September 2004

Eastern San Joaquin Groundwater Basin Groundwater Management Plan

Northeastern San Joaquin County Groundwater Banking Authority

SJC EXHIBIT 4

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.

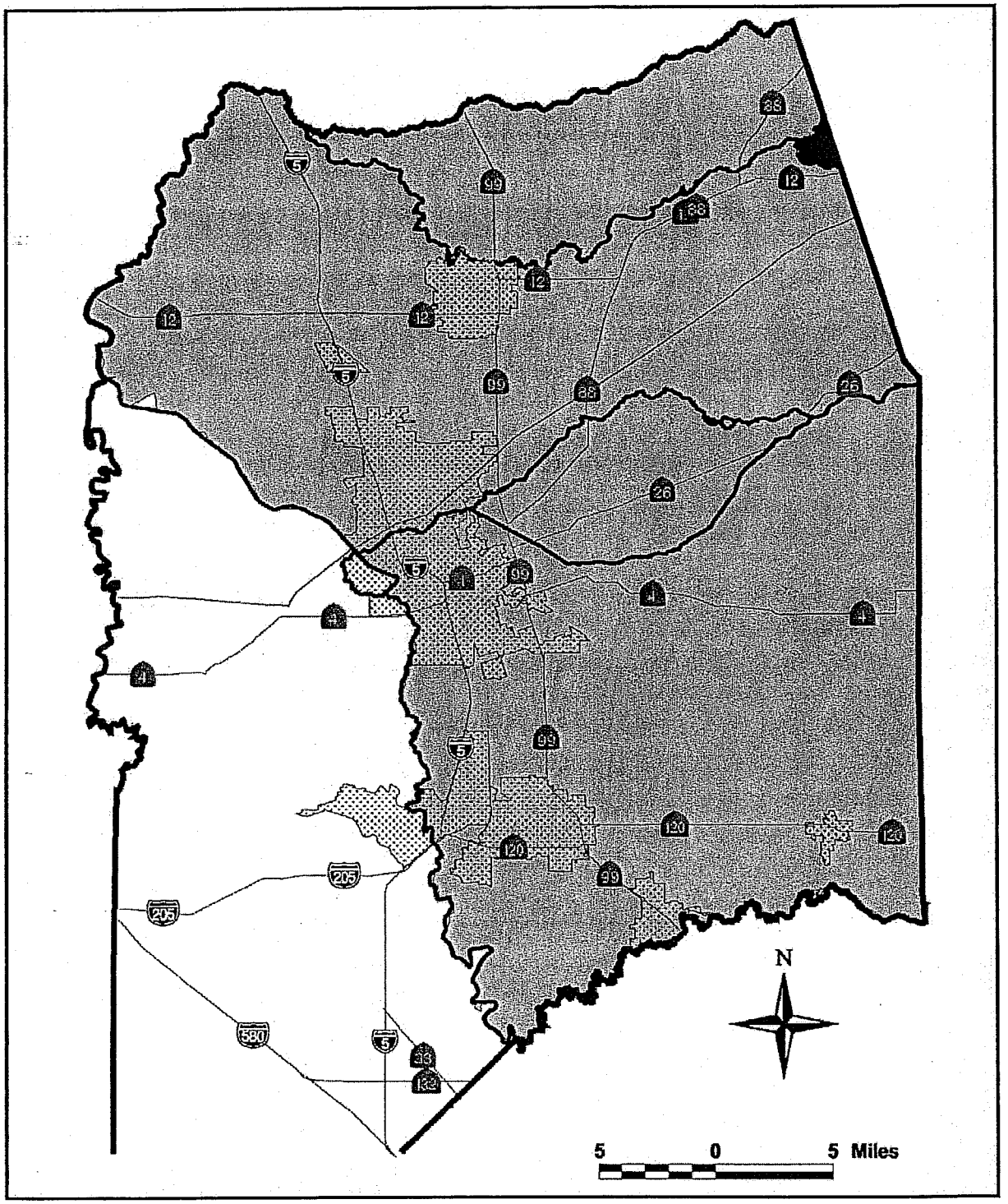

Figure ES-1 Groundwater Management Area
Source: California Spatial Information Library at http://www.gis.ca.gov/

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	
Anders Christensen	Woodbridge Irrigation District
Cary Keaton	City of Lathrop
Dante Nomellini	Central Delta Water Agency
Dave Kamper	South San Joaquin Irrigation District
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
T.R. 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
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 Senate Bill (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.

