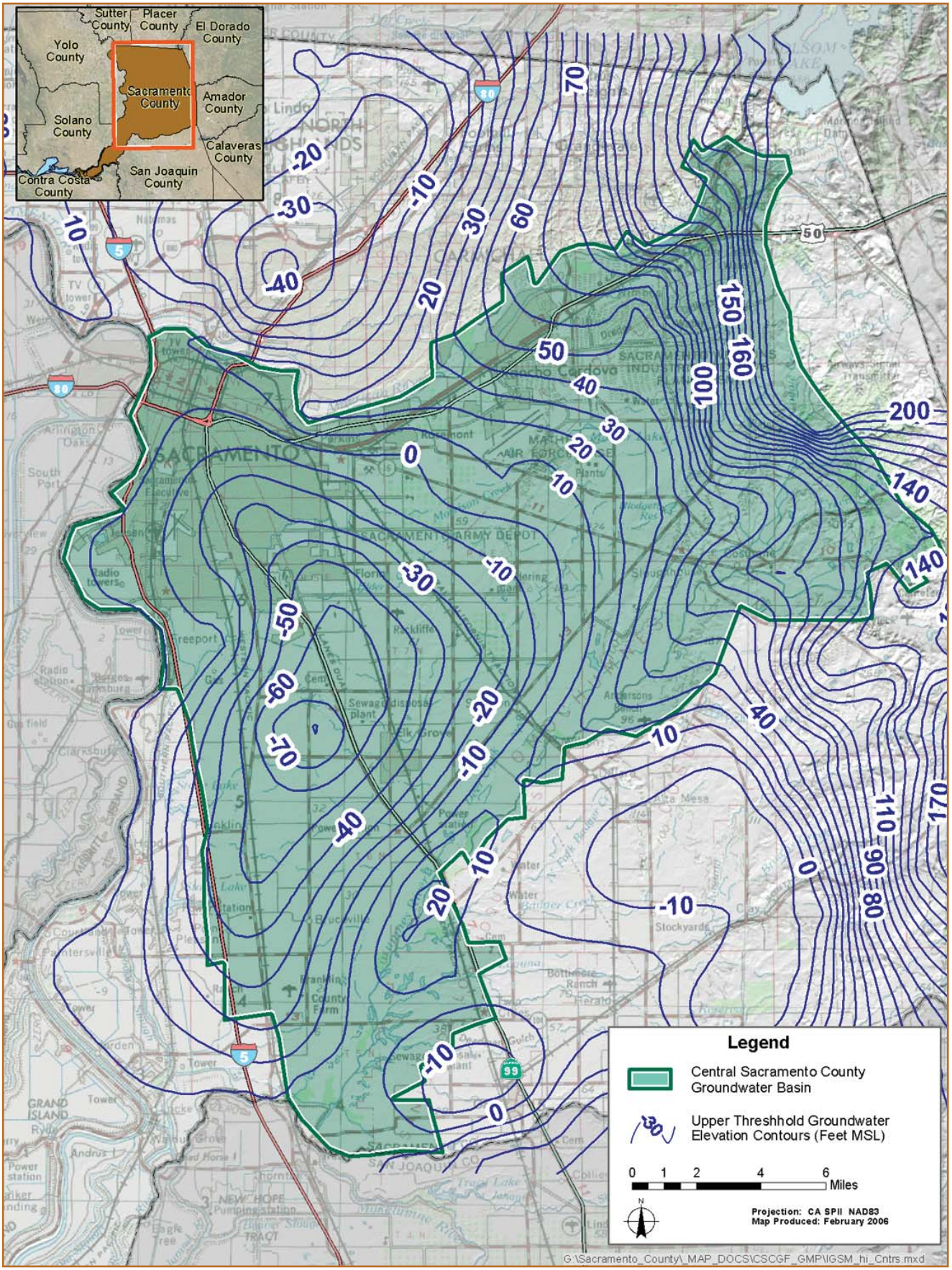
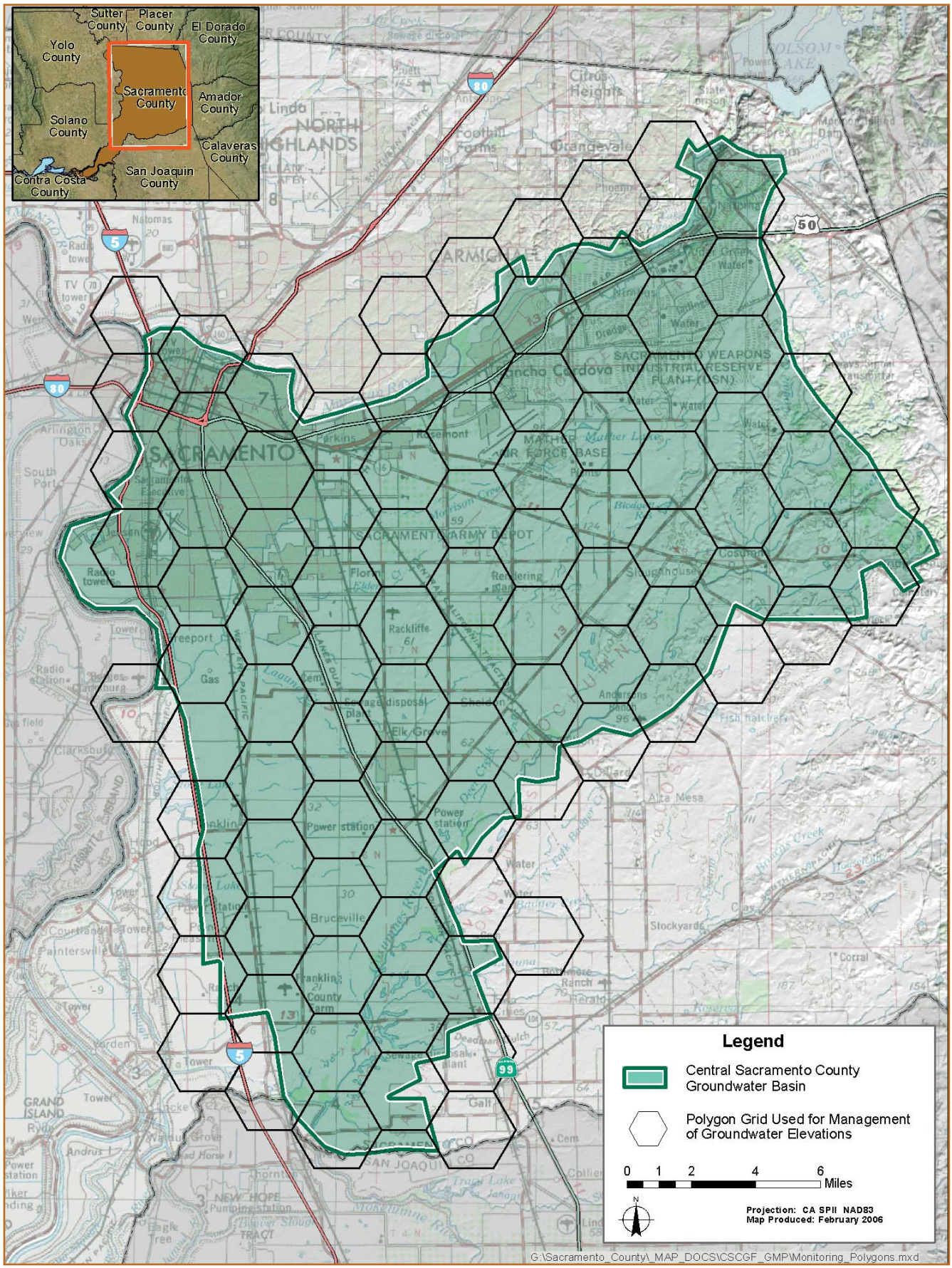


Figure 3-3 Polygon Grid Used for Management of Groundwater Elevations



3.1.4 BMO No. 4. Protect against any adverse impacts to surface water flows in the American, Cosumnes, and Sacramento rivers

Among other important uses, the American, Cosumnes, and Sacramento rivers provide habitat for a variety of fish and wildlife species. The basin management body is committed to the objectives of the WFA, which include preserving the fishery, wildlife, recreational, and aesthetic values of the lower American River. Important elements of the WFA include commitments to reduce lower American River diversions during dry years and to not exceed the agreed on long-term average annual groundwater extraction of 273,000 AF/year. In addition, the CSCGMP incorporates monitoring and evaluation data in cooperation with SGA and others (if any) between groundwater pumping and adjacent river or stream flows.

The CSCGMP also includes goals to restore and preserve the fishery, wildlife, recreational, and aesthetic resources of the lower Cosumnes River and to assure a stable supply of water for agriculture in the lower Cosumnes River floodplain area. Another goal is to protect against adverse impacts to water quality resulting from interaction between groundwater in the basin and surface water flows in the American and Sacramento rivers. In most natural settings, groundwater is higher in TDS than most other constituents found in surface water. At the present time, the flow regime is such that groundwater is not discharging to the river systems (i.e., rivers within the Central Basin are termed as losing streams to the groundwater). It is possible that future actions could temporarily alter that condition. It is the intent of the CSCGMP that controllable operations of the groundwater system would not negatively impact the water quality of the area's rivers and streams. The basin governance body will seek to gain a better understanding, in cooperation with SGA and others, of the potential impacts of discharging local area groundwater to major rivers adjacent to the Central Basin.

The basin governance body shall coordinate with other responsible regional, county, and local agencies to ensure that surface water flows in the other natural and restored streams in the area are not adversely impacted as a result of implementation of the CSCGMP.

3.1.5 BMO No. 5. Water quality objectives

The following are water quality goals for the Central Basin:

1. Total Dissolved Solids (TDS) concentration of less than 1,000 mg/l

   The Central Basin is currently not threatened by salinity intrusion typically equated to concentrations of TDS from boundary influences. The upwelling of poor quality water from depths exceeding 2,000 feet is of primary concern and is typically addressed by constructing wells in a way that prevents poor quality water from reaching potable drinking water supplies. Monitoring of TDS is not only for detecting potential salinity intrusion from the deeper aquifer but also as a possible surrogate for other problems that may be occurring in the aquifer system such as naturally occurring salts or minerals that may pose a health risk.

   TDS is considered by DHS to be an aesthetic quality falling under the category of a Secondary Drinking Water Standard. The existing requirement for privately owned wells to collect this type of data at least once (a one-time monitoring requirement) was established some years ago to provide DHS staff with sufficient information to determine whether the water quality would be within an acceptable range for drinking purposes. "Acceptable" is a subjective term; however, DHS staff have sufficient field experience to identify sources that would be likely to pose problems (e.g., avoidance by consumers), even for nonresident consumers.

   Currently DHS lists a Secondary MCL for TDS of 1,000 mg/l. For purposes of the CSCGMP, this value will be used for purposes of taking action.

2. Nitrate (NO3) concentration of less than 45 mg/l

   The Central Basin has many land use types, and differing types of sewage disposal and agricultural fertilizer application. These activities could cause

nitrates to be introduced into the groundwater. DHS has set the Primary Drinking Water MCL for nitrate at 45 mg/l. Under this GMP, this should apply to both privately and publicly owned wells.

3. Volatile Organic Compounds (VOC)

   Various sources of VOCs exist within the basin including old landfills, wrecking yards, military bases, and research and development facilities. Significant concern exists regarding the movement of these compounds from the vadose or unsaturated zone to the saturated zone or aquifer. Once these compounds are mobilized in groundwater, their movement will depend on many different factors one of which could be management activities within the basin. A need exists to monitor VOC migration within the basin for the protection of public and private wells. A concentration limit is not identified for VOCs given that many constituents fall under this category. Any measurable trace of VOC in a private or public well should be considered significant and action should be taken in accordance with the programs identified in the CSCGMP and by the regulatory agencies having jurisdiction in addressing VOC contamination.

3.2 PROGRAM COMPONENT ACTION ITEMS

There are five program components with action items to assist in meeting the BMOs. They are as follows:

1. Stakeholder involvement
2. Monitoring program
3. Groundwater resource protection
4. Groundwater sustainability
5. Planning Integration

These components are described further in the following sections.

3.2.1 Component No. 1: STAKEHOLDER INVOLVEMENT

Management actions taken by the basin governance body may impact a broad range of individuals and agencies that have a stake in the successful management of the basin. Customers of the water purveyors may be most concerned about water rates or assurances that each time the tap is turned on a steady, safe stream of water is available. Industrial, agricultural, or agricultural-residential well owners will want their wells to be protected from dewatering, water quality degradation, and significantly higher energy costs. Furthermore, the degree to which the basin can achieve local supply reliability provides an opportunity to advance banking and exchange programs that could support state and federal water programs in meeting other water needs, particularly in drier years.

The basin governance body will pursue several means of achieving broad stakeholder participation in the management of the Central Basin including: 1) involving the public, 2) involving other agencies within and adjacent to the Central Basin, 3) using advisory committees, 4) developing relationships with state and federal water agencies, and 5) pursuing a variety of partnership opportunities.

3.2.1.1 Involving the Public

Groundwater in California is a public resource, and the basin governance body is committed to involving the public in implementing the CSCGMP. In accordance with CWC § 10753.2, a public hearing was held and a Resolution of Intent (WA-2590) to prepare a groundwater management plan for the Central Basin was adopted by the Board of Directors of the SCWA on April 19, 2005. Upon adoption of the resolution, the text of the resolution was published in the Sacramento Bee on April 27, 2005 and May 4, 2005 (**Appendix C**).

Development of the CSCGMP included representatives of interested basin stakeholders (see **Section 1.3**). Upon completion of the CSCGMP all required public notification will be made prior to adoption of the document by the basin governance body (note that this action may take place several months after completion of the GMP because the governance body will not be formally established until the fall of 2006. Within six months of adoption, the basin governance body, with the assistance of an advisory committee, will develop a Public Outreach

Plan (POP). The POP will include strategies for communicating with both internal and external audiences during implementation of the CSCGMP.

