

Sacramento Valley

Integrated Regional Water Management Plan

Prepared by



Northern California
Water Association

CH2MHILL

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**Final
Sacramento Valley
Integrated Regional
Water Management Plan**

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Acronyms and Abbreviations

AB	Assembly Bill
ac-ft	acre-feet
ACID	Anderson-Cottonwood Irrigation District
af/yr	acre-feet per year
Bay-Delta	San Francisco Bay/Sacramento-San Joaquin Estuary
BMO	basin management objective
BWGWD	Biggs-West Gridley Water District
California Water Plan	California Department of Water Resources' Bulletin 160
CBDD	Colusa Basin Drainage District
cfs	cubic feet per second
Coalition	Sacramento Valley Water Quality Coalition
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
DAU	Data Analysis Unit
Department	California Department of Water Resources
DFG	California Department of Fish and Game
DW&RC	Butte County Department of Water and Resource Conservation
EIR	environmental impact report
EIS	environmental impact statement
FCWCD	Flood Control and Water Conservation District
FMMP	Farmland Mapping and Monitoring Program

Four County Document	<i>Northern Sacramento Valley (Four County) Drinking Water Quality Strategy Document</i>
GCID	Glenn-Colusa Irrigation District
GIS	Geographic Information System
IRWMP	Integrated Regional Water Management Plan
JEP	Joint Exercise of Powers
JEPA	Joint Exercise of Powers Agreement
M&I	municipal and industrial
M&T	M&T Chico Ranch
MHI	median household income
MOU	Memorandum of Understanding
msl	mean sea level
NCWA	Northern California Water Association
NPS	non-point source
NWR	National Wildlife Refuge
OAWD	Orland Artois Water District
OUWUA	Orland Unit Water User's Association
PG&E	Pacific Gas and Electric Company
RBDD	Red Bluff Diversion Dam
RCD	Resource Conservation District
RD	Reclamation District
Reclamation	U.S. Bureau of Reclamation
SB	Senate Bill
Service	U.S. Fish and Wildlife Service

SRCAF	Sacramento River Conservation Area Forum
SVWMA	Sacramento Valley Water Management Agreement
SVWMP	Sacramento Valley Water Management Plan
SWP	State Water Project
SWRCB	State Water Resources Control Board
TB	Targeted Benefit
TCCA	Tehama-Colusa Canal Authority
TMDL	Total Maximum Daily Load
Water Board	Central Valley Regional Water Quality Control Board
Water Inventory	Butte County Water Inventory and Analysis
WRA	Water Resource Agency of Yolo County
YCFCWCD District	Yolo County Flood Control and Water Conservation
YCWA	Yuba County Water Agency

1 Program Overview

1.1 Purpose

The Sacramento Valley Integrated Regional Water Management Plan (IRWMP) is being developed to provide a framework and forum to guide the development of water resources policies, programs, and projects to meet the objectives described in Section 2, Sacramento Valley IRWMP Objectives. This IRWMP builds on many years of ongoing regional and subregional planning, and related project development and implementation. The Sacramento Valley IRWMP is intended to improve coordination and the sharing of ideas across the Sacramento Valley IRWMP Region to allow for improved water management at the local, regional, and state level.

This IRWMP will serve as a regional planning process that is consistent with the California Department of Water Resources' (Department) Bulletin 160 (California Water Plan) and the State Water Resources Control Board's (SWRCB) Strategic Plan, its Watershed Management Initiative, and the basin planning process. The Sacramento Valley IRWMP is a grassroots planning process that will help implement the state's strategy to place "more emphasis on integrated regional water management" by building on regional-level water management strategies and then integrating these strategies into a coherent super-regional water management plan.

1.2 Organization of this IRWMP

This IRWMP is organized into the following nine primary sections:

- Section 1 – Program Overview (overview of ongoing and proposed regional planning efforts)
- Section 2 – Sacramento Valley IRWMP Objectives (identification of overall regional planning objectives)
- Section 3 – Planning Process (overview of current and continuing IRWMP participant and stakeholder coordination process)
- Section 4 – Assessment of Water Management Strategies (review of applicable regional water management strategies and issues)
- Section 5 – Conservation Strategies (identification of current and proposed ecosystem conservation efforts)
- Section 6 – Land and Water Use/Development Trends (summary of existing and anticipated land and water use across the eight-county region)

- Section 7 – Implementation (proposed implementation approach)
- Section 8 – Performance and Monitoring (summary of ongoing and proposed monitoring and performance efforts)
- Section 9 – References (a list of sources used to prepare this IRWMP)

