PROJECT 15A

Shasta County Water Agency Redding Basin Water Resources Management Plan

1. Project Description

Project Type:	**Groundwater/surface water planning**
Location:	**Redding Basin, Shasta County**
Proponent(s):	**Shasta County Water Agency (SCWA), Redding Area Water Council (RAWC) 12 member agencies**
Project Beneficiaries:	**Redding Basin water purveyors, others in the Sacramento Valley**
Total Project Components:	**Alternatives consisting of the core elements that would provide necessary direction on the future of Redding Basin water supply reliability**
Potential Supply:	**30,000 ac-ft per year (ac-ft/yr) to 80,000 ac-ft/yr**
Cost:	**Total cost unknown but includes short-term cost of $250,000**
Current Funding:	**$130,000 AB 303 grant**
Short-term Components:	**Complete Phase 2C - Water Supply and Management Alternatives, part of multi-step planning process**
Potential Supply (by 2003):	**None**
Cost:	**$250,000**
Current Funding:	**$130,000 AB 303 grant**
Implementation Challenges:	**Developing local in-basin transfer, impacts of increased groundwater pumping, re-operation of local U.S. Bureau of Reclamation (USBR) facilities**
Key Agencies:	**RAWC member agencies, Shasta County, USBR**

Summary

A well-established, local planning process is dealing with the long-term water resources issues for the Redding Basin. The primary forum for this planning work has been RAWC, which was formed in 1993 as an outgrowth and replacement for the Redding Area

Groundwater Committee. The group's formation was motivated by the severe local water supply shortages that occurred as a result of the 1986 to 1992 drought. RAWC representatives provide input to the governing boards and councils of the member entities.

RAWC's governing entities initiated a regional water resources planning effort for the Redding Basin in June 1996. SCWA has been the lead agency for this effort. The overall planning process is shown on Figure 15A-1. Phase 2B is nearing completion, and key components of the report include an integrated surface water/groundwater model of the basin, projections of basin water needs and available supplies through 2030, and core elements to support a long-term solution to the basin's water supply problems. These elements will be further refined and combined into a range of specific long-term alternatives under Phase 2C. Phase 2C is partially funded through an AB 303 grant in the amount of $130,000. An additional $120,000 is required for the Phase 2C Water Resources Plan for the Redding Basin.

Background

Redding Basin Water Resources

The Redding Basin is located at the northern end of the Sacramento Valley and begins just south of Lake Shasta. The basin incorporates approximately 430 square miles of land and encompasses 12 water purveyors serving a population of approximately 150,000. The basin is located at the confluence of several major water resource features. The Sacramento River flows out of Shasta Reservoir, through the Keswick Reservoir, and then through the center of the Redding Basin. The Trinity Division of the Central Valley Project (CVP), supplied by Trinity River diversions at Lewiston Dam below Trinity Reservoir, enters the Central Valley through Whiskeytown Reservoir, from which supplies are conveyed down Clear Creek and the Spring Creek Aqueduct to the Sacramento River (see Figure 15A-2). The Redding Basin also includes groundwater resources estimated at approximately 3 million acre-feet (maf), located primarily in the deep alluvial deposits in the central part of the basin. The groundwater basin is recharged by, and contributes to, surface water flows, depending on location and the overall hydrologic balance.

The average surface water inflow to the Redding Basin is approximately 8.5 maf per year. This includes flows in the Sacramento River, Cottonwood Creek, Battle Creek, Clear Creek, and several smaller tributaries. In recent years, about 800,000 ac-ft/yr has been diverted into the basin from the Trinity River via the CVP Trinity Division facilities. The average surface water outflow from the basin is approximately 9.2 maf per year. Approximately 700,000 ac-ft of this outflow is "generated" by precipitation within the Redding Basin itself.

Major Water Supply and Management Issues

Given the general water resources characteristics, the water supply and management challenges facing the Redding Basin are not readily apparent. However, the basin does in fact face major water supply and management challenges due to a mix of relatively unique factors related to the combination of water supplies available to the basin purveyors, institutional and contractual issues, and environmental issues. The mix of water supplies in the Redding Basin includes settlement contracts with pre-1914 senior water rights holders, post-1914 water rights, CVP water supply contracts, and groundwater. Figure 15A-3 summarizes the mix of resources for each of the Redding Basin purveyors.