The Water Forum has posted on its web site (http://www.waterforum.org) a copy of the CSCGMP. The Water Forum will continue to use its web site to distribute information on CSCGMP implementation activities to the public until the basin governance body's web site is operational. The basin governance body will create a public outreach web site within one year of the adoption of the CSCGMP. Copies of the CSCGMP and the POP will be posted on this site.

Actions. The basin governance body will take the following actions:

- Continue efforts to encourage public participation in the implementation process as opportunities arise.
- Provide public notice and public comment periods on formal revisions to the CSCGMP.
- Develop a POP and periodically review the POP and take actions as appropriate while implementing the CSCGMP.
- Provide briefings to the Water Forum Successor Effort on CSCGMP implementation progress.
- Maximize outreach on CSCGMP activities including the use of the Water Forum web site and in the future a web site sponsored by the basin governance body.

3.2.1.2 Involving Other Agencies Within and Adjacent to the Central Basin

As was mentioned previously, development of the CSCGMP involved the participation of a number of different stakeholders. A list of the stakeholder groups can be found in **Section 3.2.1.3**. This list of participants does not cover all interests both within and adjacent to the basin that may be affected by implementation of the CSCGMP. Once implementation of the CSCGMP begins, the basin governance body will be responsible for informing and involving agencies and stakeholders in the activities conducted under the plan.

One interest inside the Central Basin is the Air Force Real Property Agency (AFRPA), which oversees remediation efforts of contaminated soil and groundwater at Mather Field. As a stakeholder and water purveyor at Mather Field, SCWA has had ongoing dialog both with the County of Sacramento Department of Economic Development and the AFRPA to discuss issues related to land use, wellhead protection, groundwater management, and remediation efforts at Mather Field.

Outside interests include SGA which adopted a groundwater management plan that covers the organized municipal water purveyors in north Sacramento County in December 2003. Other adjacent interested agencies and stakeholders include SSCAWA and TNC, which owns and maintains wetlands and agricultural lands along the Cosumnes River corridor. Representatives from SSCAWA and TNC participate as stakeholders in the CSCGF negotiations and in preparation of the CSCGMP.

Actions. The basin governance body will take the following actions:

- Maintain a high level of involvement by stakeholders in implementing the CSCGMP by continued participation with the various stakeholder groups described above.
- Provide copies of the adopted CSCGMP and subsequent annual reports to representatives of SGA, SSCAWA, TNC, CSCGF, San Joaquin County, and the Water Forum Successor Effort.
- Meet with representatives from SGA, SSCAWA, TNC, CSCGF, and the Water Forum Successor Effort, as needed.
- Coordinate meetings outside the CSCGF with agricultural and agricultural-residential self-supplied pumpers within the basin
- Coordinate meetings with self-supplied pumpers within the basin to inform them of the management responsibilities and activities relative to this plan.
- Coordinate CSCGMP activities and work to the extent practicable with adjacent groundwater management entities, water interest groups, and state and federal regulatory agencies that have jurisdiction in areas related to CSCGMP activities.

3.2.1.3 Using Advisory Committees

The CSCGF and the basin governance body will use advisory committees in developing and implementing the CSCGMP.

Prior to beginning development of the CSCGMP, a task force made up of stakeholders in the CSCGF was named as the Advisory Committee to guide development of the CSCGMP. The Advisory Committee formed a Project Management Team (PMT) to develop the CSCGMP and to present and solicit comments from the Advisory Committee on a monthly basis. The Advisory Committee updated the CSCGF on a quarterly basis during development of the CSCGMP.

The groups represented on the CSCGMP Advisory Committee included:

- Agricultural residential users
- Building Industry Association
- Cal-Am Water Company
- California Department of Water Resources
- City of Elk Grove
- City of Folsom
- City of Rancho Cordova
- City of Sacramento
- Elk Grove, Sacramento Metropolitan, and Rancho Cordova Chambers of Commerce
- Elk Grove Water Service
- Golden State Water Company
- League of Women Voters
- The Nature Conservancy
- Omochumne-Hartnell Water District
- Sacramento County
- Sacramento County Farm Bureau
- Sacramento County Water Agency
- Sacramento Regional County Sanitation District
- Southgate Recreation and Parks District
- Water Forum

Action. The basin governance body will take the following action:

- Following adoption of the CSCGMP, the basin governance body will discuss the continuation and composition of advisory committees that will provide guidance in the implementation of the plan.

3.2.1.4 Developing Relationships with State and Federal Agencies

Working relationships between the basin governance body and local, state, and federal regulatory agencies are critical in developing and implementing the various groundwater management strategies and actions detailed in the CSCGMP.

The PMT has established working relationships with local, state, and federal regulatory agencies (e.g., EMD, DHS, EPA, etc.) in the process of developing the CSCGMP.

Action. The basin governance body will take the following action:

- Continue to develop and establish working relationships with local, state, and federal regulatory agencies, as appropriate.

3.2.1.5 Pursuing Partnership Opportunities

The basin governance body is committed to facilitating partnership arrangements at the local, state, and federal levels. Over the past decade, the Sacramento area water community and other local leaders have made great strides in regional planning and collaboration on water issues. The WFA, which involved over 40 stakeholders and seven years of facilitated discussions, resulted in a regional framework to balance the competing demands for increased use of surface and groundwater with the environmental needs of the lower American River through 2030. Several important partnerships have been formed to implement the WFA as well as to provide benefits to water agencies, their customers, and other groundwater users. For example, SCWA, TNC, and SSCAWA are working cooperatively to enhance stream flows in the Cosumnes River.

While facilities necessary to implement and expand conjunctive use programs in the Central Basin have been identified in **Section 2**, the potential exists to expand these facilities on a basin-wide level to achieve broader regional and statewide benefits. These facilities, however, would require substantial resources. To investigate any further opportunities would require resources provided through partnerships with potential beneficiaries.

Actions. The basin governance body will take the following actions:

- Continue to promote partnerships that accomplish both local supply reliability and broader regional and statewide benefits.
- Continue to track grant opportunities to fund groundwater management activities and local water infrastructure projects.

3.2.2 Component No. 2: MONITORING PROGRAM

This section describes a monitoring program that is capable of assessing the current status of the basin, and predicting responses in the basin as a result of future management actions. The program includes monitoring groundwater elevations, monitoring groundwater quality, monitoring and assessing the potential for land surface subsidence resulting from groundwater extraction, and developing a better understanding of the relationship between surface water and groundwater along the American, Cosumnes, and Sacramento rivers. Also important is establishing monitoring protocols to ensure the accuracy and consistency of data collected. Finally, the monitoring program includes a tool (DMS, a.k.a. SHEDTOOL) for assembling and assessing groundwater-related data.

3.2.2.1 Groundwater Elevation Monitoring

The PMT has compiled a significant amount of historical groundwater level data measurements, extending from prior to 1950 through 2003, for the basin. Sources of this data include the following:

- DWR/SCWA
- USGS
- SMUD

DWR and SCWA have a program that collects biannual (spring and fall) groundwater level data from more than 150 wells throughout Sacramento County. SCWA uses these data to generate biannual groundwater contour maps for the county. However, because wells have been added and dropped from the program over time, it is difficult to compare a historic contour map with a recent one. For this reason, SGA, SCWA, and the basin governance body are establishing a standardized network of wells that combines those monitored by DWR, SCWA, SGA member water purveyors, and other sources. It is the intent of these parties that the wells comprising this program be maintained as a consistent long-term network that represents overall groundwater elevation conditions in the basin. **Appendix B** shows the wells currently proposed for this network. The wells were selected to provide uniform geographic coverage and are located in a series of polygons that cover the entire Central Basin.

The resulting grid, shown in **Appendix B**, includes approximately 90 polygons roughly about five square miles each. The proposed set of monitoring wells was selected from the DMS to represent water levels for as many polygons as possible. Individual wells were selected by the following methods:

- Giving preference to wells currently in DWR's and SCWA's monitoring program. These wells were selected because (1) they have long records of historic groundwater level data and are useful in assessing trends within the groundwater basins, (2) uniform protocols were used in measuring and recording the water level data, and (3) these are typically non-producing wells, so water level readings represent relatively static levels.
- Identifying other municipal and private wells with well construction information and long records of groundwater level data and giving preference to those wells with the lowest recent extraction volumes.

Actions. Additional actions by the basin governance body will include:

- Coordinate with DWR and others to identify an appropriate group of wells for monitoring for a spring 2007 set of groundwater elevation measurements.
- Coordinate with DWR and others to ensure that the selected wells are maintained as part of a long-term monitoring network.
- Coordinate with DWR to ensure that the timing of water level data collection by other agencies coincides within one month of DWR and SCWA data collection (currently DWR and SCWA collect water level data in the spring and fall).
- Coordinate with other agencies to ensure that needed water level elevations are collected and verify that uniform data collection protocols are used among the agencies.
- Coordinate with USGS to determine the potential for integrating USGS monitoring wells constructed for the NAWQA program into the SCWA and SGA monitoring network.
- Consider ways to fill gaps in the monitoring well network by identifying suitable existing wells or identifying opportunities for constructing new monitoring wells.
- Assess annually groundwater elevation trends and conditions based on the monitoring well network.
- Assess annually the adequacy of the groundwater elevation monitoring well network.
- Identify a subset of monitoring wells that will be monitored more frequently than twice annually to improve understanding of aquifer responses to pumping throughout the year.

3.2.2.2 Groundwater Quality Monitoring

Because many of the wells in the basin are used for public water supply, an extensive record of water quality data is available for most wells. Water purveyors have compiled available historic water quality data for constituents monitored as required by DHS under CCR Title 22. Sources of water quality data include the following:

- DWR
- Central Basin water purveyors
- USGS

This level of monitoring is sufficient under existing regulatory guidelines to ensure that the public is provided with a safe and reliable drinking water supply. Ultimately, it may be advisable to have in place a network of shallow (less than 200 feet deep) sentry wells to serve as an early warning system for contaminants that could make their way to greater depths in the basin where groundwater purveyors primarily extract groundwater. SCWA has been working with AFRPA to identify a subset of the sentry wells located in and around the Mather Field for integration into this monitoring effort. The basin governance body along with SCWA will also coordinate with EPA and the RWQCB, which oversees Aerojet and Boeing's remediation efforts and with EMD for the LUST cleanup efforts, to identify existing dedicated monitoring wells in the basin.

CCR Title 22 water quality reporting is required by DHS for each public drinking water source within the Central Basin. The Central Basin monitoring network includes these wells. The water quality monitoring well network may be expanded to include additional DWR, USGS, Mather Field, Aerojet, Boeing, RWQCB, and privately owned wells based on the outcome of coordination meetings with these agencies, businesses and various land owners.

Actions. The following actions will be taken by the basin governance body:

- Coordinate with cooperating agencies to verify that uniform protocols are used when collecting water quality data.
- Coordinate with USGS to obtain historic water quality data for NAWQA wells, determine timing and frequency of monitoring under USGS program, and discuss the potential for integrating USGS monitoring resources with other portions of the Central Basin monitoring network.
- Coordinate with local, state, and federal agencies to identify where wells may exist in areas with sparse groundwater quality data. Identify opportunities for collecting and analyzing water quality samples from those wells.
- Assess annually the adequacy of the groundwater quality monitoring well network..
- Coordinate with DWR on the groundwater quality data they collect.

3.2.2.3 Land Surface Elevation Monitoring

Subsidence of the land surface resulting from compaction of underlying formations affected by head (groundwater level) decline is a well-documented concern throughout much of the Central Valley. During a typical pumping season, changes in land surface elevation can be observed as a result of both elastic and inelastic subsidence in the underlying basin. Elastic subsidence results from the reduction of pore fluid pressures in the aquifer, and typically rebounds when pumping ceases or when groundwater is otherwise recharged resulting in increased pore fluid pressure. Inelastic subsidence occurs when pore fluid pressures decline to the point that fine-grained sediments such as clays consolidate, resulting in permanent compaction and reduced ability to store water in that portion of the aquifer. Other side effects may include damaged levees, canals, or pipes.

While some land surface subsidence is known to have occurred as a result of groundwater extraction west of the Sacramento River, the extent of subsidence east of the Sacramento River has been minimal. DWR maintains three subsidence monitoring stations in the Sacramento Valley.

Historical benchmark elevation data for the period from 1912 through the late 1960s obtained from the National Geodetic Survey (NGS) were used to evaluate land subsidence in north Sacramento County. From 1947 to 1969, the magnitude of land subsidence measured at benchmarks north of the American River ranged from 0.13 feet to 0.32 feet, with a general decrease in subsidence in a northeastward direction. This decrease is consistent with the geology of the area: formations along the eastern side of the Sacramento Valley are older than those on the western side and are subject to a greater degree of pre-consolidation, making them less susceptible to subsidence. The maximum documented land subsidence of 0.32 feet was measured at both benchmark L846, located approximately two miles northeast of the former McClellan AFB, and benchmark G846, located approximately one mile northeast of the intersection of Greenback Lane and Elkhorn Boulevard. Another land subsidence evaluation was performed in the Arden-Arcade area of Sacramento County from 1981 to 1991. Elevations of nine wells in the Arden-Arcade area were surveyed in 1981, 1986, and 1991. The 1986 results were consistently higher than the 1981 results; this was attributed to extremely high rainfall totals in early 1986 that recharged the aquifer and caused a rise in actual land surface elevations. The 1991 results were consistently lower than the 1986 results; this was attributed to five years of drought immediately preceding the 1991 measurements which caused depletion of the aquifer and resulting land surface subsidence. Comparison of eight of the locations indicates that seven benchmarks had lower elevations in 1991 than in 1981 and one benchmark had a higher elevation in 1991. Of the seven benchmarks with lower elevations in 1991, the maximum difference is 0.073 feet (less than one inch).

