Solano Agencies

Integrated Regional Water Management Plan and Strategic Plan

February 2005

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List of Acronyms

AB	Assembly Bill
AWMC	Agricultural Water Management Council
BMP	Best Management Practice
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
DPW	Department of Public Works
DWR	Department of Water Resources
EWMP	Efficient Water Management Practice
FEMA	Federal Emergency Management Agency
HCP	Habitat Conservation Plan
IRWMP	Integrated Regional Water Management Plan
Member Units	NBA water users
MPWD	Maine Prairie Water District
NBA	North Bay Aqueduct
NCCP	Natural Communities Conservation Plan
NOAA Fisheries	National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination System
NZMS	New Zealand Mudsnail
O&M	Operations and maintenance
Participating Agencies	Solano Project water users
R&B Plan	Solano Project Rehabilitation and Betterment Plan
RCD	Resource Conservation District
Reclamation	United States Bureau of Reclamation
RD	Reclamation District

RWQCB	Regional Water Quality Control Board
SAFCA	Sacramento Area Flood Control Agency
SB	Senate Bill
SCWA	Solano County Water Agency
SID	Solano Irrigation District
Solano Agencies	SCWA member cities and districts
SWOTs	Strengths Weaknesses Opportunities Threats
SWP	State Water Project
SWRCB	State Water Resources Control Board
USACE	United State Army Corps of Engineers
VPW	Vallejo Permit Water
WDR	Waste Discharge Requirement

Section 1
Introduction

1. 1 PROJECT BACKGROUND

This Integrated Regional Water Management Plan (IRWMP) was developed for the Solano County Water Agency (SCWA) and its member cities and districts (Solano agencies). This IRWMP completes the second phase of a two phased planning process. For the first phase, SCWA staff identified the major sources of water supply, existing demands, and water resources-related issues. Appendix A includes the Phase 1 report of the IRWMP.

Phase 2 of the IRWMP, which is described in this report, was developed in 2004 by engaging elected officials and a cross-section of technical and policy representatives from agricultural districts and urban agencies. This Stakeholder Group functioned as the knowledge base for the issues, ideas, and direction developed in the IRWMP. Section 2 provides a full description of the planning process and participants.

This document has two components:

- IRWMP - identifies and prioritizes all the water resource-related actions for the Solano agencies to meet their missions; and
- SCWA's Strategic Plan - prioritizes the SCWA related actions so that SCWA can best allocate its financial and staffing resources to meet its needs. This IRWMP includes the SCWA Strategic Plan as Section 7.

The Stakeholder Group developed both the IRWMP and the SCWA Strategic Plan using the same planning process.

1.2 REGIONAL WATER RESOURCES BACKGROUND

Like much of California, increasing water demands, dry year shortages and water quality challenges face the Solano agencies. Solano County is at the center of the expanding metropolitan areas of the Bay Area to the west and Sacramento to the east. Cities along the Highway 80 corridor from Dixon to Vallejo are experiencing rapid urban growth and have a need for reliable water supplies. The Solano agencies also realize the advantages of integrating water related programs such as water supply, water quality, wastewater treatment/recycling, flood management, watershed planning and environmental programs.

SCWA has a reliable water supply from the Solano Project, which provides supply to urban and agricultural users. The region has significant groundwater resources used by some of the cities and agricultural districts, but this resource remains for the most part under-defined. SCWA receives as much as 20 percent of its supply from the State Water Project (SWP), and member agencies divert other water supplies from the Bay-Delta estuary. The SWP is over-allocated and is not able to meet its allocations to State Water Project contractors, including SCWA, in dry and some normal years.

SCWA, the wholesaler for urban and agricultural water in Solano County, and its member cities and districts understand the need to integrate their water resources planning efforts and identify means to solve water issues within their region. The Solano agencies have a long and successful history of working together cooperatively to improve water supply reliability and quality. Working together to address regional issues enables the Solano agencies to maximize resources and reduce third-party adverse effects to nearby agencies.

Many of the Solano agencies face similar problems of water supply reliability, water quality, flood management, and environmental protection. These problems, among others, caused the Solano agencies to cooperate to produce this IRWMP at a regional level.

1.3 IRWMP PURPOSE

The Stakeholder Group established the purpose of the IRWMP:

- The IRWMP will propose region-wide policies and projects to meet the ten strategic issues of the Solano agencies:
  - Match supply to demand through the long term
  - Manage the County's groundwater resources
  - Encourage water of the appropriate quality for the intended use
  - Improve runoff water quality
  - Manage flood control services
  - Participate in multi-county flood control
  - Manage environmental resources
  - Leverage state and federal funding opportunities
  - Address safety and security issues
  - Prepare for climate change
- The IRWMP process documents a recommended path for SCWA to use its resources for the betterment of Solano County for programs within the authority of SCWA, including the SCWA-related policies and projects defined in the IRWMP, to be designated the "SCWA Strategic Plan."

The Stakeholder Group generated the ten strategic issues identified above. These issues represent the fundamental water resource policy questions and critical challenges that affect the Solano agencies' ability to accomplish their missions. Sections 2 and 4 fully describe the strategic issue development process and content.

The Solano agencies IRWMP process also recognizes the state policy on integrated water resources planning reflected in recent legislation and in funding vehicles such as Proposition 50. The Solano Agencies developed this IRWMP with these policies in mind. State policy and Proposition 50 funding guidelines helped guide the development of local actions that also meet state policy and needs.

1.4 PLANNING AREA AND PARTICIPATING AGENCIES

The planning area encompasses the entire boundary of SCWA and its member agencies. SCWA boundaries include all of Solano County, the property for the University of California at Davis in Yolo County, and a portion of Reclamation District No. 2068 (RD 2068) in Yolo County. Figure 1-1 identifies the planning area, major water supply features, and the Solano agencies. The boundary of SCWA does not always follow watershed boundaries. For example, the watershed of Lake Berryessa is in Napa and Lake counties. Also for flood management purposes, there are areas in Napa County that drain into Solano County, such as Suisun Creek.

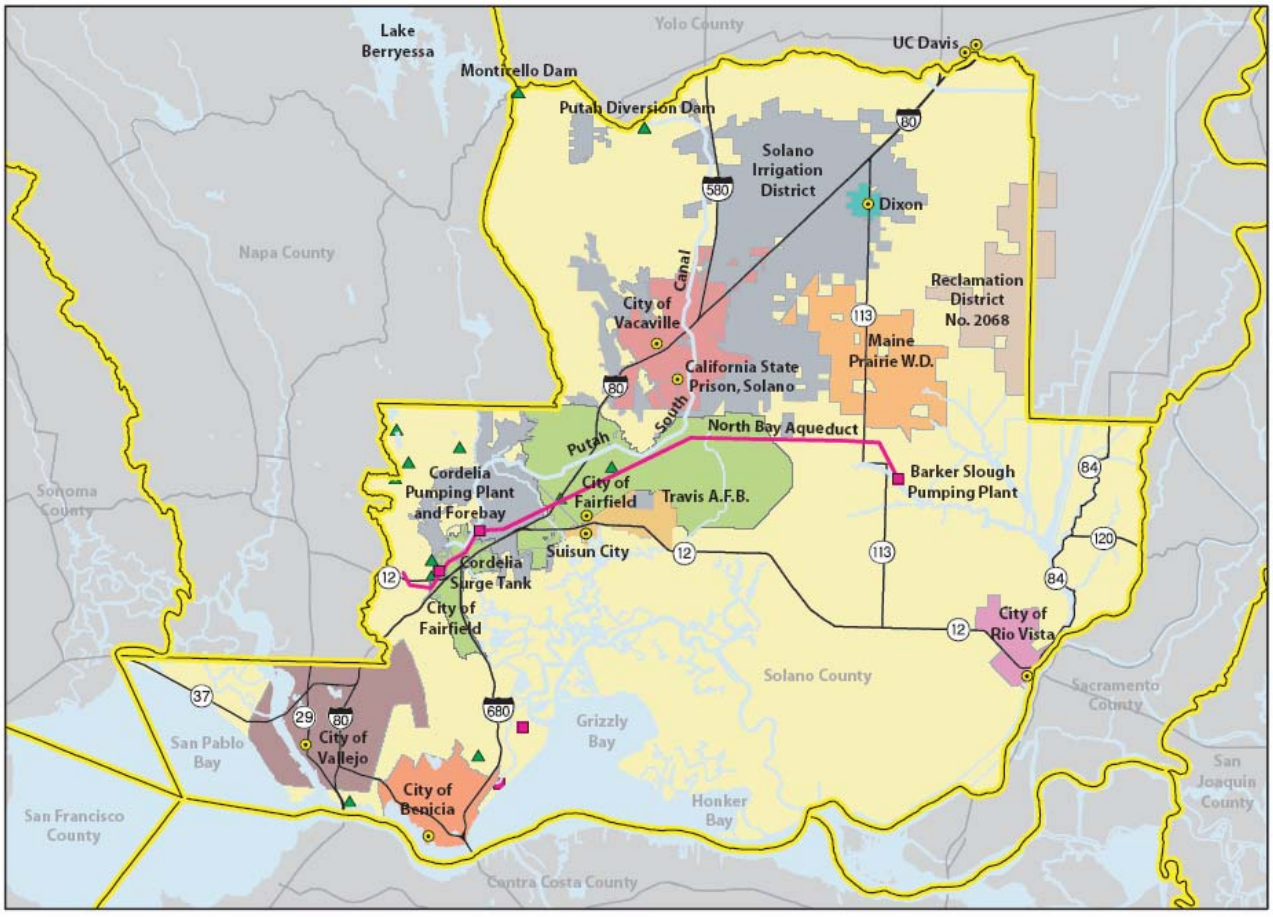


Figure 1-1
Solano Agencies IRWMP Planning Area

Solano Agencies	
• City of Benicia • City of Dixon • City of Fairfield • City of Rio Vista • City of Suisun City • City of Vacaville	• City of Vallejo • Solano Irrigation District • Maine Prairie Water District • Reclamation District No. 2068

1.5 ACKNOWLEDGEMENTS

Many organizations and individuals contributed to the development of the IRWMP; without their assistance, this document would not have been possible.

1.5.1 Stakeholder Group

The Stakeholder Group provided valuable input during the formulation of the IRWMP. Their local knowledge, understanding of regional issues, and willingness to provide input and feedback in a collaborative environment has resulted in an integrated planning document that will assist the region with meeting its future water resource needs.

IRWMP Stakeholder Group

Name	Title, Organization
Len Augustine	Mayor City of Vacaville & SCWA Board Member
Marci Coglianese	Mayor City of Rio Vista & SCWA Board Member
Barbara Kondylis	Solano County Supervisor & SCWA Board Member
Duane Kromm	Solano County Supervisor & Chair of SCWA Board
Karin MacMillan	Mayor City of Fairfield & SCWA Board Member
Rudolf Ohlemutz	District Engineer Vallejo Sanitation and Flood Control
Chris Tomasik	Assistant Public Works Director City of Benicia
David Tompkins	Assistant Public Works Director City of Vacaville
Rick Wood	Assistant Public Works Director City of Fairfield
Joe Martinez	Chairman SCWA Flood Control Advisory Committee
Bob Isaac	Manager Solano Irrigation District
Rich Luthy	Manager Fairfield-Suisun Sewer District

1.5.2 Planning Team

The planning team included the SCWA General Manager, David Okita, and Supervising Engineer, Thomas Pate. The consulting firm of CDM led the development of the IRWMP with assistance from Curalium Consulting (regarding the planning process) and Luhdorff and Scalmanini Consulting Engineers (regarding the groundwater issues).

The role of the planning team included:

- Provide draft materials for stakeholder input
- Develop information for meetings
- Guide IRWMP and Strategic Plan development
- Document and address stakeholder issues
- Develop the IRWMP

1.6 DOCUMENT CONTENTS

This report documents the Solano agencies' integrated water resources planning process and resulting recommendations, in the following sections:

- Section 2 – structured planning process used to develop recommendations.
- Section 3 – water supply and demand information that provides the context for the remainder of the planning effort.
- Section 4 – Solano agencies' strategic issues, which are the primary water-related concerns and issues within the region.
- Section 5 – identification and prioritization of potential actions.
- Section 6 – potential action descriptions and the potential action prioritization results.
- Section 7 – SCWA Strategic Plan, which identifies implementation steps for the potential actions with the highest priority
- Section 8 - references.

Section 2
Planning Process

2.1 OVERVIEW

Development of the IRWMP followed an integrated planning process to aid in group decision-making and result in a mutually acceptable document. This section describes the overall process as an introduction to the remainder of the document.

2.2 PUBLIC INVOLVEMENT

The planning team held a public meeting at the beginning of the process to solicit public information on the IRWMP. Prior to the meeting, SCWA sent notification to major stakeholders within the region, announced the public meeting at other board and water-related meetings, and placed meeting announcements in local newspapers. At the meeting, the planning team presented the IRWMP process and requested comments. Although this initial public meeting was not well attended, the meeting provided some indication of public interest on the IRWMP.

A second public meeting was held after a draft IRWMP was prepared. This meeting was similarly advertised. This meeting was also not well attended. SCWA staff also made presentations to city councils and district boards in January and February 2005.

2.3 STAKEHOLDER GROUP PROCESS

The Stakeholder Group was formed from members of SCWA's Board of Directors, the SCWA Advisory Commission, the SCWA Flood Control Advisory Committee, and wastewater agencies to focus on IRWMP development. The members represent a cross-section of technical and policy representatives from agricultural and urban agencies. The purpose of this Stakeholder Group was to work together to assemble and apply knowledge and experience regarding the region's water resources and develop recommendations for consideration by the SCWA and member agencies' boards/councils. Table 1-1 lists the Stakeholder Group participants. The Stakeholder Group was asked to:

- Increase mutual understanding of water resource issues and opportunities;
- Identify issues and strategies;
- Identify actions (policies, programs, and projects) to implement strategies;
- Define criteria to prioritize IRWMP actions; and
- Develop recommendations for SCWA Board and member agency board/council consideration.

The Stakeholder Group met six times, from February 2004 through October 2004 to develop this IRWMP. Figure 2-1, at the end of this section, shows the meeting topics and depicts the Stakeholder Group's decision-making process. The rest of Section 2.3 previews the steps in this decision-making process. Section 3 summarizes key demand and supply information used in the evaluations. Sections 4, 5, and 6 discuss the detailed methods and results from each step.

2.3.1 Identify Strengths, Weaknesses, Opportunities, and Threats

"SWOTs" are organizational "strengths, weaknesses, opportunities, and threats" with respect to long range water resources. SWOTs create a foundation for identifying strategic issues and potential actions. Strengths and weaknesses focus on resources and capabilities within the Solano agencies. Opportunities and threats focus on forces outside the Solano agencies' control, such as potential actions of allies and competitors, and political and technological forces.

The Stakeholder Group developed SWOTs by first brainstorming concerns within the region. The Stakeholder Group then identified additional SWOTs by considering several questions, such as:

- What are the biggest successes in the past few years? *(strengths)*
- What are the Solano agencies capable of doing? *(strengths)*
- What are the Solano agencies' limitations and vulnerabilities? *(weaknesses)*
- What is needed to provide service to customers? *(opportunities)*
- Do the Solano agencies face any obstacles? *(threats)*

The planning team consolidated the results of these exercises into several SWOT worksheets. Appendix B provides these results.

2.3.2 Describe and Weight Strategic Issues

Strategic issues are fundamental policy questions or critical challenges that affect the Solano agencies' ability to accomplish their mission and that require Board-level decision making. The Stakeholder Group identified strategic issues using the recurring themes from the SWOT exercise (particularly the strengths, weaknesses, and threats). All of the strategic issues ask how the Solano agencies could better address a substantial problem or challenge in the region. Section 4 contains the list of strategic issues and their descriptions.

Some strategic issues are more important to stakeholders than others. After creating the set of strategic issues, the Stakeholder Group weighted the strategic issues to show their relative importance. The Stakeholder Group used a process called "dot voting," in which the strategic issues were displayed on a large poster, and Stakeholder Group members "voted" by placing dot-shaped stickers beside the strategic issues. Each member received twenty dots, or votes, to assign to the strategic issues. The individual assigned these dots to the strategic issues of most importance to him or her. The strategic issues with the most combined dots were assumed the most important to the group as a whole. Further Stakeholder Group discussion confirmed the results.

As the Stakeholder Group further developed the strategic issues during the planning process, the definitions of several of the strategic issues changed slightly. The Stakeholder Group then re-voted on paper by assigning a number of votes to each strategic issue. Section 4 includes more information about the weighting process and the strategic issue weighting results.

2.3.3 Develop Strategy Statements

Strategy statements are brief descriptions of a pattern of policies, decisions, actions, or resource allocations that are formulated to address a strategic issue. After the Stakeholder Group identified strategic issues, it developed a suite of strategy statements that represent directions that the Solano agencies could take to address the strategic issue. Section 4 defines the strategy statements for each strategic issue.

2.3.4 Identify Potential Actions to Fulfill Strategy Statements

Potential actions are policies, programs, or classes of projects that serve to implement a strategy. Implementation steps are more specific projects that fit under a potential action. The Stakeholder Group developed a comprehensive list of potential actions and initial implementation steps using information from the SWOT exercise. Many SWOTs, especially the opportunities, represented potential actions for the Solano agencies. The Solano agencies also added potential actions and implementation steps that they have started, planned, or considered. The Stakeholder Group compiled all of the potential actions and screened the list by eliminating potential actions that were not technically feasible, effective, timely, or legal. Section 5 discusses the screening process and results.

2.3.5 Prioritize Actions

The Stakeholder Group prioritized the potential actions according to a set of prioritization criteria. Prioritization criteria are factors used to compare the importance and feasibility of potential actions and help to determine the sequence in which actions should be implemented.

The Stakeholder Group selected a set of prioritization criteria according to several guidelines. These guidelines stated that the criteria should be:

- Measurable: specify the degree to which criteria can be achieved;
- Unique: ensure no overlap between criteria;
- Clear: be easily explainable to the public and policymakers; and
- Concise: be direct and to-the-point.

The planning team ranked the prioritization criteria, with Stakeholder Group input, to indicate their relative importance. The planning team then developed rating scales for each criterion to ensure even application of the criterion to all actions. The rating scale indicates how an action should score according to each criterion. A good rating scale includes distinct rating categories, is understandable and meaningful, and distinguishes between actions.

The Stakeholder Group used the prioritization criteria and rating scales to evaluate each potential action. The planning team rated the potential action's performance according to each criterion, and recorded the results in a prioritization matrix for Stakeholder Group review and comment. The evaluation indicates which potential actions performed the best and should be a higher priority for immediate implementation. Section 5 describes the prioritization method in detail, and Section 6 presents the results.

2.3.6 SCWA Strategic Plan

The steps documented in Sections 2.3.1 through 2.3.5 lead to a prioritized set of water resources potential actions that would address strategic issues in the region. SCWA does not have a major role in all of them. To meet all document purposes, this document includes both the regional IRWMP and the SCWA Strategic Plan. The SCWA Strategic Plan is formed around a subset of the regional IRWMP that includes only actions where SCWA has a major role. Section 7 includes the SCWA Strategic Plan, which describes prioritized potential actions for SCWA and creates a roadmap for future implementation.

Section 3
Supply and Demand

Understanding the magnitude and location of water demands and supplies allows the Solano agencies to develop recommendations that will meet or manage demands for water quantity and quality into the future. Water supply and demand information provides the context for water resource planning. Section 3 contains key information on supply and demand that was used in conducting the evaluations for the decision-making process.

3.1 TYPES OF SUPPLY

The region has several major sources of supply. SCWA serves as a water wholesaler for the Solano Project and the SWP, which provide surface water supplies. Local agencies have also secured other sources of both surface water and groundwater. The sections below describe these sources. Most of the information in these sections is excerpted from the IRWMP Phase 1 report.

3.1.1 Solano Project

The Solano Project is a federal project with the Bureau of Reclamation (Reclamation) that stores water in Lake Berryessa for delivery to users throughout the region. Local agencies and Reclamation first conceived the project in the 1940s and 1950s to meet the increasing water demands of agriculture, municipalities, and military facilities within the region. The Solano Project first delivered water in 1959. The major facilities are:

- Monticello Dam, which captures water from Putah Creek in Lake Berryessa;
- Putah Diversion Dam, which diverts water out of Lower Putah Creek just downstream of Monticello Dam; and
- Putah South Canal, which delivers water to local agencies.

Reclamation holds the state water rights permits for the Solano Project in trust for the Solano water users. When the permits are converted to a license, and the capital debt for the Project is paid off, the license will be issued in the name of the Solano water users.

In 1995, the Solano agencies and upstream water right holders (upstream of Monticello Dam) reached a settlement on part of the Putah Creek Adjudication that addressed longstanding disputes between the parties. Called the “Condition 12 Settlement Agreement,” the settlement placed a cap on future water development in the watershed of Lake Berryessa and allocated a limited amount of future water development rights to projects in Napa and Lake Counties. The original water rights permit for the Solano Project had set limits to water supply development in the watershed, but the settlement clarified the limits and provided a mechanism to account, monitor, and enforce compliance. The Court appointed a Watermaster to monitor water use and enforce the settlement. The settlement agreement provides a measure of certainty to the Solano Project water supply because all major water users in the watershed of Lake Berryessa are bound by the settlement agreement.

In March 1996, the Sacramento Superior Court held a trial on instream flow needs for Putah Creek downstream from the Putah Diversion Dam. The Court ruled that Putah Creek required additional flows. The Solano parties appealed the judgment, but the parties then agreed to a negotiated settlement in 2000. The Putah Creek Accord increases flows to Putah Creek, but includes reduced flows when Lake Berryessa is low in storage and includes a process for addressing illegal surface water diverters in Putah Creek.

The contracted water supply (plus operational losses) for the Solano Project total 207,350 acre feet per year. This roughly matches the US Bureau of Reclamation's calculation of "firm yield". Firm yield is the calculated amount of water supply available during the driest hydrologic period of record for the project. SCWA has water contracts to deliver this water for municipal and agricultural uses to Fairfield, Suisun City, Vacaville, Vallejo, Solano Irrigation District, Maine Prairie Water District,

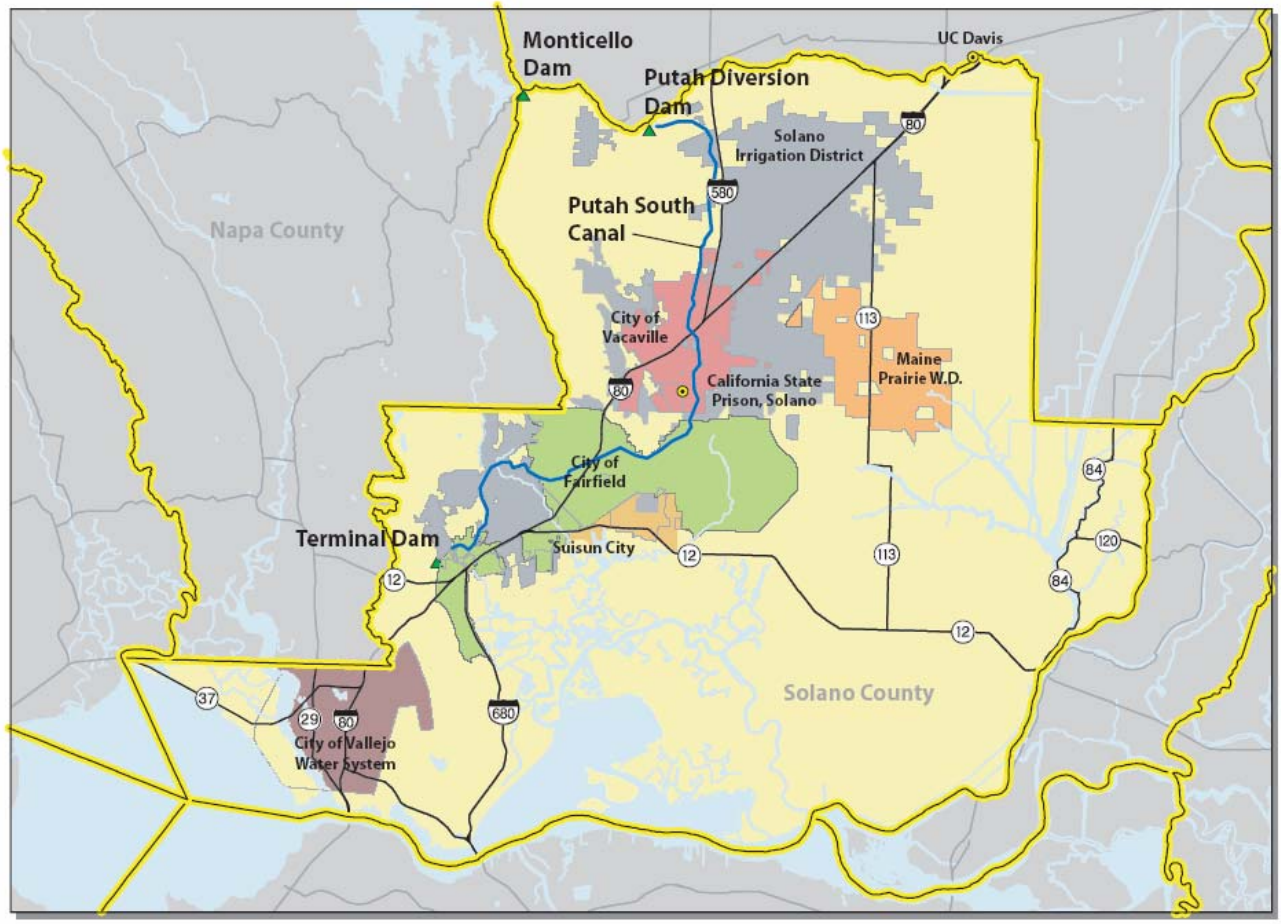


Figure 3-1
Solano Project Facilities and Participating Agencies

University of California at Davis, and California State Prison – Solano. Figure 3-1 shows Solano Project facilities and participating agencies.

3.1.2 State Water Project

The SWP provides water to the Solano agencies through the North Bay Aqueduct (NBA) (Figure 3-2). The SWP has rights to water originating from the Sacramento and San Joaquin Rivers, and it stores water in Lake Oroville (on the Feather River). The NBA diverts this water from Barker Slough, in the Delta, to the Solano agencies for water supply. DWR envisioned the NBA as part of the SWP during the initial SWP planning in the 1950s and 1960s. Construction of the NBA in Solano County started in 1984 and was completed in 1988. The major SWP facilities that deliver water to the Solano agencies include:

- Barker Slough Pumping Plant, which pumps water from Barker Slough into the NBA;
- North Bay Aqueduct, a pipeline that delivers water from Barker Slough to Cordelia Forebay; and
- Cordelia Forebay, where water is pumped to Napa County, Vallejo, and Benicia.

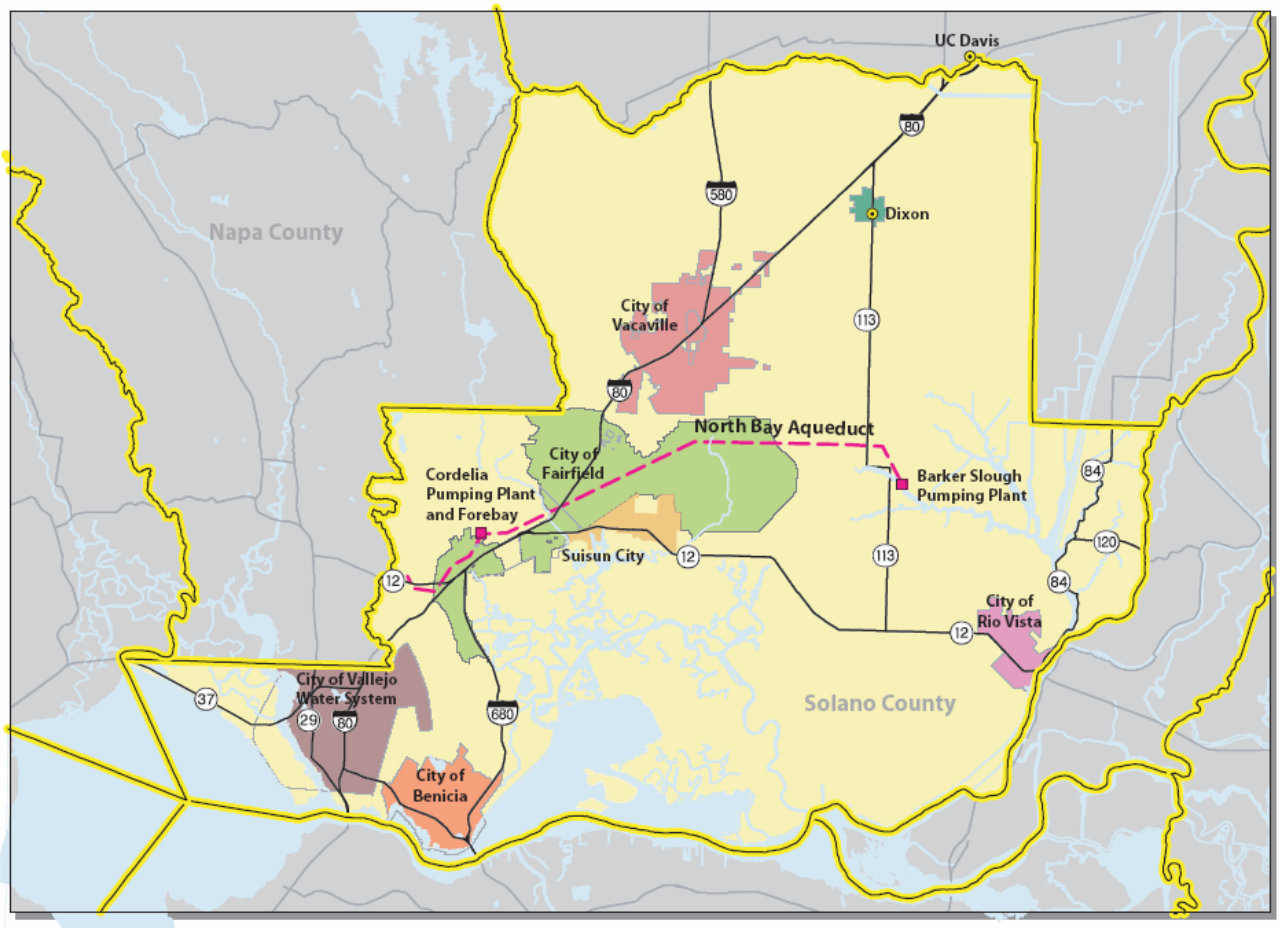


Figure 3-2
SWP Facilities and Member Units

SCWA has a contract with DWR for water supply from the SWP. In turn, SCWA has contracts with Solano cities for provision of this water supply. The NBA contracting cities are Benicia, Vacaville, Fairfield, Vallejo, Suisun City, Rio Vista, and Dixon. The city of Suisun City has an allocation of NBA water but has no facilities to take NBA water at this time. The cities of Rio Vista and Dixon

have the right to obtain a specified amount of NBA water in the future, but have no facilities to take NBA water at this time.

SCWA has contracted for an ultimate allocation of 47,756 acre-feet of water per year from the SWP. This amount includes 5,756 acre-feet of additional SWP water per year that SCWA purchased on behalf of the cities of Fairfield and Vacaville from the Kern County Water Agency (another SWP contractor) in 2001. The SWP contract amount is 47,206 acre-feet in 2004, and will increase each year until it reaches 47, 756 acre-feet per year in 2015.

DWR prepared a report on SWP reliability titled "The State Water Project Delivery Reliability Report" in 2002. This report provides a thorough analysis of the delivery capability of the SWP. DWR initially thought that the SWP would have additional facilities, and the SWP contractors' allocations are based on the yield with these additional facilities. The report indicated that supplies are variable, with the SWP able to deliver at least 82 percent of allocations in 50 percent of the years.

3.1.3 Local Supplies

Local agencies have secured additional supplies to meet local needs. Several important supplies include Vallejo Permit Water, Settlement Water, and groundwater.

3.1.3.1 Vallejo Permit Water

Vallejo holds a water rights license for 31.52 cubic feet per second (cfs) of water diverted from the Delta, known as Vallejo Permit Water (VPW). The VPW right allows use within a service area that includes Vallejo, Benicia, parts of Fairfield, and the American Canyon area of Napa County. Prior to the construction of the NBA, a pumping plant on Cache Slough in the Delta pumped water to Vallejo through an underground pipeline (the Cache Slough Pipeline, owned by Vallejo). The Cache Slough Pipeline is interconnected with the NBA, and Vallejo still uses portions of the Cache Slough Pipeline to transport water from the NBA.

When DWR constructed the NBA, Vallejo paid for the right to use the NBA to deliver VPW. DWR increased the size of the NBA to account for the additional 31.52 cfs of VPW. DWR has contractually limited the annual amounts of VPW to 17,287 acre-feet per year. This amount is 5,493 acre-feet less than if Vallejo diverted the 31.52 cfs year-round. An amendment to the agreement with DWR would be necessary to increase the amount of VPW to the maximum amount for year-round diversion.

VPW has a higher water right priority than the SWP and Central Valley Project (CVP), so it is more reliable than SWP supplies. VPW is subject to being cut off during the summer of very dry years when the State Water Resources Control Board (SWRCB) determines that the available water supply in the Delta is coming from SWP and CVP reservoir storage releases. Term 91 is not included in the VPW license (see explanation of Term 91 in the discussion below about Settlement Water).

3.1.3.2 Settlement Water

Settlement Water is a major new source of water for Benicia, Fairfield, and Vacaville. In 1998, the three cities filed for SWRCB water rights permits for an appropriation of water under the state's

Watershed of Origin statutes. The permit application was withdrawn in 2003 after the cities and DWR reached a settlement that provided an essentially equivalent water supply. A Settlement Agreement and a Conveyance Agreement with DWR specify the details of the Settlement Water supply.

Settlement Water is available up to the following amounts:

- Benicia – 10,500 acre-feet per year;
- Fairfield – 11,800 acre-feet per year, and
- Vacaville – 9,320 acre-feet per year.

The main restriction to Settlement Water is that it is not available when Standard Water Right Term 91 is in effect. SWRCB declares Term 91 when it determines that the SWP and CVP are releasing stored water in excess of natural flows (natural flow is the flow that would have been in existence if DWR and Reclamation had not constructed the Projects) to meet in-Delta demands and Delta water standards. Term 91 is declared in the summer of all but very wet years. The cities can divert Settlement Water when the Delta is in excess conditions (more inflow than needed to meet in-Delta demands and Delta water standards) or when the Delta is in balanced conditions as long as Term 91 is not in effect. Balanced conditions in the Delta are when the SWP and CVP are meeting in-Delta water demands, meeting all Delta standards, and meeting their export demands while storing any excess water.

Settlement Water is a major new source of water to meet the long-term needs of Benicia, Fairfield, and Vacaville. The cities requested these amounts of water based on projected water needs to meet city General Plan demands. The Settlement Agreement allows the three cities to apply in the future to the SWRCB for a Watershed of Origin appropriation above Settlement Agreement amounts if their demands exceed those upon which the Settlement Agreement was based. The Settlement Agreement runs through 2035 and is renewable under the same terms as the DWR/SCWA SWP contract. The Settlement Water is considered a permanent supply.

3.1.3.3 Groundwater

Prior to the development of the Solano Project, both municipal and agricultural users pumped groundwater extensively. One of the main reasons that SCWA and Reclamation developed the Solano Project was to rectify groundwater overdraft in some agricultural areas. Groundwater levels rebounded after the Solano Project started making agricultural water deliveries.

The amount of groundwater use for municipal, agricultural, and rural residential uses within the region has not been accurately quantified. The cities of Rio Vista and Dixon solely use groundwater supplies from basins underlying the cities. Approximately one-third of Vacaville's municipal water supply is from groundwater underlying the city.

Most of the growers within the Solano Irrigation District (SID) use surface water, but SID has wells to supplement its surface water supply from the Solano Project. Maine Prairie Water District (MPWD) and RD 2068 provide surface water to their growers, and do not currently use groundwater underlying their districts. Growers outside of water supply districts rely entirely on groundwater unless they have an individual right to a surface water supply.

Most rural residential landowners have individual shallow groundwater wells that serve their domestic needs. Some small rural residential water systems also distribute groundwater to their customers.

The Solano Subbasin is the largest groundwater basin in Solano County and underlies the northeastern part of the county. This groundwater basin starts from the foothills above Vacaville and extends to the Sacramento River. The groundwater basin extends from Putah Creek to the north to the boundaries of Fairfield to the south. There are two basic aquifers in the groundwater basin. The Putah Fan is a shallower aquifer providing agricultural water and local domestic supplies. The Putah Fan is underlain by the Tehama Formation aquifer. This aquifer is quite deep (over 1,000 feet) under Vacaville, but surfaces in the English Hills area north and west of Vacaville. Vacaville's wells draw from the Tehama Formation for its groundwater supply. The Suisun Valley-Fairfield Basin is the second largest groundwater basin in Solano County. It occurs to the west of the English Hills beneath the Fairfield and Suisun. This basin is not used in a significant capacity due to low yields and poor water quality.

Public agencies that overlie this groundwater basin have developed groundwater management plans as specified in Assembly Bill (AB) 3030, the state law that authorizes local agencies to prepare groundwater management plans. SCWA, through the Solano Water Authority, prepares biannual reports on groundwater levels for the groundwater basin. DWR and local public agencies that utilize the groundwater basin supply groundwater level data. These reports show no trend of groundwater overdraft with current levels of groundwater use. Groundwater levels drop in dry years, but rebound in wet years.

3.1.3.4 Other Surface Water Supplies

Vallejo has local surface water supplies stored in the "Vallejo Lakes System," which includes Lakes Frey, Madigan, and Curry. The Vallejo Lakes System historically provided water to the City of Vallejo, but it currently provides water to the unincorporated communities in Suisun Valley and Green Valley. Vallejo agreed to serve some residents in this area as part of the development of the Vallejo Lakes Systems. The largest lake, Lake Curry, has a storage capacity of 10,700 acre-feet and a yield of about 3,750 acre-feet per year.

Benicia uses Lake Herman, in the hills between Benicia and Vallejo, as a local supply. Lake Herman has a storage capacity of 1,800 acre-feet. The average yield in wet to normal years of the 10 square mile watershed is 500 to 1,000 acre-feet annually and no yield in dry years. The additional storage capacity serves as terminal storage for excess water delivered through the NBA.

In the eastern Delta part of Solano County, many growers divert directly from local waterways. Growers hold riparian rights (water rights that derive from land ownership adjacent to water ways) or appropriative rights. Records do not exist to quantify the amount of this water use. These supplies are very reliable because water is always available in this part of the Delta.

Each of these water supplies have different water quality characteristics that influence how they can be utilized.

3.2 SUMMARY OF SUPPLY

Phase I identifies supply sources for SCWA and its member agencies. Table 3-1 shows a summary of supply data from Phase I. The table does not include RD 2068 as its supply is independent of SCWA. The reliability of each supply is described in the Phase I report (that is included herein as Appendix A).

Table 3-1

Summary of Regional Supplies

Type of Supply	Amount of Supply (in acre-feet per year)
Solano Project	192,350
SWP	47,206
VPW	17,287
Settlement Water	31,620
Groundwater	23,300
Local	900
Total	***312,663***

Solano Project supplies are highly reliable. Full allocations are allowed until Lake Berryessa is empty. SCWA and the Solano Project water users have agreed on reductions in usage during low reservoir levels to carry over water for use in future years. Groundwater supplies are also very reliable; pumpers use groundwater conservatively so that they can increase pumping in a series of dry years.

The NBA has the most supply variability. DWR significantly reduces SWP supplies in dry years. Settlement Water is less available in dry years, and VPW can be reduced in very dry years.

Projecting future supplies for different hydrological conditions is complicated. The SWP has reports documenting its current reliability. There is no comparable report for the Solano Project. Additional analysis is needed to determine the conditions when VPW is likely to be reduced.

Additionally, the determination of the reliability for each supply source will depend on how much an agency relies on the supply. For example, a city that is entirely dependant on SWP supply may be more conservative regarding the reliability of its SWP supplies than an agency that has multiple supplies and is able to substitute other supplies for SWP shortages.

Additional work is necessary to portray supply projections for different hydrological year types using a common set of assumptions.

3.3 SUMMARY OF DEMAND

Phase I identified current water usage (1999 through 2002) by member agencies. Projected future demands were estimated by these agencies and reported in various documents such as Urban Water Management Plans, SB 610 reports, and Municipal Service Reviews. Further analysis is needed to develop projections with common assumptions to show collective long-term demand for all Solano water users.

City water use is expected to increase in the future as population increases. Irrigated agriculture and cropping patterns in Solano County have been stable; therefore, agricultural water use will not likely increase in the future.

Based on Phase I findings, Table 3-2 shows the current water use of member agencies. Table 3-2 does not include RD 2068 because its supplies are separate from SCWA.

Table 3-2
SCWA Member Agency Demands

Agency	Current Demand (in acre-feet per year)
Benicia	13,000
Dixon	3,500
Fairfield	25,000
Rio Vista	1,800
Suisun City	4,900
Vacaville	18,000
Vallejo	29,000
SID	140,000
MPWD	24,000
CSP Solano	1,200
UC Davis	4,000
Total	***264,400***

3.4 COMPARISON OF SUPPLY TO DEMAND

A comparison of Table 3-1 (full supply, that includes contract amounts without regard to hydrologic conditions) and Table 3-2 (current demand) shows that the region currently has an excess of supply if quantities shown in Table 3-1 are available. However, full supplies are not always available.

The supply table shows the collective supplies (full supplies) for all SCWA member agencies. This collective analysis on a countywide basis is appropriate as a baseline because, as shown in Phase I, agencies within the region have extensive exchange and transfer arrangements. If any one agency has a shortfall, it will likely make arrangements with other agencies to cover that shortfall, or join in on a future project to obtain additional supplies.

However, there are scenarios where full supplies may not be available. For example, assuming a series of dry years, supplies from the SWP could be severely reduced. Settlement Water is less available and VPW may be reduced. One possible dry year scenario is a 10% reduction in Solano Project Supply, a 70% reduction in SWP, a 20% reduction in Settlement Water, a 30% reduction in VPW, and a 10% reduction in local supplies. Table 3-3 shows the impact of such a dry year scenario on countywide supplies. Comparing this scenario with the current demands, shown in Table 3-2, identifies shortages. In this example, the region would have about a 16,000 acre-foot shortage based on current demands. This shortage would increase with increased future demands as cities grow.

Table 3-3
Dry Year Supply Scenario

Supply Source	Dry Year Supply Available (in acre-feet per year)	Reduction from Contract or Water Rights
Solano Project	173,115	10%
SWP	14,162	70%
VPW	12,101	30%
Settlement Water	25,296	20%
Groundwater	23,300	
Local Supply	810	10%
Dry Year Supply Total	***248,784***	

3.5 ADDRESSING SHORTAGES

For the foreseeable future, shortages will only occur in dry years. SCWA and the member agencies should plan on meeting these dry year demands. Although further study could provide more information on how frequent and severe these shortfalls will be, these shortfalls are driven by climatic and regulatory conditions that are difficult to predict. A practical course of action is to implement a series of projects to provide additional dry year supplies to Solano cities and assess on a regular basis whether the region needs additional dry year supplies.

Section 4
Strategic Issues and Strategy Statements

4.1 METHODOLOGY

Section 2 described the planning process, and explained how the Stakeholder Group developed strategic issues and strategy statements. The Stakeholder Group used the information contained in the SWOTs to identify common themes and concerns. These themes provided the basis for the strategic issues.

4.2 STRATEGIC ISSUES

This section discusses the ten strategic issues identified by the Stakeholder Group. Table 4-1 shows the list of strategic issues and the abbreviations for each issue that are used in the rest of the document.

Table 4-1
Strategic Issues and Abbreviations

Strategic Issue	Strategic Issue Abbreviation
1. How can supply best match demand through the long term?	Supply and Demand
2. What measures are necessary to manage the County's groundwater resources?	Groundwater
3. What measures should be taken to encourage sending water of the appropriate quality to the appropriate end user?	Quality to Users
4. What measures can be taken to improve runoff quality?	Runoff Water Quality
5. How can flood management services best be managed?	Flood Management
6. What should participation in multi-county flood control entail?	Multi-County Flood Control
7. How can environmental resources best be managed?	Environment
8. How can state and federal funding opportunities best be leveraged?	Funding
9. What measures would best address safety and security issues?	Safety and Security
10. How should the region prepare for climate change?	Climate Change

1. How can supply best match demand through the long term?

As a water wholesaler, SCWA provides water to member agencies to meet demands. Retailers obtain supplies from SCWA and other local sources to meet local demands. Estimates show that the Solano agencies can provide adequate (or even surplus) water supplies in some years, but supplies may not be adequate to meet current and future needs in all years. The major supply concerns are related to limitations on timing of supplies, and number and location of facilities.

1. **Timing of supplies.** Most supplies are reduced during dry years, and all surface water supplies are vulnerable in extreme droughts. During summers, some supplies that are pumped from the Delta can be cut off when the SWRCB declares Term 91 is in effect or the SWRCB curtails other water rights. Furthermore, some supplies that local agencies depend on are not permanent supplies. Temporary arrangements may expire in the long-term, leaving agencies with inadequate supplies.

2. **Limitations on facilities.** SCWA's surface water storage is limited to Lake Berryessa, which can only store water from the Solano Project. There is no storage for water transported through the NBA. Without additional storage, SCWA cannot store supplies from wet years until they are needed in dry years. Conveyance facilities also have limitations. The NBA cannot convey the design capacity and more conveyance facilities may be needed to optimize water supply and water quality.