The single largest impact to the Redding Basin's water management picture has been from the supply cutbacks instituted under the Central Valley Project Improvement Act (CVPIA). Given the heavy reliance of the water purveyors on this source, the increased frequency and severity of the cutbacks is drastically impacting the water supply reliability of the Redding Basin purveyors. Figure 15A-4 shows the projected cutback frequency and percentage under the terms of CVPIA. The impacts of the changes to CVP supply reliability have already been felt, such as in 1995 when shortages of 27,000 ac-ft were experienced. Projected shortages for 2005 are approximately 33,000 ac-ft, or approximately 19 percent of the basin's projected water need of 172,000 ac-ft.

The pre-1914 water rights supplies are currently exercised in accordance with the terms of the existing settlement contracts with USBR, and are the most reliable surface water supply. Two entities hold most of the pre-1914 supply: the Anderson-Cottonwood Irrigation District (ACID) with 145,000 ac-ft, and the City of Redding with 15,100 ac-ft. The ability to use this supply in a flexible manner to help meet other purveyors' water supply needs during shortages has been hampered by institutional restrictions on transfers. Some progress has been made on this issue, as illustrated by the recently completed Townsend Flat Water Ditch Company (now dissolved) transfer. The old diversion right of 55 cubic feet per second (cfs) was fixed at 6,000 ac-ft/yr in an agreement with USBR, with flexibility to transfer this supply within the basin. The overall process of negotiations also encompassed the necessary cooperation to remove Saeltzer Dam on Clear Creek, which was used for the old diversion.

The basin's significant groundwater resources are reliable and relatively affordable for those purveyors who have access to this supply, primarily ACID, City of Redding, City of Anderson, and City of Cottonwood. Other purveyors do not overlie the useful portions of the groundwater basin and cannot access this supply. The costly infrastructure, such as new wells, pipelines, and pump stations required to make this supply available cannot be readily put into place given the limited financial resources of the non-overlying purveyors. Legal and institutional issues related to the transfer and use of the groundwater and in-lieu surface water transfers need to be addressed to make this supply resource available to a larger portion of the basin.

Efforts to meet environmental restoration objectives related to in-stream flows, fish protection, water quality and temperature, and riparian habitat have also impacted water management in the Redding Basin. The reallocation of CVP yield from the Trinity Division to meet management objectives for the Trinity River has reduced flows into Whiskeytown Reservoir, Clear Creek, and the Sacramento River. This reduction in overall CVP yield to the Sacramento Valley has impacted the Redding Basin purveyors by reducing the reliability of their CVP supplies. The recent removal of Saeltzer Dam on Clear Creek involved both water transfer and fishery restoration issues. The cooperative arrangement that made possible the dam removal involved transfers of pre-1914 water rights, dedicating a portion to in-stream flows, and opening up a significant stretch of fisheries habitat. ACID recently completed a $13 million project in cooperation with CALFED agencies to install a state-of-the-art fish screen at the Main Canal intake. Other existing diversions are being evaluated for upgrading fish protection facilities, but the capital costs related to these projects present prohibitive challenges to the purveyors.

Short-term Component

The continuing water resources planning process for the Redding Basin is a short-term project; however, implementation of a preferred solution would be long term. Phase 2C of the Water Resources Plan would be completed by July 2002. Environmental documentation for a long-term water resources solution would be completed by approximately July 2003, at which time implementation of the preferred alternative could begin. The core elements that would make up the preferred long-term solution are detailed in Table 15A-1.