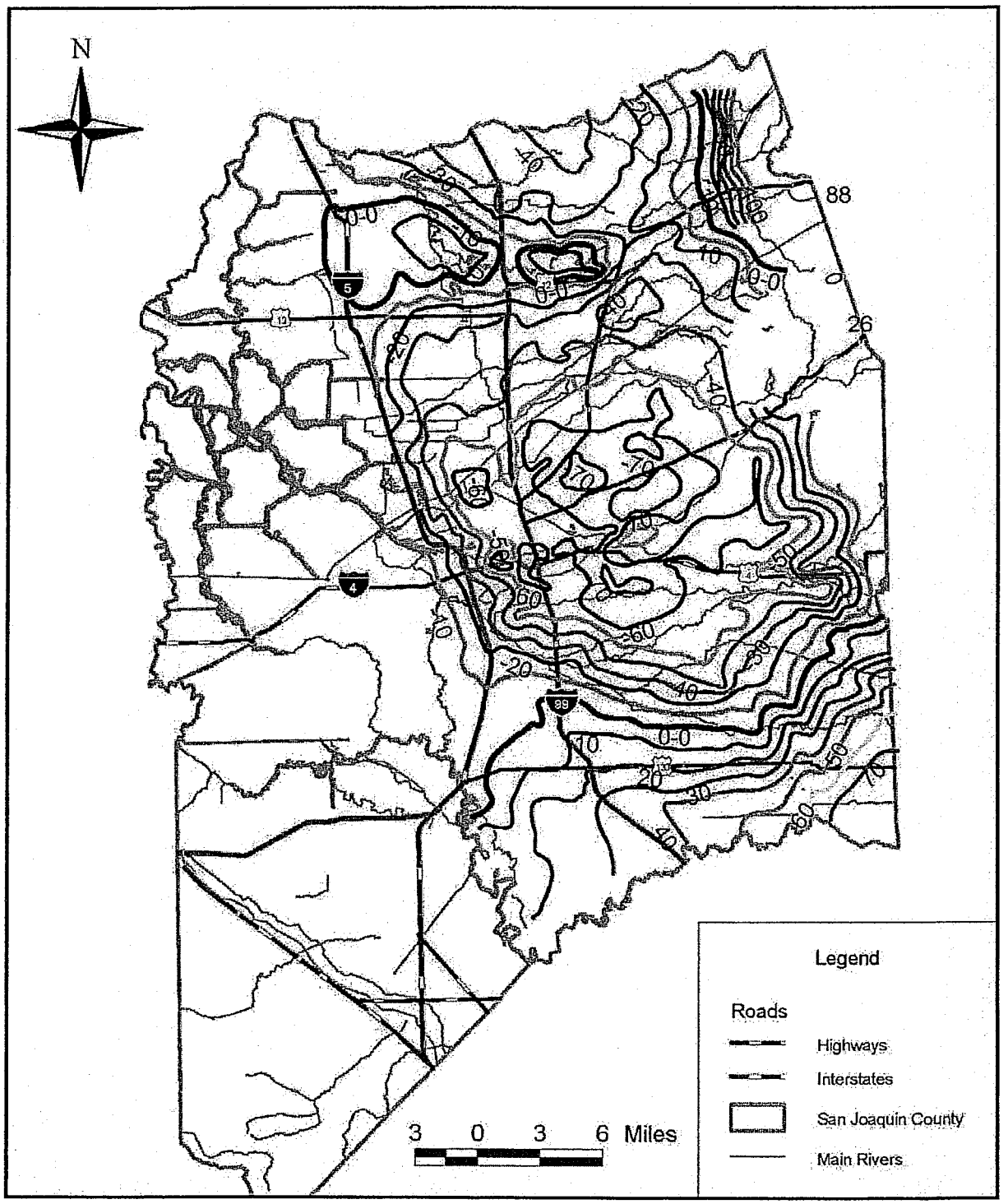

Figure ES-2 Fall 1993 Groundwater Contours
Source: Camp Dresser & McKee Inc.