3. **Treatment facility limitations.** Some areas cannot use all available supplies because of drinking water treatment limitations.

Reduced supplies in drought years could have widespread and severe consequences. Some demands would not be met, which could have consequences ranging from parched landscaping to public health risks (lack of fire protection) or reduced economic productivity.

2. What measures are necessary to manage the County's groundwater resources?

Agencies within the region (specifically the Solano Subbasin) used groundwater as the primary supply prior to development of the Solano Project. Once water deliveries from the Solano Project commenced in the 1960's, groundwater use has decreased relative to historic patterns. Despite this decrease in use, some areas still experience localized groundwater quantity and quality problems. Many areas have little or no groundwater monitoring; therefore, groundwater problems or opportunities in these areas are unknown. Major concerns include:

1. **Knowledge of conditions.** Groundwater conditions in some areas are well understood; however, other areas have little or no available information. Conditions outside of the water district boundaries and outside of the Putah Fan/Tehama Formation (Solano Subbasin) are largely unknown.

2. **Quality concerns.** Water quality of the Tehama Formation is good in the Vacaville area; however, no adequate countywide characterization of groundwater quality exists. High nitrate levels potentially limit groundwater use for potable purposes in Fairfield and Suisun City, and saline intrusion in shallow wells potentially limits use in Fairfield and Benicia.

3. **Quantity concerns.** Reports do not include any indications of overdraft in the Solano Subbasin; however, extended drought could affect groundwater levels in the Solano Subbasin. Shallow groundwater pumpers are especially subject to drought impacts.

Knowledge regarding groundwater should be improved so that County residents will be aware of potential quality or quantity problems. Many residents outside of district boundaries depend on groundwater wells for their water supply; quality or quantity problems could cause a decrease in available supplies for domestic and agricultural uses. Local agencies will need additional information about groundwater conditions prior to initiating programs to conjunctively manage groundwater and surface water.

3. What measures should be taken to encourage sending water of the appropriate quality to the appropriate end user?

The region relies on multiple water sources, including Solano Project water and diversions from the Delta through the SWP, which have varying levels of water quality. The region does not fully utilize recycled water. Future drinking water quality standards are becoming more stringent. Major water quality concerns include matching water supplies to appropriate uses and addressing more stringent water quality standards.

1. **Appropriate level of water quality.** Surface water quality of SCWA's supplies is acceptable for agricultural uses in the region; however, some supplies require a high level of treatment before municipal use.

2. **Recycled water.** The constituents in recycled water produced in the region limit its applicability for offsetting potable supplies, and render it unsuitable for some uses.

3. **Regulatory changes.** More stringent drinking water quality standards may require treatment facilities to upgrade their treatment capabilities. Treatment facilities' current processes may not be able to meet standards for the end users.

As a consequence, some end users may not receive the quality of water that they need or they may have to invest in more costly treatment processes to meet their needs.

4. What measures can be taken to improve runoff quality?

The poor quality of runoff water compromises the quality of surface water and groundwater supplies. Poor runoff quality because of land use practices can affect NBA water quality and groundwater quality.

1. **NBA water quality.** Constituents in runoff from the Barker Slough watershed contribute heavily to the degraded quality of NBA water. Soils and decaying plant matter are sources of organic carbon, while livestock grazing and erosion in the local watershed contribute to turbidity. Traditional BMPs, such as vegetative buffers and settling ponds, would not be effective in the Barker Slough watershed because of the unique soil conditions in the watershed.

2. **Future and unanticipated changes in agricultural practices and processing** may affect the quality of agricultural runoff. Currently, there are no reported water quality problems in Solano County from agricultural runoff, aside from isolated incidents, but problems evident in other areas such as nitrate contamination of groundwater could occur here with changes in agricultural practices and processing.

3. **Urban runoff** is being regulated by the SWRCB through its non-point discharge program. Urban areas are required to implement measures to treat and/or detain urban runoff to reduce adverse effects to water quality and the environment.

If the Solano agencies do not address runoff issues, the impaired condition of the region's water supplies can continue or worsen. Treatment of potable supplies will become more costly.

5. How can flood management services best be managed?

The cities in the region are responsible for their own storm drainage/flood control facilities; however, flood management in unincorporated areas is an area of conflict. Flood management can be expensive and can create liability. Both SCWA and Solano County have authority over flood management in the unincorporated areas, but with a few exceptions (like the Ulatis and Green Valley flood control projects), neither has specific responsibility. Important facets of flood management are: 1) providing adequate flood control facilities, operations and maintenance (O&M), and flood hazard awareness; and 2) planning for the long-term viability of existing flood control projects and protecting them from encroachment and liability concerns. The California Department of Water Resources published the "Floodplain Management Task Force Report" that has recommendations that should be used to guide local flood management strategies.

1. **Flood control infrastructure** in some rural areas of the region is not adequate, and a need exists to improve flood hazard information and residents' awareness. Because information on the extent of flooding is often not adequate in rural areas, land use planning in these areas is difficult. Flood mapping should identify reasonably foreseeable flooding. The limited population and limited flood hazard awareness in these areas also increases the difficulty of identifying and providing cost-effective facilities, for which SCWA may provide partial construction funds, but which require a local commitment to perform O&M and provide right of way easements.

2. **The Ulatis and Green Valley Flood Control Projects** face increased runoff from urban development; urban encroachment; and increased liability associated with multi-purpose (i.e recreational) use. In addition, environmental concerns are likely to become increasingly competitive with flood control and facility maintenance objectives.

If Solano agencies do not address the issue of flood management, the potential for flood damage throughout the region is likely to increase, because of increased urban development, inappropriate land uses in unincorporated areas, lack of infrastructure in unincorporated areas, and inadequate O&M.

6. What should participation in multi-county flood control entail?

Solano agencies manage flood control and drainage activities (to varying extents) at a local scale in Solano County. However, there is a need for participation in multi-county flood control planning based on concerns about Delta levee integrity and other flood management actions that could affect local areas.

1. **The Delta levee system protects Delta islands and helps maintain water quality.** However, there exists a potential for a levee break or multiple levee breaks in the Delta. Delta islands in Solano County could suffer a levee failure. Levee failures anywhere in the Delta could affect water quality for all Delta water users who depend upon the Delta as a major supply. DWR can provide guidance on the likelihood of Delta Levee failures.

2. **Sacramento Area Flood Control Agency is considering implementation of flood control measures along the Yolo Bypass.** Although these measures are meant to improve the flood carrying capacity of the Yolo Bypass, these measures could have damaging effects on

Rio Vista and agricultural areas in eastern Solano County where these measures may increase flooding.

If the Solano agencies do not address flood control at a multi-county level, the region could be susceptible to increased flood damage. Additionally, an influx of salt water into the Delta because of a levee breach could affect the water quality of water pumped in the North Bay Aqueduct.

7. How can environmental resources best be managed?

The Solano agencies are actively participating in the restoration of Putah Creek and developing the countywide Habitat Conservation Plan (HCP). The Solano agencies are less involved in management or restoration efforts of smaller local rivers and creeks in the region.

1. **Involvement in Lower Putah Creek activities.** The Solano agencies are currently involved in the Lower Putah Creek Coordinating Committee, which coordinates habitat enhancement projects. These projects are a long term commitment, typically requiring adaptive management and constant monitoring activity.

2. **River and creek restoration.** The Solano agencies are involved only to a limited extent in enhancing the County's small local rivers and creeks. Degraded riparian corridors could increase sedimentation and reduce water quality.

3. **Creation of a Habitat Conservation Plan.** The HCP currently under development addresses conservation of endangered species and habitats. While not addressing all environmental resources, the HCP will provide an enhanced effort from Solano agencies toward protecting the environment, including streams and riparian areas.

If the enhancement and restoration of rivers and creeks is not supported, threatened and endangered species populations could continue to decline. Erosional deposits from stream banks into these channels could contribute to flood management issues and affect water quality. Endangered species and water quality could affect the operation and maintenance objectives of the Solano agencies.

8. How can state and federal funding opportunities best be leveraged?

Large water resource and infrastructure projects have traditionally sought state and federal funding to assist with high capital costs. Solano County has experienced significant population growth creating a need for added flood protection and water supplies. These projects have high initial costs, but provide regional benefits. The Solano agencies can seek external funding from two sources: 1) state programs including Proposition 50, and 2) federal funding through Reclamation or the U.S. Army Corps of Engineers (USACE).

1. **Proposition 50** (and previous measures such a Proposition 204, 13 and 40) are state bond measures that make available funding for water resource projects related to increased supply, reliability, and quality. These bond measures also have funding for other purposes such as habitat preservation and recreation. Proposition 50 has a large amount of funding for implementation of IRWMPs. Funding is available in the form of grants, loans, and matching funds on a competitive basis from the State Resource Agencies.

2. **Federal funding is available for water resource projects** primarily through two sources: Reclamation's Energy and Water Development Appropriation bill and the USACE's Water Resource Development Appropriation bill. Competition for federal funds under these and other programs is fierce, and requires lobbying in addition to legislative support. Reclamation may have an incentive to fund new projects associated with maximizing efficiency of the Solano Project.

If the Solano agencies choose not to pursue state or federal funding, projects will be developed at the sole expense of the Solano agencies.

9. What measures would best address safety and security issues?

SCWA shares responsibility for two major water supply projects in the county: the Solano Project and the NBA. The projects provide the most significant sources of water to the Solano agencies. Other Solano agencies operate smaller scale important infrastructure. Safety and security issues relate to both natural disasters and homeland security. The vulnerable system components include:

1. **Dams.** The Solano Project has three dams that are potentially at risk: the Monticello, Putah Diversion, and Terminal Reservoir. There are also smaller local dams that impound significant amounts of water. There are no known problems with these dams. All are under scrutiny of public agencies that are required to assess vulnerability to natural and man-made disasters.

2. **Levees.** Delta levees in eastern Solano County are at risk for potential failure during natural disasters or from unexpected failures.

3. **Conveyance.** Pipelines and canals are potentially at risk from earthquakes and could result in long-term shutdowns or shortages under a worst-case scenario. Open canals have a potential to be contaminated from accidental or intentional incidents.

If the Solano agencies do not address safety and security of its facilities, a natural disaster could result in significant shortages. Facility failures from natural disasters or intentional actions could result in major service disruptions and/or catastrophic loss of life and property.

10. How should the region prepare for climate change?

Although climate change is a subject of much study and debate, its potential effects relate directly to the region's water supplies, human health, and ecological health. The potential effects of climate change include:

1. **Diminished levels of snowpack** in the Sierra Nevada mountains could lead to less capture of water in reservoirs and a corresponding decrease in SWP supplies.

2. **Rising ocean levels could inundate facilities** and contribute to a significant decline in water quality by increasing Delta salinity. City treatment facilities might be unable to treat the increased salinity to a level that could make the water available for potable uses.

3. **Regional climate changes** may affect human health, agricultural crops, and ecosystems.

4. Rising ocean levels will flood low lying areas and place increased strain on Delta levees.

If the Solano agencies do not consider the effects of climate change, climate and water level changes may potentially occur that could affect the health and safety of the region. A time frame for fully addressing this problem is unknown, and potential impacts are the subject of much scientific investigation and uncertainty. No significant impacts are likely until sometime in the distant future. However, developing and understanding potential impacts will help in prioritizing other water resource actions.

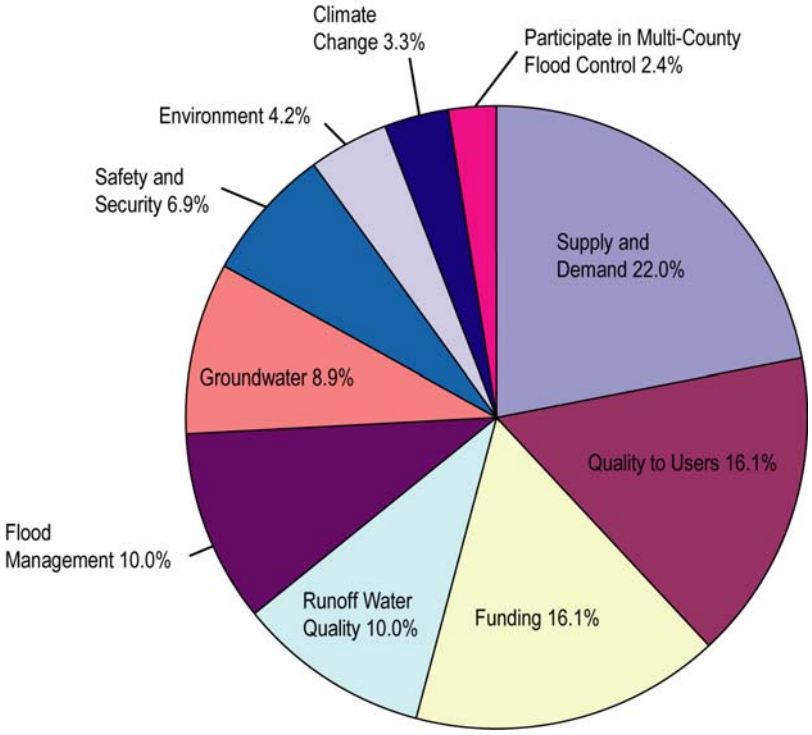


Figure 4-1
Strategic Issue Weighting Results

4.3 STRATEGIC ISSUE WEIGHTING

The planning team asked the Stakeholder Group to weight each strategic issue to show relative importance. Section 2.3.2 describes the weighting process. The weight represents the relative importance of each strategic issue. Figure 4-1 presents the results of the strategic issue weighting. The Stakeholder Group determined that strategic issue 1 (match supply to demand) was the most important strategic issue.

After the planning group compiled the results of the strategic issue weighting exercise, the Stakeholder Group reviewed the weighting to verify that it matched their understanding of the most important strategic issues. The Stakeholder Group determined that the weighting exercise did not fully reflect the importance of delivering water quality to users because the strategic issue received only approximately 12 percent of the votes. The Stakeholder Group agreed that they should increase the weight of that issue to be equal to the funding opportunities strategic issue, and adjust the weights of the other issues accordingly. Figure 4-1 shows the resulting weights. The Stakeholder Group agrees that these weights match their understanding about the most important strategic issues in the region.

4.4 CONNECTION TO PROPOSITION 50

As described in strategic issue 8, Proposition 50 contains state funds for water resources projects. Proposition 50 Chapter 8 specifically funds development and implementation of IRWMPs. As part of the draft guidelines for implementation of this chapter of Proposition 50, DWR and SWRCB identified water management elements that an IRWMP must consider to be eligible for funding. These elements represent the primary statewide water management concerns and issues.

The Stakeholder Group developed the strategic issues based on local and regional concerns and SWOTs. The Group compared its issues to the statewide issues from Proposition 50, and realized that many local and regional issues are also statewide issues. Table 4-2 shows the connections between the Solano agencies' strategic issues and Proposition 50 Chapter 8 issues.

Table 4-2
Connection between Regional and Statewide Issues

Solano Agencies' Strategic Issue	Proposition 50 Water Management Element
1. How can supply best match demand through the long term?	Water supply reliability Water recycling, water conservation
2. What measures are necessary to manage the County's groundwater resources?	Groundwater management
3. What measures should be taken to encourage sending water of the appropriate quality to the appropriate end user?	Water quality protection and improvement
4. What measures can be taken to improve runoff quality?	Water quality protection and improvement Stormwater capture and management
5. How can flood management services best be managed?	Flood management
6. What should participation in multi-county flood control entail?	Flood management
7. How can environmental resources best be managed?	Ecosystem restoration Environmental and habitat protection and improvement
8. How can state and federal funding opportunities best be leveraged?	
9. What measures would best address safety and security issues?	
10. How should the region prepare for climate change?	

The only Proposition 50 element that this IRWMP does not include is "Recreation and Access." The Stakeholder Group considered this element, but determined that it is not a strategic issue within the region. Many water bodies within the region have existing recreation facilities, or are externally managed (e.g., Reclamation manages Lake Berryessa recreation). The remaining water bodies purposely limit human contact recreation because of the water quality implications.

4.5 STRATEGY STATEMENTS

As described in Section 2, strategy statements are brief descriptions of a pattern of policies, decisions, actions, or resource allocations that are formulated to address a strategic issue. The Stakeholder Group identified a series of potential strategy statements for each strategic issue. The Group then considered if they should narrow the strategy statements to enable the IRWMP to focus in just a few directions, but they decided that multiple strategy statements is acceptable. Having multiple strategy statements for each strategic issue allows the Solano agencies to have several directions, which could allow them to more fully address the strategic issues. Figure 4-2 shows the strategy statements associated with each strategic issue.

Section 5
Potential Action Prioritization

5.1 POTENTIAL ACTION PRIORITIZATION PROCESS

This section details the process taken by the Stakeholder Group to determine potential actions that the Solano Agencies should consider for immediate and long-term implementation. The process includes identifying, screening, and prioritizing the potential actions. Figure 5-1 illustrates the process. The following sections describe the results in detail.

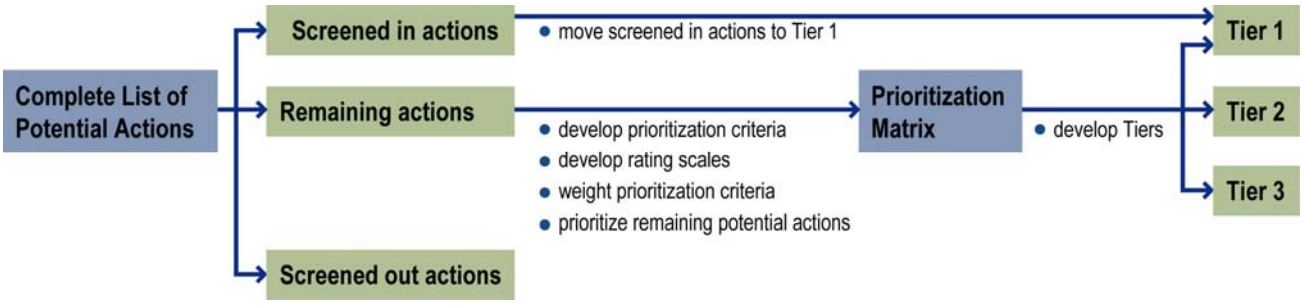


Figure 5-1
Potential Action Prioritization Process

5.2 POTENTIAL ACTION IDENTIFICATION

The planning team created a list of potential actions that address the strategic issues. A potential action, in context of this IRWMP, is a project, program, or policy that could be implemented to meet the region's water resource and management needs. The planning team developed potential actions through multiple discussions with the Stakeholder Group and research of past and ongoing studies. The planning team identified at least one potential action for each strategy statement. Table 5-1 presents the potential actions for the IRWMP, organized by strategic issue and strategy statement. The table includes all actions the Stakeholder Group and planning team created, including those that were screened into and out of the IRWMP (Section 5.2).

Table 5-1 also identifies initial implementation steps for some of the potential actions. In most cases, these are the first steps that an agency must take to implement the action. For example, the potential action, "Improve Putah South Canal conveyance efficiency," includes implementation steps to "install measuring equipment on Putah South Canal" and "explore cost effective methods to reduce operational spills." Table 5-1 also includes implementation steps that are ongoing studies or projects, such as continuing the investigation of the RD 2068 conjunctive use project or studying feasibility of the Highline Canal.

Finally, Table 5-1 identifies the implementing agencies and action status for each potential action. The table does not distinguish between those agencies that will take the lead role in implementing an action and the agencies that will have a minor, participating role. The action status defines whether the agencies are already taking steps for action implementation or have not yet begun.

Table 5-1
IRWMP Potential Actions, Implementation Steps, and Implementing Agencies

Strategic Issues and Related Proposition 50 Categories	Strategy Statement	Potential Actions	Initial Implementation Steps	Implementing Agencies														Action Status
				SCWA	SID	MPWD	County	2068	Ben	Dix	FF	FSSD	RV	Sui	VV	VJO	VSFCD	
How can supply best match demand through the long term? (Water supply reliability, water recycling, water conservation)	*1. Increase understanding of future demands and supplies*	Participate in regional water resources planning		X	X	X	X	X	X	X	X	X	X	X	X	X	X	Continuing
		Quantify countywide demand and supply	Develop a reliability study for Solano Project supplies	X	X	X					X			X	X	X		New
			Initiate a study to further quantify groundwater use	X	X	X	X	X		X					X			New
			Standardize invididual agricultural and urban water agency demand estimates	X	X	X	X	X	X	X	X	X	X	X	X	X	X	New
			Prepare a report on supply and demand projections	X	X	X	X	X	X	X	X	X	X	X	X	X	X	New
	2. Reduce demand through water conservation and other methods	Implement water use efficiency efforts	Participate in collective projects with cities and districts at a wholesale level	X														New
			Organize regional committees to coordinate agricultural and urban committeees	X														New
			Initiate a program to provide cost effective incentives for projects that benefit multiple users	X														New
			Prepare and implement water conservation plans	X	X	X		X	X		X			X	X	X		Continuing
			Implement urban water use efficiency measures		X				X	X	X		X	X	X	X		Continuing
			Implement agricultural water use efficiency measures		X	X		X										Continuing
			Investigate feasibility of RD2068 Agricultural Runoff Rediversion and Reuse Facility	X				X										New
		Improve Putah South Canal conveyance efficiency	Install measuring equipment on Putah South Canal	X														Continuing
			Explore cost effective methods to reduce operational spills															
	3. Protect existing surface water supplies	Administer State Water Project contract	Administer Master NBA agreement	X														Continuing
			Administer Member Unit NBA agreements	X					X	X	X		X	X	X	X		Continuing
			Implement water rights Settlement Agreement with DWR	X					X		X				X			Continuing
			Participate with SWP Contractors and other state and regional associations	X														Continuing
			Increase involvement of Napa County in programs and projects that benefit Napa and SCWA	X														Continuing
		Administer Solano Project contract and defend water rights	Administer Master Solano Project agreement	X														Continuing
			Administer participating agency Solano Project agreements	X	X	X					X			X	X	X		Continuing
			Play a leadership role on the Lower Putah Creek Coordinating Committee	X	X	X					X				X	X		Continuing
			Seek assurances from NOAA Fisheries on Putah Creek habitat improvements	X														Continuing
			Install measuring equipment on Putah Creek	X														New
			Consider property acquisitions along Putah Creek and Solano Project Watershed	X														New
			Complete SP licensing process	X														Continuing
			Participate in efforts to educate the public about the Solano Project	X														Continuing
		Improve conveyance at Putah Diversion Dam	Study alternatives to reduce vegetative growth in Putah Creek	X	X													Continuing
			Study alternatives to restructure Putah Diversion Dam	X	X													Continuing
			Solicit funding and partners to help with project	X	X													New
			Implement the selected alternative	X	X													New
		Administer Solano Project Rehabilitation and Betterment Program		X	X													Continuing
		Monitor land use activities with potential for encroachment or impacts on surface water supplies	Monitor and participate in Reclamation Lake Berryessa Visitor Services Plan	X														Continuing
			Work with Watermaster through the Watermaster Advisory Committee to enforce upstream settlement agreement	X														Continuing
	4. Reduce constraints to contributions from existing sources	Increase NBA utilization and capacity	Lead studies of alternate intake and capacity increase	X														Continuing
			Maximize use of Settlement Water						X		X				X			Continuing
			Amend SWP contract to maximize volume of full VPW water right	X												X		Continuing
		Reoperate Solano Project		X														New
		Increase capacity of Solano Project		X														New
		Use flood flows for water supply		X														New
		Increase use of groundwater	Increase understanding of groundwater resources of Putah Fan/Tehama Formation	X	X	X	X	X		X					X			New
			Initiate more proactive groundwater management	X	X	X		X		X					X			Continuing
			Create a groundwater model	X	X	X	X	X		X					X			New
			Investigate increasing monitoring of groundwater quality and levels countywide	X	X	X	X	X		X					X			New
			Update Groundwater Management Plans regularly (AB3030 Plan)		X	X		X		X					X			Continuing
			Develop groundwater basin management objectives (BMOs)		X	X		X		X					X			Continuing
			Maintain countywide centralized data repository for groundwater data (Solano Water Authority Project #4)	X	X	X	X	X		X					X			Continuing
			Increase coordination among groundwater pumpers		X	X	X	X		X					X			New
		Improve water treatment technology for water supplies	Continue studying feasibility of organic carbon pre-treatment of NBA water	X					X	X	X		X	X	X	X		New
			Continue to participate with other Delta water users on treatment technologies															
			Support development of a water quality research station at the NBR Water Treatment Plant															
		Establish agreement with State to receive SWP credit for Solano Project releases		X														New
	5. Increase ability to store water between years	Increase participation in Mojave Exchange Agreement	Continue to inform cities of opportunities	X					X	X	X		X	X	X	X		Continuing
			Compare costs to other dry year options															
		Work with SWP, State Water Contractors, and CALFED to explore water supply and storage opportunities outside of the region	Identify potential participating agencies	X					X	X	X		X	X	X	X		Continuing
			Discuss potential partnerships with SWC that have banks															
			Study terms of each potential groundwater bank to determine if participation would meet the needs of member agencies															
			Engage in an agreement with a groundwater bank to store water															
			Participate in SWC/DWR/CALFED meetings to stay current with proceedings															
			Consider opportunities for long-term permanent transfers/exchange/purchases															
			Review available documentation of potential storage projects and identify ways that Solano agencies could be involved															
		Increase opportunities for conjunctive use	Increase understanding of groundwater resources of Putah Fan/Tehama Formation	X	X	X	X	X		X					X			New
			Initiate more proactive groundwater management	X	X	X		X		X					X			Continuing
			Implement MPWD Study	X	X	X			X		X				X			Continuing
			Continue RD 2068 Project	X				X	X		X				X			Continuing
			Explore other conjunctive use projects	X														New
		Study feasibility of in-county surface water storage options		X														New

Table 5-1
IRWMP Potential Actions, Implementation Steps, and Implementing Agencies

Strategic Issues and Related Proposition 50 Categories	Strategy Statement	Potential Actions	Initial Implementation Steps	Implementing Agencies														Action Status
				SCWA	SID	MPWD	County	2068	Ben	Dix	FF	FSSD	RV	Sui	VV	VJO	VSFCD	
	6. Develop new permanent supplies	Use "area of origin" water rights to supplement water supplies		X			X						X			X		New
		Expand opportunities for recycled water	Investigate wastewater quality issues, study potential for recycling and implement projects, including those in recycled water Master Plans		X				X	X	X	X	X	X	X	X	X	New
			Investigate limiting use of water softeners															
			Increase distribution system for recycled water															
			Evaluate desalination of recycled water and regional brine disposal options															
		Desalinate Carquinez Strait water	Evaluate regional brine disposal options	X					X							X		New
		Investigate use of non-potable water for non-potable uses			X	X		X	X	X	X		X	X	X	X		New
	7. Develop new temporary supplies	Purchase contingency supplies at the wholesale level	Study the concept of contingency supply, including need, willingness-to-pay, and potential sources	X	X	X		X	X	X	X		X	X	X	X		New
			Compare these contingency supplies to in-county options															
			Work with other member agencies to develop partnerships for projects to secure contingency supplies															
			Obtain water from inside or outside of County															
		Seed clouds in Solano Project watershed		X														New
	8. Improve recyclability of wastewater	Expand opportunities for recycled water	Investigate wastewater quality issues, study potential for recycling and implement projects, including those in recycled water Master Plans		X				X	X	X	X	X	X	X	X	X	New
			Investigate limiting use of water softeners															
			Increase distribution system for recycled water															
			Evaluate desalination of recycled water and regional brine disposal options															
	9. Improve ability to use existing sources	Construct infrastructure and treatment for NBA water in Rio Vista, Dixon, and Suisun City								X			X	X				New
		Optimize delivery of water to end users based on quantity and quality	Create countywide water system model for water quality and supply	X														New
			Explore transfers and exchanges related to water quantity and quality	X	X	X			X		X				X	X		New
			Continue RD 2068 Project	X				X	X		X				X			Continuing
			Investigate infrastructure options, such as SWA Project #2 - Highline Canal exchange between Solano Project and NBA water	X	X				X		X				X			Continuing
		Transfer water within the County (no new infrastructure)	Work with water agencies within the County to complete intra-county transfers	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Continuing
			Explore other transfers within the County															
What measures are necessary to manage the County's groundwater resources? (Groundwater management)	***1. Increase understanding and improve management of resource***	Manage perched groundwater to reduce effects to urban and agricultural areas			X	X	X	X		X					X			New
		Reduce drought effects to groundwater pumpers			X	X	X	X		X					X			New
		Promote land use practices that could improve or protect water quality		X	X	X	X	X	X	X	X	X	X	X	X	X	X	New
		Increase opportunities for conjunctive use	Increase understanding of groundwater resources of Putah Fan/Tehama Formation	X	X	X	X	X		X					X			New
			Initiate more proactive groundwater management	X	X	X		X		X					X			Continuing
			Implement MPWD Study	X	X	X			X		X				X			Continuing
			Continue RD 2068 Project	X				X	X		X				X			Continuing
			Explore other conjunctive use projects	X														New
	2. Change contributions of existing sources	Increase use of groundwater	Increase understanding of groundwater resources of Putah Fan/Tehama Formation	X	X	X	X	X		X					X			New
			Initiate more proactive groundwater management	X	X	X		X		X					X			Continuing
			Create a groundwater model	X	X	X	X	X		X					X			New
			Investigate increasing monitoring of groundwater quality and levels countywide	X	X	X	X	X		X					X			New
			Update Groundwater Management Plans regularly (AB3030 Plan)		X	X		X		X					X			Continuing
			Develop groundwater basin management objectives (BMOs)		X	X		X		X					X			Continuing
			Maintain countywide centralized data repository for groundwater data (Solano Water Authority Project #4)	X	X	X	X	X		X					X			Continuing
			Increase coordination among groundwater pumpers		X	X	X	X		X					X			New
		Study feasibility of treating poor quality groundwater, including abandoned city wells, as a new water supply			X				X	X	X		X	X	X	X		New
What measures should be taken to encourage use of water of the appropriate quality for the intended use? (Water quality protection and improvement)	***1. Engage in activities that influence SP water quality***	Implement Solano Project watershed water quality protection activities	Solano Project sanitary survey	X	X	X					X			X	X	X		Continuing
			Support Lake Berryessa Watershed Partnership															
			Monitor watershed land use activities with potential for encroachment or impacts on surface water supply															
			Monitor recreation activities through the watershed and encourage responsible practice															
			Consider property acquisitions in Solano Project watershed above Putah South Canal Diversion															
		Protect water quality in the Putah South Canal	Investigate sources of seasonal turbidity in Putah South Canal	X	X													Continuing
			Build relationships with landowners adjacent to Putah South Canal and select and implement water quality BMPs	X	X													New
		Promote land use practices that could improve or protect water quality		X	X	X	X	X	X	X	X		X	X	X	X		New
	2. Engage in activities that influence NBA water quality	Monitor Delta water resource issues	Monitor CALFED Delta restoration activities that could affect NBA water quality	X														Continuing
			Participate in public involvement efforts for Delta water quality standards															
		Construct an alternate NBA intake	Continue with studies of alternate intake	X					X		X				X	X		Continuing
		Improve water treatment technology for water supplies	Continue studying feasibility of organic carbon pre-treatment of NBA water	X					X	X	X		X	X	X	X		New
			Continue to participate with other Delta water users on treatment technologies															
			Support development of a water quality research station at the Northbay Regional Water Treatment Plant															
		Model water quality effects on NBA intake from a levee failure		X														New
		Manage land use practices in Barker Slough watershed that could affect water quality	Implement special urban BMP's												X			New
			Encourage agricultural practice that benenfit water quality	X	X		X											New
			Consider property acquisitions necessary to protect water quality	X	X	X	X				X			X	X	X		New
			Implement BMP's to prevent livestock from entering channels	X														Continuing
	3. Improve flexibility to send water to different users	Optimize delivery of water to end users based on quantity and quality	Investigate infrastructure options, such as SWA Project #2 - Highline Canal exchange between Solano Project and NBA water	X	X				X		X				X			Continuing
			Create countywide water system model for water quality and supply	X														New
			Explore transfers and exchanges related to water quantity and quality	X	X	X			X		X				X	X		New

Table 5-1
IRWMP Potential Actions, Implementation Steps, and Implementing Agencies

Strategic Issues and Related Proposition 50 Categories	Strategy Statement	Potential Actions	Initial Implementation Steps	Implementing Agencies														Action Status
				SCWA	SID	MPWD	County	2068	Ben	Dix	FF	FSSD	RV	Sui	VV	VJO	VSFCD	
	4. Improve recyclability of wastewater	Expand opportunities for recycled water	Investigate wastewater quality issues, study potential for recycling and implement projects, including those in recycled water Master Plans		X				X	X	X	X	X	X	X	X	X	New
			Investigate limiting use of water softeners															
			Increase distribution system for recycled water															
			Evaluate desalination of recycled water and regional brine disposal options															
What measures can be taken to improve runoff water quality? (Water quality protection and improvement, stormwater capture and management)	***Manage source contribution through a watershed approach***	Implement Phase I/Phase II nonpoint NPDES runoff programs					X		X	X	X	X	X	X	X	X	X	Continuing
		Reduce water quality problems from newly emerging contaminants							X	X		X	X		X		X	New
		Clarify regulations in developing areas to minimize runoff	Collect and compile stormwater regulations for new development from Solano County and the cities	X	X		X		X	X	X		X	X	X	X	X	New
			Distribute compiled regulations to the public															
			Facilitate discussion between agencies approving development projects															
			Establish a program to provide updated flood hazard mapping where needed															
			Provide a forum for public discussion regarding the regulations															
		Cooperatively monitor agricultural runoff quality		X	X	X		X										Continuing
		Promote land use practices that could improve or protect water quality		X	X		X		X	X	X	X	X	X	X	X	X	New
How can flood management services be best managed? (Flood management)	***1. Increase awareness of flood risks***	Update flood hazard maps					X		X	X	X		X	X	X	X	X	New
		Implement flood control public awareness program		X														Continuing
	2. Provide institutional structures to make flood management more effective	Increase coordination between agencies	Coordinated review of projects and developments	X	X	X	X	X	X	X	X	X	X	X	X	X	X	New
		Clarify regulations in developing areas to minimize runoff	Collect and compile stormwater regulations for new development from Solano County and the cities	X	X		X		X	X	X		X	X	X	X	X	New
			Distribute compiled regulations to the public															
			Facilitate discussion between agencies approving development projects															
			Provide a forum for public discussion regarding the regulations															
		Update SCWA Flood Control Master Plan		X														New
		Develop final SCWA flood control funding/construction/maintenance policy from existing "interim principles"	Prepare revised Principles for consideration by SCWA Board of Directors	X														New
	3. Implement flood management projects	Implement SCWA flood control project small grant program		X														Continuing
		Implement watershed planning studies	Implement flood control projects within studies	X														New
			Implement McCune Creek flood control project	X														New
			Implement Sweeney Creek flood control project	X														New
			Implement South Channel improvements	X						X								Continuing
			Implement Gibson Canyon Creek flood control project	X														Continuing
	4. Continue O&M of Ulatis & Green Valley flood control projects	Expand the scope of Ulatis and Green Valley flood control projects		X														New
		Improve efficiencies of SCWA maintenance activities	Track changes in permitting requirements	X														Continuing
What should participation in multi-county flood control entail? (Flood management)	***Engage in activities that promote multi-county flood control***	Model water quality effects on NBA intake from a levee failure		X														New
		Monitor SAFCA's plans for Yolo Bypass		X				X					X					Continuing
		Participate in CALFED's Delta levee integrity efforts		X				X										Continuing
		Monitor statewide flood control programs for applicability to Solano County		X				X										Continuing
		Track Reclamation's emergency dam failure response plan for Putah Creek and Vallejo's plan for its dams		X	X											X		Continuing
		Evaluate flood management issues on Putah Creek		X														Continuing
How can environmental resources best be managed? (Ecosystem restoration, environmental and habitat protection and enhancement)	***Take a proactive approach towards protecting and enhancing riparian and fish habitats and watersheds***	Complete and implement an HCP		X	X	X				X	X	X	X	X	X	X	X	Continuing
		Assume a more proactive/aggressive role in control of invasive species		X	X	X	X	X	X	X	X	X	X	X	X	X	X	New
		Implement Lower Putah Creek restoration and fish passage programs		X														Continuing
		Assume a proactive role in stewardship of water-related environmental resources	Protect, restore, and/or enhance local creeks	X			X		X		X	X	X	X	X	X	X	New
			Initiate habitat restoration/enhancement projects	X	X	X	X	X	X	X	X	X	X	X	X	X	X	New
			Investigate involvement in wetland preservation issues in Solano County	X	X	X	X	X	X	X	X	X	X	X	X	X	X	New
		Construct an alternate NBA intake	Continue with studies of alternate intake	X					X		X				X	X		Continuing
		Participate in Putah Creek Discovery Corridor Partnership		X	X													Continuing
		Maintain quality of Suisun Marsh		X			X				X	X						Continuing
How can state and federal funding opportunities best be leveraged?	***Actively pursue state and federal funding***	Implement state lobbying effort		X														Continuing
		Identify funding from federal and state sources	Submit grant applications for state and federal grants	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Continuing
		Develop and implement a federal lobbying and funding strategy		X														New
		Leverage HCP for funding		X														New
What measures would best address safety and security issues?	***1. Increase the region's understanding of safety and security***	Monitor DWR safety and security studies and actions for NBA		X														Continuing
		Perform risk assessment of flood management facilities		X				X	X	X	X		X	X	X	X	X	New
	2. Implement identified actions to improve safety and security for BOR facilities	Improve security and safety of Putah South Canal near development		X	X		X				X				X			Continuing
		Improve conveyance at Putah Diversion Dam	Study alternatives to reduce vegetative growth in Putah Creek	X	X													Continuing
			Study alternatives to restructure Putah Diversion Dam	X	X													Continuing
			Solicit funding and partners to help with project	X	X													New
			Implement the selected alternative	X	X													New
		Implement identified recommendations by Reclamation to improve safety and security of Monticello Dam		X	X													Continuing
		Investigate seismic concerns and potential solutions at Terminal Reservoir		X	X													Continuing
How should the region prepare for climate change?	***Increase understanding of climate changes as it affects supply, quantity, and flood control***	Assess risk and uncertainties associated with potential effects of climate change	Identify facilities and services potentially affected by climate change	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Continuing
			Investigate potential local effects of climate change															
			Develop long-term strategy and plan for addressing potential consequences of climate change															

Implementing Agencies Abbreviations: SCWA - Solano County Water Agency; SID - Solano Irrigation District; MPWD - Maine Prairie Water District; County - Solano County; 2068 - Reclamation District 2068; Ben - Benicia; Dix - Dixon; FF - Fairfield; FFSD - Fairfield Suisun Sewer District; RV - Rio Vista; Sui - Suisun City; VV - Vacaville; VJO - Vallejo; VSFCD - Vallejo Sanitation and Flood Control District

5.3 POTENTIAL ACTION SCREENING

After identifying the complete list of actions, the Stakeholder Group looked for potential actions that could be easily screened into or out of the IRWMP. The Stakeholder Group did not further evaluate any actions that were screened into or out of the IRWMP. The following sections describe the screening process and identify the screened actions. Section 5.3 further evaluates the remaining actions after the screening process.

5.3.1 Screened-In Actions

The Stakeholder Group screened actions into the IRWMP that were either (1) ongoing potential actions that the agencies complete as part of their regular business or (2) mandatory actions required by regulatory, legal, or institutional conditions. The ongoing potential actions require few staff and/or little financial resources; therefore, their continuance would not affect the daily operations of the Solano agencies. The Solano agencies are required to implement the mandatory potential actions, so the Solano agencies do not need to prioritize their implementation. The Solano agencies must complete the mandatory potential actions; therefore, they should be at the top of the prioritized action list. The screened-in actions are included in the IRWMP without any additional analysis. This set of screened-in actions will be the highest priority in the IRWMP and Strategic Plan. Figure 5-2 lists the screened-in actions.

Continuing Actions that Require Few Resources	Mandated Actions
• Participate in regional water resources planning • Monitor land use activities with potential for encroachment or impacts on surface water supplies • Monitor Delta water resource issues • Implement flood management public awareness program • Implement SCWA Small Flood Control Project Small Grant Program • Improve efficiencies of SCWA maintenance activities • Monitor SAFCA's plans for Yolo Bypass • Participate in CALFED's efforts for Delta levee integrity • Monitor statewide flood control programs for applicability to Solano County • Track Reclamation's emergency dam failure response plan for Putah Creek and Vallejo's plans for its dams • Evaluate flood management issues on Putah Creek • Monitor DWR safety and security studies and actions for NBA	• Implement identified recommendations by Reclamation to improve safety and security of Monticello Dam • Investigate seismic concerns and potential solutions at Terminal Reservoir • Implement Phase I/Phase II nonpoint NPDES runoff programs

Figure 5-2
Screened-in Actions

5.3.2 Screened-Out Actions

The Stakeholder Group reviewed the potential action list to screen actions out of the IRWMP. The Stakeholder Group screened the potential actions using the following criteria:

- **Technical Feasibility** – Is the engineering feasible?
- **Effectiveness** – Does the action provide benefits to the region?
- **Timeliness** - Is the timing right for the action?
- **Legal** – Is the action legal?

If the potential action did not meet all the screening criteria, the Stakeholder Group removed it from further evaluation in the IRWMP. Figure 5-3 shows the potential actions that did not meet the screening criteria. A "diamond" reflects that the potential action did not meet the screening criterion. The eight actions that were screened out were dropped from further consideration.

Strategic Issues	Potential Actions	Screening Criteria: Technical Feasibility	Effectiveness	Timeliness	Legal	Notes
Supply and Demand	Reoperate Solano Project	◆				No room to reoperate, and would require change to Settlement Agreement
Supply and Demand	Increase capacity of Solano Project				◆	Limitations in Settlement Agreement and water rights
Supply and Demand	Use flood flows for water supply	◆				Past studies show not feasible
Supply and Demand	Establish agreement with State to receive SWP credit for SP releases		◆			Flow releases fixed in Settlement Agreement
Supply and Demand	Use "area of origin" water rights to supplement water supplies		◆	◆		No other cities pursuing
Supply and Demand	Seed clouds in SP watershed		◆			Hard to quantify benefits
Flood Management	Expand the scope of Ulatis and Green Valley flood control projects			◆		No requests
Funding	Leverage HCP for funding			◆		HCP not yet complete

Figure 5-3
Screened-out Actions

5.4 POTENTIAL ACTION EVALUATION

After completing the screening process, the Stakeholder Group and planning team evaluated the remaining actions. The actions screened into and out of the IRWMP are not included in this evaluation. The following sections describe the evaluation and prioritization of the remaining potential actions.

5.4.1 Prioritization Criteria

The Stakeholder Group developed a list of criteria to prioritize the remaining actions. These prioritization criteria reflect stakeholders' views of factors that Solano agencies should consider for future water resource management in the County. The prioritization criteria include:

- Affordability;
- Potential to resolve long-standing County conflicts and controversies;
- Efficient use of existing assets;
- Environmental impact;
- Weight of strategic issue;
- Responsiveness to strategic issue; and
- Potential to address multiple issues.

Several of the prioritization criteria require further clarification.

Affordability
The "affordability" criterion considers both the actual cost of implementing the action and whether or not outside funding sources are available. This criterion also examines whether partners are available to share project costs.

Potential to Resolve Long-Standing County Conflicts and Controversies
The criterion "potential to resolve long-standing County conflicts and controversies" refers to organizational conflicts or conflicts between the Solano agencies and the region's residents. The strategic issues address the major water resources conflicts or controversies; these organizational conflicts generally represent secondary conflicts. To clarify the conflicts included in this criterion, the Stakeholder Group developed a list of conflicts regarding water resources that the Solano agencies have been facing for some time. The identified conflicts include:

1. Disagreement on level of involvement by SCWA in flood management. SCWA has conducted some flood management planning in the County's unincorporated areas. The limited population and limited flood hazard awareness in these areas cause conflicts between residents that need flood protection and SCWA's funding policies, which require cost-effective projects and a local commitment to fund O&M.

2. Different assumptions by various agencies to project long term supply/demand. Each agency estimates supply and demand based on somewhat different measurement assumptions; therefore, projections are not directly comparable and are difficult to analyze at a countywide level.

3. Conflicts between land use practices and water quality. Upstream land use practices can adversely affect the quality of water to end users. Agricultural and urban runoff could increase water quality contaminants in surface and groundwater bodies.

4. Delta water quality impacts on NBA. Delta activities and flow regimes could affect water quality at the Barker Slough intake to the NBA, but water quality effects are not fully understood.

5. Conflicts with riparian water right users along Putah Creek that inappropriately pump water. The Putah Accord established a plan to reduce inappropriate riparian use along Lower Putah Creek, but enforcing this plan could cause conflicts with landowners and residents.

6. Conflicts with Napa County regarding allocation of water conveyance capacity in the NBA. Solano would like clarifications and decisions on several issues regarding the NBA from Napa.

Efficient Use of Existing Assets
The criterion "efficient use of existing assets" refers to utilization of existing physical infrastructure. These definitions are reflected in rating scales, as described in Section 5.3.1.

Environmental Impact
This criterion examines the environmental impacts of a project after mitigation is considered. It does not only consider the gross (unmitigated) impacts, which would unfairly lower the priority of larger projects that may have larger (but mitigable) impacts.

Weight of Strategic Issue
For the criterion, "weight of strategic issue," the strategic issue weighting from Section 4.2 are used to prioritize actions. This criterion rates a potential action higher if it is addressing a more important strategic issue.