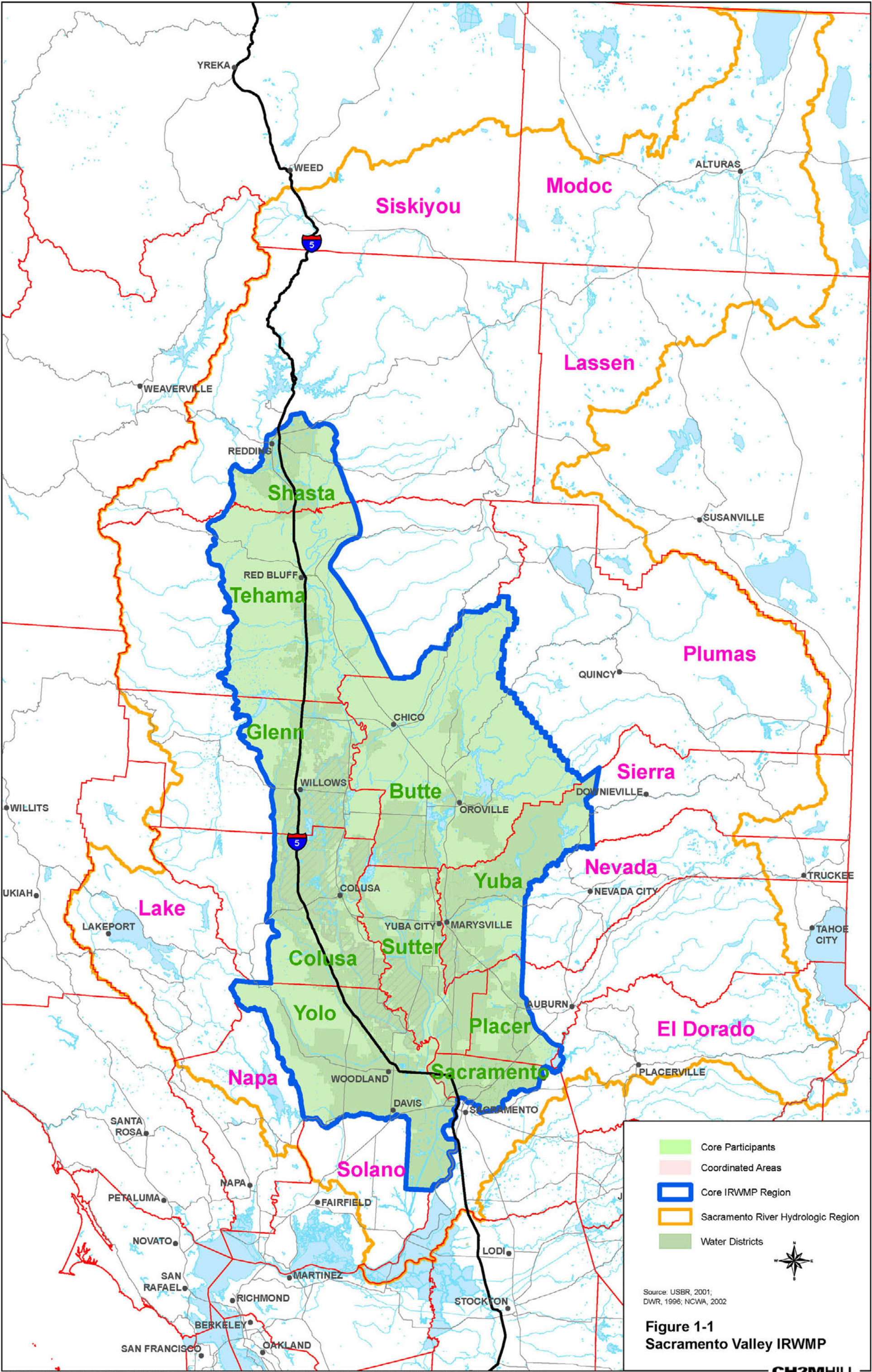
In addition to these sections, Appendix A lists currently proposed programs/projects, and Appendix B provides the Performance and Monitoring Plan.

