Crestline-Lake Arrowhead Water Agency

2005

Urban Water Management Plan

May 2006

ALBERT A. WEBB ASSOCIATES

Crestline-Lake Arrowhead Water Agency
Urban Water Management Plan

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Crestline Lake Arrowhead Water Agency
2005 Urban Water Management Plan
Contact Sheet

Date plan submitted to the Department of Water Resources: **May 12, 2006**

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The Water supplier is a: **Public Agency**

The Water supplier is a: **Wholesaler and retail water purveyor**

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

Is This Agency a Bureau of Reclamation Contractor? **No**

Is This Agency a State Water Project Contractor? **Yes**

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Adoption and Implementation of UWMP

Law

> **10642**. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published. After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

Public Participation

Crestline-Lake Arrowhead Water Agency (CLAWA) customers are encouraged to participate in the urban water management planning process. Water in all its aspects - quality, sources, availability, pricing, conservation, and reuse - is a topic of high public interest in the San Bernardino Mountains. The population served by CLAWA has done an excellent job of conserving water, both historically and recently. Many of the conservation measures discussed in this plan are already in effect, following public input and with public support. In other words, much of the water management planning process for CLAWA has already taken place through past actions by the Agency and by the purveyors, with full public involvement and review.

CLAWA will notify the public of the availability of this plan in draft form for public review, and Final draft form through postings in the local newspapers and mailings to persons/groups whom have previously identified their desire to receive CLAWA information. The plan will be made available for public inspection and comment for the required thirty-day period. Before the plan is adopted, a duly noticed public hearing will be held to receive public comment and discuss questions and issues.

Plan Adoption

CLAWA contracted Albert A. Webb Associates to prepare this Urban Water Management Plan. It is anticipated that this Urban Water Management Plan will be adopted by all relevant agencies in the CLAWA service area, and submitted to the California Department of Water Resources within 30 days of Board approval. Attached to the cover letter addressed to the Department of Water Resources and as Appendix B are copies of the signed Resolution of Plan Adoption. This plan includes all information necessary to meet the requirements of California Water Code Division 6, Part 2.6 (Urban Water Management Planning). Furthermore, water purveyors to whom CLAWA supplies water have been advised of the preparation of this plan and notified of public meetings at which it has been discussed.

Agency Coordination

Law

> **10620 (a)** Every Urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3.
>
> **10620 (c)** An urban water supplier indirectly providing water shall not include planning elements in its water management plan as provided in Article 2 (commencing with Section 10630) that would be applicable to urban water suppliers or public agencies directly providing water, or to their customers, without the consent of those suppliers or public agencies.
>
> **10620 (d)(2)** Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.

This document is an Urban Water Management Plan, prepared for the Crestline-Lake Arrowhead Water Agency (CLAWA). The purpose of this plan is to address the Agency's long-term needs and policies concerning water supply, water demand, water conservation, and water reclamation and reuse. The intended benefits of this plan are:

- to help assure reliable water supplies,
- to promote the wise and efficient use of water,
- to plan ahead for periods of water shortage, and
- to encourage use of recycled water.

This Urban Water Management Plan has been prepared to meet the requirements of the Urban Water Management Planning Act (California Water Code Division 6, Part 2.6). The Urban Water Management Planning Act requires water suppliers who directly or indirectly provide water for municipal purposes to more than 3,000 customers, or supply more than 3,000 ac-ft of water annually, to develop and implement an Urban Water Management Plan.

This plan has been prepared for the mountain communities of the Crestline/Lake Arrowhead region of the San Bernardino Mountains, San Bernardino County, California. CLAWA acts as a wholesale and retail water purveyor, delivering California State Water Project water from Cedarpines Park to Green Valley Lake. As a wholesaler, CLAWA provides water to 16 other water purveyors and public agencies that, in turn, provide municipal water service to residents, businesses, and institutions in their respective service areas. Thus, CLAWA provides supplemental water indirectly throughout most of its service area. CLAWA's wholesale customers are independent entities, each of which is responsible for its own water conservation programs and long-range planning.

This plan does not govern the water management policies and practices of CLAWA's wholesale customers. Section 10620(c) of the Water Code provides that:

> A wholesale water agency may include information for one or more of their retail agencies if the retail agencies agree. If a retail agency participates in a regional UWMP, all of the information required by the Urban Water Management Planning Act for each retailer must be included and each included agency must adopt the UWMP. However, a regional UWMP may be functionally equivalent to an Integrated Regional Water Management Plan

In addition to its role as a water wholesaler, CLAWA is also a direct retail water supplier to some areas. CLAWA has four Improvement Districts ("A" through "D"), which it serves directly as a retail water purveyor. The four improvement districts have a total of approximately 1,179 service connections. There are also a number of individual users and government authorities who receive water directly from CLAWA on a retail basis, but are located outside CLAWA's improvement districts. Water users in CLAWA's improvement districts, and the other retail customers served directly by CLAWA, are CLAWA's "direct" customers, to whom the policies in this plan will apply.

This Urban Water Management Plan, when adopted by the Board of Directors of CLAWA, will guide the Agency's water supply and conservation efforts over the next five years. Based upon this plan, the Agency may:

- require new conservation measures,
- enforce new development conditions,
- seek new sources of supply, including the use of recycled water,
- modify rate structures, and
- implement programs providing information, assistance, and enforcement.

However, as noted above, CLAWA may implement water conservation measures, development conditions, and similar regulations only with respect to the water users that CLAWA directly serves on a retail basis. The water purveyors who purchase water from CLAWA may undertake their own water management and conservation programs, which would apply to their direct customers.

Interagency Coordination

CLAWA has consulted with a number of public agencies to obtain information and input. The process of coordination and consultation with other agencies will continue as the plan undergoes public review.

1. Other Water Suppliers That Share a Common Source

CLAWA’s sole source of supply is surface water from Silverwood Lake, which is part of the East Branch of the California State Water Project (SWP). The waters of Silverwood Lake come primarily from the State Water Project and Houston Creek. The majority of water delivered to CLAWA’s wholesale and retail customers are from the SWP. The SWP is managed by the Department of Water Resources (DWR). Submittal of this plan

to the Department of Water Resources, along with the plans of other SWP contractors, will enable DWR to review the plans and projections of all SWP customers and undertake any coordination that may be warranted.

CLAWA also, indirectly, obtains some of its water supply from Houston Creek, which flows into Silverwood Lake when seasonal weather permits. Average Houston Creek allocations over the past 15 years are approximately 424 ac-ft/year. The Houston Creek water is subject to diversion permits, up to 1,302 ac-ft/year, as issued by the State Water Resources Control Board. Prior to issuance of these permits to the Agency in 1991, this water was un-appropriated.

2. Water Management Agencies

The Mojave Water Agency acts as Water-master for the Mojave Groundwater Basin and has been advised of the preparation of this plan. Staff of the California Regional Water Quality Control Boards, Lahontan and Santa Ana Regions, have also been advised of the preparation of this plan.

3. Relevant Public Agencies

The primary public agencies with land use authority in the CLAWA area are the County of San Bernardino; the U.S. Department of Agriculture, U.S. Forest Service; California Department of Water Resources; and California Department of Parks and Recreation. The County Planning Department, as well as the Southern California Association of Governments (SCAG), has been consulted regarding land use data and growth projections. The Forest Service's management plan for the San Bernardino National Forest has been reviewed with regard to land use planning and land management direction. The California Department of Water Resources was notified prior to plan preparation.

The Crestline Sanitation District, Running Springs Water District, and Lake Arrowhead Community Services District provide wastewater collection and treatment service within the CLAWA service area. Consultation with several of these agencies, concerning potential wastewater reclamation and reuse, is discussed in the Section titled Water Recycling.

Supplier Service Area

Law

> **10631**. A plan shall be adopted in accordance with this chapter and shall do all of the following:
>
> **10631 (a)** Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

Service Area Information with 20 Year Projections

The Crestline-Lake Arrowhead area is located approximately 85 miles east of the City of Los Angeles, and 18 miles north of the City of San Bernardino. The climate for this area consists of a relatively mild climate with four distinct seasons. The plan area is at an altitude of approximately 5000 feet above sea level and consists of several communities including: Crestline, Running Springs, Lake Gregory, and others. The summers are mild and dry, and winters are cold, with an annual average of approximately 40 inches of precipitation (WRCC). The region is subject to wide variations in annual precipitation, and experiences periodic wildland fires in the native chaparral and oak lands. The fluctuations in the annual average rainfall amounts occur across the entire southern California region because of the regional topography, and the Pacific Ocean cycle known as El Nino.

Table 1
Climatological Data

	Jan	Feb	Mar	Apr	May	June
Evapotranspiration (inches)	1.77	2.60	4.58	5.95	7.04	7.63
Average Rainfall (inches)	8.84	7.89	6.48	3.06	1.26	0.18
Average Temperature (Fahrenheit)	37.3	39.4	42.4	47.6	54.0	62.3

	July	Aug	Sept	Oct	Nov	Dec	Annual
Evapotranspiration (inches)	8.12	7.36	5.43	4.05	2.36	1.75	58.64
Average Rainfall (inches)	0.14	0.32	0.85	1.74	4.25	5.50	40.52
Average Temperature (Fahrenheit)	69.1	68.6	63.9	54.1	43.9	38.1	51.75

(Revised 12/7/2005) Average Rainfall data based on records from 7/1/1948 to 3/31/2005 at the NOAA website (http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?calarr)

CLAWA is a public agency, which provides wholesale and retail water service from Cedar Pines Park to Green Valley Lake. CLAWA is located about ten miles north of San Bernardino and Redlands in the San Bernardino Mountains. The service area encompasses portions of Crestline, Lake Arrowhead, Running Springs, and other nearby mountain communities occupy islands of private land surrounded by National Forest

territory.
Figure 1, Vicinity Map, shows the major travel routes and communities in the area and also shows the project area, which is CLAWA's sphere of influence. CLAWA's sphere of influence lies predominantly on the north side of State Highway 18 (Rim of the World Drive) and is served by State Highways 18, 138, 189, 173, and 330.

The CLAWA service area is located along the crest of the San Bernardino Mountains and in adjacent valleys high on the mountain slopes, extending down the north face of the mountains to Silverwood Lake. The terrain is rugged, with moderate to steep slopes and elevations ranging from about 3,200 feet at Silverwood Lake to over 7,800 feet near Keller Peak. Elevations in developed areas are generally between 4,000 and 6,000 feet. Unlike Southern California's valleys, this area experiences a four-season climate.

Crestline-Lake Arrowhead Water Agency was established in 1962 by the California Legislature and approved in 1963 by local voters. There have been a number of annexations over the years, which have enlarged the Agency's boundary. The Agency's existing boundary encompasses approximately 117 square miles, as shown in Figure 1. It is anticipated that, in 2006, CLAWA will annex a 1,235 acre area of US Forest Service land including the Snow Valley Mountain Resort. The annexation will allow water to be delivered to the ski resort of snow making purposes during the winter months. The terms of the agreement between CLAWA and Snow Valley allow for 200 ac-ft of water to be delivered from CLAWA to Snow Valley on an interruptible basis during the months of November through February.

As shown in Figure 1, the majority of the land within CLAWA is uninhabited. In fact, more than half of the land within CLAWA's boundary is part of the San Bernardino National Forest. The mountain communities occupy islands of private land surrounded by National Forest territory. There are three main clusters of developed communities within CLAWA's sphere of influence:

- In the western part of the Agency are the communities of Crestline, Skyland, Valley of Enchantment, Lake Gregory, Valley of the Moon, Arrowhead Highlands, Valley View Park, and Cedarpines Park.

- In the central part of the Agency are the communities of, Rimforest, Twin Peaks, Blue Jay, Crest Park (Meadowbrook), Skyforest, Cedar Glen, Deer Lodge Park, and Lake Arrowhead.

- In the eastern part of the Agency's sphere are the communities of Running Springs, Fredalba, Smiley Park, Arrowbear Lake, and Green Valley Lake

CLAWA's sphere of influence was established in 1973 and has not been amended to date. As discussed previously, the annexation of the Snow Valley Mountain Resort will also include an adjustment to the existing sphere of influence. The sphere of influence covers an area of approximately 150 square miles and extends about 23 miles east-west and 9 miles north-south The bulk of CLAWA's sphere of influence is within Township 2 North,

Ranges 1 West to 5 West, but some portions extend north and south into Townships 3 North and 1 North. The areas that are in CLAWA's sphere but not within the current Agency boundary are: (1) the Lake Arrowhead exclusion (2) 16 square miles of National Forest land in the Butler Peak/Keller Peak area, at the Agency's east end; and (3) a total of three square miles of primarily National Forest lands in the Cleghorn Pass and Sugarpine Mountain areas, at the Agency's west and southwest edges, along with a small area south of Crestline.

In the central part of CLAWA's sphere is an area surrounding Lake Arrowhead which chose to be excluded from the Agency's boundary, relying instead on local water sources. The "Lake Arrowhead exclusion" area consists of the community surrounding Lake Arrowhead and is served by the Lake Arrowhead Community Services District (LACSD). LACSD draws its water from Lake Arrowhead and other local sources; however, LACSD purchases water from CLAWA to serve Deer Lodge Park and approximately 300 residences within the “overlap areas”. The two “overlap areas” are located in the Grandview area on the west side of Lake Arrowhead and in Cedar Glen on the east side of Lake Arrowhead. These two area are within both CLAWA’s and LACSD’s service area.

The Lake Arrowhead Exclusion is a result of the decision made during the original formation of CLAWA decades ago. The major property owner in Lake Arrowhead elected to exclude the Lake Arrowhead community from CLAWA’s boundaries, confident that local water supplies in Lake Arrowhead would be sufficient to satisfy the consumptive needs of that community.

Population and Uses Served

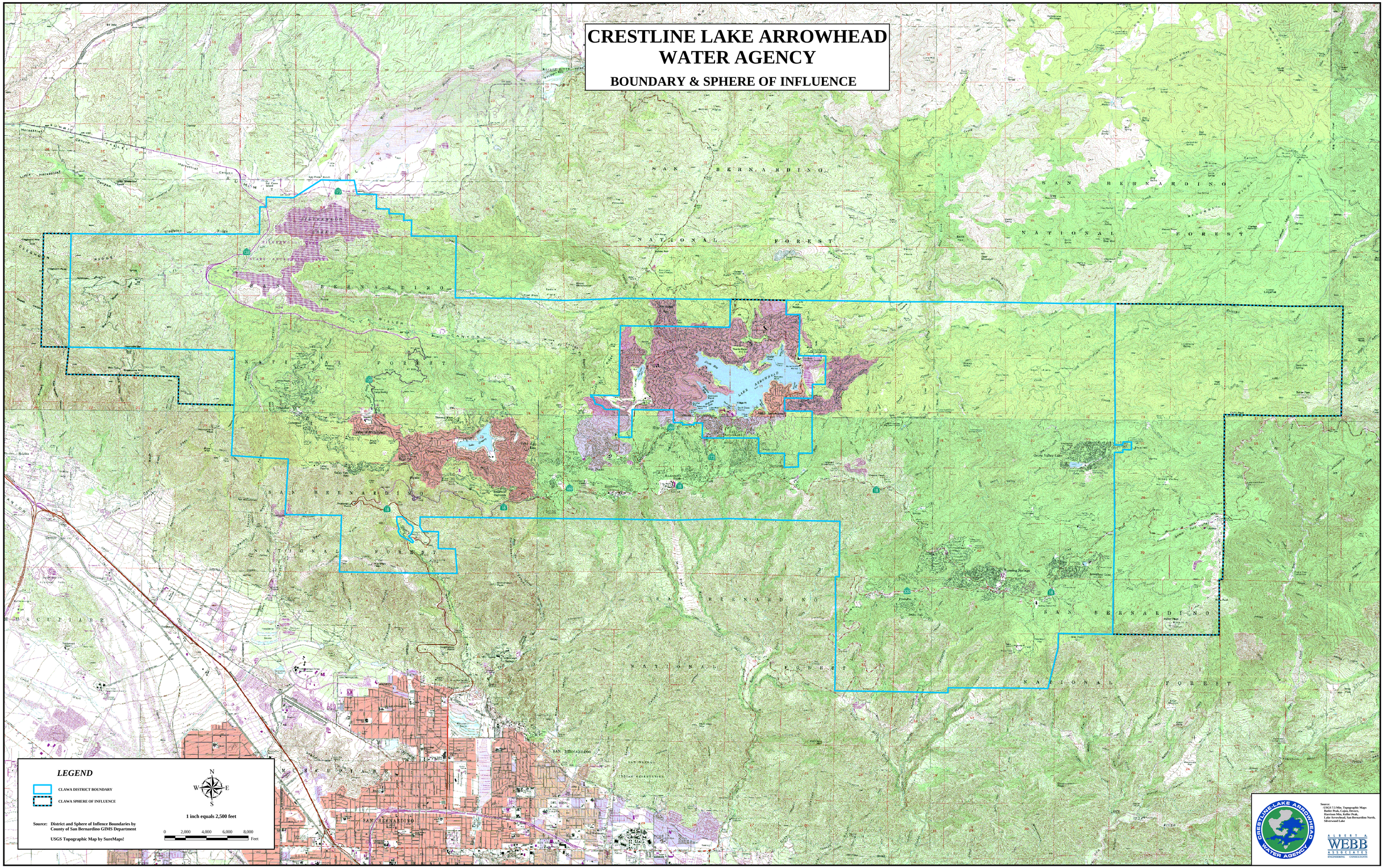
Development in the San Bernardino Mountains is naturally constrained by rugged terrain, limited access, and lack of support infrastructure, as well as by planning and environmental policies which place much of the area off limits to significant development. Most of the mountain area, including the majority of CLAWA's service area, is within the San Bernardino National Forest. Forest lands are devoted primarily to resource protection and recreational use.

Lake Arrowhead, Crestline, Running Springs, and neighboring communities are part of a mountain resort area, which experiences significant tourism. There is a large seasonal population component as well as a substantial influx of visitors. The seasonal population is not reflected in available demographic statistics, which count only year-round residents. Seasonal changes in water demand in the CLAWA area are quite different from the normal seasonal variation in water use by customers of average water purveyors, which reflect monthly changes in water use for landscape irrigation, swimming pools, car washing, space cooling, etc. (PMC 1990). By contrast, the CLAWA area experiences huge seasonal swings in the number of people it serves with peaks in both summer and winter.

The CLAWA service area includes commercial uses oriented to tourists and seasonal residents as well as year-round residents. However, development in the CLAWA service

CRESTLINE LAKE ARROWHEAD WATER AGENCY

BOUNDARY & SPHERE OF INFLUENCE



Map created Jan. 6, 2004. G:\2003\03-0324\Gis\Boundary.mxd

area is primarily single family residential, and this pattern is expected to continue. This data is compiled in Table 2, Water Purveyors, Service Connections, and Water Use in CLAWA Area.

The Agency, in its role as a water retailer, currently maintains approximately 1,179 retail service connections and serves a population of approximately 2,750 permanent residents. The seasonal population of CLAWA's retail customers can increase to approximately 5,500.

TABLE 2
SERVICE CONNECTIONS, POPULATION AND WATER USE IN CLAWA SERVICE AREA

Estimates Made by CLAWA and its Purveyors
• There are approximately 14,750 active service connections in entirety of CLAWA's service area. Of this total, the majority (approximately 13,571 or 92 percent) are served by CLAWA's purveyor customers. The remaining 1,179 connections are served directly by CLAWA.
• Ninety-three percent (1,097) of the retail service connections in the CLAWA service area are classified as general or residential. There are about 57 commercial connections, 8 agricultural/irrigation connections, no industrial connections, and 17 other water systems and camps.
• The CLAWA service area has an estimated permanent population of approximately 34,500. However, there are strong seasonal factors which can approximately double the peak population to an estimated 69,000.
• In addition to the water annually imported by CLAWA, water purveyors in the CLAWA service area produce approximately 1200-1600 ac-ft annually from local water sources.

Census Data

A review of the Census Tracts show that CLAWA is located within Census Tracts 108.01, 108.02, 109, 110, 111, and 113. While these census tracts extend considerably beyond CLAWA's boundary and sphere, most of the additional land is within the San Bernardino National Forest and is therefore essentially undeveloped. There are four developed areas in these census tracts that are not part of CLAWA's sphere of influence: a small part of the City of San Bernardino, a small area of the City of Big Bear Lake, the unincorporated community of Lake Arrowhead, and part of the unincorporated community of Big Bear City. When these four areas are subtracted, the data for these five census tracts approximately corresponds to CLAWA's sphere of influence. It is not an exact match, because the Lake Arrowhead Census Defined Place is larger than CLAWA's Lake Arrowhead Exclusion; therefore, the following census figures for CLAWA omit some residential areas along Highway 18 south of Lake Arrowhead.

Table 3, 2000 Census Data for CLAWA Area, gives selected facts about the area's population and housing stock, such as occupancy, single family vs. multifamily structures, age of structure, and housing value. For comparison, data for the Riverside-San Bernardino Primary Metropolitan Statistical Area (PMSA) are also shown.

TABLE 3
CLAWA SERVICE AREA DEMOGRAPHICS

• 93 percent of all homes in the CLAWA area are single family dwellings, as compared to 68 percent in the Riverside-San Bernardino PMSA.
• The CLAWA housing stock has very few multifamily units (2 percent), condominiums (1 percent), and mobile or other unconventional homes (4 percent). This compares to averages for the entire PMSA of 20 percent multifamily, 6 percent condominiums, and 12 percent mobile/other homes.
• Fully 51 percent of the housing units in the CLAWA area were classified as vacant at the time of the census (2000). This is primarily because 45 percent of all dwelling units are classified as "for seasonal, recreational, or occasional use." As described by the Census Bureau, "These are vacant units used or intended for use only in certain seasons or for weekend or other occasional use throughout the year" (Census 1993b). By comparison, only 7 percent of the housing units in the entire PMSA are in this category.
• The CLAWA housing stock is also older. 52 percent of the CLAWA area housing stock is more than 35 years old, as compared to 36 percent in the metropolitan area. 32 percent of CLAWA's housing is more than 45 years old.

The 2000 Census recorded a population of 32,500 within the CLAWA portion of these census tracts. As noted previously, these figures may not be totally accurate because they

do not include some residential areas south of Lake Arrowhead which are within CLAWA's service area and they do include additional land which is not in CLAWA's service area. For the purposes of this Plan, it has been determined by the CLAWA that the population projections are adequate to utilize for long-term planning figures.

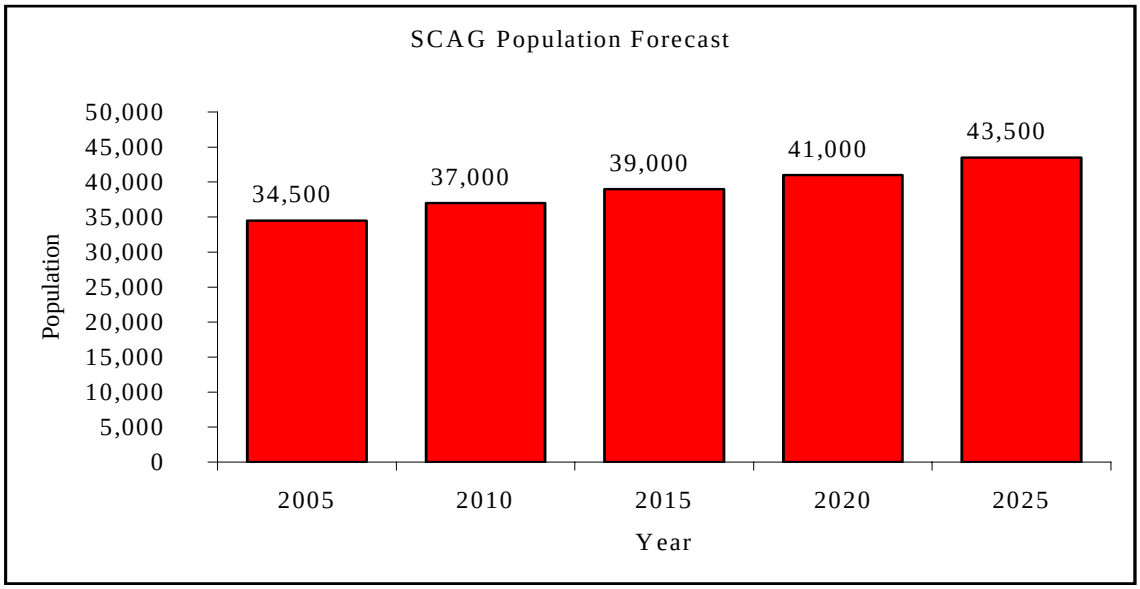
Population Growth Forecasts

The Southern California Association of Governments (SCAG) is the council of governments responsible for growth forecasting and planning in the region. SCAG has adopted growth forecasts for sub-regions within Southern California. CLAWA is within the San Bernardino sub-region, which consists of all of San Bernardino County. This is the official growth forecast applicable to the CLAWA service area.

The most detailed data available from SCAG are at the census tract and place level. Although these do not constitute the official growth forecast (which applies only at the sub-regional level), these figures for population, households, and employment are representative of the service area. The CLAWA sphere of influence is located within Census Tracts 108.01, 108.02, 109, 110, 111, and 113. Forecast data available for unincorporated county territory, excluding the incorporated cities of San Bernardino and Big Bear Lake. While this still covers a larger area than CLAWA, taking in the entire west end of the San Bernardino National Forest, there are no forecast data available for smaller areas.