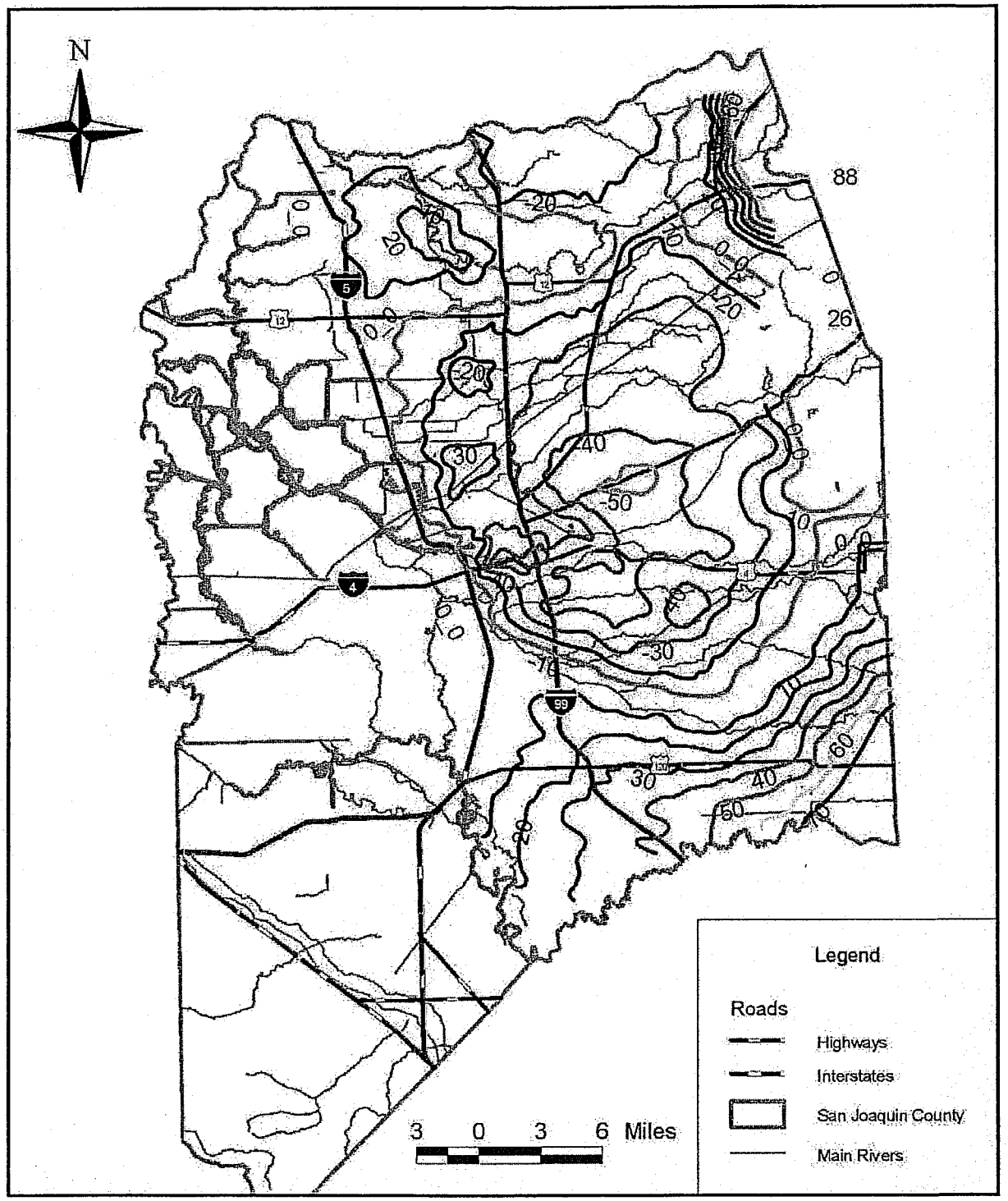

Figure ES-3 Spring 1998 Groundwater Contours
Source: Camp Dresser & McKee Inc.