Whether this is inelastic subsidence is indeterminate from the data, but it is clear that the magnitude of the potential subsidence in the benchmarks between 1981 and 1991 was negligible.

Actions. While available data and reports indicate that land surface subsidence is not a problem in the Sacramento County area, the basin governance body is interested in pursuing additional possible actions to continue to monitor potential land surface subsidence especially in the Central Basin. Actions may include the following:

- Investigate the feasibility and costs of resurveying the wells in the Arden-Arcade area, which were last measured in 1991.
- Coordinate with USGS to ascertain the suitability of the use of Interferometric Synthetic Aperture Radar (InSAR) images of the Central Basin and the surrounding area. If the technology appears suitable, identify the costs of determining ground surface elevations and identify potential cost-sharing partners.
- Coordinate with other agencies, particularly the City and County of Sacramento and the NGS to determine if there are other suitable benchmark locations exist in the area to aid in analysis of potential land surface subsidence.

3.2.2.4 Surface Water Groundwater Interaction Monitoring

The interaction between groundwater and surface water has not been extensively evaluated in the Central Basin area. This is what is known:

- A recent draft decision by the SWRCB (2003) regarding the American River concluded that from Nimbus Dam to about 6,000 feet below the dam, groundwater elevations and surface water elevations were similar enough to each other that groundwater could be tributary to the American River. Beyond 6,000 feet down river from the dam, groundwater elevations are sufficiently lower than the river channel to conclude that the American River is a "losing" stream down to its confluence with the Sacramento River.
- Groundwater modeling has been used to estimate flow volumes between surface water and groundwater for various hydrologic conditions. California State University, Sacramento (CSUS) in cooperation with DWR has recently installed several monitoring wells in and adjacent to the American River to investigate groundwater interaction with the American River and how recent United States Army Corp of Engineers (USACE) levee reinforcement projects might have changed the surface water-groundwater flow relationships.
- In 1991, SRCSD, Sacramento County, and the City established the Sacramento Coordinated Water Quality Monitoring Program (CMP). Since that time, the CMP has monitored surface water quality for a variety of constituents, including trace elements at several locations on the American and Sacramento rivers. The CMP monitors the Sacramento River at the Freeport Bridge and the American River at Nimbus Dam.
- SCWA has completed an Memorandum of Agreement (MOA) with TNC and SSCAWA for the Management of Water and Environmental Resources associated with the lower Cosumnes River. This MOA reflects a desire to work together to actively investigate opportunities for flow restoration, conjunctive use management, and enhanced recharge within the Cosumnes River corridor.

Actions. The basin governance body will pursue actions to better understand the relationship between surface and groundwater in the Central Basin area, including the following:

- Work cooperatively with SGA, TNC, and OHWD to compile available stream gage data and information on tributary inflows and diversions from the American, Cosumnes, and Sacramento rivers to quantify net groundwater recharge or discharge between gages in the Central Basin area.
- Coordinate with local, state, and federal agencies to identify available surface water quality data from the American, Cosumnes, and Sacramento rivers proximate to the Central Basin area.

- Correlate groundwater level data from wells in the vicinity of river stage data to further establish whether the river and groundwater are in direct hydraulic connection, and if surface water is gaining or losing at those points.
- Continue to coordinate with local, state, and federal agencies and develop partnerships to investigate cost-effective methods that could be applied to better understand surface water-groundwater interaction along the American, Cosumnes and Sacramento rivers.
- Coordinate with CSUS, to analyze data obtained from recently constructed monitoring wells on the CSUS campus to better understand the relationship between groundwater basin and surface water flows at that location.

3.2.2.5 Protocols for Collection of Groundwater Data

Through the work completed as part of SGA's groundwater management plan, MWH has evaluated the accuracy and reliability of groundwater data collected by cooperating agencies within the Sacramento region (MWH, 2002). The evaluation indicated a significant range of techniques, frequencies and documentation methods for collection of groundwater level and groundwater quality data.

Although the groundwater data collection protocol may be adequate to meet the needs of individual agencies, the lack of consistency yields an incomplete picture of basinwide groundwater conditions. Other types of groundwater data collection protocols are included in **Sections 3.2.2.1** and **3.2.2.2** above.

Actions. To improve the comparability, reliability, and accuracy of groundwater data, the basin governance body will take the following actions:

- The governance body will develop within one year a standard operating procedure (SOP) for collection of water level data.
- Provide cooperating agencies with guidelines developed by DHS for the collection, pretreatment, storage, and transportation of water quality samples (DHS, 1995).
- Provide training on implementing the SOPs.

3.2.2.6 Data Management System

For the basin governance body to achieve its primary objective of sustaining the groundwater resource within the Central Basin, it was essential to develop a data storage and analysis tool, or DMS. The DMS was developed by MWH under contract with USACE. Other local sponsors included SGA and its member agencies, DWR, and SCWA.

The DMS is a public domain application developed in a Microsoft Visual Basic environment and is linked to a database containing Central Basin purveyor data. The DMS provides the end-user with ready access to both enter and retrieve data in either tabular or graphical formats. Security features in the DMS allow for access restrictions based on a variety of user permission levels.

Data in the DMS include the following:

- Well construction details
- Known locations of groundwater contamination and potentially contaminating activities (PCA)
- Long-term monitoring data on the following:
  - Monthly extraction volumes
  - Water elevations
  - Water quality
- Aquifer characteristics based on well completion reports and the Sacramento County IGSM.

The DMS allows viewing of regional trends in groundwater level and quality not previously available to stakeholders in the basin. The DMS has the capability of quickly generating well hydrographs and groundwater elevation contour maps using historic groundwater level data. The DMS allows the user to view water quality data for CCR Title 22 required constituents as a temporal concentration graph at a single well, or any constituent can be plotted with respect to concentration throughout the Central Basin area. Presentation of groundwater elevation and groundwater quality data in these ways will be useful for making groundwater basin management decisions.

SGA and the basin governance body will be establishing data transfer protocols so that groundwater data in the North and Central Basins (by cooperating agencies,

DWR, AFRPA, USGS, etc.) can be readily appended to the database and analyzed through the DMS. Annual summaries of groundwater monitoring data will be prepared using the analysis tools in the DMS and presented in an annual State of the Basin report (see **Section 4**). Once the DMS is fully populated and quality-control checked, a summary of existing basin conditions will be prepared. These initial summary analyses will be performed on at least an annual basis to assess the impacts of current and future management actions on the groundwater system.

Actions. To maintain and improve the usability of the DMS, the basin governance body will take the following actions:

- Continue to update the DMS with current water purveyor data.
- Make recommendations to MWH (or assigned DMS developer) on utilities to add to the DMS to increase its functionality.

3.2.3 Component No. 3: GROUNDWATER RESOURCE PROTECTION

The basin governance body considers groundwater resource protection a critical component in maintaining a sustainable groundwater resource. There are two aspects of groundwater resource protection, 1) preventing contamination from entering the groundwater, and 2) remediation of known contaminant plumes. Prevention measures include proper well construction and destruction practices, development of wellhead protection measures, and protection of recharge areas. Prevention also includes measures that prevent human activities and deleterious natural substances, such as saline water, from entering the groundwater system. Remediation includes any activity that removes and treats man made contaminants from the soil and the groundwater system.

3.2.3.1 Well Construction Policies

The Sacramento County Environmental Management Department (EMD) administers the well permitting program for Sacramento County. Standards for well construction are identified in Sacramento County Code No. SCC-1217 (County Well Ordinance), as amended on April 9, 2002. In addition to general well construction standards, Sacramento County has a policy of special review by appropriate regulatory agencies before granting a well permit within 2,000 feet of a known contaminant plume (referred to as Consultation Zones). Prohibitions have been established by various State regulatory agencies for drilling new public supply wells at Mather Field or near the Aerojet or Boeing facilities. As part of the development of the DMS, the extent of contaminant plumes associated with Mather Field, Aerojet, and Boeing were delineated for SGA and SCWA (see **Figure 2-19**).

Actions. The basin governance body will take the following actions:

- Ensure that appropriate Sacramento County and Central Basin implementation staff and consultants are provided a copy of the County Well Ordinance and understand proper well construction procedures.
- Adhere to Sacramento County's Consultation Zone and provide a copy of the boundary of the prohibition zones to appropriate agencies within the Central Basin.
- Provide a copy of the most recently delineated plume extents at Mather Field and Aerojet/Boeing to EMD and appropriate staff for their review and possible use.
- Coordinate with other groundwater users in the Central Basin to provide guidance, as appropriate, on well construction.
- Where feasible and appropriate, use subsurface geophysical tools prior to construction of the well to assist in well design.

3.2.3.2 Well Abandonment and Destruction Policies

EMD administers the well destruction program for Sacramento County. The standards for well destruction are identified in the County Well Ordinance. A concern of the basin governance body and EMD is that many abandoned supply wells have not been properly destroyed. As part of development of the DMS for SGA, DWR well records for all known wells in the North Basin were reviewed for reported destruction. Based on the information provided

each well was then rated based on the level of confidence that the well in question was actually destroyed properly. This information was then entered into the DMS.

Actions. The basin governance body will take the following actions:

- Complete a similar survey of abandoned and/or destroyed wells in the Central Basin and populate DMS with data.
- Ensure that all public and private agencies in the Central Basin are provided a copy of the County Well Ordinance and that they understand proper well destruction procedures, and support implementation of these procedures.
- Follow up with cooperating agencies and EMD on reported abandoned and/or destroyed wells to confirm the information collected from DWR.
- Obtain copies of any information on abandoned and/or destroyed wells in the Central Basin from EMD or other regulatory agencies to fill any gaps in the governance body's records.
- Meet with EMD to discuss ways to ensure that wells in the Central Basin are properly abandoned or destroyed.
- Obtain and review a copy of a "wildcat map" from California Division of Oil and Gas to ascertain the extent of historic gas well drilling operations in the area as these wells could function as conduits of contamination if not properly destroyed. It should be noted that EMD has no jurisdiction over gas wells.

3.2.3.3 Wellhead Protection Measures

Identification of wellhead protection areas is an element of the Drinking Water Source Assessment and Protection (DWSAP) program administered by DHS. DHS set a goal for all water systems statewide to complete Drinking Water Source Assessments by mid-2003. Most water purveyors in the basin have completed their required assessments by performing the three major elements required by DHS:

- Delineation of capture zones around sources (wells).
- Inventory of PCAs within protection areas.
- Vulnerability analysis to identify the PCAs to which the source is most vulnerable.

Delineation of capture zones includes using groundwater gradient and hydraulic conductivity data to calculate the surface area overlying the portion of the aquifer that contributes water to a well within specified time-of-travel periods. Typically, areas are delineated representing 2-, 5-, and 10-year time-of-travel periods. These protection areas must be managed to protect the drinking water supply from viral, microbial, and direct chemical contamination.

Inventories of PCAs include identifying potential origins of contamination to the drinking water source and protection areas. PCAs may consist of commercial, industrial, agricultural, and residential sites, or infrastructure sources such as utilities and roads. Depending on the type of source, each PCA is assigned a risk ranking, ranging from "very high" for such sources as gas stations, dry cleaners, and landfills, to "low" for such sources as schools, lakes, and non-irrigated cropland. Vulnerability analysis includes determining the most significant threats to the quality of the water supply by evaluating PCAs in terms of risk rankings, proximity to wells, and physical barrier effectiveness (PBE). PBE takes into account factors that could limit infiltration of contaminants including type of aquifer, aquifer material (for unconfined aquifers), pathways of contamination, static water conditions, hydraulic head (for confined aquifers), well operation, and well construction. The vulnerability analysis scoring system assigns point values for PCA risk rankings, PCA locations within wellhead protection areas, and well area PBE; the PCAs to which drinking water wells are most vulnerable are apparent once vulnerability scoring is complete.

PCA and capture zone information from the DWSAP will need to be added into the DMS. The DMS includes a feature that will automatically calculate wellhead protection areas if no data are available or if new well locations are proposed.

Actions. The basin governance body will take the following actions:

- Request that public water purveyor agencies within the Central Basin provide vulnerability summaries from the DWSAP to the basin

governance body to be used for guiding management decisions in the basin.

- Contact groundwater basin managers in other areas of the state for technical advice, effective management practices, and "lessons learned" regarding establishing wellhead protection areas.

3.2.3.4 Protection of Recharge Areas

Surface geology within and directly adjacent to the Central Basin's boundary was investigated as part of the 1993 Sacramento County General Plan for the purpose of delineating areas of potentially high recharge (as shown in Figure 7 of the Conservation Element of the 1993 Sacramento County General Plan). Much of the surface area considered to have the highest potential for recharge along the American River is developed. Other recharge areas identified in the Sacramento County General Plan include areas around and adjacent to the streams that flow along and across the Central Basin such as the Cosumnes River and Morrison stream group. Previous studies have also indicated that the abandoned aggregate mining pits north and south of Jackson Highway could be possible recharge locations. These pits typically extend 20 to 30 feet below ground surface and are mined to the clay layer that separates the Laguna Formation from the Mehrten Formation. Water introduced to these pits could deep percolate vertically through the interbedded clay lenses and horizontally through the pit walls into the Laguna formation. Flood waters, raw surface water, and perhaps treated recycled water can be discharged into these pits for year-round recharge. The RWQCB will need to provide regulatory approval prior to any use of these pits for recharge.

Another recharge location is along the Cosumnes River. The Cosumnes River overlies very transmissive soils, evidenced by the lack of river flow during certain times of year. Enhancing this recharge is already being considered through a pilot program (coordinated through the Water Forum, SCWA, TNC, and SSCAWA) that conveys American River water through the Folsom South Canal and then discharges it to the Cosumnes River at the canal crossing. It is hoped that this program will demonstrate an improvement in the fishery and riparian habitat along the Cosumnes River as well as provide enhanced recharge.