TABLE 15A-1
Core Elements of Long-term Solutions
Shasta County Water Agency Redding Basin Water Resources Management Plan

Redding Basin Water Resources Management Plan—Core Element	Value/Purpose
Water transfers and exchanges	Make surface water supplies available to other purveyors with deficits. Increase supply flexibility and reliability for basin. Preserve beneficial use of existing surface water supplies. Potential for other Sacramento Valley beneficial uses.
Increased groundwater use	Significant supply source. Reliable and affordable for some purveyors. Basin can support significant increase in groundwater use without major impacts.
Conjunctive management of groundwater and surface water resources	Provides maximum reliability and flexibility between various hydrologic year types, CVP cutbacks, etc. Can help minimize impacts of increased groundwater pumping. Supports transfers and exchanges to make supplies available to purveyors without ready access to groundwater.
Conservation and water use efficiency	Ensures available supplies provide maximum benefit; minimizes need for new supply. Meets state and federal guidelines to ensure funding and other support from programs.
Water reuse and non-potable supplies	Can be used for large irrigation demands, other non-potable needs. Demonstrated already by City of Shasta Lake's nearly 100-percent recycling program. Several city wastewater plants can be readily upgraded for reuse of quality water production.
Protection of water rights	Critical to keeping water supply mix flexible and reliable.

Water Resources Plan Phase 2C Scope and Objectives

During Phase 2C of the Water Resources Plan, the core elements listed in Table 15A-1 would be further evaluated and developed into three specific long-term water management solutions for the Redding Basin. This process would make use of the extensive information gathered in the earlier phases of work, the integrated surface/groundwater model of the basin, and workshops with purveyors and other stakeholders to develop the three alternatives. The outcome of tasks anticipated to support Phase 2C would be a detailed planning document that would support specific implementation steps for the selected alternative. The tasks required to reach the objectives of Phase 2C follow:

- Task 1—Public outreach
- Task 2—Development of Regional Water Management Plan alternatives
  - Subtask 2A - Refinement and screening of core elements into combined actions

  - Subtask 2B – Development of comprehensive regional alternatives
  - Subtask 2C - Groundwater modeling, water balances, and evaluations of alternatives
  - Subtask 2D - Workshops with stakeholders for selection of alternative
  - Subtask 2E - Final model runs on selected alternative
- Task 3—Analysis of costs, benefits, and impacts
- Task 4—Development of institutional framework for implementation
- Task 5—Phase 2C report

Presentations have been made to the boards and councils of RAWC, local civic groups, public forums, and state congressional representatives (Dick Dickerson, Maurice Johannessen, and Wally Herger). Presentations and discussions have also been held with federal and state resource management agency staff from the California Department of Water Resources (DWR) and USBR. This public outreach work will continue as the plan progresses toward a specific long-term alternative under Phase 2C.

Long-term Component

The primary purpose of this evaluation is to evaluate the potential for this project to provide water supply benefits in the short-term (by end of 2003). As part of this initial evaluation, potential long-term components of the proposed project (defined as any part of the project proceeding past or initiated after December 2003) have been considered on a conceptual level. Further consideration and technical evaluation of long-term component feasibility and cost will occur as the next level of review under the Sacramento Valley Water Management Agreement. Long-term-component project descriptions are included in these short-term project evaluations only as a guide to the reader to convey overall project intent.

Phase 2C of the Redding Basin Water Resources Plan described above is a short-term planning process resulting in three long-term alternatives consisting of the core elements in Table 15A-1. Phase 2C would provide necessary direction on the future of Redding Basin water supply reliability. The alternative surface water/groundwater model runs, environmental documentation, and stakeholder participation included in this planning effort would lead to a preferred long-term solution. Specific implementation of long-term plans cannot be formulated until Phase 2C is completed.

2. Potential Project Benefits/Beneficiaries

Water Supply Benefits

The completed phases of the Redding Basin Water Resources Master Plan support the general conclusion that the Redding Basin can meet long-term in-basin needs if two critical factors are addressed. First, the necessary infrastructure and institutional arrangements must be provided to support development of the Redding Basin's significant groundwater supplies. Second, existing regulatory and institutional barriers to flexible and effective in-basin transfers of existing surface water supply must be removed to allow improved matching of surface water supplies and demands. The combined water supply and management benefits of these two steps will ensure an adequate water supply for the

Redding Basin, and may also make available a quantity of supply for other beneficial uses within the Sacramento Valley.