Potential to Address Multiple Issues
This criterion emphasizes the integrated nature of this IRWMP in that the Solano agencies are trying to address multiple strategic issues in one plan. If a potential action addresses more than one strategic issue, it rates higher according to this criterion.

Criteria Identified but Eliminated
The Stakeholder Group originally identified two additional criteria: public support and acceptance; and social impact. The planning team found that these two prioritization criteria were redundant. In other words, many of the factors associated with these criteria were already reflected in other criteria; therefore, the planning team did not include these two criteria (public support or acceptance and social impact) in the evaluation procedure. The planning team found that the "Efficient use of existing assets" and "Environmental impact" criteria already accounted for the factors considered in public support and social impacts. Actions that would have efficient use of existing assets would likely have more public support than those actions which require construction of new facilities. Similarly, actions with few environmental impacts would have more public support. Also, those actions that would have environmental impacts would have similar social effects. Therefore, the planning team removed the public support and acceptance and social impacts criteria from the evaluation. These criteria, however, are still important in the planning and implementation process because they reflect factors that the Solano agencies believe are important in prioritizing potential actions.

5.4.2 Rating Scales

The planning team developed four point rating scales for each criterion, endorsed by the Stakeholder Group, that indicate how well a potential action meets that criterion. The rating scales ensure an even application of the prioritization criteria to each potential action. Figure 5-4 presents

the rating scales for the prioritization criteria. The colors in Figure 5-4 reflect the degree to which a potential action meets the prioritization criteria. In general, dark green and light green indicate the action has beneficial effects related to the criterion and orange and red indicate the action has adverse effects related to the criterion. The yellow rating indicates minor positive or neutral effects depending on the prioritization criteria.

Figure 5-4
Rating Scales for Prioritization Criteria

5.4.3 Criteria Weighting

Several criteria are more important for action prioritization than others. The planning team, with input from the Stakeholder Group, weighted the prioritization criteria to indicate the relative importance of each criterion. Figure 5-5 shows the results of the criteria weighting. In the prioritization process, potential actions that meet the higher weighted criteria will perform better than those that only meet lesser weighted criteria.

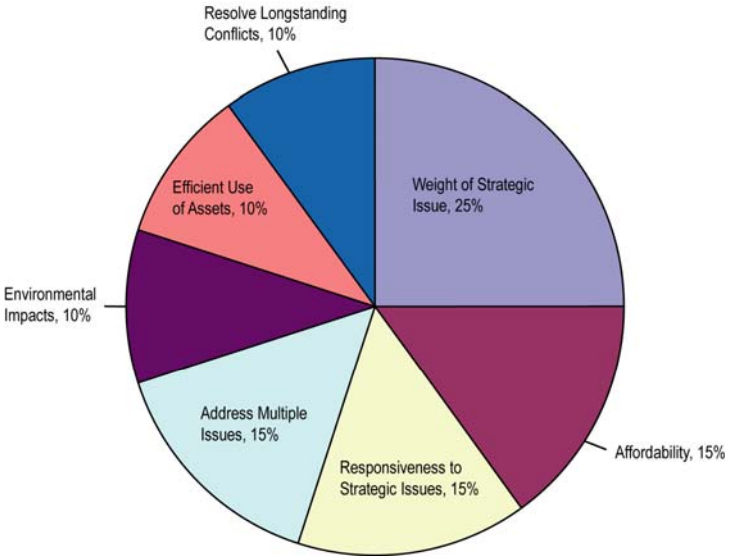


Figure 5-5
Criteria Weighting Results

5.5 PRIORITIZED POTENTIAL ACTIONS

Figure 5-6 presents the prioritized actions in a matrix format. The matrix indicates how the actions performed according to each criterion and which potential actions the Solano agencies should prioritize for implementation. In the left columns, the matrix lists the strategic issue(s), strategy statement number(s) that correspond to the statements in Table 5-1, and the associated potential actions. The matrix then presents each prioritization criterion in a separate column; the column widths correspond to the criteria weighting assigned by the planning team. The matrix lists the criteria from most important on the left to lesser important on the right. The colors displayed in the matrix correspond to the criteria rating scales in Figure 5-4. The potential actions at the top of the list performed the best relative to all criteria.

The planning team and Stakeholder Group rated each potential action on Figure 5-6 according to prioritization criteria, using the rating scales. The sections below walk through several example potential actions to describe the ratings of several potential actions, and then describe how the planning team prioritized the actions using these ratings.

Example Potential Action Ratings

This section discusses the potential action ratings for two potential actions: “Administer Solano Project contract and defend water rights” and “Construct an alternate NBA intake.” These actions represent both policy-related and construction-related potential actions, and include a range of types of impacts.

“Administer Solano Project contract and defend water rights” would involve policy-related actions on the part of SCWA and Participating Agencies. This action does not include any construction or near-term studies, but would involve staff time. Table 5-2 shows the influencing factors for each prioritization criterion and the resulting rating.

Table 5-2
Explanation of "Administer Solano Project Contract and Defend Water Rights" Ratings

Prioritization Criterion	Influencing Factors	Rating
Weight of strategic issue	Addresses the supply and demand strategic issue, which received the highest weighting of 22 percent.	Dark Green
Affordability	Does not require financial resources, and staff time would be shared among SCWA and Participating Agencies.	Dark Green
Responsiveness to strategic issue	Protects supplies from the Solano Project, which is one of the primary supplies available to the region.	Dark Green
Address multiple issues	Addresses only the supply and demand strategic issue.	Yellow
Environmental impacts	Continues operation of the Solano Project, which is neutral to the environment because of the Solano Accord.	Yellow
Efficient use of existing assets	Uses existing facilities to deliver water.	Dark Green
Resolve long-standing controversies	Reduces inappropriate diversions from Lower Putah Creek as stated in the Solano Accord.	Light Green

"Construct an alternate NBA intake" would provide a second NBA intake at a new location on or near the Sacramento River to improve NBA water quality and reduce effects to Delta smelt. A feasibility study for this potential action is complete. If the NBA water users determine the potential action to be feasible and beneficial, the potential action would be construction of a new pump station and pipeline to connect to the existing NBA.

Table 5-3
Explanation of "Construct an Alternate NBA Intake" Ratings

Prioritization Criterion	Influencing Factors	Rating
Weight of strategic issue	Addresses the water quality to users and environmental impacts strategic issues; rated according to the higher strategic issue (water quality to users) weighting of 16 percent.	Light Green
Affordability	Would be very expensive, but would not be funded without cost sharing by agencies that use the NBA. The project could potentially receive funding for water quality and environmental benefits from the state.	Light Green
Responsiveness to strategic issue	Improves water quality by providing a second intake outside of Barker Slough and benefits Delta smelt by choosing a more fish-friendly location.	Dark Green
Address multiple issues	Addresses two strategic issues: water quality to users and environmental impacts.	Light Green
Environmental impacts	Would benefit Delta smelt; however, there may be short-term or temporary impacts of construction.	Light Green
Efficient use of existing assets	Requires major construction of new pump station and conveyance system, but connects to existing NBA.	Red
Resolve long-standing controversies	Has indirect influence on regional conflicts contained on the list developed by the Stakeholder Group.	Yellow

Prioritization Method

The prioritization matrix (Figure 5-6) identifies potential actions separated into Tiers 1, 2, and 3. In general, Tier 1 actions are those that the Solano agencies should implement immediately, Tier 2

actions have moderate priority for implementation, and Tier 3 actions have lower priority for implementation. Tier 1 includes the actions that were screened into the IRWMP (see Figure 5-1). The planning team sorted potential actions in Figure 5-6 into tiers; the higher-prioritized potential actions are those that best meet the prioritization criteria. Visually, Tier 1 has more dark and light green ratings for the higher-weighted prioritization criteria and fewer orange and red ratings. Tier 3 has fewer dark and light green ratings and more orange and red ratings. Table 5-4 summarizes number of times a color from the rating scales appears in the matrix for each individual tier. See Figure 5-4 for rating scales and definitions of each color.

Table 5-4
Number of Times Colors Appear in Each Tier

Rating Color	Tier 1	Tier 2	Tier 3
Dark Green	43	22	8
Light Green	22	33	11
Yellow	39	45	67
Orange	6	15	20
Red	2	4	7

Tier 1 potential actions have the most “dark green” ratings, and the majority of these ratings appear under the top three weighted criteria. Most of the Tier 1 actions address the water supply and demand strategic issue, which the stakeholder group identified as the most important. Tier 1 actions also performed relatively well according to affordability, another criterion that was weighted high. The County could obtain funding for most of these actions relatively easily, especially when compared to actions in Tier 2 and 3. The majority of the other ratings in Tier 1 are light green or yellow. Of all the criteria, Tier 1 actions perform most poorly relating to efficient use of existing assets. The majority of orange and both red ratings fall under this criterion.

Tier 2 potential actions receive the most “light green” ratings of the three tiers. The majority of these ratings also appear in the top three weighted criteria. Tier 2 potential actions receive several orange ratings in the affordability criterion, meaning funding would be moderately difficult to obtain. These orange ratings make those potential actions lower priority to Solano agencies; therefore, the actions fall into Tier 2. All red and about half the total orange ratings in Tier 2 fall under the “existing use of efficient assets” criterion. Most of these actions would require some construction to implement.

Tier 3 potential actions receive the most red and orange ratings and the least dark green and light green ratings of the tiers. The majority of orange and red ratings occur under the “weight of strategic issue” and “affordability” criteria. These potential actions are largely in Tier 3 because they did not perform well in these categories. Tier 3 potential actions also only address one strategic issue; while Tiers 1 and 2 include several potential actions that address multiple issues. The majority of Tier 3 ratings are yellow. The Solano agencies should not disregard the Tier 3 potential actions completely; rather, they are a lower priority for implementation than the Tier 1 and 2 actions. Section 6 further defines the tiers and briefly describes each action.

	Strategic Issue(s)	Strategy Statement (s)	Potential Actions	Prioritization Criteria: Weight of strategic issue	Affordability	Responsiveness to strategic issue	Address multiple issues	Environmental impacts	Efficient use of existing assets	Resolve long-standing controversies
Tier 1	Supply and Demand	3	Administer Solano Project contract and defend water rights							
	Supply and Demand	3	Administer State Water Project contract							
	Supply and Demand	5	Work with SWP, SWC, and CALFED to explore water supply and storage opportunities outisde of the region							
	Supply and Demand; Quality to users	4; 2	Improve water treatment technology for water supplies							
	Supply and Demand	4	Increase NBA capacity and utilization							
	Supply and Demand	1	Quantify countywide demand and supply							
	Supply and Demand	9	Transfer water within the County							
	Supply and Demand; Quality to users	9; 3	Optimize delivery of water to end users based on quantity and quality							
	Supply and Demand	7	Purchase contingency supplies at the wholesale level							
	Supply and Demand; Safety and Security	3; 2	Improve conveyance at Putah Diversion Dam							
	Supply and Demand; Groundwater	5; 1	Increase opportunities for conjunctive use							
	Supply and Demand; Groundwater	4; 2	Increase use of groundwater							
	Supply and Demand	5	Increase participation in Mojave Exchange Agreement							
	Flood management	2	Develop final SCWA flood control funding/construction/maintenance policy from existing "interim principles"							
	Supply and Demand	2	Implement water use efficiency efforts							
	Flood management; Runoff water quality	2	Clarify regulations in developing areas to minimize runoff							
Tier 2	Runoff water quality		Cooperatively monitor agricultural runoff quality							
	Quality to users; Environment	2	Construct an alternate NBA intake							
	Funding		Implement state lobbying effort							
	Supply and Demand	3	Administer Solano Project Rehabilitation and Betterment Program							
	Groundwater; Quality to users; Runoff water quality	1 ; 1	Promote land use practices that could improve or protect water quality							
	Quality to users; Multi-county flood control	2	Model water quality effects on NBA intake from a levee failure							
	Supply and Demand	2	Improve Putah South Canal conveyance efficiency							
	Funding		Identify funding from federal and state sources							
	Quality to users	1	Implement SP watershed water quality protection activities							
	Quality to users	2	Manage land use practices in Barker Slough watershed that could affect water quality							
	Quality to users	1	Protect water quality in the Putah South Canal							
	Environmental		Complete and implement an HCP							
	Supply and Demand	9	Construct infrastructure and treatment for NBA water in Rio Vista, Dixon, and Suisun City							
	Supply and Demand; Quality to users	6; 4	Expand opportunities for recycled water							
	Flood management	2	Update SCWA Flood Control Master Plan							
	Supply and Demand	6	Investigate use of non-potable water for non-potable uses							
	Environmental		Assume a more proactive/aggressive role in control of invasive species							
Tier 3	Funding		Develop and implement a federal lobbying and funding strategy							
	Supply and Demand	5	Study feasibility of in-county surface water storage options							
	Supply and Demand	6	Desalinate Carquinez Strait water							
	Safety and Security	2	Improve security and safety of Putah South Canal near development							
	Environment		Implement Lower Putah Creek restoration and fish passage programs							
	Flood management	2	Increase coordination between agencies							
	Climate Change		Assess risk and uncertainties associated with potential effects of climate change							
	Runoff water quality		Reduce water quality problems from newly emerging contaminants							
	Groundwater	1	Manage perched groundwater to reduce effects to urban and agricultural areas							
	Groundwater	2	Study feasibility of treating poor quality groundwater, including abandoned city wells, as a new water supply							
	Groundwater	1	Reduce drought effects to groundwater pumpers							
	Flood management	3	Implement watershed planning studies							
	Flood management	1	Update flood hazard maps							
	Environment		Assume a proactive role in stewardship of water-related environmental resources							
	Environment		Maintain quality of Suisun Marsh							
	Safety and Security	1	Perform risk assessment of flood management facilities							

Figure 5-6
Potential Action Prioritization Matrix

Section 6
Prioritization Results

This section presents the results of the action screening and prioritization process described in Sections 2 and 5.

As described in Section 5, the Stakeholder Group and planning team screened potential actions into the IRWMP. These actions included continuing efforts of the Solano agencies that do not require much time and resources and mandated actions required by law. The planning team then rated the remaining potential actions according to each prioritization criterion and compiled results in a prioritization matrix (Figure 5-6). The matrix shows the actions that performed the best at the top of the list. Based on the screening and prioritization results, the planning team separated the potential actions into three tiers:

- Tier 1 – Highest priority for implementation;
- Tier 2 – Moderate priority; and
- Tier 3 – Lower priority - longer term implementation actions.

The following sections describe the three tiers and the actions included within each tier.

6.1 TIER 1 – HIGHEST PRIORITY FOR IMPLEMENTATION

Tier 1 actions are the highest priority for implementation. The Solano agencies should focus on implementing these actions first to achieve the most regional benefits and maximize use of resources. Tier 1 includes all the actions that were "screened-in" to the evaluation as described Section 6.1.1 below. These actions continue ongoing water resource efforts. In addition, Tier 1 includes the top 16 actions evaluated after the initial screening that performed the best according to the prioritization criteria. The actions are not listed in a specific order in which they should be implemented. More detailed explanations of the Tier 1 actions are included at the end of Section 7.

6.1.1 Continue Ongoing Water Resource Efforts (Screened-in Actions)

Solano agencies have been working for many years to more effectively manage and protect the region's water resources. Many of these ongoing actions are mandatory; therefore, they must continue. Other actions are not mandatory, but require few resources (both money and staff time) to continue. This potential action would continue ongoing efforts that are either mandatory or require few resources. These existing efforts should continue:

- Participate in regional water resources planning
- Monitor land use activities with potential for encroachment or impacts on surface water supplies
- Monitor Delta water resource issues
- Implement flood management public awareness program

- Implement SCWA Flood Control Project Small Grant Program
- Improve efficiencies of SCWA maintenance activities
- Monitor Sacramento Area Flood Control Agency's (SAFCA) plans for the Yolo Bypass
- Participate in CALFED's efforts for Delta levee integrity
- Monitor statewide flood control programs for applicability to Solano County
- Track Reclamation's emergency dam failure response plan for Putah Creek and Vallejo's plans for its dams
- Evaluate flood management issues on Putah Creek
- Monitor DWR safety and security studies and actions for NBA
- Implement identified recommendations by Reclamation to improve safety and security of Monticello Dam
- Investigate seismic concerns and potential solutions at Terminal Reservoir
- Implement Phase I/Phase II nonpoint National Pollutant Discharge Elimination System (NPDES) runoff programs

6.1.2 Administer Solano Project Contract and Defend Water Rights

To implement this potential action, SCWA would continue its activities to administer the Solano Project contract and defend the water rights. Administering Solano Project water supply contract entails basic duties, including submitting schedules, payments and water use reports to Reclamation. SCWA and the participating agencies (cities, districts, and agencies contracting with SCWA for water from the Solano Project) need to coordinate schedules, payments, and water use reports. The contract also requires SCWA and its participating agencies to meet federal water conservation standards and to submit plans on meeting the standards.

Defense of Solano Project water rights encompasses a wide variety of implementation steps, some of which may not be foreseeable at this time. Prior to the signing of the Putah Creek Accord that settled instream flow issues in Lower Putah Creek, significant SCWA resources were dedicated to protecting the Solano Project water supply and water rights. Some concerns and obligations still remain from both the upstream and downstream settlements.

6.1.3 Administer State Water Project Contract

Administering the SWP water supply contract would require continued coordination between SCWA and member units (cities contracting with SCWA for water from the NBA). SCWA and member units consistently interact regarding schedules, payments, and water use reports. SCWA must then submit these forms and reports to DWR. Other activities under this action include SCWA coordination with the other user of the NBA, the Napa County Flood Control and Water Conservation District, and with water users who utilize the NBA to convey non-SWP water.

Administering the SWP supply is much more complex and time consuming compared to the Solano Project. Fluctuating water supply allocations and changing DWR costs require close interaction between DWR and contractors using SWP water, such as SCWA. The water supply of the SWP suffers from dry year deficiencies and SWP operational constraints. Many of these operational constraints are because of environmental regulations to protect water quality, fish, and wildlife. SCWA and the member units must understand these constraints to be able to advocate regional issues; understanding these constraints involves a high degree of technical and legal expertise.

6.1.4 Work with SWP, State Water Contractors, and CALFED to Explore Water Supply and Storage Opportunities Outside of the Region

Increased water supply or water storage could increase the reliability of Solano's water supplies, particularly those from the NBA. Increasing the yield of the SWP through SWP or CALFED projects would increase the reliability of the NBA. Storing water in wet years for later use in drier years would help Solano water agencies maintain reliable water supplies in more hydrologic year types. Several options exist for Solano agencies to acquire from or store water outside the region. Solano agencies could participate in groundwater banking projects similar to the Mojave Exchange Agreement. Other potential agencies include Semitropic Water Storage District, Berrenda Mesa Irrigation District, or Arvin Edison Water Storage District. In addition to groundwater storage, new surface storage could increase SWP water supply reliability or could increase storage for the region. The CALFED program is studying five potential surface storage projects and potential groundwater storage projects throughout the state. Most of these storage facilities have the potential to increase SWP supplies, which would increase the reliability of the NBA supplies. Other potential opportunities include long-term transfers to increase SWP water supplies and purchase of additional permanent supplies. This proposed action does not envision participation in surface storage opportunities outside of the CALFED collaborative process, and any surface storage project would have to be part of a balanced CALFED implementation package.

6.1.5 Improve Water Treatment Technology for Water Supplies

High organics and turbidity in the water supply, particularly in the winter season, cause cities to have difficulty treating NBA water supply to meet ever more stringent drinking water standards. This action would provide research opportunities and facilities to develop solutions to effectively treat NBA water. Solano agencies are considering a wide variety of projects and programs to address the water quality concerns, including an alternate intake on the Sacramento River and installation of Best Management Land Use Practices. Because cities treat the drinking water, they will make final decisions on treatment technologies. The cities in Napa and Solano Counties use a common source; therefore, collective efforts on treatment technology are most efficient.

Other agencies are also studying treatment of drinking water from the Delta. Although the NBA water is different for other Delta sources in some respects, there are some commonalities that make regional cooperation important. Solano agencies should continue to work with other agencies who are studying treatment of Delta water.

6.1.6 Increase NBA Capacity and Utilization

The NBA is a major water supply facility conveying SWP water and other non-SWP water supplies to the major cities in Solano County and to Napa County. Although designed to convey 154 cfs,

recent tests have shown its actual capacity at 142 cfs due to the growth of a biofilm on the pipe's interior.

Even with an increase to DWR's contracted capacity of 175 cfs, the NBA will fall short of conveying all potential permitted and contracted water originating from the Delta. To convey all potential permitted water, the NBA will need to be expanded; an initial estimate by DWR placed the expansion at a capacity of 248 cfs. Given growth and demand for water in Solano and Napa Counties, the NBA's capacity will require expansion to meet future demand. This action includes evaluating those steps necessary to expand the NBA to meet future demand capacity.

6.1.7 Quantify Countywide Demand and Supply

This action would initiate studies to quantify existing and future agricultural, urban, and environmental water demands and water supplies (including surface water and groundwater). Understanding countywide demand and supply would facilitate better management of resources and assist in the determination of long term regional planning actions. SCWA has completed Phase 1 of the IRWMP, which documents water supplies for SCWA member agencies (all entities that receive water from SCWA, either from the Solano Project or the SWP). Each member agency characterized water supply reliability differently. This action would standardize those measurements to provide an overall estimate of countywide supply.

This action would quantify current countywide water demand and initiate studies to project future water demands. Water demand consists of agricultural, urban, and environmental water uses. The Phase 1 report includes individual city and district estimates for water demand; however, they often derive the estimates by different methods using various units, especially for urban water use. This action would standardize individual city and district demand estimates to determine an overall countywide water demand.

6.1.8 Transfer Water Within the County

This potential action would involve multiple water agencies within the region engaging in transfers to help meet water needs throughout the region. Solano water agencies engage in transfers to move water from areas with adequate supplies to areas that require additional supplies. Many agencies share use of facilities (such as the NBA and Putah South Canal), which helps them move water easily.

The Solano water agencies have demonstrated a willingness to work together to solve local supply issues; however, local supply reliability concerns persist in some areas. Increasing intra-county transfers would provide water to agencies that may have shortages in some years, and would provide financial incentives to the selling agencies. This action includes intra-county transfers that use existing facilities to move water throughout the region.

6.1.9 Optimize Delivery of Water to End Users Based on Quantity and Quality

Two fundamental sources of surface water serve Solano County – water originating from the Delta, primarily via the NBA, and Solano Project water stored in Lake Berryessa. The NBA is a primary water source for the cities of Benicia, Fairfield, Vacaville and Vallejo. NBA water originates from Barker Slough. NBA water is high in organics and turbidity and consequently is difficult and costly to treat for municipal use. The NBA is a part of the SWP, which is an unreliable supply to Solano

County in dry years as DWR strives to meet demand throughout the State system. Lake Berryessa water is of high quality (low organics and turbidity) and is conservatively operated to provide reliable water even in dry years. Approximately three quarters of water from the Solano Project is used in SID and MPWD for agriculture. The NBA and the Solano Project can have different dry year cycles so there is opportunity for conjunctive use (trading these water supplies) of these two surface water supplies to meet county demand.

This action would explore measures that could lead to greater use of the Solano Project water by the cities and NBA water by agriculture. Additionally, this action would evaluate measures to optimize the quantity of water delivered to the end user based upon existing infrastructure.

6.1.10 Purchase Contingency Supplies at the Wholesale Level

Contingency supplies augment existing supplies and are necessary to prepare for drought conditions or an unforeseeable increased demand. As part of this potential action, SCWA would pursue contingency supplies at the wholesale level for use by retailers during dry years. Contingency supplies could be either on a short-term basis, where SCWA negotiates additional water for a year when supply is needed, or for a longer-term period. Contingency supplies could come from a variety of sources, including water storage projects, conjunctive use projects, and water transfers. The most likely option would be a transfer from an out-of-county agency. SCWA could also initiate participation in an external contingency supply agreement, such as DWR's or State Water Project Contractor's Dry Year Purchase Program.

6.1.11 Improve Conveyance at Putah Diversion Dam

This action would continue studies and possibly construct improvements to improve water conveyance in Putah Creek near the dam. The Putah Diversion Dam is a small structure that backs water up to allow water to flow into the Putah South Canal. Water spills over the dam into Putah Creek. Recently it was discovered that water flows in Putah Creek are constrained by thick vegetation in the creek. Because the water cannot flow freely during high flows, it backs up and potentially could cause water to rise over the dam. Increased water levels could compromise the safety of the dam and affect flows into Putah South Canal. The conveyance improvements need additional study, and should be completed in a way that improves both water supply reliability and environmental factors.

6.1.12 Increase Opportunities for Conjunctive Use

This action focuses on increasing opportunities for conjunctive groundwater use as a means of increasing water supply and reliability. Conjunctive use projects integrate the use of groundwater and surface water to allow use of surface water when available and groundwater at other times. The surface water provides supplies to local users and recharges the groundwater basin in normal or wet years. Stored groundwater then provides supply during drier years. The groundwater recharge part of conjunctive use in Solano County would occur as in-lieu recharge, meaning that rather than direct recharge (through percolations ponds), recharge occurs by reduced groundwater pumping by districts during wet years. This allows the groundwater basin to recharge naturally during wet years.

Several agencies in the County are or could explore conjunctive use opportunities for additional water supply. In the Solano Subbasin there may be opportunities to partner with Yolo County for the

collection of data or conjunctive use management as the Tehama formation extends beneath both counties. A significant emphasis has been placed on the groundwater conjunctive use as a source of supply. DWR, CALFED, and the SWRCB are assisting with the financing of conjunctive use programs that increase water supply reliability.

6.1.13 Increase Use of Groundwater

This action focuses on increasing the use of groundwater as a means of increasing water supplies and reliability. Several entities in the region, including SID and the cities of Vacaville, Rio Vista, Dixon, rely on groundwater either for all or a portion of their supply. Before development of the Solano Project, districts and cities relied more heavily upon groundwater for supply. Historic groundwater pumping has had significant effects on groundwater levels, but groundwater levels are relatively stable at present. Groundwater levels tend to decline because of increased pumping in dry years and rebound in wet years. Increased use of groundwater can occur in two forms: increased reliance on groundwater alone or increased use of groundwater as part of a conjunctive use program. This action focuses on increased groundwater withdrawals because conjunctive use is included in a separate action. More information will be necessary to understand the safe quantity of water that can be withdrawn in Solano County. Any program to increase use of groundwater will need to be coupled with further research, monitoring can collaborative management by groundwater users.

6.1.14 Increase Participation in the Mojave Exchange Agreement

Increasing participation in the Mojave Exchange Agreement would store more water from the region for use during dry years. SCWA's agreement with Mojave Water Agency, a contractor to the SWP, allows SCWA member units to exchange wet year SWP water for dry year SWP water. In years when Solano water agencies have adequate supplies, they can send water to Mojave for storage. Mojave stores this water in its groundwater basin. In dry years, Mojave returns water by reducing its use of SWP water and instead using groundwater. A portion of Mojave's SWP supplies are directed to SCWA for use during dry years.

Benicia is the only water agency that has taken advantage of this exchange agreement. As of 2004, Benicia had stored enough water to have up to 5,500 AF returned during dry years. Increasing participation in the Mojave Exchange Agreement would allow member units to store excess water in wet/normal years and rely upon this water as a supply during dry years. DWR currently requires the return to occur within 10 years of the initial exchange, but this policy may be modified to extend the return period.

6.1.15 Develop Final SCWA Flood Control Funding/Construction/Maintenance Policy from Existing "Interim Principles"

SCWA approved Interim Principles to be followed for SCWA-Funded Flood Control Projects (Principles) in 2003. SCWA labeled the principles as "Interim" because the Solano agencies' IRWMP was under development and SCWA expected this document to provide information for the SCWA Board of Directors as to the appropriate level of resources to dedicate to the flood control program.

These principles apply to flood management projects and programs where SCWA does not have a contractual responsibility for operations and maintenance. The principles call for a proposed project to have benefits greater than costs. Non-SCWA partners shall provide at least 10% of capital costs; partners could include benefiting landowners or other public agencies. Project beneficiaries must cooperate with SCWA in planning and implementing the project by funding operations and maintenance and providing necessary right-of-way easements.

Under this action, SCWA and member agencies would revisit the principles and modify them based on the priority of these types of flood control projects compared to other activities.

6.1.16 Implement Water Use Efficiency Efforts

Water use efficiency occurs at both the larger wholesale water supplier level and the individual retail customer level. As a wholesale supplier, SCWA is limited to actions at the wholesale level that generally include big-picture region-wide actions, coordinating member agency actions, and providing incentives for water use efficiency. SCWA has formed urban and agricultural water conservation committees to address countywide water conservation issues. Under this action, SCWA would continue to support the efforts of these committees and promote coordination between them.

Solano water agencies would continue to implement water use efficiency measures at the retail level. Both SCWA and member agencies are involved in the California Urban Water Conservation Council (CUWCC) and the Agricultural Water Management Council (AWMC), statewide organizations that promote water conservation. The CUWCC and AWMC require development of water management plans that evaluate implementation of water use efficiency measures at the district level, including urban Best Management Practices (BMPs) and agricultural Efficient Water Management Practices (EWMPs). Under this action, retail water agencies would update water management plans and continue to implement EWMPs and BMPs. SCWA could provide incentive programs for member agencies to implement BMPs and EWMPs that are not locally cost effective.

A potential project to improve agricultural water use efficiency is a runoff and rediversion facility in RD2068. This facility would redirect agricultural drainage for reuse on irrigated fields and reduce agricultural drainage into Delta channels. This type of project benefits county water supply and water quality in Delta channels.

6.1.17 Clarify Regulations in Developing Areas to Minimize Runoff

When developing new areas, builders must follow regulations to mitigate any stormwater impacts. This requirement is managed by the cities within city limits and by Solano County in unincorporated areas. While the regulations are similar in all areas, the public perceives that the regulations are interpreted and applied differently under different circumstances.

The cities and Solano County have worked to uphold their regulations and make sure that all development mitigates stormwater impacts. The public, however, still expresses skepticism. As part of this action, Solano water agencies would work together and with the County to try to improve coordination and public awareness. This action would inform the public of the actions that the cities and the County are taking to mitigate stormwater impacts, and would stimulate dialogue regarding these policies and actions.

A related issue of particular importance in some populated unincorporated areas is the lack of accurate data on where flooding might occur. FEMA flood hazard maps do not always depict flooding potential (their purpose is for insurance) and the FEMA maps may be outdated. Land use decisions are not always based on accurate information regarding flooding; therefore, programs to upgrade flood hazard mapping are needed. Flood hazard mapping should depict reasonably foreseeable flooding and include impacts of "build out" of communities.

6.2 TIER 2 – MODERATE PRIORITY

Tier 2 includes actions the Solano agencies do not need to implement immediately. These actions, however, should be considered if Tier 1 actions do not achieve the expected benefits, or if additional resources become available, or if circumstances change affecting the Tier 2 priorities. The actions are not listed in a specific order in which they should be implemented.

6.2.1 Cooperatively Monitor Agricultural Runoff Quality

This potential action would continue programs to encourage local agencies and agricultural users to work together to monitor agricultural runoff. California Water Code requires dischargers to submit a report of waste discharge to the Regional Water Quality Control Boards (RWQCBs). The RWQCBs use this report to determine if the dischargers should submit waste discharge requirements (WDRs) or a National Pollutant Discharge Elimination System permit order. In July 2003, the Central Valley RWQCB adopted a conditional waiver of WDRs for discharges from irrigated lands that waives permitting for agricultural tailwater, operational spills, subsurface drainage, and stormwater runoff, subject to certain conditions. The RWQCB's order allows conditional waivers for individual dischargers and for Coalition Groups that respond on behalf of a group of individuals (Central Valley RWQCB 2004).

The objective of the conditional waiver is to create programs that manage discharges from irrigated lands to prevent violations of any water quality standards. As a result of the conditional waivers, Coalition Groups or individuals will review watershed information, develop monitoring plans, and identify ways to address pollutants within the watershed (Central Valley RWQCB 2004).

Only about half of the region falls within the area governed by conditional waivers, but water quality monitoring can provide benefits even apart from these requirements. Information about water quality could benefit multiple agencies within the region, and working with agricultural users could help them meet the requirements of the Central Valley RWQCB's conditional waiver. SCWA is working with RD 2068, MPWD, and Dixon Resource Conservation District to implement a coordinated monitoring program, and is coordinating these results with SID. Implementing regional monitoring is more cost effective than individual monitoring and beneficial in a larger area.

6.2.2 Construct an Alternate NBA Intake

This potential action would construct a new NBA intake at a different location closer to the Sacramento River to improve reliability and quality of NBA water. The NBA intake in Barker Slough is in an area where the threatened delta smelt spawn. In the past, the presence of larval delta smelt has caused pumping restrictions. An alternative intake would allow water deliveries from another location when larval delta smelt are present in Barker Slough.

Barker Slough water quality is high in organics and turbidity because of local runoff and the limited flushing that occurs in the slough. Locating the intake closer to or on the Sacramento River would provide a cleaner source of water and lower water treatment costs.

SCWA completed a feasibility study of a new NBA intake on the Sacramento River away from Delta smelt habitat and at a location with higher water quality (less organics). The cost of a new intake should be compared to the cost of enhanced treatment of existing intake water, source control in the Barker Slough watershed, and value of other benefits in order to evaluate the cost feasibility of an alternate intake.

6.2.3 Continue State Lobbying Effort

Through the year 2007, the state will spend several hundred million dollars to improve water supply reliability statewide from Proposition 50, future new bond measures, and other sources. As the population increases in California, bond funding will likely continue as alternative means are sought to improve water supply, storage, and conveyance. This action would continue SCWA's state lobbying effort to communicate the importance of water supply reliability in Solano County and increase the likelihood of grant funding. The state lobbying effort will advocate grants for the region, work to have the region's projects included in future bond measures, and protect SCWA funds.

6.2.4 Administer Solano Project Rehabilitation and Betterment Program

SCWA has a Solano Project Rehabilitation and Betterment Plan (R&B Plan). The R&B Plan provides for implementation of major maintenance projects and capital improvements for Monticello Dam, the Putah Diversion Dam, Putah South Canal and Terminal Reservoir. Typical projects are: control gate repairs, upgrading flow measuring device upgrades, gate automation, drainage improvements, security fencing and flood damage repairs. The R&B Plan prioritizes projects and establishes a timetable for implementation. SCWA and its member units evaluate the R&B Plan each year and update it as necessary. SCWA includes the cost for projects in the R&B Plan in the SCWA annual budget and in the SCWA Capital Facilities Funding Plan.

6.2.5 Promote Land Use Practices that could Improve or Protect Water Quality

Land use patterns and practices within a watershed can affect the water quality of surface water and groundwater bodies. Some land use practices (e.g., BMPs) can reduce adverse water quality impacts. Some examples include restoring riparian zones, protecting riparian zones from farming/grazing, restricting development in the watershed, and limiting lot sizes and density. These BMPs focus on improving water quality for a drinking water supply and the environment.

Instead of making these changes through a more rigid regulatory framework, this option would work to promote land use BMPs. SCWA and participating agencies could adopt several strategies to promote BMPs:

- **Build relationships with landowners.** Building relationships with landowners, particularly those who are adjacent to stream and river corridors, could help educate landowners on the mutual benefits of water quality BMPs. Development of these relationships and understanding of landowners' local area knowledge will also help create the best and most applicable BMPs to specific areas.

- **Approval process.** Integrate BMPs into the land use approval process.

- **Create a grant program.** Granting funds to willing participants to implement BMPs, which reduces the burden on local landowners.

Implementing BMPs throughout the watershed could improve water quality in surface water and groundwater to meet both drinking water and ecosystem needs.

6.2.6 Model Water Quality Effects on NBA Intake from a Levee Failure and Other Delta Water Quality Impacts

This potential action would model effects of flooding various islands in the Delta and Delta water quality changes to determine the potential effects on the NBA. The NBA takes water from Barker Slough, a tributary to the Delta. Because of tidal fluctuations, Delta water quality changes may affect the supplies diverted from Barker Slough. Delta islands are typically protected by levees that keep water from entering the subsided portions of the islands. Levee failure is a concern both to local residents and statewide water users; a levee failure has the potential to flood local residents, affect the environment, and reduce water quality of Delta export supplies (CALFED 2000). There is approximately a two in three chance of an abrupt change in the Delta in 50 years due to a large earthquake or flood (Jeffrey Mount, personal communication).

If a levee failed, water would rush in to fill the interior island space. This water would come from both Delta tributary rivers and from San Francisco Bay. The water quality of water from the Bay would be more saline than typical Delta water, which could affect exports. However, effects of levee failure on the NBA water quality are unclear because of the northeast location of Barker Slough within the Delta. The water quality effects may focus on areas closer to the Bay, and the NBA may not see an effect on water quality.

6.2.7 Improve Putah South Canal Conveyance Efficiency

The Putah South Canal delivers water from Lake Solano to water users (Participating Agencies). SCWA measures flows at the diversion point from Lake Solano and at each turnout from the Putah South Canal. Calculated losses from the Putah South Canal are relatively high. The cause of these losses is unknown, and could be from leakage, measurement errors, accounting errors, or a combination. SCWA has started a program to conduct a systematic review of Putah South Canal water use and measurement to determine the source of the high loss calculation. Steps in the program include review of each water measuring device, installation of new measuring devices, and possible repairs to the Putah South Canal if leaks are found.

6.2.8 Identify Funding from Federal and State Sources

This action would be to more aggressively identify those sources of funds available at the state and federal level for water resource issues in Solano County. The region has had success in the past obtaining state grants, and would likely have greater success with increased efforts. State funds are available through the DWR and the RWQCB for integrated water resource and environmental planning, groundwater conjunctive use, and water use efficiency. The federal government has funding mechanisms through Reclamation's Energy and Water Appropriations and the USACE Water Resources Development Act where there is a federal interest. This action would catalog available funding and identify the implementing agency and the process to secure the funds.

6.2.9 Implement Solano Project Watershed Water Quality Protection Activities

Water quality from the Solano Project is excellent for municipal, industrial, and agricultural uses. The primary sources of contamination are body contact recreation and wastewater discharges; however, Putah South Canal users are somewhat protected because of the size of Lake Berryessa and the retention time of water (SCWA and Napa County Department of Public Works 2001). SCWA works with organizations and public agencies in the Lake Berryessa watershed to promote activities that protect water quality, such as the Lake Berryessa Watershed Partnership. SCWA leads the partnership to monitor and improve water quality by supporting projects like household hazardous waste collection sites, signs to prevent water pollution, and water quality data sharing.

SCWA and Napa County Department of Public Works (DPW) have developed a sanitary survey covering Putah Creek, Putah South Canal, and the Lake Berryessa watershed to analyze potential contamination sources and recommend water quality protection measures. The sanitary survey's primary recommendations focus on creating a watershed management plan, reducing recreational use near drinking water intakes, coordinating monitoring efforts, and implementing BMPs related to agriculture and sewer/septic systems within the watershed (SCWA and Napa County DPW 2001). Implementation steps for this action include completing recommendations from the Solano Project sanitary survey, supporting the Lake Berryessa Watershed Partnership, monitoring land use activities with potential for encroachment or impacts on surface water supply, monitoring recreation activities through the watershed to encourage responsible practices, and considering property acquisitions in the Solano Project watershed above Putah Diversion Dam.

6.2.10 Manage Land Use Practices in Barker Slough Watershed that could Affect Water Quality

Land use practices in the Barker Slough watershed affect the quality of water entering the NBA. NBA water typically has poor water quality as a drinking water source because of elevated levels of turbidity, organic carbon, and pathogens (SCWA 2002). These factors can create carcinogenic disinfection byproducts during the water treatment process and can also increase costs of treatment.

Managing land use practices in and around the watershed may reduce turbidity levels and increase water quality levels. SCWA has considered implementation of traditional BMPs such as settling ponds and vegetative buffers. However, these methods will not be successful because of unique soil conditions in the watershed. Approximately 93 percent of the sediments causing increased turbidity come from erosion within the channel system (Noonan Main Drain and Barker Creek downstream to Campbell Lake) and agricultural lands (Hydro Science 2002). Studies show that new BMPs such as limiting livestock to particular grazing areas and away from channels, as well as performing erosion control, such as seeding embankments, are land use practices that can improve water quality. SCWA has secured two grants to implement BMPs, and will completely fence the waterways to prevent livestock from entering channels by 2005. Additional implementation steps for this potential action include:

- Implement special urban BMPs (where Vacaville is extending into the watershed);
- Encourage agricultural practices that benefit water quality; and

- Consider property acquisitions necessary to protect water quality.

6.2.11 Protect Water Quality in the Putah South Canal

After a rain storm, turbidity in Lake Solano and the Putah South Canal noticeably increases on a temporary basis. The effects of this seasonal increase in turbidity are unclear; local agencies have not yet compiled data to indicate if the water quality is an issue for agricultural or urban use. SCWA has been investigating the potential to bypass drainage that currently flows into the Putah South Canal, but SCWA does not have a method to reduce turbidity entering Lake Solano. This action would work to investigate sources of turbidity, understand the effects on drinking water and agricultural supplies, and identify measures that would reduce the effects.

6.2.12 Complete and Implement an HCP

SCWA, in cooperation with several irrigation districts, cities, and other public agencies, has begun development of an HCP, which is required as part of the renewal of the Solano Project water supply contract. Additionally, to comply with the California Endangered Species Act, the HCP is contemplated as a combined HCP and Natural Communities Conservation Plan (NCCP). The document authorizes federal and state agencies to issue incidental take permits that allow local agencies to negatively affect federal and state listed species. The HCP/NCCP identifies listed species that could be affected and provides conservation and mitigation measures.

SCWA expects to complete the HCP/NCCP in 2006. The document can be used to obtain grants and other funding to implement projects that could benefit the covered species. SCWA's role in implementation of the HCP/NCCP includes monitoring, adaptive management, and reporting.

6.2.13 Construct Infrastructure and Treatment for NBA Water in Rio Vista, Dixon, and Suisun City

This action would investigate the best means to convey and treat NBA water for Rio Vista, Dixon, and Suisun City; determine when they will need these facilities to be complete to meet projected demand increases; and construct the facilities. Rio Vista, Dixon, and Suisun City have current or future allocations of NBA water, but do not have the facilities to convey or treat this water. Suisun City has an allocation of 750 acre-feet/year, with an ultimate future allocation of 1,300 acre-feet/year. Rio Vista and Dixon each have an ultimate future allocation of 1,500 acre-feet/year.

Some means to convey and treat water may not be as straight-forward as building pipes from the NBA and treatment plants at each city. Suisun City could potentially create an agreement with Fairfield to treat and deliver water within Suisun City limits. Rio Vista is investigating the potential to divert SWP water directly from the Sacramento River and treat that water locally.

6.2.14 Expand Opportunities for Recycled Water

Recycled water is wastewater that has been highly treated and disinfected to meet stringent and protective standards set by the California Department of Health Services. Solano County cities and districts could use recycled water for landscape and agricultural irrigation, industrial processes, and environmental restoration. Recycled water requires its own distribution system completely separate from drinking water.

The Fairfield-Suisun Sewer District currently operates a wastewater recycling plant that provides recycled water for agricultural irrigation and as a freshwater supply for Suisun Marsh. The City of Vacaville discharges treated wastewater into Alamo Creek to be used for agricultural irrigation. This action would modify wastewater treatment plants to be capable (or increase capacity) of tertiary treatment and expand recycled water distribution systems in cities, including Fairfield, Suisun City, Benicia, Vacaville, and Vallejo. Recycled water could be used for urban purposes and to reduce domestic water demand. Implementation steps for this potential action include:

- Investigate wastewater quality issues, study potential for recycling and implement projects, including those in recycled water Master Plans;
- Investigate limiting use of water softeners;
- Increase distribution system for recycled water; and
- Evaluate desalination of recycled water and regional brine disposal options.

6.2.15 Update SCWA Flood Control Master Plan

The SCWA Board of Directors approved the SCWA Flood Control Master Plan in 1994. The plan addresses all of SCWA's flood management activities, but focuses on flooding issues in watersheds where flood management infrastructure is lacking. The plan recommended conducting watershed-wide studies to identify solutions to flooding problems that do not adversely impact others in the watershed. The plan prioritized watersheds to perform studies. SCWA has been implementing the plan since 1994, has conducted seven watershed studies, and is working on implementation of several flood management projects recommended in the watershed studies. A plan update would be beneficial because the plan is 10 years old and SCWA has gained much experience in dealing with flood management projects. An update could include more information on floodplain management based on recent State reports. This recommendation could be done after completing the Tier 1 potential action to "Develop a final SCWA flood control funding/construction/ maintenance policy."

6.2.16 Investigate Use of Non-potable Water for Non-potable Uses

Non-potable water is water that is not treated to drinking water standards and is not meant for human consumption. Non-potable water sources include untreated water from reservoirs or low quality groundwater. This action would increase the opportunities to use non-potable water for industrial and irrigation needs, including landscape irrigation, car washes, and decorative water fountains. A city implementing this action would need to build a distribution system to deliver non potable water to customers. This could include a new piping system, separate from those that deliver treated water.

6.2.17 Assume a More Proactive/Aggressive Role in Control of Invasive Species

The working draft of the Solano HCP/NCCP identifies invasive species as a factor that has had "profound effects on the structure, composition, and functionality of ecosystems" (SCWA 2004). Two primary invasive species affecting the region's ecosystems are the New Zealand Mudsnail (NZMS) and Arundo donax (Arundo). Arundo is a giant reed that is highly invasive, promotes

streambank erosion, reduces channel capacity, and has no natural local predators (UC Davis undated). In Solano County, Arundo affects the biological environmental and increases risks for flood damages. NZMS is an introduced aquatic snail; the effects of NZMS are not fully documented but it has been shown to alter primary production in streams (Montana State University undated). This action would pursue grant funding to research and monitor NZMS, develop a biological control strategy for NZMS, and invest in Arundo eradication on a stream-wide approach. This action would also fund eradication and control efforts for other existing invasive species in Solano County (e.g., Tree of Heaven, blackberries) and monitor and protect against new invasive species (e.g., Zebra mussel).

