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2010 Stockton East Water District Urban Water Management Plan Update

June 2011

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Prepared for

Stockton East Water District
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K/J Project No. 1070008*00

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The water supplier is a: **Water Conservation District**

The water supplier is a: **Wholesaler**

Utility services provided by the water supplier include: **Water**

Is this agency a Bureau of Reclamation Contractor? **Yes**

Is this agency a State Water Project Contractor? **No**

List of Acronyms

AF	Acre-Feet
AF/ac/year	Acre-Feet per Acre per Year
AF/Y	Acre-Feet per Year
BMPs	Best Management Practices
Cal Water	California Water Service Company
cBOD	Carbonaceous Biochemical Oxygen Demand
CCWD	Calaveras County Water District
CDPH	California Department of Health Services
CEQA	California Environmental Quality Act
CF	Cubic Feet
City	City of Stockton
COSMA	City of Stockton Metropolitan Area
County	San Joaquin County
CSJWCD	Central San Joaquin Water Conservation District
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
Delta	Sacramento-San Joaquin River Delta
DHS	California State Department of Health Services
District	Stockton East Water District
DJW WTP	Dr. Joe Waidhofer Water Treatment Plant
DMM	Demand Management Measure
DWR	California Department of Water Resources
DWSP	Delta Water Supply Project
EBMUD	East Bay Municipal Utility District
EDF	Environmental Defense Fund
EIR	Environmental Impact Report
ESU	Evolutionarily Significant Unit
Farmington Study	Farmington Groundwater Recharge and Seasonal Habitat Study
gpcd	Gallons per Capita per Day
gpm	Gallons per Minute
HCF	Hundred Cubic Feet
HET	High Efficiency Toilet
in	Inches of Precipitation

M&I	Municipal and Industrial
MGD	Million Gallons per Day
MOU	Memorandum of Understanding
MWH	Montgomery Watson Harza Engineering
NEPA	National Environmental Policy Act
NPDES	National Pollution Discharge Elimination System
NSJWCD	North San Joaquin Water Conservation District
OID	Oakdale Irrigation District
RWCF	Stockton Regional Wastewater Control Facility
SAWS	Stockton Area Water Suppliers
SCADA	Supervisory Control and Data Acquisition
SEWD	Stockton East Water District
SJCOG	San Joaquin Council of Governments
SSJID	South San Joaquin Irrigation District
SYRCL	South Yuba River Citizen's League
ULFT	Ultra Low Flush Toilet
USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
UWMP	Urban Water Management Plan
UWSCP	Urban Water Shortage Contingency Plan
VAMP	Vernalis Adaptive Management Plan
WY	Water Year

Section 1: Public Participation

1.1 Public Participation

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

The Stockton East Water District (SEWD or District) encourages public participation in the development of its Urban Water Management Plan (UWMP) updates every five years. A copy of notice for public meeting is contained in Appendix A. SEWD held a public meeting on 14 June 2011 for review and comments on the draft plan prior to finalization and the SEWD Board of Director's approval.

In accordance with Section 6066 of the California Government Code, notices of the meeting have been published in the Stockton Record newspaper and posted at SEWD offices. Copies of the report have been made available for public review at the District's main office. In addition to public comment, SEWD requested input from the California Department of Water Resources (DWR), California Water Service Company (Cal Water), City of Stockton (City), and San Joaquin County (County).

1.1.1 Plan Adoption

This UWMP was updated and adopted by the SEWD Board of Directors on 14 June 2011. It is hereby submitted to DWR, attached as Appendix B is the Resolution of Plan Adoption. This plan includes the information necessary to meet the requirements of California Water Code Division 6 Part 2.6.

1.2 Agency Coordination

> 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.

Kennedy/Jenks Consultants coordinated closely with SEWD staff to develop this plan. A list of groups that participated in the development of this plan is contained in Table 1. Comments received are contained in Appendix C.

SEWD is a wholesale water supplier for the Stockton area and a member of the Stockton Area Water Suppliers (SAWS). Members of SAWS include SEWD, the City, the County, and the Cal Water. Information for this plan was coordinated with the urban retail water suppliers. The County obtains less than 2000 acre-feet per year (AF/Y) from SEWD and did not provide information for this update. Table 1 presents a list of contacts, coordination, and public involvement. Notification was given to the City and Cal Water 60 days prior to the public meeting as is required by 10621(b). A copy of the notification can be found in Appendix D.

Table 1: Coordination and Public Involvement

	Was contacted for assistance	Was sent a copy of the draft	Commented on the draft	Attended public meetings
City of Stockton	X	X		
Cal-Water	X	X	X	
Wastewater Agency	X	X		
General Public		X		
Advisory Group		X	X	

Note: Based on DWR Guide Book Table 1

1.3 Agency Background

SEWD provides surface water for both agricultural and urban uses. By providing surface water for agricultural irrigation, the District supports the County's agricultural industry, which is the area's leading economic activity. SEWD also supplies wholesale treated surface water, which is retailed to Stockton area customers by Cal Water, the City, and the County.

1.3.1 History

1.3.1.1 Formation of the District

SEWD, as currently structured, was formed in 1948 under the 1931 Water Conservation Act of the State of California. The District was originally organized as the Stockton and East San Joaquin Water Conservation District, an independent political subdivision of the state government. As such, SEWD was deemed responsible for acquiring a supplemental water supply and developing water use practices that would secure a balance between the District's surface and groundwater supplies.

1.3.1.2 Establishing Water Supply and Financial Structure

From 1948 to 1963, the District focused its efforts on water resource planning by evaluating groundwater conditions and determining requirements for supplemental water. These intensive efforts on the part of the District and other local agencies resulted in the construction of New Hogan Dam in 1964. The District's first supply of supplemental surface water was obtained through a contract with the United States Bureau of Reclamation (USBR) in 1964, and a final agreement, which guaranteed 56.5% of New Hogan Reservoir's yield to the District, was put in place between SEWD and the Calaveras County Water District (CCWD) in 1970.

From its inception until 1962, the District's basic financial structure was dependent upon property taxes. In 1963, the Governor of California signed a bill establishing the District's right to levy groundwater use fees and surface water charges. The District used the additional revenue to contract for New Hogan water. About this time, SEWD began registering wells within the District, while check dams were built on the Calaveras River, and Mormon Creek and Mosher Sloughs to control surface irrigation water and promote groundwater recharge. The District also became actively involved in the pursuit of projects to mitigate significant groundwater issues, which included declining aquifer levels, pumping depressions under urban Stockton, and the continuing threat of saline intrusion in wells near the Delta.

1.3.1.3 Boundary Expansion and Drinking Water Treatment Plant Construction

In 1971, District boundaries were expanded to include the entire Stockton urban area, and plans were initiated for a 30 million gallon per day (MGD) drinking water treatment plant. In 1975, a District-wide election resulted in the approval of a $25 million bond to fund the new plant. The Dr. Joe Waidhofer Drinking Water Treatment Plant (DJW WTP), located at 6767 East Main Street in Stockton, California, was constructed in 1976 and began operation in 1977. In 1979, the Independent Benefit Commission concluded that the new drinking water treatment plant was a benefit to Stockton's planning areas. Thereafter, SEWD assessed 14,000 acres of additional agricultural area, and, in 2005, annexed an additional 27,000 acres into the District. Today, SEWD's service area encompasses approximately 143,300 acres.

1.3.1.4 Pursuit of Supplemental Water Supplies

SEWD has actively sought supplemental surface water from the American River via the Folsom South Canal. Efforts to obtain the American River supply have been thwarted by the Environmental Defense Fund, and litigation by the East Bay Municipal Utility District (EBMUD) and the Freeport Regional Diversion Project recently constructed by EBMUD and Sacramento County. In 1983, SEWD and the Central San Joaquin Water Conservation District (CSJWCD) contracted with USBR for allocations of 75,000 and 80,000 acre-feet per year (AF/Y), respectively, from New Melones Reservoir on the Stanislaus River. Also in 1983, the District expanded its surface water irrigation capabilities by constructing the 12,000 gallon-per-minute (GPM) Potter Creek Pump Facility.

1.3.1.5 Plant Expansion and New Melones Conveyance Construction

In 1991, the DJW WTP was expanded to 40 MGD to accommodate increased demand from Stockton's urban areas. Construction on the New Melones Conveyance System, in anticipation of a new water supply, was completed in 1994; however, USBR did not supply water for the project in 1993-1994. In 1995, SEWD began receiving New Melones water, but the amount received was less than the contracted amount. Legal action in this matter is ongoing, and recently SEWD has received its full 75,000 annual allocation.

Under current USBR operation of New Melones, SEWD and CSJWCD are provided with up to 155,000-acre feet of water from New Melones Reservoir annually. Water allocation amounts are based on the March-September water inflow forecast and the February end of month storage in New Melones each year.

1.3.1.6 Adoption of AB 3030 Groundwater Management Plan

In 1995, SEWD adopted a Groundwater Management Plan in accordance with Assembly Bill 3030 (AB 3030). The goal of the SEWD AB 3030 Groundwater Management Plan was to continue the District's efforts to protect existing water supplies, to relieve pressure on the local groundwater basin by seeking supplemental surface water supplies for conjunctive use, and to maintain pressure on USBR to meet the contracted delivery amounts for New Melones water.

In 2005, SEWD adopted the Eastern San Joaquin Groundwater Basin Groundwater Management Plan prepared by the Northeastern San Joaquin County Groundwater Banking Authority in compliance with AB 3030, SB 1938 and pursuant to California Water Code Section 10750 et. seq., replacing the 1995 Plan. The comprehensive plan developed by those agencies, which overlay the local groundwater basin is to review, enhance, assess and coordinate existing groundwater management policies and programs in Eastern San Joaquin County and develop new policies and programs to ensure the long-term sustainability of groundwater resources in this area.

1.3.1.7 OID/SSJID Water Transfer Agreement

In 1997, SEWD entered into a water transfer agreement with Oakdale Irrigation District (OID) and South San Joaquin Irrigation District (SSJID). This agreement allocates 8,000 to 30,000 AF/Y, based on New Melones Reservoir storage and inflow as of April 1 of each year. The contract period for the allocation ends in 2009, with a possible 10-year renewal, pending further studies. Negotiations are on-going with OID and SSJID for up to 15,000 AF/Y each.

1.3.1.8 Managing the Calaveras Resource

In March 1998, the National Marine Fisheries Service (NMFS) (now the National Oceanic and Atmospheric Administration or NOAA) listed the Central Valley steelhead as a threatened species evolutionarily significant unit (ESU) under the Endangered Species Act (ESA). In March 2000, NMFS designated the Calaveras River and Mormon Slough as critical Central Valley steelhead ESUs. Any actions that might harm the ESU or its habitat are restricted. Because this brought the entire management of the Calaveras River under review, SEWD immediately entered into a pre-informal consultation with federal and state regulators to begin discussing possible changes in the operation of New Hogan Dam and the Calaveras River water supply system.

SEWD, in consultation with CCWD, began work with fishery scientists and NMFS to develop a plan to manage resident and steelhead trout in the Calaveras River. This plan is called a Habitat Conservation Plan (HCP) and will provide SEWD and CCWD and their water users with legal permission to continue using the water resources of the Calaveras River for agricultural, municipal, and industrial purposes.

SEWD also supports various research projects funded by the CALFED Bay-Delta Program and the U.S. Fish and Wildlife Service to help learn more about rainbow and steelhead trout in the river. At the request of SEWD, DWR is studying ways to improve fish passage in Mormon Slough and the Old Calaveras River. SEWD has concluded a CALFED Bay-Delta funded study to evaluate fish screen alternatives for water diversions on the Calaveras River. The HCP is nearing completion and will soon be available for public review. While the ESA problems threaten the Calaveras River water supply for all users, SEWD is dedicated to creating a balance between environmental and water supply needs.

1.3.1.9 The Farmington Project

SEWD and the United States Army Corps of Engineers (USACE), in a cost-share agreement, have created the Farmington Groundwater Recharge Program with the intent of replenishing the aquifer to help insure future groundwater supply and protect against further saltwater intrusion.

The Farmington Groundwater Recharge Program aims to obtain 25 to 30 parcels of land, totaling 1,200 acres, for directly recharging surface water to the groundwater aquifer. It is estimated that the development of these parcels into recharge areas may return approximately 35,000 AF/Y of water into the overdrafted groundwater basin in eastern San Joaquin County. This represents approximately 15% of the surface water needed on an annual basis to assure the long-term sustainability of water resources for the region.

The Farmington Groundwater Recharge Program will primarily benefit the regional aquifer, or groundwater basin, known as the Eastern San Joaquin County Basin. As the program is implemented, local groundwater availability and quality will also improve as aquifer levels stabilize. A network of agricultural wells is needed to pump stored surface water from recharge efforts and assure reliability of water supply in years when ample surface water is not available. Based on the hydrologic history of the region, more average to wet years occur than below average to critically dry years. Therefore, over the long term if the aquifer is recharged during all average to wet years, and groundwater pumping reliance is limited to below average to critically dry years, aquifer levels are expected to rise and stabilize

The Farmington Groundwater Recharge Program will primarily benefit the regional aquifer as noted above. Local groundwater availability and quality will also improve. Water quality and abundance will also improve in the Calaveras River with the recharging of the groundwater aquifer.

1.3.1.10 Demonstration-Scale Recharge Testing Program

As part of the Farmington Groundwater Recharge Program, a Demonstration-Scale Recharge Testing Program is being proposed at the DJW WTP. The project site is located on East Main Street approximately 2 miles east of Highway 99 in the City of Stockton, California. This project site represents one parcel that may be used as a long-term recharge area if the demonstration scale recharge testing is successful.

Based on the initial field investigation and results of the pilot-scale recharge test, the site is being considered as a possible future direct groundwater recharge area (MWH 2006). The site is triangular in shape and bordered by the Stockton Diverting Canal (SDC) to the southwest, the DJW WTP to the east, and agricultural land to the north.

The proposed action would evaluate artificial groundwater recharge in accordance with stage three (and potentially four) of a four-stage process developed for the Farmington Groundwater Recharge Program. The four stages are Stage 1, Initial Site Screening; Stage 2, Pilot-Scale Recharge Testing; Stage 3, Demonstration-Scale Recharge Testing; and Stage 4, Long-Term Operation and Maintenance. As described in the *Farmington Groundwater Recharge Program Manual* (USACE 2004a), data collected and evaluated during each of the first three stages would be used to support a decision about whether a site would advance to the next stage, be archived for evaluation at a future time, or be eliminated from further consideration for artificial groundwater recharge. This proposed site was evaluated under Stages 1 and 2 and the USACE and SEWD determined that site conditions appear desirable for recharge and would continue to

Stage 3. The proposed action would include Stage 3 and potentially Stage 4, if the Demonstration-Scale Recharge Test proves successful.

The proposed action consists of diverting surplus irrigation water from SEWD's conveyance systems into recharge cells at the project site. Results from the demonstration project would be evaluated to determine if the demonstration scale testing was successful and met criteria for consideration for Stage 4, Long-Term Operation and Maintenance. The proposed action would include grading and system installation activities, as well as system operation and maintenance required for Stages 3 and 4. Stage 3 would last from 6 months to 3 years and Stage 4 would continue thereafter.

1.3.1.11 Banked Surface Water Infrastructure Project

As part of the Farmington Groundwater Recharge Program, a Demonstration-Scale Banked Surface Water Infrastructure Project is proposed to recover surface water stored in the ground to agricultural customers and the DJW WTP. This project will include approximately 25-well site locations and associated water pipelines located adjacent to existing SEWD conveyance facilities that may be used as a long-term banked surface water infrastructure project if the demonstration scale testing is successful.

Based on the initial field investigation and results of the pilot and demonstration-scale recharge tests, the banked surface water infrastructure project is being considered as the next logical step in development of the Farmington Program (MWH 2001). The project sites are located at various sites generally east of but within 13 miles of the SEWD's East Main Street DJW WTP site noted above. The well sites are all relatively small (less than 2,000 square-feet for construction purposes, and less than 200 square-feet as a final footprint). The associated water pipelines are statutorily exempt from California Environmental Quality Act (CEQA) review, as they will not expected to exceed the statutory length limits for pipeline installation.

The proposed action would evaluate the banked surface water infrastructure project in accordance with processes developed for the Farmington Groundwater Recharge Program as described in the *Farmington Groundwater Recharge Program Manual* (USACE 2004a). Data collected and evaluated during Program monitoring will be used to support a decision about whether:

- A well site would advance to a permanent status,
- Be archived for evaluation at a future time, or
- Be eliminated from further consideration of the banked surface water infrastructure project.

The proposed action consists of pumping stored surface water from the aquifer for agricultural, municipal, and industrial use. Results from the demonstration project would be evaluated to determine if the demonstration scale testing was a successful and met criteria for consideration for long-term operation and maintenance. The proposed action would include grading and well construction activities, as well as system operation and maintenance. Construction will take approximately from 6 to 12 months to complete, and monitoring and evaluation could take from about 3 to 6 years before a decision is made to make an individual site permanent.

1.3.1.12 Efficiency Enhancement Project

Currently, the District is considering adding a 10 million gallon finished water reservoir, 4 filters, additional sludge ponds and taste and odor control to the DJW WTP. This would allow greater reliability and increase the treatment plant capacity to 72 MGD. Funding would be through State Revolving Fund loans. The District has been approved for the loan on the finished water reservoir and is moving through the contracting process. The filters and additional enhancements is a planning project. The completion of these projects is contingent on the urban contractors, their needs and ability to pay for the projects.

1.3.1.13 Peters Pipeline Project

In 2003, SEWD applied for and received a California Proposition 13 Groundwater Recharge Storage Construction Grant for the Peters Pipeline portion of the Farmington Program. This conjunctive use project consists of a 6-mile long, 60-inch diameter pipeline, which provides water for agricultural irrigation, groundwater recharge, and drinking water treatment. In dry years, well water resulting from wet year recharge is pumped into the pipeline for use in the Stockton urban area. Construction on the Peters Pipeline began in April 2005 and was completed in the summer of 2006.

1.3.1.14 Efficiency Enhancement Project

In September 2005, construction began on SEWD's $7.1 million Efficiency Enhancement Project, which will implement improvements in the DJW WTP chemical mixing and settling efficiency and provide delivery of 11% more drinking water to the Stockton urban area.

In May 2006, SEWD began a $3.8 million upgrade and modernization of its DJW WTP high service pump station. This will help allow SEWD to meet the various pumping requirements of its retail customers and will increase pump capacity from the Efficiency Enhancement Project. SEWD has submitted a permit amendment from 60 MGD to 65 MGD to expand the DJW WTP to California Department of Public Health (CDPH). The permit is currently under CDPH review. This will allow SEWD to distribute more surface water to the urban area.

1.3.2 Affiliations

At the regional level, SEWD is an active member agency of the SAWS, the Northeastern San Joaquin County Groundwater Banking Authority and the Eastern Water Alliance.

1.3.3 Climate

SEWD is located in the heart of the fertile Central Valley of California. The climate ranges from summer temperatures routinely exceeding 100°F with low humidity, and winter temperatures dropping into the low 30's. Average annual rainfall is normally approximately 14 inches. Table 2 summarizes the climate for the Stockton area.

Table 2: Stockton East Water District Monthly Climate Summary

Location	Elev. (feet)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Stockton WSO (048558)	20	Period of Record: 10/1/1948 to 12/31/2009												
Avg. Max Temp (°F)		53.6	60.6	66.0	72.9	81.2	88.5	94.3	92.7	88.2	78.4	64.5	53.9	74.6
Avg. Min Temp (°F)		37.6	40.5	42.6	46.1	51.7	57.0	60.5	59.8	57.0	50.2	42.2	37.5	48.6
Avg. Total Precip. (in)		2.86	2.26	2.01	1.11	0.41	0.08	0.03	0.04	0.26	0.72	1.71	2.33	13.80
Avg. Monthly ETo (in)		1.03	1.80	3.56	4.94	6.69	7.56	8.00	7.10	5.23	3.43	1.64	1.00	51.97

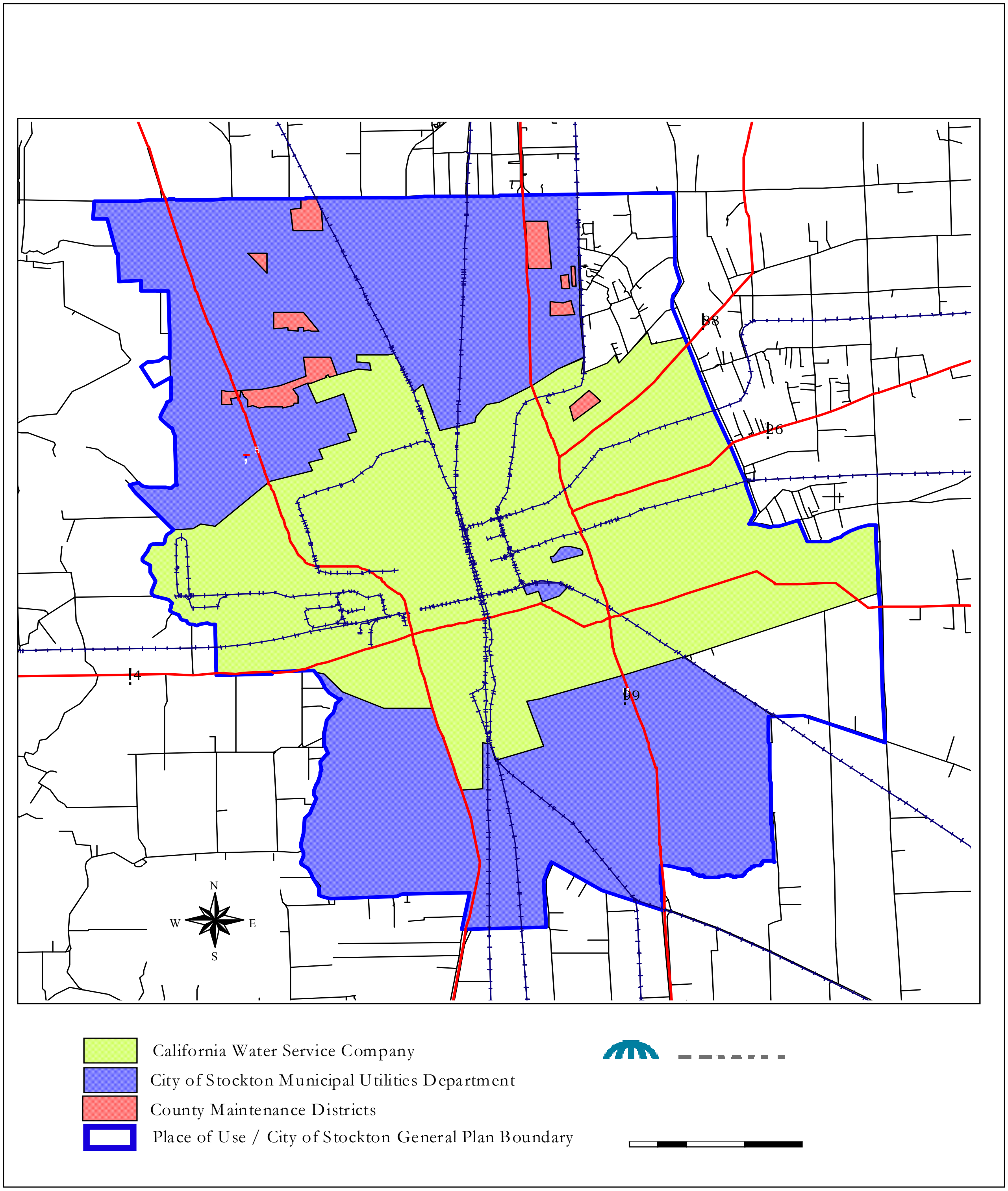
Source: Western Regional Climate Center (WRCC) and California Irrigation Management Information System (CIMIS)
Based on DWR Guide Book Table 3

1.3.4 Population Growth and Other Demographic Factors

The City of Stockton is the seat of San Joaquin County, located in the north central part of California, approximately 70 miles east of the San Francisco Bay Area and about 50 miles south of Sacramento. The City is roughly bordered by Interstate 5 on the west side and State Highway 99 on the east side. Figure 1 shows the urban contractors service areas in which SEWD supplies treated surface water.

Stockton was founded in the late 1840s and grew as a supply center during the California gold rush. The City was incorporated in 1850 and now occupies approximately 56.5 square miles. The deepwater port and channel to San Francisco Bay help support a relatively large industrial and agricultural base. For the City of Stockton General Plan adopted May 18, 2010 median household income for the City is $48,132, which is below the San Joaquin County median of $59,948.

Figure 1: 2010 Stockton East Water District Urban Service Area



Stockton is California's 12th largest city and the fourth largest city in the Central Valley. As population advances toward 350,000, so does water demand. The groundwater levels dropped in the San Joaquin County area, resulting in saline intrusion from the Delta. Water quality concerns were also raised due to runoff of pesticides from surrounding agricultural areas. The construction of New Hogan Dam in 1964 provided a supplemental water supply to the Stockton Area. In 1977, a 30 MGD water treatment plant was completed and has expanded to a capacity of 60 MGD. This DJW WTP noted above is operated by SEWD, which contracts with the City, Cal Water and the County to supply potable water to the greater Stockton area.

Table 3 presents population projections for the City of Stockton Metropolitan Area (COSMA). The growth projections were prepared by the San Joaquin Council of Governments (SJCOG). The projections are based on SJCOG's 2011 Regional Transportation Plan, a major planning document for the San Joaquin County region. The basis of the population for 2010 is based on number of service connections. The population projections for the City and Cal Water service areas were developed by the respective agencies for use in their respective urban water management plans.

Table 3: Population Projections for SEWD Service Area

	2000*	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
City of Stockton Water Service Area	121,969	169,963	183,254	199,949	216,045	231,967	246,604
Cal Water Service Area	121,635	162,336	165,190	167,180	169,170	171,160	173,140
San Joaquin County	NA						
Total Population	243,604	332,299	348,444	367,129	385,215	403,127	419,744

* *Census 2000 Population Counts*

** *Based on DWR Guide Book Table 2*

*** Source: SJCOG, 2011 Regional Transportation Plan

Section 2: Water Sources (Supply)

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

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 [to 20 years or as far as data is available].

New Hogan Reservoir and New Melones Reservoir are the current sources of surface water supplied to urban retailers by SEWD. The District is contracted to deliver a minimum 20,000 AF/Y to the urban contractors, and provides approximately 52,000 AF/Y of New Hogan Reservoir water for urban water, agricultural users, and for recharge. Table 4 shows SEWD's current typical supply allocations.

Table 4: Current and Planned Water Supply Sources (AF/Y)

Water Source	For Treatment Plant	For Ag & Recharge
New Hogan	20,000	32,822
New Melones	24,000	51,000
OID/SSJID Transfer	30,000	
Groundwater Bank	3,360	
Total	77,360	83,822

Note: Based on DWR Guide Book Table 4

Since surface water supplies are not sufficient to meet the total urban demand, urban water retailers must utilize groundwater to satisfy peak demands and/or to supplement surface water during periods of drought.

Table 5 summarizes DJW WTP projected production capacity based upon planned treatment plant expansions compared to supply projections.

Table 5: Projected Water Supply and Treatment Plant Capability (AF/Y)

	2005	2010	2015	2020	2025	2030	2035
New Hogan	20,000	20,000	20,000	20,000	20,000	20,000	20,000
New Melones	24,000	24,000	24,000	24,000	24,000	24,000	24,000
OID/SSJID Transfer	30,000	30,000	30,000	30,000	30,000	30,000	30,000
Groundwater Bank*	0	3,360	10,080	23,520	30,240	43,680	50,400
Total Supply	74,000	77,360	84,080	97,520	104,240	117,680	124,400
WTP Capability	39,668	55,680	58,000	60,320	62,645	64,960	67,290

Note: Based on DWR Guide Book Table 4.

* Groundwater Bank to be developed adding 2 to 4 - 3 MGD wells per year starting in 2012. Groundwater will be used as needed to supplement surface water availability.

2.1 Surface Water Supply Sources

Until 1977, groundwater was the sole source of supply for domestic water users in the Stockton area. A supplemental surface water supply was established when the DJW WTP began operation in 1977. The plant began operation at 30 MGD and was expanded to 45 MGD in 2000. With the completion of the Efficiency Enhancement Project in the fall of 2006, the DJW WTP is now permitted to 60 MGD.

Calaveras River water from New Hogan Reservoir is diverted at Bellota and transported through a 13-mile long, 54-inch diameter pipeline to the plant. New Melones water is diverted to the DJW WTP at Goodwin Dam through the New Melones conveyance system. The New Melones conveyance system consists of a 3-mile tunnel; 10 miles of Upper Farmington Canal; 14 miles of existing creeks, Shirley, Hoods, Rock; 10 miles of Lower Farmington Canal; 3 miles of 78-inch pipeline connecting to the existing 54-inch pipeline and a new 60-inch pipeline about 6 miles from the DJW WTP.

2.1.1 New Hogan Reservoir

New Hogan Dam and Reservoir are located on the Calaveras River approximately 28 miles east of Stockton. The New Hogan Reservoir provides water storage for flood control, municipal and industrial water supply, irrigation and recreation. The maximum capacity of New Hogan Reservoir is 317,000 AF. The average long-term conservation yield to the District and CCWD is approximately 84,100 AF/Y, assuming "safe yield operation".

Under the original 1970 contract with CCWD, SEWD supply is 56.5% of the project water. Under normal year conditions this is approximately 40,341 AF/Y. In addition, the District is entitled to 12,650 AF/Y in recognition of senior water rights of individual landowners in the District. The total supply available to the two districts is 84,100 AF/Y in normal water years, of which a maximum of 80,000 AF/Y has been available to the District.

The 1970 Contract was modified by a 1982 Memorandum of Understanding (MOU) between SEWD and CCWD to maximize yield by taking the water when it is available. This practice results in little or no water being available in dry years. Under contract, the District is entitled to all the available project supply not used by CCWD. At the current level of CCWD use, the District can rely on about 83,000 AF/Y of regulated Calaveras River water supply for percolation and surface delivery in normal water years under safe yield operation. If CCWD maintains its percentage entitlement (43.5%) and exercises it, SEWD's share will be reduced.

2.1.2 New Melones Reservoir

In 1983, SEWD and Central San Joaquin Water Conservation District (CSJWCD) contracted with USBR for 155,000 AF/Y of New Melones water. SEWD was to receive 75,000 AF/Y, 10,000 AF/Y for municipal and industrial use and the remainder for agricultural use. The allocation of municipal and industrial water under the contract can be increased to the contract total. In 1994 conveyance system and treatment plant expansion was completed at a cost of approximately $65 million.

SEWD has experienced difficulty obtaining water pursuant to its water supply contract with USBR for New Melones water. The 75,000 AF/Y water allocation to the District has been reduced for fish and wildlife enhancement. USBR has recently interpreted the court rulings such that SEWD and CSJWCD will receive a full allocation on all but dry years based on inflow to New Melones as previously described. The USBR's ruling provides that New Melones CVP water contractors with allocations based upon New Melones end of February storage plus forecasted March through September inflow. CSJWCD's USBR contract calls for 49,000 AF/Y of firm yield and up to 31,000 AF/Y on an interim basis and in past years has used approximately 30,000 AF/Y. In 2006, SEWD and CSJWCD received a full water allocation of 155,000 AF/Y for the first time. This contract remains under litigation.

In addition to the contract with USBR, SEWD has a Water Transfer Agreement (Agreement) with OID and SSJID for up to 30,000 AF/Y of New Melones Reservoir water. The Agreement adjusts the amount of water available depending on the inflow to New Melones Reservoir. The term of the Agreement is ten years, expiring in 2009. For the purposes of this UWMP it is assumed that mutually agreeable conditions will result in both irrigation districts renewing until 2030.

2.1.3 Groundwater Supply

The District currently has two wells at the DJW WTP used only for emergency and dry year supply which can pump 1,200 gpm. In critically dry years, SEWD have contracted with farmers along their pipeline to pump groundwater to supply the treatment plant. The proposed groundwater bank will supply water during dry years.

The groundwater basin underlying San Joaquin County is part of the fairly contiguous Central Valley aquifer system, which is a source of water for agricultural, domestic, and industrial water users from Redding to Bakersfield. The basin consists of Pre-Tertiary igneous and metamorphic rocks of the Sierra Nevada that continue west beneath the valley floor. Marine sediments, thousands of feet thick, overlie the basement rocks. Continental deposits overlie the marine rocks and act as the primary freshwater aquifer in the study area. In local areas, fresh water may be present in both marine and continental deposits, and saline water may be found in continental deposits.

DWR Bulletin 146 identifies the usable aquifer in the eastern portion of the County as the continental deposits of Miocene and younger age. The usable aquifer is present within the boundaries of the County in distinct geologic formations that include the Mehrten Formation, the Laguna Formation, the Victor Formation, flood basin deposits, and alluvial fan and stream channel deposits. The thickness of the usable aquifer ranges from less than 100 feet in the eastern edge of the county to over 3,000 feet in the southwestern edge. The aquifer extends to approximately 1,000 feet beneath the Stockton area.

Groundwater in the County area generally moves from sources of recharge to areas of discharge. Most recharge to the aquifer system occurs from the Delta and along active stream channels where extensive sand and gravel deposits exist. Consequently, the highest groundwater elevations typically occur near the Delta, the Stanislaus River, and the San Joaquin River. Other sources of recharge within the area include subsurface recharge from fractured geologic formations to the east, as well as deep percolation from applied surface water and precipitation.

Municipal and agricultural uses of groundwater within the County contribute to an overall average yield of groundwater estimated to be about 867,000 AF/Y. Historically, groundwater elevations generally have declined between about 40 to 60 feet. As a result, a cone of depression formed in Eastern San Joaquin County creating a gradient that allows saline water underlying the Delta region to migrate northeast within the southern portions of the Stockton area.

2.1.4 Sustainable Groundwater Yield

Over the years, various estimates of the sustainable long-term yield from the groundwater aquifer have been made (yield estimates are expressed in terms of AF/ac/year). The February 1992 *Supplemental Reports for Water Supply* prepared for the City of Stockton Metropolitan Area (COSMA) Special Planning Area Study states:

> "The long-term yield of the groundwater basin for the general plan area is uncertain but could be in the range of 30,000 AF/Y based on a total area of about 40,000 acres and an average withdrawal of 0.75 AF/ac/year. …groundwater can provide from 0.75 to 1.0 AF/Y/acre on a long-term basis."

Other references to sustainable groundwater yield are included in the City's *1995 Urban Water Management Plan Update*, which used a firm yield of approximately 1.0 AF/ac/year, and from the North Stockton Master Plan where 0.75 AF/ac/year was assumed.

For planning purposes in developing the City's future water supply management program, the City has selected 0.6 AF/ac/year as a groundwater yield target. This level of withdrawal will allow the groundwater basin to slowly recover, and the cone of depression to be ultimately eliminated or at least greatly reduced.

2.2 Future Surface Water Supplies

The District has applied for appropriative water rights on Little John Creek, Rock Creek, Stanislaus River and Calaveras River with the State Water Resources Control Board. The total combined direct diversion and storage applied for is 1,215,000 AF/Y. The District has begun a study to determine beneficial use of these supplies and preliminary conservative indications are the District may only be able to put 114,000 AFA to beneficial use. This study may lead to a reduction in the District's water right applications or award. Future surface water supplies uses would include: municipal, industrial, irrigation, fish and wildlife enhancement, water quality, saline repulsion and groundwater recharge. These future water supplies would be generally available during wet years, contributing to in-lieu and direct groundwater recharge, but would not yield any dry or critical year supply. Appendix E presents SEWD's pending water rights applications.

2.3 Recycled Water

The Stockton Regional Wastewater Control Facility had been, until recently, supplying recycled water to a privately owned 14-acre farm for over 20 years. The farm used the recycled water to irrigate crops of alfalfa and safflower. The farm was supplied approximately 107 AF/Y of recycled water. Because the Section 1485 water right is based on the amount of treated wastewater effluent discharged from the plant, there is little incentive to seek opportunities for recycled water. Please see Section 7 for more information.

2.4 Desalination Opportunities

> 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.

While SEWD may eventually become part of regional water supply improvement efforts through desalination of either surface water from the Delta or local groundwater, there are no current plans underway.

Section 3: Reliability

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

10631 (c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable.

10631 (c) 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 replace that source with alternative sources or water demand management measures, to the extent practicable.

10631 (c) Provide data for each of the following:

(1) An average water year, (2) A single dry water year, (3) Multiple dry water years.

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

10632 (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.

3.1 Supply Reliability

Past Drought, Water Demand, and Conservation Information

The Stockton area has experienced drought conditions twice in the past 30 years. The first drought was in 1977, the first year the DJW WTP was in service. Groundwater supplies were critically overdrafted during this time, raising concerns of saline intrusion and pesticide migration. The second was a prolonged drought from 1987 to 1994. During this period, a reduced amount of surface water was available for the urban and agricultural users. Production of the DJW WTP was as low as 12,495 AF/Y during the WY 1990. As a result of the reduced surface water supply, the urban area and farmers relied heavily on groundwater to meet customer demand. The groundwater level during this time dropped approximately 10 to 30 feet at various well sites.

SEWD coordinates on a regular basis with its urban area water retailers for the delivery of treated surface water. Since SEWD can, obviously, only deliver what surface water is currently available, the urban contractors must make up the balance of needed supplies from groundwater pumping. SEWD policy is to generally provide as much treated surface water to the urban area as possible. SEWD water supply is also based on yearly contract allocation.

The District coordinates and supports the urban area retailers in developing voluntary and mandatory water rationing. The District, as a wholesaler of treated water, has no authority over mandatory prohibitions on water use.

SEWD, the City, County, Cal Water, and other water agencies have explored various alternatives to meet anticipated water supply requirements of the Stockton urban area. These alternatives include consideration of potential water supplies from the New Melones Reservoir, DJW WTP expansion, and a direct diversion from Little John's Creek to the New Melones Reservoir conveyance system.

Table 6 shows the next three year minimum supply from SEWD's supply sources. As noted above, water provided to urban customers is limited by the treatment capacity of the DJW WTP (currently at 55,680 AF/Y). A normal water year for SEWD is when there is adequate supply and no restrictions are placed on the water supplies from New Hogan Reservoir and New Melones Reservoir (see year 2011 in Table 6 below). The OID/SSJID transfer ended in 2009 and was renewed to 30,000 AF/Y.

Table 6: Next Three Year Minimum Supply (AF/Y)

Supply Source	**2011**	**2012**	**2013**
New Hogan Reservoir	20,000	20,000	20,000
New Melones Reservoir	24,000	10,000	0
OID/SSJID Transfer	30,000	12,500	8,000
Groundwater Bank	3,360	3,360	3,360
Totals (AF):	55,680	45,860	31,360

Note: By MOU, any water not used by CCWD is available to SEWD for use. Typically CCWD used between 3,500 and 3,700 AF per year. This is based on DWR Guide Book Table 8.

Table 7 shows the projected availability of supply for a normal year, single dry year and multiple dry water years as required by the State Urban Water Management Plan Act. These estimates are based on a hypothetical drought period, using the 1989 to 1991 drought sequence. The controlling factor in SEWD's water supply to the urban retailers is the capacity of its water treatment plant. The demand difference is made up by the urban retailers by groundwater pumping and surface water projects being implemented by the City. The demand totals shown here represent the capacity of the WTP.

Table 7: Single Dry Year and Multiple Dry Water Years (AF/Y)

			Multiple Dry Water Years		
Water Supply Sources	**Current Supply 2010 (Volume)**	**Single Dry Water Year (Volume)**	**2011 (Volume)**	**2012 (Volume)**	**2013 (Volume)**
Supply Totals	55,680	27,840	55,680	45,860	31,360
Percent Shortage	0%	50%	0%	0%	0%
Demand Totals	55,680	55,680	55,680	56,260	56,840
Supply Deficiency	0	-27,840	0	-10,400	-25,480

Note: Difference in supply deficiency is made up for in groundwater pumping. This is based on DWR Guide Book Table 23.

3.2 Frequency and Magnitude of Supply Deficiencies

Two droughts have impacted the urban water supply in the Stockton area over the last 30 years. The first was in 1976-1977, the year the DJW WTP went on line. The second was a prolonged drought from 1987 to 1994. New Hogan Reservoir was seriously depleted during this second drought and DJW WTP production was as low as 12,495 AF/Y. Table 8 shows the WTP production for the past 30 years. The reduced amount of surface water available meant local water users relied heavily on groundwater pumping to meet demands. Fortunately, banking of the underground supply provided a reserve to draw upon during the drought.

The underground water level in the Stockton urban area has risen dramatically and consistently since the drought of 1987-1994 with the continued import of surface water to the area. Groundwater levels, as recorded by the County, indicate that the 1999 water table in the Stockton area was greater than the level recorded 20 years ago and has almost recovered to pre-drought levels. The water table in the southern and eastern areas of the City generally rose more than about 50 feet during the eight year period from 1977-85, reversing a downward trend which had taken place for many years as a result of pumping by the City, Cal Water, San Joaquin County Maintenance Districts, and agricultural users. SEWD has been providing about 60% of urban water supply in recent years.

Table 8: Dr. Joe Waidhofer Treatment Plant Production

Year	Production (AF)
1980/1981	22,508
1981/1982	24,203
1982/1983	23,255
1983/1984	24,763
1984/1985	25,416
1985/1986	27,778
1986/1987	29,984
1987/1988	19,721
1988/1989	19,565
1989/1990	12,495
1990/1991	14,262
1991/1992	24,813
1992/1993	23,559
1993/1994	35,341
1994/1995	34,553
1995/1996	36,410
1996/1997	35,918

Year	Production (AF)
1997/1998	35,713
1998/1999	37,597
1999/2000	39,668
2000/2001	38,657
2001/2002	38,345
2002/2003	40,274
2003/2004	39,725
2004/2005	39,054
2006/2007	43,641
2007/2008	52,262
2008/2009	49,755
2009/2010	50,100

3.3 Plans to Assure a Reliable Water Supply

Surface water alone cannot currently meet urban water demand. SEWD's urban water retailers use surface water and groundwater to meet customer demands on a conjunctive use basis. The groundwater basin for the eastern San Joaquin County area has been critically overdrafted. Groundwater recharge during normal to wet years has helped to increase the groundwater level in the urban area over the past six years. Measurements of the groundwater basin levels during the drought and subsequent normal year hydrology of the late 1990’s indicate that the basin is recovering and is operating within a manageable range. With continued wet years and recharging of the groundwater basin, this trend will likely continue and help ensure a reliable source of water for dry years when surface water supplies are limited.

Projections of future water supply assume normal inflows into New Hogan and New Melones Reservoirs. Continued use of appropriator volumes of surface water should allow the recovery of the groundwater basin through reduced pumping of wells. Groundwater recharge projects will also aid in the groundwater basin recovery in accordance with prudent water resources management practices. The groundwater basin provides a supply of water to utilize during times of drought when available surface water is limited.

The SEWD CDPH Water Supply Permit was recently amended to allow the DJW WTP to operate at a capacity of 60 MGD, SEWD plans to expand the plant to 65 MGD, which will allow it to distribute more surface water to the urban water retailers of the area.

SEWD has submitted a water right application to the State Water Resources Control Board for a direct water diversion from Little John Creek, Rock Creek, the Stanislaus River and the Calaveras River. This additional water would help improve stabilization of the groundwater basin.

The City is currently constructing a water treatment plan to utilize its Delta water rights as part of its Delta Water Supply Project. The Delta water rights permit was issued to the City on March 8, 2006 for 33,600 AFA. In years of average or above average precipitation, this project could eliminate the City's demand for groundwater.

3.3.1 Groundwater Recharge

The Farmington Groundwater Recharge Program was launched in 2003 and is the result of prior efforts to analyze and evaluate opportunities for development of water supplies for Eastern San Joaquin County.

This program provides a solution to the overdraft situation and will allow the District to replenish the groundwater basin during critical overdraft conditions. Each year, agricultural and municipal water use exceeds natural recharge by up to 135,000 AF/Y – a situation that has lead to the closure of municipal wells due to saline intrusion and higher well water pumping costs. An additional 70,000 AF/Y is needed to provide a hydraulic barrier to saline water intrusion.

To reverse this trend, SEWD, the USACE and other local water agencies launched the Farmington Groundwater Recharge Program. With $33.5 million in available funds, the Farmington Program aims to partner with local landowners, businesses, growers and ranchers to save the region’s water supply.

The District has completed a pilot project and undertaking a new demonstration at the DJW WTP. The pilot project in operation since April 2003 has averaged a recharge rate exceeding 0.3 feet per day. Assuming this long-term average recharge rate, the District expects to meet the project goal of recharging/banking 7,000 acre-feet of water annually. The average cost to recharge an acre-foot of water in this project is estimated to be approximately $50 per acre-foot, exclusive of land cost and approximately $91 per acre foot, including land. Given the documented costs of other groundwater storage projects, the District is optimistic about developing future projects of this kind. Details of the project, as well as progress updates, may be found at http://www.farmingtonprogram.org/index.html.

3.3.2 Water 2025 Challenge Grant

In fiscal year 2005, SEWD received $150,255 from the USBR Water 2025 Challenge Grant Program. The program funds a variety of projects to make more efficient use of existing water supplies through water conservation and water market projects as authorized under state laws. The total project funding is $335,236.

The Conveyance Enhancement Project proposes to develop a Supervisory Control and Data Acquisition (SCADA) system, which will remotely monitor twelve sites in key locations within the District’s irrigation water distribution system and provide off-site irrigation water gate control at three locations. The project includes one flow monitoring site and eleven pool level monitoring sites, and calls for the modification of existing flashboard dams with rectangular weirs to allow calculation of flow data. Additional tasks include the retrofit of two existing flow-monitoring stations to transmit data to the SCADA system; and the automation of five water control gates at three locations, allowing off-site control.

Use of this “real time” data and automation of the gates will enhance operation and management of the District’s agricultural water delivery system, which consists of approximately 64 miles of natural waterways and flood control channels. The District estimates that ultimately up to approximately 3,600 AF/Y of water will be conserved through the implementation of this project. Water conserved will be available for urban, agricultural, and/or direct groundwater recharge programs within the SEWD service area. This project will enhance water supply reliability for the District and improve conditions in the Eastern San Joaquin County Groundwater Basin, which is designated as being in a state of critical overdraft (DWR B-118-80) and is subject to saline intrusion.

3.4 Supply Reliability for Various Scenarios

The District forecasts water supply weekly or biweekly in the General Manager's Report to the District's Board of Directors. New Hogan Reservoir, and New Melones Reservoir previous years storage to date, treatment plant production, New Hogan and New Melones releases, rainfall, New Hogan and New Melones inflow (current and past years), and OID/SSJID uses are provided. Additionally, the retailers and District meet monthly with urban contractors to discuss availability of raw water and the scheduling for delivery of treated water.

As noted above, District policy is to generally provide as much treated surface water to the urban area as possible to minimize groundwater pumping, with its inherent danger of saline intrusion into the groundwater basin from the Delta. Water supply is also based on contract obligations. New Hogan Reservoir has a capacity of 317,000 AF. However, due to the need to operate under flood control criteria, the average long-term conservation yield to the District is approximately 84,100 AF/Y. This yield is divided between municipal and industrial users and the agricultural users. The first 13,000 AF of yield is available to riparian users (SEWD and CCWD) and the next 20,000 AF are contractually committed to the DJW WTP. An additional 52,000 AF is needed to meet normal year agricultural demands. Any additional available yield available is first offered to agriculture. The District Board of Directors allocates additional available yield among uses.

The District is also contracted with USBR to receive up to 75,000 AF of New Melones water based on forecasted storage March - September and February end of month storage. In addition to the contract with USBR, the District entered into a Water Transfer Agreement with OID and SSJID. The agreement allows up to 30,000 AF to be transferred to the District.

3.5 Water Quality Impacts on Water Management Strategy and Supply Reliability

CDPH sets both primary and secondary water quality standards for drinking water. Primary standards are health-based. Secondary standards are related to palatability issues such as taste, odor, scaling, and corrosion of pipelines.

Salt-water intrusion from connate brines in the Delta has threatened the Stockton area groundwater quality for many years. Small annual increases in salinity have been noted in groundwater during years with low surface water availability. However, due to increased surface water availability, groundwater has recently risen to pre-drought levels and the salt-water intrusion condition has been somewhat relieved.

Currently SEWD does not anticipate the surface water supplies being impacted by water quality issues. Table 9 shows the supply projections to 2035 with water quality impacts taken into account.

Table 9: Current and Projected Water Supply Changes Due to Water Quality (AF/Y)

Water Source	2010	2015	2020	2025	2030	2035
New Hogan	20,000	20,000	20,000	20,000	20,000	20,000
New Melones	24,000	24,000	24,000	24,000	24,000	24,000
OID/SSJID Transfer	30,000	30,000	30,000	30,000	30,000	30,000
Groundwater Bank	3,360	10,080	23,520	30,240	43,680	50,400
Supply Total	77,360	84,080	97,520	104,240	117,680	124,400

Based on DWR Guide Book Table 39

3.5.1 Potential Impacts to Water Quality

3.5.1.1 Groundwater

Over the years, as groundwater extractions increased, average groundwater levels generally declined until recent years as noted in Section 3.2 above. As a result, a cone of depression was formed in Eastern San Joaquin County creating a gradient that allows saline water underlying the Delta to migrate east.

A combination of normal hydrologic conditions and a proactive groundwater management program has been instrumental in allowing the groundwater levels under the Stockton urban area to recover. The cone of depression has migrated to the east. To achieve and maintain sustainable levels of groundwater use in the District’s service area that not only protects current supplies but also helps build up and restore groundwater resources and prevent continued salinity intrusion, effective basin management must be continued.

3.5.1.2 Surface Water

Water quality from both the Calaveras and Stanislaus Rivers is generally considered excellent. However, the Calaveras River is subject to seasonal taste and odor problems.

3.6 Transfer or Exchange Opportunities to Supplement or Replace Existing Water Sources

> 10631 (d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

SEWD continues to diversify its surface water sources to help ensure an adequate supply to its retail customers.

3.6.1 Water Transfers

In 2011, the District will enter into a water transfer agreement with SSJID. This agreement is for 8,000 to 30,000 AF/Y allocation based on New Melones Reservoir storage and inflow as of April 1 of each year. The contract period is for 10 years with a possible 10-year renewal pending further studies. Table 10 shows the amount of water available to SEWD, depending on the inflow to New Melones Reservoir.

Table 10: Water Transfer Agreement

Inflow into New Melones Reservoir	Water Transfer (AF/Y)
500,000 AF or more	30,000
Equal to or more than 450,000 AF	12,500
Less than 500,000 AF	8,000

Based On DWR Guide Book Table 11

Section 4: Water Use Provisions

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

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; and (I) Agricultural.

(2) The water use projections shall be in the same 5-year increments to 20 years or as far as data is available.

4.1 Past, Current and Projected Water Use

SEWD wholesales surface water to the Stockton urban area and supplies water to agricultural users as previously noted. Table 11 displays the past, current and projected water demands for SEWD's urban water users. San Joaquin County's service area is at full build-out and its projected water use is not expected to increase. Table 11 shows past, current, and projected customers from 2005 to 2035 for each of the three urban contractors.

The total demands for the three urban water retailers are presented below. Urban demand is met by a combination of surface water and groundwater. The City’s Delta Water Supply Project includes a new water treatment plant that is currently under construction that will provide a new source of treated surface water to City customers. Any shortfall in demand of surface water is met by pumping groundwater. SEWD will continue to supply treated surface water to meet urban needs as reflected in Table 5.

Table 11: Past, Current and Projected Water Demand (AF/Y)

	2005	2010	2015	2020	2025	2030	2035
City of Stockton [(1)]							
Single Family Residential	20,082	18,639	22,462	24,510	26,482	28,433	30,228
Multi-Family Residential	3,874	3,047	4,432	4,836	5,225	5,610	5,964
Commercial/Institutional	5,471	4,471	6,627	7,159	7,666	8,209	8,756
Industrial	0	624	714	771	826	884	943
Landscape Irrigation	3,012	3,392	3,962	4,323	4,671	5,015	5,331
Other	180	53	100	100	100	100	100
Unaccounted for Water	1,530	3,107	2,021	2,201	2,373	2,547	2,710
Total Demand	**34,149**	**33,333**	**40,317**	**43,900**	**47,342**	**50,799**	**54,032**
California Water Service – Stockton District [(2)]							
Single Family Residential	15,465	13,599	16,052	15,376	15,504	15,635	15,768
Multi-Family Residential	2,182	1,839	2,400	2,348	2,418	2,490	2,565
Commercial	5,771	5,674	6,031	5,768	5,808	5,849	5,890
Industrial	3,925	2,119	2,729	2,610	2,628	2,646	2,665
Government	2,823	2,193	3,078	3,019	3,117	3,219	3,324
Other	44	37	85	81	82	82	83
Unaccounted	1,782	1,757	1,757	1,684	1,698	1,713	1,728
Total Demand	**31,992**	**27,218**	**32,132**	**30,886**	**31,255**	**31,634**	**32,024**
San Joaquin County [(3)]							
Total Demand	**2,094**	**2,094**	**2,094**	**2,094**	**2,094**	**2,094**	**2,094**
Total COSMA Urban Demand	**66,485**	**62,645**	**74,544**	**76,880**	**80,692**	**84,527**	**88,150**
Demand Met by SEWD Supply	39,054	55,680	58,000	60,320	62,645	64,960	67,290
Remainder of Demand to be Met By Groundwater Pumping or Delta Water Supply Project	**27,431**	**6,965**	**16,544**	**16,560**	**18,047**	**19,567**	**20,860**

Note: Based on DWR Guide Book Table 12
(1) Source: City of Stockton 2005 Urban Water Management Plan Update
(2) Source: California Water Service Company, Urban Water Management Plan for the Stockton District
(3) Source: Stockton East Water District

4.1.1 Urban Contractors

SEWD delivers water to three water retailers noted below. A normal year minimum of 20,000 AF of treated surface water is delivered to these retailers. The amount delivered to each of the retailers is based on the percentage of total groundwater and surface water used in each retailer's area during the previous year and is updated every year. The current (2010/2011) percentage amount entitlements are as follows:

City of Stockton	49.89%
San Joaquin County	3.07%
California Water Service Company	47.04%

The contract with the urban contractors, known as the Second Amended Contract, is in effect until April 1, 2035.

4.1.2 Agricultural Customers

SEWD currently has 236 surface water agricultural customers outside the urban area. Approximately 170,000 AF/Y (120,000 AF/Y of groundwater and 50,000 AF/Y of surface water) is needed for a normal agricultural irrigation season. This amount includes riparian water rights, evaporation, recharge, vegetation, habitat, end losses and irrigation. Surface water is distributed utilizing the Calaveras River, Mormon Slough, Mosher Creek and Potter Creek.

The District does not sell groundwater, but assesses its use. Agricultural use of groundwater depends on crop and weather conditions, but averages about 115,000 AF/Y. This use has caused a pumping cone of depression to develop to the east of the Stockton urban area as noted in previous sections.

In 2001, SEWD completed the Farmington Groundwater Recharge and Seasonal Habitat Study (Farmington Study) in conjunction with the USACE and other local agencies. The Farmington Study identified areas suitable for recharge and seasonal habitat development, evaluated recharge techniques, conducted pilot recharge tests, developed a final report and recharge guide, and recommended an implementation strategy for the phased Farmington Program.

In 2003, the District completed the Pilot Phase of the Farmington Program, which consists of approximately 60 acres of recharge ponds and fields adjacent to the DJW WTP. This project was awarded the American Society of Civil Engineers Water/Environmental Project of the Year in 2003 and the San Joaquin Council of Government Regional Excellence Award in 2004. The Demonstration Phase, which began in 2003, included the investigation and construction of about 1,200 acres of recharge ponds and fields. To date, six sites have been investigated and two sites are moving forward to a demonstration study. Another 30-acre recharge site was constructed at the DJW WTP in 2005. The District estimates a recharge rate of approximately 0.5 feet per day for this site. For more information on the Farmington Program, see the Farmington Groundwater Recharge Site links at http://www.farmingtonprogram.org/.

The agricultural area served by SEWD is gradually becoming developed and demand by agricultural customers is expected to slowly decrease as rural land is urbanized. As this agricultural land develops to urban uses, the groundwater uses will convert to urban uses.

4.2 SBX7-7 20 x 2020 Water Conservation Goals

> 10608.36. Urban wholesale water suppliers shall include in the urban water management plans required pursuant to Part 2.6 (commencing with Section 10610) an assessment of their present and proposed future measures, programs, and policies to help achieve the water use reductions required by this part.

In November 2009, the State of California enacted Senate Bill SBX7-7 amending the Urban Water Management Plan Act and requiring statewide water savings of 20 percent by the year 2020 (20 x 2020). Each urban water supplier must determine and include in their plan:

- Baseline per capita water use.
- 2015 interim and 2020 water use goals.

The bill sets specific methods for calculating both the baseline water usage and water use goals in gallons per capita per day (gpcd). Three methods for calculating water use goals are provided in the bill, with provisions for a fourth method to be developed through a public process. Statewide compliance will be reviewed in December 2015 to check that consumption is on track to meet the reduction goals by December 31, 2020. Urban retail water suppliers that do not meet the requirements of SBX7-7 after 2020 will not qualify for State grant or loan funding. Further implications of non-compliance are not known at this time.

DWR, in consultation with the California Urban Water Conservation Council (CUWCC) has convened an Urban Stakeholder Committee (USC) public process and developed the calculation methods for baseline and water use goals (released October 1, 2010).

4.2.1 Per Capita Water Demand

The first part in determining the reduction goal is to calculate the per capita water demand for the service area. DWR has listed nine methods for determining per capita water demand depending on the methodology used for the water use targets. This section presents a summary of each retailer's per capita water demand and their chosen calculation method as it applies to choosing the water use target reduction methodology.

City of Stockton

The City's per capita water usage from 1990 to 2009 varied from approximately 186 to 211 gpcd. The average over a 10 year period ending no earlier than December 31, 2004 was 195 gpcd (West Yost 2010).

Cal Water

Cal Water Service per capita water usage was approximately 173 gpcd for the 5 year average and 180 gpcd for the 10 year average. Cal Water chose the 10 year average for the basis of their calculations (Cal Water).

4.2.2 Target Reduction Method

The next step is to calculate the target reduction through one of four methods. DWR has presented four methods for determining the target reduction method. The methods are as follows:

- **Method 1** – Eighty percent (80%) of the water supplier's baseline per capita water use.
- **Method 2** – Per capita daily water use estimated using the sum of performance standards applied to indoor residential use (55 gpcd provisional standard); landscaped area water use (as required by the Model Water Efficient Landscape Ordinance), and a 10 percent reduction in commercial, industrial, and institutional (CII) uses.
- **Method 3** – Ninety-five percent (95%) of the applicable state hydrologic region target as set in the draft 20x2020 Water Conservation Plan (February 2010).
- **Method 4** – A method to be identified and developed by DWR through a public process and reported to the Legislature by December 31, 2010, to achieve a cumulative statewide twenty percent (20%) reduction.

City of Stockton

Based on the City's evaluation of Method 1, 2, and 3, Method 3 was selected to establish their target reduction values. Method 3 has a hydrologic region target of 248 gpcd and an urban water use target for 2020 of 165 gpcd (West Yost 2010).

The UWMP per SBX7-7 also requires the retailer to check the reduction target against the minimum reduction method, which is 95% of the 5 year rolling average ending no earlier than December 31, 2007. This calculation results in water use of 183 gpcd. If this value was less than Method 3, the minimum reduction method would have been used.

Cal Water

Based on their baseline per capita use of 182 gpcd Cal Water is using Method 3 (95% of the hydrologic region target) to calculate their reduction target resulting in a target of 165 gpcd by 2020. The demand projections shown in Table 12 were provided by Cal Water and based on their population projections.

4.2.3 Reduction Targets

Applying the per capita water use reduction target calculated using the chosen method, overall reduction targets are set that apply to the whole service area's water use. Table 12 presents the

City's and Cal Water's projected water use using the reduction targets to 2035. There is an interim target at 2015 and the full reduction target is implemented by 2020.

Table 12: 20 x 2020 Water Use Targets (AF/Y)

	2010	2015	2020	2025	2030	2035
City of Stockton	33,333	36,950	36,958	39,932	42,874	45,580
Cal Water	31,877	32,132	30,887	31,225	31,635	32,023

* Information not available pending population projections for the City of Stockton service area.

4.2.4 Achieving Water Use Reduction Goals

> 10608.36. Urban wholesale water suppliers shall include in the urban water management plans required pursuant to Part 2.6 (commencing with Section 10610) an assessment of their present and proposed future measures, programs, and policies to help achieve the water use reductions required by this part.

Current measures that SEWD is implementing to achieve the water use reduction goals include fully implementing DMMs required by wholesale water suppliers, SAWS participation, and water shortage contingency plan.

Section 5: Water Demand Management Measures

> CWC 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:
>
> (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.

SEWD is committed to ensuring the implementation of water conservation programs. SEWD's authority to implement all of the municipal and industrial Demand Management Measures (DMMs) is limited due to contractual limitations in the second amended contract with the urban water contractors. USBR recognizes SEWD's limitation in enforcing certain DMMs and does not require SEWD to ensure that urban water retailers implement all of the DMMs. SEWD does encourage and support the urban retailers to the best of its ability. The San Joaquin County receives less than 2,000 AF/Y of water and is exempt from these requirements.

SEWD's Best Management practices Annual Update is contained in Appendix F. A letter from USBR containing SEWD's BMP exemptions is contained in Appendix G.

SEWD actively implements the following DMMs:

- DMM 7: Public Information Programs
- DMM 8: School Education Programs
- DMM 10: Wholesale Agency Programs
- DMM 12: Water Conservation Coordinator

SEWD does not currently implement a program for DMM 3 because it has a limited amount of raw and treated water conveyance transmission mains. SEWD's treated water conveyance system delivers water to the City's and Cal Water's distribution systems. The City and Cal Water are primarily responsible for implementing DMM 3 as the majority of the distribution system is within their jurisdiction.

The following section provides a summary of the implementation of DMMs for the City of Stockton, Cal Water and SEWD.

5.1 DMM1: Water Survey Programs for Single-Family Residential and Multifamily Residential Customers

City of Stockton: The City has developed a program that addresses this DMM in its service area. Implementation of this program is ongoing.

Cal Water: Cal Water has developed a program that addresses this DMM in its service area. Implementation of the program is ongoing.

5.2 DMM2: Residential Plumbing Retrofit

City of Stockton: The City has developed a program that addresses this DMM in its service area. Implementation of this program is ongoing.

Cal Water: Cal Water has developed a program that addresses this DMM in its service area. Implementation of this program is ongoing.

5.3 DMM3: System Water Audits, Leak Detection, and Repair

SEWD: Although the water distribution system is limited, the District has developed a program that addresses this DMM in its service area. Implementation of this program is ongoing.

City of Stockton: The City has developed a program that addresses this DMM in its service area. Implementation of this program is ongoing.

Cal Water: Cal Water has developed a program that addresses this DMM in its service area. Implementation of this program is ongoing.

5.4 DMM4: Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections

City of Stockton: The City is fully metered and all new services are metered. Implementation of this program is ongoing.

Cal Water: The Cal Water service area is fully metered and all new services are metered. Implementation of this program is ongoing.

5.5 DMM5: Large Landscape Conservation Programs and Incentives

City of Stockton: The City has developed a program that addresses this DMM in its service area. Implementation is ongoing.

Cal Water: Cal Water has developed a program that addresses this DMM in its service area. Implementation of this program is ongoing.

5.6 DMM6: High-Efficiency Washing Machine Rebate Programs

DMM6 was added to the UWMP by Senate Bill 553. Both the City and Cal Water are developing programs at this time. Information for this DMM will be gathered and presented in the next UWMP update.

Cal Water: Cal Water has developed a program that addresses this DMM in its service area. Implementation of this program is ongoing.

5.7 DMM7: Public Information Programs

SEWD is an active member of SAWS, an association of water providers dedicated to communication and mutual assistance regarding issues affecting water supply, distribution, and conservation in metropolitan Stockton. The SAWS group believes that providing water education in elementary and secondary schools is highly effective in reaching the public at large because young children are apt to share the lessons they learn in class with their parents, siblings, and extended families. Appendix H shows examples of information that SEWD makes available to the public.

In addition to the public information through SAWS, SEWD offers treatment plant tours, publishes a newsletter and has a booth at the local Agriculture Fair, Earth Day, and State of the City events etc. Implementation of this DMM is ongoing.

City of Stockton: The City has developed a program that addresses this DMM in its service area. Implementation of this DMM is ongoing.

Cal Water: Cal Water has developed a program that addresses this DMM in its service area. Implementation of this program is ongoing.

5.8 DMM8: School Education Programs

As noted above, SEWD is an active member of SAWS. In an effort to increase public awareness in the area of water resource conservation, the SAWS group offers a variety of free water education programs to all public and private schools in the Stockton Metropolitan Area.

While SAWS has been active in providing popular and innovative school education programs in Stockton since 1991, the group recently significantly increased its outreach efforts. The current SAWS program offers in-class water education programs with grade specific curriculums for grades K-5, as well as large target-audience water education assemblies for grades K-8. These standards based programs are designed to educate and inform students about water conservation, water science, non-point source pollution, and other concepts relative to protecting and preserving our water resources. SAWS offers these programs at no charge to Stockton area public and private schools. The SEWD Water Conservation Coordinator administers and directs the water education program for SAWS.

5.8.1 SAWS In-Class Water Education Program

The goal of the SAWS in-class program is to inform and educate residents about the practical and scientific premises behind society's need to conserve water. The focus is on building a primary awareness starting early with simple concepts and builds knowledge progressively, year after year, until water conservation becomes second nature. From the introduction to conservation concepts and the water cycle in kindergarten to the comprehensive grade five program covering states of matter, conservation, non-point source pollution, and the water treatment process, each of the five 50- to 90-minute presentations offered provides a building block in the progressive water education process.

These programs are designed to support grade-specific state and national content standards and aid teachers in implementing their lesson plans. Participating students and teachers are also supplied with educational materials that support the SAWS conservation message. By contacting the SEWD Water Conservation Coordinator, teachers can schedule any of these in-class water presentations at their convenience. In the 2005/2006 school year, the SAWS in-class water education program reached over 8,000 students in the Stockton Metropolitan Area. In 2006, this program received an honorable mention in the San Joaquin Council of Governments Regional Excellence Awards competition.

5.8.2 SAWS Sponsored Assembly Programs

Through program evaluation and monitoring, SEWD and the SAWS agencies have determined that water education in the primary grades is a key element in successful conservation efforts. In late 2005, SAWS decided to expand its outreach by adding a large-target audience water education assembly to its school education program offerings.

In its search for an appropriate water education assembly, the SEWD Water Conservation Coordinator found that the options currently available are somewhat limited in quantity, but certainly not in quality. Development of an in-house presentation was considered. However, after research and observation, it was decided that use of one of three water conservation assembly programs already in production in Northern California would be a wiser choice. The ready-made options included:

- **Zun Zun's Water Show:** An interactive musical presentation about watersheds and the water cycle.
- **EarthCapades' Water Connections:** A water-focused acrobatic and juggling show based on water, ecology and the preservation of our natural resources.
- **SYRCL's *The Great Water Mystery*:** South Yuba River Citizen's League (SYRCL)/River Teachers' grade-level adaptable, interactive water science and conservation assembly, featuring Detective Drizzle.

While all three of these water awareness assembly productions are excellent, SAWS chose to sponsor SYRCL's *Great Water Mystery.* This large-target audience production is appropriate for the SAWS program because:

- SYRCL recently received grant funding (thus, approval) from the State of California Office of Water Use Efficiency to deliver *The Great Water Mystery* assemblies to over 12,000 students in Yolo and Solano Counties.

- The SYRCL assemblies convey a multi-faceted message about water science and conservation that coordinates well with SAWS outreach goals.

- The SYRCL assemblies are grade-level adaptable and meet specific California and National Science Standards.

- Each SYRCL assembly can serve up to 300 students.

- The SYRCL assemblies are reasonably priced and provide tracking, scheduling and statistics for record-keeping and evaluative purposes.

Further, the SYRCL assemblies provide teachers with well-designed pre and post assembly materials that encourage reinforcement of the message in the classroom. Finally, and probably most importantly, the students truly enjoy the SYRCL assemblies; when SAWS agency representatives observed, attending students were generally captivated by and involved in the story.

The methodology employed by *The Great Water Mystery* is best described in SYRCL's brochure:

> *The Great Water Mystery* uses an engaging mystery story to teach children about water conservation. This presentation uses hilarious audience participation, dramatic slides, exciting demonstrations, and fun stories to keep students and teachers enthralled while teaching them to understand the effects that their daily actions have on our water supply.
>
> The goal of *The Great Water Mystery* is to change the attitudes and behaviors of the audience members so that they incorporate simple water conservation techniques into their daily habits. [The assemblies] are interactive science shows…that teach students to be responsible stewards of our water resources. Experience has shown that even teachers who do not usually include education about water conservation in their classrooms participate in and enjoy this program.

On behalf of SAWS, SEWD recently purchased 72 productions of *The Great Water Mystery* to be presented in Stockton area schools in the coming year. Of the twelve assemblies performed in Stockton prior to the 2006 summer break, nine were presented in Title 1 schools. With each assembly serving an average of 250 students, *The Great Water Mystery* will reach approximately 18,000 students in the 2006/2007 school year. When combined with the 6,000 students reached through the in-class program, the SAWS Water Education Program will serve 24,000 students annually in the Stockton Metropolitan Area, effectively expanding the SEWD/SAWS outreach effort by 300%.

5.8.3 Additional SEWD School Education and Outreach Programs

SEWD currently offers or has plans to offer a variety of additional and alternative water education programs in Stockton as well.

For special events, SAWS offers the *H20lympics* (adapted from Project WET), a water activity game designed to demonstrate some of the scientific properties of water to early elementary through middle school aged children. The SEWD Water Conservation Coordinator works with community volunteers to present the *H20lympics* at a variety of local events, including school and community Earth and Ag Days, the American Zoological Association's Wonders of Water celebrations, the San Joaquin County Fair Children's Day, and other local children's festivals and events. In addition, SAWS offers a "Waterworks" day camp for children ages 5 to 12 through the City of Stockton during the summer break.

In May 2005, SAWS was awarded full funding from DWR's Office of Water Use Efficiency Prop 50 Grant Program to refurbish the water awareness exhibit in the Children's Museum of Stockton. When completed, this project, which is currently under construction, will reach approximately 60,000 museum visitors annually.

SEWD and SAWS are also considering and/or developing new outreach programs, including a combined water education/career path development program for middle and high school students, a sixth grade in-class groundwater education program, and a water treatment plant tour program for upper elementary school students.

Implementation of this DMM is ongoing.

City of Stockton: The City has developed a program that addresses this DMM in its service area. Implementation of this DMM is ongoing.

Cal Water: Cal Water has developed a program that addresses this DMM in its service area. Implementation of this program is ongoing.

5.9 DMM9: Conservation Programs for Commercial, Industrial, and Institutional Accounts

City of Stockton: The City has developed a program that addresses this DMM in its service area. Implementation of this DMM is ongoing.

Cal Water: Cal Water has developed a program that addresses this DMM in its service area. Implementation of this DMM is ongoing.

5.10 DMM10: Wholesale Agency Programs

SEWD: DMM10 was added to the UWMP by Senate Bill 553. The City, Cal Water, the County, and SEWD are members of SAWS as noted above. This group meets regularly to discuss water-related matters, including water supply, use, conservation, and the development of water shortage contingency plans. SEWD will continue to meet with SAWS to discuss the state of water-related matters in the Stockton Area.

Estimated water savings shown below in Table 13 are calculated as a total for the City's water conservation program, which is a cooperative effort with SAWS, the City, Cal Water, the County, and SEWD. New information is not available to update this table to 2010.

Table 13: Water Conservation Program Savings

Year	Approximate Acre-Feet Saved
1992	15,200
1993	12,400
1994	10,520
1995	11,096
1996	9,185
1997	8,105
1998	13,528
1999	12,751
2000	8,372
2001	8,640
2002	9,473
2003	9,652
2004	10,243
2005	11,082
Total	**150,247**

City of Stockton: The City has developed a program that addresses this DMM in its service area. Implementation is ongoing.

Cal Water: Cal Water has developed a program that addresses this DMM in its service area. Implementation of this DMM is ongoing.

5.11 DMM11: Conservation Pricing

Both Cal Water and the City provide uniform rates for residential customers and declining block rates for customers over 30,000 cubic feet (CF). Declining block rates are not acceptable to the urban suppliers for residential customers. The City and Cal Water offer the following justification for not implementing DMM11:

1. The large water users in the area have threatened to relocate their businesses if the declining block rate is eliminated. Relocation would have a great impact on this already economically depressed area.

2. As an alternative to relocating, commercial and industrial users have the option of installing their own wells as a possibility to lower water costs. Additional pumping from the aquifer would have a negative impact on the City's water conservation efforts. The objective of the City's water supply program of obtaining supplemental surface water is to reduce well pumping to protect and increase the water level of the local aquifer. The local aquifer has been declared critically overdrafted by the DWR Bulletin 160. The proliferation of large private wells would be counterproductive to the efforts of local water agencies to manage and limit extractions from the groundwater basin.

3. Cal Water provides approximately 47% of the water in the City's greater metropolitan area. The City's Water Utility, except for two small areas served by the County, serves the remainder of the area. Cal Water offers declining block rates. The City's Water Utility would be placed at an economic disadvantage if required to implement a structure that was not similar to that of the largest water retailer in the County. It would also be inconsistent to have substantially different water policies in effect in the same political jurisdiction.

SEWD will continue to work with Cal Water and the City on this issue. A copy of the SEWD Water Fee Schedule Effective April 13, 2010 is included in Appendix I.

The City has a three-tier system in the residential quantity rates. Three-tiered districts, consists of districts with consumption patterns that show significant seasonal differences in which the average summer use is more than twice the average winter use. The tiers are designated as follows:

i. Tier 1 – From zero to the midpoint between winter average and winter median consumption (this is the proxy for indoor water use). This ensures that consumers at low and average levels of consumption stay within Tier 1.

ii. Tier 2 – From the top of Tier 1 to the mid-point between weather adjusted average monthly annual consumption and average summer consumption.

iii. Tier 3 – All consumption above the top of Tier 2.

5.12 DMM12: Water Conservation Coordinator

SEWD has had a Conservation Coordinator since 1993. The Water Conservation Coordinator's responsibilities include developing and implementing the UWMP and Groundwater Management Plan. The coordinator also implements the Agriculture Best Management Practices (BMPs).

Jeanette Thomas has served as coordinator and supervised implementation of the UWMP DMMs on a part-time basis since 1993. In October 2004, SEWD created a full-time Water Conservation Coordinator position and hired Ms. Kristin Coon to serve in this capacity. Ms. Coon’s current responsibilities include working with the SAWS member agencies to coordinate the appropriate application and implementation of the UWMP DMMs, and developing and implementing a comprehensive public outreach and water conservation education program.

SEWD also implements the Agriculture BMPs as prescribed by the USBR. Mr. Edward Morley currently is responsible for implementing this program for the District.

Implementation of this DMM is ongoing.

City of Stockton: The City has developed a program that addresses this DMM in its service area. Implementation is ongoing.

Cal Water: Cal Water has developed a program that addresses this DMM in its service area. Implementation of this DMM is ongoing.

5.13 DMM13: Water Waste Prohibition

City of Stockton: The City has developed a program that addresses this DMM in its service area. Implementation is ongoing.

Cal Water: Cal Water has developed a program that addresses this DMM in its service area. Implementation of this DMM is ongoing.

5.14 DMM14: Residential Ultra-Low-Flush Toilet Replacement Programs

City of Stockton: An ultra low flush toilet replacement incentive program is not currently being conducted by the City. All new construction and remodeling require the installation of ultra low flush toilets. In fact, ultra low flush toilets are the only toilets available currently. Therefore, the City has not been supportive of offering an ultra low flush toilet replacement incentive program, because this program is essentially using funds supplied by all water users to subsidize new toilets for a small fraction of the users that are otherwise required to utilize these units under existing law.

Cal Water: Cal Water has developed a program that addresses this DMM in its service area. Implementation of this DMM is ongoing.

5.15 AB 1420 Self Certification

Part of the new requirements from DWR for agencies to receive funding is AB 1420 self certification of DMM (BMP) implementation. Appendix J contains a copy of the DWR review letter dated 11 March 2011 and a copy of the submitted Table 1 required for BMP reporting by DWR. The self certification is only completed for the BMPs a wholesaler is required to implement. SEWD reports to CUWCC and has updated reporting through 2008.

SEWD implements the following BMPs as required by Table 1:

- BMP 3: System Water Audits, Leak Detection, and Repair
- BMP 7: Public Information Programs
- BMP 8: School Education Programs
- BMP 10: Wholesale Agency Programs
- BMP 12: Water Conservation Coordinator

SEWD has reported on and is in compliance with all of the above BMPs for 2007 and 2008. SEWD is claiming legal exemption for BMP 10 even though through its participation in SAWS and implementation of BMP 7, 8, and 12 SEWD is complying with BMP 10. SEWD is in the process of updating BMP 10 so it shows compliance but is unable to do so since the CUWCC BMP reporting data base has been offline since December of 2010.

Section 6: Water Shortage Contingency Plan

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.

SAWS was formed in 1980 as an association of Stockton urban area retail water suppliers and the SEWD. Members of SAWS include the City, SEWD, the County, and the Cal Water Service. As noted above, SAWS members meet regularly to discuss water-related matters, including water supply, water use, water conservation, and the development of water shortage contingency plans. In declared emergencies when more extensive coordination is required, members meet as frequently as necessary.

At the SAWS monthly meetings, planning efforts, education and public information, and other water management activities are coordinated. As a result of these meetings, all SAWS member agencies have adopted compatible rationing plans, landscape water use restrictions, and nearly identical "mandatory water reduction" ordinances. The Mandatory Water Use Reduction Ordinance adopted by the City has been incorporated into the City Municipal Code (see Appendix K).

This section addresses the UWMP Act 10632 part (a) through (i) as required by the UWMP Act and following the UWMP Guide Book.

6.1 Stages of Action

SEWD is a wholesale water agency and does not have an adopted water use ordinance and has not established multi tiered stages of action for a water shortage. Each entity contracting with SEWD for the supply of treated surface water has a contractual limit to the amount of SEWD water they can receive. When SEWD declares a supply shortage, all member agencies receive a uniform percentage reduction from their contractual allocation. It is the water retailers' responsibility to implement water use reduction from their customers during a water shortage. The Mandatory Water Use Reduction Ordinance for the City of Stockton is in Appendix K. Cal Water has adopted the same ordinance.

The stages of action are as follows:

Stage1: Mandatory Water conservation

Stage 2: Water Shortage Emergency

Stage 3: Water Shortage Emergency

Stage 4: Water Shortage Emergency

Stage 5: Water Shortage Emergency

Each stage of action has its own water reduction regulations. The reduction ordinance at each stage of action is presented in Appendix K.

In 1992, through SAWS, SEWD consulted during the preparation of the Urban Water Shortage Contingency Plans (UWSCPs) for the City, Cal Water and SEWD. This plan is now part of the UWMP. Since 1992, the only changes to the District Urban Water Shortage Contingency Plan are the percentages and amounts of entitlements to each urban retailer. The percentage is calculated annually. They are based on the percentages of total water used (ground and surface) in each retailer area during the previous year. The current percentages and entitlements are as follows:

City of Stockton	49.89%
San Joaquin County	3.07%
California Water Service Company	47.04%

SEWD coordinates with the urban area contractors on a regular basis for the delivery of treated surface water. Since SEWD can only deliver what is available within water supply and treatment capacity constraints, the balance must be made up by the contractors from groundwater pumping. SEWD coordinates and supports the urban area retailers in developing voluntary and mandatory rationing. SEWD, as a wholesaler of treated water, has no authority over mandatory prohibitions on water use.

The UWSCP includes a five-stage rationing plan in response to water shortage emergencies. The plan includes voluntary and mandatory rationing, depending on the cause, severity, and anticipated duration of the water supply shortage. The rationing plan applies to all City water suppliers and is incorporated into the City Municipal Code (see Appendix K).

6.2 Next Three Year Minimum Supply

The next three year minimum supply is based on the contracts with USBR and the water treatment plant capacity for 2011. The next three year minimum supply is presented below in Table 14.

Table 14: Next Three Year Minimum Supply (AF/Y)

Supply Source	**2011**	**2012**	**2013**
New Hogan Reservoir	20,000	20,000	20,000
New Melones Reservoir	24,000	10,000	0
OID/SSJID Transfer	30,000	12,500	8,000
Groundwater Bank	3,360	3,360	3,360
Totals (AF):	55,680	45,860	31,360

6.3 Catastrophic Interruption and Response

Since SEWD is a wholesaler there is a limited amount of scenarios that could cause a catastrophic supply interruption. The most likely scenario is a power failure. The District currently has back-up generators to run the plant for at least three (3) days without refueling. The District also has an Emergency Response Plan (ERP) to guide activities dealing with other non-drought related water supply issues. This ERP is a confidential document and is not presented in this UWMP. Needless to say, the District has planned for a multitude of scenarios and is prepared to handle them if necessary.

6.4 Mandatory Prohibitions

Mandatory water reduction prohibitions are contained within the City's Water Use Reduction Ordinance in Appendix K.

6.5 Consumption Reduction Methods

Consumption reduction methods are contained within the City's Water Use Reduction Ordinance in Appendix K.

6.6 Penalties or Charges for Excessive Use

The penalties and charges for excessive use are contained within the City's Water Use Reduction Ordinance in Appendix K.

6.7 Revenue and Expenditure Impacts and Measures to Overcome Impacts

The contract with the retailers known as the Second Amended Contract, in effect until April 1, 2035, assures a designated amount of water to be delivered to retailers during an 18-month period, even during times of water supply shortage. At the end of each year, budgeted expenditures are compared with actual expenditures. Credits are applied to retailer accounts in the event that actual expenditures are less than budgeted expenditures.

To assure adequate operating budget, the District strives to maintain dry year reserves. One account is provided for agricultural supply and another account is provided for municipal and industrial supply. Each year a contribution is made to each reserve fund based upon the quantity of water delivered in that year to irrigators and urban retailers.

Each year a review is conducted to compare increases in SEWD expenses to revenues, in order to determine if rate adjustments may be necessary to help ensure an adequate budget for operations and maintenance expenses.

6.8 Water Shortage Contingency Ordinance/Resolution

SEWD coordinates on a regular basis with the urban area contractors for the delivery of treated surface water. Since SEWD can only deliver what is available within water supply and treatment capacity constraints, the balance must be made up by the contractors from groundwater pumping. SEWD coordinates and supports the urban area retailers in developing voluntary and mandatory rationing. SEWD, as a wholesaler of treated water, has no authority over mandatory prohibitions on water use by urban water users.

The UWSCP includes a five-stage rationing plan in response to water shortage emergencies (Appendix L). The plan includes voluntary and mandatory rationing, depending on the cause, severity, and anticipated duration of the water supply shortage. The City's rationing plan applies to all City water suppliers and is incorporated into the City Municipal Code (see Appendix K).

6.9 Measuring Water Use Reductions

Section 10632 (i) of the UWMP Act requires a mechanism for determining actual reductions on water use pursuant to the urban water shortage contingency analysis. The City and Cal Water service areas are 100% metered. Water use reduction can be measured by meter readings during reduction periods to non-reduction periods in previous years.

Section 7: Water Recycling

7.1 Consideration of Water Recycling

> 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. To the extent practicable, the preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies and shall include all of the following:
>
> 10633 (a) A description of the wastewater collection and treatment systems in the supplier's service area…

A Recycled Water Market Evaluation Study was developed for the City in 1996. Information from this study has been accepted and will be used for master planning of the City's Stockton Regional Wastewater Control Facility (Stockton RWCF).

7.2 Wastewater System Description

7.2.1 Wastewater Collection and Treatment in Stockton

The City owns and operates the Stockton RWCF. This facility is located adjacent to the San Joaquin River and State Highway 4. The existing treatment capacity at the Stockton RWCF is 48 MGD average dry weather flow.

7.2.2 Wastewater Treatment Process

The treatment processes include:

- Grit Removal
- Primary Clarification
- High-Rate Trickling Filters
- Secondary Clarification
- Anaerobic Sludge Digestion and Belt Press Dewatering
- Oxidation Ponds – Enhanced Secondary Treatment
- Tertiary Filtration
- Disinfection
- Dechlorination

The Stockton RWCF provides tertiary level treatment during the dry season months and secondary treatment during the wet season months. Between about July 1 and October 15 of each year, the Stockton RWCF receives cannery wastes, which significantly influences influent wastewater quantity and quality.

7.3 Wastewater Disposal and Recycled Water Uses

7.3.1 Recycled Water Currently Being Used

The Stockton RWCF supplied recycled water to a privately owned 14-acre farm for over 20 years. The farm used the recycled water to irrigate crops of alfalfa and safflower. However, the farmer recently declined to renew his National Pollution Discharge Elimination System (NPDES) permit. Currently, recycled water is not being used for this reason.

Prior to the 2002 NPDES permit the effluent received tertiary treatment (not meeting Title 22 requirements) during the warmer months of the year (approximately April through October) to meet the stricter carbonaceous biological oxygen demand (cBOD) discharge requirements. A combination of enhanced secondary treatment and/or tertiary filtration (not meeting Title 22 requirements) was used the rest of the year to meet the less stringent cBOD requirements.

The issuance of the 2002 NPDES Permit had a Time Schedule Order (TSO) for meeting full Title 22 Tertiary Requirements which had a compliance date of 2007. Consequently, there was no Title 22 Recycled water discharged during the 2000 -2005 time period.

7.3.2 Potential Uses of Recycled Water

Three potential options for recycled water use in the Stockton area were identified in a study conducted in 1996. These alternatives include community based customers, market to Central San Joaquin Water Conservation District (CSJWCD), and groundwater recharge in the Linden area. The City held focus group meetings for the three alternatives. The meetings included individuals with knowledge on water issues in the Stockton area with knowledge or expertise in recycled water, as well as, farmers, community members and individuals from the Linden area.

Community based customers would require new recycled water distribution pipelines be added throughout the City to carry the recycled water to the customers. Approximately 43 AF new recycled water storage facilities would also be required. The estimated cost for implementing community based recycled water use is approximately $135 million. Recycled water would not be used throughout each year within the community. Storage or diversion of the unused recycled water would also be necessary. Marketing to CSJWCD would require a pipeline to Woodward Reservoir and approximately 33,200 AF of recycled water storage volume. The estimated cost for providing recycled water to CSJWCD is approximately $60 million.

Farmers in the San Joaquin area currently have a reliable supply of surface water and groundwater at a fairly low cost. Therefore, at the present time there is minimal interest by farmers in the area in paying for recycled water. Additionally, since 1996, Woodward Reservoir has become the water supply for the DJW WTP. This would effectively preclude the use of recycled water.

Groundwater recharge in the Linden area would require a new pipeline to Linden. No storage would be necessary. The estimated cost for groundwater recharge is approximately $86 million to $117 million. The range in cost is based on the rate of percolation, which previous studies have shown vary from about 1 to 11 feet per day.

Customers in the Stockton area have expressed concerns for the use of recycled water. Concerns include the possible long-term impacts recycled water would have on groundwater and surface water, potential negative impacts on crops and soils, and a perceived potential decrease in marketability of crops irrigated by recycled water.

Neither SEWD nor the City is pursuing any of the alternatives listed above at this time for the reasons noted above. Cost, lack of public interest, and concerns of the customers make the alternatives prohibitive to implement at the present time. The information from the Recycled Water Market Evaluation Study will be used in future master planning of the City RWCF. The availability of grant funding could possibly change the current situation noted above. The City is reviewing options for possibly applying for $40 million in grant money for implementing a future recycled water project.

Since no recycled water is currently being used or projected to be used projections for the use of recycled water in accordance with 10633 (e) are not provided.

7.4 Wastewater Projections

Projected discharges from the City's RWCF are shown below in Table 15. The leveling off of wastewater discharge is a result of high water use industries improving their water use efficiencies. Currently all of the City's wastewater is treated and discharged into the San Joaquin River.

Table 15: Wastewater and Recycled Water Projections (AF/Y)

	2010	**2015**	**2020**	**2025**	**2030**	**2035**
Wastewater Collected and Treated	32,000	35,000	38,000	41,500	50,000	50,000
Quantity Used for Recycled Water	0	0	0	0	0	0

Based on DWR Guide Book Table 33

Section 8: Water Service Reliability

> 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 the state, regional or local agency population projections within the service area of the urban water supplier.

Plans to increase surface water availability, continued recharging the groundwater basin through banking, and continued commitment to conservation programs will help to ensure that the Stockton urban area will be able to meet growing customer water demands. Table 16 compares current and projected water supplies (from Table 5) and total surface water demands (from Table 11). SEWD will have sufficient surface water supplies to meet the urban water retailers. The water supply and demand comparisons are based on the DJW WTP capacity compared to total urban demand. Urban water retailers have access to additional supplies such as local groundwater and surface water from the DWSP to meet their additional demands.

Table 16: Water Supply and Demand Comparison under Normal Water Year (AF/Y)

Volume	2010	2015	2020	2025	2030	2035
Supply totals (1)	55,680	58,000	60,320	62,645	64,960	67,290
Demand totals (2)	62,645	74,544	76,880	80,692	84,527	88,150
Difference (3)	-6,965	-16,544	-16,560	-18,047	-19,567	-20,860
Difference as a % of Supply	-13%	-29%	-27%	-29%	-30%	-31%
Difference as a % of Supply	-11%	-22%	-22%	-22%	-23%	-24%

Note: Based on DWR Guide Book Table 32, 33 and 34
(1) From Table 5 based upon projected capacity of DJW WTP
(2) From Table 11 Total COSMA urban demand
(3) From Table 11 Difference will be met by Urban Contractors groundwater pumping and/or future DWSP

SEWD water supplies are New Hogan Reservoir and New Melones Reservoir. The supply of runoff from the Sierra Nevada mountains is dependent on hydrologic conditions and varies drastically. In addition, long-term affects of climate change on the Sierra snowpack are unknown at this time. Urban demand is shown in Table 10 and it includes the total urban demands for retailers in the District's service area, including those demands met by groundwater sources. The single dry year supply is estimated to be 50% of normal water supply (per DWR guidance). Single dry year demand is assumed to be 100% of demand and is not reduced for this evaluation.

The multiple dry year scenarios are based on 75% of normal water supply. Water demand is reduced to 90% of normal demand in the 2nd year of the five-year dry year sequence, and 80% of normal demand in the 3rd, 4th and 5th year, in accordance with the UWSCP. It is assumed that the shortages indicated in the following tables will be alleviated with a combination of increased groundwater pumping, additional surface water supplies and/or additional reductions in customer demand. SEWD is contracted to provide a minimum of 20,000 AF/Y to the urban contractors, and this evaluation shows that 20,000 AF/Y being met in all scenarios.

8.1 Single Dry Year Scenarios

Table 17 presents the single dry year water supply and demand comparison in AF/Y. The analysis reveals that there will be supply deficiencies during single dry water years projected to 2035. The difference between projected supply and projected demand will be met with groundwater production and/or the City's Delta Water Supply Project.

Table 17: Comparison of Projected Supply and Demand for Single Dry Year (AF/Y)

	2010	2015	2020	2025	2030	2035
Supply Totals	27,840	29,000	30,160	31,323	32,480	33,645
Demand Totals	62,645	74,544	76,880	80,692	84,527	88,150
Difference (supply minus Demand)	-34,805	-45,544	-46,720	-49,369	-52,047	-54,505
Difference as % of Supply	-125%	-157%	-155%	-158%	-160%	-162%
Difference as % of Demand	-56%	-61%	-61%	-61%	-62%	-62%

8.2 Multiple Dry Year Scenarios

Table 18 presents the multiple dry year supply and demand comparison. The analysis shows that there will be supply deficiencies throughout the planning period in the second and third year of the dry year scenario. The difference between projected supply and projected demand will be met with groundwater production and/or the City's Delta Water Supply Project. In addition SEWD's groundwater banking program will help offset the reduction of surface water supplies. Year one of the multiple dry year scenario is based on the projected water treatment plant capacity. This scenario makes the assumption that there will be conservation savings of 10% for the second dry year and 20% for the third dry year. Regardless SEWD is still able to provide the minimum 20,000 AF/Y to the urban contractors during the multiple dry year scenario.

Table 18: Projected Multiple-Dry Year Water Supply and Demand Assessment (AF/Y)

Year	Supply (AF/Y)	Demand (AF/Y)	Difference	Difference as Percent of Supply	Difference as Percent of Demand
2011	55,680	65,025	-9,345	-17%	-14%
2012	45,860	60,664	-14,804	-32%	-24%
2013	31,360	55,827	-24,467	-78%	-44%
2014					
2015					
2016	58,000	75,011	-17,011	-29%	-23%
2017	45,860	67,930	-22,070	-48%	-32%
2018	31,360	60,756	-29,396	-94%	-48%
2019					
2020					
2021	60,320	77,642	-17,322	-29%	-22%
2022	45,860	70,564	-24,704	-54%	-35%
2023	31,360	63,334	-31,974	-102%	-50%
2024					
2025					
2026	62,645	81,459	-18,814	-30%	-23%
2027	45,860	74,003	-28,143	-61%	-38%
2028	31,360	66,394	-35,034	-112%	-53%
2029					
2030					
2031	64,960	85,252	-20,292	-31%	-24%
2032	45,860	77,378	-31,518	-69%	-41%
2033	31,360	69,360	-38,000	-121%	-55%
2034					

References

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City of Stockton. December 2005. *Urban Water Management Plan 2005 Update*

West Yost, December 2010*, Evaluation of Preliminary Urban Water Use Targets for Compliance with Senate Bill No. 7.*

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Western Regional Climate Center. http://www.wrcc.dri.edu.

Appendix A

Copy of Notice for Public Meeting

THE RECORD
PROOF OF PUBLICATION

STATE OF CALIFORNIA
COUNTY OF SAN JOAQUIN

THE UNDERSIGNED SAYS:

I am a citizen of the United States and a resident of San Joaquin County; I am over the age of 18 years and not a part to or interested in the above-entitled matter. I am the principal clerk of the printer of THE RECORD, a newspaper of general publication, printed and published daily in the City of Stockton, County of San Joaquin by the Superior Court of the County of San Joaquin, State of California, under the date of February 26, 1952, File No. 52857, San Joaquin County Records; that the notice of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published each regular and entire issue of said newspaper and not in any supplement thereof on the following dates,
To wit, May 24 2011, May 31 2011

I declare under penalty of perjury that the foregoing is true and correct. Executed on May 31, 2011 In Stockton California

Carlette Schnell

Carlette Schnell,
The Record

0000869853

NOTICE OF PUBLIC HEARING
BEFORE THE BOARD OF DIRECTORS OF THE
STOCKTON EAST
WATER DISTRICT

The Board of Directors of the Stockton East Water District will hold a public hearing on Tuesday, June 7, 2011 at noon, to accept comments and consider the district's 2010 Urban Water Management Plan. The hearing will be held at the District Office, 6767 East Main Street, Stockton, California, and will be held pursuant to and in accordance with the State of California Government Code Section 6066. The draft 2010 Urban Water Management Plan is available for inspection at the District Office.

Kevin M. Kauffman,
General Manager
Stockton East Water
District

#869853 5/24, 31, 2011

Appendix B

Resolution to Adopt the Urban Water Management Plan

RESOLUTION NO. 11-12-05

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE STOCKTON EAST WATER DISTRICT

2010 URBAN WATER MANAGEMENT PLAN UPDATE

The Board of Directors of Stockton East Water District does hereby resolve as follows:

WHEREAS, the California Legislature enacted Assembly Bill 797 (Water Code Section 10610 et seq., known as the Urban Water Management Planning Act) during the 1983-1984 Regular Session, and as amended subsequently, which mandates that every supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, prepare an Urban Water Management Plan, the primary objective of which is to plan for the conservation and efficient use of water; and

WHEREAS, the District is an urban wholesale supplier of water supplying more than 3,000 acre feet of water annually (usually over 50,000 acre-feet), and

WHEREAS, the Plan shall be periodically reviewed at least once every five years, and that the District shall make any amendments or changes to its plan which are indicated by the review; and

WHEREAS, the Plan must be adopted by July 1, 2011 after public review and hearing, and filed with the California Department of Water Resources within thirty days of adoption; and

WHEREAS, Stockton East Water District has therefore, prepared and circulated for public review a draft Urban Water Management Plan, and a properly noticed the public hearing regarding said Plan on April 6, 2011, and

WHEREAS, Stockton East Water District held a Public Hearing on Tuesday, June 7, 2011 to receive comments and accept the District's Urban Water Management Plan; and

WHEREAS, Stockton East Water District did prepare and shall file said Plan with the California Department of Water Resources by July 1, 2011; and

WHEREAS, the District's plan carefully analyzes and balances the tension between water conservation goals and the District's legislative directive to increase the use of surface water within the District for the benefit of the groundwater basin;

NOW, THEREFORE, BE IT RESOLVED by Stockton East Water District as follows:

1. The 2010 Urban Water Management Plan is hereby adopted;
2. The General Manager is hereby authorized and directed to file the 2010 Urban Water Management Plan with the California Department of Water Resources within 30 days after this date;

3. The General Manager is hereby authorized and directed to implement the Water Conservation Programs as set forth in the 2010 Urban Water Management Plan, which includes water shortage contingency analysis and recommendations to the Board regarding necessary procedures, rules, and regulations to carry out effective and equitable water conservation and conjunctive management programs;
4. In a water shortage, the General Manager is hereby authorized to declare a Water Shortage Emergency and implement necessary elements of the Plan;
5. The General Manager shall recommend to the Board additional procedures, rules, and regulations to carry out effective and equitable allocation of water resources, including the conjunctive use of surface and groundwater supplies.