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,

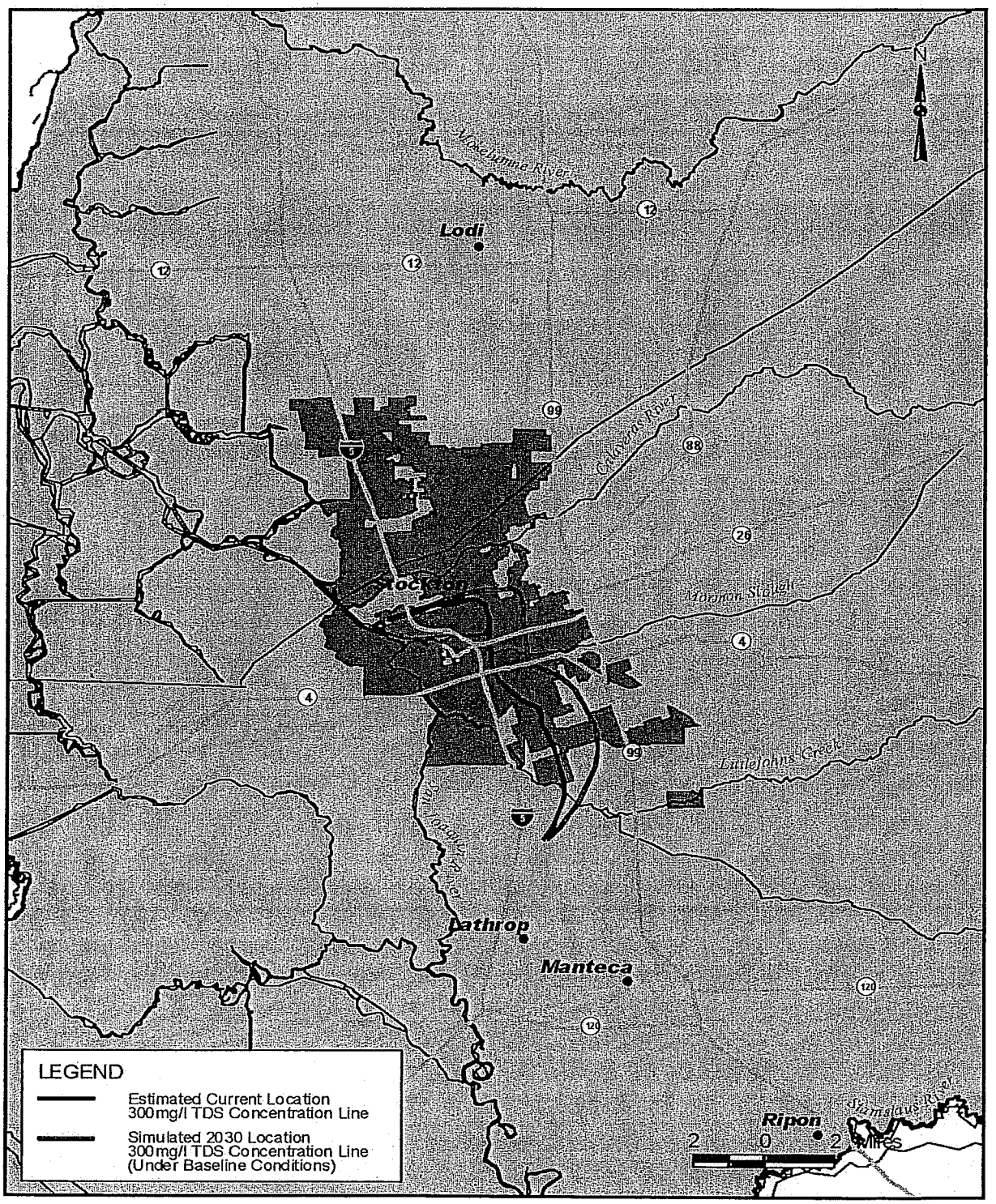

Figure ES-4 Estimated 2000 and 2030 Projected Saline Front
Source: Camp Dresser & McKee, Inc.

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

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.