6.3 TIER 3 – LOWER PRIORITY - LONGER TERM IMPLEMENTATION ACTIONS

Tier 3 includes lower priority actions or longer term actions that the Solano agencies should consider implementing as appropriate. These actions did not receive as high ratings compared to Tier 1 and 2 actions, and consequently have less priority for implementation. The Solano agencies should monitor the strategic issues associated with these actions to determine if these actions are necessary to implement in the future. The actions are not listed in a specific order in which they should be implemented.

6.3.1 Develop and Implement a Federal Lobbying and Funding Strategy

Federal funds are available through the Water Resource Development Act, Energy and Water Appropriations and the new CALFED Bay Delta Authorization Act. The federal government can commit money to water resources and flood control where a federal interest is identified. This action would involve identifying projects that the county is interested in developing with federal funds and hiring a federal lobbyist to promote the projects in Washington DC. Actions involving the Solano Project could receive funding from Reclamation as could ecosystem restoration in the Bay-Delta from CALFED or the USACE. The USACE can also fund flood control projects. As an example of a federal funding effort, Sonoma County Water Agency is engaged in a multi-year congressional appropriations request to develop a regional wastewater reuse program for agriculture in Sonoma and Napa counties. Pursuing federal funds for water resource development takes time (2- 5 years or more) and a monetary investment. This process is most effective with the support of local congressional representative to promote the project.

6.3.2 Study Feasibility of In-county Surface Water Storage Options

Surface water storage could help meet future demands by storing water during normal-to-wet years when water is available until regional agencies need additional supplies during drier years. Past studies have investigated the potential for in-county surface water storage. This potential action would revisit these studies, update the analyses to current conditions, and determine if these facilities are feasible.

6.3.3 Desalinate Carquinez Strait Water

Desalinating Carquinez Strait water to supplement water supplies could be a long-term solution to develop new permanent supplies. SCWA is a member of the Northern California Salinity Coalition that helps seek funding for studies and projects involving desalting water for beneficial uses. SCWA could work with the Coalition to seek funding for feasibility studies for a desalination plant. Potential

locations include offshore of Benicia and Vallejo. A major obstacle would be disposal of brine from the treated water. Solano agencies would need to investigate alternatives for discharging brine into San Francisco Bay that would not have substantial environmental effects. A potential alternative is constructing infrastructure for deeper discharges of brine.

6.3.4 Improve Security and Safety of Putah South Canal Near Development

The Putah South Canal runs from Lake Solano to Terminal Reservoir in Cordelia. The canal runs through urban areas of Vacaville and Fairfield. While the canal right-of-way is fenced in all these developed areas, the canal is still vulnerable to intentional or accidental contamination. While this has not been a problem to date, SCWA and SID, the operators of the canal, should continue to implement measures to maximize the security and safety of the canal.

6.3.5 Increase Flood Management Coordination between Agencies

Flood management is dispersed between many public agencies. Cites and Solano County, through their land use approval authority, approve development that can affect flood management. Other agencies, like SCWA and other special districts that are involved in flood management, sometimes maintain flood management facilities that are affected by actions of other agencies. Informal coordination exists between most public agencies through the public review process for development. Agencies can communicate their concerns and recommendations for projects that could affect flood management under their jurisdictions. A common standard does not exist for mitigating impacts from development nor is there a process for resolving disputes. Most potential problems are worked out in advance of becoming real problems through the current process, but some problems still need to be addressed (such as use of outdated flood maps to determine building requirements). SCWA could act as a facilitator to improve communications between agencies involved in flood management and land use.

6.3.6 Assess Risk and Uncertainties Associated with Potential Effects of Climate Change

Climate change in the future could change water supply and demand within Solano County. A recent study in the Proceedings of the National Academy of Sciences examined the types of potential effects, including a reduction in Sierra snowpack, an increased incidence of heatwaves, and a reduction in alpine and sub-alpine forests. These effects would create changes in water supply by storing less water in the Sierras and changing groundwater tables. It could also affect demand because temperature changes could have impacts on agricultural production (Hopkins 2004).

The study of climate change and its impacts is at a very preliminary stage. The types of effects of climate change are uncertain. This potential action would follow scientific efforts to further the study of climate change, and apply this information to local supplies and facilities. Solano water agencies would identify facilities and services potentially affected by climate change, and develop a long-term strategy and plan for addressing potential consequences of climate change.

6.3.7 Reduce Water Quality Problems from Newly Emerging Contaminants

Recent studies have started to identify potential contaminants that are not yet regulated. These contaminants originate from a variety of standard household products and common

pharmaceuticals. The effects of these contaminants are unclear, including fate and transport in the environment and in the human body. This potential action would investigate potential emerging contaminants and follow state and federal research projects that could identify the types of potential effects. After identifying the types and intensity of effects, the Solano water agencies would implement projects to address these contaminants.

6.3.8 Manage Perched Groundwater to Reduce the Effects to Urban and Agricultural Areas

Perched groundwater is groundwater that is separated from the groundwater table by an unsaturated zone. Perched groundwater may occur when geologic materials having low permeability (e.g., clay or silt) restrict the downward percolation of groundwater. Where perched groundwater is close to the ground surface, soggy or swampy conditions can result. Perched groundwater should be mapped for its occurrence and severity in the county. Geologic investigations could be conducted to better understand the local occurrence of perched conditions. Adequate drainage design can mitigate most problems associated with perched groundwater.

6.3.9 Study Feasibility of Treating Poor Quality Groundwater, Including Abandoned City Wells, as a New Water Supply

Poorer quality groundwater is known to exist in the Suisun-Fairfield groundwater basin. The City of Fairfield have shut down wells due to poor quality groundwater. Contaminants include high total dissolved solids and nitrates. This action would evaluate treating or blending this water for domestic consumption. This action would be most cost effective if the existing water well and conveyance infrastructure is operable. This type of supply could be used as either new water or emergency supply.

6.3.10 Reduce Drought Effects to Groundwater Pumpers

In times of drought, independent pumpers are more likely to experience impacts to wells than agencies or cities because independent pumpers tend to operate shallower, lower yielding wells. As greater reliance on groundwater occurs during drought, particularly an extended drought, the local groundwater table will drop making shallow wells vulnerable to dewatering. This action would evaluate means to understand and reduce these effects. Steps would include mapping shallow low yield wells, identifying wells affected during the last drought in the early 1990s, and developing contingent supplies for the pumpers. Contingent supplies could include well networks, inter-connections, or deepening shallow wells below the vulnerable groundwater fluctuation zone. Understanding drought effects on wells is an important step in mitigating the effects of groundwater conjunctive use projects.

6.3.11 Implement Watershed Planning Studies

Implementation of the SCWA Flood Control Master Plan has resulted in seven watershed planning studies addressing flood problems and potential solutions. Once the planning studies are completed, recommended projects are considered for implementation. SCWA staff works with local residents and other agencies to gain support for a project including developing a funding plan, acquiring easements for maintenance, and permitting. Funding and easement acquisition have been major impediments to implementing these projects. The current policy of the SCWA Board is that others must pay for permanent maintenance of the constructed project and permanent

easements must be granted for SCWA to maintain the project. At least 10 percent of the project capital costs must come from non-SCWA sources. SCWA staff is working on implementation of projects resulting from the following watershed studies: Sweeney Creek, Gibson Canyon Creek, Dixon Area and McCune Creek.

6.3.12 Update Flood Hazard Maps

Many existing Federal Emergency Management Agency (FEMA) flood hazard maps of Solano County are outdated and do not account for current population levels and new urban developments, particularly in unincorporated areas. FEMA updates these maps, but the cycle between updates can be very long. This action would collect data and facilitate an update of the County's flood hazard maps. These updated maps would then be submitted to FEMA for approval.

6.3.13 Assume a Proactive Role in Stewardship of Water-related Environmental Resources

The region is home to multiple environmental resources. The Solano water agencies typically focus on securing and delivering water, but more environmental actions could be in their purview. As part of this potential action, the Solano water agencies would begin to be more proactive related to protecting and restoring environmental resources in the region as part of a multi objective approach to water management. Implementation steps could include protecting, restoring, and/or enhancing local creeks, initiating habitat restoration/enhancement projects, and investigating involvement in wetland preservation issues in Solano County.

6.3.14 Maintain Quality of Suisun Marsh

This potential action would monitor and control runoff to maintain the quality of Suisun Marsh. Suisun Marsh is the brackish water marsh between the Delta and the San Francisco Bay. It encompasses 116,000 acres, and is the largest contiguous brackish marsh in the United States (Interagency Ecological Program undated). The marsh serves as valuable habitat for many species of wetland species and waterfowl. Some surface water runoff from Solano County eventually flows to Suisun Marsh; poor quality runoff could affect the quality of the habitat.

6.3.15 Perform Risk Assessment of Flood Management Facilities

Several dams that impound water could affect Solano County if they failed, including dams impounding the following waters: Lake Berryessa, Lake Curry, Lake Frey, Lake Madigan, and Terminal Reservoir (Putah South Canal). Some are under state and federal dam safety programs. These structures have no known immediate risks. Additionally, many man-made and natural channels convey flood flows. Most of these channels are not capable of passing a large storm, such as a 100-year storm. Most of these channels have not had a risk analysis to determine how they would function in a 100-year storm. Delta levees in the eastern part of Solano County are also susceptible to failure or damage during large storm events and natural disasters such as earthquakes. A risk assessment of these facilities could provide additional information on how to manage risks associated with these facilities.

Section 7
SCWA Strategic Plan

7.1 INTRODUCTION

The first six sections of this document outline an IRWMP for the region enclosed by SCWA's boundaries. The IRWMP includes actions that SCWA or member agencies could undertake, and establishes future priorities for resources.

This section, the SCWA Strategic Plan, focuses more specifically on SCWA to determine its resource priorities. SCWA has many potential actions that fall under its mission statement, but it only has the resources to undertake a fraction of those actions at any given time. The purpose of the Strategic Plan is to create a roadmap for SCWA that identifies the immediate and high priority actions for commitment of agency resources.

The Strategic Plan is a subset of the IRWMP, and used the same planning process to develop priorities. The Stakeholder Group established strategic issues and strategy statements that are applicable for both the region and SCWA. The Strategic Plan includes only actions where SCWA has a major role, whereas the IRWMP includes all actions that the Solano agencies could implement. The Strategic Plan also includes conclusions to aid in SCWA policy development.

7.2 POTENTIAL ACTIONS WHERE SCWA HAS A PRIMARY ROLE

The IRWMP presents a list of potential actions that encompass all activities to meet regional water resource needs. The potential action evaluation resulted in three tiers of prioritized potential actions. Tier 1 includes the highest priority potential actions, Tier 2 includes moderate priority potential actions and Tier 3 includes the lowest priority potential actions.

Some IRWMP actions do not involve SCWA as a primary participant; therefore, these actions are not a part of this SCWA Strategic Plan. Table 7-1 shows the tiered list of potential actions for the SCWA Strategic Plan. The SCWA Strategic Plan focuses on the Tier 1 actions that are highest priority for implementation.

7.3.1 Tier 1 SCWA Strategic Plan Potential Actions

The Stakeholder Group, through the prioritization process described in Section 5, identified Tier 1 potential actions that SCWA should advance with its available resources. Tier 1 includes 17 potential actions. All Tier 1 actions are included in the SCWA Strategic Plan.

The first potential action (Continue Ongoing Water Resources Efforts) describes the list of *Screened-In Potential Actions* (see IRWMP Section 5) that are ongoing and require few resources or are mandatory. SCWA currently administers these potential actions and they are thus a high priority. The rest of the Tier 1 potential actions represent the ongoing programs, new policies, and future projects that SCWA should begin immediately to address water resource issues in the region.

Descriptions of Tier 1 actions are included at the end of this section. These descriptions include the benefits of the potential actions, implementing and cooperating agencies, and implementation steps that outline how SCWA should move the potential action forward.

Table 7-1
SCWA Strategic Plan Potential Actions
Tiers 1 through 3

Tier 1	Continue Ongoing Water Resources Efforts
	Administer Solano Project contract and defend water rights
	Administer State Water Project contract
	Work with SWP, SWC, and CALFED to explore water supply and storage opportunities outside of the region
	Improve water treatment technology for water supplies
	Increase NBA capacity and utilization
	Quantify countywide demand and supply
	Transfer water within the County
	Optimize delivery of water to end users based on quantity and quality
	Purchase contingency supplies at the wholesale level
	Improve conveyance at Putah Diversion Dam
	Increase opportunities for conjunctive use
	Increase use of groundwater
	Increase participation in Mojave Exchange Agreement
	Develop final SCWA flood control funding/construction/maintenance policy from existing "interim principles"
	Implement water use efficiency efforts
	Clarify regulations in developing areas to minimize runoff
Tier 2	Cooperatively monitor agricultural runoff quality
	Construct an alternate NBA intake
	Implement state lobbying effort
	Administer Solano Project Rehabilitation and Betterment Program
	Promote land use practices that could improve or protect water quality
	Model water quality effects on NBA intake from a levee failure
	Improve Putah South Canal conveyance efficiency
	Identify funding from federal and state sources
	Implement SP watershed water quality protection activities
	Manage land use practices in Barker Slough watershed that could affect water quality
	Protect water quality in the Putah South Canal
	Complete and implement an HCP
	Update SCWA Flood Control Master Plan
	Assume a more proactive/aggressive role in control of invasive species
Tier 3	Develop and implement a federal lobbying and funding strategy
	Study feasibility of in-county surface water storage options
	Desalinate Carquinez Strait water
	Improve security and safety of Putah South Canal near development
	Implement Lower Putah Creek restoration and fish passage programs
	Increase coordination between agencies
	Assess risk and uncertainties associated with potential effects of climate change
	Implement watershed planning studies
	Assume a proactive role in stewardship of water-related environmental resources
	Maintain quality of Suisun Marsh
	Perform risk assessment of flood management facilities

7.3.2 SCWA Resource Allocation

This section addresses the general allocation of SCWA resources available to implement the Tier 1 potential actions. SCWA has seven staff members that work to implement existing projects and programs and an operations budget of approximately $16 million annually.

SCWA could accomplish the implementation steps for the potential actions within Tier 1 using existing staff assuming the actions were accomplished over several years. The only exception is an increased level of water efficiency efforts, where additional staffing or consultants would be needed.

Table 7-2 shows the approximate division of time among the staff members. Note that SCWA uses consultants extensively to augment staff, so allocation of just staff time to categories of tasks is not necessarily a good indication of overall resource commitment to these tasks.

Table 7-2
SCWA Staff Allocation

Task	Staff Time (in full time staff equivalents)
Solano Project Administration	1.25
SWP Administration	1
Flood Control	0.75
HCP and Regulatory Assistance	1
Accounting	1
Putah Creek Streamkeeper	0.8
Clerical –Administrative	0.8

SCWA receives annual revenues of approximately $16 million through water sales and property tax revenues. The major SCWA expenditures are to Reclamation and DWR for water supply. Maintenance of Ulatis and Green Valley flood control projects is approximately $800,000 annually. Excess funds are placed in SCWA's Capital Project Funding Plan. In recent years, revenues exceeded expenses by about $1-$2 million per year. For fiscal years 2004-2005 and 2005-2006, no excess revenues are expected as a state-imposed property tax shift decreases SCWA revenues by $1.3 million for each year. The Capital Project Funding Plan was developed to plan major capital expenditures for a four year horizon. The Capital Project Funding Plan has approximately $14 million that could be used for potential actions identified in the SCWA Strategic Plan.

SCWA could undertake the Tier 1 potential actions and a fraction of the Tier 2 and 3 potential actions with existing resources and reliance on consultants functioning as an extension of SCWA staff. Table 7-3 provides a breakdown of the Tier 1 potential actions and the resources allocated to implement these actions. SCWA's Capital Project Funding Plan has available resources to

undertake most of the Tier 1 capital projects under the responsibility of SCWA. Larger projects such as the expansion of the NBA and water supply purchases will require additional funding.

Table 7-3
SCWA Tier 1 Potential Action Resources Allocation

Tier 1 Potential Actions	Capital Cost	Staffing	Cost for External Resources ($1,000s)	Comments
Ongoing SCWA Actions	na	SCWA	To be determined	• Small investment of SCWA time and resources or mandatory programs
Administer Solano Project contract and defend water rights	na	SCWA	na	• Increased costs if Solano Project property acquisitions are done on Putah Creek
Administer State Water Project contract	na	SCWA	na	
Work with SWP, SWC, and CALFED to explore water supply and storage opportunities outside of the region	Unknown	SCWA	na	• Future beneficiaries pay water costs
Improve water treatment technology for water supplies	Unknown	SCWA/ Cities	100	• Research station candidate for grants • Requires consultant services
Increase NBA capacity and utilization	$50M	Consultant	100	• Requires consulting services
Quantify countywide supply and demand	na	Consultant	200	• Requires consultant services
Transfer water within the County	na	SCWA	na	
Optimize delivery of water to end users based on quantity and quality	$2M	SCWA	200	• Systems model development $100k • Design Highline canal project $100k
Purchase contingency supplies at the wholesale level	Unknown	SCWA	na	
Improve conveyance efficiency at Putah Diversion Dam	Unknown	SCWA/Consultant	100	• Continued study $100K. • Implementation >$1M
Increase opportunities for conjunctive use	Unknown	Consultant	100	• Hydrogeology studies required • Potential grant funding
Increase use of groundwater	Unknown	Consultant	200	• Hydrogeology studies required
Increase participation in Mojave Exchange Agreement	na	SCWA	na	
Develop final SCWA flood control funding/construction/maintenance policy from existing “Interim Principles”	na	SCWA	na	
Implement water use efficiency efforts	Unknown	SCWA	75	• Additional staff or consultant needed for an expanded program.
Clarify regulations in developing areas to minimize runoff	na	SCWA	na	

na – not applicable

7.3.3 Water Resources Governance

During the Strategic Plan development process, the Stakeholder Group asked whether a different governance structure might better serve water resources in the county. Some members suggested that a “super agency” responsible for both water wholesale and retail may be a better option than the existing structure. Currently, SCWA is responsible for wholesale raw water supplies from the Solano Project and the NBA, O&M of the Ulatis and Green Valley flood control projects, and some flood control planning. The cities and districts are responsible for water treatment and retail sales to customers.

SCWA is governed by its Board of Directors, which includes elected representatives of cities, agricultural agencies, and the Board of Supervisors. SCWA also utilizes its Advisory Commission for input and guidance on water resource issues. The Advisory Commission is composed of water managers from the cities and districts. In addition to providing direction for SCWA, the Commission provides a forum for water-related issues. Agencies bring issues of local concern to the group for guidance or to solicit partners. If the groups determine that these local concerns are actually more regional concerns, the agencies come together under the umbrella of SCWA (or the Solano Water Authority) to implement regional water resources projects.

Water management under the existing structure is successful, as demonstrated by the willingness of local agencies and districts to transfer water and jointly cooperate on projects to improve water supply reliability and quality. The existing regional governance meets the needs of the local agencies and successfully addresses regional issues; therefore, no change is necessary at this time.

7.3.4 Strategic Plan Conclusions

The Stakeholder Group process for identification of strategic issues and prioritization of potential actions resulted in several conclusions that affect the future actions of SCWA. The following sections describe these conclusions.

Tier 1 Potential Actions

SCWA should focus on implementing the Tier 1 potential actions. SCWA should regularly reevaluate its progress towards addressing strategic issues with implementation of the Tier 1 actions. As needed based on the ongoing evaluation of results, SCWA should proceed with Tier 2 and 3 potential actions to improve progress or address new or emerging issues. SCWA should identify and monitor triggers that may elevate or lower an action from one Tier to another.

Flood Control

SCWA commits significant resources to flood control projects and O&M. However, the Stakeholder Group process did not see the prioritization of flood control projects into Tier 1 with the exception of policy development. The main reasons that action-oriented flood control projects rated lower was that strategic issue related to flood control received a low weighting from the Stakeholder Group because of the uncertainty of the financing of these types of projects and unclear responsibility for flood control. SCWA should develop final flood control policies from the interim principles to provide clear guidance on its role in county flood control.

Dry Year Supply

The County has adequate water supply in all but dry years and SCWA, cities and districts work well together to meet individual agency demands through water transfer agreements in below normal years. Nevertheless, a significant percentage of supply (NBA, VPW, and Settlement Water) originates from the Delta and is subject to summer and dry year pumping limitations. During dry years, the NBA supplies can be reduced dramatically; for example, supplies were reduced by 70 percent in 1991. Implementation of one or more of the Tier 1 potential actions related to water supply could provide additional dry year supply.

Dynamic Water Resource Issues

Dynamic water resource issues will require continued monitoring to understand their cumulative or future impacts on the county. "Dynamic" issues are those where the conditions surrounding the potential action will likely change into the future. These issues are beyond the immediate control of SCWA and also do not require immediate response. The planning process identified two potential actions in this category; these actions are in Tier 3.

- Emergent contaminants from pharmaceuticals and personal care products
- Climate change effects on water supply, quality, and flooding

SCWA should continue monitoring the research and participate in programs where necessary to understand the potential impacts of these dynamic water resource issues to the region.

Water Resources Governance

The existing regional water resource governance, with SCWA functioning as wholesaler and the districts and agencies functioning as retailer, meets the needs of the local agencies and successfully addresses regional issues.

SCWA Resources Allocation

SCWA has available staffing resources for the Tier 1 potential actions if these actions are phased through implementation and completion. SCWA's Capital Project Funding Plan has available funds for most of the Tier 1 projects. Larger capital projects including the expansion of the NBA will require additional funding from partners.

Grant Funding

California Proposition 50 grants are available for integrated water resource projects through 2006. Additional future funding is likely given California's need for new water supply. The region is well-positioned for grants because of SCWA's central location in the Delta, proactive water resources planning, and reliance on both federal and state water projects. Importantly, grant requests will need to clearly define the regional need and ideally should demonstrate statewide benefits. Federal grants are extremely competitive and take several years of investment to successfully develop. Developing a federal funding strategy is a Tier 3 potential action and is not an activity that the SCWA should undertake at this time unless new federal programs become available.

Tier 1: Continue Ongoing Water Resources Efforts

DESCRIPTION

Lead Agency:
SCWA

Participating Agencies:
All

Current Status

SCWA and member agencies have worked to implement these programs; all are ongoing.

SCWA has been working for many years to more effectively manage and protect the region's water resources. Many of these ongoing actions are mandatory; therefore, they must continue. Other actions are not mandatory, but require few resources (both money and staff time) to continue. This potential action would continue ongoing efforts that are either mandatory or require few resources. These existing efforts should continue:

- Participate in regional water resources planning
- Monitor land use activities with potential for encroachment or impacts on surface water supplies
- Monitor Delta water resource issues
- Implement flood management public awareness program
- Implement SCWA Flood Control Project Small Grant Program
- Improve efficiencies of SCWA maintenance activities
- Monitor SAFCA's plans for the Yolo Bypass
- Participate in CALFED's efforts for Delta levee integrity
- Monitor statewide flood control programs for applicability to Solano County
- Track Reclamation's emergency dam failure response plan for Putah Creek and Vallejo's plans for its dams
- Evaluate flood management issues on Putah Creek
- Participate in Putah Creek Discovery Corridor
- Monitor DWR safety and security studies and actions for NBA
- Implement identified recommendations by Reclamation to improve safety and security of Monticello Dam
- Investigate seismic concerns and potential solutions at Terminal Reservoir
- Implement Phase I/Phase II nonpoint NPDES runoff programs

BENEFITS

- Increased participation in statewide water resource issues
- Protection of the region's water resources

Tier 1: Administer Solano Project contract and defend water rights

DESCRIPTION

To implement this potential action, SCWA would continue its activities to administer the Solano Project contract and defend the water rights. Administering Solano Project water supply contract with the United States entails basic duties, including submitting schedules, payments, and water use reports to Reclamation. SCWA also interacts with its Participating Agencies (cities, districts, and agencies contracting with SCWA for water from the Solano Project) to coordinate schedules, payments, and water use reports. The contract also requires SCWA and its Participating Agencies to meet federal water conservation standards and to submit plans on meeting the standards.

Defense of Solano Project water rights encompasses a wide variety of implementation steps, some of which may not be foreseeable at this time. Prior to the signing of the Putah Creek Accord that settled instream flow issues in Lower Putah Creek, significant SCWA resources were dedicated to protecting the Solano Project water supply and water rights. Some concerns and obligations still remain from both the upstream and downstream settlements.

The upstream settlement requires SCWA to pursue licensing of the Solano Project water rights. Licensing is the final step in perfecting state issued water rights for projects. The downstream settlement requires the water rights for the Solano Project to conform to the settlement provisions.

The downstream settlement agreement was formalized in the Putah Creek Accord, which requires SCWA to undertake multiple actions as part of operating the Solano Project:

- Increase monitoring on Lower Putah Creek. SCWA must monitor and report flows at specified locations on Lower Putah Creek to make sure that minimum flows are met. This task entails installation and maintenance of measuring equipment and human resources to conduct the monitoring.
- Participate in instream habitat improvements. Lower Putah Creek provides habitat for a variety of fish, likely including steelhead (federally-listed as a threatened species). Before improving habitat for steelhead, SCWA is working towards an understanding with NOAA Fisheries that SCWA will not need to release additional flows in Putah Creek because of the presence of anadromous fish that are attracted by the increased instream flows and/or habitat improvements. Other water users along the migration routes of these fish should also not be adversely affected.
- Participate in Lower Putah Creek Coordinating Committee (LPCCC). The LPCCC is made up of representatives from Yolo and Solano Counties who were involved in the Putah Creek Accord. The LPCCC is overseeing habitat restoration/enhancement projects in Lower Putah Creek. SCWA acts as staff and financial agent to the LPCCC.

This action could also include acquisition of property along Putah Creek and along other areas associated with the Solano Project (such as key locations along the Putah South Canal). Much of the lands surrounding Putah Creek and the Solano Project are privately held. Acquisition of property or easements would allow more control over adjacent lands. This could facilitate habitat restoration/enhancement projects, control potential illegal water diversions, and protect water quality.

Lead Agency:
SCWA

Participating Agencies:
Participating Agencies (Fairfield, Suisun City, Vacaville, Vallejo, Solano Irrigation District, Maine Prairie Water District, UC Davis, California State Prison – Solano)

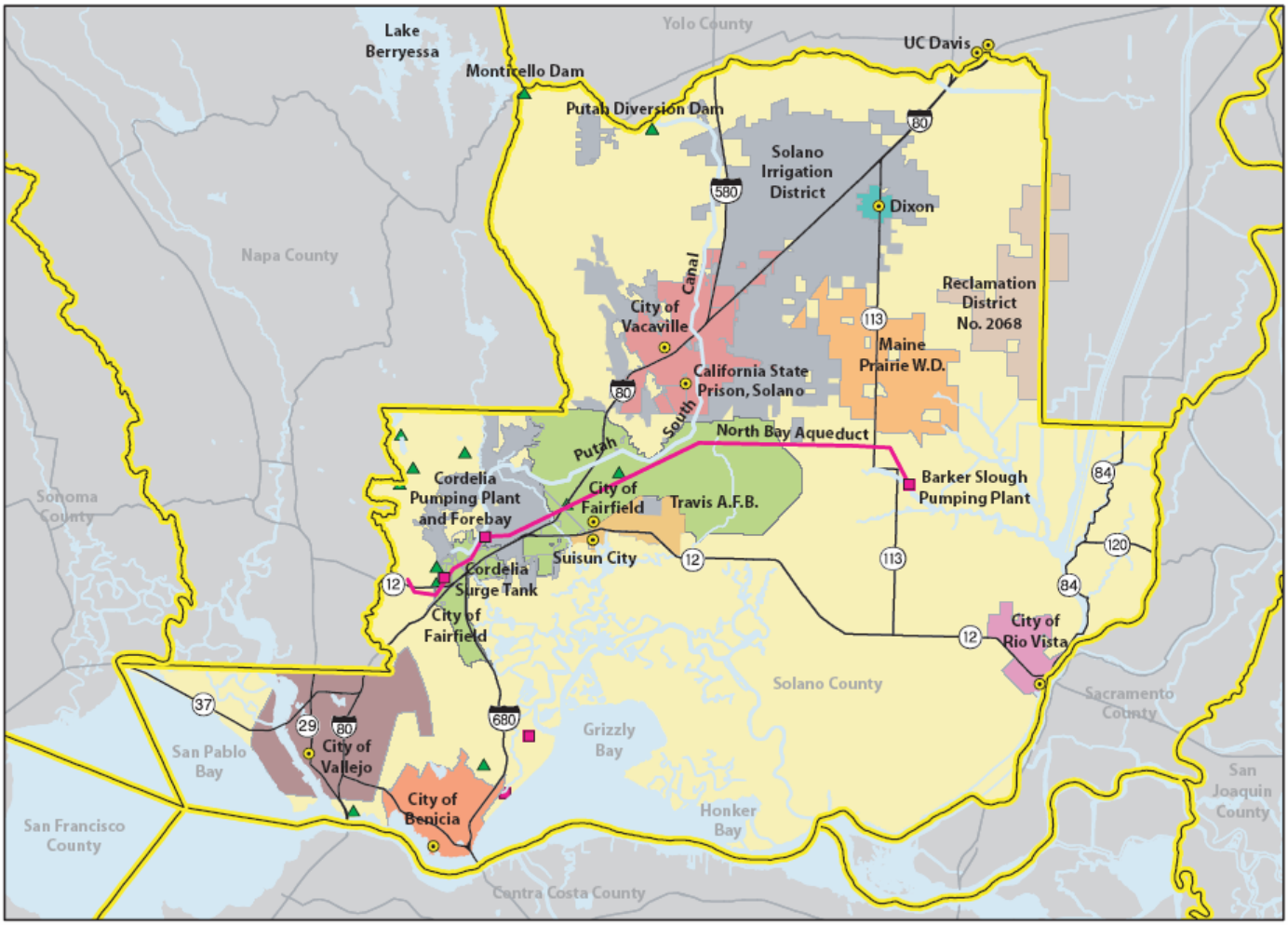
Current Status
Day-to-day administration of the Solano Project contracts with the United States and SCWA's Participating Agencies is ongoing. The SWRCB is slowing water rights licensing. Implementation of the Putah Creek Accord is underway. SCWA is working with NOAA Fisheries to obtain assurances on the flow releases to Putah Creek and habitat improvement projects. Administration of LPCCC grants and funding is ongoing.

INITIAL IMPLEMENTATION STEPS

- Encourage the SWRCB to complete water rights licensing
- Encourage NOAA Fisheries to grant assurances on Putah Creek
- Study land acquisition along Putah Creek and the Solano Project to determine if it would allow SCWA and the Participating Agencies to aid restoration and increase control over land use activities
- Participate in efforts to educate the public about the Solano Project, including the Lake Solano Park and Visitor Center sponsored by the Solano County Parks Department
- Install measuring devices in Lower Putah Creek

BENEFITS

- Solano Project water supply protection
- Habitat improvement on Putah Creek



SCWA would continue its activities to administer the Solano Project contract. The figure shows Solano Project facilities and water users.

Tier 1: Administer State Water Project contract

DESCRIPTION

Administering the SWP water supply contract would require SCWA to continue its activities to administer the contract and coordinate with member units. SCWA's basic duties include submitting schedules, payments, and water use reports to DWR. SCWA also interacts with member units regarding schedules, payments, and water use reports. SCWA accounts for several categories of water transported through the NBA because each category has different priorities, costs, and availability.

Coordination with the other user of the NBA, the Napa County Flood Control and Water Conservation District (Napa), is important. SCWA shares use of the NBA with Napa subject to each agency's contract with DWR. Any improvements to the NBA or projects to improve water quality will benefit Napa. SCWA and Napa must work closely together in NBA issues. If SCWA wants to initiate projects or studies regarding the NBA, it should cooperate with Napa to ensure that the study meets the needs of both agencies and to negotiate a cost share.

Lead Agency:
SCWA

Participating Agencies:
Member units (Benicia, Dixon, Fairfield, Rio Vista, Suisun City, Vacaville, Vallejo)

Current Status
Day-to-day administration of the SWP contracts with DWR and SCWA's member units is ongoing. SCWA is an active participant in the State Water Contractors organization and continues to serve as an advocate for more reliable and higher quality SWP supplies.

In addition to coordinating SWP supply in the NBA, SCWA must coordinate SWP supplies with other supplies that the NBA conveys. Because the NBA pumps water from the Delta, the NBA can convey additional water supplies from outside Solano County. Vallejo Permit Water and (Watershed of Origin) Settlement Water are examples of non-SWP water supplies that are transported through the NBA.

Administering the SWP supply is much more complex and time consuming compared to the Solano Project. Fluctuating water supply allocations and changing DWR costs require close interaction between DWR and contractors, such as SCWA. The water supply of the SWP suffers from dry year deficiencies and SWP operational constraints. Many of these operational constraints are because of environmental regulations to protect water quality, fish, and wildlife. SCWA must understand these constraints to be able to serve as an advocate for the region; understanding these constraints involves a high degree of technical and legal expertise.

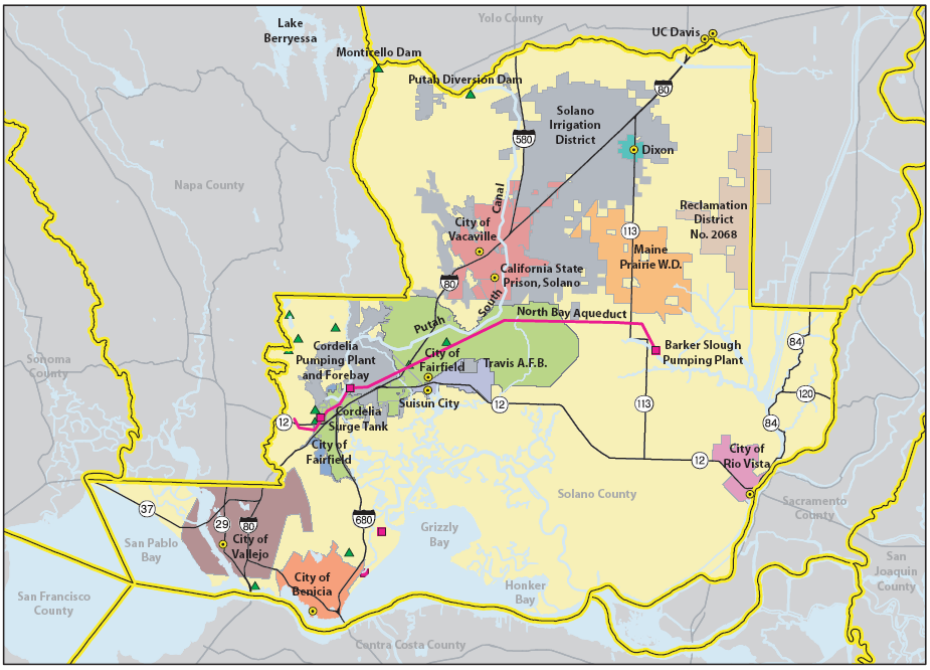
SWP contractors have formed an organization called the State Water Contractors to interact with DWR on all facets of the SWP, with most of their efforts dealing with advocacy of a more reliable water supply, improved efficiency, and cost containment for the SWP. SCWA is an active member of the State Water Contractors, which involves considerable SCWA staff time on a wide variety of issues dealing with the SWP and other statewide water issues.

INITIAL IMPLEMENTATION STEPS

- Increase involvement of Napa County in programs and projects that benefit Napa and SCWA, including financial participation
- Continue current level of involvement in the State Water Contractors and other statewide and regional water groups

BENEFITS

- Increased water supply reliability
- Increased water quality from the SWP
- Support from agencies outside of the region to help implement regional projects



SCWA would continue to contract and coordinate with member units to administer the SWP contract. The figure shows SWP facilities and NBA member units.

Tier 1: Work with SWP, State Water Contractors, and CALFED to explore water supply and storage opportunities outside of the region

DESCRIPTION

Potential Lead Agency:
SCWA

Participating Agencies:
All

Current Status
SCWA is an active participant in the State Water Contractors and the CALFED program.

Increased water supply or water storage could increase the reliability of SCWA's water supplies, particularly those from the NBA. Increasing the yield of the SWP through SWP or CALFED projects would increase the reliability of the SWP. Storing water in wet years for later use in drier years would help Solano water agencies maintain reliable water supplies in more hydrologic year types.

Groundwater storage

Several State Water Contractors have developed groundwater banking projects. These projects accept water during wet years, and return water during dry years. One example of this type of project is the Mojave Exchange Agreement; SCWA and member units are already involved in this project (see the description of the potential action "Increase participation in the Mojave Exchange Agreement"). In addition to Mojave, several agencies within Kern County Water Agency have existing or potential new water banks. These agencies include Semitropic Water Storage District (WSD), Berrenda Mesa Irrigation District, and Arvin-Edison WSD.

Each bank may function differently; for example, Semitropic WSD functions differently than the Mojave Exchange Agreement. Semitropic WSD constructed distribution facilities within their service area that deliver surface water from the partner agencies to areas that previously used groundwater. Shifting to surface water results in a reduction in groundwater extraction, also called in-lieu recharge. Semitropic WSD then returns water to partner agencies in dry years in one of two ways:

- Directs a portion of its SWP supply to the partner and pumps groundwater instead; or
- Pumps groundwater directly into the California Aqueduct, which allows supplies that would otherwise be sent to southern California to be sent to the partner.

SCWA could pursue opportunities with State Water Contractors that may have terms that are beneficial to member units. Having a variety of return terms and conditions may create benefits for SCWA member units that are greater than just participating in the Mojave Exchange Agreement. For example, instead of requiring a 2:1 exchange with an annual limit of 5,000 AF of returned supply, a project could provide for higher amounts of water returned in dry years.

Surface water storage

In addition to groundwater storage, new surface storage could increase SWP water supply reliability or could increase SCWA storage. The CALFED program, a consortium of 23 state and federal agencies working to restore the Bay-Delta system, is investigating surface storage. The Storage Element of the CALFED program is studying five potential off-stream surface storage projects and potential groundwater storage projects throughout the state. The figure below illustrates the location of the five storage sites under feasibility investigation. Most of these storage facilities have the potential to increase SWP supplies, which would increase the reliability of the NBA supplies. This proposed action does not envision participation in surface storage opportunities outside of the CALFED collaborative process, and any surface storage project would have to be part of a balanced CALFED implementation package.

Long-term transfers to increase SWP supplies

The State Water Contractors are also investigating the potential for long term transfers or purchases. These transfers would purchase water from willing sellers to increase reliability of all SWP supplies. The water would increase the SWP allocations received by participating State Water Contractors. For example, transfer may result from the Sacramento Valley Water Management Program, which is proposing a series of transfers as part of a program to satisfy water quality standards in the Delta. The program will create facilities to enable transfers (such as water supply wells) that could also be used for long-term transfers to the State Water Contractors.

Purchase of additional permanent water supplies

Another potential permanent water supply is through Maine Prairie Water District's (MPWD) rights through the North Delta Water Agency (NDWA). Landowners in the NDWA, through a DWR agreement, are entitled to a surface water supply from DWR. Part of MPWD is in the boundary of NDWA and these lands are eligible for supplemental water supply. Construction of infrastructure and environmental review would be necessary to utilize this water supply. This source could offset MPWD Solano Project water use.

BENEFITS

- Increased storage of water when available for drought supply
- Increased water supply reliability

INITIAL IMPLEMENTATION STEPS

- Identify potential participating agencies
- Discuss potential partnerships with State Water Contractors that have groundwater banks (or are considering banks)
- Study terms of each potential groundwater bank to determine if participation would meet the needs of member agencies
- Engage in an agreement with a groundwater bank to store water (if terms are satisfactory)
- Participate in State Water Contractor/DWR/CALFED meetings to stay current with proceedings
- Consider opportunities for long-term permanent transfers/exchanges/purchases
- Review available documentation of potential storage projects and identify ways that Solano water agencies be involved

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SCWA could explore opportunities for surface and groundwater storage outside the county.

Tier 1: Improve water treatment technology for water supplies

DESCRIPTION

High organics and turbidity in the water supply, particularly in the winter season, cause cities to have difficulty treating NBA water supply to meet ever more stringent drinking water standards. SCWA is considering a wide variety of projects and programs to address the water quality concerns, including an alternate intake on the Sacramento River and installation of BMPs. Studies completed to date show that BMPs alone will not improve all the water quality problems of the NBA.

Potential Lead Agency:
SCWA

Participating Agencies:
Benicia, Fairfield, Vacaville, Vallejo, Napa County

Current Status
SCWA is planning a grant application for a water quality research station at the North Bay Regional Water Treatment Plant.

SCWA received a CALFED grant to study alternative water treatment processes for dealing with high organic carbon levels in NBA water. Treatment solutions are possible, but cost, performance and reliability considerations need to be studied. Considerable research is needed to develop solutions to effectively treat NBA water. Facilities to conduct this research are needed.

The Solano Project also has seasonal problems with water quality. Additionally, rural areas are sometimes challenged in meeting drinking water standards.

Because cities treat the drinking water, they will make final decisions on treatment technologies. The cities in Napa and Solano Counties use a common source; therefore, collective efforts on treatment technology are most efficient.

Other agencies are also studying treatment of drinking water from the Delta. Although the NBA water is different for other Delta sources in some respects, there are some commonalities that make regional cooperation important. Solano agencies should continue to work with other agencies who are studying treatment of Delta water.

INITIAL IMPLEMENTATION STEPS

- Continue studying feasibility of organic carbon pre-treatment of NBA water
- Continue to participate with other Delta water users on treatment technologies
- Support development of a water quality research station at the North Bay Regional Water Treatment Plant

BENEFITS

- Improvements in NBA water quality
- Improved water supply reliability by increasing usability of existing asset

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Tier 1: Increase NBA capacity and utilization

DESCRIPTION

The NBA is a major water supply facility conveying SWP water and other non-SWP water supplies to the major cities in Solano County and to Napa County. The NBA was constructed in 1988 to convey 154 cubic feet per second (cfs) of water from the Delta at Barker Slough to the Cordelia Forebay outside of Fairfield. Although designed to convey 154 cfs, recent tests have shown its actual capacity at 142 cfs due to the growth of a biofilm on the pipe's interior.

Potential Lead Agency:
SCWA

Participating Agencies:
Benicia, Fairfield, Vacaville, Vallejo, and Suisun City Rio Vista, Dixon and Napa County

Current Status

SCWA is currently working with DWR to expand the existing design capacity of the NBA and is also studying an alternate NBA intake

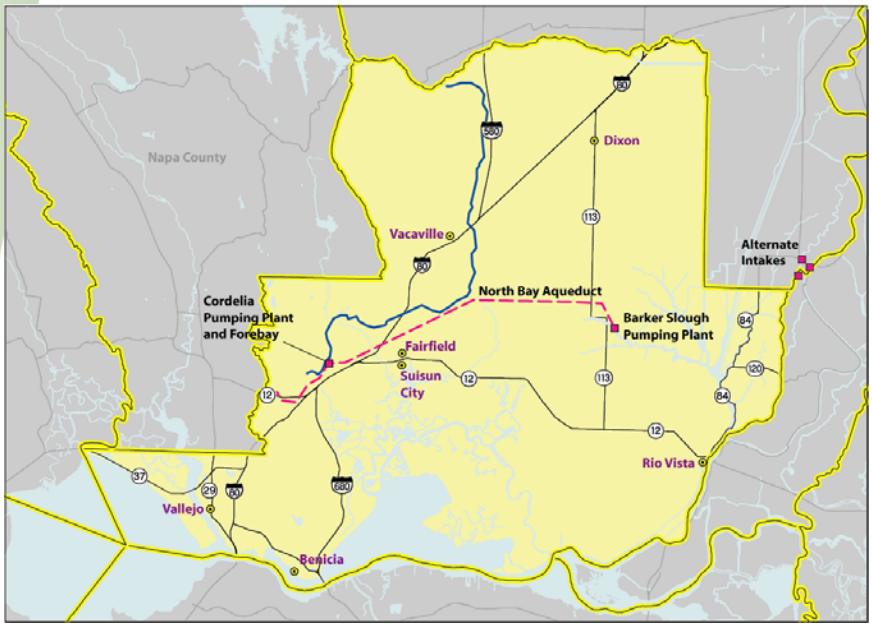
Even with an increase to DWR's contracted capacity of 175 cfs, the NBA will fall short of conveying all potential permitted and contracted water originating from the Delta. Two additional water sources conveyed in the NBA include Vallejo Permit Water (VPW) and Settlement Water (derived from a recent Watershed of Origins claim and subsequent settlement with DWR by the cities of Benicia, Fairfield and Vacaville) . To convey all potential permitted water, the NBA will need to be expanded; an initial study by DWR examined an expansion to a capacity of 248 cfs. Given growth and demand for water in Solano and Napa Counties, the NBA's capacity will require expansion to meet future demand. This action includes evaluating those steps necessary to expand the NBA to meet future demand capacity.

The biofilm in the NBA is causing a reduction of supply. SCWA and DWR have investigated methods to reduce the biolfilm; however, they have not identified a feasible way to address the biofilm. The biofilm will likely also cause a reduction in capacity in the future as DWR and SCWA work to expand the NBA. DWR and SCWA are planning to size the NBA expansion to account for the losses in capacity from the biofilm and still be able to meet local needs.