PASSED AND ADOPTED at the regular meeting of the Board of Directors of Stockton East Water District on June 14, 2011 by the following vote:

Ayes:	Atkins, Cortopassi, McGaughey, McGurk, Panizza, Sanguinetti and Watkins
Noes:	None
Absent:	None
Abstain:	None

RICHARD ATKINS, President
Board of Directors

ATTEST:

KEVIN KAUFFMAN, Secretary

Appendix C

Comments on the 2010 UWMP Update

James Bowland

From: Bob Young
Sent: Tuesday, March 29, 2011 1:28 PM
To: James Bowland
Subject: FW: Revised Table 18

James,

Please read this and call me. Thanks.

Robert F. Young | Vice President
Kennedy/Jenks Consultants - Sacramento Office
10860 Gold Center Drive, Suite 350 | Rancho Cordova, CA 95670
P: 916.858-2733 | F: 916.858-2754 | C: 916.849-3260

From: Jacobson, Dana [mailto:djacobson@calwater.com]
Sent: Tuesday, March 29, 2011 11:57 AM
To: Jeanette Thomas
Cc: jyoshimura@sewd.net; Bob Young
Subject: RE: Revised Table 18

Hi Jeannette,

I spoke with John Yoshimura this morning and he suggested that you may be able to answer a few questions about your groundwater banking efforts prior to your return. As you know, our public review draft is scheduled to be available on April 1, this Friday. I think I can make some reasonable assumptions about our reliability with some more information about how your groundwater banking program works. I have a few questions:

- As far as your plans to pump groundwater during a shortage goes, would you only pump the quantity that you previously banked, or would you ever consider (except in extreme emergencies) increasing pumping above this amount?
- Will you have the well capacity to produce the amounts shown in the later years, or would there be a cap based on your planned facilities?
- Have you included expected groundwater bank withdrawals on an annualized basis into your bank projections?

If a drought happened which required pulling from the bank in the next ten years or so, the amount previously stored would be completely used up, assuming that you would supplement surface water in this way, thereby limiting total supply from SEWD. Of course, retail agencies would pump as necessary. As time goes on you are showing a great deal of banked groundwater, so much that you would be limited by the treatement plant capacity. I am wondering how much of this would actually be available in any given year.

I realize that these are not easy questions to answer. Perhaps we should have a call when you get back. We plan on showing 100% reliability, assuming that any shortfall in treated water from SEWD would be made up for with pumping groundwater using Cal Water wells, with the caveat that we would request reductions in use from our customers. The only question is what proportion these supplies make up. I'm not sure that anyone will have a beef with us changing numbers after our public review goes out, but it would be nice to have it as close to final as possible. Thanks again with all your help on this.

Dana

Dana Jacobson
Water Resources Planning
California Water Service Company
1720 North First Street
San Jose, CA 95112
Phone: (408) 367-8361

From: Jeanette Thomas [mailto:jrthomas@sewd.net]
Sent: Wednesday, March 23, 2011 2:10 PM
To: Jacobson, Dana
Subject: RE: Revised Table 18

Dana,
I tend to agree with you now that I see both tables side by side. Currently we are doing an internal review. I want comments from others here. I will talk this over with Bob again. Next week I am on vacation, and we should have something when I get back – April 4. Thanks for all the analysis. Having all these eyes on the report really makes it better.

We should have an answer soon.
Jeanette

From: Jacobson, Dana [mailto:djacobson@calwater.com]
Sent: Wednesday, March 23, 2011 12:58 PM
To: Jeanette Thomas; BobYoung@KennedyJenks.com
Subject: RE: Revised Table 18

Jeanette and Bob,

I apologize but I think I may have led you astray with my thinking about your reliability section of the UWMP. You may have had it right the first time. Humor me for a minute here but I am proposing another change.

Your total supply allocated to urban customers is 77,360 AFY. In a normal year this would be your supply (perhaps minus the 3,360 AF banked groundwater which you wouldn't be using anyways). But of course you are limited by the capacity of the TP, so using the lower number makes sense.

For the single dry and multiple dry years my feeling is that we should be reducing from the total supply amount first, then adding banked groundwater, then checking where we are as far as treatment plant capacity goes, because the treatment plant capacity doesn't change with respect to hydrologic conditions. Under the method I proposed yesterday this is how it appears, which I think is incorrect.

In a single dry year, if you reduced your supply by 50%, you would be reducing from the 74,000 AF of surface water and not from TP capacity, giving you a total supply of 40,360 (37,000 from surface water and 3,360 from banked GW).

For the multiple dry years the UWMP states that you assume 75% of normal supply. It's not clear to me where this is used, but if applied to the 74,000 AF it would be 55,000 AF for surface water plus 3,360 for banked GW for a total of 58,360 AF in the first year. Again, you would be limited by your TP capacity in the first year. I'm not sure if maybe you are assuming normal supply in the first year due to carryover storage in the reservoirs? In the second year, you have a 57% reduction in surface water (based on 1989-1991 sequence), resulting in 42,180 AF plus 3,360 AF groundwater. For the third year there is a 38% reduction in surface water giving you 28,120 AF plus 3,360 AF groundwater.

Now, I realize that there are many ways to skin a cat. These things can be interpreted in many ways. Because we have 24 different service districts I've seen a lot of wholesale and retail UWMPs and there is a lot of variation. If you would like to discuss this by telephone I would be happy to. I think what I'll do is give you the assumtptions we will make about your supply in our UWMP and you can decide if they make sense for you. Here is my plan for the normal, single dry, and multiple dry year analysis in our UWMP:

Normal Year: 74,000 AF surface water, limited to treatment plant capacity, groundwater is not included
Single Dry: 50% of surface water = 37,000 AF + 3,360 AF banked groundwater = 40,360 AF
Multi-Dry Year 1: 75% of surface water = 55,000 AF + 3,360 GW = 58,360 AF but limited to TP capacity
Multi-Dry Year 2: 57% of normal surface water = 42,180 AF + 3,360 AF GW = 45,540 AF
Multi-Dry year 3: 38% of normal surface water = 28,120 AF + 3,360 AF GW = 31,480 AF

Again, I'm sorry for the confusion. Please feel free to give me a call with any questions.

Dana

Dana Jacobson
Water Resources Planning
California Water Service Company
1720 North First Street
San Jose, CA 95112
Phone: (408) 367-8361

From: Jeanette Thomas [mailto:jrthomas@sewd.net]
Sent: Tuesday, March 22, 2011 4:01 PM
To: Jacobson, Dana
Subject: RE: Revised Table 18

Dana,
Thanks I will pass this on to KJ. Yes we do have your conservation master plan.
Jeanette R. Thomas
Stockton East Water District
P.O. Box 5157
Stockton CA 95205
209-948-0333 (Office)
209-969-7395 (Cell)

From: Jacobson, Dana [mailto:djacobson@calwater.com]
Sent: Tuesday, March 22, 2011 2:54 PM
To: Jeanette Thomas
Cc: BobYoung@KennedyJenks.com
Subject: RE: Revised Table 18

Jeanette,

I have attached some revised data for you to use in your Draft UWMP. I don't know what we changed but the population and water demands are slightly different from the data I provided earlier. I think what happened is that we had a huge rebound in active services this year (which we use to estimate population) and we had to adjust a few things. The water demand numbers represent our target demand, including conservation savings, as calculated under SBx7-7. Please also note that our 10-yr baseline per capita water use will be calculated using 1996-2005 data, which results in an average of 182 gpcd. I am assuming that you already have a draft of our conservation master plan. This report details these calculations in excruciating detail, and can be used as a reference as well. But really, if you have any questions just give me a call because it likely will be easier for me to explain it.

Dana

Dana Jacobson
Water Resources Planning
California Water Service Company
1720 North First Street
San Jose, CA 95112
Phone: (408) 367-8361

From: Jeanette Thomas [mailto:jrthomas@sewd.net]
Sent: Tuesday, March 22, 2011 11:52 AM
To: Jacobson, Dana
Subject: RE: Revised Table 18

Dana,
No thanks for bringing it to our attention. It is better to do it now then before it goes out to public comment.

Thanks
Jeanette

From: Jacobson, Dana [mailto:djacobson@calwater.com]
Sent: Tuesday, March 22, 2011 9:01 AM
To: Jeanette Thomas
Subject: RE: Revised Table 18

Jeanette,

Thanks for thinking this through with me. I didn't intend to force a change in your methodology, I was just noticing an inconsistency that I didn't quite understand. If you have a good reason to use the higher number please do so. Otherwise I will go with what you have here. I will also double check the data (population, water demands, etc) relating to Cal Water to make sure you have the most up to date information. We tried our best to not change anything but slight tweaks always seem to be inevitable.

Dana

Dana Jacobson
Water Resources Planning
California Water Service Company
1720 North First Street
San Jose, CA 95112
Phone: (408) 367-8361

From: Jeanette Thomas [mailto:jrthomas@sewd.net]
Sent: Tuesday, March 22, 2011 8:52 AM
To: Jacobson, Dana
Subject: Revised Table 18

Dana,
Sorry hit the wrong button. Table 18 was revised.

Jeanette R. Thomas
Stockton East Water District
P.O. Box 5157
Stockton CA 95205
209-948-0333 (Office)
209-969-7395 (Cell)

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Appendix D

60-Day Notice

Stockton East Water District

Notice of Intent to Adopt
An Urban Water Management Plant
And
Hold a Public Meeting
To
Receive Comments on the Proposed Plan

California Water Code, Part 2.6 Charters 1 through 4 (Sections 10610 through 10656), are known and may be cited as the "Urban Water Management Planning Act."

These California Water Code sections require all urban water suppliers that provide water for municipal purposes either directly or indirectly to more than 3,000 customers or supply more than 3,000 acre-feet of water annually to prepare an Urban Water Management Plan as outlined and identified in those sections. This requirement applies to public and privately owned water utilities – wholesale and retail agencies.

The plan must 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 must address measures for residential, commercial, governmental, and industrial water demand management.

A key focus of this Urban Water Management Plant is the conservation requirement set forth in Senate Bill 7 (SBx7-7) as passed in November 2009. SBx7-7 mandates a statewide 20% reduction in per capita urban water use by 2020. The district supports the efforts of City of Stockton and California Water Service Company in achieving the 20% urban water per capita reduction. Stockton East Water District, City of Stockton and California Water Service Company have coordinated and provided water use and supply information to each other in the preparation of their respective Urban Water Management Plans.

The act requires the urban water suppliers to update their Urban Water Management Plans at least once every five years, and to file updated plans with the Department of Water Resources, the California State Library, and any city or county served by the supplier no later than 30 days after adoption.

Schedule of upcoming actions:

On or about April 12, 2011, a copy of the draft Urban Water Management Plan will be available for review during normal business hours at the district office, located at 6767

East Main Street, Stockton CA 95215, (209) 948-0333. Comments will be received on the draft from April 12, 2011 through June 6, 2011.

The Urban Water Management Plan will also be available April 12, 2011 – June 14, 2011on at the district's website through Sharepoint at http://www.sewd.net; the user name is XXX and the password is XXX. If you have difficulty accessing the site, please call during business hours Kelly Stephens (209) 948-0333.

A public meeting to receive comments will be held June 14, 2011 as part of the regular district meeting held at noon, at district office, located at 6767 East Main Street, Stockton CA 95215.

If you are unable to attend the scheduled public meeting, but want to provide comments regarding the draft Urban Water Management Plan, you may send your comments in writing via mail or email to:

Jeanette R. Thomas
Stockton East Water District
P.O. Box 5157
Stockton CA 95215

jrthomas@sewd.net

Appendix E

Pending Surface Water Rights

Wagner&Bonsignore

Consulting Civil Engineers, A Corporation

Nicholas F. Bonsignore, P.E.
Robert C. Wagner, P.E.
Paula J. Whealen
Andrew T. Bambauer, P.E.
David M. Houston, P.E.
Ryan E. Stolfus

PRIVELEGED & CONFIDENTIAL
ATTORNEY-CLIENT WORK PRODUCT

MEMORANDUM

To: Karna Harrigfeld, Herum, Crabtree, Brown

From: Nick Bonsignore NB

cc: Kevin Kauffman, Stockton East Water District

Date: September 27, 2007

Re: **Stockton East Water District - Water Availability for Pending Water Right Applications**

Introduction

On July 28, 2007, I met with Kevin Kauffman to discuss the draft conclusions reached by Mark Williamson in his estimate of yield for SEWD's pending water right applications on the Calaveras River, Stanislaus River and Littlejohns Creek.[1] My concerns were that Mark's report did not provide much back-up data for his analysis, and that his estimates of annual yield for each source were reported as *average* yields. Mark reported an average annual yield among the three source streams of about 118,900 acre-feet, which is only about 18 percent of the total face value of pending applications (excluding Application 30603B for the Stanislaus county-of-origin water, which I understand is being excluded from further consideration for the time being). Because the proposed project is intended to capture and recharge excess flows in wet years, limiting seasonal diversions to the "average" may not fully utilize available supply. Accordingly, while Mark's results suggest that the amount of water requested in the applications be reduced, it is important that we fully understand the implications of his results before finalizing a project description and amending the water right applications.

At Kevin's suggestion, I met with Mark on August 1, 2007. Mark advised me that his yield results for the Stanislaus River were based on recent very detailed *daily* modeling studies prepared by Avry Dotan. The yield studies for the Calaveras River and Littlejohns Creek were performed by Mark on a *monthly* time step using data from the USBR's *Draft Programmatic Environmental Impact Statement for the American River Water Resources Investigation* dated October 1995. The study period Mark used for the Calaveras and Littlejohns spanned the period

[1] Draft report entitled *Stockton East and Central San Joaquin Water Supply Enhancement Project Description*. My memo refers to the draft Version 11 transmitted to Kevin Kauffman on August 13, 2007.

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from the early 1920s to the early 1990s. Although I had provided Mark with more recent actual and synthesized flow data for these streams, he apparently did not use them in his analysis. Accordingly, we conducted an independent evaluation of water availability for the Calaveras and Littlejohns sources based on the data we compiled.

One other noteworthy item is that Mark's analysis for Littlejohns Creek is based a maximum rate of diversion of 630 cfs, which is the combined rate for the six pending State-filed applications. Mark's report does not consider the higher rate of diversion of 825 cfs associated with the two other pending applications for the Littlejohns source.

Provided below is a recap of the pending water right actions and a commentary on water availability for each source stream.

Calaveras River - Application 31534

Application 31534 requests direct diversion of 800 cfs and storage of 288,000 acre-feet annually, with the total of direct diversions and diversions to storage not to exceed 288,000 acre-feet. The season of diversion is November 1 to April 30. The storage "reservoir" is limited to underground storage.

We have previously prepared a detailed daily analysis of historical operations for New Hogan Reservoir for the period of 1963 to 2004 as part of our licensing investigation for the USBR's Permit 14434 (Application 18812). Accordingly, we were able to readily quantify historical flood control releases from New Hogan on a daily basis. A monthly summary of *available* historical flood control releases is provided on the attached Table 1 for the proposed diversion season of November through April. In this instance the term "available" means that diversions were limited to the rate of direct diversion specified in Application 31534, 800 cfs. We computed that annual obtainable flood control releases averaged about 43,200 acre-feet. This value is reasonably close to Mark's average value of 47,800 acre-feet per year for the Calaveras River. The reckoning point for Mark's analysis is not stated in his report, but if he reckoned flows at Bellota then the difference in our values may be attributable to accretions between New Hogan and Bellota. Based on our analysis the estimated maximum obtainable is about 236,000 acre-feet based on the extremely wet water year of 1983.

Littlejohns Creek – Applications 31536 to 31541 (Petitions for Partial Assignment of State-Filed Applications 13333 to 13338, respectively); and Applications 30602 and 31535

The State-filed applications collectively seek direct diversion of 630 cfs from September 1 through June 30, not to exceed 260,000 acre-feet, and diversions to storage from November 1 to

May 1 not to exceed 108,400 acre-feet, with the combined direct diversion and storage not to exceed 260,000 acre-feet annually.[2] The storage "reservoir" is limited to underground storage.

Applications 30602 and 31535 jointly request direct diversion of 825 cfs and storage of 260,000 acre-feet annually, with the total of direct diversions and diversions to storage, together with diversions under the State-filed applications, not to exceed 260,000 acre-feet. The season of diversion is December 1 to April 30 under both applications. The storage "reservoir" is limited to underground storage.

We previously compiled monthly gaged flow data obtained from the US Army Corps of Engineers for gaging stations *Littlejohns Creek Near Farmington* and *Duck Creek Diversion*. We estimated monthly flow at Farmington Dam by deducting Duck Creek Diversion flows from Littlejohns Creek flows.

State-filed Applications

A monthly summary of estimated *available* historical flows at Farmington Dam is provided on the attached Table 2A for September through June for the period of Water Years 1953 to 2004. In this instance the term "available" means that diversions were limited to the combined rate of direct diversion for the six State-filed applications, 630 cfs. We computed that the annual amount obtainable by direct diversion averaged about 55,100 acre-feet, which exceeds Mark's average value of 45,300 acre-feet by about 22 percent. Based on our analysis the estimated maximum obtainable is about 184,000 acre-feet based on Water Year 1983.

We also computed the amount of obtainable for the proposed storage season of November 1 through May 1 assuming a maximum rate of diversion of 630 cfs. Per Table 2A, the amount obtainable averaged about 48,500 acre-feet, which is closer to Mark's average value. The estimated maximum amount obtainable is about 167,000 acre-feet based on Water Year 1983.

Applications 30602 and 31535

Table 2B shows estimated historical monthly flows available at Farmington Dam for December through April for the period of 1952 to 2004. In this instance the term "available" means that diversions were limited to the combined rate of diversion for the two applications of 825 cfs. We computed that the annual amount obtainable averaged

[2] Jeanne Zolezzi has raised the question of whether each pair of consecutive State-field applications are duplicative in terms of the rate of diversion and total amount diverted. We do not see anything in the original application documents that indicates such is the case, however, if they are in fact duplicative then the combined rates of diversion and amounts would be half of what is stated herein.

about 50,400 acre-feet, and the estimated maximum obtainable is about 182,700 acre-feet based on Water Year 1983.

Stanislaus River – Application 30603A (excess flood flows)

Application 30603A requests direct diversion of 750 cfs, not to exceed 3,900 acre-feet annually, and diversion to storage in New Melones Reservoir or to underground storage of 108,000 acre-feet annually, with the total of direct diversion and diversion to storage not to exceed 111,900 acre-feet. The season of diversion is November 1 to April 30.

Mark has provided me with a version of Avry Dotan's daily spreadsheet model for the Stanislaus covering the period from January 1, 1980 to June 30, 2006. As I understand it, the spreadsheet that Avry provided to Mark modeled a "hybrid" IPO/RPO scenario with RPO deliveries to SEWD and CSJWCD under their CVP contracts averaging 56,000 and 63,000 acre-feet per year, respectively. OID/SSJID deliveries averaged 26,000 acre-feet per year. Avry advised me in August this year that the figures that Mark is using do not reflect the most recent assumptions that Kevin and Avry discussed, which involved "switching back" to IPO conditions with some modifications to SEWD and CSJWCD deliveries. Accordingly, if Kevin concurs, some additional modeling studies by Avry may be in order.

Based on the version of Avry's model that Mark relied upon, the availability of water from the Stanislaus by direct diversion only for the period of December 1 through March 31 of each water year is summarized on Table 3. As shown, the amount averaged about 25,800 acre-feet annually. Maximum availability of about 111,900 acre-feet occurred in Water Year 1983.

Discussion and Conclusion

Based on the foregoing in the maximum year of availability there would be an estimated 531,900 acre-feet available from the three sources combined. This is about 4.5 times the combined average value determined by Mark.

Mark's report includes consideration of groundwater recharge facilities required to recharge 118,900 acre-feet in more-or-less real time (no surface regulation or storage). Based on an average percolation rate of 0.5 feet per day, about 8,400 acres of land would be required. Mark considered a smaller project involving a diversion rate from the Littlejohns Creek system of about half the proposed rate; together with the other two sources that project would require about 7,000 acres of recharge area.

For a groundwater recharge project not considering regulatory surface storage, the extent of recharge area required is dependent upon short-term flows, not annual seasonal volumes.

Accordingly, there should be no substantial difference in capital cost between a project capable of recharging 118,900 acre-feet and one capable of recharging 531,900 acre-feet (there will likely be differences in operational costs that would need to be considered as the design becomes optimized). At this early stage, however, we suggest that the project be scoped to divert the estimated maximum annual amounts discussed herein, summarized below:

Source	Application No.	Rate (cfs)	Season	Estimated Max Amount Available (af)
Calaveras	31534	800	Nov. 1 to Apr. 30	236,000
Littlejohns	State-filed apps	630 (direct)	Sept. 1 to June 30	184,000
		630 (to storage)	Nov. 1 to May 1	167,000
	A30602 and A31535	825	Dec. 1 to Apr. 30	182,700
Stanislaus	A30603A	750	Nov. 1 to Apr. 30	111,900
Total (max)				**531,900**

SEWDB117.doc

9/27/2007

TABLE 1

Stockton East Water District

Estimated Monthly Flood Control Release Obtainable From New Hogan Reservoir at 800 cfs

(all amounts in acre-feet)

Water Year	Estimated Monthly Discharge						Annual Total
	Nov	Dec	Jan	Feb	Mar	Apr	
1964	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0
1966	0	0	2,474	0	0	0	2,474
1967	0	0	25,779	1,886	40,078	47,502	115,245
1968	0	0	0	0	14,299	0	14,299
1969	0	0	49,190	44,430	49,190	0	142,810
1970	0	0	49,190	5,299	36,011	0	90,500
1971	0	19,721	7,857	0	0	0	27,578
1972	0	0	0	0	0	0	0
1973	0	0	15,470	44,430	29,022	0	88,923
1974	0	9,698	24,417	0	25,246	0	59,361
1975	0	0	0	0	49,190	0	49,190
1976	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0
1979	0	0	16,724	30,429	17,375	0	64,529
1980	0	585	49,190	41,017	20,347	0	111,139
1981	0	0	0	0	0	0	0
1982	0	0	48,564	44,430	26,230	47,603	166,827
1983	44,298	49,190	49,190	44,430	49,190	0	236,297
1984	47,603	49,190	4,578	0	0	0	101,372
1985	0	0	0	0	0	0	0
1986	0	0	0	44,430	49,190	0	93,620
1987	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0
1995	0	0	0	0	40,927	0	40,927
1996	935	0	25,007	46,017	5,480	0	77,438
1997	0	49,190	49,190	9,943	0	0	108,323
1998	0	0	5,251	44,430	5,320	13,302	68,303
1999	0	0	25,756	44,430	1,754	0	71,940
2000	0	0	0	46,017	36,018	0	82,034
2001	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0
2005	0						0
Average	**2,210**	**4,331**	**10,923**	**11,991**	**12,070**	**2,644**	**43,170**
Maximum	**47,603**	**49,190**	**49,190**	**46,017**	**49,190**	**47,603**	**236,297**

TABLE 2A

Stockton East Water District

Estimated Obtainable at Farmington Dam at 630 cfs

(all amounts in acre-feet)

Water Year	Month										Seasonal Total	
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Sep to Jun	Nov to Apr
1953		123	325	744	9,471	1,281	274	702	327	212	13,460	12,797
1954	79	93	0	0	6	910	3,749	954	321	0	6,113	5,619
1955	0	0	0	3,041	26,571	2,102	1,335	500	137	0	33,685	33,548
1956	0	0	617	27,027	38,737	5,044	1,940	1,345	635	0	75,344	74,710
1957	0	0	0	0	0	0	4,973	246	1,704	436	7,359	5,219
1958	250	46	0	0	8,188	34,988	25,230	37,488	1,218	460	107,868	105,893
1959	1,976	178	7	0	386	11,248	621	111	10	0	14,536	12,372
1960	597	2	0	0	0	5,091	8	60	23	5	5,859	5,232
1961	94	12	0	0	(10)	203	4	62	61	88	515	259
1962	0	0	0	0	0	32,577	9,249	288	381	216	42,710	42,113
1963	204	206	41	1	(69)	15,086	4,522	15,798	651	260	36,700	35,379
1964	175	149	1,098	183	4,945	630	62	139	238	228	7,846	7,057
1965	591	357	1,549	24,238	24,173	1,454	1,012	9,836	230	301	63,741	62,261
1966	604	228	1,252	3,726	8,226	10,639	371	149	135	151	25,480	24,363
1967	280	359	256	10,987	24,344	10,255	8,322	37,488	1,792	900	94,981	91,651
1968	1,244	1,297	121	2	339	4,479	2,896	388	478	457	11,701	8,224
1969	1,036	649	175	6,156	38,737	34,988	13,480	2,963	871	1,094	100,149	96,499
1970	1,750	545	78	883	31,805	4,586	16,003	1,097	1,164	812	58,723	54,452
1971	507	486	2,470	22,076	5,514	569	809	325	291	273	33,319	31,763
1972	457	315	159	6,527	1,198	3,645	296	432	308	266	13,602	12,257
1973	238	246	732	1,583	27,118	34,988	27,787	2,079	764	298	95,832	94,287
1974	2,335	2,545	1,553	13,490	15,410	1,496	18,339	10,673	1,031	595	67,466	60,960
1975	494	1,212	1,188	1,283	631	11,265	22,542	2,043	1,012	893	42,561	38,951
1976	1,406	1,537	1,200	303	0	0	0	0	0	0	4,447	1,503
1977	198	0	0	0	0	0	0	0	0	0	198	0
1978	1,200	0	0	0	19,021	26,606	20,888	10,494	389	0	78,598	77,009
1979	0	2,390	0	0	14,573	31,076	19,573	968	0	0	68,579	66,189
1980	599	1,607	595	1,446	36,684	21,580	10,806	992	0	0	74,308	72,103
1981	0	953	0	0	4,644	8,045	15,909	1,349	0	0	30,899	29,946
1982	0	0	5,564	7,971	38,737	29,670	27,077	37,488	0	0	146,506	146,506
1983	3,887	3,997	9,190	38,737	37,402	34,988	38,737	7,965	4,891	3,868	183,663	167,020
1984	4,022	4,176	21,360	38,704	13,011	15,255	7,001	3,868	3,997	3,868	115,262	99,199
1985	5,176	5,752	8,758	14,022	5,838	14,277	9,299	4,848	4,035	3,868	75,872	57,042
1986	5,723	4,977	3,868	3,997	8,652	34,988	36,971	5,265	4,101	3,943	112,485	93,741
1987	5,713	4,931	258	0	0	4,787	21,260	2,394	0	1,439	40,781	28,698
1988	5,330	3,451	1,587	2,065	4,934	3,894	3,695	4,205	4,298	4,284	37,743	20,379
1989	4,300	1,363	0	2,420	1,339	0	4,168	4,020	167	0	17,776	11,947
1990	0	0	0	0	0	1,759	780	0	0	0	2,539	2,539
1991	0	0	(83)	(436)	0	(7)	15,769	1,580	371	89	17,283	16,823
1992	(2,180)	(398)	0	0	0	16,822	5,986	0	34	(272)	19,992	22,808
1993	304	0	0	0	38,737	27,030	15,449	6,010	60	190	87,780	87,226
1994	13,454	6,895	2,340	1,363	843	8,205	5,141	242	19	418	38,919	18,134
1995	0	30	0	0	38,737	32,273	38,737	1,537	26,058	30,902	168,275	111,285
1996	2,456	0	0	1,069	19,094	36,238	14,861	4,623	2,741	3,525	84,607	75,885
1997	1,196	1,000	2,485	32,175	38,737	25,801	3,961	2,378	8,031	10,627	126,392	105,538
1998	5,591	3,427	1,501	666	38,737	34,988	28,812	17,503	3,376	5,486	140,088	122,207
1999	214	7,471	345	4,810	3,026	29,909	1,358	1,732	7,396	4,495	60,756	41,180
2000	1,076	25	0	0	12,012	36,238	13,222	639	2,429	7,220	72,861	62,111
2001	1,105	0	101	0	0	7,183	6,645	1,483	3,780	3,640	23,935	15,411
2002	620	0	0	4,691	18,946	3,062	4,529	1,742	2,955	5,296	41,842	32,970
2003	1,452	160	0	3,718	2,773	0	643	78	0	2,561	11,385	7,212
2004	1,296	137	100	361	3,662	6,591	1,345	649	3,878	4,205	22,224	12,709
Average	1,511	1,210	1,361	5,385	12,805	13,823	10,318	4,793	1,861	2,069	55,107	48,484
Max	13,454	7,471	21,360	38,737	38,737	36,238	38,737	37,488	26,058	30,902	183,663	167,020

Notes:

(1) Amounts based on measurements made by U.S. Army Corps of Engineers: Duck Creek Diversion subtracted from Littlejohns Creek at Farmington.

(2) Shaded months are maximum based on max diversion rate of 630 cfs.

TABLE 2B

Stockton East Water District

Estimated Obtainable at Farmington Dam at 825 cfs

(all amounts in acre-feet)

Water Year	Month					
	Dec	Jan	Feb	Mar	Apr	Dec to Apr
1953	744	9,471	1,281	274	702	12,472
1954	0	6	910	3,749	954	5,619
1955	3,041	26,571	2,102	1,335	500	33,548
1956	27,027	50,727	5,044	1,940	1,345	86,083
1957	0	0	0	4,973	246	5,219
1958	0	8,188	36,365	25,230	49,091	118,873
1959	0	386	11,248	621	111	12,366
1960	0	0	5,091	81	60	5,232
1961	0	(10)	203	4	62	259
1962	0	0	32,577	9,249	288	42,113
1963	1	(69)	15,086	4,522	15,798	35,338
1964	183	4,945	630	62	139	5,959
1965	24,238	24,173	1,454	1,012	9,836	60,712
1966	3,726	8,226	10,639	371	149	23,111
1967	10,987	24,344	10,255	8,322	43,914	97,821
1968	2	339	4,479	2,896	388	8,103
1969	6,156	50,727	45,818	13,480	2,963	119,144
1970	883	31,805	4,586	16,003	1,097	54,373
1971	22,076	5,514	569	809	325	29,292
1972	6,527	1,198	3,645	296	432	12,098
1973	1,583	27,118	37,829	27,787	2,079	96,396
1974	13,490	15,410	1,496	18,339	10,673	59,407
1975	1,283	631	11,265	22,542	2,043	37,763
1976	303	0	0	0	0	303
1977	0	0	0	0	0	0
1978	0	19,021	26,606	20,888	10,494	77,009
1979	0	14,573	31,076	19,573	968	66,189
1980	1,446	36,684	21,580	10,806	992	71,507
1981	0	4,644	8,045	15,909	1,349	29,946
1982	7,971	48,246	29,670	27,077	39,090	152,053
1983	40,808	37,402	45,818	50,727	7,965	182,720
1984	38,704	13,011	15,255	7,001	3,868	77,839
1985	14,022	5,838	14,277	9,299	4,848	48,283
1986	3,997	8,652	45,818	36,971	5,265	100,703
1987	0	0	4,787	21,260	2,394	28,440
1988	2,065	4,934	3,894	3,695	4,205	18,793
1989	2,420	1,339	0	4,168	4,020	11,947
1990	0	0	1,759	780	0	2,539
1991	(436)	0	(7)	15,769	1,580	16,907
1992	0	0	16,822	5,986	0	22,808
1993	0	46,819	27,030	15,449	6,010	95,308
1994	1,363	843	8,205	5,141	242	15,794
1995	0	47,909	32,273	42,371	1,537	124,090
1996	1,069	19,094	39,376	14,861	4,623	79,023
1997	32,175	50,727	25,801	3,961	2,378	115,042
1998	666	50,727	45,818	28,812	17,503	143,526
1999	4,810	3,026	29,909	1,358	1,732	40,835
2000	0	12,012	45,953	13,222	639	71,826
2001	0	0	7,183	6,645	1,483	15,310
2002	4,691	18,946	3,062	4,529	1,742	32,970
2003	3,718	2,773	0	643	78	7,212
2004	361	3,662	6,591	1,345	649	12,609
Average	5,425	14,242	14,984	10,618	5,170	50,439
Max	40,808	50,727	45,953	50,727	49,091	182,720

Notes:

(1) Amounts based on measurements made by U.S. Army Corps of Engineers: Duck Cre from Littlejohns Creek at Farmington.

(2) Shaded months are maximum based on max diversion rate of 825 cfs.

TABLE 3

Summary of Estimated Seasonal Direct Diversions
Available Under Application 30603A, Stanislaus River*

Water Year	Cumulative Direct Diversion (af)
1980	26,416
1981	0
1982	42,127
1983	152,556
1984	96,993
1985	0
1986	28,980
1987	0
1988	0
1989	0
1990	0
1991	0
1992	0
1993	3,787
1994	0
1995	2,749
1996	34,158
1997	134,214
1998	36,437
1999	116,885
2000	0
2001	0
2002	0
2003	0
2004	0
2005	0
2006	8,939
Average	**25,342**
Maximum	**152,556**

* Values compiled from spreadsheet *NMopRPOIPO Avry rev061214 rev5.xls/Data* by Avry Dotan.

Appendix F

Stockton East Water District Best Management Practices Annual Update

Reported as of 10/6/10

BMP 03 Coverage: System Water Audits, Leak Detection and Repair

Reporting Unit:
Stockton East Water District

Reporting Period:
07-08

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? No

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An agency must meet one of two conditions to be in compliance with BMP 3:

Condition 1: Perform a prescreening audit. If the result is equal to or greater than 0.9 nothing more needs be done.

Condition 2: Perform a prescreening audit. If the result is less than 0.9, perform a full audit in accordance with AWWA's Manual of Water Supply Practices, Water Audits, and Leak Detection.

Test for Conditions 1 and 2

Report Year	Report Period	Pre-Screen Completed	Pre-Screen Result	Full Audit Indicated	Full Audit Completed
1999	99-00	NO			NO
2000	99-00	NO			NO
2001	01-02	NO			NO
2002	01-02	NO			NO
2003	03-04	NO			NO
2004	03-04	NO			NO
2005	05-06				
2006	05-06	NO			NO
2007	07-08	YES	98.0%	No	
2008	07-08	YES	99.7%	No	YES

BMP 3 COVERAGE STATUS SUMMARY:
Water supplier has met the coverage requirements for this BMP.

Reported as of 10/6/10

BMP 07 Coverage: Public Information Programs

Reporting Unit:
Stockton East Water District

Reporting Period:
07-08

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? No

An agency must meet one condition to comply with BMP 7.

Condition 1: Implement and maintain a public information program consistent with BMP 7's definition.

Test for Condition 1

Year	Report Period	BMP 7 Implementation Year	RU Has Public Information Program?
1999	99-00		
2000	99-00		YES
2001	01-02	1	YES
2002	01-02	2	YES
2003	03-04	3	YES
2004	03-04	4	YES
2005	05-06	5	YES
2006	05-06	6	YES
2007	07-08	7	YES
2008	07-08	8	YES

BMP 7 COVERAGE STATUS SUMMARY:
Water supplier has met the coverage requirements for this BMP.

Reported as of 10/6/10

BMP 08 Coverage: School Education Programs

Reporting Unit:
Stockton East Water District

Reporting Period:
07-08

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period?	No

An agency must meet one condition to comply with BMP 8.

Condition 1: Implement and maintain a school education program consistent with BMP 8's definition.

Test for Condition 1

Year	Report Period	BMP 8 Implementation Year	RU Has School Education Program?
1999	99-00		
2000	99-00		NO
2001	01-02	1	NO
2002	01-02	2	NO
2003	03-04	3	NO
2004	03-04	4	NO
2005	05-06	5	YES
2006	05-06	6	YES
2007	07-08	7	YES
2008	07-08	8	YES

BMP 8 COVERAGE STATUS SUMMARY:
Water supplier has met the coverage requirements for this BMP.

Reported as of 10/6/10

BMP 12 Coverage: Conservation Coordinator

Reporting Unit:	Reporting Period:
Stockton East Water District	**07-08**

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? No

---

Agency shall staff and maintain the position of conservation coordinator and provide support staff as necessary.

Test for Compliance

Report Year	Report Period	Conservation Coordinator Position Staffed?	Total Staff on Team (incl. CC)
1999	99-00		
2000	99-00	YES	1
2001	01-02	YES	1
2002	01-02	YES	1
2003	03-04	YES	1
2004	03-04	YES	1
2005	05-06	YES	1
2006	05-06	YES	1
2007	07-08	YES	1
2008	07-08	YES	1

BMP 12 COVERAGE STATUS SUMMARY:
Water supplier has met the coverage requirements for this BMP.

Water Supply & Reuse

Reporting Unit: **Stockton East Water District**

Year: **2008**

Water Supply Source Information

Supply Source Name	Quantity (AF) Supplied	Supply Type

Total AF:

Purchaser Information

Name of Agency	Quantity (AF) Supplied	Retailer or Wholesaler

Total AF:

Reported as of 10/5/10

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit: **Stockton East Water District**

BMP Form Status: **100% Complete**

Year: **2008**

A. Implementation

1. Does your agency own or operate a water distribution system?	yes
2. Has your agency completed a pre-screening system audit for this reporting year?	yes
3. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:	
a. Determine metered sales (AF)	48705.8
b. Determine other system verifiable uses (AF)	0
c. Determine total supply into the system (AF)	48855.1
d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required.	1.00
4. Does your agency keep necessary data on file to verify the values entered in question 3?	yes
5. Did your agency complete a full-scale audit during this report year?	yes
6. Does your agency maintain in-house records of audit results or completed AWWA M36 audit worksheets for the completed audit which could be forwarded to CUWCC?	yes
7. Does your agency operate a system leak detection program?	yes
a. If yes, describe the leak detection program:	

In house calculation.

B. Survey Data

1. Total number of miles of distribution system line.	1.2
2. Number of miles of distribution system line surveyed.	1.2

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as"	No

variant of this BMP?

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Stockton East Water District is a wholesaler. The "distribution system" is confined only to the treatment plant. Once outside the confines of the treatment plant the retailers distribution system starts.

Voluntary Questions (Not used to calculate compliance)

E. Volumes

	Estimated	Verified
1. Volume of raw water supplied to the system:		
2. Volume treated water supplied into the system:		
3. Volume of water exported from the system:		
4. Volume of billed authorized metered consumption:		
5. Volume of billed authorized unmetered consumption:		
6. Volume of unbilled authorized metered consumption:		
7. Volume of unbilled authorized unmetered consumption:		

F. Infrastructure and Hydraulics

1. System input (source or master meter) volumes metered at the entry to the:
2. How frequently are they tested and calibrated?
3. Length of mains:
4. What % of distribution mains are rigid pipes (metal, ac, concrete)?
5. Number of service connections:
6. What % of service connections are rigid pipes (metal)?
7. Are residential properties fully metered?
8. Are non-residential properties fully metered?
9. Provide an estimate of customer meter under-registration:
10. Average length of customer service line from the main to the point of the meter:
11. Average system pressure:
12. Range of system pressures: From to
13. What percentage of the system is fed from gravity feed?
14. What percentage of the system is fed by pumping and re-pumping?

G. Maintenance Questions

1. Who is responsible for providing, testing, repairing and replacing customer meters?

2. Does your agency test, repair and replace your meters on a regular timed schedule?

   a. If yes, does your agency test by meter size or customer category?:

   b. If yes to meter size, please provide the frequency of testing by meter size:

      Less than or equal to 1"

      1.5" to 2"

      3" and Larger

   c. If yes to customer category, provide the frequency of testing by customer category:

      SF residential

      MF residential

      Commercial

      Industrial & Institutional

3. Who is responsible for repairs to the customer lateral or customer service line?

4. Who is responsible for service line repairs downstream of the customer meter?

5. Does your agency proactively search for leaks using leak survey techniques or does your utility reactively repair leaks which are called in, or both?

6. What is the utility budget breakdown for:

Leak Detection	$
Leak Repair	$
Auditing and Water Loss Evaluation	$
Meter Testing	$

H. Comments

Reported as of 10/5/10

BMP 07: Public Information Programs

Reporting Unit:	BMP Form Status:	Year:
Stockton East Water District	**100% Complete**	**2008**

A. Implementation

1. How is your public information program implemented?
   Wholesaler and retailer both materially participate in program

2. Describe the program and how it's organized:
   The District participates in the Stockton Area Water Suppliers (SAWS), which jointly funds the Water Conservation Education Program in the Stockton urban area.

3. Indicate which and how many of the following activities are included in your public information program:

Region-Wide Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	yes	6
b. Public Service Announcement	yes	3

c. Bill Inserts / Newsletters / Brochures	no	0
d. Bill showing water usage in comparison to previous year's usage	no	
e. Demonstration Gardens	no	0
f. Special Events, Media Events	yes	2
g. Speaker's Bureau	no	0
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

1. Annual Expenditures (Excluding Staffing) 16000

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 10/5/10

BMP 08: School Education Programs

Reporting Unit:
Stockton East Water District

BMP Form Status:
100% Complete

Year:
2008

A. Implementation

1. How is your public information program implemented?
   Wholesaler and retailer both participate in program

2. Please provide information on your region-wide school programs (by grade level):

Grade	Are grade-appropriate materials distributed?	No. of class presentations	No. of students reached	No. of teachers' workshops
Grades K-3rd	yes	280	5823	0
Grades 4th-6th	yes	44	1424	0
Grades 7th-8th	no	0	0	0
High School	no	0	0	0

4. Did your Agency's materials meet state education framework requirements? yes

5. When did your Agency begin implementing this program? 10/1/2004

B. School Education Program Expenditures

1. Annual Expenditures (Excluding Staffing) 16500

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? — No

    a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

The District is exempt from this BMP. However the District does support school programs through the Water Conservation Education Program mentioned in BMP #7.

Reported as of 10/5/10

BMP 10: Wholesale Agency Assistance Programs

Reporting Unit:	BMP Form Status:	Year:
Stockton East Water District	**100% Complete**	**2008**

A. Implementation

1. Financial Support by BMP

BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded	BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded
1	No			**8**	No		
2	No			**9**	No		
3	No			**10**	No		
4	No			**11**	No		
5	No			**12**	No		
6	No			**13**	No		
7	No			**14**	No		

2. Technical Support

a. Has your agency conducted or funded workshops addressing CUWCC procedures for calculating program savings, costs and cost-effectiveness? — No

b. Has your agency conducted or funded workshops addressing retail agencies' BMP implementation reporting requirements? — No

c. Has your agency conducted or funded workshops addressing:

1) ULFT replacement	No
2) Residential retrofits	No
3) Commercial, industrial, and institutional surveys	No
4) Residential and large turf irrigation	No
5) Conservation-related rates and pricing	No

3. Staff Resources by BMP

BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP	BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP
1	No		8	No	
2	No		9	No	
3	No		10	No	
4	No		11	No	
5	No		12	No	
6	No		13	No	
7	No		14	No	

4. Regional Programs by BMP

BMP	Implementation/ Management Program?	BMP	Implementation/ Management Program?
1	No	8	No
2	No	9	No
3	No	10	No
4	No	11	No

5	No	**12**	No
6	No	**13**	No
7	No	**14**	No

B. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

C. Comments

The District is exempt from this BMP

BMP 12: Conservation Coordinator

Reporting Unit:	BMP Form Status:	Year:
Stockton East Water District	**100% Complete**	**2008**

A. Implementation

1. Does your Agency have a conservation coordinator?	yes
2. Is this a full-time position?	
3. If no, is the coordinator supplied by another agency with which you cooperate in a regional conservation program ?	no
4. Partner agency's name:	
5. If your agency supplies the conservation coordinator:	
a. What percent is this conservation coordinator's position?	20%
b. Coordinator's Name	John E. Morley
c. Coordinator's Title	Water Quality Control Analyst
d. Coordinator's Experience and Number of Years	8yrs
e. Date Coordinator's position was created (mm/dd/yyyy)	12/21/1993
6. Number of conservation staff, including Conservation Coordinator.	1

B. Conservation Staff Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures		
2. Actual Expenditures		

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 10/5/10

Water Supply & Reuse

Reporting Unit: Year:
2007

Report Not Filed

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit:	BMP Form Status:	Year:
Stockton East Water District	**100% Complete**	**2007**

A. Implementation

1. Does your agency own or operate a water distribution system?	Yes
2. Has your agency completed a pre-screening system audit for this reporting year?	Yes
3. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:	
a. Determine metered sales (AF)	52261.8
b. Determine other system verifiable uses (AF)	
c. Determine total supply into the system (AF)	53339
d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required.	0.98
4. Does your agency keep necessary data on file to verify the values entered in question 3?	
5. Did your agency complete a full-scale audit during this report year?	
6. Does your agency maintain in-house records of audit results or completed AWWA M36 audit worksheets for the completed audit which could be forwarded to CUWCC?	
7. Does your agency operate a system leak detection program?	
a. If yes, describe the leak detection program:	

B. Survey Data

1. Total number of miles of distribution system line.
2. Number of miles of distribution system line surveyed.

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?
   a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Voluntary Questions (Not used to calculate compliance)

E. Volumes

	Estimated	Verified
1. Volume of raw water supplied to the system:		
2. Volume treated water supplied into the system:		
3. Volume of water exported from the system:		
4. Volume of billed authorized metered consumption:		
5. Volume of billed authorized unmetered		

consumption:

6. Volume of unbilled authorized metered consumption:

7. Volume of unbilled authorized unmetered consumption:

F. Infrastructure and Hydraulics

1. System input (source or master meter) volumes metered at the entry to the:
2. How frequently are they tested and calibrated?
3. Length of mains:
4. What % of distribution mains are rigid pipes (metal, ac, concrete)?
5. Number of service connections:
6. What % of service connections are rigid pipes (metal)?
7. Are residential properties fully metered?
8. Are non-residential properties fully metered?
9. Provide an estimate of customer meter under-registration:
10. Average length of customer service line from the main to the point of the meter:
11. Average system pressure:
12. Range of system pressures: From to
13. What percentage of the system is fed from gravity feed?
14. What percentage of the system is fed by pumping and re-pumping?

G. Maintenance Questions

1. Who is responsible for providing, testing, repairing and replacing customer meters?
2. Does your agency test, repair and replace your meters on a regular timed schedule?
    a. If yes, does your agency test by meter size or customer category?:
    b. If yes to meter size, please provide the frequency of testing by meter size:
        Less than or equal to 1"
        1.5" to 2"
        3" and Larger
    c. If yes to customer category, provide the frequency of testing by customer category:
        SF residential
        MF residential
        Commercial
        Industrial & Institutional
3. Who is responsible for repairs to the customer lateral or customer service line?
4. Who is responsible for service line repairs downstream of the customer meter?
5. Does your agency proactively search for leaks using leak survey techniques or does your utility reactively repair leaks

which are called in, or both?

6. What is the utility budget breakdown for:

Leak Detection	$
Leak Repair	$
Auditing and Water Loss Evaluation	$
Meter Testing	$

H. Comments

Reported as of 10/5/10

BMP 07: Public Information Programs

Reporting Unit:	BMP Form Status:	Year:
Stockton East Water District	**100% Complete**	**2007**

A. Implementation

1. How is your public information program implemented?
   Wholesaler and retailer both materially participate in program
2. Describe the program and how it's organized:
   The District participates in the Stockton Area Water Suppliers (SAWS), which jointly funds the Water Conservation Education Program in the Stockton urban area.
3. Indicate which and how many of the following activities are included in your public information program:

Region-Wide Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	yes	300
b. Public Service Announcement	no	
c. Bill Inserts / Newsletters / Brochures	no	
d. Bill showing water usage in comparison to previous year's usage	no	
e. Demonstration Gardens	no	
f. Special Events, Media Events	yes	1
g. Speaker's Bureau	no	
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

1. Annual Expenditures (Excluding Staffing) 13500

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No
   a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

The SAWS group has approved plans to add public announcements, TV ads ect... in 2008.

Reported as of 10/5/10

BMP 08: School Education Programs

Reporting Unit:	BMP Form Status:	Year:
Stockton East Water District	**100% Complete**	**2007**

A. Implementation

1. How is your public information program implemented?
   Wholesaler and retailer both participate in program
2. Please provide information on your region-wide school programs (by grade level):

Grade	Are grade-appropriate materials distributed?	No. of class presentations	No. of students reached	No. of teachers' workshops
Grades K-3rd	yes	146	4097	0
Grades 4th-6th	yes	104	1158	0
Grades 7th-8th	no	0	0	0
High School	no	0	0	0

4. Did your Agency's materials meet state education framework requirements? yes

5. When did your Agency begin implementing this program? 10/1/2004

B. School Education Program Expenditures

1. Annual Expenditures (Excluding Staffing) 12500

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

The District is exempt from this BMP. However the District does support school programs through the Water Conservation Education Program mentioned in BMP #7.

Reported as of 10/5/10

BMP 10: Wholesale Agency Assistance Programs

Reporting Unit:	BMP Form Status:	Year:
Stockton East Water District	**100% Complete**	**2007**

A. Implementation

1. Financial Support by BMP

BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded	BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded
1	No			**8**	No		
2	No			**9**	No		
3	No			**10**	No		
4	No			**11**	No		

5	No	12	No
6	No	13	No
7	No	14	No

2. Technical Support

a. Has your agency conducted or funded workshops addressing CUWCC procedures for calculating program savings, costs and cost-effectiveness?	No
b. Has your agency conducted or funded workshops addressing retail agencies' BMP implementation reporting requirements?	No
c. Has your agency conducted or funded workshops addressing:	
1) ULFT replacement	No
2) Residential retrofits	No
3) Commercial, industrial, and institutional surveys	No
4) Residential and large turf irrigation	No
5) Conservation-related rates and pricing	No

3. Staff Resources by BMP

BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP	BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP
1	No		8	No	
2	No		9	No	
3	No		10	No	
4	No		11	No	
5	No		12	No	
6	No		13	No	
7	No		14	No	

4. Regional Programs by BMP

BMP	Implementation/ Management Program?	BMP	Implementation/ Management Program?
1	No	8	No
2	No	9	No
3	No	10	No
4	No	11	No
5	No	12	No
6	No	13	No
7	No	14	No

B. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

C. Comments

The District is exempt from this BMP

BMP 12: Conservation Coordinator

Reporting Unit:	BMP Form Status:	Year:
Stockton East Water District	**100% Complete**	**2007**

A. Implementation

1. Does your Agency have a conservation coordinator?	yes
2. Is this a full-time position?	
3. If no, is the coordinator supplied by another agency with which you cooperate in a regional conservation program ?	no
4. Partner agency's name:	
5. If your agency supplies the conservation coordinator:	
a. What percent is this conservation coordinator's position?	20%
b. Coordinator's Name	John E. Morley
c. Coordinator's Title	Water Quality Control Analyst
d. Coordinator's Experience and Number of Years	7yrs
e. Date Coordinator's position was created (mm/dd/yyyy)	12/21/1993
6. Number of conservation staff, including Conservation Coordinator.	1

B. Conservation Staff Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures		
2. Actual Expenditures		

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 10/5/10

Water Supply & Reuse

Reporting Unit:

Year:
2006

Report Not Filed

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit:	BMP Form Status:	Year:
Stockton East Water District	**100% Complete**	**2006**

A. Implementation

1. Does your agency own or operate a water distribution system? no

AGENCY DOES NOT OWN OR OPERATE A WATER DISTRIBUTION SYSTEM

Reported as of 10/5/10

BMP 07: Public Information Programs

Reporting Unit:	BMP Form Status:	Year:
Stockton East Water District	**100% Complete**	**2006**

A. Implementation

1. How is your public information program implemented?
   Wholesaler and retailer both materially participate in program
2. Describe the program and how it's organized:
   The District participates in the Stockton Area Water Suppliers (SAWS), which jointly funds the Water Conservation Education Program in the Stockton urban area.
3. Indicate which and how many of the following activities are included in your public information program:

Region-Wide Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	no	
b. Public Service Announcement	no	
c. Bill Inserts / Newsletters / Brochures	no	
d. Bill showing water usage in comparison to previous year's usage	no	
e. Demonstration Gardens	no	
f. Special Events, Media Events	yes	90
g. Speaker's Bureau	no	
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

1. Annual Expenditures (Excluding Staffing) 116027

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No
   a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

The SAWS group has approved plans to add public announcements, TV ads ect... in 2007.

Reported as of 10/5/10

BMP 08: School Education Programs

Reporting Unit:
Stockton East Water District

BMP Form Status:
100% Complete

Year:
2006

A. Implementation

1. How is your public information program implemented?
   Wholesaler and retailer both participate in program
2. Please provide information on your region-wide school programs (by grade level):

Grade	Are grade-appropriate materials distributed?	No. of class presentations	No. of students reached	No. of teachers' workshops
Grades K-3rd	yes	133	3178	0
Grades 4th-6th	yes	21	512	0
Grades 7th-8th	yes	4	90	0
High School	no	0	0	0

4. Did your Agency's materials meet state education framework requirements? yes
5. When did your Agency begin implementing this program? 10/1/2004

B. School Education Program Expenditures

1. Annual Expenditures (Excluding Staffing) 116027

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No
   a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

The District is exempt from this BMP. However the District does support school programs through the Water Conservation Education Program mentioned in BMP #7.

Reported as of 10/5/10

BMP 10: Wholesale Agency Assistance Programs

Reporting Unit:
Stockton East Water District

BMP Form Status:
100% Complete

Year:
2006

A. Implementation

1. Financial Support by BMP

BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded	BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded

1	No	8	No
2	No	9	No
3	No	10	No
4	No	11	No
5	No	12	No
6	No	13	No
7	No	14	No

2. Technical Support

a. Has your agency conducted or funded workshops addressing CUWCC procedures for calculating program savings, costs and cost-effectiveness?	No
b. Has your agency conducted or funded workshops addressing retail agencies' BMP implementation reporting requirements?	No
c. Has your agency conducted or funded workshops addressing:	
1) ULFT replacement	No
2) Residential retrofits	No
3) Commercial, industrial, and institutional surveys	No
4) Residential and large turf irrigation	No
5) Conservation-related rates and pricing	No

3. Staff Resources by BMP

BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP	BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP
1	No		8	No	
2	No		9	No	
3	No		10	No	
4	No		11	No	

5	No	**12**	No
6	No	**13**	No
7	No	**14**	No

4. Regional Programs by BMP

BMP	Implementation/ Management Program?	BMP	Implementation/ Management Program?
1	No	**8**	No
2	No	**9**	No
3	No	**10**	No
4	No	**11**	No
5	No	**12**	No
6	No	**13**	No
7	No	**14**	No

B. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

C. Comments

The District is exempt from this BMP

BMP 12: Conservation Coordinator

Reporting Unit:	BMP Form Status:	Year:
Stockton East Water District	**100% Complete**	**2006**

A. Implementation

1. Does your Agency have a conservation coordinator?	yes
2. Is this a full-time position?	
3. If no, is the coordinator supplied by another agency with which you cooperate in a regional conservation program ?	no
4. Partner agency's name:	
5. If your agency supplies the conservation coordinator:	
a. What percent is this conservation coordinator's position?	20%
b. Coordinator's Name	John E. Morley
c. Coordinator's Title	Water Quality Control Analyst
d. Coordinator's Experience and Number of Years	6 yrs
e. Date Coordinator's position was created (mm/dd/yyyy)	12/21/1993
6. Number of conservation staff, including Conservation Coordinator.	1

B. Conservation Staff Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures		
2. Actual Expenditures		

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 10/5/10

Water Supply & Reuse

Reporting Unit:

Year:
2005

Report Not Filed

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit:	BMP Form Status:	Year:
Stockton East Water District	**100% Complete**	**2005**

A. Implementation

1. Does your agency own or operate a water distribution system? no

AGENCY DOES NOT OWN OR OPERATE A WATER DISTRIBUTION SYSTEM

Reported as of 10/5/10

BMP 07: Public Information Programs

Reporting Unit:	BMP Form Status:	Year:
Stockton East Water District	**100% Complete**	**2005**

A. Implementation

1. How is your public information program implemented?
   Wholesaler and retailer both materially participate in program
2. Describe the program and how it's organized:
   The District participates in the Stockton Area Water Suppliers (SAWS), which jointly funds the Water Conservation Education Program in the Stockton urban area.
3. Indicate which and how many of the following activities are included in your public information program:

Region-Wide Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	no	0
b. Public Service Announcement	no	0
c. Bill Inserts / Newsletters / Brochures	no	0
d. Bill showing water usage in comparison to previous year's usage	no	
e. Demonstration Gardens	no	0
f. Special Events, Media Events	yes	9
g. Speaker's Bureau	no	0
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

1. Annual Expenditures (Excluding Staffing) 741860

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No
   a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

The SAWS group plans to add public announcements, TV ads ect... in

2006.

Reported as of 10/5/10

BMP 08: School Education Programs

Reporting Unit:	BMP Form Status:	Year:
Stockton East Water District	**100% Complete**	**2005**

A. Implementation

1. How is your public information program implemented?
   Wholesaler and retailer both participate in program
2. Please provide information on your region-wide school programs (by grade level):

Grade	Are grade-appropriate materials distributed?	No. of class presentations	No. of students reached	No. of teachers' workshops
Grades K-3rd	yes	135	2696	0
Grades 4th-6th	yes	9	285	0
Grades 7th-8th	no	0	0	0
High School	no	0	0	0

4. Did your Agency's materials meet state education framework requirements? yes
5. When did your Agency begin implementing this program? 10/01/2004

B. School Education Program Expenditures

1. Annual Expenditures (Excluding Staffing) 74180

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No
   a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

The District is exempt from this BMP. However the District does support school programs through the Water Conservation Education Program mentioned in BMP #7.

Reported as of 10/5/10

BMP 10: Wholesale Agency Assistance Programs

Reporting Unit:	BMP Form Status:	Year:
Stockton East Water District	**100% Complete**	**2005**

A. Implementation

1. Financial Support by BMP

BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded	BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded

1	No	8	No
2	No	9	No
3	No	10	No
4	No	11	No
5	No	12	No
6	No	13	No
7	No	14	No

2. Technical Support

a. Has your agency conducted or funded workshops addressing CUWCC procedures for calculating program savings, costs and cost-effectiveness?	No
b. Has your agency conducted or funded workshops addressing retail agencies' BMP implementation reporting requirements?	No
c. Has your agency conducted or funded workshops addressing:	
1) ULFT replacement	No
2) Residential retrofits	No
3) Commercial, industrial, and institutional surveys	No
4) Residential and large turf irrigation	No
5) Conservation-related rates and pricing	No

3. Staff Resources by BMP

BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP	BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP
1	No		8	No	
2	No		9	No	
3	No		10	No	
4	No		11	No	

5	No	**12**	No
6	No	**13**	No
7	No	**14**	No

4. Regional Programs by BMP

BMP	Implementation/ Management Program?	BMP	Implementation/ Management Program?
1	No	**8**	No
2	No	**9**	No
3	No	**10**	No
4	No	**11**	No
5	No	**12**	No
6	No	**13**	No
7	No	**14**	No

B. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

C. Comments

The District is exempt from this BMP.

BMP 12: Conservation Coordinator

Reporting Unit:	BMP Form Status:	Year:
Stockton East Water District	**100% Complete**	**2005**

A. Implementation

1. Does your Agency have a conservation coordinator?	yes
2. Is this a full-time position?	
3. If no, is the coordinator supplied by another agency with which you cooperate in a regional conservation program ?	no
4. Partner agency's name:	
5. If your agency supplies the conservation coordinator:	
a. What percent is this conservation coordinator's position?	15%
b. Coordinator's Name	John E. Morley
c. Coordinator's Title	Water Quality Control Analyst
d. Coordinator's Experience and Number of Years	5 yrs
e. Date Coordinator's position was created (mm/dd/yyyy)	12/21/1993
6. Number of conservation staff, including Conservation Coordinator.	1

B. Conservation Staff Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures		
2. Actual Expenditures		

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 10/5/10

Appendix G

USBR BMP Exemptions Letter

United States Department of the Interior

BUREAU OF RECLAMATION
Central California Area Office
7794 Folsom Dam Road
Folsom, California 95630-1799

JUN 05 1997

IN REPLY REFER TO:
CC-414
RES-3.10

Mr. John W. Stovall
Neumiller & Beardslee
PO Box 20
Stockton, California 95201-3020

Subject: Stockton East Water District's Request for Exemptions for Best Management Practices--New Melones Dam and Power Plant--Central Valley Project, California

Dear Mr. Stovall:

After review by our Regional Solicitor of the information you provided, we concluded that the Stockton East Water District (District) is exempt from requiring the California Water Service Company, the City of Stockton, the Lincoln Village Maintenance District, and the Colonial Heights Maintenance District to implement certain municipal and industrial Best Management Practices (BMPs). A list of the exempted and non-exempt municipal and industrial BMPs is enclosed. This exemption is in place as long as the existing contract among the parties is not amended or renegotiated. In addition, if any other legal issue that is tied to this contract is executed, the District will be required to implement all exempted BMPs.

Although the District is not required to implement these BMPs with their contractors at this time, the District is encouraged to continue assisting their contractors with implementation. The District's Resolution 95-96-08 committed the District to implementing all the urban BMPs by either requiring the retailers to implement or by implementing regionally. Reclamation's Water Conservation Field Service Program is available to assist the District and its contractors in implementing these BMPs and promoting the best management of water.

If you have any questions, please contact Mr. Pete Vonich (Water Conservation Specialist) at (916) 989-7265 (TDD 989-7285).

Sincerely,

for Thomas J. Aiken
Area Manager

Enclosure

Exempted BMPs 1993 Criteria

B-3 Tiered block or similar water pricing

Exempted BMPs 1996 Criteria

A- 1 Distribution system water audits, leak detection and repair

A-2 Metering with commodity rates for all new and existing conditions

A-3 Landscape efficiency requirements for new/existing commercial, industrial, institutional governmental and multi-residential developments

A-5 School education

A-7 Conservation pricing - water and sewer

A-8 Water waste prohibition

B-1 Interior and exterior water audits and incentive programs for single family residential, multi family residential and governmental/institutional customers

B-2 Plumbing, new and retrofit

B-3 Large landscape audits and incentives

B-4 Commercial, industrial and institutional conservation

B-5 Landscape water conservation for new and existing single family homes

B-6 Ultra low flush toilet installation

Non-exempted BMPs 1996 Criteria

A-4 Public Information

A-6 New commercial, industrial and institutional water use review

A-9 Demand management staff

A-10 Financial incentives

Appendix H

Samples of Public Information/Samples of Public Education Materials

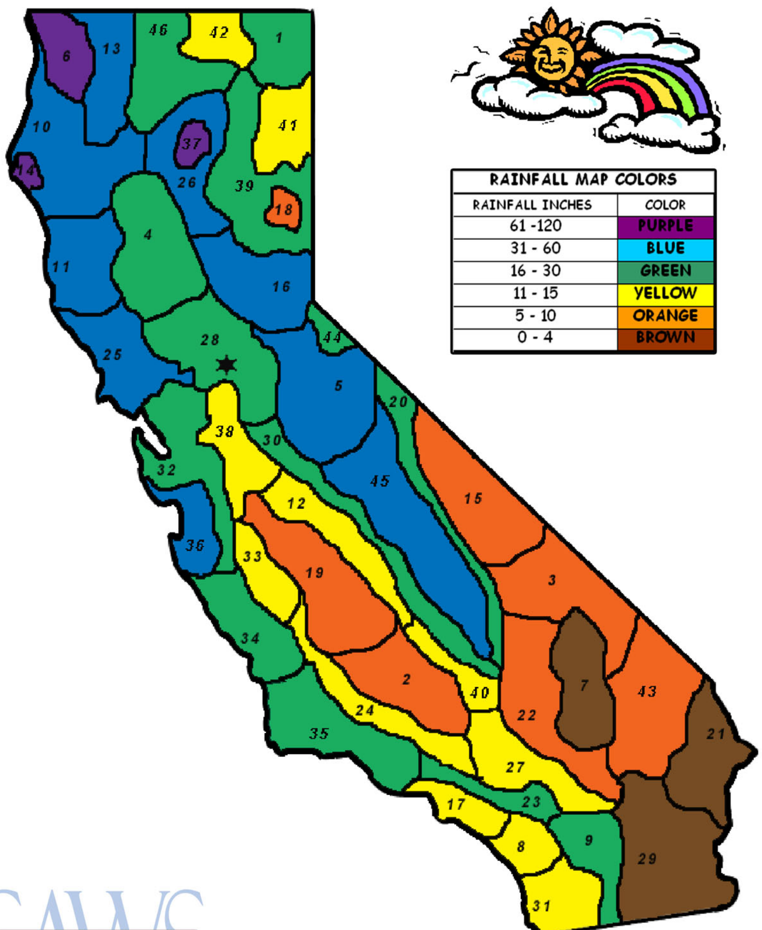
SAWS Water Education Program

ANNUAL REPORT

2009/2010 School Year

ANNUAL RAINFALL		
#	CITY / PLACE	RAINFALL INCHES
1	Alturas	16"
2	Bakersfield	6"
3	Bishop	6"
4	Chico	26"
5	Columbia	15"
6	Crescent City	66"
7	Death Valley	2"
8	Disneyland	14"
9	Escondido	16"
10	Eureka	39"
11	Fort Bragg	40"
12	Fresno	11"
13	Happy Camp	52"
14	Honeydew	100"
15	Independence	5"
16	Lake Tahoe	32"
17	Los Angeles	12"
18	Loyalton	10"
19	Mendota	8"
20	Mono Lake	14"
21	Needles	5"
22	Palm Springs	5"
23	Pasadena	20"
24	Paso Robles	15"
25	Point Arena	32"
26	Redding	40"
27	Riverside	11"
28	Sacramento	18"
29	Salton Sea	3"
30	San Andreas	27"
31	San Diego	11"
32	San Francisco	24"
33	San Jose	14"
34	San Luis Obispo	23"
35	Santa Barbara	18"
36	Santa Cruz	31"
37	Shasta Dam	63"
38	Stockton	15"
39	Susanville	11"
40	Tehachapi	11"
41	Termo	11"
42	Tulelake	11"
43	Twenty Nine Palms	4"
44	Woodfords	21"
45	Yosemite Valley	43"
46	Yreka	21"

RAINFALL MAP COLORS	
RAINFALL INCHES	COLOR
61 -120	PURPLE
31 - 60	BLUE
16 - 30	GREEN
11 - 15	YELLOW
5 - 10	ORANGE
0 - 4	BROWN



California Rainfall Puzzle Map

SAWS
STOCKTON AREA WATER SUPPLIERS
Water Education Program

SAWS
STOCKTON AREA WATER SUPPLIERS
Water Education Program

SAWS Water Education Program Annual Report

School Year: 2009/2010

August 1, 2009 through July 31, 2010

REPORT SUMMARY

This report presents an update on activities related to implementation of the SAWS Water Education Program in the 2009/2010 school year. This report presents the year's highlights followed by a detailed chart of program statistics.

In the 2009/2010 school year, the SAWS Water Education Program continued to serve Stockton in elementary school classrooms, on the Delta College Campus, at AgVenture, Kid's College, Farm Days and numerous special events. The standard program offers six, grade-level specific in-class presentations, an after school program and water-themed, school-wide assemblies through the Zun Zun environmental education performing troop. As part of a comprehensive outreach effort, the SAWS Water Education Program also participates in a variety of youth oriented events in the Stockton area. In the 2009/2010 school year, the SAWS Water Education Program reached a total of 23,297 students; 18,838 through in-class, event and after school programs and 4,459 through the Zun Zun assembly program.

A summary of 2009/2010 Program highlights:

- The SAWS in-class programs visited 76 Stockton area schools, presenting in 284 classrooms for 7,728 students.
- All 42 SUSD campuses hosted the SAWS After School H20lympics program, reaching 3,609 students.

- SAWS sponsored 15 Zun Zun "Water Beat" assembly performances for 4,459 students in nine Stockton elementary schools.
- The SAWS Water Education Program participated in a variety of local, youth-oriented special events and promotional programs, reaching 7,501 attendees. These events included:
    - San Joaquin County's AgVenture Programs (South County, Stockton & Lodi)
    - Stockton's Earth Day Festival
    - Pixie Woods Children's Day
    - Manteca Unified School District's Farm Days
    - KWIN/KAT Country's Promo at Orchard Supply
    - SJCOE "Dinner with a Scientist"
    - SJCOE Science Fair judging
    - San Joaquin Delta College "Kid's College" Program
    - Stockton's State of the City Event
    - Don Riggio Elementary School's "Delta Experience"
    - Stockton City Council's Water Awareness Month Proclamation
- Special presentations on water awareness, conservation, career path development and implementation of the SAWS Water Education Program were made for a variety of organizations and groups, including:
    - Lincoln High School's "Window on Your Future" career path development event
    - Delta College Reading for Science classes
    - Stagg High School Chemistry classes

- Benjamin Holt University Preparatory School Chemistry classes
- Lincoln USD Parent/Teacher Organization
- Solano County Environmental Educator's Symposium
- APAPA (Asian Pacific Islander American Public Affairs)

- The SAWS Water Education Program conducted water treatment plant tours for the fifth grade classes from Don Riggio and John Muir Elementary Schools and presented a week of water programs for the summer school sessions at both Annunciation and Lakeside Christian Schools.
- SAWS hosted at the Fall 2009 meeting of the DWR Water Education Committee, which included a guided bus and boat tour of the Sacramento/San Joaquin Delta, visits to the Harvey O. Banks Pumping Plant (the California Aqueduct) and the SAWS exhibits at the Children's Museum of Stockton, and a day of presentations and networking for over 30 water educators from around the state at the Robert J. Cabral Agricultural Center in Stockton.

Water Educators from around the state attended the DWR Water Education Committee Meeting hosted by SAWS in October 2009

2009/2010 SAWS WATER EDUCATION PROGRAM

HIGHLIGHTS & UPDATES

<u>The SAWS In-Class Presentation Program:</u>

SAWS in-class presentations and the H20lympics After School Programs continue to increase in popularity in all four Stockton school districts. Most presentation slots for the upcoming school year fill before the current year is over. In the 09/10 school year, invitations were sent to teachers and administrators via email in May 2009, just prior to the end of the school year. The presentation calendar was 90 percent full by mid September, and a waiting list had been established by the end of 2009.

Teachers familiar with the program often coordinate our presentations with their lesson plans. First grade teachers will host our presentation during their weather unit, second grade while studying gravity and motion, and third grade during the study of states of matter. The fourth grade "California Water" presentation features map interpretation and an in-depth look at the history, use and distribution of water in our state, concepts that closely relate to this grade's California history standards, including the California Missions and the Gold Rush.

The "California Water" presentation uses interactive games and hands-on activities, like this topographical map, to help fourth graders understand how water is distributed in our state.

In our fifth grade program, students spend 90 minutes immersed in the water cycle and are invited to tour the plant to observe the water treatment process firsthand. Unfortunately, most schools lack the funding for transportation to our facilities, but with parent chauffeurs we are still able to host a few classrooms at the plant each year. We ask that tours include one parent/adult chaperon for every five students. While the main purpose for this request is crowd control, we have also found that parents touring the plant often learn more than their children do, and invariably leave with a greater appreciation for the community's water resources. **After a tour last year, a parent remarked, "I will never complain about my water bill again!"**

Plant tours help students *and their parents* understand the water treatment and distribution process

There is evidence that as Stockton's educational resources have diminished, our programs have steadily gained favor. Teachers have found value in our ability to connect content standards to water resources, the environment and conservation. We like to remind teachers that, in spite of budget cuts, students can still experience the benefit of community learning because the SAWS in-class programs "bring the field trip to the classroom."

The SAWS H20lympics for After School Programs, AgVenture & Special Events:

The H2Olympics After School Program: In the 2009/2010 school year, SAWS presenters visited 42 SUSD campuses with the H20lympics After School Program, reaching over 3,600 students with our message of water awareness and conservation. The program was presented at every SUSD after school program site, and schools from both the Lincoln and Lodi districts hosted the program as well. SUSD is pleased with the program and has scheduled all sites for repeat visits in 2010/2011.

Benefits of the SAWS H20lympics After School Programs Include:

- Hands-on activities educate and entertain
- Format holds students' attention because it provides an alternative to standard after school activities
- Students likely to take message home
- Parents often show up, may even participate
- Broad outreach to multiple grade levels (K-8): maximum contacts in minimum amount of time
- Use of upper elementary and middle school helpers allows older students to work with/teach younger students: excellent learning environment for all students

Hands-on activities educate and entertain students, while providing program facilitators with free, appropriate curriculum for understaffed and underfunded programs…

…AND the after school program format is an excellent venue for dissemination of SAWS' message of water conservation!

- Provides after school program coordinators and facilitators with free, appropriate educational activities for understaffed and underfunded programs.

San Joaquin County's AgVenture Events: Every third grader in San Joaquin County is eligible to participate in this dynamic program sponsored by San Joaquin Select. AgVenture participants enjoy a day of fun while learning about the vast diversity of agriculture in San Joaquin County. AgVenture exposes students to important concepts during their "day on the farm," including nutritional values, agronomics, marketing, farm and crop production, the value of locally grown products and the role that producers, vendors and the purveyors of our natural resources play in bringing these commodities to the community. AgVenture's unique format offers a meaningful and memorable experience for students and a special opportunity for the agricultural community to reach out to some of our most impressionable citizens. SAWS participation in these events allows us to promote our in-class, after school and assembly programs while sharing our message of water awareness and conservation with thousands of third graders and their teachers. Each AgVenture hosts between 2,500 and 4,000 third graders. **In 2010, SAWS and the SEWD Board of Directors donated $1,000 to AgVenture to help keep this valuable program alive.**

SAWS participates in all three AgVenture events: South County in November, Stockton in January and Lodi in March. At left, Mrs. Webster helps students fashion a "Water Saver" button and guides them through a hands-on "water experiment" at the Stockton AgVenture.

Zun Zun "Water Beat" Assemblies

Because most Stockton schools had hosted the SAWS sponsored Great Water Mystery assembly program by the close of the 2008/2009 school year, SAWS contracted with a new water assembly provider for 2009/2010.

Stephen Snyder and Gwynne Snyder Cropsey are "Zun Zun," a performing arts group that celebrates the environment through water-themed, interactive, musical assemblies. In the 2009/2010 school year, SAWS sponsored 15 Zun Zun assemblies in nine Stockton area schools.

ZunZun's "Water Beat" show highlights the connection of the community to its watershed, focusing on water conservation and resource protection. In this 45 minute program, Zun Zun performs a number of skits using musical instruments, song and dance, audience participation and humor for a truly memorable show. Topics covered include water conservation, watershed protection, water reclamation, and water pollution. Students and teachers are encouraged to participate, playing unique "water instruments" from around the world, joining in the Sprinkler, Swimmer, and Washing Machine dances, and singing the "Save Some Water" song. Audience members are invited on stage to participate in hilarious activities like the "Toilet Game Show," where students learn that a leaking toilet may be the single greatest use of water in a home. Students do the Drought Limbo and participate in a crazy race that explains the purpose of storm drains and the potential threat of storm water pollution. Students leave the assembly singing, dancing and chatting about the many facets of water covered by the show.

In Stockton, Zun Zun received an enthusiastic reception, evidenced by some of the comments we received from teachers about the Zun Zun assembly:

- "What a wonderful program! The children loved it, as did the faculty and staff. They have been singing the songs all week…Thank you so much!! (St. Luke's CES)
- "Awesome assembly with awesome actors! Students and staff loved it and retained the info. Thank you!" (Wilhelmina Henry Elementary)
- "My students are still talking about it! Great job!" (Wilhelmina Henry Elementary)
- "The presentation was engaging and informative…the perfect follow-up to the SAWS water cycle/conservation course in helping us remember basic water conservation ideas. Thank you!" (St. Luke's CES)
- "Great way to teach water conservation!" (Richard Pittman Elementary)
- 'The students were very excited when they came back from the assembly. Great show!" (Richard Pittman Elementary)

- "The presentation was fantastic – one of the best assemblies we've ever had. It contained all the elements that make up a great learning experience. Thank you!" (Tully C. Knoles Elementary)
- "Outstanding assembly. The best I've seen in a very long time." (TCK)
- "Very entertaining! Reminded me of Science Camp!" (Annunciation CES)
- "My students had so much to say [after the assembly]…I took notes so you can see how you influenced them! Thank you for the humor, music, dance, creativity and kindness which helped all of us to think and learn!" (Annunciation CES)
- "Awesome – kept the students' interested – very valuable! You taught something that I don't have time to teach!" (Brookside Elementary)

Status Update: The SAWS Conservation Cottage Exhibit and Water Mural at the Children's Museum of Stockton

2010 was not the best year for the SAWS Conservation Cottage. Due to budget cutbacks, the museum's maintenance crew was eliminated and operating hours were reduced. When the power to the exhibit was left on over a long weekend, the pump ran low on water and burned out. It appears that Gizmo, the firm that built the exhibit, is no longer in business, so it was difficult to find someone to repair the exhibit. A local construction firm was contracted to replace the pump and get the exhibit working again, and the same firm was hired to replace the warped floor of the Conservation Cottage. While the exhibit is currently mostly operational, the touch screen computer was hacked by visitors, and the "Pick-Quick" water conservation game is no longer functional. The plan was to repair the computer and enclose it in a child-proof kiosk; however this plan is currently on hold because operation of the museum has been transferred from the City of Stockton to the museum's Board of Directors, and SAWS felt it was wise to allow museum operations to stabilize before spending money to build a new kiosk.

The outside wall of the SAWS Conservation Cottage demonstrates how many bottles of water would be needed to make one slice of bread

The SAWS Conservation Cottage

The SAWS Water Education Program and the Community

The SAWS Water Education Program participates in and supplies hand-outs and materials for a long list of community gatherings and other special activities and events for Stockton residents. In the 2009/2010 school year, SAWS participated in the following events:

- **Rotary Read-In:** On behalf of SAWS, Mrs. Webster visited Elmwood Elementary School to read aloud to a Kindergarten class from a hard-bound, water-themed book. The book was donated to the school library, and SAWS water conservation booklets and materials were provided.
- **San Joaquin Delta College "Kid's College" Program:** The SAWS Water Education Program again participated in this unique program that offers children and teens summer academic and enrichment workshops. In July, SAWS offered a two-day workshop for 9-12 year old students entitled "The Wonders of Water," featuring lectures, games, videos and hands-on activities focusing on water science, conservation, and water treatment and distribution in California. In lieu of a service stipend from SJDC, SAWS sponsored several scholarships for Kid's College students.
- **KWIN/KAT Country's Promo at Orchard Supply:** The SAWS Water Education Program joined the City of Stockton staff in hosting a booth at this promotional event, which featured a washing machine giveaway and handouts of conservation materials.
- **San Joaquin County's "Dinner with a Scientist":** The SAWS Coordinator participated in this event designed to recognize Stockton students' achievements in science.
- **San Joaquin County Science Fair:** The SAWS Coordinator was selected to be a judge at the annual Science Fair, rating science projects for grades 4-6.
- **Children and Youth Day at Pixie Woods:** In July 2010, SAWS staffed a booth at this annual youth-oriented fun day that is designed to increase community awareness of services and opportunities available for children in San Joaquin County.
- **Lincoln USD "Window on Your Future":** Both Mrs. Webster and Mrs. Coon participated in mock job interviews designed to prepare Lincoln High School students for entry into the job market.
- **Manteca Unified School District's Farm Days:** SAWS sponsored an activity booth (H20lympics) at each of the three Weston Ranch elementary schools' annual Farm Day events.
- **State of the City:** Each year, SAWS joins the City of Stockton and Cal Water in hosting a booth at Stockton's annual State of the City event.
- **Stockton's Earth Day Festival:** SAWS sponsors a booth featuring color-your-own water saver buttons and water themed activities for children at Stockton's annual Earth Day event at Victory Park.
- **"May is Water Awareness Month":** The SAWS Coordinator attended a meeting of the Stockton City Council to participate in the acceptance of a "May is Water

Awareness Month" proclamation in recognition of water conservation efforts by SAWS member agencies.

- **Community Based Programs:** SAWS visited and supplied water conservation materials for Special Day classrooms at Stagg High School, First Five, Head Start and regional pre-school programs, SUSD's "Project Live" program for developmentally disabled adults, and other community programs requesting resources.
- **Water Treatment Plant Tours:** SAWS conducted on-site tours of the Joe Waidhofer Drinking Water Treatment Plant for Grade 5 classrooms.
- **Water Educator Training:** The SAWS Coordinator met with and shared ideas and resources and with other Northern California water agencies.
- **DWR Water Education Committee:** The SAWS Coordinator attends bi-annual meetings of the DWR Water Education Committee, joining water educators from all over California to share resources and ideas for water conservation education and outreach. In October 2009, SAWS hosted the fall meeting of the DWR Water Education Committee for a tour of the Delta and a sit-down meeting at the Robert J. Cabral Agricultural Center in Stockton.
- **Children's Museum Benefit Bocce Challenge:** Each year, SAWS donates to and participates in the Children's Museum Annual Bocce Challenge, an event that raises thousands of dollars for the Children's Museum of Stockton.
- **Don Riggio Elementary School's "Delta Experience":** The SAWS Water Education Program participated in this lower-elementary school event that focuses on the Sacramento/San Joaquin Delta.
- **Delta College "Reading for Science" classes:** During both the fall and spring semesters, the SAWS Coordinator made presentations SJDC's Reading for Science classes on the water cycle, water treatment and distribution and the Sacramento San Joaquin Delta. Instructors at SJDC use our presentations to teach incoming community college students how to listen to a guest speaker, take notes and ask meaningful questions.
- **Career Path Development:** The SAWS Coordinator was invited to visit several Stockton high school classes to talk about careers in the water industry.
- **PTO Presentations:** Mrs. Webster made a presentation on water resources and conservation for the Lincoln Unified School District's Parent/Teacher Organization.
- **Solano County Environmental Educator's Symposium:** Mrs. Coon was invited by the organizers of this regional conference to make a presentation on the design, development and implementation of the SAWS Water Education Program.
- **APAPA Presentation:** The SAWS Coordinator was invited to talk to the Stockton branch of the Asian Pacific Islander American Public Affairs group about water resources, conservation and the SAWS outreach programs.

Conclusion

The SAWS Water Education Program is endorsed and approved by the Stockton, Lincoln, Lodi and Manteca school districts, works closely with SUSD as part of the STEP UP After School Program, and is sanctioned by the San Joaquin County Office of Education. The program's success is evidenced by the numbers: in-class participation has increased steadily year after year. The most effective tool for program growth remains teacher-to-teacher recommendations; every year more teachers add our programs to their curriculums and recommend us to their colleagues and acquaintances. This promotes a progressive learning approach, which is a major component of the overall plan: when we see students year after year, we are building a comprehensive knowledge base that will make water conservation and awareness second nature for our future citizens, ultimately helping us achieve our goal of promoting effective, community-wide water conservation in Stockton. Evaluations from both teachers and students have been overwhelmingly positive, and support for the program has increased because it reinforces grade specific content standards, coordinates seamlessly with curriculum, and provides a hands-on, memorable learning experience for students.

As the teacher and students look on, Mrs. Webster demonstrates how a town's growth and well-being might be affected by a water shortage during a round of "Pass the Jug," a role-playing game designed to teach fourth graders the importance of water in our communities.

Looking Ahead:

- **Maintain and enhance current programs:** After six years, the SAWS Water Education Program has become a well-known and respected outreach program in Stockton area schools and with the public. We are reaching significant numbers of students with a variety of programs, and we participate in many high-profile youth oriented local events. Early on, the program focused on building participation and expansion, and that mission has been accomplished. From here on, our priority will be enhancement; since our programs are established, popular and in demand and we are making an impressive number of contacts with minimal staff, our plan for the future is to enhance the value of our programs for those we are able to serve. While our evaluations are always enthusiastic and positive, suggestions for improvement indicate that teachers would like to see us offer more hands-on activities. We will look to programs like Project WET, CREEC, Project WILD, AIMS and other experiential learning curriculums to develop and incorporate more grade level appropriate activities into our presentations.
- **Middle/High School Programs:** The SAWS Coordinator is collaborating with Contra Costa Water District to develop a middle school (grades 6-8) presentation that focuses on storm water awareness, groundwater and water quality.
- **Project WET Workshop:** The SAWS Coordinator is currently working with Project WET to develop and schedule a Project WET workshop for Stockton area teachers and educational facilitators.

Project WET (Water Education for Teachers) offers training workshops and a catalog of grade-appropriate, standards-based experiential learning activities designed to be incorporated into water education curriculums.

Comments from teachers (taken from our Program Evaluation Forms):

I notice that each year this program has added more to help students really understand. I appreciate the additional materials that reinforce learning. *Mrs. Ross, Grade 1, Colonial Heights Elementary*

The best program I have ever had in the classroom, and I have been teaching for 19 years!
Julie Steyer, Grade 3, GW Bush Elementary

Objectives and content were clearly aligned with our current curriculum and California standards…I like the way the program integrates standard-based instruction and explores local issues related to water procurement and distribution. *Mr. Guzman, Grade 5, Pittman Elementary*

Every aspect of the lesson was age-appropriate and the kids were very engaged in the subject matter.
Misa Horita, Grade 1, Mable Barron Elementary

The curriculum is very good – love that local tie-in! *Mrs. Loftin, Grade 3, Wagner-Holt Elementary*

Good balance of listening activities and movement activities…an interesting science lesson that meets state standards. *Ms. Falat, Grade 1, Mable Barron Elementary*

[The presenter] tailored the presentation to my adult students and covered topics at my request, like the Delta and groundwater. Thanks! *Michelle Marta, San Joaquin Delta College "Reading for Science"*

This is our third year [hosting the after school program] and the students love it…the games were very easy, fun and fast paced. Kids didn't have time to be bored – they came back talking about what they learned – awesome! Kristal *Bloch, SUSD After School Program Facilitator, Hoover Elementary*

[The presenter's] tone of voice, gestures and realia help my ELL students to understand the water cycle. The presentation was excellent! *Mr. Ruiz, Grade 1, Grant Elementary*

The presentation was wonderful! The students benefitted in many ways and gained a clear understanding of the water cycle. *Ms. Bregman, Grade 5, Pittman Elementary*

Water cycle clearly explained…hits all content standards…all kids engaged and happy!
Mrs. Ringer, Grade 2, GW Bush Elementary

Hit every second grade Earth Science standard! Very prepared! Very knowledgeable!
Ms. Salgado, Grade 2, Aspire Rosa Parks Academy

Our instructor had a great rapport with the children. Those few who are easily off task were brought back with ease. I love that [the program] is very interactive and engaging; the children get very excited!
Ms. Eggert, Grade 1, Stockton Collegiate International

[The presentation] was a definite learning experience which was well worth the time.
Ms. Stansfield, Grade 2, McKinley Elementary

I like the fact that water treatment and distribution is discussed.
Ms. Maloy, Grade 5, Brookside Elementary

Program met and went beyond grade specific content standards; the presentation was engaging. Students had a lot of fun and were excited about learning and reviewing.
Ms. Malibunas, Grade 5, Brookside Elementary

This program does a good job of integrating both science and social science standards and covering them in an engaging way. Thank you for visiting each year! Our kids love it!
Ms. Gregoire, Grade 1, John Muir Elementary

Everything was grade appropriate; the presenter asked good questions and made the students think. The questions fit perfectly into our curriculum…Thanks so much - keep up the good work!
Ms. Sandoval, Grade 3, Dolores Huerta Elementary

The varied activities are designed perfectly for fourth grade – everything fits well with our standards!
Ms. Huiras, Grade 4, Elkhorn Elementary

Objectives were clear and met; the program made learning about science fun. My kids loved the very cool hands-on game. Students were able to apply information to their lives!
Ms. Go Miller, Grade 5, Elkhorn Elementary

Perfect! [The presenter] does such a good job of tying together, in a fun way, everything that we've been covering. *Mrs. Carido, Grade 4, St. Luke's CES*

All objectives were clear and were met. Materials were very much grade appropriate; excellent charts, pictures, illustrations, visuals…an excellent presentation! Please come back more often!
Mrs. Razo, Grade 1, GW Bush Elementary

[The program] teaches students to be aware of saving water while incorporating fun and science.
Ms. DelPrato, SUSD After School Program Coordinator, Elmwood Elementary

The presenter's personality, questioning, presence, visual aids: all excellent! I cannot think of one thing that could make this program better! *Mrs. Ewart, Grade 3, First Baptist Christian School*

[The presenter] was fluent, articulate, well-prepared and got an immediate, eager student response. They "drank it all up"! *Ms. Zuckerman, Grade 1, Tully Knoles Elementary*

Outstanding! Standards were pointed out along the way. The content was appropriate, informative and just the right amount. The program covered science standards in a fun, interactive and educational manner, providing easy access for all learners. This is the first time having the program in my classroom, and it is absolutely wonderful. I really appreciate and value the SAWS Water Education Program – Thank you! *Ms. Mary Hood, Grade 5, Podesta Ranch Elementary*

This program meets 3rd grade standards well. The water filter was a great hands-on activity. The kids love it and talk about it all year long! *Jan Utterback, Grade 3, Tyler Elementary*

Perfect balance of listening to hands-on. This program honors the students' abilities – leaves them with something they can share. *Leslie Warmke, Grade 3, Brookside Elementary*

The hands-on portion of the program is very helpful in reaching the different learning types. A fine program – thanks! *Mrs. Maring, Grade 3, Tyler Elementary*

I look forward to this presentation every year. I love the visuals – they help students relate the content to their city, and the hands-on activities light up their faces! *Mrs. Blake, Grade 2, Taylor Elementary*

Excellent!! Totally on-target with grade level standards. Lots of hands-on. [The presenter] was terrific! She was able to describe content in 2nd grade lingo, kept the pace moving – the kids were totally engaged. This is the second time we've had the program and we couldn't be more pleased!
Ann Garcia, Grade 2, John Muir Elementary

Students were very engaged. All new content will tie in to our science lessons!
Karin Compise, Grade 5, Pittman Elementary

This program is right on target with our benchmark test. I love the songs and game activities.
Ms. Nguyen, Grade 1, Oakwood Elementary

Objectives were very clear and well planned; [the presenter] checked for understanding and presented in a challenging manner…this program should be on PBS so other children can enjoy it and learn about water!
Mrs. Clover, Grade 1, San Joaquin Elementary

All content is related to third grade standards – it tied in nicely to what I've already taught or as a preview of what is to come. *Thank you! Suzanne Podesto, Grade 3, TCK*

This program is a great lead-in to my next science lesson. [The presenter] is positive and upbeat. She holds the students' attention and has a variety of items that help the students understand the concepts.
Barbara Yamada, Grade 3, Julia Morgan Elementary

What an excellent lesson – perfect for third grade! The students had so much fun they didn't even realize how much they were learning. It was fun, hands-on, full of information…just what kids love!
Isabel Calderon, Grade 3, Hazelton Elementary

The children truly enjoyed this lesson – it was full of energy and information. Hands-on, informative, age-appropriate demonstrations, good use of age-appropriate language. Fantastic! I will pass it on to other grade levels! *Ms. Fortney, Grade 2, Hazelton Elementary*

Very useful and important information delivered in an extremely clear manner – [the presentation is] outstanding. *Patrick Wall, San Joaquin Delta College, "Reading for Geography"*

Everyone who went to the presentation came back with a smile on their face! The students had fun while learning how to save water.
Malinda Otero, SUSD After School Program Facilitator, Hamilton Elementary

Students understand the importance of water and where it comes from. My class remembered [the presenter] from Kindergarten and were excited to see her again. The hands-on activities and visuals are super! *Mrs. Acosta, Grade 1, Brookside Elementary*

Ours is a large and talkative group, but [the presenter] had great control and did a fantastic job! I hope we can schedule a return visit in January to coincide with our weather unit. Thank you so much!
Ms. Vizcarra, Kindergarten, Tully Knoles Elementary

The lesson met all our standards for this unit of study. I like that it covers so many grade level standards and that my students enjoyed it so much. Thank you! *Julie Glennon, Kindergarten, Brookside Elementary*

The presenter was fun and interested in her topic – students were kept on task for over an hour! I really liked the pictures, storyboard, stretching, reenacted rainy day activities and the game.
Ms. Vaughan, Grade 1, TCK

The presentation fit perfectly with our curriculum and touched on so many standards – the hands-on activities made it come alive for the kids. *Ms. Rodriguez, Grade 4, Manlio Silva Elementary*

The hands on activities about the water cycle and three states of matter will stay with students – the whole program is wonderful! *Mrs. Conrad, Grade 2, Mable Barron Elementary*

The presentation contains "spot-on" content standards. I like how smooth and quick it is - the time went by so quickly, we didn't even realize it! Great information presented so well; you truly do a wonderful job! *Sachi Harada-Ponder, Grade 1, TCK*

This program was good to begin with and just keeps improving every year! The information directly correlated with 4th grade standards. Thanks! *Mrs. Strobel, Grade 4, TCK*

I really liked that the program showed how water is connected to the students' lives. They talked about water days after the presentation. *Ms. Johnson, Grade 2, Oakwood Elementary*

The format was great! Discussion…Modeling…Hands-on…Follow-up…Debrief…Excellent!
Ms. West, Grade 2, TCK

I liked the way the activities connected to 4th grade California history standards! It was great!
Ms. Smith, Grade 4, Aspire Rosa Parks Academy

The entire program is extremely worthwhile and meets our standards. Excellent scheduling, communication, materials, presenters! Keep everything as is!
Debbie Rojas, Grade 1, El Dorado Elementary

I love the felt board story and the game…change NOTHING…the program is wonderful the way it is! *Sabrina Rohleder, Grade 1, El Dorado Elementary*

The program is very interactive and hands-on while being standards-based. It is wonderful!
Susie Rainwater, Grade 4, Annunciation CES

The presentation is perfect for first grade, touching on standards very effectively in an engaging way. Students love the activities and game. Both Mrs. Webster and Mrs. Coon have presented to my classes over the years and they are awesome! So good with the kids – they make them feel smart and confident. The only thing that would make this presentation better would be if you created another first grade program so we could see you twice a year instead of once!
Amy Hickenbotham, Grade 1, Ansel Adams Elementary

Dear Mrs. Coon,

Thankyou for coming to teach us about water! I really enjoyed your fun and interesting presentation. I wish you could come again! The activities were just simply wonderful. I don't have any questions, anyway, because you explained everything so clear and very understandable. As soon as I got into my car, I bursted out with information from the presentation, to my parents. Again, I enjoyed everything and thankyou so much for the useful information.

From,

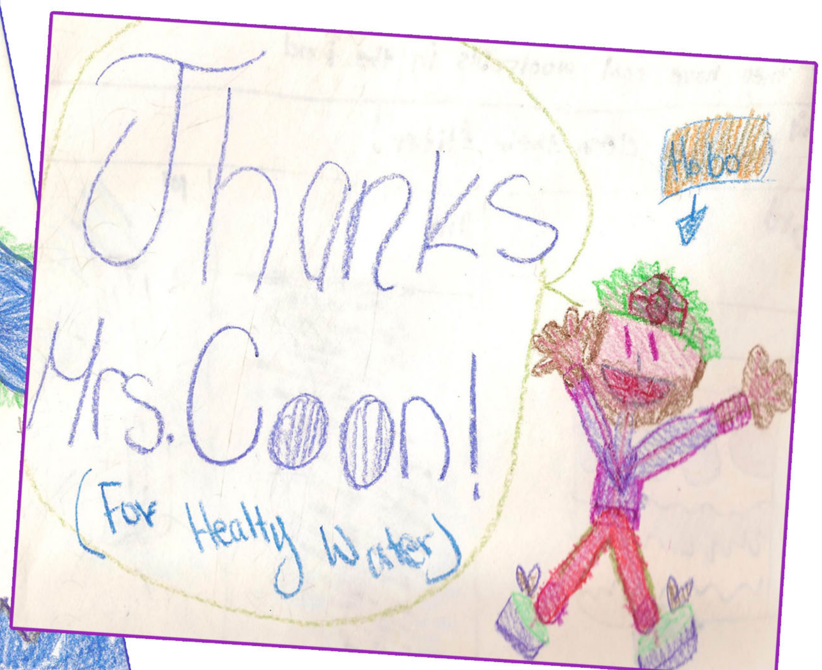
Megan Shanice Kan

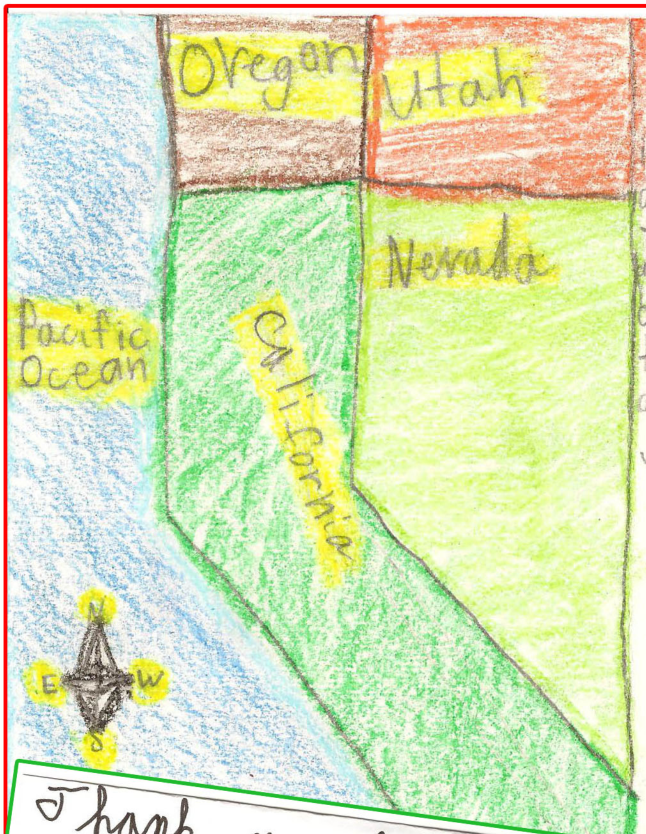
2010

Dear Mrs. Coon,

Thank you for doing the water presentation for us. It was fun. Three things I leared are Aquaduct, Columbia was fighting over water, and Columbia is deserted. My favorite was making the puzzle. We couldent have don this without you.