The quantity of new water supply would be confirmed as part of the Phase 2C work, and would depend on the long-term water management plan that is actually implemented. However, preliminary analysis of the Redding Basin's surface- and groundwater resources indicate that development of up to 80,000 ac-ft/yr of new groundwater supply may be feasible without long-term net depletion of the groundwater basin. Therefore, it is reasonable to assume that the long-term plan would very likely include increased development of the Redding groundwater basin, which would help alleviate severe local dry-year shortages. Deficits of up to 33,000 ac-ft are projected during the next 5 years because of increasing water demand and CVPIA-mandated cutbacks in contract supply to local purveyors. These deficits are projected to increase during the next 10 to 20 years because of continued population growth and heavy reliance by many purveyors on fixed CVP-contract supply quantities. The primary intended beneficiaries of the Redding Basin Water Resources Plan are the Redding Basin water purveyors who face severe deficits as described above. However, under appropriate circumstances, there would likely be secondary supply beneficiaries within the Sacramento Valley.

Water Management Benefits

The potential water management benefits from the long-term plan include improved timing of surface water diversions, increased water supply reliability, and increased local and regional flexibility. The timing of diversions from the Sacramento River can be more closely matched to regional river management objectives if there are other supply sources, such as local groundwater, that are developed and integrated into the basin's water systems. By managing the surface- and groundwater resources conjunctively, the reliability of the area's water supply can be greatly improved, using the stored groundwater to offset reductions in dry-year surface water supply. Finally, the overall flexibility provided by an integrated basin water supply would allow the Redding Basin's water purveyors to adopt to changing conditions both locally and within the Sacramento Valley system overall.

Environmental Benefits

Environmental benefits may accrue from the ability to reduce surface water diversions on a seasonal basis in support of regional management goals such as minimum in-stream flows. Other benefits would include likely consolidation of diversions on the Sacramento River, reducing the number of intakes that present hazards to migrating fish. A good recent example of the type of cooperative arrangements that may be possible is the previously mentioned process by which the Townsend Flat Water Ditch Company's water transfer was done, providing water supply and fishery benefits by the removal of Saeltzer Dam on Clear Creek.

Water Quality Benefits

Seasonal decreases in surface water diversions may be achieved as local groundwater resources are developed. Increased local re-use of water, as demonstrated by the City of Shasta Lake's aggressive water recycling program, may also provide in-stream water quality benefits as effluent discharges are reduced. Improved irrigation efficiency among the basin's

major irrigators may also reduce the quantity of return flows and resultant water quality impacts such as increased temperatures and runoff constituents.

3. Project Costs

The cost opinions shown, and any resulting conclusions on project financial or economic feasibility or funding requirements, have been prepared for guidance in project evaluation from the information available at the time of the estimate. It is normally expected that cost opinions of this type, an order-of-magnitude cost opinion, would be accurate within +50 to -30 percent. Project costs were developed at a conceptual level only, using data such as cost curves and comparisons with bid tabs and vendor quotes for similar projects. The costs were not based on detailed engineering design, site investigations, and other supporting information that would be required during subsequent evaluation efforts.

The final costs of the project and resulting feasibility will depend on actual labor and material costs, competitive market conditions, actual site conditions, final project scope, implementation schedule, continuity of personnel and engineering, and other variable factors. As a result, the final project costs will vary from the opinions presented here. Because of these factors, project feasibility, benefit/cost ratios, risks, and funding needs must be carefully reviewed prior to making specific financial decisions or establishing project budgets to help ensure proper project evaluation and adequate funding.

Phase 2C of the Redding Basin Water Resources Plan would cost approximately $250,000. A grant for $130,000 was secured through the AB 303 program to support the project, leaving an unfunded balance of $120,000. The implementation costs for the selected long-term alternative would be determined as part of the Phase 2C report.

4. Environmental Issues

The most likely environmental issues associated with implementation of a long-term water resources management plan are related to changes in groundwater levels that may result from future conjunctive management programs. Preliminary groundwater modeling for the Redding Basin indicates that long-term changes in groundwater levels are relatively minor, but areas with shallow existing wells may be impacted.