INITIAL IMPLEMENTATION STEPS

Lead studies of alternate intake - The NBA's intake in Barker Slough has been limited in the past (between February and July) to protect delta smelt. An alternative intake at a location away from smelt spawning sites could ensure future conveyance reliability. This project is discussed in the Tier 2 Action: Construction of an alternate intake to improve water quality of NBA water.

Lead studies of capacity increases - The NBA's full DWR contracted capacity (175 cfs) could potentially be achieved by the installation of an additional pump at the Barker Slough. A new parallel pipeline could increase the NBA capacity and reliability to convey a larger quantity of water. Studies should be conducted to accurately determine the needed future capacity and the optimum design to achieve this capacity.



To convey all anticipated water, the NBA capacity must be increased. The figure shows the NBA facilities and potential locations for an alternate intake.

Maximize use of Settlement Water - The cities of Benicia, Fairfield, and Vacaville should continue to utilize their Settlement Water to establish their water rights with DWR

Amend SWP contract to maximize volume of full VPW water rights- The City Vallejo participated as an initial partner on the NBA to convey 31.5 cfs (22,819 AF per year) of VPW although contractual amounts are limited to 17,287AF per year. Amending the SWP contract will result in an additional 5,493 AF per year.

BENEFITS

- Greater water supply reliability to Solano and Napa Counties
- Optimization of existing infrastructure

Tier 1: Quantify countywide supply and demand

DESCRIPTION

This action would initiate studies to quantify existing and future agricultural, urban, and environmental water demands and water supplies (including surface water and groundwater). Understanding countywide demand and supply would facilitate better management of resources and assist in the determination of long term regional planning actions. SCWA has completed Phase 1 of the IRWMP, which documents water supplies for SCWA member agencies. Each member agency characterized water supply reliability differently. This action would standardize those measurements to provide an overall estimate of countywide supply.

Potential Lead Agency:
SCWA

Participating Agencies:
All

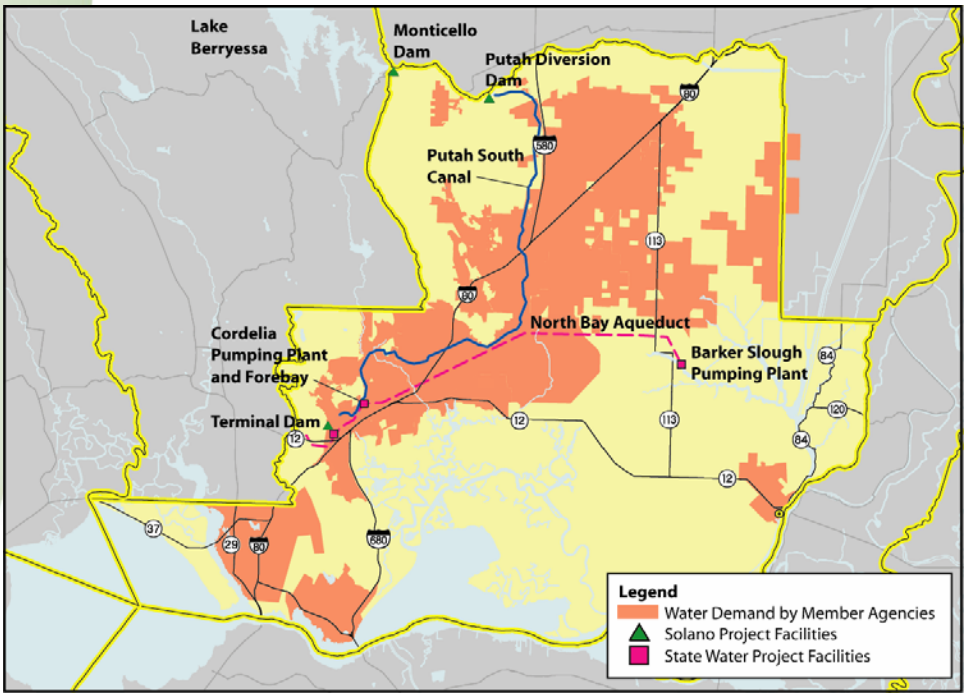
Current Status
SCWA and member agencies have completed water supply and demand estimates individually.

Groundwater is a significant source of water supply for Solano County. Much of the county overlies the Solano Subbasin. The cities of Rio Vista and Dixon rely solely on groundwater, while other cities and districts have both surface and groundwater supplies. Many growers outside of districts use groundwater for irrigation and domestic needs; however, exact amounts have not been quantified. Because of this gap in supply understanding, this action would include a study tp quantify groundwater supplies in the county.

This action would quantify current countywide water demand and initiate studies to project future water demands. Water demand consists of agricultural, urban, and environmental water uses. The Phase 1 report includes individual city and water district estimates for water demand; however, they often derive the estimates by different methods. This action would standardize individual city and district demand estimates to determine an overall countywide water demand. The standardization of demand estimates would preserve as much local data as possible. A countywide water demand estimate would also account for environmental water uses.

Agencies do not always quantify water supplies on a consistent common basis. Agencies use differing assumptions to quantify supplies; they often use different assumptions in characterizing supplies in dry years. While the SWP has a recent study on its water supply reliability, no such report exists for the Solano Project.

Comparing overall supply to demand can determine areas of potential future shortages, particularly during dry years. The figure below shows areas of water demand in the County served by SCWA member agencies and facilities that deliver surface water supplies.



INITIAL IMPLEMENTATION STEPS

- Develop a reliability study for Solano Project supplies
- Initiate a study to further quantify groundwater use (See action: Increase use of groundwater)
- Standardize individual agricultural and urban water agency demand estimates
- Prepare report on supply and demand projections

BENEFITS

- Determination of areas with potential future water shortages
- Determination of accurate amounts and distributions of water supply
- Better water management

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Tier 1: Transfer water within the County

DESCRIPTION

This potential action would involve multiple water agencies within the region engaging in transfers to help meet water needs throughout the region. SCWA serves as a wholesale agency that sells water to multiple member agencies within the region. These member agencies engage in transfers to move water from areas with adequate supplies to areas that require additional supplies. Many agencies share use of facilities (such as the NBA and Putah South Canal), which helps them move water easily. Several existing transfers include:

Potential Lead Agencies:
All member agencies

Participating Agencies:
All member agencies

Current Status
Member agencies have already engaged in several long-term transfers.

- SID transfers to cities. SID transfers water to Fairfield (up to 16,018 AF/year) and Vacaville (up to 10,050 AF/year) in return for limiting urban growth into agricultural lands. SID and Suisun City have a Joint Powers Agreement to operate Suisun City's water supply system, which uses water from Suisun City's Solano Project supply supplemented with SID's Solano Project water.
- Solano Project Drought Measures Agreement. As part of the Solano Project water supply contract renewal, the Solano Project contracting cities (Fairfield, Vacaville, Vallejo, and Suisun City) entered into an agreement with the two agricultural Solano Project contracting districts (SID and MPWD) to share water supplies during droughts.
- Vallejo Agreements. Vallejo provides supplemental water to Benicia (up to 1,100 AF/year of SP water) as needed. Vallejo has an agreement for a future permanent sale of up to 750 AF of VPW to American Canyon, which would sell an equivalent amount of Napa County SWP contract water to Calistoga and Yountville. Under mutually agreeable circumstances, Vallejo provides Fairfield with two units of VPW and receives one unit of SP water in return. Additionally, Vallejo provides service to unincorporated communities in the Green Valley/Suisun Valley areas from local reservoirs.

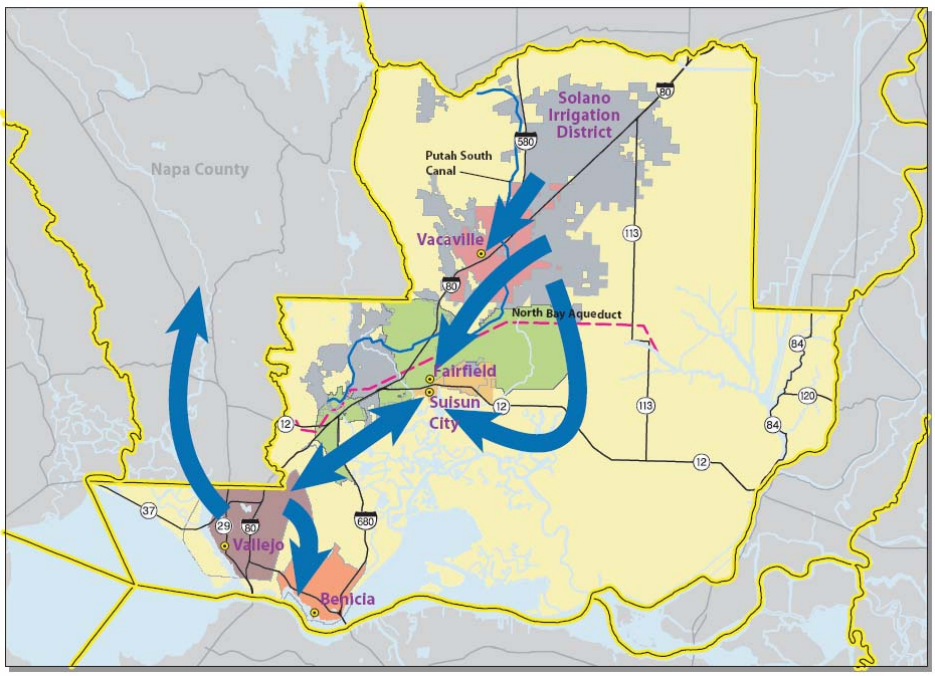
The Solano water agencies have demonstrated a willingness to work together to solve local supply issues; however, local supply reliability concerns persist in some areas. Increasing intra-county transfers would provide water to agencies that may have shortages in some years, and would provide financial incentives to the selling agencies. This action includes intra-county transfers that use existing facilities to move water throughout the region.

INITIAL IMPLEMENTATION STEPS

- Continue intra-county transfers
- Explore other transfers within the County to optimize water reliability

BENEFITS

- Inexpensive water supply
- Increased water supply reliability
- Shared resource management within the County



The figure shows existing in-County transfers.

Tier 1: Optimize delivery of water to end users based on quantity and quality

DESCRIPTION

Two fundamental sources of surface water serve Solano County – water originating from the Delta, primarily via the NBA, and Solano Project water stored in Lake Berryessa. The NBA is a primary water source for the cities of Benicia, Fairfield, Vacaville and Vallejo. NBA water originates from Barker Slough. NBA water is high in organics and turbidity and consequently is difficult and costly to treat for municipal use. The NBA is a part of the SWP, which is an unreliable supply to Solano County in dry years as DWR strives to meet demand throughout the State system. Lake Berryessa water is of high quality (low organics and turbidity) and is conservatively operated to provide reliable water even in dry years. Approximately three quarters of water from the Solano Project is used in SID and MPWD for agriculture. The NBA and the Solano Project can have different dry year cycles so there is opportunity for conjunctive use (trading these water supplies) of these two surface water supplies to meet county demand.

Potential Lead Agencies:
Solano Water Authority, SCWA

Participating Agencies:
Benicia, Vacaville, Fairfield, SID, MPWD, Vallejo, RD2068

Current Status
The SWA, a joint powers authority formed around water projects in the County, is evaluating the transfer of water using the Highline Canal. Participants in the project include Benicia, Vacaville, Fairfield, and SID.

This action would explore measures that could lead to greater use of the Solano Project water by the cities and NBA water by agriculture. Additionally, this action would evaluate measures to optimize the quantity of water delivered to the end user based upon existing infrastructure.

Agricultural districts have opportunities to modify irrigation and drainage in order to more efficiently use water supplies, reduce agricultural drainage and improve water quality in receiving waters. For example RD 2068 is planning a project to recirculate their drainage water for reuse. This type of project benefits water supply and water quality of receiving waters.

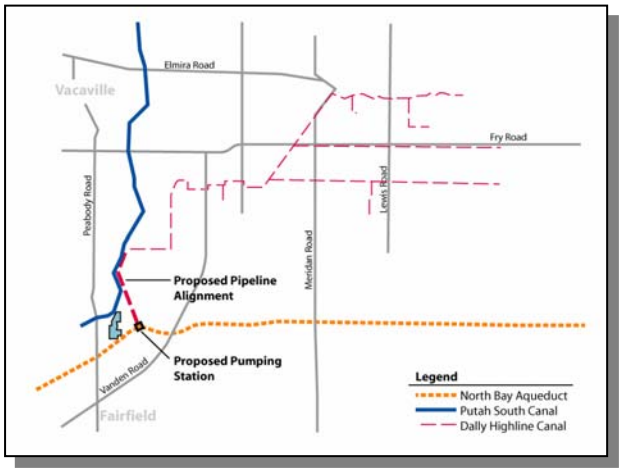
INITIAL IMPLEMENTATION STEPS

Explore water transfers and exchanges - MPWD and SID could enter into agreements with Solano County cities to exchange Solano project water for NBA water, groundwater, or other water supplies. Factors in successful exchanges include the proximity of the new supply with agricultural distributions systems, cost of facilities, and the quality of the water for agriculture use. Also important to the agricultural interests will be assurances of reliability and incentives to use a lower quality water supply.

Create county-wide system model for water quality and supply - A dynamic system model representing storage, conveyance and quality would benefit all water agencies in understanding how water can best be moved and where it is needed most to meet water quality and quantity objectives. Example models include STELLA and EXTEND. SCWA could administer the model as a tool for the various cities and agencies to move water through the available infrastructure to meet supply during different water years (wet to dry). This model would also best identify additional conveyance and storage infrastructure needs as water agencies explore programs like conjunctive groundwater use. A system model would help predict ideal movement of water to meet County water quality and quantity needs.

Investigate infrastructure options to connect the SP and NBA - The SWA Project #2 is investigating infrastructure options to enable exchanges between the SP and NBA. The primary focus is on the Highline Canal exchange that could take up to 15,900 AF of NBA water for use in the SID service area. The project has been studied in a location just south of Vacaville where the NBA and the Putah South Canal are very close to each other (see figure). The project would involve constructing a pump station and infrastructure connecting the NBA to the existing Highline Canal (which connects to the Putah South Canal) and another system connecting the Putah South canal to the NBA. This project is advantageous in that it allows the use of NBA water at times during the year when agriculture needs it and the cities could use higher quality SP water. The members of the SWA would continue to investigate both the infrastructure, legal, and policy requirements of the Highline Canal transfer.

The Highline Canal would enable exchanges between the SP and NBA. The figure shows the potential location for the canal.



BENEFITS

- Greater water supply reliability to Fairfield, Benicia, and Vacaville
- Higher quality Solano Project water delivered to cities, reducing treatment costs
- System model would lead to better understanding and optimization of water supplies
- Financial benefit to agricultural partners

Tier 1: Purchase contingency supplies at the wholesale level

DESCRIPTION

Potential Lead Agency:
SCWA

Participating Agencies:
Any agency in the region

Current Status
Agencies in the region have not yet expressed a need and suggested funding for SCWA to pursue contingency supplies.

Contingency supplies augment existing supplies and are necessary to prepare for drought conditions or an unforeseeable increased demand. As part of this potential action, SCWA would pursue contingency supplies at the wholesale level for use by retailers during dry years. Contingency supplies could be either on a short-term basis, where SCWA negotiates additional water for a year when supply is needed, or for a longer-term period.

Contingency supplies could come from a variety of sources, including water storage projects, conjunctive use projects, and water transfers. The most likely option would be a transfer from an out-of-county agency. SCWA could work through the State Water Contractors or DWR's Water Transfer Office to look for potential willing sellers. Willing sellers could make water available through multiple mechanisms, including:

- Reservoir water: agencies with surface water storage facilities could sell available water in storage;
- Groundwater purchase: agencies with groundwater banking programs could sell stored groundwater;
- Groundwater substitution: agencies with surface water rights or contracts could forego their surface water supplies and use groundwater instead;
- Conservation: agencies could sell conserved water (that would have been an irrecoverable loss without the conservation program); and
- Fallowing: agencies could allow fields to be fallow for a short time (typically only one year) and sell the water that would have irrigated that field.

These transfers could be either short-term or long-term in duration. For long-term agreements, SCWA could engage in "option" contracts with potential willing sellers. These contracts typically extend over a longer period of time (such as ten years) and allow the purchaser to call for the water in a subset of those years (e.g., two out of ten years). Calling for the water could be tied to dry year types or percentage of SWP allocation. A more flexible option could allow SCWA to call for the water in any year type, as long as they notified the willing seller by a certain date.

SCWA could also initiate participation in an external contingency supply agreement, such as DWR's Dry Year Purchase Program. As part of this program, DWR serves as an agent to purchase water through transfers and sell it to water users with shortages. SCWA could also work through the State Water Project Contracting Authority, which has provided a mechanism to secure dry year contracts.

INITIAL IMPLEMENTATION STEPS

- Study the concept of contingency supply, including the need for these supplies, willingness-to-pay, and potential sources of supplies
- Compare these contingency supplies to in-county options
- Work with other member agencies to develop partnerships for projects to secure contingency supplies
- Obtain water from inside or outside of County

BENEFITS

- Increased water supply reliability
- More efficient for SCWA to obtain contingency supplies for all member agencies than for each member agency to independently engage in these contracts

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Tier 1: Improve conveyance efficiency at Putah Diversion Dam

DESCRIPTION

Potential Lead Agency:
SCWA

Participating Agencies:
Solano Irrigation District

Current Status
SCWA has initiated a study to investigate alternatives at a preliminary level.

This action would continue studies and possibly construct modifications to improve conveyance in Putah Creek near the dam. The Putah Diversion Dam is a small structure that backs water up to allow water to flow into the Putah South Canal. Water spills over the dam into Putah Creek. Recently it was discovered that water flows in Putah Creek are constrained by thick vegetation in the creek. Because the water cannot flow freely during high flows, it backs up and potentially could cause water to rise over the dam. Increased water levels could compromise the safety of the dam and affect flows into Putah South Canal.

Several options are being investigated to address this problem. SCWA could remove vegetation from Putah Creek to increase flows. This would require access to the creek for approximately 3 miles for equipment necessary to remove the vegetation. The costs associated with this alternative would likely be prohibitive. Another alternative is to modify the Putah Diversion Dam, but adding infrastructure may also be costly. The conveyance improvements need additional study, and should be completed in a way that improves both water supply reliability and environmental factors.

INITIAL IMPLEMENTATION STEPS

- Study alternatives to reduce vegetative growth in Putah Creek
- Study alternatives to modify the Putah Diversion Dam
- Solicit funding and partners to help with the project
- Implement the selected alternative

BENEFITS

- Water supply reliability improvements
- Reduced effects on water supply in Putah South Canal
- Putah Creek environmental restoration
- Reduced flood control concerns associated with Putah Diversion Dam

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Tier 1: Increase opportunities for conjunctive use

DESCRIPTION

This action focuses on increasing opportunities for conjunctive groundwater use as a means of increasing water supply and reliability. Conjunctive use projects integrate the use of groundwater and surface water to allow use of surface water when available and groundwater at other times. The surface water provides supplies to local users and recharges the groundwater basin in normal or wet years. Stored groundwater then provides supply during drier years. The groundwater recharge part of conjunctive use in Solano County would occur as in-lieu recharge, meaning that rather than direct recharge (through percolation ponds), recharge occurs by reduced groundwater pumping by districts during wet years. This allows the groundwater basin to recharge naturally during wet years.

Potential Lead Agency:
SCWA

Participating Agencies:
RD2068, MPWD, SCWA, Vacaville, Fairfield, SID, Benicia

Current Status

Study underway for RD2068 to characterize the groundwater basin.

Most of Solano County is underlain by groundwater in two distinct sub-basins; the Solano Subbasin of the Sacramento Valley and smaller Suisun Valley-Fairfield Basin. Within the Solano Subbasin, the Tehama Formation and the Putah Creek Fan provide the most significant supply of groundwater and opportunity for conjunctive use.

Prior to the development of the Solano Project, agriculture relied heavily on the groundwater in the Solano Subbasin. The cities of Fairfield and Suisun City also relied on groundwater in the Suisun Valley-Fairfield Basin but poor water quality and low yields limited further use of this basin as a significant supply.

Today, Tehama Formation groundwater (deeper water bearing unit of the Solano Subbasin) is used by SID and the cities of Vacaville, Dixon, and SID. Rio Vista and independent pumpers rely primarily on the shallower water bearing alluvial formations including the Putah Creek Fan, for a groundwater supply. The Tehama Formation is several hundred to several thousand feet thick and surfaces north of the City of Vacaville. Most of the recharge to the Tehama Formation occurs in this area; to the ease and south it is a confined aquifer with little direct recharge. The Tehama Formation is also the principal aquifer in Yolo County where it is estimated to contain several million acre-feet of groundwater (Yolo County Flood Control and Water Conservation District 2002).

A significant emphasis has been placed on the groundwater conjunctive use as a source of supply. DWR, CALFED, and SWRCB are assisting with the financing of conjunctive use programs that increase water supply reliability.

INITIAL IMPLEMENTATION STEPS

Reclamation District No. 2068 conjunctive use project – RD 2068 is studying a conjunctive use project. This project would install groundwater production wells within the district. During dry years, the district would use the groundwater wells and transfer its surface water to other areas (typically cities) in the region that need additional supply. The agencies receiving the water supplies would compensate RD 2068 for the costs of drilling the wells, pumping the water, and groundwater monitoring. Because RD 2068 receives some of its water supply under the North Delta Water Agency agreement with DWR, the participating agencies may be able to use the NBA to facilitate water exchanges. The participants are considering a forebearance agreement, in which RD 2068 would forebear, or not take, its water supply from the North Delta Water Agency, and the SWP would use that water to increase reliability to NBA users.

Maine Prairie Water District conjunctive use project – A conjunctive use study project could be done in MPWD, which has similar geology to RC 2068 and independent surface water supplies.

Explore other opportunities for conjunctive use – Several other agencies in the county could explore conjunctive use opportunities for additional water supply. In the Solano Subbasin there may be opportunities to partner with Yolo County for the collection of data or conjunctive use management as the Tehama formation extends beneath both counties. The Suisun Valley-Fairfield Basin may also present opportunities for conjunctive use of potable or nonpotable supplies. Other opportunities for conjunctive use will require monitoring programs and a thorough understanding of the groundwater aquifer beyond what has been studied to date.

Increase understanding of groundwater resources of Solano Subbasin – Limited monitoring and modeling of the formation has been conducted by the City of Vacaville for its well field in the Tehama Formation of the Solano Subbasin. Further studies would be useful in understanding safe yield, and in refining basin management objectives (BMOs). Studies could include a basin-wide integrated surface water/groundwater model (including Yolo County), and a comprehensive well monitoring network for levels and quality.

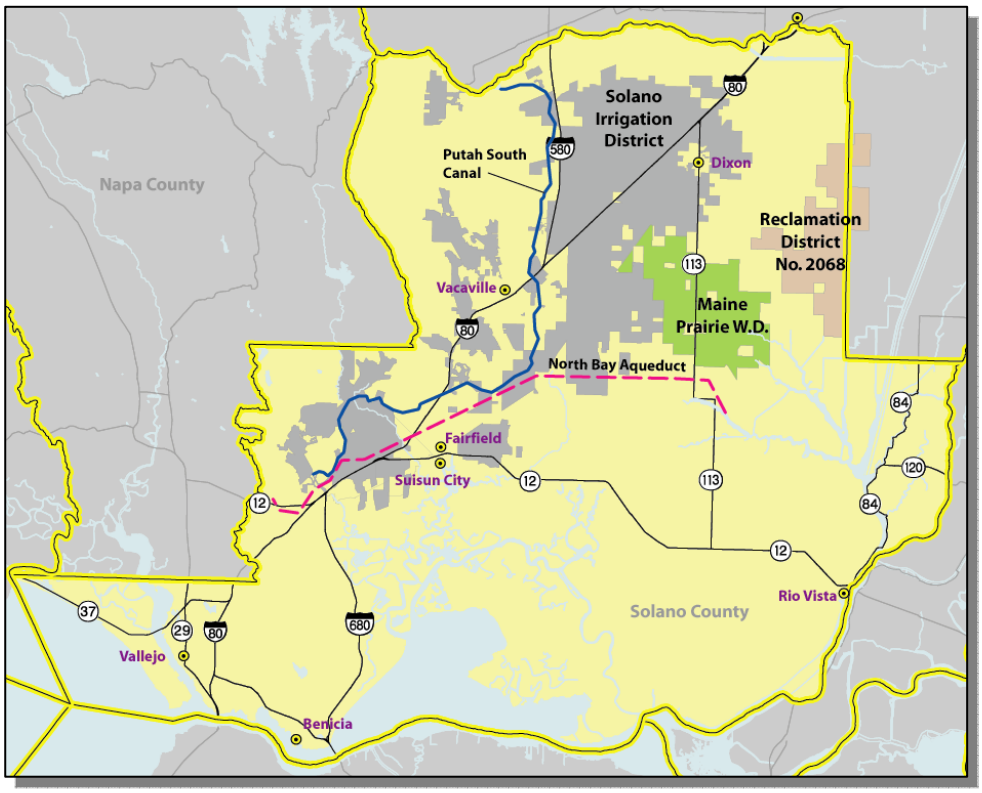
Initiate more proactive groundwater management – Proactively managing groundwater will assist in the development of conjunctive use projects and in meeting future water supply

BENEFITS

- Dry year supplies to cities
- Flexibility in agricultural district operations

reliability studies (SB610 water supply assessment). Important elements of proactive management include:

- Regular update of Groundwater Management Plans (AB3030 Plans)
- Refinement of groundwater BMOs
- Maintain countywide centralized data repository for groundwater data
- Increase coordination among groundwater pumpers (including neighboring Yolo County).



The figure shows districts that could implement potential conjunctive use projects in Solano County.

Tier 1: Increase use of groundwater

DESCRIPTION

This action focuses on increasing the use of groundwater as a means of increasing water supplies and reliability. Several entities in the region, including SID and the cities of Vacaville, Rio Vista, Dixon, rely on groundwater either for all or a portion of their supply. Before development of the Solano Project, districts and cities relied more heavily upon groundwater for supply. Historic groundwater pumping has had significant effects on groundwater levels, but groundwater levels are relatively stable at present. Groundwater levels tend to decline because of increased pumping in dry years and rebound in wet years. Increased use of groundwater can occur in two forms: increased reliance on groundwater alone or increased use of groundwater as part of a conjunctive use program. This action focuses on increased groundwater withdrawals because conjunctive use is included in a separate action.

Potential Lead Agencies:
Vacaville, SID, MPWD, RD2068, Dixon, Rio Vista

Participating Agencies:
SCWA, Solano Water Authority

Current Status

The SWA is performing joint monitoring of a portion of the Solano Subbasin for AB3030 plans. Vacaville has modeled a portion of the Solano Subbasin for its SB610 water supply assessment. Updates to the Groundwater Management Plan standards are underway.

More information will be necessary to understand the safe quantity of water that can be withdrawn in Solano County. The Tehama Formation is the major water-bearing unit of the Solano Subbasin, and is an important source of water supply for Vacaville, Dixon, and SID. The Tehama Formation is also the principal aquifer in Yolo County where it is estimated to contain several million acre-feet of fresh water (Yolo County Flood Control and Water Conservation District 2000). Vacaville has conducted some monitoring and modeling of the formation for its well field. Increased monitoring and modeling would provide a greater understanding of the Tehama Formation and other producing zones within the Solano Subbasin, which would allow increased use of groundwater without causing third-party effects on other users or the environment.

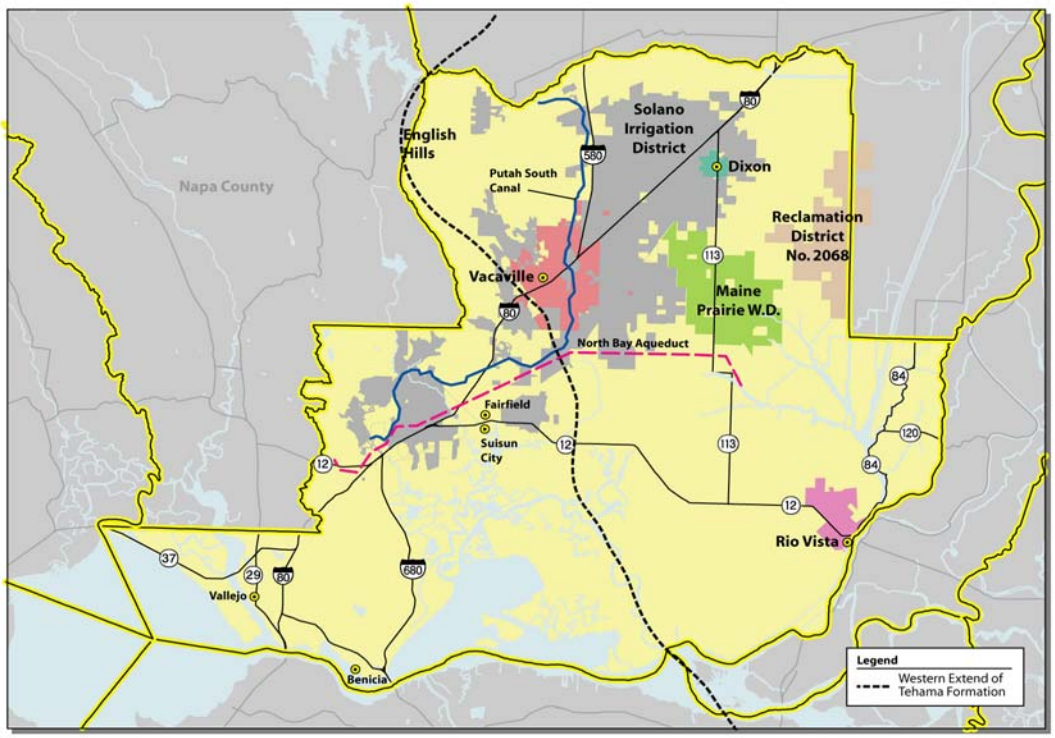
Increasing use of groundwater would also require more proactive groundwater management to avoid impacts. Political and agency boundaries do not line up with the groundwater basin boundaries; therefore, cooperation and joint efforts are necessary to manage the basin. Proactive management includes the creation of BMOs, which create water quality, water level, and subsidence objectives for each portion of the basin. BMOs also prevent actions in one portion of the groundwater basin from adversely affecting another portion. The region is in the process of developing BMOs for the Solano Subbasin.

BENEFITS

- Greater water supply reliability
- Relatively affordable water source
- Drought year supplies
- Water banking for transfers inside or outside the County

INITIAL IMPLEMENTATION STEPS

- Develop a comprehensive groundwater management plan
- Increase monitoring of the Solano Subbasin
- Expand groundwater modeling efforts
- Regularly update agency Groundwater Management Plans (AB 3030 Plans)
- Refine and update groundwater BMOs as needed
- Increase coordination among groundwater pumpers (including neighboring Yolo County)



The figure shows the extent of the Solano Subbasin and the areas that use groundwater (in bold).

Tier 1: Increase participation in Mojave Exchange Agreement

DESCRIPTION

Potential Lead Agency:
SCWA

Participating Agencies:
NBA member units

Current Status
Benicia has sent water to Mojave for storage, and has the capability to have 5,500 AF returned during dry years.

Increasing participation in the Mojave Exchange Agreement would store more water from the region for use during dry years. SCWA's agreement with Mojave Water Agency, a contractor to the SWP, allows SCWA member units to exchange wet year SWP water for dry year SWP water. In years when Solano water agencies have adequate supplies, they can send water to Mojave for storage. Mojave stores this water in its groundwater basin. In dry years, Mojave returns water by reducing its use of SWP water and instead using groundwater. A portion of Mojave's SWP supplies are directed to SCWA for use during dry years. This exchange is at a 2:1 ratio: the Solano water agencies exchange two units of SWP water for a future return of one unit of water from Mojave. This agreement allows water agencies to send up to 10,000 AF in any one year, resulting in a return obligation of 5,000 AF in a future year. The program has a cumulative limit return obligation of 20,000 AF at any one time.

Benicia is the only water agency that has taken advantage of this exchange agreement. As of 2004, Benicia had stored enough water to have up to 5,500 AF returned during dry years. Increasing participation in the Mojave Exchange Agreement would allow SCWA and its member agencies to store excess water in wet/normal years and rely upon this water as a supply during dry years. DWR currently requires the return to occur within 10 years of the initial exchange, but this policy may be modified to extend the return period.

INITIAL IMPLEMENTATION STEPS

- Continue to inform cities of opportunities
- Compare costs to other dry year options

BENEFITS

- Increased storage of water when available for drought supply
- Increased water supply reliability

SCWA member units could store SWP water in Mojave Water Agency's groundwater basin during wet years and exchange SWP water for future use during dry years.

Tier 1: Develop final SCWA flood control funding/construction/maintenance policy from existing "Interim Principles"

DESCRIPTION

SCWA approved "Interim Principles to be Followed for SCWA-Funded Flood Control Projects" (Principles) in 2003. SCWA labeled the Principles as "Interim" because the IRWMP was under development and SCWA expected this document to provide information for the SCWA Board of Directors as to the appropriate level of resources to dedicate to the flood control program.

Lead Agency:
SCWA

Participating Agencies:
All

Current Status
SCWA Board of Directors approved the Interim Principles in 2003; these Principles are providing current flood control policy guidance.

These Principles apply to flood management projects and programs where SCWA does not have a contractual responsibility for operations and maintenance. The Principles call for a proposed project to have benefits greater than costs. Non-SCWA partners shall provide at least 10% of capital costs; partners could include benefiting landowners or other public agencies. Project beneficiaries must cooperate with SCWA in planning and implementing the project by funding operations and maintenance and providing necessary right-of-way easements.

Potential partners are developing several large flood control projects that the SCWA Board of Directors will need to make a decision soon on a level of SCWA funding. Based on the results of this SCWA Strategic Plan, SCWA should revisit the Principles and modify them based on the priority of these types of flood control projects compared to other SCWA activities.

INITIAL IMPLEMENTATION STEPS

With assistance of the SCWA Advisory Commission and the Flood Control Advisory Committee, SCWA staff should prepare revised Principles for consideration by the SCWA Board of Directors.

BENEFITS

- Guidance to staff and flood management project advocates on expected levels of SCWA capital funding of these types of flood management projects
- Simplified planning and implementation process for flood management projects
- Improved long-term financial planning for SCWA capital reserves

The picture shows Hartley Road in Allendale under water in December 2002.

Tier 1: Implement water use efficiency efforts

DESCRIPTION

Water use efficiency occurs at the larger wholesale water supplier level and the individual retail customer level. As a wholesale supplier, SCWA is limited to actions at the wholesale level that generally include big-picture region-wide actions, coordinating member agency actions, and providing incentives for water use efficiency. SCWA has formed urban and agricultural water conservation committees to address countywide water conservation issues.

Potential Lead Agencies:
All

Participating Agencies:
All

Current Status
SCWA, cities, and water agencies are implementing water use efficiency measures to some degree.

SCWA's Urban Water Conservation Committee consists of staff from urban agencies and focuses on development of regional water conservation activities, programs, and projects. Several past projects include a water conservation poster contest, a water conservation radio script contest, and water efficient landscaping exhibits. A major project was the Six Flags Marine World (Vallejo) water education exhibit and demonstration water conservation garden.

The Agricultural Water Conservation Committee major focus is water conservation projects to benefit irrigated agriculture. One of their projects has been the purchase of three California Irrigation Management Information System (CIMIS) weather-rainfall stations. These stations are part of a statewide network that provides growers with information on how much water their crops need based on weather conditions. Other committee activities include educational workshops for growers, publishing a quarterly newsletter for irrigators, conducting surveys to determine irrigator's needs, and applying for funds for agricultural water use efficiency efforts.

Under this action, SCWA would continue to support the efforts of these committees and promote coordination between them. The committees could work together to develop strategies to most effectively utilize conserved water. There could be opportunities for the agricultural and urban interests to work together to improve water use efficiency.

SCWA and member agencies are also involved in the California Urban Water Conservation Council (CUWCC) and the Agricultural Water Management Council (AWMC), statewide organizations that promote water conservation. The CUWCC and AWMC require development of water management plans that evaluate implementation of water use efficiency measures at the district level, including urban Best Management Practices (BMPs) and agricultural Efficient Water Management Practices (EWMPs). The figure lists the CUWCC BMPs and AWMC technical List B EWMPs. SCWA and member agencies have implemented BMPs and EWMPs to levels at or above those required by CUWCC, AWMC, or the Bureau of Reclamation. Under this action, SCWA would provide incentive programs for member agencies to implement not locally cost effective BMPs and EWMPs.

AWMC EWMPs	CUWCC BMPs
• Alternative land uses • Use of available recycled water • Financing capital improvements for on-farm irrigation systems • Voluntary water transfers • Canal lining or piping • Flexibility in water ordering by, and delivery to, water users • Contractor spill and tailwater recovery systems • Conjunctive use of surface and groundwater • Canal structure automation	• Water Use Survey programs for single family and multi-family residential customers • Residential plumbing retrofit • System water audits, leak detection and repair • Metering with commodity rates for all new connections and retrofit of existing connections v • Large landscape conservation programs and incentives • High efficiency washing machine rebate programs • Public information programs • School education programs • Conservation programs for commercial/industrial/institutional (CII) accounts • Wholesale agency assistance programs • Conservation pricing • Conservation coordinator • Water waste prohibition (through ordinances) • Residential ultra low flow toilet (ULFT) replacement programs

INITIAL IMPLEMENTATION STEPS

- Participate in collective projects with cities and districts at the wholesale level
- Continue region-wide committees to coordinate efficiency programs
- Initiate a water use efficiency program to provide cost effective incentives for projects that benefit multiple users
- Support RD2068 Agricultural Runoff Rediversion and Reuse Facility: This facility would redirect agricultural drainage for reuse on irrigated fields and reduce agricultural drainage into Delta channels.
-

BENEFITS

- Reduction in urban and agricultural water needs
- Efficient use of existing resources

Tier 1: Clarify regulations in developing areas to minimize runoff

DESCRIPTION

Potential Lead Agency:
SCWA

Participating Agencies:
All

Current Status

Solano County and the cities have worked to evenly apply their stormwater drainage requirements to all new

When developing new areas, builders must follow regulations to mitigate any stormwater impacts. This requirement is managed by the cities within city limits and by Solano County in unincorporated areas. While the regulations are similar in all areas, the public perceives that the regulations are interpreted and applied differently under different circumstances.

Historically, Solano County did not think that smaller rural development would have stormwater impacts, and focused on larger developments. The County has begun more recently to address these impacts on a more site-specific basis to mitigate runoff impacts. The public has also expressed concern that cities have not been as diligent as they should be to prevent impacts.

The cities and Solano County have worked to uphold their regulations and make sure that all development mitigates stormwater impacts. The public, however, still expresses skepticism. As part of this action, SCWA would work with the cities and the County to try to improve coordination and public awareness. SCWA would ask each entity to explain what they do to mitigate development, and SCWA would combine this information into one publicly-available document. This document would allow the public to understand the actions that the cities and the County are taking, and would stimulate dialogue regarding these policies and actions.

A related issue of particular importance in some populated unincorporated areas is the lack of accurate data on where flooding might occur. FEMA flood hazard maps do not always depict flooding potential (their purpose is for insurance) and the FEMA maps may be outdated. Land use decisions are not always based on accurate information regarding flooding; therefore, programs to upgrade flood hazard mapping are needed.

INITIAL IMPLEMENTATION STEPS

- Collect and compile stormwater regulations for new development from Solano County and the cities
- Distribute the compiled regulations to the public
- Provide a forum for public discussion regarding the regulations
- Facilitate discussion between agencies approving development projects
- Establish a program to provide updated flood hazard mapping where needed

BENEFITS

- Decreased effects of new development on stormwater runoff
- Increased understanding of Solano County and city efforts regarding stormwater

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Section 8
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Appendix A

Phase I
Report of Integrated Regional Water Management Plan

TABLE OF CONTENTS

LIST OF ABBREVIATIONS

CEQA - California Environmental Quality Act
CHWTP – Cement Hill Water Treatment Plant
CIMIS – California Irrigation Management Information System
CUWCC - California Urban Water Conservation Council
CVP - Federal Central Valley Project
CWSC – California Water Service Company
DSMWS – Dixon Solano Municipal Water Service
DWR - California Department of Water Resources
FCAC – SCWA Flood Control Advisory Committee
FEMA – Federal Emergency Management Agency
FSSD – Fairfield-Suisun Sewer District
HCP – Habitat Conservation Plan
IRWMP – Integrated Regional Water Management Plan
JPA – Joint Powers Authority
LPCCC – Lower Putah Creek Coordinating Committee
MPWD – Maine Prairie Water District
MWA – Mojave Water Agency
NBA - North Bay Aqueduct
NBR – North Bay Regional (Water Treatment Plant)
NOAA – National Oceanic and Atmospheric Administration
PSC – Putah South Canal
RD 2068 – Reclamation District No. 2068
SCFC&WCD - Solano County Flood Control and Water Conservation District
SCWA - Solano County Water Agency
SID – Solano Irrigation District
SP – Solano Project
SSWA – Suisun Solano Water Authority
SWA - Solano Water Authority
SWP - State Water Project
SWRCB - State Water Resources Control Board
TAFB – Travis Air Force Base
USBR - United States Bureau of Reclamation
VPW – Vallejo Permit Water

PREAMBLE

This document is the first phase of an Integrated Regional Water Management Plan (IRWMP) for the Solano Agencies. Existing SCWA programs are documented and individual member agency water supplies and current demands are provided.

DESCRIPTION OF THE SOLANO COUNTY WATER AGENCY

History

The boundaries of the Solano County Water Agency include the entire County of Solano, the property of the University of California at Davis in Yolo County and approximately 2,800 acres of Reclamation District No. 2068 that is in Yolo County. The Agency was formed in 1951 by an act of the State Legislature as the "Solano County Flood Control and Water Conservation District". The full text of the legislative act, as amended, is in the California Water Code Appendix Chapter 64 entitled the "Solano County Water Agency Act".

As originally established, the Board of Supervisors of Solano County was the governing board (ex-officio) of the Solano County Flood Control and Water Conservation District (SCFC&WCD). As with other countywide flood control and water conservation districts established about that same time, the SCFC&WCD was given water supply and flood control authorities. The first major action of the SCFC&WCD was to contract with the United States Bureau of Reclamation (USBR) for water supply from the Solano Project.

In 1988, the legislative act was changed to modify the governing board of the SCFC&WCD and to make other minor updates to the act. In 1989 the name of SCFC&WCD was changed to the "Solano County Water Agency" (SCWA).

The change in the governing board of SCWA was very significant. In addition to the five members of the Board of Supervisors, the mayors from all seven cities in the County were added and a board member from each of the three agricultural irrigation districts (Solano Irrigation District, Maine Prairie Water District and Reclamation District No. 2068) was added. The three agricultural districts were added because those districts provide retail water service to their constituents. During the 1988-89 time period, the governing board made a decision to hire a staff independent of the County. Previously the County Transportation Department and other County departments provided staff and administrative services. In October of 1989 SCWA hired its first employee, the General Manager. Additional employees were added starting in 1990.

Authorities

The authorities of SCWA fall into two main categories: water supply and flood control. The water supply function consists of providing wholesale, untreated water supply to cities, districts and state agencies. Additionally, SCWA leads efforts to protect rights to existing sources of water and participates in efforts to secure new sources of water for water supply reliability and future growth in the County.

For flood control, SCWA is responsible for operations and maintenance of the Ulatis Flood Control Project and the Green Valley Flood Control Project. These two projects are described in more detail later in this document. SCWA also has authority to deal with all flood control matters within the boundaries of SCWA.

Funding

SCWA revenues come from essentially two sources: property taxes and water sales. SCWA receives 1.72% of the countywide 1% property tax. This amounts to approximately $4,634,000 per year (FY 2003-2004). This is the Water Agency's "general fund", but most of the revenue goes to fund Solano Project activities. SCWA also has a special tax of 2-cent per $100 of assessed value that is assessed to property within a zone of benefit for the State Water Project. The zone of benefit includes all the cities in the County and much of the irrigated agricultural land. This property tax amounts to approximately $6,208,000 per year (FY 2003-2004). These two property taxes are used to offset some of the costs for the water provided to the cities, districts and state agencies.

Water sales revenues amount to about $2 million per year.

Overall SCWA revenues are about $16 million.

Expenditures

The major expenditures for SCWA are payments to the state and federal government for water supply. Annual payments to the Department of Water Resources (DWR) amount to about $6 million per year. The DWR payments include all costs for delivery of water supply including labor and power costs. Payments to the US Bureau of Reclamation are about $1 million per year. This payment is only for capital cost repayment, operations and maintenance are funded separately with SCWA funds.

Operation and maintenance of the Solano Project is about $3 million per year. Maintenance of the Ulatis and Green Valley Flood Control Projects is about $800,000 per year.

SCWA has a Capital Project Funding Plan that allocates SCWA financial reserves to fund future capital projects.

Overall SCWA expenditures are about $16 million per year.

Staffing

The staff of SCWA currently consists of the General Manager, a Supervising Water Resources Engineer, a Supervising Water Resources Scientist, a Water Resources Specialist a Streamkeeper, an Assistant Streamkeeper, an Administrative Analyst and an Administrative Assistant. Various consultants

and contractors supplement these employees. The General Manager serves at the pleasure of the Board of Directors as a contract employee. The Streamkeeper is also a contract employee who is managed by the Lower Putah Creek Coordinating Committee.