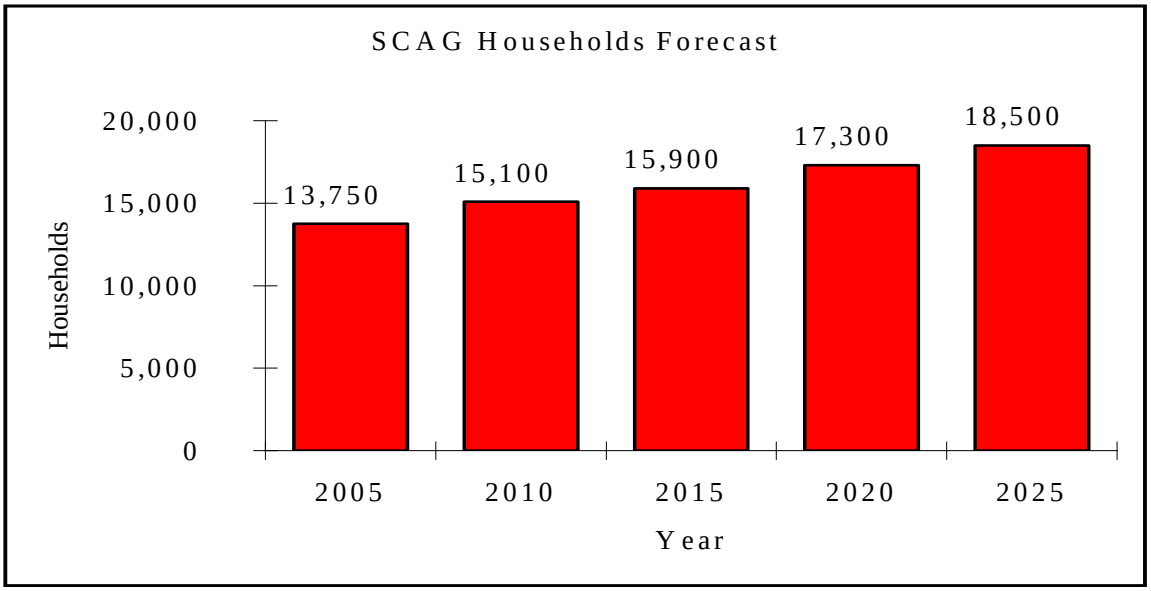
Figure 2, SCAG Population Forecast, shows the estimated 2005 population, per the 2000 Census, and the SCAG population forecast to the year 2025 for these census tracts. Figure 3, SCAG Households Forecast, gives similar data for household projections within CLAWA’s service area. Population in these census tracts is projected to grow from 34,500 in 2005 to 43,500 by 2025. Households are forecasted to increase from 13,800 to 18,500.

FIGURE 2
CLAWA SERVICE AREA POPULATION FORECAST



Revised 12/7/05
Source: SCAG 2005; Albert A. Webb Associates.

FIGURE 3
HOUSEHOLD FORECAST UNINCORPORATED PORTION OF CENSUS TRACTS



Revised (12/7/2005)
Source: SCAG 2005; Albert A. Webb Associates.

SCAG does not provide a forecast for the number of housing units, only for households. (A household is an occupied housing unit; thus, vacant units must be added to the number of households to arrive at total housing units). The SCAG Housing Projection gives total housing units per the 2000 Census, and estimates future housing units corresponding to the SCAG growth forecast for households. This projection adds to SCAG's households forecast a number of vacant dwelling units, based upon the ratio of vacant homes observed within the unincorporated portion of these census tracts. The 2000 Census found that 45 percent of these dwelling units were held for seasonal or part-time occupancy, and another 6 percent were vacant for other reasons, giving a total vacancy ratio of 51 percent.

Water Sources (Supply)

Law

> **10631**. A plan shall be adopted in accordance with this chapter and shall do all of the following:
>
> **10631 (b)** Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments [to 20 years or as far as data is available.]

Water Supply Sources

CLAWA's primary water supply source is the California State Water Project (SWP). The following description of the SWP was obtained from the Department of Water Resources' Office of Public Affairs.

The SWP is the nation's largest state-built water and power development and conveyance system. It includes facilities—pumping and power plants; reservoirs, and storage tanks; and canals, tunnels, and pipelines—that capture, store, and convey water to 29 water agencies.

The SWP's watershed encompasses the mountains and waterways around the Feather River. Rain and melting snow run off mountainsides and into waterways that lead into Lake Oroville. The lake in Butte County is the State Water Project's official start and a part of a complex that includes three power plants, a forebay, and an afterbay. One of the power plants, Hyatt Powerplant, is the largest and was built in the bedrock under the lake.

There are three smaller lakes above Oroville in Plumas County—Antelope Lake, Frenchman Lake, and Lake Davis—which are mainly used for recreation and downstream releases for fisheries. Lake Davis also provides water to the nearby community of Portola.

When water is needed, Lake Oroville releases water into the Feather River. It travels down the river to where the river converges with the Sacramento River, the state's largest waterway. Water flows down the Sacramento River into the Sacramento-San Joaquin Delta. Some of the water is pumped into the North Bay Aqueduct, which serves Napa and Solano counties.

The remaining water travels further south in the Delta, where it is pumped by Banks Pumping Plant into the 444-mile-long California Aqueduct. Water then enters Bethany Reservoir, where the South Bay Aqueduct begins. It serves Alameda and San Jose counties.

Water in the mainstem of the California Aqueduct flows south by gravity into the San Luis Joint-Use Complex, which was designed and constructed by the federal government and is operated and maintained by the Department of Water Resources. Within the complex are O'Neill Forebay, Sisk Dam and San Luis Reservoir, the nation's largest offstream reservoir (it has no natural watershed), the Gianelli Pumping-Generating Plant, Dos Amigos Pumping Plant, and the San Luis Canal. This section of the California Aqueduct serves both the SWP and the federal Central Valley Project.

After leaving the Joint-Use Complex, water travels through the central San Joaquin Valley and splits near Kettleman City into the Coastal Branch Aqueduct, completed in 1997, to serve San Luis Obispo and Santa Barbara counties.

The water in the mainstem is pumped up California's hilly terrain by three pumping plants—Buena Vista, Teerink, and Chrisman— until it reaches Edmonston Pumping Plant, the SWP's largest. Its huge motor-pump units, each standing about 65 feet tall and weighing more than 400 tons, lift water nearly 2,000 feet up and over the Tehachapi Mountains through 10 miles of tunnels.

As the water reaches the bottom of the mountain, it bifurcates (splits) into two branches: the West Branch and the East Branch (the mainstem). Water in the West Branch is pumped by Oso Pumping Plant into Quail Lake. From there, it enters a pipeline leading into Warne Powerplant to generate power. Water is then discharged into Pyramid Lake, travels through Angeles Tunnel, and into Castaic Powerplant (the latter two are joint developments by DWR and the Los Angeles Department of Water and Power, their owner). At the end of the West Branch is Castaic Lake and Castaic Lagoon, a popular Southern California recreation spot.

Water flowing down the East Branch generates power at Alamo Powerplant then is pumped uphill by Pearblossom Pumping Plant. The plant lifts the water 540 feet. From there, it flows downhill through an open aqueduct, linked at its end to four underground pipelines which carry the water into the Mojave Siphon Powerplant, which discharges the water into Lake Silverwood. When water is needed, it is discharged into Devil Canyon Powerplant and its two afterbays. The 28-mile-long Santa Ana Pipeline then takes it underground to Lake Perris, the southernmost SWP facility and one of Southern California's most popular recreation spots.

The SWP's most recently constructed facility, the East Branch Extension delivers water from Devil Canyon Powerplant's Afterbay to Yucaipa Valley and the San Gorgonio Pass area in San Bernardino and Riverside counties. The project— consisting of 13 miles of buried pipeline, three pump stations, and a 90 acre-foot regulatory reservoir—will meet the region's water needs for the next 40 years. SWP water will be used to recharge over drafted groundwater basins and allow more flexibility for local water systems.

The extension, completed in 2003, is a cooperative project between DWR, the San Bernardino Valley Municipal Water District, and the San Gorgonio Pass Water Agency. The two contractors will pay for the project's construction costs by repaying the principal

and interest of revenue bonds sold to finance the project. Appendix C shows a map of the entire SWP. *(DWR Website 2005 – http://www.publicaffairs.water.ca.gov/swp/swptoday.cfm)*

While the majority of CLAWA's water supply is imported, the Agency does obtain some water from local sources. In 1978, CLAWA made application to appropriate local water from Houston Creek which is tributary to Lake Silverwood, and in 1991 the State Water Resources Control Board issued two permits which allow appropriations of up to 1,302 ac-ft per year. Actual diversion quantities vary depending upon annual amounts of precipitation and are limited to the amount of return flow to the Mojave watershed each year. As an example, reports for water years 1992-93 and 1996-97 filed with the State Water Resources Control Board list 617 and 608 ac-ft of water, respectively, appropriated pursuant to these permits. The average amount of water appropriated per year is 424 ac-ft. This local water appropriated by CLAWA is in addition to its 5,800 ac-ft/year of SWP Table A amount water. Table 4 lists the current and projected water supplies available to CLAWA. As seen in this table, CLAWA's long-term projection for water supply is approximately 4,500 ac-ft/year. This is based upon the SWP's long-term reliability of 70% allocations and average appropriations from Houston Creek of 424 ac-ft/year.

Groundwater

CLAWA does not currently use any groundwater, nor are there any projected future plans for CLAWA to use groundwater.

Local Surface Water

Houston Creek is CLAWA's local water supply. CLAWA's appropriative rights to Houston Creek together with State Water Project deliveries creates a more reliable water supply in that Houston Creek is able to supplement CLAWA's total water supply. As an example, in 1992-93 an extended drought in Northern California forced the Department of Water Resources to cut its State Water Project deliveries to CLAWA. CLAWA was able to use water from Houston Creek to supplement its supply.

The reliability of supply from Houston Creek is dependent upon local precipitation, surface water management, and possibly groundwater production by others. The variability of local precipitation can be seen in Figure 7, Historical Precipitation, Lake Arrowhead, 1948-2005. Over this period, local precipitation has ranged from about 14.6 inches to more than 98 inches. Due to the unpredictable nature of local hydrology, CLAWA's appropriated water from Houston Creek is not as reliable as SWP. The annual amount of Houston Creek water appropriated by CLAWA is limited to the return flow to the Mojave Basin, based upon annual reports submitted to the State Division of Water Rights (see Table 4A for yearly totals of water appropriated from Houston Creek). For planning purposes CLAWA generally

Recycled Water

To date, CLAWA has made no use of recycled water. There are a number of reasons for

this. First, the California Regional Water Quality Control Board, Lahontan Region, has had a longstanding prohibition against the use of recycled water at elevations above 3,200 feet in the San Bernardino Mountains. In January 2003, a request for a Basin Plan amendment was filed. The amendment would allow the discharge of treated waters that are of waste origin above 3,200-foot elevation. In early September 2003, the Regional Board recommended approval of the Basin Plan Amendment. The amendment was reviewed and approved by the State Water Resources Control Board and the US Environmental Protection Agency in 2004. These changes will allow recycled water projects to proceed.

Second, because of the climate, topography, and development patterns in the mountains, there are very few sizable landscaped areas where recycled water could potentially be used for irrigation. Third, for the same reasons, total landscaped area is extremely low, since most lots have little landscaped area. Fourth, there are no industrial uses to speak of in the CLAWA service area, hence no potential market for industrial use of reclaimed water. Most commercial uses are also fairly small. Fifth, the lack of potential major users of recycled water makes the economic feasibility of constructing dual water systems not viable at this point in time.

For purposes of this plan, it has been assumed that all reclaimed water supply and use will be handled by others due to the fact that CLAWA does not have any wastewater treatment facilities or a reclaimed water distribution system.

Table 4
Current and Projected Water Supplies

Water Supply Sources	2005	2010	2015	2020	2025
Available from DWR [1, 2]	3,800	4,060	4,060	4,060	4,060
Locally produced groundwater	0	0	0	0	0
Locally Surface Water [3]	433	433	433	433	433
Transfers					
Exchanges In					
Recycled Water	0	0	0	0	0
Other					
Total	4,233	4,493	4,493	4,493	4,493

Units of Measure: Ac-ft/Year

[1] 2005 availability based upon approved DWR Table A allocation percentage of 65%
[2] Future availability based upon SWP long term reliability of 70%
[3] Average total surface water available from Houston Creek via Lake Silverwood from 1989-2004

Table 4A
Historical Water Supplies (SWP and Houston Creek)

Calendar Year	State Water Project Deliveries (ac-ft)			Water Year[1]	Houston Creek Water (ac-ft)
1990	---			89-90	123
1991	---			90-91	472
1992	---			91-92	692
1993	---			92-93	617
1994	---			93-94	391
1995	409			94-95	492
1996	485			95-96	603
1997	651			96-97	608
1998	187			97-98	517
1999	1,132			98-99	13
2000	1,194			99-00	264
2001	1,057			00-01	671
2002	2,189			01-02	0
2003	1,563			02-03	471
2004	2,006			03-04	557
				Average	433

[1] The 12-month period from October through September. The water year is designated by the calendar year in which it ends and which includes 9 of the 12 months. For example, the year ending September 30, 1992 is called the "1992 water year".

Reliability Planning

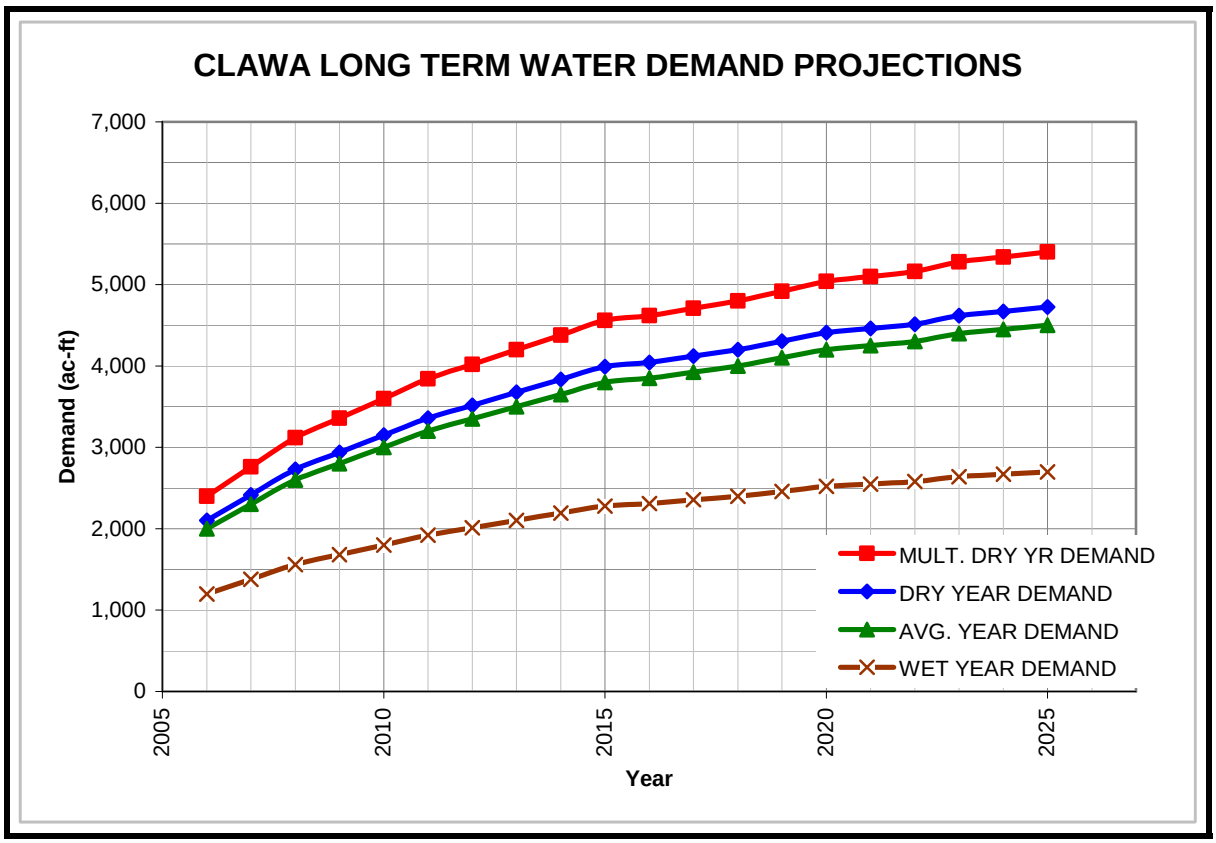
Law

> **10631**. A plan shall be adopted in accordance with this chapter and shall do all of the following:
>
> **10631 (c)** Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable.
>
> **10631 (c)** For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to replace that source with alternative sources or water demand management measures, to the extent practicable.
>
> **10631 (c)** Provide data for each of the following:
> (1) An average water year, (2) A single dry water year, (3) Multiple dry water years.

Reliability of Supply

CLAWA's total Table A contract amount from the SWP is 5,800 ac-ft of water annually. As described in the previous section, the SWP water travels from northern California to Lake Silverwood via a complex series of lakes, rivers, canals, pipelines and pump stations. A detailed map of these facilities is included as Appendix C. The Agency's average demand over the past 15 years has been approximately 1,500 ac-ft per year (26% of CLAWA'S Table A amount) and peaked at 2,563 ac-ft (43% of Table A amount) in the year 2004. Based upon current population projections (See Figure 2) and estimated water consumption rates (approximately 125 gal/person-day), CLAWA's average year water demand is expected to reach 5,800 ac-ft/year well beyond the year 2025 (see Figure 4). The multiple dry year water demand is not expected to reach 5,800 ac-ft/year until after the year 2025 as well.

FIGURE 4
CLAWA's PROJECTED WATER DEMAND



Source: Albert A. Webb Associates (05-0535/UWMP/demand projection_rev.xls)

The Agency's experience from the late 1978 to 2005 provides data to evaluate the reliability of the Agency's water supply for an average water year, a single dry water year, and multiple dry water years. Figure 5 shows the approved SWP allocations each year between 1978 and 2005. The average approved allocation for these years is approximately 87%. DWR has recently published a 2005 Draft Reliability report for the SWP (copy included as Appendix D). The probable long-term water deliveries from the SWP are given as a function of the percentage of water being delivered. For example, DWR states that approximately 70% of the time the SWP will have a 70% approved allocation and approximately 82% of the time the SWP will have a 50% approved allocation. For the purposes of this report, a 100% allocation will be used as a wet year supply, a 70% allocation will be used as an average year supply, a 34% allocation will be used for a single dry year supply, and an approximately 40% allocation will be used for multiple dry year supply (see Appendix D Table B-2 page 51). Figure 6 shows the projected water supply available for each of these allocation scenarios.

Figure 5
HISTORICAL SWP ALLOCATIONS, 1978-2005

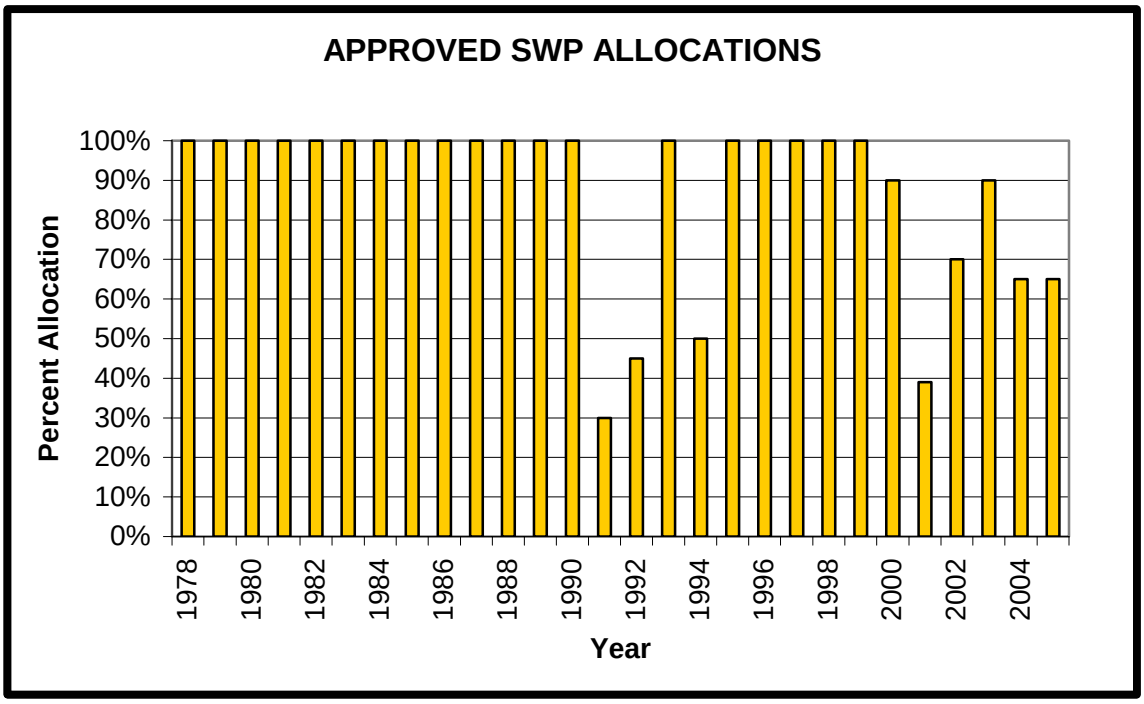
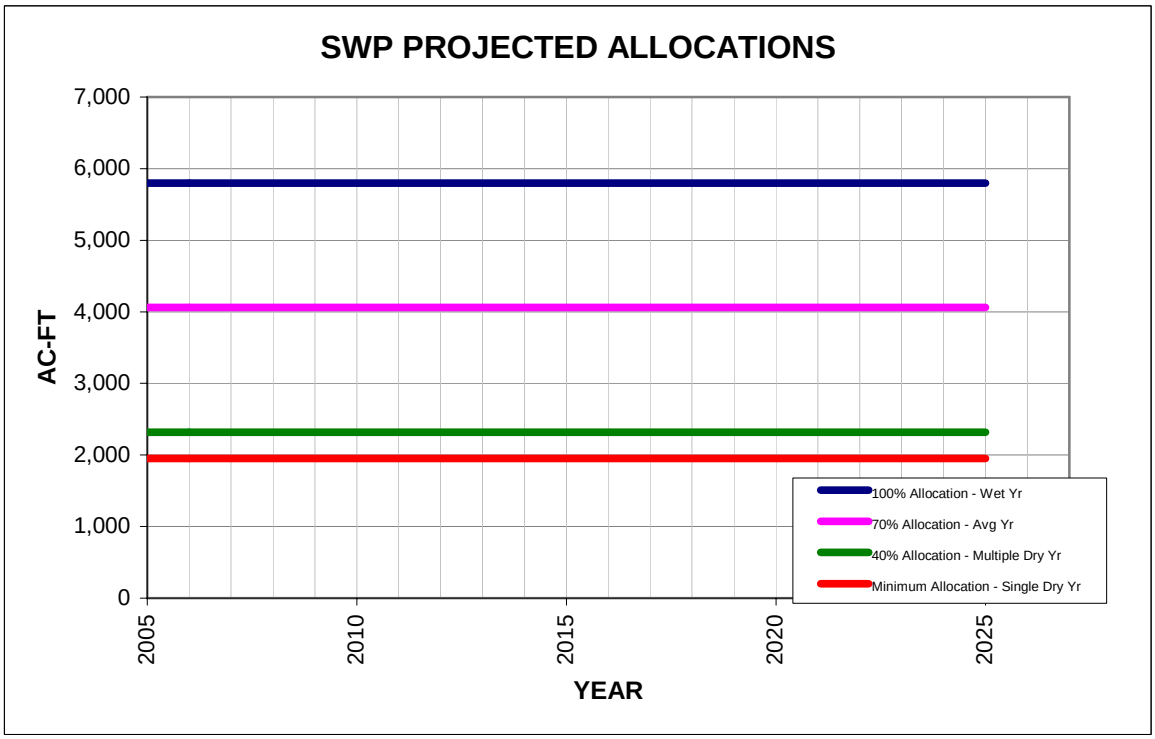


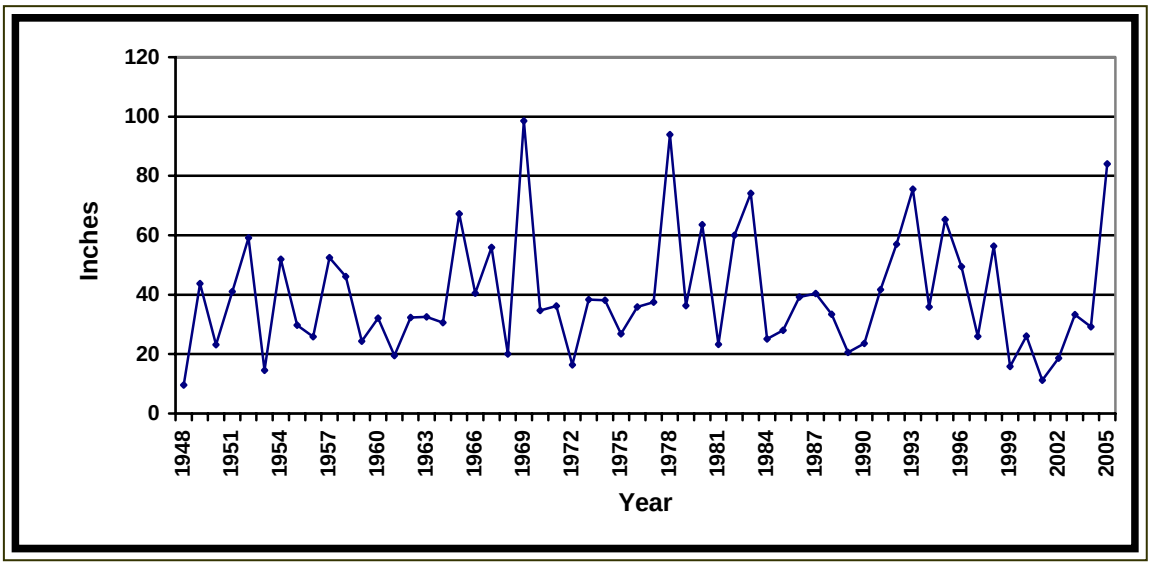
Figure 6
PROJECTED SWP ALLOCATIONS



Houston Creek is CLAWA's local water supply. CLAWA's appropriative rights to Houston Creek together with State Water Project deliveries creates a more reliable water supply in that Houston Creek is able to supplement CLAWA's total water supply. As an example, in 1992-93 an extended drought in Northern California forced the Department of Water Resources to cut its State Water Project deliveries to CLAWA. CLAWA was able to use water from Houston Creek to supplement its supply.