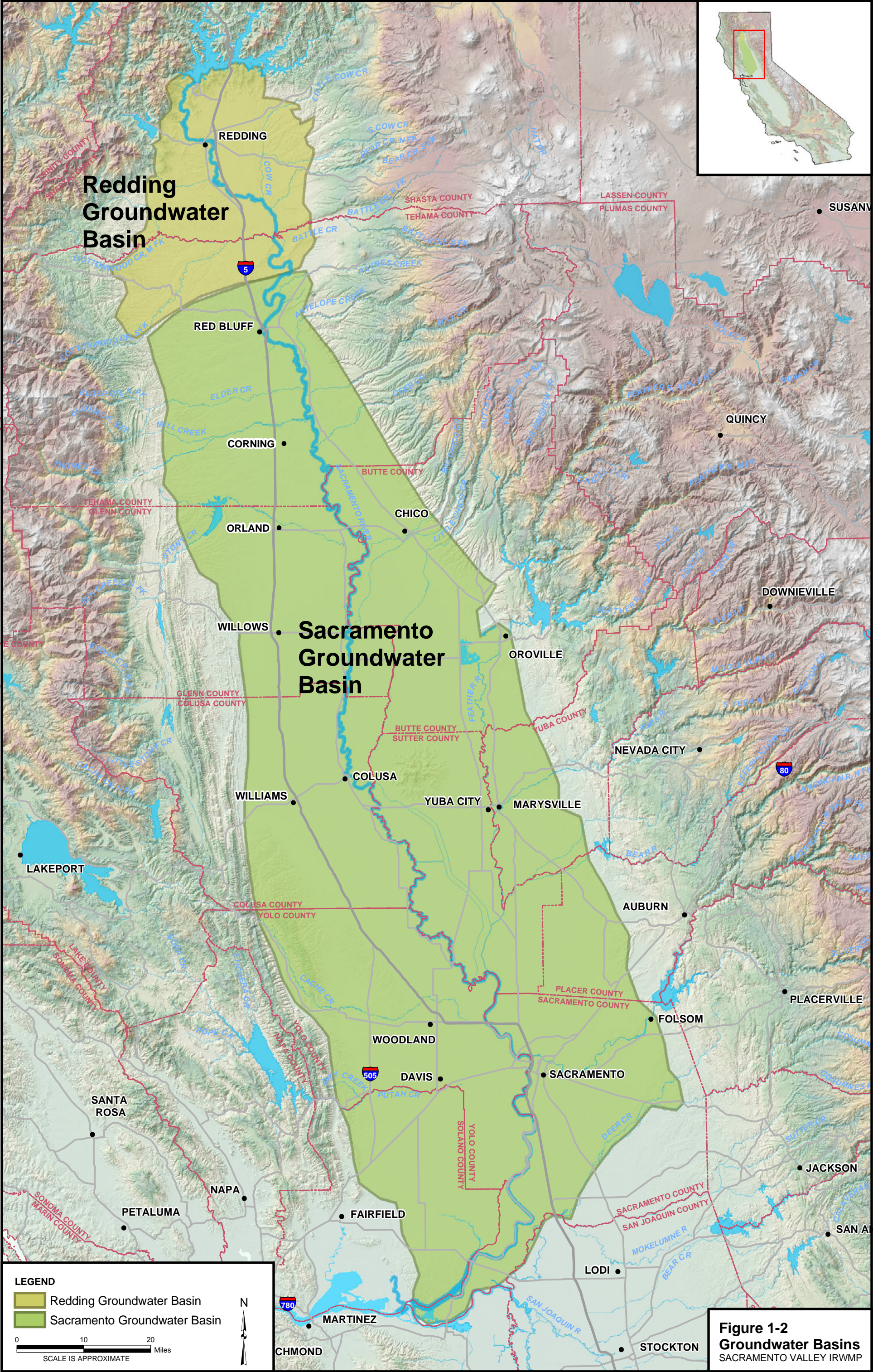
1.3 Regional Description

The Sacramento Valley IRWMP encompasses the portion of the Sacramento River Hydrologic Region (as defined in the Department's California Water Plan) from the Redding Groundwater Basin in the north to the Sacramento metropolitan area in the south. The Sacramento Valley IRWMP Region consists primarily of the Sacramento Valley floor area bounded by foothills in the east and west (see Figure 1-1). This area also generally overlies the Redding and Sacramento Valley Groundwater Basins (see Figure 1-2). To maintain consistency with other ongoing subregional IRWMPs, the entire area within Butte and Yolo Counties has been integrated into the Sacramento Valley IRWMP Region. The public agencies, organizations, and individuals participating in this regional planning process are described in Section 3, Planning Process.

The valley has mild winters and hot, dry summers. Precipitation usually occurs from October through May. Agriculture is the largest industry in the valley (with major crops including rice, trees, grain, pastures, tomatoes, and vines) in addition to urban-related activities associated with the Cities of Redding, Chico, Oroville, Yuba City, Willows, and smaller cities and communities throughout the valley. The valley's agricultural water requirements are met through surface water and groundwater supplies, recirculated tailwater, and use of drainwater from upstream sources. Throughout most of the region, groundwater is the principal source of water for urban and rural dwellers, individual farmsteads, and small towns.

In addition to agriculture and specialty agricultural production that are key employers throughout the valley, particularly in the more rural areas, other key economic sectors include business and professional services (particularly near the urban centers), wood products, logistics (trucking, warehousing, and distribution), and health care. Ethnic distribution is primarily White, followed by Hispanic, Asian/Pacific Islander, African American, and Native American. Indian Trust Assets in the Sacramento Valley IRWMP Region include 12 rancherias and 18 individual allotments, most of which are located in Shasta County. Numerous counties in the region are designated as disadvantaged communities under state law and are discussed further in Section 3.3.3, Outreach and Input Process.





The Sacramento River, a critical source of water for California, originates in and flows through the region. The state's growing population and the resulting increase in urban and environmental water demands are placing more demands on the river. Since 1944, the flow of the river and its tributaries has been managed to a significant degree by the facilities of the Central Valley Project (CVP) and State Water Project (SWP), a system of reservoirs and conveyance facilities that help to deliver river water to users both within and outside the Sacramento River Basin. Flows in the Sacramento River are influenced by the operation of Shasta and Oroville Dams and other local projects, by climatic conditions, by land use, and by water rights and contractual allocations that govern the use of surface water and influence groundwater use.

The Sacramento Valley can be broadly characterized as a flow-through system, in that most of the water not consumed for irrigation or other purposes eventually returns to the river via various tributaries or percolates to groundwater that recharges local aquifers. The typically high groundwater levels in the Sacramento Valley result in the river and many streams gaining flow through groundwater discharge in much of the valley.

Large-scale irrigation in the valley began to increase significantly after 1910, fueled by the dramatic increase in the demand for food and fiber associated with World War I. The number of irrigated acres continued to grow during the following years, and by 1930, approximately 540,000 acres were irrigated. With the additional water supply made available by the construction of the CVP and other projects, irrigation in the Sacramento Valley has expanded to about 2 million acres today. Figure 1-3 shows the location of water agencies and districts throughout the region.

Numerous federal, state, and private wildlife refuges exist throughout the valley and are discussed in Section 5, Conservation Strategies. Water supply sources for the refuges include surface water diverted from the rivers and streams, agricultural return flows, and groundwater. Local water districts have been working with the region's refuge managers to improve conveyance to ensure a reliable water supply for the refuges. Examples of these efforts in cooperation with the U.S. Bureau of Reclamation (Reclamation) include Sutter Extension Water District working with the Sutter National Wildlife Refuge (NWR); Biggs-West Gridley Water District (BWGWD) working with the Gray Lodge Wildlife Management Area (WMA); and Glenn-Colusa Irrigation District (GCID) working with the Sacramento, Delevan, and Colusa NWRs in Glenn and Colusa Counties.

Sacramento Valley water users for the past decade have been implementing projects to provide upstream solutions to improve fish passage and habitat. The Sacramento Valley's initiative and effort to help protect salmon and other aquatic species is unprecedented and is now recognized as one of the most exciting and progressive regional voluntary fishery restoration efforts in the United States.