SOLANO PROJECT

History

The idea for the development of the Solano Project was conceived in the 1940's and 1950's to meet the water demands of agriculture, municipalities and military facilities within Solano County. As agriculture developed in the County, use of groundwater increased substantially. Groundwater overdraft persisted in several parts of the County. This overdraft condition provided the impetus for a surface water supply to offset the overdraft. The population of Solano County in the 40's and 50's was also expected to grow; however, planners at that time had no way of knowing that the urban population growth in Solano County would increase as dramatically as it has over the past three decades.

During the planning of the Solano Project, Napa County and Yolo County were asked if they wished to participate in a larger Solano Project. Napa and Yolo declined, so the Solano Project was sized to meet only the projected water needs of Solano County. Congressional authorization was granted for the construction of the Solano Project and the first water was delivered in 1959. The total construction cost for the Solano Project was $38 million. For a more detailed history of the Solano Project, see the book by the Solano Irrigation District entitled "The Solano Water Story: A History of the Solano Irrigation District and the Solano Project."

Solano Project Facilities

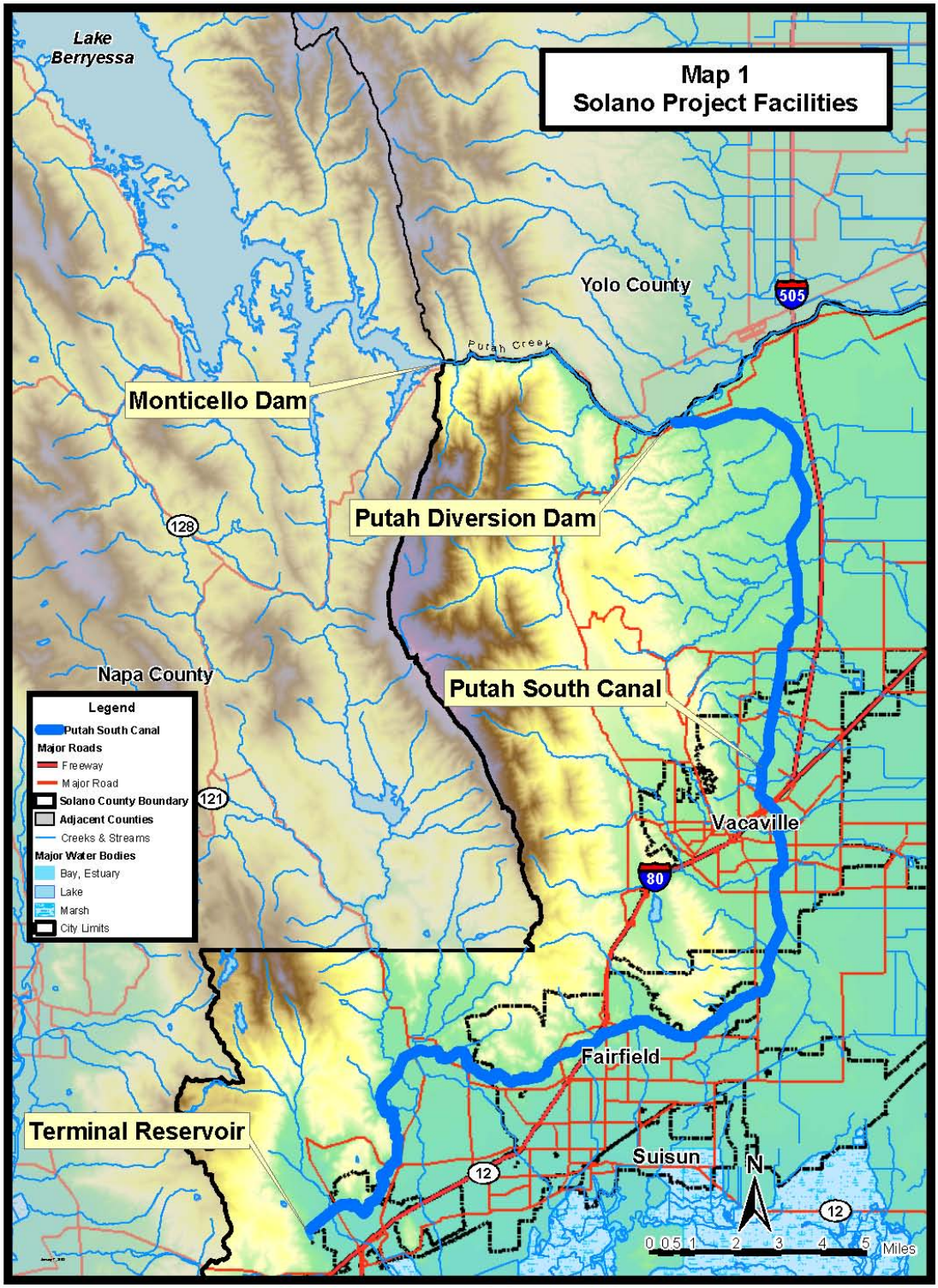
The physical facilities of the Solano Project include Monticello Dam, the Putah Diversion Dam and the Putah South Canal. Facts and figures on these facilities are presented in Figure 1. The locations of the facilities are shown in Map 1.

FIGURE 1
Solano Project Facilities

Monticello Dam - Lake Berryessa
- Storage - 1,602,000
- Dam Height - 304 feet
- Dam Crest - 1,023 feet

Putah Diversion Dam - Lake Solano
- Lake Capacity - 750 acre-feet
- Dam Height - 29 feet
- Dam Crest - 910

Putah South Canal
- Length - 33 miles
- Capacity - 956 cubic feet per second (maximum)


Map 1
Solano Project Facilities
Lake Berryessa
Yolo County
Putah Creek
Monticello Dam
Putah Diversion Dam
Putah South Canal
Napa County
Vacaville
Fairfield
Suisun
Terminal Reservoir
505
128
121
80
12
N
0 0.5 1 2 3 4 5 Miles
Legend
Putah South Canal
Major Roads
Freeway
Major Road
Solano County Boundary
Adjacent Counties
Creeks & Streams
Major Water Bodies
Bay, Estuary
Lake
Marsh
City Limits

SCWA has operations and maintenance responsibility for the Solano Project. SCWA has an agreement with the Solano Irrigation District (SID) to operate Solano Project facilities on behalf of SCWA. SID also owns and operates a hydroelectric power plant at Monticello Dam.

Water Rights

The water rights permits for the Solano Project are held by the USBR in trust for the Solano water users. The water right permits further state that when the permits are converted to a license the license will be issued in the name of the Solano water users. Unlike most federal water projects, the water rights to the Solano Project "belong" to the Solano water users. The water rights permit specifies releases to Putah Creek and limits upstream water development in the Lake Berryessa watershed.

Licensing is the final step in the water rights permitting process. After a water right permit holder puts its water to full beneficial use, the water rights holder can apply to convert the permit to a license. This "firms up" or “perfects” the water right and finalizes the amount of water that can be used based on the water right. The State Water Resources Control Board (SWRCB) is the permitting and licensing agency. The SWRCB will retain jurisdiction over the license holder for instream fish and wildlife concerns. The USBR has applied to the SWRCB for a water rights license for the Solano Project.

In 1995 a settlement was reached on part of the Putah Creek Adjudication that settled longstanding disputes between most appropriative upstream water right holders (i.e., above Monticello Dam) and Solano agencies. Called the "Condition 12 Settlement Agreement," the settlement placed a cap on future water development in the watershed of Lake Berryessa and allocates a limited amount of future water development rights to projects in Napa and Lake Counties. The original water rights permit for the Solano Project had set limits to water supply development in the watershed, but the settlement clarified the limits and provided a mechanism to account, monitor and enforce compliance. A Watermaster has been appointed by the Court to monitor water use and to enforce the settlement. The settlement agreement provides a measure of certainty to the Solano Project water supply since all the major water users in the watershed of Lake Berryessa are bound by the settlement agreement.

In March of 1996 a trial was held in Sacramento Superior Court on instream flow needs for Putah Creek downstream of the Putah Diversion Dam. The Court ruled that additional flows were required in Putah Creek. The judgement was appealed by the Solano parties, but a settlement, the Putah Creek Accord, was negotiated in 2000 among the parties that resolved all disputes. The settlement provides for increased flows to Putah Creek, but includes reduced flows when Lake Berryessa is low in storage and includes a process for addressing illegal surface water diverters in Putah Creek. Prior to the settlement approximately 21,000 acre feet per year was released to Putah Creek to meet instream flow needs. The settlement requires the previous release amount as a baseline with additional flows at specified times. Additionally, set flows were required at specified downstream flow locations. Until there is more experience operating to the settlement standards, the additional water costs of the settlement is difficult to determine.

In normal hydrologic conditions the additional flows from the settlement amount to about an additional 1,000 acre feet per year. In drier years the amount of additional flows increase.

A Lower Putah Creek Coordinating Committee, made up of Yolo and Solano representatives was formed to address Putah Creek issues such as Creek habitat enhancement projects and a Streamkeeper has been hired.

The SWRCB is currently processing a modification to the water rights for the Solano Project that will effectively consolidate terms of the water rights permits, extend some of the terms of the permits and add Putah Creek to the allowed place of use for Solano Project water (to conform to the Putah Creek Accord).

Solano Project Yield

The amount of water contracted (207,350 acre feet per year) is approximately the firm yield of the Solano Project. The firm yield is an engineering calculation based on providing a specified water amount (the firm yield) every year during the driest hydrologic period on record. For the Solano Project the driest hydrologic record was from 1916 to 1934. This is a conservative method of determining a water supply from a reservoir and results in a very dependable water supply.

Water Supply Contracts

A water supply contract executed in 1955 between SCWA and the USBR provided for repayment of Solano Project costs. The contract included a fixed water payment for the term of the contract. The contract was renewed for a 25-year term in 1999. The pricing of the water was kept the same as the rates set in 1955. The rates are $15 per acre-foot for urban water and $2.65 per acre-foot for agricultural water. SCWA pays for operational losses and spills from the Putah South Canal. Payments to the USBR for the water go to offset the capital cost for the Solano Project. SCWA expects the complete repayment of the Project capital costs in about 2005. SCWA uses property taxes to pay for the operations and maintenance of the Solano Project.

SCWA has entered into agreements with cities, districts and state agencies to provide them water from the Solano Project. The contracts with the Solano Project member units are for the full supply available from the Solano Project. The Solano Project contracting agencies are: Fairfield, Suisun City, Vacaville, Vallejo, Solano Irrigation District, Maine Prairie Water District, University of California at Davis, and California State Prison - Solano.

The USBR is contractually committed to deliver the full contract amount of water supply from the Solano Project unless the water supply does not physically exist (e.g. an empty reservoir). All Solano Project contractors, whether they are municipal or agricultural, are on an equal basis for Solano Project water supply.

The contractual allocation of water supply from the Solano Project to Solano Project contracting agencies is shown in Table 2. SID and the Maine Prairie Water District have an

agreement where SID receives 10,000 acre-feet per year of Maine Prairie Water District's Solano Project entitlement in return for providing a larger amount of agricultural return flows to the Maine Prairie Water District. There have been other exchanges and transfers of Solano Project entitlements that are explained in the Member Unit Water Portfolios.

Table 2
Solano Project Water Contracts

Agency	Annual Entitlement (Acre Feet)
Fairfield	9,200
Suisun City	1,600
Vacaville	5,750
Vallejo	14,600
Solano Irrigation District	141,000
Maine Prairie Water District	15,000
UC Davis	4,000
California State Prison – Solano	1,200
Project Operating Loss (average estimated)	15,000
TOTAL PROJECT	**207,350**

Water Quality

Water quality from the Solano Project is excellent for both municipal/industrial use and agriculture. The watershed of Lake Berryessa is 576 square miles in Lake and Napa Counties. Much of the watershed is a natural state, but there is urban and agricultural development.

In the Lake County part of the watershed, the communities of Middletown, Anderson Springs and Hidden Valley have a cumulative population of about 13,000. Near Lake Berryessa in Napa County there are several small subdivisions and the town of Pope Valley. Estimated population for the Napa County part of the watershed is estimated at under 5,000, but recreational visitors will seasonally increase the number of people temporarily in the watershed substantially. It is estimated that 2 million recreational visitors come to the Lake Berryessa area each year.

The primary agricultural land use in the watershed is vineyard production of wine grapes. Cattle grazing occurs on the eastern shore of Lake Berryessa. Much of the watershed remains in a natural undeveloped state.

SCWA works with groups in the Lake Berryessa watershed to promote activities to protect water quality. SCWA leads the Lake Berryessa Watershed Partnership. The Partnership consists of organizations and public agencies in the watershed of Lake Berryessa to monitor and

improve water quality in the Lake. The Partnership supports projects such as household hazardous waste collection sites, signage to prevent water pollution, and sharing of water quality data.

The large volume of Lake Berryessa provides a large dilution factor for any contaminants that may reach the Lake. Additionally, the Solano Project draws its water supply from the bottom of the reservoir that provides for additional decomposition and dilution of any contaminants before and Solano Project water is release to Putah Creek for delivery to the Putah South Canal.

In compliance with state law, a sanitary survey has been prepared for the Solano Project that analyses all potential contamination sources and recommends measures to protect water quality. The sanitary survey covers Putah Creek (between Monticello Dam and the Putah Diversion Dam) and the Putah South Canal, in addition to the Lake Berryessa watershed. City water treatment plants regularly test Solano Project water and find it to be of high quality.

Current Issues

Anadromous Fish. The Putah Creek Accord provides flows that benefit anadromous fish (e.g. salmon and steelhead). The Lower Putah Creek Coordinating Committee desires to improve the habitat in Putah Creek to attract more salmon and steelhead. Steelhead are listed as a threatened species under the Endangered Species Act. The Accord provides for SCWA to request assurances from the Federal Government that improvements to steelhead habitat and the additional flows will not result in a demand for more water releases from the Solano Project. SCWA does not want to be put into a situation where steelhead populations are improved due to the Accord and Lower Putah Creek Coordinating Committee activities, resulting in more steelhead in the Creek, then NOAA Fisheries (the federal agency responsible for enforcing the Endangered Species Act for anadromous fish) demanding more water be released to the Creek to further benefit the increased population of steelhead. Negotiations with NOAA Fisheries are underway to provide a means to allow measures to improve the steelhead populations in the Creek to take place with assurances to SCWA about the need for future increased Creek flows.

Rehabilitation and Betterment. The Solano Project is over 40 years old. SCWA expends an increasing amount of resources on Project maintenance and rehabilitation and betterment. Also, due to the need for better water measurement and water management, SCWA and SID staff has been improving water measurement and water management procedures for the Solano Project.

NORTH BAY AQUEDUCT

History - Water Rights

The North Bay Aqueduct (NBA) is part of the State Water Project (SWP). The SWP exports water from Northern California to parts of the San Francisco Bay Area, San Joaquin Valley and Southern California. Along with the Federal Central Valley Project, the SWP is a major water

supplier in the State of California. The SWP contracts with twenty-nine public agencies for water supplies. SCWA is one of those agencies.

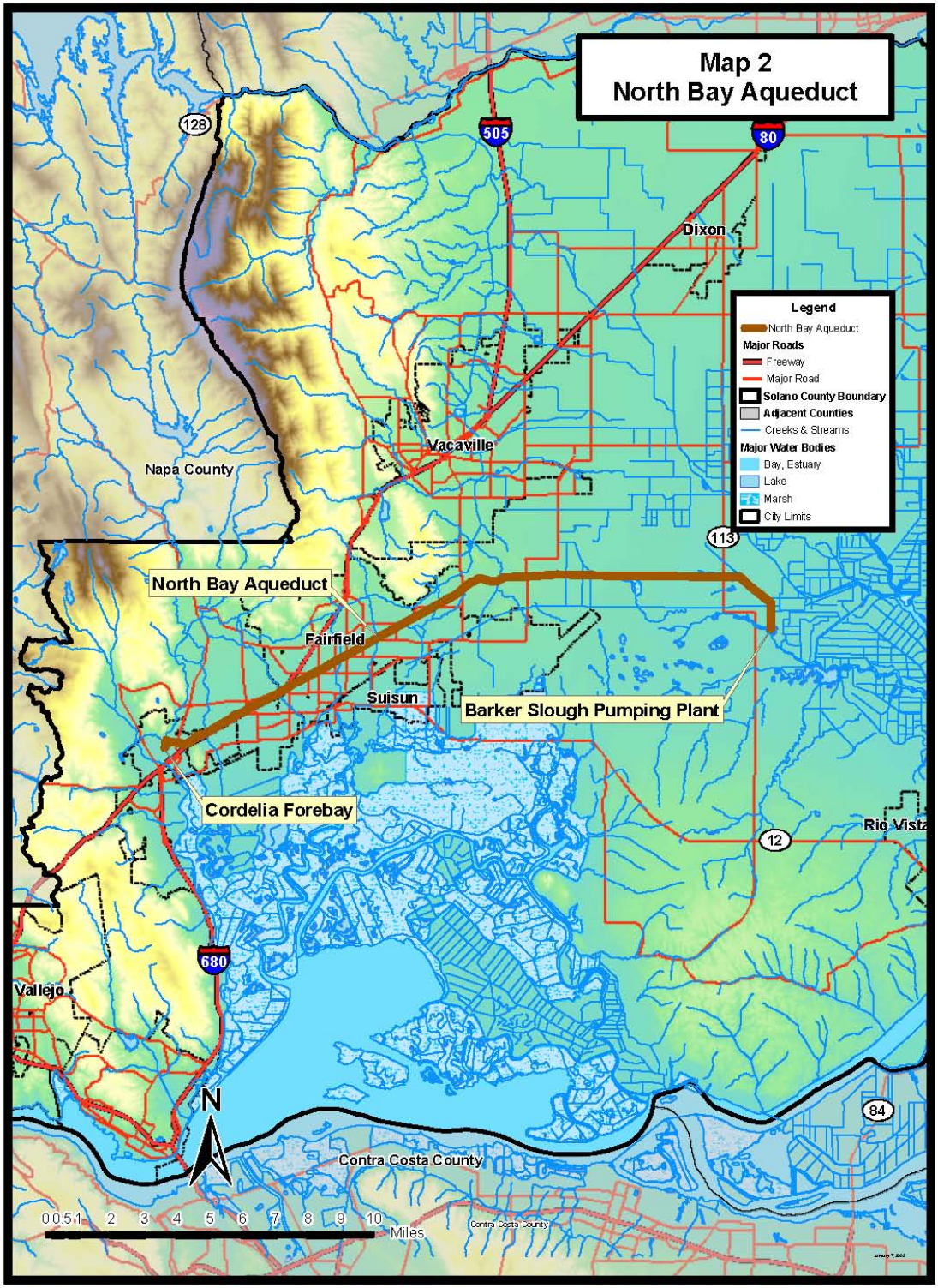
The water supply from the SWP comes from Lake Oroville, a SWP facility, and water rights for flows in the Sacramento and San Joaquin River systems. Major facilities of the SWP are the Banks Pumping Plant in the South Delta, the California Aqueduct, Lake Oroville on the Feather River and San Luis Reservoir located south of the Delta.

The NBA was envisioned as part of the SWP during the 1950's and 1960's when the SWP was being planned. NBA water supplies to Napa County started in 1969 using an interim water supply from the Solano Project. These NBA water deliveries to Napa were provided through this temporary arrangement until the NBA was completed. Construction of the NBA in Solano County started in 1984 and was completed in 1988. Initial NBA water service in the SCWA service area went to Benicia and Vallejo. In 1990 the North Bay Regional Water Treatment Plant, serving Fairfield and Vacaville, came on line and was able to treat water from the NBA for these two cities. The NBA cost approximately $83 million to construct.

NBA Facilities

The NBA is an underground pipeline that runs from Barker Slough in the Delta to Cordelia Forebay, just outside of Fairfield. From the Cordelia Forebay water is pumped to Napa County, Vallejo and Benicia. Travis Air Force Base is also served off the NBA. The size of the underground pipeline varies from 72 inches at Barker Slough to 54 inches at Cordelia Forebay. The facilities of the NBA are shown in Map 2. The NBA is operated remotely by the State Department of Water Resources (DWR) at the Delta Field Division office near Tracy.

DWR has recently found that the NBA cannot deliver the full 154 cfs flow for which it was designed (An additional pump, not presently installed, is required to reach the full contract amount of 175 cfs). Pumping tests have shown that the NBA can deliver a maximum of 142 cfs. DWR, SCWA and Napa County are investigating methods to increase the capacity of the NBA to design levels and are considering increasing the capacity to as much as 248 cfs.


Map 2
North Bay Aqueduct
Legend
North Bay Aqueduct
Major Roads
Freeway
Major Road
Solano County Boundary
Adjacent Counties
Creeks & Streams
Major Water Bodies
Bay, Estuary
Lake
Marsh
City Limits
128
505
80
Dixon
Vacaville
Napa County
113
North Bay Aqueduct
Fairfield
Suisun
Barker Slough Pumping Plant
Cordelia Forebay
Rio Vista
12
680
Vallejo
N
84
Contra Costa County
0 0.5 1 2 3 4 5 6 7 8 9 10
Miles
Contra Costa County

Water Supply Contracts

SCWA has a contract with DWR for water supply from the SWP. In turn, SCWA has contracts with Solano cities for provision of this water supply. The NBA contracting cities are: Benicia, Vacaville, Fairfield, Vallejo, Suisun City, Rio Vista and Dixon. The city of Suisun City has an allocation of NBA water but has no facilities to take NBA water at this time. The cities of Rio Vista and Dixon have the right to obtain a specified amount of NBA water in the future, but have no facilities to take NBA water at this time.

All the water from the NBA supply is currently used for municipal and industrial purposes. The SWP contract runs to the year 2035 and is renewable. The contract term is tied to the repayment of bonds that pay for SWP facilities. If additional bonds are issued, the SWP contract term could be extended. The price charged for the water varies each year to recoup the capital and operations and maintenance costs for the SWP. Water payments from SWP contractors pay for the full capital cost of SWP facilities and operations and maintenance.

SCWA has contracted for 47,756 acre-feet per year of water from the SWP. This amount includes 5,756 acre feet per year additional SWP water that SCWA purchased on behalf of the cities of Fairfield and Vacaville from the Kern County Water Agency (another SWP contractor) in 2001.

The amount of contract water increases each year until it reaches this ultimate entitlement. Table 3 shows the annual increases in supply. For 2003 the contract amount is 46,756 acre-feet.

Table 3

SCWA North Bay Aqueduct Water Supply

Year	Total Annual Amount (Acre Feet)
2004	47,206
2005	47,256
2006	47,306
2007	47,356
2008	47,406
2009	47,456
2010	47,506
2011	47,556
2012	47,606
2013	47,656
2014	47,706
2015 and each succeeding year thereafter	47,756

The cities of Vallejo, Fairfield and Vacaville have purchased the rights to additional capacity in the NBA beyond the amounts of their contractual entitlements. Table 4 shows current and ultimate contract amounts for water from the SWP for each NBA contracting agency.

Table 4
North Bay Aqueduct Member Unit Water Supply
(in acre-feet per year)

City	Current Amount [1]	Ultimate Amount
Benicia	17,200	17,200
Dixon	0	1,500 [2]
Fairfield	14,678	14,678
Rio Vista	0	1,500 [2]
Suisun City	750	1,300
Vacaville	8,978	8,978
Vallejo	5,600	5,600
TOTAL	**47,206**	**47,756**

1. 2004 Entitlements
2. Dixon and Rio Vista Ultimate Amounts are not included in the Total. If Dixon and/or Rio Vista decide to use the NBA water supply; supplies to Benicia, Fairfield and Vallejo are commensurately reduced.

The cost of water through the NBA is approximately $146 per acre-foot (2004 costs). Contracts between SCWA and NBA contracting cities call for a price of $20.50 per acre-foot. This price was established to roughly equate to the price of municipal and industrial water from the Solano Project. There are provisions in the NBA contract for increasing the price of water sold to cities should additional money be necessary to pay DWR for the water. The special NBA property tax generates funding necessary to make up the difference between the $146 paid to DWR for the water and the $20.50 charged to cities. The special NBA property tax of 2 cents per $100 assessed valuation is assessed to a zone of benefit that includes all the cities and most of the irrigated agricultural lands in the County. The property tax assessment is to be in effect as long as payments must be made for NBA water supply.

A large part of the cost of water from the SWP is for fixed capital costs. A breakdown of the approximately $146 per acre foot cost of water is shown in Table 5.

Table 5
North Bay Aqueduct Water Cost Breakdown

Item	Cost [1]	Cost/Acre-Foot
Delta Water Charge	$ 1,212,000	$25.67
NBA Capital	3,368,000	71.35
O&M and Power	2,305,000	48.85
TOTAL	**$6,885,000**	**$145.85**

1. 2004 costs and water amount of 47,206AF

State Water Project Reliability

The biggest issue regarding the NBA water supply is its reliability. When the SWP was first envisioned, it was assumed that the water supply would be very reliable. Additional dams and reservoirs were to be built to meet the ultimate contractual demands of SWP contractors of 4.2 million acre-feet per year. But currently, in dry years, and even many normal years, the SWP will not be able to deliver its full contractual amount. For example in 1991 and 1992 SWP supplies for urban contractors were reduced to 30% and 45% of contracted supply, respectively. In 2001 SWP supplies were curtailed to 39% of contracted supply. Future SWP facilities are not expected to raise the yield of the SWP up to the 4.2 million acre-feet per year amount. SWP export pumping is limited by fishery and water quality constraints in the Delta.

DWR prepared and extensive report on SWP reliability entitled "The State Water Project Delivery Reliability Report" in 2002. This report provides a thorough analysis of the delivery capability of the SWP. The report includes a line graph of the probabilities of projected annual SWP deliveries for three different demand scenarios. There are many variables that effect SWP deliveries including: regulatory standards, operating rules, reservoir carryover supplies, demand in service areas and most importantly precipitation. The line graph is reproduced as Figure 2 below.

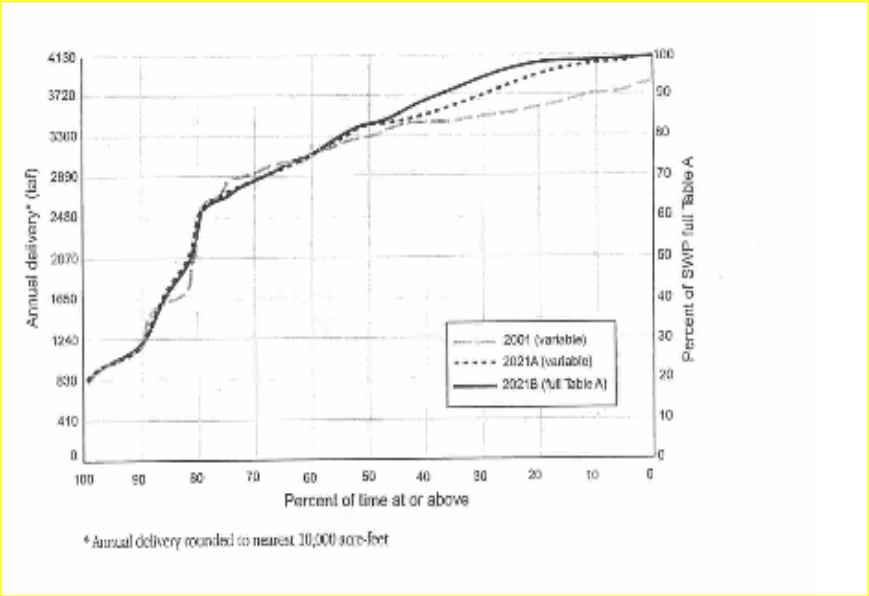
Figure 2 is an exceedence curve. The bottom horizontal scale is the "percent of time at or above". For example if you are reading the 80 % mark, the graph shows that at least 80% of the years the SWP will be able to deliver about 2,275,000 AF, or about 55% of full Table A (contract amounts). The graph will be updated in the future as variables change. At the 50% exceedence level about 82% of contract amounts are delivered.

This graph does not include Article 21 water. Article 21 water is water that is available in excess of Table A contract amounts when there is water available in the Delta in excess of what can be pumped and stored in the SWP system. Article 21 water usually becomes available to south of the Delta SWP contractors when San Luis Reservoir fills in the late winter. San Luis Reservoir is an off stream regulating reservoir south of the SWP and the Federal Central Valley Project (CVP) pumping plants that is filled in the winter when more Delta water is available and supplements

Delta pumping in the summer when demands are high. For NBA water contractors Article 21 water is available whenever the Delta is in excess conditions. Excess conditions in the Delta occur when the SWP and CVP are pumping the maximum amount allowed, all Delta standards are met and there is still water available for export. NBA contractors have Article 21 water available substantially more than south of the Delta SWP contractors. DWR rules specify that use of Article 21 water is to be only for water used beyond that scheduled by SWP contractors.

Historically, SCWA has not used its full SWP contract amount in many years, although this situation will change as cities build out. SWP contractors are allowed to carry over unused water to the next calendar year. "Carryover water" becomes the first water used in the following year. Carryover water is available until San Luis Reservoir spills. Any carryover water left in San Luis Reservoir is lost once it spills.

Figure 2
SWP Delta Delivery Probability



SCWA has an agreement with the Mojave Water Agency (Mojave), another SWP contractor, to exchange wet year SWP water for dry year SWP water. In years when SWCA has extra SWP supplies, SCWA can exchange two units of SWP water for a future return of one unit of water to be provided (at the Delta) by Mojave most likely in a dry year when there are SWP shortages. SCWA also pays some SWP transportation charges to Mojave when water is delivered to Mojave. So far only Benicia has taken advantage of this exchange program and currently (as of 2004) has the right to 5,500 AF of return water from Mojave. Up to 10,000AF in any one year of SCWA SWP supply can be exchanged with Mojave (resulting in a return obligation of 5,000 AF in a future year) with a cumulative return obligation of Mojave of 20,000 AF at any one time. Mojave stores its excess water supply in its groundwater basin. Mojave and SCWA enter into agreements with DWR to transport the exchange water through SWP facilities. The agreement calls for the water to be returned within 10 years.

The NBA was subject to pumping restrictions due to the delta smelt, a threatened species listed under the Federal Endangered Species Act. This fish resides in sloughs and channels of the Delta. Delta smelt spawn in the slough where the NBA intake is located. In several of the years since delta smelt monitoring started in 1993 a temporary pumping restriction of 65 cfs was placed on the NBA in order to protect young delta smelt from being entrained (sucked up) by the NBA pumping plants. In 2005, the U.S. Fish and Wildlife Service discontinued Delta Smelt monitoring at the NBA intake.

Non State Water Project Water

SWP Table A contract water is not the only water that is allowed to be transported in the NBA. Two other important water sources use the NBA: Vallejo Permit Water (VPW) and Settlement Water.

VPW is derived from a water rights license held by Vallejo. The license allows for 31.52 cfs to be pumped from the Delta. The service area allowed to use VPW includes Vallejo, Benicia, parts of Fairfield and the American Canyon area of Napa County. Prior to the construction of the NBA, VPW was transported in the Cache Slough pipeline owned by Vallejo. A pumping plant located on Cache Slough in the Delta pumped water to Vallejo through an underground pipeline.

The Cache Slough Pipeline is interconnected with the NBA and portions of the Cache Slough Pipeline are still being used to transport water from the NBA.

When the NBA was constructed, Vallejo paid for the right to use the NBA to deliver VPW through the NBA. The NBA was increased in size to transport 31.52 cfs of VPW. Annual amounts of VPW are contractually limited to 17,287 AF per year by DWR. This amount is 5,493 AF less than the amount if the 31.52 cfs were taken all year round. An amendment to the agreement with DWR would be necessary to increase the amount of VPW to the maximum amount.

VPW has a higher water rights priority date than the SWP and CVP, so it is more reliable than SWP supplies. VPW is subject to being cut off during the summer of very dry years when the State Water Resources Control Board determines that the available water supply in the Delta is coming from SWP and CVP reservoir storage releases. Term 91 is not included in the VPW license (see explanation of Term 91 is the discussion below about Settlement Water).

Particularly in dry years, VPW is an important part of the water supply in Solano County. Vallejo exchanges and sells VPW to other cities to augment their supplies. See the Member Unit Water Portfolio for detailed information on these exchanges and sales.

Settlement Water is a major new source of water for Benicia, Fairfield and Vacaville. In 1990 the three cities filed for State Water Resources Control Board water rights permits for an appropriation of water under the State's Watershed of Origin statues. The permit application was withdrawn after a settlement was reached with DWR that provided an essentially equivalent water supply from the SWP. A Settlement Agreement and a Conveyance Agreement with DWR specify the details of the Settlement Water supply.

Settlement Water is available up to the following amounts: Benicia 10,500 AF/year; Fairfield 11,800 AF/year; and Vacaville 9,320 AF/year. The main restriction to Settlement water is that is in not available when Standard Water Right Term 91 is in effect. Term 91 is declared by the State Water Resources Control Board when it is determined that the SWP and CVP are releasing stored water in excess of natural flow (natural flow is the flow that would have been in existence if the dam was not there) to meet in Delta demands and Delta water standards. Term 91 is declared in the summer of all but very wet years. Settlement water can be taken when the Delta is in excess conditions (same conditions as when Article 21 water is available) or when the Delta is in balanced

(non-excess) conditions as long as Term 91 is not in effect. Balanced conditions in the Delta are when the SWP and CVP are meeting in Delta water demands, meeting all Delta standards, meeting their export demands and there is no extra water available. During balanced conditions the SWP and CVP are releasing water from reservoir storage to meet their water delivery obligations. The main benefit of Settlement Water is that it is available during balanced conditions when Term 91 is not in effect. Under excess conditions Article 21 water is available, negating the need to use Settlement Water.

Settlement Water is a major new source of water to meet the long term needs of Benicia, Fairfield, and Vacaville. The amount of water requested was based on projected water needs to meet city General Plan demands. The Settlement Agreement allows the three cities to apply in the future to the State Water Resources Control Board for a Watershed of Origin appropriation above Settlement Agreement amounts if their demands exceed those upon which the Settlement Agreement was based. The Settlement Agreement runs through 2035 and is renewable under the same terms as the DWR/SCWA SWP contract. The Settlement Water can be considered a permanent supply.

Water Quality

Another major NBA issue is water quality. The Delta water from the NBA is generally of poorer quality and requires more treatment than water from the Solano Project. Statewide studies of water quality show that the NBA has the poorest water quality of all SWP contractors for some constituents such as turbidity and organic carbon. City water treatment plants have been designed to take into consideration the poorer quality and are able to meet current drinking water standards. However, as drinking water standards become more stringent, it will be more difficult and more expensive to treat water from the NBA. Some city water treatment plants will switch from NBA water to other sources of water when NBA water quality is poor, but this may be less of an available option as the cities build out. Poor NBA water quality particularly occurs in the winter when runoff from the Barker Slough watershed is pumped into the NBA.

SCWA conducted studies to determine the source of contaminants to the NBA water supply. Studies have shown that winter runoff from the local watershed is the source of elevated levels of turbidity and total organic carbon. No point sources were identified. The local watershed is mostly used for grazing of livestock.

The organic carbon is coming from natural sources such as the soil and decaying plant matter. Studies have shown that it is not possible to effectively control organic carbon in the NBA watershed. Turbidity comes from soil particles that are not settling. The soil types in the Barker Slough watershed do not settle well and remain in suspension for very long periods. Traditional best management practices such as vegetative buffers and settling ponds do not reduce turbidity for these types of soils. Studies have determined that eliminating livestock from channels and erosion control are the best management practices to reduce turbidity. SCWA has installed fencing and alternate water supplies to prohibit livestock access to much of the waterways in the watershed. Water quality testing and monitoring is ongoing to test the effectiveness of these source control measures.

Through grant funding SCWA has also investigated the feasibility of an alternate intake to the NBA located away from Delta Smelt habitat and on or near the Sacramento River where there is better water quality. Such a project is feasible from an engineering perspective but is very expensive.

Also through grant funding SCWA is evaluating water treatment technologies to reduce organic carbon in the NBA water.

Current Issues

Reliability. The biggest issue with SWP supplies is the dry year reliability. SWP contracts specify that all SWP contractors be reduced proportionally when there is a shortage. The SWP is making some efforts to increase the water supply of the SWP but realistically can only make marginal improvements due to the high costs of water projects and tough environmental constraints. Most SWP contractors are developing their own projects to augment SWP supplies, such as local surface water storage facilities and groundwater banking. In recent years the SWP has modified its operating rules to encourage innovative local projects to stretch SWP water supplies, such as those measures included in the "Monterrey Amendments" to the SWP contracts. In dry years the SWP and/or the State Water Contractors (an organization of contract holders with the SWP) sometimes organize purchase pools to obtain water supplies from outside the SWP to distribute to participants in the purchase pools.

Many of the ways to increase the supply from the SWP are tied to statewide water issues. The California Bay Delta Authority (CALFED) is implementing plans to enhance ecosystem restoration, increase water supply, promote efficient water use, improve water quality and improve Delta levees. One of the main tenants of the Authority is to seek improvements simultaneously in all of the facets of the Authority's programs. The Authority has been hampered in implementation of its program due to lower than expected levels of funding, in particular from the Federal government. Most measures to improve the SWP water supply are tied to the Authority's overall program. The controversial nature of water issues in California makes it difficult to implement projects that benefit SWP water supplies.

Water Quality. Poor NBA water quality is being addressed on several fronts. Best management land use practices are being implemented in the Barker Slough watershed, primarily to reduce erosion from livestock grazing. These measures are expected to reduce turbidity in the winter runoff season. Alternative water treatment methods to deal with high organic carbon are being studied. A feasibility study of an alternate intake to the NBA that is away from Delta smelt habitat and located at a point on or near the Sacramento River that has better water quality has been completed. Once the treatment studies are completed, the cost and effectiveness of treatment and source control can be compared to the costs of an alternate intake to better determine what options are most feasible to improve water quality at the NBA.

Endangered Species. The endangered species, delta smelt, spawns in Barker Slough pumping plant intake to the NBA. In order to protect larval delta smelt, the US Fish and Wildlife

Service had imposed pumping restrictions on the NBA when larval delta smelt are present. While the restriction did not significantly impact NBA water supplies (shortages were made up later in the year), as NBA water use increases, a pumping restriction could have a major impact on NBA supplies. This restriction was discontinued in 2005, but could be reinstated in the future. This results in some uncertainty as to the availability of the NBA to be fully utilized in the future.

GROUNDWATER

Prior to the development of the Solano Project, groundwater was extensively used in Solano County both for municipal supplies and for agriculture. One of the main reasons for the development of the Solano Project was to rectify groundwater overdraft in some agricultural areas. Once the Solano Project started making agricultural water deliveries, groundwater levels rebounded.

The cities of Rio Vista and Dixon are served exclusively with groundwater from basins underlying the cities. Vacaville gets approximately one third of its municipal water supply from groundwater underlying the city. Most of the growers within SID use surface water supplied by SID, but SID has its own wells to supplement their surface water supply from the Solano Project. Maine Prairie Water District and Reclamation District No. 2068 provide surface water to their growers, and do not currently use groundwater underlying their districts. Growers outside of districts that provide surface water rely entirely on groundwater unless they have an individual right to a surface water supply. The amount of this groundwater use has not been accurately quantified.

Most rural residential landowners have individual shallow groundwater wells that serve their domestic needs. There are also some small rural residential water systems that distribute groundwater to their customers.

The largest groundwater basin underlies the northeastern part of Solano County. This groundwater basin starts from the foothills above Vacaville and goes to the Sacramento River. The groundwater basin goes from Putah Creek to the north to the boundaries of Fairfield to the south. There are two basic levels to the groundwater basin. The shallower aquifer provides agricultural water and local domestic supplies. The shallower aquifer is underlain by the Tehama Formation aquifer. This aquifer is quite deep (over 1,000 feet) under Vacaville, but surfaces in the English Hills area north and west of Vacaville. Vacaville's wells draw from the Tehama Formation for its groundwater supply.

Public agencies that overlie this groundwater basin have developed groundwater management plans as specified in AB 3030, the state law that authorizes local agencies to prepare groundwater management plans. SCWA, through the Solano Water Authority (see pg 41 for explanation of the SWA), prepares biannual reports on groundwater levels for the groundwater basin. Groundwater level data comes from DWR and local public agencies utilize the groundwater basin. These reports show no trend of over drafting with current levels of groundwater use. Groundwater levels drop in dry years, but rebound in wet years.

There may be a potential to more aggressively utilize the groundwater basin. Areas that have a surface water supply that are underlain by a groundwater basin are good candidates for conjunctive use projects. A typical conjunctive use project includes the installation of groundwater wells that are used in drier years instead of surface water that can be sold or exchanged. In wet years, the groundwater basin is recharged and the use returns to surface water.

Rio Vista has done studies on its groundwater basin and is evaluating how had little study.

Groundwater basins outside of the Tehama Formation area and Rio Vista have not been studied much.

OTHER SURFACE WATER SOURCES

Vallejo and Benicia have local reservoirs that provide a portion of their water supply.

For Vallejo, lakes Frey, Madigan and Curry are part of what is called the Vallejo Lakes System. In the past the Vallejo Lakes System provided water to the city of Vallejo. Currently the Vallejo Lakes System provides water to the unincorporated communities in Suisun Valley and Green Valley. As part of the development of the Vallejo Lakes System, Vallejo agreed to serve some residents in the area. The largest lake, Lake Curry, has a storage capacity of 10,700 AF and a yield of about 3,750 AF/year. Vallejo is attempting to get permission for the United States Bureau of Reclamation to transport water from Lake Curry via the Putah South Canal to its water treatment plant in Vallejo. This would more fully utilize the yield from Lake Curry. An environmental impact report for this proposal is underway. One major issue is the impact of the proposal on steelhead (a Federally listed threatened species). Suisun Creek, which is impounded by Lake Curry, supports a small population of steelhead.

For Benicia, Lake Herman, situated in the hills between Benicia and Vallejo, has a storage capacity of 1,800 AF. The average yield of the 10 square mile watershed is 500 to 1000 AF annually with no yield in dry years. The additional storage capacity serves as terminal storage for excess water delivered through the NBA.

In the eastern Delta part of Solano County many growers divert directly from local waterways. Growers hold riparian rights (water rights that derive from land ownership) or appropriative rights. There are no records on the amount of this type of water use. Reliability for these water supplies is high since there is always water physically available in this part of the Delta. There are also these types of small direct diversions on waterways in other parts of Solano County.

SUMMARY OF SCWA MEMBER AGENCY WATER USE

Table 6 below shows SCWA member agency water use from 1999-2002. Water use is broken down by different sources, if the agency receives water from multiple sources. This table

does not include water users who do not get water from one of these agencies, such as individual growers who have their own groundwater wells or their own surface water diversion rights.

Table 6
Member Agency Water Use

Agency	1999	2000	2001	2002
Benicia				
SWP	11,018	15,290	8,523	11,110
Other	749	913	4,087	1,257
Total	**11,767**	**16,203**	**12,610**	**12,367**
Dixon (groundwater)	**3,429**	**3,450**	**3,469**	**3,545**
Fairfield				
SWP	7,263	6,598	5,760	8,555
SP	10,278	9,550	7,867	9,200
Other	3,530	6,109	10,356	6,955
Total	**21,071**	**22,257**	**25,316**	**24,710**
Rio Vista (groundwater)	**1,565**	**1,550**	**1,725**	**1,799**
Suisun City SP	**4,175**	**4,379**	**4,759**	**4,820**
Vacaville				
SWP	4,897	5,484	3,424	6,296
SP	5,410	5,542	5,656	4,012
Groundwater	4,096	5,141	6,211	6,638
Other	1,000	1,322	2,000	1,000
Total	**15,403**	**17,489**	**17,291**	**17,946**
Vallejo				
SWP	8,544	9,461	2,912	5,961
SP	13,514	13,278	12,337	13,714
VPW	0	774	5,448	2,628
Other	82	174	137	157
Total	**21,140**	**23,687**	**20,834**	**22,460**
SID				
SP	125,978	126,378	134,490	129,527
Groundwater	4,820	5,959	5,300	6,853
Total	**130,798**	**132,337**	**139,790**	**136,380**
Maine Prairie Water Dist	**23,142**	**21,390**	**24,170**	**23,894**
CSP Solano	**1,372**	**1,147**	**1,191**	**1,241**
UC Davis	**3,878**	**3,708**	**3,815**	**3,098**
Reclamation Dist 2068	**55,007**	**54,471**	**53,449**	**53,956**
Overall Total	**292,747**	**301,958**	**308,419**	**306,216**

WATER CONSERVATION

Water conservation is an integral part of water management in Solano County. Under the auspices of SCWA, there is both an urban and an agricultural water conservation committee that deal with countywide water conservation issues. Additionally, cities and districts have active water conservation programs as part of their retail water supply program.

SCWA's Urban Water Conservation Committee concentrates on countywide water conservation programs. Examples of programs are water conservation poster contests, water conservation radio script contests, and water efficient landscaping exhibits. Staff from urban agencies meet on a regular basis to plan these types of events and coordinate water conservation activities of individual urban agencies. This also provides a mechanism for sharing information and group purchase of water conservation materials. A major project of the Committee was the Six Flags Marine World (Vallejo) water education exhibit and demonstration water conservation garden. Six Flags has an annual attendance of over a million people, so the exhibit gets a large audience.

Cities and districts receiving water from the Solano Project (Fairfield, Vacaville, Suisun City, Vallejo, Solano Irrigation District, Maine Prairie Water District and SCWA) are required to meet water conservation standards of the federal government. These are the same conservation standards required of CVP contractors and, for municipal users, are basically equivalent to the standards developed by the California Urban Water Conservation Council.