The reliability of supply from Houston Creek is dependent upon local precipitation, surface water management, and possibly groundwater production by others. The variability of local precipitation can be seen in Figure 7, Historical Precipitation, Lake Arrowhead, 1948-2005. Over this period, local precipitation has ranged from about 14.6 inches to more than 98 inches. Due to the unpredictable nature of local hydrology, CLAWA does not depend on the water from Houston Creek to supply its customers. Rather, CLAWA considers water received via Houston Creek as supplemental to it primary SWP supply. The annual amount of Houston Creek water appropriated by CLAWA is limited to the return flow to the Mojave Basin, based upon annual reports submitted to the State Division of Water Rights (see Table 4A for yearly totals of water appropriated from Houston Creek).

Figure 7
Historical Precipitation at Lake Arrowhead, 1948-2005



Source: NCDC 2005. Data for Lake Arrowhead reporting station.

The Agency's experience in 1991 and 1992 (see Figure 5) illustrates the effect of multiple dry water years in northern California. Approved allocations were 100% for the previous 13 years. In 1991, the state faced a serious shortfall and cut approved allocations to 30%. During that time, CLAWA requested DWR approve a minimum water delivery of 1,950 ac-ft/year for domestic, health-safety, and fire protection purposes. CLAWA understands that this minimum allocation would be supplied even during critically dry water years.

There is no question that water shortages at the state level have the potential to disrupt CLAWA's water supply. However, many approaches are being pursued at the state level, as well as regionally and locally, to reduce the likelihood of serious shortages. The drought mitigation measures relating to the SWP are discussed in the SWP Reliability Report, Appendix D. In 1991, CLAWA adopted Ordinance No. 44 & 45 which established a water conservation plan (copies of these ordinances are included as Appendix E). Also in 1991, CLAWA submitted a comprehensive conservation plan to the State Water Resources Control Board (copy of the plan is included as Appendix F). These ordinances and conservation plan remain in effect today and CLAWA's Board can implement the provisions of those plans as necessary. A more detailed discussion of the Agency's conservation and contingency plans will be presented in the section titled Demand Mitigation Measures.

For purposes of multiple-dry year's system reliability, Department of Water Resources, in 1999, completed construction of a new tunnel intake structure in Lake Silverwood. CLAWA participated with provisions for installing up to three new raw water pumps. Accordingly, CLAWA immediately installed two 100 horsepower pumps in DWR's new intake structure. This enables CLAWA to pump water from the second intake facility, even in the event of a lower lake level, which is a vital feature especially during emergency conditions.

During 2004-05, in accordance with the Agency's annual Standby Charge Engineer's Report, Group II Proposed Projects (high priority), CLAWA is adding a single 500 horsepower electric motor-driven pumps at two of its six transmission booster stations. These pumps are being added to further increase system reliability and fire protection.

Table 5 Water Supply Reliability, summarizes State Water Project deliveries and Houston Creek allocations. One may infer from Table 5 that the Agency's overall water supply does vary in response to dry conditions, but is primarily susceptible to the effects of dry water years at the state level.

Table 5
Water Supply Reliability

	Average Water Year (70% SWP & Avg HC)		Single Dry Water Year (34% SWP & 0% HC)		Multiple Dry Water Year (40% SWP & 20% HC)	
Source		Supply (ac-ft)		Supply (ac-ft)		Supply (ac-ft)
SWP	70% Allocation	4,060	34% Allocation	1,950**	40% per DWR Reliability Report	2,320
Houston Creek	Average Houston Creek	433*	0% of Houston Creek	0	20% of Houston Creek	173
Total Supply		4,493		1,950		2,493

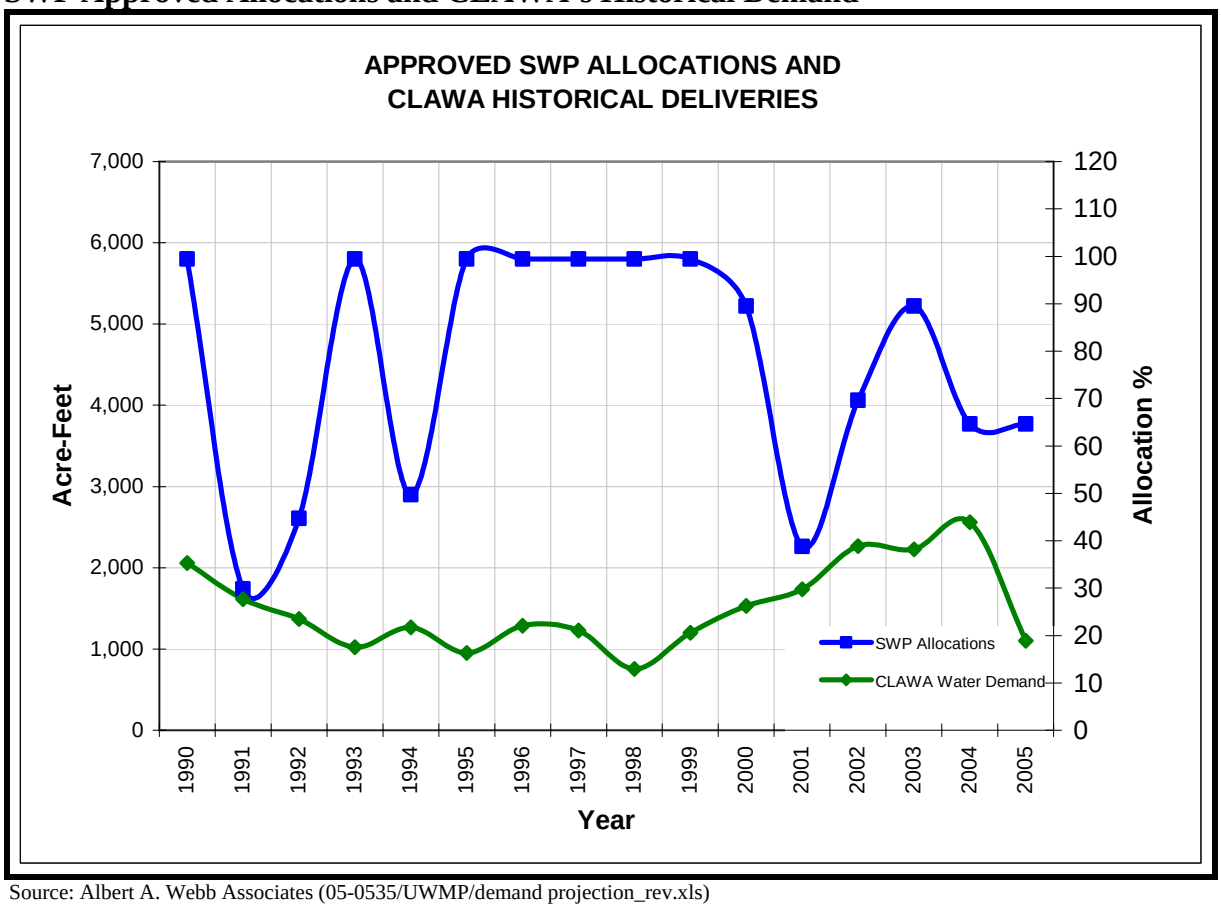
* Average Houston Creek appropriations from 1990-2004 have been 433 ac-ft/yr.

** Department of Water Resources granted CLAWA 1,950 ac-ft per year as a Minimum allocation of SWP deliveries for domestic, health/safety, and fire fighting uses.

Frequency and Magnitude of Supply Deficiencies

Figure 8 shows the historical allocations from the SWP and the total water deliveries made by CLAWA (total deliveries include water supplied by the SWP and Houston Creek). As can be seen in Figure 8 and in the SWP Reliability Report, the SWP is a very reliable source of water supply. There are annual supply availability fluctuations but on the whole, the SWP has been able to deliver an average allocation of 78% over the past 15 years. Figure 8 also shows that the SWP approved allocations have greater than 1,000 ac-ft above the total CLAWA demand in all but three of the last fifteen years. Going forward, the SWP is anticipated to deliver approximately 80% allocations in 50% of the years. It is also anticipated that allocations less than 40% will be limited to approximately one in every six and a half years (see Appendix D page 24 & 25). The DWR has done a better job since 1991 at managing the SWP and minimizing low allocation years. The DWR has also been successful at creating a more dependable water supply.

Figure 8
SWP Approved Allocations and CLAWA's Historical Demand



Source: Albert A. Webb Associates (05-0535/UWMP/demand projection_rev.xls)

Plans to Assure a Reliable Water Supply

The Department of Water Resources requires all state water contractors (SWC) to submit a tentative long-term water delivery schedule for anticipated SWP water deliveries. This long-term water delivery schedule projects water deliveries over a 33-year period and includes anticipated allocations from Houston Creek. Table 6, Projected Water Demand throughout CLAWA's Service Area, utilizes this tentative long-term water delivery schedule in projecting future water demands from these sources. Also included in Table 6, are local water sources other than Houston Creek. These local water sources within CLAWA's service area were estimated to have a safe yield of 1,620 ac-ft of water per year (CLAWA 1963). Although CLAWA does not currently use any local water source other than Houston Creek, other water purveyors within CLAWA's service area do. Since water from these sources is used in supplying the population within CLAWA's service territory and estimated future water demand is derived from the future population estimates, these other local water sources need to be included in the analysis.

Table 6
Projected Water Demand throughout CLAWA's Service Area

Sources	Year				
	2005	2010	2015	2020	2025
Projected CLAWA Deliveries (ac-ft/year)[6]	1,100 [1]	3,000	3,800	4,200	4,500
Projected Deliveries from Other Local Water Sources (ac-ft/year) [2]	2,000 [4]	1,600 [5]	1,600 [5]	1,600 [5]	1,600 [5]
Total Water Demand Projections for Entire Service Area (ac-ft/year) [3]	3,100	4,600	5,400	5,800	6,100

[1] Historical Data (lower than average demand year)
[2] Estimated from total water supply once SWP deliveries where subtracted
[3] Estimated using service area population (population x 125 gal/person-day)
[4] Local production increase due to higher than normal local precipitation
[5] Long term average for local water production (CLAWA 1963)
[6] See Figure 4 Average Demand curve

Reliability Comparison

Table 7 details estimated water supply projections associated with several water supply reliability scenarios. For further information on the data, see Three-year Minimum Supply and Water Shortage Contingency Plan sections.

Table 7
Historical SWP Supply Reliability

		Multiple Dry Water Years[1]		
Average/ Normal Water Year 2002 (Volume)	**Single Dry Water Year 1991 (Volume)**	**Year 1 1991 (Volume)**	**Year 2 1992 (Volume)**	**Year 3 1993 (Volume)**
4,060 (70%)	1,950 (34%)	1,950 (34%)	2,610 (45%)	5,800 (100%)

Unit of Measure: Ac-ft/Year

[1] Actual three driest years on record for CLAWA

Three Year Minimum Water Supply

The driest three years on record for CLAWA's water SWP supply was from 1991-1993. The approved allocations from the State were 34% (1,950 ac-ft actually approved based upon minimum deliveries necessary for domestic, health/safety, and fire fighting purposes), 45%, and 100% respectively. The average approved allocation over this period was 58% or 3,364 ac-ft. The next closest three-year period was from 2001-2003 when the average approved allocation was 66% or 3,828 ac-ft. It should be noted that CLAWA's average annual demand is not anticipated to reach 3,300 ac-ft in one year until approximately the year 2012. Therefore, on average, CLAWA should be able to supply average year demand for the next five to seven years even during a multiple dry year scenario.

Water Shortage Stages and Triggering Mechanisms

CLAWA has developed a staged plan designed for supply reductions to its wholesale customers of up to 40 percent, and limiting retail customers to a base-line amount. The Agency enacted Ordinance No. 44 in February of 1991, establishing a water conservation program and was implemented by Ordinance No. 45 in April of 1991.

These ordinances will implement the Agency's water shortage contingency plan. Copies are provided in Appendix E and F.

Response Plan for Catastrophic Interruption of Water Supplies

The most likely events which could cause CLAWA to sustain a catastrophic interruption in water supply are wildland fires, earthquakes, and system failure. CLAWA has recently prepared emergency response plans and participated in the preparation of a regional hazard mitigation plan. Each of these plans attempts to mitigate the effects of these catastrophic interruptions in water supply.

The primary effect of fires and earthquakes on water supply is the interruption of power throughout the San Bernardino Mountains. During the 2003 "Old Fire", most of CLAWA's service area was without power for approximately two weeks. CLAWA was able to successfully mitigate this situation by installing permanent standby generators at each of its main treatment, pumping, and operations facilities. The primary concern related to earthquakes is the potential damage to CLAWA's treatment, storage and distribution facilities. In order to minimize system damage during an earthquake, CLAWA's facilities have been designed in accordance with the most current building and safety requirements and have generally been constructed with multiple units to minimize the system disruption if a single unit is damaged.

CLAWA has also stockpiled various materials necessary to repair pipeline breaks and leaks in order to minimize outages during catastrophic events.

Transfer and Exchange Opportunities

Law

> **10631**. A plan shall be adopted in accordance with this chapter and shall do all of the following:
>
> **10631 (d)** Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

Water Transfers

CLAWA has been investigating opportunities to begin a long-term water storage agreement. CLAWA is seeking an arrangement which would allow the transfer of unused water, in years when SWP allocations exceed demand, to another water purveyor for storage. CLAWA would then have the right to utilize all or some of that stored water during years in which the SWP allocations did not meet demand. To date, CLAWA has not entered into such an agreement, but the Agency will continue investigating the possibility of such an arrangement.

In 2005, CLAWA entered into an agreement with the Lake Arrowhead Community Services District (LACSD) and San Bernardino Valley Municipal Water District (SBVMWD) to deliver water purchased from SBVMWD to the Lake Arrowhead woods area. This agreement provides that CLAWA will treat and deliver 7,600 ac-ft of water to LACSD over the next 10-15 years. The agreement also gives CLAWA the right to utilize a portion of the water to satisfy demands within the Agency's service area during years of low SWP allocation. The agreement does however limit the deliveries of water to LACSD and/or CLAWA to 15% of SBVMWD's approved allocations for that year. For example in a 10% SWP allocation year, SBVMWD's allocation would equal 10,260 ac-ft and no more than 15% of that total (1,539 ac-ft) could be delivered to LACSD and/or CLAWA. This transfer agreement will provide CLAWA with the ability to supplement its source of supply while seeking additional long-term storage agreements.

Water Use Provision

Law

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

10631 (e)(1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors including, but not necessarily limited to, all of the following uses:

(A) Single-family residential; **(B)** Multifamily; **(C)** Commercial; **(D)** Industrial; **(E)** Institutional and governmental; **(F)** Landscape; **(G)** Sales to other agencies; **(H)** Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof; and **(I)** Agricultural.

10631 (e)(2) The water use projections shall be in the same 5-year increments to 20 years or as far as data is available.

Water Use by Customer Type - Past, Current, and Future

As discussed previously, 92 percent of the customers within CLAWA's service area are served by other water purveyors but approximately 65 – 75 percent of CLAWA's water is delivered to CLAWA's wholesale customers. This is due to the fact that each of CLAWA's retail customers has their own source of local supply and utilize CLAWA's water as supplemental to their own local supply. Information is not available from CLAWA's purveyor customers to break down each purveyor's water use by customer sector. It has been estimated that approximately 97 percent of all connections in CLAWA's service area fall in the general/residential category; most of the rest are commercial. There are currently no industrial connections in CLAWA's area.

Water deliveries by CLAWA for the year 2003 are summarized in Table 8 and are intended to give a general breakdown of CLAWA's water deliveries by customer category. This table uses the categories by which CLAWA classifies its customers in the Agency's annual reports to the California Department of Health Services. In the future, CLAWA will attempt to modify its record keeping to use the customer sector categories identified in the Urban Water Management Planning Act (single family residential use, multifamily residential use, commercial use, industrial use, institutional and governmental use, landscape use, agricultural use, other uses, and sales to other agencies).

TABLE 8
CLAWA's 2003 Water Deliveries by Customer Category

CUSTOMERS	CLAWA's 2003 WATER DELIVERIES	
	Water Deliveries (ac-ft)	Percent of Water Deliveries (%)
Improvement District "A"	10	0.5
Improvement District "B"	173	8.4
Improvement District "C"	29	1.4
Improvement District "D"	135	6.5
Wholesale Customers	1,617	78.1
Other Retail Customers	107	5.1
Total Water Use	2,071	100

Source: Albert A. Webb Associates (2003 Annual Report to CDHS)

Water Purveyor Data

As described previously, CLAWA is primarily a water wholesaler. That is, the Agency contracts for State Water Project water, and in turn sells this water to public and private retail water purveyors in CLAWA's service area. It has always been the policy of CLAWA not to compete with other water purveyors for retail water service within the Agency. There are four improvement districts in which CLAWA acts as a water retailer directly to 1,179 customers. The Agency delivered approximately 2,071 ac-ft of water in 2003 (approximately 1,617 ac-ft), 78 percent of which was wholesale water and 22 percent was retail water.

CLAWA does not have any information regarding the retail customers of its wholesale customers. Additional information regarding those water purveyors could be found by consulting each individual purveyor or by consulting the California Department of Health Services and County of San Bernardino Department of Environmental Health Services records.

Demand Management Measures

Law

> **10631**. A plan shall be adopted in accordance with this chapter and shall do all of the following:
>
> **10631 (f)** Provide a description of the supplier's water demand management measures. This description shall include all of the following:
> **(1)** A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following:
> **(2)** A schedule of implementation for all water demand management measures proposed or described in the plan.
> **(3)** A description of the methods if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.
> **(4)** An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand.

The Crestline-Lake Arrowhead Water Agency has had a Water Conservation Program in effect since 1991. The program was prepared and submitted to the State Department of Water Resources as a condition of permits issued to CLAWA.

CLAWA has also become a member of the California Urban Water Conservation Council by executing the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU) (CUWCC 1994). The Council is a voluntary organization whose members agree to implement reasonable water conservation measures. The Memorandum of Understanding identifies specific Best Management Practices (BMPs) for water conservation. All signatory agencies have agreed to make a good faith effort to implement these BMPs.

CLAWA has committed itself to make a good faith effort to implement the BMPs that lie within its authority, are technically and economically reasonable, and are environmentally and socially acceptable. CLAWA's authority in this regard extends to its own activities and those of its direct retail customers. CLAWA's wholesale customers are independent entities, each of which is responsible for its own water management and water conservation efforts. CLAWA's water conservation programs are not applicable to its wholesale purveyors or their customers. Section 10620(c) of the Water Code provides:

> "An urban water supplier indirectly providing water shall not include planning elements in its urban water management plan . . . that would be applicable to urban water suppliers or public agencies directly providing water, or to their customers, without the consent of those suppliers or public agencies." [Emphasis added.]

CLAWA has advised all of its water purveyor wholesale customers of the preparation of this plan, and encourages purveyors to implement their own similar programs. CLAWA will also make the Memorandum of Understanding available to all purveyors, with the recommendation that they consider joining the Council.

CLAWA's customers and purveyors already use their water in an extremely efficient manner as compared to other areas of southern California. CLAWA's annual average water consumption is approximately 100-150 gallons/person/day depending on local precipitation. In other areas of California, water agencies are attempting to reduce their water consumption down from much higher gallon/person/day. The Agency's water rates are also much higher when compared to other areas. This rate structure contributes to efficient water use within CLAWA's service area.

Because water conservation is already strongly practiced within the Agency's service area, specific water conservation measures may yield less benefit in the CLAWA area than they would in other areas of the state which use more water on a per capita basis. For this reason, the reasonableness and effectiveness of each proposed conservation measure needs to be carefully analyzed in light of the conditions unique to the San Bernardino Mountains area.

The following sections identify each BMP as defined in the MOU (in boxed text), and discuss CLAWA's activities related to it. Signatories of the MOU are not required to provide detailed discussion and analysis of each BMP in their Urban Water Management Plans. The following discussion covers some of CLAWA's existing practices and highlights some issues which will be evaluated in more detail by CLAWA in the future.

BMP 1 Interior and Exterior Water Audits and Incentive Programs for Single Family Residential, Multifamily Residential, and Governmental/Institutional Customers

CLAWA does not currently perform water audits for its customers. The California Department of Water Resources has published a Water Efficiency Guide for Business Managers and Facility Engineers (DWR 1994) which provides detailed guidance to users for conducting water audits of their facilities. This publication is available free and includes many specific suggestions for water conservation tailored to particular categories of businesses and facilities. Agency staff will review this guide to evaluate its potential usefulness to Agency customers.

BMP 2 Plumbing, New and Retrofit

Implementation methods shall be at least as effective as delivering retrofit kits including high quality low-flow showerheads to pre-1980 homes that do not have them and toilet displacement devices or other devices to reduce flush volume for each home that does not already have ULF toilets; offering to install the devices; and following up at least three times.

a. Enforcement of Water Conserving Plumbing Fixture Standards Including Requirement for Ultra Low Flush ("ULF") Toilets in All New Construction Beginning January 1, 1992

The State of California has mandated the use of low flow fixtures in new construction.

b. Support of State and Federal Legislation Prohibiting Sale of Toilets Using More than 1.6 Gallons per Flush

Status of BMP 2b: Inactive. State legislation prohibiting sale of toilets using more than 1.6 gallons per flush was enacted in October, 1992.]"

The Agency is not currently involved in code enforcement that would prohibit the sales of toilets using more than 1.6 gallons per flush.

c. Plumbing Retrofit

In 1978, CLAWA purchased and distributed water conservation kits to all customers within its own retail service area. These kits included toilet displacement devices, shower flow restrictors, dye tablets for detecting leaks, and water conservation pamphlets. CLAWA purchased water conservation kits again in 1988 consisting of the same materials. CLAWA distributed these kits to retail customers who could be contacted at their premises. Those who could not be contacted received notices from CLAWA that the kits were available for their use.

In addition, a kit was mailed to each of CLAWA's wholesale purveyor customers along with a notice encouraging each of them to implement similar water conservation measures within their own retail service areas. A number of these wholesale customers obtained water conservation kits for distribution to their retail customers. In some cases, these kits were obtained from CLAWA's stockpile; in at least one case, a wholesale customer arranged separately to purchase water conservation kits from another source.

As part of its Water Conservation Program established in January 1991, CLAWA has continued to provide these water conservation kits at no charge to any interested customer (CLAWA 1991). CLAWA also sends notices to its customers periodically reminding them that these conservation kits are available.
Source: (CLAWA Water Conservation Plan)

BMP 3 Distribution System Water Audits, Leak Detection and Repair

Implementation methods shall be, at least as effective as, once every three years completing a water audit of the water supplier's distribution system using methodology such as that described in the American Water Works Association's "Manual of Water Supply Practices, Water Audits and Leak Detection"; advising customers whenever it appears possible that leaks exist on the customers' side of the meter; and performing distribution system leak detection and repair whenever the audit reveals that it would be cost effective.

Corrosion of water mains and pipes can eventually result in leaks and other problems. Therefore, CLAWA will include corrosion control measures in its overall water

conservation program. As part of this corrosion control effort, CLAWA has expanded and improved its treatment plant in order to meet drinking water quality requirements. CLAWA's treatment process now includes pH adjustment which significantly lessens the corrosivity index of CLAWA's water.

CLAWA will also begin a program to refurbish its main line appurtenances. As part of this refurbishment, the main line appurtenances will be replaced with corrosion-resistant materials.

CLAWA began a valve exercising program in 1989 by hiring a contractor to examine each valve in its wholesale distribution system and to exercise, grease, and repair valves where necessary. Thus, if CLAWA has a leak problem, it will be able to isolate the problem relatively quickly to minimize water waste.

CLAWA will continue to check every valve every two to three years and will extend this program to cover inspection of retail valves as well.

CLAWA has installed a clarifying unit in its treatment plant to remove turbidity from the backwash water. The backwash water is then reclaimed and re-circulated back to the headwaters of the treatment plant. A lift station boosts the backwash water up to two water storage tanks and then to the clarifying unit. Using this new clarifying unit will result in reclaiming all backwash water from the treatment plant which was previously lost.

Source: (CLAWA's Water Conservation Plan)

BMP 4 Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections

Implementation methods shall be, requiring meters for all new connections and billing by volume of use; and establishing a program for retrofitting any existing un-metered connections and billing by volume of use; for example, through a requirement that all connections be retrofitted at or within six months of resale of the property or retrofitted by neighborhood.

CLAWA has 16 wholesale customers, four improvement districts which serve approximately 1,179 retail connections. CLAWA's system is completely metered. Meters are regularly serviced and replaced as necessary to ensure the accurate recording of water quantity delivered. CLAWA's rate structure is based upon the quantity of water delivered, not upon a flat rate regardless of quantity delivered.

BMP 5 Large Landscape Water Audits and Incentives

Implementation methods shall be at least as effective as identifying all irrigators of large (at least 3 acres) landscapes (e.g., golf courses, green belts, common areas, multi-family housing landscapes, schools, business parks, cemeteries, parks and publicly owned landscapes on or adjacent to road rights-of-way); contacting them directly (by mail and/or telephone); offering landscape audits using methodology such as that described in the Landscape Water Management

Handbook prepared for the California Department of Water Resources; and cost-effective incentives sufficient to achieve customer implementation; providing follow-up audits at least once every five years; and providing multi-lingual training and information necessary for implementation.