Sicerly,
Dominic Pespicio





Thank you, Mrs. Coon, for coming and teaching us about water and how to save it. I had a wonderful time learning and doing fun activities with you. Now I know lots of facts about water and hope to see you next year. Thank you again for teaching us about water and how to save it.

Sincerely,
Khemnathan
Chorn

Thank you for doing the water presatation with us. I learned alot. Three things I learned were that we need water everyday, Northren California shores water and Southern California borrows our water. Thank again for doing the water presetation. That's nice.

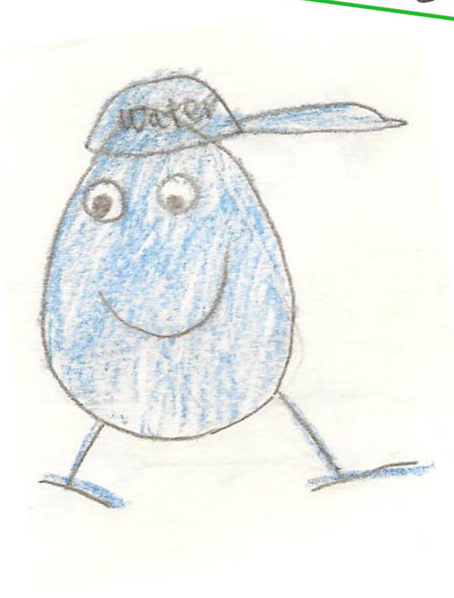
love,
Nik Vargas

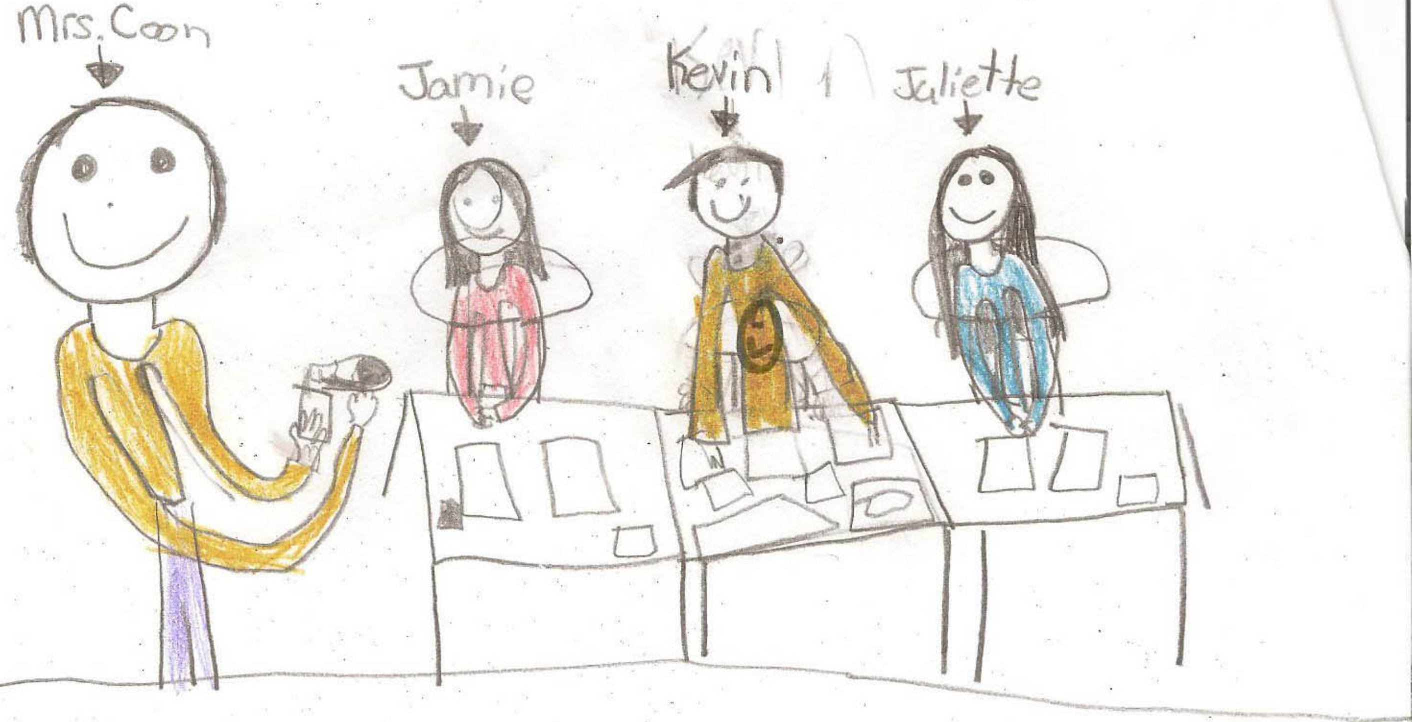
April 8, 2010

Dear Mrs. Coon

Thank you for teaching us about water. I learned that you should use water more carefully, and that I should not waist water. I like water and I dont want the water to be gone so I'm going to use water more carefully.

Sincerly,
Shion





Dear Mrs. Coon,
Thank you for coming to Manlio Silva and giving us the wonderful presentation. My favorite part of the presentation was learning about the differen states and how much rain fall came a year. I remember I had Honeydew and it had 100 inches of rain. A really fun game was Pass the Jug. I think thats what it's called. I really feel bad for the farimers because the miners flooded their crops.

Sincearly,
Jamie

P.S. You have beautiful handwriting

August 14, 2009

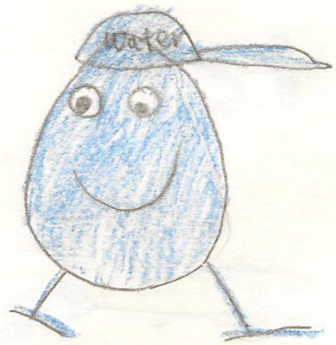
Dear Mrs. Webster,

Thank you for coming to our class yesterday. You taught me so much about water. First, I learnd that our water comes from the moutain. Then I found out that the water tower cleans the water. Finally, I absorbed info about water. That was so nice of you to visit our class.

Sincerely
Darren Kaseumsoak

Dear Mrs. Coon,

Thankyou for teaching us about water and saving water. Those california aqueduct are cool. I can't believe we had a lot of rains but its just average.



waterlover,
aaron

Thursday Apri

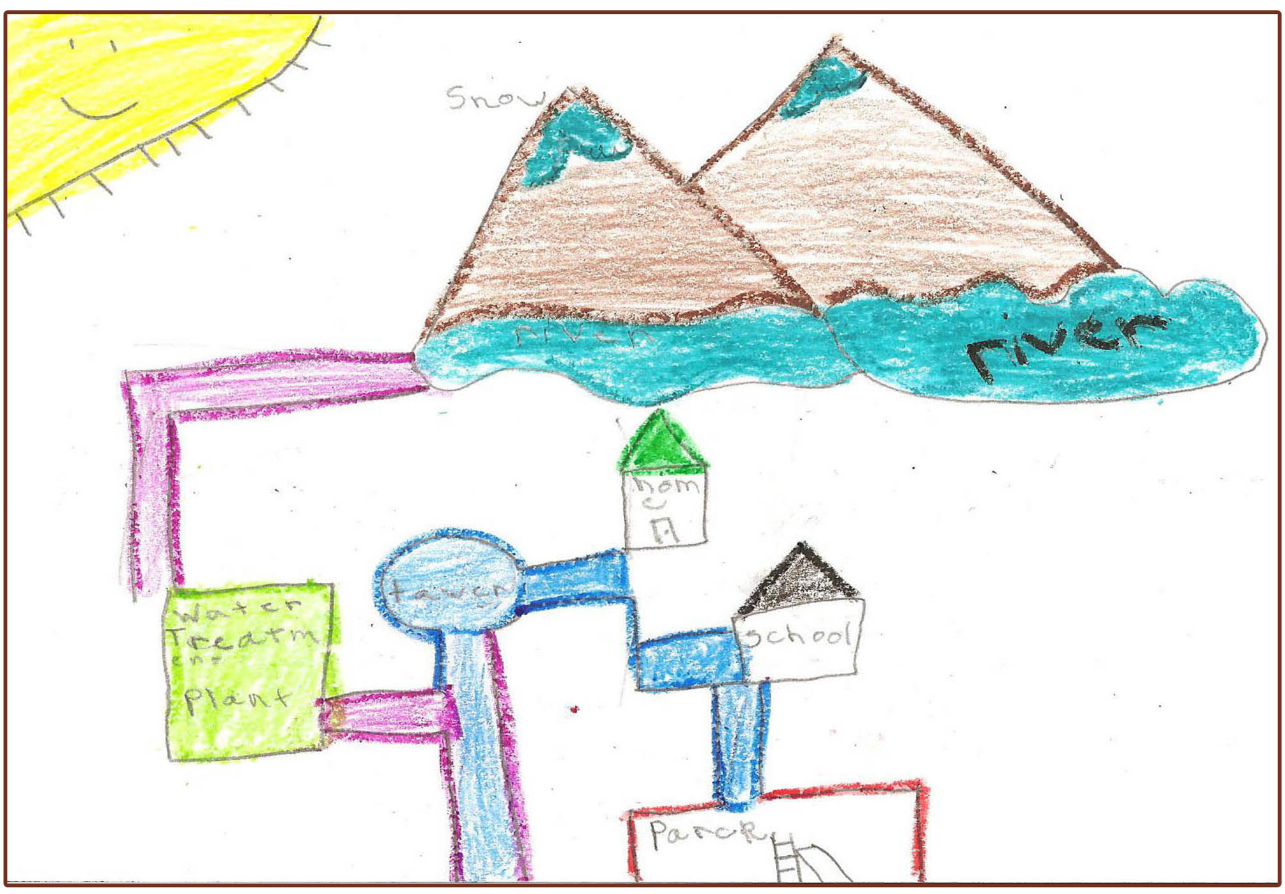
Dear Mrs. Coon,

Thank you for coming to our class. It was very fun doing all the activities with us. My favorite one w the contest. I was glad my group an won. It was very nice of you to come our class and explain how water very important. Enjoy!

From,
Jessica

Once Again
Thank You
Mrs. Coon

These drawings were done by second graders after seeing our "H20 to Go!" presentation



SAWS Water Education Program
Students Participating: All Outreach Programs
Comparison by School Year (SY)

	# of Students				
Program	**SY 05/06**	**SY 06/07**	**SY 07/08***	**SY 08/09****	**SY 09/10*****
In-Class Program:	8044	12357	15344	18293	18838
Large Audience Assembly Program	3002	11452	9925	13989	4459
Totals:	11046	23809	25269	32282	23297

* 46 GWM assemblies performed in the 2007/2008 school year covered under the 2007/2008 agreement with SYRCL
** 54 GWM assemblies performed in the 2008/2009 school year covered under the 2007/2008 agreement with SYRCL
*** 15 Zun Zun assemblies performed in the 2009/2010 school year covered under the 2009/2010 agreement with Zun Zun

SAWS Water Education Program Presentations and Events
School Year: 2009/2010
Category Breakdown

By Presentation Type

Quantity	Presentation Type	%
269	Classrooms	80%
9	Events	3%
42	After School Programs	13%
15	Other	4%
335		100%

By Grade

Grade	Clsrms	Students	%
K	24	656	3%
Gr 1	60	1484	8%
Gr 2	59	1364	7%
Gr 3	60	1504	8%
Gr 4	29	952	5%
Gr 5	37	1291	7%
Aftersch	42	3609	19%
Other	15	477	3%
Event	9	7501	40%
	335	18838	100%

By School District

Students	District	%
5617	SUSD	30%
2188	Lincoln	12%
1763	MUSD	9%
1973	Lodi	10%
574	Private	3%
719	Aspire	4%
6004	All *	32%
18838		100%

By Presenter

Presenter	Venues	Students	%
Kristin (KC)	107	3211	17%
Susan (SW)	174	5103	27%
Heather (HD)	41	3654	19%
Combo (KC/SW/HD)	13	6870	36%
	335	18838	100%

Total Schools Visited 08/09	
76	Total Schools

By Water Provider

Provider	Students	Title 1 Students	T1%
Cal Water	4220	3816	90%
City of Stockton	5295	3493	66%
SJ County/???	2007	1995	99%
All *	7316	N/A	0%
	18838	9304	49%

* Students or children reached through city or county wide events: unable to determine district, provider or Title 1 status

SAWS Water Education Program Presentations and Events
School Year: 2009/2010 (8/1/09-7/31/10)
Master Presentation List

Date	School	T-1	District	Water Provider	# Clsrms	Grade	Students	Presenter	Remarks
03/02/10	Adams Elementary	Y	SUSD	Cal Water	1	A	60	HD	
12/09/09	Adams Elementary	Y	SUSD	Cal Water	1	O	30	KC	
03/10/10	AgVenture (Lodi)	N	All	All	1	E	1220	KC/SW	
11/04/09	AgVenture (South County)	N	MUSD	All	1	E	1300	KC/SW	
02/17/10	AgVenture (Stockton)	N	All	All	1	E	1200	KC/SW	
01/27/10	Annunciation CES	N	Private	Cal Water	1	4	37	KC	
06/09/10	Annunciation CES	N	Private	Cal Water	1	3	35	KC/HD	
06/16/10	Annunciation CES	N	Private	Cal Water	1	5	35	KC/HD	
01/14/10	Ansel Adams Elementary	Y	Lodi	City of Stockton	1	1	23	KC	
06/10/10	APAPA	N	All	All	1	O	12	KC	comm mtg
09/15/09	APSARA	Y	SUSD	Cal Water	1	A	100	HD	
08/21/09	August Elementary	Y	SUSD	???	1	A	100	HD	
10/16/09	August Elementary	Y	SUSD	???	2	1	45	KC	
09/04/09	August Elementary	Y	SUSD	???	1	2	21	KC	
10/23/09	August Elementary	Y	SUSD	???	2	1	45	SW	
04/28/10	Ben Holt Univ Prep	Y	Aspire	City of Stockton	2	O	80	KC	High School
01/26/10	Brookside Elementary	N	Lincoln	City of Stockton	2	1	57	SW	
01/28/10	Brookside Elementary	N	Lincoln	City of Stockton	1	1	28	SW	
10/05/09	Brookside Elementary	N	Lincoln	City of Stockton	3	2	60	SW	
10/08/09	Brookside Elementary	N	Lincoln	City of Stockton	1	2	21	SW	

Date	School	T-1	District	Water Provider	# Clsrms	Grade	Students	Presenter	Remarks
10/09/09	Brookside Elementary	N	Lincoln	City of Stockton	1	2	21	SW	
09/29/09	Brookside Elementary	N	Lincoln	City of Stockton	1	3	21	SW	
10/06/09	Brookside Elementary	N	Lincoln	City of Stockton	1	3	21	SW	
05/24/10	Brookside Elementary	N	Lincoln	City of Stockton	1	4	35	SW	
05/27/10	Brookside Elementary	N	Lincoln	City of Stockton	1	4	34	SW	
05/28/10	Brookside Elementary	N	Lincoln	City of Stockton	1	4	34	SW	
10/26/09	Brookside Elementary	N	Lincoln	City of Stockton	1	5	40	SW	
12/04/09	Brookside Elementary	N	Lincoln	City of Stockton	1	5	40	SW	
12/05/09	Brookside Elementary	N	Lincoln	City of Stockton	2	5	70	SW	
02/16/10	Brookside Elementary	N	Lincoln	City of Stockton	2	K	58	SW	
02/18/10	Brookside Elementary	N	Lincoln	City of Stockton	1	K	28	SW	
11/06/09	Bush Elementary	Y	SUSD	City of Stockton	1	1	21	KC	
08/14/09	Bush Elementary	Y	SUSD	City of Stockton	1	3	25	KC	
08/18/09	Bush Elementary	Y	SUSD	City of Stockton	1	3	25	KC	
09/11/09	Bush Elementary	Y	SUSD	City of Stockton	1	3	25	KC	
03/01/10	Bush Elementary	Y	SUSD	City of Stockton	1	5	40	KC	
03/12/10	Bush Elementary	Y	SUSD	City of Stockton	1	A	100	KC	
11/10/09	Bush Elementary	Y	SUSD	City of Stockton	1	1	26	SW	
08/21/09	Bush Elementary	Y	SUSD	City of Stockton	1	2	25	SW	
09/10/09	Bush Elementary	Y	SUSD	City of Stockton	1	2	21	SW	
10/16/09	Bush Elementary	Y	SUSD	City of Stockton	1	2	23	SW	
11/19/09	Bush Elementary	Y	SUSD	City of Stockton	1	3	30	SW	
11/20/09	Bush Elementary	Y	SUSD	City of Stockton	1	3	25	SW	
10/29/09	Bush Elementary	Y	SUSD	City of Stockton	1	5	35	SW	

Date	School	T-1	District	Water Provider	# Clsrms	Grade	Students	Presenter	Remarks
01/19/10	Clairmont Elementary	Y	Lodi	City of Stockton	1	1	25	KC	
01/22/10	Clairmont Elementary	Y	Lodi	City of Stockton	2	1	49	SW	
03/17/10	Claudia Landeen Elementary	Y	Lincoln	City of Stockton	1	1	30	KC	
03/24/10	Claudia Landeen Elementary	Y	Lincoln	City of Stockton	1	1	28	KC	
11/09/09	Claudia Landeen Elementary	Y	Lincoln	City of Stockton	1	3	35	KC	
01/25/10	Claudia Landeen Elementary	Y	Lincoln	City of Stockton	1	5	35	KC	
04/06/10	Claudia Landeen Elementary	Y	Lincoln	City of Stockton	1	1	30	SW	
11/06/09	Claudia Landeen Elementary	Y	Lincoln	City of Stockton	1	3	21	SW	
11/10/09	Claudia Landeen Elementary	Y	Lincoln	City of Stockton	1	3	27	SW	
01/15/10	Claudia Landeen Elementary	Y	Lincoln	City of Stockton	1	5	35	SW	
01/29/10	Claudia Landeen Elementary	Y	Lincoln	City of Stockton	1	5	29	SW	
09/01/09	Cleveland Elementary	Y	SUSD	Cal Water	1	A	81	HD	
10/16/09	Commodore Stockton Skills	Y	SUSD	???	1	A	80	HD	
12/08/09	Commodore Stockton Skills	Y	SUSD	???	2	3	50	KC	
02/25/10	Commodore Stockton Skills	Y	SUSD	???	1	4	35	KC	
10/13/09	Commodore Stockton Skills	Y	SUSD	???	1	5	35	KC	
12/07/09	Commodore Stockton Skills	Y	SUSD	???	2	3	50	SW	
12/10/09	Commodore Stockton Skills	Y	SUSD	???	1	3	25	SW	
12/11/09	Commodore Stockton Skills	Y	SUSD	???	2	3	50	SW	
09/21/09	Davis Elementary	Y	Lodi	???	1	2	24	KC	
04/29/10	Davis Elementary	Y	Lodi	???	1	3	25	KC	
09/25/10	Davis Elementary	Y	Lodi	???	2	3	50	SW	
03/10/10	Dinner w/ Scientist	N	All	All	1	E	6	KC	
02/22/10	Don Riggio	Y	Lincoln	City of Stockton	2	5	70	KC	

Date	School	T-1	District	Water Provider	# Clsrms	Grade	Students	Presenter	Remarks
03/05/10	Don Riggio	Y	Lincoln	City of Stockton	2	5	64	KC	
03/26/10	Don Riggio	Y	Lincoln	City of Stockton	4	K	94	KC	"Delta Exp"
09/08/09	El Dorado Elementary	Y	SUSD	Cal Water	1	A	58	HD	
01/04/10	El Dorado Elementary	Y	SUSD	Cal Water	1	1	25	SW	
01/05/10	El Dorado Elementary	Y	SUSD	Cal Water	1	1	25	SW	
01/06/10	El Dorado Elementary	Y	SUSD	Cal Water	1	1	25	SW	
02/11/10	El Dorado Elementary	Y	SUSD	Cal Water	1	1	23	SW	
02/12/10	El Dorado Elementary	Y	SUSD	Cal Water	1	1	24	SW	
03/31/10	Elkhorn Elementary	N	Lodi	City of Stockton	1	4	40	KC	
04/07/10	Elkhorn Elementary	N	Lodi	City of Stockton	1	5	40	KC	
09/11/09	Elmwood Elementary	Y	SUSD	???	1	A	60	HD	
03/16/10	Fillmore Elementary	Y	SUSD	Cal Water	1	A	100	HD	
04/09/10	First Baptist	N	Private	Cal Water	1	2	30	SW	
08/10/09	First Baptist	N	Private	Cal Water	1	3	23	SW	
09/18/09	Fremont Elementary	Y	SUSD	Cal Water	1	A	100	HD	
03/19/10	Great Valley Elementary	Y	MUSD	City of Stockton	5	2	130	KC/SW	farm day
05/07/10	Grunsky Elementary	Y	SUSD	Cal Water	1	A	80	HD	
10/23/09	Hamilton Elementary	Y	SUSD	???	1	A	80	HD	
05/14/10	Hamilton Elementary	Y	SUSD	???	1	2	22	SW	
10/27/09	Harrison Elementary	Y	SUSD	Cal Water	1	A	100	HD	
05/25/10	Harrison Elementary	Y	SUSD	Cal Water	2	K	60	KC	
11/06/09	Hazelton Elementary	Y	SUSD	Cal Water	1	A	100	HD	
05/12/10	Hazelton Elementary	Y	SUSD	Cal Water	3	3	60	KC	
11/10/09	Henry Elementary	Y	SUSD	???	1	A	80	HD	

Date	School	T-1	District	Water Provider	# Clsrms	Grade	Students	Presenter	Remarks
05/18/10	Hong Kingston Elementary	Y	SUSD	City of Stockton	1	A	80	HD	
11/17/09	Hoover Elementary	Y	SUSD	???	1	A	80	HD	
10/20/09	Hoover Elementary	Y	SUSD	???	2	4	65	KC	
10/22/09	Hoover Elementary	Y	SUSD	???	1	4	30	SW	
04/27/10	Huerta Elementary	Y	SUSD	Cal Water	1	A	80	HD	
02/23/10	Huerta Elementary	Y	SUSD	Cal Water	2	K	46	SW	
01/14/10	John Muir Elementary	N	Lodi	City of Stockton	1	5	35	KC	
01/18/10	John Muir Elementary	N	Lodi	City of Stockton	1	5	45	KC	
02/16/10	John Muir Elementary	N	Lodi	City of Stockton	1	5	36	KC	
11/03/09	John Muir Elementary	N	Lodi	City of Stockton	2	1	45	SW	
11/05/09	John Muir Elementary	N	Lodi	City of Stockton	2	1	45	SW	
08/24/09	John Muir Elementary	N	Lodi	City of Stockton	1	2	25	SW	
09/22/09	John Muir Elementary	N	Lodi	City of Stockton	1	2	25	SW	
10/26/09	John Muir Elementary	N	Lodi	City of Stockton	1	2	25	SW	
10/27/09	John Muir Elementary	N	Lodi	City of Stockton	1	2	25	SW	
11/02/09	John Muir Elementary	N	Lodi	City of Stockton	1	5	35	SW	
02/22/10	John Muir Elementary	N	Lodi	City of Stockton	1	5	25	SW	
02/26/10	John Muir Elementary	N	Lodi	City of Stockton	2	K	88	SW	
06/29/10	JR Williams Elementary	Y	Lincoln	City of Stockton	1	2	14	SW	
01/29/10	Julia Morgan Elementary	Y	Lodi	City of Stockton	1	3	27	KC	
02/10/10	Julia Morgan Elementary	Y	Lodi	City of Stockton	1	3	25	KC	
04/12/10	Julia Morgan Elementary	Y	Lodi	City of Stockton	2	4	41	KC	
04/19/10	Julia Morgan Elementary	Y	Lodi	City of Stockton	1	4	40	KC	
03/08/10	Julia Morgan Elementary	Y	Lodi	City of Stockton	2	1	46	SW	

Date	School	T-1	District	Water Provider	# Clsrms	Grade	Students	Presenter	Remarks
03/09/10	Julia Morgan Elementary	Y	Lodi	City of Stockton	2	1	47	SW	
04/26/10	Julia Morgan Elementary	Y	Lodi	City of Stockton	2	2	47	SW	
04/27/10	Julia Morgan Elementary	Y	Lodi	City of Stockton	2	2	47	SW	
04/29/10	Julia Morgan Elementary	Y	Lodi	City of Stockton	1	2	23	SW	
01/28/10	Julia Morgan Elementary	Y	Lodi	City of Stockton	1	3	27	SW	
02/01/10	Julia Morgan Elementary	Y	Lodi	City of Stockton	1	3	24	SW	
02/02/10	Julia Morgan Elementary	Y	Lodi	City of Stockton	1	3	23	SW	
04/13/10	Julia Morgan Elementary	Y	Lodi	City of Stockton	1	4	32	SW	
12/01/09	Kennedy Elementary	Y	SUSD	City of Stockton	1	A	100	HD	
07/13/10	Kid's College (SJ Delta)	N	Private	All	1	O	12	KC	
12/08/09	King Elementary	Y	SUSD	City of Stockton	1	A	100	HD	
09/22/09	King Elementary	Y	SUSD	City of Stockton	1	2	24	KC	
10/23/09	King Elementary	Y	SUSD	City of Stockton	1	2	23	KC	
10/15/09	King Elementary	Y	SUSD	City of Stockton	2	2	45	SW	
10/19/09	King Elementary	Y	SUSD	City of Stockton	2	2	45	SW	
12/05/09	Kohl Open School	Y	SUSD	Cal Water	1	A	100	HD	
05/05/10	Komure Elementary	Y	MUSD	City of Stockton	1	E	225	HD	Farm Day
04/08/10	Komure Elementary	Y	MUSD	City of Stockton	1	4	40	KC	
09/01/09	Komure Elementary	Y	MUSD	City of Stockton	1	1	35	SW	
01/19/10	Komure Elementary	Y	MUSD	City of Stockton	1	1	33	SW	
05/27/10	KWIN/KAT Country Promo	N	All	All	1	E	600	SW	
06/21/10	Lakeside Christian	N	Private	City of Stockton	1	1	16	KC	
06/23/10	Lakeside Christian	N	Private	City of Stockton	1	3	22	KC	
06/24/10	Lakeside Christian	N	Private	City of Stockton	1	4	40	KC	

Date	School	T-1	District	Water Provider	# Clsrms	Grade	Students	Presenter	Remarks
06/22/10	Lakeside Christian	N	Private	City of Stockton	1	2	15	SW	
06/25/10	Lakeside Christian	N	Private	City of Stockton	1	5	35	SW	
04/14/10	Lincoln Elementary	Y	Lincoln	???	2	K	50	KC	
04/20/10	Lincoln Elementary	Y	Lincoln	???	2	K	45	SW	
02/24/10	Lincoln HS	N	SUSD	???	1	O	12	KC	"Window"
04/13/10	Lincoln USD	Y	Lincoln	???	1	O	40	SW	PTO
04/23/10	Mabel Barron Elementary	N	Lincoln	City of Stockton	1	2	25	KC	
06/17/10	Mabel Barron Elementary	N	Lincoln	City of Stockton	1	4	35	KC	
05/07/10	Mabel Barron Elementary	N	Lincoln	City of Stockton	1	E	150	KC/SW	
03/25/10	Mabel Barron Elementary	N	Lincoln	City of Stockton	1	1	28	SW	
05/11/10	Mabel Barron Elementary	N	Lincoln	City of Stockton	2	1	56	SW	
05/13/10	Mabel Barron Elementary	N	Lincoln	City of Stockton	1	1	32	SW	
04/30/10	Mabel Barron Elementary	N	Lincoln	City of Stockton	2	2	50	SW	
03/23/10	Mabel Barron Elementary	N	Lincoln	City of Stockton	2	3	56	SW	
12/15/09	Madison Elementary	Y	SUSD	Cal Water	1	A	100	HD	
05/03/10	Manlio Silva Elementary	Y	Lodi	City of Stockton	1	4	35	KC	
05/04/10	Manlio Silva Elementary	Y	Lodi	City of Stockton	1	4	35	KC	
04/02/10	Manlio Silva Elementary	Y	Lodi	City of Stockton	1	5	40	KC	
04/16/10	Manlio Silva Elementary	Y	Lodi	City of Stockton	1	5	40	KC	
04/08/10	Manlio Silva Elementary	Y	Lodi	City of Stockton	1	5	40	SW	
04/15/10	Manlio Silva Elementary	Y	Lodi	City of Stockton	1	5	32	SW	
08/28/09	Marshall Elementary	Y	SUSD	Cal Water	1	A	100	HD	
05/17/10	Marshall Elementary	Y	SUSD	Cal Water	2	1	42	SW	
11/20/09	McKinley Elementary	Y	SUSD	Cal Water	1	A	80	HD	

Date	School	T-1	District	Water Provider	# Clsrms	Grade	Students	Presenter	Remarks
10/27/09	Merryhill Brookside	N	Private	City of Stockton	1	3	30	SW	
12/11/09	Monroe Elementary	Y	SUSD	???	1	A	100	HD	
03/23/10	Montezuma Elementary	Y	SUSD	Cal Water	1	A	80	HD	
10/20/09	Nightingale Elementary	Y	SUSD	Cal Water	1	A	80	HD	
11/09/09	Oakwood Elementary	Y	Lodi	City of Stockton	2	1	44	SW	
11/12/09	Oakwood Elementary	Y	Lodi	City of Stockton	2	1	47	SW	
04/12/10	Oakwood Elementary	Y	Lodi	City of Stockton	1	2	22	SW	
04/19/10	Oakwood Elementary	Y	Lodi	City of Stockton	1	2	22	SW	
05/06/10	Oakwood Elementary	Y	Lodi	City of Stockton	2	2	46	SW	
05/06/10	Pittman Elementary	Y	SUSD	Cal Water	1	2	25	KC	
08/12/09	Pittman Elementary	Y	SUSD	Cal Water	2	3	40	KC	
11/20/09	Pittman Elementary	Y	SUSD	Cal Water	1	5	30	KC	
04/06/10	Pittman Elementary	Y	SUSD	Cal Water	1	A	80	KC	
11/17/09	Pittman Elementary	Y	SUSD	Cal Water	1	1	23	SW	
08/13/09	Pittman Elementary	Y	SUSD	Cal Water	2	3	40	SW	
08/14/09	Pittman Elementary	Y	SUSD	Cal Water	1	3	20	SW	
11/19/09	Pittman Elementary	Y	SUSD	Cal Water	1	5	34	SW	
04/28/10	Pittman Elementary	Y	SUSD	Cal Water	1	K	24	SW	
05/15/10	Pixie Woods Children's Day	N	All	All	1	E	1600	SW/HD	
09/14/09	Podesta Ranch Elementary	Y	Lodi	City of Stockton	1	2	23	KC	
04/01/10	Podesta Ranch Elementary	Y	Lodi	City of Stockton	1	4	40	KC	
09/28/09	Podesta Ranch Elementary	Y	Lodi	City of Stockton	2	1	44	SW	
09/11/09	Podesta Ranch Elementary	Y	Lodi	City of Stockton	1	2	25	SW	
09/18/09	Podesta Ranch Elementary	Y	Lodi	City of Stockton	1	3	25	SW	

Date	School	T-1	District	Water Provider	# Clsrms	Grade	Students	Presenter	Remarks
01/21/10	Podesta Ranch Elementary	Y	Lodi	City of Stockton	2	4	55	SW	
11/16/09	Podesta Ranch Elementary	Y	Lodi	City of Stockton	1	5	32	SW	
05/10/10	Port City Academy	Y	Aspire	Cal Water	2	1	44	KC	
05/10/10	Port City Academy	Y	Aspire	Cal Water	2	K	44	KC	
09/24/09	Port City Academy	Y	Aspire	Cal Water	2	2	50	SW	
11/30/09	Port City Academy	Y	Aspire	Cal Water	2	3	60	SW	
04/23/10	Pulliam Elementary	Y	SUSD	City of Stockton	1	A	80	HD	
05/11/10	Rio Calaveras Elementary	Y	SUSD	City of Stockton	1	A	80	HD	
09/22/09	Roosevelt Elementary	Y	SUSD	Cal Water	1	A	100	HD	
04/26/10	Roosevelt Elementary	Y	SUSD	Cal Water	1	3	25	KC	
03/02/10	Roosevelt Elementary	Y	SUSD	Cal Water	1	3	28	SW	
04/09/10	Roosevelt Elementary	Y	SUSD	Cal Water	1	3	30	SW	
04/23/10	Roosevelt Elementary	Y	SUSD	Cal Water	1	3	23	SW	
02/10/10	Rosa Parks Elementary	Y	Aspire	Cal Water	1	1	22	KC	
06/07/10	Rosa Parks Elementary	Y	Aspire	Cal Water	1	4	35	KC	
05/24/10	Rosa Parks Elementary	Y	Aspire	Cal Water	2	5	80	KC	
02/09/10	Rosa Parks Elementary	Y	Aspire	Cal Water	1	1	22	SW	
02/11/10	Rosa Parks Elementary	Y	Aspire	Cal Water	1	1	22	SW	
08/18/09	Rosa Parks Elementary	Y	Aspire	Cal Water	1	2	25	SW	
09/03/09	Rosa Parks Elementary	Y	Aspire	Cal Water	2	2	50	SW	
09/04/09	Rosa Parks Elementary	Y	Aspire	Cal Water	1	2	25	SW	
08/20/09	Rosa Parks Elementary	Y	Aspire	Cal Water	2	3	50	SW	
12/18/09	San Joaquin Elementary	Y	SUSD	Cal Water	1	A	100	HD	
09/14/09	San Joaquin Elementary	Y	SUSD	Cal Water	1	1	21	KC	

Date	School	T-1	District	Water Provider	# Clsrms	Grade	Students	Presenter	Remarks
09/18/09	San Joaquin Elementary	Y	SUSD	Cal Water	1	1	21	KC	
08/24/09	San Joaquin Elementary	Y	SUSD	Cal Water	1	1	25	SW	
09/21/09	San Joaquin Elementary	Y	SUSD	Cal Water	1	1	23	SW	
11/16/09	San Joaquin Elementary	Y	SUSD	Cal Water	1	1	26	SW	
03/15/10	Sierra Christian Elementary	N	Private	Cal Water	1	1	29	SW	
03/15/10	Sierra Christian Elementary	N	Private	Cal Water	1	3	21	SW	
03/16/10	Sierra Christian Elementary	N	Private	Cal Water	1	4	21	SW	
03/16/10	Sierra Christian Elementary	N	Private	Cal Water	1	5	19	SW	
09/01/09	SJ Delta College	N	All	All	1	O	45	KC	
10/06/09	SJ Delta College	N	All	All	1	O	41	KC	
01/26/10	SJ Delta College	N	All	All	1	O	40	KC	
04/06/10	SJ Delta College	N	All	All	1	O	40	KC	
04/13/10	Spanos Elementary	Y	SUSD	Cal Water	1	A	80	HD	
05/14/10	St. George Elementary	Y	SUSD	Cal Water	1	A	30	HD	
03/22/10	St. Luke's CES	N	Private	Cal Water	1	4	25	KC	
03/04/10	St. Luke's CES	N	Private	Cal Water	1	1	29	SW	
04/22/10	St. Luke's CES	N	Private	Cal Water	1	2	23	SW	
02/12/10	St. Luke's CES	N	Private	Cal Water	1	3	27	SW	
03/04/10	St. Luke's CES	N	Private	Cal Water	1	5	20	SW	
03/05/10	St. Luke's CES	N	Private	Cal Water	1	K	30	SW	
03/03/10	Stagg HS	Y	SUSD	Cal Water	3	O	90	KC	
04/18/10	Stockton Earth Day	N	All	All	1	E	1200	KC/SW	
08/18/09	Taft Elementary	Y	SUSD	Cal Water	1	A	100	HD	
05/04/10	Taylor Elementary	Y	SUSD	Cal Water	1	A	80	HD	

Date	School	T-1	District	Water Provider	# Clsrms	Grade	Students	Presenter	Remarks
09/15/09	Taylor Elementary	Y	SUSD	Cal Water	2	2	45	SW	
09/17/09	Taylor Elementary	Y	SUSD	Cal Water	2	2	45	SW	
03/11/10	Tully Knoles Elementary	Y	Lincoln	???	1	1	28	KC	
03/18/10	Tully Knoles Elementary	Y	Lincoln	???	2	1	60	KC	
05/21/10	Tully Knoles Elementary	Y	Lincoln	???	2	2	41	KC	
02/03/10	Tully Knoles Elementary	Y	Lincoln	???	1	3	27	KC	
05/20/10	Tully Knoles Elementary	Y	Lincoln	???	1	4	35	KC	
05/20/10	Tully Knoles Elementary	Y	Lincoln	???	2	2	41	SW	
02/04/10	Tully Knoles Elementary	Y	Lincoln	???	1	3	26	SW	
02/05/10	Tully Knoles Elementary	Y	Lincoln	???	1	3	26	SW	
05/18/10	Tully Knoles Elementary	Y	Lincoln	???	2	4	63	SW	
12/14/09	Tully Knoles Elementary	Y	Lincoln	???	1	5	35	SW	
12/15/09	Tully Knoles Elementary	Y	Lincoln	???	1	5	35	SW	
12/18/09	Tully Knoles Elementary	Y	Lincoln	???	1	5	35	SW	
02/19/10	Tully Knoles Elementary	Y	Lincoln	???	3	K	89	SW	
08/25/09	Tyler Elementary	Y	SUSD	???	1	A	100	HD	
08/31/09	Tyler Elementary	Y	SUSD	???	1	3	21	KC	
08/25/09	Tyler Elementary	Y	SUSD	???	1	3	25	SW	
09/08/09	Tyler Elementary	Y	SUSD	???	1	3	21	SW	
09/25/10	Valenzuela Elementary	Y	SUSD	City of Stockton	1	A	100	HD	
03/09/10	Van Buren Elementary	Y	SUSD	Cal Water	1	A	60	HD	
12/17/09	Venture Academy	N	Aspire	City of Stockton	1	4	35	KC	
12/04/09	Venture Academy	N	Aspire	City of Stockton	1	5	40	KC	
10/08/09	Venture Academy	N	Aspire	City of Stockton	1	O	35	KC	

Date	School	T-1	District	Water Provider	# Clsrms	Grade	Students	Presenter	Remarks
11/13/09	Victory Elementary	Y	SUSD	Cal Water	1	A	80	HD	
04/16/10	Wagner-Holt Elementary	Y	Lodi	City of Stockton	1	3	40	KC	
12/10/09	Wagner-Holt Elementary	Y	Lodi	City of Stockton	1	4	35	KC	
03/11/10	Wagner-Holt Elementary	Y	Lodi	City of Stockton	1	3	25	SW	
03/12/10	Wagner-Holt Elementary	Y	Lodi	City of Stockton	1	3	25	SW	
04/15/10	Wagner-Holt Elementary	Y	Lodi	City of Stockton	1	3	22	SW	
11/03/10	Washington Elementary	Y	SUSD	Cal Water	1	A	100	HD	
10/13/09	Wilson Elementary	Y	SUSD	Cal Water	1	A	80	HD	
Totals:					**335**		**18838**		

KEY

Grade	Description
K	Kindergarten
1 - 5	Grade Level
A	After School Program
E	Event
O	Other

Appendix I

Stockton East Water District Rates – 2010 Base Monthly Payment and Groundwater Assessment Calculations

SCHEDULE C

STOCKTON EAST WATER DISTRICT
CALCULATION OF RATE EQUALIZATION GW ASSESSMENT &
BASE MONTHLY PAYMENT
FY 2010-2011 BUDGET

CALCULATION OF RATE EQUALIZATION GW ASSESSMENT

(A) Assumed Groundwater Pumping Cost:

Power cost per acre foot	70.00
Operation & Maintenance cost	36.00
Replacement costs	10.00
Total GW Pumping Cost	116.00

(B) Calculation of Rate Equalization Groundwater Assessment:

2009 - 2010 (Budget)	Water Production	$ Cost/AF	Amount
Ground water	26,500 AF	116.00	3,074,000.00
Surface water	55,000 AF	325.10	17,880,668.83
Totals	81,500 AF		20,954,668.83
GW Rate Equalization Assessment:	$20,954,668.83 /	81,500	$257.11
Less: GW Pumping Cost			(116.00)
2009-2010 GW Rate Equalization Assessment			**$141.11**

2010 - 2011 (Budget)	Water Production	$ Cost/AF	Amount
Ground water	26,500 AF	116.00	3,074,000.00
Surface water	55,000 AF	354.14	19,477,684.17
Totals	81,500 AF		22,551,684.17
GW Rate Equalization Assessment:	$22,551,684.17 /	81,500	$276.71
Less: GW Pumping Cost			(116.00)
2010-2011 GW Rate Equalization Assessment			**$160.71**

BASE MONTHLY PAYMENT (BMP) \CALCULATION

Treatment Plant Budget - FY 2010-2011			(a)	**19,477,684.17**
Revenue - Groundwater Rate Equalization	22,500 AF	160.71		3,615,975.00
Interest Income - M&O Funds				96,000.00
Total Revenues before Base Monthly Payment			(b)	**3,711,975.00**
Total Annual Payment (a)-(b)			(c)	**15,765,709.17**
Less: Prior Fiscal Year BMP adjustment (credit)			(d)	(1,274,502.72) *
Total - Adjusted Annual Payment - FY 2010-2011				**14,491,206.45**

Total Base Monthly Payment - (c) divided by 12 months	**1,313,809.10**
Less: BMP adjustment (credit) for prior fiscal year - (d) divided by 12 months	(106,208.56) *
Total Adjusted BMP - FY 2010-2011	**1,207,600.54**

**Based on final audited statements for FY 2008-2009.*

PRORATION OF BASE MONTHLY PAYMENT
FOR FISCAL YEAR 2010-2011 (04/01/10 - 03/31/11)

Total Base Monthly Payment FY 20010-2011 (per month)	**1,313,809.10**
Add/(Less): BMP adjustment	(106,208.56)
Total Adjusted Base Monthly Payment FY 2010-2011	**1,207,600.54**

	2008-2009 Water Use (AF)				**2010-2011** Base Monthly Payment	**2009-2010** Base Monthly Payment	**Difference**
	Surface	Well	Total	Percentage			
City of Stockton	26,584	10,282	36,866	52.262648%	$ **631,124.03**	532,980.54	$ **98,143.49**
Lincoln Village	1,308	745	2,053	2.910168%	$ **35,143.20**	22,810.63	$ **12,332.57**
Colonial Heights	426	8	434	0.615198%	$ **7,429.12**	7,429.22	$ **(0.09)**
Cal Water	20,384	10,803	31,187	44.211987%	$ **533,904.20**	451,465.29	$ **82,438.90**
Totals	48,702	21,838	70,540	100.000000%	$ **1,207,600.54**	1,014,685.68	$ **192,914.86**

ORDINANCE NO. 34
Adopted 4/13/10

AN ORDINANCE ESTABLISHING MUNICIPAL GROUNDWATER ASSESSMENTS, AGRICULTURAL GROUNDWATER ASSESSMENTS, DOMESTIC GROUNDWATER ASSESSMENTS AND CHARGES FOR STREAM-DELIVERED WATER FOR CALENDAR YEAR 2010

The Board of Directors of Stockton East Water District does ordain as follows:

Section 1: The Municipal Groundwater Assessment for calendar year 2010 shall be One Hundred Sixty Dollars and Seventy One Cents ($160.71) for Rate Equalization and Three Dollars and Sixty Cents ($3.60) for base Groundwater Production Assessment or a Total Municipal Groundwater Assessment of One Hundred Sixty Four Dollars and Thirty-One Cents ($160.71 + $3.60= $164.31) per acre foot of water.

Section 2: The Agricultural Groundwater Assessment for calendar year 2010 shall be Four Dollars and Fifty-Eight Cents ($4.58) per acre foot of water.

Section 3: The Domestic Groundwater Assessment for calendar year 2010 shall be Thirty-Seven Dollars and Fifty Cents ($37.50) per Domestic Use Unit.

Section 4: The rate for sales of stream-delivered water for calendar year 2010 shall be Twenty Dollars ($20.00) per acre foot of water.

Section 5: This ordinance shall take effect thirty (30) days after its final passage, and shall be published at least once in a newspaper of general circulation within fifteen (15) days after its final passage, with the names of the members of the Board of Directors voting for and against the same.

AYES:	Atkins, Cortopassi, McGaughey, McGurk, Panizza, Sanguinetti, and Watkins
NOES:	None
ABSTAIN:	None
ABSENT:	None

ANDREW WATKINS, President
Board of Directors
Stockton East Water District

ATTEST:

KEVIN M. KAUFFMAN, Secretary
Board of Directors
Stockton East Water District

RULE NO. 161

ADOPTED 04/13/10

RULE FOR RATE EQUALIZATION - CALENDAR YEAR 2010

WHEREAS, the District Act authorizes the Board to adopt rules and regulations as it deems necessary and proper for carrying out the provisions of the Act; and

WHEREAS, paragraph 6D (3) of the Second Amended Contract among SEWD; City of Stockton, County of San Joaquin and California Water Service Company states that "Stockton East shall annually levy a municipal groundwater assessment, pursuant to its enabling legislation such that the cost of groundwater use is equivalent to the cost of surface water use";

NOW, THEREFORE, THE BOARD OF DIRECTORS OF STOCKTON EAST WATER DISTRICT HEREBY ENACTS AND ESTABLISHES THE FOLLOWING RULES TO LEVY A GROUNDWATER ASSESSMENT TO EQUALIZE THE COST OF GROUNDWATER AND SURFACE WATER FOR 2010:

1. POWER COST -- Use actual power costs submitted by owner to accommodate for differences in water depth, pumping efficiency, system pressure, etc. In the absence of actual power costs, the cost of $70 per acre foot will be assumed.

2. OPERATION AND & MAINTENANCE COST -- Includes labor, repairs, chemicals, treatment costs and the current $3.60 assessment. The cost of $36 per acre foot will be assumed.

3. AMORTIZATION AND DEPRECIATION COST -- Includes well and equipment replacement. The cost of $10 per acre foot will be assumed.

4. FORMULA FOR RATE EQUALIZATION -- Surface water costs plus Groundwater costs divided by total M & I water production equals cost per acre foot. The assumed costs and water production for 2010 are as follows:

Ground water	26,500 AF X $116.00 =	$3,074,000
Surface water	55,000 AF X $354.14 =	$19,477,684
Totals	81,500 AF	$22,551,684

   The total cost of $22,551,684 divided by total use of 81,500 AF equals $276.71 per acre foot. The assumed 2010 additional groundwater assessment is $276.71 less $116 (total of items 1-3 above), or $160.71.

5. Any municipal groundwater user has the right to appeal the amount of this additional $160.71 per acre foot rate equalization assessment if it can be demonstrated that actual groundwater production costs are higher than the assumed $116 per acre foot. The appeal process will begin with the Administration Committee of the District Board and if necessary can be appealed to the full Board.

6. Any appeal which is granted shall entitle the appellant to a refund of the amount demonstrated to have been over-collected, less the actual costs to the District of processing the appeal and refund, provided that no overpayment shall be refunded unless the request for appeal has been filed with the Secretary of the District within three years of such overpayment.

Appendix J

AB 1420 Self Certification Table 1

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

MAR 2 1 2011
KMK

March 15, 2011

Mr. Kevin Kauffman
General Manager
Stockton East Water District
6767 East Main Street
Stockton, California 95215

Dear Mr. Kauffman:

The Department of Water Resources (DWR) has reviewed the Stockton East Water District's (SEWD) Self-Certification Statement – Table 1 submitted on March 10, 2011, regarding implementation of the Urban Best Management Practices (BMPs).

The purpose of DWR's review is to determine eligibility of SEWD to receive water management grant or loan funds. DWR has followed the *Draft AB 1420 Compliance Requirements* dated June 1, 2009. For detailed information, please visit http://www.water.ca.gov/wateruseefficiency/finance/.

Based on DWR's review of the information in Table 1, SEWD has and is currently implementing the BMPs consistent with AB 1420 and, therefore, is eligible to receive water management grant or loan funds.

DWR reserves the right to request additional information and documentation, including reports from SEWD to substantiate the accuracy of the information provided in Table 1. DWR may reverse or modify its eligibility determination and notify you and the funding agency if inaccuracies are found in the supporting documentation or in Table 1.

If you have any questions, please contact me at (916) 651-7025 or Betsy Vail at (916) 651-9667.

Sincerely,

Fethi BenJemaa

Fethi BenJemaa
Ag Water Use Efficiency Section Chief

AB 1420 Self- Certification Statement Table 1

Note: Table 1 documents Status of Past and Current BMP implementation.

Self-Certification Statement: The Urban Water Supplier and its authorized representative certifies, under penalty of perjury, that all information and claims, stated in this table, regarding compliance and implementation of the BMPs, including alternative conservation approaches, are true and accurate. This signed AB 1420 Self-Certification Statement Table 1, and Table 2 are the basis for granting funds by the Funding Agency. Falsification and/or inaccuracies in AB 1420 Self Certification Statement Table 1, and Table 2 and in any supporting documents substantiating such claims may, at the discretion of the funding agency, result in loss of all State funds to the applicant. Additionally, the Funding Agency, in its sole discretion, may halt disbursement of grant or loan funds, not pay pending invoices, and/or pursue any other applicable legal remedy and refer the matter to the Attorney General's Office.

Name of Signatory___Kevin M. Kauffman____________Title of Signatory ___General Manager__________ Signature of signatory ______ Date 3/10/11

Application Date: 1/7/11

Proposal Identification Number: ______ CUWCC Member? Yes/No: No

Has Urban Water Supplier submitted a 2005 Urban Water Management Plan? Yes/No: Yes

Is the UWM Plan Deemed Complete by DWR? Yes/No: Yes

Applicant Name: Stocton East Water District

Project Title: 35 Acre Recharge Pond and Conjuctive Use Project

Applicant's Contact Information: Name: Kevin Kauffman Phone: (209)948-0333 E-mail: kkauffman@sewd.net

Participants:

Retailer (List Below)	Wholesaler (List Below)

C1

C2	C3	C4	C5	*C6	C7	**C8	**C9	**C10	C11	C12	C13	C14	C15	C16	C17	C18
			BMP Implemented by Retailers and/or Wholesalers / BMP			Compliance Options/Alternative Conservation Approaches (1)			BMP Is Exempt (2)			BMP Implementation Requirements Met				
BMPs required for Wholesale Supplier	BMPs required for Retail Supplier	BMPs	Retailer Yes/No	Wholesaler Yes/No	Regional Yes/No	BMP Checklist	Flex Track	Gallons Per Capita Per Day GPCD	Not Cost Effective	Lack of Funding	Lack of Legal Authority	CUWCC MOU Requirement Met: Retailer Yes/No	CUWCC MOU Requirement Met: Wholesaler Yes/No	Date of BMP Report Submitted to CUWCC for (2007-2008) (MOU Signatories)	Date BMP Implementation Data Submitted to DWR in CUWCC Format (Non MOU Signatories) (3)	All Supporting Documents have been Submitted Yes/No
	✓	BMP 1 Water Survey for Single/Multi-Family Residential Customers														
	✓	BMP 2 Residential Plumbing Retrofit														
✓	✓	BMP 3 System Water Audits, Leak Detection		yes		✓							yes		na	yes
✓	✓	BMP 3 Leak Repairs		yes		✓							yes		na	yes
	✓	BMP 4 Metering with Commodity Rates for All New connections														
	✓	BMP 4 Retrofit of Existing Connections														

C1

C2	C3	C4	C5	*C6	C7	**C8	**C9	**C10	C11	C12	C13	C14	C15	C16	C17	C18
			BMP Implemented by Retailers and/or Wholesalers / BMP			Compliance Options/Alternative Conservation Approaches (1)			BMP is Exempt (2)			BMP Implementation Requirements Met				
BMPs required for Wholesale Supplier	BMPs required for Retail Supplier	BMPs	Retailer Yes/No	Wholesaler Yes/No	Regional Yes/No	BMP Checklist	Flex Track	Gallons Per Capita Per Day GPCD	Not Cost Effective	Lack of Funding	Lack of Legal Authority	CUWCC MOU Requirement Met: Retailer Yes/No	CUWCC MOU Requirement Met: Wholesaler Yes/No	Date of BMP Report Submitted to CUWCC for (2007-2008) (MOU Signatories)	Date BMP Implementation Data Submitted to DWR in CUWCC Format (Non MOU Signatories) (3)	All Supporting Documents have been Submitted Yes/No
	✓	BMP 5 Large Landscape Conservation Programs and Incentives														
	✓	BMP 6 High-Efficiency Washing Machine Rebate Programs														
✓	✓	BMP 7 Public Information		yes		✓							yes		na	yes
✓	✓	BMP 8 School Education		yes		✓							yes		na	yes
	✓	BMP 9 Conservation programs for Commercial, Industrial, and Institutional (CII) Accounts														
✓		BMP 10 Wholesale Agency Assistance Programs		yes		✓							yes		na	yes
	✓	BMP 11 Conservation Pricing														
✓	✓	BMP 12 Conservation Coordinator		yes		✓							yes		na	yes
	✓	BMP 13 Water Waste Prohibitions														
	✓	BMP 14 Residential ULFT Replacement Programs														

***C6**: Wholesaler may also be a retailer (supplying water to end water users)
****C8, **C9, **, and C10**: Agencies choosing an alternative conservation approach are responsible for achieving water savings equal or greater than that which they would have achieved using only BMP list.

(1) For details, please see: http://www.cuwcc.org/mou/exhibit-1-bmp-definitions-schedules-requirements.aspx.
(2) BMP is exempt based on cost-effectiveness, lack of funding, and lack of legal authority criteria as detailed in the CUWCC MOU
(3) Non MOU signatories must submit to DWR reports and supporting documents in the same format as CUWCC.

Appendix K

Mandatory Water Use Reduction Ordinance (City of Stockton Municipal Code)

Chapter 13.28 WATER CONSERVATION

13.28.010 Definitions.

Unless the context requires otherwise, the following definitions shall be used in the interpretation and construction of this chapter. Words used in the present tense include the future; the singular number includes the plural and the plural the singular.

"Alternate water source" means water from sloughs, canals, streams, rivers or nonpotable wells which is acquired with permission from the responsible owner or agency with jurisdiction.

"Director" means the Director of Municipal Utilities of the City.

"Person" means any individual, firm, organization, partnership, association, trust, company, business, corporation, public entity, political entity, or any agent thereof.

"Reclaimed" and "reclaimed water" refer to the process of reusing the soap/water solution and to that portion of the soap/water solution which is recaptured, processed, and reused at a non-self service commercial car wash facility.

"Recycled water" means water from the City of Stockton Regional Wastewater Control Facility supplied from designated hydrants under permit from the State Regional Water Quality Control Board.

"Waste" means any inefficient or unreasonable use of or unreasonable method of use of water.

"Water" means any water used in the City. (Prior code § 9-710)

13.28.020 Application of regulations.

The provisions of this chapter shall apply to all persons using water in the City regardless of whether any person using water shall have a contract for water service with the City. Notwithstanding other provisions of this code inconsistent with the chapter, the provisions of this chapter shall supersede and prevail until termination of this chapter, except during a declared water shortage emergency, Stage 2, 3, 4 or 5, in which event the provisions of Chapter 13.32 shall prevail. (Prior code § 9-711)

13.28.030 Regulations.

It is unlawful during the period May 1st to November 1st of each year for any person to use, permit or allow the use of water in any of the following manners:

A. Any use of potable water from any fire hydrant is prohibited except by regularly constituted fire protection agencies for fire suppression purposes or by the responsible water agency, when alternate water sources or reclaimed water sources are available. In the absence of alternate water sources or recycled water sources, potable water from any fire hydrant may be used provided a permit for such use is approved by the Fire Department and the responsible water agency.

B. For exterior irrigation except as follows:

1. These provisions shall apply to all exterior irrigation including but not limited to public, private and commercial locations.

2. Irrigation shall be prohibited between the hours of 11:00 a.m. to 6:00 p.m.

3. To conduct exterior irrigation in such a manner or extent that allows water to run off or escape from the premises or to be wasted.

4. Exceptions to the above regulations:

a. Drip and/or mist irrigation systems.

b. During the initial 21-day period of establishment for new plantings the above regulations shall not apply.

c. Other uses which cannot reasonably comply with the above regulations due to the large size, normal hours of use or type of use of the area to be irrigated may be excepted upon approval by the Director of a water conservation plan which meets the goals of reduction and conservation.

C. To allow the escape of water through leaks, breaks, or malfunction within the water user’s plumbing or distribution system for any period of time within which such break or leak should reasonably have been discovered and corrected. It shall be presumed that a period of 24 hours after the water user discovers such break, leak, or malfunction, or receives notice from the City, any water provider or enforcement authority of such condition, whichever occurs first, is a reasonable time within which to correct such condition or to make arrangements for correction.

D. The use of water for washing cars or boats is permitted only with the use of a quick-acting positive shut-off nozzle on the hose.

E. The operation of any non-self service commercial car wash unless the soap/water solution for such use is reclaimed. If a reclaimed water system cannot be installed, the car wash operator shall submit a plan satisfactory to the Director to modify operation of the facility to reduce its usage of water by at least 20 percent of its usage during the same month of the prior year for comparable business volume. If there is no history of prior use, the operator shall provide to the Director data comparable to such history to establish its base monthly usage.

F. Restaurants shall serve water to customers only upon request.

G. Use of water for cleaning building or mobile home exteriors shall be prohibited except as follows:

1. With the use of a bucket and sponge; or

2. For the preparation of such exterior surfaces for the purpose of repair or repainting with the use of a pressurized washing device equipped with a quick acting positive shut off.

H. Use of water in publicly displayed ornamental fountains in public and commercial establishments shall be prohibited unless the water is recirculated.

I. Use of water to wash driveways, sidewalks, patios, parking lots, aprons and other similar exterior surfaces is prohibited except with the use of pressurized sidewalk cleaning equipment or for sanitation, public health and safety and fire protection purposes.

J. The draining and/or refilling of all existing swimming pools, whether public, private or commercial, shall be prohibited between June 1st and October 1st except for protection of public health and safety.

K. Use of potable water for dust control purposes except for public health or safety purposes. Reclaimed, recycled or other nonpotable water may be used for such purposes so long as such water is not wasted.

L. The indiscriminate running of water or washing with water not otherwise prohibited above which is wasteful and without reasonable purpose.

M. Exception. The above regulations shall not apply to users or uses when the source of water is other than:

1. A public water system as defined in California Code of Regulations, Section 64555(a) (23); or
2. A groundwater aquifer used by a public water system. (Prior code § 9-712)

13.28.040 Regulations.

During the period of November 1st through April 30th, it is unlawful for any person to use, permit to allow the use of water as set out in Section 13.28.030 except that no restriction as to the hours of irrigation shall be imposed. (Prior code § 9-712.1)

13.28.050 Water rates and surcharges.

A. Whenever the City becomes aware of a person violating, causing or permitting a violation of the provisions of this chapter, a written notice stating the nature of the violation shall be delivered to the person at the premises by personal service or by first class mail and by posting in a conspicuous location at said premises. A copy of the notice shall be mailed to the person who is regularly billed for use of water at said premises.

B. All notices provided for by this section may be served as an addendum to the regular water service bill. All such notices may be given to any other person known to the City who is responsible for the violation or the correction thereof.

C. The notice shall describe the nature of the violation and order that said violation be corrected, cured or abated immediately or within such specified period as the City believes is reasonable under the circumstances.

D. Upon occurrence of a second violation or failure to immediately correct, cure or abate a violation, a second notice shall be served, as provided above, ordering the immediate correction, cure or abatement of the violation and imposing a surcharge of $100.00 per day for each day the violation continues. The surcharge may be added to the next regular billing for water service. (Prior code § 9-713)

13.28.060 Discontinuance of service.

Upon a determination by the Director that a person has consumed water in violation of any of the provisions of this chapter, the Director may issue an order to cease and desist from such violation, and further order such person to comply forthwith with such provisions or otherwise to take appropriate remedial or preventive action. If, after the issuance of a cease and desist order, such person continues to consume or use, or again consumes or uses water in violation of any such provisions, the Director may, subject to the provisions for notification and hearing hereafter set forth, discontinue water service to the premises of such person. (Prior code § 9-714)

13.28.070 Procedure for discontinuance of service.

Prior to the discontinuance of water service to any premises, the Director shall give written notice of intention to discontinue such service, and of hearing to be held by the Director upon the question of termination, not less than 10 days prior to such hearing. A person determined to be in violation of the provisions of this chapter, the owner of the premises (if not such person), and such other persons as the Director may deem appropriate, shall be heard at the hearing on the question of termination. If, upon completion of the hearing, the Director finds that no violation has occurred, the Director shall order that the service shall not be terminated. If, upon completion of the hearing, the Director determines that such violation has occurred, or is occurring, the Director may order the water service to be terminated, or may order that service be terminated within a specified period of time unless such violation or the conditions or activities causing such violations cease forthwith or within a specified period of time, or the Director may make such other order as deemed appropriate under the circumstances and in furtherance of the purposes and intent of this chapter. (Prior code § 9-714.1)

13.28.080 Appeal.

Any person aggrieved by a determination, order, or directive of the Director made pursuant to the provisions of Sections 13.28.060 and 13.28.070 may appeal such determination, order, or directive to the City Manager. Written notification of such appeal shall be filed with the City Clerk within 10 days after notification of the determination, order, or directive of the Director, and shall set forth in detail the facts and reasons supporting the appeal. Hearing on the appeal shall be held by the City Manager or the designee within 10 days from the date of filing the notice of appeal. The appellant, the Director, and such other persons as the City Manager or the City Manager's designee may deem appropriate, shall be heard at the hearing on appeal. Upon conclusion of hearing the appeal, the City Manager or the designee may affirm, reverse or modify the determination, order or directive of the Director as deemed just and equitable, and in furtherance of the provisions, purposes, and intent of this chapter. During the pendency of any such appeal, the determination, order or directive of the Director shall remain in full force and effect. The City Manager's or the designee's action on the appeal shall be final. (Prior code § 9-715)

13.28.090 Violation an infraction.

Any person violating any of the provisions of this chapter shall be deemed guilty of an infraction. Each day such violation is committed or permitted to continue shall constitute a separate offense and shall be punishable as such. Said violation shall be in addition to the surcharges and disconnection procedure established hereinabove. (Prior code § 9-716)

13.28.100 Powers and duties of the Director.

The Director of Municipal Utilities is hereby authorized to and may enforce all the provisions of this chapter. For such purposes, the Director shall have the powers and discretion of a law enforcement officer. The Director, and duly delegated representatives, pursuant to the provisions of Section 836.5 of the Penal Code of the State of California, are hereby authorized to arrest a person without a warrant whenever there exists reasonable cause to believe the person has in his or her presence violated any provision of this chapter which is an infraction. Upon making such arrest, the Director or the delegated representative shall prepare a citation and release the person arrested pursuant to Section 853.6 of the Penal Code of the State of California. The provisions of Sections 836.5 and 853.6 of the Penal Code are hereby adopted by reference as part of this section. (Prior code § 9-717)

13.28.110 Remedies cumulative.

The remedies and penalties provided for in this chapter shall be cumulative and shall be in addition to any or all other remedies available to the City. (Prior code § 9-719)

Chapter 13.32 WATER SHORTAGE EMERGENCIES

13.32.010 Purpose and scope.

This chapter adopts regulations to deal with water shortage emergency conditions which exist within the City and the City's water service areas, as declared by resolution of this City Council. These regulations shall become effective with the effective date of the ordinance codified in this chapter. A water shortage emergency declaration shall be in effect upon proper findings made by the City Council after a public hearing and shall remain in effect until the City Council finds and declares by resolution that the water shortage emergency condition has abated, has changed in degree or no longer exists. (Prior code § 9-730)

13.32.020 Findings.

The City Council finds, determines, and declares that the following shall occur prior to enforcement of the provisions of this chapter:

A. The City Council shall conduct duly noticed public hearings for the purpose of determining whether a water shortage emergency condition exists and, if so, the degree of the emergency and what regulations and restrictions should be enforced in response to the shortage.

B. The City Council shall adopt a resolution which declares that a water shortage emergency condition exists, the facts and conclusions which support such a declaration and that the ordinary water demands and requirements of water consumers within the City cannot be satisfied.

C. The regulations set forth herein are necessary and proper to protect and conserve the water supply for human consumption, sanitation, and fire protection during the duration of the water shortage emergency condition.

D. The regulations set forth herein shall remain enforceable to the extent declared by the City Council and until such time as the City Council finds that the water shortage emergency no longer exists.

E. During the existence of a declared water shortage emergency, the provisions of this chapter shall take precedence over the provisions of the City's Water Conservation Ordinance, Stockton Municipal Code Chapter 13.28, as now enacted or hereafter amended. The provisions of the Water Conservation Ordinance shall continue in effect except where provisions of this chapter are different. Within areas of the City where water service is provided by any other water provider, the provisions of this chapter as to prohibited uses and waste shall be applicable. The Water Conservation Ordinance shall remain in effect except where more stringent requirements are set out herein. (Prior code § 9-731)

13.32.030 Definitions.

The following terms are defined for the purposes of this chapter:

"Allocation" means the calculated percentage of the amount of water delivered to each customer's property during the corresponding monthly billing period of the base year for which no penalty or surplus use charge shall be imposed.

"Applicant" means a person, firm, partnership, business, corporation, district or governmental agency that requests or receives water service from the City.

"Base year" means the calendar year of 1987 or any other period established by resolution of the City Council.

"Customer" means any person, firm, partnership, business, corporation, district, or governmental agency that receives water from the City ("City") Water Utility.

"Director" means the Director of the Municipal Utilities Department of the City.

"Process water" means water used to manufacture, alter, convert, clean, grow, heat or cool a product, including water used in laundries and car wash facilities.

"Water" means water used in or supplied by the City. (Prior code § 9-732)

13.32.040 Additional limits on water use available to all water users.

During Stage 2, 3, 4 and 5 emergencies, the following wasteful uses shall be prohibited in addition to the prohibitions and limitations stated in the Water Conservation Ordinance, Stockton Municipal Code Chapter 13.28. During said stages Section 13.28.040 and Sections 13.28.030(A) and (B)(3) and (4) shall not be applicable. In the event the provisions of the section are inconsistent with the Water Conservation Ordinance, this section shall prevail.

A. Any use of potable water from any fire hydrant is prohibited, except by regularly constituted fire protection agencies for fire suppression purposes or by the responsible water agency, when alternate water sources or recycled water sources are available. In the absence of alternate water sources or reclaimed water sources, use of potable water from a hydrant may be used provided a permit for such use is approved by the Fire Department and the responsible water agency.

B. Use of potable water for dust control purposes except for public health or safety purposes. Reclaimed, recycled or other nonpotable water may be used for such purposes so long as such water is not wasted.

C. Irrigation of exterior landscaping, turf areas, open ground, crops, trees, grass, lawn, groundcover, shrubbery, or decorative plantings between the hours of 11:00 a.m. and 6:00 p.m. except irrigation by drip or mist irrigation systems shall not be restricted as to hours.

D. Irrigation of exterior landscaping, turf areas, open ground, crops, trees, grass, lawn, groundcover, shrubbery, or decorative plantings in such a manner or extent that allows water to run off or escape from the premises or to be wasted.

E. Violation of the above stated provisions shall be unlawful and an infraction. (Prior code § 9-733)

13.32.050 Water allocations—City water utility.

A. The following classes of water use are established:

1. "Residential" which shall consist of water service to land improved with structures designed to serve as a residence for human habitation.

2. "Multiple-family residential" which shall consist of water service to land improved with structures designed to serve as a residence for more than a single family, including apartments, condominiums, townhouses, mobilehome parks, and the like where more than one unit is served by a single meter.

3. "Nonresidential" which shall consist of water service to land improved with structures designed to serve for uses other than residential uses and land without structures but used for agricultural purposes. The following kinds of water use are, without limitation, designated as nonresidential: commercial, industrial, agricultural, municipal, schools, and churches.

4. "Process water users" which shall consist of nonresidential users which utilize water primarily to manufacture, alter, convert, clean, grow, heat, or cool a product, including laundries and vehicle wash facilities.

B. No customer shall use City water for permitted uses in excess of the respective allocation for each class of service within each stage of water shortage emergency. (Prior code § 9-734)

13.32.060 Stages of water shortage emergency.

The following stages of water shortage emergency are established. Upon declaration of the City Council that an emergency condition exists, as provided in Sections 13.32.010 and 13.32.020, the City Council shall declare the degree of emergency and identify the applicable stage and the regulations which shall be enforceable for each respective stage. During Stages 2, 3, 4 and 5 additional restrictions on water use shall be enforceable as stated in Section 13.32.040.

A. Stage 1—Mandatory Water Conservation. Upon a finding made by the City Council that a Stage 1 water shortage emergency exists, the regulations set out in the Water Conservation Ordinance, Stockton Municipal Code Chapter 13.28, as presently enacted or amended shall be enforceable as to all water users.

B. Stage 2—Water Shortage Emergency. Upon declaration of the City Council that a Stage 2 water shortage emergency exists, the following regulations shall be applicable to all customers of the City's water system:

1. Residential Accounts. Residential accounts shall use no more than 90 percent of the quantity of water delivered to the customer's property as recorded by meter during the corresponding billing period of the base year. Notwithstanding this provision, no residential account shall receive an allocation of less than 600 cubic feet (6 CCF) of water per billing period.

2. Multiple-Family Residential Accounts. Multiple family residences which are served by a single meter shall use no more than 90 percent of the total quantity of water delivered to the customer's property as recorded by meter during the corresponding billing period during the base year. Notwithstanding this provision, no multiple-family residential account shall receive a monthly allocation of less than 400 cubic feet (4 CCF) of water per unit served on a single meter.

3. Nonresidential Accounts. Nonresidential accounts shall use no more than 90 percent of the quantity of water delivered to the customer's property as recorded by meter during the corresponding billing period of the base year.

4. Process-Water User Accounts. Process-water users shall use no more than 100 percent of the quantity of water as recorded by meter during the corresponding billing period during the base year.

C. Stage 3—Water Shortage Emergency. The following regulations shall be applicable to all customers of the City's water system:

1. Residential Accounts. Residential accounts shall use no more than 80 percent of the quantity of water delivered to the customer's property as recorded by meter during the corresponding billing period of the base year. Notwithstanding this provision, no residential account shall receive an allocation of less than 600 cubic feet (6 CCF) of water per billing period.

2. Multiple-Family Residential Accounts. Multiple family residences which are served by a single meter shall use no more than 80 percent of the total quantity of water delivered to the customer's property as recorded by the meter during the corresponding billing period during the base year. Notwithstanding this provision, no multiple-family residential account shall receive a monthly allocation of less than 400 cubic feet (4 CCF) of water per unit served on a single meter.

3. Nonresidential Accounts. Nonresidential accounts shall use no more than 80 percent of the quantity of water delivered to the customer's property as recorded by meter during the corresponding billing period of the

base year.

4. Process-Water User Accounts. Process-water users shall use no more than 90 percent of the quantity of water as recorded by meter during the corresponding billing period during the base year.

D. Stage 4—Water Shortage Emergency. The following regulations shall be applicable to all customers of the City's water system.

1. Residential Accounts. Residential accounts shall use no more than 70 percent of the quantity of water delivered to the customer's property as recorded by meter during the corresponding billing period of the base year. Notwithstanding this provision, no residential account shall receive an allocation of less than 600 cubic feet (6 CCF) of water per billing period.

2. Multiple-Family Residential Accounts. Multiple-family residences which are served by a single meter shall use no more than 70 percent of the total quantity of water delivered to the customer's property as recorded by meter during the corresponding billing period during the base year. Notwithstanding this provision, no multiple-family residential account shall receive a monthly allocation of less than 400 cubic feet (4 CCF) of water per unit served on a single meter.

3. Nonresidential Accounts. Nonresidential accounts shall use no more than 70 percent of the quantity of water delivered to the customer's property as recorded by meter during the corresponding billing period of the base year.

4. Process-Water User Accounts. Process-water users shall use no more than 90 percent of the quantity of water as recorded by meter during the corresponding billing period during the base year.

E. Stage 5—Water Shortage Emergency. The following regulations shall be applicable to all customers of the City's water system.

1. Residential Accounts. Residential accounts shall use no more than 60 percent of the quantity of water delivered to the customer's property as recorded by meter during the corresponding billing period of the base year. Notwithstanding this provision, no residential account shall receive an allocation of less than 600 cubic feet (6 CCF) of water per billing period.

2. Multiple-Family Residential Accounts. Multiple family residences which are served by a single meter shall use no more than 60 percent of the total quantity of water delivered to the customer's property as recorded by meter during the corresponding billing period during the base year. Notwithstanding this provision, no multiple-family residential account shall receive a monthly allocation of less than 400 cubic feet (4 CCF) of water per unit served on a single meter.

3. Nonresidential Accounts. Nonresidential accounts shall use no more than 60 percent of the quantity of water delivered to the customer's property as recorded by meter during the corresponding billing period of the base year.

4. Process-Water User Accounts. Process-water users shall use no more than 80 percent of the quantity of water as recorded by meter during the corresponding billing period during the base year. (Prior code § 9-735)

13.32.070 Establishment of customer allocation.

A. The Director shall classify each customer and calculate each customer's allocation. Each customer shall be notified of the Director's determination by mail deposited in the United States Postal Service.

B. Establishment of Allocations With No Customer Use History.

1. Residential. All residential customers with no water use history at the current property address shall be assigned an allocation for single- or multiple-family residential accounts, as determined by the Director, on

the basis of usage by similarly situated customers or on such other basis as may be fair and equitable under all the circumstances.

2. Other Use Classifications. In order to determine water use allocations for a new nonresidential use customer, for a change in property use, or for a customer with no water use history at the current property address, an application by the customer shall be submitted to the Director designating the intended use of the property, the square footage, and number of employees. An allocation will be determined by the Director after reviewing the above factors as well as comparing water use for similar types of construction and property uses, averaging the water use and applying the appropriate percentage reduction to this amount. (Prior code § 9-736)

13.32.080 Request for increase in allocation.

A. All applicants for an increase in allocation must submit an application in writing to the City Department of Municipal Utilities on an application form provided by the City.

B. Requests for increased allocations will be reviewed by the Water Conservation Officer for recommendation to the Director for approval, modified approval, or denial. Requests for increased allocations in excess of the historical use may be recommended for approval for reasons outlined in subsection D of this section.

C. All residential applicants for an additional allocation based on additional persons residing at a residence shall show proof of residency for all residents at that property.

D. Water allocations may be adjusted by the Director upon written application where the requested adjustment is found to be reasonably necessary. Factors for consideration shall include without limitation:

1. Additional people residing full time at that residence.

2. Unusual medical needs.

3. Change of property use.

4. Where a City audit of nonresidential customer's water-using appliances and usage shows that all reasonable conservation measures are being employed and the applicant provides a conservation plan demonstrating the measures employed and compliance with the plan.

5. Where a nonresidential customer has demonstrated growth in business volume over the base year in providing a water-related service to the public, the allocation may be based upon 1990 annual water use.

6. Hospitals, health care facilities, nursing care facilities, health clinics, and similar users may be excepted from the percentage reductions providing that a water conservation plan demonstrating reductions in consumption to the maximum extent feasible without jeopardizing patient care is prepared and approved by the Director.

E. A decision in writing shall be mailed to the applicant within 15 days of receipt of the application. (Prior code § 9-737)

13.32.090 Appeals.

A. Procedure. Any customer may appeal for reconsideration of the Director's classification of use, allocation or determination of a request for an increase in allocation on the basis of hardship or incorrect calculation. Appeals for reconsideration shall be processed as set forth below.

1. Any customer appealing for reconsideration of the classification or allocation shall do so in writing to the Director by either using forms provided by the City or by letter setting forth in detail the reasons for the appeal.

2. The appeal for reconsideration shall be reviewed by the City Department of Municipal Utilities and a site visit scheduled if required.

3. If an appeal for reconsideration is sustained, a condition of approval may include a requirement for the installation of water efficient plumbing fixtures and/or irrigation systems.

4. A staff committee or designee of the Director and the Director shall review all appeals for reconsideration and make decisions on the appeal.

5. If an applicant disagrees with the Director's decision, the decision may be appealed in the same procedural manner as specified in subsection A of this section to the City Manager or a designee, whose decision shall be final. If an appeal to the City Manager is requested, the customer shall be notified of a hearing date by mail. Such hearing shall be scheduled within 10 days of filing the appeal. A decision shall be forwarded to the applicant within 15 days of the date of the hearing.

B. Each appeal to the City Manager shall be accompanied by an appeal fee in an amount to be set by resolution of the City Council from time to time to defray the additional costs to the City. (Prior code § 9-738)

13.32.100 Enforcement and penalties.

A. The first billing period after the effective date of the Council's declaration of a water shortage emergency or the effective date stated in said resolution shall be considered an adjustment period during which no penalties will be imposed for water usage in excess of the allocation.

B. Beginning with the second billing period after the effective date and except as provided in subsection C of this section, any customer who exceeds the established allocation in any monthly billing cycle shall pay an excess use charge in addition to all other charges. The excess use charge shall be based on a rate schedule as specified from time to time by resolution of the City Council.

C. No excess use charge shall be imposed in the following circumstances:

1. Multiple-family residential customers whose consumption is 400 cubic feet (4 CCF) per unit or less during any billing period;

2. All other customers whose consumption is 600 cubic feet (6 CCF) or less during any billing period.

D. Installation of Flow Restrictor.

1. After the issuance of one (1) written warning for violation of the provisions of this chapter, or for any use of water which is prohibited, the City may install a flow restricting device on the customer's water service which shall remain in place for a period of not less than 48 hours and until the customer has paid the removal charges set forth below. The device shall not be removed except by the City.

2. If the customer, after removal of a flow restricting device by the City, shall again violate the provisions of this ordinance or the Water Conservation Ordinance, the City may install a flow restricting device which shall remain for a period of at least two (2) weeks and until payment for removal by the City.

3. Further violations, removal of or by-passing the flow restricting device may result in termination of water service. Upon a determination by the Director that service shall be terminated, written notice of intent to disconnect shall be mailed to the customer. Said notice shall be mailed to the resident and any other person or entity known to the City who is responsible for the violation or correction of the violation, including the property owner in the case of rentals. A request for hearing on the discontinuance of service shall be requested within five (5) days of mailing the notice. A hearing before the Director shall be held within three (3) days of expiration of the period for requesting a hearing. The Director's final decision shall be mailed to the responsible parties within three (3) days of the hearing. If the final decision is to discontinue service, the discontinuance shall not occur less than three (3) days after mailing of the Director's final decision.

4. Removal Charges. The charge for removal of a flow restricting device shall be based on a rate schedule as established from time to time by resolution of the City Council. In the case of rentals, the person or entity occupying the premises and the owner shall be jointly and severally responsible for payment of said costs. (Prior code § 9-739)

Appendix L

SEWD Urban Water Shortage Contingency Plan

STOCKTON EAST WATER DISTRICT
URBAN WATER SHORTAGE CONTINGENCY PLAN

Section 1 - Coordinated planning

Stockton East Water District was formed in 1948 under the 1931 Water Conservation Act of the State of California. In 191, the District was granted additional powers to acquire a supplemental water supply and to promote water use practices leading to a balance between surface water and ground water use.

In 1964 with the completion of New Hogan Reservoir on the Calaveras River, the District signed an Interim Contract with the U.S. Bureau of Reclamation for use of New Hogan Water for Agricultural irrigation. In 1970 Permanent Contracts with the U.S. Bureau of Reclamation and Calaveras County Water District were signed for the safe yield of New Hogan Reservoir. These Contracts provide the District with 56.5% and Calaveras County Water District with 43.5% of the normal year 84,100 AF safe yield of New Hogan Reservoir.

In 1977 the District completed construction of a 30 MGD Water Treatment Plant and entered into a contract with the City of Stockton, California Water Service Company, Lincoln Village County Maintenance District and Colonial Heights County Maintenance District for the use of treated surface water. This Contract is for a minimum annual delivery of 20,000 AF during normal years.

In 1983 the District entered into a contract with the U.S. Bureau of Reclamation for 75,000 AF of Interim water from New Melones Reservoir on the Stanislaus River. 40,000 AF have been designated for urban use with the rest to be used for agricultural irrigation. The District is now in the final construction phase of a $60 million Conveyance Project to convey New Melones water to the District.

The District's governing board consists of 7 directors elected at large to represent 7 Divisions within the District. The Board of Directors holds meetings on the first and third Tuesdays of each month.

The District encompasses a land area of approximately 115,000 acres and includes a population of 250,000. Normal year urban water demands are 65,000 AF and agricultural demands are 225,000 AF.

Stockton Area Water Suppliers (SAWS) was formed as an association of Stockton urban area retail water suppliers and Stockton East Water District. SAWS members include Stockton East Water District, City of Stockton Water Utility District, San Joaquin County (representing Lincoln and Colonial Heights Maintenance

Districts) and the California Water Service Company, an investor-owned utility. SAWS members meet regularly to discuss water related matters, including water supply, use, conservation and the development of water shortage contingency plans. SAWS members consulted during the preparation of Urban Water Shortage Contingency Plans for the City of Stockton, the California Water Service Company and Stockton East Water District.

Section 2 - Past, Current and Projected Water Use

The District as stated above, wholesales delivery of a normal year minimum of 20,000 AF of treated surface water. The amounts delivered to each of 4 retailers is based on the percentage of total water used (well and surface) in each retailer area during the previous year. The current year percentage and amount entitlements are as follows:

City of Stockton	35.6%	=	7,120 AF
Lincoln Village Maintenance District	2.6%	=	520 AF
Colonial Heights Maintenance District	1.0%	=	200 AF
California Water Service Company	60.6%	=	12,160 AF

Upon completion of the New Melones Water Conveyance Project (expected during the spring of 1993), an additional 40,000 AFA of treated water will be available to the retailers.

Section 3 - Worst Case Water Supply Availability for 12, 24, and 36 Months

New Hogan Reservoir has a capacity of 317,000 AF; however, due to the need to operate under flood control criteria, the average long term conservation yield to the District is approximately 84,100 AF. This yield is divided between M&I users and agricultural users. The first 13,000 AF of yield is available to water rights holders and the next 20,000 AF are contractually committed to the treatment plant. An additional 52,000 AF is needed to meet normal year agricultural demands. Any additional available yield above 72,000 AF is normally used for M&I purposes.

Since the treatment plant began operating in March 1977, there have been two drought periods when deliveries of treated water had to be curtailed. Annual deliveries have ranged from as low as 5,000 AF in 1977 to 29,000 AF in 1986.

The District policy has been to provide as much treated surface water to the urban area as possible because of the danger of saline intrusion into the groundwater basin from the Delta. It is estimated that the groundwater basin is being over-drafted 30,000 AF during a normal year. Any deficiencies in treated water deliveries from the treatment plant are reflected in additional groundwater pumping by the contractors to make up the difference.

In addition to New Hogan Reservoir, the District has contracted for 75,000 AF of interim water from New Melones Reservoir. This water, when it is available, will be used to reduce groundwater pumping within the District.

Section 4 - Stages of Action

The District coordinates on a regular basis with the urban area Contractors for the delivery of treated surface water. The District can only deliver what is available. The balance has to be made up by the Contractors from groundwater pumping. The District coordinates and supports the urban area retailers in developing voluntary and mandatory rationing.

Section 5 - Mandatory Prohibitions on Water Use

The District is a wholesaler only of treated water and has no authority over mandatory prohibitions on water use. The District does coordinate with and support the efforts of the urban area retailers.

Section 6 - Consumption Limits in the Most Restrictive Stages

Same response as Section 5

Section 7 - Penalties or Charges for Excessive Use

Same response as Section 5

Section 8 - Revenue and Expenditure Analysis

Each year a budget is adopted at a public hearing to determine the amount of revenue needed from the Contractors to meet treatment plant related expenses for the succeeding year. Revenue requirements are adjusted for over or under collection from the previous year which are generally related to the amount of water treated.

Section 9 - Monitoring mechanisms

Same response as Section 5

Section 10 - Public Noticing and Adoption

On 1/21/92 the District Board of Directors voted unanimously to endorse the City of Stockton and California Water Service Company Plans, made a firm commitment to continue to monitor groundwater levels in the urban area, and to cooperate with the retailers to determine groundwater pumping patterns which will provide for maximum protection against saline intrusion.

CITY OF STOCKTON

DEPARTMENT OF MUNICIPAL UTILITIES

URBAN WATER SHORTAGE

CONTINGENCY PLAN

Note: Appendices & other back-up material is on file at SCWS

January, 1992

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CITY OF STOCKTON

DEPARTMENT OF MUNICIPAL UTILITIES

URBAN WATER SHORTAGE

CONTINGENCY PLAN

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Appendices

Section 1 Coordinated Planning

California Water Code Section 10620 (d)(2) specifies that each urban water supplier shall coordinate the preparation of its urban water shortage contingency plan with other urban water suppliers and public agencies in the area, to the extent practicable.

All water sources available to the City of Stockton's urban area are shared in common with other urban and agricultural interests in the area. Therefore, the City developed this Water Shortage Contingency Plan in coordination with the following involved parties:

> Stockton East Water District; California Water Service Company; and San Joaquin County. Other Agencies and Departments consulted during the preparation of this Plan include the State and County Health Departments, and the City and County Office of Emergency Services.

The Stockton Area Water Suppliers (SAWS)

SAWS was formed several years ago as an association of Stockton urban area retail water suppliers and the Stockton East Water District (SEWD). SAWS members include the Stockton East Water District, City of Stockton Water Utility District, San Joaquin County (representing Lincoln and Colonial Heights Maintenance Districts) and the California Water Service Company, an investor-owned utility. The City and each entity contracting with SEWD for the supply of treated surface water has a contractual limit to the amount of SEWD water it can receive. However, none of the contracting agencies depends solely on treated SEWD water. Each retail water purveyor agency has wells capable of supplying all of the normal base demand from the common groundwater basin. When SEWD declares a supply shortage, all member agencies receive a uniform percentage reduction from their contractual allocation.

Treated surface water has accounted for about 20 to 30% of the City's normal water supply on a historical basis. The other 70 to 80 percent of the supply is produced by City-owned wells from the groundwater basin. During critical dry periods, the City Water Utility, in cooperation with other SAWS members, has agreed to forego its allotment of treated Municipal and Industrial water from SEWD to permit the water to be distributed to Agricultural users that rely solely on surface water.

SAWS members normally meet regularly to discuss water related matters, including water supply, use, conservation, and the development of water shortage contingency plans. In declared emergencies, when more extensive coordination is necessary, members meet as frequently as necessary.

At the SAWS monthly meetings, planning efforts, education and public information, and other water management activities are coordinated. As a result of these meetings, all SAWS member agencies have adopted compatible rationing plans, landscape water use restrictions, and nearly identical "mandatory water reduction " ordinances. The Mandatory Water Use Reduction Ordinance adopted by the City of Stockton is attached to this plan as Appendix II.

Local Surface Water from the New Hogan Reservoir

New Hogan Reservoir is owned by the State of California and is operated under an agreement between the U.S. Bureau of Reclamation (USBR), SEWD and the Calaveras County Water District. Each agency sets its own priorities for the use of the Reservoir within the limits of the master contract with the Bureau of Reclamation. The Stockton East Water District has dedicated the use of its share of the New Hogan Project so as to provide 13,000 acre feet per annum (AFA) to riparian, agricultural users, with the next 20,000 AFA reserved for municipal and industrial (M&I) users, and with the next 52,000 AFA allocated to non-riparian agricultural users. Any surplus or unused agricultural water is sent to the treatment plant for M&I users in the Stockton urban area. Under normal conditions, the treatment plant has delivered over 28,000 AFA of treated water to the Stockton urban area. A recent plant expansion project has increased the capacity of the SEWD treatment plant from 20,000 AFA to 30,000 AFA.

Local Surface Water from the New Melones Reservoir

New Melones Reservoir is owned and operated by USBR. In 1983, the Stockton East Water District contracted with USBR for a "long-term interim" supply of 75,000 AFA from New Melones Reservoir for M&I and agricultural use. A "long-term interim" supply from New Melones Reservoir is available to SEWD until other demands develop in the Stanislaus River Basin (area of origin). It is estimated that the annual allotment of water from this source will be available at least until the year 2020.

Based upon the strength of the USBR contract, SEWD recently sold $50 million in Certificates of Participation to finance the New Melones Conveyance System Project. The main project features include a diversion structure at Goodwin Dam, a 3.3 mile long tunnel to Littlejohn Creek, a 9-mile long section of lined canal to Shirley Creek, 16 miles of streambed improvements to the existing Farmington Dam, a 10-mile section of unlined canal, and a 2.5 mile section of 78-inch diameter aqueduct to the SEWD Treatment Plant. This project is currently underway, and is expected to be completed in the Fall of 1992.

SEWD intends to divide its annual allocation of 75,000 acre feet into 20,000 AFA agricultural, and 40,000 AFA M&I, with 15,000 AFA as conveyance losses. The 40,000 AFA M&I allocation is divided into 8,000 AFA to correct groundwater

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overdrafting, and 32,000 AFA to accommodate expected growth in water demand in the urban area. Project costs will be repaid by water sales to both agricultural and urban water users.

Ground Water Supply

Prior to 1976, ground water was the sole water supply for the Stockton urban area. Since 1976 when the SEWD treatment plant became operational, the groundwater basin has supplied approximately 70-75 percent of the needs of the urban area. All three retail water agencies still have enough operating wells to meet their respective base water demands under normal conditions.

Currently, the urban area is using approximately 64,000 AFA from a groundwater basin with a proportionate safe yield of approximately 29,000 AFA. With a normal allocation of 25,000 AFA of surface water from the New Hogan Reservoir supplied to the Urban Area by SEWD, there is a net overdraft of 10,000 AFA within the urban area. With the completion of the New Melones Conveyance System, and a return to "normal" weather patterns, this net overdraft will be eliminated in the urban area until approximately the year 2010. Agriculture uses about 225,000 AFA of which approximately 65,000 AF is surface water and 160,000 AF is groundwater. As the "safe yield" of the groundwater basin is approximately 164,000 AFA this results in an annual overdraft of about 40,000 AFA in a "normal year". When the surface water supply available to SEWD falls below 90,000 AFA the groundwater overdraft increases proportionately.

Water Quality Concerns

With all of its wells operational, the City's Water Utility can supply 100% of the service area's current base water demands from groundwater. During successive dry and critically dry years, supplemental surface water deliveries from SEWD are reduced. This creates a water shortage emergency which forces both the agricultural and urban area water users to pump additional groundwater during the summer season. The added pumping accelerates the decline in groundwater levels east of Stockton and induces subsurface inflow from adjacent areas. The groundwater basin west of the City is known to be contaminated with saline water and some chemical contamination is known to exist in the groundwater basin North of the City. Due to the potential for saline and chemical contamination by intrusion into the groundwater basin from the areas west and north of the City, the relative difference in groundwater levels underlying the City and these areas of known contamination must be closely monitored and controlled.

Water Shortage Emergency Response Coordination

Water shortage emergency response is coordinated with the County's Advisory Water

Commission. Loss of water facilities is incorporated into the City's Emergency Plan. The City's response planning includes the use of standby generators, water purification supplies and equipment, emergency drinking water storage, and water trucks. Water storage, treatment and pumping facilities have been constructed to meet earthquake safety standards and are inspected regularly.

During any declared Stage 5 Water Shortage Emergency, the Building Department can process applications for building permits, but will not issue the actual permits until the Emergency declaration is rescinded. See Appendix III.

The City and County Planning Commissions have been advised of the short and long term water supply outlook in the area. Development guidelines to require a determination of water supply and sewer capacity impacts are incorporated in all project environmental documentation. In addition, in order for a development project to receive County approval, the developer must certify that the project will not result in any net increase in overall water demand.

A noticed Public Hearing was held concerning the City's Urban Water Management Plan and this Water Shortage Contingency Plan. At the Hearing, City Staff proposed to reduce water use during an emergency by the use of an allotment method for each customer class. The final version of this Urban Water Shortage Contingency Plan was reviewed and adopted by the City Council of the City of Stockton at a Public Hearing held on ________1992.

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Section 2 Past, Current and Projected Water Use (1991-94)

California Water Code Section 10631 (e)(1) requires that a statement of past, current and projected water use and, to the extent records are available, a breakdown of those uses on the basis of residential single family, residential multifamily, industrial, commercial, governmental, and agricultural use be provided in the Urban Water Shortage Contingency Plan.

The City's Water Utility District serves about 78,000 residents through approximately 25,100 meters. Residential users make up 94% of the total customer base. The commercial and industrial users account for a little more than 3%, while institutional users, including parks, schools, greenbelts, and street planting, total slightly less than 3% of the total number of users. All users of water in the City of Stockton are metered.

The current water demand is 18,400 AFA. New connections are increasing at a rate of 2.5% per year (600). New water demand is expected to either remain equal to or less than the annual growth rate, due to efficiency standards for new construction.

Total annual demand, without improved efficiency at pre-1990 accounts, is estimated to be 22,000 AFA in 1995. Unaccounted-for water averages less than three percent and is apportioned to all account types. Residential connections average 3.5 residents with a historical water use of 193 gallons per person per day (gpcd). Multifamily connections range from 2.9 to 1.8 residents per apartment unit with an average use of 98 gpcd. The City's total average water use is 193 gpcd.

TABLE 1 Customer Types, Normal Demand and Demand Including Growth

Customer	Connections	Highest Use, AF	Actual 1991, AF	Projected 1992, AF	Projected 1993, AF	Projected 1994, AF
Residential	23,669	13,800	13,800	14,100	14,625	15,188
Commercial	828	2,024	2,042	2,068	2,145	2,228
Institutional	678	2,546	2,392	2,632	2,730	2,835
TOTALS	25,175	18,370	18,234	18,800	19,500	20,250

RESIDENTIAL connections are projected to continue to increase by 2.5% per year. Existing single-family accounts use 193 gpcd and multifamily accounts use 98 gpcd. Efficiency requirements for new construction are expected to reduce interior use in new residences to less than 98 gpcd.

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COMMERCIAL, INDUSTRIAL, and GOVERNMENTAL demand is projected to continue to show an increase of between two and one half and three percent per year.

OTHER USES & RECREATIONAL demand is expected to remain constant. Increased efficiency and landscape conversions at existing parks, golf courses and cemeteries will provide sufficient water savings to supply new recreational projects contained in the general plan.

Section 3: Worst Case Water Supply Availability for 12, 24 & 36 Months

California Water Code Section 10631 (e)(2) requires an estimate be made of the minimum water supply available at the end of 12, 24 and 36 months, assuming the worst case water supply shortage.

The City of Stockton currently has two water sources which are listed below. Average water supply by source and projected worst case supply by source are provided in Table 2.

TABLE 2: Supply Sources and Worst Case Supply Projections Values in Acre Feet

Source	Contracted Amount	85-89 Average Use	Actual 1991	Projected 1992	Projected 1993	Projected 1994
New Hogan	7,000	2,000	6,000	0	0	0
Melones	14,000	0	0	0	0	0
Groundwater	3,395	3,395	3,395	3,395	3,395	3,395
Overdraft	Unknown	12,327	8,839	15,405	16,105	16,855
TOTALS	Unknown	17,722	18,234	18,800	19,500	20,250
% Shortage*	*based on safe yield	70%	49%	82%	83%	83%
Additional Shortage**	**based on historical	N/A	-3,490	3,078	3,756	4,528
% Additional Shortage		0%	-28%	25%	31%	37%

Notes:
1. City's share of the groundwater basin's "safe yield" is assumed equal to SEWD contract limits, i.e. 35%.
2. Assuming 12,327 AFA (Historical overdraft) as a base, projected shortage represents difference from historical overdraft conditions.

NEW HOGAN RESERVOIR operation is discussed in Section 1. Primarily it is a flood control facility and use of the conservation storage is divided between M&I users in Calaveras and San Joaquin Counties. New Hogan reservoir has a capacity of 317,000 AF; however, due to the need to operate under flood control criteria, the average long term conservation yield available to the SEWD is less than 100,000 AFA. SEWD is contractually obligated to make 13,000 AFA available to the riparian users along the river, with the next 20,000 AFA committed to the treatment plant. Any excess water can be used for agricultural or M&I purposes. Since 1975, when SEWD begin

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operating the treatment plant, there have been two drought periods when deliveries of water for M&I users had to be curtailed.