Action. The basin governance body will take the following action:

- Continue to work with mining companies, TNC, and SSCAWA to explore the possibilities for enhancing recharge into the Central Basin.

3.2.3.5 Control of the Migration and Remediation of Contaminated Groundwater

Major sources of contamination within the Central Basin are primarily from Mather Field, Aerojet, Boeing, and various active and inactive landfill sites. The extent of the groundwater contaminant plumes emanating from these sources are shown in **Figure 2-19**. Also of concern is localized contamination by industrial/commercial point sources such as dry cleaning facilities and numerous fuel stations throughout the basin.

While the basin governance body does not have the authority or responsibility for remediation of this contamination, it is committed to coordinating with responsible parties and regulatory agencies to stay informed on the status and disposition of known contamination in the basin. For example, information on known LUST sites has been collected from the EMD, the SWRCB, and the RWQCB and entered into the DMS. Also, SCWA has been in communication with AFRPA,

which is overseeing remediation efforts at Mather AFB (see **Section 3.2.2.2**).

Actions. The basin governance body will take the following actions:

- Coordinate with appropriate regulatory agencies (EMD, DTSC, EPA, and DHS) and known responsible parties to develop a network of monitoring wells to act as sentry wells for public supply wells.
- If detections occur in these monitoring wells, meet with the appropriate regulatory agencies and responsible parties to develop strategies to minimize the further spread of contaminants.
- Use the information on mapped contaminant plumes and LUST sites in developing groundwater extraction patterns and in locating future production or monitoring wells.
- Meet with representatives of EMD and RWQCB to establish a mutual understanding about the basin governance body's groundwater management responsibilities. Identify ways to have open and expedited communication with EMD regarding any new occurrences of LUSTs, particularly when contamination is believed to have reached the groundwater.

3.2.3.6 Control of Saline Water Intrusion

Saline water intrusion from the Sacramento/San Joaquin Delta (Delta) is not currently a problem in the Central Basin, and is not expected to become a problem in the future. Higher groundwater elevations associated with recharge from the American and Sacramento rivers have maintained a historical positive gradient, preventing significant migration of any saline water from the Delta into the Sacramento County region. These groundwater gradients will continue to serve to prevent any localized pumping depressions in the basin from inducing flow from the Delta into the Central Basin.

Actions. The basin governance body will take the following actions:

- Track the progression, if any, of saline water bodies moving toward the east from the Delta. Because this is a highly unlikely scenario, this action will be limited to communicating with DWR's Central District Office on a biennial basis to check for significant changes in TDS concentrations in wells. DWR has a regular program of sampling water quality in select production wells throughout the adjacent Solano, San Joaquin, and Yolo counties. This program will serve as an early warning system for potential saline water intrusion from the Delta.
- Observe TDS concentrations in municipal wells that are routinely sampled under CCR Title 22. These data will be readily available as part of the DMS and will be reported on in the annual State of the Basin report.
- Inform all stakeholders of the presence of the salinity interface and the approximate depth to the interface for their reference when locating potential wells. EMD, which issues well permits, is aware of the interface. SCWA will provide a map to EMD indicating the contour of the elevation of the base of fresh water in Sacramento County for its reference when issuing well permits.

3.2.4 Component No. 4: GROUNDWATER SUSTAINABILITY

To ensure a long-term viable supply of groundwater, the basin governance body seeks to maintain or increase the amount of groundwater stored in the basin over the long term. The WFA's groundwater management element provides a framework by which the groundwater resource in the Sacramento County-wide basin can be protected and used in a sustainable manner. As mentioned previously, the WFA estimated a long-term average annual pumping limit within the Central Basin of 273,000 AF/year. As discussed in **Section 2**, historic groundwater extractions have resulted in a net depletion of groundwater stored under the Central Basin area. To ensure a sustainable resource, SCWA continues to move forward with its conjunctive use program in Zone 40, including pursuit of additional surface water supplies, increased use of recycled water, and implementation of the WFA water conservation element. Current conjunctive use activities include the City/SCWA Franklin Intertie and continued development of the FRWA project that will bring additional surface water supplies into Zone 40. The

City also is considering optimizing the use of American River water within the POU boundaries. Lastly, SRCSD is looking at opportunities for use and possible in-lieu recharge of groundwater through use of recycled water for non-potable uses.

Conjunctive management is a program that includes both conjunctive use and the development of banking and exchange opportunities with local in-basin partners after local needs are met. Banking and exchange partnerships will result in increased surface water and perhaps revenue to pay for some of the necessary capital improvements to help sustain the resource. The basin governance body and SCWA are also interested in direct recharge and propose to investigate a variety of ways to recharge water into available storage space in the basin. Opportunities for direct recharge exist through the use of recharge basins (e.g., abandoned aggregate mining pits) or through a aquifer storage and recovery (ASR) program. The City of Roseville is currently implementing an ASR program where treated surface water is injected into the groundwater and then recovered in the summer months and dry years through groundwater wells. The success of this program will be monitored closely by the governance body.

Another recharge opportunity would provide raw or treated surface water to municipal and agricultural users in lieu of extracting groundwater. During the early phases of Zone 40's conjunctive use program, there is expected to be excess capacity in both the raw water pipeline from the FRWA project and the Central WTP that could be delivered through some type of conveyance to groundwater users.

Actions. The basin governance body will take the following actions:

- Continue to investigate conjunctive use opportunities within the Central Basin area. Groundwater users within the Central Basin will coordinate any recharge efforts.
- Continue to investigate opportunities for development of direct recharge facilities in addition to in-lieu recharge (e.g., injection wells or surface spreading facilities, through constructed recharge basins or in riverbeds or streambeds).

3.2.4.1 Demand Reduction

An important factor in maintaining the sustainable yield of the basin is by reducing demand for potable water supplies through conservation and the use of recycled water for landscape irrigation.

Water Conservation. RWA's efforts in developing and implementing a regional Water Efficiency Program (WEP) are well recognized by CSCGF. The WEP assists participants in meeting their water conservation agreements with the Water Forum, the California Urban Water Conservation Council, and CVPIA. The goal of the WFA is to achieve system-wide conservation of slightly more than 25 percent by 2030.

The basin governance body will work closely with the Water Forum Successor Effort and RWA to ensure that all applicable cost-effective BMPs are implemented in the Central Basin urban areas. The basin governance body shall develop BMPs for self-served agricultural and agricultural-residential water users. These BMPs will be based on applicable Reclamation and DWR data and recommendations.

Water Recycling. The SRCSD is developing a countywide Water Recycling Master Plan to provide up to 40 MGD of recycled water. SRCSD treats wastewater at its Sacramento Regional WWTP and is looking for ways to increase demand for tertiary treated or recycled water. Currently, SRCSD is treating approximately 5 mgd of recycled water and delivering it to nearby landscape irrigation users within the Laguna West, Lakeside and Laguna Stonelakes portion of Zone 40. SRCSD expects the capacity of that facility to increase to 10 mgd over the next few years to serve areas within the City of Elk Grove known at the East Franklin and Laguna Ridge development areas within Zone 40.

Actions. The basin governance body will take the following actions:

- Participate in RWA's WEP to ensure that Central Basin purveyor conservation efforts are focused and effective. For those who receive wholesale water supplies, the governance body of the Central Basin will ensure that they are informed of the benefits and regional importance of participating in the WEP.

- The basin governance body shall develop BMPs for self-served agricultural and agricultural-residential water users.
- Coordinate with SRCSD to investigate further opportunities for expanded use of recycled water throughout the Central Basin.

3.2.5 Component No. 5: PLANNING INTEGRATION

With the large number of water purveyors that serve the greater Sacramento area, the need to integrate water management planning on a regional scale is a high priority. Individual purveyors derive their supplies from the American River, Sacramento River, the groundwater basin, or some mix of these sources. Individual purveyor infrastructure systems are mostly independent; where interconnections do exist they are typically for emergency purposes only.

The WFA provides a regional conjunctive use framework with commitments from individual purveyors concerning groundwater and surface water operations, including limitations on surface water diversions from the lower American River during dry years. SCWA and others planning efforts seek to better integrate the individual plans of various entities to implement various elements of the WFA in keeping with the 2030 regional framework. Such integration also promotes operational efficiency, cost savings, and in some cases generates larger statewide-system benefits.

Some of the municipal groundwater purveyors that provide water service within the Central Basin have opted out of the Water Forum Process and the development of the CSCGMP. If these purveyors choose to participate in the future, then information relative to their water system will be added to the CSCGMP.

3.2.5.1 Existing Integrated Planning Efforts

Stakeholders in the Central Basin, such as SCWA, have already implemented integrated management in the region through cooperation with the City in treating and wheeling surface water (see **Section 2.2.3.2**), participation in the WEP (see **Section 3.2.4.1**), and the SRCSD recycled water program (see **Section 2.4**).

3.2.5.1.1 Urban Water Management Planning

Most urban purveyors in the Central Basin are required to prepare an Urban Water Management Plan. These plans, as defined by CWC § 10610 et seq., require public water suppliers with more than 3,000 customers, or who deliver more than 3,000 AF of water annually, to identify conservation and efficient water use practices to help ensure a long-term, reliable water supply. The basin governance body will encourage that all retail purveyors to submit plans to DWR.

3.2.5.1.2 DWSAP Program

The DWSAP Program is administered by DHS. The first step in completing a source protection program is to conduct a preliminary assessment. The assessment includes "delineation of the area around a drinking water source through which contaminants might move and reach the drinking water supply; an inventory of PCAs that might lead to the release of microbiological or chemical contaminants within the delineated area; and a determination of the PCAs to which the drinking water source is most vulnerable." Refer to the following DHS web site for more details

on the DWSAP program: (http://www.dhs.ca.gov/ps/ddwem/dwsap/overview.htm).

These assessments only apply to agencies that deliver groundwater for public drinking water supply. Data from the assessments have or will be incorporated into the DMS.

3.2.5.1.3 Land Use Planning

Effective January 1, 2002, State Water Code Sections 10910-10915 (inclusive) (commonly known as SB 610) required that a water supplier take certain actions to confirm sufficiency of water supply as a condition to approval of new development projects. These actions involve the development of Water Supply Assessments and Written Verifications at the request of the land use authority. These documents provide an assurance that adequate water supplies are available before a project moves forward in gaining entitlements for development. The governance body will coordinate with and exchange information with all land use agencies within the area on a continuing basis to provide the latest information pertaining to activities taking place for the protection and availability of groundwater resources; however, the governance body will not be placed in a role of responding to SB 610 requests.

3.2.5.1.4 Integrated Groundwater and Surface Water Modeling

The basin governance body is interested in using and building on existing groundwater models for the Sacramento area. In the late 1990s, a range of groundwater extraction and recharge scenarios were simulated using the North American River and Sacramento County Combined IGSM. This model was originally developed for the American River Water Resources Investigation (ARWRI), conducted by Reclamation, and was later used for the Draft Water Forum Solution Model developed for the Water Forum. The Water Forum used the model in the development of a conjunctive use strategy for the groundwater basin underlying Sacramento County and southern Placer County. SGA recently updated the calibration model to run with the latest version of IGSM. Historical water budgets from 1970 to 1995 were developed and a comparison was provided of model results and actual measured values for groundwater elevations and streamflows over the calibration period. SCWA and SGA are pursuing having the hydrologic period extended from 1995 to 2000 and extending the planning model hydrologic period that is used for measuring effects of conjunctive use practices. Currently the hydrologic period extends from 1922 to 1995.

The reason for maintaining and updating the IGSM is because it forms the basis for the WFA and the Zone 40 WSMP environmental analyses. The basin governance body should be the custodian of the IGSM model because the model is used for regional planning by Reclamation and DWR for projects such as ARWRI, CVPIA, and the CALFED process and is a tool that is supported by the DMS. In addition, the model is a suitable tool to analize the effects of local projects on regional groundwater conditions.

Actions. The basin governance body will take the following actions:

- Prepare and adopt a formal integrated water management plan in accordance with CWC § 10540 et seq. The plan will include, but not be limited to, the elements listed above. The Central Basin governance body will seek to form an ad hoc committee with SCWA, RWA, SSCAWA, and TNC to determine which agency would be most appropriate to prepare that plan and to update and make use of the IGSM model.
- Review the Water Forum Land Use procedures and make recommendations on the type of role, if any, the basin governance body should take with respect to land use decisions within the basin.

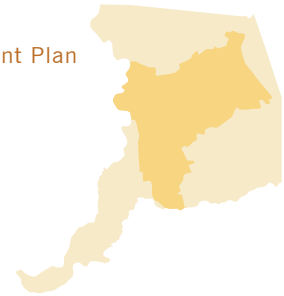
3.3 SUMMARY OF SECTION 3

Table 3-1 below provides a summary of **Section 3** for quick reference and for use in further sections. The table correlates which activities are related to one or more BMOs.