1.4 Water Supplies

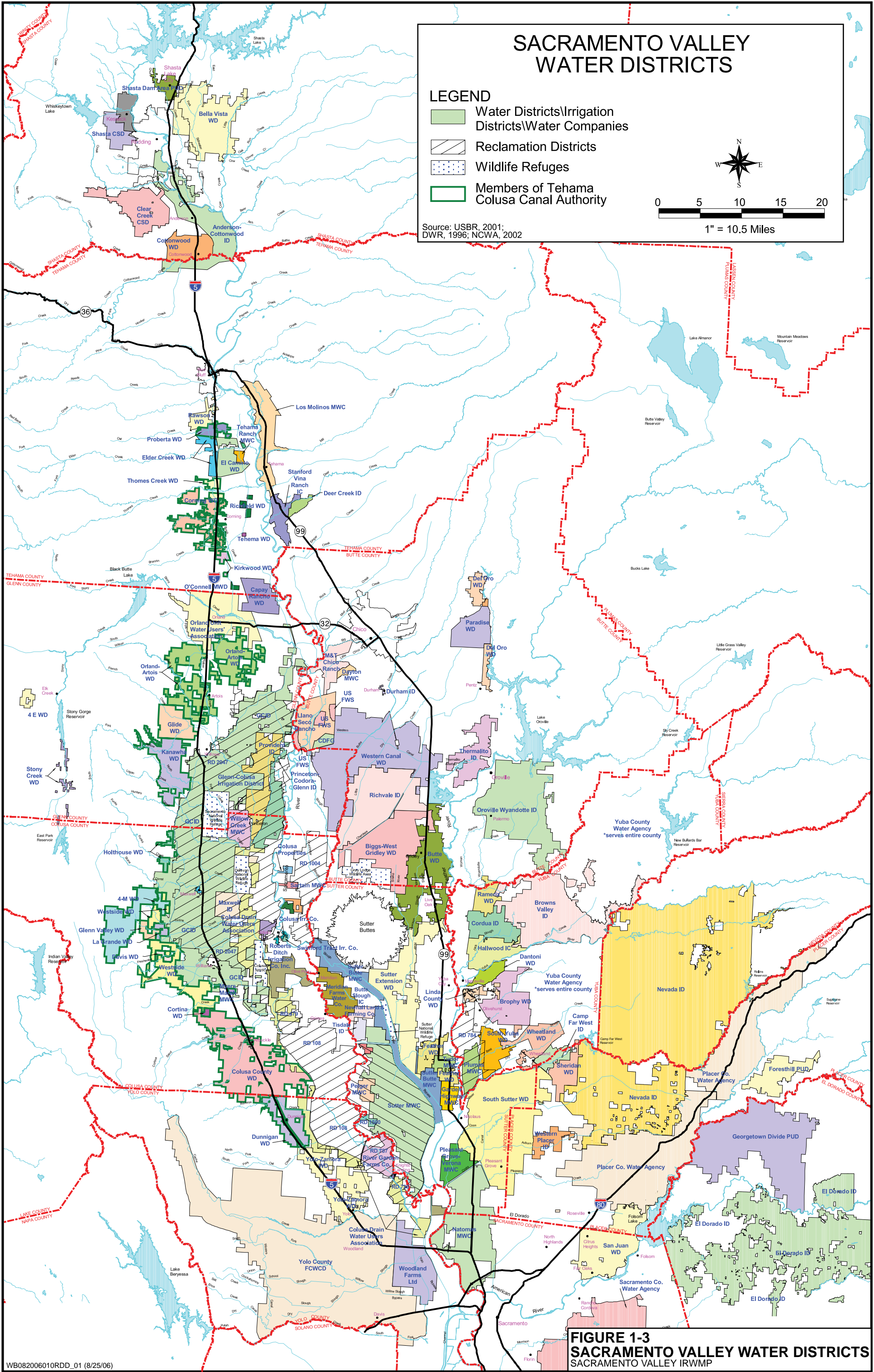
1.4.1 Surface Water

The Sacramento River and its tributaries are the main water supply source for much of California's urban and agricultural areas. Sacramento River runoff averages about 22.3 million acre-feet (ac-ft), nearly one-third of California's total natural runoff. Major water supplies in the region are provided through reservoirs and direct groundwater pumping. The region's water supply is delivered through a complex combination of natural and constructed conveyance systems.

Water supply facilities that affect flow conditions on the upper Sacramento River above Red Bluff include CVP and local irrigation district facilities. The most significant of these facilities is Shasta Dam, which was completed in 1944, and created the largest reservoir in the CVP with a storage capacity of 4.5 million ac-ft. Additionally, since 1964, over 1 million ac-ft of flow from the Trinity River has been exported each year to the Sacramento River Basin through CVP facilities. Prior to the construction of Shasta Dam, monthly flows reflected the runoff patterns associated with winter precipitation and spring snowmelt. Peak flows generally occurred during February, March, and April. Following the construction of Shasta Dam, average monthly flows downstream of the dam have been regulated and are generally reduced during March and April and increased during the summer irrigation months.

In 1960, California voters authorized construction of the SWP. Three small reservoirs in the upper Feather River (Lake Davis, Frenchman Lake, and Antelope Lake) were the first to be constructed. Farther downstream in the foothills of the Sierra Nevada is Lake Oroville, which is the primary reservoir of the SWP with a capacity of 3.5 million ac-ft. In addition to supplying local irrigation water, a major portion of the SWP water supply is exported to Southern California and the lower San Joaquin Valley for urban and agricultural use. Other major reservoirs in the region include New Bullards Bar Reservoir on the Yuba River and Black Butte, East Park, and Stony Gorge Reservoirs on Stony Creek.

Additionally, agricultural return flows and groundwater seepage into drains is used downstream by many water districts and companies. Because of the extensive water reuse within and among districts, water use efficiency throughout the Sacramento Valley is quite high. In some instances, this efficiency illustrates the potential impact of conservation programs on areas that rely on recirculation and reuse of drainwater for their supply.



1.4.2 Groundwater

The Department's Bulletin 118 divides the Sacramento Valley aquifer systems, which cover 5,500 square miles, into the Sacramento Valley and Redding Groundwater Basins. Most of the Redding Groundwater Basin is underlain by several hundred feet of water-bearing materials, and its groundwater characteristics are governed by unconfined conditions. A majority of the groundwater development in the basin has occurred south of Redding. Irrigation wells typically range between 100 and 500 feet deep, although in some places, the static groundwater level might be within 10 feet of the ground surface. Groundwater in both the Sacramento Valley and Redding Groundwater Basins is typically replenished through the deep percolation of precipitation and streams as well as applied irrigation water. Typically, the Sacramento River is a gaining stream between Redding and Grimes (groundwater is discharged to the river) and a losing stream south of Grimes.

In the Sacramento Valley Groundwater Basin, groundwater is used intensively in some areas but is little used in areas with abundant surface water supplies. The Department estimates that the average annual groundwater use in this basin is about 2.5 million ac-ft. On average, groundwater use accounts for approximately 31 percent of total water use (Department, 2003a). Groundwater typically is unconfined in the alluvial deposits and becomes partially confined at greater depths.