Treated water from the treatment plant is allocated based on a contract between SEWD and the three retail water users. The City's Water Utility District is allocated in excess of 35% of the treatment plant output. In a normal water year, this would represent an allocation of approximately 8,750 AFA. The finished water quality is good, and under normal delivery conditions, this treated surface water costs the City about $150 per acre foot. Reductions in deliveries are triggered by the April 1 storage levels listed in Table 3.

If in the 1992-94 period no surface supply is available from SEWD, the City's share of the New Hogan Reservoir supplies is expected to decline to zero each year. See Table 2. Also, even though the New Melones Conveyance System Project is expected to be completed by Fall, 1992, if in the 1992-94 period no surface supply is available from SEWD, the City's share of the New Melones Reservoir supplies is expected to be zero each year.

TABLE 3 NEW HOGAN RESERVOIR STAGED REDUCTIONS IN ACRE FEET

Total Reservoir Storage, AF	% Reservoir Storage	% Reduction	Total Deliveries	Riparian Agriculture	Other Agriculture	Stockton Urban	Other Urban	Total Urban
317,000	100%	0%	125,000	13,000	87,000	8,750	16,250	25,000
100,000	32%	64%	100,000	13,000	67,000	7,000	13,000	20,000
41,000	13%	87%	36,000	13,000	3,000	7,000	13,000	20,000
21,000	7%	93%	16,000	13,000	3,000	0	0	0
18,000	6%	96%	3,000	0	3,000	0	0	0
15,000	5%	100%	0	0	0	0	0	0

<u>Groundwater Basin</u>

In Section 1 of this report and in the UWMP, the threat to the groundwater basin from continued overdraft was discussed. SEWD is constructing facilities that in future could allow it to manage the basin for conjunctive use. Supplemental supplies of surface and imported water will be stored in the basin as a contingency against the possibility of a future water shortage. The Water District's experience from 1977 through 1987 indicates that with the conjunctive use program, up to five years contingent water shortage can be stored in the underground water basin.

In addition to the New Hogan Reservoir, The Stockton East Water District (SEWD) has contracted for 75,000 AFA of interim water from the New Melones Reservoir . This

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water, when it is available, will be used to reduce groundwater pumping in the SEWD. For planning purposes, the City assumes that this interim supply will firm up the conjunctive use program and provide a firm supply to accommodate the City's 2.6% per year growth in water demand. "Wet" years should allow the SEWD to provide the City with "surplus" imported water for treatment in the expanded SEWD water treatment plant. It is assumed that disasters, such as earthquakes, could interrupt SEWD water delivery availability for up to six months.

During 1991, the City's SEWD delivery was not reduced, and all SEWD urban water contractors received full delivery. However, for worst case planning purposes, the City has assumed that three consecutive years of 1977 level precipitation could result in no deliveries for 1992-94. In this event, both agricultural and urban areas will be forced to pump additional groundwater. These added demands will result in additional overdrafting of the groundwater basin.

A WATER RECLAMATION/REUSE system is currently under consideration by the City and up to 20,000 AF of tertiary treated water will be available for use in 1992. The system will not be fully developed by 1993 but some water will be provided for use on construction sites. In 1991, about 1,000 AF of reclaimed waster was used for construction and dust control purposes. Recycled water is considered the most reliable of all the City's alternative supplies.

Water Quality and Emergency Supplies

The City's water sources are of medium to good quality, and no problems resulting from industrial or agricultural contamination have been experienced to date. Extended multi-week supply shortages due to natural disasters or accidents which damage both imported and local surface sources are unlikely. Even in the event of a severe earthquake, groundwater wells could probably be back in production within five days. Loss of a significant number of wells is not anticipated as Stockton is in a relatively low earthquake hazard zone. The City's distribution reservoirs hold sufficient treated water to meet the health & safety requirements (50 gpcd) for City residents for 36 hours.

Section 4 Stages of Action

California Water Code Section 10631 (e)(3) requires a statement of appropriate triggering 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.

In response to the water shortage emergency anticipated in 1991, the City of Stockton developed a five stage rationing plan. The City's plan includes both voluntary and mandatory conservation stages. In order to carry out the requirements of this Urban Water Shortage Contingency Plan, Stage reductions specified in the City's existing Ordinance would need to be revised as shown in Table 4 below.

TABLE 4 Rationing Stages and Reduction Goals

Shortage	Stage	Demand Reduction Goal	Type Program
up to 10%	Stage 1	10% reduction	Voluntary
up to 20%	Stage 2	20% reduction	Mandatory
20-30%	Stage 3	30% reduction	Mandatory
30-40%	Stage 4	40% reduction	Mandatory
40-50%+	Stage 5	50%+ reduction	Mandatory

The Demand Reduction Goal as noted above applies to all except "process water users", as defined in the City's Mandatory Water Use Reduction Ordinance.

The following PRIORITIES for use of available water have been established, based on California Water Code Chapter 3 (see Appendix IV) and community input:

- HEALTH & SAFETY - interior residential and fire fighting
- COMMERCIAL & INSTITUTIONAL - maintain jobs & economic base
- EXISTING LANDSCAPING - especially trees and shrubs
- NEW DEMAND - projects without permits when shortage declared
- NEW LANDSCAPING - defer until after emergency is over
- NONESSENTIAL USES - to be curtailed for duration of emergency

HEALTH & SAFETY water quantity calculations used to determine the interior gpcd requirements are provided below. The Stage 2 and Stage 3 health & safety allotments are 100 gpcd (49 HCF per person per year, equaling 8,744 AFA). The Stage 4 and 5 health & safety allotments are reduced to 76 gpcd (37 HCF per person per year, or 6,640 AFA). The total annual amount of water required to meet these health & safety needs is calculated by multiplying the appropriate gpcd times 78,000 residents.

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TABLE 5 Per capita Health & Safety Water Quantity Calculations

	Non-Cons. Fixtures		Habit Changes*		Cons. Fixtures**	
Toilets	7 fls @ 6 gpf =	42.0	5 fls @ 6 gpf =	30.0	5 fls @ 1.5 gpf =	7.5
Shower	7 min @ 5.0 gpm =	35.0	5 min @ 5.0 gpm =	25.0	5 min @ 2.0 gpm =	10.0
Washer	13 gpcd (1/3 load) =	13.0	13 gpcd (1/3 load) =	13.0	11.5 gpcd (1/3 load) =	11.5
Kitchen	5 gpcd =	5.0	4 gpcd =	4.0	4 gpcd =	4.0
Other	5 gpcd =	5.0	4 gpcd =	4.0	4 gpcd =	4.0
TOTAL (gpcd)		100.0		76.0		37.0
HCF per capita per year		48.8 CCF		37.1 CCF		18.1 CCF

*Reduced shower use is result of shorter showers or reduced flow, reduced washer.
**Fixtures include 1.6 gpf toilets, 2.0 gpm shower heads.
fls - flush
gpf - gallons per flush
gpm - gallons per minute
gpcd - gallons per capita per day

Notes:
1. Reduced shower use results from shorter showers or reduced flow. Reduced washer use results from fuller loads.
2. Conservation Fixtures include Ultra Low Flush 1.6 gpf toilets, 2.0 gpm showerhead and efficient clothes washers.

The Health & Safety minimum allotment was set at 100 gpcd in Stages 2 & 3 because it provides sufficient water for essential interior use with no habit or plumbing fixture changes. If individuals wish to change water use habits or plumbing fixtures, 100 gpcd is sufficient to provide for limited non-essential uses. In Stage 4, the health & safety allotment would require habit changes.

Based on the customer demand information in Table 1, Table 6 indicates the water allocated to each customer type by priority and rationing stage.

TABLE 6 - Water Supply Allocated by Priority

WATER SUPPLY BY PRIORITY					
			ALL OTHERS		
STAGE 2	Residential	Commercial	Government	Irrigation	TOTALS
Average use	13,800 AF	2,024 AF	1,403 AF	1,175 AF	18,400 AF
Requested use % Reduction	11,040 20%	1,822 10%	1,262 10%	940 20%	15,064 18%
STAGE 3					
Average use	13,800 AF	2,024 AF	1,403 AF	1,175 AF	18,400 AF
Requested use % Reduction	9,660 30%	1,720 15%	1,192 15%	881 25%	13,454 27%
STAGE 4					
Average use	13,800 AF	2,024 AF	1,403 AF	1,175 AF	18,400 AF
Requested use % Reduction	8,280 40%	1,619 20%	982 30%	822 30%	11,703 36%
STAGE 5					
Average use	13,800 AF	2,024 AF	1,403 AF	1,175 AF	18,400 AF
Requested use % Reduction	6,900 50%	1,417 30%	842 40%	822 30%	9,981 46%

Supply Shortage Triggering Levels

The City of Stockton has a legal responsibility to provide for the health and safety water needs of the community (see Appendix IV). In order to minimize the social and economic impact of water shortages, the City will manage water supplies prudently. This Plan is designed to provide a minimum of 50 percent of normal supply during a severe or extended water shortage. The following rationing program triggering levels are established to ensure that these policy statements are implemented, and are based upon the mutual sharing of the groundwater basin by all urban area water purveyors (i.e. supply reductions resulting in increased overdrafting of the basin either inside or outside the City's service area could trigger rationing by the City of Stockton).

The City's two water sources are groundwater and imported surface water. Rationing stages may be triggered by a shortage in one source or a combination of sources. Because Stages overlap, the triggers stated herein automatically implement the more restrictive Stage, unless the City Council, at a Public Hearing, adopts findings to implement the less restrictive Stage. Shortages may trigger a change in Stage at any time.

The specific criteria for triggering the City's rationing stages are listed in Table 7.

TABLE 7 - Water Supply Triggering Levels

Stage	% Shortage	Water Shortage	Carry-over Storage
Stage 1	Up to 10% supply reduction	Supply reductions that increase the overdraft by 6,000 AFA	Insufficient storage to provide 50% of normal supplies for the year
Stage 2	10 to 20% supply reduction	Supply reduction that increases the overdraft by 12,000 AFA	Insufficient storage to provide 35% of normal supplies for the next year
Stage 3	20 to 30% supply reduction	Supply reduction that increases the overdraft by 18,000 AFA	Insufficient storage to provide 25% of normal supplies for the next year
Stage 4	30 to 40% supply reduction	Supply reduction that increases the overdraft by 24,000 AFA	Insufficient storage to provide 10% of normal supplies for the next year
Stage 5	40 to 50% supply reduction	Supply reduction that increases the overdraft by 30,000 AFA	No storage for either agriculture or M & I

Section 5 Mandatory Prohibitions on Water Use

California Water Code Section 10631 (e)(4) requires a statement of the mandatory provisions of the Plan which will reduce water use and which include prohibitions against specific wasteful practices, such as gutter flooding.

The City adopted a "No Waste" Ordinance in 1987, please see Appendix II.

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Section 6 Consumption Limits

California Water Code Section 10631 (e)(5) requires the establishment of consumption limits for the most restrictive conservation stages of the Plan. Each urban water supplier may use any type of consumption limit in its water shortage contingency plan that would reduce water use and is appropriate for its area. Examples of consumption limits that may be used include, but are not limited to, percentage reductions in water allotments, per capita allocations, an increasing block rate schedule for high usage of water with incentives for conservation, or restrictions on specific uses.

The City has established the following allocation method for each customer type:

CUSTOMER CLASS	STAGE	ALLOCATION METHOD
Residential	1-4	Percentage reduction with maximum amount
	5	Hybrid of per capita and percentage
Commercial	1-4	Percentage Reduction
	5	Percentage Reduction; vary by efficiency
Institutional	1-4	Percentage Reduction
& all Others	5	Percentage Reduction; vary by efficiency

The specific percentage reductions at each stage and for each customer class correspond to the figures listed in Table 6.

The individual customer allotments will be based on the 1987 base year and customer class averages. This gives the City a more accurate view of the usual water needs of each account and provides additional flexibility in determining allotments and reviewing appeals.

The Municipal Utilities Director has been delegated authority to classify each customer and calculate each customer's allotment according to the methods described in Appendix V. The allotments reflect seasonal patterns. Each customer will be notified of their classification and allotment by mail before the effective date of the Water Shortage Emergency. New customers and connections will be notified at the time service commences. In a disaster, prior notice of allotment may not be possible; in these cases, notice must be provided by other means. Any customer may appeal the Municipal Utilities Director's classification on the basis of use or the allotment on the basis of incorrect calculation. Appeals shall be processed as set forth in Appendix V.

Section 7 Penalties or Charges for Excessive Use

California Water Code Section 10631 (e)(6) requires a statement regarding penalties or charges for excessive use.

The City of Stockton's current rate structure is provided in Table 8.

TABLE 8 Current Normal Rate Structure

SERVICE CHARGE PER METER PER MONTH

METER SIZE		RATE	METER SIZE		RATE
5/8"	METER	$6.30	3"	METER	$32.00
3/4"	METER	7.30	4"	METER	46.00
1"	METER	9.70	6"	METER	76.00
1-1/2"	METER	14.00	8"	METER	110.00
2"	METER	14.00	10"	METER	137.00

QUANTITY RATES

For the first 30,000 Cubic Feet-- per 100 CF..	$0.352
For all over 30.000 Cubic Feet--- per 100 CF..	$0.300

Excess use charges -- During Mandatory Water Use Reduction Period

EXCESS USE ABOVE ENTITLEMENT:

An Excess Use Penalty of $2.00 per CCF of water used in excess of the customer's ration quantity during each billing period up to and including 100% of the average base year amount per customer class; and $4 per CCF for all additional water used above the average base year amount per customer class.

If a customer receives more than one written warning for violation of the provisions of the Mandatory Water Use Reduction Ordinance, or for any of the prohibited uses as defined, and after the observation of a subsequent violation, the City may install a flow restricting device on the customer's water service, which shall remain for a period of at least 48 hours, and until the specified removal penalty has been paid. For a subsequent violation, the flow restrictor shall remain for a period of at least two weeks.

Section 8 Analysis of Revenue and Expenditure Impacts

California Water Code Section 10631 (e)(7) requires inclusion of an analysis of the impacts of the plan 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.

The City's current normal annual income from water sales is $5,020,237 of which the monthly meter charges provide $2,198,760, or 44% Any surplus revenues are used to fund Water Utility Operations, Emergency Fund (described below) projects, and other water system capital improvements. Tables 10 and 11 are based on the Table 9 sales ranges.

TABLE 9 - Projected Ranges of Water Sales by Stage

Water Sales	Normal	Stage 2 20%	Stage 3 30%	Stage 4 40%	Stage 5 50%
TOTAL (AFA)	18,400	15,064	13,454	11,703	9,981

Tables 10 and 11 provide information on projected revenue impacts by Stage.

Table 10 shows the Water Utility's Revenues and Expenditures, and the projected fiscal impacts of increased costs and reduced sales due to shortages.

TABLE 10 - Revenues & Expenditures (at current rates with no increases) (in $1,000)

-	Normal	Stage 2 (20%)	Stage 3 (30%)	Stage 4 (40%)	Stage 5 (50%)
Oper. Revenues					
Water Sales	$2,821	$2,297	$2,051	$1,784	$1,522
Meter Charges	$2,199	$2,199	$2,199	$2,199	$2,199
Total Revenue	$5,020	$4,496	$4,250	$3,983	$3,721
% Reduction	0%	-10%	-15%	-21%	-26%
Oper. Expenses*					
Personal Svcs.	$1,376	$1,376	$1,376	$1,376	$1,376
Purchased Wtr	$1,550	$1,550	$1,150	$1,550	$1,550
Pump Tax	$ 54	$ 926	$ 827	$ 720	$ 614
Debt Service	$1,248	$1,248	$1,248	$1,248	$1,248
Depreciation	$ 637	$ 637	$ 637	$ 637	$ 637
Other O&M Exp.	$ 389	$ 272	$ 216	$ 155	$ 94
Total Expenses	$5,256	$6,011	$5,856	$5,687	$5,521
Oper Exp per AF	$ 286	$ 399	$ 435	$ 486	$ 553
Surplus or (Deficiency)	($235)	($1,515)	($1,606)	($1,704	($1,800)

*1989-90 Fiscal Year Expenses

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Table 11 provides an estimate of the Water Utility's Revenues & Expenditures with reduced sales (20%, 30%, 40% and 50%) at Stages 2 through 5. The Utility will incur added capital costs for lowering pump settings, increased pumping and treatment costs, added ground water extractions costs. These costs will be partially offset by the reduced production but it will be necessary to increased rates to maintain the fiscal integrity of the system.

TABLE 11 - Projected Revenues & Expenditures

Opr.Revenues	Normal	Stage 3 (30%)	Stage 4(40%)	Stage 5(50%)
Water Sales	$6,192,490	$4,968,092	$5,136,874	$5,457,110
Meter Charges	1,894,438	1,894,438	1,894,438	1,894,438
Total Revenue	$8,086,927	$6,862,530	$7,031,312	$7,351,547
% reduction	-	-15%	-13%	-9%
Operating Expenses				
Salaries	$1,600,000	$1,700,000	$1,750,000	$1,750,000
Overhead	990,000	1,050,000	1,080,000	1,080,000
Cost of Supply	2,224,000	1,825,400	2,178,600	3,363,600
Purification	300,000	270,000	270,000	270,000
Transmission	150,000	150,000	150,000	150,000
Customer Accounts	60,000	90,000	100,000	110,000
General & Admin.	450,000	650,000	700,000	750,000
Depreciation	1,200,000	1,200,000	1,200,000	1,200,000
Capital Proj.	1,000,000	750,000	0	0
Total Opr. Exp.	$7,974,000	$7,685,400	$7,428,600	$8,673,600
Surplus or (Deficiency)	$ 112,927	($822,870)	($397,288)	($1,322,053)

Establishment of a Rate Stabilization Fund

In order to mitigate the financial impacts of a water shortage, the City is establishing a policy of maintaining a Contingency Reserve as part of its Water Fund. The goal is to maintain the Fund at 75 percent of normal Water Department revenue. This fund will be used to stabilize rates during periods of water shortage or disasters affecting the water supply. The City will not have to increase rates as much or as often during a prolonged or severe shortage.

However, even with the emergency fund, rate increases will be necessary during a prolonged water shortage. As described in Section 4 of this Plan, a Stage 1 shortage requires a 20 percent reduction in water deliveries while a Stage 3 requires up to a 40 percent reduction. The experiences of California water purveyors during the 1990-91 drought shortage demonstrated that actual water use reductions by customers are usually considerably larger that those requested by the supplier. During the 1990-91 usually considerably larger that those requested by the supplier. During the 1990-91 drought shortage it was also politically difficult for many agencies to adopt the rate increases necessitated by a 20 to 50 percent reduction in sales.

In order to maintain fiscal solvency of the Water Utility, water rates would have to be increased by the following percentages when the indicated Stages are implemented:

Stage 2 or 3 --- 25 percent increase over pre-shortage rates

Stage 4 or 5 -- 35 percent increase over pre-shortage rates

Most California water agencies which experienced water shortages found that it required several years for daily per capita use to return to pre-shortage levels. Thus, in anticipation of reduced sales following a shortage, the City's rates will be continued. After a shortage, Water Utility expenses are expected to drop below pre-shortage levels. Per capita water use is projected at 90 percent of the pre-shortage use, so continuation of the emergency rate should generate sufficient income to equal expenses. Any excess revenues collected as a result of this rate adjustment will be used to re-establish the "Contingency Reserve" within the Water Fund.

Section 9 Implementation of the Plan

California Water Code Section 10631 (e)(8) requires the preparation of a draft water shortage contingency resolution or ordinance to carry out the urban water shortage contingency plan.

The City adopted a Resolution to Declare a Water Shortage Emergency which will implement this Plan, please see Appendix VI.

Section 10 Water Use Monitoring Procedures

California Water Code Section 10631 (e)(9) requires inclusion in the Plan of a mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency plan.

Normal Monitoring Procedure

In normal water supply conditions, production figures are recorded and reported weekly to the Deputy Director responsible for the Water operations. Totals are reported monthly to the Municipal Utilities Director and incorporated into the water supply report.

Stage 2 and 3 Water Shortages

During a Stage 1 or 2 water shortage, daily production figures are reported to the Supervisor. The Supervisor compares the weekly production to the target weekly production to verify that the reduction goal is being met. Weekly reports are forwarded to the Water Department Manager and the Water Shortage Response Team. Monthly reports are sent to the City Council. If reduction goals are not met, the City Manager will notify the City Council so that corrective action can be taken.

Stage 4 and 5 Water Shortages

During a Stage 3 or 4 water shortage, the procedure listed above will be followed, with the addition of a daily production report to the City Manager.

Disaster Shortage

During a disaster shortage, production figures will be reported to the Supervisor hourly, and to the City Manager daily. Reports will also be provided to the City Council.

Section 11 Plan Adoption Standards

California Water Code Section 10621 (a) states that each urban water supplier shall, not later than January 31, 1992, prepare, adopt, and submit to the Department of Water Resources, an amendment to its urban water management plan which meets the requirements of subdivision (e) of Section 10631.

The City of Stockton prepared this Water Shortage Contingency Plan during December, 1991. The Plan was adopted on January_____, 1992 (see Appendix I) and submitted to the Department of Water Resources on January _____, 1992. The Plan includes all the information necessary to meet the requirements of subdivision (e) of California Water Code Section 10631.

California Water Code Section 10642 states that, 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 California Water Code Section 6066 of the Government Code. 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.

The Public Hearing was duly held in accordance with law, and the availability of copies of the draft water shortage contingency plan were properly noticed in the City's newspapers. Copies of the draft plan were made available for public review at City offices and the Public Library.

The 1992 Water Shortage Contingency Plan for the City of Stockton was formally adopted at a duly noticed City Council Meeting on January____, 1992

California Water Code Section 10656 states that an urban water supplier that does not submit an amendment to its urban water management plan pursuant to subdivision (a) of Section 10621 to the Department of Water Resources by January 31, 1992, is ineligible to receive drought assistance from the state until the Urban Water Management Plan is submitted pursuant to Article 3 (commencing with Section 10640) of Chapter 3.

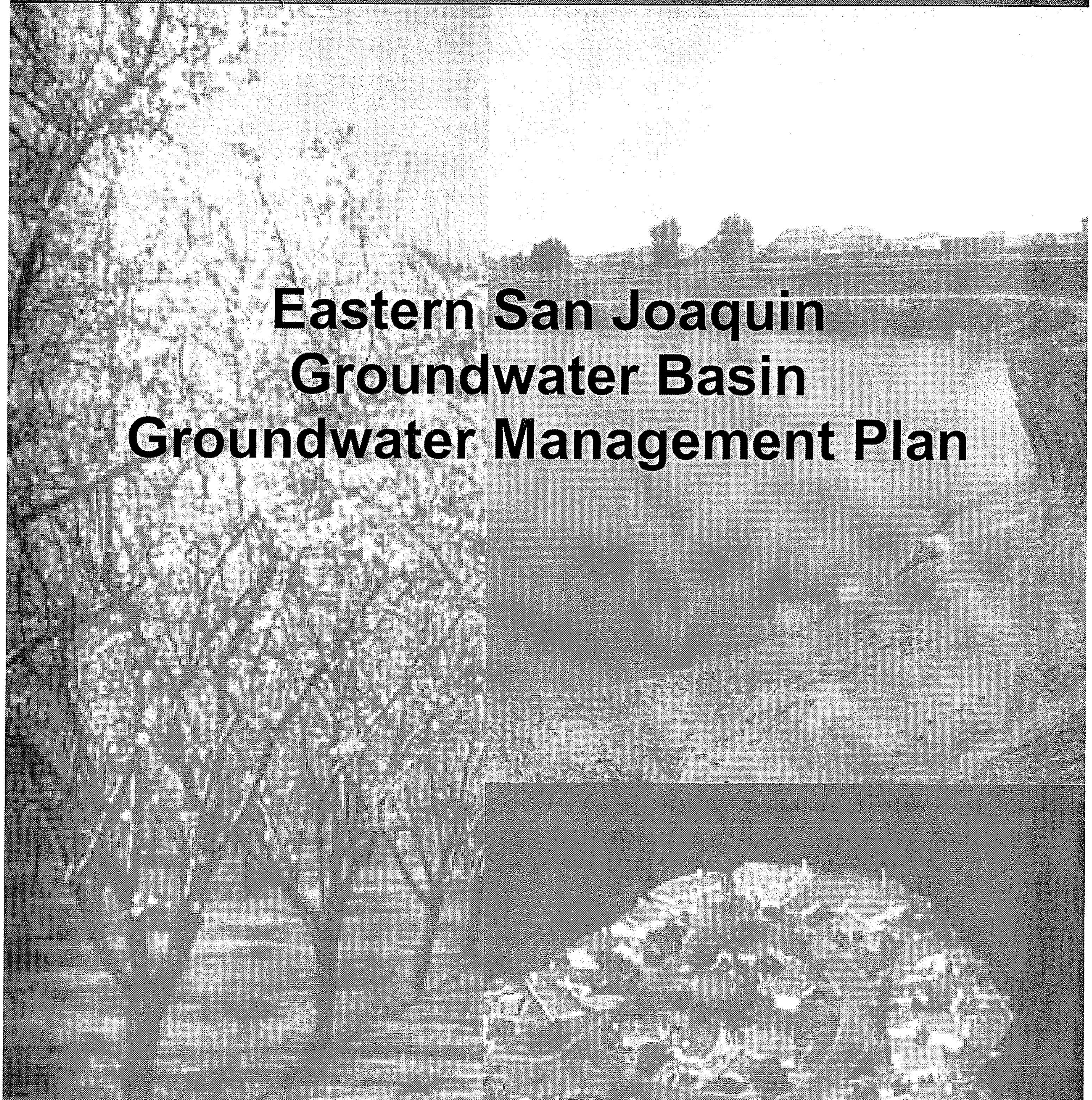
The City of Stockton submitted a Water Shortage Contingency Plan to the Department of Water Resources on January ____, 1992.

Appendix M

San Joaquin Groundwater Management Plan

June 2004

Eastern San Joaquin Groundwater Basin Groundwater Management Plan



Northeastern San Joaquin County Groundwater Banking Authority

Eastern San Joaquin Groundwater Basin Groundwater Management Plan

Executive Summary

Jack Sieglock, Chairman
Northeastern San Joaquin County
Groundwater Banking Authority

Thomas R. Flinn, Director
San Joaquin County Department of Public Works

Thomas M. Gau, Deputy Director
San Joaquin County Department of Public Works

Written by

Brandon Nakagawa, Engineer
San Joaquin County Department of Public Works

Assisted by

Marshall Haueter, Tanya Moreno, and C. Mel Lytle, Ph.D.
San Joaquin County Department of Public Works

Copies of the Groundwater Management Plan may be purchased for $40 from:
San Joaquin County Department of Public Works
P.O. Box 1810
Stockton, CA 95201

Make checks payable to: San Joaquin County Department of Public Works

Foreword

. . .

The American West and particularly the State of California is faced with the critical challenge of sustainable development and equitable management of increasingly scarce water resources. The entirety of this concern is framed by greater competition between regional powers for limited surface supplies from major rivers and heightened attention regarding the future use and control of groundwater by overlying landowners, appropriative agencies and the State. Consequently, the Northeastern San Joaquin County Groundwater Banking Authority Joint Exercise of Powers Agreement was established in 2001 to provide a consensus-based forum for local water interests with historically diverse viewpoints regarding the exploitation of groundwater resources in the Eastern San Joaquin Groundwater Basin. Members agreed to work cooperatively with unanimity toward achieving water resource planning objectives and to speak with one regional voice. This Groundwater Management Plan is the result of this inexorable collaborative effort, which was single-minded in its effort to reinforce local control and provide direction for the sustainable development of this vital resource for the future social, economic and environmental viability of San Joaquin County.

Mel Lytle, Ph.D.
Water Resource Coordinator

Acknowledgements

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This Groundwater Management Plan (GMP) is a product of the commitment that the Groundwater Banking Authority (GBA) members together with many other interested agencies made to sustain and enhance the groundwater resources of the Eastern San Joaquin Basin. The GBA extends thanks to staff consultants from HDR, Schlumberger Water Services and Camp Dresser & McKee Inc. in the preparation of materials, modeling information and technical review of the GMP. In addition, special thanks are given for grant funding, information and services provided by the California Department of Water Resources, the Center for Collaborative Policy and the U.S. Geological Survey.

Finally, the GBA would like to thank staff, the Department of Public Works and the GBA Coordinating Committee and Plan Group members in guiding the preparation and technical review of the GMP. Significant funding for this work was provided by GBA member contributions and the San Joaquin County Flood Control and Water Conservation District Water Investigation Zone No. 2. A special benefit assessment supported by the taxpayers of San Joaquin County.

Northeastern San Joaquin County Groundwater Banking Authority

Board of Directors

Supervisor Jack Sieglock, *Chairman*
San Joaquin County Board of Supervisors

Councilmember Gary Giovanetti, *Vice Chairman*
City of Stockton

Anders Christensen
Woodbridge Irrigation District

Director Mel Panizza
Stockton East Water District

Councilmember John Beckman
City of Lodi

Reid Roberts
Central San Joaquin Water Conservation District

Ed Steffani
North San Joaquin Water Conservation District

Dante Nomellini
Central Delta Water Agency

John Herrick
South Delta Water Agency

Associate Members

Paul Risso
California Water Service Company

Joe Peterson
San Joaquin County Farm Bureau

Staff

Tom Flinn, *Secretary*
San Joaquin County Public Works

Mel Lytle, Ph.D., Water Resources Coordinator
San Joaquin County Department of Public Works

Table of Contents

List of Abbreviations

ACWA – Association of California Water Agencies
ADAPS - Automatic Data Acquisition and Processing System
af – Acre-feet
ASR – Aquifer Storage and Recovery
BMP – Best Management Practice
Cal Water – California Water Service Company
CCWD – Calaveras County Water District
CDWA – Central Delta Water Agency
CERCLA – Comprehensive Environmental Response, Compensation and Liability Act
cfs – Cubic Feet per Second
CSJWCD – Central San Joaquin Water Conservation District
CVP – Central Valley Project
CVPIA – Central Valley Project Improvement Act
DMM – Demand Management Measure
DO – Dissolved Oxygen
DWR – California Department of Water Resources
EBMUD – East Bay Municipal Utility District
EC – Electrical Conductivity
EDF – Environmental Defense Fund
EIR – Environmental Impact Report
EIS – Environmental Impact Statement
ESJGB – Eastern San Joaquin Groundwater Basin
ESJPWA – East San Joaquin Parties Water Authority
FERC – Federal Energy Regulatory Commission
FSC – Folsom South Canal
FRWP – Freeport Regional Water Authority
GBA – Groundwater Banking Authority
GIS – Geographic Information System
GMP – Groundwater Management Plan
GOES – Geostationary Observational Environmental System
JPA – Joint Powers Agreement
MARS – Mokelumne Aquifer Recharge & Storage
MGD – Million Gallons per Day
MORE WATER – Mokelumne Regional Water Storage and Conjunctive Use Project
MOU – Memorandum of Understanding
MRWPA – Mokelumne River Water and Power Authority
MSL – Mean Sea Level
MW – Megawatts
NSJWCD – North San Joaquin Water Conservation District
OID – Oakdale Irrigation District
RWQCB – Regional Water Quality Control Board
SARA – Superfund Amendments and Reauthorization Act
SAWS – Stockton Area Water Suppliers
SCADA – Supervisory Control and Data Acquisition
SDWA – South Delta Water Agency
SEWD – Stockton East Water District
SJCOG – San Joaquin Council of Governments
SSJID – South San Joaquin Irrigation District
SWP – State Water Project

SWRCB – State Water Resources Control Board
TDS – Total Dissolved Solids
TMDL – Total Maximum Daily Load
USACE – U.S. Army Corps of Engineers
USBR – U.S. Bureau of Reclamation
USGS – U.S. Geological Survey
WHPA – Wellhead Protection Area
WID – Woodbridge Irrigation District

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Executive Summary

ES-1 Background

Independently, agencies in Eastern San Joaquin County have found it difficult to wield the political and financial power necessary to mitigate conditions of critical groundwater overdraft. County interests have come to realize that a regional consensus based approach to water resources planning and conjunctive water management increases the chance for successfully implementing groundwater management actions that are equitable, affordable, and provide far reaching benefits locally, regionally, and Statewide.

Organized in 2001, the Northeastern San Joaquin County Groundwater Banking Authority (Authority) employs the consensus based approach in its goal to develop "...locally supported groundwater banking projects that improve water supply reliability in Northeastern San Joaquin County...and provide benefits to project participants and San Joaquin County as a whole." Collaboration amongst the Authority member agencies has strengthened the potential for broad public support for groundwater management activities as well as the ability to leverage local, State, and federal funds. The Groundwater Management Plan for Eastern San Joaquin County (Plan) is a continuation of the collaborative effort to effectively manage the Eastern San Joaquin Groundwater Basin (Basin). Table ES-1 lists the member agencies of the Authority.

Table ES-1 Member Agencies of the Northeastern San Joaquin County Groundwater Banking Authority
City of Stockton
City of Lodi
Woodbridge Irrigation District
North San Joaquin Water Conservation District
Central San Joaquin Water Conservation District
Stockton East Water District
Central Delta Water Agency
South Delta Water Agency
San Joaquin County Flood Control and Water Conservation District
California Water Service Company*
San Joaquin Farm Bureau Federation*
* Associate Members

ES-2 Purpose and Objectives

The purpose of the Groundwater Management Plan is to review, enhance, assess, and coordinate existing groundwater management policies and programs in Eastern San Joaquin County and to develop new policies and programs to ensure the long-term sustainability of groundwater resources in Eastern San Joaquin County. To better define the supporting values included with this Plan's purpose, the Authority has listed the following mission values centered on the development of the Plan as outlined in Table ES-2.

Table ES-2 Groundwater Management Plan Mission Values for Success		
Be implemented in an equitable manner	Maintain or enhance the local economy	Protect groundwater and surface water quality
Be affordable	Minimize adverse impacts to entities within the County	Provide more reliable water supplies

Exhibit multiple benefits to local land owners and other participating agencies	Maintain overlying landowner and Local Agency control of the Groundwater Basin	Restore and maintain groundwater resources
Minimize adverse impacts to the environment	Protect the rights of overlying land owners	Increase amount of water put to beneficial use within San Joaquin County

In order to meet the purpose of the Plan and ensure the long-term sustainability of the Basin, the Authority created the following Plan objectives:

1. Maintain long-term sustainability of the Basin through the development of management objectives, practices and conjunctive use projects to benefit the social, economic and environmental viability of Eastern San Joaquin County.
2. Prevent further saline intrusion and degradation of groundwater quality throughout the Basin.
3. Increase understanding of Basin dynamics through the development of a sound research program to monitor, evaluate, and predict Basin conditions.
4. Maintain local control of the groundwater Basin through the responsible management of groundwater resources by overlying cities, counties, water districts, agencies, and landowners.
5. Formulate rational and attainable Basin management objectives to comply with SB 1938 and retain State funding eligibility.
6. Formulate voluntary policies, practices and incentive programs to meet established Basin management objectives.
7. Formulate appropriate financing strategies for the implementation of the Plan.

ES-3 Groundwater Management Area

San Joaquin County overlies the Eastern San Joaquin, Cosumnes, and Tracy Sub-basins of the greater San Joaquin Valley Groundwater Basin. For the purposes of the Plan, the Eastern San Joaquin County Groundwater Management Area (GMA) is defined as the portion of San Joaquin County overlying the Eastern San Joaquin and Cosumnes Sub-Basins. Within the GMA, the member agencies of the Authority will implement the Plan within their respective boundaries. To ensure that every parcel in the GMA is represented, all unorganized areas will be included in the San Joaquin County Flood Control and Water Conservation District. Figure ES-1 depicts the member Agencies of the Authority and their respective boundaries within the GMA.

ES-4 Agency Participation

The physical boundaries of the Eastern San Joaquin and Cosumnes Sub-Basins extend beyond the political boundaries of San Joaquin County. Portions of Calaveras and Stanislaus Counties overlie the eastern fringes of the Basin. Recognizing the need for increased coordination between agencies outside of the GMA, the Authority invited a variety of interest groups from the business, environmental, agricultural, and political communities to participate in the development of the Plan. The Authority values the consensus based approach to groundwater management and strives to coordinate, integrate, and mutually benefit from the groundwater management efforts of its member agencies and those with vested interest in the social, economic, and environmental viability of Eastern San Joaquin County.

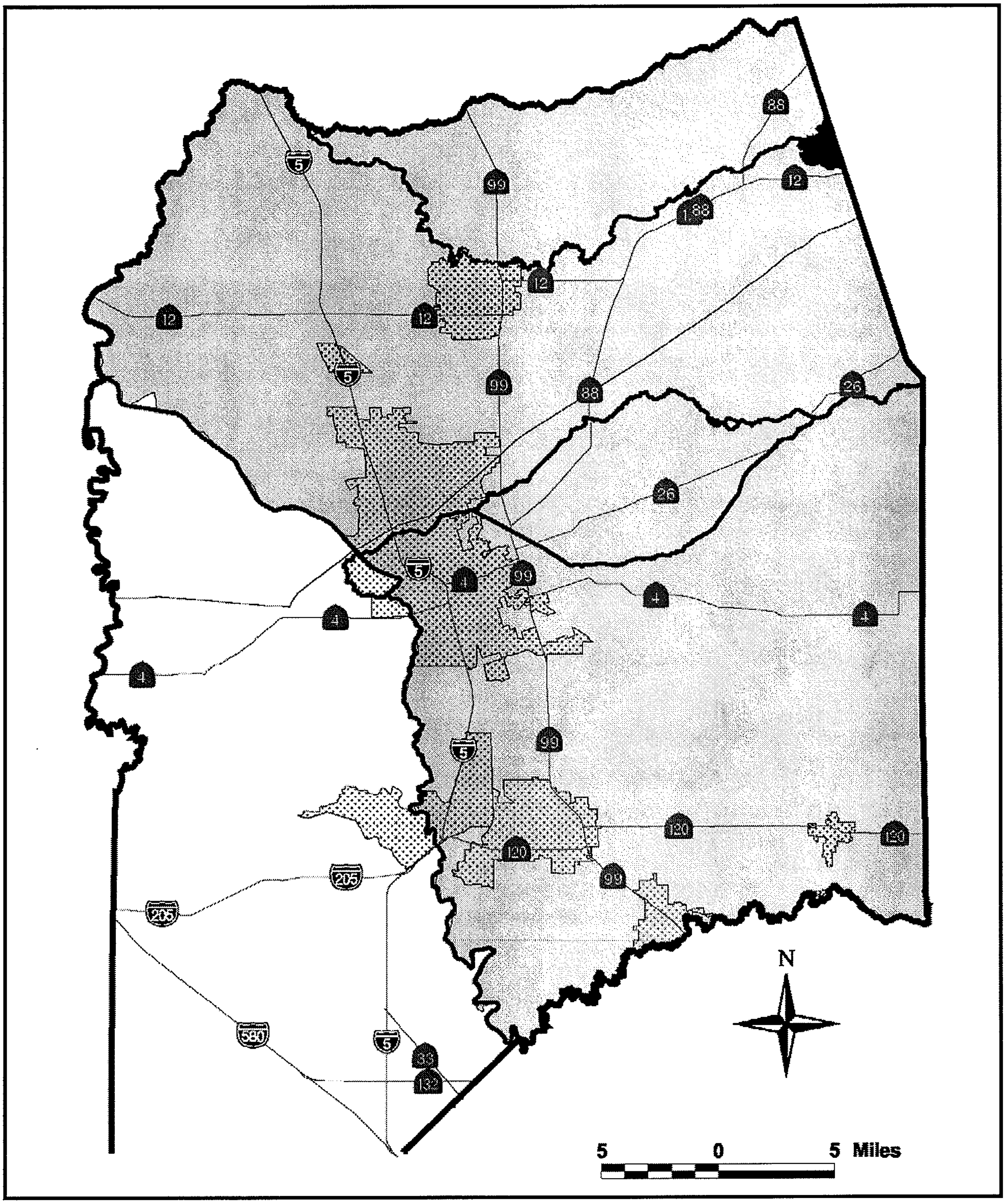

Figure ES-1 Groundwater Management Area
Source: California Spatial Information Library at http://www.gis.ca.gov/

Throughout the planning process, the Authority's Coordinating Committee, a technical sub-group of the Authority, convened every 4th Wednesday of the Month to formulate the Plan. Key discussion points and decisions were debated and finalized by the Coordinating Committee and incorporated into the Plan by Authority Staff. Draft sections of the Plan were also presented to and commented on by the Coordinating Committee. The Authority Board of Directors was regularly updated on the activities of the Plan at their regular meetings on the 2nd Wednesday of the month. For the purpose of providing an atmosphere conducive to broad-based consensus building and compromise, Authority Coordinating Committee meetings were facilitated through the California Center for Collaborative Policy.

Attendees of these meetings include representatives from over 40 agencies and interest groups. Table ES-3 is a list of meeting attendees and agencies contributing to the plan.

Table ES-3 Groundwater Management Planning Participants

Local Participants & Agencies	
Andy Christensen	Woodbridge Irrigation District
Cary Keaton	City of Lathrop
Dante Nomellini	Central Delta Water Agency
Dave Kamper	South San Joaquin Irrigation District
David Simpson	Natural Resource Conservation Service
Ed Formosa	City of Stockton Municipal Utilities Department
Ed Steffani	North San Joaquin Water Conservation District
Gary Giovanetti	Stockton City Council
Joe Petersen	San Joaquin Farm Bureau Federation
John Herrick	South Delta Water Agency
Keith Conarroe	City of Manteca
Kevin Kauffman	Stockton East Water District
Larry Diamond	Calaveras County Water District
Loralee McGaughey	Stockton East Water District
Mark Lindseth	City of Lodi
Mark Madison	City of Stockton Municipal Utilities Department
Mel Lytle	San Joaquin County Public Works
Melvin Panizza	Stockton East Water District
Michael McGrew	San Joaquin County Counsel
Paul Risso	California Water Service Company
Ray Borges	San Joaquin County Environmental Health
Reid Roberts	Central San Joaquin Water Conservation District
Richard Prima	City of Lodi
Steve Stroud	South San Joaquin Irrigation District
Teresa Tanaka	Linden County Water District
Tom Flinn	San Joaquin County Public Works
Tom Gau	San Joaquin County Public Works
State Participants & Agencies	
Ann Jordan	Office of State Senator Charles Poochigan
Mary Bava	Office of Assemblyperson Barbara Matthews
Tim Parker	Department of Water Resources
Federal Participants & Agencies	
David Simpson	Natural Resource Conservation Service

Eric Reichard	US Geologic Survey
John Izbicki	US Geologic Survey
Patrick Dwyer	US Army Corps of Engineers
	Other Participants & Agencies
Barbara Williams	Sierra Club
Carolyn Ratto	California Center for Collaborative Policy
David Beard	Great Valley Center
David Simpson	Natural Resource Conservation Service
Gerald Schwartz	East Bay Municipal Utility District
Gina Veronesc	Camp, Dresser, & McKee
James Cornellius	Calaveras County Water District
James Moore	Galt Economic Development Task Force
John Aud	Stanislaus County
Larry Diamond	Calaveras County Water District
Mark Williamson	Saracino-Kirby-Snow
Robert Vince	Camp, Dresser, & McKee
Ron Addington	Business Council, Inc.

The Authority will continue to seek the input of its neighbors and interest groups during the implementation of the Groundwater Management Plan and any future planning efforts.

ES-5 Consistency with Water Code Section 10750 *et. seq.*

Groundwater management is the planned and coordinated effort of sustaining or improving the health of the underlying basin in order to meet future water supply needs. With the passage of Assembly Bill (AB) 3030 in 1992, local water agencies were provided a systematic way of formulating groundwater management plans and granted the Authority to implement those plans through fees and assessments. AB 3030 also encourages coordination between local entities through joint power authorities or memorandums of understanding.

In 2002, the passage of SB 1938 further emphasized the need for groundwater management in California. SB 1938 requires AB 3030 groundwater management plans to contain specific plan components in order to receive state funding for water projects. Table ES-4 illustrates the recommended components of a groundwater management plan as outlined in AB 3030 and the required sections under SB 1938. Table ES-4 also indexes the sections of this Plan where the recommended or required AB 3030/SB 1938 components are addressed.

ES-6 Eastern San Joaquin County Hydrogeology

Current and historical groundwater pumping rates exceed the sustainable yield of the underlying groundwater Basin on an average annual basis. Historic groundwater level trends as seen by well hydrographs throughout the Basin illustrate the following trends:

1. In the central portion of the Basin, the groundwater table dropped continuously from the 1950s to the early 1980s. Inclines during the early 1980s are attributed to extreme wet years of heavy rainfall.

2. In the northern part of the Basin, groundwater levels declined into the early 1990s.

3. Beginning in the early 1980s, a distinct drawdown and recovery cycle appears be driven by climatic conditions more than long-term changes in groundwater use.

4. Groundwater levels in the early 1990s had declined to the point where a number of wells throughout the Basin could not be operated. The severity of the situation forced many pumpers to construct new deeper wells.

Table ES-4 Components of a Groundwater Management Plan

Plan Component	Recommended by AB 3030	Required by SB 1938	Plan Sections
Control of saline water intrusion	X		2, 3, 4, 5, 8
Management of wellhead protection and recharge areas	X		4
Regulation of contaminated groundwater	X		4
The administration of a well abandonment	X		4
Elimination of groundwater overdraft	X		2, 3, 4, 5, 8
Replenishment of groundwater	X		2, 3, 4, 8
Groundwater monitoring	X	X	5
Operation of a conjunctive water management system	X		3, 8
Well construction standards	X		4
Financing groundwater management projects	X		6, 7
The development of groundwater management partnerships	X		1, 4, 7, 8
Coordination of land use planning and groundwater management	X		4
Description of participation by interested parties		X	1, 7
Plan to involve agencies overlying the basin		X	1, 7
Basin Management Objectives		X	3
Basin management entity and area map		X	1

Sources: California Department of Water Resources Division of Planning and Local Assistance
http://wwwdpla.water.ca.gov/cgi-bin/supply/gw/management/hq/ab3030/main.pl

California Department of Water Resources Draft 2003 Update Bulletin 118

Figures ES-2 and Figure ES-3 depict the Fall 1993 and Spring 1998 groundwater level contours respectively. The Fall 1993 contour represents the lowest groundwater level contours recorded in the Basin historic record. The Spring 1998 contour represents the recovery of the Basin following years of above average and severe precipitation.

The result of long-term groundwater overdraft is two fold: significant decline in groundwater levels and increased accretions from area waterways. Although increased accretions to the groundwater basin from high quality surface water sources are desirable, accretions in the western fringes of the Basin from the Lower San Joaquin River and older marine geologic formations are generally undesirable primarily due to elevated salt levels. Based on a simplified groundwater balance, as shown in Table ES-5, the net groundwater overdraft is estimated to be approximately 160,000 af/yr.

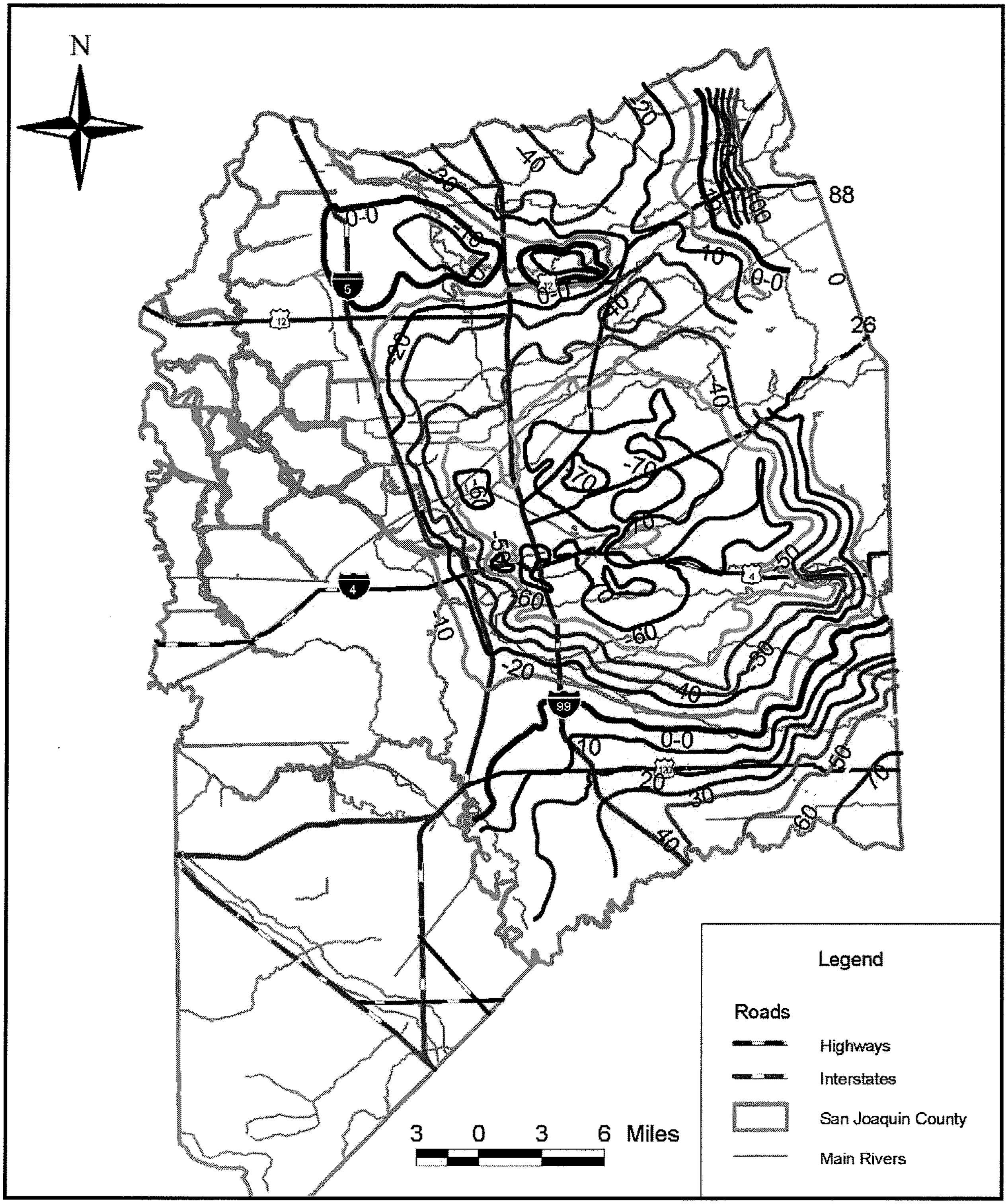

Figure ES-2 Fall 1993 Groundwater Contours
Source: Camp Dresser & McKee Inc.

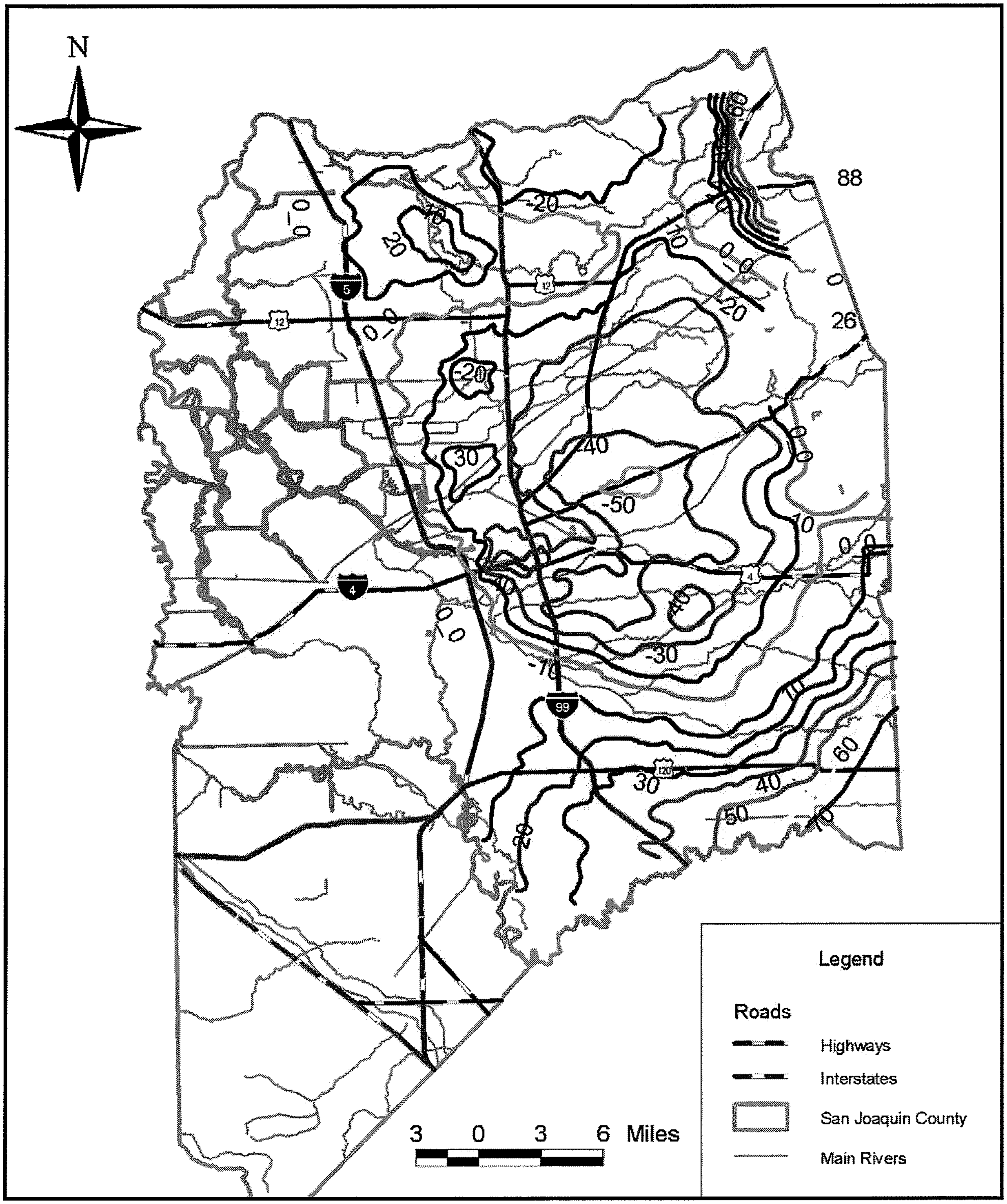

Figure ES-3 Spring 1998 Groundwater Contours
Source: Camp Dresser & McKee Inc.

Table ES-5 Simplified Groundwater Balance for Eastern San Joaquin County		
Groundwater Flow Component	**Average Value**	**Explanation**
	Inflows (af)	
Deep Percolation/Recharge	608,400	Net infiltration from rainfall, irrigation, canal leakage etc.
Gain from Streams	198,170	Net inflow from streams to groundwater system
Lateral Inflow	98,000	Net of subsurface inflows and outflows.
Total Inflows	**904,577**	
	Outflows (af)	
Groundwater Pumping	867,600	Net agricultural, municipal and industrial pumping
Loss to Streams	108,898	Net outflow from groundwater system to streams
Lateral Outflow	35,300	Subsurface Outflows
Total Outflows	**1,011,815**	
	Groundwater Overdraft (af)	
Mined Aquifer Storage	107,238	Total Inflows minus Total Outflows
Estimated Saline Intrusion	42,000	Lateral Saline Intrusion into the Stockton Area
Total Estimated Overdraft	**150,700**	Sum of Mined Aquifer Storage and Saline Intrusion
Source: San Joaquin County Water Management Plan Volume I		

Groundwater flow in the Basin now converges on the depression with relatively steep groundwater gradients eastward from the Delta toward the cone of depression as depicted in Figures ES-2 and ES-3. The eastward flow from the Delta area is significant because of the typically poorer quality water now moving eastward in the Stockton area. Increased lateral inflow from the west is undesirable, as this water is typically higher in TDS and chloride levels and causes the degradation of water quality in the Basin. Figure ES-4 illustrates the approximate location of the 300 mg/L isochlor as measured in 2000. Projections indicate that the rate of eastward migration of the saline front is approximately 150 to 250 feet per year. Figure ES-4 also depicts the projected 2030 location of the 300 mg/L isochlor under no-action conditions.

Degradation of water quality due to TDS or chloride contamination threatens the long-term sustainability of a very important water resource for San Joaquin County, since water high in TDS and/or chloride is unusable for either urban drinking water needs or for irrigating crops. Damage to the aquifer system could for all practical purposes be irreversible due to saline water intrusion, withdrawal of groundwater from storage, and potentially subsidence and aquifer consolidation. The saline intrusion problem is not well understood by the Authority. Further studies and monitoring methods are necessary to ensure the problem is addressed and monitored adequately. The Plan further defines the groundwater science and monitoring investigations geared towards both saline intrusion and general Basin understanding.

A no-action or baseline simulation was conducted to predict how current groundwater and surface management practices would impact the groundwater basin in 2030. Groundwater modeling has shown that unless there is a change in how groundwater is used or managed,

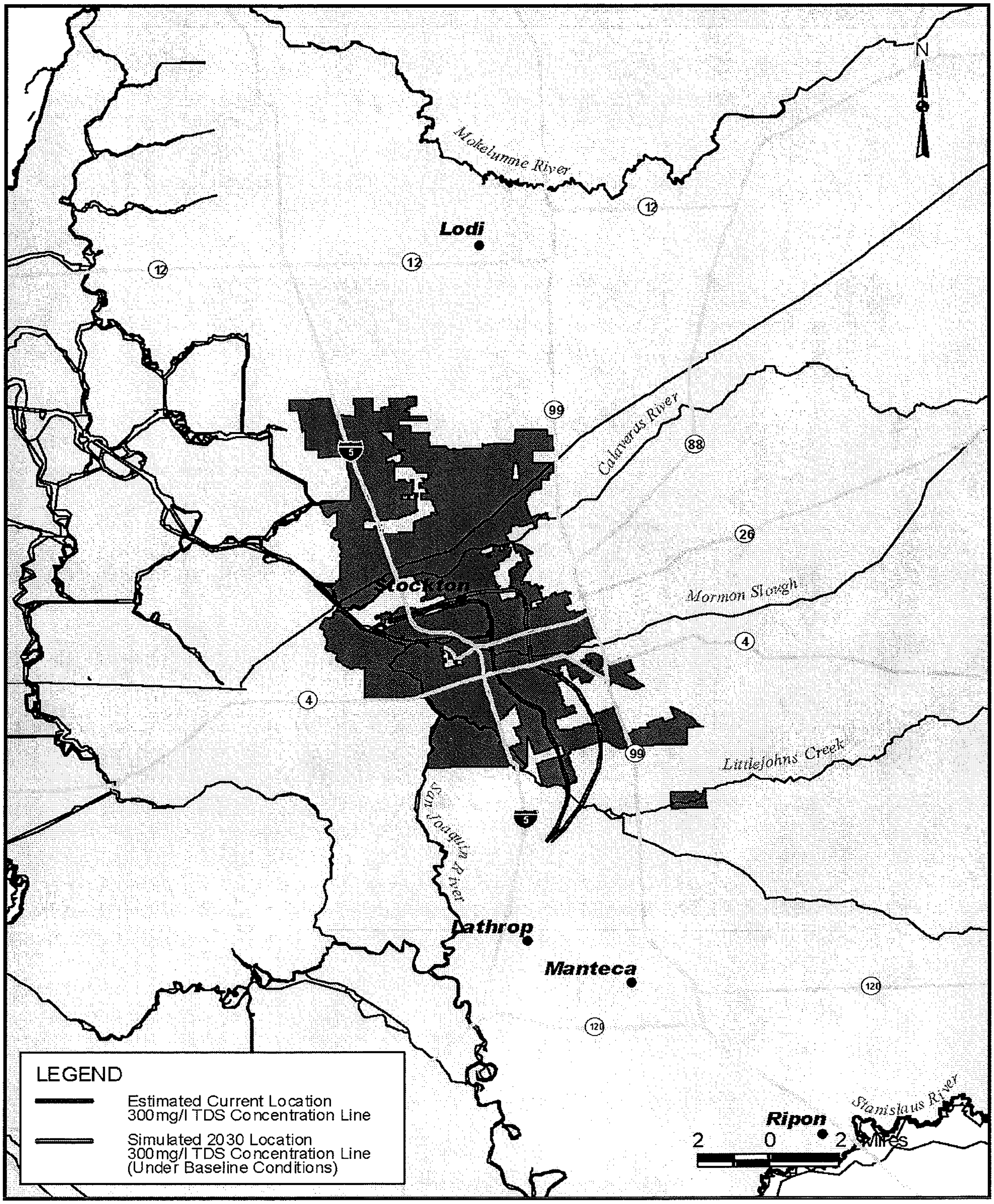

Figure ES-4 Estimated 2000 and 2030 Projected Saline Front
Source: Camp Dresser & McKee, Inc.

levels will continue to decline and storage will continue to be reduced. Figure ES-5 shows the corresponding simulated groundwater table for the year 2030 under baseline conditions. A large portion of the Basin is shown to have groundwater levels 60 to 80 feet below sea level.

Further exacerbating the groundwater conditions, as already mentioned, is the lateral inflow of higher salinity water from the west, which could render parts of the aquifer unusable. Figure ES-4 illustrates the approximate location of the 300 mg/l chloride concentration contour as of 1996 as well as the projected 2030 contour. Groundwater modeling has indicated that the rate of eastward movement of this line is approximately 150 to 250 feet per year. Figure ES-4 also shows the projected location of the 300 mg/L chloride concentration line by the year 2030 under baseline conditions.

ES-7 Basin Management Objectives

Senate Bill (SB) 1938, created in 2002, requires that agencies that elect to, "Prepare and implement a groundwater management plan that includes basin management objectives for the groundwater basin that is subject to the plan. The plan shall include components relating to the monitoring and management of groundwater levels within the groundwater basin, groundwater quality degradation, inelastic land surface subsidence, and changes in surface flow and surface water quality that directly affect groundwater levels or quality or are caused by groundwater pumping in the basin." In addition, local agencies that do not adopt or participate in a plan fulfilling the requirements of SB 1938 shall not be eligible for State funding intended for groundwater projects. The Authority has developed the following qualitative Basin Management Objectives (MO) for the GMA.

Management Objective #1: Groundwater Levels

Maintain or enhance groundwater elevations to meet the long-term needs of groundwater users within the Groundwater Management Area.

Management Objective #2: Water Quality

Maintain or enhance groundwater quality underlying the Basin to meet the long-term needs of groundwater users within the Groundwater Management Area.

Management Objective #3: Surface Water Quality

Minimize impacts to surface water quality and flow due to continued Basin overdraft and planned conjunctive use.

Management Objective #4: Water Quality

Prevent inelastic land subsidence in Eastern San Joaquin County due to continued groundwater overdraft.

ES-8 Groundwater Management Options

Groundwater management tools available to the Authority are explored in the Plan. In order to successfully implement a conjunctive use program that will meet the goals of this Plan, the Authority must first identify and develop a list of water management options. An option, in the context of this Plan, is the method, program or policy suitable for the broader conjunctive use program for Eastern San Joaquin County. The Plan explores the concepts for the acquisition of new and maximization of existing surface water supplies, groundwater recharge techniques, and other options dealing with demand management and water reuse. Table ES-6 lists the groundwater management options explored in the Plan.

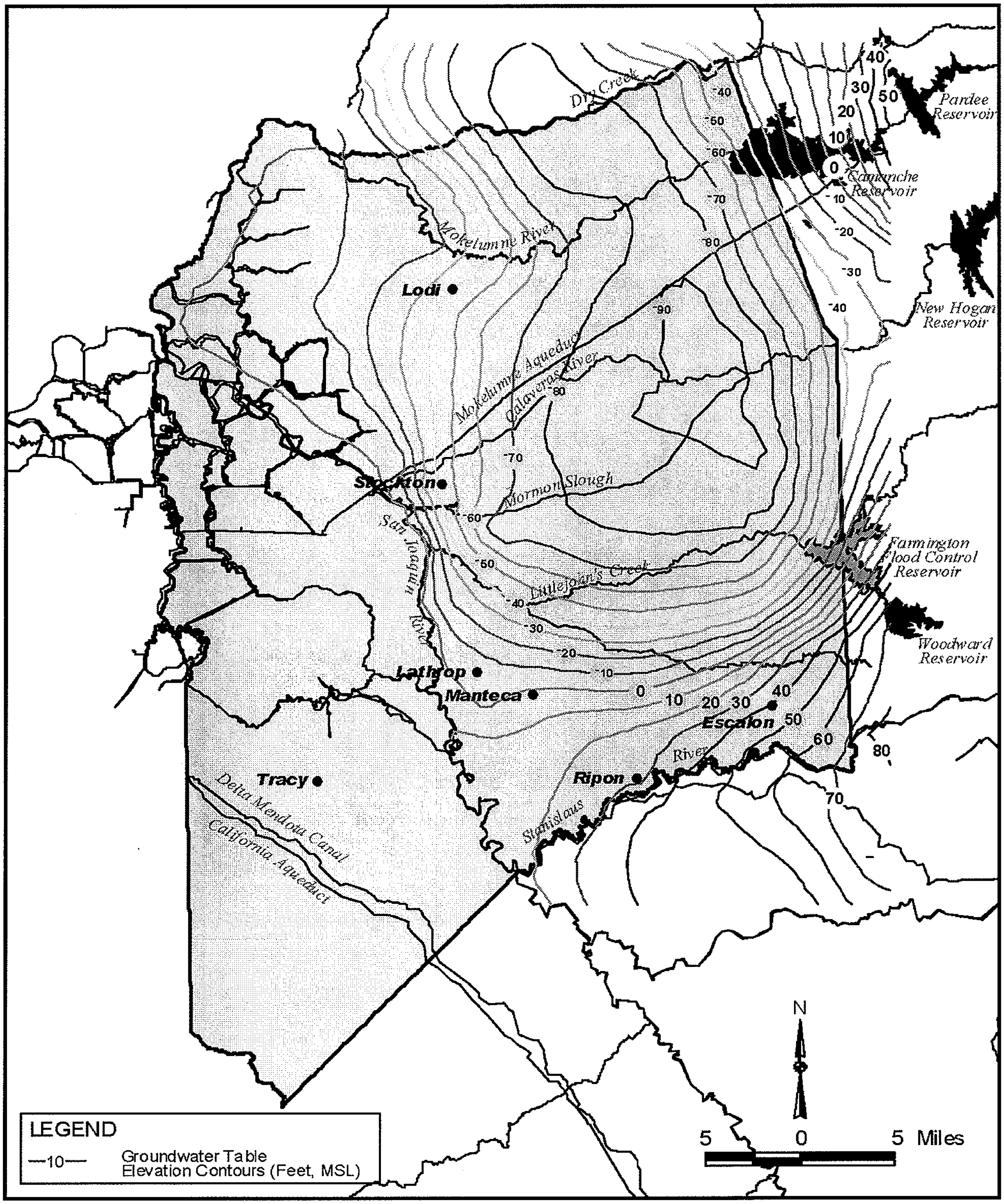

Figure ES-5 Simulated Groundwater Levels Under Baseline Conditions
Source: Camp Dresser & McKee Inc.

Table ES-6 Groundwater Option Comparisons

Option Type	Recharge Method	Improvement Costs ($/af)	Infrastructure Requirements	Land Requirements	Effectiveness	Operation/ Maintenance
Surface Supply Options	Wet Year Flows	~$500	On or off-stream regulating reservoir	Extreme for new reservoir	Very effective based on reservoir size and frequency	Very high requirements
	Water Transfers - Out of Basin	$200-400	Conveyance and storage	Potentially land intensive	Effective based on quantity of water and agreement duration	Varies with infrastructure requirements and year to year availability
	Area of Origin Priority	$0-$350	Use of existing or new infrastructure	Potentially land intensive	Very effective	Varies with infrastructure requirements
	Reservoir Re-operation	~$100	Use of existing infrastructure and storage	Minimal	Less effective	Minimal based on existing facilities
	Water Transfers - In Basin	~$100-$200	Minor conveyance	Minimal	Less effective	Varies with infrastructure requirements and year to year availability
Groundwater Recharge Options	Field Flooding	$50 - $100	Uses Existing Infrastructure	Uses seasonally fallow areas	Somewhat effective only available seasonally	Significant effort
	Spreading Basin/ Recharge Pond	$100 - $150	New Infrastructure	Requires relatively large dedicated areas	Potentially effective, requires detailed field testing	Significant effort
	Recharge Pit	$400 - $450	New Infrastructure	Requires dedicated areas	Potentially effective, requires detailed field testing	Significant effort
	Leaky Canal	Varies	New Infrastructure	Land intensive	Potentially effective, conveyance benefits	Significant effort
	Injection Wells	$150 - $200	New Infrastructure	Requires dedicated areas	Potentially effective, requires extensive well field	Significant effort
	Agricultural In-lieu	$200 - $250	New / Or Existing Infrastructure	Existing Land Use	Very effective based on quantity of water	Additional effort required by owner and district
	Urban In-lieu	~$250-$400	New / Or Existing Infrastructure	Existing Land Use	Very effective based on quantity of water	Requires treatment plant O&M costs
	Regional Groundwater Banking	$200-$300	New / Or Existing Infrastructure	Potentially land intensive	Very effective, financial assistance through third party	Significant effort
Other Options	Water Reclamation	$300-$500	Retrofit of existing facilities	Minimal	Less effective due to treatment costs and public perception	Requires treatment plant O&M costs
	Agricultural Water Conservation	$200-$250	New Infrastructure	Minimal	Potentially effective	Significant effort
	Urban Water Conservation	$200-$250	New Infrastructure	Minimal	Potentially effective	Minimal
	Crop Rotation/Land Fallowing	~$50	None	Potentially land intensive	Potentially effective if mitigated	Minimal

Source: San Joaquin County Water Management Plan Volume I
Farmington Groundwater Recharge and Seasonal Habitat Study

ES-9 Groundwater Contamination

Groundwater contamination and the continued degradation of groundwater quality is a global threat to all groundwater users. The Authority recognizes that the long-term sustainability of the underlying Basin cannot be accomplished without adequate groundwater quality protection, contamination prevention, and remediation programs. The Authority has discussed the issue of managing groundwater protection and contamination programs in Eastern San Joaquin County. A major concern of the Authority is that undertaking regulatory oversight will only duplicate the existing efforts of other regulatory agencies while financially burdening the community beyond its abilities. Increased coordination with regulatory agencies and a concerted effort to ensure its activities do not degrade water quality is potentially less resource intensive for the Authority and a more efficient method of protecting groundwater quality throughout the Basin. The Authority will continue to lead the pursuit against saline groundwater intrusion.

The following policies reflect the Authority's desire to address groundwater contamination and groundwater quality degradation:

1. Coordinate with local, State, and Federal agencies to ensure the underlying Basin is adequately protected against groundwater contamination and to ensure all contaminated sites are documented and mitigated by the responsible parties.

2. Continue to manage efforts to combat saline groundwater intrusion.

3. Strive to improve groundwater quality when technically and economically feasible. Authority actions degrading groundwater quality are not acceptable.

4. Require recharge projects to identify and evaluate impacts to groundwater quality and the potential for mobilization of soil and source water contaminants.

5. Consider current and future water quality standards in the planning and design of projects identified in this Plan.

ES-10 Groundwater Monitoring and Science Program

Since 1971, the San Joaquin County Flood Control and Water Conservation District (County) initiated the collection and management of groundwater data and the production of semi-annual groundwater reports. Currently, the County is undertaking the development of a Web-based interactive tool in order to make groundwater data collected over the years available to the public over the internet. The tool has been coined the San Joaquin County Groundwater Data Center (GDC). The GDC would become the repository for groundwater data and would facilitate groundwater analysis essential to the groundwater management objectives of San Joaquin County. The GDC is not only a technical tool, but also a public outreach tool as well. Through the internet, water users including County and agency staff, industry professionals, decision makers, and the general public will have access to groundwater data and historic semi-annual reports.

The overall goals and objectives of the GDC are:

1. Create and maintain a working groundwater database for San Joaquin County.
2. Develop the tools necessary to analyze groundwater data.
3. Make groundwater information available to decision makers, agency staff, and the general public through the internet.

4. Create an efficient and enforceable QA/QC plan.
5. Utilize the proven and supported technologies in groundwater monitoring, database management, and Geographic Information Systems (GIS).

The Authority and its member agencies are co-participants with the United States Geological Survey (USGS) and California Department of Water Resources (DWR) for the Groundwater Recharge and Distribution of High-Chloride Groundwater from Wells Study (Study). The purpose of the study is to quantify the source, aerial extent, and vertical distribution of high-chloride groundwater and the sources, distribution, and rates of recharge to aquifers along selected flow paths in Eastern San Joaquin County. The information gained from the Study will answer many questions with respect to future water levels, water quality, and storage potential under current and future management of the Basin. The total cost of the study is $2,579,350. The proposed USGS contribution will be $625,000 over 5 fiscal years as well as an additional $625,000 from the DWR over the first 3 fiscal years. Member agencies within the Authority will contribute the remaining $1,322,350 over next 5 fiscal years.

In order to ensure that groundwater data is collected in a systematic and consistent manner, the Authority has adopted the Groundwater Monitoring Program Quality Assurance/Quality Control (QA/QC) Plan, prepared by MWH in 1998. The QA/QC Plan addresses the following items: monitoring and sampling preparations, sample collection procedures, chain-of-custody procedures, sample transport, laboratory procedures and methods, and data validation and reporting. The QA/QC Plan can be obtained at the San Joaquin County Department of Public Works Stormwater Management Division. A revised QA/QC plan proposed as part of the GDC is expected to be completed by the Spring of 2005 ad subsequently adopted by the Authority Board.

ES-11 Financing Options

The development of new water supplies and the necessary infrastructure is a major financial undertaking. It is absolutely necessary for the Authority and its member agencies to leverage as much support for outside funding. The Plan provides a general overview of the potential funding sources, programs, and project partnerships available to the Authority from federal, State, and local sources.

ES-12 Plan Governance

Water interests in San Joaquin County have historically been fragmented, but have realized that projects developed in a collaborative process have the potential to exhibit greater and more far reaching benefits to all involved parties while increasing its implementability and fundability. Implementation of the water management options can best be achieved by continuing to work in a collaborative fashion to develop a broad base of political and financial support. The Authority has explored numerous options concerning the appropriate organization and powers needed to implement the plan and the best management framework that addresses the concerns of the Authority member agencies. Although no changes have been formally proposed to the powers and governance structure, the Authority could consider revisions in the future.

The Authority has served as a regional planning body and a forum for member agencies to share their groundwater management efforts and ensure that those efforts do not detrimentally affect other member agencies. In order to avoid potential conflicts between Basin stakeholders, the Authority employs the following policies:

- **Expanded Membership:** The membership in the Authority is diverse as are the challenges facing water Eastern San Joaquin County. In 2001, the Central Delta Water Agency and the South Delta Water Agency became full contributing and voting member agencies to the Authority. Associate membership (ex-officio) was also extended to the California Water Service and the San Joaquin Farm Bureau Federation as their input and support is essential to the success of the Authority. Other members have been contemplated such as SSJID, OID, City of Lathrop, Manteca, Escalon, and Ripon, Calaveras County Water District, Stanislaus County, DWR, Freeport Regional Water Authority, and EBMUD.

- **Continued Use of the Authority as a Forum:** As the Authority looks to implement the Plan, the member agencies will move the outlined projects through the planning, permitting, and design stages and ultimately to construction. In a forum, implementing member agencies will be able to quantify the benefits of its projects to stakeholders and receive comments and suggestions before disputes arise.

- **Continued Facilitation by the California Center for Collaborative Policy:** The California Center for Collaborative Policy (Center) has been an integral part to the success of the Authority's consensus based process. The Center's presence has maintained an atmosphere conducive to openness, compromise, and agreement. It is expected that the Center will continue to facilitate Authority meetings and throughout the implementation of the Plan.

ES-13 Integrated Conjunctive Use Program

The Integrated Regional Conjunctive Use Program is the key element in fulfilling the purpose of the Plan to ensure the sustainability of Groundwater resources in Eastern San Joaquin County. The Program is an inventory of viable options available to stakeholders in Eastern San Joaquin County as described by major supply elements, major surface storage and conveyance elements, and groundwater recharge components. Supply elements are grouped by river system and are a combination of reallocations, new water, and transfers. Entitlements to water are supported by legal claims based on existing water right permits, water service contracts and agreements, and pending water right applications. Major surface storage and conveyance elements are considered existing or proposed regional infrastructure intended for the capture and delivery of substantial amounts of water when available. Groundwater recharge components include groundwater recharge infrastructure improvements programs, drinking water treatment facilities, and incentive based agency conjunctive use programs. Table ES-7 describes each of the Integrated Conjunctive Use Program components.

Table ES-7 Integrated Conjunctive Use Program Elements			
Supply Source	**Water Rights and Contracts**	**Storage/Conveyance**	**GW Recharge**
American River	• 350 cfs diversion at Freeport from Dec. 1 to June 30 • Currently limited to 155 cfs by EBMUD's pipeline • (Average Annual Yield = 44,000 af)	• Proposed Duck Creek Reservoir • SJC Freeport Interconnect • Alliance Canal • Freeport Regional Water Project	• Farmington Program • GW Recharge and Conjunctive Use • ASR Wells • Third Party Banking and Conjunctive Use Partnerships
Mokelumne River	• 1000 cfs diversion to storage Dec. 1. to June 30 • 620 cfs direct diversion • (Average Annual Yield = 60,000 - 100,000 af) • 39,000 to 60,000 af to WID • 20,000 af to NSJWCD subject to others • (Average Annual Yield = 11,000 af)	• MORE WATER Project Tunnel and Pipeline • MORE WATER Project Lower River Diversions • Woodbridge Dam Replacement and Existing Canal System • Existing South System and North System Rehabilitation • NSJWCD - Bear Creek, Pixely Slough, Paddy Creek, Gill Creek • Alliance Canal	• Proposed Duck Creek • Lodi Recharge or use of 6,000 af transfer • Farmington Program • In-lieu and direct recharge by Districts • Third Party Banking and Conjunctive Use Partnerships • ASR Wells
Calaveras River	• 100,000 af 56.5% to SEWD and 43.5% to CCWD • By agreement, SEWD is allowed to utilize CCWD unused supply • 13,000 ac-ft riparian demand	• Peters Pipeline • Mormon Slough • Alliance Canal • South Gulch Reservoir	• Farmington Program • Treatment Plan Expansion - Urban In-lieu • In-lieu and direct recharge • SJAFCA and Other Storm Water Detention Ponds • Third Party Banking and Conjunctive Use Partnerships
Stanislaus River	• 155,000 af contract to SEWD/CSJWCD • 75,000 af interim to SEWD • 49,000 af firm and <31,000 ac-ft interim to CSJWCD • 320,000 af (In San Joaquin County) • 34,000 af (South County Project In-basin delivery) • 30,000 af transfer to SEWD	• Peters Pipeline • CSJWCD - Lone Tree, Duck Creek, Temple Creek, Littlejohns Creek • Alliance Canal • South County Water Supply Project	• Farmington Program • Treatment Plant Expansion • Lathrop, Manteca, and Escalon In-lieu • In-lieu and direct recharge • SJAFCA and Other Storm Water Detention Ponds • Third Party Banking and Conjunctive Use Partnerships
Littlejohns Creek and Rock Creek	• 250,000 af Dec. 1 to April 30 • 60,000 af direct diversion • 190,000 af to storage • (Average Annual Yield = 15,000 af)	• Farmington Canal • CSJWCD - Lone Tree, Duck Creek, Temple Creek, Littlejohns Creek • Alliance Canal • Farmington Canal to South Gulch • Lyons Dam Project	• Farmington Program • CSJWCD Surface Water Incentive Program • In-lieu and direct recharge by Districts • Third Party Banking and Conjunctive Use Partnerships • SJAFCA and SJCOG Storm Water Detention Ponds
Delta	• City of Stockton Delta Water Supply Project • Initially 20,000 af increasing to 125,900 af in 2050 • (Average Annual Yield = 60,000 af)	• Pipeline and Treatment Facility	• Stockton In-lieu and ASR Wells • Third Party Banking and Conjunctive Use Partnerships • Farmington Program

The opportunity for groundwater banking partnerships in Eastern San Joaquin County is considered a viable alternative that creates new water. Groundwater banking is supported regionally and Statewide as an alternative means to new highly-contentious on-stream reservoirs and costly desalinization plants. The underlying Basin has the potential to store over 1 million acre-feet in close proximity to the Delta. The opportunities possible are a logical match for regional and Statewide interests to look to the Authority for groundwater banking opportunities. It is paramount to the Authority that banking rates, extraction rates, and quantities remain under local control.

The San Joaquin Groundwater Export Ordinance (Export Ordinance) is purposefully and notoriously stringent in order to protect local groundwater users from groundwater exports. San Joaquin County Board of Supervisors has continually stated that they are willing to amend the Export Ordinance should a project be proposed that can demonstrate local benefits with minimal risk to losing local control of the Basin.

Banking partnerships could provide the Authority with capital to fund portions of Integrated Conjunctive Use Program envisioned above. Conceptually, the Authority could employ various arrangements for the ranging from water storage agreements, surface water transfers/groundwater substitution, and a 'two for one' storage/extraction concept. Potential partners that have shown interest are EBMUD, Metropolitan Water District of Southern California, DWR, CALFED Environmental Water Account, and the City of Tracy. Entities have purchased raw water from other groundwater banks throughout the State at rates upwards of $420/af.

ES-14 Plan Implementation

The Authority is committed to adopting a Plan implementation strategy that is adaptive and incentive driven. This Plan is the first step in the development of a regional document that details how the groundwater basin will be managed and initiates the process that will ultimately define the guidelines and conditions that water districts and others will follow to achieve basin management objectives. Following the adoption of this Plan, the Authority and its members will work to implement the management objectives. The objectives coupled with regular groundwater monitoring and the development of basin operations criteria will establish a framework and the foundational information for future groundwater banking and recharge project operations in the Basin.

To encourage the continued implementation of the Plan, the Authority will complete a periodic assessment of the progress, direction and recommendations regarding Plan objectives. Basin conditions are currently measured by groundwater level and quality monitoring on a semi-annual basis. This assessment activity will be coupled with the annual review of Plan implementation activities and project development in the basin.

To ensure that the Authority is constantly striving to better manage groundwater resources, the following actions will be undertaken:

1. An annual report by March 1st of each year that outlines the accomplishments of the previous year's groundwater management efforts and report the current state of the Basin,

2. A review of the political, institutional, social, or economic factors affecting groundwater management, and

3. Based on the information gained in the above actions, recommendations for any required amendments to the Plan.

ES-15 Future Activities

The adoption of the Plan is merely the beginning of a series of actions the Authority will undertake to help meet future basin demands. As such, many of the identified actions will likely evolve as the Authority takes a more active approach to manage the Basin and meet the outlined objectives. Many additional actions will also be identified in the annual summary report described above. The Plan is therefore intended to be an iterative 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 goal of the plan. The Authority plans to evaluate this entire plan within five years of adoption.

1 Introduction

1.1 Background

San Joaquin County is home to approximately 600,000 people and sustains a $1.34 billion agricultural economy. The population is expected to increase to approximately 1.1 million by 2030. Water demand in the county is approximately 1,600,000 acre feet per year, 60 percent of which is quenched by groundwater. The California Department of Water Resources (DWR) has declared the Eastern San Joaquin Groundwater Basin (Basin) "critically overdrafted," indicating that the current rate of groundwater pumping exceeds the rate of recharge and is not sustainable. (DWR, 1980) Based on the San Joaquin County Water Management Plan, the Basin is overdrafted by 150,000 af/yr on average. Long-term groundwater overdraft has lowered the groundwater table by 2 ft/yr in some areas to -70 ft (MSL) and has induced the intrusion of highly saline groundwater into the Basin from the west. Without mitigation, such intrusion will degrade portions of the Basin, rendering the groundwater unusable for municipal supply and irrigation.

Failure to address water supply and management needs in Eastern San Joaquin County will ultimately result in severe economic disruptions to the County. Agriculture in San Joaquin County, valued at $1.34 Billion, is already stressed due to declining market prices, rising regulatory, labor, and energy costs, and can ill afford threats to its water supply – a fundamental component of its continued existence. Municipal and industrial users simply must have reliable, high-quality supplies to exist. Loss of supplies to saline intrusion, potential loss of basin yield due to subsidence or simply lack of reliability will translate into business flight, job loss, loss of revenue for public services and general economic decline. Individual agencies in Eastern San Joaquin County have long grappled with declining groundwater levels and unreliable supplemental water supplies.

Conversely, long term overdraft has created opportunities for groundwater banking to the benefit of regional and statewide interest. Overuse of groundwater has depleted a substantial portion of stored groundwater in the Basin and has made available volume for potential regulatory storage. It is estimated that at least 1.2 million af, a volume equivalent to Folsom Lake, could be used to store wet year water for use in subsequent dry years. However, to do so would require the monumental task of overcoming the institutional, political, financial, and physical challenges of groundwater banking.

Independently, agencies in Eastern San Joaquin County have found it difficult to wield the political and financial power necessary to mitigate the conditions of overdraft. County interests have come to realize that a regional consensus based approach to water resources planning and conjunctive water management increases the chance for success. Regional planning efforts such as the San Joaquin County Water Management Plan (adopted by the County Board of Supervisors in October 2002) and the Mokelumne Aquifer Storage, Recovery Study (MARS Study), and the South County Surface Water Supply Project have proven successful ventures.

Since its formation in 2001, the Northeastern San Joaquin County Groundwater Banking Authority (Authority) has employed the consensus based approach in its goal to develop "...locally supported groundwater banking projects that improve water supply reliability in Northeastern San Joaquin County...and provide benefits to project participants and San Joaquin County as a whole." Collaboration amongst the Authority member agencies has strengthened the potential for broad public support for groundwater management activities as well as the ability to leverage local, State, and federal funds. Table 1-1 lists the member agencies of the Authority.

Table 1-1 Member Agencies of the Northeastern San Joaquin County Groundwater Banking Authority
City of Stockton
City of Lodi
Woodbridge Irrigation District
North San Joaquin Water Conservation District
Central San Joaquin Water Conservation District
Stockton East Water District
Central Delta Water Agency
South Delta Water Agency
San Joaquin County Flood Control and Water Conservation District
California Water Service Company*
San Joaquin Farm Bureau Federation*
* Associate Members

1.2 Purpose and Objectives

Over the past several years, the Authority has provided a consensus-based forum of local public water interests to work cooperatively with one voice to study, investigate, and plan locally supported groundwater banking and conjunctive use projects in the Eastern San Joaquin County. The Authority Board convenes monthly while the Authority Coordinating Committee meets twice a month on planning activities with cooperative assistance provided by the California State Department of Water Resources and the Center for Collaborative Policy.

San Joaquin County has made substantial progress related to water resource planning and continues to build on the momentum gained by local achievements in such endeavors through the Authority. In a report published by the Center for Collaborative Policy entitled, "Stakeholder Assessment for San Joaquin County – Conditions, Issues, and Options for Collaborative Solutions", the report suggested a core group of issues fundamental to continuing a comprehensive approach to solving the water resource needs within the County. The report concluded that the keys to successful planning efforts include:

- Development of a common understanding of the operations of water sub-basins within the County and the necessity of conjunctive use to the health of these basins and the County's economy in the future
- Use of consensus decision-making
- Grouping of members who are consistent in attendance, clear in communication, and conscientious in relaying information and views between their constituency and the group

One of the major activities the Authority has dedicated itself to this past year is the Groundwater Management Plan (Plan). The purpose of the Plan is to review, enhance, assess, and coordinate existing groundwater management policies and programs in Eastern San Joaquin County and to develop new policies and programs to ensure the long-term sustainability of groundwater resources in Eastern San Joaquin County. To better define the supporting values included with this Plan's purpose, the Authority has listed the following mission values centered on the development of the Plan as outlined in Table 1-2.

Table 1-2 Groundwater Management Plan Mission Values for Success		
Be implemented in an equitable manner	Maintain or enhance the local economy	Protect groundwater and surface water quality
Be affordable	Minimize adverse impacts to entities within the County	Provide more reliable water supplies
Exhibit multiple benefits to local land owners and other participating agencies	Maintain overlying landowner and Local Agency control of the Groundwater Basin	Restore and maintain groundwater resources
Minimize adverse impacts to the environment	Protect the rights of overlying land owners	Increase amount of water put to beneficial use within San Joaquin County

In order to meet the purpose of the Plan and ensure the long-term sustainability of the Basin, the Authority created the following Plan objectives:

1. Maintain long-term sustainability of the Basin through the development of management objectives, practices and conjunctive use projects to benefit the social, economic and environmental viability of Eastern San Joaquin County.
2. Prevent further saline intrusion and degradation of groundwater quality throughout the Basin.
3. Increase understanding of Basin dynamics through the development of a sound research program to monitor, evaluate, and predict Basin conditions.
4. Maintain local control of the groundwater Basin through the responsible management of groundwater resources by overlying cities, counties, water districts, agencies, and landowners.
5. Formulate rational and attainable Basin management objectives to comply with SB 1938 and retain State funding eligibility.
6. Formulate voluntary policies, practices, and incentive programs to meet established Basin management objectives.
7. Formulate appropriate financing strategies for the implementation of the Plan.

1.3 Groundwater Management Area

San Joaquin County overlies the Eastern San Joaquin, Cosumnes, and Tracy Sub-basins of the greater San Joaquin Valley Groundwater Basin. The Eastern San Joaquin Sub-basin is bounded by the Mokelumne River to the north, the Stanislaus River to the south, the San Joaquin River to the west, and bedrock to the east. The Cosumnes Sub-Basin is defined by the Cosumnes River to the northwest, the Mokelumne River to the South, and bedrock to the east. Figure 1-1 depicts the groundwater sub-basins of San Joaquin County as described in DWR Draft Bulletin 118 Update 2003. For the purposes of the Plan, the Eastern San Joaquin County Groundwater Management Area (GMA), depicted in Figure 1-2, is defined as the portion of San Joaquin County overlying the Eastern San Joaquin and Cosumnes Sub-Basins.. Within the GMA, the member agencies of the Authority will implement the Plan within their respective boundaries. To ensure that every parcel in the GMA is represented, all unorganized areas will be included in the San Joaquin County Flood Control and Water Conservation District. Figure 1-3 depicts the member Agencies of the Authority and their respective boundaries within the GMA.

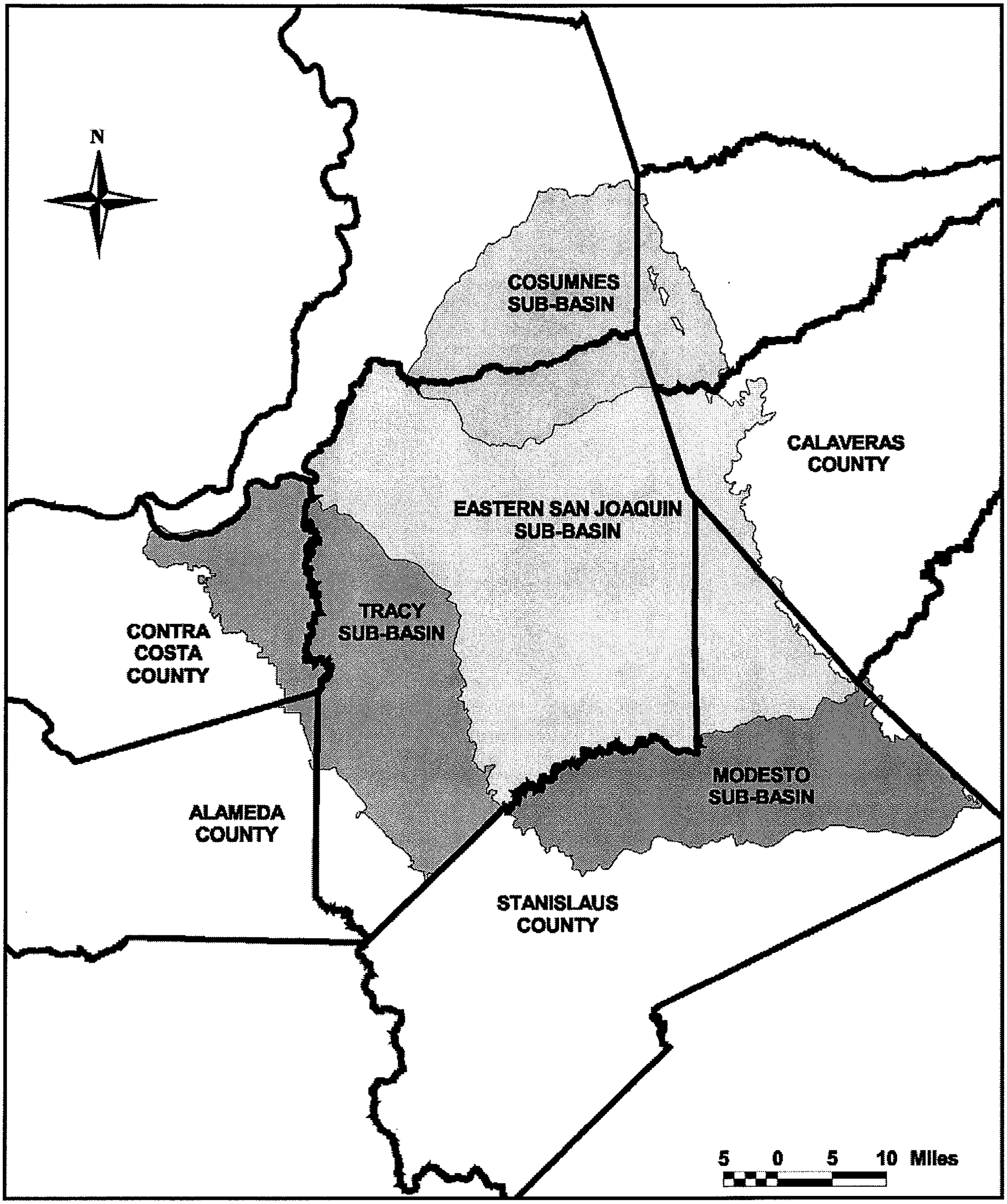

Figure 1-1 Groundwater Sub-Basins of San Joaquin County
Source: California Spatial Information Library at http://www.gis.ca.gov/

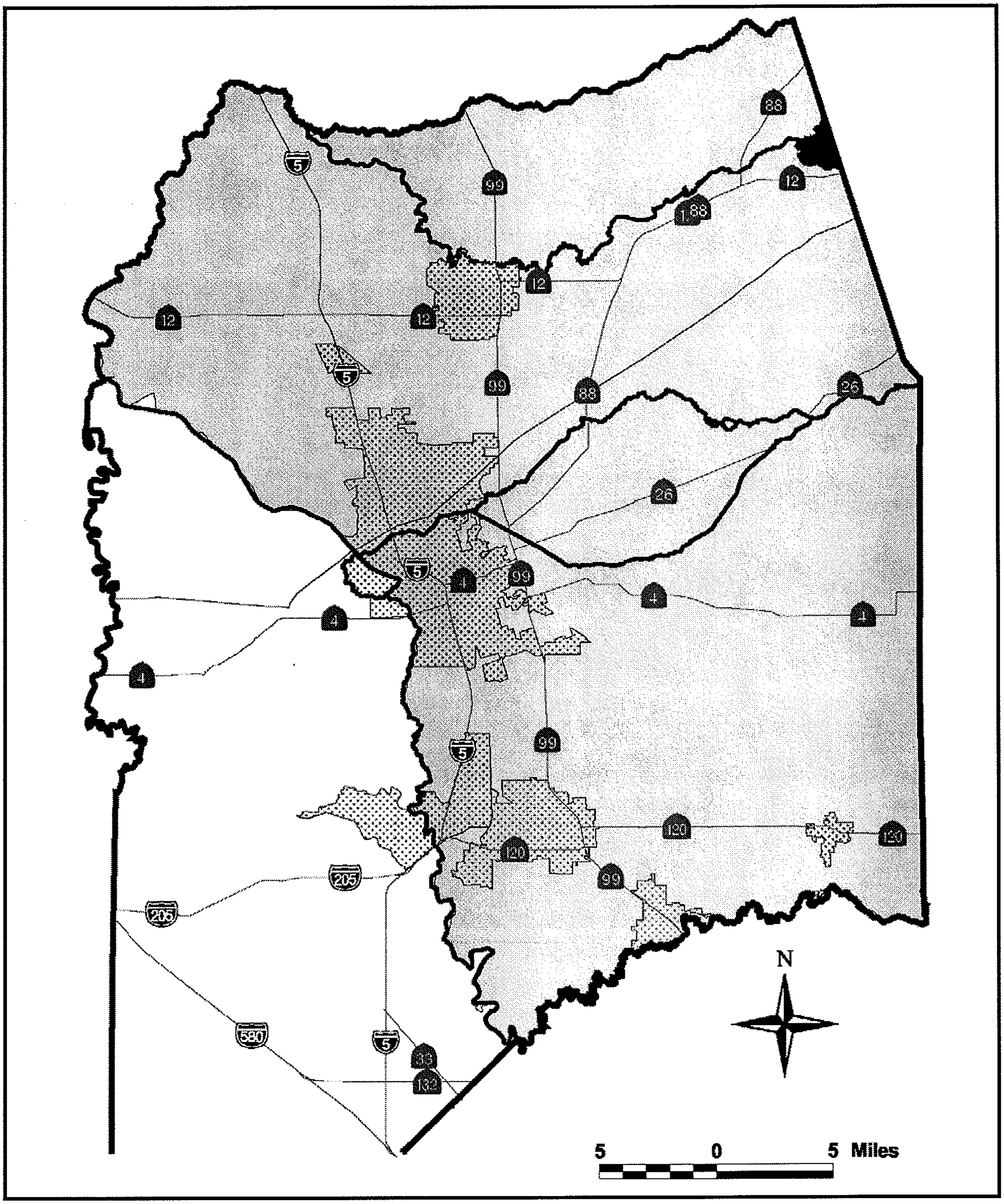

Figure 1-2 Groundwater Management Area
Source: California Spatial Information Library at http://www.gis.ca.gov/

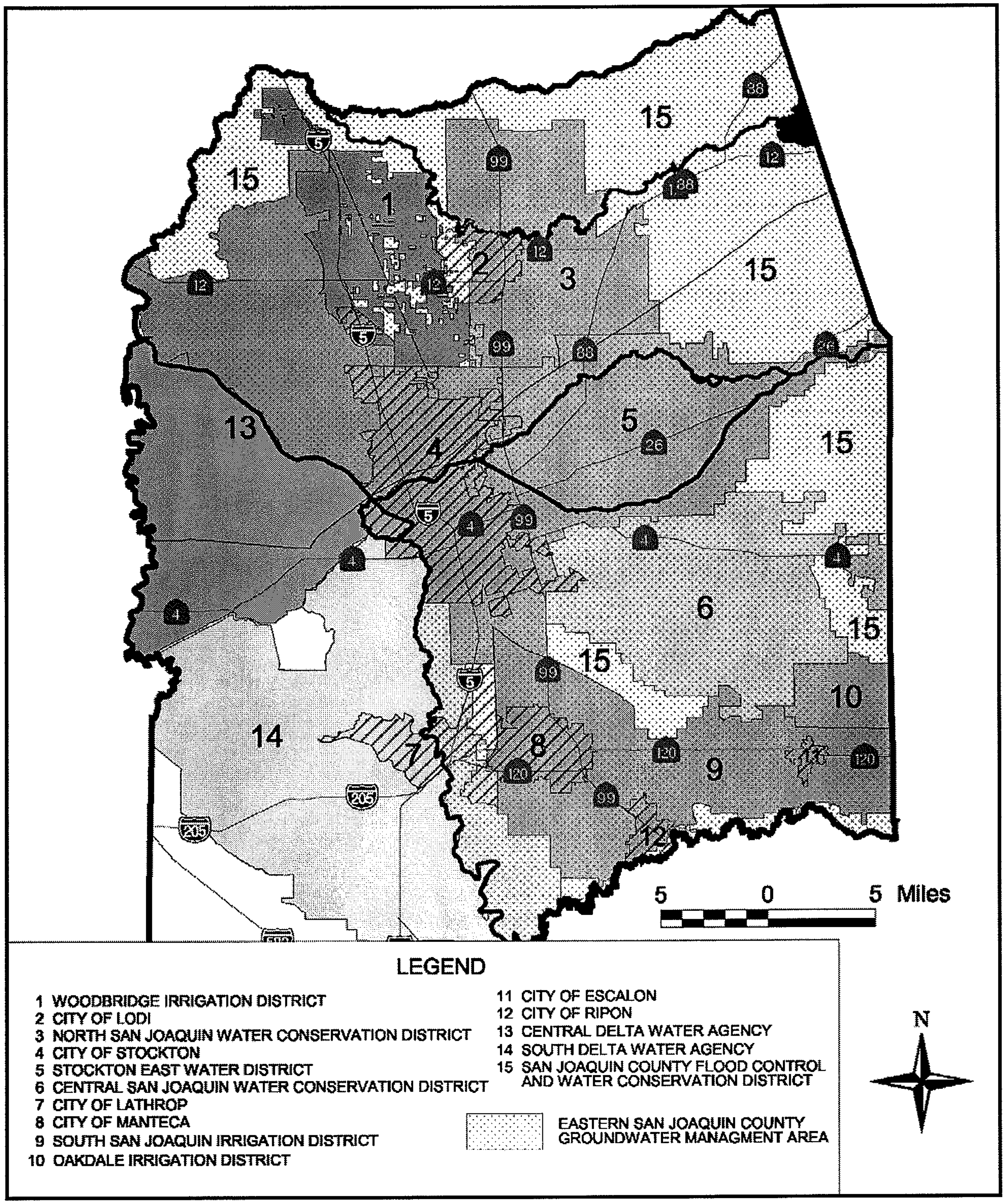

Figure 1-3 Overlying Agencies within the Groundwater Management Area
Source: California Spatial Information Library at http://www.gis.ca.gov/

1.4 Agency Participation

The physical boundaries of the Eastern San Joaquin and Cosumnes Sub-Basins extend beyond the political boundaries of San Joaquin County. Portions of Calaveras County and Stanislaus County overlie the Eastern San Joaquin Sub-basin. Recognizing the need for increased coordination between agencies outside of the GMA, in May 2003, the Authority invited a variety of interest groups from the business, environmental, agricultural, and political communities to participate in the development of the Plan. The Authority values the consensus based approach to groundwater management and strives to coordinate, integrate, and mutually benefit from the groundwater management efforts of its member agencies and those with vested interest in the social, economic, and environmental viability of Eastern San Joaquin County.