Environmental and Permitting Requirements

The proposed Phase 2C report is intended to provide sufficient information to move forward with a "programmatic" environmental impact statement/environmental impact report (EIS/EIR) that would evaluate the specific long-term plans and related actions and impacts. Implementation of specific infrastructure projects would then be expected to involve a wide range of standard permitting requirements, which cannot be determined in detail until the water resources plan is completed.

A draft California Environmental Quality Act (CEQA) checklist was not prepared for this proposed project because no physical alterations to the environment would occur as a result of this proposed action.

5. Implementation Challenges

The water resources planning efforts have widespread support among local stakeholders, including the members of RAWC. Completing the Water Resources Master Plan itself has few, if any, implementation issues. Eventual adoption and implementation of a regional water management plan by the many local stakeholders, together with state and federal agency participants, would involve addressing a wide range of issues. These include maintaining purveyor autonomy, secondary impacts such as seasonal changes in groundwater levels, and institutional issues related to water transfers and combined water supply and management efforts involving multiple water purveyors.

Key Stakeholders

Table 15A-2 lists the major stakeholders in the Redding Basin and the anticipated concerns and issues of each.

TABLE 15A-2
Stakeholder Roles and Issues
Shasta County Water Agency, Redding Basin Water Resources Management Plan

Stakeholder	Role/Concerns/Issues
RAWC (14 members include municipalities, irrigation districts, Shasta County, private parties)	• Primary forum for water resources planning in the Redding Basin • Goal is to achieve a long-term reliable, affordable water supply for the communities • Maintaining local autonomy over resource management
USBR	• CVP supply is critical for many purveyors in Redding Basin • USBR operates the major water resources facilities in the Redding Basin—Shasta Dam, Whiskeytown, Keswick; also owns major conveyance facilities used by purveyors • Implementing terms of CVPIA while seeking to improve reliability of supply, flexibility of operations, and environmental benefits
CALFED	• Has provided funding for significant projects to date, such as ACID fish ladder • Needs cooperation of Redding Basin purveyors and political leaders to support CALFED objectives, help provide net increases in seasonal water supply downstream of Redding Basin
U.S. Fish and Wildlife Service, California Department of Fish and Game, other local resource agencies	• Protection and enhancement of in-stream and terrestrial habitat as it relates to water supply development • Have been active participants in cooperative efforts that address both water supply and fishery restoration work
Local landowners	• Potential groundwater-level changes resulting from increased seasonal pumping • Future water supply facilities' construction and long-term impacts
Environmental interest groups	• In-stream flow impacts, fishery impacts, land use

6. Implementation Plan

The implementation plan for the overall water resources planning effort is essentially underway, as shown by the completion of the Phase 1 and Phase 2A/B reports. The next step in the process, the Phase 2C Report, would then lead to a specific implementation plan for the selected long-term alternative. See Figure 15A-1 for the overall process.