Since SCWA does not provide water directly to residents, the cities are left to develop local programs such as distribution of low flow showerheads, in-school education and low flush toilet installations. SCWA, as a wholesale agency, is a member of the California Urban Water Conservation Council (CUWCC) and has signed the Memorandum of Understanding to implement best management practices for urban agencies at a wholesaler level. The cities of Fairfield and Benicia are also members. The CUWCC is made up of urban water supply agencies, public interest groups and businesses to promote a consistent urban water conservation program statewide. The CUWCC is working with the California Bay Delta Authority to develop a possible urban water conservation certification program that may require any agency that benefits from an Authority related program to meet the CUWCC conservation standards. All the large cities in Solano County and SCWA currently meet this standard.

The Agricultural Water Conservation Committee works on projects that benefit irrigated agriculture. One of their projects has been the purchase of three California Irrigation Management Information System (CIMIS) weather-rainfall stations. These stations are part of a statewide network that provides growers with information on how much water their crops need based on weather conditions. The Committee also provides irrigation efficiency evaluations and information on crop water needs to growers so that they can more efficiently use their water supplies. SCWA, SID, Maine Prairie Water District and Reclamation District No. 2068 are all members of the Agricultural Water Management Council, which is the agriculture version of the CUWCC. SID and the Maine Prairie Water District are also required to have agricultural water conservation plans that meet CVP standards.

In summary, agencies in Solano County meet the water conservation standards that have been established by the CUWCC, the Federal Government (CVP standards) and the Agricultural Water Management Council. The only exceptions are the smaller cites and districts that are not required to meet these conservation requirements.

CITY WATER MANAGEMENT PLANNING

State law requires cities (having over 3,000 connections or serving over 3,000 acre feet per year) to prepare Urban Water Management Plans every five years. These Plans describe current water supplies of each city, water demands, and plans for meeting water demands under shortage conditions. Each city that contracts for Solano Project water is required to have water conservation plans that meet federal requirements. Members of the California Urban Water Conservation Council (CUWCC) voluntarily agree to meet urban water conservation standards and report compliance annually. The federal water conservation standards are similar to the CUWCC standards.

SB 610 and SB 221 (of 2001) require cities to provide detailed information regarding water availability prior to approval of specified large development projects (generally over 500 units). Cites must show how they will meet the water use requirements of existing development and the proposed new development over multiple consecutive dry years. The Urban Water Management Plans are used as a foundation for the SB 610/221 reports.

Solano cities and districts are also undergoing water supply Municipal Service Reviews by the Solano County Local Agency Formation Commission (LAFCO) pursuant to state law. These reviews also look at water supply and demand of each entity. These reviews also examine organizational and jurisdictional aspects of the entity.

Table 7 shows the status of each city's current involvement in the previously described programs.

TABLE 7
City Water Management Planning

City	Urban Water Management Plan	Solano Project Water Conservation Plan	CUWCC	AB 3030 (groundwater)	SB 610/221
Benicia	√	N/A	√	N/A	
Dixon	N/A	N/A			√
Fairfield	√	√	√	N/A	
Rio Vista	N/A	N/A			√
Suisun City		√		N/A	√
Vacaville	√	√		√	√
Vallejo	√	√		N/A	

WASTEWATER RECYCLING

The Fairfield/Suisun Sewer District has one of the longest operating wastewater recycling plants in California. Wastewater from the Fairfield/Suisun area is recycled and used for agricultural irrigation and as a fresh water supply for the Suisun Marsh. Fairfield, working with the Fairfield/Suisun Sewer District, has installed a distribution system that provides reclaimed wastewater to landscaping projects in Fairfield. Plans have been developed for increasing the use of recycled water but cost considerations are holding back implementation.

Vacaville discharges treated wastewater into local waterways that eventually drain into the Ulatis Flood Control Project. During the summer irrigation season the treated wastewater, along with agricultural return flows, natural runoff and Solano Project water, is stored behind temporary dams installed by the Maine Prairie Water District and the Solano Irrigation District. The water is used for irrigation and only a fraction of the water leaves the County. This is another form of recycling of wastewater.

Benicia is considering a wastewater recycling project that could provide treated wastewater to the Valero refinery, reducing the refinery's use of NBA water.

SCWA is member of the Northern California Salinity Coalition. The Coalition seeks funding for studies and projects that deal with desalting water for beneficial uses. Seawater desalination is one example. In Solano County several projects for removing salts in recycled water to make the recycled water more readily used by industrial processes have been proposed.

WATER TRANSFERS, EXCHANGES AND SALES

Solano County has a long history of cooperation between and among cities and districts with water projects. From the development of the Solano Project to water sharing during the droughts of the past decade, agencies in Solano County have sold, exchanged and transfer water supplies to both meet long term needs and emergency supplies. The below are some key examples. See the Member Unit Water Portfolios for more detailed explanations of these transfers, exchanges, and sales. The Member Unit Water Portfolios also includes smaller arrangements that are not listed below.

SID/City Agreements. SID has longstanding agreements with Fairfield, Vacaville, Suisun City and Dixon.

SID/Fairfield. Originally executed in 1974, this agreement was recently renewed in 2002. This is a complicated agreement that basically promised that Fairfield would not expand its city limits into Suisun Valley in return for additional water supply from SID. The additional supplies provide a significant amount of Fairfield's overall water supply. The Amended 2002 Agreement provides for up to 16,018AF/year of water from SID. A Separate JPA agreement provides for SID water to serve lands within the common boundaries of the two agencies not covered under the 2002 Agreement.

SID/Vacaville. This agreement executed in 1995 provides for SID to sell Vacaville up to 10,050AF/year of Solano Project water supply in return for limitations of Vacaville city expansion east into agricultural land.

SID/Suisun City. SID and Suisun City have created a Joint Powers Authority (JPA) called the Suisun Solano Water Authority to run Suisun City's water supply system. The JPA uses Suisun City's Solano Project contract supply and supplements it with SID's Solano Project supply to meet Suisun City's water demand along with the unincorporated Tolenas area. Suisun City is unable to treat its State Water Project contract supply, so it is not currently utilized.

SID/Dixon. SID and Dixon have a Joint Exercise of Powers Agreement that creates the Dixon Solano Municipal Water Service to provide part of Dixon's water supply. The other part of Dixon's water supply comes from the California Water Service Company, a California Public Utility Commission regulated private utility. Each water provider has a specified service area in Dixon. Groundwater is the source for both water suppliers.

Solano Project Drought Measures Agreement. As part of the Solano Project water supply contract renewal, the Solano Project contracting cities (Fairfield, Vacaville, Vallejo and Suisun City) entered into and agreement with the two agricultural Solano Project contracting districts (SID and Maine Prairie Water District) to share water supplies during drought periods. The "Drought Measures Agreement" was executed concurrently with the renewed Solano Project water supply agreements in 1999.

The Agreement works as follows:

When Solano Project storage is less than 800,000 AF on December 1, a Drought Contingency Plan is developed. If Solano Project storage is greater than 1.1 million AF by the following April 1, the Drought Contingency Plan is suspended.

When Solano Project storage is between 800,000 AF and 550,000AF on April 1, each of the parties to the agreement will forgo at least 5% of their contract amount that year. If storage is between 550,000 AF and 450,000 AF on April 1 the parties forgo at least 10%. These forgone amounts are called "Restricted Carryover" and are credited to the party forgoing the water.

This Restricted Carryover cannot be withdrawn from storage until Solano Project storage exceeds 800,000 AF or is less than 450,000 AF on a subsequent April 1. The concept is that the Restricted Carryover should not be used until conditions improve (storage in excess of 800,000AF) or worsen (storage less than 450,000 AF). There is a further restriction for SID and Maine Prairie. When Storage is less than 450,000 AF, their Restricted Carryover can only be used for municipal purposes or to be sold for municipal purposes. When April 1 storage is below 450,000 no Restricted Carryover is accumulated, full contract amounts are available. Restricted Carryover cannot exceed 50% of any party's annual contract amount.

Restricted Carryover is in addition to any voluntary carryover that is allowed under the Solano Project contracts.

If Solano Project storage is less than 400,000 AF on April 1, a drought emergency is declared. This will trigger the "Solano Irrigation District Drought Impact Reduction Program." This program provides for SID growers to fallow land and provide up to 20,000 AF per year for voluntary sale to cities (not restricted only to those with Solano Project contracts). Such a drought fallowing program was implemented in 1991 that created 15,000 AF of SID water sold to cities and SCWA.

Vallejo Agreements. Vallejo often has water supplies in excess of its current needs. Vallejo has entered into agreements with Benicia, Napa County and Fairfield for sales and exchanges.

Benicia. Vallejo has two agreements with Benicia to provide supplemental water when needed by Benicia. The first agreement provides for sale of 1,100 AF/year of Solano Project water. The second agreement provides for up to 4,400 AF/year of NBA water.

Napa County. Vallejo has an agreement with the city of American Canyon in Napa County to provide for a future permanent sale of up to 750 AF of Vallejo Permit Water to American Canyon. American Canyon would then sell an equivalent amount of its Napa County SWP contract amount to the cities of Calistoga and Yountville. This is an indirect way of selling VPW to Calistoga and Yountville who are outside of the allowed place of use for VPW. That transfer has not been activated yet. Vallejo also has an agreement with American Canyon that allows Vallejo to treat part of American Canyon's Napa County NBA contract water and deliver it to American Canyon. This arrangement has no impact on SCWA water supplies since it is Napa's NBA water being treated.

Fairfield. Vallejo and Fairfield have an agreement where by under mutually agreeable circumstances, Vallejo provides Fairfield with two units of VPW water and gets one unit of Solano Project water from Fairfield.

Vallejo Lakes System. Vallejo provides water service to unincorporated communities in the Green Valley/Suisun Valley areas from local reservoirs.

Mojave Exchange Agreement. SCWA has an agreement with the Mojave Water Agency (Mojave), another SWP contractor, to exchange wet weather SWP water for dry year SWP water. In years when SWCA has extra SWP supplies, SCWA can exchange two units of SWP water for a future return of one unit of water to be provided (at the Delta) by the Mojave most likely in a dry year when there are SWP shortages. SCWA also pays some SWP transportation charges to Mojave when water is delivered to Mojave. So far only Benicia has taken advantage of this exchange program and currently (as of 2004) has the right to 5,500 AF of return water from Mojave. Up to 10,000AF in any one year of SCWA SWP supply can be exchanged with Mojave (resulting in a return obligation of 5,000 AF in a future year) with a cumulative limit return obligation of Mojave of 20,000 AF at any one time. Mojave stores its excess water supply in its groundwater basin. Mojave and SCWA enter into agreements with DWR to transport the exchange water through SWP

facilities. DWR currently requires that the water supply exchanged be returned within 10 years of the initial exchange, but this policy may be changed.

Highline Canal Study. This study originated as an investigation of constructing a blending reservoir (called the Noonan Reservoir) for SWP water and Solano Project water. The blended water reservoir would allow exchanges of Solano Project and NBA water and provide for emergency water supply storage. The reservoir was to be located just south of Vacaville where the NBA and the Putah South Canal nearly meet. The proposed location for the blending reservoir proved to have geotechnical problems so the reservoir plan was postponed indefinitely. In its place a project is being developed to implement some of the benefits of the reservoir project.

A revised project was developed where water from the NBA would be utilized in the SID Highline Canal, serving an agricultural area of 7,400 acres. The project facilities include a pump station, a connection to the NBA and a connection to the SID Highline Canal. NBA water will be pumped into the Highline Canal, blended with Solano Project water, and distributed to SID growers.

This project is beneficial since it provides a means to better utilize NBA water when it is available. The project would include agreements between cities who are funding the project (Fairfield, Vacaville and Benicia) and SID who would be distributing water to their customers from the project. The cities would also provide financial incentives to growers to use the NBA water. In return for providing NBA water the cities would obtain Solano Project water in Lake Berryessa storage.

Since the cities usually do not fully utilize their NBA supplies, and this water ends up as spilled carryover or just forgone, this project would optimize use of NBA water and take advantage to Solano Project storage. NBA water would be used conjunctively with Solano Project water. The Solano Project water is also a better drinking water source for the cities.

A total of 12,000 – 15,900 AF of NBA water could be used in the service area of the project if 100% NBA water was used. It is anticipated that a blend of NBA water and Solano Project water would be used during initial stages. This project has the potential to be expanded to other agricultural areas, but infrastructure costs would be higher for other locations.

Maine Prairie Water District Study. A study was done to determine if it is possible to fund water system improvements in the Maine Prairie Water District (MPWD) that would allow MPWD to exchange some of its Solano Project entitlement. Some of the options to be studied include a groundwater conjunctive use project and exercise of MPWD's North Delta Water Agency water supplies that are currently not utilized.

Parts of the MPWD and Reclamation District No. 2068 are in the North Delta Water Agency. The North Delta Water Agency has an agreement with DWR that provides a supplemental water supply to landowners within the boundaries of the North Delta Water Agency when their water rights from the State Water Resources Control Board are reduced or cut off due to Delta water quality standards.

Reclamation District No. 2068 Conjunctive Use. RD 2068 currently uses surface water supplies derived from its own water rights and the North Delta Water Agency agreement. RD 2068 also overlies a groundwater basin that is not utilized. If RD 2068 could develop the groundwater basin, they could exchange their surface water and utilize groundwater at certain times. This has a potential to supplement dry year supplies in Solano County.

RD 2068 recently received a grant to study its groundwater basin in the context of a possible future conjunctive use project. Cities in Solano County are interested in participating in such a conjunctive use project, in particular, to improve the reliability of their SWP supplies, that come from the same Delta source. Allowing other entities to use RD 2068 surface water requires additional research to determine if and how best this can be done.

ULATIS FLOOD CONTROL PROJECT

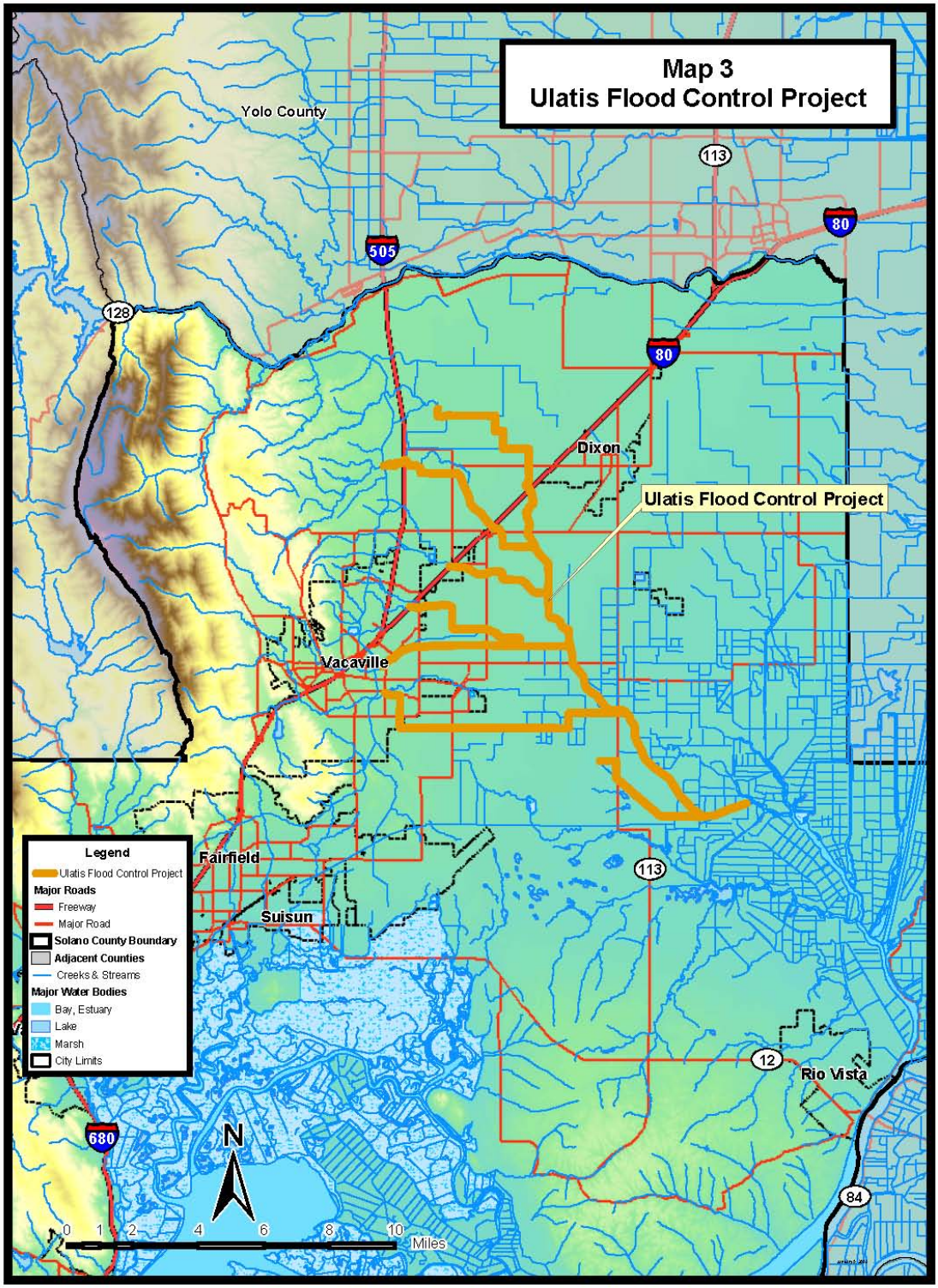
The Ulatis Flood Control Project is located in the Vacaville -Elmira drainage basin. The watershed area for the Ulatis Flood Control Project ranges from the hills to the northwest of Vacaville to the Liberty Island area in the Delta. The Ulatis Project location is showed in Map 3.

The Project was constructed from 1962 to 1972 by the Federal Soil Conservation Service (now the Natural Resource Conservation Service). After completion of the Ulatis Project the Project was turned over to SCWA for operations and maintenance. The channels are almost entirely on private property with easements granted to SCWA for operations and maintenance access. The Natural Resource Conservation Service reviews any plans for major modifications or improvements to the Project. SCWA is responsible for all maintenance and capital improvements. The total cost of construction was approximately $14 million.

Although the City of Vacaville is entirely within the watershed, the primary purpose of the Ulatis Project was to protect agricultural land downstream of Vacaville. The Ulatis Project was designed to control a storm with a 10-year recurrence level, meaning the Project was designed to handle a storm that occurs on an average of once in every ten years. This is a standard level of protection for a non-urban area. Flood control protection in an urban area is usually at a 100-year recurrence level. Portions of the Ulatis Project within the City of Vacaville have been upgraded to a 100-year protection level.

The channels of the Ulatis Project are unlined earth channels where some vegetation is allowed to grow for slope protection. There are a total of 57 miles of channel in the Ulatis Project. Trees and woody vegetation are cleared annually to ensure adequate flood control capacity. The channels are dredged as needed, erosion control utilized and some weed growth is controlled by chemical herbicides.

SCWA contracts with the Solano County Resource Management Department for maintenance of the Ulatis Project. SCWA staff provides engineering, administration and right-of-way management. The County Resource Management Department is responsible for all field operations.


Map 3
Ulatis Flood Control Project
Yolo County
113
80
505
128
80
Dixon
Ulatis Flood Control Project
Vacaville
Fairfield
Suisun
113
12
Rio Vista
680
84
N
0 1 2 4 6 8 10
Miles
Legend
Ulatis Flood Control Project
Major Roads
Freeway
Major Road
Solano County Boundary
Adjacent Counties
Creeks & Streams
Major Water Bodies
Bay, Estuary
Lake
Marsh
City Limits

Funding for the Ulatis Project comes from a portion of the countywide 1 percent property tax. This property tax revenue generates approximately $637,000 per year (FY 2003-2004). Additional funding from the SCWA general fund can supplement the property tax revenues.

Some of the channels of the Ulatis Project are used by Solano Irrigation District and Maine Prairie Water District to convey agricultural irrigation water during the irrigation season. The two districts install a total of eleven temporary dams in the Ulatis Project channels to store water during the irrigation season. These dams are removed prior to the rainy season to ensure that the channels can perform their flood control function.

As development in the watershed of the Ulatis Project continues, SCWA must ensure that there is adequate capacity for additional runoff created. SCWA works closely with the City of Vacaville to ensure that development projects adequately mitigate their storm water runoff impacts. Part of the long-term maintenance program includes monitoring the channels to ensure that they retain the capacity to carry the flows the Ulatis Project was designed for.

GREEN VALLEY FLOOD CONTROL PROJECT

The Green Valley Flood Control Project is located in the Cordelia area. The watershed area for the Green Valley Project ranges from the hills between Vallejo and Fairfield to the Suisun Marsh. The Green Valley Project location is shown in Map 4.

Construction for the Green Valley Project was completed in 1962. The United States Army Corps of Engineers designed and constructed the Project. After completion of the Green Valley Project the Project was turned over to SCWA for operations and maintenance. The channels are almost entirely on private property with easements granted to SCWA for operations and maintenance access. The Corps of Engineers inspects the Green Valley Project once a year and reviews any plans for major modifications or improvements to the Project. SCWA is responsible for all maintenance and capital improvements.

The Green Valley Project is partially within the City of Fairfield. When the Green Valley Project was first built, the service area was unincorporated and largely undeveloped. The Green Valley Project was designed to control a storm with a 40-year recurrence level, meaning the Project was designed to handle a storm that occurs on an average of once in every 40 years. Flood control protection in an urban area is usually a 100-year recurrence level. Portions of the Green Valley Project within the City of Fairfield have been upgraded to a 100-year protection level.

The channels of the Green Valley Project are unlined earth channels where some vegetation is allowed to grow for slope protection. There are a total of six miles of channel in the Green Valley Project. Trees and woody vegetation are cleared annually to ensure adequate flood control capacity. The channels are dredged as needed, erosion control utilized and some plant weed growth is controlled by chemical herbicides.

SCWA contracts with the Solano County Resource Management Department for maintenance of the Green Valley Project. SCWA staff provides engineering, administration and right-of-way management. The County Resource Management Department is responsible for all field operations.

Funding for the Green Valley Project comes from a portion of the countywide 1 percent property tax. This property tax revenue generates approximately $39,000 per year (FY 2003-2004). Additional funding from the SCWA general fund can supplement the property tax revenues.

As development in the watershed of the Green Valley Project continues, SCWA must ensure that there is adequate capacity for additional runoff created. SCWA works closely with the City of Fairfield to ensure that development projects adequately mitigate their storm water runoff impacts. Part of the long-term maintenance program includes monitoring the channels to ensure that they retain the capacity to carry the flows the Green Valley Project was designed for.

OTHER MAJOR FLOOD CONTROL PROJECTS

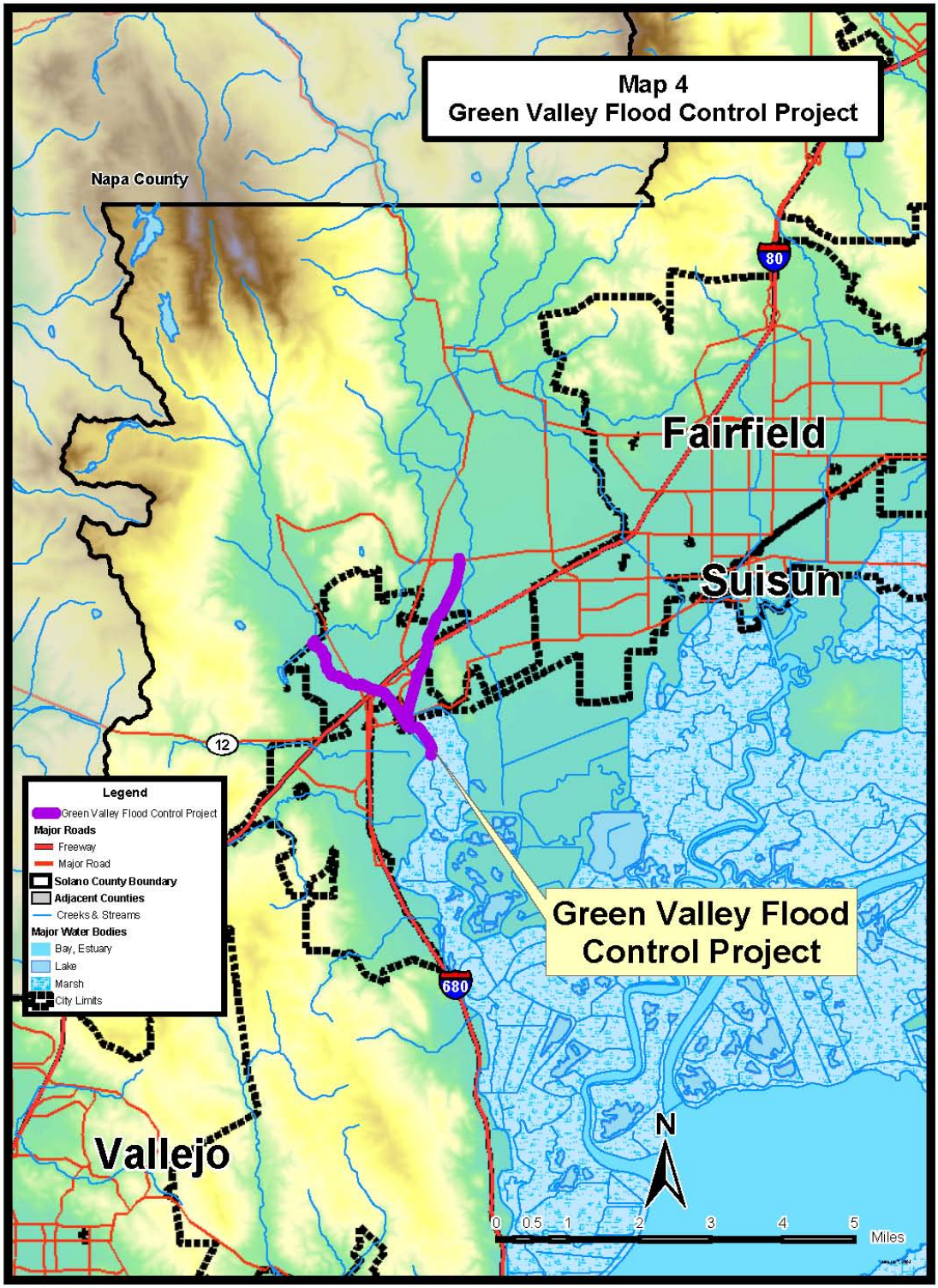
Fairfield Streams. The Fairfield Streams Project was sponsored by the US Army Corps of Engineers. This project provides 100 year flood protection for Fairfield and Suisun. The project consists of improvements to the bottom end of Ledgewood, Laurel, Union and McCoy Creeks that drain the Fairfield/Suisun area into the Suisun Marsh. The project was started in 1970's and completed over time. This project is maintained by the Fairfield Suisun Sewer District which collects a tax to fund maintenance.

Dixon Area Drainage. The agricultural areas in the eastern part of Solano County are provided drainage service by the Dixon Resource Conservation District, MPWD and RD 2068. Each agency has an agricultural drainage system whose purpose is to drain excess irrigation water during the irrigation season and stormwater during the winter. These systems are not designed to act as flood control projects such as city systems or the Ulatis Project.

These agencies have formed a Joint Powers Agency with the city of Dixon to collectively improve and manage drainage facilities. A study, partially funded by SCWA is the basis for this JPA. The city of Dixon lies in the watershed and contributes urban runoff to the agricultural drainage system. This area has a history of disputes and lawsuits over drainage. The JPA will resolve these disputes and provide for new drainage facilities to improve drainage in the area and allow Dixon to more effectively manage its stormwater.

The new projects include an enlarged channel (Lateral 1) leaving a main Dixon detention basin. This project has been completed. This project allows Dixon to discharge stormwater from its basin under metered conditions that shut off discharges when receiving channels of adjacent agricultural fields are flooded. The improved channels provide adjacent agricultural areas with improved drainage when Dixon flows are not using channel capacity.

The JPA also contemplates other projects that benefit the drainage in the region. The New South Channel, a facility that increase the capacity of some existing drains and constructs


Map 4
Green Valley Flood Control Project
Napa County
80
Fairfield
Suisun
12
680
Vallejo
Green Valley Flood Control Project
Legend
Green Valley Flood Control Project
Major Roads
Freeway
Major Road
Solano County Boundary
Adjacent Counties
Creeks & Streams
Major Water Bodies
Bay, Estuary
Lake
Marsh
City Limits
N
0 0.5 1 2 3 4 5
Miles

some new drainage segments would provide additional drainage capacity at the lower end of the system where the drainage outfalls into Delta sloughs. The JPA agreement provides that the city of Dixon will pay for most of the costs of this facility, with the JPA managing design and construction. SCWA is also planned to share in some of the costs. The Eastside Drain is a potential future project that would provide drainage to the Northeast Quadrant part of Dixon to the New South Channel. The viability of this project depends on the future drainage needs of Dixon's Northeast Quadrant area.

City Facilities. Each city in Solano County is responsible for its own storm drainage/flood control. Typically cities provide 100 year protection to residents. Flood control improvements are funded by the cities through taxes and/or assessments. In some cases cities must manage drainage from upstream sources that run into the city. Also they must coordinate with lands downstream of the city to make sure their runoff does not damage those who have interests downstream of their city. SCWA has little to do with city flood control issues other than sometimes working with cities to address upstream and downstream impact issues.

FLOOD CONTROL PLANNNG

Flood Control Master Plan. In 1998 the SCWA Board of Directors approved a Flood Control Master Plan. The Master Plan's main recommendation was to perform flood control watershed studies on problem areas in Solano County. The Master Plan ranked the problem watersheds to provide guidance on which watershed studies should be done first. A watershed study looks at the problem area from the standpoint of all lands that drain into a waterway. It also looks at potential downstream impacts so that any potential solutions will not adversely impact downstream interests

The Master Plan also had other recommendations that were implemented. Six new stream gages were installed throughout the County to provide better stream flow information. The Ulatis Flood Control Project computer model was updated to provide a better tool to analyze flood control improvements. The County Hydrology Manual was revised to provide updated rainfall/runoff data for designing flood control facilities. A small flood control grant program was established to deal with smaller projects meeting specified criteria.

Watershed Studies. So far six watershed studies have been completed (Ledgewood, Suisun, Dixon, McCune, Sweeney and Horse) and one more (Gibson Canyon) are underway. Costs for these studies run from about $50,000 to $200,000.

The watershed studies identify potential solutions to flooding/drainage problems. After the studies are complete SCWA staff works on implementing solutions. It is SCWA policy that SCWA will consider funding part of the capital costs of a potential project, but others must fund permanent operations and maintenance. Also permanent easements must be provided for SCWA funded improvements. Solutions are usually difficult to implement as many of the problem areas are rural and it is difficult to find cost effective solutions and to get operations and maintenance funding. SCWA works with the Flood Control Advisory Committee and local residents to

develop projects as recommended in the watershed studies. Project development includes of public meetings, project financing, right of way acquisition, design, permitting, CEQA and construction.

The following is a brief status report of each of the watershed studies as of the beginning of 2005.

Ledgewood Creek. This study was completed and identified several alternatives to reduce flooding in the area. No project is being implemented due to lack of interest from landowners that would benefit from flood improvements. Some landowners felt that flooding was not a major problem and others were not interested in funding project maintenance.

Suisun Creek. A first phase study was completed that failed to find any cost effective solutions to flooding problems. All solutions we prohibitively expensive compared to flood control benefits of a project. Staff and the Flood Control Advisory Committee are examining smaller potential projects that would benefit smaller areas along the creek. There may also be a possibility to partner with Caltrans, who may be building detention storage in the watershed as part of the North Connector project.

Dixon. A watershed study is complete and the city of Dixon is completing construction of the first phase of improvements along Lateral No. 1 that parallels Highway 113. A Joint Powers Authority (JPA) was being formed by Dixon, Dixon Resource Conservation District, Maine Prairie Water District and Reclamation District No. 2068 to operate and maintain JPA projects. Other future drainage projects identified in the watershed study are being considered for implementation.

McCune. The watershed study for McCune Creek upstream of Hally Road has been completed and staff is working on implementation of the project to determine interests of residents in the project, acquisition of right of way and funding of maintenance costs.

Horse Creek. A variation of a project identified in the watershed study for a one square mile area tributary to Horse Creek has been identified and been completed.

Sweeney Creek. This watershed study was started in 2003 and completed in 2004. SCWA approved projects identified in the study and the projects are in an implementation stage.

Gibson Canyon Creek. This watershed study was started in 2003 and will be completed in 2005.

Small Project Grants. Since 1996, SCWA has budgeted about $100,000 per year for a grant program aimed at solving small flood control/drainage problems. Generally these are projects less than $10,000. Criteria include that property owners must commit to maintaining projects after completion, project must not have adverse downstream impacts, and the project benefits more than one landowner. The full $100,000 is not always expended each year, but this program has been successful in resolving smaller flood control problems.

Flood Hazard Awareness. Storms of December 2002 cause severe flooding in the North West part of the County. Many residents were not aware that they lived in an area subject to flooding. In these areas the December 2003 storm was rated as a 100 year event, a 1% chance of happening in any year. Many people rely upon Federal Emergency Management Agency maps that were developed for flood insurance purposes to determine if they are in an area subject to flooding. These FEMA maps are not always accurate or up to date, particularly in rural areas.

In 2003 the SCWA Board of Directors funded a Flood Hazard Awareness Program to inform County residents of the danger of flooding. Had a 100 year storm been centered over another part of the County, it is likely that similar damage would have occurred. The program seeks to educate residents on how to determine if they are in an area that is subject to flooding and how to prepare for a flood.

Flood Control Project Funding Principles. SCWA has adopted "Interim Principles to be Followed for SCWA-Funded Flood Control Projects". The Principles are intended to be used by SWCA to make decisions on funding flood control projects identified in watershed studies developed by SCWA. The principles generally call for cost sharing of capital costs and non-SCWA funding of maintenance of projects. Projects must show a benefit commensurate with costs.

ENVIRONMENTAL PROGRAMS

Habitat Conservation Plan. SCWA, cities/districts that contract with SCWA for Solano Project water, and a few other public agencies are co-applicants to develop a Habitat Conservation Plan (HCP) that will allow issuance of incidental take permits to impact Federally listed endangered species. The HCP identifies species to be covered, covered activities, conservation measures, financing and HCP administration. If the HCP is approved by the US Fish and Wildlife Service the applicants will receive incidental take permits that allow them to impact species listed in the HCP for the activities listed in the HCP. The HCP benefits the Solano agencies by providing a streamlined and predictable permitting process for listed species and benefits the species by requiring conservation measures developed on a landscape basis rather than a project by project basis.

The HCP is planned to be a combined with a Natural Communities Conservation Plan, the state version of an HCP. Then state listed endangered species could be covered by the joint document.

The HCP also provides a conservation strategy for the entire County for the covered species. The HCP can be used to obtain grants and other funds to implement projects beneficial to the species above and beyond just mitigation.

The HCP is expected to be completed in 2006. SCWA will have a role in administration of the HCP including monitoring, adaptive management and reporting.

Lower Putah Creek Coordinating Committee. The Lower Putah Creek Coordinating Committee (LPCCC) was formed in 1999. The Putah Creek Accord that settled the instream flow dispute concerning the Solano Project and provided for the creation of the LPCCC. The LPCCC is made up of five members from Solano and five from Yolo representing the parties to the Accord. The LPCCC is charge with coordinating Putah Creek restoration and monitoring activities in Lower Putah Creek (downstream of the Solano Diversion Dam).

The Accord calls for the funding, by SCWA of monitoring programs and a Steamkeeper who plans and implements restoration projects. The Streamkeeper is an employee of SCWA, but works under the direction of the LPCCC. SCWA provides clerical, accounting and administrative support for the Streamkeeper and the LPCCC. The LPCCC has been very successful in obtaining grants to fund planning and restoration activities.

ADVISORY COMMITTEES

SCWA Advisory Commission. The legislation that created SCWA also calls for an Advisory Commission. The Commission is made up of public works directors and water district managers of member agencies. The Commission meets monthly and makes recommendations to the SCWA Board of Directors. One of the major benefits of the Commission is the forum it provides to discuss and coordinate water issues in Solano County.

Flood Control Advisory Committee. In 1998 the SCWA Board of Directors formed the Flood Control Advisory Committee (FCAC). The FCAC is made up of seven public members appointed by SCWA, two members from the SCWA Advisory Commission, and three from Resource Conservation Districts. The FCAC provides advice to the SCWA Board of Directors on flood control matters and monitors the implementation of the SCWA Flood Control Master Plan. The FCAC also acts as a liaison between the public who have flooding problems and the SCWA Board of Directors.

SOLANO WATER AUTHORITY

The Solano Water Authority (SWA) is a joint powers authority whose members are the same member agencies of the SCWA. SWA is structured around joint projects of interest to the member agencies and "project agreements" that establish how a project is to be funded and managed. There are presently four SWA project agreements. SWA is legally a separate entity from SCWA, although there is very close coordination and overlapping in responsibilities.

The SWA was established in 1987. At that time only the Solano Irrigation District, Fairfield and Vacaville were members of the SWA. In 1988, Vallejo, Benicia, Suisun City, Dixon, Rio Vista, The Maine Prairie Water District, Reclamation District No. 2068 and Solano County became members of SWA. With these additional agencies, SWA was made up of the same agencies that make up SCWA.

The governing board of SWA is a "Policy Committee" made up of one representative of each member agency. The SWA Policy Committee closely mirrors the governing board of SCWA.

One difference is that SCWA has all 5 members of the County Board of Supervisors on its governing board while the SWA has only one member of the Board of Supervisors. Additionally, SCWA has elected board members from agricultural irrigation districts on its governing board while for the SWA agricultural irrigation districts have chosen the option to have managers of the districts serve on the SWA governing board.

The project agreements are structured so the participating member agencies have full control over the projects done through the project agreements. SWA projects are funded solely by agencies that are participants of the project agreements.

Each SWA project agreements has a task force made up of staff from the participating agencies. Non-SWA members may also participate in projects. These task forces meet as necessary to carry out projects. Major project decisions are made by a subset of the SWA Policy Committee from representing only the project participants. The staff of SCWA provides staff services and is involved in each of SWA's task forces. The Solano Irrigation District staffs the SWA Policy Committee and acts as Treasurer/Controller. SWA has its own legal counsel.

All SWA projects are financed through contributions from member agencies. There are no outside sources of funding for SWA projects. General administration costs for SWA are allocated to member agencies.

The SWA has broad authorities as a joint powers authority through California law. The SWA can finance and own facilities, acquire water and construct, maintain and operate water projects.

The four SWA project agreements are described below:

Solano Project Transfer. This project agreement is for the transfer of ownership of the Solano Project from Federal ownership to local control. The participants in this project agreement were the Solano Irrigation District, Fairfield, Vacaville, Suisun City, Maine Prairie Water District, Vallejo and the Solano County Water Agency. This project is currently inactive.

This project agreement was formally established in 1990, although preliminary work on the proposed transfer of the Solano Project started several years earlier. The sole task of this project agreement was to obtain Federal legislation providing for the transfer of ownership of the Solano Project to local control. Legislation was first introduced in 1988. Solano Project transfer legislation continued to be discussed in Congress through 1992, where the legislation was discussed in a House-Senate Conference Committee, but was not included in water legislation that was ultimately enacted.

Noonan Reservoir. The Noonan Reservoir was anticipated to be a small, 2,800 acre-foot impoundment, located were the Putah South Canal and the North Bay Aqueduct come very close to each other between Vacaville and Fairfield. The idea was that Noonan Reservoir could serve as a blending reservoir for the two sources of water and as an emergency storage supply.

The participants in this project agreement are the Solano Irrigation District, Fairfield, Vacaville, the Suisun/Solano Water Authority, Vallejo, Benicia and the Solano County Water Agency.

Investigations have found that the soil conditions at the site are probably not suitable for a reservoir. The soil preparation necessary to construct a reservoir would be very expensive and the project is probably not financially feasible as proposed. This project is inactive.

A subset of the participants in the project agreement are currently looking at a physical connection at the Solano Irrigation District Highline Canal between the Putah South Canal and the NBA in order to provide some of the same benefits of Noonan Reservoir at a substantially lower cost. This connection would allow the use of NBA water for agriculture in exchange for Solano Project water to be used by cities. This project is described in more detail on page 31.

New Water Supply. This project agreement is for obtaining new permanent water supplies for the participants. The participants are the Solano Irrigation District, Fairfield, Vacaville, Rio Vista, Vallejo, Benicia, and the Solano County Water Agency.

This project agreement started out as a vehicle to apply to the U.S. Bureau of Reclamation for a Central Valley Project water supply contract. Subsequently, the USBR determined that it would not provide contracts for water supply to new contractors. The focus of the participants then shifted to water transfers. There are currently no active water transfer investigations underway.

The cities of Fairfield, Vacaville and Benicia have a sub agreement to participate in an application to the State Water Resources Control Board for additional water appropriations under the watershed of origin provisions in State law. This effort resulted in a Settlement Agreement with DWR that gave the cities an equivalent water supply. See details in the State Water Project section. This project is now complete.

Coordinated Groundwater Analysis. This project agreement is to study and monitor the Putah Fan/Tehama Formation Groundwater Basin. The participants are: the Solano Irrigation District, Vacaville, Maine Prairie Water District, Reclamation District No. 2068, Dixon, Solano County and the Solano County Water Agency. The project provides data for groundwater management plans pursuant to AB 3030 approved by the Legislature in 1993. SWA is preparing biannual reports on the groundwater basin levels that can be used to determine if future steps need to be taken.

STATE AND REGIONAL ORGANIZATIONS

State Water Contractors. Agencies that contract water from the SWP have joined in an organization called the State Water Contractors. The State Water Contractors include 27 of the 29 agencies that have contracts with DWR. These agencies represent over 99 percent of the total water contracted. The main activity of the State Water Contractors is to advocate for the protection and enhancement of supplies from the SWP. The State Water Contractors participate in CALFED activities and water right hearings regarding the Bay-Delta Estuary and are very involved in issues

regarding the Endangered Species Act. The State Water Contractors also advocate development of additional facilities to improve water supply reliability and increase the water supply of the SWP.

Cost control and cost containment are another important advocacy role of the State Water Contractors. Since the contracts between SWP contractors and DWR require the Contractors to pay for all of the costs of the SWP, the State Water Contractors are diligent in monitoring the activities of DWR to ensure that money is not unnecessarily spent. The State Water Project contractors also sponsor an annual audit of the SWP to ensure that expenditures and income are appropriate.

SCWA is a relatively small SWP Contractor with about 1 percent of the ultimate contracted yield. In contrast, the Metropolitan Water District of Southern California has contractual entitlements to about half the SWP water supply. The second largest agency is the Kern County Water Agency with approximately one quarter of the total SWP water supply. The rest of the agencies make up the remaining approximately one quarter of entitlements.

State Water Project Contracting Authority. The State Water Contractors, in 2003, formed a joint powers authority to provide assistance to DWR. The Authority is made up of almost all State Water Project contractors and is structured to allow DWR to contract with the Authority for a wide variety of services. The Authority would perform these services and bill DWR. DWR would pass along these costs to the SWP contractors in their standard bills for SWP water. An example of a service that the Authority provides is expert consulting in SWP energy acquisition.

The Authority is also involved in studies that benefit groups of SWP contractors and could become involved in water transfers in the future. The Authority has the ability to take over operations of parts of the SWP, but that type of work is not envisioned at this time. There are examples of local water contractors successfully running parts of Federal water facilities, like how SCWA operates and maintains the Solano Project for the USBR.

The Authority was formed under the realization that DWR was having trouble obtaining needed expertise and staffing due to staffing freezes and the cumbersome and restrictive State government process for procuring outside consultants.

CALFED - California Bay Delta Authority. The Authority oversees the CALFED Bay Delta Program, that is implementing plans to enhance ecosystem restoration, increase water supply, promote efficient water use, improve water quality and improve Delta levees. One of the main tenants of CALFED is to seek improvements simultaneously in all of the facets of the CALFED'S programs. The CALFED has been hampered in implementation of its program due to lower than expected levels of funding, in particular from the Federal government.

CALFED is a potential funding source for many SCWA projects. Grant programs through CALFED and from state general obligation bonds, such as Proposition 204 and Proposition 50, have funded several SCWA and LPCCC projects and are anticipated to fund future projects as future grant programs are announced.

Additionally CALFED deals with statewide water issues that directly impact the State Water Project. Any enhancement of the reliability of the State Water Project will benefit the SCWA NBA water supply.

Northern California Salinity Coalition. The Coalition was formed in 2003 by Bay Area water agencies to cooperate, share information and seek funding for desalination and desalting projects. The Coalition is developing a list of projects in need of funding, are investigating cooperative projects, and matching them to funding opportunities. The Coalition will also advocate for new funding for their projects. Examples of projects that may benefit SCWA and member agencies are projects that reduce salts in recycled wastewater making the recycled water more useful for industrial purposes. In the long term, desalination plants for water offshore of Benicia and Vallejo may be viable.

Bay Area Integrated Water Resources Plan. The Association of Bay Area Governments CALFED Task Force is developing a Bay Area Integrated Water Resources Plan. The Bay Area Plan contemplates including water supply, wastewater, stormwater discharge, land use issues, and watershed programs. SCWA has been invited to participate. The Solano Agencies IWRMP will be submitted to be part of the Bay Area Plan. One of the purposes of the Bay Area Plan is to be competitive for funding for State Proposition funding that encourages projects consistent with regional integrated water resources plans.

Coastal and Northern California Water Bond Coalition. This Coalition seeks funding from recently passed State General Obligation Water Bond measures for projects in constituent counties from Northern and Coastal California. The Coalition has developed a list of projects in each participating county that is seeking funding. The Coalition advocates that State funding be directed towards these projects.