Throughout the planning process, the Authority's Coordinating Committee, a technical sub-group of the Authority, convened every 4th Wednesday of the Month to formulate the Plan. Key discussion points and decisions were debated and finalized by the Coordinating Committee and incorporated into the Plan by Authority Staff. Draft sections of the Plan were also presented to and commented on by the Coordinating Committee. The Authority Board of Directors was regularly updated on the activities of the Plan at their regular meetings on the 2nd Wednesday of the month. For the purpose of providing an atmosphere conducive to broad-based consensus building and compromise, Authority Coordinating Committee meetings were facilitated through the California Center for Collaborative Policy.

Attendees of these meetings include representatives from over 40 agencies and interest groups. Table 1-3 is a list of meeting attendees and agencies contributing to the Plan.

Table 1-3 Groundwater Management Planning Participants

Participant	Agency
Andy Christensen	Woodbridge Irrigation District
Cary Keaton	City of Lathrop
Dante Nomellini	Central Delta Water Agency
Dave Kamper	South San Joaquin Irrigation District
David Simpson	Natural Resource Conservation Service
Ed Formosa	City of Stockton Municipal Utilities Department
Ed Steffani	North San Joaquin Water Conservation District
Gary Giovanetti	Stockton City Council
Joe Petersen	San Joaquin Farm Bureau Federation
John Herrick	South Delta Water Agency
Keith Conarroe	City of Manteca
Kevin Kauffman	Stockton East Water District
Larry Diamond	Calaveras County Water District
Loralee McGaughey	Stockton East Water District
Mark Lindseth	City of Lodi
Mark Madison	City of Stockton Municipal Utilities Department
Mel Lytle	San Joaquin County Public Works
Melvin Panizza	Stockton East Water District
Michael McGrew	San Joaquin County Counsel
Paul Risso	California Water Service Company
Ray Borges	San Joaquin County Environmental Health
Reid Roberts	Central San Joaquin Water Conservation District
Richard Prima	City of Lodi

Steve Stroud	South San Joaquin Irrigation District
Teresa Tanaka	Linden County Water District
Tom Flinn	San Joaquin County Public Works
Tom Gau	San Joaquin County Public Works
State Participants & Agencies	
Ann Jordan	Office of State Senator Charles Poochigan
Mary Bava	Office of Assemblyperson Barbara Matthews
Tim Parker	Department of Water Resources
Federal Participants & Agencies	
David Simpson	Natural Resource Conservation Service
Eric Reichard	US Geologic Survey
John Izbicki	US Geologic Survey
Patrick Dwyer	US Army Corps of Engineers
Other Participants & Agencies	
Barbara Williams	Sierra Club
Carolyn Ratto	California Center for Collaborative Policy
David Beard	Great Valley Center
David Simpson	Natural Resource Conservation Service
Gerald Schwartz	East Bay Municipal Utility District
Gina Veronesc	Camp, Dresser, & McKee
James Cornellius	Calaveras County Water District
James Moore	Galt Economic Development Task Force
John Aud	Stanislaus County
Larry Diamond	Calaveras County Water District
Mark Williamson	Saracino-Kirby-Snow
Robert Vince	Camp, Dresser, & McKee
Ron Addington	Business Council, Inc.

The Authority will continue to seek the input of its neighbors and interest groups during the implementation of the Groundwater Management Plan and any future planning efforts.

1.5 Consistency with Water Code Section 10750 *et. seq.*

Groundwater management is the planned and coordinated effort to sustain or improve the health of a groundwater basin in order to meet the future water supply needs of groundwater users. With the passage of Assembly Bill (AB) 3030 in 1992, local water agencies were provided a systematic way of formulating groundwater management plans and a means to implement those plans through fees and assessments. AB 3030 also encourages coordination between local entities through joint power authorities or memorandums of understanding.

In 2002, the passage of SB 1938 further emphasized the need for groundwater management in California. SB 1938 requires AB 3030 groundwater management plans to contain specific plan components in order to receive state funding for water projects. Table 1-4 illustrates the recommended components of a groundwater management plan as outlined in AB 3030 and the required sections under SB 1938.

On July 9, 2003, the Authority Board of Directors held a public hearing to initiate the formulation of this Plan. The hearing was formally noticed per Water Code Section 10750 et. seq. and a Resolution of Intent to Prepare a Groundwater Management Plan was adopted by the Authority

Board of Directors. Table 1-4 also indexes the sections of this Plan where the recommended or required AB 3030/SB 1938 components are addressed.

Table 1-4 Components of a Groundwater Management Plan

Plan Component	Recommended by AB 3030	Required by SB 1938	Plan Sections
Control of saline water intrusion	X		2, 3, 4, 5, 8
Management of wellhead protection and recharge areas	X		4
Regulation of contaminated groundwater	X		4
The administration of a well abandonment	X		4
Elimination of groundwater overdraft	X		2, 3, 4, 5, 8
Replenishment of groundwater	X		2, 3, 4, 8
Groundwater monitoring	X	X	5
Operation of a conjunctive water management system	X		3, 8
Well construction standards	X		4
Financing groundwater management projects	X		6, 7
The development of groundwater management partnerships	X		1, 4, 7, 8
Coordination of land use planning and groundwater management	X		4
Description of participation by interested parties		X	1, 7
Plan to involve agencies overlying the basin		X	1, 7
Basin Management Objectives		X	3
Basin management entity and area map		X	1

Sources: California Department of Water Resources Division of Planning and Local Assistance http://wwwdpla.water.ca.gov/cgi-bin/supply/gw/management/hq/ab3030/main.pl

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1.6 Current Groundwater Management Efforts

To ensure that groundwater management efforts are not duplicated or conflicting, the Authority has reviewed existing groundwater and urban water management plans of member agencies, which are attached in the Technical Appendix.

1.6.1 Overview of Existing Groundwater Management Plans

Woodbridge Irrigation District – The Woodbridge Irrigation District (WID), organized in 1924 under the California Irrigation District Act, holds extensive water rights to Mokelumne River Water dating back to the mid-1880s. The boundaries of WID encompass a gross area of approximately 42,900 acres., however, WID is discontinuous resulting in patches of non-district lands within the its boundary. WID overlaps with the North San Joaquin Water Conservation District (NSJWCD), Stockton East Water District (SEWD), and the City of Lodi.

In 1996, WID adopted an AB 3030 Groundwater Management Plan for the purpose of ensuring that groundwater levels would continue to supplement surface water supplies in order to meet the demands of the District. WID's goal for conjunctive use is to maximize the use of surface water for the protection of the underground water supply. WID was also a member agency of the East San Joaquin Parties Joint Powers Authority, a predecessor to the Authority.

WID owns and operates the aging Woodbridge Diversion Dam located on the Lower Mokelumne River northeast of Lodi and an extensive canal system serving approximately 13,000 acres. Due to the deterioration and age of the Woodbridge Diversion Dam, WID has worked very hard to obtain the necessary approvals for its replacement. Through WID's conservation efforts to convert to drip irrigation, WID has made available up to 6,000 af/yr to the City of Lodi at a cost of $200/af. WID intends to use the proceeds of the water purchase agreement to finance the current construction activities to replace the Woodbridge Diversion Dam in order to continue to fully utilize its right to Mokelumne River water and meet the goals of their AB 3030 Plan. Also at the regional level, WID has participated as a member agency of the East San Joaquin Parties Water Authority (ESJPWA) and the Authority.

North San Joaquin Water Conservation District – The North San Joaquin Water Conservation District (NSJWCD), organized in 1948 under provisions of the Water Conservation District Act of 1931, includes approximately 53,100 acres east of the City of Lodi. Approximately 4,740 acres are within the Lodi city limits and 5,600 acres are within Lodi's sphere of influence. NSJWCD straddles the Mokelumne River and is consequently located in both the Cosumnes and the Eastern San Joaquin sub-basins as defined by the DWR Draft Bulletin 118.

In 1996 NSJWCD adopted an AB 3030 Plan to address declining groundwater levels, degradation of groundwater quality, and securing reliable surface water supplies. Actions in their AB 3030 Plan include the continued effort to seek a reliable supplemental water supply from the Mokelumne River and other sources, promotion of more efficient water application methods, participation in regional groundwater management efforts, and the maximum use of surface water supplies through the development of groundwater recharge facilities.

On July 3, 1956, Decision 858 of the California State Engineer predecessor to the State Water Resources Control Board (D-858) denied NSJWCD a water right permit to divert up to 50,000 af/yr and instead approved East Bay Municipal Utility District's (EBMUD) request to appropriate an amount greater than the request of NSJWCD. A temporary permit was issued to NSJWCD for interim water based on EBMUD's unused entitlements and future demands, but could only be diverted from December 1 to July 1. Through an agreement between both parties, EBMUD stores up to 20,000 acre-feet in the wettest years for delivery to NSJWCD during the irrigation season. The permit expired in 2002.

In order to renew the permit, NSJWCD must show the SWRCB that it can put the water to beneficial use. NSJWCD has received a $462,500 CALFED grant and has participated in the Farmington Groundwater Recharge and Seasonal Habitat Study to demonstrate their ability to utilize its full appropriation. Property owners within NSJWCD have also approved an assessment to levy up to $5/acre to further the recharge effort. NSJWCD continues to seek resolution to D-858 through requests to the SWRCB to consider a reallocation of 50,000af/yr of Mokelumne River Water from EBMUD to the District.

At the regional level, NSJWCD has participated as a member agency of the ESJPWA, the Eastern Water Alliance, and the Authority.

Stockton East Water District – The Stockton East Water District (SEWD), as currently structured, was formed in 1948 under the 1931 Water Conservation Act of the State of California. The SEWD was originally organized as the Stockton and East San Joaquin Water Conservation District, an independent political subdivision responsible for acquiring a supplemental water supply and assisting in the development of practices of water use that would promote the required balance between surface water and groundwater.

From 1948 to 1963, SEWD's efforts were in planning, evaluating groundwater conditions and determining requirements for supplemental water. As a result of the SEWD planning and with intensive efforts of part of the SEWD and local agencies, New Hogan Dam was constructed in 1964. The SEWD's first supply of supplemental surface water was contracted with the USBR in 1964 and a final agreement in 1970 guaranteeing 56.5% of New Hogan Reservoir's yield to the District.

Prior to 1963, the SEWD's basic financial structure rested upon a tax on land. In 1963, the Governor of California signed a bill that established groundwater use fees and surface water charges that could be levied by the SEWD. The additional revenues were used by the SEWD to contract for New Hogan water. The SEWD began registering wells within their boundaries. Check dams were built on the Calaveras River, Mormon and Mosher Sloughs for control of surface irrigation water and to promote groundwater recharge. SEWD became actively involved in the pursuit of projects to mitigate declining groundwater levels and to prevent the further intrusion of saline groundwater.

In 1971, SEWD boundaries were expanded to include the entire Stockton urban area. SEWD began plans for a 30 MGD treatment plant to serve the urban area. In 1975, a $25 million bond issue was passed by the SEWD wide election to fund the water treatment plant. The plant was completed in 1977 and went on line in 1978 to reduce the groundwater pumping depression under the urban area and the affects of saline intrusion on urban wells near the Delta. In 1979 the Independent Benefit Commission concluded that the treatment plant was a benefit to the planning areas. SEWD began to assess 14,000 af of additional agricultural acres. The total area within SEWD is approximately 116,300 acres, of which 47,600 acres (approximately 41%) are within the City of Stockton. WID and SEWD share approximately 9,700 acres in North Stockton.

SEWD has actively sought supplemental surface water from the American River via the Folsom South Canal and from the New Melones Reservoir. Efforts to obtain the American River supply have been thwarted by the Environmental Defense Fund (EDF), EBMUD litigation and the Freeport Regional Diversion Project litigation. The District and Central San Joaquin Water Conservation District (CSJWCD) contracted with the USBR in 1983 for 75,000 and 80,000 af of water respectively from New Melones Reservoir. In 1983, the District expanded surface water irrigation with the construction of the 12,000 gpm Potter Creek Pump Facility.

The Water Treatment Plant capacity was increased in 1991 to accommodate increased demand from the Stockton Urban areas. Construction on the New Melones Conveyance System was completed in 1994. Under the Central Valley Project Improvement Act (CVPIA), the USBR provided no water to SEWD in 1993 and 1994. In 1995 SEWD began receiving New Melones water, but less than the contracted amount because of the Miller-Bradely bill requirements regarding water quality issues on the San Joaquin River and fish flows. Legal action is ongoing.

Under current USBR operation of New Melones, SEWD and CSJWCD are provided up to 90,000 af water from New Melones annually. Water allocation is based on March-September water forecast plus February end-of-month storage in New Melones.

In 1995, SEWD adopted an AB3030 Groundwater Management Plan. The goal of their Plan is to continue past efforts to seek supplemental surface water supplies for conjunctive use, to protect existing supplies, and to further pressure the USBR to meet the contracted delivery amounts for New Melones water.

In 1997, the District entered into a water transfer agreement with Oakdale Irrigation District (OID) and South San Joaquin Irrigation District (SSJID). This agreement is for 8,000 to 30,000 af allocation based on New Melones storage and inflow as of April 1 of each year. The contract period ends 2009 with a possible 10-year renewal pending further studies.

SEWD completed the Farmington Groundwater Recharge and Seasonal Habitat Study (Farmington Study) in conjunction with the United States Army Corps of Engineers and other local agencies in 2001. The Farmington Study identified areas suitable for recharge and seasonal habitat development, evaluated recharge techniques, conducted pilot recharge tests, developed a final report and recharge guide, and developed an implementation strategy for the phased Farmington Program.

In 2003, SEWD completed the Pilot Phase of the Farmington Program, which consists of 60 acres of recharge ponds and fields adjacent to the SEWD Water Treatment Plant. The Demonstration Phase beginning in 2003 will investigate and construct up to 1,200 acres of recharge ponds and fields.

In 2003, SEWD applied for a Proposition 13 Groundwater Recharge Storage Construction Grant for the Peters Pipeline portion of the Farmington Program. The proposed project consists of a six-mile long 60-inch diameter pipeline, which will distribute irrigation and recharge water as well as water to the SEWD Water Treatment Plant.

At the regional level, SEWD has participated as a member agency of the Eastern Water Alliance and the Authority.

Central San Joaquin Water Conservation District – The CSJWCD was formed in 1959 under provisions of the California Water Conservation Act of 1931. The CSJWCD includes approximately 65,100 acres, of which 670 acres are within the sphere of influence for the City of Stockton.

CSJWCD has not adopted formally an AB 3030 Plan, however, in 1997, to mitigate declining groundwater levels, the District participated in the Goodwin Tunnel Project for the use of New Melones water subject to the contract with the USBR. The contract amount calls for 49,000 af/yr of firm yield and up to an additional 31,000 af/yr on an interim basis to the District. Under the existing New Melones Reservoir operations plan, the contracted amount has never been fully delivered. Irrigation facilities have been installed and operated by individual landowners through a surface water incentive program sponsored by the District.

At the regional level, CSJWCD has participated as a member agency of the Eastern Water Alliance and the Authority.

South San Joaquin Irrigation District – Formed in 1909 under the Irrigation District Act, SSJID comprises about 72,000 acres in the southeastern portion of San Joaquin County, all of which is located within the Basin. The cities of Manteca, Ripon and Escalon comprise approximately 10,000 acres of the District area. SSJID is allocated half of 600,000 af/yr from the Stanislaus River with the other half going to Oakdale Irrigation District. SSJID owns and operates an extensive system of conveyance structures and canals.

Adopted in 1993, the Plan outlines the efforts of the district to maintain groundwater levels and continue to utilize its surface water entitlements. As part of the plan, SSJID began regularly monitoring their irrigation wells for water quality. Before the Plan, only the municipal wells used for drinking water supply were tested because of Health Department requirements. SSJID also uses agricultural sites during the off-season for recharge and plans to implement recharge and wellhead protection areas to safeguard groundwater quality.

The estimated safe yield of the Basin within the entire District is 72,000 af/yr. Municipal usage, particularly within the City of is about 2½ times the safe yield. Based on data from 32 wells in the District, the groundwater levels have decreased between 20 to 30 feet in the last 40 years. To address the water supply needs of the urban areas of the District and the Region, SSJID will begin in 2005 the delivery of up to 44,000 af/yr of treated surface water from Woodward Reservoir to the Cities of Escalon, Manteca, Lathrop, and Tracy. The net benefit to the Basin is expected to be approximately 30,000 af/yr. SSJID and OID also provide water to the City of Stockton through a 10-year transfer agreement for up to 30,000 af/yr of New Melones Water.

Oakdale Irrigation District – Formed in 1909 under the Irrigation District Act, OID comprises about 72,345 acres mostly in the northern portion of Stanislaus County with about 12% overlying the Eastern San Joaquin Sub-basin. With the adoption of a Plan in 1995, OID has taken a proactive approach to preventing groundwater contamination from abandoned wells by educating property owners and improving enforcement policies. OID has also developed guidelines for a wellhead protection program. Flood irrigation practices in OID have helped to recharge the Basin. As stated above, SSJID and OID provide water to the City of Stockton through a 10-year transfer agreement for up to 30,000 af/yr of New Melones Water.

1.6.2 Overview of Existing Urban Water Management Plans

City of Lodi – The City of Lodi is located northeast of Stockton, along Highway 99. According to the 2001 City of Lodi Urban Water Management Plan, 24 wells provide a population of 57,935 with water from the Basin. In 1999, City of Lodi wells produced 16,587 af with a projected 2020 demand of 22,727 af assuming a 1.5 percent constant growth rate. Since 1977, the City of Lodi has enforced stringent water conservation programs and is considering implementing other economically feasible Best Management Practices (BMPs). BMPs considered include Large Landscape Conservation Programs and Incentives, Commercial, Industrial and Institutional Conservation Programs, Residential Ultra Low Flush Toilet Rebate Programs, and Water Metering.

The City of Lodi's future water use projections indicate that groundwater in the area should be sufficient to meet the City's needs over the next 20 years. However, they have recognized that groundwater levels are declining, and have participated in the East San Joaquin Parties Water Authority to discuss and be a party to solutions. In 2003, the City of Lodi approved a 40-year agreement with WID for the purchase of 6,000 af/yr of Mokelumne River Water. The City is currently considering various methods to utilize the water either through direct recharge, injection, or treatment to potable standards.

Stockton East Water District – The mission of SEWD was established by the legislature when the District was created and to insure proper management of the Basin and provide supplemental water supplies. In accordance with its mission, SEWD wholesales drinking water to the City of Stockton, Cal Water, and San Joaquin County. By contract, the District delivers a minimum of 20,000 af/yr. From 1992 to 2002, the District delivered 439,048 af of treated water or about 40,000 af/yr to these urban contractors. As a wholesaler, SEWD has no authority over mandatory prohibitions on water use for the Stockton Urban Area.

City of Stockton – The City of Stockton has a population of approximately 243,700 and has three water suppliers to serve the area: City of Stockton Municipal Utility District (Stockton MUD) (38,300 connections); California Water Service Company (42,250 connections within the city, 10,950 outside of city limits); and County of San Joaquin (2,387 unmetered connections through County Maintenance Districts). The Stockton MUD service area generally encompasses north of the Calaveras River, however, the City also serves areas in South Stockton.

The Stockton MUD has 22 wells in North Stockton and seven wells in South Stockton providing groundwater to its customers. SEWD also provides surface water to the three suppliers. Approximately 45% of the Stockton MUD's water deliveries come from groundwater, and 55% is treated surface water from SEWD. Saline intrusion in the Stockton area is a continual concern even with surface water deliveries from SEWD to offset some pumping.

Adopted in 2000, the City of Stockton Urban Water Management Plan outlines numerous demand management measures (DMM) to promote conservation including an extensive water conservation education program. The Stockton Area Water Suppliers (SAWS) which includes SEWD, Stockton MUD, San Joaquin County, and Calwater, coordinates monthly to oversee implementation of the conservation education program. SAWS has sponsored the award winning Sally-Save-Water campaign since 1990. The Sally-Save-Water campaign actively promotes water conservation through school visits, television advertisements, educational videos, posters and handouts. The campaign has also been recognized for its achievements by receiving a San Joaquin County Council of Governments Regional Excellence Awards. SAWS is also active in the promotion of the statewide declaration of May as Water Awareness Month.

Projected growth of the City of Stockton is expected to increase from its 2000 demand of 68,000 af/yr to the 2015 General Plan build out demand of 85,330 af/yr and ultimately to 177,900af/yr in 2050. In order to address the increase in demand, the City of Stockton is currently working to perfect a water right application for a Delta water supply. Citing Water Code Section 1485 and the watershed of origin priority, the City seeks to secure up to 125,900 af/yr from the Delta to the urban area. The Delta Water Supply Project is a major component in the efforts of the Authority to restore the health of the Basin.

California Water Service Company (Associate Member of the Authority) – The California Water Service Company (Calwater) serves approximately 42,250 connections within the City of Stockton primarily south of the Calaveras River as well as 10,950 beyond the City limits. Calwater is contracted to receive 50% to 55% of SEWD treated water deliveries and supplements the supply with 34 active wells.

In 2001, an Urban Water Management Plan was adopted for the Stockton District Calwater service area. Calwater actively participates in the conservation activities of the SAWS and has implemented an ultra low flush toilet rebate program and a plumbing retrofit program. Calwater participated in the activities of the East San Joaquin Parties Water Authority and have been contributing Associate Member of the Authority. Calwater is limited in its financial participation to the Authority because it is an investor owned public utility and is stringently regulated by the California Public Utilities Commission.

City of Manteca – The City of Manteca straddles State Route 99 south of Stockton. According to the 2002 City of Manteca Urban Water Management Plan, 16 wells provide groundwater to a population of approximately 50,000 with more wells planned for construction. Manteca is currently entirely dependant on groundwater to for its municipal and industrial needs. Since 1998, the City has implemented the following BMPs: Large Landscape Conservation Programs and Incentives, Commercial, Industrial, and Institutional Conservation Programs, Residential Water Audits, Water Metering, Residential Plumbing Retrofit, Public Information and Education

Programs, Conservation Coordinator, Conservation Pricing, and Water Waste Prohibition. Up to 3.65 MGD of reclaimed waste water is applied to fodder crops on City owned and leased lands.

The City of Manteca is expected to grow to over 130,000 by 2025. Recognizing the need for a reliable water supply to meet the demands of growth, the City of Manteca will participate with SSJID in the South County Surface Water Supply Project. At build out in 2025, the City will receive up to 18,500 af/yr of high quality water from the Project.

City of Ripon – The city of Ripon is located at the southern edge of the county along State Route 99. The population in 2002 was approximately 11,500 and is expected to grow to 29,900 by 2020. All of the city's potable water is provided by groundwater wells supplying 4,565 af in 2002, and this is estimated to increase to 12,310 af in 2020 in the 2003 City of Ripon Urban Water Management Plan. In 2002, 1,400 af of non-potable water was supplied by city groundwater wells, and 500 af of non-potable water was supplied with SSJID contracted surface water. In 2020, the city's non-potable wells are expected to supply the same amount of water, and the SSJID's contract is expected to increase to 5,080 af. The plan also anticipates 960 af of non-potable groundwater supplied by Nestle in 2020.

The City of Ripon Urban Water Management Plan contains 14 demand management measures (DMM) to promote conservation. A few of these are interior and exterior water audits for single family and multi-family customers, large landscape conservation programs and incentives, school education, and water waste prohibition.

City of Lathrop – Information not received prior to release of Plan.

City of Escalon – Information not received prior to release of Plan.

1.6.3 Overview of Groundwater Management by San Joaquin County

East San Joaquin Parties Water Authority – In 1995, County water interests facilitated the ESJPWA to conceive and implement a joint conjunctive use and groundwater banking project with EBMUD. Several alternatives were developed and explored with the goal of implementing the Mokelumne Aquifer Recharge and Storage Project (MARS). In wet years, supplemental surface water obtained would be used by County interest in-lieu of groundwater or be actively recharged using various methods. In dry years, EBMUD would be allowed to extract and export from the Basin a portion of the recoverable supply for use in the EBMUD service area.

In order to technically support the concept of aquifer storage and recovery, the ESJPWA undertook the Beckman Injection/Extraction Study (Beckman Study). The Beckman Study involved the injection of water from EBMUD's Mokelumne River entitlement via the Mokelumne Aqueduct and subsequent monitoring. The Beckman Study provided insight into the Groundwater Basin's ability to accept injected water. The Beckman Study concluded that the migration of injected water is attributed to many factors including seasonal hydrogeology, regional pumping patterns, and prevailing groundwater gradients. In 2002, the Authority continued the work of the ESJPWA and completed the Beckman Test Final Report. The Report concluded water injected at the site remained in the general vicinity. Further studies are needed to evaluate long-term storage and the overall recoverability of injected water from the underlying aquifer. Further analysis has concluded that the test area is suitable for recharge and that the recoverability of injected water is high.

Northeastern San Joaquin County Groundwater Banking Authority – Organized in 2001, the Authority has provided a consensus-based forum to local, State, and federal water interests to work cooperatively with one voice to study, investigate, plan, and develop locally supported groundwater banking and conjunctive use projects in Northeastern San Joaquin County.

The System Plan, completed in 2002, outlined specific groundwater recharge options into a conjunctive water management system with the capability of recharging up to 300,000 af/yr. Projects in the System Plan included the Freeport Interconnect Project, the Farmington Groundwater Recharge and Seasonal Habitat Project, the City of Stockton Delta Diversion Project and direct groundwater recharge through well injection and seasonal field flooding. Potentially new water supplies may come from surplus flows on the American River, Mokelumne River, Calaveras River, Littlejohns Creek, Stanislaus River, and the Delta.

Also in 2002, the Authority continued the work of the ESJPWA and completed the Beckman Test Final Report. The Report concluded water injected at the site remained in the general vicinity and that the test area exhibited a high degree of injected water recoverability. Further studies are needed to evaluate long-term storage and the overall recoverability of injected water from the underlying aquifer.

For over 30 years, the EBMUD and Sacramento County Water interests have fought over the future of the American River. In 2000, the parties agreed to a joint project whereby Sacramento interests and EBMUD would receive American River water on the Sacramento River near the town of Freeport. The project, coined the Freeport Regional Water Project, is expected to deliver water to the Mokelumne Aqueducts in Northeast San Joaquin County by 2008. The EBMUD is only allowed to receive American River water in the driest 35 percent of all years. In the remaining years, San Joaquin County could divert a significant amount of water through the Freeport Project. The Authority is currently in discussions with EBMUD on the development of the San Joaquin County Freeport Interconnect, a proposed interconnecting pipeline project, which would take advantage of this opportunity. Thus far, the Authority has commissioned a water availability analysis to determine the feasibility of amending a County water right application on the American River to coincide with the Freeport Project.

County Groundwater Export Ordinance – In 2000, the Board of Supervisors adopted the Groundwater Export Ordinance to prevent the deliberate export of groundwater for use outside of the County and condition the extraction of banked groundwater by out-of-County partners without a permit. The Export Ordinance requires stringent monitoring and extraction protocols deemed necessary to protect adjacent landowners and underlying basin from adverse impacts. Ordinance Authority does not extend into the incorporated city limits of the County's municipalities. The Board of Supervisors has in the past indicated that a more workable form of the Groundwater Export Ordinance is possible should stakeholders propose changes in the context of a workable project.

San Joaquin County Water Management Plan – Adopted in 2002, the San Joaquin County Flood Control and Water Conservation District facilitated the development of the San Joaquin County Water Management Plan. Over the course of almost two-years, stakeholders representing over 30 water interests, have met to synthesize a plan that addresses overdraft conditions in the Basin, prevent further degradation of groundwater quality due to saline water intrusion, increases water supply reliability, meets the projected year 2030 County water demand, identifies viable water supply and recharge options, identifies the institutional structure to implement the options. Since the Water Management Plan's adoption, the County has continued to promote the goals of the Plan through the support of other agencies, the facilitation of the Advisory Water Commission and the Authority.

San Joaquin County Groundwater Monitoring Program – Since 1971, the San Joaquin County Flood Control and Water Conservation District has monitored groundwater levels and groundwater quality on a semi-annual basis. Over 300 wells are sampled by the District, and data from an additional 200 wells are incorporated into the groundwater level database. Groundwater levels are published in both the spring and fall reports. Groundwater quality data is collected once a year in the fall months for publication in the Fall Groundwater Report.

In 2000, the County completed an evaluation of the existing groundwater monitoring program in order to identify its adequacy. The evaluation concluded that the groundwater monitoring program is relatively adequate for groundwater levels, but does not collect enough saline water intrusion data. The recommendation was to increase the groundwater quality monitoring effort and perform an extensive hydrogeologic investigation of the Groundwater Basin in the region of the saline front. In 2002, the County worked with the DWR to drill two multiple depth well clusters in the City of Stockton along the projected saline front. Additionally, a joint study with the US Geologic Survey, the DWR, and member agencies of the Authority could further the efforts to better understand saline groundwater intrusion and the overall hydrogeology of the Basin.

Mokelumne River Water Right Applications – In 1990, the Mokelumne River Water and Power Authority (MRWPA) filed with the State Water Resources Control Board (SWRCB) Water Right applications for unappropriated wet year flows on the Mokelumne River and obtained a Federal Energy Regulatory Commission (FERC) Preliminary Permit to further study the associated power generation potential. The application sought to capture water behind a new on-stream dam located at Middle Bar upstream of Pardee Reservoir or at a site off-stream at the proposed Duck Creek Reservoir. The Application also included the ability for County interest to divert wet year flows off of the Lower Mokelumne River from Camanche Dam to Interstate 5.

In 2003, the MRWPA retained the services of HDR Engineering, Inc. to move forward the Mokelumne River Regional Water Storage and Conjunctive Use Project (MORE WATER Project) and prepare the necessary environmental documentation to perfect the water right applications and obtain all necessary permissions. The MORE WATER Project could potentially bring 60,000 – 100,000 af/yr to the Basin.

American River Water Right Applications – In 1990, the County also filed an application for unappropriated flows on the American River. The Application seeks to divert and store water between December 1 and June 30 from Nimbus Dam via the Folsom South Canal on the Lower American River and from the South Fork of the American River via a series of proposed pipelines and reservoirs. The County has amended its application in order to divert American River water from the Sacramento River at Freeport as well. The size of the Freeport diversion limits the amount of potential water delivered San Joaquin County under the amended application. The potential annual average yield to the County using the Freeport Project capacity is estimated at 44,000 af/yr.

1.6.4 Overview of Groundwater Management Outside the GMA

Calaveras County Water District – Calaveras County Water District's (CCWD) boundaries coincide with the boundaries of Calaveras County. Approximately 70 square miles of the Camanche and Valley Springs areas in Calaveras County overly the Eastern San Joaquin Groundwater Sub-basin. In 2001, CCWD adopted an AB 3030 Groundwater Management Plan specifically for the Camanche Valley Springs area. The goals and objectives of the Plan are to develop a better understanding of the Basin dynamic and the establishment of a groundwater management program that will ensure the sustainability of the Basin. CCWD coordinates closely with numerous local, State, and Federal agencies as well as SEWD and EBMUD.

East Bay Municipal Utility District – EBMUD provides water and wastewater services to over 1.2 million customers east of the San Francisco Bay Area in Alameda and Contra Costa Counties. EBMUD owns and operates two major reservoirs on the Mokelumne River: Pardee and Camanche Reservoirs. Pardee Reservoir, built in 1929, is the primary source of drinking water for EBMUD. Camanche Reservoir, completed in 1969, is a multipurpose reservoir serving a variety of interests on the Lower Mokelumne River including WID's water rights, in-stream flow requirements, and recreation.

In times of severe drought, Pardee and Camanche cannot meet the needs of all of its down stream requirements and its customers. For a number of years, EBMUD and ESJPWA studied the possibility of a large scale conjunctive use project in Eastern San Joaquin County beneficial to both parties. A combined project has not yet been negotiated. EBMUD has also fought for over thirty years to uphold a Federal Central Valley Project contract for water from the American River at Nimbus. Opposition to the diversion by Sacramento County interests prompted both sides to develop a mutually beneficial project to divert American River water from the Sacramento River near the town of Freeport. In 2002, the Freeport Regional Water Authority was formed to move the Project forward. EBMUD is allowed to take no more than 133,000 af in one year and no more than 165,000 af in any three year period. EBMUD is expected to divert from Freeport in one-third of all years (http://www.ebmud.com/, 2003).

Despite the Freeport Project, EBMUD must address the 20,000 af shortage in a severe drought even while imposing a 25 percent water use reduction through rationing. Several conjunctive use projects involving aquifer storage and recovery (ASR) are currently being evaluated at several sites throughout the East Bay and the Mokelumne River watershed. San Joaquin County is a potential partner for a conjunctive use project.

2 Hydrogeology

2.1 Regional Geology and Stratigraphy

San Joaquin County is situated within the Central Valley, a 400-mile long, 50 mile wide northwestward trending, asymmetrical structural trough. The Sierra Nevada Ranges, east of the Central Valley, is comprised of pre-Tertiary igneous and metamorphic rocks. The Coastal Ranges, to the west, is comprised of pre-Tertiary and Tertiary semi-consolidated to consolidated marine sedimentary rocks. The geologic formations within San Joaquin County vary in origination in geologic times ranging from Recent to Pre-Cretaceous. Six to 10 miles of sediment have been deposited within the Central Valley and include both marine and continental gravels, sands, silts and clays.

During the middle Cretaceous (~100 million years ago), parts of the Central Valley were inundated by the Pacific Ocean resulting in deposition of marine deposits. Marine conditions persisted through the middle Tertiary period after which time sedimentation changed from marine to continental. The material source for the continental deposits are the Coastal Ranges and Sierra Nevada which are composed primarily of granite, related plutonic rocks, and metasedimentary and metavolcanic rocks from Late Jurassic to Ordovician age (Bertoldi, et al, 1991). The Central Valley has one natural surface water outlet, the Carquinez Strait located east of San Francisco Bay (USGS).

Geologic formations within the Central Valley and San Joaquin County are generally grouped as either east-side or west-side formations based on their location relative to the San Joaquin River, and the source of the sedimentary material of which they are composed. Generally, Eastside formation material originates in the Sierra Nevada and Westside formation material originates in the Coastal Ranges. Table 2-1 shows a generalized stratigraphic column for San Joaquin County. The most important fresh water-bearing formations in Eastern San Joaquin County are the Mehrten, Laguna, Victor, and alluvial deposits. The formations are described below.

Mehrten

The Mehrten Formation is considered the oldest significant fresh water-bearing formation within Eastern San Joaquin County. It is exposed in the eastern most portion of the county, and slopes steeply from 90 to 180 feet per mile reaching a depth of 800 to 1,000 feet and a thickness of 400 to 600 feet in the Stockton sands, and gravels, the formation is often subdivided into upper and lower units. The upper unit is reported to contain finer grained deposits (black sands interbedded with brown-to-blue clay) and the lower unit consists of dense tuff breccia. Consequently, groundwater is reported to be semi-confined in the Stockton area. The Mehrten Formation has moderate to high permeability where black sands occur (DWR, 1967, Brown & Caldwell, 1985).

Laguna

The Laguna Formation outcrops in the northeastern part of the County and dips at 90 feet per mile (DWR, 1967), and reaches a maximum thickness of 1,000 feet. It consists of discontinuous lenses of unconsolidated to semi-consolidated sand and silt with lesser amounts of clay and gravel. The Laguna Formation is moderately permeable with some reportedly highly permeable coarse-grained beds and generally unconfined, but semi-confined conditions probably exist locally. Some studies have suggested that an extensive aquitard, namely the Corcoran Clay, extends into the Laguna Formation or separates the Laguna and Mehrten Formations (Brown & Caldwell, 1985).

Table 2-1 Stratigraphic Column for San Joaquin County

System	Series	Formation	Location	Thickness (feet)	Rock Characteristics and Environment	Hydrogeologic Description
Quaternary	Recent	Stream Channel Deposits	Eastside & Westside		Continental unconsolidated gravel, course to medium sand deposited along present stream channels.	High permeability, unimportant to groundwater except as avenue for percolation.
	Late to Pleistocene	Alluvial Fan Deposits	Westside	0 to 150±	Continental fan deposits-heterogeneous, discontinuous mixtures of gravel silt & clay.	Moderate to locally high permeability, unconfined aquifers.
		Recent Alluvium and Victor	Eastside	0 to 150±	Continental fan and interfan material, locally some basin type. Lenticular gravel, sand, silt, & clay	Moderate permeability, unconfined aquifers.
Tertiary	Plio-Pleistocene	Flood Basin Deposits	Eastside & Westside	0 to 1400±	Continental basin equivalent of Laguna, Tulare, and younger formations. Clay, silt, & sand, organic in part.	Generally low permeability, saturated environments, unconfined to confined.
	Mio-Pliocene	Tulare	Westside	0 to 1400±	Continental semi-consolidated clay, sands, & gravel. Contains Corcoran Clay member.	Moderate permeability, generally unconfined above Corcoran Clay, confined below.
	Upper Miocene	Laguna	Eastside	0 to 1000±	Continental, semi to unconsolidated silt, sands, & gravel poorly sorted, include Arroyo Seco gravel pediment of Mokelumne River area.	Moderate permeability, unconfined to locally semi-confined. Restricted perched bodies in some areas
Cretaceous		Merhten	Eastside	0 to 600±	Continental andesitic derivatives of silt, sand, & gravel & their indurated equivalents; tuff; Breccias; agglomerate.	Moderate to high permeability, where "black sands" occur. Confined to unconfined. Saline west of Stockton.
	Miocene	San Pablo Group	Westside	0 to 1000±	Continental to marine massive sandstone & shale. Westside equivalent to Merhten & Valley Springs formations, in part.	Low permeability. Saline in part. Essentially non-water bearing except along fractures & joints.
	Eocene	Valley Springs	Eastside	7 to 500±	Continental to marine rhyolitic ash, clay, sand, gravel & their induriated equivalents.	Low permeability. Saline in Stockton area. Not considered significant in groundwater studies.
Jurassic	Cretaceous	Eocene Undifferentiated	Westside	?	Marine shale, siltstone, & sandstone.	Contains saline waters except where flushed in outcrop areas. Unimportant to freshwater basin except as possible contaminant source.
		Cretaceous Undifferentiated	Westside	?	Marine shale, siltstone, & sandstone.	Contains saline waters, unimportant to freshwater basin except as possible contaminant source.
	Jurassic	Franciscan Group, Undifferentiated	Westside	?	Marine shale, sandstone, chert metamorphica, serpentine.	Unimportant to freshwater basin except as possible contaminant source.

Source: San Joaquin County Water Management Plan Volume II

Victor
The Victor Formation is of Holocene to Pleistocene Age and consists primarily of stream deposited unconsolidated gravel, sand, silt, and clay. Coarse sands and gravels are found to the east, and sands, silts and clays towards the west. This formation is generally more permeable than underlying formations, and groundwater is typically unconfined (CDM, 2001).

Alluvial/Stream channel deposits
Stream channel deposits are found along major stream and river courses within the study area. Generally they consist of unconsolidated gravel and coarse sand with high permeabilities (CDM, 2001).

2.2 Surface Water Features

San Joaquin County lies at the northwestern corner of the San Joaquin Hydrologic Region as defined by DWR and shown on Figure 2-1. The major rivers in this hydrologic region are the San Joaquin, Cosumnes, Mokelumne, Calaveras, Stanislaus, Tuolumne, Merced, Chowchilla, and Fresno. The Calaveras, Mokelumne, and Stanislaus Rivers flow through or border San Joaquin County and at times discharge directly into the Delta or into the San Joaquin River which in turn flows to the Delta. The west and southwestern portion of the County is part of the Delta, and the areas of primary and secondary concern are shown above. The Delta and other major waterways are shown on Figure 2-2 and are discussed in more detail below (DWR, 2003).

2.2.1 Delta

The Sacramento-San Joaquin Delta covers more than 738,000 acres in five counties and is comprised of numerous islands within a network of canals and natural sloughs. The Sacramento and San Joaquin Rivers come together in the Delta before they flow to the San Francisco Bay and out to the ocean. The Delta is the largest estuary on the west coast and is home to over 750 plant and animal species, many of which are threatened or endangered. The Delta provides drinking water for two-thirds of all Californians and irrigation water for over 7 million acres of highly productive farmland. Rivers in San Joaquin County all flow into the Delta as they flow out to sea. Table 2-2 provides a summary of the major reservoirs located in the region. More detailed descriptions of the rivers and the associated facilities are provided in the following sections.

Table 2-2 Major Area Reservoirs

River	Major Reservoirs	Size (acre-feet)	Owning/Operating Agencies
Mokelumne	Pardee Reservoir Camanche Reservoir	197,950 417,120	East Bay MUD
Calaveras	New Hogan Lake	317,000	U.S. Army Corps of Engineers Stockton East Water District
Stanislaus	New Melones Reservoir	2,400,000	Central Valley Project
	Beardsley Reservoir Donnells Reservoir Tulloch Reservoir	77,600 56,893 68,400	Oakdale Irrigation District, South San Joaquin Irrigation District

Source:
State of California, *California Statistical Abstract*, 2002.

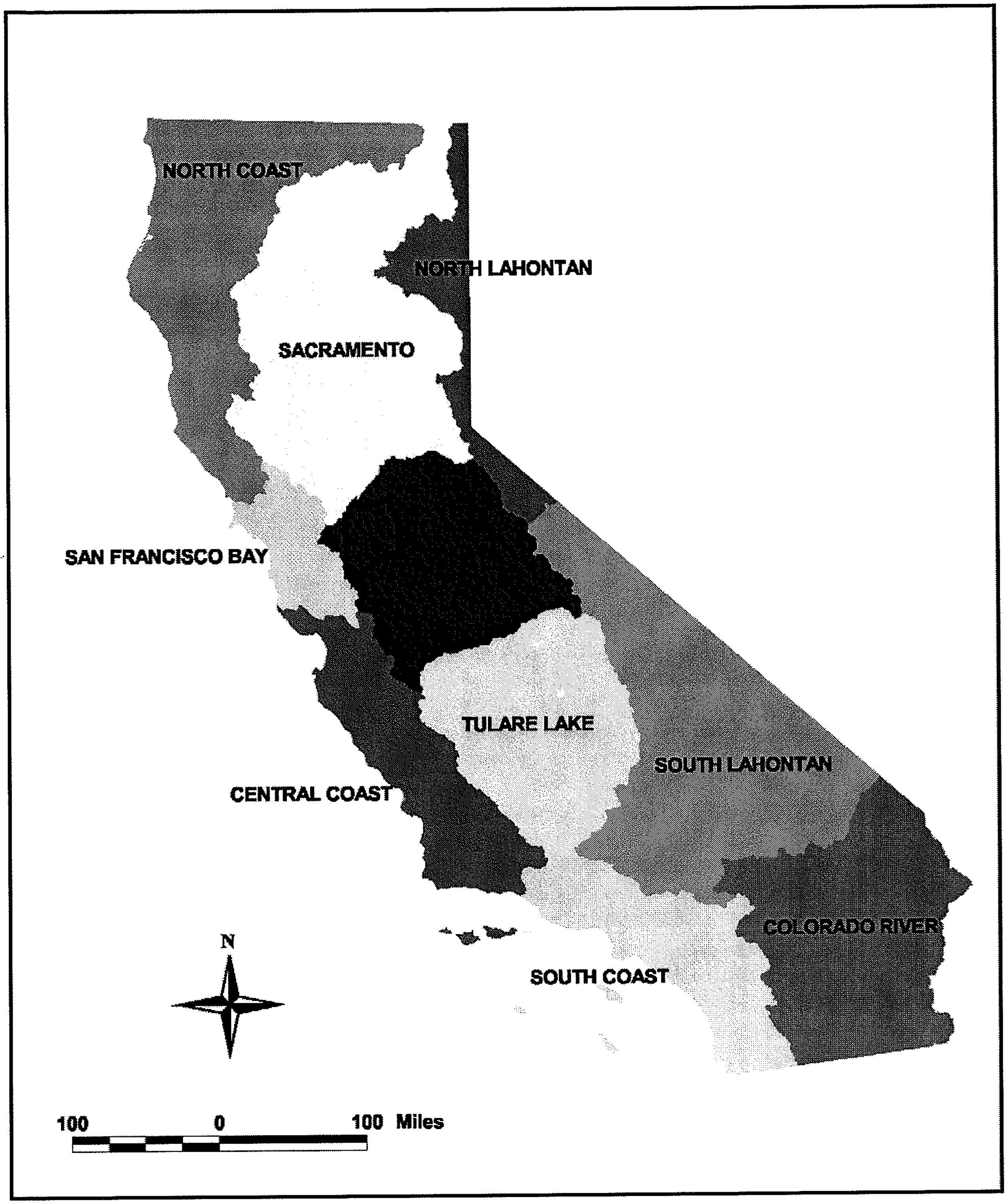


Figure 2-1 Hydrologic Regions of California
Source: California Spatial Information Library at http://www.gis.ca.gov/

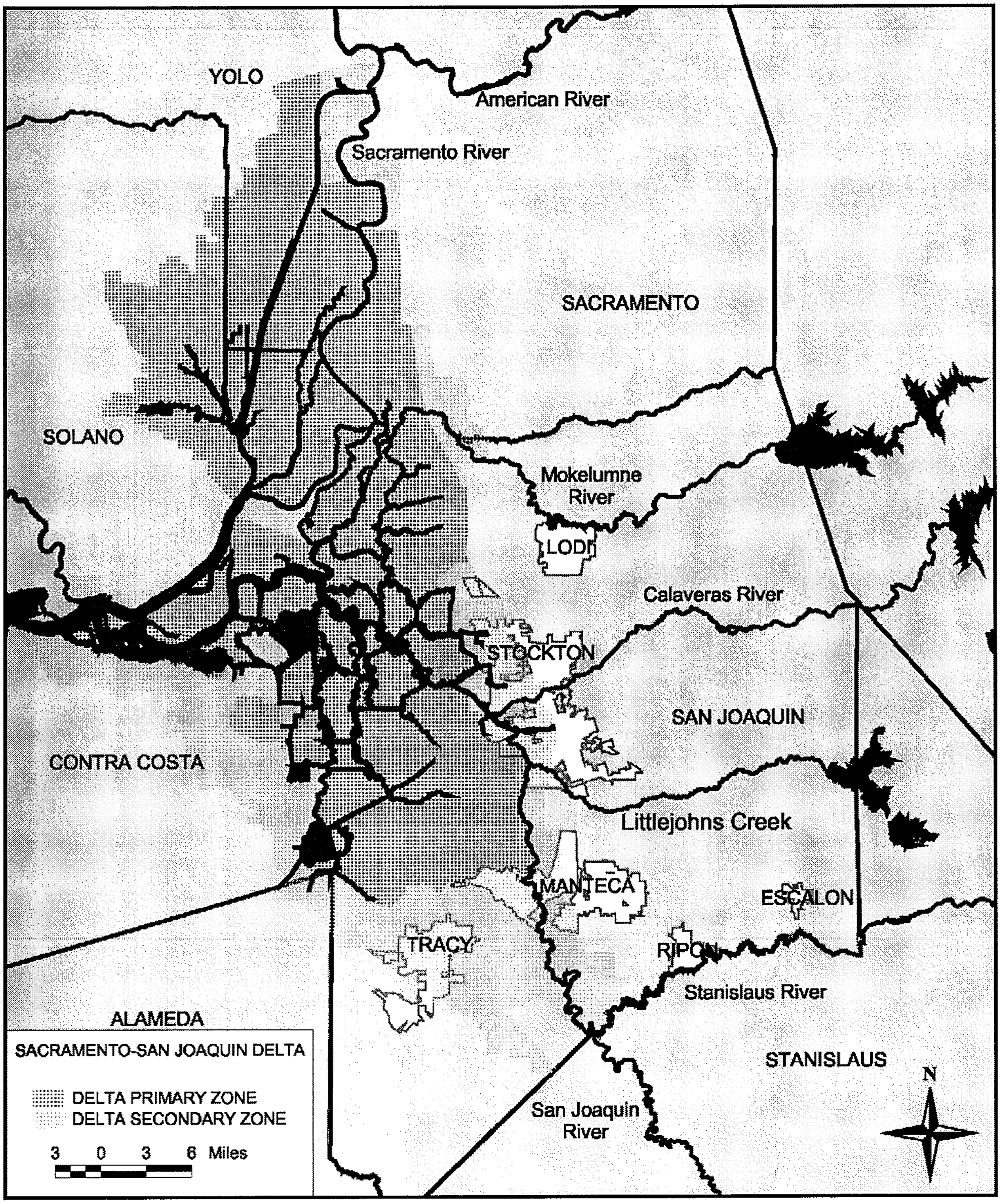


Figure 2-2 Sacramento San Joaquin Delta
Source: California Spatial Information Library at http://www.gis.ca.gov/

2.2.2 Calaveras River

The Calaveras River watershed consists of 363 square miles and stretches from the Sierra Nevada foothills to San Joaquin River in west Stockton. Flow in the Calaveras is primarily derived by rainfall with almost no contribution by snowmelt. The United States Army Corps of Engineers (USACE) constructed the multi-purpose New Hogan Dam in 1963 for flood control, municipal, industrial, and irrigation purposes. New Hogan Reservoir has a capacity of 317,000 af. The USACE controls flood control releases from New Hogan. SEWD operates New Hogan at all other times. SEWD and CCWD have rights to the yield from New Hogan. The current supply available to SEWD is subject to reductions based on CCWD's future demands. CCWD currently uses approximately 3,500 af/yr and estimates it will use up to 5,300 af/yr by 2040 (Calaveras County Water District, 1996).

2.2.3 Mokelumne River

The Mokelumne River watershed encompasses approximately 660 square miles stretching from the high Sierra Nevadas westward to the Delta. Snowmelt comprises a large portion of the watersheds runoff. Major facilities located on the Mokelumne are the Salt Springs Reservoir on the North Fork of the Mokelumne and the Pardee and Camanche Reservoirs on the rivers main stem. Salt Springs Reservoir is a PG&E facility built in 1963 and is operated for hydropower generation. Pardee and Camanche are both owned by EBMUD. Pardee Reservoir, which is upstream from Camanche, has a capacity of 197,950 af and is operated as a water supply reservoir. Reservoir water from Pardee is conveyed by the Mokelumne River Aqueducts to the EBMUD service area some 82 miles away. Camanche Reservoir, with a capacity of 417,120 af, is operated for flood control and also to meet instream flow requirements and down stream entitlements. Both Pardee and Camanche generate incidental hydro power at 30 MW and 9.9 MW respectively (EBMUD, Urban Water Management Plan 2000). Water rights on the Mokelumne form a complex hierarchy, with water rights held by Woodbridge Irrigation District, Amador County, Calaveras County, EBMUD, and North San Joaquin Water Conservation District.

2.2.4 Stanislaus River

The Stanislaus River watershed consists of approximately 904 square miles with an annual average runoff of approximately 1 million af. The majority of the runoff occurs from November to July and peaks during the summer months when snow melt is greatest. More than half the runoff is snowmelt-derived (USBR, Website, undated). The USACE constructed New Melones Dam on the Stanislaus River in 1978, replacing the original Old Melones Dam. Old Melones Dam was constructed in 1924 jointly by OID and SSJID, which hold pre-1914 water rights on the Stanislaus River. New Melones Reservoir has a capacity of 2.4 million af and is operated as part of the CVP. The average runoff at New Melones for the 74 years from 1904 to 1977 was 1.12 million af.

There are 9 additional reservoirs and two diversion canals upstream from New Melones on the Stanislaus River, including the Donnells, Beardsley, and Tulloch Reservoirs, which were constructed jointly by OID and SSJID and operated by the Tri-Dam Authority (USBR, Website, undated). Tulloch Reservoir, located several miles downstream from New Melones, is used to re-regulate releases from New Melones. SSJID, OID and SEWD divert from Goodwin Dam downstream from Tulloch Dam. Water can be diverted by gravity via Goodwin Tunnel to CSJWCD and SEWD. SSJID and OID are the principal users of Stanislaus River water in San Joaquin County. Both SEWD and CSJWCD interim CVP contracts for New Melones water.

2.2.5 San Joaquin River

The San Joaquin River originates in the Sierra Nevada and enters the San Joaquin Valley at Friant. The lower San Joaquin River is the section of the river from its confluence with the Merced River north to Vernalis. The lower San Joaquin River encompasses a drainage area of approximately 13,400 square miles. The majority of the flow in the lower San Joaquin River is derived from inflow from the Merced, Tuolumne and Stanislaus Rivers as the upper San Joaquin River contributes virtually no inflow during the summer months.

2.2.6 Other Rivers

Other rivers that have some relevance to discussions on water resources but are not located in San Joaquin County are the Tuolumne River, Cosumnes River and Dry Creek. The Tuolumne River originates in the Sierra Nevada Mountains and is the largest tributary to the San Joaquin River. It has a watershed of approximately 1,500 square miles and an unimpaired runoff of approximately 1.8 million af. Flows in the lower reaches of the Tuolumne River are regulated by New Don Pedro Dam, which was constructed in 1971 and is owned by Turlock and Modesto Irrigation Districts. New Don Pedro Reservoir has a capacity of approximately 2 million af and is operated for irrigation, hydroelectric generation, fish/wildlife protection, recreation, and flood control. Irrigation water is diverted downstream from New Don Pedro at La Grange into the Modesto Main Canal and Turlock Main Canal. The City and County of San Francisco operate several facilities in the upper water of the Tuolumne, namely O'Shaughnessy Dam at Hetch Hetchy Valley, Lake Eleanor and Cherry Lake. These facilities are operated for municipal and industrial supply as well as hydropower.

The Cosumnes River is a tributary of the Mokelumne River. It meets the Mokelumne near the town of Thornton and has a watershed area of approximately 540 miles. Flows are primarily rain/runoff-derived.

Dry Creek is a relatively minor tributary to the Mokelumne River and forms the northern boundary between San Joaquin and Sacramento Counties. The Cosumnes, Dry Creek, Mokelumne and Calaveras Rivers are collectively referred to as the Eastside Streams.

2.2.7 Surface Water Quality

Surface water quality for San Joaquin County water sources can be categorized as either an eastside or Sacramento-San Joaquin Delta source. Eastside rivers and streams are sources of high water quality with generally low total dissolved solids (TDS) loads. Reservoir storage and regulated flow on the Mokelumne, Calaveras and Stanislaus River systems reduces suspended solids as these rivers flow through San Joaquin County. However, during flood events and times of elevated flows, TDS and suspended solid levels can increase.

The Sacramento-San Joaquin Delta water quality is heavily influenced by the operations of the Central Valley and State Water Projects. Generally, the Sacramento-San Joaquin Delta water quality is best during the winter and spring months and poorer through the irrigation season and early fall. Delta Water quality is also very dependant on the ability for higher quality Sacramento River water to dilute poorer quality San Joaquin water in the South and Central Delta. Presently, the Central Valley Regional Water Quality Control Board is undertaking Total Maximum Daily Load (TMDL) proceedings for low dissolved oxygen (DO) in the Stockton Deep Water Ship Channel and salinity and Boron in the Lower San Joaquin River.

The San Joaquin River in the South Delta, experiences periods of severely degraded water quality. The SWRCB has set flow and water quality objectives at Vernalis, located just downstream of the confluence of the Stanislaus River with the San Joaquin River. The USBR is obligated to meet the Vernalis objectives as a condition of their water right permits. Water quality in the San Joaquin River is influenced by factors such as rain and snow melt runoff, reservoir operations, and irrigation return flows in the San Joaquin River basin. The CVP service area on the Westside of the San Joaquin Valley drain agricultural return flows with significant elevated salt loads into the San Joaquin River. To meet the Vernalis objective, the Bureau of Reclamation supplements flows on the San Joaquin River with releases from New Melones Reservoir on the Stanislaus River by reducing allocations to SEWD and CSJWCD. Despite the take away, the Bureau is unable to meet the Vernalis standard in years when runoff is below average. Eastern San Joaquin County and Delta interests have pushed for the development of water quality objectives up-stream of the confluence of the San Joaquin and Stanislaus Rivers.

2.3 Regional Groundwater Flow Patterns

Regional groundwater flow patterns have been significantly altered since pre-development conditions. The pre-development and current/post-development groundwater flow patterns are discussed below.

2.3.1 Pre-Development Conditions

Groundwater was used for agriculture in the Central Valley starting around 1850, prior to which time the groundwater system was in a state of hydrologic equilibrium (Williamson, et. al., 1989). Under equilibrium, or steady-state conditions, groundwater flowed from the natural recharge areas along the perimeter of the valley towards the low areas along the San Joaquin River. The natural groundwater and surface water discharge was through the Delta westward to San Francisco Bay. Under pre-development conditions groundwater gradients within San Joaquin County were likely similar to the topographic gradient, or around 0.0012 ft/ft.

2.3.2 Post-Development Conditions

Beginning in 1850 the development of groundwater for agriculture expanded rapidly. Within the Central Valley, irrigated agriculture has grown from less than 1 million acres around the turn of the century, to an estimated 7 to 8 million acres at present. Within eastern San Joaquin County, an estimated 800,000 af/yr of groundwater was being extracted by 1993. In Bulletin 118-80, DWR designated the Basin as 'critical overdrafted'.

Figures 2-1 through 2-4 illustrate groundwater table contours for spring and fall 1993 and 1998. The map clearly shows the significant cone of depression east of Stockton. Regional groundwater flow now converges on this low point, with relatively steep groundwater gradients (0.0018 feet/feet) westwards towards the cone of depression, and eastward gradients from the Delta area on the order of 0.0008 feet/feet. The eastward flow from the Delta area is significant because of the typically poorer quality water.

2.3.3 Groundwater Level Trends

The groundwater level trends illustrate the change in groundwater flow patterns described above. Hydrographs for selected wells and sub-regions are presented in Figures 2-7 through 2-21 and a map of the well locations is shown on Figure 2-22.

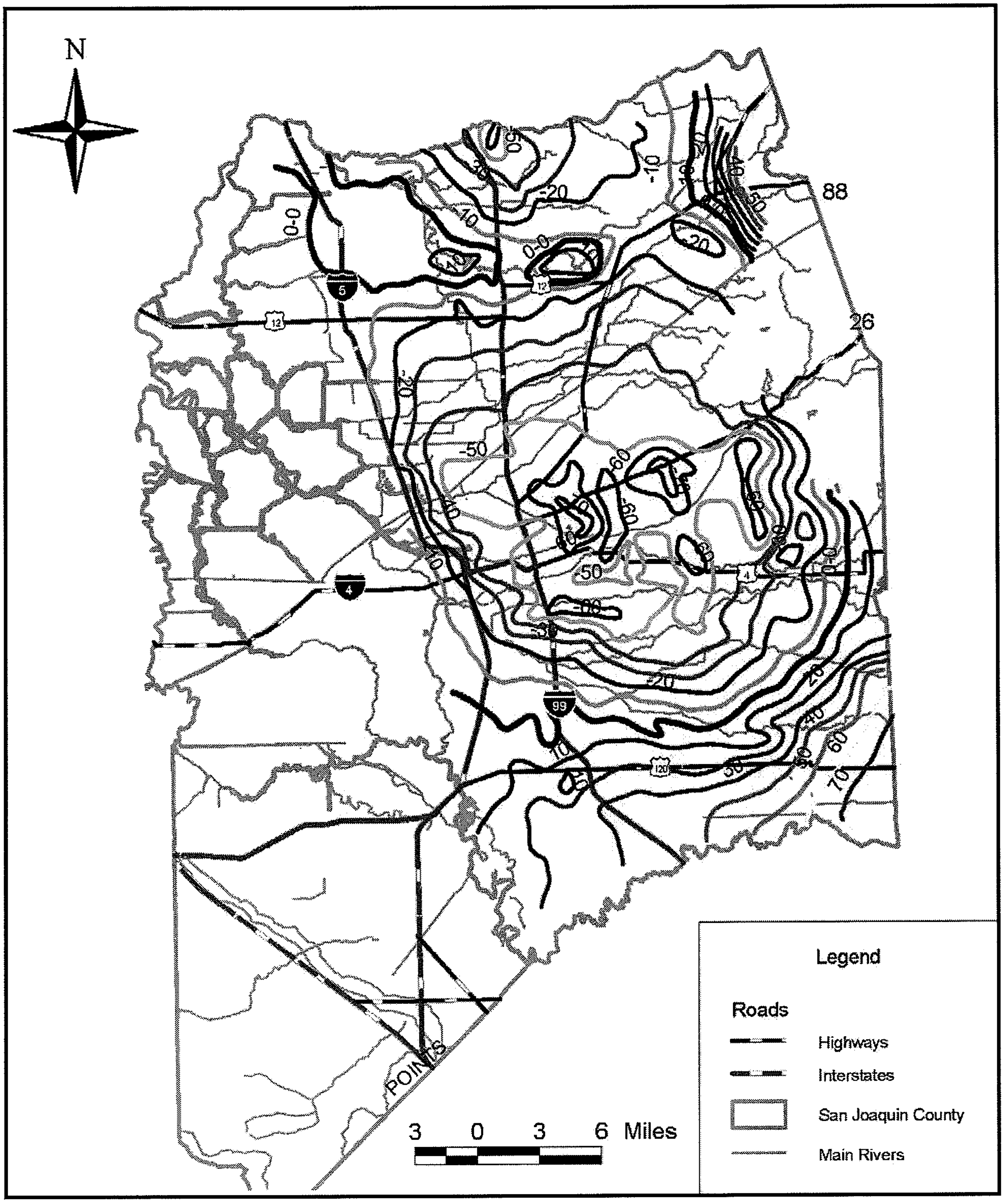


Figure 2-3 Spring 1993 Groundwater Contours
Source: Camp Dresser & McKee Inc.

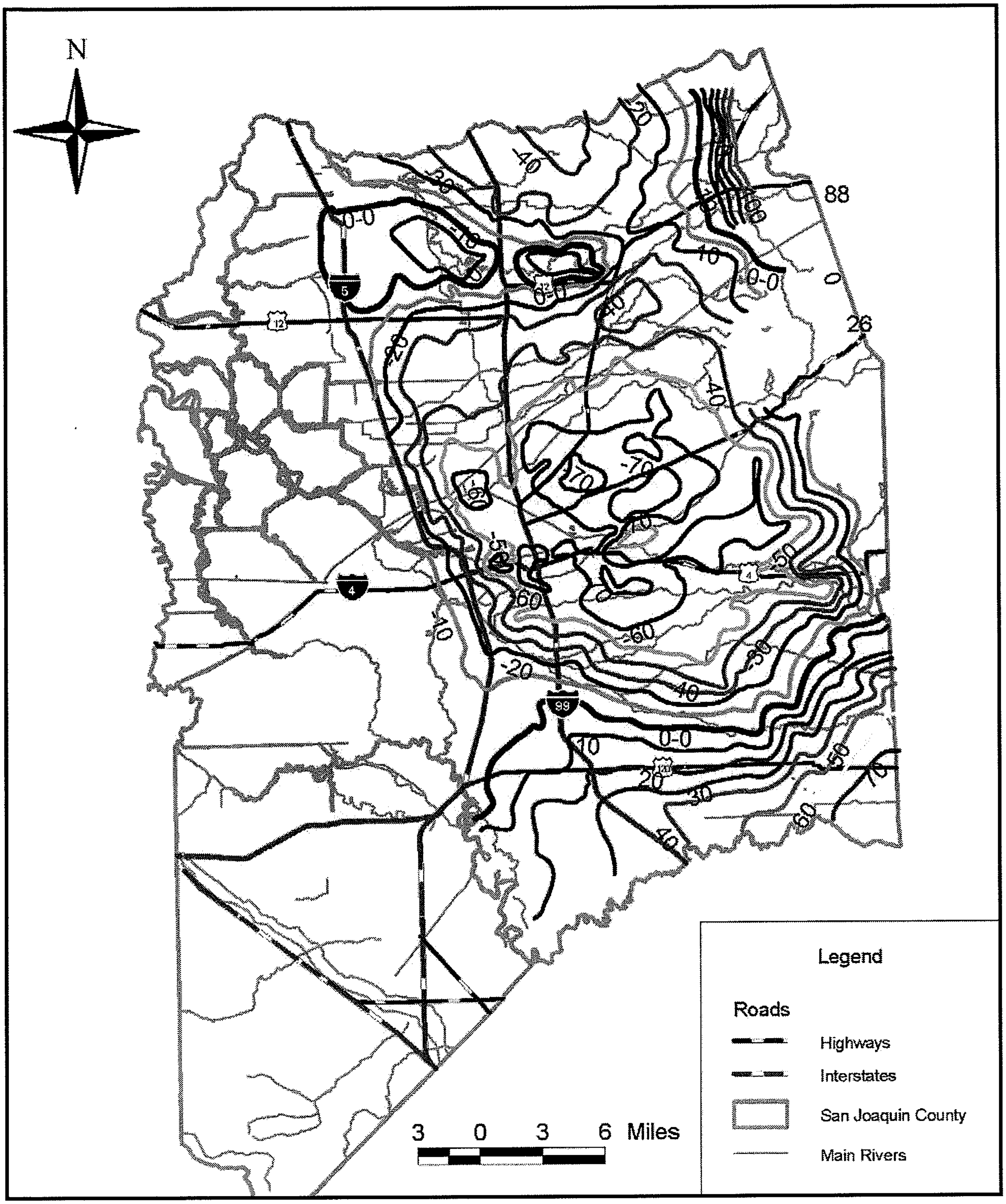


Figure 2-4 Fall 1993 Groundwater Contours
Source: Camp Dresser & McKee Inc.

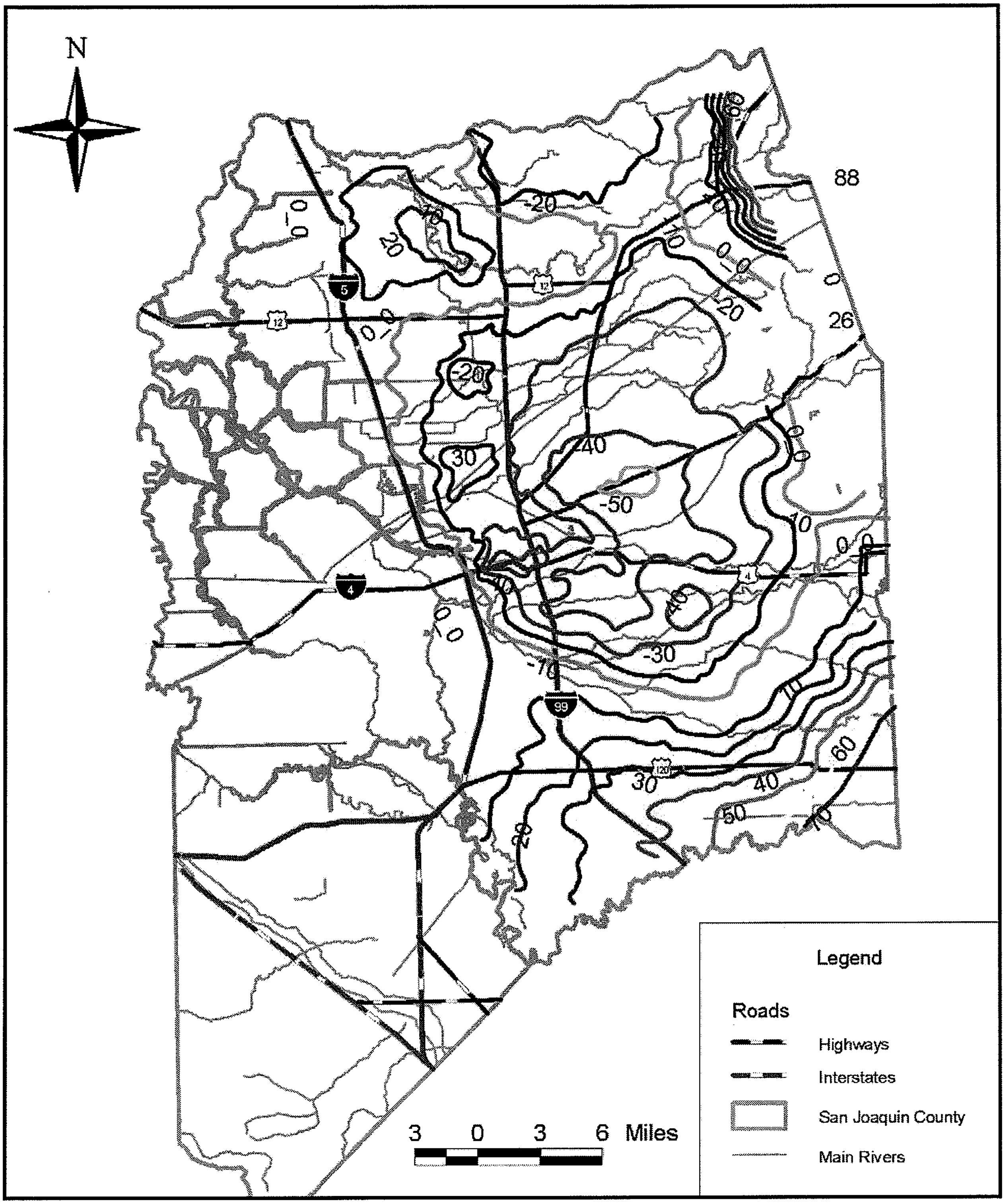


Figure 2-5 Spring 1998 Groundwater Contours
Source: Camp Dresser & McKee Inc.

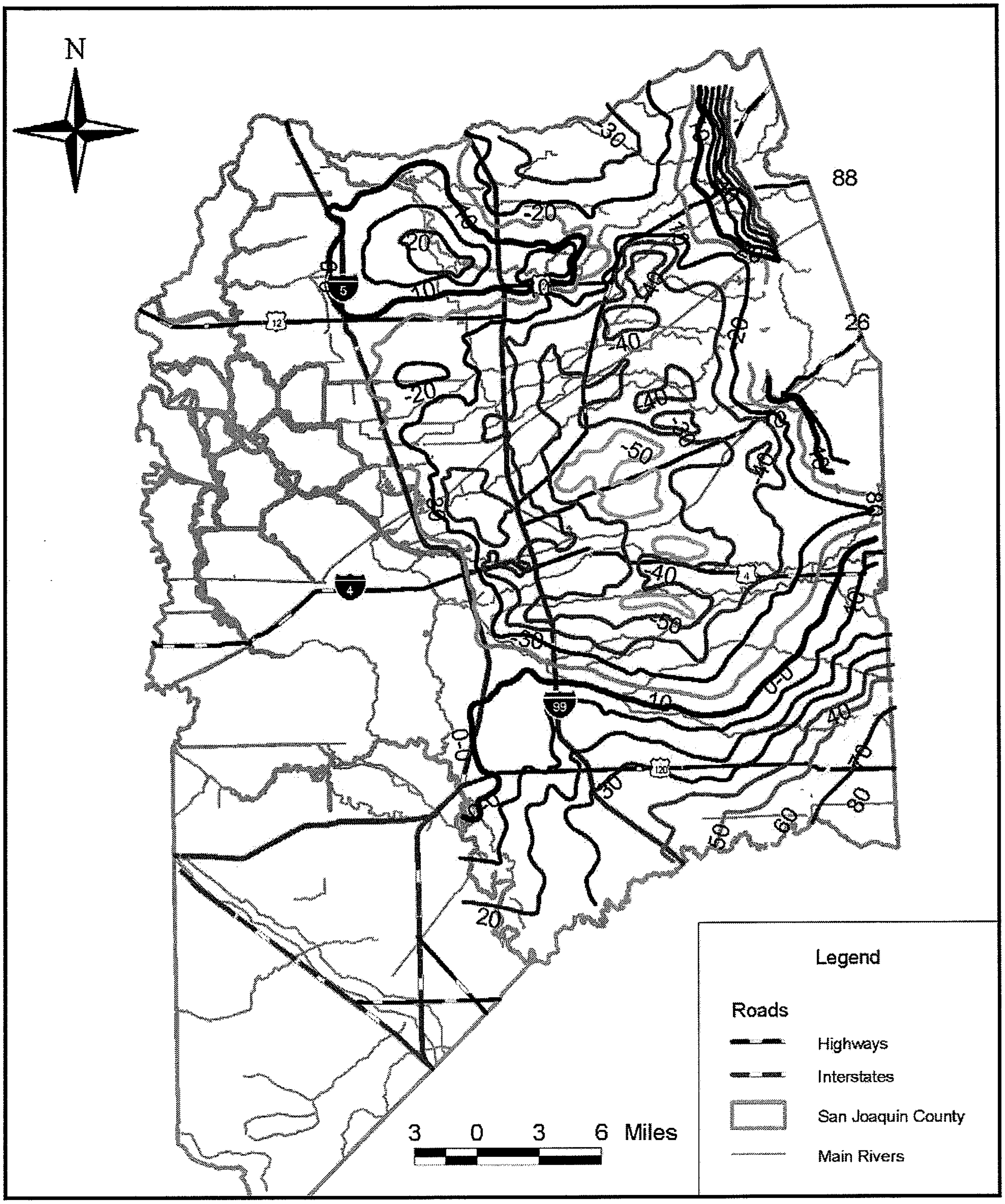


Figure 2-6 Fall 1998 Groundwater Contours
Source: Camp Dresser & McKee Inc.

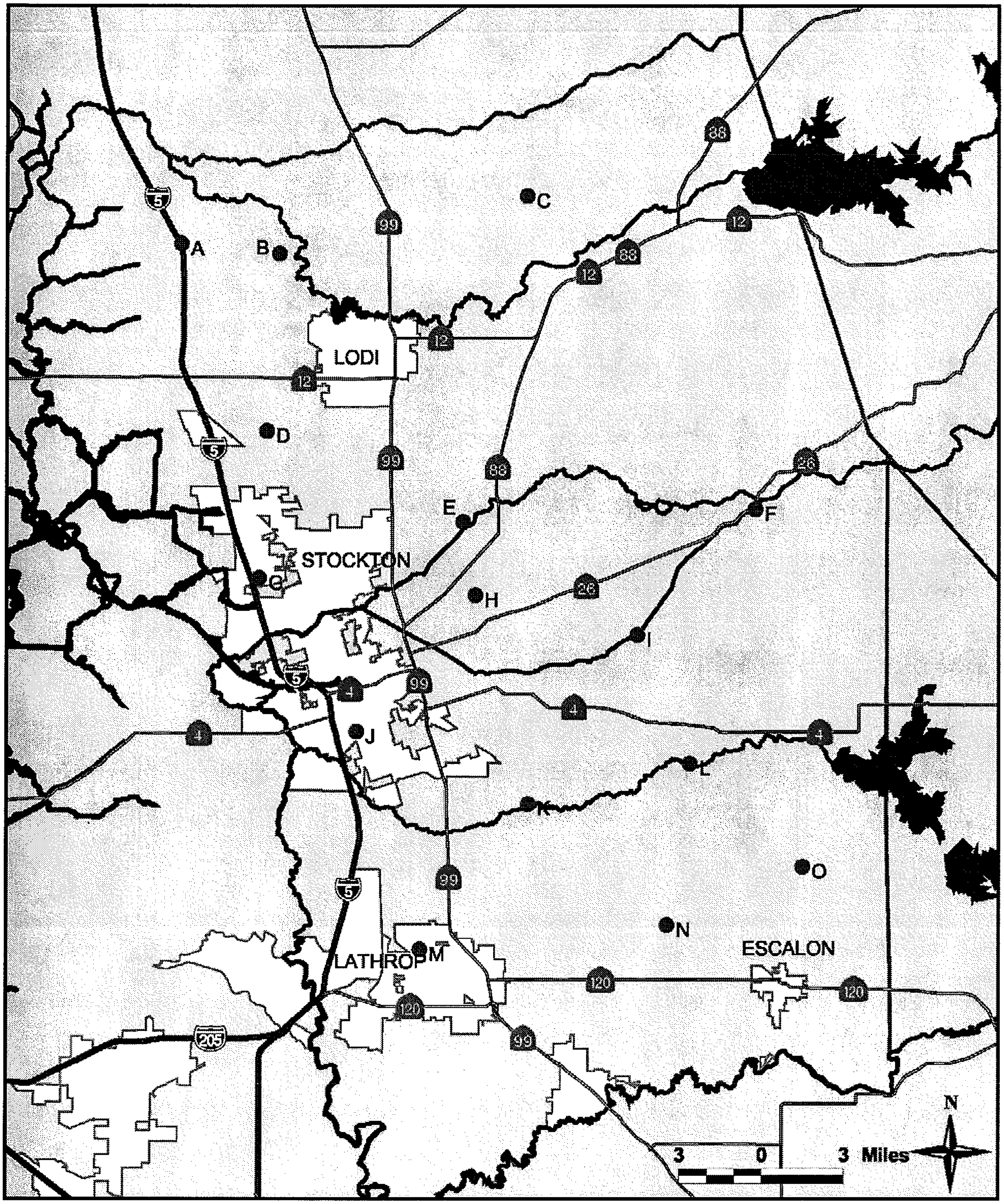


Figure 2-7 Groundwater Well Locations
Source: California Department of Water Resources, Water Data Library at
http://well.water.ca.gov/

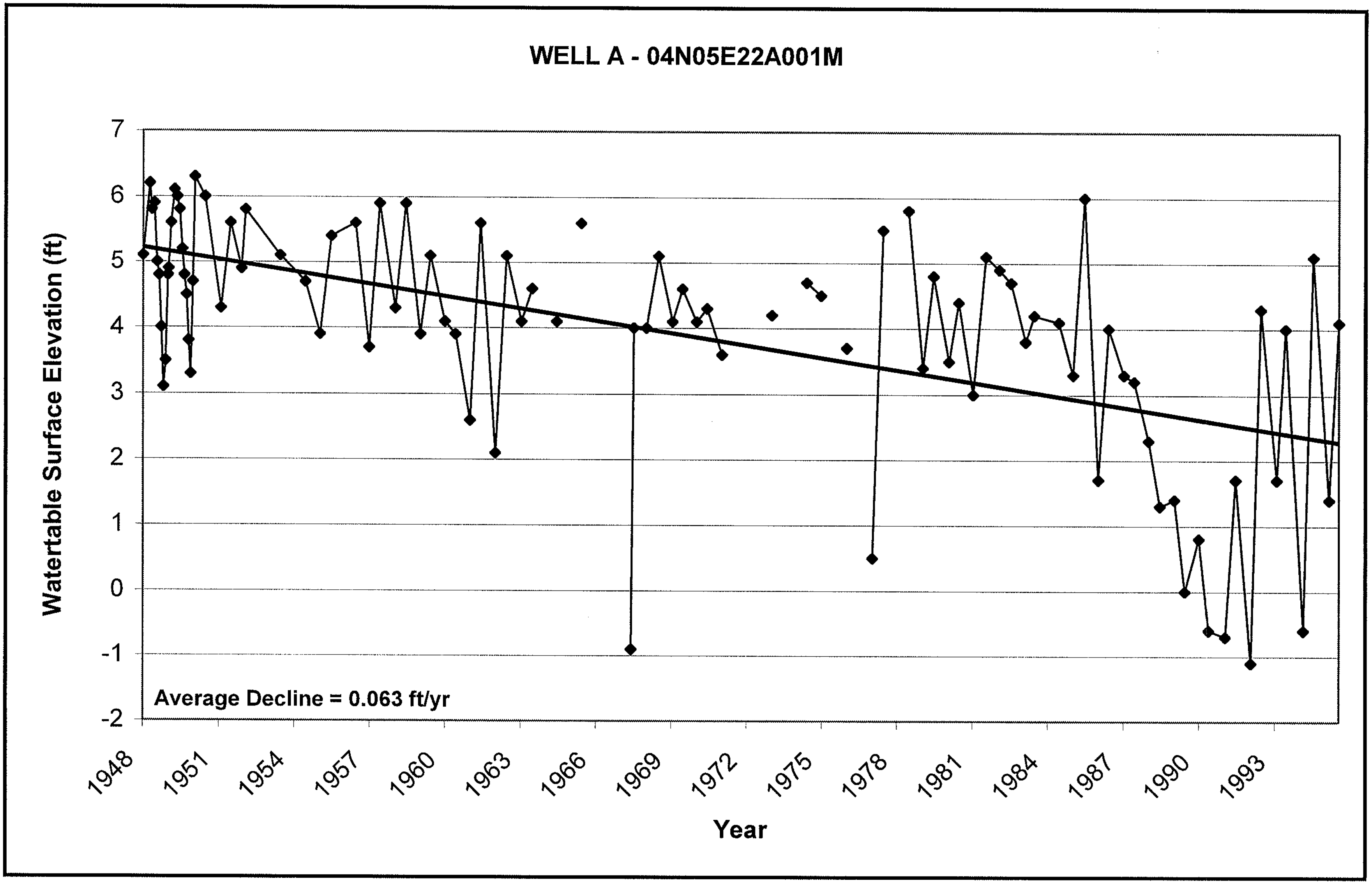


Figure 2-8 Hydrograph Well A
Source: California Department of Water Resources, Water Data Library at http://well.water.ca.gov/

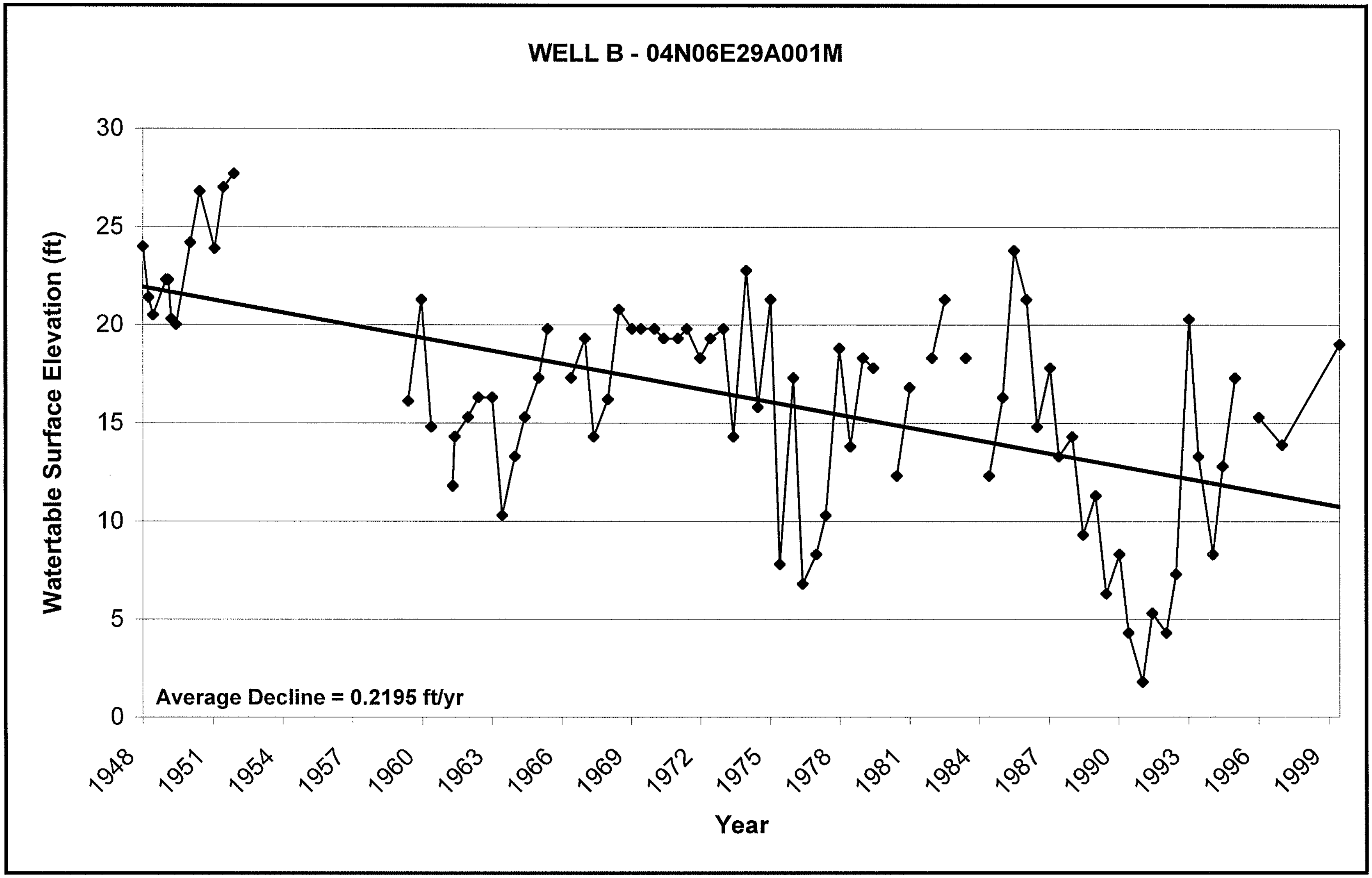


Figure 2-9 Hydrograph Well B
Source: California Department of Water Resources, Water Data Library at http://well.water.ca.gov/

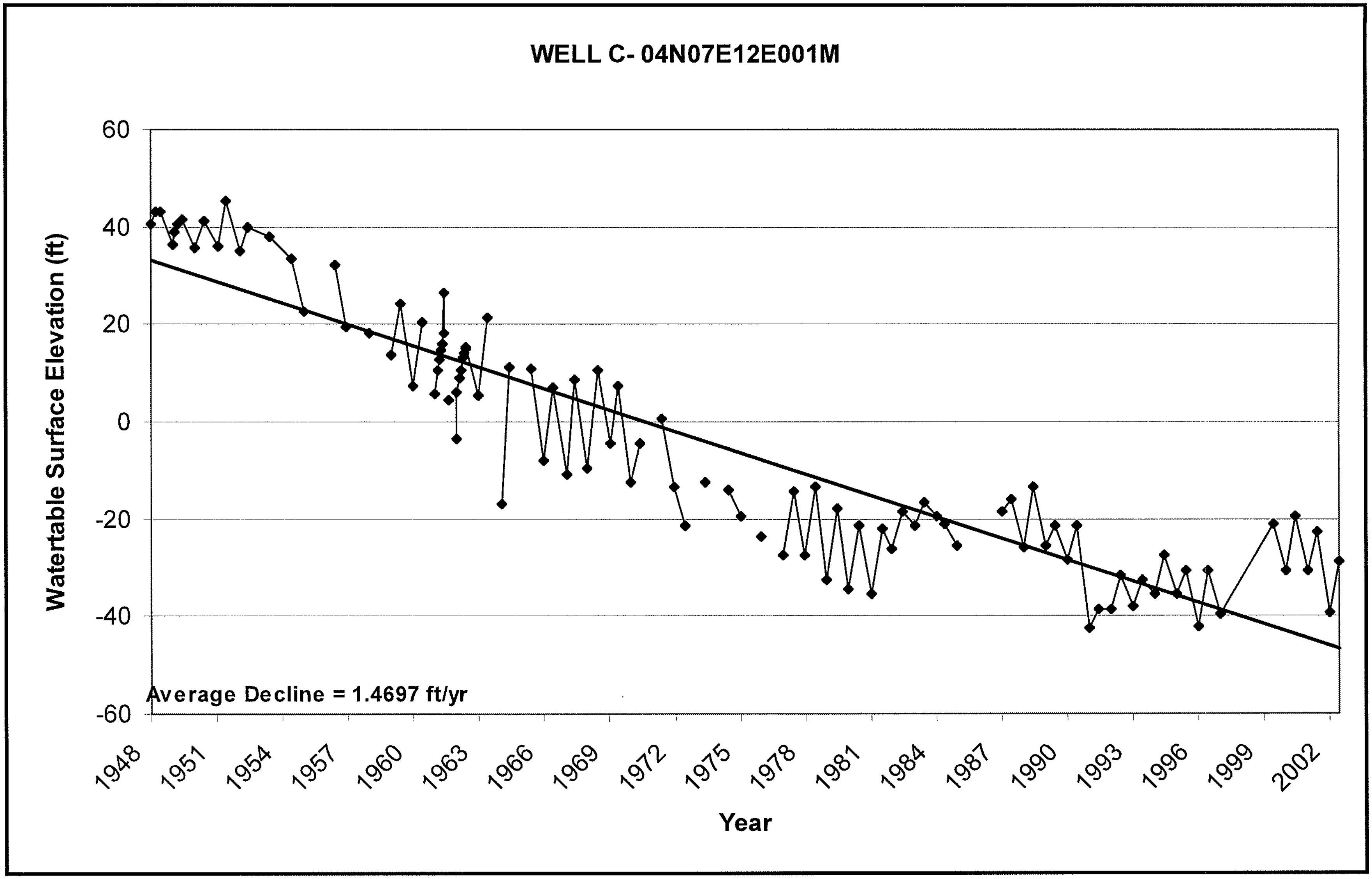


Figure 2-10 Hydrograph Well C
Source: California Department of Water Resources, Water Data Library at http://well.water.ca.gov/

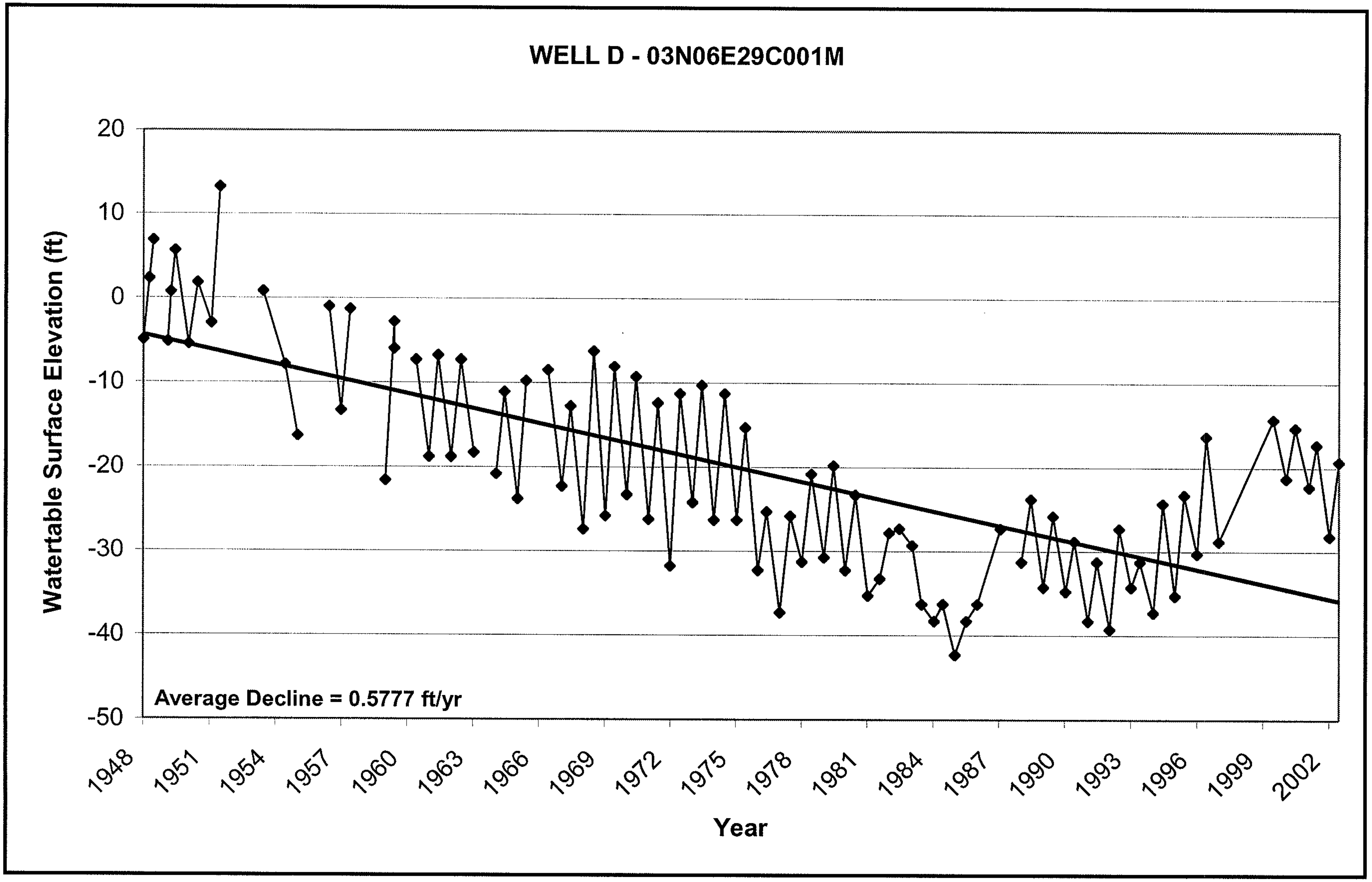


Figure 2-11 Hydrograph Well D
Source: California Department of Water Resources, Water Data Library at http://well.water.ca.gov/