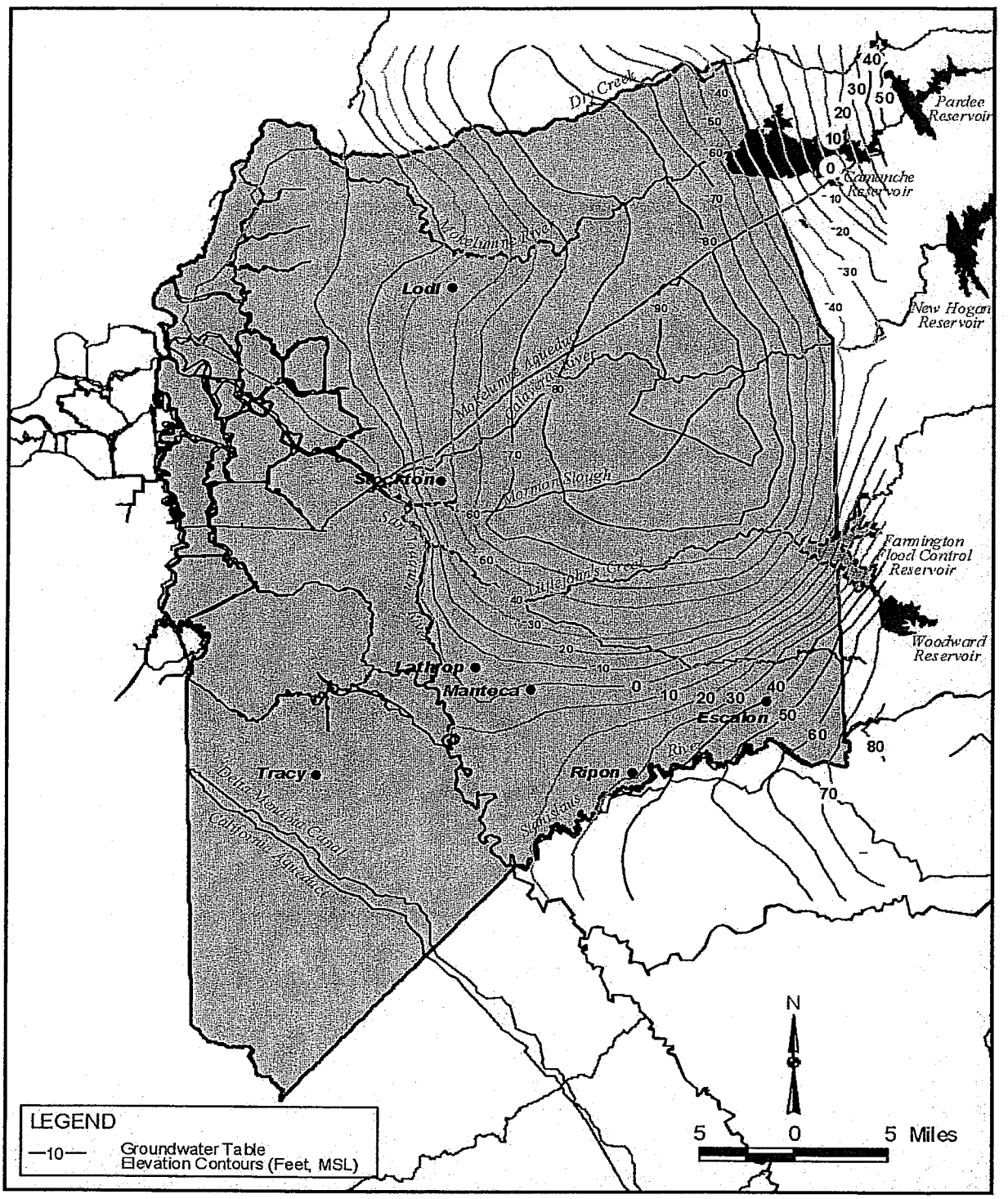

Figure ES-5 Simulated Groundwater Levels Under Baseline Conditions
Source: Camp Dresser & McKee Inc.

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.

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.

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 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. In the immediate future, the Authority and its member agencies will undertake the following planned activities described below subsequent to the adoption of the Plan.

Integrated Conjunctive Use Program CEQA Review

The California Environmental Quality Act (CEQA) allows agencies to prepare a Programmatic Environmental Impact Report (EIR) for a proposed course of action. The Integrated Conjunctive Use Program is a grouping of stand alone projects that could have very different specific environmental impacts, but would also have to address many of the same global environmental impacts requiring disclosure under CEQA. The Program EIR will support the implementation of future site-specific projects by:

- Allowing proper consideration of broader scale impacts, alternatives, and mitigation criteria that would extremely difficult in individual site-specific project level EIR.
- Focusing on cumulative impacts and growth inducing impacts with the implementation of the Conjunctive Use Program.
- Addressing policy, design, and management issues at the program level rather than repeatedly considering them at the project level.
- Considering broad policy alternatives and programmatic mitigation measures at an early stage in the development of the Conjunctive Use Program when policy flexibility is greatest.
- Conserving resources and promoting consistency by encouraging the reuse of data.