Irrigation wells range from 100 to 600 feet deep; however, some wells in the southern portion of the basin have been drilled beyond 1,000 feet. Historically, groundwater levels associated with the Sacramento Valley have remained steady, declining moderately during extended droughts and generally recovering to their pre-drought levels during subsequent wetter periods.

In recent years, the Department has studied the extent of a deep regional aquifer in the valley. This regional aquifer is in the Tuscan Formation and covers a large portion of the valley from Butte County in the east to Stony Creek in west, and extends south to Sutter and Yuba Counties. This aquifer is generally confined and has a large storage capacity. Investigation into the characterization and potential use of this formation is a continued priority issue in the region and will be the focus in a Department Bulletin 118 supplement over the next several years.

1.4.3 Water Needs

Although a majority of the water users in the region are rural and surrounded by agricultural land, urban development has become increasingly important with respect to water demands, especially in the northern and southern portions of the valley as both Redding and Sacramento expand. Cities and communities along the major highways are also growing at a rapid rate, including Redding, Willows, Williams, Chico, Oroville, Orland, Yuba City, Marysville, and other small towns.

In general, water requirements in the majority of the region can be met in normal years, but shortages can occur during dry years. The shortages during the dry years are potentially significant for Tehama-Colusa Canal Authority (TCCA) districts, which hold CVP water service contracts that allow for substantial curtailment provisions. In addition, some water users are projected to experience shortfalls in the future even in normal years. Future water needs have also been evaluated for many other areas within the region and are discussed further in Section 6, Land and Water Use/Development Trends.

Although attempts have been made to estimate sustainable groundwater yields for different areas of the region, these estimates vary significantly with the methodology and the water management and land use assumptions. The Department's Bulletin 118 identified three areas of greatest concern with respect to groundwater supply: Placer and Sacramento Counties, northern Yolo and southern Colusa Counties, and Glenn County west of Interstate 5. With the exception of Sacramento County, these areas have stabilized; that is, groundwater levels are not declining because, on average, groundwater extractions no longer exceed recharge. Isolated areas remain a concern and are generally monitored by the Department and/or local governments and interests.

Institutional and legal impediments currently limit the flexibility needed to manage water resources in a manner that would improve water supply reliability in the areas with water shortages. Although water transfers provide some relief, additional flexibility in moving surface water, groundwater, agricultural drainwater, and recycled water in a coordinated manner among regional users would greatly aid overall water management. In addition, improved coordination of these supplies at the regional level is needed to improve overall water management. To aid in establishing the operational improvements that support regional water management, including working with local jurisdictions such as cities and counties with respect to land use planning, this approach could be provided by an umbrella organization functioning under a joint powers authority or through a Memorandum of Understanding (MOU) among the participants.

1.5 Regional Water Management Group

The Northern California Water Association (NCWA), as administrator of the Joint Exercise of Powers Agreement (JEPA) for Northern California, is coordinating the preparation of the Sacramento Valley IRWMP on behalf of the Sacramento Valley IRWMP Region. NCWA members include more than 70 public water districts and agencies, water companies, and individual water rights holders with senior rights and entitlements to the surface waters of the Sacramento Valley. NCWA's members also have overlying and appropriative water rights to groundwater resources throughout Northern California. These water suppliers and individual landowners irrigate more than 900,000 acres of fertile Northern California farmland, provide water for six NWRs and various other managed wetlands, and meet the local municipal and domestic water needs in the region. NCWA also represents the local governments and the

business leadership in the region. Most of these local entities have been actively involved in development of the IRWMP, as described below.

The Regional Water Management Group members and other water entities in the Sacramento Valley who are responsible for management of water resources within their respective agencies will address the water management objectives and strategies in this IRWMP. The Sacramento Valley IRWMP has been developed with broad involvement and input from throughout the region, as described in Section 3, Planning Process.

For the purpose of Water Code Section 10537, the Regional Water Management Group for the IRWMP is the JEPA, which includes Anderson-Cottonwood Irrigation District (ACID), BWGWD, Browns Valley Irrigation District, Butte Water District, Feather River Water District, GCID, Maxwell Irrigation District, Meridian Farms Water Company, Orland Artois Water District, Pelger Mutual Water Company, Richvale Irrigation District, Paradise Irrigation District, Princeton-Codora-Glenn Irrigation District, Provident Irrigation District, Reclamation District (RD)108, TCCA, and Yuba County Water Agency (YCWA).

NCWA administers the JEPA under an administration agreement with the JEPA pursuant to Government Code Section 6504.

1.6 Framework for Integrated Regional Water Management for the Sacramento Valley IRWMP Region

The Sacramento Valley IRWMP follows more than a decade of cooperative, integrated efforts by local agencies, resource management agencies, and other federal and statewide cooperators in developing regional water management solutions of unprecedented scale and with statewide benefits. The broad, long-term vision for the region consists of the following:

- Integration of water resources management and planning processes in which water agencies and water interests in the valley continue concerted coordinated approaches to the planning of multi-beneficiary projects that will achieve the common objectives of all parties.
- Institutional and political integration through which institutional and political alliances of water suppliers and government entities formulate, develop, finance, and implement integrated programs for the common benefit of its members and citizens. In addition, continuing existing and building new political alliances with entities outside the region will strengthen long-term working relationships and foster long-term, viable water management solutions.
- Operational integration providing for the coordinated management and operation of facilities and resources to generate the greatest possible benefit from the available resources.

To achieve the level of regional integration described above, a concerted effort, founded on the advances made to date, will need to be continued to develop additional working relationships and trust among participating entities and to foster confidence that regionalization will serve the water interests of the region and more effectively meet the objectives in Section 2, Sacramento Valley IRWMP Objectives.