There are no irrigators of large landscapes within CLAWA's service area.

BMP 6 Landscape Water Conservation Requirements for New and Existing Commercial, Industrial, Institutional, Governmental, and Multifamily Developments

Implementation methods shall be enacting and implementing landscape water conservation ordinances, or if the supplier does not have the authority to enact ordinances, cooperating with cities, counties and the green industry in the service area to develop and implement landscape water conservation ordinances pursuant to the 'Water Conservation in Landscaping Act' ("Act") (California Government Code 65590 et seq.). The ordinance shall be at least as effective as the Model Water Efficient Landscape Ordinance being developed by the Department of Water Resources. A study of the effectiveness of this BMP will be initiated within two years of the date local agencies must adopt ordinances under the Act.

The Agency does not have specific landscape water conservation reviews; however, it does review water use during its Will-Serve and Application for Water Service process.

BMP 7 Public Information

Implementation methods shall be at least as effective as ongoing programs promoting water conservation and conservation related benefits including providing speakers to community groups and the media; using paid and public service advertising; using bill inserts; providing information on customers' bills showing use in gallons per day for the last billing period compared to the same period the year before; providing public information to promote other water conservation practices; and coordinating with other governmental agencies, industry groups and public interest groups.

CLAWA will implement a public information program regarding water conservation. This program consists of several components.

First, CLAWA will place a fact sheet regarding water conservation along with the water quality report it sends annually to its customers. CLAWA will also utilize the Agency website to post relevant information regarding water conservation. As noted in the Department of Water Resources' "Water Conservation Reference Manual, Urban Conservation Measures" (March 1984), fact sheets are easy to update and work well for "changeable information." CLAWA's fact sheet will indicate how water users can conserve water (e.g., around the home) and will describe the measures that CLAWA itself is using to conserve its overall supply.

Second, in the past, CLAWA has posted outdoor signs near public streets and roadways throughout its service area reminding its customers to conserve water. CLAWA will refurbish and repaint these signs and will assure that the signs are placed in strategic locations.

Third, CLAWA will issue press releases on a periodic basis in the local newspaper urging water conservation and suggesting ways to reduce water use.

Fourth, CLAWA will send each customer an annual notice reminding customers to winterize their pipes to prevent breakage and leaking during the winter months. This notice will also indicate that CLAWA is entitled to shut off service to property if it suspects that breaks or leaks have occurred.
Source: (CLAWA's Water Conservation Plan)

BMP 8 School Education

Implementation methods shall be, at least as effective as, ongoing programs promoting water conservation and conservation related benefits including working with the school districts in the water supplier's service area to provide educational materials and instructional assistance.

CLAWA does not currently offer a school education program, although the Agency will provide speakers to schools upon request.

BMP 9 Commercial and Industrial Water Conservation

Implementation methods shall be at least as effective as assuring the review of proposed water uses for new commercial and industrial water service and making recommendations for improved water use efficiency before completion of the building permit process.

CLAWA does not currently have a program of contacting high water users. However, the Agency does work closely with water users upon request.

BMP 10 New Commercial and Industrial Water Use Review

Implementation methods shall be at least as effective as assuring the review of proposed water uses for new commercial and industrial water service and making recommendations for improved water use efficiency before completion of the building permit process.

CLAWA reviews water use during its Will-Serve and Application for Water Service process. CLAWA serves few commercial accounts and no industrial users.

BMP 11 Conservation Pricing

Implementation methods shall be at least as effective as eliminating non-conserving pricing and adopting conserving pricing. For signatories supplying both water and sewer service, this BMP applies to pricing of both water and sewer service. Signatories that supply water but not sewer service shall make good faith efforts to work with sewer agencies so that those sewer agencies adopt conservation pricing for sewer service.
"Non-conserving pricing provides no incentives to customers to reduce use. Such pricing is characterized by one or more of the following components:
"a. Rates in which the unit price decreases as the quantity used increases (declining block rates);
"b. Rates that involve charging customers a fixed amount per billing cycle regardless of the quantity used;
"c. Pricing in which the typical bill is determined by high fixed charges and low commodity charges.
"Conservation pricing provides incentives to customers to reduce average or park use, or both. Such pricing includes:
"a. Rates designed to recover the cost of providing service; and
"b. Billing for water and sewer service based on metered water use.
"Conservation pricing is also characterized by one or more of the following components:
"c. Rates in which the unit rate is constant regardless of the quantity used (uniform rates) or increases as the quantity used decreases (increasing block rates);
"d. Seasonal rates or excess-use surcharges to reduce peak demands during summer months;
"e. Rates based upon the long-run marginal cost or the cost of adding the next unit or capacity to the system;
"f. Lifeline rates.

CLAWA implements conservation pricing in its rate schedule in accordance with item a, b, and c in the conservation pricing guidelines above. The Agency's water rates are based on cost of providing service, metered water use and no change in water regardless of usage.

BMP 12 Residential Landscape Water Conservation for New and Existing Single Family Homes

Implementation methods shall be at least as effective as providing guidelines, information and incentives for installation of more efficient landscapes and water saving practices (e.g., encouraging local nurseries to promote sales and use of low water using plants, providing landscape water conservation materials in new home owner packets and water bills, sponsoring demonstration gardens); and enacting and implementing landscape water conservation ordinances or, if the supplier does not have the authority to enact ordinances, cooperating with cities, counties, and the green industry in the service area to develop and implement landscape water conservation ordinances pursuant to the 'Water Conservation in Landscaping Act' ("Act") (California Government Code a65590 et seq.). The ordinance shall be at least as effective as the Model Water Efficient Landscape Ordinance being developed by the Department of Water Resources.

Although the Agency does not have specific landscape water conservation reviews for single family homes, it does review water use during its Will-Serve and Application for Water Service process.

BMP 13 Water Waste Prohibition

Implementation methods shall be enacting and enforcing measures prohibiting gutter flooding, single pass cooling systems in new connections, nonrecirculating systems in all new conveyer car wash and commercial laundry systems, and nonrecycling decorative water fountains. "Signatories shall also support efforts to develop state law regarding exchange-type water softeners that would: (1) allow the sale of only more efficient, demand-initiated regenerating (DIR) models; (2) develop minimum appliance efficiency standards that (a) increase the regeneration efficiency standard to at least 3,350 grains of hardness removed per pound of common salt used; and (b) implement an identified maximum number of gallons discharged per gallon of soft water produced; (3) allow local agencies, including municipalities and special districts, to set more stringent standards and/or to ban on-site regeneration of water softeners if it is demonstrated and found by the agency governing board that there is an adverse effect on the reclaimed water or groundwater supply.

Signatories shall also include water softener checks in home water audit programs and include information about DIR and exchange-type water softeners in their educational efforts to encourage replacement of less efficient timer models.

Ordinance No. 44 prohibits water waste during times of water shortage and discourages excessive water use at any time. These prohibitions include running water into streets or gutters, washing of autos or buildings, ornamental water use, leaks, as well as other restrictions.

BMP 14 - Water Conservation Coordinator

Implementation methods shall be at least as effective as designating a water conservation coordinator responsible for preparing the conservation plan, managing its implementation, and evaluating the results. For very small water suppliers, this might be a part-time responsibility. For larger suppliers this would be a full-time responsibility with additional staff as appropriate. This work should be coordinated with the supplier's operations and planning staff.

The Agency does not currently have a formally appointed water conservation coordinator. This duty falls under the Field Superintendent position.

BMP 15 - Financial Incentives

Implementation methods shall be at least as effective as:
a. Offering financial incentives to facilitate implementation of conservation programs. Initial recommendations for such incentives will be developed by the Council within two years of the initial signing of the MOU, including incentives to improve the efficiency of landscape water use; and
b. Financial incentives offered by wholesale water suppliers to their customers to achieve conservation

The Agency offers financial incentives for water conservation in its retail water rate structure by charging a basic rate per cubic foot of water used up to a base amount. Rates are increased per cubic foot above the base amount. Rates become more restrictive during times of shortage.

BMP 16 - Ultra-Low Flush Toilet Replacement

> *Water suppliers agree to implement programs for replacement of existing high-water-using toilets with ultra-low-flush toilets (1.6 gallons or less) in residential, commercial, and industrial buildings. Such programs will be at least as effective as offering rebates of up to $100 for each replacement that would not have occurred without the rebate, or requiring replacement at the time of resale, or requiring replacement at the time of change of service. . . .*

This BMP requires detailed analysis to assess its feasibility in the Agency's case. The MOU contains additional technical materials spelling out analytical approaches and assumptions which can be used to evaluate the feasibility of this specific measure (CUWCC 1994). The circumstances in CLAWA's service area are such that the advisability of implementing ultra-low-flush toilet replacement is in question. The MOU does provide for exemptions from particular BMPs under certain conditions. Further analysis will be undertaken for the Agency.

Planned Water Supply Projects and Programs

Law

> **10631 (h)** Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

There are currently no proposed projects to directly provide additional water supply. As stated previously, CLAWA has a set SWP Table "A" amount (5,800 ac-ft/year) of water and there are no groundwater supplies being utilized by CLAWA. The Agency is, however, pursuing long-term storage to supplement supply during low allocation years. The Agency will strive to make up to 1,000-1,500 ac-ft/year available to supplement supply as a result of storage and transfer agreements.

The Agency does have a temporary (10-15 year) agreement in place with LACSD and SBVMWD as described in the Transfer and Exchange section. This agreement allows the Agency to receive water from SBVMWD's SWP Table "A" water for use within the Agency.

Water Shortage Contingency Plan

Law

> **10632** The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:
>
> **10632 (a)** Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a fifty percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage.
>
> **10632 (b)** An estimate of the water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.

Stages of Action

As all of CLAWA's supplies are for municipal purposes, it has been less affected than some agencies by deficiencies in deliveries of agricultural water from the SWP. CLAWA has an ultimate Table A amount to 5,800 ac-ft water annually from the State Water Project. The Agency's need for its full Table A amount is several decades in the future. It is anticipated that as the demand for CLAWA water increases and nears 70% of the Agency's 5,800 ac-ft Table A amount (4,060 ac-ft), the Agency will have additional water available for use. The additional water will be made up primarily from two sources. The first will be water available through long-term storage and transfer agreements and the second is the purchase of additional Table A amount. The Agency feels that 70% of its total Table A amount should be able to cover the Agency's average yearly demand.

Houston Creek is CLAWA's local water supply. CLAWA's appropriative rights to Houston Creek together with State Water Project deliveries creates a more reliable water supply in that Houston Creek is able to supplement CLAWA's total water supply when droughts in Northern California reduce State Water Project deliveries. As an example, in 1992-93 an extended drought in Northern California forced the Department of Water Resources to cut in half its State Water Project deliveries to CLAWA. CLAWA was able to use water from Houston Creek to supplement its supply.

Table 9 lists the estimated minimum water supply available over the next three years based upon the driest three year sequence on record for the Agency. Based upon this data, CLAWA will be able to meet its delivery projections over the next five years.

Table 9
Three-Year Estimated Minimum Water Supply – AF/Year

Source	Year 1	Year 2	Year 3	Average
SWP	1,950	2,610	5,800	4,060
Houston Creek	472	692	617	433
Total	2,422	3,302	6,417	4,493

Water Shortage Emergency Response

Law

> **10632** The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:
>
> **10632 (c)** Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.

Catastrophic Supply Interruption Plan

The most likely events which could cause CLAWA to sustain a catastrophic interruption in water supply are wildland fires, earthquakes, and system failure. CLAWA has recently prepared emergency response plans and a participated in the preparation of a regional hazard mitigation plan. Each of these plans attempts to mitigate the effects of these catastrophic interruptions in water supply.

The primary effect of fires and earthquakes on water supply is the interruption of power throughout the San Bernardino Mountains. During the 2003 Old Fire, most of CLAWA's service area was without power for approximately two weeks. CLAWA was able to successfully mitigate this situation by installing standby generators at each of its main treatment, pumping, and operations facilities. The primary concern related to earthquakes is the potential damage to CLAWA's treatment, storage and distribution facilities. In order to minimize system damage during and earthquake, CLAWA's facilities have been designed in accordance with the most current building and safety requirements and have generally been constructed with multiple units minimize the system disruption if a single unit is damaged.

The Department of Water Resources has assured that water requests by CLAWA for State Water Project water would be honored to a minimum of 1,950 ac-ft per year even during extended droughts for domestic, health/safety, and fire fighting purposes. Assuming a worst-case scenario that no local water supplies are available, this is the estimated total worst-case water supply projection.

Table 10
Preparation Actions for a Catastrophe

Possible Catastrophe	Summary of Actions
Regional power outage	Standby generators have been installed at all critical facilities to ensure continuous operation during a power outage. Staff will monitor facilities to ensure proper operation.
Earthquake	CLAWA's facilities have been designed and retrofitted if necessary to ensure safety during seismic events. CLAWA has also stockpiled essential materials to fix broken or leaking pipelines throughout the transmission and distribution systems. Standby generators have been installed at all critical facilities to ensure continuous operation during a power outage. Staff will monitor facilities to ensure proper operation.
Wildland Fires	CLAWA field crew actively performs weed abatement to minimize potential damage to facilities during fires. Standby generators have been installed at all critical facilities to ensure continuous operation during a power outage. Staff will monitor facilities to ensure proper operation.

Prohibitions, Penalties, and Consumption Reduction Methods

Law

> **10632**. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:
>
> **10632 (d)** Additional Mandatory Prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.
>
> **10632 (e)** Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.
>
> **10632 (f)** Penalties or charges for excessive use, where applicable.

Mandatory Prohibitions on Wasting Water

Ordinance No. 44 contains mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting using water to wash cars or buildings. Please see Appendix E for specifics on wasteful practices which are prohibited by Ordinance No. 44.

Consumption Reduction Methods in the Most Restrictive Stages

CLAWA's water conservation ordinance includes methods to reduce consumption on a staged basis.

For wholesale customers, CLAWA will use 2004 as a base year and determine the amount of water which the Agency delivered to each wholesale customer during each month of 2004. Each wholesale customer will then be allowed to receive from CLAWA, each month, a percentage of the quantity of water which the Agency delivered to that wholesale customer during the corresponding month of the base year. Each stage progressively reduces the percentage of the base year allocation as water shortages worsen.

All retail customers are charged a base rate up to a certain quantity of water without payment of an additional charge. During a water shortage, surcharges for water consumption in excess of the base quantity are increased in each restrictive stage.

The ordinance also provides for increasingly stringent prohibitions of nonessential uses of water.

Penalties or Charges for Excessive Use

Ordinance No 44, Section 4A, includes surcharges for water use in excess of a basic allocation. Both the allocation and the surcharges become more stringent in more severe water shortages.

Water Shortage Contingency Plan

Law

> **10632**. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:
>
> **10632 (g)** An analysis of the impact if each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water suppliers, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.

Effects of Water Shortage on CLAWA Revenues and Expenditures

CLAWA currently has sufficient funds to cover yearly shortfalls in revenue as a result of decreased water supply and deliveries. In 2005, the Agency created separate accounts within the general fund in order to allocate money for things such as capital improvement projects, debt service, and operations.

Draft Water Shortage Contingency Resolution or Ordinance

CLAWA's Water Shortage Contingency Resolution has already been enacted. Please see Appendix F, Resolution 475, Resolution of the Board of Directors of Crestline-Lake Arrowhead Water Agency Adopting an Urban Water Shortage Contingency Plan.

Mechanism to Determine Reductions in Water Use

CLAWA monitors its water supply, use, and system losses on a monthly basis. When a water shortage occurs and a stage of water conservation is declared, Agency staff will continue to monitor water use in order to determine actual reductions in water use.

Water Shortage Stages and Triggering Mechanisms

CLAWA has developed a staged plan designed for supply reductions to its wholesale customers of up to 40 percent, and limiting retail customers to a base-line amount. The Agency enacted Ordinance No. 44 in February of 1991, establishing a water conservation program and was implemented by Ordinance No. 45 in April of 1991.

These ordinances will implement the Agency's water conservation plan. Copies are provided in Appendix E and F.

Water Shortage Contingency Plan

Law

> **10632 (h)** A draft water shortage contingency resolution or ordinance.
>
> **10632 (i)** A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

Supply Mitigation

In addition to the water shortage contingency plan, the Agency is developing means to mitigate the effects of low allocation years on the SWP. Figure 9 depicts a scenario in which the average demand within the Agency is greater than the available supply. As shown in the figure, the mitigation measures currently available to CLAWA to reduce and replace the shortfall are as follows.

- Implement mandatory conservation effort as described in the Agency's conservation plan to reduce the actual demand. As shown in the figure, it is anticipated that a reduction of 500 ac-ft of water demand can be achieved through conservation.
- Utililize the water available as part of the water transfer agreement with LACSD and SBVMWD (discussed previously in section titled Transfers and Exchange. As shown in the figure, it is anticipated that 500 ac-ft of additional water supply can be achieved through this transfer in any given year until the expiration of this agreement in the year 2020. As the Agency's demand continues to increase, it would be appropriate to request additional water be guaranteed by DWR for basic health and human safety. Currently the Agency has assurances from DWR that no less than 1,950 ac-ft of water will be delivered in any one year for these purposes.
- During critically dry years, additional drought relief water is typically available through DWR for purchase by the state water contractors at a higher price. The Agency plans to utilize such water to further supplement supply if necessary.
- Long-term storage continues to be a need for the Agency. Preliminary talks have taken place between CLAWA and other local state water contractors to explore long-term storage and transfer agreements. To date the Agency does not have storage and transfer agreements with the exception of utilizing water from the LACSD/SBVMWD transfer agreement.

Long – Term Storage

As previously discussed, CLAWA is pursuing long-term storage and transfer agreements. Figure 10 depicts water available to be stored when supply exceeds demand.

Additional SWP Table "A" Supply

The Agency's long-term average demand will eventually meet or exceed the long-term average supply of the SWP. It is currently projected to occur after the year 2015 as shown in Figure 11. When this occurs it will be necessary for the Agency to have the ability to supplement its supply available. Long-term storage and transfer agreements will be able to mitigate some of the shortfall but the yearly average supply will be less than the yearly average demand and the Agency will have an annual deficit in source of supply. At some point prior to this deficit occurring, the Agency will seek to purchase additional SWP Table "A" water. There are currently sales of Table "A" water occurring amongst the state water contractors. CLAWA will monitor this situation and determine when the appropriate time is to make that purchase.

Figure 9
Low Water Supply Mitigation Measures

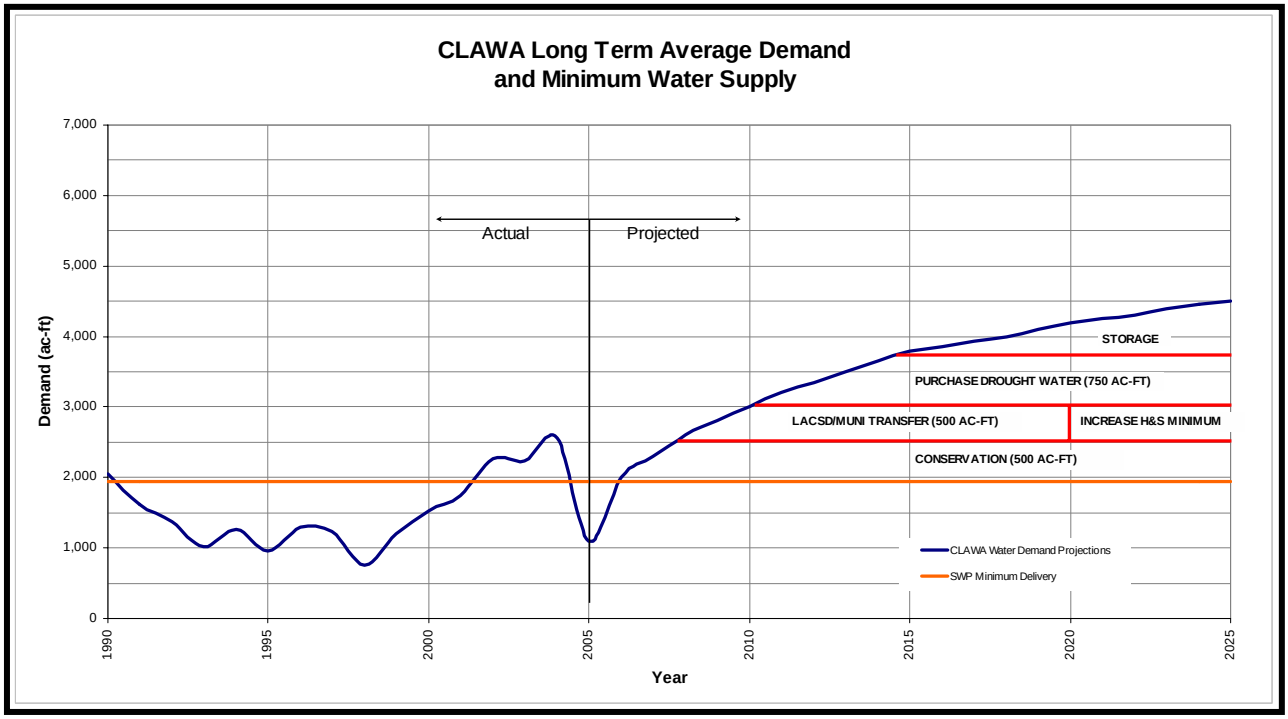


Figure 10
Potential Water Storage

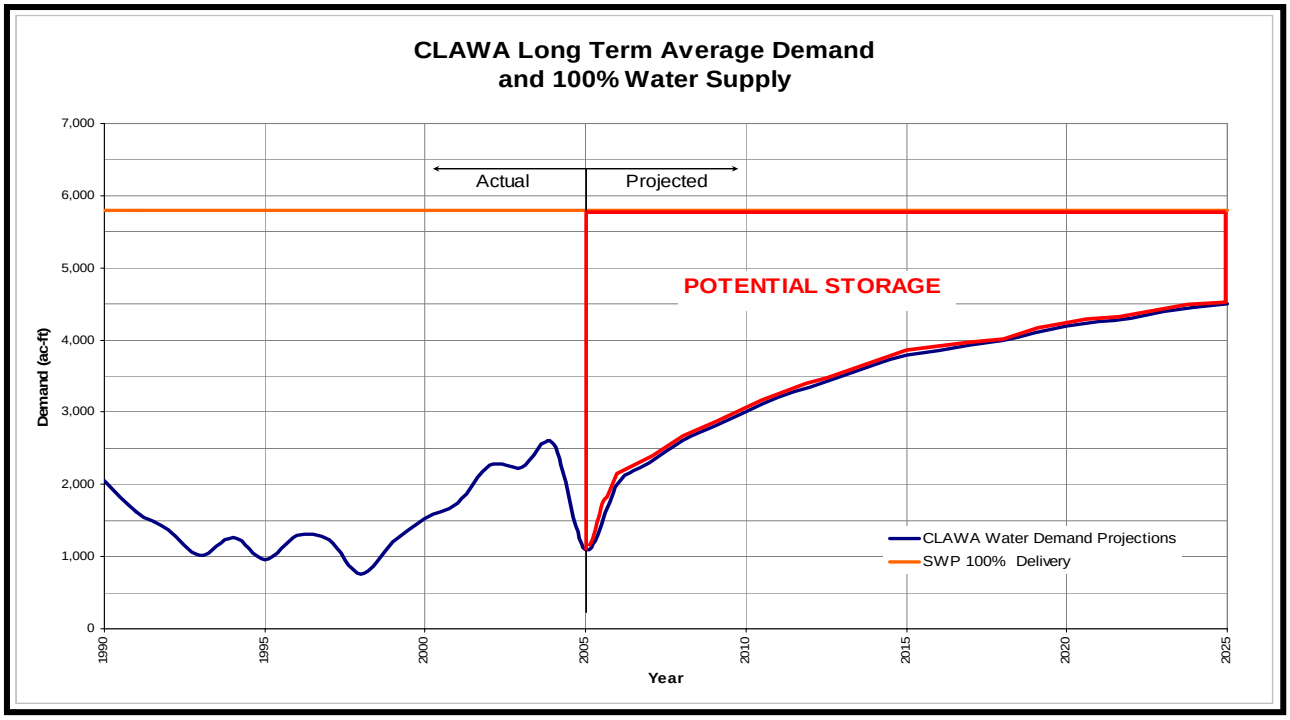
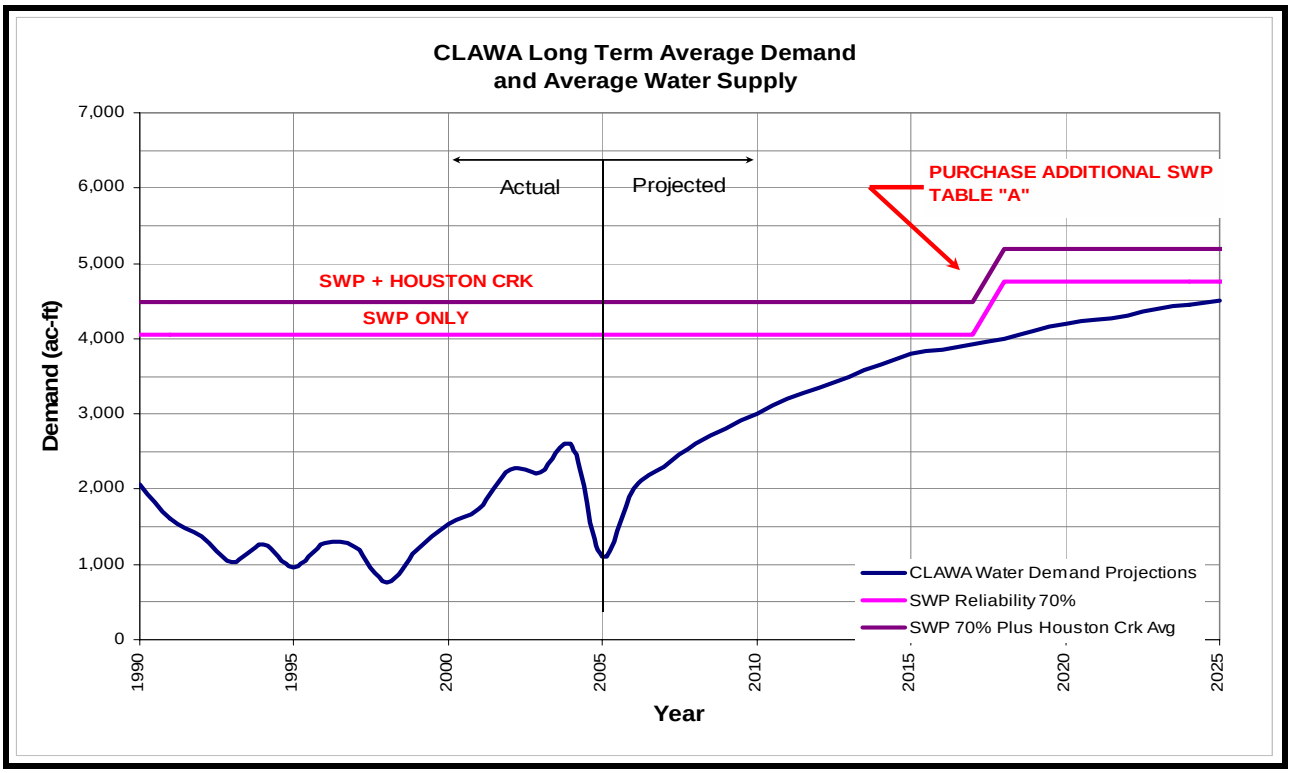


Figure 11
Potential Purchase of Additional SWP Table "A" Water



Wastewater System Description and Water Recycling

Law

> **10633.** The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. To the extent practicable, the preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies and shall include all of the following:
>
> **10633 (a)** A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.
>
> **10633 (b)** A description of the recycled water currently being used in the supplier's service area, including but not limited to, the type, place and quantity of use.
>
> **10633 (c)** A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

Wastewater Collection and Treatment in the CLAWA Service Area

There are three agencies which provide wastewater collection and treatment service in parts of CLAWA's service area and sphere of influence. They are the Crestline Sanitation District, Running Springs Water District, and Lake Arrowhead Community Services District.