- Providing the basis for National Environmental Policy Act (NEPA) review and Federal permitting approval processes should federal interest be established in the Conjunctive Use Program or any of the Program elements.

The Program EIR would also include a healthy technical appendix that would speak to the feasibility of specific project in the Conjunctive Use Program, demand management measures, and other policy alternatives. The Program EIR will also analyze the potential environmental effects of the Basin Management Objectives, assumptions and technical methods, policy alternatives to achieving identified objectives, broad-scale impacts, and establish mitigation criteria for the overall Plan. The Program EIR effort is expected to begin in 2005 and continue for 18 to 24 months

Basin Operations Criteria

Originally tied to the development of Basin Management Objectives, Basin Operations Criteria would set quantitative target groundwater levels and descriptive basin condition levels. Basin Operations Criteria could potentially consist of a series of groundwater levels that would correspond to basin condition levels (similar to the US EPA Air Quality Index and the US Department of Homeland Security Advisory System) to indicate the effectiveness of groundwater recharge programs and also potentially when and how much groundwater could be exported. The development of Basin Operations Criteria is a collaborative process that will be undertaken by the Authority immediately following the adoption of the Plan and is expected to be completed by summer 2005. Basin Operations Criteria developed with the framework of the Authority could ultimately provide the basis for a revised Export Ordinance and a new Groundwater Management Ordinance.