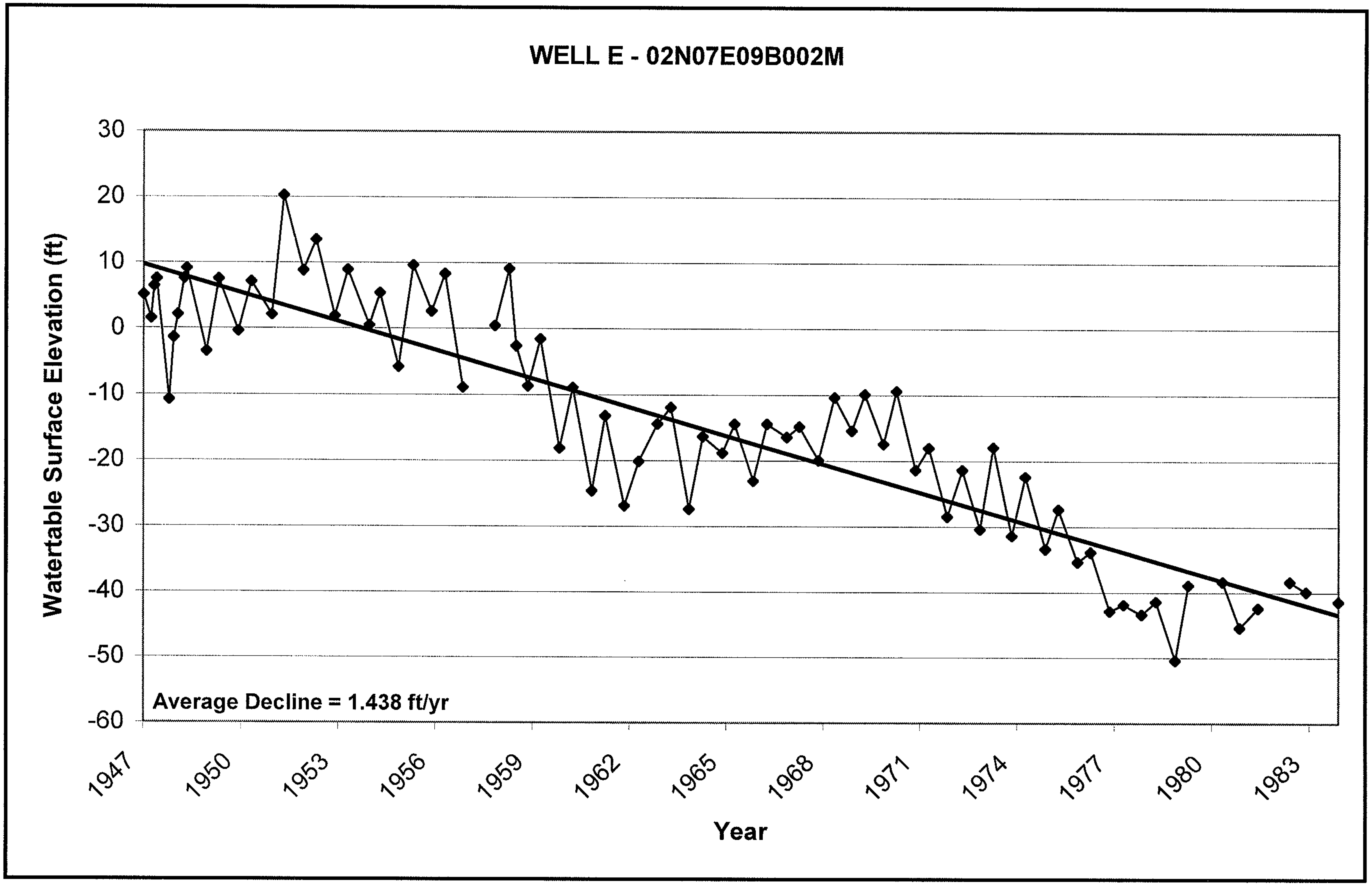


Figure 2-12 Hydrograph Well E
Source: California Department of Water Resources, Water Data Library at http://well.water.ca.gov/

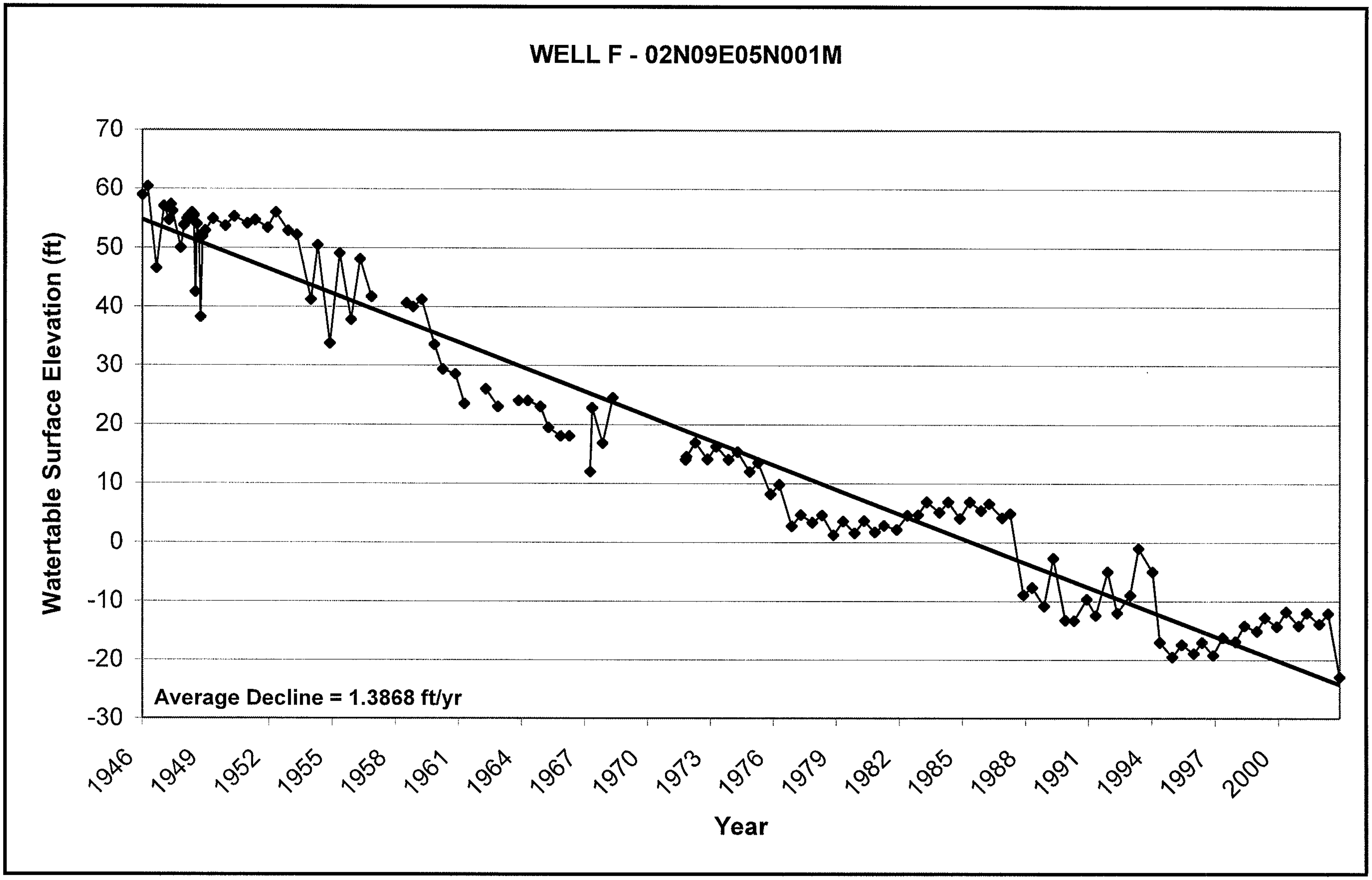


Figure 2-13 Hydrograph Well F
Source: California Department of Water Resources, Water Data Library at http://well.water.ca.gov/

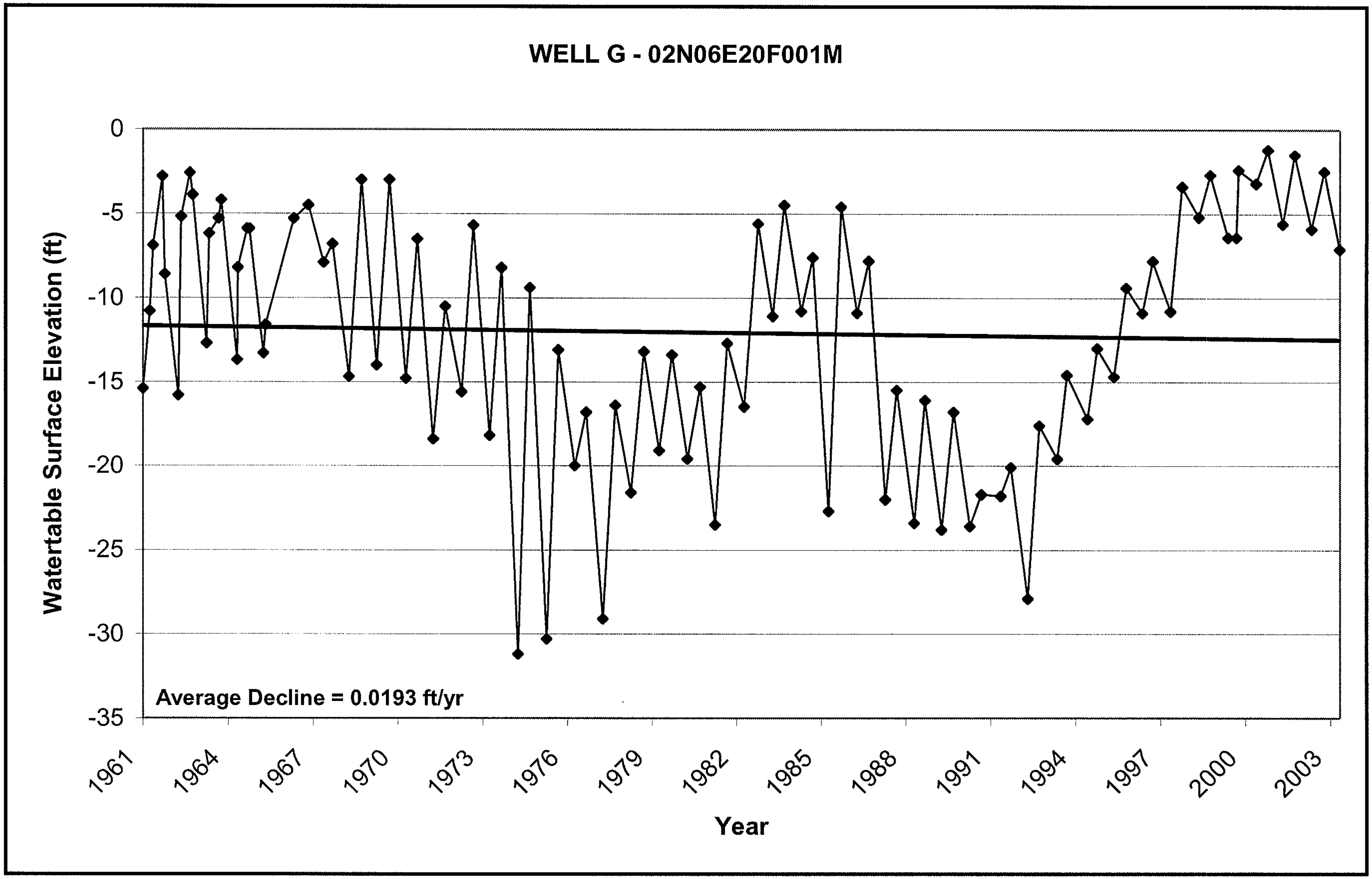


Figure 2-14 Hydrograph Well G
Source: California Department of Water Resources, Water Data Library at http://well.water.ca.gov/

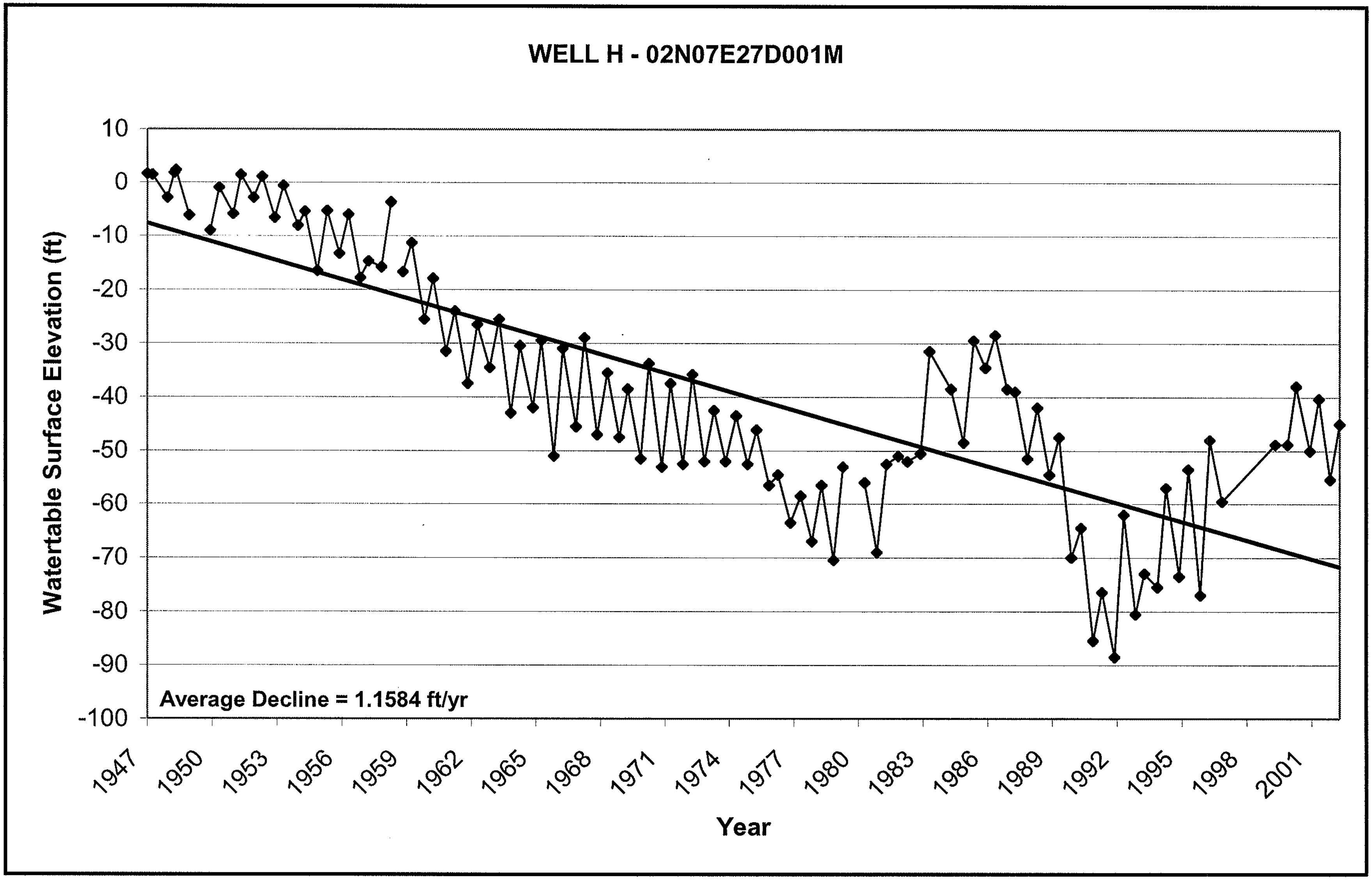


Figure 2-15 Hydrograph Well H
Source: California Department of Water Resources, Water Data Library at http://well.water.ca.gov/

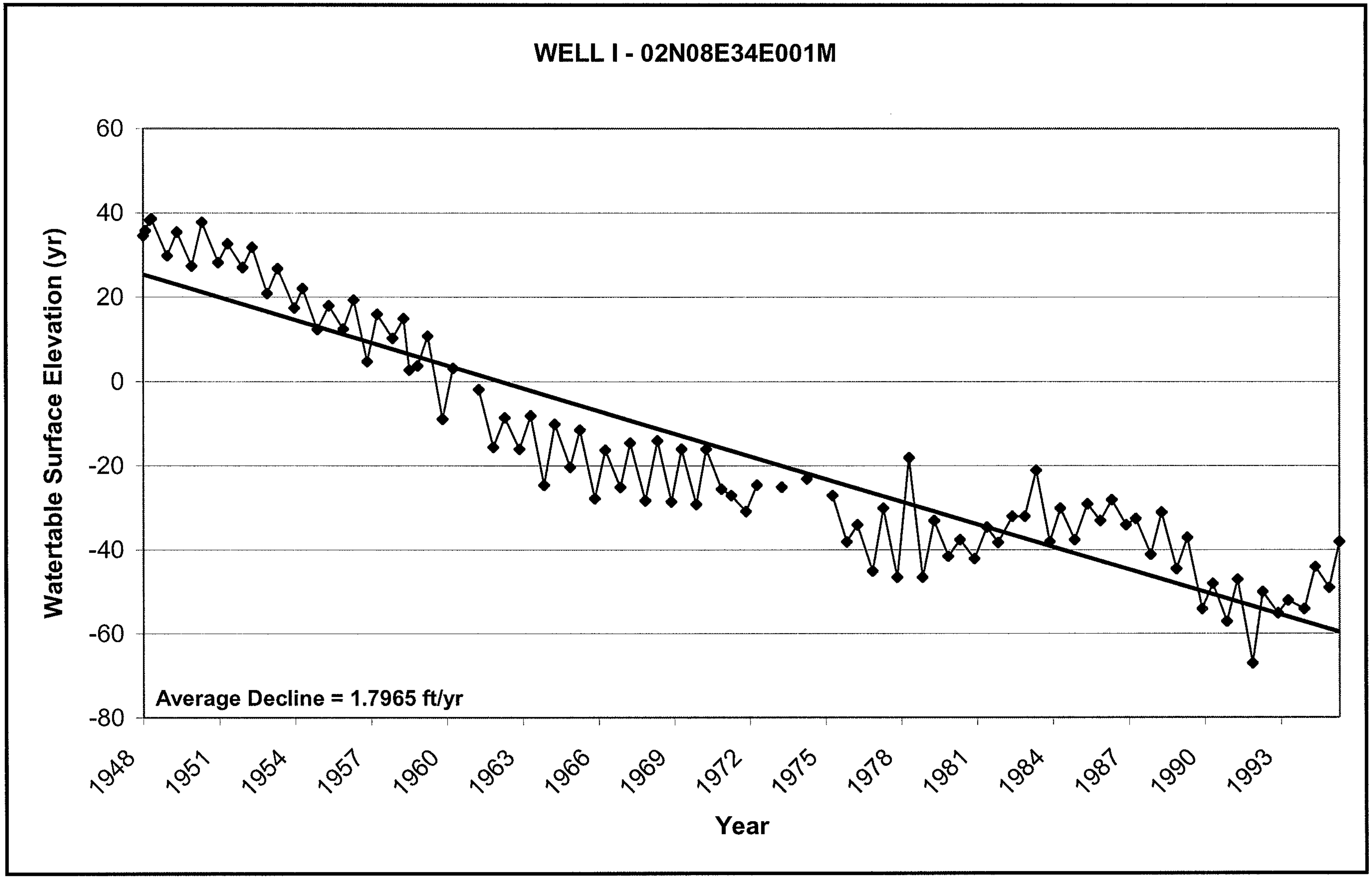


Figure 2-16 Hydrograph Well I
Source: California Department of Water Resources, Water Data Library at http://well.water.ca.gov/

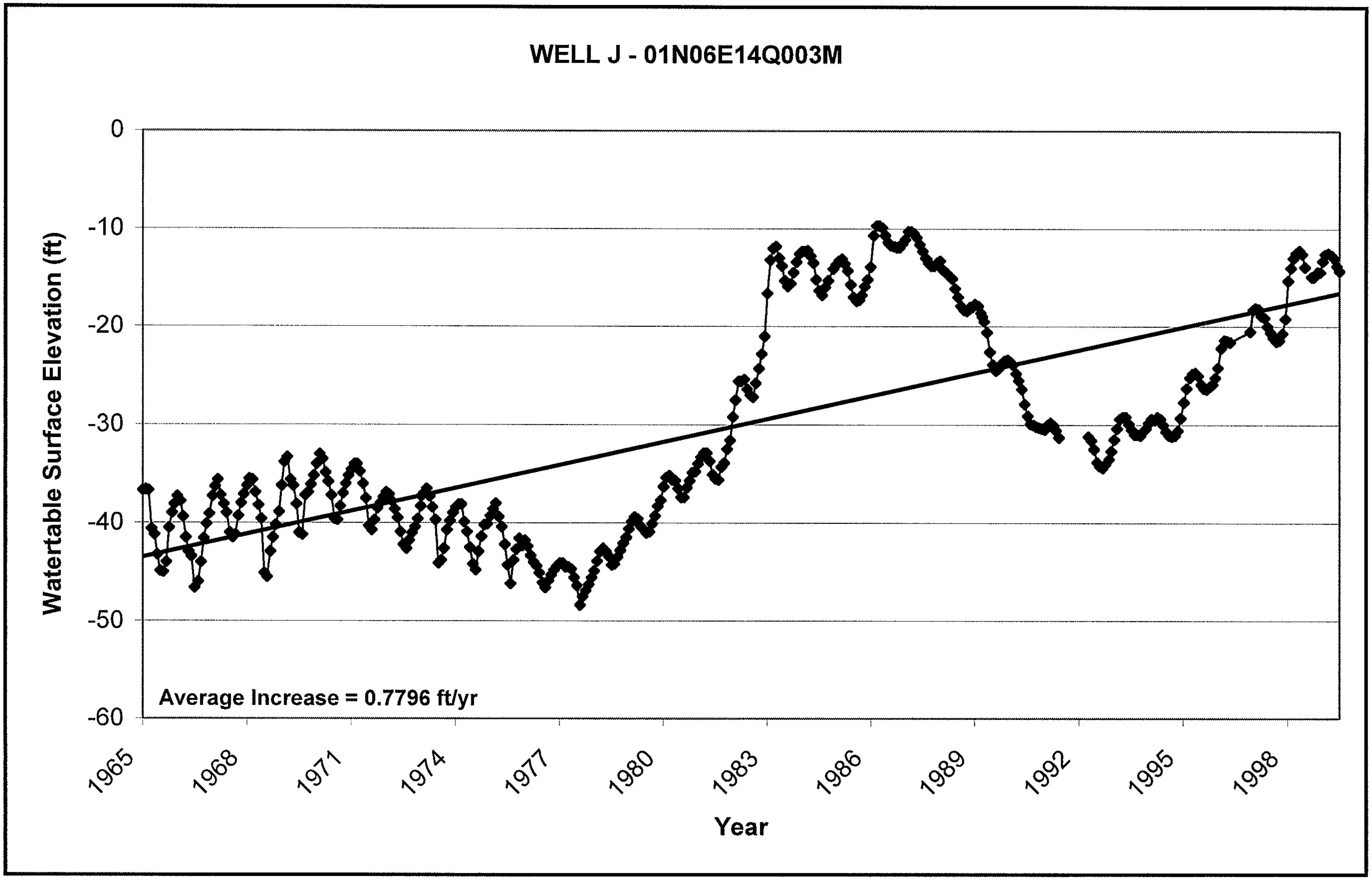


Figure 2-17 Hydrograph Well J
Source: California Department of Water Resources, Water Data Library at http://well.water.ca.gov/

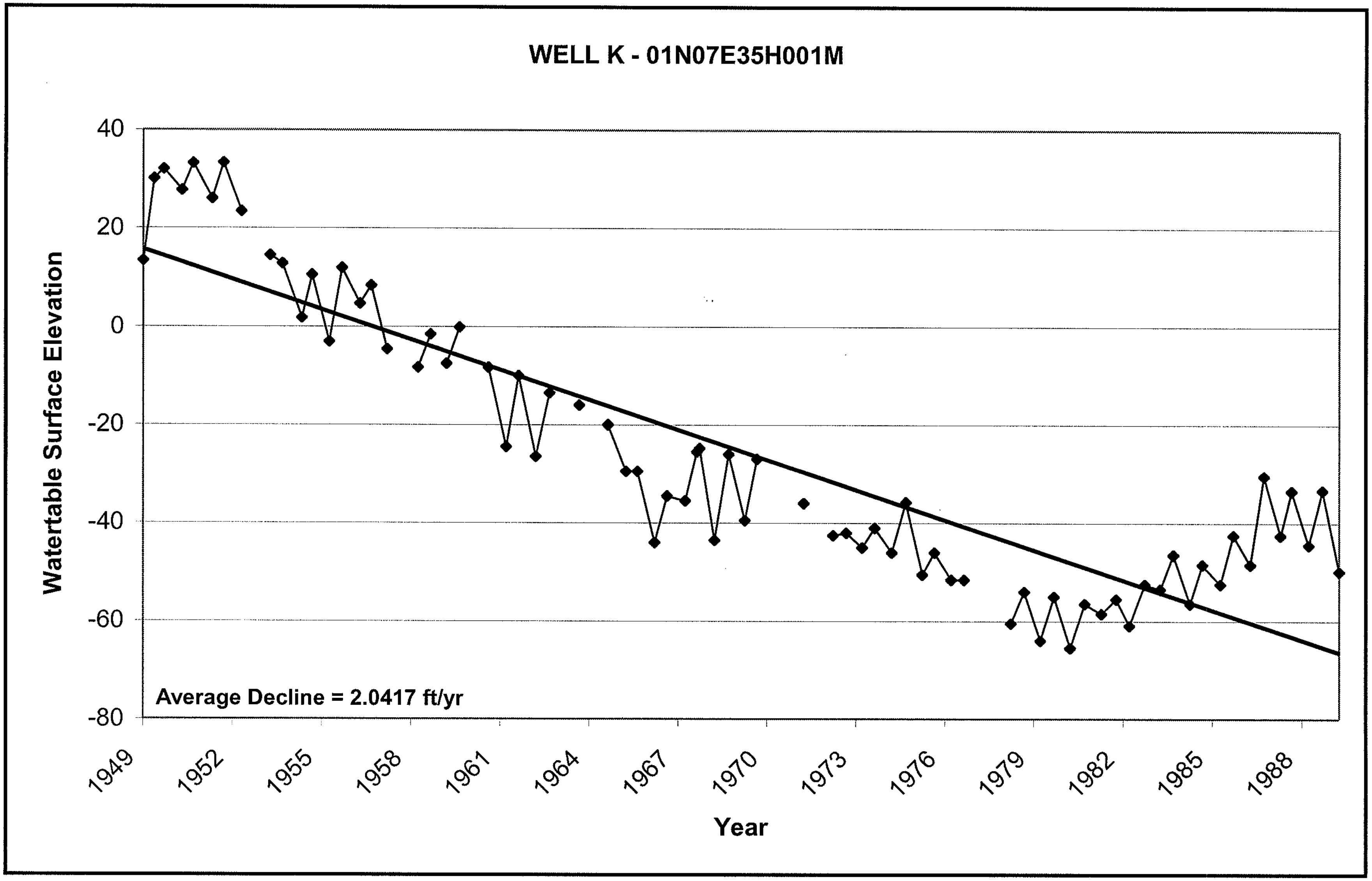


Figure 2-18 Hydrograph Well K
Source: California Department of Water Resources, Water Data Library at http://well.water.ca.gov/

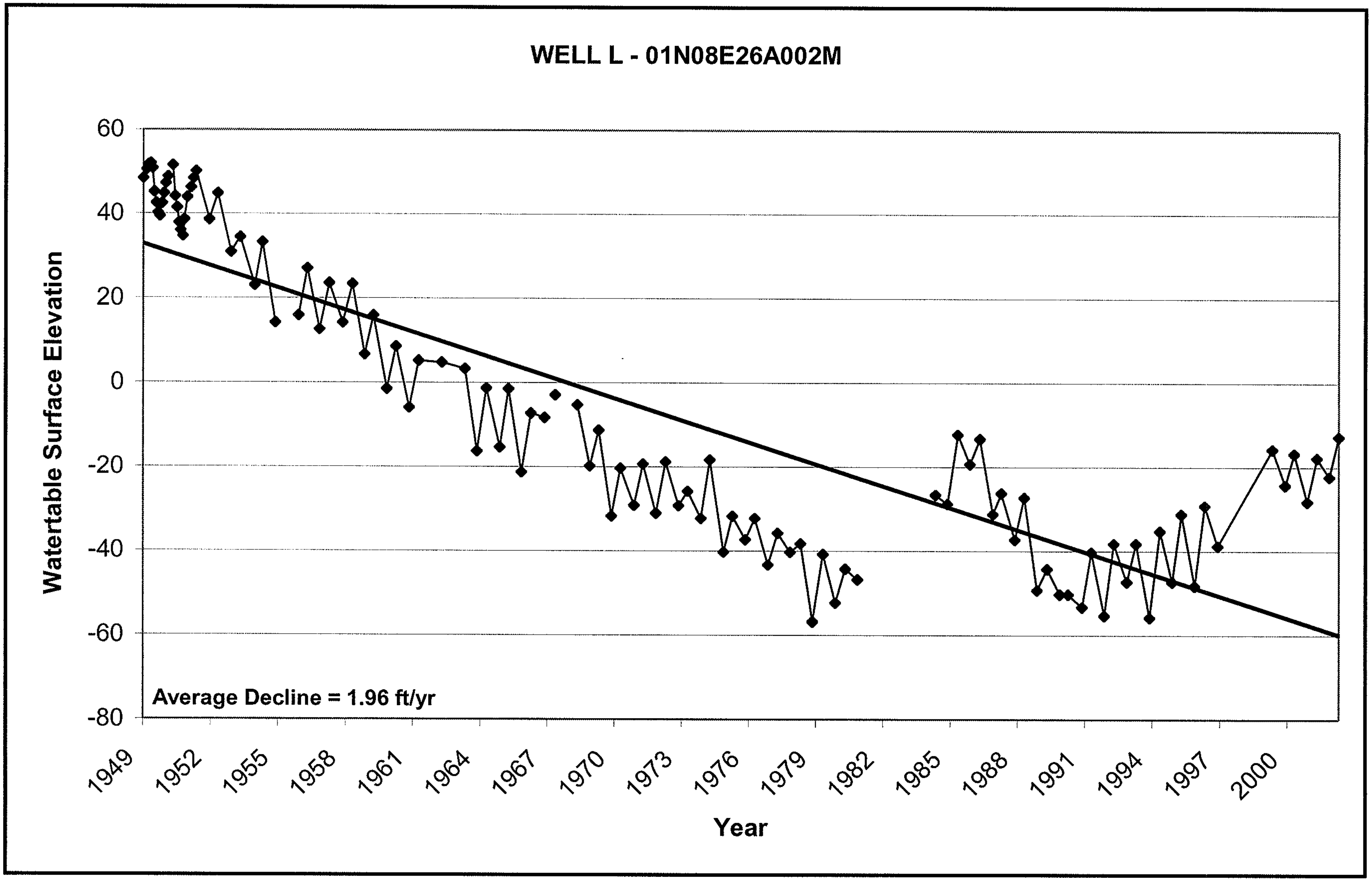


Figure 2-19 Hydrograph Well L
Source: California Department of Water Resources, Water Data Library at http://well.water.ca.gov/

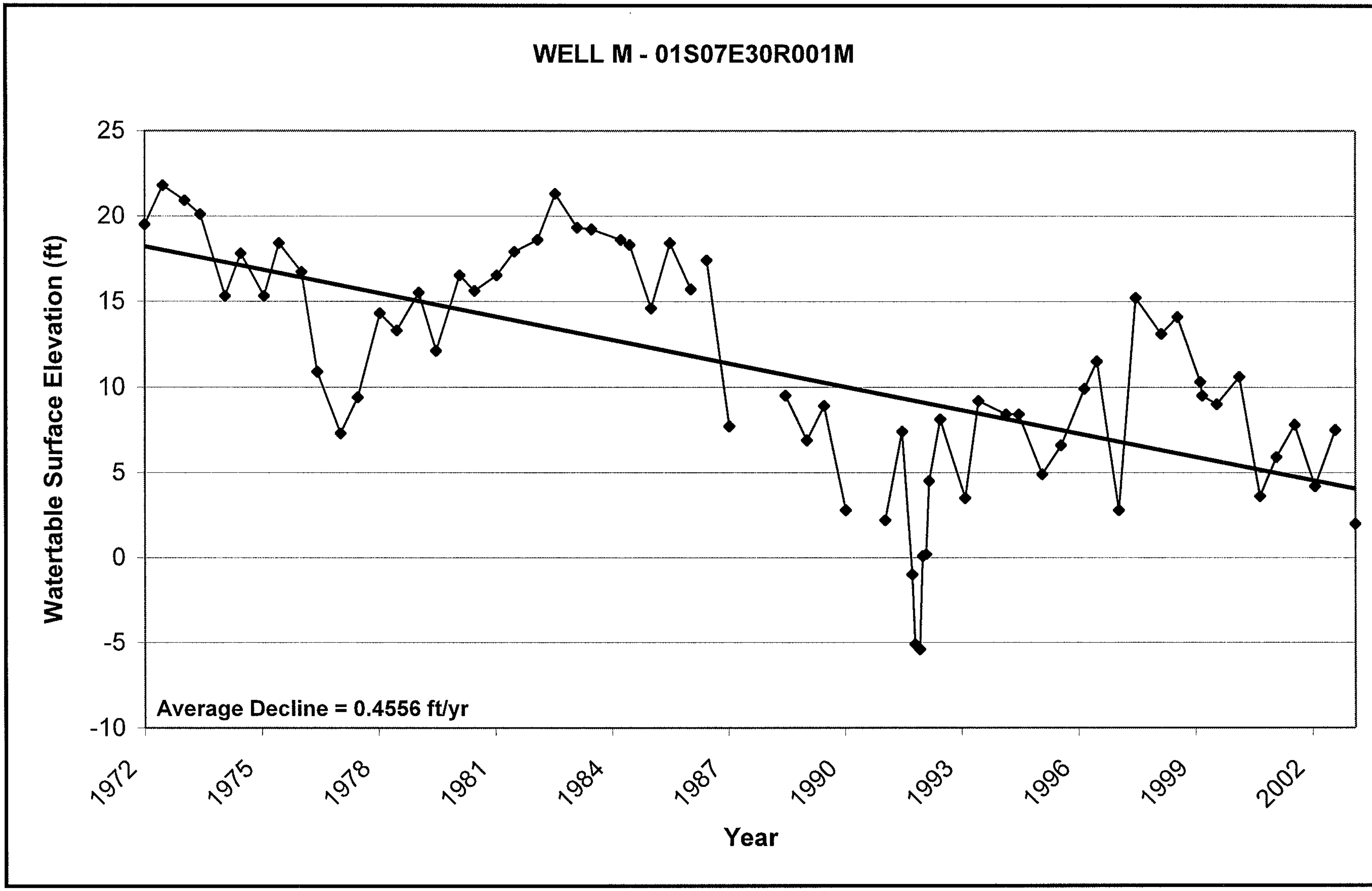


Figure 2-20 Hydrograph Well M
Source: California Department of Water Resources, Water Data Library at http://well.water.ca.gov/

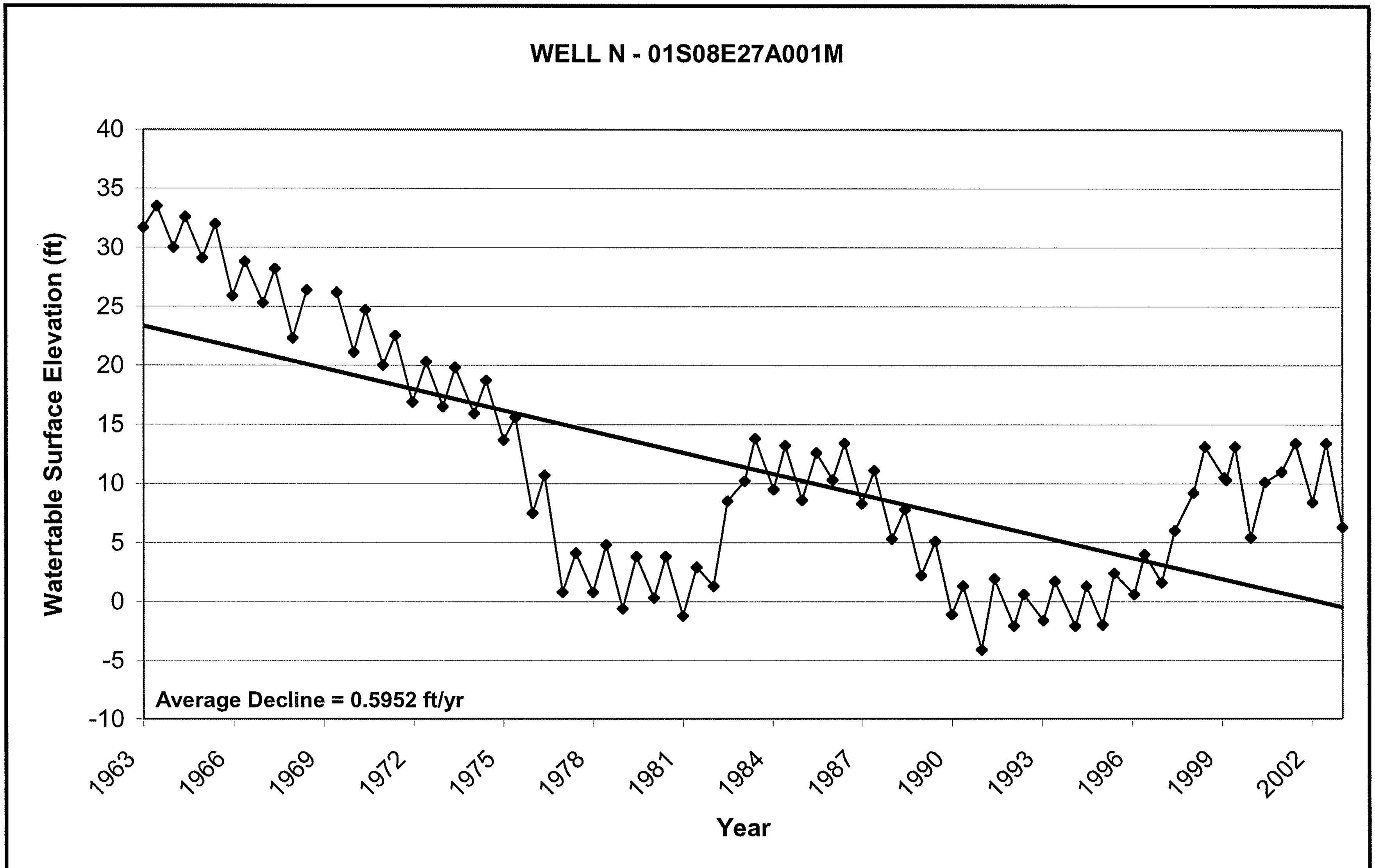


Figure 2-21 Hydrograph Well N

Source: California Department of Water Resources, Water Data Library at http://well.water.ca.gov/

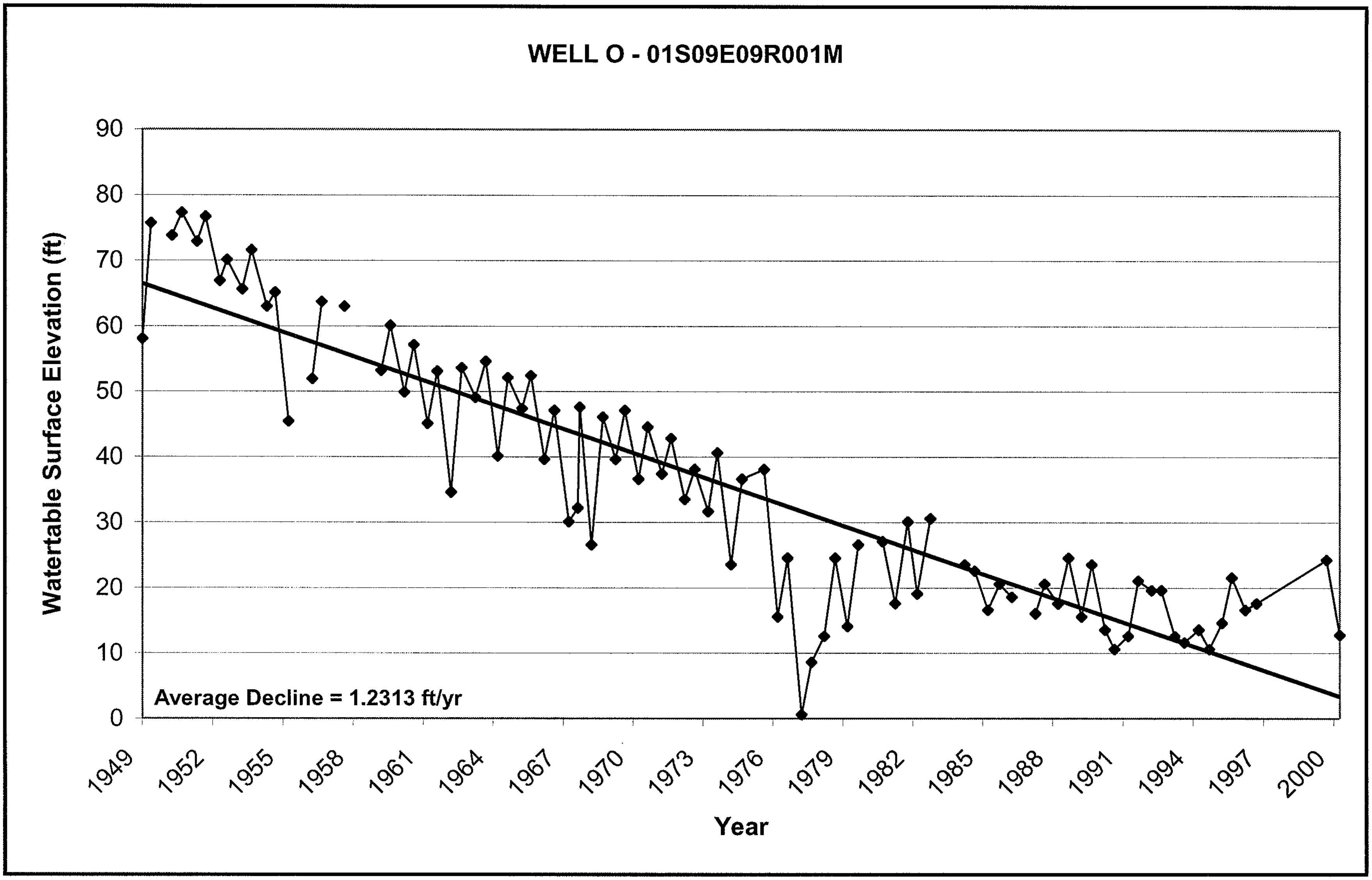


Figure 2-22 Hydrograph Well O
Source: California Department of Water Resources, Water Data Library at http://well.water.ca.gov/

Figures 2-9, 11, 12, 14, 15, 17, 18, and 21 illustrate groundwater levels for selected wells located in and around the principal cone of depression in eastern San Joaquin County. The groundwater levels in these wells clearly illustrate the significant decline in water levels since the 1960s, an average drop of 60 feet. The hydrographs of these wells illustrate average groundwater level drops of around 1.3 feet per year. In general, the lowest groundwater levels were reached in the late 1970s, recovering 10 to 20 feet, but then declined again in the mid-1990s. Wells in this area have a significant seasonal variation of 10 to 20 feet.

Figures 2-7, 8, 10, 13, 16, 19, and 20 illustrate groundwater levels for wells located further away from the main cone of depression, primarily further west and north. These wells show a less dramatic drop than the other wells, and more noticeable increase due to the wet years of 1981 through 1983 (total rainfall in 1983 was more than double the long-term average). The seasonal variation in these wells is distinct but not as pronounced as shown on the other hydrographs. In summary, the hydrographs reviewed illustrate the following general patterns:

1. In the central part of the County the groundwater table dropped continuously from the 1950s and possibly earlier to the mid 1980s. The decline was temporarily reversed due to climatic events.

2. In the northern part of the County groundwater table decline continued into the early 1990s.

3. Starting in the early 1980s a distinct drawdown and recovery cycle appears to have developed. The cycle covers a 10 to 15 year time period, and appears to be driven by climatic conditions more than long-term changes in groundwater use. This recovery and drawdown cycle may indicate that groundwater levels are beginning to equilibrate under current groundwater/surface water use patterns.

2.3.4 Groundwater Discharge and Recharge

The estimates of groundwater discharge and recharge presented in these sections are based on the modeling conducted by CDM for the San Joaquin County Water Management Plan, and the modeling originally conducted for the American River Water Resources Investigation (AWRI, 1996), and updated in 1999 for the Bureau of Reclamation by CH2MHill (CH2MHill, 1999). The results are for the Basin only.

2.3.4.1 Groundwater Pumping

Groundwater pumping records are not typically available for all wells within the study area. The approach adopted by DWR and other agencies to estimate groundwater withdrawals is based on land use. Figure 2-23 illustrates the 'simulated' total agricultural and municipal groundwater pumping for the model domain. Average annual groundwater withdrawal for the period from 1970 to 1993 for the Eastern San Joaquin portion of the model was 850,000 af.

2.3.4.2 Lateral Outflow

Under predevelopment conditions, lateral outflow from the Basin discharged to the San Joaquin River and the Delta area. For the period from 1970 to 1993, the net flow was positive, indicating no net groundwater outflow from study area.

2.3.4.3 Deep Percolation

The amount of water from natural and human activities that reaches the groundwater table is referred to as deep percolation. Deep percolation is the net of rainfall, applied irrigation water,

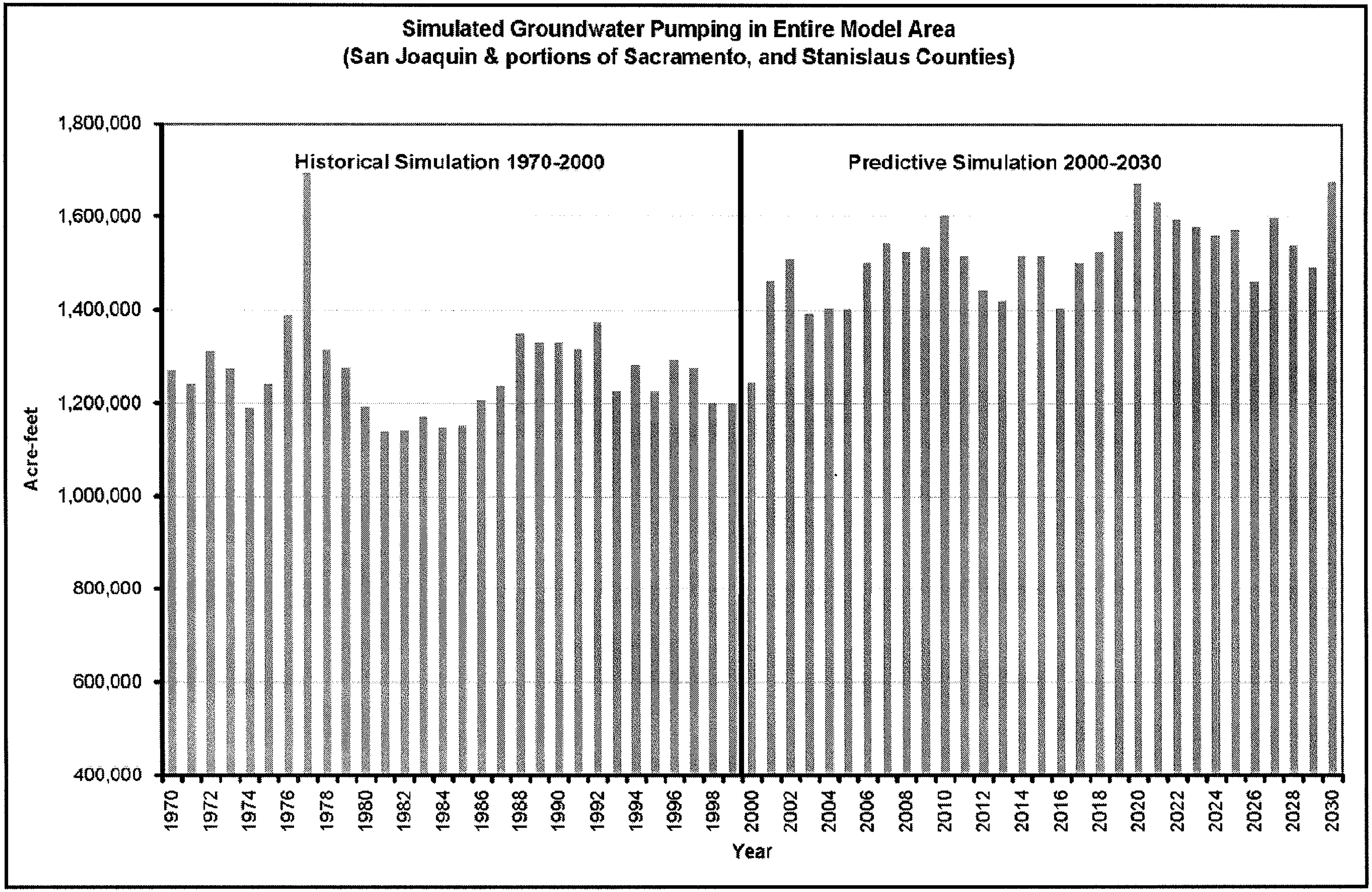


Figure 2-23 Simulated Groundwater Pumping
Source: Camp Dresser & McKee Inc.

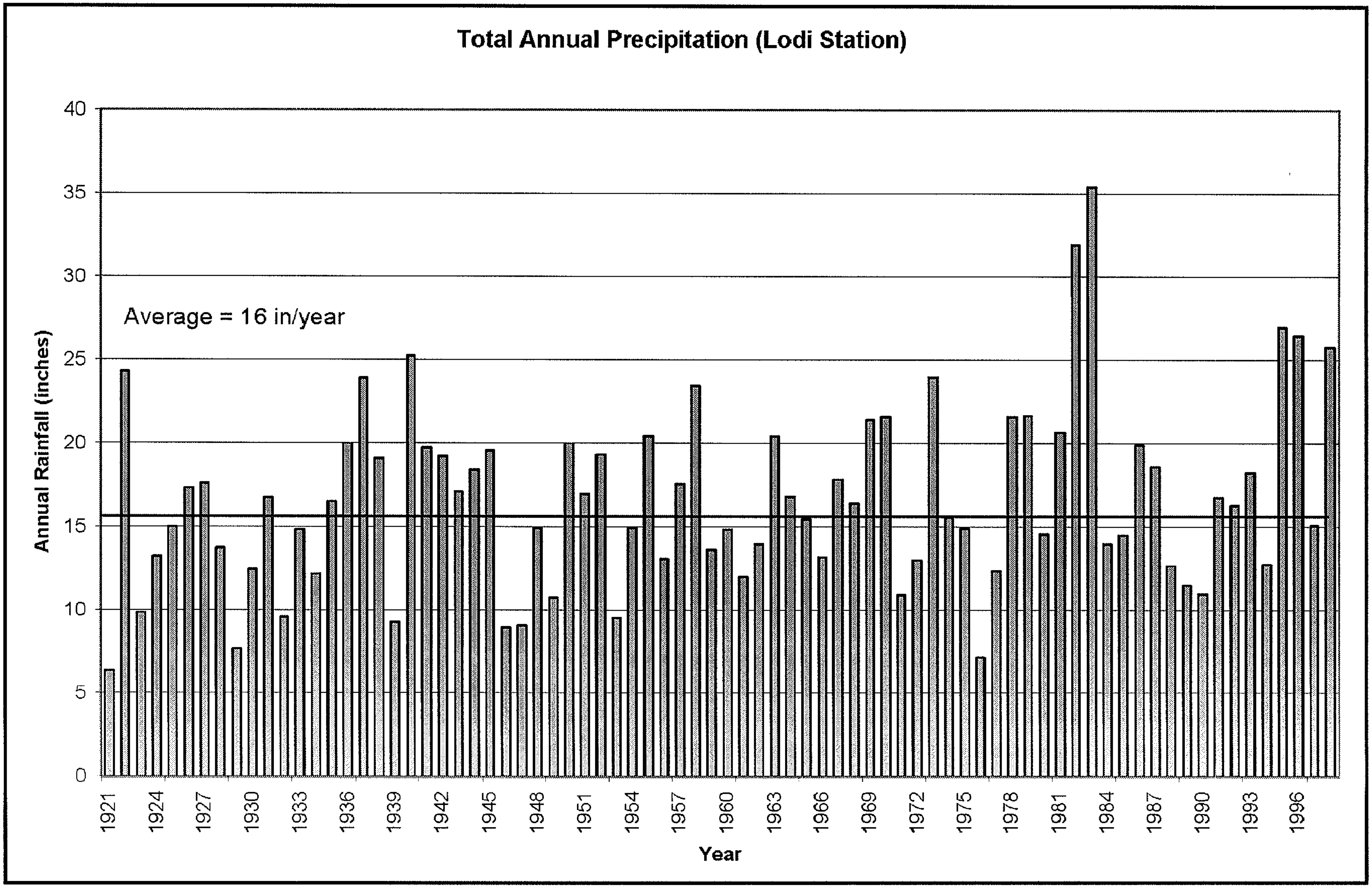


Figure 2-24 Annual Precipitation (Lodi Station)
Source: Camp Dresser & McKee Inc.

consumptive use, evapotranspiration, runoff, and unsaturated zone retention. Average rainfall within the study area is 14-16 inches per year. Figure 2-24 illustrates total annual rainfall for the Lodi Station. Within the Basin the estimated net deep percolation based on the modeling results is 590,000 af. Figure 2-25 illustrates the deep percolation for eastern San Joaquin County.

2.3.4.4 Lateral Inflow

Lateral inflow into the study area occurs primarily across the northern, western and southern boundaries. Under predevelopment conditions a net outflow existed, however due to the changed hydraulic conditions in eastern San Joaquin area there is now a net groundwater inflow. The groundwater model estimates net lateral inflow to be 120,000 af for the 1970 to 1993 period.

2.3.5 Surface Water Interaction

A large number of streams and rivers dissect the study area. The rivers that have a regional impact on the hydrogeology are Cosumnes River, Mokelumne River, Dry Creek, Calaveras River, Stanislaus River, Tuolumne River, and San Joaquin River.

Based on modeling results for the five-year period from 1989 to 1993, the Tuolumne and the upstream reaches of the Mokelumne and San Joaquin Rivers were gaining rivers – that is groundwater discharged into the rivers. The Calaveras, Dry Creek, Stanislaus, and the downstream reaches of the Mokelumne and San Joaquin Rivers were all losing rivers – i.e. surface water recharged the groundwater. On average from 1970 to 1993, there was a groundwater gain from streams of 140,000 af and a groundwater loss to streams of 100,000 af. The net gain to the groundwater system was 40,000 af.

2.3.6 Groundwater Balance

Current and historical groundwater pumping rates exceed the sustainable yield of the underlying groundwater basin on an average annual basis. Based on a simplified groundwater balance, as shown in Table 2-3, the net groundwater overdraft is estimated to be approximately 160,000 af/yr.

The result of long-term groundwater overdraft is two fold: significant decline in groundwater levels and increased accretions from area waterways. Although increased accretions to the groundwater basin from high quality surface water sources are desirable, accretions in the western fringes of the Basin and the Lower San Joaquin River are undesirable due to elevated salinity levels. Saline groundwater intrusion in the City of Stockton has forced the closure of several wells.

Approximately 222,400 acres in Eastern San Joaquin County irrigate with groundwater only and an additional 129,300 acres irrigate with both groundwater and surface water. At an extraction rate of 850,000 af and a combined groundwater irrigation area of approximately 352,000 acres, the average rate of groundwater extraction is 2.42 ft/ac. To eliminate groundwater overdraft and maintain the basin safe yield, the average rate of extraction would need to be reduced by 0.45 ft/ac to 1.96 ft/ac.

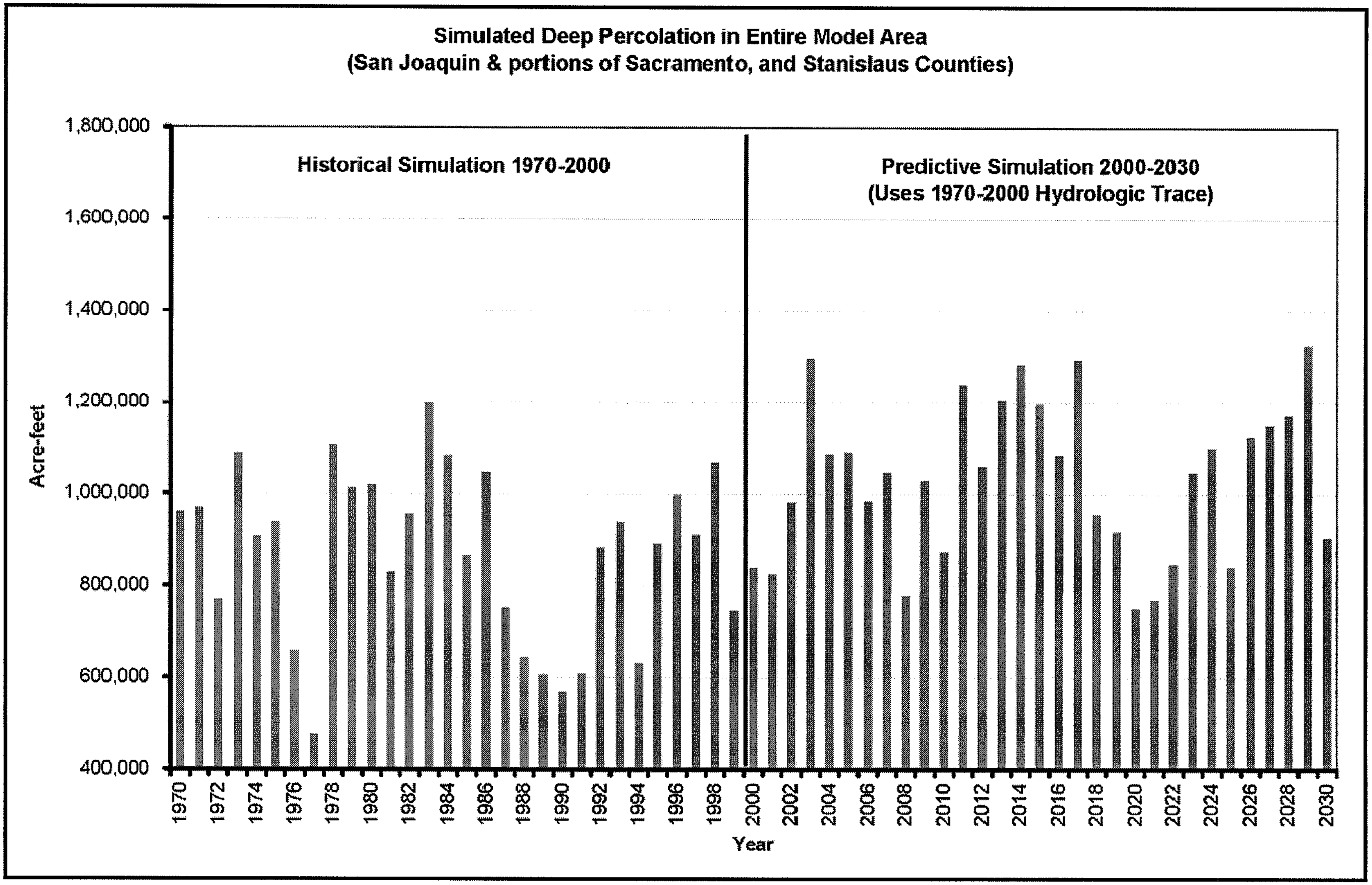


Figure 2-25 Simulated Deep Percolation
Source: Camp Dresser & McKee Inc.

Table 2-3 Simplified Groundwater Balance for Eastern San Joaquin County		
Groundwater Flow Component	**Average Value**	**Explanation**
	Inflows (af)	
Deep Percolation/Recharge	608,400	Net infiltration from rainfall, irrigation, canal leakage etc.
Gain from Streams	198,170	Net inflow from streams to groundwater system
Lateral Inflow	98,000	Net of subsurface inflows and outflows.
Total Inflows	**904,577**	
	Outflows (af)	
Groundwater Pumping	867,600	Net agricultural, municipal and industrial pumping
Loss to Streams	108,898	Net outflow from groundwater system to streams
Lateral Outflow	35,300	Subsurface Outflows
Total Outflows	**1,011,815**	
	Groundwater Overdraft (af)	
Mined Aquifer Storage	107,238	Total Inflows minus Total Outflows
Estimated Saline Intrusion	42,000	Lateral Saline Intrusion into the Stockton Area
Total Estimated Overdraft	**150,700**	Sum of Mined Aquifer Storage and Saline Intrusion
Source: San Joaquin County Water Management Plan Volume I		

2.3.7 Saline Groundwater Intrusion

Groundwater flow in the Basin now converges on the depression with relatively steep groundwater gradients eastward from the Delta toward the cone of depression as depicted in Figures 2-3 and 2-4. The eastward flow from the Delta area is significant because of the typically poorer quality water now moving eastward in the Stockton area. Increased lateral inflow from the west is undesirable, as this water is typically higher in TDS and chloride levels and causes the degradation of water quality in the Basin. Figure 2-9 illustrates the approximate location of the 300 mg/L isochlor as measured in 2000. Projections indicate that the rate of eastward migration of the saline front is approximately 150 to 250 feet per year. Figure 2-9 also shows the projected 2030 location of the 300 mg/L isochlor under no-action conditions.

Degradation of water quality due to TDS or chloride contamination threatens the long-term sustainability of a very important water resource for San Joaquin County, since water high in TDS and/or chloride is unusable for either urban drinking water needs or for irrigating crops. Damage to the aquifer system could for all practical purposes be irreversible due to saline water intrusion, withdrawal of groundwater from storage, and potentially subsidence and aquifer consolidation. The saline intrusion problem is not well understood by the Authority. Further studies and monitoring methods are necessary to ensure the problem is addressed and monitored adequately. Section 4 discusses further the current groundwater monitoring program and future actions to be undertaken by the Authority and its member agencies.

2.3.8 Baseline Conditions

A no-action, or baseline simulation, was conducted to predict how current groundwater and surface management practices, projected out to 2030, would impact the Basin. Groundwater modeling has shown that unless there is a change in how groundwater is used or managed, levels will continue to decline and storage will continue to be reduced. Figure 2-26 shows the corresponding simulated groundwater table for the year 2030 under baseline conditions. A large portion of the Basin is shown to have groundwater levels 60 to 80 feet below sea level.

Further exacerbating the groundwater conditions, as already mentioned, is the lateral inflow of saline water from the west, which could render parts of the aquifer unusable. Figure 2-27 illustrates the approximate location of the 300 mg/l chloride concentration contour as of 1996 as well as the projected 2030 contour. Groundwater modeling has indicated that the rate of eastward movement of this line is approximately 150 to 250 feet per year. Figure 2-27 also shows the projected location of the 300 mg/L chloride concentration line by the year 2030 under baseline conditions.

In other portions of California's Central Valley, declining groundwater levels have also resulted in land subsidence. Generally, this is not a widespread problem in the Basin, but may be a localized issue in some areas.

2.4 Urban Water Demands

The population of San Joaquin County is growing rapidly. The current population is expected to increase by approximately 83 percent by 2030 from nearly 600,000 to 1.1 million. While increases in urban water demands will largely be offset by the development of agricultural lands, the changes in differing water quality needs and demand patterns will further stress the ability of urban purveyors to meet the areas water needs. Because water use per acre varies by city, an analysis of each cities acreage and usage was undertaken. The area for each city was determined from 1996 DWR Land Use Surveys.

In consideration of planned growth, future water demands are based on each city's sphere of influence. Future water demands assume that by the 2030 planning horizon, each city's sphere of influence will be fully developed and will maintain a similar water demand. Table 2-4 indicates that the total 1996 urban demand was 82,600 af annually, which is projected to increase by 146,000 af/yr to 241,100 af/yr by 2030. Unforeseeable changes such as general plans revisions, changes in population density and increased water conservation can affect the accuracy of the projected water demand. It is recommended that the projections be updated as DWR Land Use Surveys for San Joaquin County become available.

2.5 Agricultural Water Demands

The agricultural water demands presented in this Plan are based on the 1996 DWR Land use survey. Based on the associated land use and crop type, applied water demands under average conditions were identified and summarized by Water District in Table 2-5. The entire applied water demand for non-urban and non-riparian vegetative areas in San Joaquin County in 1996 is approximately 1,522,000 af/yr, 954,000 af of which is needed in Eastern San Joaquin County. Table 2-5 assumes that agricultural lands outside of the urban spheres of influence will remain in production and that any agricultural lands within the urban spheres of influence will be developed by the 2030 planning horizon. The decrease in agricultural demand within city's sphere of influence is estimated to be 132,000 af. With this decrease, the projected agricultural demand in 2030 is estimated to be 1,390,000 af per year.

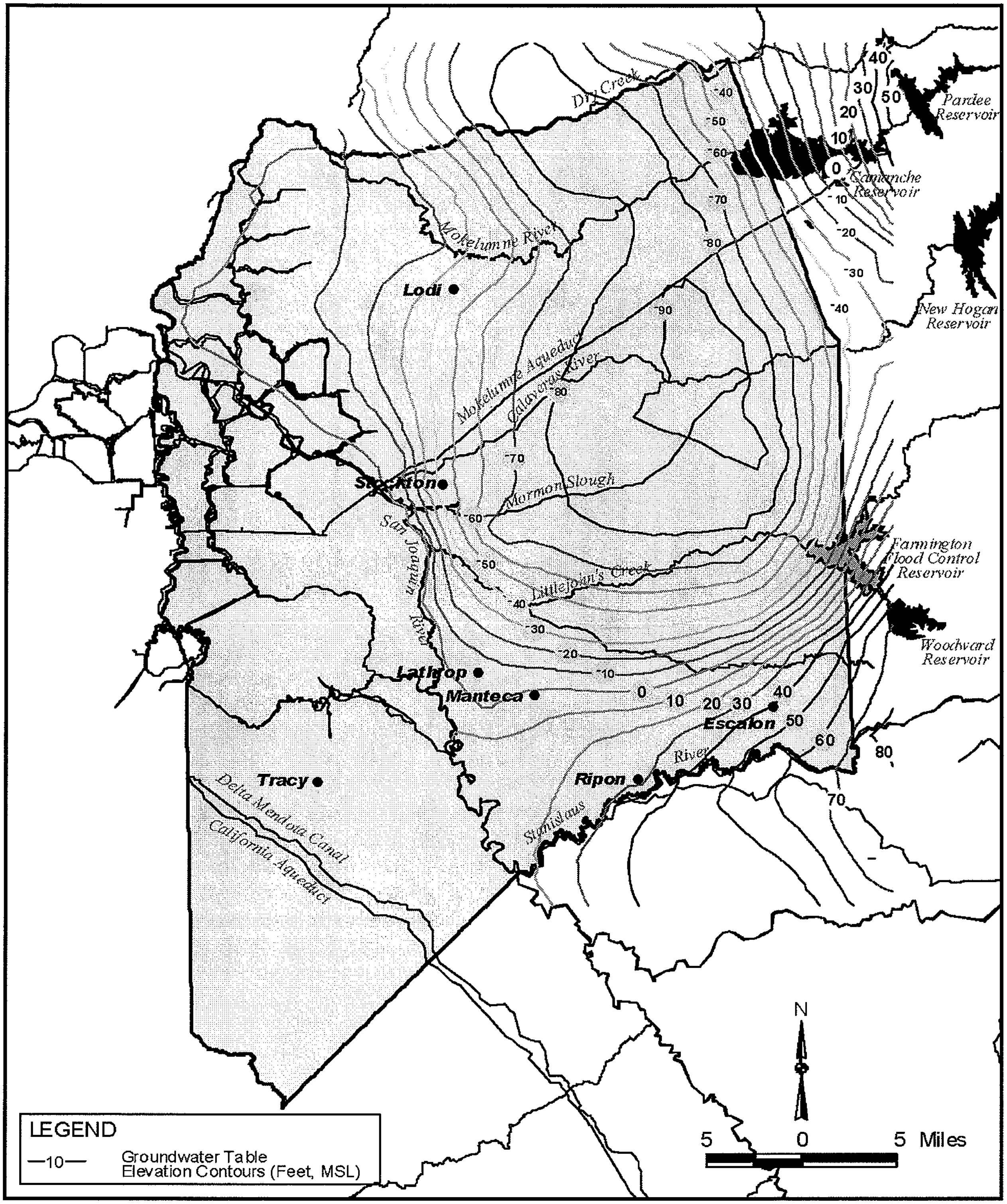


Figure 2-26 Simulated 2030 Groundwater Table Under Baseline Conditions
Source: Camp Dresser & McKee Inc.

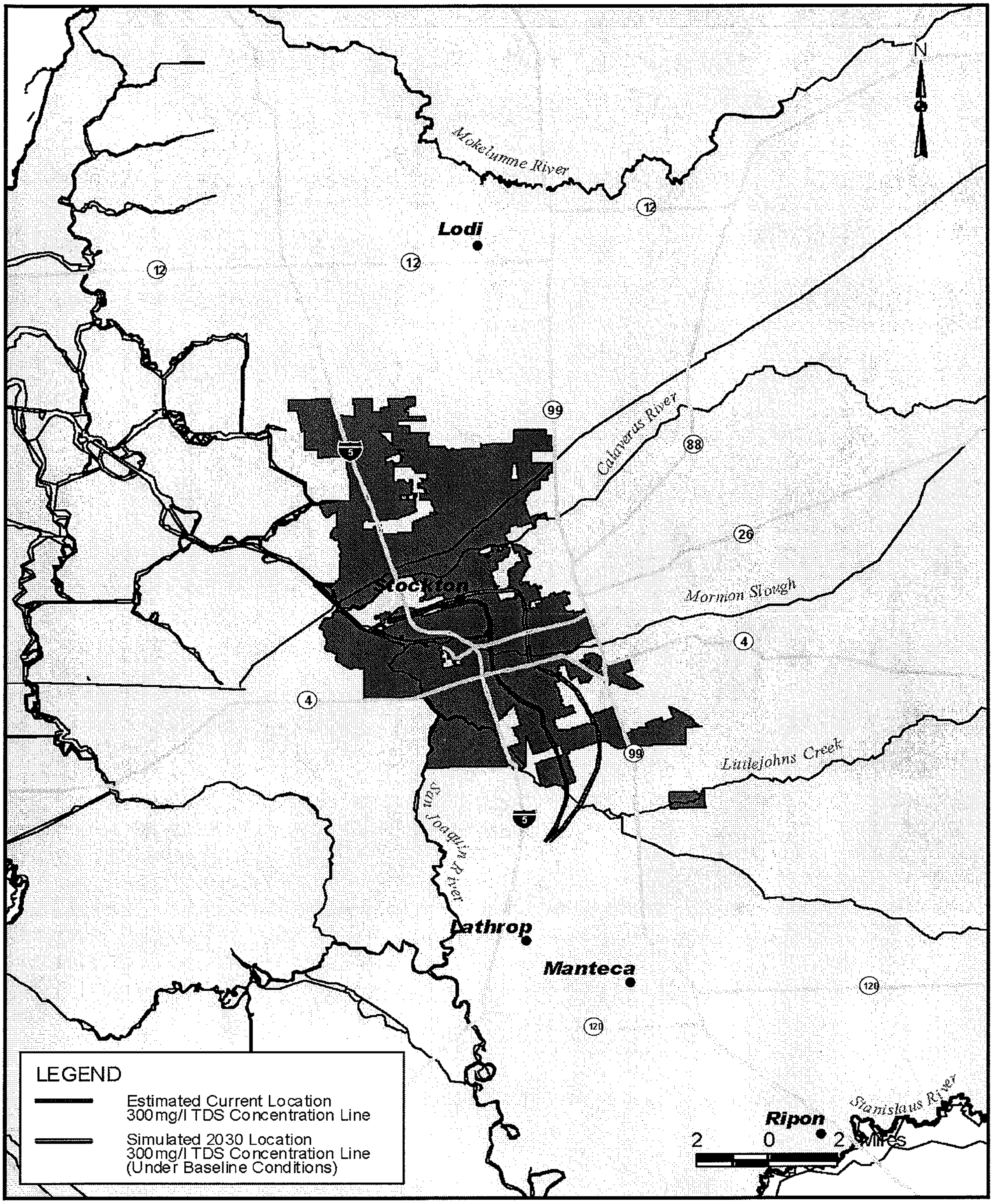


Figure 2-27 Estimated 2000 and Projected 2030 Saline Front
Source: Camp Dresser & McKee, Inc.

Table 2-4 Future Urban Water Demands						
City	"1996" Current Demand[3] (af)	Current Land Use (acres)	Water Use/ Acre[4] (af/ac)	Future Land Use (acres)	Future Demand (af)	Net Increase in Demand (af)
Escalon	1,400	932	1.5	2,106	3,200	1,800
Lathrop [1]	2,900	3,409	0.85	13,254	11,300	8,400
Lodi	16,600	6,071	2.7	9,650	26,400	9,800
Manteca	11,200	5,056	2.2	14,140	31,300	20,100
Ripon	3,500	1,764	2.0	6,676	13,200	9,700
Stockton [2]	47,000	29,746	1.6	61,353	96,900	49,900
Total	**82,600**				**241,100**	**146,600**

Source: San Joaquin County Water Management Plan Volume I

Notes:

1. Lathrop water use per acre is lower than the remainder of the cities because their developments are less dense than other cities. The city's future projections indicate that their water use per acre will increase to 1.4 ac-ft/ac. To maintain consistency, the water use per acre has been calculated as if it will stay the same over time. It is difficult to predict how development patterns will change, and the error that could be associated with this assumption is less than 0.5 percent of the future County demand.
2. The demand for the city of Stockton only reflects the water use within city limits. Water providers for the Stockton area also provide significant water to the urban areas outside of the city limits. Total water deliveries for the Stockton urban area are approximately 62,000 ac-ft.
3. Current year represents "1996". Individual city water usage data is based on information gathered during the development of the San Joaquin County Water Management Plan, 2001.
4. Water usage on a per acre basis is used to simulate groundwater withdrawals in the Camp Dresser & McKee developed DYNFLOW Groundwater Model for Eastern San Joaquin County.

The estimated and projected water demands presented are based on the following assumptions:

1. Drastic changes in cropping patterns will not change drastically.

2. Applied water demands include evapotranspiration, system losses, tailwater drainage, and percolation to groundwater.

3. Applied water demands do not include conveyance losses or off-farm demands. The applied water demand is the information necessary for the groundwater model, which also takes into account the differences in consumptive use for each parcel of land. Urban areas have different consumptive use than agricultural areas, and consumptive use also varies between different types of crops. Therefore, the applied water demand will usually be less than the diversion amounts maintained by each district.

The decrease of 132,000 af of agricultural water use can be compared to an increase in urban water use of 146,000 af. In terms of net demand, this is not a significant change. This similarity in demand is due to an approximate one-to-one conversion rate between urban and agricultural use for each acre. The usage rates for agricultural and urban water use are similar, with urban water use slightly higher per acre. Most land around urban areas is currently farmed; thus, in order for the urban areas to expand, agricultural land would be converted at an approximate one-to-one ratio. Because each acre of new urban land results in 1 less acre of agricultural land, and the water use figures are similar, the water demands are projected to remain essentially constant throughout the planning period.

Table 2-5 Estimated and Projected Agricultural Water Demands
(Applied Water Requirement under Average Conditions)

District (Within San Joaquin County Only)	1996 Estimated Applied Water Demand (af/yr)	2030 Projected Applied Water Demand (af/yr)
North Delta Water Agency	**37,244**	**37,244**
Central Delta Water Agency	**209,622**	**209,622**
South Delta Water Agency	206,759	206,759
West Side ID	17,205	17,205
City of Tracy	34,192	-
Banta-Carbona	42,585	42,585
Lathrop	21,225	-
South Delta Area (Total)	**321,966**	**266,549**
Del Puerto WD	**15,529**	**15,529**
Plain View WD	**11,217**	**11,217**
North San Joaquin WCD	**88,022**	**88,022**
Woodbridge ID	**102,517**	**102,517**
Lodi	**5,124**	**-**
Stockton East WD	151,210	151,210
Stockton	38,701	-
SEWD (Total)	**189,911**	**151,210**
Central San Joaquin WCD	**159,554**	**159,554**
Oakdale ID	**48,391**	**48,391**
South San Joaquin ID	126,709	126,709
Manteca	21,663	-
Escalon	1,761	-
Ripon	9,508	-
SSJID (Total)	**159,641**	**126,709**
Unincorporated Areas	**173,390**	**173,390**
Total	**1,522,128**	**1,389,954**

Notes:

1. This table was modified based on comments received on the Draft SJCWMP. It was compiled from the DWR land use information linked to Private, State and Federal water district outlines in a GIS system. There are significant areas of overlap between city limits, spheres of influence, and between water districts themselves. Bearing this in mind, there are bound to be variations and differences between these estimates and those compiled using different methodology. The figures in this table represent theoretical applied water requirements for average conditions.
2. The quantity of water actually pumped, diverted and applied will be significantly different due to a variety of factors including distribution system inefficiencies and losses (ranging from 10 to 20 %), climate, soil conditions, etc. The loss of agricultural land to urban expansion is illustrated by the reduction in agricultural acreage currently located within urban spheres of influence.
3. Agricultural lands in urban areas and urban spheres of influence are phased out completely by 2030. Other changes are likely to impact water demand, such changes in cropping patterns, irrigation methods, and farming of previously vacant land. However, these changes have not been quantified in any systematic or reliable basis.
4. Urban development will be undertaken by increasing urban densities through infill of spheres of influence. Development according to this guideline has yet to gain market acceptance and widespread application in the County. However, current development patterns, and their associated average unit water usage rates, are assumed to apply in the future.
5. Local urban development practices will result in new developments with similar water use rate. Water use figures were calculated for each individual urban area, and these figures were applied to future development. Each urban area has a unique unit water use rate based upon local factors, such as amounts of open space and conservation practices. As best management practices are implemented with respect to water conservation, projected water demands for urban developments may actually be conservative as compared to past conservation efforts.
6. The urban spheres of influence reflect 2030 development. The urban spheres reflect the local plans for where expansion could occur in the future, but it is possible that the development will occur in different areas, or in different amounts than predicted. The State Department of Finance predicts future populations; the projected 2030 population can fit within the spheres at current urban densities.

The assumptions in Table 2-5 simplify the process of predicting future water demands. The analysis undertaken does in no way imply that other changes in urban development and agriculture are not likely, nor are the assumptions intended to discourage implementation of structural or policy changes that improve water use efficiency. For the purposes of the Plan, extensive analysis of the sensitivity of the assumptions on the projected water demand was not undertaken. From a water resources planning perspective, the demands presented are sufficient.

2.6 Water Supplies

The California water rights system, considered a dual system, recognizes both riparian and appropriative rights. Appropriative rights date back to the mid-1800's during the California Gold Rush under the "*First-in-Time, First-in-Right*" doctrine. The Water Commission Act of 1913 required that a permit be issued for appropriation of surface water and that the right be assigned a priority based on the date issued. Today, the SWRCB is the regulatory agency through which surface water rights are appropriated. Water rights acquired prior to December 14, 1914 are not subject to State Board regulation; however, Article X, § 2 of the California Constitution mandates that water must be put to "...reasonable and beneficial use..." or risk loss of water right. (http://ceres.ca.gov/, 2003)

The State defines groundwater as either the underflow of a surface stream, a definite underground stream, or percolating waters. The appropriative water rights system applies to the first two definitions, but does not apply to percolating waters. Percolating waters are treated similarly to riparian water rights in that groundwater may be put to beneficial use in an amount proportional to the size and needs of the property. Only relatively recently have local public agencies and the State begun to look at the management of groundwater to prevent excessive overdraft. Disputes in groundwater rights have created adjudications in some basins whereby groundwater is extracted by court order.

2.6.1 Surface Water Supplies

Water supplies in San Joaquin County are subject to the complex system of riparian and appropriative rights and are further complicated by numerous agreements and water service contracts. Table 2-6 provides a synopsis of the major water rights and contracts held by San Joaquin County water agencies. It is estimated that San Joaquin County has approximately 1.2 million af/yr of surface water available. This amount includes approximately 500,000 af/yr applied by farmers in the Delta.

The actual quantity of water delivered varies significantly from year to year due to contractual and water right conditions. The actual quantities utilized within San Joaquin County also vary significantly with climatic fluctuations, infrastructure limitations, and facility operation. For example, although SEWD has an interim contract with USBR for 75,000 af/yr from New Melones Reservoir, this full quantity has yet to be made available to SEWD.

Surface water supplies are likely to decrease in the future. As shown in Table 2-6, there are several current contracts for "interim" supplies, which are available subject to requirements of upstream or senior rights holders. As development increases in areas with senior water rights, San Joaquin County's surface water supplies will be reduced.

2.6.2 Groundwater Supplies

Groundwater pumping quantities in San Joaquin County are not recorded at the water district or county level. Consequently, an accurate assessment of the quantity of groundwater used is difficult to establish. The approach adopted by DWR and other agencies to estimate groundwater withdrawals is based on land use and population. Using a similar approach with groundwater modeling, CDM estimated that the total agricultural and municipal groundwater pumping in Eastern San Joaquin County has averaged approximately 870,000 af/yr for the last 20 to 30 years. Sustaining the current rate of groundwater pumping in Eastern San Joaquin

County will further decline groundwater levels and saline groundwater will continue to migrate east into the Basin as described in Section 2.2.8.

Table 2-6 Summary of Current Water Rights and Contracts[1]

District/Agency	Source River/Reservoir	Wet Year Quantity	Dry Year Quantity	Comments
SEWD	Calaveras/ New Hogan	40,115	<40,115	Firm, dry[2]
		27,000	<27,000	Estimated unused portion of CCWD's 43,500 af allocation
	Stanislaus/ New Melones	75,000	<75,000	Interim, subject to other users requirements and availability
WID	Mokelumne/ Camanche	60,000	39,000	Firm
		See note[3]	0	Nonfirm
NSJWCD	Mokelumne/ Camanche	20,000	0	Subject to EBMUD supply and future requirements
CSJWCD	Stanislaus/ New Melones	80,000	<80,000	49,000 af firm supply, 31,000 af interim supply subject to other user's requirements
SSJID/OID	Stanislaus/ New Melones	320,000	<320,000,	Estimated use in County. [4]
CDWA	Delta	226,000	226,000	Estimated based on current demand.
SDWA	Delta	225,000	225,000	
City of Tracy	Delta Mendota Canal/CVP	10,000	10,000	CVP Contract and water purchase agreements with Local Irrigation Districts
		7,500	7,500	
West Side ID	San Joaquin River	30,000	30,000	Dependent on flow
	Delta Mendota Canal/CVP	7,500	7,500	CVP Contract
Plain View WD	Delta Mendota Canal/CVP	21,000	21,000	CVP Contract
Banta-Carbona WD	Delta Mendota Canal/CVP	25,000	25,000	CVP Contract
	San Joaquin River	30,000	30,000	Depends on flow
Hospital WD	Delta Mendota Canal/CVP	34,000	34,000	CVP Contract

Notes:

1. The figures in this table are not necessarily authoritative and are provided for general information purposes only. The actual quantity of water available from year to year and the quantity that is actually used vary significantly.
2. New Hogan Reservoir has an estimated yield of 84,100 af/yr. SEWD contract with the Bureau of Reclamation is for 56.5% of the yield, and Calaveras County Water District rights to the remaining 43.5%. CCWD currently uses approximately 3,500 af of its allocation, and riparian demand is 13,000 af. Based on an agreement between CCWD and SEWD, SEWD currently has use of the unused portion of CCWD's allocation.
3. Under the WID-EBMUD water right settlement agreement, 60,000 af per year is the firm portion of the Woodbridge Irrigation District Water Rights. 60,000 af is the minimum amount available to WID during any year when the inflow to Pardee Reservoir is greater than 375,000 af. When the Pardee inflow is less than 375,000 af, the minimum amount available to WID is 39,000 af. WID is entitled to divert water in excess of the 60,000 af under the priority of its water right licenses when such water is available at WID's point of diversion and is surplus to EBMUD's downstream commitments under the Joint Settlement Agreement.
4. OID and SSJID share equally rights to 600,000 af/yr when available. Of its 300,000 af/yr share, OID applies approximately 20,000 af/yr in Eastern San Joaquin County. SSJID is located completely within San Joaquin County. In years when the full allotment is not available, the amount is less than 320,000 af and is based on a formula which is part of the agreement with USBR.

3 Basin Management Objectives

Senate Bill (SB) 1938, created in 2002, requires that agencies that elect to, "Prepare and implement a groundwater management plan that includes basin management objectives for the groundwater basin that is subject to the plan. The plan shall include components relating to the monitoring and management of groundwater levels within the groundwater basin, groundwater quality degradation, inelastic land surface subsidence, and changes in surface flow and surface water quality that directly affect groundwater levels or quality or are caused by groundwater pumping in the basin." In addition, local agencies that do not adopt or participate in a plan fulfilling the requirements of SB 1938 shall not be eligible for State funding intended for groundwater projects. The Authority has developed the following qualitative Basin Management Objectives (MO) for the GMA.

3.1 Groundwater Levels

Management Objective #1: Groundwater Levels

Maintain or enhance groundwater elevations to meet the long-term needs of groundwater users within the Groundwater Management Area.

Groundwater Management Plan elements contributing to the success of Basin MO #1:

1. Increased use of available and new surface water supplies;
2. Implementation of local and regional conjunctive use programs and projects;
3. Urban and agricultural incentive based conservation and demand management programs;
4. Basin-wide monitoring and science programs;
5. Development of operations criteria for protection against prolonged droughts and the prevention of Basin mismanagement; and
6. Development of sufficient local and outside revenue sources for projects and programs to meet the Basin MO #1.

3.2 Groundwater Quality

Management Objective #2: Water Quality

Maintain or enhance groundwater quality underlying the Basin to meet the long-term needs of groundwater users within the Groundwater Management Area.

Groundwater Management Plan elements contributing to the success of Basin MO #2:

- Development and implementation of saline groundwater intrusion control projects and programs;
- Increased coordination with regulatory agencies to better protect against and mitigate groundwater contamination;

- Monitoring and science programs focused on the source and migration of saline groundwater;
- Development of operations criteria for protection against prolonged droughts and the prevention of Basin mismanagement; and
- Development of sufficient local and outside revenue sources to meet Basin MO #2.

3.3 Surface Water Quality and Flow

Management Objective #3: Surface Water Quality

Minimize impacts to surface water quality and flow due to continued Basin overdraft and planned conjunctive use.

Groundwater Management Plan elements contributing to the success of Basin MO #3:

- Utilization of surface water supplies when available in a regional groundwater recharge program or conjunctive use program that is sensitive to downstream users and the environment;
- Avoidance or mitigation of projects that detrimentally affect surface water quality and flow;
- Increased understanding of the interaction between surface water and groundwater through basin-wide monitoring and science programs;
- Regular updates to the Eastern San Joaquin County Groundwater Model as new data becomes available; and
- Development of sufficient local and outside revenue sources for projects and programs to meet the Basin MO #3.

3.4 Inelastic Land Subsidence

Management Objective #4: Water Quality

Prevent inelastic land subsidence in Eastern San Joaquin County due to continued groundwater overdraft.

Groundwater Management Plan elements contributing to the success of Basin MO #4:

- Continue to monitor observations of datums and bench marks in order to assess if an inelastic land subsidence problem exists in Eastern San Joaquin County; and
- Should problems exist, the Authority will re-evaluate the need for inelastic land subsidence monitoring and prevention programs.

4 Groundwater Management Options

4.1 Conjunctive Use Options

Conjunctive Use, as defined by the DWR 2003 Draft Bulletin 118, is:

> "The coordinated and planned management of both surface and groundwater systems in order to maximize the efficient use of the resource; that is, the planned and managed operation of a groundwater basin and a surface water storage system combined through a coordinated conveyance infrastructure. Water is stored in the groundwater basin for later and planned use by intentionally recharging the basin during years of above-average water supply."

In order to successfully implement a conjunctive use program that will meet the goals of this Plan, the Authority must first identify and develop a list of water management options. An option, in the context of this Plan, is the method, program, or policy suitable for the broader conjunctive use program for Eastern San Joaquin County. The following section defines the concepts for the acquisition of new and maximization of existing surface water supplies, groundwater recharge techniques, and other options dealing with demand management and water reuse.

4.1.1 Surface Water Options

4.1.1.1 New Surface Water Supplies

Opportunities to obtain new surface water rights within California are limited. The SWRCB has designated most rivers in the region as generally fully appropriated in the summer months when demands for water are at their peak. Methods to acquire new surface water are described below.

Wet Year Flows

Wet year water, also known as flood-flows or unregulated flows, are defined as either releases made from upstream storage reservoirs to maintain adequate flood storage capacity or flows in excess of in-stream flow requirements. Developing cost effective methods to capture and store flood water is a major challenge due to the intensity and infrequency of major storm/runoff events. Capturing flood-flows are often associated with new or expanded reservoir storage either off-stream or on-stream. Major rivers and streams accessible to Eastern San Joaquin County have generally unappropriated flows in the late fall through spring months and are subject to water right permit approval by the SWRCB.

Water Transfers from Out-of-Basin

Water transfers have become a key component in water resources planning throughout the State. Entities import water from willing sellers to supplement their supplies. Water transfers often benefit both parties by helping sellers recover water development costs at prices often far below the cost of developing new supplies. The water rights of the sellers are not impacted by water transfers, which is an incentive for entities to promote conservation and water use efficiency. An example of a water transfer agreement in California is the transfer of Colorado River water from Imperial Irrigation District to the City of San Diego in return for irrigation system improvements and compensation for lost revenue due to land fallowing. Water transfers are subject to approval by the SWRCB except in the case of existing Pre-1914 water rights.

Exercise of Area of Origin Priority

The system of appropriated surface water rights in California is based on a system of hierarchy and priority. However, protected areas or Areas of Origin within the Sacramento/San Joaquin Delta watershed receive priority when considering water right appropriations. Water code §1216 states that, "A protected area shall not be deprived directly or indirectly of the prior right to all the water reasonably required to adequately supply the beneficial needs of the protected area... by a water supplier exporting or intending to export water for use outside a protected area..." Historically, the interpretation of the statute has favored those who export water from the Delta, nevertheless pending legal action and political pressure could increase water allocations to Eastern San Joaquin County and give priority to future water right applications.

4.1.1.2 Maximizing Existing Surface Water Supplies

Agencies within Eastern San Joaquin County have existing water rights and contracts that cannot be fully utilized for a variety of factors including supply reliability and infrastructure limitations. The following section describes methods to maximize the use of existing supplies.

Re-operation of Existing Facilities

The re-operation of existing reservoirs is the intentional drawdown of stored water below the minimum capacity required for flood control purposes. In the context of a conjunctive use program, reservoir re-operation potentially utilizes a reservoir's carryover storage for groundwater recharge allowing for greater flood control capacity and a reduction in the foreseeable frequency of reservoir spills. Changes in the mode of operation could detrimentally affect other reservoir benefits such as hydropower, water supply, temperature control, and recreation. These impacts can vary the reservoirs ability to be re-operated for increased water supply benefits.

In-Basin Water Transfers and Purchases

Similar to water transfers from out-of-basin entities, agencies with extensive surface water rights could make water available to other agencies with limited water rights overlying more depressed groundwater levels within Eastern San Joaquin County. Additional investments in infrastructure resulting in increased efficiency could facilitate the transfer or sale of water. In order to avoid the loss of water rights through non-use, water districts and agencies could transfer their rights to other in-basin users. Examples of in-basin water transfer include purchases by the City of Tracy from the West Side and Banta-Carbona Irrigation Districts and by the City of Stockton from SSJID/OID.

4.1.2 Groundwater Recharge Options

In 2001 SEWD, in conjunction with the USACE and other local sponsors, completed the Farmington Groundwater Recharge/Seasonal Habitat Study. This Study explored the feasibility of groundwater recharge methods in the context of San Joaquin County's available surface water supplies and availabilities. The Study explores the benefits and drawbacks of the various methods used to recharge groundwater including detailed cost comparisons. The groundwater recharge methods are discussed below and summarized in Table 4-1.

4.1.2.1 Direct Recharge to Groundwater

Field Flooding

Field flooding consists of ponding surface water on seasonally fallowed agricultural areas in the late fall, winter, and early spring months for the purpose of recharging the groundwater Basin. In general this option could be used in fields with permeable soils and with little or no vertical impediments. Very few minor site preparations are necessary to percolate substantial amounts of water, making this method economical. Recharge efficiencies can also be increased with the addition of internal berms and check structures creating recharge cells for the purpose of keeping water from draining from the field too quickly. Field flooding is not effective on permanent crops such as orchards, but is very feasible on vineyards and certain row crops. There could be additional environmental benefits to this approach, such as providing seasonal habitat to migratory waterfowl.

Spreading Basins and Recharge Ponds
Unlike field flooding, spreading basins or recharge ponds are dedicated facilities constructed solely for recharge and seasonal habitat. Spreading basins are not rotated into production during the growing season. Spreading basins consist of relatively shallow basins, which are excavated to a depth of several feet. If present, shallow fine-grained sediment, hardpan, or clay may be excavated to provide more favorable recharge conditions in recharge ponds.

Recharge Pits
Recharge pits are similar to spreading basins and recharge ponds but are generally deeper and may be located in an existing natural or manmade depression such as a gravel quarry or flood control detention basin. Recharge pits require extensive excavation making them well suited for areas with an extensive aquitard or hardpan layer. Although not as cost effective as field flooding or spreading basins, existing quarries and flood control detention basins could serve as seasonal recharge pits with minor site improvements and minor changes in operation.

4.1.2.2 Injection Wells
Injection wells pump water directly into the groundwater aquifer. Injecting water into the aquifer system is an effective option for providing hydraulic control in well-defined hydrogeologic and hydraulic conditions. Complex injection/extraction well systems can be used for aquifer storage and recovery (ASR) projects. ASR systems often use treated water sources such as municipal supplies meeting safe drinking water requirements. Injection wells are also applicable in coastal settings where high quality reclaimed wastewater is injected to create a hydraulic barrier to seawater intrusion. Capital costs for ASR facilities include conveyance, treatment, and well construction costs.

4.1.2.3 In-lieu Recharge
In-lieu recharge is the direct substitution of surface water for groundwater creating a reduction in amount of groundwater pumped. Surface water can be substituted for groundwater in both urban and agricultural areas.

Agricultural In-lieu
Agricultural in-lieu recharge offers significant opportunities within Eastern San Joaquin County. To successfully implement agricultural in-lieu, the delivery capacity of the conveyance system needs to be expanded and on-farm dual irrigation systems constructed. In the past water supply reliability and availability have deterred the use of surface water. If additional firm entitlements are not obtained for diversion during the irrigation season, additional storage and conveyance would be needed to meet the demands of growers. Successful in-lieu programs are often incentive based and will require the financial and political support of the community.

Urban In-lieu
Urban in-lieu recharge consists of utilizing surface water to meet municipal and Industrial (M&I) demands. Should reliable surface water sources become readily available to urban areas, urban in-lieu recharge programs can be achieved on the order of current water service costs. Although urban areas require capital investments for treatment facilities, cities often have existing distribution facilities or the means to construct them through connection and development fees.

Groundwater banking criteria is further discussed in Section 8 of this Plan.

4.1.2.4 Regional Groundwater Banking

The groundwater depletion has created a potential groundwater bank in Eastern San Joaquin County estimated at 1 to 2 million af of operable groundwater storage. Outside interests with surplus water could store water in the underlying Basin during wet years for use in subsequent dry years. Other groundwater banking options include regional partnerships with entities who would share in the financing of infrastructure improvements and projects for a portion of the project yield.

In 1995, the ESJPWA formulated the following principles of negotiation for a joint conjunctive use/groundwater banking project with EBMUD:

- The priority of any regional groundwater banking project shall be to:
  1. Eliminate overdraft of the underlying Basin.
  2. Restore Basin levels to a specified groundwater level.
  3. Supply the water needs of Eastern San Joaquin County.
  4. Meet the needs of project partners.
- Extractions and export of groundwater shall not cause water levels to fall below 1992 levels.
- Participation of outside interests shall not cause increases in costs to meet the needs of local water users.
- Adverse impacts to groundwater users shall be fully mitigated.
- Extraction and exportation of banked groundwater must adhere to the above principals.

Both parties could not come to consensus on the issues stated above. The Authority is open to suggestions to ensure that groundwater banking is a worthwhile investment in Eastern San Joaquin County.