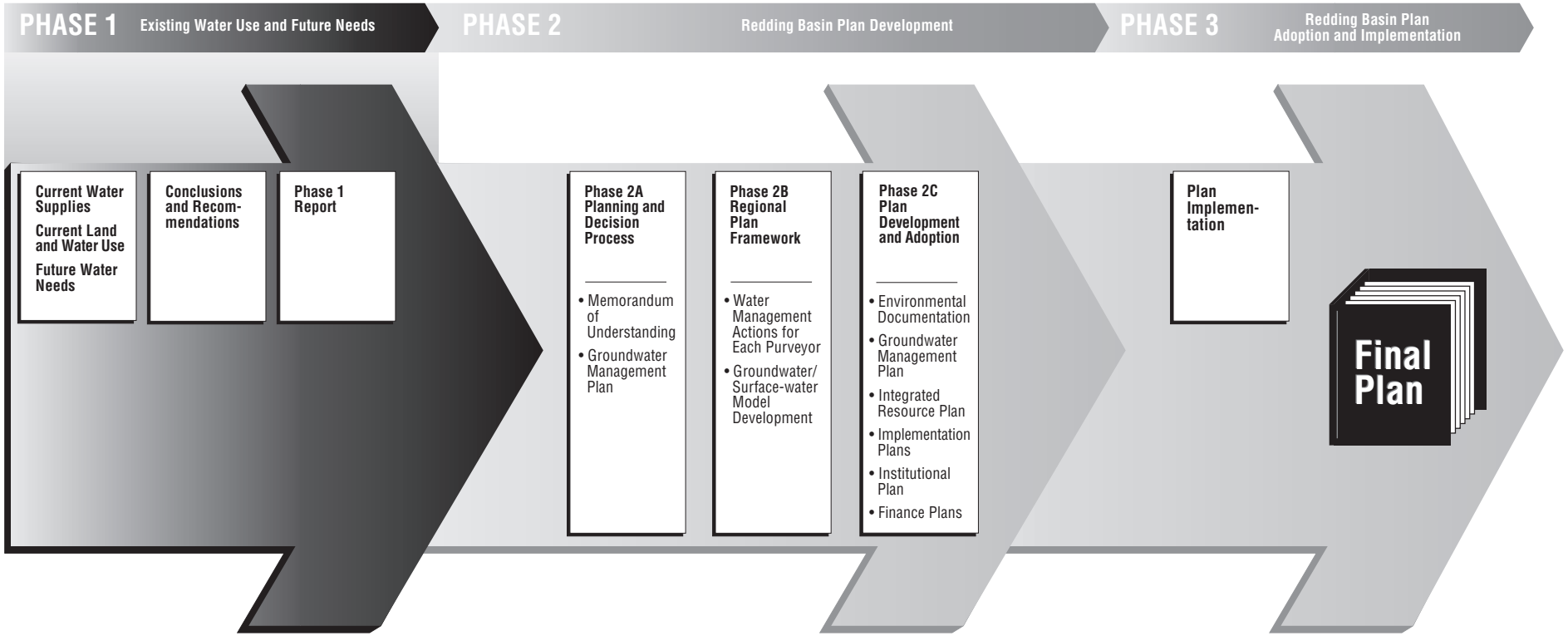

FIGURE 15A-1
PLANNING PROCESS
SCWA REDDING BASIN WATER RESOURCES MANAGEMENT PLAN
SHORT-TERM PROJECT EVALUATIONS
SACRAMENTO VALLEY WATER MANAGEMENT AGREEMENT