In addition, the participating entities must continue to recognize and support the concept that regional integration will further their ability to manage their operations and collective resources, will increase their water supply reliability, and will provide a framework to improve water management across the region. More importantly, all participating entities should be assured that by participating in a regional integrated water management program, they will not lose opportunities to control their own future nor will they lose their autonomy. Regional integration does not seek to diminish the individual purveyor's decisionmaking power or a local government's power to exercise its rights, but instead to enhance the local entities' collective power and ability to manage their resources. Participating entities would also participate in addressing water management issues on a much larger scale. This vision of integration and regionalization would result in the following:

- Provide opportunities to formulate broad water management objectives at the regional and statewide level.
- Encourage regional responsibility for the management of the region's resources.
- Pool regional resources, political wills, and local agencies' talents and expertise to develop creative solutions.
- Create a powerful voice for protecting and enhancing regional interests.
- Promote collaboration and cooperation for regional and subbasin-level initiatives.

Regional planning in the Sacramento Valley is not, and most likely will not be, a top-down plan; it is, rather, a grassroots, bottom-up program composed of many projects, plans, and partnerships with common objectives and a long-term vision. As time passes, the integration of these partnerships and plans will further grow and mature.

1.7 A Nested Approach to Integrated Regional Planning

As described above, local, state, and federal interests in the Sacramento Valley continue to take concrete steps toward the goal of regional integration. As agricultural and urban development across the valley increases and efforts continue to improve water quality and environmental objectives, it is incumbent on Sacramento Valley water users to identify and implement improved management practices.

In December 2000, water leaders in the valley prepared a paper titled “An Integrated Water Supply Management and Water Development Program for the Sacramento Valley.” This paper described a framework for a possible partnership between Sacramento Valley IRWMP Region interests and the federal and state agencies. The paper asserted that the goal of the program is “... to achieve integration of 100 percent of existing water demands throughout Northern California.”

The paper stated that integrated regional water management

“can be best visualized perhaps as viewing the Sacramento Valley area of origin as a ‘virtual water district’ where water management decisions, including basic operational questions, are made contemplating the total water resource available to the ‘virtual district.’ Just as we know that more can be done with respect to total water management within a district than can be done on a farm-by-farm basis, better overall management can be accomplished with basin-wide planning than can be done on a district-by-district basis.”

The fundamental elements of the paper prepared in 2000, and described above are used as the foundation of this IRWMP.

1.8 Regional Foundational Efforts

Water leaders in the region have taken affirmative steps in improving water management practices and planning for management of this precious resource in the future. Nested within the Sacramento Valley IRWMP are ongoing regional integrated planning and implementation efforts that are organized to optimize the use and conservation of coherent hydrologic resources in the basin, and are being conducted by the interests who have a shared stake in that outcome. These complementary implementation and planning efforts and agreements, including subregional IRWMPs, are the foundation of this IRWMP. A number of these efforts have been key in moving the concept of regional action and planning forward. The following summarizes some of the key regional foundational efforts occurring across the region. All of these efforts meet one, or in many cases several, of the IRWMP objectives identified in Section 2, Sacramento Valley IRWMP Objectives. The overarching objective of improving the regional economy is met by each of these efforts.

As discussions and partnerships among water entities in the region have continued, the scope of regional planning has broadened, and the integration of programs has matured. Today, more than 50 plans, projects, and partnerships have been developed to achieve the objectives listed in Chapter 2, Sacramento Valley IRWMP Objectives. These partnerships have been designed to help improve local, regional, and statewide water supply reliability, while protecting the environment and contributing to San Francisco Bay/Sacramento-San Joaquin Estuary (Bay-Delta) flows and water quality. These projects include groundwater planning and monitoring efforts, system improvement and water use efficiency measures, conjunctive

management programs, and surface water storage and reoperation projects that are discussed in Section 7, Implementation. As these project proponents and other interests across the region continue to coordinate their efforts, it is expected that the list of projects and participants will grow in response to meeting the IRWMP objectives.

1.8.1 Sacramento River Basinwide and Regional Water Management Plans

One of the first steps in the regionalization process was taken in the mid-1990s, when the Sacramento River Settlement Contractors initiated discussions with Reclamation for CVP contract renewals. This process resulted in the Sacramento River Settlement Contractors, in cooperation with Reclamation and with assistance from the Department, preparing the Sacramento River Basinwide Water Management Plan. Finalized in 2004, the plan identified potential water management improvements, including subbasin-level management actions and system improvement (water use efficiency) projects such as canal lining. This planning process resulted in a high level of regional cooperation among the Sacramento River Settlement Contractors, other CVP contractors, government agencies, and stakeholders. The Sacramento River Settlement Contractors and Reclamation are currently cooperating to finalize a regional water management plan that will encourage further regional and subbasin coordination, including meeting the CALFED Targeted Benefits (TB) and establishing proposed Quantifiable Objectives associated with numerous projects, including some that are listed in Appendix A to this IRWMP. The partnerships, cooperation, and ideas developed as part of the plan were a primary catalyst for the Sacramento Valley Water Management Agreement (SVWMA) discussed below.

1.8.2 Sacramento Valley Water Management Agreement

In 1995, the SWRCB adopted a Water Quality Control Plan for the Bay-Delta. In July 1998, the SWRCB conducted a water rights hearing to consider how to implement the Water Quality Control Plan, which is an administrative action to allocate responsibility for achieving the Water Quality Control Plan objectives to water right holders affecting the beneficial uses of the Bay-Delta. At the request of several stakeholders, the hearing was divided into eight phases to facilitate testimony, cross-examination, and potential settlements.

After the completion of Phases 1 through 7, which involved the San Joaquin Valley and other Delta issues, Phase 8 addressed the responsibility of water rights holders within the Sacramento Valley for meeting the Water Quality Control Plan objectives. In Phase 8, the Department and Reclamation were expected to suggest that certain water rights holders in the Sacramento Valley cease diversions or release water from storage to help meet Delta water quality standards. Sacramento Valley water users believe their use has not contributed to water quality problems in the Delta. Phase 8 was expected to entail 10 years of litigation and judicial review. This extended process would have resulted in adverse impacts to the environment and undermined the progress of other statewide water management initiatives.