Crestline Sanitation District

The Crestline Sanitation District (CSD) is a special district of San Bernardino County, formed in 1946. Crestline Sanitation District operates three small wastewater treatment plants, with a combined treatment capacity of 4.3 ac-ft per day (af/d) or 1.4 MGD in the San Bernardino National Forest. The Houston Creek wastewater treatment plant, located north of Lake Gregory, has a treatment capacity of 2.2 af/d. The Seeley Creek treatment plant, located north of Valley of Enchantment, has 1.5 acre-foot capacity, and the Cleghorn facility, southwest of Lake Silverwood, has capacity of 0.6 ac-ft. CSD also disposes of effluent from the Pilot Rock Treatment Plant, located in Miller Canyon north of Crestline, which is owned by the California Department of Forestry and has a treatment capacity of 0.3 af/d.

Running Springs Water District

Running Springs Water District (RSWD) is a San Bernardino County special district formed in 1958 and authorized to provide water, sewer, sanitation, fire, and park and recreation services. RSWD provides wastewater collection and treatment for the communities of Running Springs, Fredalba, and Smiley Park.

The District operates a single wastewater treatment facility, the Running Springs Water Pollution Control Plant, which is located approximately one-quarter mile south of Smiley Park. The plant's treatment capacity is approximately 3.1 af/d.

Lake Arrowhead Community Services District

There is presently no recycled water use in LACSD's service area. Between 1994 and 2004 the District treated an average annual wastewater flow of 1.32 million gallons per day (mgd) or 1,479 AFY. The District currently produces between 1,500 and 2,000 AFY of treated wastewater that is conveyed through an outfall pipeline to the District's disposal facility in the City of Hesperia. This disposal site consists of groundwater recharge into the Mojave Basin.

In the past, Federal and state laws, administered by the State Water Resources Control Board, Lahontan Region (Regional Board) prohibited the use of recycled water in the District service area because the rules governing discharge of waters of a waste origin were not permitted to be used in locations above 3,200 feet in elevation.

In January 2003, The District made a request for a Basin Plan amendment that would allow the discharge of waters that are of waste origin above 3,200-foot elevation. In early September 2003, the Regional Board recommended approval of the Basin Plan Amendment. The amendment was reviewed and approved by the State Water Resources Control Board and the US Environmental Protection Agency in 2004. These changes have allowed the District to proceed with the implementation of a recycled water program which when completed will supply approximately 1 mgd of recycled water for outdoor irrigation in the Grass Valley Basin.

The District currently operates two wastewater treatment plants; 1) the Grass Valley Wastewater Treatment Plant (GVWWTP) and, 2) the Willow Creek Wastewater Treatment Plant (WCWWTP). The District is currently designing improvements to the wastewater treatment process at the GVWWTP so that the effluent will qualify as "recycled" water that can be beneficially used in the District's service area for outdoor irrigation.

Current Use of Recycled Water

There is no use of reclaimed water in the CLAWA service area at this time.

Encouraging Recycled Water Use

Law

> **10633**. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. To the extent practicable, the preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies and shall include all of the following:
>
> **10633 (d)** The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.
>
> **10633 (e)** A description of actions, including financial incentives, which may be taken to encourage the use of recycled water , and the projected results of these actions in terms of ac-ft of recycled water used per year.
>
> **10633 (f)** A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

Potential Uses of Recycled Water

The potential applications of recycled water within CLAWA are limited as a result of natural conditions and development patterns. The terrain in CLAWA's service area is steep and irregular, winters are severe, and maintenance of natural forest conditions is preferred. As a result, most lots have little landscaped area that requires irrigation. There are very few uses classified as industrial in the CLAWA service area, hence no potential market for industrial use of reclaimed water. Most commercial uses are also fairly small. There are virtually no agricultural/irrigation uses. The lack of potential major users of recycled water makes the economic feasibility of constructing dual water systems questionable.

There is a potential to use recycled water for wildlife habitat and wetland enhancement within the National Forest. The Forest Service is interested in exploring opportunities for water reuse. However, regulatory constraints would have to be overcome to make this possible.

The California Regional Water Quality Control Board, Lahontan Region, has had a longstanding prohibition against the use of recycled water at elevations above 3,200 feet in the San Bernardino Mountains. In January 2003, a request for a Basin Plan amendment was filed. The amendment would allow the discharge of treated waters that

are of waste origin above 3,200-foot elevation. In early September 2003, the Regional Board recommended approval of the Basin Plan Amendment. The amendment was reviewed and approved by the State Water Resources Control Board and the US Environmental Protection Agency in 2004. These changes will allow recycled water projects to proceed.

The area served by CLAWA and the three wastewater agencies (CSD, RSWD, and LACSD) have been subject to these discharge prohibitions. In addition, large areas served by the districts are tributary to lakes which are sources of public drinking water supply. It is not known whether the Regional Board will grant exemptions for discharge of reclaimed wastewater under these circumstances. In the absence of an exemption, no reuse of recycled water is possible.

Running Springs Water District is exploring ways to use its treated effluent in the mountain area. RSWD is also seeking approval to discharge up to 100,000 gpd of effluent in spray irrigation on 20 acres of land owned by the District adjacent to its treatment plant. In the long term, one potential use of reclaimed water being considered by RSWD would extend this irrigation activity eastward along the mountain to create a greenbelt that would help protect the area from fire. Over time, such a program could make use of all of the District's effluent.

Water Quality Impacts on Reliability

Law

> **10634**. The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.

The quality of the Agency's potable water supply has been historically very good. However, since 2003 it has been superior, and satisfied every standard established by the State Department of Health Services and the Environmental Protection Agency.

In January of 2003 the Agency placed four granular activated carbon (GAC) vessels in service at its treatment plant site to reduce the level of trihalomethanes (THMs) in the drinking water supply and to improve the taste of the treated water. That proved to be an outstanding success, reducing THMs to levels far below the levels permitted by the Health Department. In June of that same year, the Agency installed a second set of four additional GAC vessels at the treatment plant site to accommodate increased flows resulting from the increased demand experienced during the summer. In March of 2004, the Agency installed the third set of four additional GAC vessels, for a total of 12 GAC vessels at the treatment plant site to handle current maximum plant design capacity. The GAC treatment is expected to provide a permanent solution to the THM problem.

In addition to the GAC treatment system, the Agency installed a pH control system at the Lake Silverwood Water Treatment Plant. This system has greatly reduced the corrosivity of the Agency's water entering the distribution system and has also enhanced the Agency's water quality.

The Agency does not anticipate any supply reductions in the future due to water quality problems associated with the SWP.

Water Service Reliability

Law

10635 (a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional or local agency population projections within the service area of the urban water supplier.

10635 (b) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.

10635 (c) Nothing in this article is intended to create a right or entitlement to water service or any specific level of water service.

10635 (d) Nothing in this article is intended to change existing law concerning an urban water supplier's obligation to provide water service to its existing customers or to any potential future customers.

Projected Normal Water Year Supply – AF/Y

	2010	2015	2020	2025
Supply	4,493	4,493	4,493	4,493
% of Table A	70%	70%	70%	70%

Projected Normal Water Year Demand – AF/Y

	2010	2015	2020	2025
Demand	3,000	3,800	4,200	4,500
% of year 2005*	272	336	381	409

* 2005 was unusually low demand year

Projected Normal Year Supply and Demand Comparison – AF/Y

	2010	2015	2020	2025
Supply totals	4,493	4,493	4,493	4,493
Demand totals	3,000	3,700	4,200	4,500
Difference (supply minus demand)	1,493	793	293	-7
Difference as % of Supply	33%	18%	7%	0%
Difference as % of Demand	50%	22%	7%	0%

Projected Single Dry Year Water Year Supply – AF/Y

	2010	2015	2020	2025
Supply	1,950	1,950	1,950	1,950
% of Table A	34%	34%	34%	34%

Projected Single Dry Year Water Year Demand – AF/Y

	2010	2015	2020	2025
Demand	3,000	3,800	4,200	4,500
% of Average Year	100%	100%	100%	100%

Projected Single Dry Year Supply and Demand Comparison – AF/Y

	2010	2015	2020	2025
Supply totals (34% Allocation)	1,950	1,950	1,950	1,950
Demand totals	3,000	3,800	4,200	4,500
Difference (supply minus demand)	-1,050	-1,750	-2,250	-2,550
Difference as % of Supply	-54%	-90%	-115%	-131%
Difference as % of Demand	-35%	-47%	-54%	-56%

Projected supply during Multiple Dry Year period ending in 2010 – AF/Y

	2006	2007	2008	2009	2010
Supply*	1,950	2,610	5,800	2,900	5,800
% of Table A	34%	45%	100%	50%	100%

* Based upon years 1991 – 1995, which are the driest five years on record for CLAWA.

Projected demand Multiple Dry Year period ending in 2010 – AF/Y

	2006	2007	2008	2009	2010
Demand	2000	2300	2600	2800	3000
% of Average Year	100%	100%	100%	100%	100%

Projected Supply & Demand Comparison during Multiple Dry Year period ending in 2010 – AF/Y

	2006	2007	2008	2009	2010
Supply totals	1,950	2,610	5,800	2,900	5,800
Demand totals	2,000	2,300	2,600	2,800	3,000
Difference (supply minus demand)	-50	310	3,200	100	2,800
Difference as % of Supply	-2.5%	12%	55%	3.4%	48%
Difference as % of Demand	-1.7%	13%	123%	3.5%	93%

Projected supply during Multiple Dry year period ending in 2015 – AF/Y

	2011	2012	2013	2014	2015
Supply*	1,950	2,610	5,800	2,900	5,800
% of Table A	34%	45%	100%	50%	100%

* Based upon years 1991 – 1995, which are the driest five years on record for CLAWA.

Projected demand Multiple Dry year period ending in 2015 – AF/Y

	2011	2012	2013	2014	2015
Demand	3,200	3,350	3,500	3,650	3,800
% of Average Year	100%	100%	100%	100%	100%

Projected Supply & Demand Comparison during Multiple Dry year period ending in 2015- AF/Y

	2011	2012	2013	2014	2015
Supply totals*	1,950	2,610	5,800	2,900	5,800
Demand totals	3,200	3,350	3,500	3,650	3,800
Difference (supply minus demand)	-1,250	-740	2,200	-750	2,000
Difference as % of Supply	-64%	-28%	38%	-26%	34%
Difference as % of Demand	-39%	-22%	63%	-21%	53%

* Based upon years 1991 – 1995, which are the driest five years on record for CLAWA.

Projected supply during Multiple Dry year period ending in 2025 – AF/Y

	2021	2022	2023	2024	2025
Supply*	1,950	2,610	5,800	2,900	5,800
% of projected normal	34%	45%	100%	50%	100%

* Based upon years 1991 – 1995, which are the driest five years on record for CLAWA.

Projected demand Multiple Dry year period ending in 2025 – AF/Y

	2021	2022	2023	2024	2025
Demand	4,250	4,300	4,400	4,450	4,500
% of Average Year	100%	100%	100%	100%	100%

Projected Supply & Demand Comparison during Multiple Dry year period ending in 2025- AF/Y

	2021	2022	2023	2024	2025
Supply totals*	1,950	2,610	5,800	2,900	5,800
Demand totals	4,250	4,300	4,400	4,450	4,500
Difference (supply minus demand)	-2,300	-1,690	1,400	-1,550	1,300
Difference as % of Supply	-118%	-65%	24%	-53%	22%
Difference as % of Demand	-54%	-39%	32%	-35%	29%

* Based upon years 1991 – 1995, which are the driest five years on record for CLAWA.

APPENDIX A

CALIFORNIA WATER CODE DIVISION 6
PART 2.6. URBAN WATER MANAGEMENT PLANNING
CHAPTER 1. GENERAL DECLARATION AND POLICY

10610. This part shall be known and may be cited as the "Urban Water Management Planning Act."

10610.2. (a) The Legislature finds and declares all of the following:
(1) The waters of the state are a limited and renewable resource subject to ever-increasing demands.
(2) The conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level.
(3) A long-term, reliable supply of water is essential to protect the productivity of California's businesses and economic climate.
(4) As part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry water years.
(5) Public health issues have been raised over a number of contaminants that have been identified in certain local and imported water supplies.
(6) Implementing effective water management strategies, including groundwater storage projects and recycled water projects, may require specific water quality and salinity targets for meeting groundwater basins water quality objectives and promoting beneficial use of recycled water.
(7) Water quality regulations are becoming an increasingly important factor in water agencies' selection of raw water sources, treatment alternatives, and modifications to existing treatment facilities.
(8) Changes in drinking water quality standards may also impact the usefulness of water supplies and may ultimately impact supply reliability.
(9) The quality of source supplies can have a significant impact on water management strategies and supply reliability.
(b) This part is intended to provide assistance to water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies to meet existing and future demands for water.
10610.4. The Legislature finds and declares that it is the policy of the state as follows:
(a) The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.
(b) The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions.
(c) Urban water suppliers shall be required to develop water management plans to actively pursue the efficient use of available supplies.

CHAPTER 2. DEFINITIONS
10611. Unless the context otherwise requires, the definitions of this chapter govern the construction of this part.
10611.5. "Demand management" means those water conservation measures, programs, and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies.
10612. "Customer" means a purchaser of water from a water supplier who uses the water for municipal purposes, including residential, commercial, governmental, and industrial uses.
10613. "Efficient use" means those management measures that result in the most effective use of water so as to prevent its waste or unreasonable use or unreasonable method of use.
10614. "Person" means any individual, firm, association, organization, partnership, business, trust, corporation, company, public agency, or any agency of such an entity.
10615. "Plan" means an urban water management plan prepared pursuant to this part. A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities. The components of the plan may vary according to an individual community or area's characteristics and its capabilities to efficiently use and conserve water. The plan shall address measures for residential, commercial, governmental, and industrial water demand management as set forth in Article 2 (commencing with Section 10630) of Chapter 3. In addition, a strategy and time schedule for implementation shall be included in the plan.
10616. "Public agency" means any board, commission, county, city and county, city, regional agency,

district, or other public entity.
10616.5. "Recycled water" means the reclamation and reuse of wastewater for beneficial use.
10617. "Urban water supplier" means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 ac-ft of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems subject to Chapter 4 (commencing with Section 116275) of Part 12 of Division 104 of the Health and Safety Code.

CHAPTER 3. URBAN WATER MANAGEMENT PLANS
Article 1. General Provisions
10620.
(a) Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640).
(b) Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.
(c) An urban water supplier indirectly providing water shall not include planning elements in its water management plan as provided in Article 2 (commencing with Section 10630) that would be applicable to urban water suppliers or public agencies directly providing water, or to their customers, without the consent of those suppliers or public agencies.
(d)(1) An urban water supplier may satisfy the requirements of this part by participation in area wide, regional, watershed, or basin wide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use.
(2) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.
(e) The urban water supplier may prepare the plan with its own staff, by contract, or in cooperation with other governmental agencies.
(f) An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.
10621.
(a) Each urban water supplier shall update its plan at least once every five years on or before December 31, in years ending in five and zero.
(b) Every urban water supplier required to prepare a plan pursuant to this part shall notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.
(c) The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).
Article 2. Contents of Plans
10630. It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied.
10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:
(a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.
(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a). If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:
(1) A copy of any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management.

(2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.

(3) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:

(1) An average water year.

(2) A single dry water year.

(3) Multiple dry water years.

For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.

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

(e)(1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors including, but not necessarily limited to, all of the following uses:

(A) Single-family residential.

(B) Multifamily.

(C) Commercial.

(D) Industrial.

(E) Institutional and governmental.

(F) Landscape.

(G) Sales to other agencies.

(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.

(I) Agricultural.

(2) The water use projections shall be in the same five-year increments described in subdivision (a).

(f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following:

(A) Water survey programs for single-family residential and multifamily residential customers.

(B) Residential plumbing retrofit.

(C) System water audits, leak detection, and repair.

(D) Metering with commodity rates for all new connections and retrofit of existing connections.

(E) Large landscape conservation programs and incentives.

(F) High-efficiency washing machine rebate programs.

(G) Public information programs.

(H) School education programs.

(I) Conservation programs for commercial, industrial, and institutional accounts.

(J) Wholesale agency programs.

(K) Conservation pricing.

(L) Water conservation coordinator.

(M) Water waste prohibition.

(N) Residential ultra-low-flush toilet replacement programs.

(2) A schedule of implementation for all water demand management measures proposed or described in the plan.

(3) A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.

(4) An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand.

(g) An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following:

(1) Take into account economic and noneconomic factors, including environmental, social, health, customer impact, and technological factors.

(2) Include a cost-benefit analysis, identifying total benefits and total costs.

(3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost.

(4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.

(h) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

(i) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

(j) Urban water suppliers that are members of the California Urban Water Conservation Council and submit annual reports to that council in accordance with the "Memorandum of Understanding Regarding Urban Water Conservation in California," dated September 1991, may submit the annual reports identifying water demand management measures currently being implemented, or scheduled for implementation, to satisfy the requirements of subdivisions (f) and (g).

(k) Urban water suppliers that rely upon a wholesale agency for a source of water , shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water -year types in accordance with subdivision (c). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (c).

10631.5. The department shall take into consideration whether the urban water supplier is implementing or scheduled for implementation, the water demand management activities that the urban water supplier identified in its urban water management plan, pursuant to Section 10631, in evaluating applications for grants and loans made available pursuant to Section 79163. The urban water supplier may submit to the department copies of its annual reports and other relevant documents to assist the department in determining whether the urban water supplier is implementing or scheduling the implementation of water demand management activities.

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

(a) Stages of action to be undertaken by the urban water supplier in response to water supply shortages,

including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage.

(b) An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.

(c) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.

(d) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.

(e) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.

(f) Penalties or charges for excessive use, where applicable.

(g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.

(h) A draft water shortage contingency resolution or ordinance.

(i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

(b) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

(c) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(d) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

(e) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of ac-ft of recycled water used per year.

(f) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

10634. The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.

Article 2.5 Water Service Reliability

10635. (a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

(b) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.
(c) Nothing in this article is intended to create a right or entitlement to water service or any specific level of water service.
(d) Nothing in this article is intended to change existing law concerning an urban water supplier's obligation to provide water service to its existing customers or to any potential future customers.

Article 3. Adoption and Implementation of Plans

10640. Every urban water supplier required to prepare a plan pursuant to this part shall prepare its plan pursuant to Article 2 (commencing with Section 10630). The supplier shall likewise periodically review the plan as required by Section 10621, and any amendments or changes required as a result of that review shall be adopted pursuant to this article.
10641. An urban water supplier required to prepare a plan may consult with, and obtain comments from, any public agency or state agency or any person who has special expertise with respect to water demand management methods and techniques.
10642. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area. After the hearing, the plan shall be adopted as prepared or as modified after the hearing.
10643. An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.
10644. (a) An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.
(b) The department shall prepare and submit to the Legislature, on or before December 31, in the years ending in six and one, a report summarizing the status of the plans adopted pursuant to this part. The report prepared by the department shall identify the outstanding elements of the individual plans. The department shall provide a copy of the report to each urban water supplier that has filed its plan with the department. The department
shall also prepare reports and provide data for any legislative hearings designed to consider the effectiveness of plans submitted pursuant to this part.
10645. Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

CHAPTER 4. MISCELLANEOUS PROVISIONS

10650. Any actions or proceedings to attack, review, set aside, void, or annul the acts or decisions of an urban water supplier on the grounds of noncompliance with this part shall be commenced as follows:
(a) An action or proceeding alleging failure to adopt a plan shall be commenced within 18 months after that adoption is required by this part.
(b) Any action or proceeding alleging that a plan, or action taken pursuant to the plan, does not comply with this part shall be commenced within 90 days after filing of the plan or amendment thereto pursuant to Section 10644 or the taking of that action.
10651. In any action or proceeding to attack, review, set aside, void, or annul a plan, or an action taken pursuant to the plan by an urban water supplier on the grounds of noncompliance with this part, the inquiry shall extend only to whether there was a prejudicial abuse of discretion. Abuse of discretion is established if the supplier has not proceeded in a manner required by law or if the action by the water supplier is not supported by substantial evidence.
10652. The California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) does not apply to the preparation and adoption of plans pursuant to this part or to

the implementation of actions taken pursuant to Section 10632. Nothing in this part shall be interpreted as exempting from the California Environmental Quality Act any project that would significantly affect water supplies for fish and wildlife, or any project for implementation of the plan, other than projects implementing Section 10632, or any project for expanded or additional water supplies.

10653. The adoption of a plan shall satisfy any requirements of state law, regulation, or order, including those of the State Water Resources Control Board and the Public Utilities Commission, for the preparation of water management plans or conservation plans; provided, that if the State Water Resources Control Board or the Public Utilities Commission requires additional information concerning water conservation to implement its existing authority, nothing in this part shall be deemed to limit the board or the commission in obtaining that information. The requirements of this part shall be satisfied by any urban water demand management plan prepared to meet federal laws or regulations after the effective date of this part, and which substantially meets the requirements of this part, or by any existing urban water management plan which includes the contents of a plan required under this part.

10654. An urban water supplier may recover in its rates the costs incurred in preparing its plan and implementing the reasonable water conservation measures included in the plan. Any best water management practice that is included in the plan that is identified in the "Memorandum of Understanding Regarding Urban Water Conservation in California" is deemed to be reasonable for the purposes of this section.

10655. If any provision of this part or the application thereof to any person or circumstances is held invalid, that invalidity shall not affect other provisions or applications of this part which can be given effect without the invalid provision or application thereof, and to this end the provisions of this part are severable.

10656. An urban water supplier that does not prepare, adopt, and submit its urban water management plan to the department in accordance with this part, is ineligible to receive funding pursuant to Division 24 (commencing with Section 78500) or Division 26 (commencing with Section 79000), or receive drought assistance from the state until the urban water management plan is submitted pursuant to this article.

10657. (a) The department shall take into consideration whether the urban water supplier has submitted an updated urban water management plan that is consistent with Section 10631, as amended by the act that adds this section, in determining whether the urban water supplier is eligible for funds made available pursuant to any program administered by the department.

(b) This section shall remain in effect only until January 1, 2006, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2006, deletes or extends that date.

APPENDIX B

RESOLUTION NO. 664

RESOLUTION OF THE BOARD OF DIRECTORS OF CRESTLINE-LAKE ARROWHEAD WATER AGENCY ADOPTING THE 2005 URBAN WATER MANAGEMENT PLAN

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

WHEREAS, the Agency is an urban supplier of water providing water indirectly to a population more than 3,000; and

WHEREAS, following adoption, the Plan must be periodically reviewed at least once every five years, and the Agency will then make any amendments or changes to its plan which are indicated by the review; and

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

WHEREAS, the Agency has prepared and circulated for public review a draft Urban Water Management Plan, and a properly noticed public hearing regarding said Plan was conducted by this Board of Directors on April 6, 2006; and

WHEREAS, the Agency did prepare and shall file said Plan with the California Department of Water Resources within thirty days after adoption of this Resolution;

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the Crestline-Lake Arrowhead Water Agency follows:

1. The 2005 Urban Water Management Plan is hereby adopted and ordered filed with the Agency. The General Manager is hereby authorized and directed to file the 2005 Urban Water Management Plan with the California Department of Water Resources within thirty days after this date.