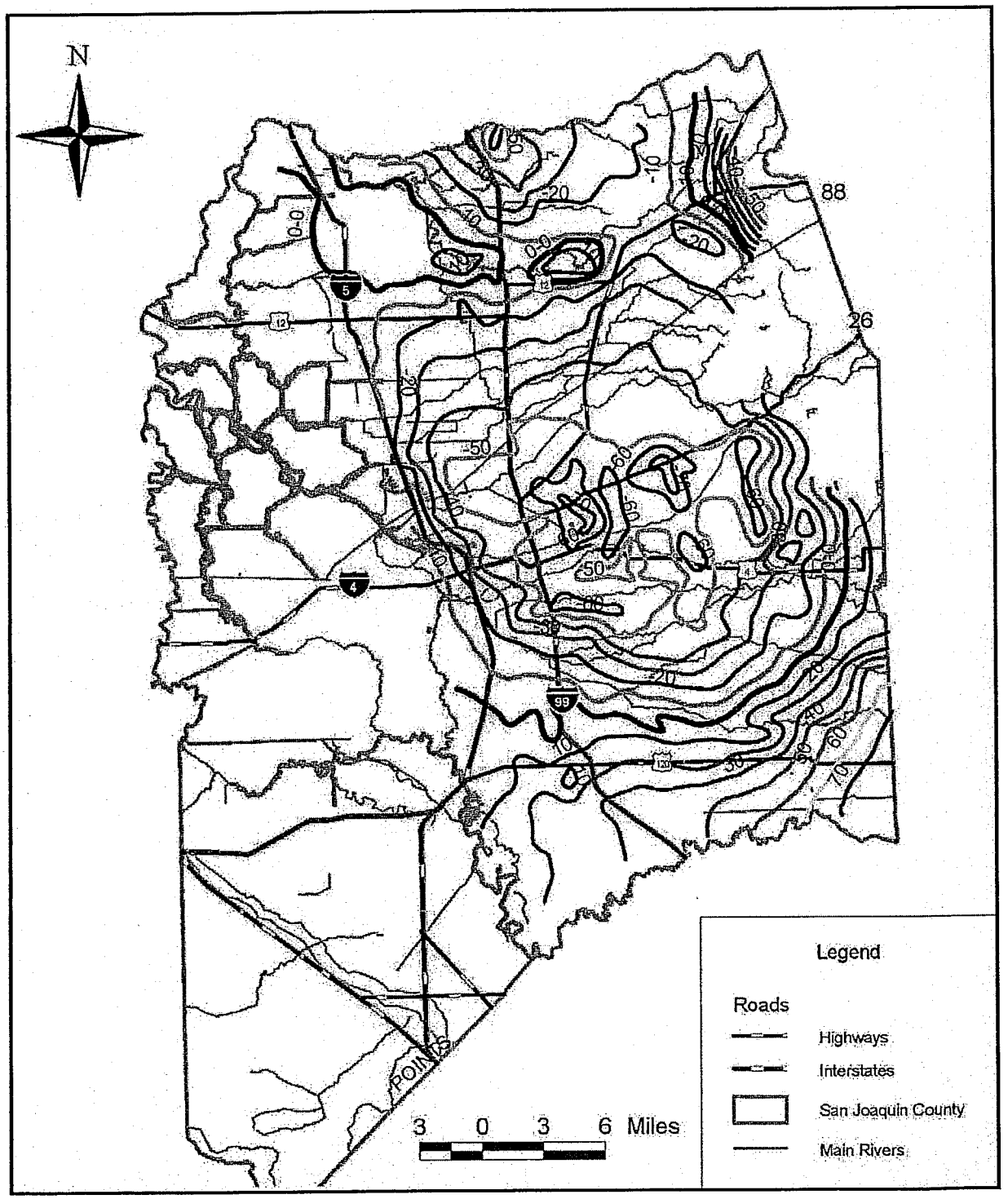

Figure 2-3 Spring 1993 Groundwater Contours
Source: Camp Dresser & McKee Inc.