Table 4-1 Groundwater Option Comparisons

Option Type	Recharge Method	Improvement Costs ($/af)	Infrastructure Requirements	Land Requirements	Effectiveness	Operation/ Maintenance
Surface Supply Options	Wet Year Flows	~$500	On or off-stream regulating reservoir	Extreme for new reservoir	Very effective based on reservoir size and frequency	Very high requirements
	Water Transfers - Out of Basin	$200-400	Conveyance and storage	Potentially land intensive	Effective based on quantity of water and agreement duration	Varies with infrastructure requirements and year to year availability
	Area of Origin Priority	$0-$350	Use of existing or new infrastructure	Potentially land intensive	Very effective	Varies with infrastructure requirements
	Reservoir Re-operation	~$100	Use of existing infrastructure and storage	Minimal	Less effective	Minimal based on existing facilities
	Water Transfers - In Basin	~$100-$200	Minor conveyance	Minimal	Less effective	Varies with infrastructure requirements and year to year availability
Groundwater Recharge Options	Field Flooding	$50 - $100	Uses Existing Infrastructure	Uses seasonally fallow areas	Somewhat effective only available seasonally	Significant effort
	Spreading Basin/ Recharge Pond	$100 - $150	New Infrastructure	Requires relatively large dedicated areas	Potentially effective, requires detailed field testing	Significant effort
	Recharge Pit	$400 - $450	New Infrastructure	Requires dedicated areas	Potentially effective, requires detailed field testing	Significant effort
	Leaky Canal	Varies	New Infrastructure	Land intensive	Potentially effective, conveyance benefits	Significant effort
	Injection Wells	$150 - $200	New Infrastructure	Requires dedicated areas	Potentially effective, requires extensive well field	Significant effort
	Agricultural In-lieu	$200 - $250	New / Or Existing Infrastructure	Existing Land Use	Very effective based on quantity of water	Additional effort required by owner and district
	Urban In-lieu	~$250-$400	New / Or Existing Infrastructure	Existing Land Use	Very effective based on quantity of water	Requires treatment plant O&M costs
	Regional Groundwater Banking	$200-$300	New / Or Existing Infrastructure	Potentially land intensive	Very effective, financial assistance through third party	Significant effort
Other Options	Water Reclamation	$300-$500	Retrofit of existing facilities	Minimal	Less effective due to treatment costs and public perception	Requires treatment plant O&M costs
	Agricultural Water Conservation	$200-$250	New Infrastructure	Minimal	Potentially effective	Significant effort

	Urban Water Conservation	\$200-\$250	New Infrastructure	Minimal	Potentially effective	Minimal
	Crop Rotation/Land Fallowing	~\$50	None	Potentially land intensive	Potentially effective if mitigated	Minimal
Source:	San Joaquin County Water Management Plan Volume I Farmington Groundwater Recharge and Seasonal Habitat Study					

4.1.3 Water Reclamation

Water reclamation or water reuse is the treatment of water that has been used previously and would otherwise be discharged out of the Basin. Municipal and industrial wastewater reclamation is becoming increasingly prevalent throughout the State as a viable alternative for compliance with regulatory waste discharge requirements. As municipalities and industries move to meet these waste discharge requirements with tertiary treatment, high quality supplies may become available for irrigation or other non-potable uses. Pending further growth of the reclaimed water market, Eastern San Joaquin County could put to beneficial use a substantial non-potable water supply; however, the resulting reduced supply to downstream users would need to be mitigated.

4.1.4 Water Conservation

Demand management is a key component for long-term planning and management of water resources. Implementation of best management practices (BMPs) can be more economical than developing new water sources and less damaging to the environment.

Urban Water Conservation

Active urban water conservation programs throughout the State potentially save 10 to 20 percent of the historical demand. BMPs included in such programs include water metering, tiered water pricing, rebates for water saving appliances and amenities, water-saving household plumbing devices, and education and outreach. Urban water conservation programs are eligible for State and Federal grants.

Agricultural Water Conservation

Crop science has determined that plants consumptively use a fraction of the total water applied during irrigation. Agricultural water conservation relates mainly to the use of more efficient irrigation technologies that reduce the amount of water applied while still meeting the consumptive needs of the plant. Increasing irrigation efficiency decreases the amount of water that is lost through evaporation during conveyance or application and the discharge of tailwater to surface streams. Growers moving from flood irrigation to drip and sprinkler systems often report irrigation efficiencies upwards of 90 percent.

It should be noted that the conversion to drip and sprinkler irrigation is not suited for all crop types and in some cases does not provide its intended benefits. Some crops are sensitive to changes in irrigation methods and may either produce crops of poorer quality or, in some cases, actually increase the consumptive demand of the plant. Excess applied surface water resulting in tailwater drainage is a benefit to the groundwater Basin when allowed to percolate and may be a major source of water for downstream users who depend on return flows. Extensive analysis should be undertaken prior to implementation of agricultural water conservation measures to ensure the intended benefits are realized.

Voluntary Crop Rotation

A voluntary crop rotation program is intended to be exclusively at the discretion of the local grower. Removing acreage from production does in fact save water; however, the economic consequences are not acceptable to the member agencies of the Authority. As an incentive based program, growers opting for crop rotation could be compensated based on conserved water thus reducing the economic impacts. Substantial analysis must be undertaken to ensure that crop rotations do not adversely impact the agribusiness of Eastern San Joaquin County, downstream users depending on return flows, or the environment.

4.2 Groundwater Contamination

Groundwater contamination and the continued degradation of groundwater quality is a global threat to all groundwater users. The Authority recognizes that the long-term sustainability of the underlying Basin cannot be accomplished without adequate groundwater quality protection, contamination prevention, and remediation programs. As depicted in Table 3-2, numerous local, State, and Federal agencies currently regulate activities with potential impacts to groundwater quality and enforce monitoring and remediation requirements.

The Authority has discussed the issue of managing groundwater protection and contamination programs in Eastern San Joaquin County. A major concern of the Authority is that undertaking regulatory oversight will only duplicate the existing efforts of other regulatory agencies while financially burdening the community beyond its abilities. Increased coordination with regulatory agencies and a concerted effort to ensure its activities do not degrade water quality is potentially less resource intensive for the Authority and a more efficient method of protecting groundwater quality throughout the Basin. The Authority will continue to lead the pursuit against saline groundwater intrusion.

The following policies reflect the Authority's desire to address groundwater contamination and groundwater quality degradation:

1. Coordinate with local, State, and Federal agencies to ensure the underlying Basin is adequately protected against groundwater contamination and to ensure all contaminated sites are documented and mitigated by the responsible parties.

2. Continue to manage efforts to combat saline groundwater intrusion.

3. Strive to improve groundwater quality when technically and economically feasible. Authority actions degrading groundwater quality are not acceptable.

4. Require recharge projects to identify and evaluate impacts to groundwater quality and the potential for mobilization of soil and source water contaminants.

5. Consider current and future water quality standards in the planning and design of projects identified in this Plan.

Table 4-2 Local, State, and Federal Regulatory Agencies Involved in Groundwater Quality Protection and Remediation

	Agency	Well Standards	Direct Groundwater Recharge	Land Fills	Pesticide Use	Ag/Urban Runoff	Database	Underground Storage Tanks	Water Quality Standards	Groundwater Remediation	Standardized Laboratory Analysis	Groundwater Monitoring and Science
Local	San Joaquin County - Environmental Health	X	X	X			X	X		X		
	Local Solid Waste Agencies			X						X		
	San Joaquin County - Agricultural Commissioner		X		X	X	X					
State	Department of Water Resources	X	X				X		X			X
	State Water Resources Control Board		X	X	X	X	X	X	X	X		
	Central Valley Regional Water Quality Control Board		X	X	X	X	X	X	X	X		
	Integrated Waste Management Board			X						X		
	Department of Pesticide Regulation		X		X	X	X					
	Department of Health Services		X						X		X	
Federal	Environmental Protection Agency		X	X	X	X	X	X	X	X	X	X
	US Geological Survey	X	X							X		X

5 Groundwater Monitoring Program

Marked changes in groundwater levels and groundwater quality during the 1960's prompted the DWR to initiate a groundwater investigation in Eastern San Joaquin County. Completed in 1967, DWR Bulletin No. 146 San Joaquin County Groundwater Investigation recommended that a groundwater monitoring program be established to track changes throughout the Basin. In the fall of 1971, the San Joaquin County Flood Control and Water Conservation District (County) initiated the collection and management of groundwater data and the production of semi-annual groundwater reports.

In December of 2000, Montgomery Watson Harza (MWH) performed an evaluation of the County's groundwater monitoring program and recommended improvements to better assess groundwater level conditions and saline intrusion and to develop measurement and sample collection protocols. Since that time the County has continued to implement the recommendations of the evaluation and will work closely with and meet the monitoring needs of the Authority.

5.1 Current Groundwater Monitoring Program

The current groundwater level monitoring program includes semi-annual groundwater level measurements of over 550 wells (exact number varies from year to year) of which approximately 300 are measured by County staff. Water level measurements are taken in October and April in order to capture groundwater levels after and before peak groundwater pumping occurs. According to the MWH evaluation, both the frequency of measurement and the spatial adequacy of the monitoring well network are sufficient to determine regional groundwater trends throughout the Basin.

The data collected is stored electronically in a database for further analysis. DWR posts a portion of the data on the internet at http://wdl.water.ca.gov/gw/admin/main_menu_gw.asp. In 2003, San Joaquin County Public Works Staff, in conjunction with Kennedy/Jenks Consultants, reformatted the database to facilitate advanced analysis of groundwater data in a Geographic Information System (GIS). Future upgrades include electronic data collection and the availability of the groundwater database and analysis capabilities over the internet.

As documented in Section 2, saline intrusion from the west threatens the health of the underlying Basin. The County supports a limited effort groundwater monitoring program which includes the annual groundwater quality sampling of approximately 40 municipal and domestic supply wells (exact number varies from year to year) measured by County staff or obtained from the various urban water purveyors. The analysis typically includes chloride, electrical conductivity (EC) and total dissolved solids (TDS). Water quality sampling occurs in October when chloride levels are generally highest during the year. According to the MWH evaluation, the spatial adequacy of the monitoring well network is not sufficient to determine the source, aerial and vertical extent, and the rate of migration of saline groundwater. The data collected is stored electronically in a database for further analysis.

5.1.1 San Joaquin County Groundwater Data Center

The San Joaquin County Groundwater Data Center (GDC) is a Countywide centralized interactive groundwater information vehicle that provides access to groundwater data collected and shared by agencies throughout San Joaquin County. Over half of the water used in San Joaquin County comes from groundwater. It is vital that we protect and ensure the long-term health and sustainability of the underlying groundwater basin. The San Joaquin County GDC is the foundation for Countywide groundwater management efforts pursued by its water interests.

The GDC is essential to the groundwater management activities of the County. Currently, there is no centralized groundwater information source for San Joaquin County. Monitoring efforts undertaken by the San Joaquin County Flood Control and Water Conservation District (SJCFC&WCD), the San Luis and Delta-Mendota Water Authority (SLDMWA), the Northeastern San Joaquin County Groundwater Banking Authority (GBA), and other individual agencies and water districts generate data that reside in separate databases. The GDC would become the repository for groundwater data and would facilitate groundwater analysis essential to the groundwater management objectives of San Joaquin County. The GDC is not only a technical tool, but a public outreach tool as well. Through the internet, water users including County and agency staff, industry professionals, decision makers, and the general public will have access to groundwater data and historic semi-annual reports. Additionally, the concept of the GDC will extend into ongoing groundwater programs including the joint GBA/DWR/USGS Groundwater Recharge and Salinity Study and the Farmington Recharge Program.

Over the next 20-30 years, hundreds of millions of dollars will be invested for the management of groundwater in San Joaquin County. Water demand projections, basin health, and groundwater management effectiveness is based on groundwater data. The GDC is also a commitment to the development of a comprehensive quality assurance and quality control plan (QA/QC) that increases confidence in the quality and reliability of groundwater data.

The overall goals and objectives of the GDC are:

1. Create and maintain a working groundwater database for San Joaquin County.
2. Develop the tools necessary to analyze groundwater data.
3. Make groundwater information available to decision makers, agency staff, and the general public through the internet.
4. Create an efficient and enforceable QA/QC plan.
5. Utilize the proven and supported technologies in groundwater monitoring, database management, and Geographic Information Systems (GIS).

GDC Features:

1. *Create and maintain a working groundwater database for San Joaquin County.*

   The backbone of the GDC is the groundwater database. From the database, groundwater information can be queried and exported to groundwater analysis programs and applications. The groundwater database should have the following characteristics:

   - Secure from inadvertent or malicious deletions or manipulations
   - Efficiently designed to limit extraneous information
   - Expandable to include additional water quality fields, geologic data, well construction information, etc.
   - Portable data entry forms
   - Maintainable by existing staff with intermediate level database expertise

2. *Develop the tools necessary to analyze groundwater data.*

   GIS applications used to perform groundwater analysis are increasingly powerful. ESRI, the leader in GIS technology, has developed proven GIS tools that are capable of performing the following:

   - Groundwater level and water quality contouring
   - 3-D visualization of groundwater characteristics
   - Geospatial report generation
   - Relational data analysis

3. *Make groundwater information available to decision makers, agency staff, and the general public through the internet.*

   GIS is now available via the internet. Users will be able to access the database through the internet and will be able to query selected well data and view graphical representations of groundwater conditions. This eliminates the need for users to be trained in GIS and also the associated software license costs. The following is a list of on-line features:
   - Downloadable historic semi-annual groundwater reports
   - Graphical user interface (GUI)
   - County base map with crop information, well locations, agency boundaries, recharge areas, well fields, water level contours, etc.
   - Data query and download into MS Excel or HTML

4. *Create an efficient and enforceable QA/QC plan:*

   To effectively manage groundwater, decision makers need to know what is physically going on in the sub-surface. Over the next 20-30 years, San Joaquin County will invest hundreds of millions of dollars for projects in restoring and protecting the underlying groundwater basin. Therefore, confidence in the integrity and accuracy of groundwater data is of utmost importance. Also, State law mandates that agencies adopt groundwater monitoring protocols for quality assurance and quality control (QA/QC). By eliminating manual data entry through electronic data logging and utilizing advances in portable Global Positioning Systems, we can reduce human errors, create a monitoring system with quality assurance tests, and minimize labor costs associated with data entry and database correction. The new QA/QC plan will include:

   - Electronic data logging using Palm Pilots
   - Electronic data upload to database
   - Remote database entry forms
   - Location checks using hand-held GPS units
   - Telemetry and remote data logging
   - Monitoring protocols
   - Sampling techniques
   - Acceptable laboratory methods
   - Health and safety
   - Database security

5. *Utilize proven and supported technologies in groundwater monitoring, database management, and Geographic Information System (GIS).*

   Proven software and hardware technologies continue to redefine the field of environmental monitoring. The following applications will power the GDC:

   - ArcView 3.x/8.x
   - ArcView Spatial Analyst
   - ArcView 3-D Analyst
   - ArcPad
   - ArcIMS Application
   - Dedicated Server
   - ArcInfo
   - MS Access
   - MS SQL Server
   - Pendragon Forms
   - Personal Data Assistant (PDA)
   - Global Positioning System (GPS)

The GDC is expected to be publicly available in 2005.

5.1.2 Status of Monitoring Network Enhancements

As part of the monitoring program evaluation, MWH recommended that the depth specific monitoring well clusters be installed along the estimated saline front to capture better the geologic factors and physical flow driving saline intrusion. The report envisioned five general locations along Interstate 5 from North Stockton to the Lathrop and Manteca. Of the 5 recommended well clusters, two have been installed by the DWR at the Swenson Golf Course and the Sperry Road/McKinley Avenue stormwater detention basin in the City of Stockton. The County and the DWR continue to coordinate monitoring and installation efforts.

5.1.3 USGS and DWR Partnership

The Authority and its member agencies are co-participants with the United States Geological Survey (USGS) and DWR for the Groundwater Recharge and Distribution of High-Chloride Groundwater from Wells Study (Study). The purpose of the Study is to quantify the source, aerial extent, and vertical distribution of high-chloride groundwater and the sources, distributions, and rates of recharge to aquifers along selected flow paths in Eastern San Joaquin County. The information gained from the Study will answer many questions with respect to future water levels, water quality, and storage potential under current and future management of the Basin.

Historically, high-chloride groundwater along the San Joaquin River boundary of the Eastern San Joaquin Sub-basin (Basin) has been defined by interpolating the 300 mg/L isochlor based on limited groundwater quality data. Samples have measured in excess of 2,000 mg/L chloride. Consequently, the aerial and vertical distribution of high-chloride groundwater is poorly defined and the source of the high-chloride groundwater is unknown. Postulates on the origins of high-chloride groundwater include the accretion of poor-quality water from the San Joaquin River, incidental recharge of applied irrigation water and return flow, and upwelling of groundwater from beneath the base of freshwater. Also, local efforts to augment the natural recharge rate are ongoing; however, the cumulative effect of ongoing groundwater recharge projects on water levels and water quality in aquifers is unknown. The scope of Study is explained in detail below.

1. Assembly and review of existing geologic, hydrologic, and water-quality data
Existing well logs, groundwater level, and groundwater quality data will be compiled and assembled into a GIS database. The GIS database will be used, updated, and revised throughout the study and will be the basis for a 3-D visualization. The GIS database will be used to evaluate the aerial extent of high-chloride water, and to draw geologic sections through the study area that define the aerial and vertical extent of aquifer deposits along three selected flow paths from sources of recharge to discharge areas near the delta. The aerial extent of high-chloride water and the geologic sections will be used to define data gaps that guide test-drilling and installation of observation wells. Existing water-quality data in the area of high-chloride water and along the three study flow paths will be used to define the quality of native ground water and its geochemical evolution prior to collection of new data.

2. Collection of geochemical and geophysical data
Water chemistry data will be collected from up to 60 existing production and the 12 observation wells installed as part of this study. The data will be used to define the source, movement, and age of water from wells and the aerial and vertical extent and source of high-chloride water to wells along the three study flow paths. Samples will be analyzed for major ions, nutrients, selected trace elements, and stable oxygen and hydrogen isotopes.

Selected trace elements including bromide, iodide, boron, and barium will be used in conjunction with chloride data to determine the source of high-chloride water in wells. The stable isotopic composition of water from wells also will be used to determine the hydrologic and evaporative history of the Basin. Selected samples will be analyzed for tritium, carbon-14, and carbon-13 to determine the age of groundwater. Selected samples will also be analyzed for noble gasses to determine the recharge mechanism as either focused recharge from stream infiltration or aerial recharge from precipitation or irrigation return.

Electromagnetic logs will be collected from existing observation wells and at the multiple-well sites drilled as part of this study. The logs will be used to determine if saline water is present at depths not sampled by well screens. Sequential logs done annually as part of this study will be used to determine if chloride concentrations are increasing at depths where screens are not located.

Well-bore flow and depth-dependent water quality data (Izbicki and others, 1996) will be collected from selected production wells to determine at what depths high-chloride water enters the well under pumping conditions. Water movement through selected abandoned wells will be measured using low-flow current meters (such as an electromagnetic or heat-pulse current meter) to determine the direction and rate of water movement through the well casing under non-pumping conditions.

3. Test drilling and well installation
Three multiple-well sites, each containing three to four 2-inch diameter wells, will be drilled along one study flow path. The wells will define movement of recharge water laterally and vertically through the flow system. Deeper wells at each site will define potential high-chloride source water from underlying bedrock. Similarly, shallower wells at each site will define potential high-chloride source water from irrigation return and, at the down gradient site, brackish water from delta sediments.

4. Telemetry

Selected wells (as many as 10) will be instrumented to provide real-time water-level data and potentially water-quality data (such as pH and specific conductance). Data will be output through satellites using the Geostationary Observational Environmental System (GOES) and uploaded to the Automatic Data Acquisition System (ADAPS) on California District computers. Graphical and tabular data will be available in near-real time through the Internet. Where available the data also will be output through local Supervisory Control and Data Acquisition (SCADA) systems. Equipment will be calibrated and serviced at 15-week intervals by U.S. Geological Survey personnel.

5. 3-D Visualization

Spatial data will be stored in a GIS which will be the basis of a 3-D visualization of the ground water flow system using Earth Vision computer software. The visualization will incorporate hydrogeologic units and spatially connect data in the area of high-chloride water and along study flow paths. The visualization will be a tool to evaluate data uncertainty and illustrate the effects of aquifer hydraulic properties and ground-water flow on the movement of high-chloride water toward wells.

6. Data Interpretation and Report Preparation

Sources of high-chloride water to wells will be determined primarily from trace-element to chloride ratios and further refine by ^{18}O and Deuterium analysis. Results will be compared to similar data collected in coastal aquifers elsewhere in California. The recharge temperature and tritium/helium-3 age of younger ground water will be estimated using the computer program NOBLEGAS. Recharge temperature will be used to evaluate focused sources (such as infiltration from stream flow) and diffuse sources (such as infiltration of precipitation, and irrigation return) of ground-water recharge. Changes in ground water chemistry and the age of older ground water interpreted from carbon-14 data will be evaluated along selected flow paths using the computer program NETPATH.

Interim papers describing the source of high-chloride water to wells and the movement and age of water from wells will be published during the course of the study. Annual progress meetings with cooperators and stakeholders will be held. A final report integrating information from all aspects of the study including data review, well installation, data collection, telemetry, and 3-D visualization will commence at the end of the Study.

7. Project Costs

The total cost of the study is $2,579,350. The proposed USGS contribution will be $625,000 over 5 fiscal years as well as an additional $625,000 from the DWR over the first 3 fiscal years. Member agencies within the Authority will contribute the remaining $1,322,350 over next 5 fiscal years.

5.2 Monitoring Protocols

In order to ensure that groundwater data is collected in a systematic and consistent manner, the Authority has adopted the Groundwater Monitoring Program Quality Assurance/Quality Control (QA/QC) Plan, prepared by MWH in 1998. The QA/QC Plan addresses the following items: monitoring and sampling preparations, sample collection procedures, chain-of-custody procedures, sample transport, laboratory procedures and methods, and data validation and reporting. The QA/QC Plan can be obtained at the San Joaquin County Department of Public Works Stormwater Management Division. The revised QA/QC plan proposed as part of the GDC is expected to be completed by the spring of 2005.

6 Financing Options

The development of new water supplies and the necessary infrastructure is a major financial undertaking. It is absolutely necessary for the Authority and its member agencies to leverage as much support for outside funding. The following section is intended to provide stakeholders with a general overview of the potential funding sources, programs, and project partnerships available to the Authority.

6.1 Funding Sources

6.1.1 Federal Funding

Federal funds can be made available to the Authority and its member agencies through a variety of mechanisms including, but not limited to, subsidies, appropriations, in-kind services, grants, loans and cost-sharing agreements. Securing these funds is accomplished through the following processes.

Legislative Approach - Federal funding can be secured through the legislative process to directly fund an approved project. This approach is initiated by a request by the Authority to a local congressional representative. The project may require the establishment of Federal interest through an act of Congress and funded in subsequent years (e.g. Farmington Program). If, however, the project is consistent with the goals and objectives of an existing Federal program, an appropriation can be made that same year (e.g. MORE WATER Project). Competition for funds through Congress is fierce and will require the broad support of local, regional, and State interests.

Federal Agency Interest - Funding can also be secured for projects directly from Federal agencies. Local projects, consistent with the goals and objectives of an agency, are eligible for funds and in-kind services through directed actions and partnerships (e.g. Joint USGS/DWR/Authority Groundwater Recharge and Distribution of High-Chloride Groundwater from Wells Study). Federal agencies commit to projects during their respective internal budgeting processes and have the flexibility to disperse funding over several years.

Federal Assistance Programs - Finally, a third option is to apply for project funding under an existing grant, loan, or assistance program administered by any of the various Federal agencies. Potential partnering agencies include the USBR, Environmental Protection Agency (EPA), USACE, United States Department of Agriculture (USDA), National Fish and Wildlife Service (NFWS), and the National Oceanic and Atmospheric Administration (NOAA). Eligibility, cost sharing, and application requirements vary between the programs.

6.1.2 State Funding

State funds are similar to Federal funds in that they can also be secured through the legislative process, state agency interest, and through competitive grants and assistance programs. The availability of State funds for water resources projects is a reflection of the current fiscal climate and can vary significantly. Voter approval of Proposition 50, the $3.4 Billion Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002, is expected to carry many of the water resources development programs of interest to the Authority for the next few fiscal years including CALFED, Integrated Storage Investigations, and other groundwater recharge construction grants and loans.

Legislative Approach – Although the dollar amounts available from the State are usually not as substantial as Federal, the State process can be somewhat more streamlined than the

Federal approach. Appropriating funds through the State legislature is extremely competitive and subject to the State budget climate.

State Agency Interest – Discretionary funds may be available in the form of directed action assistance or in-kind services. Partnerships with the agencies such as the DWR Division of Planning and Local Assistance (DPLA) and CALFED may yield monies and services to projects (e.g. Joint USGS/DWR/Authority Groundwater Recharge and Distribution of High-Chloride Groundwater from Wells Study).

State Assistance Programs - Finally, a third option is to apply for project funding under an existing grant, low interest loan or assistance program administered by any of the various State agencies. Under Proposition 13, the Safe Drinking Water, Clean Water, Watershed Protection, and Flood Protection Act of 2000, approximately $200 million statewide for groundwater management and recharge projects were provided through the DWR DPLA. Similarly, Proposition 13 provided a major source of funding for the CALFED Bay-Delta Program and other such programs administered by SWRCB. Most recently, voters approved the $3.44 Billion Proposition 50, the Water Quality, Supply and Safe Drinking Water Projects, Coastal Wetlands Purchase and Protection Act of 2002. Proposition 50 is expected to provide similar funding opportunities for the next few years.

6.1.3 Local Funding

Local funds are available from a variety of sources including general funds, water rates, developer fees, connection fees, capital improvement programs, acreage or *ad valorem* assessments, and taxes. Local funds can be raised by individual agencies and districts or through more regional efforts such as the San Joaquin Council of Governments (SJCOG). The implementation of assessments and taxes is subject to Proposition 218 voting requirements. The Authority member agencies have the power to issue bonds for capital projects separately or jointly as the Authority. The following sections briefly explore the revenue generating mechanisms available for bond repayment and annual operations and maintenance costs.

Assessments – The Authority has the power to implement a number of funding mechanisms available including the exercise of provisions set forth in Water Code Sections 10750 *et. seq.* Upon adoption of the Plan, the Authority could choose to equitably assess parcels within the GMA for the purpose of implementing the Plan subject to a Proposition 218 vote. The Authority does not have a time table by which this particular funding mechanism will be exercised. In addition, benefit assessments consistent with the existing statutory authorities of the member agencies could be used to generate revenues.

Sales Tax – Local sales tax measures such as Measure K, the ½ % regional transportation sales tax initiative, could be pursued by the Authority for the implementation of the Plan. The Authority or a similar broad stakeholder based Authority is necessary to garner the support of the voters. Through 2011, over its 20 year life span, Measure K is expected to generate over $750 million.

Water Service Fees – The Authority or its member agencies could revise or formulate a fee structure for the water served either at the wholesale or retail level. Revenue generated could be directed towards the debt service of capital projects or for the implementation of the Plan.

Developer Fees – Mitigation fees paid by new urban developments are currently collected by cities and counties. Specifically, a Water Impact Mitigation Fee is collected per new residential building permit within a defined area to finance capital repayment of bonds used to construct the

Goodwin Tunnel Project and the New Melones Conveyance Project. Similar development fee structures could be developed by the member agencies of the Authority to ensure that urban growth is apportioned their fair share for future water resources in Eastern San Joaquin County.

Groundwater Banking and Transfer – Enormous opportunity exists for the utilization of the underground storage potential of the underlying Basin estimated at 1.2 – 1.5 million acre-feet. To regional and Statewide interests, the benefits of a conjunctive use program involving over a million acre-feet of underground storage is undeniable. Constructing and financing the infrastructure necessary to accommodate a groundwater bank of this magnitude will require several sources of funding for capital recovery, operations and maintenance, and mitigation. The evolving California water market could potentially enable Eastern San Joaquin County to provide economic alternatives to regional and statewide water interests while also concurrently meeting the Basin Management Objectives. The San Joaquin County Groundwater Export Ordinance currently protects Basin users from the potential ill-effects of export, however the San Joaquin County Board of Supervisors are amenable to proposed amendments made by Basin stakeholders and banking partners.

7 Plan Governance

Water interests in San Joaquin County have historically been fragmented, but have realized that projects developed in a collaborative process have the potential to exhibit greater and more far reaching benefits to all involved parties while increasing its implementability and fundability. Implementation of the water management options can best be achieved by continuing to work in a collaborative fashion to develop a broad base of political and financial support. Currently, the powers and term of the Authority are limited thus, if the Authority member agencies decide that the Authority should implement the Plan, then additional powers are necessary. The Authority has explored numerous options concerning the appropriate organization and powers needed to implement the plan and the best management framework that addresses the concerns of the Authority member agencies.

7.1 Member Agency Concerns

Throughout the development of the Plan, the Stakeholder group voiced their concerns over the purpose and need for a new or expanded Authority. The following concerns are presented as follows:

- Does the purpose, goals, and objectives of the current Authority provide for the implementation of the Authority Plan?
- What powers are necessary for the implementation of the Authority Plan?
- Does expanding the powers of the Authority threaten projects previously set in motion by individual agencies or smaller partnerships?
- How will stakeholders be represented in the new Authority?
- How can we engage all Basin stakeholders including those who showed no interest in participating in the past?
- How do we include Cal Water in a Joint Powers Authority?
- How will individuals and special interest groups be allowed to participate?
- How will the Authority relate to other groundwater management efforts in San Joaquin County (e.g. San Joaquin County Groundwater Export Ordinance, Mokelumne River Water and Power Authority – MORE WATER Project, Eastern Water Alliance – SEWD, NSJWCD, & CSJWCD)
- How will the Authority coordinate with Basin neighbors outside of the Groundwater Management Area?
- How will the new Authority be funded?
- Should the Authority be allowed to construct projects or should the member agencies be the ones to construct projects?
- Should votes be weighed by acreage, water use, monetary contribution, or not weighted at all?

With the above concerns in mind, the Authority is currently exploring a number of potential governance models suitable for the unique situation in Eastern San Joaquin County.

7.2 Organizational Structures

Organized stakeholder groups come in all shapes and sizes and hold varying degrees of authority and powers. The form of a stakeholder group is entirely dependant on its function or activities. Stakeholders can be coordinated under one of various organizational structures for representation, including 1) Joint powers agreement (JPA), 2) Memorandum of understanding, 3) various types of water districts (e.g., water replenishment district, water conservation district). The following subsections discuss each type of organizational structure in more detail.

7.2.1 Joint Powers Agreement

Pursuant to Government Code Section 6500 *et. seq.*, two or more public agencies may enter into a joint powers agreement for the purpose of exercising those powers common to each of the member agencies. Powers include but are not limited to: execution of contracts; employment of staff; issuance of bonds, acquisition of property, construction, operation and maintenance of facilities, and incurrence of debt. JPAs have the authority to prepare, adopt, and implement groundwater management plans developed pursuant to Water Code section 10750 *et. seq.* JPAs may also seek additional powers through the legislature.

Case Study: San Joaquin Council of Governments – The San Joaquin Council of Governments (SJCOG) is a joint powers authority comprised of the County of San Joaquin and the Cities of Stockton, Lodi, Manteca, Tracy, Ripon, Escalon and Lathrop. SJCOG serves as the regional transportation planning agency for San Joaquin County. SJCOG also analyzes population statistics, airport land use, habitat and open space planning, and other regional issues. SJCOG fosters intergovernmental and public coordination within San Joaquin County, in neighboring jurisdictions, and with other various State and federal agencies.

Measure K, the half-cent sales tax measure passed in 1990 for San Joaquin County, is administered by SJCOG and overseen by its Board of Directors. The SJCOG Board of Directors consists of one voting member from each of the member agencies and an additional member from San Joaquin County. Over the twenty-year life of Measure K, an estimated $750,000,000 will have been generated for regional transportation projects.

7.2.2 Memorandum of Understanding

A memorandum of understanding (MOU) is a somewhat more flexible organizational structure that allows signatory agencies to pursue a common purpose or goals. The organization formed by the MOU cannot directly enter into any contracts, incur debt, or employ staff directly. An organization formed under an MOU is adequate for consensus building and facilitation.

Case Study: : The Butte Basin Water Users Association - The Butte Basin Water Users Association in Butte County is an example of a group formed under an MOU who share common interests. In response to water management challenges encountered during consecutive drought years through the mid-1990's, agricultural and urban water purveyors organized themselves to combine financial and technical resources to better understand and manage the surface water and groundwater resources. In addition to promoting improved water management by individual agencies through the collective sharing of information, the organization was able to demonstrate broad local support for their efforts.

7.2.3 Various Types of Water Districts

The State of California recognizes the formal organization of various water districts as political subdivisions of the State. Examples of water districts include County water agencies, County water districts, resource conservation districts, water districts, water conservation districts, irrigation districts, water storage districts and water replenishment districts. In addition, specific legislation may also be sought to create a special district or to enhance its powers. Many of the individual entities represented on the water management plan stakeholder committee have utilized one of these acts as the basis for their organizational structure. Stakeholders may chose to annex adjacent lands, organize as a new special water district, or be incorporated into an existing district to exercise its powers. Additionally, a specific benefit zone can be created under the San Joaquin County Flood Control and Water Conservation District for the purpose of implementing a groundwater management program in Eastern San Joaquin County.

7.3 Management Framework Models

A Management framework model is a depiction of the relationship between the basin stakeholders, Authority, Groundwater Management Plan, and the Groundwater Export Ordinance. The following management framework models are depicted below.

7.3.1 Individual Interest-based

Depicted in Figure 7-1, an individual interest-based management framework reflects a philosophy whereby stakeholders would govern and develop water resources projects individually. Historically, this has been the approach to groundwater management and water resources development in San Joaquin County.

In the individual interest-based model, water districts, cities, and other mutual partnerships are free to develop and implement projects independently. Input from the public and comments from other affected agencies are dealt with during regular or mandated outreach opportunities or progress meetings. Individual entities may choose to develop projects pursuant to a regional groundwater management plan. However, project decision-making authority would remain exclusively within the jurisdiction of the entity sponsoring the project. Fund raising would also be the sole responsibility of the sponsoring entity.

The individual interest-based management approach allows agencies to focus their resources on projects specific to its needs; however, this approach may hinder the ability for agencies to coordinate project development in order to best meet the needs of the involved agencies and the region. Competition for State and federal funding is also an issue as projects demonstrating broad benefits to multiple agencies are given funding priority over narrowly scoped projects developed by individual entities.

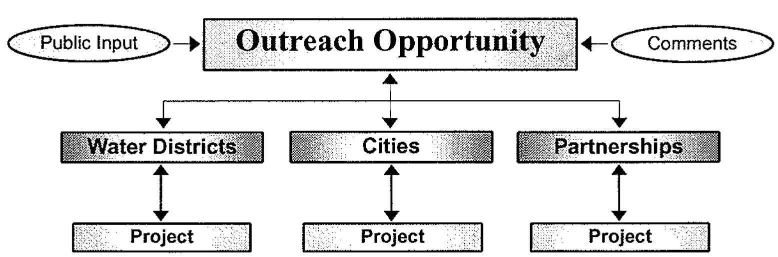


Figure 7-1 Individual Interest-based Model

7.3.2 Mutual Interest-based

The mutual interest-based model reflects a governance framework that creates a stakeholder group of common interests with the powers to undertake specific goals and objectives. The current Authority structure is a form of the mutual interest based approach. A stakeholder group such as a JPA or coalition, represented by individual agencies overlying the Basin, would be responsible for providing a consensus based forum in which projects can be developed by Basin stakeholders in a manner that maximizes benefits to all involved parties and the region as a whole. Projects developed with input from the stakeholder group would ensure consistency with the Plan.

The distinct advantage to this approach is the benefit of regionalism. Broad based support for a project is a deterrent to litigation, protest, and opposition. In addition, regional projects are more competitive in the funding arena both at the State and federal levels. A potentially negative aspect of this management framework is the perceived loss of control over a project. Nonetheless, a project will be weighed and measured on its merits and its fate decided on by its constituents. It is highly unlikely that a mediocre project without broad based consensus will survive an onslaught of political, legal, and regulatory challenges.

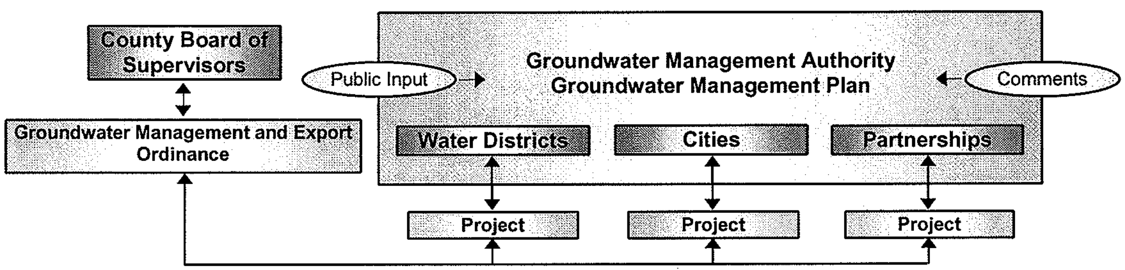


Figure 7-2 Mutual Interest-based Model

Presented in Figure 7-2 is an example of a mutual interest-based governance framework in the context of the current Authority governance structure and groundwater management efforts. The Authority is a forum for its member agencies to develop groundwater recharge and banking projects and programs. The forum creates accountability for its member agencies to health of the underlying Basin. Development within the Authority ensures that projects are consistent with the Basin Management Objectives developed in this Plan to sustain the health of the Basin. The Authority would not be governed by the County Board of Supervisors, however, as currently structured, should a Groundwater Export Permit be necessary for an export project, Board of Supervisor approval would be required. The Board of Supervisors of San Joaquin County would remain a member agency of the Authority.

7.4 Dispute Resolution

The Authority has served as a regional planning body and a forum for member agencies to share their groundwater management efforts and ensure that those efforts do not detrimentally affect other member agencies. In order to avoid potential conflicts between Basin stakeholders, the Authority employs the following:

- **Expanded Membership:** Authority membership is diverse as are the myriad of water challenges and issues facing Eastern San Joaquin County. In 2001, the Central Delta Water Agency and the South Delta Water Agency became full contributing and voting member agencies to the Authority. In 2004, amendments to the Authority JPA included language to include California Water Service Company as an appointed voting member to the Authority Board of Directors. Associate membership (ex-officio) was also extended to the San Joaquin Farm Bureau Federation as their input and support is essential to the success of the Authority. Other members have been contemplated such as SSJID, OID, City of Lathrop, Manteca, Escalon, and Ripon, Calaveras County Water District, Stanislaus County, DWR, Freeport Regional Water Authority, and EBMUD.

- **Continued Use of the Authority as a Forum:** As the Authority looks to implement the Plan, the member agencies will move the outlined projects through the planning, permitting, and design stages and ultimately to construction. In a forum, implementing member agencies will be able to quantify the benefits of its projects to stakeholders and receive comments and suggestions before disputes arise.

- **Continued Facilitation by the California Center for Collaborative Policy:** The California Center for Collaborative Policy (Center) has been an integral part to the success of the Authority's consensus based process. The Center's presence has maintained an atmosphere conducive to openness, compromise, and agreement. It is expected that the Center will continue to facilitate Authority meetings and throughout the implementation of the Plan.

8 Integrated Conjunctive Use Program

The following section describes the options available to the Authority in the development of an Integrated Conjunctive Use Program. The Conjunctive Use Program is the key element in fulfilling the purpose of the Plan to ensure the sustainability of Groundwater resources in Eastern San Joaquin County. For organizational purpose, project options are grouped into water supply elements by source, surface water storage and major conveyance projects, and groundwater recharge components by program or entity.

8.1 Supply Elements

Supply elements are grouped by river system and are a combination of reallocations, new water, and transfers. Entitlements to water are supported by legal claims based on existing water right permits, water service contracts and agreements, and pending water right applications. A map of the waterways discussed can be seen in Figure 8-1.

8.1.1 Stanislaus River

As listed in Table 2-5, Stanislaus River supplies are available to the SSJID and OID via pre-1914 water rights and to the Stockton East Water District and Central San Joaquin Water Conservation District through Central Valley Project (CVP) contracts. SSJID and OID are senior water right holders to 600,000 af per year from the yield of New Melones Reservoir, 320,000 af of which are used directly in the GMA. SEWD and CSJWCD hold junior contracts for a total of 155,000 af subject to other users requirements.

The Stanislaus River watershed consists of approximately 904 square miles with an annual average runoff of approximately 1 million af. The majority of the runoff occurs from November to July and peaks during the summer months when snow melt is greatest. More than half the runoff is snowmelt-derived (USBR, Website, updated). The USACE constructed New Melones Dam on the Stanislaus River in 1978, replacing the original Old Melones Dam constructed in 1924 jointly by OID and SSJID. New Melones Reservoir has a capacity of 2.4 million af and is operated as part of the CVP under the USBR's Interim Operations Plan. The average annual runoff at New Melones for the 74 years from 1904 to 1977 was 1.12 million af.

Urban growth in South San Joaquin County in the Cities of Lathrop, Manteca, Escalon and Ripon and the increased irrigation efficiencies made over the years have made water available for transfer by SSJID and OID. Beginning in 2005, SSJID will serve the urban communities of Escalon, Manteca, Lathrop, and Tracy with surplus water through the South County Surface Water Supply Project. SSJID and OID also currently make available to SEWD up to 30,000 af/yr through the New Melones Conveyance System specifically for urban use as part of a 10-year water transfer agreement which expires in 2009. The agreement is renewable pending future water availability and negotiation. SSJID and OID have also made on occasion water available to CSJWCD for irrigation.

In 1978, New Melones Dam was completed and the reservoir was filled. At the time of development and construction of New Melones, the expected yield of the project was fully allocated to meet the needs of the contracts in the Eastside Unit of the CVP. SSJID and OID held the most senior of rights and were allocated their full historic diversion amount. CSJWCD executed both a firm and interim CVP contract and SEWD an interim CVP contract; both are junior to other CVP contract for New Melones water. The CVP contracts provide up to 155,000 af per year subject to inflow, storage, and senior requirements. CSJWCD would receive up to 49,000 af of firm yield and an additional 31,000 af when available. SEWD would receive up to 75,000 af when available.

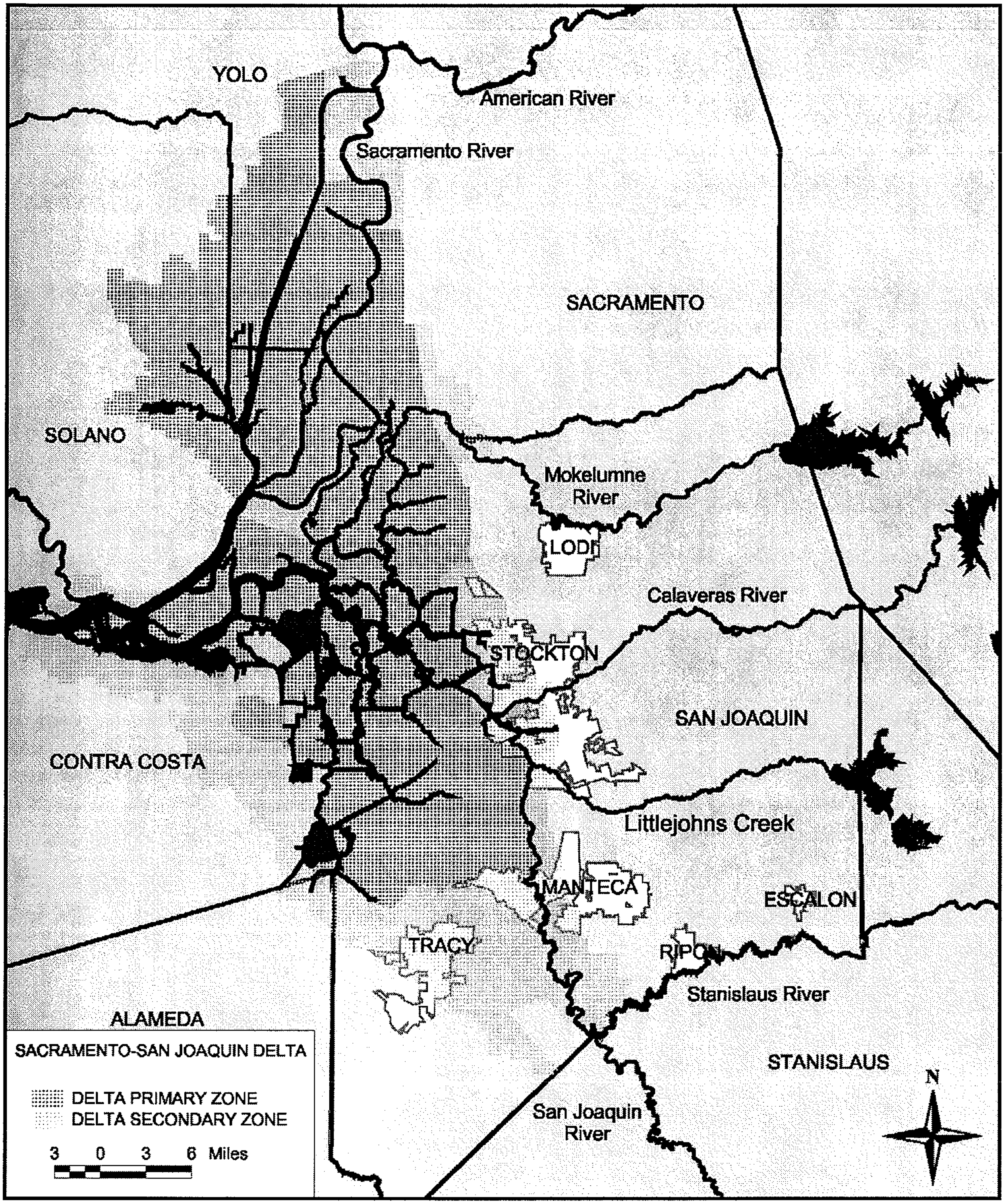


Figure 8-1 Regional Waterways

The severity in the quantity and quality of flow in the San Joaquin River directly affects the operation of New Melones Reservoir. Quality and flow of the San Joaquin River has seriously deteriorated since the completion of the Friant Dam, the Delta Mendota Canal, and California Aqueduct. Inflow to the Delta from the San Joaquin River consists primarily of high saline drainage from farmlands and wetlands in the CVP's Westside service area. As a result, hundreds of thousands of tons of concentrated salt flow into the San Joaquin River each year. The SWRCB established flow and water quality standards on the San Joaquin River near Vernalis and directed the USBR to meet these standards. Consequently, the USBR has elected to meet the Vernalis standards with substantial releases from New Melones Reservoir. These releases for water quality purposes directly reduce the amount of water available for the Stockton East Water District and the Central San Joaquin Water Conservation District under their respective CVP interim contracts. The USBR and the Central Valley Regional Water Quality Control Board have shown little interest in addressing salt drainage or the restoration of flows in the San Joaquin River in a manner that does not harm San Joaquin County interests.

Additionally, the Central Valley Improvement Act of 1992 (CVPIA) required more releases from the CVP for fish and wildlife system wide. The resulting actions have disproportionately affected New Melones Reservoir thus reducing the amount of water available for SEWD and CSJWCD. The USBR has made no real substantial progress towards revising the Interim Operations Plan for New Melones Reservoir, implementing source control programs for salinity in the CVP Westside service area, nor finding alternative sources for meeting the SEWD and CSJWCD water service contracts.

CDWA and SDWA are directly affected by the quantity and quality of flow in the San Joaquin River. CDWA and SDWA have been the lead proponents of alternative means for the USBR to meet the Vernalis flow objective. While CDWA and SDWA recognize the use of New Melones to improve water quantity and flow in the San Joaquin River at Vernalis, it is neither a permanent solution nor a solution that is acceptable economically to San Joaquin County as a whole. San Joaquin County, Delta interests, and Eastern San Joaquin County have been supportive of measures that would restore the San Joaquin River through in-stream releases at Friant Dam, the establishment of water quality and flow standards upstream of Vernalis, and recirculation of Delta exports through the Delta-Mendota Canal and the San Joaquin River. Modeling has shown that any of the above options if implemented would free up water in New Melones for the SEWD/CSJWCD contract entitlements.

8.1.2 Calaveras River

The Calaveras River is the primary surface water supply for the City of Stockton and SEWD. In 1963, the USACE constructed New Hogan Dam for flood control, recreation, and water supply purposes. The Calaveras River watershed consists of 363 square miles and stretches from the Sierra Nevada foothills to San Joaquin River in west Stockton. New Hogan Reservoir is primarily derived from rainfall and has a capacity of 317,000 af. The USACE operates New Hogan when flood control releases are necessary and reserves approximately 165,000 af of reservoir capacity for flood control storage. SEWD operates New Hogan and schedules releases at all other times. By agreement, SEWD is entitled to 56.5% of the yield to New Hogan with the remaining yield reserved for Calaveras County Water District (CCWD). Currently, SEWD utilizes CCWD's unused supply. CCWD currently uses approximately 3,500 af per year and estimates it will use up to 5,300 af per year in 2040; however, growth in Calaveras County could spur interest in expanding use of its New Hogan supply (CCWD, 1996).

8.1.3 Mokelumne River

The Mokelumne River watershed encompasses approximately 660 square miles stretching from the high Sierra Nevadas westward to the Delta. Major facilities located on the Mokelumne are the Salt Springs Reservoir on the North Fork of the Mokelumne and the Pardee and Camanche Reservoirs on the rivers main stem. Salt Springs Reservoir, the largest of seven Pacific Gas & Electric (PG&E) reservoirs (Project 137), was built in 1963 and is operated for hydropower generation. Pardee and Camanche are both owned by EBMUD. Pardee Reservoir, which is upstream from Camanche, has a capacity of 197,950 af and is operated as a water supply reservoir. Reservoir water from Pardee is conveyed by the Mokelumne River Aqueducts to the EBMUD service area some 82 mile away. Camanche Reservoir, with a capacity of 417,120 af, is operated for flood control and also to meet instream flow requirements and down stream entitlements. Snowmelt comprises a large portion of the watersheds runoff. Both Pardee and Camanche generate incidental hydro power at 30 MW and 9.9 MW respectively. (EBMUD, Urban Water Management Plan 2000)

In-stream flow requirements and water rights on the Mokelumne form a complex hierarchy of entitlements. Under the Joint Settlement Agreement on the Lower Mokelumne River Project (JSA), minimum in-stream flows, reservoir pool elevations, and fisheries enhancements are implemented conditional to the FERC Permit of Pardee and Camanche Reservoirs. Subsequently, the D-1641 of the SWRCB reaffirms the validity of the JSA commitment to establishing adequate Bay-Delta flows and water quality. Additionally, provisions in the Lodi Decree protect groundwater levels in the City of Lodi from flow related deficiencies and inadequate groundwater levels. Table 8-1 depicts the target JSA release and in-stream flow requirements.

Table 8-1 Lower Mokelumne In-stream Flow Requirements

Year Type	Requirements (cfs)	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual (af)
Normal	Minimum Camanche Reservoir Release	325	325	325	325	325	325	325	325	325	100	100	100	194,000
Below Normal		250	250	250	250	250	250	250	250	250	100	100	100	154,000
Dry		220	220	220	220	220	220	220	220	100	100	100	100	130,000
Critical		115	130	130	130	130	130	130	100	100	100	100	100	80,000
Normal	Expected Flow below Woodbridge Diversion Dam	100	100	100	100	100	100	150	300	300	25	25	25	86,000
Below Normal		100	100	100	100	100	100	150	200	200	20	20	20	73,000
Dry		80	80	80	80	80	80	150	150	20	20	20	20	52,000
Critical		75	75	75	75	75	75	75	15	15	15	15	15	52,000

Note: Minimum releases from Camanche Reservoir are approximately and should not be used to determine the actual available quantity of water available for new uses on the Mokelumne River.

Source: MORE WATER Project Phase I - Reconnaissance Study Summary Report, 2004

EBMUD must also meet the requirements of both upstream and downstream water right holders. Increasing demands of upstream developments in Alpine, Amador, and Calaveras Counties are recognized by the SWRCB as having priority to Mokelumne River water. Downstream users served by Camanche Reservoir include WID and NSJWCD. WID holds both pre and post-1914 water rights. In years when Mokelumne inflow is greater than 375,000 af, WID is entitled to 60,000 af. When Mokelumne inflow is less that 375,000 af, WID is entitled less than 60,000 af to a minimum of 39,000 af. Through conservation and irrigation efficiency efforts, WID has made 6,000 af per year available to the City of Lodi. Under the agreement, the

City of Lodi will pay WID $200 per af for water delivered by the existing WID canal system. WID will use the proceeds to replace the aging WID Dam. The new WID Dam will allow Lodi Lake to remain full year round thus enabling WID to serve recharge areas during the late fall and winter months. The dam will also feature state of the art fish ladders making it easier for spawning salmon to reach the Fish Hatchery at Camanche Reservoir.

NSJWCD has attempted to acquire a firm supply from the Mokelumne River through the SWRCB, however, in D-858 of 1956, the State Engineer gave priority to EBMUD for Mokelumne River water and cited the Folsom South Canal (FSC) as the preferred surface water supply for NSJWCD. The FSC was planned as part of the Auburn-Folsom South Unit of the CVP for the conveyance of American River Water stored behind Folsom Dam and the proposed Auburn Dam. Auburn Dam and the remaining reaches of the FSC were never completed. The USBR has no plans or intentions to extend the FSC into San Joaquin County to its planned terminus 20 miles southeast of Stockton.

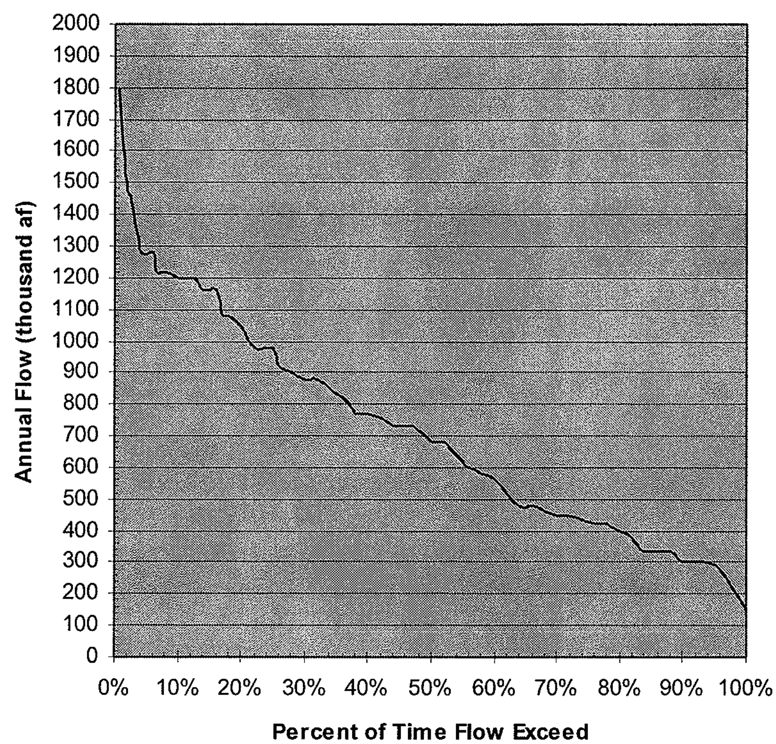
Also in D-858, the State Engineer granted NSJWCD a permit to divert Mokelumne River water from December 1st to July 1st which is surplus to EBMUD's needs until the FSC is completed as envisioned by the CVP or until EBMUD uses its full entitlements. EBMUD has agreed to store up to 20,000 af per year pursuant for NSJWCD subject to inflow and other requirements. The interim nature of the water supply and the extensive use of private groundwater wells have reduced the

Table 8-2 Water Available from the Mokelumne River (af)

Year	Total		Year	Total	
1922	194,274		1961	0	
1923	7,909		1962	0	
1924	0		1963	0	
1925	0		1964	0	
1926	0		1965	316,779	
1927	0		1966	6,968	
1928	0		1967	289,774	
1929	0	13-year Period	1968	0	
1930	0		1969	463,970	
1931	0		1970	209,374	
1932	0		1971	93,591	
1933	0		1972	0	
1934	0		1973	0	
1935	0		1974	272,910	
1936	0		1975	97,983	
1937	19,096		1976	0	
1938	519,170		1977	0	
1939	0		1978	0	
1940	0		1979	0	
1941	119,569		1980	156,188	
1942	274,525		1981	0	
1943	286,933		1982	656,659	
1944	0		1983	1,146,269	
1945	0		1984	380,946	
1946	33,755		1985	4,503	
1947	0		1986	378,552	
1948	0		1987	0	
1949	0		1988	0	
1950	0		1989	0	
1951	453,705		1990	0	8-year Period
1952	603,929		1991	0	
1953	18,421		1992	0	
1954	0		1993	0	
1955	0		1994	0	
1956	341,038		1995	500,787	
1957	0				
1958	322,485		**Minimum:**	**0**	
1959	0		**Maximum:**	**1,146,269**	
1960	0		**Average:**	**43,173**	
Number of diversion years in 74-yr period:				**26**	**(35%)**

Source: MORE WATER Project Phase I – Reconnaissance Study Summary Report, 2004 demand for surface water to less than 3,000 af per year. Water demands in the EBMUD service area are not expected to rise considerably over the next 20 to 40 years. Water for NSJWCD is available from the Mokelumne River in above average and wet years.

Figure 8-2 Mokelume River Flow Duration Curve
Mokelumne River Hill Gage



Additional supply from the Mokelumne River is possible in a major regional conjunctive use project. The Mokelumne River Regional Water Storage and Conjunctive Use Project (MORE WATER Project) is currently being studied by the Mokelumne River Water and Power Authority (MRWPA). In 1990 the MRWPA submitted applications to the SWRCB for unappropriated flood flows on the Mokelumne River from December 1 to June 30. The application seeks to divert up to 1000 cfs to storage and up to 620 cfs for direct use. Historic alternatives for capturing the water include Middle Bar Dam and on-stream reservoir, Duck Creek Reservoir and off-stream diversion, and direct diversions on the Lower Mokelumne River from Camanche Reservoir to Interstate 5. Preliminary studies have shown that substantial 'new water' is available for use in Eastern San Joaquin County; however, the facilities necessary to capture water intermittently are expensive and may remain idle in some years. Table 8-2 depicts the available water from the Mokelumne River surplus to all in-stream and user requirements over the historic 74-year hydrologic record. Based on the historic Mokelumne Hill gage record, there is substantial water available on an interim basis as depicted in Figure 8-2.

8.1.4 Sacramento-San Joaquin Delta

The City of Stockton has long looked to the Sacramento-San Joaquin Delta as a potential source of water to meet long-term needs. In 1996 the City of Stockton submitted an application to the SWRCB seeking an increasing amount of water from 20,000 af initially up to 125,900 af per year. The Delta Water Supply Project seeks to replace existing surface supplies subject to future reductions, protect and restore groundwater levels to within a target safe yield of 0.6 af per acre, and provide a reliable water supply for planned growth outlined in the 1990 City of Stockton General Plan. The basis for the water right is Water Code Section 1485 whereby an agency may appropriate water from the Delta in a like amount to water discharged upstream into the San Joaquin River less any losses and the Area of Origin and Delta Protection Statutes which were enacted to protect against water exports. Any new diversion from the Delta is extremely contentious.

The health of the Delta is also linked to the water supply of Eastern San Joaquin County. Inflow into the Delta from the San Joaquin River is of poor quality and is diluted by higher quality flows from the Sacramento River. A number of Total Maximum Daily Load (TMDL) actions are underway for the San Joaquin River. The Regional Board is required to establish a TMDL load allocation for high priority impaired water bodies under the Federal Clean Water Act. A low dissolved oxygen TMDL is currently being formulated for the Stockton Deepwater Ship Channel which includes effluent from the City of Stockton Regional Water Quality Control Facility (Wastewater Treatment Plant). Additionally, a TMDL for salt and Boron is being formulated to control salt drainage into the San Joaquin River to meet the Vernalis standard. Improvement in delta water quality is the highest priority for both Delta interests and the City of Stockton Diversion Project.

8.1.5 American River

Eastern San Joaquin County has long been promised water from the American River by both the State and Federal Governments. The planned construction of the Auburn Dam, FSC and other smaller regulating reservoirs never came to fruition. The USBR's inaction and the current regulatory restrictions on water resources development have forced Eastern San Joaquin County to weigh other more expensive alternative water sources.

In 1990 San Joaquin County submitted an application to the SWRCB to appropriate wet-year water from either the South Fork of the American River via the completed Auburn-Folsom South Unit of the CVP or from Lake Natomas on the Lower American River. The application requests a diversion of up to 620 cfs between December 1 and June 30 subject to availability of unappropriated flow. The construction of the Auburn Dam, the Countyline and Clay Station Reservoirs, and the extension of the Folsom South Canal into San Joaquin County were never undertaken. In addition Sacramento County and environmental interests have long opposed the substantial delivery of water from Nimbus Dam to the detrimental health of the Lower American River.

In August 2003, San Joaquin County amended its American River application to move and consolidate the points of diversion on the South Fork of the American River and Nimbus Dam to the Sacramento River to coincide with the point of diversion of the Freeport Regional Diversion Project (Freeport Project) at a diversion rate of 350 cfs. In order to maintain the priority filing date, San Joaquin County needed to demonstrate that the amended amount requested at Freeport on the Sacramento River would be available on the South Fork American River. To support the amendment of the water right application, the Authority co-sponsored the San Joaquin County Amended Water Right Application 29657 South Fork American River Water Availability Study (Water Availability Study).

The Water Availability Study explores the hydrologic, regulatory, and water right constraints of the American River System. The Water Availability Study concluded that substantial water is available on the South Fork of the American River and would likewise be available for diversion downstream at Freeport on the Sacramento River in normal and wet years. The Water Availability Study also concluded that the 155 cfs Freeport Project capacity severely limits the amount available to San Joaquin County. By increasing the capacity of the diversion and conveyance elements of the Freeport Project to 350 cfs, the Authority could maximize its use of the American River Water Right Application.

The Water Availability Study concluded that the average annual yield available to San Joaquin County is limited by the physical capacity of the Freeport Project capacity of 155 cfs or approximately 44,000 af per year. An increase in capacity to 286 cfs could potentially increase the average annual yield to 72,000 af per year. In the months of July-November, other supplies available either from the American or Sacramento Rivers through exchanges, transfers, banking partnerships, federal contracts, and additional water right fillings could significantly increase the yield to San Joaquin County. A more detailed description of the Freeport Project is found in Section 8.2.1.

8.2 Surface Storage and Major Conveyance Elements

The water sources described above require substantial investments in storage and conveyance in order to capture and put to beneficial use substantial amounts of water. The following elements are considered major reservoirs or new conveyance facilities. Final use is discussed in Section 8.3.

8.2.1 Freeport Regional Water Project

The Freeport Regional Water Authority (FRWA) was created by exercise of a joint powers agreement between Sacramento County Water Agency (SCWA) and EBMUD. FRWA's basic project purpose is to increase water service reliability for customers, reduce rationing during droughts, and facilitate conjunctive use of surface water and groundwater supplies in central Sacramento County. The Freeport Project will also provide EBMUD with flexibility in the event of an emergency or during Pardee System maintenance. The Freeport Project will provide up to 85 mgd of surface water to SCWA to be used conjunctively with groundwater to meet future supply needs of central Sacramento County and provide up to 100 MGD to EBMUD in dry years.

In 1970, EBMUD entered into a contract with the USBR for delivery of CVP water from the American River to be taken at Nimbus through the FSC to the Mokelumne Aqueduct. Legal challenges by American River interests culminated in the 1990 ruling of Alameda Superior Court Judge Richard Hodge (Hodge Decision). The Hodge Decision conditioned EBMUD's diversion from Nimbus on maintaining minimum in-stream flow requirements on the Lower American River necessary to protect the fishery. EBMUD continued to work with Sacramento County interests on diversion alternatives that could meet the dry year needs of EBMUD, protect and uphold the National Wild and Scenic Rivers designation of the Lower American River, and provide benefits to the region.

In 1993 the Sacramento Area Water Forum (Water Forum), a diverse group of water interests from the business, agricultural, environmental, citizen, and local government communities, began a collaborative process to devise a comprehensive plan to "Provide a reliable and safe water supply for the region's economic health and planned development to the year 2030, and Preserve the fishery, wildlife, recreational, and aesthetic values of the Lower American River." (Water Forum Agreement, 2000) In the context of the Water Forum, EBMUD and Sacramento County successfully developed a project that would move EBMUD's American River Diversion from Nimbus to the Sacramento River near the town of Freeport. In January 2001, EBMUD, Sacramento County interests, and the USBR executed a Memorandum of Agreement to fully explore the engineering feasibility of joint use facilities under the Freeport Project concept.

On July 20, 2001, EBMUD executed an Amendatory Contract with the USBR for water from the American River. Under the terms of the Amendatory Contract, EBMUD is entitled to divert its CVP supply from the Sacramento River only if its March 1st forcast of the expected October 1st total system storage is less than 500,000 af. The Amendatory Contract entitles EBMUD to divert up to 133,000 af in any one year and no more than 165,000 af total in any three-consecutive year period. While the Amendatory Contract allows for the diversion of up to

133,000 af in any one year, the diversion and transmission system is sized to convey no more than 112,000 af annually to the Mokelumne Aqueducts. Hydrologic records predict that the condition is expected to occur in the driest one-third of all years. EBMUD American River entitlements are also subject to curtailments pursuant to CVP drought conditions and regulatory requirements. The Freeport Project concept consists of the following facilities:

- a 185 MGD (286 cfs) intake facility and pumping plant on the Sacramento River near the community of Freeport;
- an 84-inch pipeline to convey water east to an 85 MGD SCWA water treatment plant;
- a 66-inch pipeline from the SCWA turnout east to the existing FSC;
- a 100 MGD (155 cfs) pumping plant near the terminus of the FSC;
- a 100 MGD (155 cfs) 66-inch pipeline from the terminus of the FSC to the Mokelumne Aqueducts; and
- an aqueduct pumping plant and pre-treatment facility near Camanche Reservoir.

The total preliminary cost of the Freeport Project is estimated at $690 million, $439 million of which will be funded by EBMUD (Freeport Regional Water Authority Website, 2004). Additional operations and maintenance costs are estimated to be approximately $130 per af. (Williamson, 2003)

In August 2003, the FRWA released the Freeport Regional Water Project (Freeport) Draft Environmental Impact Report/Environmental Impact Statement DEIR/EIS. The Freeport DEIR/EIS discloses potential environmental impacts of various alternatives to the Freeport Project. The preferred Freeport Project Alternative is depicted in Figure 8-3. The Final EIR/EIS was released in March 2004 and was certified on April 15, 2004. Construction of the intake and EBMUD portion of the Freeport Project is set to begin in 2007 and be completed in 2009 (Freeport Regional Water Authority Website, 2004).

Following the execution of the amendatory contract with the USBR, over 100 agencies served by the State Water Project (SWP) and CVP opposed the concept of EBMUD diverting water from the Delta in dry years. In 2003 State and Federal Contractors agreed to drop all but one suit and have pledged support for the Freeport Project through its construction. The terms of the settlement included provisions to include the EBMUD Amendatory Contract as an export under the Coordinated Operations Agreement. The settlement reduces the water supply impacts to the State and Federal Contractors. A separate settlement with the Santa Clara Valley Water District (SCVWD) would defer 6,500 af of EBMUD's diversion entitlement during the 1st year of a drought. Should the drought continue into a 2nd consecutive year, SCXWD would make available a like amount for EDMUD to divert.

On January 27, 2004, Contra Costa Water District (CCWD) became the last CVP Contractor to settle litigation against the Freeport Project. Under the terms of the settlement, the FRWA would use the joint Freeport project facilities to wheel up to 3,200 af per year under an existing CCWD CVP contract to the Los Vaqueros Reservoir near Brentwood. The settlement terms would offset the effects of lower quality water at the Los Vaqueros Reservoir intake in the Delta in years when EBMUD is diverting through the Freeport Project. The settlement with CCWD is the first allocation of EBMUD's unused capacity in the Freeport Project (California Water Law and Policy, 2004).

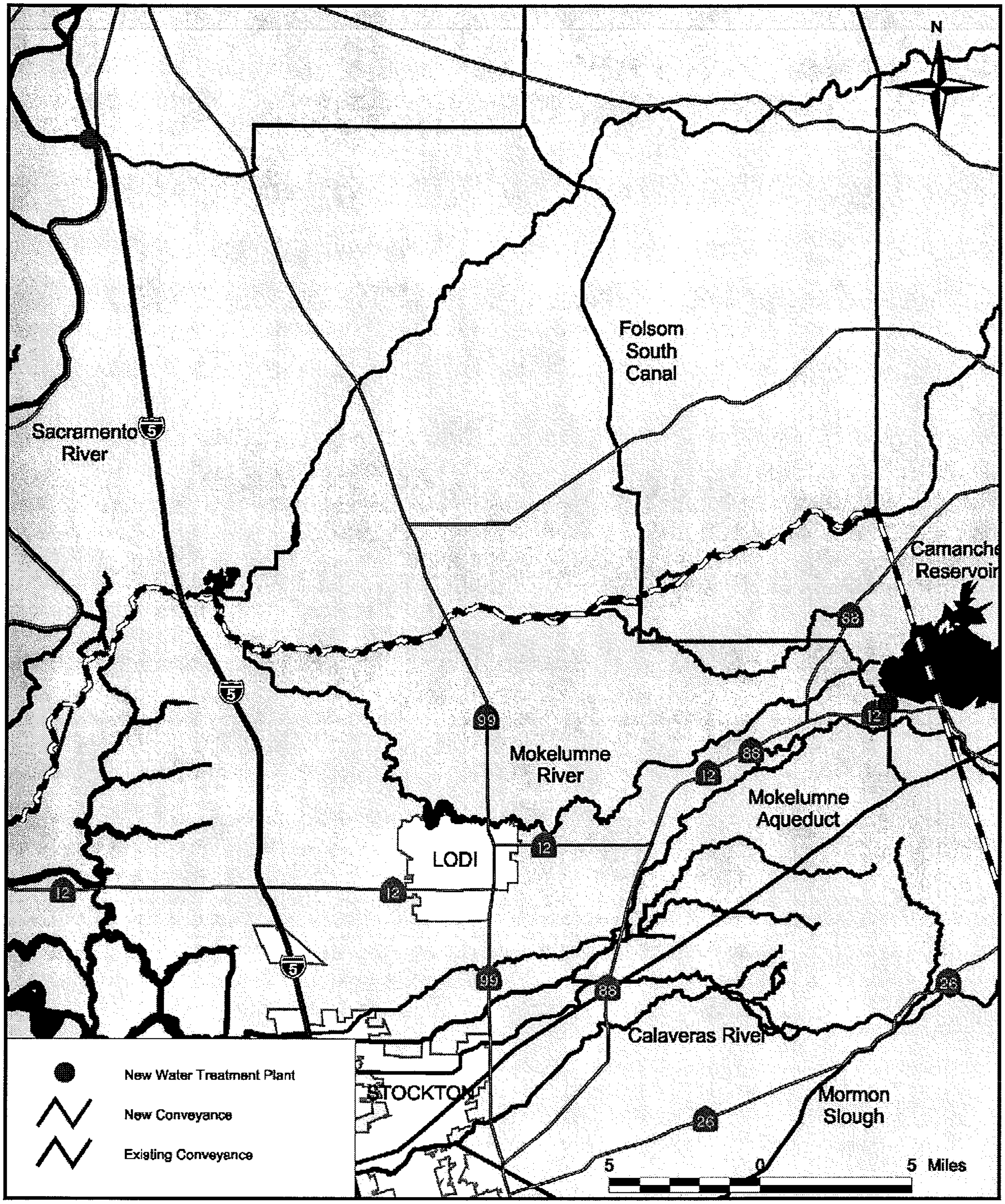


Figure 8-3 Freeport Regional Water Project
Source: Freeport Regional Water Authority at http://www.freeportproject.org

Assuming the Freeport Project is utilized by EBMUD in one-third of all years and the County is able to secure a wet-year water right on the American River, the maximum annual diversion amount would be approximately 65,000 af/yr at an average annual yield of 44,000 af/yr. The Water Availability Study suggests that in years when EBMUD is not utilizing the Freeport Project, the full amount will be available to the Authority under the County Water Right. Additional supplies obtained through third party groundwater banking and water transfers could also increase the yield to the Authority.

8.2.2 MORE WATER PROJECT

In 1990 the Mokelumne River Water and Power Authority (MRWPA) filed a water right application with the SWRCB for unappropriated wet year flows on the Mokelumne River. The application cited three alternatives for the capture of water at the proposed Middle Bar Reservoir, a new "On-stream" 40,000 to 434,000 af reservoir, the proposed Duck Creek Reservoir, a new "Off-stream" 100,000 to 150,000 af regulating reservoir, or through direct diversions off the Lower Mokelumne River between Camanche Reservoir and Interstate 5. The classic alternatives are collectively known as the Mokelumne River Regional Water Storage and Conjunctive Use Project (MORE WATER Project).

The MRWPA filed an additional water right application for power generation at the proposed Middle Bar Dam with an estimated power generation capacity of approximately 85 megawatts (MW) per year. The MRWPA also obtained 3 consecutive Preliminary Permits from the Federal Energy Regulatory Commission (FERC) for the proposed Middle Bar Dam alternative. The fourth consecutive Preliminary Permit, obtained for the proposed Duck Creek Reservoir alternative on January 22, 2004, is current for a period of three years through December 2006. The Preliminary Permit protects the MRWPA's priority to study the power generation potential of the proposed Duck Creek Reservoir (FERC, 2004).

In 2003 the MRWPA retained the services of HDR, Inc. in order to fully evaluate the engineering feasibility of the MORE WATER Project and devise and implement a strategy that would satisfy the requirements of CEQA, NEPA, the Water Right Applications, and all applicable permits. Funding for HDR services have come from contributions by the City of Stockton, the City of Lodi, and the MRWPA. The Authority is also looking to secure funding assistance through the Congressional appropriations process, State grants, and other interested agencies.

In May 2004, the MRWPA completed Phase I – Reconnaissance Study of the MORE WATER Project. Phase I evaluated all historic information available regarding the water right applications, the FERC filings, Mokelumne River hydrology, and any past studies done on the classic alternatives. From the information gained, the classic alternatives and other alternatives meeting the MORE WATER Project purpose and need were conceptualized and evaluated. The following alternatives were considered in Phase I:

- Pardee Dam and Reservoir Replacement/Enlargement
- Middle Bar Dam and Reservoir
- Mokelumne River Storage System Re-operation
- Devil's Nose Dam and Reservoir Construction
- Duck Creek Reservoir – Pardee Diversion
- Duck Creek Reservoir – Camanche Diversion

- South Gulch Dam and Reservoir with New Hogan Reservoir and Pardee Diversion
- Alliance Canal
- Lower Mokelumne River Diversions – Structural and Non-Structural

The list of alternatives was further reduced by eliminating projects too contentious to implement under the current regulatory and political climate. The historic Middle Bar Dam and Reservoir alternative was eliminated from the list due to numerous adverse impacts to whitewater rafting opportunities, riparian upland areas, oak savannah habitat, and wildlife. The Devil's Nose Dam was also eliminated from further consideration likewise due to the impacts on pristine up-county areas. The remaining alternatives were ranked based on a variety of factors weighing the benefits and likelihood of implementation. Table 8-3 shows the weighed screening criteria and evaluation results. The top five ranking alternatives will be carried forward and further explored in a detailed engineering feasibility analysis as part of the next phase of the MORE WATER Project and are described below.

Table 8-3 MORE WATER Project Alternatives Screening Results

Weight	**0**	**3**	**3**	**1**	**2**	**1**	**5**		
ALTERNATIVE	**Cost per acre-foot**	**Regulatory Feasibility**	**Political Feasibility**	**Financial Feasibility**	**Environmental Feasibility**	**Water Quality**	**Benefits Achieved**	**Sum Product**	**Relative Ranking**
Duck Creek Dam - Pardee Reservoir Diversion	H	M	M	H	M	H	H	37	1
Duck Creek Dam - Camanche Reservoir Diversion	H	M	M	H	M	H	H	37	2
Lower Mokelumne River Diversions-Non structural	L	H	H	H	H	H	L	35	3
Lower Mokelumne River Diversion-Structural	L	M	H	M	M	H	M	34	4
Mokelumne River Storage System Re-operation	L	H	M	M	H	H	L	31	5
New Hogan Reservoir Diversion with South Gulch Dam Reservoir Construction	H	L	M	M	M	H	M	29	6
Pardee Dam and Reservoir Replacement/Enlargement	M	L	L	M	L	H	H	28	7

Cost: Relative cost per acre-foot for each alternative. High = $$$ per af. Medium = $$ per af. Low = $ per af
Regulatory Feasibility: High: Good chance for regulatory support (i.e., regulatory agency concurrence). Medium: Moderate chance for legal support. Low: Low chance for support (i.e. regulatory agencies opposed).
Political Feasibility: High: Good chance for political support (i.e., elected officials/powerful interest groups support). Medium: Moderate chance for political support. Low: Low chance for support (i.e. elected officials/powerful interest groups opposed).
Financial Feasibility: High: High chance for financing partners outside of the Authority. Medium: Moderate chance for partners. Low: Low chance for partners outside of the Authority.
Environmental Feasibility: High: Limited environmental impacts that can be mitigated to level of insignificance. Medium: Adverse environmental impacts that can be mitigated. Low: Adverse environmental impacts that cannot be mitigated.
Water Quality: High: No effect to downstream or County users. Medium: Potential effect to downstream users that can be mitigated. Low: Adverse effect to downstream or County users.
Benefits Achieved: High: High Yield Medium: moderate yield. Low: low yield.
NOTE: Sum Product = high, medium, low ranking of 3,2, and 1 respectively, multiplied by weighted factor (ranging form 1 to 5) for each screening criterion.

Source: MORE WATER Project Phase I - Reconnaissance Study Summary Report, 2004

Mokelumne River Storage System Re-operation

This alternative includes re-operating Pardee Dam and Reservoir, Camanche Dam and Reservoir, and Project 137 systems to generate additional water supply. Working with the USACE, it may be possible to redefine the flood control operating guidelines for the Mokelumne River. The latest trends in weather forecasting and hydrologic modeling could be utilized to operate the flood control capabilities of the Mokelumne storage system less conservatively to allow for greater conservation storage capacity. Re-operation could also consist of allocating more flood control storage to PG&E Project 137 thus reducing the required flood control storage defined by the rule-curves of Pardee and Camanche Reservoirs. The yield of the re-operation alternative is on the order of 10,000 af.

Duck Creek Reservoir (Pardee or Camanche Diversions)

The proposed Duck Creek Reservoir is an off-stream reservoir located in Eastern San Joaquin County in the Duck Creek watershed which drains into the Calaveras River at divergence of the Calaveras River and Mormon Slough at Bellota. The Duck Creek dam system would consists of a 6000' earthen main dam at the south end and a series of smaller coffer dams to the west. The optimal size of the reservoir will be determined in the engineering feasibility study. Figure 8-4 is the elevation-area-capacity curve for the proposed Duck Creek Reservoir.

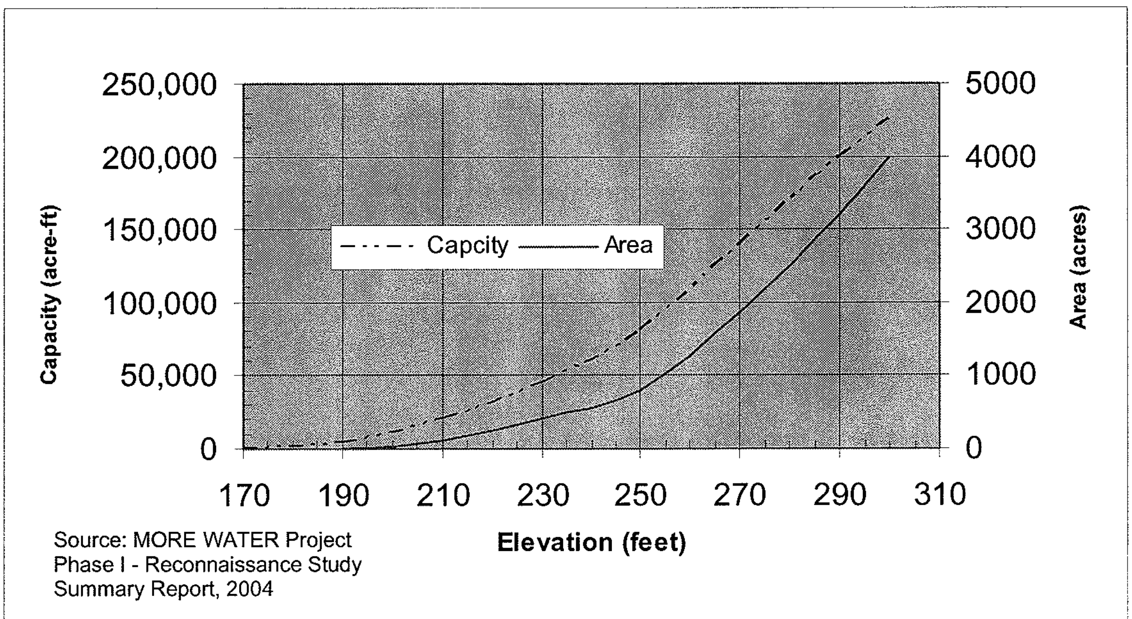


Figure 8-4 Duck Creek Reservoir Elevation-Area-Capacity Curve

Water would be diverted at either Pardee Reservoir or Camanche Reservoir for storage in Duck Creek Reservoir. A map and diagram of the Pardee Reservoir alternative are shown in Figure 8-5 and Figure 8-6, respectively. A diagram of the Camanche Reservoir alternative is shown in Figure 8-7, and a diagram of the proposed reservoir is shown in Figure 8-8. The water right application seeks to divert up to 1,000 cfs to storage and 620 cfs by direct diversion. The total maximum diversion capacity is 1,620 cfs from either Pardee or Camanche Reservoirs. Water diverted from Pardee Reservoir at a rate of 1,620 cfs would require a Regulated releases from

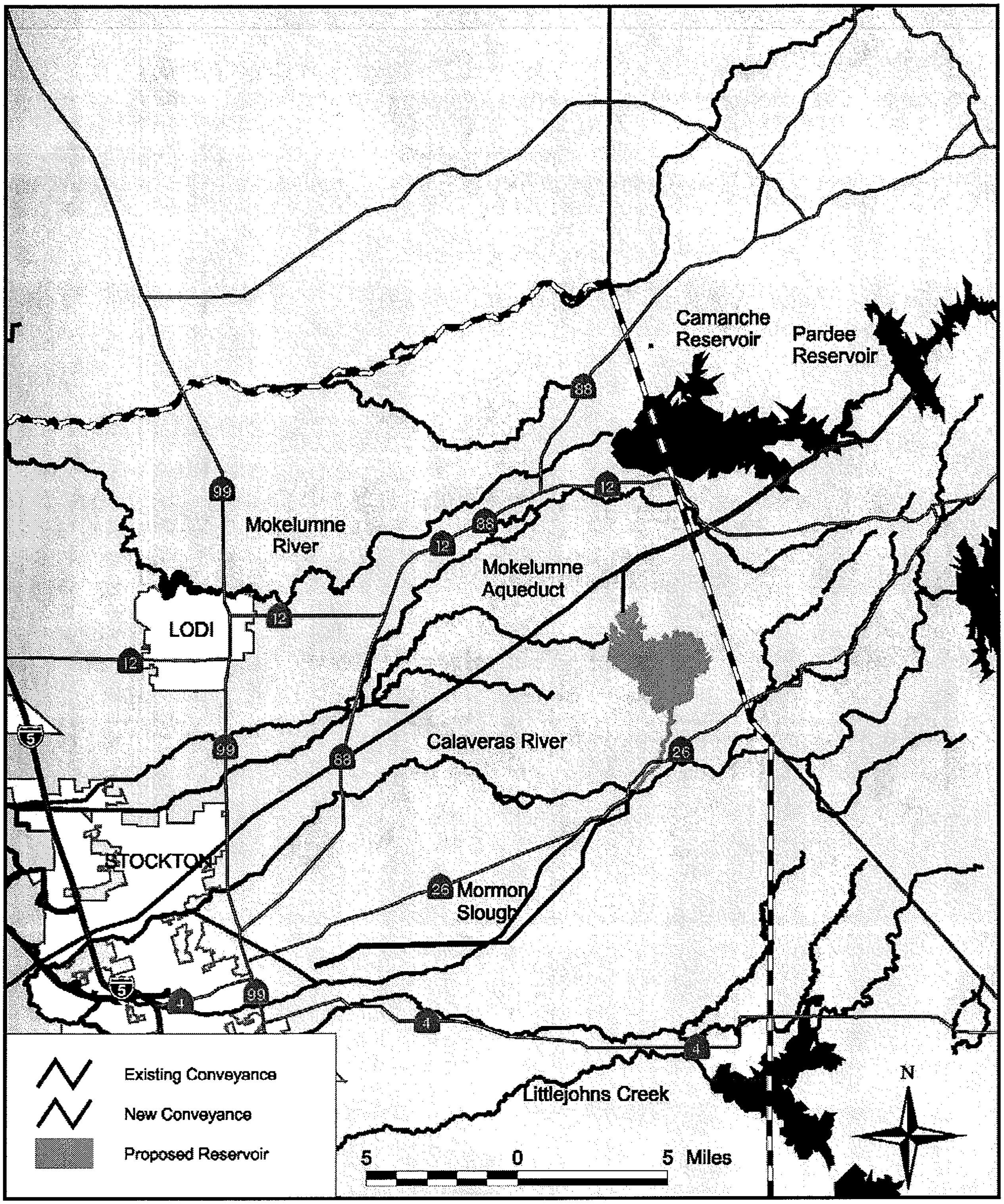


Figure 8-5 Duck Creek from Pardee Reservoir

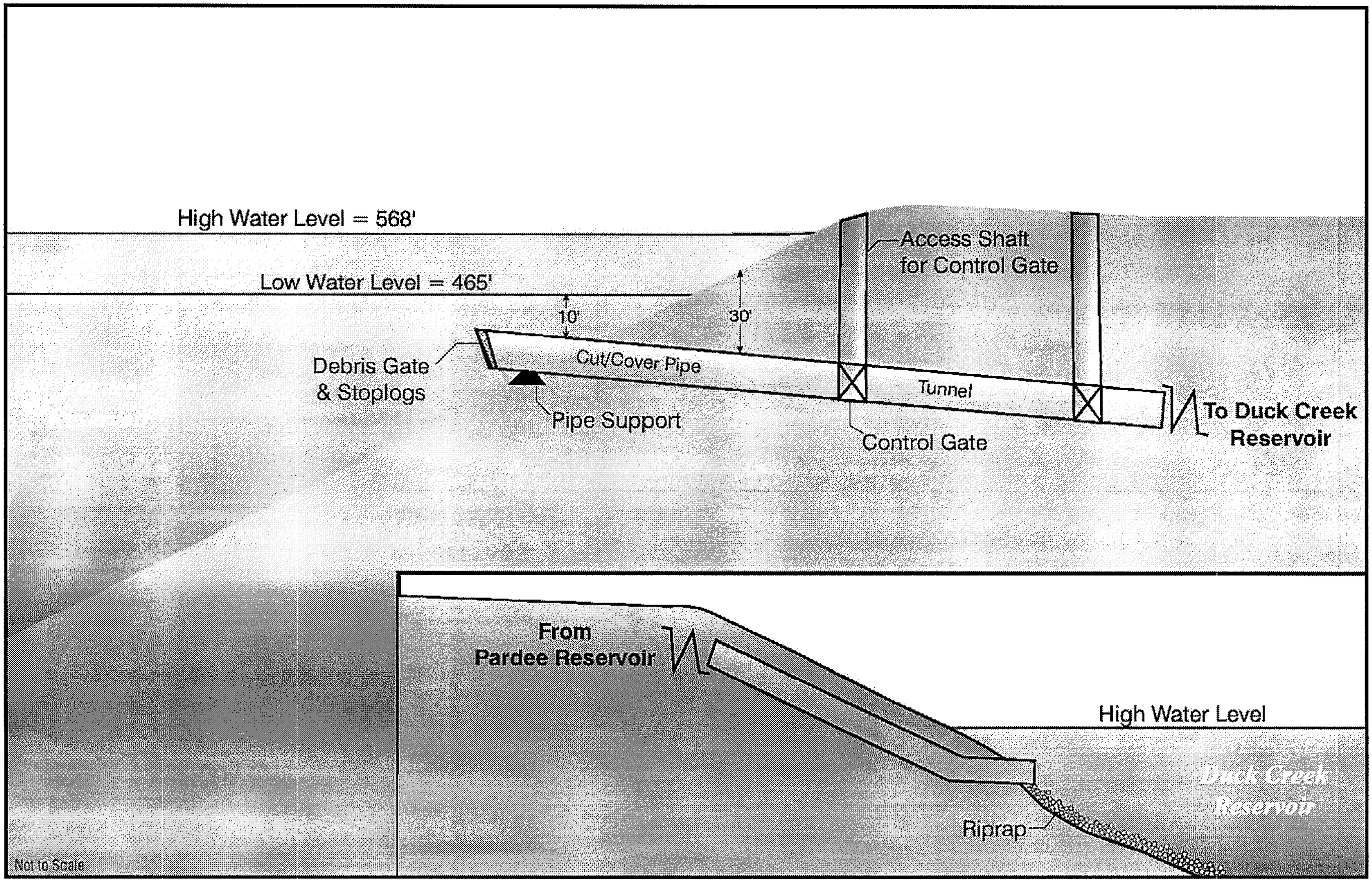


Figure 8-6 Duck Creek from Pardee Reservoir Inlet and Outlet Diagram
Source: HDR, Inc.

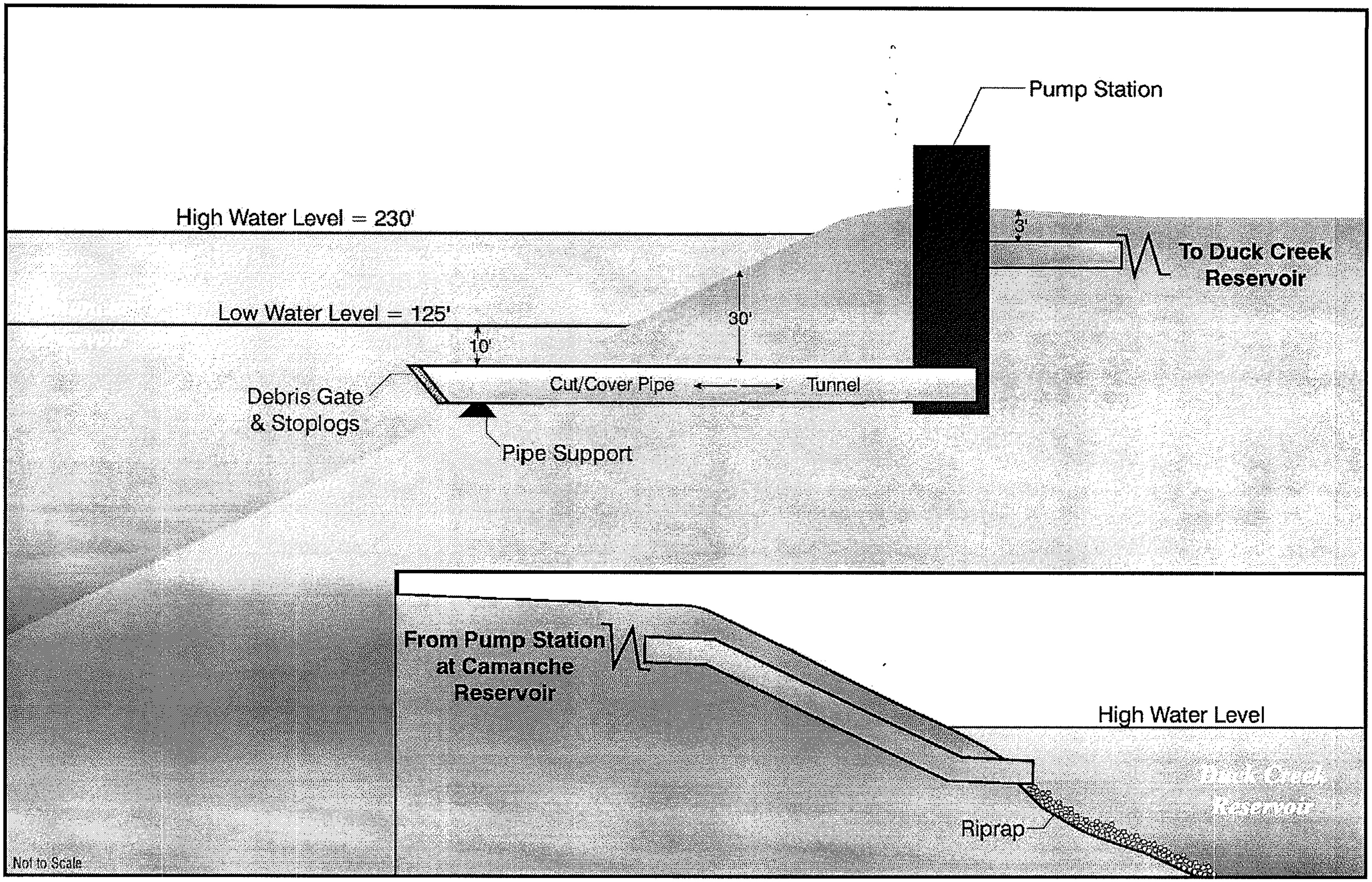


Figure 8-7 Duck Creek from Camanche Reservoir Inlet and Outlet Diagram
Source: HDR, Inc.

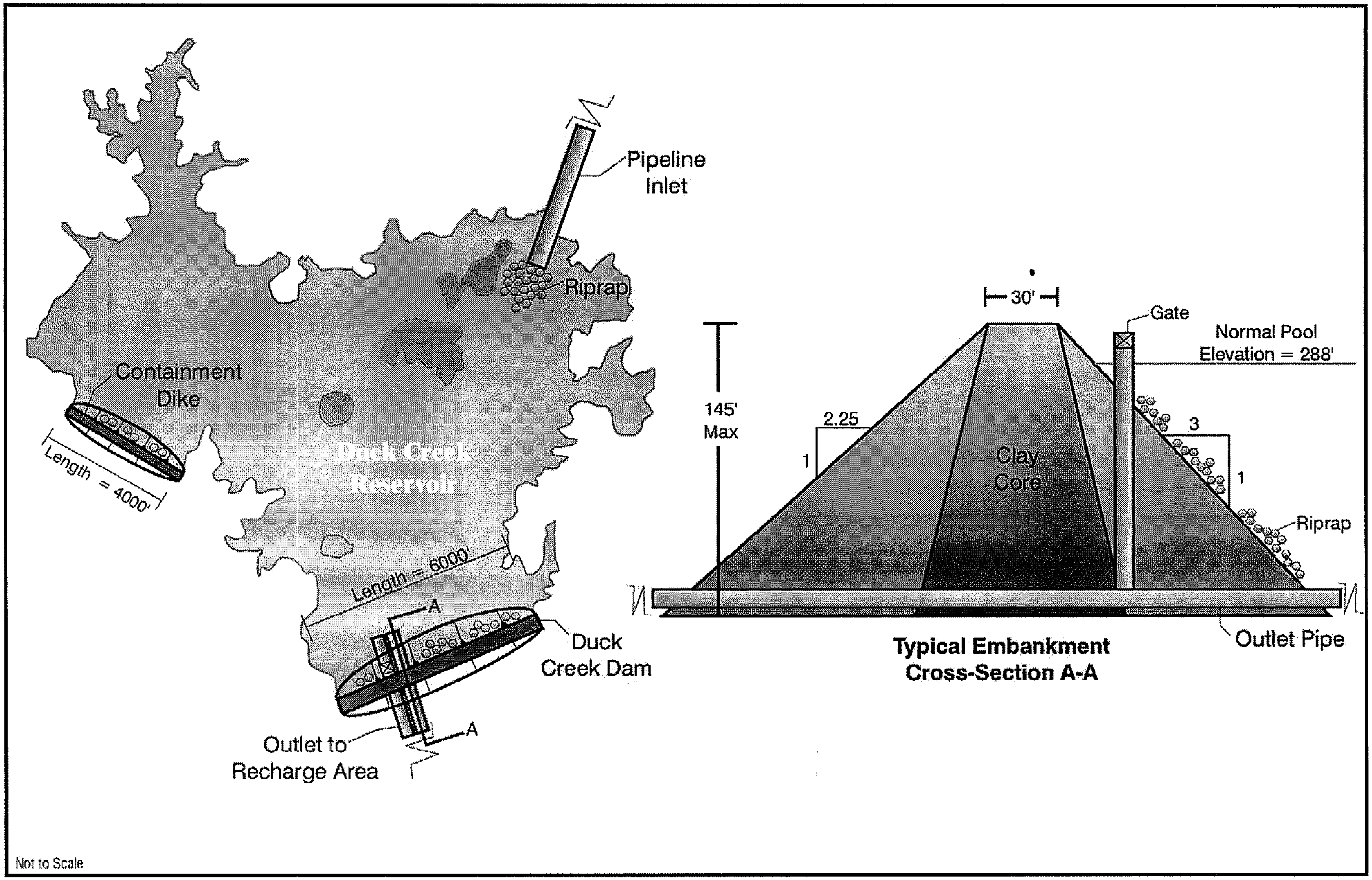


Figure 8-8 Proposed Duck Creek Reservoir Diagram
Source: HDR, Inc.

the Reservoir to Bellota would be re-diverted to the SEWD water Treatment Plant, Mormon Slough, Potter Creek, Mosher Slough, the Lower Calaveras River, and potentially the proposed Alliance Canal for beneficial use or direct groundwater recharge. Evaporation is potentially a major concern for shallow large surface area reservoirs; however, the operation of the proposed Duck Creek Reservoir would completely drain Duck Creek Reservoir to maximize use in anticipation for the next season's divertible flows. Evaporation rates for the duck creek area are shown in Figure 8-9.