2. The General Manager is hereby authorized and directed to implement the Water Conservation Programs as set forth in the 2005 Urban Water Management Plan, which includes water shortage contingency analysis and recommendations to the Board of Directors regarding necessary procedures, rules, and regulations to carry out effective and equitable water conservation and water recycling programs.

3. In a water shortage, the General Manager is hereby authorized to declare a Water Shortage Emergency according to the Water Shortage Stages and Triggers indicated in the Plan, and implement necessary elements of the Plan.

ADOPTED this 4th day of May, 2006

James J. McCrory
President, Board of Directors
CRESTLINE-LAKE ARROWHEAD WATER AGENCY

ATTEST:

Secretary, Board of Directors
CRESTLINE-LAKE ARROWHEAD WATER AGENCY

CERTIFICATION

I, Jennifer Spindler, Secretary of the Board of Directors of the Crestline-Lake Arrowhead Water Agency, hereby certify that the foregoing is a full, true and correct copy of the Resolution adopted by the Board of Directors of said Agency at the regular meeting of said Board held on the 4th day of May, by the following vote:

AYES: Directors McCrory, Pleasant, Risher, Meek and Sutton

NOES:

ABSENT:

ABSTAIN:

Jennifer Spindler

Jennifer Spindler

APPENDIX C

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CALIFORNIA STATE WATER PROJECT

APPENDIX D

State of California
The Resources Agency
Department of Water Resources

The State Water Project Delivery Reliability Report 2005

Public Review Draft

November 16, 2005

Arnold Schwarzenegger	**Mike Chrisman**	**Lester A. Snow**
Governor	Secretary for Resources	Director
State of California	The Resources Agency	Department of Water Resources

If you need this report in alternate format, call the Equal Opportunity and Management Investigations Office at (916) 653-6952 or TDD (916) 653-6934.

Foreword

The Department of Water Resources (DWR) is issuing this report to update information presented in the *State Water Project Delivery Reliability Report – 2002*, which was finalized in 2003 after an extensive public review. DWR will update this information every two years or more frequently if new information significantly affecting the assessments warrants an earlier update.

The 2002 report was the first of this biennial series. It was welcomed by SWP contractors as the source of delivery estimates of their SWP supply that could be incorporated into their, or their sub-agencies', water supply plans. The information contained in this update was recommended by DWR in May 2005 for use by SWP contractors in developing their 2005 Urban Water Management Plans.

The information contained in the 2002 report and this update is based upon a computer simulation model, CalSim II. DWR believes CalSim II is the best available method for this assessment. Public criticism of the model has centered upon the ability of the model to simulate "real world" conditions and accurately estimate SWP deliveries. Following up on commitments in the 2002 report, DWR has completed an assessment of how well the model simulates a recent historical period and conducted a sensitivity analysis investigating the relative effect of assumptions used for input data upon the results of the simulation. The simulation of the historical period corresponds very well with the actual data. The sensitivity study and a study on the significance of the calculation interval (monthly) provide useful information in identifying areas important to CalSim II results. These studies are discussed in Chapter 3.

In addition, a peer review sponsored by the CALFED Science Program was conducted in 2003 to evaluate the strengths and weaknesses of CalSim II. The panel concluded the model is comparable to other state-of-the-art models and, specific to the type of information contained in this report, recommended calibration and verification of the model, as well as analyses of the sensitivity and uncertainty associated with the studies. The studies mentioned above and discussed in Chapter 3 address some of these concerns. DWR, with the support of U.C. Davis, is planning to develop a strategy for identifying and reducing the major sources of uncertainty in CalSim II studies and a procedure for quantifying the uncertainties. This effort should begin in 2006.

The next version of CalSim, CalSim III, is planned to be completed by early 2007. This version will include improvements in the land-use-based water budget calculations, which include refinements in the water budget boundaries, agricultural water use efficiencies, modeling wildlife refuges, and modeling the surface water-groundwater interaction. A new and improved graphical user interface will also be developed as part of this effort.

The updated SWP delivery estimates are summarized in Chapter 5. Chapter 6 contains examples of how to incorporate this information into a local water supply assessment. These examples are based upon examples contained in the *Draft Guidelines for Documentation and Integration of SWP Supplies*, which will soon be released by DWR for public review. These draft guidelines are designed to assist SWP urban contractors in estimating the amount of SWP supplies available to them and in integrating the SWP supply information with supply information from other sources to develop an overall assessment of each contractor's total water portfolio.

The release of the *Draft SWP Delivery Reliability Report – 2005* continues public involvement in this important topic and the evolution of the assessment tools. For additional information or questions about this report, please contact DWR's Bay-Delta Office at (916) 653-1099.

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Chapter 1. Introduction

Will there be enough water? Public officials throughout California face this question with increasing frequency as growth and competing uses strain existing resources. Water supply, however, has always been an uncertain and contentious matter in our state. For many years, the Department of Water Resources (DWR) has investigated this question. At its simplest level, the question might be, "How many wells are needed for a rural town's water supply?" or "How many people can a 100,000 acre-foot reservoir serve?" But for most areas of the state, the evaluation of water supply adequacy is not simple. The answer requires a complex analysis, taking into account multiple sources of water, a range of water demands, the timing of water uses, hydrology, available facilities, regulatory restraints, levels of demand management (water conservation) strategies, and, of course, future weather patterns.

Most water users in California live in areas that rely on multiple sources of water supply, some local and some imported. Typically, local water providers "mix and match" their supply sources to maximize water supply and quality and to minimize cost. In addition to considering available sources of supply, local water providers are planning for ways to improve the efficiency of local water uses and the operation of their water management systems. To help with this effort, DWR presents 25 different resource management strategies available to local agencies and governments and private utilities in the *California Water Plan Update 2005* (see website at http://www.waterplan.water.ca.gov).

Purpose

The State Water Project Delivery Reliability Report 2005 presents DWR's current information regarding the annual water delivery reliability of the State Water Project (SWP) for existing and future levels of development in the water source areas, assuming historical patterns of precipitation. This report first looks at the general subject of water delivery reliability and then discusses how DWR determines delivery reliability for the SWP. A discussion of the analysis tool, the CalSim II computer simulation model, and the analyses and peer review regarding the accuracy of CalSim II and its suitability for use in this report is included. Finally, estimates of SWP delivery reliability today and in the future are provided along with examples of how to incorporate this information into local water management plans.

This delivery reliability report also responds to public comments on how DWR administers the SWP. Comments on the Monterey Amendment Environmental Impact Report stated that local planners and public officials were relying on inflated estimates of water supply from the SWP in approving new development. This report provides local officials with a single source of the most current data available on SWP delivery reliability for use in local planning decisions.

The report does not, however, analyze how specific local water agencies integrate SWP water into their water supply equation. That topic requires extensive information about local facilities, local water resources, and local water use, which is beyond the scope of this report. Moreover, such an analysis would require decisions about water supply and use that traditionally have been made at the local level. DWR believes that local officials should continue to fill this role. The examples provided in Chapter 6 are included to help local agencies incorporate the information presented in this report into local water management assessments.

Background

The original *SWP Delivery Reliability Report* was issued as a draft in August 2002. In 2002, DWR held six public meetings throughout the state to discuss the report and receive comments upon the content. The final *SWP Delivery Reliability Report* was released in early 2003. The 2005 SWP Delivery Reliability Report is an update to the report issued in 2003. DWR intends to publish biennial update of the *SWP Delivery Reliability Report* in the future.

The SWP supplies two-thirds of the state's population with a portion of its water supply and provides water to irrigate, in part, 750,000 acres of agriculture. The SWP delivers water under long-term contracts to 29 public water agencies throughout the state. They, in turn, either deliver water to water wholesalers or retailers or deliver it directly to agricultural and urban water users.

The water delivery reliability of the SWP is of direct interest to those who use SWP supplies because it is an important element in the overall water supply in those areas. Local supply reliability is of key importance to local planners and local government officials who are responsible for planning for future growth while assuring that an adequate and affordable water supply is available for the existing population and businesses. This function is usually conducted in the course of preparing a water management plan such as the Urban Water Management Plans required by Water Code section 10610. The information in this report may be used by local agencies in preparing or amending their water management plans and identifying the new facilities or programs that may be necessary to meet future water demands.

Local agencies and governments and private utilities will also find in this report information that is useful in conducting analyses mandated by legislation authored by Senator Sheila Kuehl (SB 221) and Senator Jim Costa (SB 610). These laws require water retailers to demonstrate whether their water supplies are sufficient for certain proposed subdivisions and development projects subject to the California Environmental Quality Act.

DWR published the *Guidebook for Implementation of Senate Bill 610 and Senate Bill 221 of 2001*, which includes suggestions on how local water suppliers can integrate supplies from various sources such as the SWP into their analyses. DWR has also published the *Guidebook to Assist Water Suppliers in the Preparation of a 2005 Urban Water Management Plan*, which includes suggestions on how local water suppliers can integrate supplies from other sources such as the SWP in their analyses. Both documents can be found on the DWR's Office of Water Use Efficiency home page at http://www.owue.water.ca.gov.

DWR will also soon publish *Guidelines for Documentation and Integration of SWP Supplies* to assist SWP urban contractors in determining the amount of SWP supplies available to them. These guidelines, using the information in this report (*SWP Delivery Reliability Report 2005)*, explain how to integrate the SWP supply information with supply information from other sources to develop an overall reliability assessment of each contractor's total water portfolio.

Senate Bill 221

This law amends Section 11010 of the Business and Professions Code and Section 65867.5 of the Government Code. It also adds Sections 66455.3 and 66473.7 to the Government Code.

Under the Subdivision Map Act, a legislative body of a city or county is required to deny approval of a tentative map, or a parcel map for which a tentative map is not required, if it makes any of a number of findings. Under the Planning and Zoning Law, a city, county, or city and county may not approve a development agreement unless the legislative body finds that the agreement is consistent with the general plan and any applicable specific plan. [SB 221 prohibits] approval of a tentative map, or a parcel map for which a tentative map was not required, or a development agreement for a subdivision of property of more than 500 dwelling units, except as specified, including the design of the subdivision or the type of improvement, unless the legislative body of a city or county or the designated advisory agency provides written verification from the applicable public water system that a sufficient water supply is available or, in addition, a specified finding is made by the local agency that sufficient water supplies are, or will be, available prior to completion of the project.

(From Legislative Counsel's Digest of Senate Bill No. 221, 2001-2002 session, filed with Secretary of State Oct. 9, 2001, Chapter 642:88-89)

An exception is made for the County of San Diego if the Governor's Office of Planning and Research determines certain conditions are met.

Senate Bill 610

Senate Bill 610 This law amends Section 21151.9 of the Public Resources Code, and Sections 10631, 10656, 10910, 10911, 10912, and 10915 of the Water Code. It also repeals Section 10913 and adds and expires Section 10657 of the Water Code.

This [law requires] additional information be included as part of an urban water management plan if groundwater is identified as a source of water available to the supplier. [It] requires an urban water supplier to include in the plan a description of all water supply projects and programs that may be undertaken to meet total projected water use. [It prohibits] an urban water supplier that fails to prepare or submit the plan to the [California Department of Water Resources] from receiving funding made available from specified bond acts until the plan is submitted. The law, until January 1, 2006, requires the department to take into consideration whether the urban water supplier has submitted an updated plan, as specified, in determining eligibility for funds made available pursuant to any program administered by the department.

[In addition, the law] requires a city or county that determines a project is subject to the California Environmental Quality Act to identify any public water system that may supply water for the project and to request those public water systems to prepare a specified water supply assessment, except as otherwise specified. [It requires] the assessment include, among other information, an identification of existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project and water received in prior years pursuant to those entitlements, rights, and contracts. The [law requires] the city or county, if it is not able to identify any public water system that may supply water for the project, to prepare the water supply assessment after a prescribed consultation.

The [law prescribes] a timeframe within which a public water system is required to submit the assessment to the city or county and would authorize the city or county to seek a writ of mandamus to compel the public water system to comply with requirements relating to the submission of the assessment.

[It requires] the public water system, or the city or county, as applicable, if that entity concludes that water supplies are, or will be, insufficient, to submit the plans for acquiring additional water supplies. [It also requires] the city or county to include the water supply assessment and certain other information in any environmental document prepared for the project pursuant to the act.

(From Legislative Counsel's Digest of Senate Bill No. 610, 2001-2002 session, filed with Secretary of State Oct. 9, 2001, Chapter 643:94-95.)

An exception is made for the County of San Diego if the Governor's Office of Planning and Research determines certain conditions are met.

Chapter 2.
Delivery Reliability in General

What is Water Delivery Reliability?

"Water delivery reliability" means how much one can count on a certain amount of water being delivered to a specific place at a specific time.

Objectively, water delivery reliability indicates a particular amount of water that can be delivered with a certain numeric frequency. A delivery reliability analysis assesses such things as facilities, system operation, water demand, and weather projections.

Subjectively, water delivery reliability indicates an acceptable or desirable level of dependability of water deliveries to the people receiving the water. Usually, a local water agency in coordination with the public it serves determines the acceptable level of reliability and plans for new facilities, demand-management and conservation programs, or additional water supply sources to meet or maintain this level.

What Factors Determine Water Delivery Reliability?

In its simplest terms, water delivery reliability depends on three general factors:

1) Availability of water from the source (that is, the natural source or sources of the water from which the supplier draws—the particular watercourse or groundwater basin). Availability of water from the source depends on the amount and timing of precipitation and runoff, or "hydrology," which provides water to the stream or groundwater basin, and the anticipated patterns of use and consumption of this water within the source area, including water returned to the source after use.

2) Availability of means of conveyance (that is, the means for conveying the water from the source via pumps, diversion works, reservoirs, canals, etc. to its point of delivery). The ability to convey water from the source depends on the existence and physical capacity of the diversion, storage, and conveyance facilities and also on contractual, statutory, and regulatory limitations on the operation of the facilities.

3) The level and pattern of water demand in the delivery service area (destination). The level of water demand in the delivery service area is affected by the magnitude and types of water demands, level of water conservation strategies, local weather patterns, water costs, and other factors. Supply from a water system may be sufficiently reliable at a low level of demand but may become less reliable as the demand increases. In other cases under increased demand, the water supply system may be able to deliver more water than in the past and maintain its reliability because the system's facilities had not been fully utilized.

How is Water Delivery Reliability Determined?

Water Delivery Reliability is Defined for a Specific Point in Time

For this report, water delivery reliability is analyzed for 2005 conditions and for conditions projected to exist 20 years in the future (2025). These analyses must describe current conditions adequately and make predictions about the three factors described earlier and discussed here.

The Availability of Water at the Source

This factor depends on how much rain and snow there will be in any given year and what the level of development (that is, the use of water) will be in the source areas. No model or analytical tool can predict the actual, natural water supplies for any year or years in the future. Until we are able to better quantify the impacts of climate change on precipitation and runoff patterns in California, future weather patterns are usually assumed to be similar to those in the past, especially where there is a long historical rainfall record.

The State Water Project analyses contained in this report are based upon 73 years of historical records (1922-1994) for rainfall and runoff that have been adjusted to reflect the current and future levels of development in the source areas by analyzing land use patterns and projecting future land and water use. These series of data are then used to forecast the amount of water available to the SWP under current and future conditions.

The Ability to Convey Water from the Source to the Desired Point of Delivery

This factor describes the facilities available to capture and convey surface water or groundwater and the institutional limitations placed upon the facilities. The facilities and institutional limitations may be assumed to be those that currently exist. Alternatively, predictions may be made regarding planned new facilities. Assumptions made about the institutional limitations to operation—such as legal, contractual, or regulatory restrictions—often are based upon existing conditions. Future changes in conditions that affect the ability to convey water usually cannot be predicted with certainty, particularly the regulatory and other institutional constraints on water conveyance.

Although new facilities are planned to increase the water delivery capability of the SWP, the analyses contained in this report assume no additional facilities. The analyses also assume current regulatory and institutional limitations will exist 20 years in the future (2025).

The Level of Demand

This factor includes the amount and pattern of water demand on the water management system. Demand can have a significant effect upon the reliability of a water system. For example, if the demand occurs only three months in the summer, a water system with a sufficient annual supply but insufficient water storage may not be able to reliably meet the demand. If, however, the same total amount of demand is distributed over the year, the system could more easily meet the demand because the need for water storage is reduced.

Demand levels for the SWP are derived from historical data and information received from the SWP contractors. Demand on the SWP is nearing the maximum Table A amount. Each of the SWP contracts has a Table A, which lists the maximum annual delivery amount over the period of the contract. These annual amounts usually increase over time. Most contractors' Table A amounts reached a maximum in 1990. The total of all contractors' maximum Table A amounts is 4.173 million acre-feet (maf) per water year. Table A is used to define each contractor's portion of the available water supply that the Department will allocate and deliver to that contractor. The Table A amounts in any particular contract, accordingly, should not be read as a guarantee of that amount but rather as the tool in an allocation process that defines an individual contractor's "slice

of the pie." The size of the "pie" itself is determined by the factors described in this report. (See Appendix C for additional explanation and listing of the maximum Table A amounts.)

There are 29 SWP contractors. Yuba City, Butte County, and the Plumas County Flood Control and Water Conservation District are north of the Delta. Their maximum Table A amounts total 0.040 maf. The maximum Table A amounts for the remaining 26 contractors, which receive their supply from the Delta, total 4.133 maf. This report focuses on SWP deliveries from the Delta because the amount of water pumped from the Delta by SWP facilities is the most significant component of the total amount of SWP deliveries. The results presented in this report regarding the percent of Table A deliveries applies to contractors north of the Delta in the same manner as those contractors receiving supply from the Delta.

Past Deliveries Cannot Accurately Predict Future Deliveries

It is worthwhile to note that actual, historical water deliveries cannot be used with a significant degree of certainty to predict future water deliveries. As discussed earlier, there are continual, significant changes over time in the determinants of water delivery: changes in water storage and delivery facilities, in water use in the source areas, in water demand in the receiving areas, and in the regulatory constraints on the operation of facilities for the delivery of water. Given the very significant historical changes that have occurred, past deliveries are not necessarily good predictors of current deliveries, much less of future deliveries.

For example, the demand 30 years ago for water from the SWP was not as high as it is currently or expected to be in the future. Because the need for SWP water then was relatively low, less water was transported through the SWP during normal and wet times than could have been if the demand had been higher. Simply put, less water was delivered in those past years because less water was needed. Conversely, the current or projected delivery capability of a water project would be less than the past if (1) demand for water from a water project was at its maximum level for many years, (2) no new facilities were built, and (3) the supply from one of its main sources of water was recently reduced because another entity with a prior water right increased its use of that source.

Many Assumptions Must Be Made in the Determination and Analysis of Water Delivery Reliability

As discussed earlier, to plan for the future, many assumptions must be made about the future. One of the most significant assumptions for water planning in general is how wet, dry and variable the weather will be. For many planning purposes, the assumption is that future patterns of weather will be like the past, and an effort is made to develop information on the longest historical period for which acceptable records exist.

Using the historical record, planners analyze the worst drought in the period of record to evaluate how the water management systems will respond. Precipitation information for the Central Valley used for this report begins in 1922 and records the area's worst multi-year drought (1928-1934), although the brief drought from 1976 through 1977 was more acutely dry. Whatever assumptions are made, every responsible water delivery reliability analysis should expressly state the assumptions, methods and data used to produce its results. It should always be understood that those numbers depend on, and are no better than, the assumptions upon which they must necessarily rest.

Because assumptions are the foundation upon which the estimates are made, it is helpful to know how each assumption affects study results. For example, what impact would a significant increase in water use in the source areas have upon the projected SWP water delivery reliability? Would it significantly reduce the amount of SWP supply, and if so, by how much? These types of

questions can be answered by varying specific factors to see the impact upon the results. These studies are referred to as sensitivity analyses and can be helpful in assessing the importance of certain assumptions to the study results. In the 2002 Reliability Report, the Department committed to conducting a comprehensive sensitivity analysis for assumptions contained in the CalSim II model studies. This analysis is complete. Summaries of the findings of this and other studies of CalSim II as well as a peer review of the model are contained in this report and discussed in more detail in Appendix E.

Chapter 3.
Study Approach and CalSim II Follow-up Studies

This report presents information from computer simulation studies of the operation of the SWP using the CalSim II model. CalSim II is a planning model developed by the Department of Water Resources (DWR) and the U.S. Bureau of Reclamation. It simulates the SWP and the Central Valley Project (CVP) and areas tributary to the Sacramento-San Joaquin Delta. Using historical rainfall and runoff data, which has been adjusted for changes in water and land use that have occurred or may occur in the future, the model simulates the operation of the water resources infrastructure in the Sacramento and San Joaquin river basins on a month-to-month basis. In the model, the reservoirs and pumping facilities of the SWP and CVP are operated to assure the flow and water quality requirements for these systems are met.

The month-to-month simulations are conducted over the 73-year period (1922-1994) of the adjusted historical rainfall/runoff data. This approach incorporates the over-arching assumption that the next 73 years will have the same rainfall/snowmelt amount and pattern, both within-year and from year to year, as the period 1922 through 1994. The studies do not incorporate any modifications to account for changes related to climate change or assess the risk of future seismic or flooding events significantly disrupting SWP deliveries. As tools are developed to address these risks and the resulting studies become available, the information will be incorporated into the assessment of SWP delivery reliability. The results of the CalSim II studies conducted for this update to *The State Water Project Delivery Reliability Report 2002* (DWR 2003b) represent the best available assessment of the delivery capability of the SWP.
Since the release of the 2002 report, a peer-review and several studies have been conducted regarding CalSim II. These reports include:

- An external peer review commissioned by the California Bay-Delta Authority (CALFED);
- An analysis of an historical operations simulation;
- An analysis of the effect varying selected parameters has upon model results (sensitivity analysis study); and
- An analysis of the significance of the simulation time-step to the estimated SWP delivery amounts.

A strategic plan for improvements to CalSim II that incorporates recommendations of the peer review and on-going efforts has been developed. The conclusion of the historical simulation study is that CalSim II estimates of SWP Delta deliveries are very good. The analysis of the monthly versus daily time-step concludes it is not a significant factor in estimating SWP Delta deliveries. A more comprehensive sensitivity analysis report provides insight to the parameters with the greatest potential for affecting SWP Delta deliveries. An overview of these efforts follows.

Science Program Peer Review of CalSim II

In 2003, the CALFED Science Program commissioned an external review panel to provide an independent analysis and evaluation of the strengths and weaknesses of CalSim II. The central question put to the review panel was whether the CALFED program had adopted an appropriate approach to modeling the Central Valley Project/State Water Project (CVP/SWP) system. The panel considered a variety of CalSim II issues and addressed how future model development activities could be managed to assure quality results for current and proposed applications. The panel published its results in *A Strategic Review of CALSIM II and its Uses for Water Planning, Management, and Operations in Central California* (Close and others 2003).

In general, the panel concluded that the current modeling approach was comparable to other state-of-the-art models and addressed many of the complexities of the CVP/SWP system. To balance

the competing needs of those who require greater detail from the model and those who require less detail, the panel recommended steps to achieve a more comprehensive, modular, and flexible approach in modeling practices and tools. To increase user confidence in model results and to provide a basis for gauging the model's ability to produce absolute predictive results of system behavior, the panel suggested calibration and verification of the model, as well as analyses in sensitivity and uncertainty.

In what was most relevant to the subject of this report on the SWP delivery reliability, the panel summarized its observation on the accuracy of the model to estimate the delivery capability of both the CVP and SWP systems in the *Strategic Review's* Appendix F "Analysis of the November 2003 CalSim II Validation Report." Appendix F is discussed in the next section.

In August 2004, DWR and the USBR jointly responded to the questions, comments, and recommendations of the review panel in a report, *Peer Review Response: A Report by DWR/Reclamation in Reply to the Peer Review of the CalSim II Model Sponsored by the CALFED Science Program in December 2003.* (*Peer Review Response*). In their report, the agencies outline current and planned work on model development and the priorities for improving CalSim II. The *Peer Review Response* also highlights the ongoing and planned efforts to establish trust in and credibility for the model by improving documentation, conducting sensitivity and uncertainty analyses of the model parameters and results. Other efforts include enhancing the level of detail in the geographic representation of the system, and improving hydrologic input and software development.

Many of the elements of model development outlined in the *Peer Review Response* are in progress and will be implemented in the updated version of the model, CalSim III. Some of the *Strategic Review's* pressing issues regarding the reliability of CalSim II as a planning tool are addressed below.

The Ability of CalSim II to Estimate Water Deliveries

The accuracy of CalSim II in simulating "real-world" conditions was one of the major issues raised by the peer review panel. The review panel focused on the system's delivery capability as a major concern to water users as well as water managers who rely on CalSim II when making planning decisions. In Appendix F of the *Strategic Review*, the panel expresses concern that CalSim II overestimates deliveries to south-of-Delta water users. This observation is based on comparing the average deliveries for the last 10 years (1993–2002) with the average annual deliveries in a 73-year model simulation (1922–1994) conducted at the 2001 level of development.

In *Peer Review Response*, DWR and USBR (2004) conclude the concern about overestimations of south-of-Delta deliveries is unwarranted because the 73-year study referenced by the panel is not designed to mimic historical conditions; rather it is intended to determine the reliability of the SWP when the demand equals the maximum Delta Table A amount (4.133 MAF) every year. The results of the referenced study are documented in *The SWP Delivery Reliability Report 2002* (DWR 2003b) as study 3 (2021B).