Lake Berryessa Watershed Partnership. The Partnership consists of organizations and public agencies in the watershed of Lake Berryessa to monitor and improve water quality in the Lake. The Partnership supports projects such as household hazardous waste collection sites, signage to prevent water pollution, and sharing of water quality data.

Suisun Creek Restoration Team. The Team consists of landowners, organizations and public agencies interested in the resources of Suisun Creek. The group originated from the concern that water releases from Vallejo's Lake Curry would be reduced when Vallejo starts to divert Lake Curry water for its own use. Steelhead in Suisun Creek, an endangered species, could be impacted by the diversion of water to Vallejo. The Team is meeting to determine if there are solutions that meet Vallejo's water supply needs while protecting the natural resources of Suisun Creek.

California Urban Water Conservation Council. The CUWCC is an organization of representatives of water agencies and public interest groups whose goal is to increase the implementation of urban water conservation measures. The CUWCC has developed a set of Best Management Practices that sets a standard for water agency compliance for water conservation. All members must report their compliance with these standards.

Agricultural Water Management Council. The Council is the agricultural counterpart of the CUWCC. The Council had developed a set of water conservation standards geared towards agricultural water districts.

The following are other organizations that SCWA is a member:

Floodplain Management Association, Association of California Water Agencies, and California Central Valley Flood Control Association.

MEMBER UNIT WATER PORTFOLIOS

CITY OF BENICIA

Water Supply and Source(s)

(Acre-feet/Year)

Source	Amount[1]
State Water Project	17,200
Water Rights Settlement	10,500
Lake Herman	500
Vallejo Agreements	5,500
Mojave Exchange	5,500 [a]

[a] Amount currently available, not annually.

State Water Project

Benicia currently has contract rights up to 17,200 AF annually for State Water Project (SWP) water delivered via the North Bay Aqueduct (NBA). SWP water is taken from the Delta at the Barker Slough Pumping Plant and conveyed through the NBA to the Cordelia Forebay where Benicia then pumps the water to their treatment facility or Lake Herman for storage. The current SWP contract amount to Benicia could ultimately be reduced by 1,125 AF annually beginning in the year 2016, if Dixon and Rio Vista take their full NBA contract amount.

Water Rights Settlement

The "Area of Origin" Water Rights Settlement with the California Department of Water Resources (DWR) provides Benicia with 10,500 AF annually of non-project (not SWP) water. Settlement water is available when the Delta is in excess or balanced conditions and Term 91 is not in effect. This is essentially a permanent allocation of water supply. The water is conveyed through the NBA when capacity is available and delivered to Benicia in the same manner as SWP water.

Lake Herman

Lake Herman, situated in the hills between Benicia and Vallejo, has a storage capacity of 1,800 AF. The average yield of the 10 square mile watershed is 500 to 1000 AF annually with no yield in dry years. The additional storage capacity serves as terminal storage for excess water delivered through the NBA. The contribution to Benicia's water supply from local runoff produced by the Lake Herman Watershed is currently not quantified.

[1] See text for an explanation of reliability of these supplies.

Vallejo Agreements

Benicia has facilities to accept delivery of water from three of Vallejo's sources. SWP water and Vallejo Permit Water (VPW) can be delivered to Benicia's pumping facility at the Cordelia Forebay Reservoir and Solano Project (SP) water can be taken by Benicia's pumping facility at the Terminal Reservoir. There is also an inter-connection between the Benicia and Vallejo municipal water transmission systems that gives Benicia the capability to receive treated water from Vallejo. Benicia has two active water purchase agreements with Vallejo.

The first agreement was executed in February 1962, has been amended twice and ultimately provides for the sale of 1,100 AF per year of Vallejo's SP contract amount to Benicia. To execute the agreement, Benicia paid to Vallejo a connection fee of $4,575. The agreement allows Benicia to purchase at its option either treated or untreated water. The current cost of untreated water to Benicia is $34.50/AF. Treated water is delivered at the 'Outside City Limits Rate' in effect when the water is taken. The second amendment pushes the expiration date of the agreement to February 28, 2025.

The second agreement provides 4,400 AF per year of Vallejo's NBA water for purchase by Benicia, annually. Under the provisions of this agreement Benicia must pay $50 per AF per year ($220,000 per year) regardless of usage plus $75 per AF for usage during the entire term of the agreement. This agreement was executed in March, 1992, and expires February 28, 2010. This water is available to Benicia on a "stand-by" basis.

Solano Irrigation District Purchase

Benicia will often negotiate informal purchases with Solano Irrigation District (SID) for SP water to augment Benicia's supplies. These purchases usually occur during the winter period or when the NBA is unavailable.

Mojave Water Agency Exchange

Since 1997, when the Solano County Water Agency entered into the exchange agreement with the Mojave Water Agency (MWA), Benicia has exchanged through SCWA, 11,000 AF of SWP water with MWA. Benicia is entitled to 5,500 AF of MWA's SWP contract amount in the future based on the stipulations of the agreement. In addition to the two for one ratio of the exchange, a fee to pay for part of the transportation costs to get the water to the MWA. The amount is indexed, but is approximately $50/acre foot for each acre foot of water sent to MWA. There is not charge assessed for the return exchange.

Solano Project Agreement

Benicia also has a Storage Agreement with SCWA that provides an option to store up to 9000 AF in Lake Berryessa. To exercise this agreement, Benicia must exchange a portion of its NBA water for SP water or purchase it from other member units that have the capability to use either source. Essentially the other member unit uses the NBA water and foregoes the use of the

agreed upon SP water that it would have used normally. However, in the event Lake Berryessa spills, Benicia's storage is the first to be deducted ahead of carry-over belonging to other member units.

ANNUAL WATER CONSUMPTION
(Acre-Feet/Year)

	1999	2000	2001	2002
State Water Project [a]	11,018	15,290	8,523	11,110
Water Rights Settlement	0	0	0	0
Vallejo Agreements	524	143	3,170	1,087
SID Purchase	225	770	917	170
TOTAL	**11,767**	**16,203**	**12,610**	**12,367**

[a] Includes carry-over and Article 21 if available, therefore may exceed contract amount.

The Valero refinery has a contractual agreement with Benicia for up to 12,322 AF of raw water per year. Refinery use has historically ranged between 4,600 to 5,700 AF annually and is included in the above table.

ANNUAL WATER TRANSFERS, EXCHANGES, SALES
(Acre-Feet/Year)

	1999	2000	2001	2002
Mojave Exchange [a]	0	4,000	0	0
TOTAL	**0**	**4,000**	**0**	**0**

[a] Water transferred to Mojave Water Agency.

CITY OF DIXON

Water Supply and Source(s)

(Acre-Feet/Year)

Source	Amount[2]
State Water Project	1,500
Groundwater	variable

State Water Project

Dixon's SWP contract will begin with 300 AF in the year 2016 and gradually increase by 300 AF annually. The contract amount reaches a maximum of 1,500 AF by 2020 and remains so each year thereafter. Dixon currently has no transmission or treatment facilities to utilize water from the NBA but can initiate their SWP contract earlier with a five year notice.

NORTH BAY AQUEDUCT CONTRACT SCHEDULE - DIXON

(Acre-Feet/Year)

Year	Total Amount
2016	300
2017	600
2018	900
2019	1,200
2020 and beyond	1,500

Groundwater

Water service is currently provided to Dixon by the California Water Service Company (CSWC) and the Dixon-Solano Municipal Water Service (DSMWS). The supply source is groundwater.

CSWC, a California Public Utility Commission regulated private company, serves approximately 3,000 accounts in its service area, which primarily consists of the 'older' Dixon geographic area. CSWC supplies customer demand via a network of eight groundwater wells, averaging 500-600 feet below the ground surface, distributed around Dixon. The original supply system was purchased by CSWC in 1927 from PG&E. CSWC was the sole water service provider in Dixon prior to 1984.

In 1984 DSMWS was established through a Joint Exercise of Powers Agreement (JEPA) between Dixon and Solano Irrigation District. DSMWS currently serves approximately 1,800 accounts outside of CSWC's service area, primarily new developments since 1984. DSMWS serves the area from a well network consisting of 4 wells ranging from 800 to 1500 feet below

[2] See text for an explanation of reliability of these supplies.

the ground surface. The maximum annual yield of the groundwater system is approximately 2,000 AF. DSMWS service area is within SID's service area therefore Dixon is eligible to utilize a share of SID's surface water when necessary. The terms of the JEPA expire in 2009.

ANNUAL WATER CONSUMPTION
(Acre-Feet/Year)

	1999	2000	2001	2002
CWSC	1,767	1,747	1,668	1,701
DSMWS	1,662	1,703	1,801	1,844
TOTAL	**3,429**	**3,450**	**3,469**	**3,545**

CITY OF FAIRFIELD

Water Supply and Source(s)

(Acre-Feet/Year)

Source	Amount[3]
State Water Project	14,678
Solano Project	9,200
Water Rights Settlement	11,800
Vallejo Agreement	variable
SID Agreements	16,018
Recycled Water	3,000

State Water Project

Fairfield currently has contract rights up to 14,678 AF annually for State Water Project (SWP) water delivered via the North Bay Aqueduct (NBA). SWP water is taken from the Delta at the Barker Slough Pumping Plant and conveyed through the NBA to the North Bay Regional (NBR) Water Treatment Plant which is jointly owned with Vacaville. The current SWP contract amount to Fairfield could ultimately be reduced by 750 AF annually beginning in the year 2016 if Dixon and Rio Vista take their full NBA contract amount.

Solano Project

Solano Project (SP) water, stored in Lake Berryessa, is released down Putah Creek from Monticello Dam and re-captured by Putah Diversion Dam approximately 13 miles downstream. The water is diverted through the Putah South Canal to Fairfield's Waterman and NBR treatment plants. Fairfield has contract rights up to 9,200 AF annually from the Solano Project.

Water Rights Settlement

The "Area of Origin" Water Rights Settlement with the California Department of Water Resources (DWR) provides Fairfield with 11,800 AF annually of non-project (not SWP) water. Settlement water is available when the Delta is in excess or balanced conditions and Term 91 is not in effect. This is essentially a permanent allocation of water supply. The water is conveyed through the NBA when capacity is available and delivered to Fairfield in the same manner as SWP water.

[3] See text for an explanation of reliability of these supplies.

Vallejo Agreement

Fairfield has an ongoing water exchange agreement with Vallejo. The agreement stipulates that the parties can exchange portions of Vallejo's Permit Water (VPW) for Fairfield SP water on a 2:1 basis, respectively, with mutual willingness. The agreement also allows Fairfield to purchase Vallejo's VPW at a mutually agreeable rate. The agreement can be terminated by either party with a 30-day written notice.

Solano Irrigation District Agreements

Amendment No. 2, executed in 2002, to an agreement between SID and Fairfield entered in 1974 adds Fairfield-Suisun Sewer District (FSSD) as a party and re-titles the agreement the "Second Amended Agreement." The Second Amended Agreement provides Fairfield with up to 7,000 AF annually of "1974 common boundary SP water" deemed necessary and sufficient to serve all lands that were in the 1974 common boundaries of SID and Fairfield (including, most notably, the Anheuser-Busch brewery). This amount represents a 1,000 AF/year increase over the 1974 agreement. The 1974 agreement and Second Amended Agreement also provide Fairfield with up to 9,018 AF of "pre-1974 option SP water" annually based on lands that had been in SID prior to 1974 but had detached upon annexing to the city. The total amount of SP water available to Fairfield from the Second Amended Agreement is therefore 16,018 AF annually.

Fairfield and SID entered an joint exercise of powers agreement (JPA) in 1987 that established a basis for SID to provide the water to serve lands within the common boundaries of the two agencies not covered under the 1974 agreement (now the Second Amended Agreement). Water service under this JPA is typically supplied by dual systems, potable water from Fairfield and non-potable water from SID. All raw water is supplied by SID or reimbursed to Fairfield. Water supplies are provided under separate "water service sub-agreements" pursuant to the JPA. Since 1987, the two agencies have entered three water service sub-agreements. The three sub-agreements provide a minimum of 1 AF per year of raw water per acre or actual quantity reimbursement to Fairfield from SID for potable water served to lands specified. The current total acreage specified is approximately 450 acres.

In addition, SID provides water directly to a small number of irrigation customers within the Fairfield city limits based on service that existed prior to the property being annexed into Fairfield (e.g., Vanden High School, Fairfield High School, Busch Properties, etc.) or under subsequent outside-district water service agreements (e.g., B. Gale Wilson Elementary School, historic Waterman ranch, etc.). Because the supplies provided under the 1987 JPA and these other arrangements are technically to meet SID demands, they are included only under the section of this appendix on SID.

Recycled Water

Under the Second Amended Agreement, SID and FSSD agree to provide Fairfield with the first 12 million gallons per day (or 13,447 AF/year) of recycled water from the FSSD wastewater treatment plant in exchange for full an adequate consideration. For planning purposes, Fairfield

estimates it will be able to use 3,000 AF/year of recycled water at ultimate development. (This figure, and the city's overall water demand, could be much higher if a planned power plant required to utilize recycled water is constructed within the city adjacent to the FSSD plant.) If Fairfield is not using the recycled water, then SID may use it or sell it.

ANNUAL WATER CONSUMPTION
(Acre-Feet/Year)

	1999	2000	2001	2002
State Water Project [a]	7,263	6,598	5,760	8,555
SP - Fairfield [b]	10,278	9,550	7,867	9,200
Water Rights Settlement	0	0	0	0
VPW [c]	0	0	2,667	0
SID Agreements	3,530	6,109	7,679	6,838
Recycled Water	0	0	<10	117
TOTAL	**21,071**	**22,257**	**25,316**	**24,710**

[a] Includes carry-over and Article 21 if available, therefore may exceed contract amount.

[b] Based on project year Mar-Feb; includes carry-over if available, therefore may exceed contract amount.

ANNUAL WATER TRANSFERS, EXCHANGES, SALES
(Acre-Feet/Year)

	1999	2000	2001	2002
SP - Vallejo [a]	0	0	1,333	0
TOTAL	**0**	**0**	**1,333**	**0**

[a] Fairfield/Vallejo 2VP:1SP exchange agreement.

Fairfield has agreements with other neighboring water agencies to provide a water treatment and delivery service of raw water the other agency provides. These agreements do not yield a new supply to Fairfield because the raw water provided to Fairfield in reimbursement from the other agency matches the amount the other agency uses. Such agreements include the Vallejo "Lakes" system emergency water service agreement; the Suisun-Solano Water Authority seasonal water service agreement (under which S-SWA may use water between the months of November through March, and other months with restrictions), and the SID Blue Ridge Oaks and Peabody Road water service agreements (continuous use; facilities not yet in place). Only the SID agreements provide a permanent use of City facilities and require payment of a connection fee.

CITY OF RIO VISTA

Water Supply and Source(s)

(Acre-Feet/Year)

Source	Amount[4]
State Water Project	1,500
Groundwater	variable

State Water Project

Rio Vista's SWP contract will begin with 300 AF in the year 2016 and gradually increase by 300 AF annually. The contract right reaches a maximum of 1,500 AF by 2020 remains so each year thereafter. Rio Vista currently has no transmission or treatment facilities to utilize water from the NBA. With permission from DWR (and other relevant regulatory agencies) Rio Vista could take its SWP contract water directly from the Sacramento River rather than through the NBA. Rio Vista can initiate their SWP contract earlier with a five year notice.

NORTH BAY AQUEDUCT CONTRACT SCHEDULE - RIO VISTA

(Acre-Feet/Year)

Year	Total Amount
2016	300
2017	600
2018	900
2019	1,200
2020 and beyond	1,500

Groundwater

Rio Vista currently uses groundwater to meets its water demands. The supply system consists of six wells, four of which are currently producing. The well depths range between 500 and 1000 feet below the ground surface. Rio Vista has a contractual agreement with ECO-Resources, Inc., a subsidiary of Southwest Water Company, to maintain, operate and manage the water and waste-water facilities. Customers in the Rio Vista service area currently pay a flat fee for water usage.

[4] See text for an explanation of reliability of these supplies.

ANNUAL WATER CONSUMPTION

(Acre-Feet/Year)

	1999	2000	2001	2002
Groundwater	1,565	1,550	1,725	1,799
TOTAL	**1,565**	**1,550**	**1,725**	**1,799**

SUISUN CITY

Water Supply and Source(s)

(Acre-Feet/Year)

Source	Amount[5]
State Water Project	1,300
Solano Project	1,600
SSWA [a]	varies

[a] SSWA fulfills total demand as needed.

State Water Project

Suisun's SWP contract amount is 750 AF as of 2004 and gradually increases by 150 AF annually. The contract right reaches a maximum of 1,300 AF by 2015 remains so each year thereafter. Suisun currently has no transmission or treatment facilities to utilize water from the NBA.

NORTH BAY AQUEDUCT CONTRACT SCHEDULE - SUISUN CITY

(Acre-Feet/Year)

Year	Total Amount
2004	750
2005	800
2006	850
2007	900
2008	950
2009	1,000
2010	1,050
2011	1,100
2012	1,150
2013	1,200
2014	1,250
2015 and beyond	1,300

Solano Project

Suisun has contract rights up to 1,600 AF of Solano Project (SP) water annually. SP water stored in Lake Berryessa is released down Putah Creek from Monticello Dam and re-captured by Putah Diversion Dam approximately 13 miles downstream. The water is diverted through the

[5] See text for an explanation of reliability of these supplies.

Putah South Canal to the Cement Hill Water Treatment Plant (CHWTP) where the water is treated and piped to Suisun through Tolenas.

Suisun and SID entered into Joint Powers Authority Agreement (JPA) in 1988. The full JPA, Suisun-Solano Water Authority (SSWA) was implemented in 1991. Under this authority, SID operates the CHWTP to treat water on Suisun's behalf. The CHWTP treats Suisun's 1600 AF SP contract water and delivers it to their service area for distribution. A small portion of Suisun Valley is historically part of the service area and still being served. SSWA provides any additional contract water as needed beyond 1600 AF from SID's SP water supply.

ANNUAL WATER CONSUMPTION
(Acre-Feet/Year)

	1999	2000	2001	2002
State Water Project [a]	0	0	0	0
Solano Project [b]	1,763	1,689	1,600	1,584
SSWA	2,412	2,690	3,159	3,236
TOTAL	**4,175**	**4,379**	**4,759**	**4,820**

[a] Includes carry-over and Article 21 if available, therefore may exceed contract amount.

[b] Based on project year Mar-Feb; includes carry-over if available, therefore may exceed contract amount.

CITY OF VACAVILLE

Water Supply and Source(s)

(Acre-Feet/Year)

Source	Amount[6]
State Water Project	8,978
Solano Project	5,750
Water Rights Settlement	9,320
SID Agreement	3,000
Groundwater	8,000
Recycled Water	880

State Water Project

Vacaville currently has contract rights up to 8,978 AF annually for State Water Project (SWP) water delivered via the North Bay Aqueduct (NBA). SWP water is taken from the Delta at the Barker Slough Pumping Plant and conveyed through the NBA to the North Bay Regional (NBR) treatment plant which is jointly owned with Fairfield.

Solano Project

Solano Project (SP) water, stored in Lake Berryessa, is released down Putah Creek from Monticello Dam and re-captured by Putah Diversion Dam approximately 13 miles downstream. The water is diverted through the Putah South Canal to Vacaville's Diatomacous Earth plant and the NBR treatment plant. Vacaville has a contract right to 5,750 AF annually from the SP.

Water Rights Settlement

The "Area of Origin" Water Rights Settlement with the California Department of Water Resources (DWR) provides Vacaville with 9,320 AF annually of non-project (not SWP) water. Settlement water is available when the Delta is in excess or balanced conditions and Term 91 is not in effect. This is essentially a permanent allocation of water supply. The water is conveyed through the NBA when capacity is available and delivered to Vacaville in the same manner as SWP water.

Groundwater

Vacaville has a system of 10 deep aquifer wells. Most of these wells are located in the Elmira well field. Currently, approximately 6,000 AF per year is withdrawn. The estimated safe yield of Vacaville's groundwater system is 8,000 AF annually. The supply in dry years could be

[6] See text for an explanation of reliability of these supplies.

increased to 10,000 AF. Vacaville continually explores expansion of its well system to maintain an adequate water supply.

Solano Irrigation District Agreement

The 1995 Master Water Agreement between Vacaville and Solano Irrigation District (SID) provides Solano Project water to Vacaville from SID. The delivery schedule started at 1,000AF per year in 1995 and increases incrementally to a maximum of 10,050 AF in 2016. The amount available under the agreement for 2004 is 2,500 AF. The agreement expires in 2045. Vacaville pays SID $100/AF for this water supply.

ANNUAL WATER SCHEDULE FOR SID AGREEMENT
(Acre-Feet/Year)

Year	Amount
2005	3,000
2006	3,000
2007	3,000
2008	3,000
2009	3,000
2010	8,000
2011	8,000
2012	9,000
2013	9,000
2014	10,000
2015	10,000
2016 through 2045	10,050

Recycled Water

In 2003, Vacaville began developing a Recycled Water Master Plan. Preliminary estimates indicate approximately 1,200 AF of tertiary treated recycled water may be available annually by 2015. However, this drought-proof resource will require user contracts and possible retrofit costs on the user's behalf. Therefore, for planning purposes, only 75 percent of the total delivery estimate, or 880 AF per year, is assumed to be available beginning in 2015.

ANNUAL WATER CONSUMPTION

(Acre-Feet/Year)

	1999	2000	2001	2002
State Water Project [a]	4,897	5,484	3,424	6,296
Solano Project [b]	5,410	5,542	5,656	4,012
Water Rights Settlement	0	0	0	0
SID Agreement	1,000	1,322	2,000	1,000
Groundwater	4,096	5,141	6,211	6,638
TOTAL	**15,403**	**17,489**	**17,291**	**17,946**

[a] Includes carry-over and Article 21 if available, therefore may exceed contract amount.

[b] Based on project year Mar-Feb; includes carry-over if available, therefore may exceed contract amount.

CITY OF VALLEJO

Water Supply and Source(s)

(Acre-Feet/Year)

Source	Amount[7]
State Water Project	5,600
Solano Project	14,600
Vallejo Permit	17,287
Lakes System	400

State Water Project

Vallejo currently has contract rights up to 5,600 AF annually for State Water Project (SWP) water delivered via the North Bay Aqueduct (NBA). SWP water is taken from the Delta at the Barker Slough Pumping Plant and conveyed through the NBA to the Cordelia Forebay where Vallejo then pumps the water to their Fleming Hill Treatment Plant. The current SWP contract amount to Vallejo could ultimately be reduced by 1,125 AF beginning in the year 2016, if Dixon and Rio Vista take their full NBA contract amount.

Solano Project

Solano Project (SP) water, stored in Lake Berryessa, is released down Putah Creek from Monticello Dam and re-captured by Putah Diversion Dam approximately 13 miles downstream. The water is diverted through the Putah South Canal and conveyed approximately 33 miles to the Terminal Reservoir in Cordelia where Vallejo then pumps the water to their Fleming Hill Treatment Plant. Vallejo has contract rights up to 14,600 AF annually from the SP.

Vallejo Permit Water

Vallejo holds an Appropriative Water Rights License No. 7848 with the State Water Resources Control Board, issued August 1966 that is commonly referred to as Vallejo Permit Water (VPW). The license prescribes a maximum diversion of 31.52 cubic feet per second throughout each year that corresponds to a maximum annual amount of 22,780 AF from the Sacramento River. VPW is conveyed to Vallejo through the NBA project facilities governed by Amendment No. 10 to the Water Supply Contract between DWR and the Solano County Water Agency.

Conveyance of VPW is limited by contract to a maximum of 17,287 AF per year. Since the limitation is not based on a physical capacity constraint of the NBA, an additional 5,493 AF could be available upon execution of an amendment to the existing agreement between DWR and the Solano County Water Agency.

[7] See text for an explanation of reliability of these supplies.

Since VPW is non-project water, Amendment No. 16 to the State Water Supply Contract provides that costs for power resources for transporting non-project water shall be charged as if it were SWP water. In addition, the 'Vallejo Permit Water Power Agreement' between the Solano County Water Agency and the Vallejo, entered into March 2000, stipulates that Vallejo will not incur any charges for VPW used by public agencies within Solano County, including Vallejo itself, to make up deficiencies in SWP contract deliveries in a calendar year. However, Vallejo will pay transportation power costs at the SWP rate for any amount of VPW used above and beyond the collective Solano County SWP contract rights. The 'Vallejo Permit Water Power Agreement' expires December 31, 2035.

Lakes System

Vallejo also holds various appropriative rights to store water in three small local reservoirs, commonly known as the Lakes System. The annual safe yield of Lakes Frey and Madigan is 400 AF and Lake Curry's is 3,750 AF.

Vallejo provides domestic water service to several unincorporated areas in western Solano County. Historically these areas were served from the Lakes System. The system distributed water from Lakes Madigan and Frey to Green Valley and Jameson Canyon. Lake Curry water was distributed to Gordon and Suisun Valleys. Vallejo itself also received water supply from the Lakes System in the past. The water was treated at a pressure filtration plant near Lake Curry prior to delivery to Vallejo and other service areas.

In 1992, Vallejo was compelled to cease delivering water from the Lakes System to domestic users due to stringent new water treatment requirements adopted by the California Department of Health Services. Consequently, Vallejo built a new water treatment facility in Green Valley and has continued to serve the users in the Lakes System.

Lake Curry water is currently not available due to conveyance issues. Vallejo is actively seeking an agreement under the Warren Act with the U.S. Bureau of Reclamation to transport Lake Curry water through the Putah South Canal project facilities so Vallejo can transport it to its Fleming Hill treatment plant for use in the Vallejo. However, the total yield from Lake Curry will likely be reduced due to in-stream flow needs pending the results of studies currently being conducted as part of an EIR/EIS process for the Lake Curry project.

Fairfield Agreement

Vallejo has an ongoing water exchange agreement with the Fairfield. The agreement stipulates that Vallejo can exchange portions of its VPW with Fairfield for SP water on a 2:1 basis, respectively, with mutual willingness. The agreement also allows Fairfield to purchase excess VPW at a mutually agreeable rate. The agreement can be terminated by either party with a 30-day written notice.

Vallejo also has a "stand-by" agreement whereby Fairfield may provide emergency water service to the Vallejo Lakes Water System. This agreement is the successor to an expired agreement for

temporary potable water service whereby Fairfield treated raw water provided by Vallejo and delivered it to the Lakes System while Vallejo was upgrading the water treatment facilities in that service area. Vallejo established two connections, in Gordon Valley and Cordelia, between the Lake System and Fairfield water system under the original agreement, which are now reserved for emergency service. Because the emergency service agreement is not permanent and the service is by permission only, Fairfield required no connection fees or capacity charges.

Travis Air Force Base Agreement

Travis Air Force Base (TAFB) has an agreement with Vallejo to purchase one-third of Vallejo's SWP entitlement, annually. TAFB is served via a turnout off the NBA to the TAFB water treatment plant. Additional demand to TAFB is met with VPW. The ultimate annual water demand by TAFB is estimated to be 5,521 AF by the Vallejo based on the 'Final report, Travis Air Force Base Water Treatment Plant Evaluation', (1998). TAFB also augments their water supply with groundwater.

Benicia Agreements

Benicia has facilities to accept delivery of water from three of Vallejo's sources. SWP water and Vallejo Permit Water (VPW) can be delivered to Benicia's pumping facility at the Cordelia Forebay Reservoir and Solano Project (SP) water can be taken by Benicia's pumping facility at the Terminal Reservoir. There is also an inter-connection between the Benicia and Vallejo municipal water transmission systems that gives Benicia the capability to receive treated water from Vallejo. Benicia has two active water purchase agreements with Vallejo.

The first agreement was executed in February 1962, has been amended twice and ultimately provides for the sale of 1,100 AF per year of Vallejo's SP contract amount to Benicia. To execute the agreement, Benicia paid to Vallejo a connection fee of $4,575. The agreement allows Benicia to purchase at its option either treated or untreated water. The current cost of untreated water to Benicia is $34.50/AF. Treated water is delivered at the 'Outside City Limits Rate' in effect when the water is taken. The second amendment pushes the expiration date of the agreement to February 28, 2025.

The second agreement provides 4,400 AF per year of Vallejo's NBA water for purchase by Benicia, annually. Under the provisions of this agreement Benicia must pay $50 per AF per year ($220,000 per year) regardless of usage plus $75 per AF for usage during the entire term of the agreement. This agreement was executed in March, 1992, and expires February 28, 2010. This water is available to Benicia on a "stand-by" basis.

American Canyon Agreements

The City of American Canyon, in Napa County, entered into a Water Service Agreement in May 1996, with the Vallejo. Vallejo agreed to sell American Canyon a permanent supply potable water, to treat American Canyon excess raw water, and provide transmission facilities to convey American Canyon water to certain areas in the American Canyon water service area. To execute

this agreement, American Canyon paid to Vallejo a water connection fee of $1,428,571 to connect to Vallejo water facilities for a maximum day capacity of 1.0 million gallons per day (MGD). The connection fee is for the purchase of capacity in the Vallejo water facilities required to convey raw water on behalf of American Canyon, treat such water and transfer such potable water to American Canyon. The agreement currently has a maximum annual capacity of 628.6 AF based on the 1.0 MGD but provides for additional incremental capacity purchases up to 6.25 MGD within stipulated time constraints.

A series of four addendums to the original agreement have been executed. Addendum No. 1 allows American Canyon to purchase up to 500 AF of raw VPW for landscape irrigation under "emergency" conditions. The terms of this sub-agreement are at the discretion of Vallejo regarding availability.

Addendum No. 2 permanently transferred 500 AF of VPW to American Canyon for domestic use. American Canyon sold 500 AF of its SWP contract amount to the City of Calistoga, in-kind. To execute the sub-agreement, American Canyon paid to Vallejo a one-time charge of $1,000 per AF or $500,000, and $114,000 compensation for previous costs incurred by Vallejo for NBA capacity increases. American Canyon also reimburses Vallejo for all annual operation, maintenance, and replacement costs associated water delivered under this sub-agreement.

Addendum No. 4 could permanently transfer 250 AF of VPW to American Canyon for domestic use. Under the terms of this addendum American Canyon would sell 250 AF of its SWP contract amount to the City of Yountville, in-kind. To execute the sub-agreement, Yountville is to pay Vallejo a one-time charge of $1,100 per AF or $275,000, and $57,000 compensation for previous costs incurred by Vallejo for NBA capacity increases. American Canyon also reimburses Vallejo for all annual operation, maintenance, and replacement costs associated water delivered under this sub-agreement. This addendum does not appear to be fully executed at this time however Yountville maintaining the "option" provisions of the agreement.

Addendum No. 3 is for fire supply storage and flow to the Montevino Subdivision in American Canyon and has no impact on Vallejo's water supplies.

Solano Irrigation District Exchange

Vallejo has service exchange agreement with SID. Under this agreement Vallejo provides raw water service to Tolenas, in SID's service area, in exchange SID delivers an equal amount of raw water to Vallejo's Green Valley Treatment Plant. Consequently, Vallejo supplies Tolenas water demand from its NBA water supplies and SID augments Vallejo with SP water. The demands of both areas are typically not equal and SID typically owes Vallejo a balance of SP water at the end of each year. Vallejo estimates the ultimate annual water demand of the Lakes System service area to be 620 AF.

ANNUAL WATER CONSUMPTION
(Acre-Feet/Year)

	1999	2000	2001	2002
SWP [a]	8,544	9,461	2,912	5,961
SP [b]	13,514	13,278	12,337	13,714
VPW	0	774	5,448	2,628
Lakes System	82	174	137	157
TOTAL	**22,140**	**23,687**	**20,834**	**22,460**

[a] Includes carry-over and Article 21 if available, therefore may exceed contract amount.

[b] Based on project year Mar-Feb; includes carry-over if available and water exchanged from Fairfield, therefore may exceed contract amount.

ANNUAL WATER TRANSFERS, EXCHANGES, SALES
(Acre-Feet/Year)

	1999	2000	2001	2002
SWP - Travis [a]	3,031	261	482	3,090
SP - Benicia [b]	412	143	316	1,087
VPW - Vallejo	0	774	5,448	2,628
VPW - Travis	0	3,147	2,538	3,538
VPW - Benicia	0	0	2,854	0
VPW - Fairfield [c]	0	0	2,665	0
VPW - Vacaville	0	0	0	0
TOTAL	**3,443**	**4,325**	**14,303**	**10,343**

[a] Includes carry-over and Article 21 if available, therefore may exceed contract amount.

[b] Based on project year Mar-Feb; includes carry-over if available, therefore may exceed contract amount.

[c] Fairfield/Vallejo 2VP:1SP agreement.

SOLANO IRRIGATION DISTRICT

Water Supply and Source(s)

(Acre-Feet/Year)

Source	Amount[8]
Solano Project	141,000
MPWD Exchange	10,000
Groundwater	10,000

Solano Project

Solano Irrigation District (SID) serves primarily agriculture and some municipal and industrial users. SID has contract rights up to 141,000 AF of Solano Project (SP) annually. SID's service area is approximately bounded between Lake Solano, Dixon, Suisun, and Green Valley exclusive of the Fairfield and Vacaville service areas, dominantly rural. In addition to serving it own service area, SID also has various water supply and exchange agreements with other Solano County member units encumbering the contract amount.

Suisun-Solano Water Authority

Suisun and SID entered into Joint Powers Authority Agreement (JPA) in 1988. The full JPA, Suisun-Solano Water Authority (SSWA) was implemented in 1991. Under this authority, SID operates the CHWTP to treat water on Suisun's behalf. The CHWTP treats Suisun's 1600 AF SP contract water and delivers it to their service area for distribution. A small portion of Suisun Valley is historically part of the service area and still being served. SSWA provides any additional contract water as needed beyond 1600 AF from SID's SP contract amount.

Maine Prairie Water District Exchange

The SID Irrigation Tail Water Exchange Agreement with MPWD allows SID to exchange irrigation tail water for 10,000 acre-feet of Solano Project water. Under the terms of the agreement, SID can receive one acre-foot of Solano Project water for every two acre-feet of irrigation tail water exchanged to MPWD.

Vallejo Exchange

SID has service exchange agreement with Vallejo. Under this agreement Vallejo provides raw water service to Tolenas, in SID's service area, in exchange SID delivers an equal amount of raw water to Vallejo's Green Valley Treatment Plant. Consequently, Vallejo supplies Tolenas water demand from its NBA water supplies and SID augments Vallejo with SP water. The demands of

[8] See text for an explanation of reliability of these supplies.

both areas are typically not equal and SID typically owes Vallejo a balance of SP water at the end of each year.

Benicia, MPWD Purchases

Benicia will often negotiate informal purchases with Solano Irrigation District (SID) for SP water to augment Benicia's supplies. These purchases usually occur during the winter period or when the NBA is unavailable.

On occasion, MPWD utilizes their full contract amount prior to the end of irrigation demands and sufficient SID tail-water is not available. During those instances MPWD will purchase supplemental contract water from SID.

Fairfield Agreements

Amendment No. 2, executed in 2002, to an agreement between SID and Fairfield entered in 1974 adds Fairfield-Suisun Sewer District (FSSD) as a party and re-titles the agreement the "Second Amended Agreement." The Second Amended Agreement provides Fairfield with up to 7,000 AF annually of "1974 common boundary SP water" deemed necessary and sufficient to serve all lands that were in the 1974 common boundaries of SID and Fairfield (including, most notably, the Anheuser-Busch brewery). This amount represents a 1,000 AF/year increase over the 1974 agreement. The 1974 agreement and Second Amended Agreement also provide Fairfield with up to 9,018 AF of "pre-1974 option SP water" annually based on lands that had been in SID prior to 1974 but had detached upon annexing to the city. The total amount of SP water available to Fairfield from the Second Amended Agreement is therefore 16,018 AF annually.

Fairfield and SID entered an joint exercise of powers agreement (JPA) in 1987 that established a basis for SID to provide the water to serve lands within the common boundaries of the two agencies not covered under the 1974 agreement (now the Second Amended Agreement). Water service under this JPA is typically supplied by dual systems, potable water from Fairfield and non-potable water from SID. All raw water is supplied by SID or reimbursed to Fairfield. Water supplies are provided under separate "water service sub-agreements" pursuant to the JPA. Since 1987, the two agencies have entered three water service sub-agreements. Water supplies are provided under separate "water service sub-agreements" pursuant to the JPA. Since 1987, the two agencies have entered three water service sub-agreements. The three sub-agreements provide a minimum of 1 AF per year of raw water per acre or actual quantity reimbursement to Fairfield from SID for potable water served to lands specified. The current total acreage specified is approximately 450 acres. In addition, SID provides direct irrigation water service to a limited number of properties within the Fairfield city limits outside of any agreements between the two agencies.

In addition, SID provides water directly to a small number of irrigation customers within the Fairfield city limits based on service that existed prior to the property being annexed into Fairfield (e.g., Vanden High School, Fairfield High School, Busch Properties, etc.) or under subsequent outside-district water service agreements (e.g., B. Gale Wilson Elementary School,

historic Waterman ranch, etc.). The supplies provided under the 1987 JPA are technically to meet SID demands.

Vacaville Agreement

The 1995 Master Water Agreement between SID and Vacaville provides SP water to Vacaville from SID. The delivery schedule started at 1,000AF per year in 1995 and increases incrementally to a maximum of 10,050 AF in 2016. The amount available under the agreement for 2004 is 2,500 AF. The agreement expires in 2045.

ANNUAL WATER SCHEDULE FOR VACAVILLE AGREEMENT
(Acre-Feet/Year)

Year	Amount
2005	3,000
2006	3,000
2007	3,000
2008	3,000
2009	3,000
2010	8,000
2011	8,000
2012	9,000
2013	9,000
2014	10,000
2015	10,000
2016 through 2045	10,050

Groundwater

SID is also uses groundwater conjunctively with surface water supplies. SID has a groundwater well network consisting of 29 wells ranging from 400 to 1,000 feet below the ground surface. Groundwater is primarily used to supplement irrigation demands in area constrained by conveyance capacity for surface water deliveries. The historical yield of the groundwater system is 15,000 AF per year. Current annual system yield is approximately 10,000 AF due to physical failures in a few wells rendering them inoperative pending repair or replacement.

In 1984 DSMWS was established through a Joint Exercise of Powers Agreement (JEPA) between Dixon and Solano Irrigation District. DSMWS currently serves approximately 1,800 customers from a well network consisting of 4 wells ranging from 800 to 1500 feet below the ground surface. The DSMWS service area is within SID's service area therefore Dixon is eligible to utilize a share of SID's surface water when necessary. The terms of the JEPA expire in 2009.

Recycled Water

In the 1974 agreement with Fairfield, SID exchanged 6,000 AF per year of its SP contract water to Fairfield for an estimated equivalent amount of recycled wastewater. SID was only able to utilize approximately 1,000 AF per year of the recycled water, however, due to water quality constraints. Under the 2002 amendment to the agreement (the Second Amended Agreement), Fairfield agreed to full and adequate consideration to SID for the acquisition and transfer of SID's recycled water rights. If Fairfield is not using the recycled water then SID can continue to sell it.

ANNUAL WATER CONSUMPTION
(Acre-Feet/Year)

	1999	2000	2001	2002
SP - SID (AG) [a]	124,037	123,839	131,241	126,042
SP - SID (M&I) [a,c]	1,746	2,076	2,358	2,812
SP - Vallejo [b]	195	463	891	673
Groundwater	4,820	5,959	5,300	6,853
TOTAL	**130,798**	**132,337**	**139,790**	**136,380**

[a] Based on project year Mar-Feb; includes carry-over if available, therefore may exceed contract amount.
[b] SP credited to Vallejo for Tolenas/Green Valley exchange balance.
[c] Primarily raw water for urban landscape and Industrial use.

ANNUAL WATER TRANSFERS, EXCHANGES, SALES
(Acre-Feet/Year)

	1999	2000	2001	2002
SP - Benicia	0	0	917	170
SP - Fairfield	3,530	6,109	7,679	6,838
SP - Suisun	2,412	2,690	3,159	3,236
SP - Vacaville	1,000	1,322	2,000	1,000
SP – MPWD	0	2,478	220	0
MPWD Exchange	18,389	13,912	18,950	18,985
TOTAL	**25,331**	**26,511**	**32,943**	**30,229**

MAINE PRAIRIE WATER DISTRICT

Water Supply and Source(s)
(Acre-Feet/Year)

Source	Amount[9]
Solano Project	5,000
SID Exchange	20,000
Local Surface Water Rights	variable

Solano Project

Maine Prairie Water District (MPWD) has annual contract right to 15,000 AF of Solano Project (SP) water. SP water, stored in Lake Berryessa, is released down Putah Creek from Monticello Dam and re-captured by Putah Diversion Dam approximately 13 miles downstream. The water is diverted through the Putah South Canal (PSC) and diverted to Sweeney Creek, approximately 6 miles downstream of the PSC head-works, and conveyed through the creek system to MPWD approximately 7 miles downstream of the Sweeny turnout. MPWD SP contract water can also diverted to the creek system at various other locations in the SID conveyance system. MPWD can purchase additional SP water from SID as needed. On occasion MPWD has sold small amounts of SP water to CSP-Solano.

Solano Irrigation District Agreement

The SID Irrigation Tail Water Exchange Agreement (1984) allows MPWD to exchange 10,000 AF of its Solano Project water for SID's irrigation tail water. Under the terms of the agreement, MPWD can receive two acre-feet of irrigation tail water for each acre-foot of Solano Project water exchanged to SID. The agreement has officially expired but the terms have been extended by a letter agreement until further notice.

Local Surface Water Rights

MPWD has surface water rights to local streams that supplement their water supply from the Solano Project and SID. The contribution to MPWD's water supply from local surface water sources is currently not quantified.

[9] See text for an explanation of reliability of these supplies.

ANNUAL WATER CONSUMPTION
(Acre-Feet/Year)

	1999	2000	2001	2002
Solano Project [a]	4,753	5,000	5,000	4,909
SID Exchange	18,389	13,912	18,950	18,985
SID Purchase	0	2,478	220	0
TOTAL	**23,142**	**21,390**	**24,170**	**23,894**

[a] Based on project year Mar-Feb; includes carry-over if available, therefore may exceed contract amount.

CA STATE PRISON - SOLANO

Water Supply and Source(s)

(Acre-Feet/Year)

Source	Amount[10]
Solano Project	1,200

The CA State Prison – Solano (CSP) has a contract right to 1,200 AF annually from the Solano Project (SP). SP water, stored in Lake Berryessa, is released down Putah Creek from Monticello Dam and re-captured by Putah Diversion Dam approximately 13 miles downstream. The water is diverted from the Putah South Canal (PSC) to CSP via a small pump and pipeline facility located along the canal approximately 15 miles downstream of the PSC head-works. CSP treats most of the water at their water treatment plant for municipal use but a portion is also used for agriculture use.

CSP also has a service connection to Vacaville's distribution system to purchase supplemental treated water to augment their supply when necessary.

ANNUAL WATER CONSUMPTION

(Acre-Feet/Year)

	1999	2000	2001	2002
Solano Project (M&I)[a]	1,044	946	963	1,007
Solano Project (AG)[a]	328	201	228	234
TOTAL	**1,372**	**1,147**	**1,191**	**1,241**

[a] Based on project year Mar-Feb; includes carry-over if available, therefore may exceed contract amount.

[10] See text for an explanation of reliability of these supplies.

UNIVERISITY OF CALIFORNIA DAVIS

Water Supply and Source(s)

(Acre-Feet/Year)

Source	Amount[11]
Solano Project	4,000

UCD has a contract right to 4,000 AF annually from the Solano Project (SP). SP water, stored in Lake Berryessa, is released down Putah Creek from Monticello Dam and re-captured by Putah Diversion Dam approximately 13 miles downstream. The water is diverted from the Putah South Canal (PSC) to UCD via a surcharged pipeline approximately 2 miles downstream of the PSC head-works. UCD uses the water for agricultural purposes only.

ANNUAL WATER CONSUMPTION

(Acre-Feet/Year)

	1999	2000	2001	2002
Solano Project (AG)[a]	3,878	3,708	3,815	3,098
TOTAL	**3,878**	**3,708**	**3,815**	**3,098**

[a] Based on project year Mar-Feb; includes carry-over if available, therefore may exceed contract amount.

[11] See text for an explanation of reliability of these supplies.

RECLAMATION DISTRICT NO. 2068

Water Supply and Source(s)

(Acre-Feet/Year)

Source	Amount[12]
Local Surface Water	75,000

Reclamation District 2068 (RD2068) has riparian and appropriative water rights to surface water from the Sacramento River Delta. The riparian right is currently exercised but not adjudicated.

The appropriative rights consist of two licenses and one permit pending licensing with the oldest dating back to the early 1920's. The licenses are unquantified. The permit stipulates a water right amount of 75,000 AF annually as long as the permit is in effect.

In addition to these surface water rights, the landowners, as members of the North Delta Water Agency, hold a water rights settlement contract with DWR executed in 1981. The contract benefits the land and RD2068 is the surrogate as owner of the conveyance system. The terms of the contract provides water users to divert water from the Delta for reasonable and beneficial uses for agricultural, municipal, and industrial purposes. DWR furnishes such water as may be required within the Agency to the extent not otherwise available under the water rights of the water users and to maintain appropriate water quality conditions without restrictions.

ANNUAL WATER CONSUMPTION

(Acre-Feet/Year)

	1999	2000	2001	2002
Local Surface Water	55,007	54,471	53,449	53,956
TOTAL	**55,007**	**54,471**	**53,449**	**53,956**

[12] See text for an explanation of reliability of these supplies.