CH2MHILL
in association with
MONTGOMERY WATSON HARZA
MBK
SWRI

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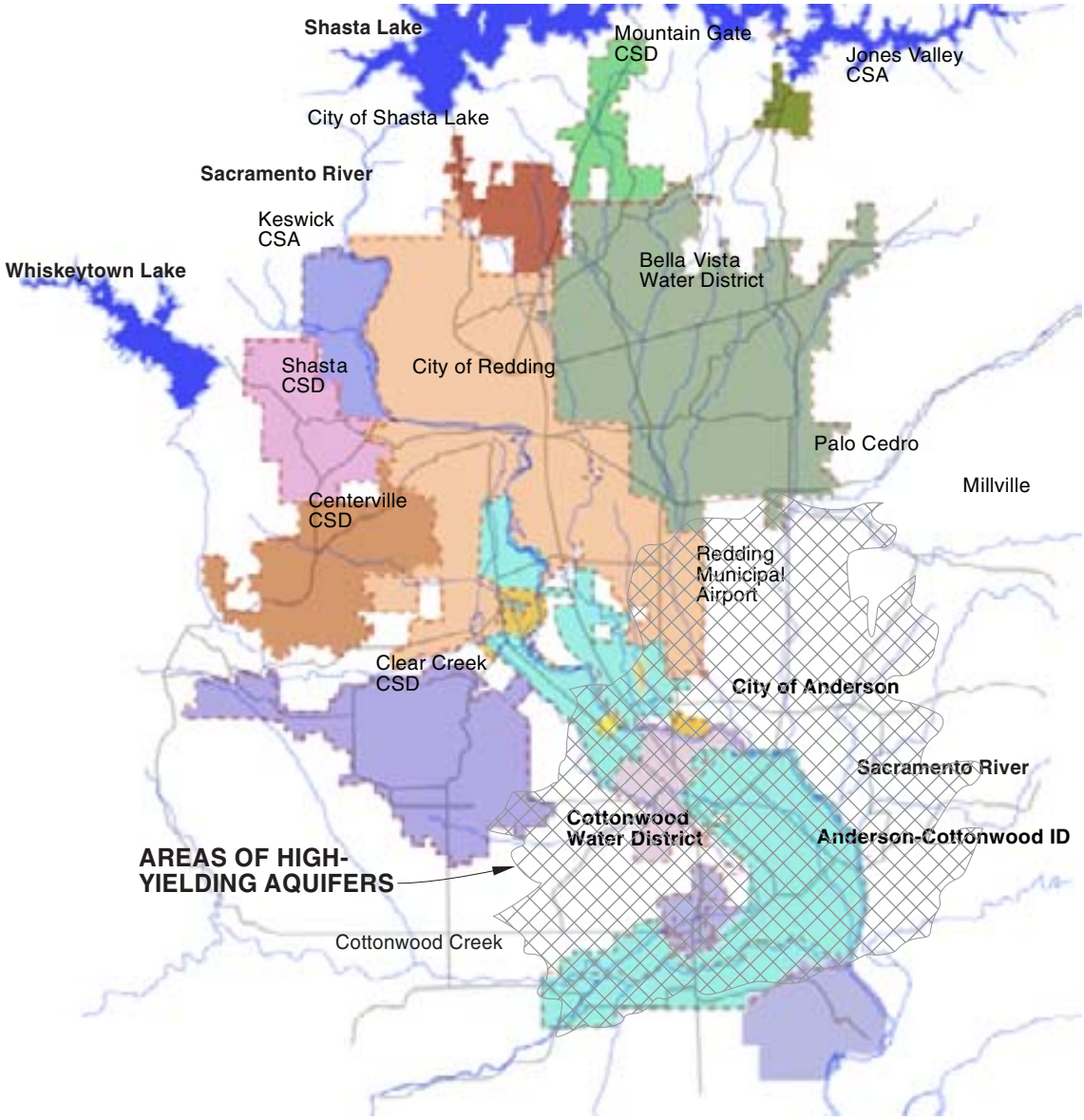

FIGURE 15A-2
REDDING GROUNDWATER BASIN FEATURES
SCWA REDDING BASIN WATER RESOURCES MANAGEMENT PLAN
SHORT-TERM PROJECT EVALUATIONS
SACRAMENTO VALLEY WATER MANAGEMENT AGREEMENT

CH2MHILL
in association with
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SWRI

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	Settlement Contract (Pre-1914 Water Right)	Post-1914 Water Right	CVP Water Supply Contract	Groundwater
City of Anderson				●
Anderson-Cottonwood Irrigation District	◒		○	
Bella Vista Water District		○	◒	○
Centerville Community Services District	◒		◒	
Clear Creek Community Services District			●	
Cottonwood Water District				●
Jones Valley County Service Area		◒	◒	
Keswick County Service Area			●	
Mountain Gate Community Services District			◒	◒
City of Redding	◒		◒	◒
City of Shasta Lake			●	
Shasta Community Services District			●	
Townsend Flat Ditch Company	●			
Large Industrial (SPI, Shasta Paper Mill, Wheelabrator)				●

Legend: ● Sole Source ◒ Primary Source ○ Minor Source

FIGURE 15A-3
REDDING BASIN PURVEYORS' SOURCES OF SUPPLY
SCWA REDDING BASIN WATER RESOURCES MANAGEMENT PLAN
SHORT-TERM PROJECT EVALUATIONS
SACRAMENTO VALLEY WATER MANAGEMENT AGREEMENT