A more appropriate method for assessing the ability of CalSim II to accurately model SWP operations is to compare the historical SWP deliveries with the simulated deliveries of the Historical Operations Study. DWR committed to conducting this study in *The SWP Delivery Reliability Report 2002* (DWR 2003b). The study is documented in the November 2003 Technical Memorandum Report *CALSIM-II Simulation of Historical SWP/CVP Operations* (DWR 2003a). The Historical Operations Study is designed to assess CalSim II's ability to mimic historical operations of the SWP. In this study, historical input is used where reliable data are

available. In situations where reliable historical record is not readily available, reasonable assumptions and estimates are made.

Comparing the average annual historical deliveries with the simulated deliveries in the Historical Operations Study for the dry period showed reasonable results: The average annual SWP south-of-Delta Table A delivery for the 6-year drought of 1987–1992 was 1,930 taf per year, compared to 2,030 taf per year for actual historical deliveries (Figure 3-1). The simulated deliveries in Figure 3-1 were adjusted for any differences between the historical and simulated carryover storage in the SWP system reservoirs, Lake Oroville and SWP's portion of San Luis Reservoir.

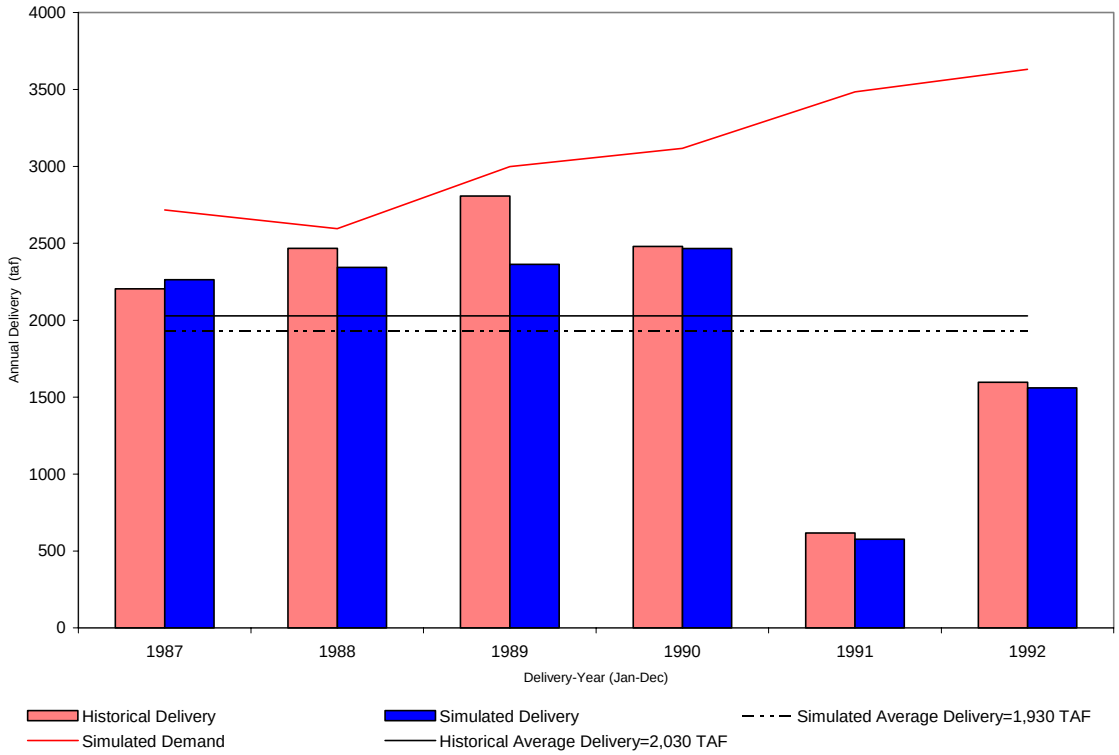

Figure 3-1 SWP south-of-Delta Table A deliveries (1987–1992 dry period)

The observed differences in the historical and simulated deliveries can be attributed to differences in the operational rules and parameters assumed in the simulation run. Some of the major operational parameters that could be different between the model run and the actual historical operations include the rule governing the amount of delivery versus the amount of storage to be carried-over into the following year (delivery-carryover storage rule), flood control rules, San Luis Reservoir operation rule, Delta outflow requirements, regulatory decisions, Delta export curtailments caused by pumping facilities outages or compliance with state and federal endangered species regulations, compliance with the provisions of the Coordinated Operations Agreement, implementation of a drought water bank, and water transfers.

In the wetter years (above-normal and wet year-types), when supply is plentiful and deliveries are mostly determined by demands, the simulated deliveries were very close to historical values. When long-term values were compared, the average annual delivery for the SWP during the 23-year period of 1975–1997 was 1,810 taf per year for the Historical Operations Study and 1,790 taf per year for the historical deliveries.

Additional details of this study are in Appendix E.

CalSim II Sensitivity Analysis Study

The sensitivity analysis is an important component of any water resources planning model evaluation. The sensitivity analysis procedures explore and quantify the impact of possible errors in input data on the model outputs and system performance measures. With a simple sensitivity analysis procedure, errors in model input parameters are generally investigated one at a time. With a more complex procedure, the investigation can be conducted by varying a set of parameters simultaneously. In the sensitivity analysis conducted in response to the recommendations in the *Strategic Review* (Close and others 2003), the simple procedure was adopted and errors in model input parameters were investigated one at a time. The objective of the analysis was twofold: (1) to examine the behavior of the model in response to variations in selected input parameters; (2) to provide a basis for CalSim II modelers for prioritizing future model development activities. The *CalSim-II Model Sensitivity Analysis* is available at website http://baydeltaoffice.water.ca.gov/index.cfm.

There are many input parameters used in the CalSim II model to define the physical characteristics of the system, as well as the regulatory environment and operational characteristics. Some input parameters are in the form of time series or monthly distribution curves, and others are simply single values. Some input parameters are estimated from the historical data, and others are values developed or calibrated by users. After consultation with model developers and project operators, 21 model input parameters in 4 major categories with reasonable ranges of variations were selected for this sensitivity analysis study. The results of the sensitivity analysis are given in more detail in Appendix E.

Examination of the results of the sensitivity analysis provides the following information on the behavior of the SWP system's delivery capability with respect to some of the key input parameters:

- The most significant input parameters affecting SWP Table A Delta deliveries are the assumed SWP Table A demands and the monthly diversion limits imposed on Banks Pumping Plant. The results show the long-term average annual SWP Table A Delta deliveries between 3.0 maf to 3.5 maf increase by 0.54 acre-foot for every acre-foot increase in Table A demands. The increase is 0.33 acre-foot for every acre-foot of increase in Table A demands for the range between 3.5 maf per year and 3.9 maf per year.
- Also, the long-term average annual SWP Table A Delta deliveries decrease by 0.48 acre-foot for every 1 acre-foot per month decrease in Bank's allowable monthly pumping limit during March 16 to December 14 period. This sensitivity study evaluates a 5 percent reduction in the capacity during this period.
- Inflow to Lake Oroville displays a moderate impact on the SWP Table A Delta deliveries. The long-term average annual SWP Table A Delta deliveries increase by 0.20 acre-foot for every acre-foot increase in annual Oroville inflows.
- The effect of changing contractors' demands for Article 21 water on Article 21 deliveries is high, as expected. The results show that for every acre-foot of change in the peak monthly demands for Article 21 water in the range between 134 taf per month and 400 taf per month, the long-term average annual Article 21 deliveries increase by 0.27 acre-foot.

Examples of parameters not significantly influencing the estimates for SWP Delta deliveries include the projected land use in the source areas and inflow into Lake Shasta and Folsom Reservoir.

Impact of Model Simulation Time-step in Estimating Projects Average Deliveries

In general, the delivery reliability of the SWP is assessed using monthly time-step CalSim II simulations. Monthly time-step simulations implicitly assume that daily hydrologic variability combined with daily physical and regulatory operating constraints are not significant to the forecast of expected average annual deliveries. In other words, it is assumed that a study with monthly inflows, reservoir releases, exports, and associated constraints would produce the same long-term average annual deliveries as a study where inflows, releases, exports, and associated constraints vary on a daily basis.

To confirm the above assumption, results were examined from a recently completed, simplified, daily time-step CalSim II simulation conducted for the California Bay-Delta Authority's Surface Storage Investigations. The assumptions for the baseline monthly and daily time-step simulations are documented in the draft report "Interim Common Model Package, Modeling Protocol and Assumptions" (CALFED 2005). The daily variability appears to have only minor impacts on SWP Table A deliveries. The results show the long-term average annual SWP Table A delivery is increased by 0.3 percent and the average annual deliveries during two 6-year droughts (1929–1934 and 1987–1992) is increased by 0.8 percent in the daily simulation.

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Chapter 4.
Computer Simulation Assumptions

The selection of the assumptions and factors that go into the estimation of future water delivery reliability is very important and must be tailored to the particular water supplier. Assumptions and factors for the State Water Project focus on Sacramento and San Joaquin river basin precipitation; water rights and uses; SWP storage and conveyance facilities, including diversion facilities in the Delta; SWP service area demand; and the statutes, regulations, and contractual provisions that govern and regulate the SWP, including coordinating operations with the federal Central Valley Project (CVP). A detailed list of the study assumptions for this report is found in Appendix A.

The results of five computer simulations are included in this report. Studies 1, 2, and 3 are from the *The State Water Project Delivery Reliability Report 2002* (DWR 2003). The results of studies 1, 2 and 3 are included in this report for comparison purposes. Studies 4 and 5 are updated studies conducted specifically for this report. A significant difference between the updated studies and the earlier studies is the assumed demands for SWP Table A and Article 21. Article 21 refers to a section of the water supply contracts that allows additional water to be delivered under certain conditions (see Chapter 5 for further discussion).The assumed demands for studies 4 and 5 were developed in discussions with SWP water contractors and stakeholders involved in the development of the analyses associated with the environmental documentation for the Monterey Agreement.

The assumptions for the studies differ in three main categories: the assumed level of water use in the source areas (the level of development), the assumed SWP Table A and Article 21 demands, and the base model assumptions. These categories are summarized in Table 4-1.

Table 4-1 Key study assumptions

Study	Study name	Level of development (year)	SWP Table A demand (maf/year)	SWP Article 21 demand (taf/month)	Model version
SWP Delivery Reliability Report (2003)					
1	2001 Study	2001	3.0–4.1	0–84, Apr–Nov 50–134, Dec–Mar	May 2002 benchmark
2	2021A Study	2021	3.3–4.1	0–84, Apr–Nov 50–134, Dec–Mar	May 2002 benchmark
3	2021B Study	2021	4.1	0–84, Apr–Nov 50–134, Dec–Mar	May 2002 benchmark
Updated Studies					
4	2005 Study	2005	2.3–3.9	0–84, Apr–Nov 100–184, Dec–Mar	2004 OCAP
5	2025 Study	2025	3.9–4.1	0–84, Apr–Nov 100–184, Dec–Mar	2004 OCAP

maf = million acre-feet

OCAP = 2004 Long-Term Central Valley Project Operations Criteria and Plan

taf = thousand acre-feet

The water use estimates for the source areas for 2001 are assumed to be representative of 2005. The water use estimates for the source areas for 2020 are assumed to be representative of 2021 and 2025 conditions.

The SWP contractors' Table A and Article 21 demands for deliveries from the Delta assumed for the five studies are shown in Table 4-1. In four of the studies, a range in Table A demands is shown because the demand is assumed to vary each year with the weather in the delivery areas. In study 3 (2021), the SWP Table A demand is maximized each year, regardless of weather. Article 21 deliveries are available on an unscheduled and interruptible basis and are not counted as part of the Table A amount. (See Chapter 5 for more discussion of Article 21.) The Article 21 demand in the updated studies (4 and 5) is higher than the earlier studies for the December through March period.

Two versions of the model are used for these studies as shown in Table 4-1. Studies 1, 2 and 3 are based on the May 2002 benchmark study version. The updated studies (4 and 5) use the most recent version, which was developed for the 2004 Long-Term Central Valley Project Operations Criteria and Plan (OCAP). The assumption differences between the May 2002 benchmark version and the 2004 OCAP version that affect the SWP simulation significantly are listed below. A complete list of the differences in key assumptions is included in Appendix A.

1. Addition of a minimum pumping level at Banks Pumping Plant of 300 cubic feet per second.
2. Addition of flow requirements for flow at the mouth of the Feather River for SWP Settlement Contractors.
3. Delivery-carryover relationship adjusted to reduce delivery targets and increase carryover in critically dry years.
4. Addition of Lake Oroville end-of-September carryover target storage rule.
5. Study 5 assumes the implementation of Freeport Regional Water Project, including modified East Bay Municipal Utility District operations on the Mokelumne River.

All studies assume current Banks Pumping Plant capacity, existing conveyance capacity of the upper Delta-Mendota Canal/California Aqueduct system, and current SWP/CVP operations agreements.

Cited Reference

[DWR] California Department of Water Resources, Bay-Delta Office. 2003. The State Water Project Delivery Reliability Report 2002. Final.

Chapter 5.
Study Results

The five CalSim II model studies in this report are described in Chapter 4. Studies 1, 2, and 3 are from the *The State Water Project Delivery Reliability Report 2002* (DWR 2003). Studies 4 and 5 are updated studies conducted specifically for this report. The results of studies 1, 2 and 3 are included in this report for comparison purposes. This chapter contains tables summarizing the estimated delivery amounts of the studies for the entire study period (1922-1994), dry years, and wet years and presents information on the estimated probability of SWP delivery amounts currently and twenty years in the future. The annual values for SWP deliveries estimated by CalSim II for the five studies are listed in tables B-3 through B-7 of Appendix B. These tables also show the annual Table A demands assumed for each study.

The results of the updated studies (4 and 5) are compared to the results of the earlier studies (1, 2 and 3) to identify and explain any significant differences in estimated delivery values. For most values, the differences are not large enough to be significant and are generally caused by differences in the assumed demands. There are, however, significant differences between the updated and earlier studies for the estimated deliveries during 1, 2 and 4-year droughts. These differences are discussed further in “Drought Years.”

Article 21 Deliveries

The studies estimate delivery amounts for Table A and Article 21. As mentioned in Chapter 2, Table A is the contractual method for allocating available supply, and the total of all maximum Table A amounts for deliveries from the Delta is 4.133 million acre-feet (maf) per year. Article 21 refers to a provision in the contracts for delivering water that is available in addition to Table A amounts. (See appendix C for more detail about Table A and Appendix D for historical delivery amounts.) Article 21 of SWP contracts allows contractors to receive additional water deliveries only under specific conditions. These conditions are:

1. It is available only when it does not interfere with Table A allocations and SWP operations;
2. It is available only when excess water is available in the Delta;
3. It is available only when conveyance capacity is not being used for SWP purposes or scheduled SWP deliveries; and
4. It cannot be stored within the SWP system. In other words, the contractors must be able to use the Article 21 water directly or store it in their own system.

Water supply under Article 21 becomes available only during wet months of the year, generally December through March. Because an SWP contractor must have an immediate use for Article 21 supply or a place to store it outside of the SWP, not all SWP contractors can take advantage of this additional supply.

The importance of Article 21 water to local water supply is tied to how each contractor uses its SWP supply. For those SWP contractors who are able to store their wet weather supplies, Article 21 supply can be stored by being put directly into a reservoir or by offsetting other water that would have been withdrawn from storage, such as local groundwater. In the absence of storage, Article 21 water is not likely to contribute significantly to local water supply reliability. Incorporating supplies received under Article 21 into the assessment of water supply reliability is

a local decision based on specific local circumstances, facts, and level of water supply reliability required.

This report presents information on Article 21 water separately, so local agencies can determine whether it is appropriate to incorporate this supply into their analyses.

SWP Water Deliveries under Different Hydrologic Scenarios

Tables 5-1 and 5-2 summarize the assumed Table A demands for the updated (4 and 5) and the earlier (1, 2, and 3) studies and the resulting estimates for SWP deliveries. Table 5-3 presents information on the assumed Article 21 demand and the estimated Article 21 deliveries. Tables 5-4 through 5-8 summarize values for dry and wet hydrologic periods. The estimated probabilities for a given amount of annual SWP delivery are presented in Figures 5-1 and 5-2.

Assumed Table A Demands

The average, maximum, and minimum Table A demands from the Delta for the five studies are shown in Table 5-1. Study 4 has lower assumed demands than study 1. The average demand for study 4 is 80 percent of maximum Table A compared to 90 percent of maximum Table A for study 1. The primary reason for the lower demand in study 4 is that it includes a new set of annual Table A demands for the Metropolitan Water District of Southern California (MWDSC) prepared specifically for 2003 conditions by MWDSC. The average demand for study 5 is 99.4 percent of maximum Table A and is very similar to study 3. The annual assumed demand for study 5 is less than maximum Table A in only seven wet years due to the assumption that some Table A deliveries would be replaced by supplies from the Kern River.

As explained in Chapter 2 and Appendix C, the maximum Table A amounts for the 26 contractors which receive their supply from the Delta total 4.133 maf. The demands for studies 1 and 4 assume slightly earlier conditions when the maximum Table A amounts totaled slightly less than 4.133 maf (4.114 maf and 4.112 maf, respectively). To simplify the use of this report, the calculation of demand or delivery in percent of maximum Table A is based on the maximum Delta Table A total of 4.133 maf for all five studies. This simplification has no significant effect on the annual delivery percentages for studies 1 and 4. Additional information can be found in Appendix B.

Table 5-1 SWP Table A demand from the Delta

Study	Average demand		Maximum demand		Minimum demand	
	(taf per year)	(percent of maximum Table A)	(taf per year)	(percent of maximum Table A)	(taf per year)	(percent of maximum Table A)
SWP Delivery Reliability Report (2003):						
1. 2001 Study	3,712	90%	4,114	100%	3,007	73%
2. 2021A Study	4,026	97%	4,133	100%	3,343	81%
3. 2021B Study	4,133	100%	4,133	100%	4,133	100%
Updated Studies:						
4. 2005 Study	3,290	80%	3,862	93%	2,321	56%
5. 2025 Study	4,110	99%	4,133	100%	3,898	94%

Maximum Delta Table A is 4.133 million acre-feet per year.

Table A and Article 21 Deliveries

Table 5-2 contains the average, maximum, and minimum estimates of Table A deliveries from the Delta for the five studies. Comparing the relevant updated and earlier studies shows the averages of the estimated delivery percentages and the maximum estimated deliveries do not vary significantly. Study 4 has an average delivery of 68 percent of maximum Table A compared to 72 percent for study 1. This lower delivery under current conditions is due to the lower demand level assumed for study 4. The slightly higher average delivery of 77 percent for study 5 compared to 75 percent for study 2 is attributed to the higher demand assumed for study 5 and to differences in modeling assumptions as summarized in Chapter 4 and listed in Appendix A. The average delivery for study 5 is one percentage point higher than study 3 even though study 3 has a slightly higher demand. This slightly higher value for study 5 is due to differences in modeling assumptions. Comparing the updated studies (2005 versus 2025 study levels) shows study 5 has an average delivery of 77 percent of maximum Table A compared to 68 percent for study 4, an increase of 9 percent. This average increase in delivery is due to the higher demand assumed for study 5.

The difference between the earlier studies and the updated studies for the estimated minimum Table A delivery is significant. The updated studies have a minimum delivery of 4 percent to 5 percent of maximum Table A compared to 19 to 20 percent for the studies in the *SWP Delivery Reliability Report 2002* (DWR 2003). The lower minimum delivery is primarily due to modification of the delivery-carryover storage rule. Compared to the rule used for the earlier studies, the modified rule reduces delivery by about 80 percent whenever carryover storage (sum of the end-of-September storages of Oroville Reservoir and the SWP share of San Luis Reservoir) is projected to be less than about 860 thousand acre-feet (taf). The modified rule was developed in coordination with the DWR's SWP Operations Control Office to meet the primary objective of reducing the number of years storage in Oroville Reservoir reaches a very low level. The minimum delivery occurs in 1977, the driest year in the 73-year simulation. A closer look at this estimation is done later in this chapter. It applies reasonable assumptions about the amount of Table A deliveries carried-over in San Luis Reservoir from the previous year by SWP contractors and the use of storage in San Luis Reservoir to illustrate how the estimate could be adjusted to 20% of maximum Table A while not reducing storage in Oroville Reservoir.

Table 5-2 SWP Table A delivery from the Delta

Study	Average delivery		Maximum delivery		Minimum delivery	
	(taf per year)	(percent of maximum Table A)	(taf per year)	(percent of maximum Table A)	(taf per year)	(percent of maximum Table A)
SWP Delivery Reliability Report (2003):						
1. 2001 Study	2,962	72%	3,845	93%	804	19%
2. 2021A Study	3,083	75%	4,128	100%	830	20%
3. 2021B Study	3,130	76%	4,133	100%	830	20%
Updated Studies:						
4. 2005 Study	2,818	68%	3,848	93%	159	4%
5. 2025 Study	3,178	77%	4,133	100%	187	5%

Maximum Delta Table A is 4.133 million acre-feet per year.

Average Article 21 demands and average, maximum, and minimum Article 21 deliveries for the five studies are shown in Table 5-3. All studies have the same Article 21 demand from April through November. The updated studies (4 and 5) assume a 200 taf increase in Article 21 demand for the period December through March compared to the earlier studies (50 taf per month).

Table 5-3 SWP Article 21 demand and delivery from the Delta (taf per year except as noted)

Study	Average Article 21 demand			Annual delivery from the Delta		
	Dec-Mar	Apr-Nov	Total	Average	Maximum	Minimum
SWP Delivery Reliability Report (2003):						
1. 2001 Study	504	607	1,111	130	510	0
2. 2021A Study	504	607	1,111	80	400	0
3. 2021B Study	504	607	1,111	70	400	0
Updated Studies:						
4. 2005 Study	704	607	1,311	260	1,110	0
5. 2025 Study	704	607	1,311	120	550	0

Delivery numbers rounded to the nearest 10,000 acre-feet.

The average Article 21 delivery for study 4 is 260 taf per year, an increase of 130 taf per year from the study 1 average delivery of 130 taf per year. This increase in delivery is a result of the increase in Article 21 demand of 200 taf per year in studies 4 and 5 and also due to the decrease in Table A demand in study 4 compared to study 1. Study 5 has an average Article 21 delivery of 120 taf per year, 40 taf per year more than study 2 and 50 taf per year more than study 3. These increases are the result of the higher assumed Article 21 demand.

Drought Years

Table 5-4 includes estimates of water deliveries under an assumed repetition of historical drought periods for the five studies. The years are identified as dry by the Eight River Index, a good indicator of the relative amount of water supply available to the SWP. The Eight River Index is the sum of the unimpaired runoff from the four rivers in the Sacramento Basin used to define water conditions in the basin plus the four rivers in the San Joaquin Basin, which correspondingly define water conditions in that basin. The eight rivers are the Sacramento, Feather, Yuba, American, Stanislaus, Tuolumne, Merced, and San Joaquin. Table 5-4 also includes the average deliveries for comparison purposes.

As discussed earlier in conjunction with the minimum deliveries shown in Table 5-2, the single-year drought deliveries for the updated studies are estimated at 4 percent to 5 percent of maximum Table A compared to 19 to 20 percent for the studies in the *SWP Delivery Reliability Report 2002* (DWR 2003). The 2-year drought average annual delivery decreases from 48 percent for study 1 to 41 percent for study 4. Similarly, study 5 delivery decreases to 40 percent as compared to 44 percent for studies 2 and 3. The results for a 4-year drought show a 5 percent decrease in delivery for study 4 compared to study 1 and a 6 percent decrease in delivery for study 5 compared to studies 2 and 3, for the same reason. The decreases in each of these cases are primarily due to modification of the delivery-carryover storage rule as discussed earlier.

Table 5-4 SWP average and dry year Table A delivery from the Delta

Study	SWP Table A delivery from the Delta (in percent of maximum Table A)					
	Average 1922-1994	Single dry year 1977	2-year drought 1976-1977	4-year drought 1931-1934	6-year drought 1987-1992	6-year drought 1929-1934
SWP Delivery Reliability Report (2003):						
1. 2001 Study	72%	19%	48%	37%	41%	40%
2. 2021A Study	75%	20%	44%	39%	40%	41%
3. 2021B Study	76%	20%	44%	39%	40%	41%
Updated Studies:						
4. 2005 Study	68%	4%	41%	32%	42%	37%
5. 2025 Study	77%	5%	40%	33%	42%	38%

For the updated studies, the annual delivery for the single dry year is estimated to be about the same amount whether the dry year happens now or in twenty years. This is also true for estimated annual deliveries during the multi-year drought periods. This is projected to occur even though the amount of reservoir carryover storage resulting from the increased demand is projected to be less. This result is attributable to the operation rules governing the amount of water that must be retained for carryover storage, the fact the SWP demand between 2005 and 2025 increases only slightly, and because less water is made available under Article 21.

Table 5-5 summarizes the estimates of dry year deliveries under Article 21 for the five studies. The updated studies (4 and 5) have higher deliveries than the earlier studies (1, 2 and 3) because of assumed higher Article 21 demand. Also notice the reductions in delivery for studies 2 and 3 compared to study 1 in the years 1930, 1932, 1933, and 1976. These reductions are due to the increase in Table A deliveries. The average values for Article 21 deliveries for Study 5 is lower than study 4, primarily due to the assumed higher Table A demand in study 5.

Table 5-5 Average and dry year delivery under Article 21 (taf per year)

Study:	1	2	3	4	5
Year	Study 2001	Study 2021A	Study 2021B	Study 2005	Study 2025
1929	0	0	0	0	0
1930	90	30	30	120	140
1931	0	0	0	0	0
1932	200	40	40	240	110
1933	130	10	10	510	550
1934	0	0	0	210	240
1976	110	0	0	190	0
1977	0	0	0	0	0
1987	0	0	0	550	180
1988	0	0	0	0	0
1989	0	0	0	0	90
1990	0	0	0	0	0
1991	0	0	0	0	0
1992	0	0	0	0	100
1922-1994 average	130	80	70	260	120

Numbers rounded to the nearest 10,000 acre-feet.