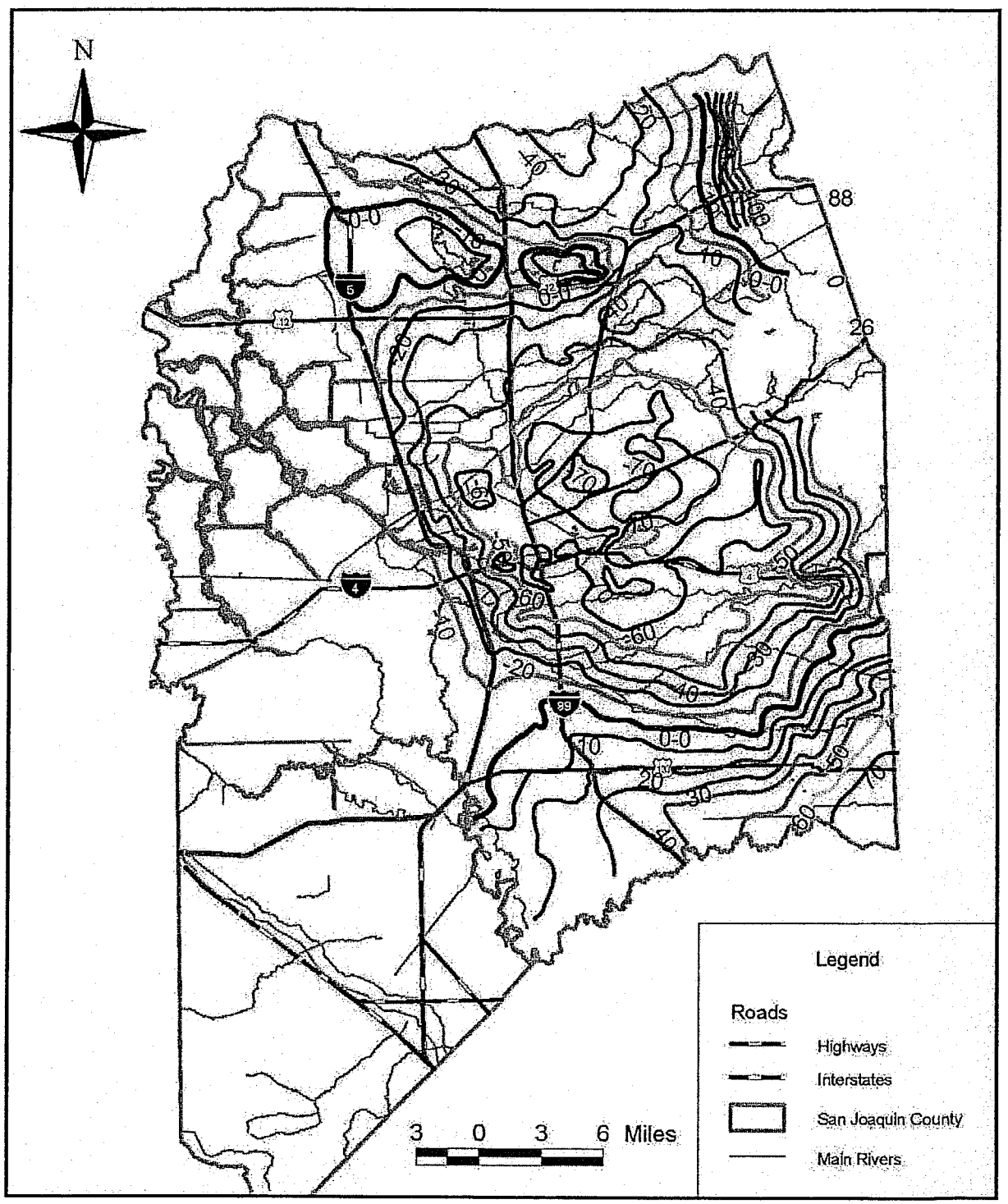

Figure 2-4 Fall 1993 Groundwater Contours
Source: Camp Dresser & McKee Inc.

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
Notes		
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.