Table 3-1. Summary of Action Items and How Each Applies to the BMOs

Action Items Related to BMO	BMO No. 1 Maintain the long-term average groundwater extraction rate at or below 273,000 AF/year	BMO No. 2 Maintain specific groundwater elevations within all areas of the basin consistent with the Water Forum "solution"	BMO No. 3 Protect against any potential inelastic land surface subsidence by limiting subsidence to no more than 0.007 feet per 1 foot of drawdown in the groundwater basin	BMO No. 4 Protect against any adverse impacts to surface water flows in the American, Cosumnes, and Sacramento rivers	BMO No. 5 Water quality objectives
Component No. 1 Stakeholder Involvement					
Involving the Public		✓		✓	✓
Involving Other Agencies Within & Adjacent to the Central Basin		✓	✓	✓	✓
Using Advisory Committees	✓	✓	✓	✓	✓
Developing Relationships with State and Federal Agencies	✓	✓	✓	✓	✓
Pursuing Partnership Opportunities			✓	✓	✓
Component No. 2 Monitoring Program					
Groundwater Elevation Monitoring		✓			
Groundwater Quality Monitoring					✓
Land Surface Elevation Monitoring			✓		
Surface Water Groundwater Interaction Monitoring				✓	
Protocols for Collection of Groundwater Data		✓			
Data Management System	✓	✓	✓	✓	✓
Component No. 3 Groundwater Resource Protection					
Well Construction Policies					✓
Well Abandonment and Destruction Policies					✓
Wellhead Protection Measures					✓
Protection of Recharge Areas					✓
Control of the Migration and Remediation of Contaminated Groundwater					✓
Control of Saline Water Intrusion					✓
Component No. 4 Groundwater Sustainability					
Demand Reduction (Water Conservation and Water Recycling	✓	✓	✓	✓	✓
Component No. 5 Planning Integration					
Existing Integrated Planning Efforts (Urban Water Management Planning, DWSAP Program, Land Use Planning, and Groundwater Modeling)	✓	✓	✓	✓	✓

Plan Implementation



Section 4

Plan Implementation

This section identifies needed monitoring, trigger points, and recommended steps necessary to fully implement the BMOs and action items presented in **Section 3**. Many of these steps involve coordination by the future basin governance body with other local, state and federal agencies. This coordination can take place within 6 months of the adoption of this CSCGMP by the governance body. Monitoring, assessing data trends, and reporting the state of the basin for the purpose of determining the adequacy of the management activities is a key process in this plan. Assessments in the value of monitoring and reporting activities will be made as new monitoring data become available for review by the Central Basin governance body. All results of the monitoring program and actions/decisions made by the governance body will be documented in an annual State of the Basin report. This section also considers the schedule and budget necessary to implement the CSCGMP.

4.1 BACKGROUND

Section 3 identified BMOs, plan components, and management actions (see **Table 3-1**) to implement the groundwater management plan. However, it did not define or identify specific actions that would be taken in the event the objectives of the BMOs were not being met. **Section 4** defines these specific actions by providing a set of "trigger points" in conjunction with recommended actions for each BMO. Associated steps based on exceeding a trigger point's established threshold are the next level of management activity to be undertaken by the governance body.

As mentioned in previous sections, determining and maintaining the health of the Central Basin is the governance body's foremost concern and is accomplished through data collection and evaluation, remedial and/or restorative actions if necessary, and reporting. Findings and the success or failure of steps taken to remedy a problem will comprise a good portion of the content of the annual State of the Basin report published by the basin governance body.

4.2 SPECIFIC ACTIONS BASED ON MONITORING RESULTS

The term "trigger point" as used in this section is defined as a condition in which a BMO has been breached at a defined level. Each trigger point has a corresponding recommended action that is linked to each level. The recommended action is dependent on the measurement taken and the BMO in

question. Individual trigger points are tied to monitoring actions such as groundwater level measurements, groundwater extraction calculations, water quality determinations, etc.

Once a trigger point has been reached, the basin governance body must decide on its course of action. For example, if groundwater levels begin to fall in basin polygon areas (discussed in **Section 3.1.2** and **Appendix B**) that had previously been identified as an area of concern, what action(s) should be taken by the basin governance body? In this case, the basin governance body would go to the trigger points that address potential lowering of groundwater levels in areas being impacted by groundwater pumping or by hydrologic conditions.

The actions that a trigger point might require for the "groundwater elevation" BMO (BMO No. 2) are described as follows:

Trigger Point 1. This initial alert stage informs the basin governance body and the overlying groundwater extractor(s) that a specific polygon area is being compromised. Activation of this trigger will only take place after conducting a thorough investigation into the cause of the condition.

Trigger Point 2. This stage assumes that the area has already gone through Trigger Point 1 actions and is at the next level of alert. This stage may require a reduction in pumping in predefined area(s) to bring the affected area back into compliance. Groundwater extractors within the affected area may not be the actual cause of decline.

Trigger Point 3. This stage indicates continuously declining groundwater levels in an area even during wet and normal hydrologic cycles. This would indicate that excessive pumping is the probable cause. Well owners with operating wells in the affected area(s) will be identified and notified of the basin condition in their area. An assessment will be levied against those owners who continue to pump at the higher level.

Trigger Point 4. If the recommended actions from the first three trigger points do not result in an improvement to the affected area(s), the basin governance body will need to consider what action it will take. In this example there appears to be two alternatives. The first is to consider whether a lower groundwater level in the area is acceptable. If lower groundwater levels are deemed acceptable, then the basin governance body has the ability to adapt to the real monitoring data and change the model-based thresholds for management in the area. If lower groundwater levels are deemed unacceptable, the second alternative would require finding supplemental water supplies and building the necessary infrastructure to deliver these supplies, for the area(s) and reduce pumping to allow groundwater levels to recover to acceptable levels. The cost of this last action will be exacted upon well owners with operating wells in the area that are contributing to the decline in groundwater levels.

This same process can be extrapolated for the average groundwater extraction rate, water quality, land subsidence, and aquifer stream interaction BMOs. The only difference in each trigger point is the measurement parameters and the set of actions and penalties. These are listed by BMO in **Table 4-1**. A full description of the BMOs, the methods of monitoring and management actions are provided in **Section 3**. **Table 4-1** provides the set of conditions that initiate change in how the basin is being managed and lays down the initial framework for penalties in the event trigger points are continuously exceeded.

Table 4-1. Monitoring Actions and Trigger Points

Monitoring Action	Trigger Points	Recommended Action
BMO No. 1. Maintain the long-term average groundwater extraction rate at or below 273,000 AF/year		
The term "long-term average" means averaging data over a long period of time. This will begin with completion of an accurate estimate of the current total groundwater extraction from the basin. Once completed, estimates will be made at least every five years. Five-year estimates will consist of agricultural and agricultural-residential data available through the DWR Land Use Survey, and data collected by the various purveyors (collected monthly and available on an annual basis). The collective data will then be used to compare estimated groundwater extractions and the BMO requirement of 273,000 AF/year. More frequent estimates can be made by assuming agriculture and agricultural-residential data remain relatively constant.	Trigger Point 1. Groundwater extractions for the basin have exceeded 273,000 AF for the previous year.	Evaluate and confirm the data. Look for opportunities to reduce pumping either through conservation, or education in water use and irrigation practices for urban, agricultural, and agriculture-residential.
	Trigger Point 2. Groundwater extractions for the basin have exceeded 273,000 AF for the previous two (2) years	Evaluate and confirm the data and include formal notification of the signatory governing bodies, local water purveyors and the agricultural community. Reduce pumping through importation of surface water where conveyance systems exist. In cases where infrastructure is not in place to convey alternative water supplies, reductions in pumping may be necessary until said facilities are in-place.
	Trigger Point 3. Groundwater extractions for the basin have exceeded 273,000 AF for the previous five (5) consecutive years	Evaluate and confirm data and include formal notification of the signatory governing bodies, local water purveyors and the agricultural community. Reduce pumping, acquire surface water entitlements to replace lost groundwater supplies, and construct conveyance facilities for surface water. Look for agreements with third parties and financing mechanisms to assist in infrastructure requirements. Initiate an extraction-rate-based funding mechanism over the entire basin.
	Trigger Point 4. Groundwater extractions for the basin have exceeded 273,000 AF for more than five (5) years.	Evaluate and confirm data and include formal notification of the signatory governing bodies, local water purveyors and the agricultural community. Conduct a mandatory examination of adequacy of long-term sustainable yield criteria and the actual effects on the basin with the higher groundwater yield. This may require a reassessment of the sustainable yield criteria, and possibly an increase, in accordance with basin governance body procedures. Consultation with the Water Forum Successor Effort will be required prior to taking this action.

Table 4-1. Monitoring Actions and Trigger Points (continued)

Monitoring Action	Trigger Points	Recommended Action
BMO No. 2. Maintain specific groundwater elevations within all areas of the basin consistent with the Water Forum "solution."		
A monitoring methodology to meet specific objectives in managing groundwater levels requires a systematic, repeatable, and scientific approach. The objective of this monitoring program is to take measurements from selected monitoring wells that have sufficient construction and hydrogeologic data. Wells will be assigned to represent the polygon areas defined in **Appendix B**, and may be grouped within the basin in areas that are sufficiently distinct in the makeup of hydrogeology and land use. Monitored groundwater levels for a well will be compared with the designated upper and lower groundwater level threshold for each polygon that is assigned to the well. The upper and lower thresholds are termed the "bandwidth" of the polygon.	Trigger Point 1. A 25 to 50 percent encroachment into the designated bandwidth of a polygon.	Alert stage that informs the basin governance body and the overlying groundwater extractor(s) that a specific polygon area is being compromised. Activation of this trigger will take place only after the cause of the condition is thoroughly investigated.
	Trigger Point 2. A 50 to 75 percent encroachment into the designated bandwidth of a polygon.	In the event groundwater level measurements hit Trigger Point 2 without first initiating Trigger Point 1, the recommended actions of Trigger Point 1 still apply. Additionally, this stage initiates a requirement to collect a fee to secure supplemental water supplies or to reduce pumping in a predefined area(s).
	Trigger Point 3. A 75 to 100 percent encroachment into the designated bandwidth of a polygon. This indicates continuously declining groundwater levels in an area even during wet and normal hydrologic cycles, indicating that excessive pumping is the probable cause.	Well owners with operating wells in the affected area(s) will be identified and notified of the basin's condition in their area. An assessment will be levied against those owners who continue to pump at the higher level. Every attempt will be made by the governance body to ameliorate the impact assessments to private domestic groundwater pumpers.
	Trigger Point 4. Over 100 percent encroachment into the designated bandwidth of a polygon.	If the recommended actions from the first three trigger points do not result in an improvement to the affected area(s), the basin governance body will need to consider which of two actions it will take. The first is to consider whether a lower groundwater level in the area is acceptable. If so, the basin governance body has the ability to adapt to the actual monitoring data and change the model-based thresholds for management in the area. If lower groundwater levels are deemed unacceptable, the second action would require finding supplemental water supplies and construct infrastructure for the area(s) and reduce pumping to allow groundwater levels to recover to acceptable levels. Fees in addition to Trigger Point 3 fees will be assessed to cover costs associated with this action.

Table 4-1. Monitoring Actions and Trigger Points (continued)

Monitoring Action	Trigger Points	Recommended Action
BMO No. 3. Protect against any potential inelastic land surface subsidence by limiting subsidence to no more than 0.007 feet per 1 foot of drawdown in the groundwater basin.		
If inelastic subsidence is documented in conjunction with declining groundwater levels, the basin governance body will investigate and take appropriate actions to avoid or mitigate adverse impacts. Subsidence should be measured and thought of as a long-term process. While some measurements have been made to determine the level of subsidence in the Sacramento area, some concern exists regarding the accuracy of the measurements and sufficiency of the data. The North and Central basins should collaborate to gain a better understanding of subsidence.	Trigger Point 1. Subsidence measured at less than 0.007 feet per foot of groundwater decline.	If subsidence is measured either in the North or Central basins, further study should be initiated to rule out any error in survey or survey markers. A measure of impacts, if any, should also be noted and weighed as to whether the impact is acceptable.
	Trigger Point 2. Subsidence measured at or above 0.007 feet per foot of groundwater decline.	Subsidence greater than the set limit is cause for concern and needs to be addressed by first assessing Trigger Point 1 data and then determining if the amount of subsidence can occur with acceptable impacts. If so, the criteria of 0.007 feet per foot of groundwater decline may be increased according to the data collected.
	Trigger Point 3. Data collected for ground subsidence has a high correlation with declines in groundwater elevations or if any structural damage is identified as being caused by subsidence.	The basin governance body needs to develop and implement a plan to reduce pumping, or by some other means, prevent dewatering of the aquifer in areas where inelastic subsidence is occurring. This may mean providing surface water or other supplemental water supplies to these areas or injection of surface water (or off-site groundwater) to replace groundwater that has been removed through extraction or in some manner has been prohibited from recharging the area of concern.
BMO No. 4. Protect against any adverse impacts to surface water flows in the American, Cosumnes, and Sacramento rivers.		
It is the intent of this plan that controllable operations of the groundwater system do not negatively impact the area's rivers and streams. The basin governance body will seek to gain a better understanding, in cooperation with SGA and others, of potential impacts of the discharge of local area groundwater to major rivers adjacent to the Central Basin. Water quality issues related to this type of discharge will be reported in the Annual State of the Basin Report. No Trigger Points are assigned to water quality issues as a result of groundwater discharges at this time.	Trigger Point 1. Monitoring of losses of river water to groundwater shows a 5 percent increase over the current loss rate based on total flow in the river.	Use the calibrated Sacramento County IGSM to identify where losses are likely occurring in the river(s). Identify and provide quantity of loss in the State of the Basin Report. Coordinate and consult any efforts with State DWR, SGA, TNC, and SSCAWA.
	Trigger Point 2. Monitoring of losses of river water to groundwater shows a 25 percent increase over the current loss rate based on total flow in the river.	Complete the same analysis as for Trigger Point 1 and begin to develop alternative management strategies that reduce the hydraulic gradient (or slope) of the groundwater pieziometric surface that is in contact with the river(s). Seek stakeholder approval and funding to implement a preferred alternative to begin managing the losses of surface water to the groundwater system.