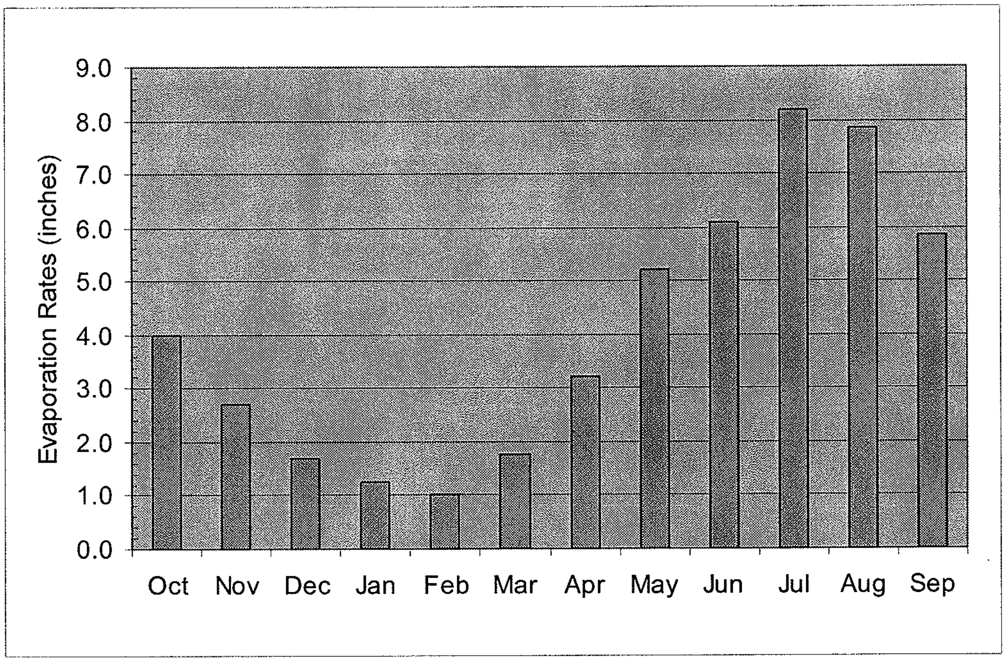


Figure 8-9 Duck Creek Reservoir Evaporation Rates

<u>Lower River Diversions – Non-Structural and Structural</u>

The water right application includes diversions along the lower Mokelumne River from below Camanche Reservoir to Interstate 5. Non-Structural implies the use of existing facilities with minor improvements. Under the non-structural alternative, NSJWCD existing diversion pumps and irrigation systems could be used to maximize recharge and in-lieu distribution. Additionally, the new Woodbridge Dam when completed will be able to supply the WID canal system year round, thus enabling groundwater recharge from Lodi to north Stockton. Structural alternatives consist of new diversion structures such as check dams, pump stations, and fish screens where flows would be diverted to supply direct recharge facilities or irrigation in-lieu deliveries. A diagram of the structural lower river diversion schematic can be seen in Figure 8-10.

During the course of Phase I, numerous agencies from the regulatory community warned that the MRWPA would be vulnerable to legal opposition because other less environmentally damaging alternatives to reversing the historic overdraft in Eastern San Joaquin County (i.e. agricultural and urban water conservation, water recycling, tiered water rate systems, etc.).

To evaluate the alternatives carried forward, the MRWPA developed the MORE Model of the Mokelumne River System based on the EBMUDSIM proprietary software package. Figure 8-11 is a schematic of the MORE Model. The MORE Model preliminary yield and cost estimates are presented in Table 8-4.

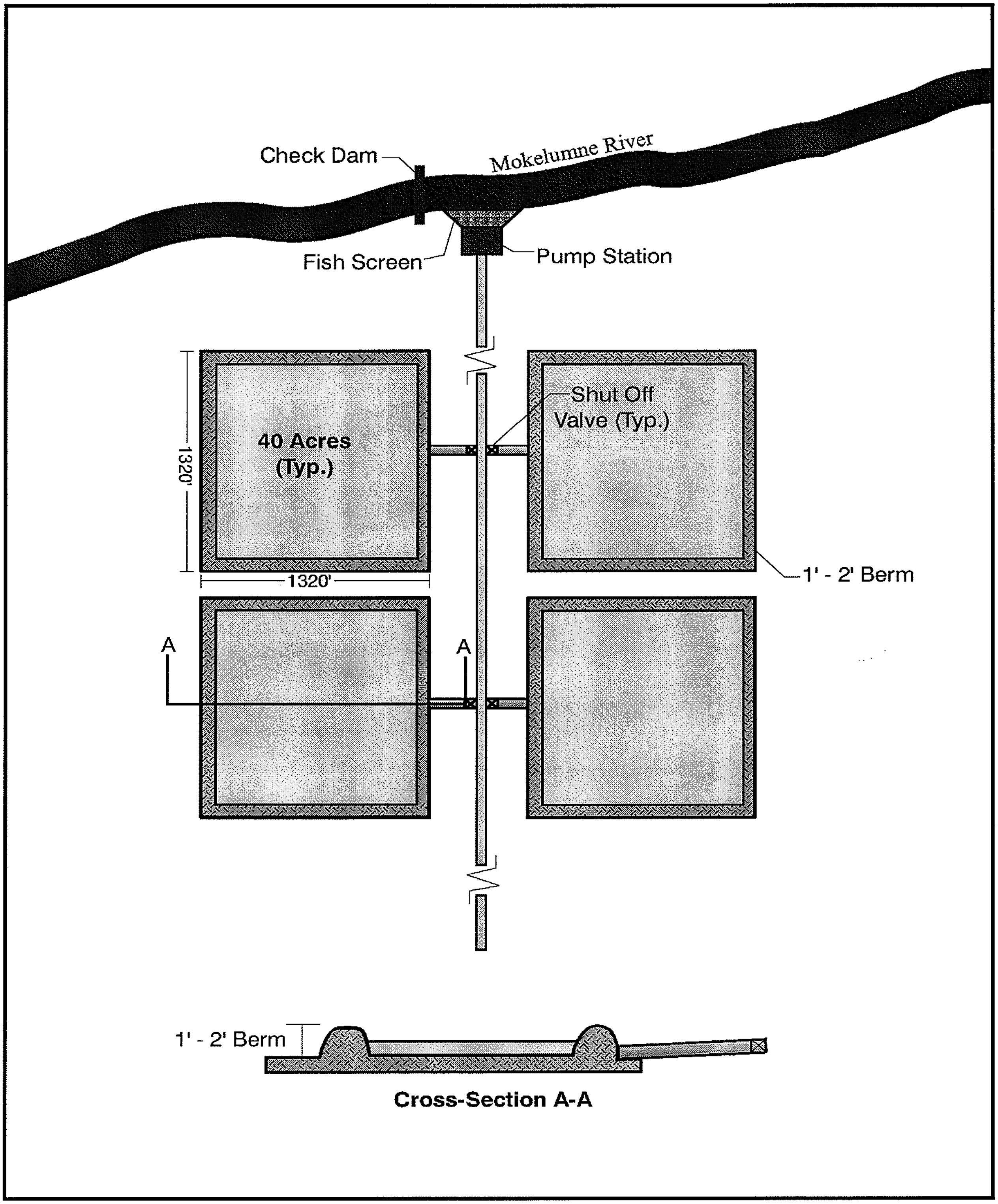


Figure 8-10 Structural Lower River Diversion Schematic
Source: HDR, Inc.

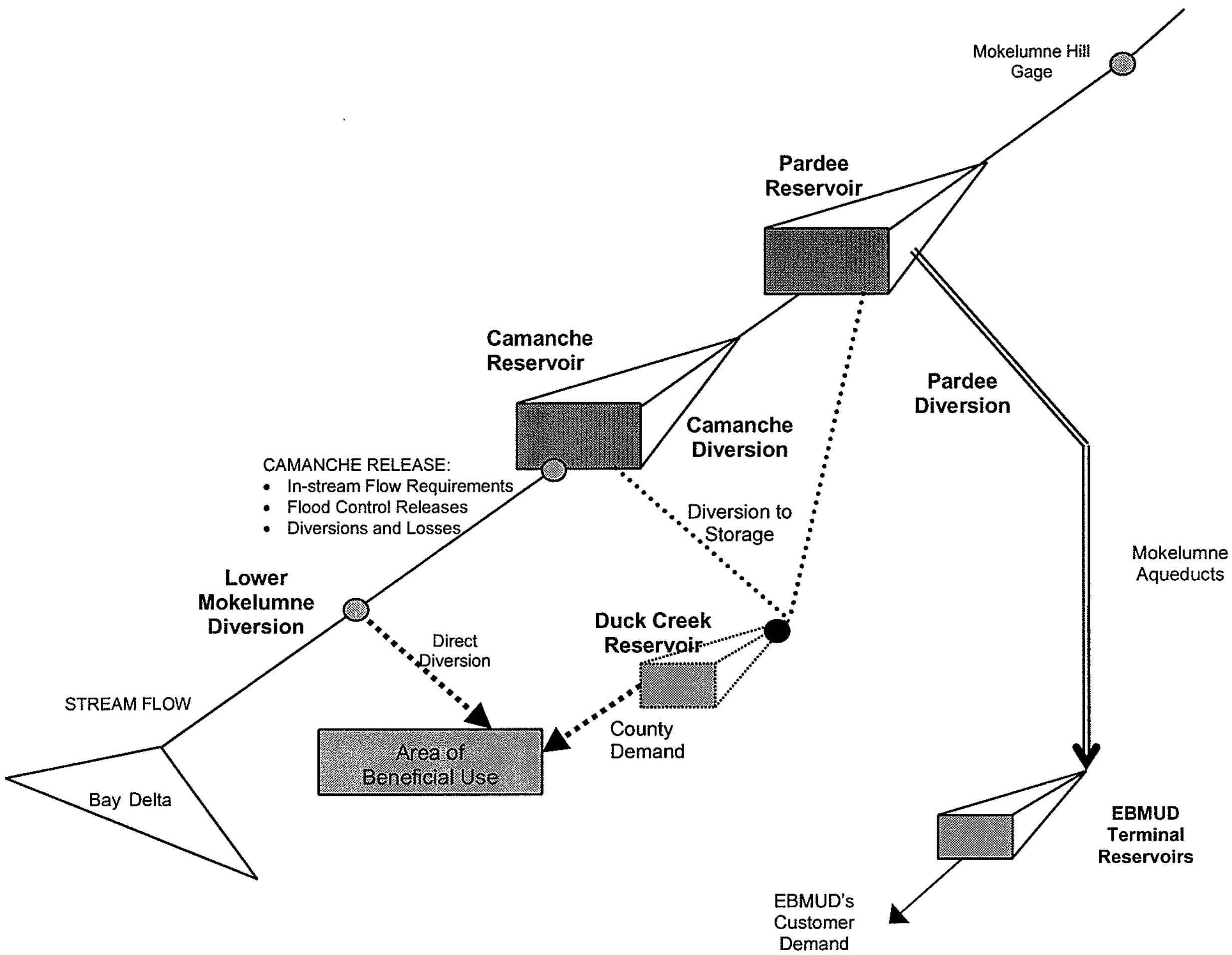


Figure 8-11 Schematic Diagram of the MORE Model

Table 8-4 MORE WATER Project Preliminary Average Annual Yield and Cost Analysis Results					
	Lower Mokelumne River Diversion - Structural	Duck Creek Dam and Reservoir Construction			
		Camanche Reservoir Diversion		Pardee Reservoir Diversion	
		No Hydropower Impacts	Hydropower Impacts	No Hydropower Impacts	Hydropower Impacts
Annual Project Yield (af)	49,200	82,300	90,300	82,300	90,300
Annual Cost ($ per af)	$150	$213	$196	$156	$147
Source: MORE WATER Project Phase I - Reconnaissance Study Summary Report, 2004					

8.2.3 New Melones Conveyance Project

The New Melones Conveyance Project was constructed in order to deliver contractual CVP entitlements to CSJWCD and SEWD from New Melones Reservoir on the Stanislaus River. Water is diverted through the Goodwin Tunnel and conveyed through the Upper Farmington Canal and a series of natural creeks to the Farmington Flood Control Reservoir. The Lower Farmington Canal conveys water from the Farmington Flood Control Reservoir to its terminus near the community of Peters. The Lower Farmington Canal is connected to Mormon Slough by a 78-inch pipeline where water can be re-diverted for irrigation. The 78-inch pipeline also interconnects with the Bellota Pipeline enabling high-quality New Melones water to be conveyed to the SEWD Water Treatment Plant for delivery to customers in the City of Stockton. Figure 8-12 illustrates the New Melones Conveyance System.

The Goodwin Tunnel, completed in 1992, is approximately 3.3 miles long and 14 feet in diameter, with a design flow capacity of 850 cfs. It originates on the north bank of the Stanislaus River, just upstream from Goodwin Diversion Dam in Calaveras County. The Goodwin Tunnel connects with the Upper Farmington Canal, an open trapezoidal channel that extends approximately 7.9 miles to its current terminus near Shirley Creek. Water then flows through the natural creek system of Shirley, Hoods, and Rock Creeks where it finally enters the Farmington Flood Control Reservoir. The maximum capacity of the Natural Canal system is approximately 550 cfs. The Upper Farmington Canal was envisioned to extend northward to the proposed South Gulch Reservoir where excess water from the Stanislaus River could be stored and conveyed through the Calaveras River System (Farmington , 2000).

The Peters Pipeline is a proposed addition to the New Melones Conveyance System. The Peters Pipeline is a 6-mile, 60-inch diameter pipeline that will be located parallel to the existing 54-inch diameter Bellota Pipeline from the 78-in pipeline at Mormon Slough to the Water Treatment Plant. Figure 8-13 illustrates the proposed Peters Pipeline route. Water conveyed in Peters Pipeline will be used to increase the delivery capacity at the SEWD Water Treatment Plant. A series of turnouts and laterals from the Peters Pipeline will enable SEWD to serve surface water to areas traditionally reliant on groundwater through integration with the Farmington Program. The average annual increase in water delivery by the New Melones Conveyance System is approximately 7,500 af/yr. The total cost of the Peters Pipeline Project is $7,401,260. SEWD has been selected to receive a Proposition 13 grant for 50% of the project cost. Local cost share for the Peters Pipeline Project will come from available funds of the New Melones Conveyance Project.

8.2.4 South County Water Supply Program

The South County Water Supply Program (South County Program) is a cooperative effort between SSJID and the cities of Escalon, Manteca, Lathrop, and Tracy. The goals of the South County Water Supply Program are to:

1. Provide a safe and reliable supplemental water supply for South San Joaquin County;
2. Put to beneficial use conserved water from SSJID entitlements;
3. Keep conserved water within SSJID and San Joaquin County; and
4. Reduce the heavy reliance on groundwater for the urban areas of South San Joaquin County.

As previously noted, SSJID has pre-1914 rights to Stanislaus River water. Water served to the participating cities is made available from the implementation of conservation practices, more efficient means of irrigation by SSJID, and through the loss of irrigated agriculture to planned urban growth. The South County Program consists of an intake facility at Woodward Reservoir, a 44 MGD state-of-the-art membrane filtration water treatment plant just west Woodward Reservoir near Dodds Road, and over 40 miles of pipe ending in the City of Tracy. A map of the project can be seen in Figure 8-14. Phase I of the South County Program will serve up to

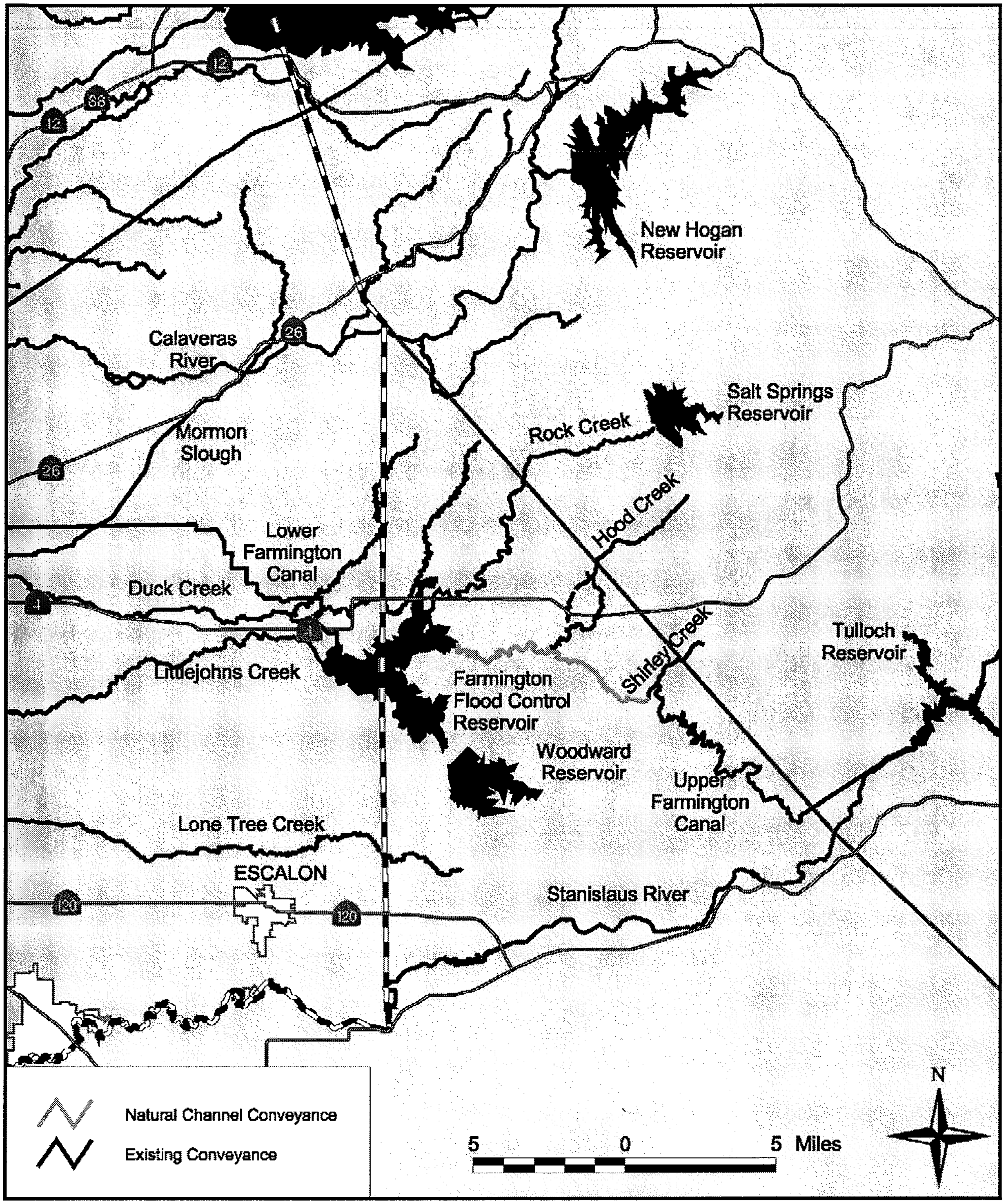


Figure 8-12 New Melones Conveyance System
Source: Farmington Groundwater Recharge/Seasonal Habitat Study, 2001

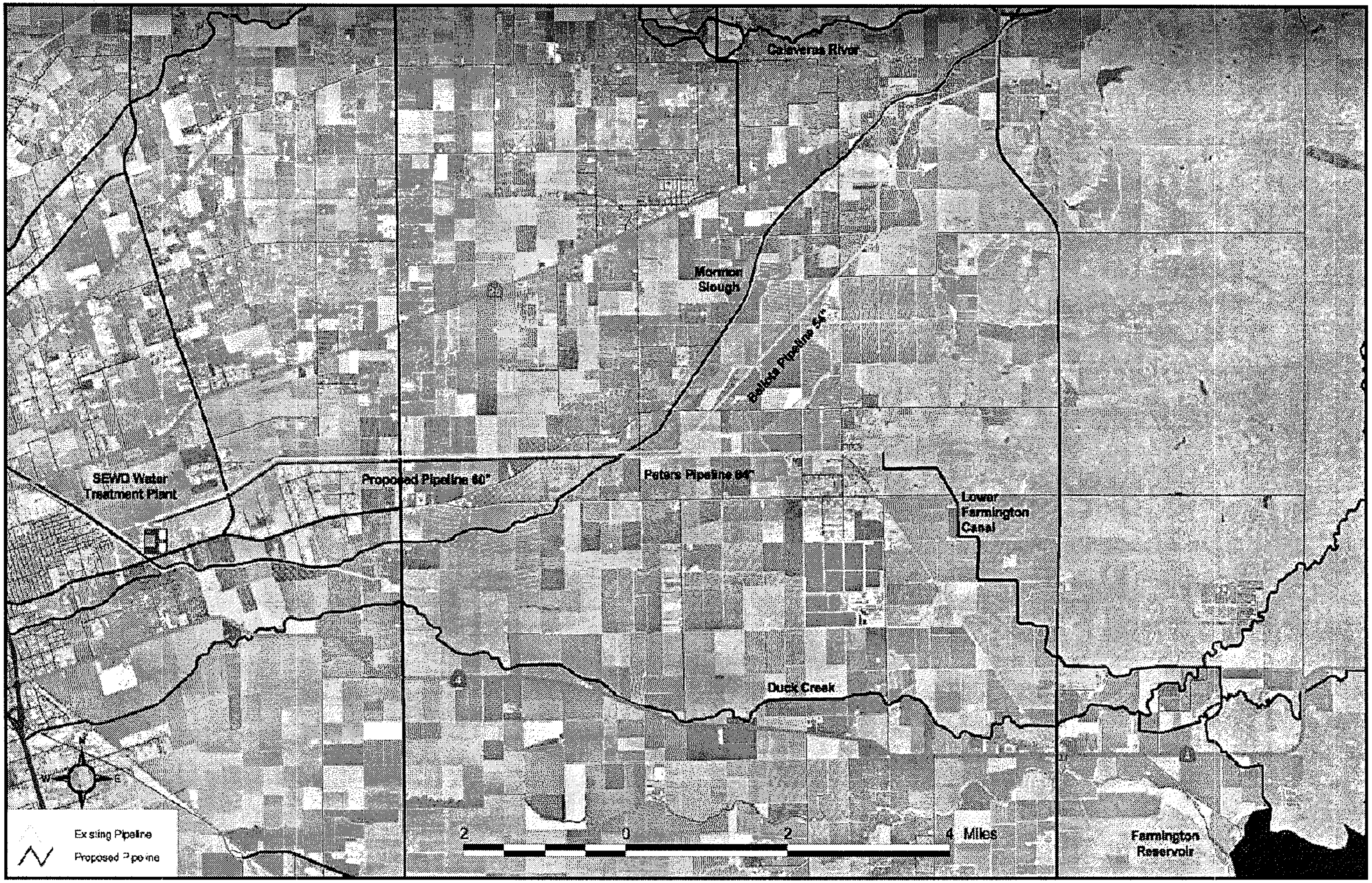


Figure 8-13 Proposed Peters Pipeline Alignment
Source: Farmington Groundwater Recharge/Seasonal Habitat Study, 2001

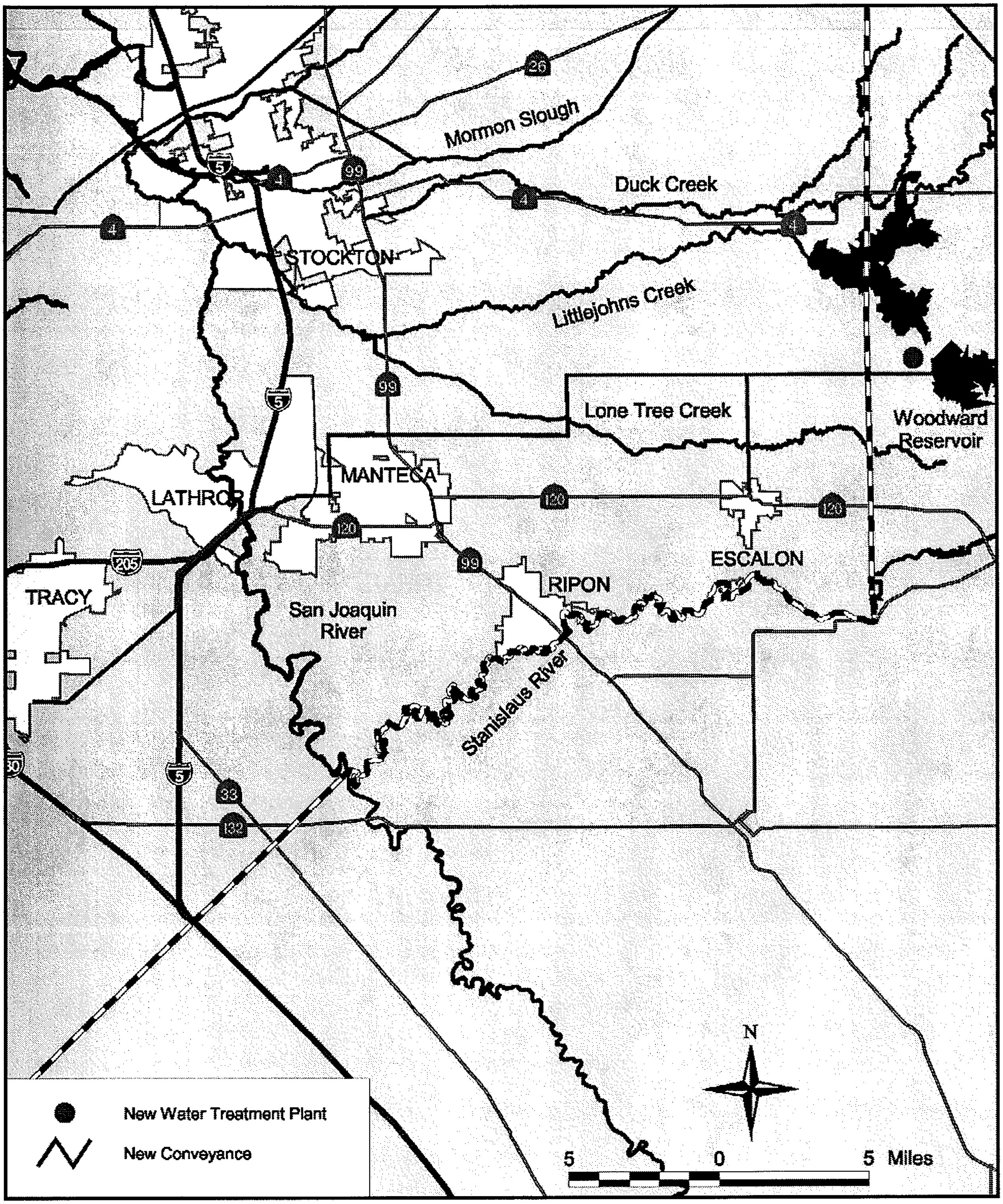


Figure 8-14 South County Water Supply Project
Source: SSJID, 2003

30,000 af per year though 2010. Phase II will increase deliveries to 44, 000 af annually and provide a net reduction of groundwater pumping from the underlying Basin of approximately 30,000 af annually. The total cost of the project is estimated at $126 million. (SSJID, 2001) The Cities of Escalon, Lathrop, and Manteca typically exceed the 1.0 af per acre safe yield of the Basin. The South County Program would allow those cities to pump groundwater within the safe yield (SSJID, 1994).

8.2.5 Woodbridge Dam Replacement and Canal System

The Woodbridge Diversion Dam (Woodbridge Dam) is a 12-foot tall removable flash board dam built in 1910. The Woodbridge Dam is operational from March to October at which time Lodi Lake is heavily used for recreation. The Woodbridge Dam feeds a 100-mile series of canals west of Lodi to Northeast Stockton. The location of the dam and canals is shown in Figure 8-15. The Woodbridge Dam itself is considered an impediment to anadromous fish and is recognized as a key area for the restoration of fall run Chinook Salmon by the National Marine Fishery Service (NMFS) and the California Department of Fish and Game (CDFG) (CDM, WMP, 2002).

In 2000 WID, in cooperation with the USBR, completed the Lower Mokelumne River Restoration Program Final EIR/EIS for new improved fish passage facilities. The preferred alternative consists of the construction of an adjustable weir dam upstream and the removal of the old flash board dam base. State of the art fish ladders and monitoring station for anadromous fish migrations will also be constructed. Additionally, a fish screen and new diversion pipeline extending form Lodi Lake to the canal system will prevent incidental takes of salmon smolts and juveniles without the loss of water deliveries to WID customers. The improvements would exceed the environmental restoration goals set on the Lower Mokelumne River while protecting the irrigated agriculture in Woodbridge. The new Woodbridge Dam will be able to operate year round and keep Lodi Lake full in all months. In addition, year round diversions into the canal system could facilitate year round groundwater recharge and interim deliveries to other in-basin partners including the City of Stockton and SEWD. (http://www.spk.usace.army.mil/pub/outgoing/co/reg/pn/199900057.pdf, 2002)

In 2003, the City of Lodi and WID reached an agreement by which the City of Lodi would purchase 6,000 af/yr at a cost of $200 /af for a term of 40-years. The annual payment of $1.2 million dollars per year is fixed even if the City of Lodi is ready to put its water to beneficial use; however, a three year banking clause allows the City of Lodi to gain credit for the undelivered water up to a total of 18,000 af. The City of Lodi is currently exploring various alternatives to put the water to beneficial use including drinking water treatment and distribution, groundwater recharge, or injection. (http://www.lodi.gov/city-council/html/body_2003-03-11s.htm, 2003)

8.2.6 Eastern Water Alliance Canal

The Eastern Water Alliance Canal is essentially a locally driven completion of the Folsom South Canal. In concept, the Alliance could construct an open canal along the 100-ft contour or pipeline equivalent in order to connect the FSC to the Mokelumne River, Calaveras River, and New Melones Conveyance System. The proposed alignment is shown in Figure 8-116. The Alliance Canal would facilitate water transfers and the diversion of wet year flow to the recharge basins and irrigated lands throughout Eastern San Joaquin County. The ultimate capacity of the Alliance Canal varies; however, the Alliance Canal would transport water both from north to south and vice versa. If left unlined, the canal could also double as a groundwater recharge facility. Preliminary discussions have suggested that a canal 300-feet wide would provide the equivalent recharge of over 1000 acres of recharge basins. Capital costs for the originally envisioned 85-ft wide, 8-ft deep, 2:1 side sloped, 6-mile long unlined canal constructed from the

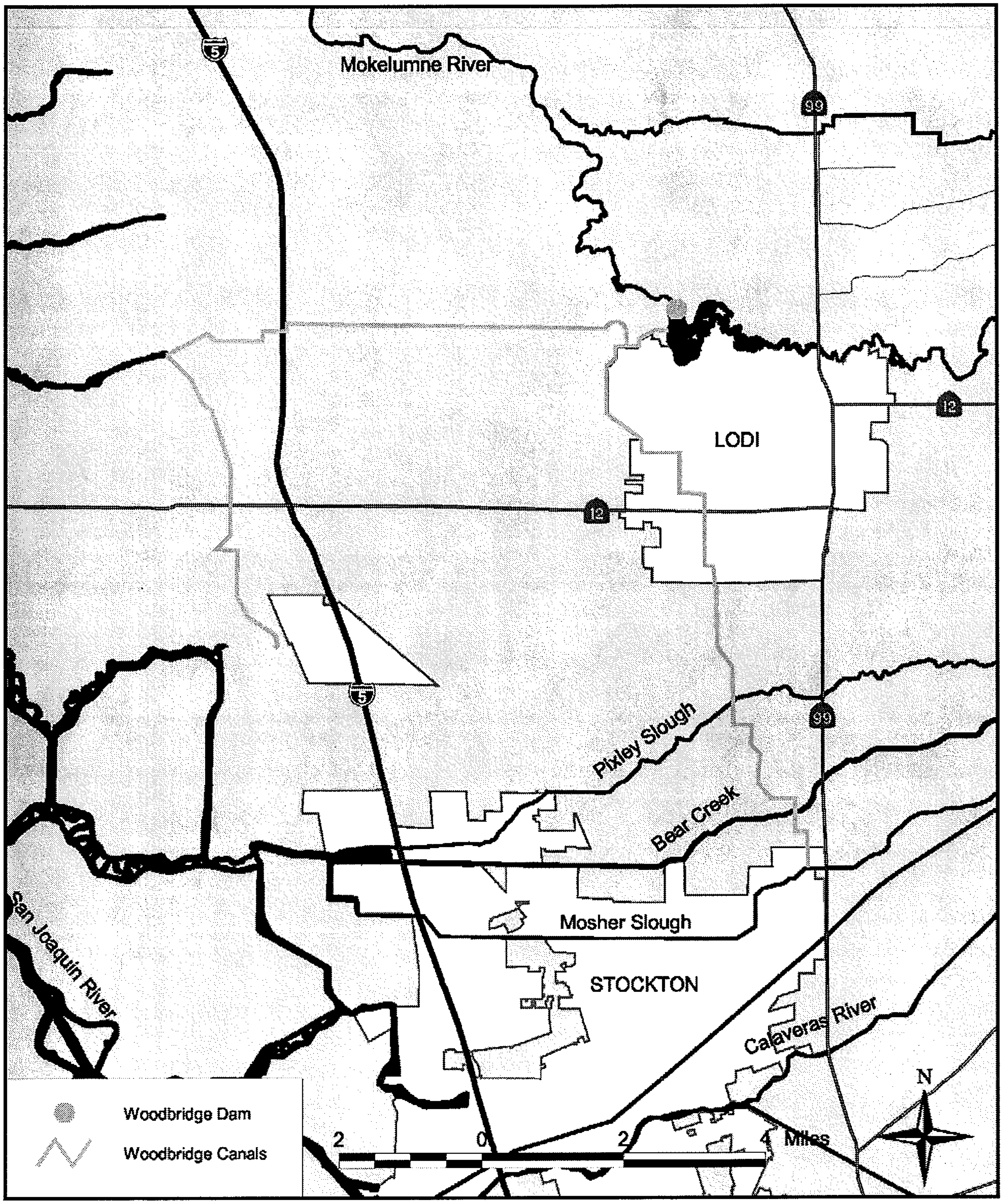


Figure 8-15 Woodbridge Irrigation District Diversion Dam and Canal System

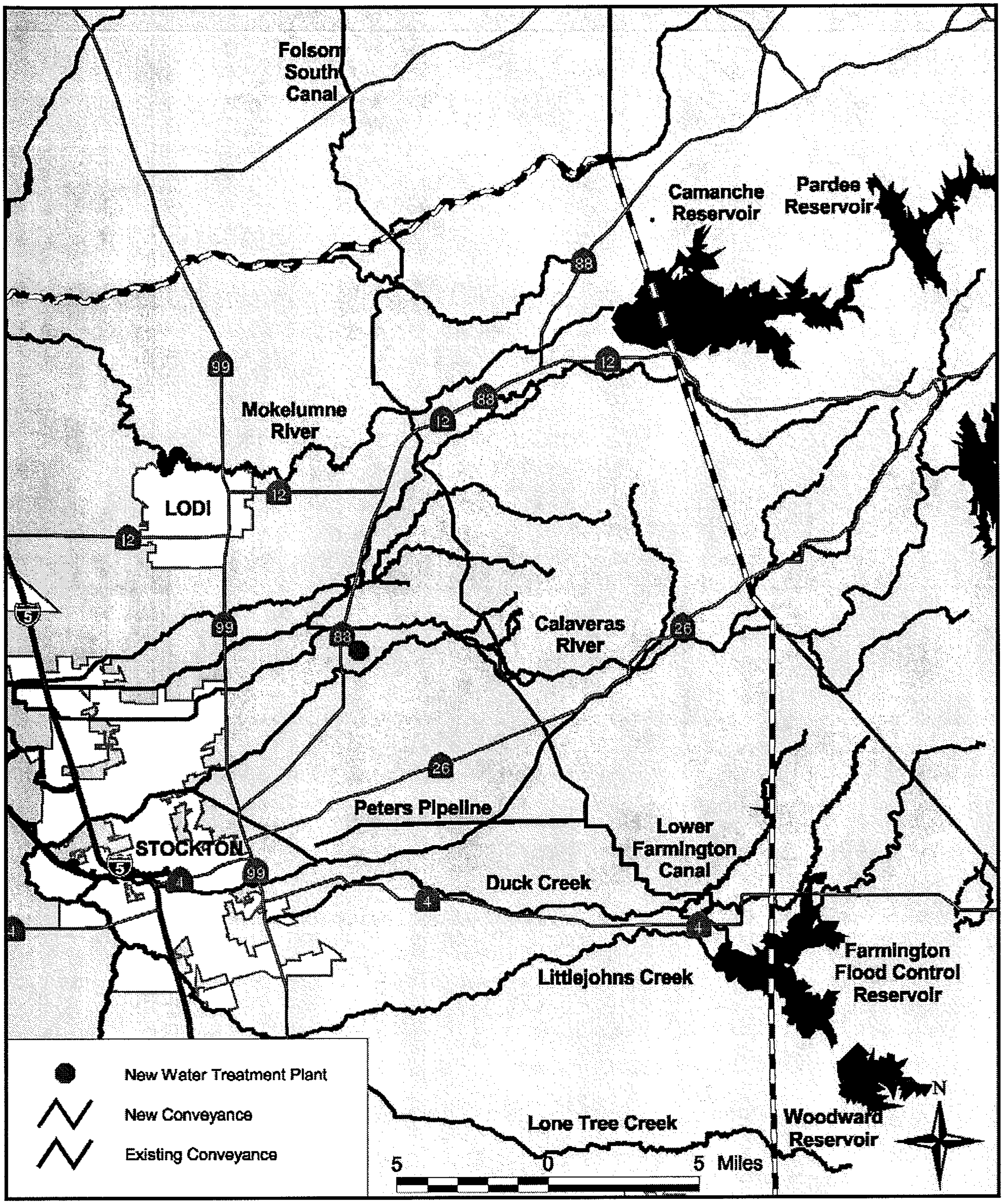


Figure 8-16 Alliance Canal Alignment

Mokelumne River to the Lower Farmington Canal would cost approximately $15 to $20 million (SEWD, 2000).

8.2.7 Gill Creek and Woodbridge Road Flood Control Improvements

The Gill Creek and Woodbridge Road watersheds are located approximately four miles north of the City of Lodi and cover about 14.4 square-miles of relatively flat terrain. The area has a history of drainage deficiencies resulting in long-duration shallow flooding including infill or disking of natural drainage ways, changes in land use, rural residential development, and undersized culvert crossings and pump stations. Historically, the proposed solution focused on increased channel capacities along Gill Creek; however, current regulations regarding down stream impacts, stormwater quality, and permitting present challenges to a diversion focused project. In 2004 the San Joaquin County Department of Public Works Stormwater Management Division completed the Gill Creek and Woodbridge Road Watersheds Reconnaissance Study (Gill Creek Study) to identify and recommend a project that would provide a 100-year level of protection to structures and a 25-year level of protection to agriculture in the study area.

The Gill Creek Study explored three alternatives with the following focuses: channel enlargement, detention, and diversion into the Lower Mokelumne River. The Gill Creek Study identified detention as the preferred alternative which includes minor channel improvements and the construction of up to 15 detention basins covering a total area of 65 acres spread throughout the watersheds. A map of the preferred alternative can be seen in Figure 8-17. The preferred alternative also has the potential to provide addition benefits as the channels and detention basins could be used to convey Mokelumne River Water for irrigation and direct recharge. The NSJWCD owns an existing 30 cfs irrigation system near Tretheway Road extending west along Acampo Road. Improvements to the NSJWCD North Irrigation System or an additional system could serve the conjunctive water management needs of the area. The preferred alternative is expected to cost approximately $25 million with an expected benefit of close to $30 million in prevented structural and agricultural damages. The next step is to perform a feasibility study where the conjunctive use and flood control operation can be explored further and the benefits quantified (San Joaquin County Department of Public Works, 2004).

8.2.8 South Gulch Reservoir

In 1984, SEWD completed the South Gulch Water Conservation Project Technical Reconnaissance Report to evaluate the feasibility of the proposed South Gulch Reservoir. South Gulch Reservoir is located approximately 22 miles east of Stockton, California, and approximately seven miles southwest of New Hogan Dam. The proposed dam location is six-tenths of a mile upstream from the South Gulch and Calaveras River confluence. The South Gulch Reservoir surface area is approximately 3,000 acres with a storage capacity of 130,000 af. In conjunction with the construction of the South Gulch Dam, the Upper Farmington Canal would be completed to supply excess water from the Stanislaus River. Additionally, a diversion structure on the Calaveras River just down stream of New Hogan Reservoir would convey excess water to the proposed South Gulch Reservoir in wet years. A map of the proposed reservoir can be seen in Figure 8-18. The project is one of the key proposed facilities of the Eastern Water Alliance. (Aqua Resources, Inc. *et al*, 1984)

8.2.9 Lyon's Dam

The Tuolumne Utilities District (TUD) obtains the majority of its water supply from the South Fork of the Stanislaus River. In 1983 TUD entered into an agreement with PG&E for the use of

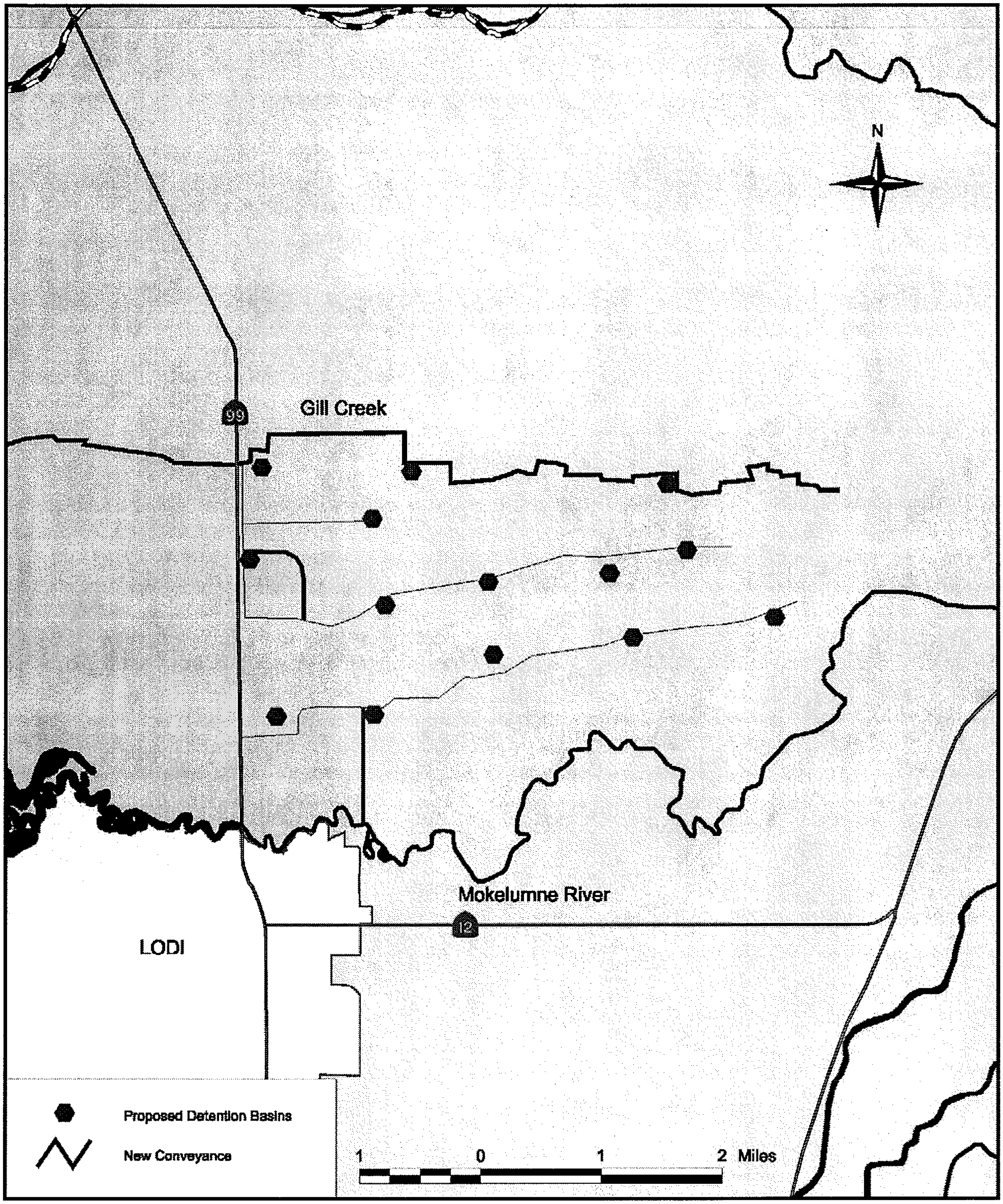


Figure 8-17 Gill Creek and Woodbridge Road Flood Control Improvements
Source: San Joaquin County Department of Public Works, 2004

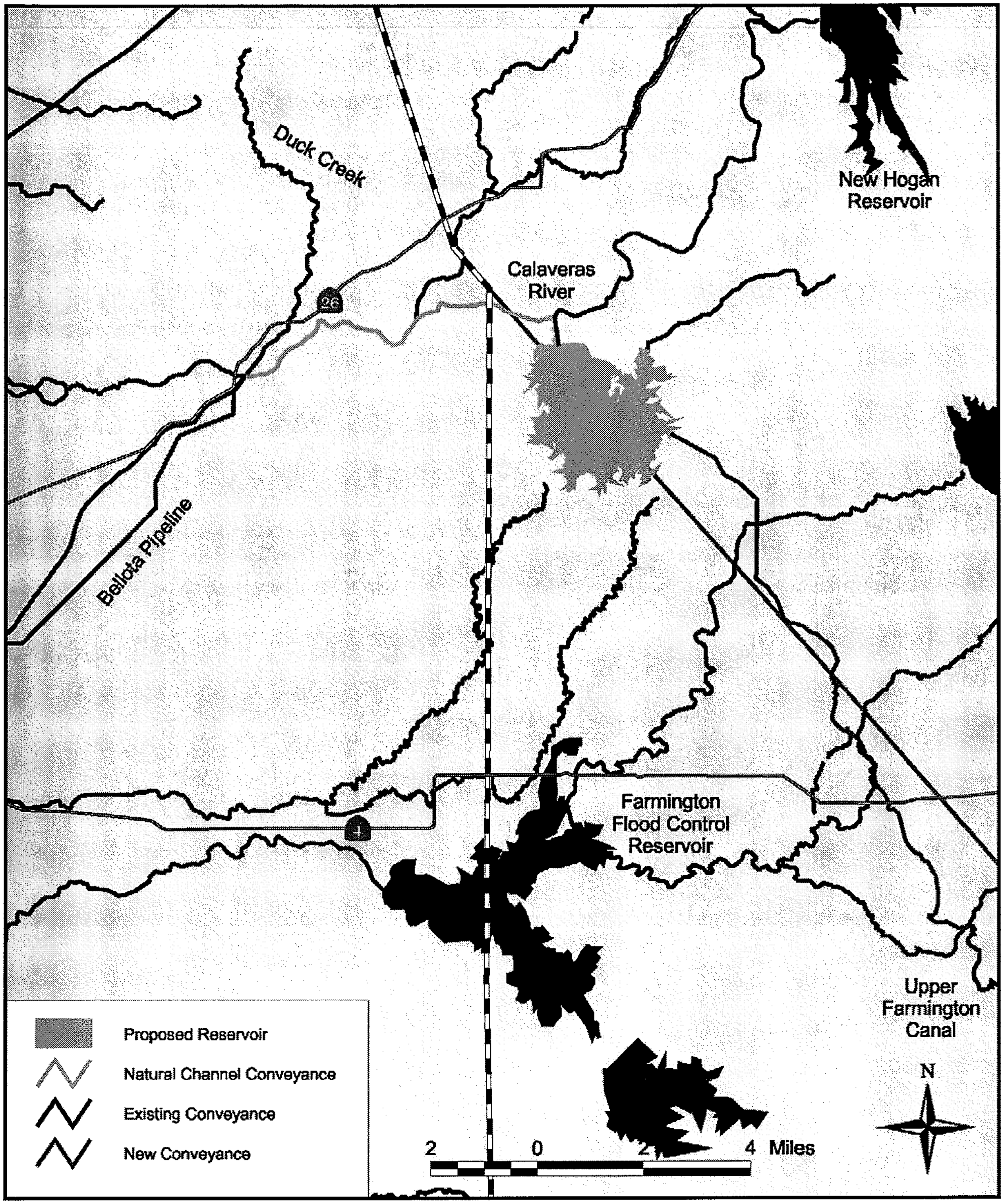


Figure 8-18 Proposed South Gulch Reservoir
Source: Aqua Resources, Inc. *et al*, 1984

all water diverted through Strawberry (Pinecrest) Reservoir and Lyons Reservoir in excess of the required in-stream flows. The amount of water available annually is dependent upon the natural flow of the South Fork of the Stanislaus River which has an average annual yield of approximately 100,000 af including 24,000 af combined storage in Strawberry and Lyons Reservoirs (http://www.tuolumneutilities.com/uwmp.pdf, 2000).

TUD is currently evaluating the possibility of replacing the existing Lyons Dam to create a larger reservoir to provide enough water for future development. The current capacity of Lyons Reservoir is 6,219 af, and the current spillway elevation is 4,214-ft. TUD has contemplated either a 25,000 af or 50,000 af reservoir with surface elevations of 4,285-ft and 4,328-ft respectively. Both options would be located 800-ft downstream of the current dam. The estimated cost of a new 50,000 af reservoir is $26 million. A map of the 50,000 af option is shown in Figure 8-19. SEWD has expressed interest in partnering with TUD for supplemental water supplies from the Lyons Reservoir enlargement (http://www.cserc.org/news/newsletter/2003winter/Lyons.html, 2003).

8.3 Groundwater Recharge Components

For planning purposes, the following descriptions represent the final use of water. The components include groundwater recharge infrastructure and improvements, drinking water treatment facilities, and agency conjunctive use programs.

8.3.1 Farmington Program

In 1997, the USACE completed the Farmington Dam and Reservoir Conjunctive Use Study, which evaluated potential structural and operational changes at Farmington Dam and Reservoir as part of a conjunctive use program. The study found that long-term storage at Farmington Reservoir is not cost-effective; however, operational modifications and the construction of groundwater recharge facilities are cost-effective. Consequently, the USACE, SEWD, and local water interests embarked on the development of a groundwater recharge program. In 1999 the U.S. Congress authorized up to $25 million for construction of groundwater recharge and conjunctive use projects in Eastern San Joaquin County.

In 2001, SEWD completed the Farmington Groundwater Recharge/Seasonal Habitat Study (Farmington Study) to evaluate the physical and financial feasibility of a groundwater recharge program in Eastern San Joaquin County. Through pilot testing, the study team found that the most effective area for groundwater recharge is the area bounded by Highway 99, Jack Tone Road, the City of Manteca, and the Mokelumne River. A map of the general area is shown in Figure 8-20. The Farmington Study also explored the feasibility of various recharge techniques and concluded that the most efficient method of groundwater recharge in Eastern San Joaquin County is the use of field flooding, recharge basins, and excavated pits. Each method varies in average water depth from a few inches to several feet. Figure 8-21 illustrates the various methods of recharge used in the Farmington Program. Existing structures and improvements such as flood detention basins, quarry excavations, canals, and clarifiers can also be easily modified and incorporated in to the project.

In November of 2003, the District received $1.3 million from the DWR for a Proposition 13 grant to complete the first pilot project facilities adjacent to the SEWD Treatment Plan. The pilot project is a permanent facility consisting of one 19-acre pond and three recharge basins totaling 35 acres. These facilities are expected to recharge 7,000 af/yr. In February of 2004, the pilot project was named the Water/Environment Project of the Year, 2003, by the American Society of Civil Engineers.

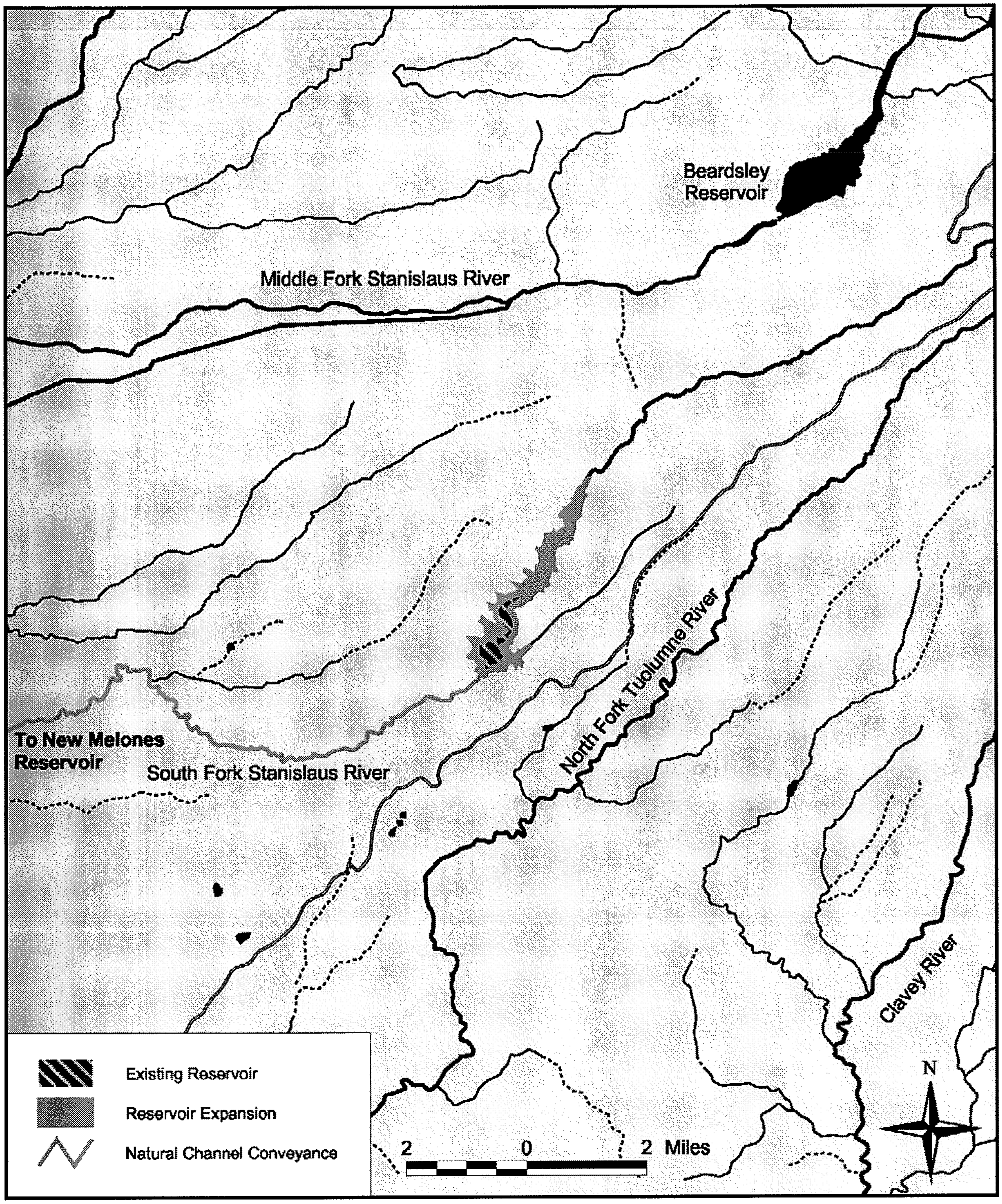


Figure 8-19 Lyons Reservoir Expansion
Source: http://www.tuolumneutilities.com/uwmp.pdf, 2000

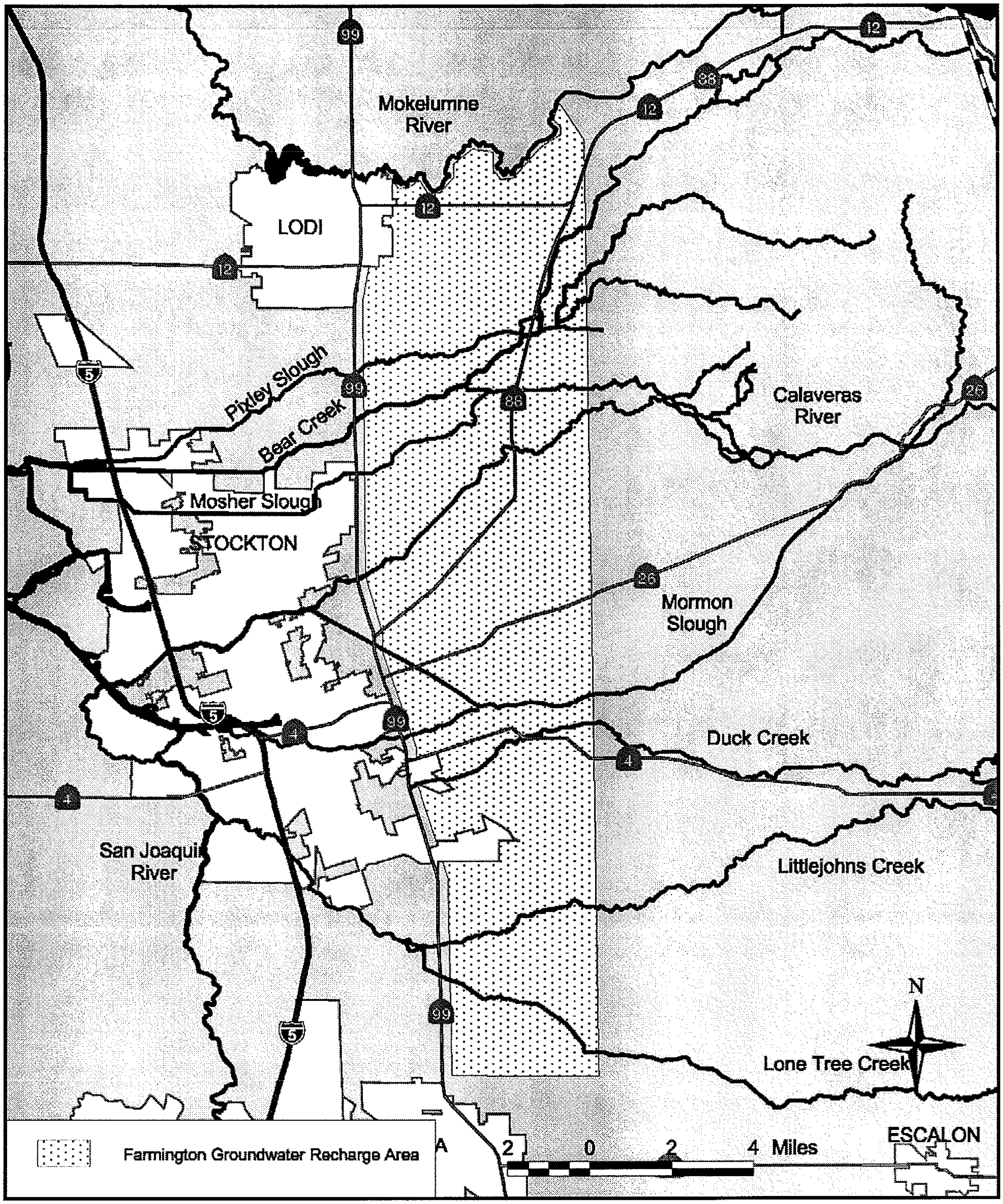


Figure 8-20 Farmington Groundwater Recharge Area
Source: Farmington Groundwater Recharge/Seasonal Habitat Study, 2001

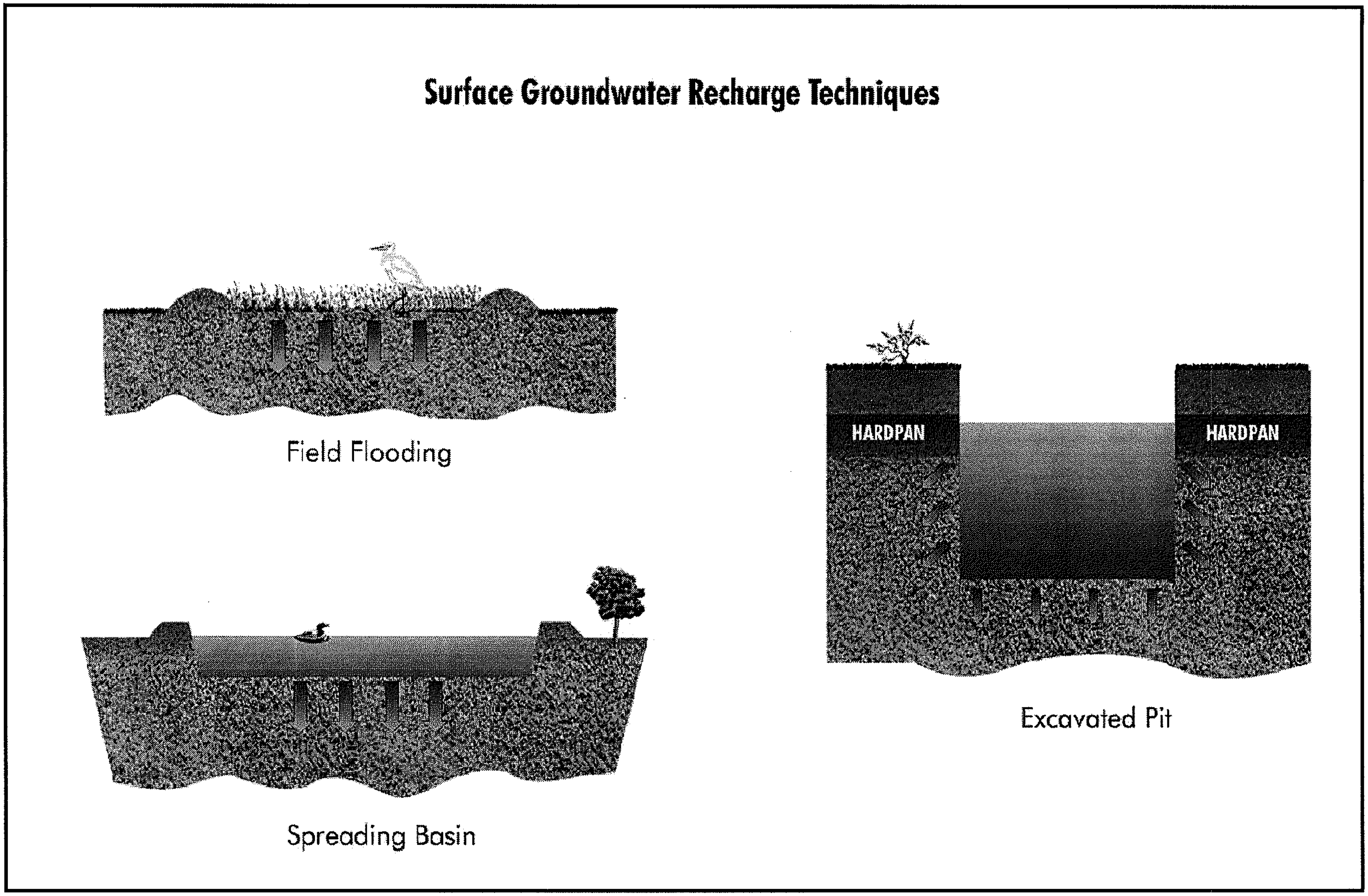


Figure 8-21 Surface Groundwater Recharge Techniques
Source: Farmington Groundwater Recharge/Seasonal Habitat Study, 2001

The Farmington Program Base Project (Farmington Program) objective is to recharge an average of 35,000 af of water annually by directly recharging surface water on 800 to 1,200 acres of land in the area described above. The Farmington Program is a flexible program by which willing landowners with 20 to 100 acre parcels may enter into short-term and long-term agreements and receive market-based compensation for the use of their land for groundwater recharge. In addition all improvements are paid for through the Farmington Program. The arrangement allows the rotation of groundwater recharge practices with traditional land use making water a cash crop for farmers in the program. The Farmington Groundwater Recharge Program is currently seeking out landowners who are willing to participate in the program by providing fields that can be flooded.

The planned capacity of the Farmington Program is approximately 35,000 af/yr. The following water sources are assumed available for the Farmington Program:

- 10,000 af/year from Stanislaus River
- 10,000 af/year from Littlejohns Creek
- 5,000 af/year from Calaveras River
- 10,000 af/year from Mokelumne River

8.3.2 City of Stockton Delta Water Supply Project

In 1996, the City of Stockton filed a water right application with the SWRCB seeking to appropriate initially 20,000 are-ft per year of water from the Delta, increasing to 125,900 af per year in 2050. The application specifies a place of use that coincides with the adopted 1990 City of Stockton General Plan boundary as shown in Figure 8-22. The city filed the water right application under two legal authorities: California Water Code Section 1485, the recapturing of treated wastewater discharge in the Delta, and California Water Code Sections 11460 and 12200 *et seq.*, area of origin provisions and the Delta Protection Act, respectively. The city currently discharges approximately 35,000 af per year of treated wastewater into the San Joaquin River. Diversions from the Delta are extremely contentious and therefore somewhat restrictive due to constraints under the State and the federal Endangered Species Act (ESA). The City of Stockton also expects to be limited by SWRCB Term 91 conditions, which limits diversion to when Delta outflow is higher than regulatory minimum requirements. (City of Stockton, 2003) In 2003 the City of Stockton completed the Delta Water Supply Project (DWSP) Feasibility Report.

The DWSP consists of a new diversion structure in the delta at the southwestern tip of Empire Tract on the San Joaquin River, a raw water conveyance pipeline, a new water treatment plant along Eight Mile Road, treated water transmission facilities, and groundwater injection and extraction wells, as shown in Figures 8-23 and 8-24. The estimated capital costs of the facilities are:

- River Intake and Pumps: $18 million
- Raw Water Conveyance: $35 million
- Water Treatment Plant (30 MGD): $59 million
- Treated Water Pipelines: $9 million

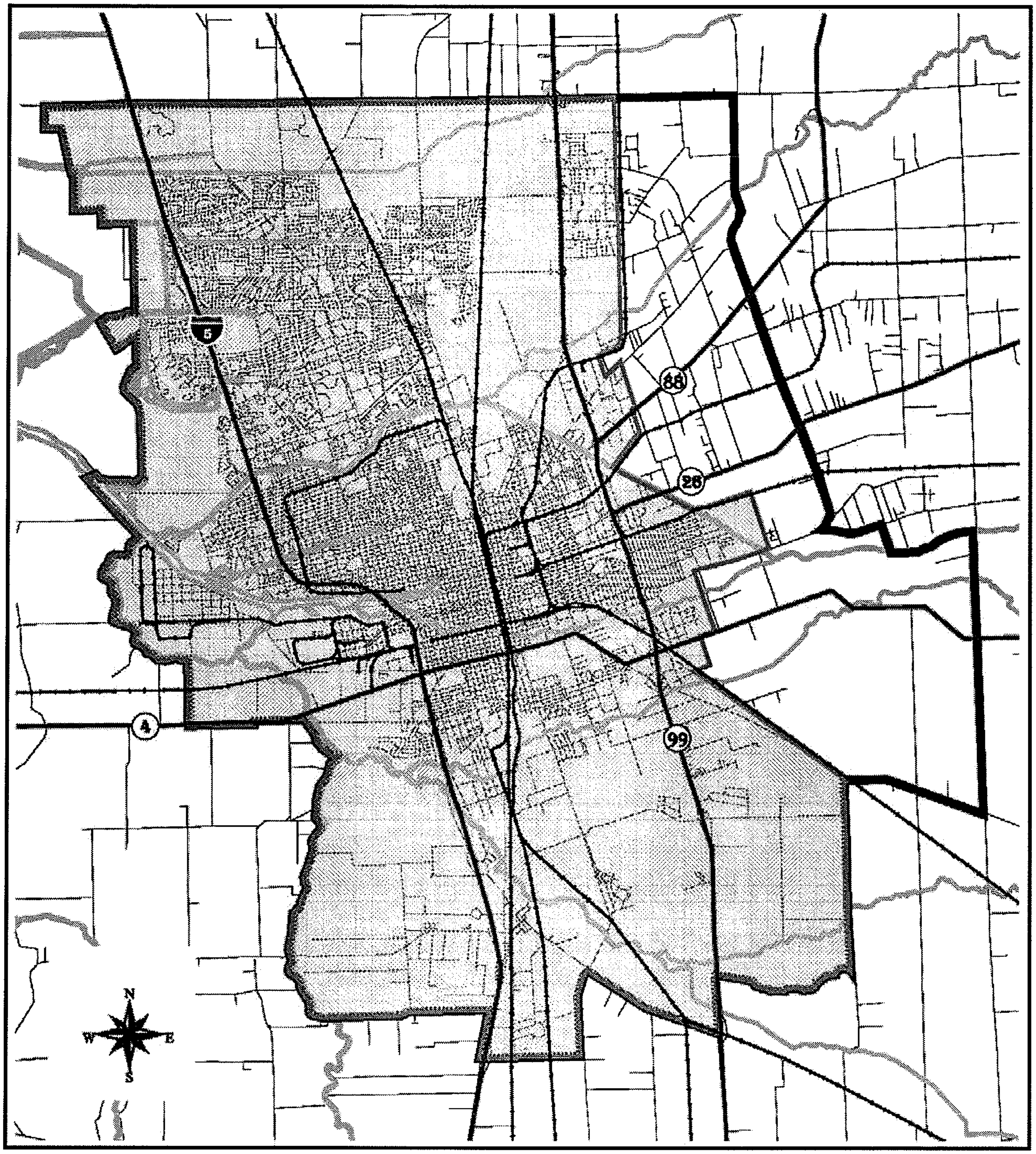


Figure 8-22 City of Stockton General Plan Boundary
Source: City of Stockton Delta Water Supply Project Engineering Feasibility Study, 2003

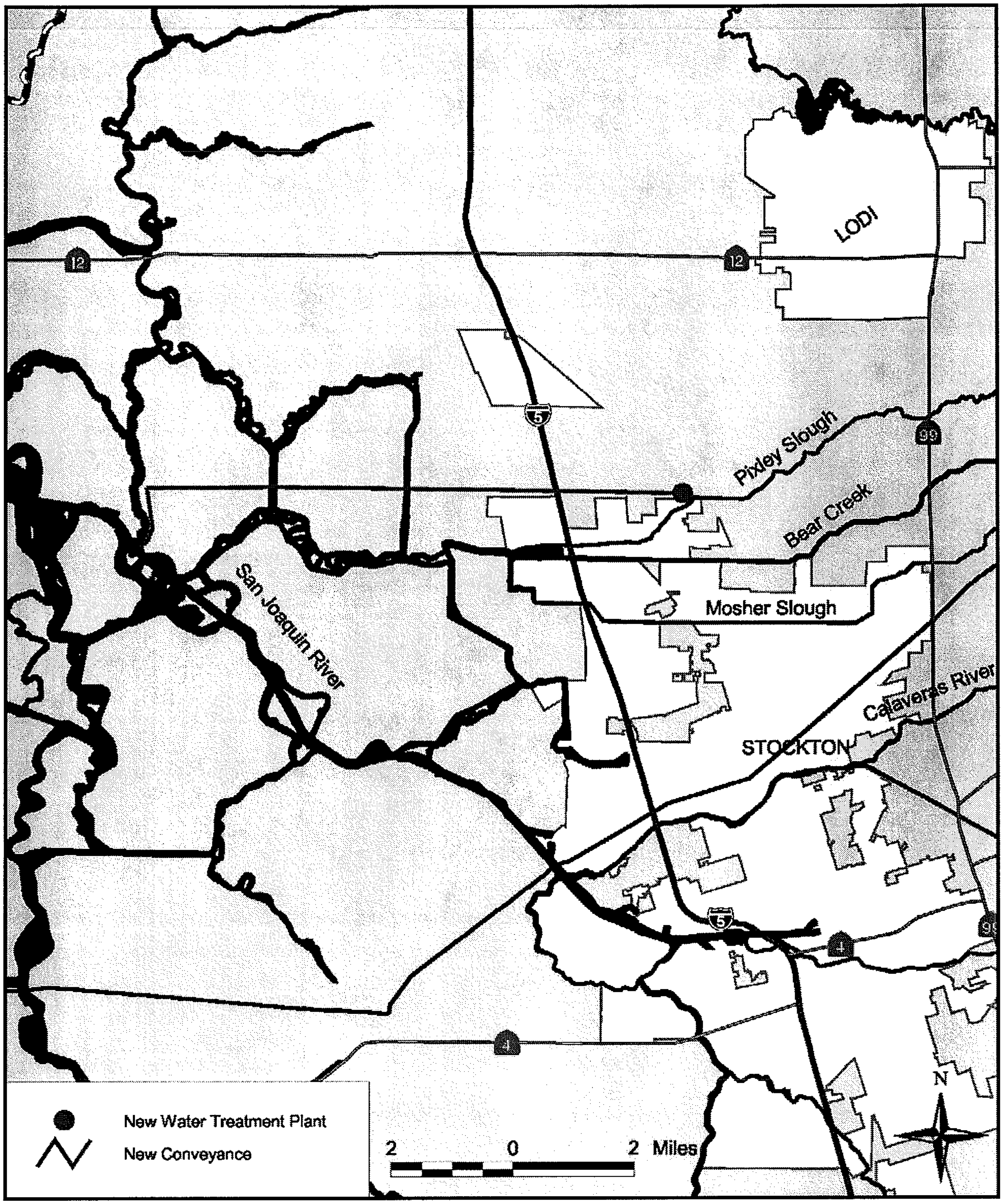


Figure 8-23 Delta Water Supply Project Intake and Treatment Plant
Source: City of Stockton Delta Water Supply Project Engineering Feasibility Study, 2003

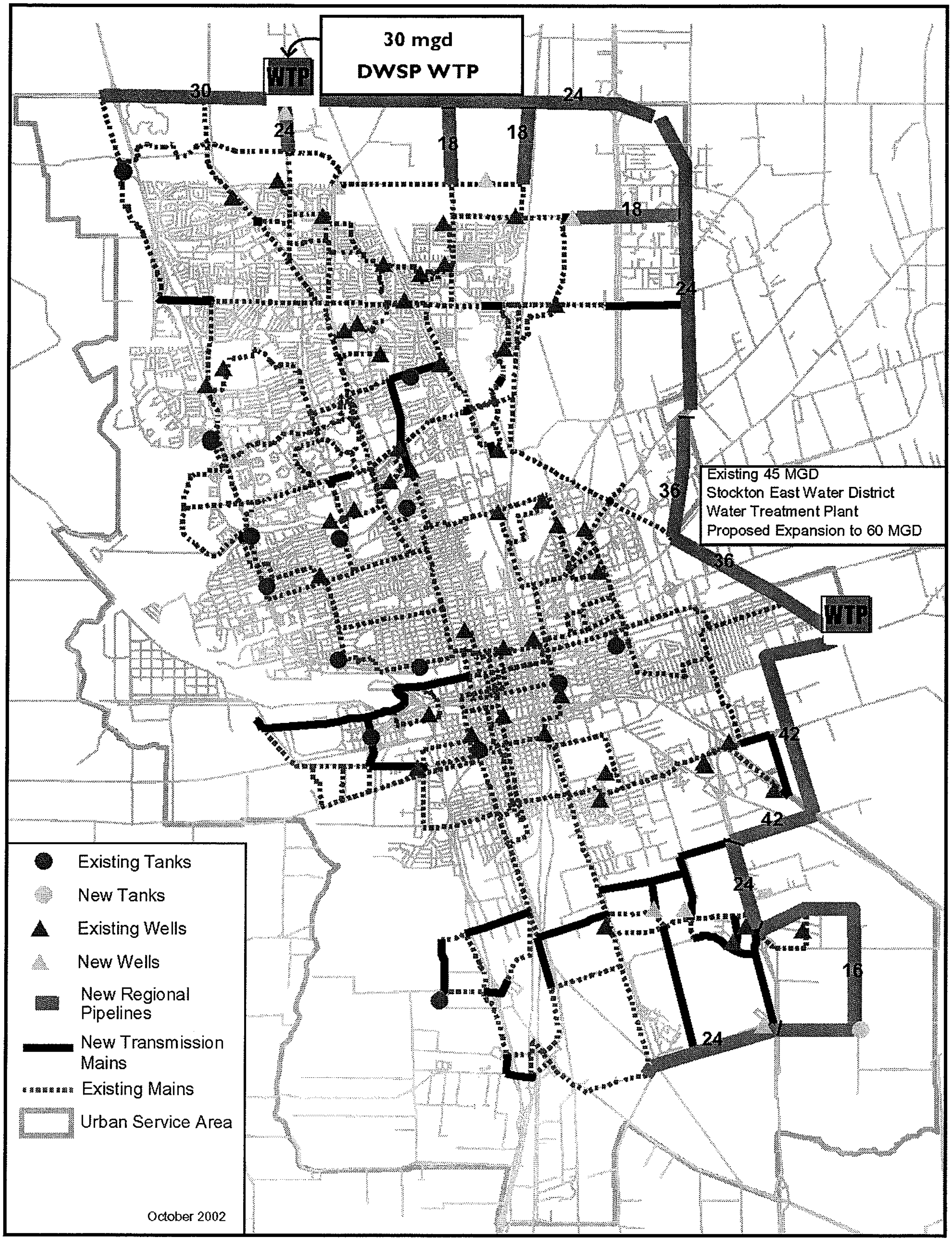


Figure 8-24 Delta Water Supply Project Distribution System
Source: City of Stockton Delta Water Supply Project Engineering Feasibility Study, 2003

Operations and Maintenance costs are expected to steadily increase to $5.75 million by 2015. The cost of the groundwater injection and extraction facilities is unknown at this time. The estimated cost of raw water delivery is approximately $200 per af, and the cost of delivery of fully treated water is expected to be about $350 per af.

Past groundwater studies in the region show that the maximum, sustainable, long-term yield from the aquifer is 0.75 to 1 acre-foot per acre per year. The City of Stockton selected 0.6 af per acre per year as the target groundwater extraction rate which corresponds to an extraction amount of 40,000 af per year to combat historic overdraft conditions and the intrusion of saline groundwater into the underlying Basin. The DWSP will also include an aquifer storage and recovery (ASR) program to better meet long-term needs of the City of Stockton.

The City of Stockton is currently preparing a project level EIR/EIS with an anticipated groundbreaking date of 2008 and water delivery scheduled for 2010. The aggressive schedule is indicative of the uncertainty in final revised State Maximum Contaminant Level (MCL) for arsenic. At present the City of Stockton meets or exceeds the Federal MCL for arsenic; however, more conservative State regulations may force numerous well closures forcing the City of Stockton to rely more heavily on the DWSP and alternative sources.

Subsequent phases include a 10 MGD pilot ASR program to bank treated surface water in the underlying aquifer. The pilot ASR program involves retrofitting up to 10 existing wells for injection and extraction at an estimated cost of $200,000. After the completion of the pilot program, costs will be determined for an expanded program to serve as a groundwater bank. In the Feasibility Study, three potential banking sites were identified: Site A, north of Alpine Road and west of Highway 99, site B, south of Alpine Road and west of Highway 99, and site C, located along the Southern Pacific Railroad - Figure 8-25 (City of Stockton, 2003).

8.3.3 SEWD Water Treatment Plant Expansion

The current capacity of the Dr. Joe Waidhofer Water Treatment Plant (SEWD Treatment Plant) is 45 MGD, and the capacity of the planned expanded facility is 60 to 65 MGD. Currently turbidity occasionally limits production to 30 MGD resulting in an average yearly production of approximately 41,000 af. An expanded SEWD Treatment Plant is expected to supply up to 62,000 af per year. Currently, raw water sent to the SEWD Treatment Plant originates from either New Hogan Reservoir on the Calaveras River or New Melones Reservoir on the Stanislaus River. The combination of available water from these sources totals 90,099 af per year. The additional 28,000 af could be used for groundwater recharge and extracted during dry years. The estimated cost for the expansion is $26.9 to $33.4 million (SEWD, 2003).

8.3.4 CSJWCD Surface Water Delivery Program

CSJWCD holds CVP contract entitlements for water from New Melones Reservoir with the USBR. The total amount available to CSJWCD under the contract is 80,000 af/yr, 49,000 of which is said to be a firm supply. Because of current USBR operations of the New Melones Reservoir, in water year 2003, an above normal year for precipitation in the Stanislaus River watershed, the contract amount received was 10,000 af. CSJWCD delivered this amount in its irrigation system while SEWD did not receive any allocation in water year 2003. The CSJWCD irrigation system currently has the infrastructure capabilities to deliver approximately 35,000 af/yr for direct irrigation through a series of ditches and natural creeks, including Littlejohns, Temple, Lone Tree and Duck Creeks. The current system can be expanded to deliver up to 50,000 af/yr should water become available. Figure 8-26 depicts the CSJWCD irrigation system.

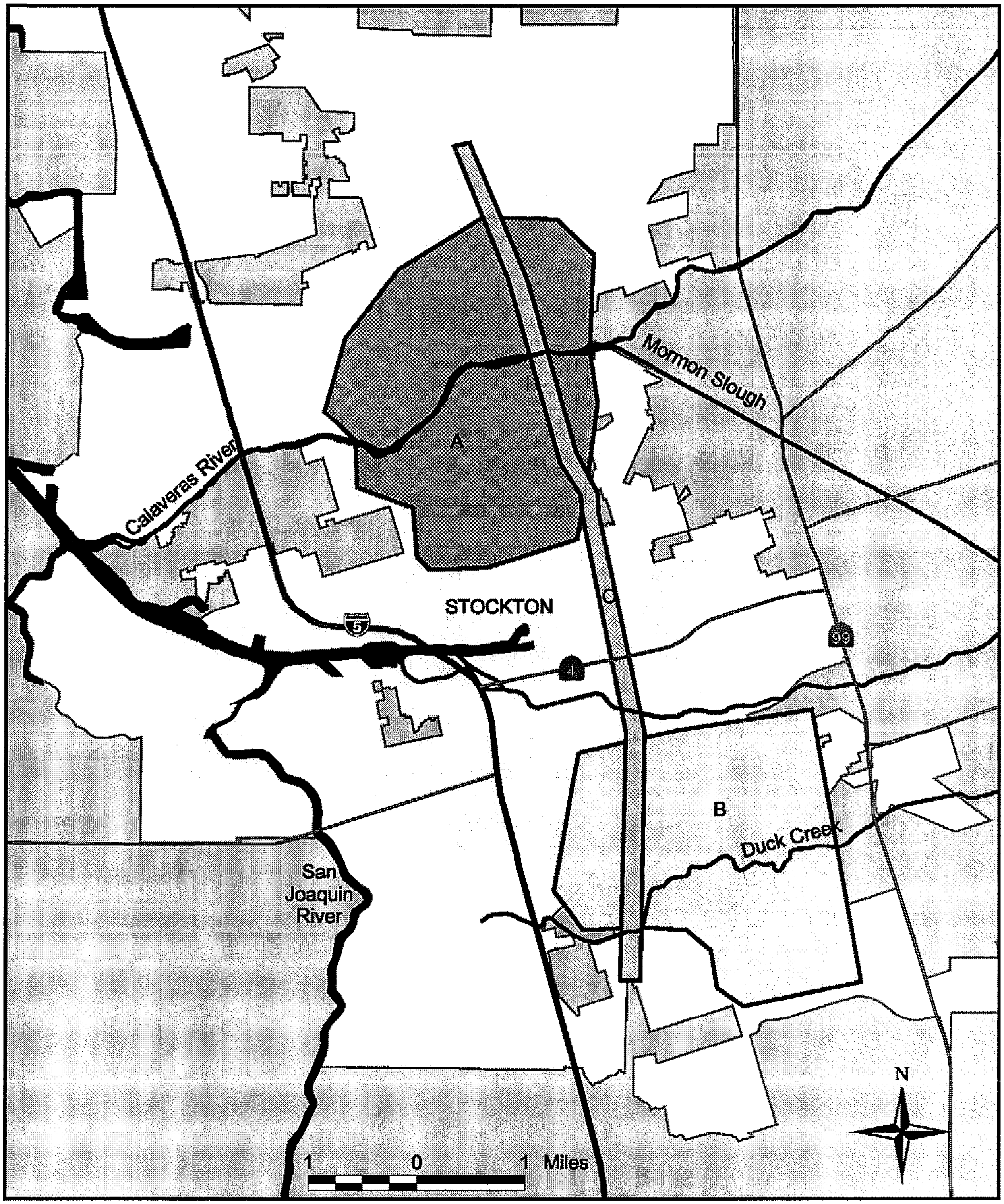


Figure 8-25 Delta Water Supply Project Potential Banking Sites
Source: Delta Water Supply Project Engineering Feasibility Study, 2003

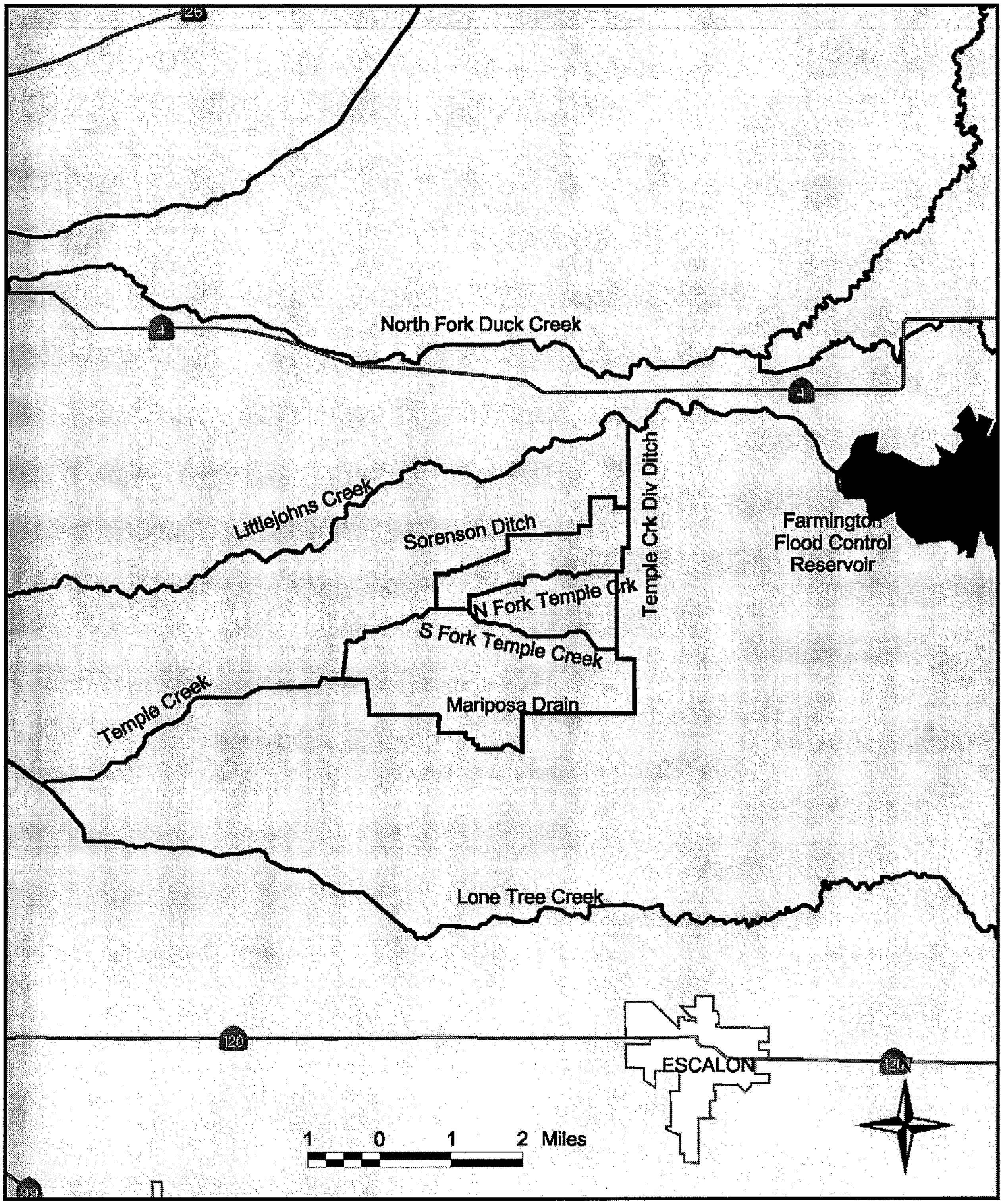


Figure 8-26 CSJWCD Irrigation System

Since the completion of the New Melones Conveyance System, surface water deliveries have elevated groundwater levels by as much as 15-ft in some areas within the CSJWCD.

8.3.5 NSJWCD Conjunctive Use Program

NSJWCD owns and operates two surface water irrigation systems on the Lower Mokelumne River. NSJWCD holds interim water rights and relies on EBMUD to store its divertible allotment at Camanche for use during the irrigation season. The interim nature of the water requires farmers to maintain two irrigation systems thus reducing the demand for surface water to less than 3,000 af/yr. NSJWCD has rights to divert up to 20,000 af/yr when available at an average annual yield of approximately 11,000 af/yr.

The north system consists of a 30 cfs pipeline and intake pump near Trethway Road where it veers east along Acampo Road. The north system pipeline is in disrepair and requires extensive improvements. Repair and expansion of the north system is highly compatible with the Gill Creek and Woodbridge Road Flood Control Improvements Project. The system is much larger and consists of pump station and a series of laterals that discharge into both Bear Creek and Pixley Slough. Growers along either the natural drainages or the pipeline are able to divert for irrigation. Both systems can be easily integrated into the MORE WATER Project direct diversion alternative should permanent or long-term groundwater recharge facilities be constructed. A map of NSJWCD's distribution system is shown in Figure 8-27.

In 2000, NSJWCD was selected to receive $462,500 from a CALFED grant to study groundwater recharge in the Mokelumne River watershed. The project includes a five-year pilot study involving the spreading of wet-year water on two four-acre ponds. Up to 50 percent of the recharged water, minus losses, would be available for extraction by wells for discharge into the Delta during dry and critically dry years. The impact of dibromo-chloro-propane (DBCP) on groundwater quality and its implications for larger-scale conjunctive use projects would also be evaluated.

In 2003, land owners in NSJWCD approved an acreage assessment dedicated to groundwater recharge. Beginning in 2003, land owners would be assessed $1 per acre up to a maximum of $5 per acre. Revenues generated in 2003 and 2004, estimated at $50,000, were used to construct a series of two pilot recharge ponds; one north of the Mokelumne River and one to the south. NSJWCD is also a local participant in the Farmington Program and a member of the Eastern Water Alliance.

8.4 Groundwater Banking Partnerships

Groundwater banking partnerships in Eastern San Joaquin County have the potential to benefit locally, regionally, and Statewide. The unique situation in Eastern San Joaquin County, with over 1 million af of groundwater storage potential and the development of an integrated conjunctive use program, is a logical match for regional and Statewide interests to look to the Authority for groundwater banking opportunities. In the past, entities have been known to purchase raw water from groundwater banks at rates upwards of $420/af. Numerous banking partnership concepts exist; however, it is of utmost importance that control over extraction rates and quantities remain in the hands of locals and out of the hands of politicians and the courts.

The San Joaquin Groundwater Export Ordinance (Export Ordinance) is notoriously stringent in order to protect local groundwater users from groundwater exports. The San Joaquin County Board of Supervisors has continually stated that they are willing to amend the Export Ordinance

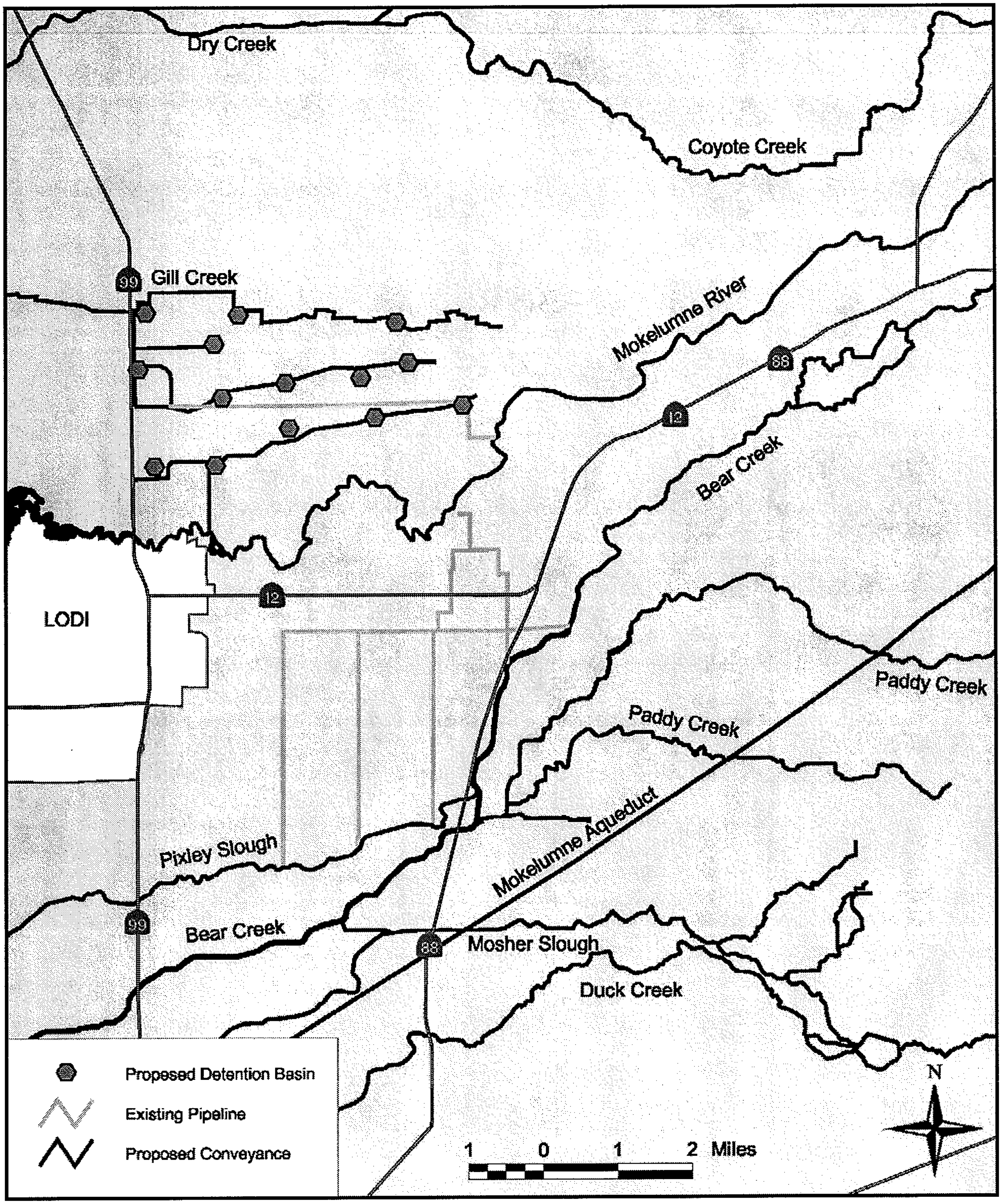


Figure 8-27 NSJWCD Distribution System

should a project be proposed that can demonstrate local benefits with minimal risk to losing local control of the Basin.

Banking partnerships could provide the Authority with capital to fund portions of Integrated Conjunctive Use Program envisioned above, water storage agreements, groundwater substitution, and a 'two for one' storage/extraction concept. Potential partners that have shown interest are EBMUD, Metropolitan Water District of Southern California, DWR, CALFED Environmental Water Account, and the City of Tracy.

9 Plan Implementation

The Authority is committed to adopting a Plan implementation strategy that is adaptive and incentive driven. This Plan is the first step in the development of a regional document that details how the groundwater basin will be managed and initiates the process that will ultimately define the guidelines and conditions that water districts and others will follow to achieve basin management objectives. Following the adoption of this Plan, the Authority and its members will work to implement the management objectives. The objectives coupled with regular groundwater monitoring and the development of basin operations criteria will establish a framework and the foundational information for future groundwater banking and recharge project operations in the Basin.

9.1 Plan Implementation Reports

To encourage the continued implementation of the Plan, the Authority will complete a periodic assessment of the progress, direction and recommendations regarding Plan objectives. Basin hydrogeologic conditions are currently measured by groundwater level and quality monitoring on a semi-annual basis. This assessment activity will be coupled with the annual review of Plan implementation activities and project development in the basin.

To ensure that the Authority is constantly striving to better manage groundwater resources, the following actions will be undertaken:

4. Produce an annual report by March 1st of each year that outlines the accomplishments of the previous year's groundwater management efforts and report the current state of the Basin;

5. Review changes in political, institutional, social, or economic factors affecting groundwater management; and

6. Based on the information gained in the above actions, provide recommendations for any required amendments to the Plan.

9.2 Future Activities

The adoption of the Plan is merely the beginning of a series of actions the Authority will undertake to help meet future basin demands. As such, many of the identified actions will likely evolve as the Authority takes a more active approach to manage the basin and meet the outlined objectives. Many additional actions will also be identified in the annual summary report described above. The Plan is therefore intended to be an iterative 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 goal of the plan. The Authority plans to evaluate this entire plan within five years of adoption.

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