As an alternative, more than 40 water suppliers in the Sacramento Valley negotiated and executed the SVWMA with Reclamation; the Department; the U.S. Fish and Wildlife Service (Service); the California Department of Fish and Game (DFG); and the State Water Contractors, which represents water users in Southern California, the Central Coast, and the San Joaquin Valley.

Signed in 2002, the SVWMA outlined a need for a cooperative regional approach to improve local, regional, and statewide water supply reliability and quality, while providing supplies to help meet water quality standards in the Delta. Its proposed implementation will offer relief to water-short areas of the Sacramento Valley and provide additional water supplies for the Delta. It established a framework to meet water supply, water quality, and environmental needs in the areas of origin first, and throughout California after local demands have been met. On January 31, 2003, the SWRCB officially dismissed the Phase 8 proceedings and allowed the SVWMA to be implemented.

1.8.3 *Groundwater Monitoring and Management*

The preservation of the Sacramento Valley's groundwater resources is critical to the IRWMP and the long-term viability of the region's economic prosperity and environmental well-being. In the Sacramento Valley, local public agencies for the past decade have been adopting groundwater management plans under the Groundwater Management Act (Assembly Bill [AB] 3030, Water Code Section 10750 et seq.) and other specific authorities to provide stability to meet the water supply needs for farms, cities, fish, and waterfowl throughout the region. Additionally, many counties have adopted groundwater ordinances designed to protect the health and welfare of the citizens within these areas. As a result of legislation in 2002, these local public agencies are now undertaking more comprehensive efforts to protect and manage the groundwater supplies in the Sacramento Valley, including the development of basin management objectives and more extensive monitoring (see Water Code Section 10753.7 (Senate Bill [SB] 1938)).

For the past 5 years, as part of the IRWMP development, these various local public agencies have also been leading and participating in the continued move toward more integrated planning and improved management. This coordination is intended to support a more thorough evaluation and understanding of groundwater resources in the region and promote active groundwater management for the benefit of Northern California. The implementation of the IRWMP will build on the local water management plans by coordinating the local public agencies' efforts to protect and manage the groundwater resources across the region. Most importantly, discussions and collaborative efforts among water suppliers, counties, and state staff have led to the formulation of groundwater management efforts and the establishment of a regional groundwater monitoring program (see Appendix B).

1.8.4 Ecosystem Enhancement

A concerted effort to improve the environmental and water quality conditions of the Sacramento River system parallels the water management activities listed above. Over the past decade, an impressive array of regional activities has been undertaken in the Sacramento Valley to improve the health of the region's ecosystem. The environmental enhancement program consists of three major components: (1) improvements in water quality, (2) construction of facilities (fish screens, ladders, and siphons) and implementation of operational programs to support and enhance Sacramento River fisheries, and (3) conveyance system improvements to improve water supply reliability that will enhance an extensive system of wildlife refuges providing habitat for avian and terrestrial species. These three components demonstrate the degree to which an integrated basinwide approach to program planning and implementation has taken root in the Sacramento Valley and will provide the basis for continued success. Section 5, Conservation Strategies, of this IRWMP further describes the progress made to date and proposed future actions with respect to continued ecosystem enhancement.

1.8.5 Water Quality Protection and Improvement

The California Rice Commission and the Sacramento Valley Water Quality Coalition (Coalition) have undertaken aggressive programs to address discharges from agricultural lands and managed wetlands in the region. These efforts are designed, in part, to meet the Regional Water Quality Control Board (Water Board) requirements under its Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands (Irrigated Lands Program). These coalitions are an ongoing example of how water entities, government agencies, and stakeholders in the Sacramento Valley can formulate and implement an integrated approach to improving water management and water quality in the region. It is composed of farmers, wetlands managers, affiliated state and local agricultural organizations, and local governments throughout the Sacramento River watershed. The coalitions are taking a regional, integrated approach to enhance and improve water quality in the Sacramento River Basin and are currently undertaking a regional water quality monitoring program that is intended to characterize representative agricultural drainage and to provide for the implementation of management practices, as necessary. The monitoring program identified for 2006 is included as part of this Sacramento Valley IRWMP Performance and Monitoring Plan (see Appendix B).

1.8.6 Flood Protection and Floodplain Management

The Sacramento Valley IRWMP Region, particularly the Sacramento Valley, has a history of frequent major floods. In addition to the Sacramento River, other rivers in the region, including the Yuba and the Bear, and other tributaries up and down the valley have historically and continue to flood. These floods have resulted in loss of human life and property, as well as loss of agricultural production. Local governments; reclamation, drainage, and water districts; and other local, state, and federal flood management agencies

and interests continue to evaluate flood management options and make improvements across the valley. These projects and investigations include levee improvements, levee setback projects and evaluations, flow detention, system reoperation, watershed evaluations and land management recommendations, and outlook capacity increases. Many of the projects proposed include environmental enhancement as part of the proposal.

1.8.7 Local Water Management Plans

Water purveyors and local agencies in the valley face diverse water management challenges given different water sources; different types of water rights; and varying degrees of water supply reliability, water quality, flood control issues, and ecosystem resources and concerns. Several local planning efforts summarized below have been completed or are currently underway in the Sacramento Valley IRWMP Region to address these issues at the county level. Further information related to each of these evaluations is contained in Section 6, Land and Water Use/Development Trends.

1.8.7.1 Butte County Integrated Water Resources Program

In July 1999, the Butte County Board of Supervisors approved the formation of the Butte County Department of Water and Resource Conservation (DW&RC). As one of its initial planning efforts, the DW&RC documented current countywide water resources in two reports: the *Butte County Water Inventory* and the *Butte County Groundwater Inventory*, which was prepared by the Department's Division of Planning and Local Assistance through their Northern District. The DW&RC then initiated an Integrated Water Resources Program (IWRP) that included multiple water resource components. The DW&RC has also completed a *Drought Management Plan* to reduce short- and long-term impacts of drought to Butte County.