Table 4-1. Monitoring Actions and Trigger Points (continued)

Monitoring Action	Trigger Points	Recommended Action
BMO No. 5. Water quality objectives		
Water quality objectives will include analyzing for total dissolved solids (TDS) (typically a measure of salinity), volatile organic compounds (VOC), and nitrates. Any violation exceeding the management criteria will require an action by the basin governance body.	Total Dissolved Solids	
	Trigger Point 1. Monitoring results of TDS exceed the secondary drinking water standard MCL of 1,000 mg/L.	Report the exceedance in the State of the Basin Report. If a health concern exists, the affected stakeholder(s) would be notified and arrangements made to remedy the problem.
	Trigger Point 2. High TDS levels believed to be coming from the deeper aquifer system.	A study will be conducted to determine if the increase in TDS is a result of groundwater well construction and extraction activities. Well construction may be a concern if high TDS water moves upward into the shallow aquifer due to the high piezometric surface of the deep aquifer. This condition "pushes" water into the shallow aquifer zone through a well or along the outside of a well. This condition also may occur through an improperly abandoned well that is screened in the deep aquifer.
	Volatile Organic Compounds	
	Trigger Point 1. Monitoring results of VOCs meet or exceed established maximum contaminant levels.	Report the exceedance in the State of the Basin Report. The affected stakeholder(s) and appropriate regulatory agencies would be notified and arrangements made to remedy the problem.
	Trigger Point 2. VOC monitoring results believed to be a result of normal basin pumping activities.	A study, in conjunction with appropriate regulatory agencies, will be conducted to determine the source of the contamination. If specific pumping activities are found to be the cause of contaminant migration, the appropriate regulatory agency will take the necessary steps to have the designated responsible party replace lost capacity and to protect other private and public wells from being contaminated.
	Nitrates	
	Trigger Point 1. Monitoring results of nitrates meet or exceed established the Primary Drinking Water Standard of 40 mg/l.	Report the exceedance in the State of the Basin Report. If a health concern exists, the affected stakeholder(s) would be notified and arrangements made to remedy the problem.
	Trigger Point 2. Source of nitrates believed to be a result of activities related to on-site wastewater disposal system management.	A study, in conjunction with the appropriate regulatory agencies, will be conducted to determine the source of the contamination. If on-site wastewater disposal systems are found to be the cause, a larger study of the impacted area may be warranted. Recommendations from these studies may necessitate an evaluation of design standards for on-site wastewater disposal systems county-wide.

4.3 CENTRAL BASIN WELL PROTECTION PROGRAM

The Central Basin Well Protection Program (WPP) is a result of negotiations that took place in the CSCGF. A copy of the negotiated Trial Balloon on Well Protection is included in **Appendix D**. Any differences between the Trial Balloon and this section are a result of the need to provide supplemental information and clarification for full implementation of the WPP. The basin governance body will be responsible for implementing this program.

4.3.1 Background

The WFA set the long-term average annual extraction of groundwater (i.e., sustainable yield) from the Central Basin at 273,000 acre-feet. When the Water Forum stakeholders negotiated this extraction volume for the basin, it was anticipated that this volume would result in a further decline in groundwater levels (approximately 50 feet in the deepest part of the cone of depression as measured in 1990). It was expected that such a decline would affect some existing domestic and agricultural wells. An update of the Impact Analysis (**Appendix E**) was recently completed. This update is based on groundwater model improvements and the Zone 40 WSMP. Results of this analysis show that the decline is not as severe as originally expected.

Protection of the Central Basin's groundwater resource and the domestic and agricultural wells located within the basin is of fundamental importance to the stakeholders of the CSCGF. Regarding the basin's long-term sustainable yield, the CSCGF was concerned that the continued decline in groundwater levels could result in the "dewatering" of some wells, particularly agricultural and agricultural-residential wells. Agricultural and agricultural-residential users have no alternative source of supply if their wells are dewatered, and current groundwater users should not have to subsidize future growth in the basin by paying the cost of deepening or replacing existing wells. To address this concern, it was proposed that a WPP be included as part of the groundwater management plan for the Central Basin.

4.3.2 Trust Fund Proposal

It is the responsibility of the basin governance body to develop specific details on operation of the well protection trust fund (trust fund). These details include, but are not limited to, the amount of a well protection fee, how the well protection fee will be collected, criteria for submitting a claim, claim verification, maximum amount paid per verified claimant, timeline between submission of claim and date of decision, etc.

All details related to the trust fund should be developed, and the WPP fully operational, within one year of the creation of the basin governance body. (NOTE: Development and implementation of the Central Basin WPP is not intended to modify or change any provisions of the North Vineyard Well Protection Program Agreement, or to relieve any party of their obligations as set forth in that agreement.) Some of the specific details of the trust fund are defined in the following subsections.

4.3.2.1 Creation of the Trust Fund

The purpose of the trust fund is to cover the cost of deepening or replacing existing agricultural or agricultural-residential wells that may be impacted by future development in the Central Basin area. As mentioned previously, funding for the trust fund will be provided through collection of a well protection fee. Well protection fees can be collected as part of the building permit process for new construction or as part of the well drilling permit process for a new well. The amount of the fee, how it will be collected, and how the trust fund should be administered will be determined by the basin governance body. The specifics of the fees, how much the fee should be, and who gets assessed will be determined within 6 months of adoption of the CSCGMP.

4.3.3 Fee Exemptions

Any property that is exclusively served by surface water is exempt from paying the well protection fee. Any well drilling permit application for a remediation well required by a regulatory compliance order and all monitoring wells are exempt from paying the well protection

fee. If an individual is obtaining both a building permit and applying to drill a new well on the same property, only one assessment should be made. For example, if a purveyor has paid the impact fee for a new well and is required to also get a building permit for appurtenant structures, the fee would only be assessed once.

4.3.4 Update to Fee Program

Once the well protection fee has been established by the governance body, a public notice and comment period will be conducted. The fee shall be indexed to the average of the Engineering News-Record (ENR) construction cost index for 20 U.S. cities and San Francisco when the WPP is adopted. Increases shall be determined by calculating an adjustment factor based on the index when the WPP is adopted, and the current index. Adjustments shall be made on an annual basis.

Throughout the life of the trust fund, the basin governance body should have the power to change the amount of the assessment by conducting a nexus study, including an impact analysis. This study would be initiated as a result of the findings of actuarial studies. An impact analysis was completed in December 2005 (see **Appendix E**).

4.3.5 Authority to Collect Fees

The basin governance body is responsible for collecting the well protection fee and administering the trust fund. Details of this authority will be determined as part of the process of establishing the basin governance body. The basin governance body should work cooperatively with permit-issuing authorities to see that fees are collected in an efficient manner.

4.3.6 Eligibility to Participate in Program

To establish eligibility for coverage under the program, existing wells must be registered with the basin governance body by the well owners. The basin governance body shall establish the terms and conditions under which a well shall be registered, and will develop a schedule and set a reasonable time limit by which to complete the registration process. The governance body shall make every reasonable attempt to inform all residents who may be eligible to participate in the WPP to register their well(s).

Once a well has been registered, coverage by the trust fund shall continue for as long as the fund remains active. Coverage of a well can be transferred for a particular property if ownership changes. Once a well has been registered, coverage by the trust fund shall continue for as long as the fund remains active. Coverage of well can be transferred on a particular property when there is a change in ownership.

4.3.7 Eligibility for Claims

The basin governance body will establish eligibility criteria for claims against the trust fund that are clearly defined and strictly related to a decline in groundwater level. Wells that have failed for reasons other than a decline in groundwater level, such as a structural failure or faulty motors or pumps, etc., will not be covered by the fund.

Any claim against the trust fund must be submitted to the basin governance body for review and verified by an independent source (e.g., hydrogeolologist, well service company, etc.) to be compensated by the fund. The verification cost will be funded by the trust fund.

4.3.8 Sunset Provision

No earlier than five years after implementing this program, nor later than the beginning of the eleventh year after surface water from the FRWA project is delivered to the Central Basin area, the basin management body shall conduct a comprehensive evaluation to determine whether a continuing need exists to maintain the trust fund. In conducting this evaluation, the basin management body shall consider the following factors:

- Groundwater levels
- Number of claims made against the trust fund
- Rate of claims filed over time (i.e., is the rate of claims increasing or decreasing)
- Status of urbanization (i.e., is further growth/development anticipated and, if yes, how will it affect water supply)

A decision on whether or not to continue the trust fund shall be reserved to the basin governance body.

If the basin governance body decides to terminate the program, any undisbursed money should be used for other activities consistent with the purposes of the CSCGMP (e.g., conservation, habitat mitigation, enhancement of groundwater recharge, etc.). For this to occur, the language establishing the trust fund must be consistent with the requirements set forth in Government Code, Section 1600.

4.4 GROUNDWATER CONTAMINATION MONITORING AND COLLABORATION PROGRAM

The Central Basin Groundwater Contamination Monitoring and Collaboration Program is a result of negotiations that took place in the CSCGF. A copy of the negotiated Trial Balloon is included in **Appendix F**. Any differences between the Trial Balloon and this section are a result of the need to provide supplemental information and clarification for full implementation of the program. The basin governance body will be responsible for implementing this program.

4.4.1 Background

Groundwater contamination and remediation of contaminated groundwater in the Central Basin must be addressed proactively. Water purveyors, regulatory agencies, responsible parties, and the Water Forum Successor Effort should meet on a regular basis to share information and develop strategies to collaborate on potential threats to drinking water sources and on cleanup activities.

These collaborative strategies should be designed to avoid negative impacts on all other water resources and water users.

4.4.2 Program Components

The components of the program focus on maintaining a policy of keeping remediated groundwater within the Central Basin through non-potable uses within newly developing areas and to maintain consistent outreach programs to private well owners to inform and collect data on groundwater cleanup efforts taking place within the region.

Program Component 1. Use of Remediated Groundwater in Urbanized Areas

The Water Forum Successor Effort and the basin governance body should commence a high-priority effort to convince Sacramento County and the cities of Elk Grove, Rancho Cordova, and Sacramento to adopt policies that encourage the use of remediated groundwater for non-potable purposes.

Program Component 2. Survey Private Wells for Potential Contamination

The Water Forum Successor Effort and the basin governance body should request that the RWQCB require responsible parties (i.e., parties who caused contamination) to survey private wells within 2,000 feet of any identified contaminant plume, and also require development of an appropriate monitoring plan for said wells. The monitoring plan shall be subject to review by the basin governance body and shall include the use of “sentinel” wells. The plan also should include information on frequency of sampling, reporting requirements, etc.

Program Component 3. Assistance of the Sacramento County Environmental Management Department

Sacramento County EMD is responsible for issuing well drilling permits and ensuring that the provisions of Sacramento County’s well drilling ordinance are enforced. If the requirements of the ordinance are not met, EMD should undertake whatever rigorous enforcement actions are available and effective in the given circumstances.

The basin governance body will work with EMD to establish and maintain an information clearing house to assist individual well owners in addressing contamination concerns (e.g., sources for well testing services, substances to be tested for, cost, options if

contamination is found, etc.). As part of its responsibility for this information clearinghouse, the basin governance body should collaborate with the RWQCB to maintain up-to-date information on contamination sources in the Central Basin. Also, EMD should undertake a concerted effort to inform individual well owners of the importance of testing/monitoring water quality in their wells through a variety of public education tools, including (but not limited to) a brochure provided to all applicants as part of the well permitting procedure.

4.5 CENTRAL BASIN REPORTING METHODS

The basin governance body is responsible for reporting on the progress of implementing the CSCGMP in an annual State of the Basin report. At a minimum, the annual State of the Basin report will summarize groundwater conditions within the basin, and document groundwater management activities from the previous year. Much of the data used in developing the annual State of the Basin report will come from the monitoring data stored in the basin's DMS. The report also will detail the progress made on implementing the various action items described in **Section 3**.

4.5.1 State of the Basin Report

The annual State of the Basin report is an essential document that will provide detailed information to stakeholders and the general public on the current state of the Central Basin. This report will include the following:

- Reports on trigger points that were reached (if any) and actions that were taken to evaluate/mitigate the problem.
- An evaluation supported by monitoring results on whether management actions and trigger point actions are meeting the BMOs.
- Improved characterization of the basin through interpretation of new and historical data included in the DMS.
- Summary and interpretation of groundwater elevation data based on the polygon method outlined in **Appendix B**.
- Summary and interpretation of basin water quality, including a graphical presentation of how the sampling data compare with thresholds set in **Section 3.1.5** for the various water quality constituents.
- Update on implementation of the WPP and identification of fund reserves and any monies spent, including specific information on which wells were impacted and how the determination was made to expend program funds.
- Update on the Groundwater Contamination Monitoring and Collaboration Program, including actions taken throughout the year, and how those actions lead toward the stated goals of the CSCGMP.
- Summary of any component changes, including the addition or modification of BMOs (e.g., polygon thresholds for maximum and minimum groundwater elevations or thresholds for water quality concentrations) during the period covered by the report.

The annual State of the Basin report will be completed between April 1 and June 1 of each year and will cover conditions and activities completed through December 31 of the prior year.

4.6 FUTURE REVIEW OF THE GMP

The CSCGMP is intended to serve as a framework for the first regionally coordinated management effort in the Central Basin area. Updates by the basin governance body will be identified in the annual State of the Basin report described above. The CSCGMP is therefore intended to be a living document, and it will be important to evaluate all of the actions and objectives over time to determine how well they are meeting the overall specific goals. The basin governance body will reevaluate the entire CSCGMP within five years of adoption.

4.7 FINANCING AND SCHEDULE

The basin governance body is responsible for implementing the various programs as follows:

- Monitoring for groundwater quality or elevations in wells located outside participating water purveyor boundaries.

- Customization of the DMS interface.
- Preparation of annual reports.
- Adaptive updates of the CSCGMP.
- Update of data sets and recalibration/improvement of existing groundwater model (IGSM).
- Collection of additional subsidence data.
- Construction of monitoring wells where critical data gaps exist.
- Stream-aquifer interaction studies.
- Implementation of the CSCGMP action items in **Section 3**, including, but not limited to the following:
  - Ad-Hoc Advisory Committee coordination, as required.
  - Project management.
  - Implementation of broader regional conjunctive use program, including agriculture.
  - Development of Public Outreach Plan.
  - BMO monitoring procedures.
  - Survey of abandoned wells.
  - Obtain DWSAP dates.
  - Update DMS data.
- Develop details of administering WPP including outreach.
- Registering wells for the WPP.
- Implementation of the WPP.
- Implementation of the Groundwater Contamination Monitoring and Collaboration Program.
- Reevaluate CSCGMP every five years.