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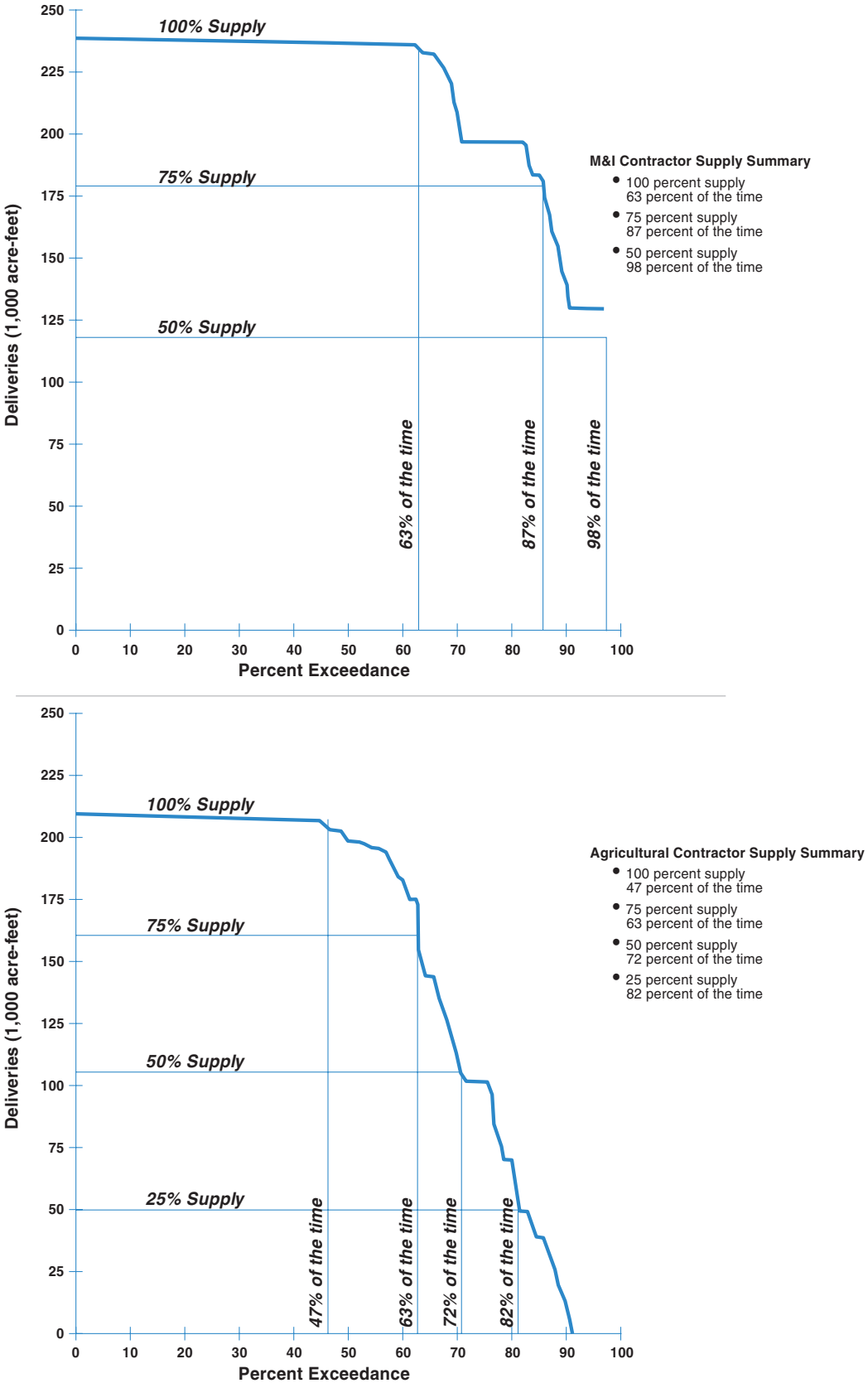

FIGURE 15A-4
SIMULATED DELIVERIES FOR CVP MUNICIPAL AND INDUSTRIAL CONTRACTORS AND CVP AGRICULTURAL CONTRACTORS NORTH OF THE DELTA
SCWA REDDING BASIN WATER RESOURCES MANAGEMENT PLAN
SHORT-TERM PROJECT EVALUATIONS
SACRAMENTO VALLEY WATER MANAGEMENT AGREEMENT

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