The county's *Groundwater Management Plan* documents the county's existing groundwater management programs and explains potential future actions that could improve groundwater management. The County Board of Supervisors enacted a Groundwater Management Ordinance (Ordinance 3869) in February 2004, codified as Chapter 33(b) of the Butte County Code, that includes the development and monitoring of groundwater basin management objectives (BMO) associated with groundwater levels, groundwater quality, and land subsidence. The board approved the first series of BMOs on July 25, 2006.

The Butte County IWRP was adopted by the Butte County Board of Supervisors in May 2005. This program describes current and future agriculture and urban water demands, water management options, and policy recommendations for the county. The Butte County IWRP has recently been integrated into the larger Sacramento Valley IRWMP through a series of coordination meetings where planning objectives and strategies were discussed, combined, and prioritized to meet the demands of both the larger region and the Butte County IWRP.

1.8.7.2 *Redding Basin Water Resources Management Plan*

In September 1996, the Redding Area Water Council, in conjunction with the Shasta County Water Agency, began a multi-phase water resource planning project. Phase I of the program provided an in-depth look at water use throughout Shasta County, and land and water use projections to the year 2030. Phase 2 of the program provided groundwater assessment and modeling to develop a groundwater management strategy for the Redding Groundwater Basin. The *Redding Basin Groundwater Management Plan* was adopted by the Redding Area Water Council in November 1998. Phase 2C of the program focused specifically on developing water management strategies for the Redding Groundwater Basin. In August 2003, the *Redding Basin Water Resources Management Plan* was completed. This plan provides detailed analysis of the present and future water resources available to purveyors in the Redding Groundwater Basin and alternatives for conjunctive use and water use efficiency. The final phase of the program (Phase 3) is now underway. The final product of Phase 3 will be a programmatic environmental impact statement (EIS)/environmental impact report (EIR) that will be used to select a preferred alternative for managing water within the Redding Groundwater Basin. The county is currently working toward finalizing an SB1938-compliant plan for the Redding Groundwater Basin.

1.8.7.3 *Yuba County IRWMP*

In May 2005, YCWA, in cooperation with local water purveyors, flood management entities, wastewater reclamation entities, and local stakeholders, formed the Regional Water Management Group to prepare and adopt the Yuba County IRWMP. The YCWA plays a major role in the management and allocation of surface water supplies in the region, and owns and operates the Yuba River Development Project. This multi-purpose project provides electric power generation, water supply, flood control, and instream flows for fisheries and recreation. The Yuba River Development Project is one of the primary water management facilities in Yuba County and is an integral part of many local water management strategies.

The proposed Lower Yuba River Accord is a collaborative settlement agreement among YCWA, state, federal, and environmental groups to address water resources issues for the lower Yuba River, including instream flows. The above activities and the urbanization demonstrate the need for an IRWMP in which these issues will be examined in detail and water management strategies developed to address the particular needs of Yuba County.

The Yuba County IRWMP is being developed to integrate water management strategies to address recent changes in the area, including flood management issues along the Yuba and Feather Rivers, increasing urbanization of agricultural lands, implementation of the Lower Yuba River Accord to settle water rights issues, and new wastewater discharge requirements. Extensive coordination is underway to ensure the Yuba County IRWMP, which is scheduled for completion in mid-2007, is consistent with the Sacramento Valley IRWMP.

1.8.7.4 Yolo County IRWMP

The Water Resource Agency of Yolo County (WRA), a coalition of local agencies including the Yolo County Flood Control & Water Conservation District (YCFCWCD), the City of Woodland, the City of Davis, and the University of California Davis, is responsible for the development of the Yolo County IRWMP. The plan identifies and prioritizes water resource projects directed at the following five key areas: water supply and drought preparedness, water quality, flood control and storm drainage, recreation, and riparian and aquatic ecosystem enhancement.

The goals and objectives for water management in Yolo County have been developed through a variety of countywide planning efforts including the *Yolo County Water Plan – 1984* and the *Yolo County Water Plan Update – 1992*. In addition, the MOU that formed the WRA and the WRA bylaws includes statements of purpose and powers that effectively are goals for water resource management in Yolo County. The WRA has conducted two public information sessions to obtain input toward development of a set of over 150 individual actions. These individual actions have, in turn, been consolidated into nine integration actions ranging from water supply, flood management, and conveyance. The final Yolo County IRWMP will be adopted in early 2007, and is available on the WRA's Web site (<http://www.yolowra.org/irwmp>). The Sacramento Valley IRWMP will continue to coordinate with the Yolo County IRWMP in the development of proposed actions and sharing of information and ideas.

1.8.7.5 Yuba-Sutter Regional Recycled Water Master Plan

Recognizing their common interests as urban water users and wastewater dischargers, the City of Yuba City, City of Marysville, and Linda County Water District entered into an MOU in December 2005, to jointly prepare a Regional Recycled Water Master Plan. The goals of the *Yuba-Sutter Regional Recycled Water Master Plan* are to develop a cost-effective water recycling program that can (1) improve water supply reliability; (2) provide a “diversified portfolio” of water supply options; (3) reduce the costs of developing new water supplies; (4) reduce the costs of wastewater treatment improvements to meet future surface water discharge limitations; (5) reduce withdrawals from the Feather River, Yuba River, and local aquifers; (6) improve water quality in the Feather River; and (7) increase flows to the Bay-Delta.

The area covered by the *Yuba-Sutter Regional Recycled Water Master Plan* is experiencing rapid growth and addressing long-term water supply reliability. Cost is a high priority to the member agencies. The three agencies are conducting a market assessment of the potential demand for recycled water and are preparing a cost-benefit analysis to identify high-value water recycling opportunities within and adjacent to the urban areas. Potential demands include agricultural irrigation, landscape irrigation, industrial and construction uses, and habitat enhancement.