Table 4-2 provides an estimate of annual costs to operate the monitoring and reporting program according to the recommended trigger point actions described in **Section 3** and **Table 4-1** above. Other costs include implementation of remedies to problems, the WPP, and additional costs associated with the start-up of the first year of plan implementation. Table 4-3 shows an implementation schedule for the first two years.

4.7.1 Plan Implementation Costs

First year program startup costs are estimated at $280,000. This is essentially 1.2 full time people working throughout the year on setting up monitoring programs, taking measurements, compiling data, reporting data. Future program costs will be evaluated on an annual basis by the basin governance body.

Table 4-2. Estimate in Implementation of the GMP

Action Items Related to the adopted CSCGMP	Total Cost
Component No. 1 Stakeholder Involvement	
Involving the Public (Development of Public Outreach Plan)	$5,590
Involving Other Agencies Adjacent to the Central Basin	$7,405
Utilizing Advisory Committees	$9,605
Developing Relationships with State and Federal Agencies	$9,605
Pursuing Partnership Opportunities	$5,545
Subtotal	$37,750
Component No. 2 Monitoring Program	
Groundwater Elevation Monitoring	$20,974
Groundwater Quality Monitoring	$44,886
Land Surface Elevation Monitoring	$3,420
Surface Water Groundwater Interaction Monitoring	$5,310
Protocols for the Collection of Groundwater Data	$8,886
Data Management System	$23,418
Subtotal	$106,894
Component No. 3 Groundwater Resource Protection	
Well Construction Policies	$3,500
Well Abandonment and Destruction Policies	$3,500
Wellhead Protection Measures	$3,500
Protection of Recharge Areas	$3,500
Control of the Migration and Remediation of Contaminated Groundwater	$3,500
Control of Saline Water Intrusion	$1,062
Subtotal	$18,560
Component No. 4 Groundwater Sustainability	
Demand Reduction (Water Conservation and Water Recycling)	$2,148
Subtotal	$2,148
Component No. 5 Planning Integration	
Existing Integrated Planning Efforts (Urban Water Management Planning, DWSAP Program, Land Use Planning, and Groundwater Modeling)	$30,414
Subtotal	$30,414
Reporting	
Well Protection Program	$4,015
Water Quality Collaboration Program	$14,015
Completion of Annual State of the Basin Report	$50,684
Subtotal	$68,714
Subtotal	
Associated Project Costs (5%)	$13,224
Estimated Annual Total	**$277,704**

Table 4-3. Implementation Schedule

TASKS	2006			2007												2008											
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Monitoring for groundwater quality or elevations in wells located outside participating water purveyor boundaries						✓						✓						✓						✓			
Customization of the DMS interface	✓	✓	✓												✓												✓
Preparation of annual reports							✓	✓											✓	✓							
Adaptive updates of the CSCGMP									✓	✓											✓	✓					
Update of data sets and recalibration/improvement of existing groundwater model (IGSM)																									✓	✓	✓
Collection of additional subsidence data	Every Five Years																										
Apply for state/federal grant funding	✓ →																										
Construction of monitoring wells where critical data gaps exist																✓ →											
Stream-aquifer interaction studies																		✓	✓	✓							
Implementation of the CSC-GMP, including:																											
▪ Ad-Hoc Committee coordination, as required	✓ →																										
▪ Project management	✓ →																										
▪ Implementation of broader regional conjunctive use program, including agriculture	✓ →																										
▪ Development of Public Outreach Plan	✓	✓	✓																								
▪ BMO monitoring procedures			✓	✓	✓																						
▪ Survey of abandoned wells			✓	✓	✓																						
▪ Obtain DWSAP dates				✓	✓											✓	✓										
▪ Update DMS data							✓	✓					✓	✓					✓	✓					✓	✓	
Develop details of administering WPP	✓	✓	✓																								
Registering wells for the WPP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓												
Implementation of the Groundwater Contamination Monitoring and Collaboration Program			✓	✓	✓																						
Revaluate CSCGMP	Every Five Years																										

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Section 5

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CENTRAL SACRAMENTO COUNTY

GROUNDWATER MANAGEMENT PLAN

FEBRUARY 2006

MWH

WATER FORUM

SACRAMENTO COUNTY WATER AGENCY

Appendix G

Summary of Population Based on Census Data

Appendix G-1: Census Tracts within the Cordova System

County	City	TAZ	Percentage of TAZ in System
Sacramento	Rancho Cordova	559	30%
Sacramento	Rancho Cordova	560	25%
Sacramento	Rancho Cordova	561	100%
Sacramento	Rancho Cordova	562	100%
Sacramento	Rancho Cordova	565	25%
Sacramento	Rancho Cordova	567	80%
Sacramento	Rancho Cordova	571	100%
Sacramento	Rancho Cordova	572	100%
Sacramento	Rancho Cordova	573	100%
Sacramento	Rancho Cordova	574	100%
Sacramento	Rancho Cordova	575	100%
Sacramento	Rancho Cordova	576	100%
Sacramento	Rancho Cordova	577	100%
Sacramento	Rancho Cordova	578	10%
Sacramento	Rancho Cordova	584	100%
Sacramento	Rancho Cordova	585	100%
Sacramento	Rancho Cordova	899	100%
Sacramento	Rancho Cordova	900	100%
Sacramento	Rancho Cordova	901	40%
Sacramento	Rancho Cordova	902	100%
Sacramento	Rancho Cordova	903	100%
Sacramento	Rancho Cordova	1043	100%
Sacramento	Rancho Cordova	1122	100%
Sacramento	Rancho Cordova	1123	100%
Sacramento	Rancho Cordova	1228	100%
Sacramento	Rancho Cordova	1232	100%
Sacramento	Rancho Cordova	1233	100%
Sacramento	Rancho Cordova	1238	100%

Table G-2: Population, Household and Employment Projections for Cordova System

TAZ	County	City	Population 2005	2010	2015	2020	2025	2030	2035	Percentage of Tract in System
559	Sacramento	Rancho Cordova	0	0	387	875	919	963	1,007	30%
560	Sacramento	Rancho Cordova	508	514	521	526	525	525	524	25%
561	Sacramento	Rancho Cordova	0	0	0	0	0	0	0	100%
562	Sacramento	Rancho Cordova	2,902	2,912	2,909	2,896	2,897	2,899	2,901	100%
565	Sacramento	Rancho Cordova	613	609	603	598	598	598	598	25%
567	Sacramento	Rancho Cordova	3,179	3,192	3,201	3,203	3,205	3,208	3,210	80%
571	Sacramento	Rancho Cordova	5,110	5,348	5,476	5,458	5,467	5,475	5,484	100%
572	Sacramento	Rancho Cordova	236	239	239	236	237	239	240	100%
573	Sacramento	Rancho Cordova	2,278	2,646	2,856	2,841	2,837	2,834	2,830	100%
574	Sacramento	Rancho Cordova	3,764	3,779	3,763	3,841	4,129	4,418	4,707	100%
575	Sacramento	Rancho Cordova	4,387	4,385	4,390	4,396	4,386	4,377	4,367	100%
576	Sacramento	Rancho Cordova	3,797	4,036	4,189	4,203	4,207	4,210	4,213	100%
577	Sacramento	Rancho Cordova	1,373	1,370	1,372	1,377	1,377	1,376	1,376	100%
578	Sacramento	Rancho Cordova	1,895	2,148	2,299	2,301	2,305	2,308	2,311	10%
584	Sacramento	Rancho Cordova	0	162	260	262	264	265	266	100%
585	Sacramento	Rancho Cordova	3,040	3,054	3,055	3,047	3,053	3,058	3,064	100%
899	Sacramento	Rancho Cordova	0	20	34	36	33	30	27	100%
900	Sacramento	Rancho Cordova	68	68	71	74	71	67	63	100%
901	Sacramento	Rancho Cordova	2,865	2,858	2,853	2,852	2,852	2,853	2,853	40%
902	Sacramento	Rancho Cordova	0	0	0	198	694	1,190	1,686	100%
903	Sacramento	Rancho Cordova	0	0	0	0	0	0	0	100%
1043	Sacramento	Rancho Cordova	671	663	663	671	672	674	675	100%
1122	Sacramento	Rancho Cordova	0	1,021	1,683	1,757	1,755	1,754	1,753	100%
1123	Sacramento	Rancho Cordova	1,888	4,149	5,522	5,549	5,556	5,562	5,568	100%
1228	Sacramento	Rancho Cordova	0	0	0	0	0	0	0	100%
1232	Sacramento	Rancho Cordova	3,433	3,414	3,410	3,422	3,424	3,427	3,429	100%
1233	Sacramento	Rancho Cordova	2,768	2,781	2,779	2,769	2,778	2,787	2,796	100%
1238	Sacramento	Rancho Cordova	371	370	368	366	371	375	380	100%
Total Population Based on SACOG			40,245	44,607	47,366	47,875	48,699	49,524	50,348	
SACOG Growth Rate					6%	1%	2%	2%	2%	

Table G-2: Population, Household and Employment Projections for Cordova System

Census Tract	County	City	Households 2005	2010	2015	2020	2025	2030	2035	Percentage of Tract in System
559	Sacramento	Rancho Cordova	0	21	175	396	417	437	457	30%
560	Sacramento	Rancho Cordova	235	235	235	235	235	236	236	25%
561	Sacramento	Rancho Cordova	0	0	0	0	0	0	0	100%
562	Sacramento	Rancho Cordova	1,144	1,144	1,144	1,144	1,144	1,144	1,144	100%
565	Sacramento	Rancho Cordova	242	242	242	242	242	242	242	25%
567	Sacramento	Rancho Cordova	1,284	1,289	1,293	1,293	1,293	1,293	1,293	80%
571	Sacramento	Rancho Cordova	2,062	2,154	2,209	2,209	2,209	2,209	2,209	100%
572	Sacramento	Rancho Cordova	97	97	97	97	97	97	97	100%
573	Sacramento	Rancho Cordova	922	1,060	1,143	1,143	1,143	1,143	1,143	100%
574	Sacramento	Rancho Cordova	1,517	1,517	1,518	1,564	1,679	1,794	1,909	100%
575	Sacramento	Rancho Cordova	1,765	1,769	1,771	1,771	1,771	1,771	1,771	100%
576	Sacramento	Rancho Cordova	1,536	1,633	1,691	1,691	1,691	1,691	1,691	100%
577	Sacramento	Rancho Cordova	549	549	549	549	549	549	549	100%
578	Sacramento	Rancho Cordova	781	895	964	964	964	964	964	10%
584	Sacramento	Rancho Cordova	0	82	131	131	131	131	131	100%
585	Sacramento	Rancho Cordova	1,322	1,323	1,324	1,324	1,324	1,324	1,324	100%
899	Sacramento	Rancho Cordova	0	9	15	15	15	15	15	100%
900	Sacramento	Rancho Cordova	28	28	28	28	28	28	28	100%
901	Sacramento	Rancho Cordova	1,132	1,132	1,132	1,132	1,132	1,132	1,132	40%
902	Sacramento	Rancho Cordova	0	0	0	95	332	569	806	100%
903	Sacramento	Rancho Cordova	0	0	0	0	0	0	0	100%
1043	Sacramento	Rancho Cordova	264	264	264	264	264	264	264	100%
1122	Sacramento	Rancho Cordova	0	405	668	698	698	698	698	100%
1123	Sacramento	Rancho Cordova	684	1,543	2,059	2,059	2,059	2,059	2,059	100%
1228	Sacramento	Rancho Cordova	0	0	0	0	0	0	0	100%
1232	Sacramento	Rancho Cordova	1,346	1,346	1,346	1,346	1,346	1,346	1,346	100%
1233	Sacramento	Rancho Cordova	1,098	1,098	1,098	1,098	1,098	1,098	1,098	100%
1238	Sacramento	Rancho Cordova	167	167	167	167	167	167	167	100%
Total Population Based on SACOG			16,177	17,888	18,978	19,215	19,573	19,931	20,290	
SACOG Growth Rate					6%	1%	2%	2%	2%	

Table G-2: Population, Household and Employment Projections for Cordova System

Census Tract	County	City	Employment 2005	2010	2015	2020	2025	2030	2035	Percentage of Tract in System
559	Sacramento	Rancho Cordova	279	284	2,114	4,963	5,230	5,498	5,766	30%
560	Sacramento	Rancho Cordova	833	833	833	869	959	1,049	1,140	25%
561	Sacramento	Rancho Cordova	480	480	480	480	480	480	480	100%
562	Sacramento	Rancho Cordova	2,102	2,102	2,102	2,102	2,102	2,102	2,102	100%
565	Sacramento	Rancho Cordova	2,650	3,025	3,303	3,442	3,593	3,744	3,895	25%
567	Sacramento	Rancho Cordova	382	384	386	386	386	386	386	80%
571	Sacramento	Rancho Cordova	885	885	885	885	885	885	885	100%
572	Sacramento	Rancho Cordova	406	406	406	406	406	406	406	100%
573	Sacramento	Rancho Cordova	279	313	334	334	334	334	334	100%
574	Sacramento	Rancho Cordova	3,875	3,879	3,882	3,703	3,251	2,799	2,347	100%
575	Sacramento	Rancho Cordova	670	670	670	671	676	681	685	100%
576	Sacramento	Rancho Cordova	441	469	485	485	485	485	485	100%
577	Sacramento	Rancho Cordova	564	564	564	564	564	564	564	100%
578	Sacramento	Rancho Cordova	1,720	1,757	1,779	1,779	1,779	1,779	1,779	10%
584	Sacramento	Rancho Cordova	2,709	3,414	3,837	3,899	4,054	4,208	4,362	100%
585	Sacramento	Rancho Cordova	5,075	5,426	5,637	5,637	5,637	5,637	5,637	100%
899	Sacramento	Rancho Cordova	5,841	5,966	6,155	6,332	6,348	6,363	6,379	100%
900	Sacramento	Rancho Cordova	764	865	925	925	925	925	925	100%
901	Sacramento	Rancho Cordova	152	152	152	152	152	152	152	40%
902	Sacramento	Rancho Cordova	1,600	1,600	1,600	1,889	2,613	3,336	4,059	100%
903	Sacramento	Rancho Cordova	3,119	3,706	4,058	4,058	4,058	4,058	4,058	100%
1043	Sacramento	Rancho Cordova	4,387	4,387	4,387	4,393	4,407	4,422	4,436	100%
1122	Sacramento	Rancho Cordova	3,404	3,934	4,381	4,501	4,320	4,140	3,960	100%
1123	Sacramento	Rancho Cordova	1,513	1,577	1,691	1,896	2,124	2,351	2,579	100%
1228	Sacramento	Rancho Cordova	633	1,295	1,692	1,995	2,755	3,515	4,274	100%
1232	Sacramento	Rancho Cordova	191	263	306	306	306	306	306	100%
1233	Sacramento	Rancho Cordova	112	112	112	112	112	112	112	100%
1238	Sacramento	Rancho Cordova	516	516	516	516	516	516	516	100%
Total Population Based on SACOG			41,058	44,421	47,320	49,203	50,611	52,020	53,428	
SACOG Growth Rate					7%	4%	3%	3%	3%	

Appendix H

Documentation of submittal to Library, Cities and Counties

Golden State
Water Company
A Subsidiary of American States Water Company

July 25, 2011

Peter Brostrom, Department of Water Resources
Statewide Integrated Water Management
Water Use and Efficiency Branch
901 P Street
Sacramento, CA 95814

Subject: Submittal of the Golden State Water Company (GSWC) 2010 Urban Water Management Plan (UWMP) – Barstow, Bay Point, Cordova and Southwest Systems

Dear Mr. Brostrom:

This transmittal letter submits the GSWC 2010 UWMPs for the Barstow, Bay Point, Cordova and Southwest Systems. GSWC prepared these UWMPs consistent with the Water Conservation Act of 2009 (Water Code sections 10608.12 to 10608.64) and the Urban Water Management Planning Act (Water Code sections 10610 to 10656).

GSWC adopted the UWMPs on July 1, 2011. Pursuant to California Water Code Sections 10620(d) and 10644, enclosed are one hard copy and one PDF version of the GSWC 2010 UWMPs for the Barstow, Bay Point, Cordova and Southwest Systems.

Please contact me at (916) 853-3612 or at eagisler@gswater.com with any questions on the 2010 GSWC Urban Water Management Plans.

Very truly yours,

GOLDEN STATE WATER COMPANY

Ernest A. Gisler
Planning Manager

3035 Prospect Park Drive, Ste. 60, Rancho Cordova, CA 95670
Tel: (800) 999-4033 • Fax: (916) 852-0171 • www.gswater.com

Golden State
Water Company
A Subsidiary of American States Water Company

July 25, 2011

California State Library
Government Publications Section
900 N Street
Sacramento, CA 95814

Subject: Submittal of the Golden State Water Company (GSWC) 2010 Urban Water Management Plan (UWMP) – Barstow, Bay Point, Cordova and Southwest Systems

To Whom It May Concern:

This transmittal letter submits the GSWC 2010 UWMPs for the Barstow, Bay Point, Cordova and Southwest Systems. GSWC prepared these UWMPs consistent with the Water Conservation Act of 2009 (Water Code sections 10608.12 to 10608.64) and the Urban Water Management Planning Act (Water Code sections 10610 to 10656).

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Please contact me at (916) 853-3612 or at eagisler@gswater.com with any questions on the 2010 GSWC Urban Water Management Plans.

Very truly yours,

GOLDEN STATE WATER COMPANY

Ernest A. Gisler
Planning Manager

3035 Prospect Park Drive, Ste. 60, Rancho Cordova, CA 95670
Tel: (800) 999-4033 • Fax: (916) 852-0171 • www.gswater.com

Golden State
Water Company
A Subsidiary of American States Water Company

July 28, 2011

City of Rancho Cordova
Paul Junker
Planning Director
2729 Prospect Park Drive
Rancho Cordova, CA 95670

RE: Golden State Water Company- 2010 Urban Water Management Plan

Golden State Water Company (GSWC) adopted the 2010 Urban Water Management Plan (UWMP) following a public hearing on June 9, 2011. The 2010 UWMP was adopted, July 1, 2011, in accordance with the Urban Water Management Planning Act and filed with DWR and the California Sate Library.

Pursuant to Section 10644(a) of the California Water Code, GSWC is required to file a copy of the adopted 2010 UWMP with any city or county within which GSWC provided water. Enclosed for your files is one copy of GSWC's adopted 2010 UWMP. It is also on our website at www.gswater.com.

If you have any questions you can contact me at (916) 853-3612.

Sincerely,

Ernest A. Gisler
Planning Manger

Enclosure

Golden State
Water Company
A Subsidiary of American States Water Company

July 28, 2011

County of Sacramento
Robert Sherry
Director of Planning and Community Development
827 7th Street
Sacramento, CA 95814

RE: Golden State Water Company- 2010 Urban Water Management Plan

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If you have any questions you can contact me at (916) 853-3612.

Sincerely,

Ernest A. Gisler
Planning Manger

Enclosure

Appendix I

(Not Applicable; Appendix Intentionally **Not** Included)

Appendix J

Urban Water Management Plan Checklist

Table I-2 Urban Water Management Plan checklist, organized by subject

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location	Page Number
PLAN PREPARATION					
4	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)		1.6	1-6
6	Notify, at least 60 days prior to the public hearing on the plan required by Section 10642, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. Any city or county receiving the notice may be consulted and provide comments.	10621(b)		1.6	1-6
7	Provide supporting documentation that the UWMP or any amendments to, or changes in, have been adopted as described in Section 10640 et seq.	10621(c)		1.6	1-6
54	Provide supporting documentation that the urban water management plan has been or will be provided to any city or county within which it provides water, no later than 60 days after the submission of this urban water management plan.	10635(b)		Appendix H	
55	Provide supporting documentation that the water supplier has encouraged 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		1.6	1-6
56	Provide supporting documentation that the urban water supplier made the plan available for public inspection and held a public hearing about the plan. For public agencies, the hearing notice is to be provided pursuant to Section 6066 of the Government Code. The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water. Privately-owned water suppliers shall provide an equivalent notice within its service area.	10642		Page vii	Vii
57	Provide supporting documentation that the plan has been adopted as prepared or modified.	10642		1.6	1-6
58	Provide supporting documentation as to how the water supplier plans to implement its plan.	10643		1.8	1-8

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location	Page Number
59	Provide supporting documentation that, in addition to submittal to DWR, the urban water supplier has submitted this UWMP to 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. This also includes amendments or changes.	10644(a)		1.7 Appendix H	1-7
60	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the urban water supplier has or will make the plan available for public review during normal business hours	10645		1.7	1-7
SYSTEM DESCRIPTION					
8	Describe the water supplier service area.	10631(a)		2.1	2-1
9	Describe the climate and other demographic factors of the service area of the supplier	10631(a)		2.2 & 2.4	2-1 & 2-10
10	Indicate the current population of the service area	10631(a)	Provide the most recent population data possible. Use the method described in "Baseline Daily Per Capita Water Use." See Section M.	2.3	2-5
11	Provide population projections for 2015, 2020, 2025, and 2030, based on data from State, regional, or local service area population projections.	10631(a)	2035 and 2040 can also be provided to support consistency with Water Supply Assessments and Written Verification of Water Supply documents.	2.3.2	2-5
12	Describe other demographic factors affecting the supplier's water management planning.	10631(a)		2.2 & 2.4	2-1 & 2-10
SYSTEM DEMANDS					
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)		3.2	3-4

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location	Page Number
2	*Wholesalers:* Include an assessment of present and proposed future measures, programs, and policies to help achieve the water use reductions. *Retailers:* Conduct at least one public hearing that includes general discussion of the urban retail water supplier's implementation plan for complying with the Water Conservation Bill of 2009.	10608.36 10608.26(a)	Retailers and wholesalers have slightly different requirements	4.6	4-8
3	Report progress in meeting urban water use targets using the standardized form.	10608.40		Not Applicable	
25	Quantify past, current, and projected water use, identifying the uses among water use sectors, for the following: (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, conjunctive use, and (I) agriculture.	10631(e)(1)	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	3-9
33	Provide documentation that either the retail agency provided the wholesale agency with water use projections for at least 20 years, if the UWMP agency is a retail agency, OR, if a wholesale agency, it provided its urban retail customers with future planned and existing water source available to it from the wholesale agency during the required water-year types	10631(k)	Average year, single dry year, multiple dry years for 2015, 2020, 2025, and 2030.	3.7 Appendix I	3-16
34	Include projected water use for single-family and multifamily residential housing needed for lower income households, as identified in the housing element of any city, county, or city and county in the service area of the supplier.	10631.1(a)		3.8	3-16
SYSTEM SUPPLIES					
13	Identify and quantify the existing and planned sources of water available for 2015, 2020, 2025, and 2030.	10631(b)	The 'existing' water sources should be for the same year as the "current population" in line 10. 2035 and 2040 can also be provided.	4.1	4-2

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location	Page Number
14	Indicate whether groundwater is an existing or planned source of water available to the supplier. If yes, then complete 15 through 21 of the UWMP Checklist. If no, then indicate "not applicable" in lines 15 through 21 under the UWMP location column.	10631(b)	Source classifications are: surface water, groundwater, recycled water, storm water, desalinated sea water, desalinated brackish groundwater, and other.	4.3	4-4
15	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)		4.3	4-4
16	Describe the groundwater basin.	10631(b)(2)		4.3	4-4
17	Indicate whether the groundwater basin is adjudicated? Include a copy of the court order or decree.	10631(b)(2)		4.3 & Appendix F	4-4
18	Describe the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. If the basin is not adjudicated, indicate "not applicable" in the UWMP location column.	10631(b)(2)		Not Applicable	
19	For groundwater basins that are not adjudicated, provide information as to whether DWR 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. If the basin is adjudicated, indicate "not applicable" in the UWMP location column.	10631(b)(2)		4.3.2	4-5
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	10631(b)(3)		4.3	4-4
21	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	10631(b)(4)	Provide projections for 2015, 2020, 2025, and 2030.	4.3	4-4
24	Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.	10631(d)		4.4	4-7

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location	Page Number
30	Include a detailed description of all water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and multiple-dry years, excluding demand management programs addressed in (f)(1). Include specific projects, describe water supply impacts, and provide a timeline for each project.	10631(h)		4.5	4-7
31	Describe desalinated water project opportunities for long-term supply, including, but not limited to, ocean water, brackish water, and groundwater.	10631(i)		4.7	4-9
44	Provide information on recycled water and its potential for use as a water source in the service area of the urban water supplier. Coordinate with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area.	10633		4.8	4-9
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)		4.8.2	4-10
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)		4.8.2	4-10
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)		4.8.2	4-10
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)		4.8.3	4-11
49	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.	10633(e)		4.8	4-9
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)		4.8.4	4-12

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location	Page Number
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)		4.8.4	4-12
WATER SHORTAGE RELIABILITY AND WATER SHORTAGE CONTINGENCY PLANNING [b]					
5	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	10620(f)		1.10	1-9
22	Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage and provide data for (A) an average water year, (B) a single dry water year, and (C) multiple dry water years.	10631(c)(1)		6.1	6-1
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)		6.1.5	6-6
35	Provide an urban water shortage contingency analysis that specifies stages of action, including up to a 50-percent water supply reduction, and an outline of specific water supply conditions at each stage	10632(a)		8.1	8-1
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)		8.2	8-3
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)		8.3	8-4
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)		8.4	8-6
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)		8.4	8-6
40	Indicated penalties or charges for excessive use, where applicable.	10632(f)		8.4	8-6

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location	Page Number
41	Provide 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)		8.5	8-8
42	Provide a draft water shortage contingency resolution or ordinance.	10632(h)		8.4 & Appendix D	8-6
43	Indicate a mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.	10632(i)		8.6	8-10
52	Provide information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments, and the manner in which water quality affects water management strategies and supply reliability	10634	For years 2010, 2015, 2020, 2025, and 2030	5	5-1
53	Assess the water supply reliability during normal, dry, and multiple dry water years by comparing 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. Base the assessment on the information compiled under Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.	10635(a)		6.2 – 6.4	6-7
DEMAND MANAGEMENT MEASURES					
26	Describe how each water demand management measures is being implemented or scheduled for implementation. Use the list provided.	10631(f)(1)	Discuss each DMM, even if it is not currently or planned for implementation. Provide any appropriate schedules.	7.1	7-2
27	Describe the methods the supplier uses to evaluate the effectiveness of DMMs implemented or described in the UWMP.	10631(f)(3)		7.1	7-2
28	Provide 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 ability to further reduce demand.	10631(f)(4)		7.2	7-4

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location	Page Number
29	Evaluate each water demand management measure that is not currently being implemented or scheduled for implementation. The evaluation should include economic and non-economic factors, cost-benefit analysis, available funding, and the water suppliers' legal authority to implement the work.	10631(g)	See 10631(g) for additional wording.	7.2	7-4
32	Include the annual reports submitted to meet the Section 6.2 requirements, if a member of the CUWCC and signer of the December 10, 2008 MOU.	10631(j)	Signers of the MOU that submit the annual reports are deemed compliant with Items 28 and 29.	N/A	

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. It is aligned with the organization presented in Part I of this guidebook. 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.