Wet Years

Tables 5-6 and 5-7 below summarize the model run results for historical wet years. As with drought years, the Eight River Index is used to identify the wet years. Because plenty of water is available for deliveries in wet years, variations in Table A delivery are due to variations in the demand assumed for each of the studies.

Table 5-6 SWP average and wet year Table A delivery from Delta

Study	SWP Table A delivery from the Delta (in percent of maximum Table A)					
	Average 1922-1994	Single wet year 1983	2-year wet 1982-1983	4-year wet 1980-1983	6-year wet 1978-1983	10-year wet 1978-1987
SWP Delivery Reliability Report (2003):						
1. 2001 Study	72%	73%	79%	80%	80%	80%
2. 2021A Study	75%	82%	89%	86%	87%	84%
3. 2021B Study	76%	100%	100%	91%	91%	87%
Updated Studies:						
4. 2005 Study	68%	60%	65%	69%	75%	72%
5. 2025 Study	77%	95%	97%	93%	93%	89%

Table 5-7 contains information about Article 21 deliveries for the wet period 1978–1987. The information illustrates a significant decrease in the availability of Article 21 supply between study 5 and study 4. This is primarily due to the increase in Table A demand. Article 21 deliveries are generally higher in the updated studies (4 and 5) than the earlier studies (1, 2 and 3). This is attributed to the 200 taf per year increase in Article 21 demand assumed for studies 4 and 5. In addition, the increase in Article 21 deliveries for study 4 compared to the study 1 is partially due to the lower Table A demand assumed for study 4.

Table 5-7 Average and wet year delivery under Article 21 (taf per year)

Study:	1	2	3	4	5
Year	Study 2001	Study 2021A	Study 2021B	Study 2005	Study 2025
1978	100	100	100	300	300
1979	140	90	100	160	140
1980	100	70	80	140	90
1981	120	0	0	550	70
1982	390	100	60	800	170
1983	200	200	160	400	360
1984	410	380	370	550	490
1985	0	0	0	0	0
1986	50	50	60	120	80
1987	0	0	0	550	180
1922-1994 average	130	80	70	260	120

Numbers rounded to the nearest 10,000 acre-feet.

SWP Table A Delivery Probability

The probability that a given level of SWP Table A amount will be delivered from the Delta is shown for the two current condition studies (1 and 4) in Figure 5-1 and for the three future condition studies (2, 3, and 5) in Figure 5-2. The plot lines in the figures are derived from the study results listed in tables B-3 through B-7. Each line is constructed by ranking the 73 annual Table A delivery values of the relevant study from lowest to highest and calculating the percentage of values equal to or greater than the delivery value of interest. For example, for study 4 in Figure 5-1, the value of 3.3 maf is in the 30 percent position of the ranking; therefore, it is equaled or exceeded by 30 percent (about 22) of the 73 delivery values. The delivery value of 0.16 maf, the minimum value for study 4, is equaled or exceeded by all of the delivery values.

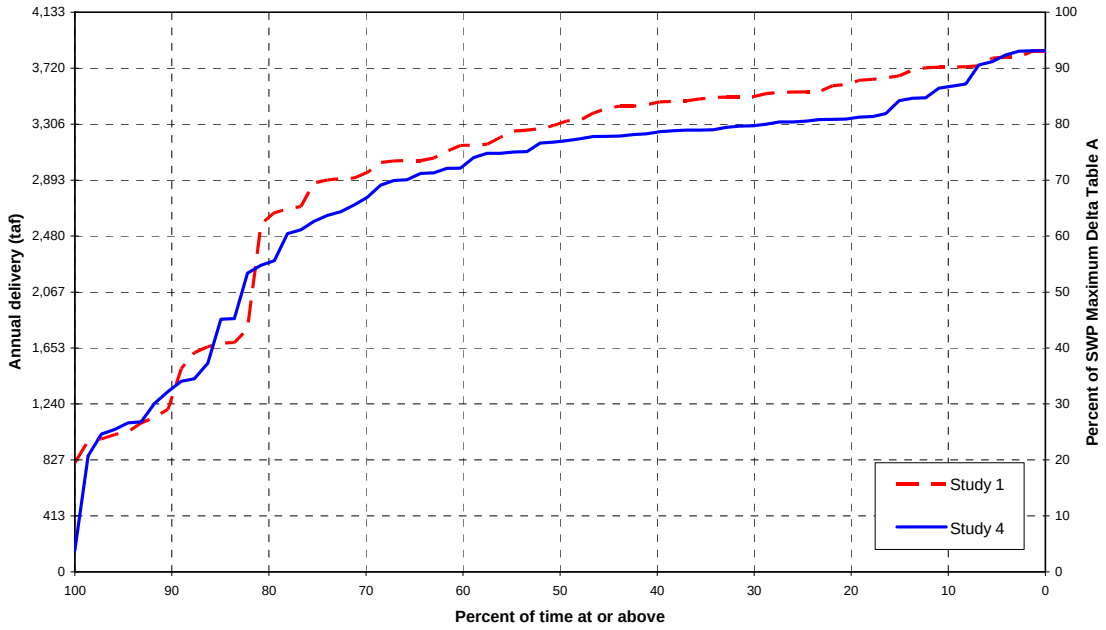

Figure 5-1 SWP Delta Table A delivery probability for year 2005

The curve for study 4 is generally lower than study 1 due to assumed lower annual demands. Neither curve reaches 100 percent because the assumed annual demands are 100 percent (99.5 percent) of the maximum Delta Table A in only two years for study 1 and the assumed maximum demand for study 4 is 93 percent of the maximum Delta Table A. In study 1, the two years with demand at 100 percent are dry years so delivery of 100 percent is not possible. The divergence of the two curves for the minimum delivery amounts (100% probability of being equaled or exceeded) is due to modification of the delivery-carryover storage rule.

Study 5 shows higher deliveries than study 3 for delivery values exceeded by up to 70 percent of the values, and mostly lower deliveries for values exceeded by 80 to 100 percent of the values. Because the assumed demands are nearly the same for these two studies, the delivery differences between study 5 and study 3 are primarily due to modification of the delivery-carryover storage relationship. The delivery-carryover relationship assumed in study 5 allows less delivery than study 3 in dry years which results in higher carryover storage and higher deliveries in normal to above normal years. Study 5 deliveries reach 100 percent 26 percent of the time, the highest percentage for the five studies.

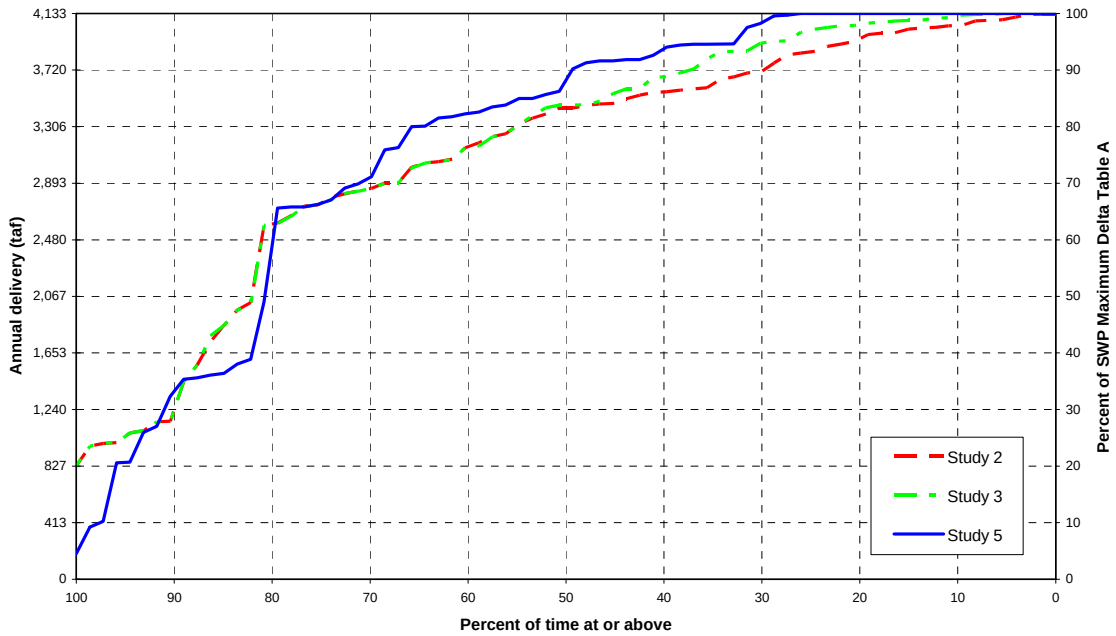

Figure 5-2 SWP Delta Table A delivery probability for year 2025

The amount of SWP Table A delivery per year, either in percent of maximum Delta Table A or in thousand acre-feet, associated with a specific degree of reliability can be estimated from Figures 5-1 and 5-2 for 2005 and 2025 conditions, respectively. The study 4 curve in Figure 5-1 is recommended to be used to represent 2005 conditions, and the study 5 curve in Figure 5-2 is recommended to be used to represent 2025 conditions. By referencing the curve for study 5 in Figure 5-2, the following can be deduced:

- In 75 percent of the years, the annual water delivery of the SWP is estimated to be at or above 2.70 maf per year (65 percent of 4.13 maf).
- In 50 percent of the years, it is estimated to be at or above 3.50 maf per year (85 percent of 4.13 maf).
- In 25 percent of the years, it is at 4.13 maf per year.

Figures 5-1 and 5-2 depict the estimated reliability for the total of SWP deliveries. Under conditions when almost all contractors are requesting their maximum Table A, like in study 5, this information can be directly applied to individual long-term water supply contracts for the SWP. For example, if a water agency has a maximum SWP Table A amount of 400 taf, at least 260 taf per year (65 percent of 400 taf) is estimated to be delivered 75 percent of the time.

Potential Adjustments to 1977 CalSim II Table A Deliveries

The CalSim II model, a planning model, is best used for estimating SWP performance over long periods of time. Considerable judgment should be applied when evaluating CalSim II results for shorter periods of time. This is especially true for estimates for a single year. The updated studies (studies 4 and 5) show that the changes in the operations criteria assumed for the SWP produce a delivery estimate of about 5 percent of maximum Delta Table A for the driest year on record (1977). This estimate is lower than the amount actually delivered from the Delta in 1977 (733 taf, 18 percent of maximum Delta Table A), as well as lower than what was shown in *SWP Delivery*

Reliability Report 2002 (DWR 2003). The discussion below presents some adjustments contractors may consider in estimating Table A deliveries under weather conditions similar to 1977.

In order to understand what led to the lower delivery estimates for 1977, it is best to start with 1975. The year 1975 is a wet year and is immediately followed by two critically dry years (1977 being the driest year on record during the last 80 years of historical hydrology). SWP Table A deliveries estimated in study 4 for 1975, 1976, and 1977 are 3.23 maf, 3.27 maf, and 159 taf, respectively. For study 5 the respective deliveries are 4.13 maf, 3.14 maf, and 187 taf. As currently practiced and allowed under the SWP water supply contracts, many of the contractors would carry over a portion of their allocated Table A water during 1975 and 1976 to succeeding years. In the case of 1977, it is reasonable to assume that up to 500 taf of 1976 allocated Table A water could be carried over to 1977. In addition, due to the slightly conservative delivery-carryover rule curve used in these studies, the minimum SWP storage in San Luis Reservoir for 1977, which occurs during the June-August period, averages about 190 taf for both studies 4 and 5. The minimum pool for the SWP share of San Luis Reservoir is just over 40 taf. In a year as critically dry as 1977, it is also reasonable to assume an additional 150 taf would be made available for deliveries bringing the SWP storage in San Luis Reservoir to minimum pool. After August, the SWP storage in San Luis Reservoir begins to rise. It is reasonable to expect additional deliveries to be made in the September-December period.

In summary, under the hydrologic conditions similar to a critically dry year like 1977, project deliveries can be expected to range from 4 or 5 to 20 percent of Table A, depending upon such factors as the delivery-carryover risk curve applied by SWP operators and the amount of allocated Table A water carried over from the previous year by SWP contractors.

Additional Analysis of Tables B-3 through B-7 in Appendix B

The information presented earlier in this chapter is helpful in analyzing the delivery reliability of a specific water system receiving a portion of its water supply from the SWP. In addition, the series of data contained in tables B-3 through B-7 are very helpful in analyzing longer periods of time that contain not only dry periods but wetter periods, which can replenish local water supplies if there is a place to store the supply. Analysis of this information can help determine if a local agency has adequate storage for capturing these supplies or if more storage could be utilized in the local water system.

Cited Reference

[DWR] California Department of Water Resources, Bay-Delta Office. 2003. The State Water Project Delivery Reliability Report 2002. Final.

Chapter 6. Examples of How to Apply Information

The following two examples illustrate how to use the information presented in this report to develop water supply assessments for a hypothetical SWP contractor. Hypothetical examples illustrating applications of the delivery probability curves and adjustments to the data for a SWP contractor that cannot convey its maximum Table A amount are provided in *The State Water Project Delivery Reliability Report 2002*. Questions regarding the use of the information contained in these reports may be directed to the Department of Water Resources' Bay-Delta Office at (916) 653-1099.

Example 1

This example uses data directly from Table 5-4 for studies 4 and 5, and employs an allocation methodology that provides a simple means of estimating supplies to each contractor. The data in the table is interpolated for 5-year increments and contained in Table 6-1. Although the percentage values are calculated using the maximum Delta Table A value, they may be directly applied to generate estimates for SWP deliveries for the entire 20-year period. This is because the Delta Table A value for 2005 is 4.114 maf/yr, 99.5 percent of the maximum Delta Table A value of 4.133 maf/yr. For comparison purposes, the percentage values for studies 1 and 4 based upon a full Table A value of 4.113 maf/yr and 4.133 maf/yr are listed in Tables B-3 and B-6. In addition, the percentages may also be used to estimate the Table A deliveries to SWP contractors in Butte and Plumas counties and Yuba City. The deliveries to these contractors would be calculated using the same method described below.

Table 6-1 shows the average percentage of maximum Delta Table A deliveries for average, single-dry year, and 2-, 4-, and 6-year multiple dry year scenarios from 2005 to 2025 in five-year increments. The maximum Table A amounts of each contractor are listed in Appendix C. Note that Table A amounts can be amended and a contractor's Table A amount over the next 20 years may be less than its maximum over some or all of this period. In this case, the contractor should use the amended Table A amounts for the corresponding years during this period. To use dry years other than those presented in Table 6-1, or to show year-to-year supplies instead of averages over a multiple-dry year period, see Example 2.

Table 6-1 SWP average and dry year Table A delivery from the Delta in five-year intervals for studies 4 and 5

Year	SWP Table A delivery from the Delta (in percent of maximum Table A)					
	Average 1922-1994	Single dry year 1977	2-year drought 1976-1977	4-year drought 1931-1934	6-year drought 1987-1992	6-year drought 1929-1934
2005	68%	4%	41%	32%	42%	37%
2010	70%	4%	41%	32%	42%	37%
2015	73%	4%	41%	33%	42%	37%
2020	75%	4%	41%	33%	42%	37%
2025	77%	5%	40%	33%	42%	38%

How to calculate supplies:

Multiply the contractor's Table A amount for a particular year by the corresponding delivery percentages for that year from Table 6-1 to get an estimated delivery amount, for the average and drought periods, for each 5 year increment from 2005 to 2025.

The following tables show the SWP Table A deliveries projected to be available to a hypothetical contractor with a maximum Table A amount of 100,000 AF, on average and for the various drought periods. For this example, the supplies shown for the multiple-dry year period are average supplies over the four-year drought from 1931-1934. Data from other year types, although not required in an urban water management plan, could also be presented this way.

Average Annual Values
(acre-feet)

Water Supply Source	2005	2010	2015	2020	2025
State Water Project (Table A)	68,000	70,000	73,000	75,000	77,000
State Water Project (Article 21)					
Groundwater					
Local Surface Water					
Transfers					
Exchanges					
Reclaimed Water					
Other (identify)					
Total					

Single Dry Year (1977 conditions)
(acre-feet)

Water Supply Source	2005	2010	2015	2020	2025
State Water Project (Table A)	4,000	4,000	4,000	4,000	5,000
State Water Project (Article 21)					
Groundwater					
Local Surface Water					
Transfers					
Exchanges					
Reclaimed Water					
Other (identify)					
Total					

Multiple Dry Year Period
1931-1934 conditions
(acre-feet per year)

Water Supply Source	2005	2010	2015	2020	2025
State Water Project (Table A)	32,000	32,000	33,000	33,000	33,000
State Water Project (Article 21)					
Groundwater					
Local Surface Water					
Transfers					
Exchanges					
Reclaimed Water					
Other (identify)					
Total					

Example 2

This example is similar to Example 1 but allows a contractor to select alternative single year or multiple-dry year sequences other than those presented in Table 6-1. This option might be selected if analyzing different hydrologic year(s) makes more sense given a contractor's other supply sources, or given the locally acceptable risk level for water delivery shortages.

This example can also be used to identify supplies projected to be available in each year of a multiple-dry year period. While the Water Code does not specifically require this, the Urban Water Management Plan Guidebook suggests showing year-to-year supplies (see the UWMP Guidebook, Section 7, Step 3).

Where to find the data

Choose a single year or multiple-year sequences from Tables B-6 and B-7 to represent single-dry year and multiple-dry year scenarios. Table B-6 contains the percent of maximum Table A deliveries under all 73 hydrologic years in the updated model study for 2005. Table B-7 contains the percent of maximum Table A deliveries under all 73 hydrologic years in the updated model study for 2025.

How to calculate supplies

Multiply the contractor's Table A amount for a particular year by the percent of maximum Table A deliveries for the selected years, to get an estimated delivery amount for the years selected, for 2005 and 2025. Values for years between 2005 and 2025 can be linearly interpolated.

The following tables show the SWP Table A deliveries projected to be available to a hypothetical contractor with a maximum Table A amount of 100,000 AF, in a single dry year and year-to-year over a multiple dry-year period. For this example, the single dry year selected is for 1988 conditions, and the multiple dry-year period selected is the three-year period from 1990-1992. In showing year-to-year supplies for the multiple-dry year period, these year-to-year supplies should be shown for each five year increment during the 20 year projection period.

Single Dry Year (1988 conditions)
(acre-feet)

Water Supply Source	2005	2010	2015	2020	2025
State Water Project (Table A)	21,000	18,000	15,000	13,000	10,000
State Water Project (Article 21)	0	0	0	0	0
Groundwater					
Local Surface Water					
Transfers					
Exchanges					
Reclaimed Water					
Other (identify)					
Total					

Multiple Dry Year Period 1990-1992
1990 conditions
(acre-feet per year)

Water Supply Source	2005	2010	2015	2020	2025
State Water Project (Table A)	27,000	25,000	24,000	22,000	21,000
State Water Project (Article 21)	0	0	0	0	0
Groundwater					
Local Surface Water					
Transfers					
Exchanges					
Reclaimed Water					
Other (identify)					
Total					

Multiple Dry Year Period 1990-1992
1991 conditions
(acre-feet per year)

Water Supply Source	2005	2010	2015	2020	2025
State Water Project (Table A)	25,000	24,000	23,000	22,000	21,000
State Water Project (Article 21)	0	0	0	0	0
Groundwater					
Local Surface Water					
Transfers					
Exchanges					
Reclaimed Water					
Other (identify)					
Total					

Multiple Dry Year Period 1990-1992
1992 conditions
(acre-feet per year)

Water Supply Source	2005	2010	2015	2020	2025
State Water Project (Table A)	34,000	34,000	35,000	35,000	35,000
State Water Project (Article 21)	0	0	0	0	0
Groundwater					
Local Surface Water					
Transfers					
Exchanges					
Reclaimed Water					
Other (identify)					
Total					

Appendices

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Appendix A. 2005 Delivery Reliability Report CalSim II Modeling Assumptions

Two versions of the model are used for this report. Studies 1, 2 and 3 are based on the May 2002 benchmark study version. The updated studies (4 and 5) use the most recent version, which was developed for the 2004 Long-Term Central Valley Project Operations Criteria and Plan (OCAP). The key assumption differences between the May 2002 benchmark version and the 2004 OCAP version are listed below.

1. Temperature flow below Keswick Dam was changed from a fixed time series flow to a dynamic storage dependent flow.
2. Relaxation of criteria for flow below Nimbus Dam when Folsom Lake storage drops below 300 thousand acre-feet.
3. Navigation control point flow criteria were modified from being dependent on water year type to being dependent on CVP agricultural allocation levels. Criteria were also relaxed for very low allocation years.
4. Clear Creek Tunnel target flows were modified to match the latest Trinity EIR analysis.
5. Addition of a minimum pumping level at Banks Pumping Plant of 300 cubic feet per second.
6. Addition of a minimum pumping level at Tracy Pumping Plant of 600 cubic feet per second.
7. Addition of flow requirements for flow at the mouth of the Feather River for Settlement Contractors.
8. Delivery-carryover relationship was adjusted to reduce delivery targets and increase carryover in critically dry years.
9. Addition of Lake Oroville end-of-September carryover target storage rule.
10. Five-step study setup modified to isolate (b)(2) accounting from “with Project” conditions.
11. Modification of American River demands as described in Tables A-2 and A-3.
12. Modification of Contra Costa Water District demands to include the effect of Los Vaqueros Reservoir operations.
13. The minimum flow of the Trinity River below Lewiston Dam in study 4 ranges from 369 to 453 thousand acre-feet per year depending on water year type. All other studies used in this report assume the Trinity River minimum flow has a greater range from 369 to 815 thousand acre-feet per year. This greater range of Trinity River minimum flows represents the Trinity Environmental Impact Statement Preferred Alternative.
14. Study 5 assumes the implementation of Freeport Regional Water Project, including modified East Bay Municipal Utility District operations on the Mokelumne River.
15. Implementation of May 2003 CVPIA 3406 (b)(2) decision and other changes:
    a. Streamlining actions to simplify analysis of the results.
    b. Anadromous Fish Restoration Program table updates to better represent management of (b)(2) water under the May 2003 (b)(2) decision.

c Action triggering modifications to attempt to meet 200 thousand-acre feet target during October through January period.

16 Environmental Water Account (EWA) changes include:

a Streamlining actions and coordination with (b)(2) actions.

b EWA purchase amount increase to a maximum of 250 thousand acre-feet per year.

c Addition of storage debt carryover accounting, including debt spill at San Luis Reservoir.

d Addition of EWA asset takeover by SWP and CVP at San Luis Reservoir when reservoir space utilized by EWA is needed for project operations.

All studies assume current Banks Pumping Plant capacity, existing conveyance capacity of the upper Delta-Mendota Canal/California Aqueduct system, and current SWP/CVP operations agreements.

The following table is a complete list of the study assumptions.

Table A-1 2005 Delivery Reliability Report CalSim II Modeling Assumptions

	Study 1 2001 Study, 2003 Report	Study 4 2005 Study, Updated Studies	Study 2 2021A Study, 2003 Report	Study 3 2021B Study, 2003 Report	Study 5 2025 Study, Updated Studies
Period of Simulation	73 years (1922-1994)	Same	Same	Same	Same
HYDROLOGY					
Level of Development (Land Use)	2001 Level, DWR Bulletin 160-98[1]	Same as Study 1	2020 Level, DWR Bulletin 160-98	Same as Study 2	Same as Study 2
Demands					
North of Delta (except American River)					
CVP	Land Use based, limited by Full Contract	Same	Same	Same	Same
SWP (FRSA)	Land Use based, limited by Full Contract	Same	Same	Same	Same
Non-Project	Land Use based	Same	Same	Same	Same
CVP Refuges	Firm Level 2	Same	Same	Same	Same
American River Basin					
Water rights	20012	20013	20204	Same as Study 2	2020, as projected by Water Forum Analysis5
CVP	20012	20013	20206	Same as Study 2	2020, as projected by Water Forum Analysis7
San Joaquin River Basin					
Friant Unit	Regression of historical	Same	Same	Same	Same
Lower Basin	Fixed annual demands	Same	Same	Same	Same
Stanislaus River Basin	New Melones Interim Operations Plan	Same	Same	Same	Same

1 2000 Level of Development defined by linearly interpolated values from the 1995 Level of Development and 2020 Level of Development from DWR Bulletin 160-98

2 1998 level demands defined in Sacramento Water Forum's EIR with a few updated entries.

3 Presented in attached Table 2001 American River Demand Assumptions.

4 Sacramento Water Forum 2025 level demands defined in Sacramento Water Forum's EIR.

5 Presented in attached Table 2020 American River Demand Assumptions

6 Sacramento Water Forum 2025 level demands defined in Sacramento Water Forum's EIR. Freeport Alternative defined in EBMUD Supplemental Water Supply Project REIR/SEIS.

7 Same as footnote 5 but modified with PCWA 35 TAF CVP contract supply diverted at the new American River PCWA Pump Station

	Study 1 2001 Study, 2003 Report	Study 4 2005 Study, Updated Studies	Study 2 2021A Study, 2003 Report	Study 3 2021B Study, 2003 Report	Study 5 2025 Study, Updated Studies
South of Delta					
CVP	Full Contract	Same	Same	Same	Same
CCWD	143 TAF/YR[8]	124 TAF/YR[8]	151 TAF/YR[8]	Same as Study 2	158 TAF/YR[8]
SWP (w/ North Bay Aqueduct)	3.0-4.1 MAF/YR	2.3-3.9 MAF/YR	3.3-4.1 MAF/YR	4.1 MAF/YR	3.9-4.1 MAF/YR
SWP Article 21 Demand	MWDSC up to 50 TAF/month, Dec-Mar, others up to 84 TAF/month	MWDSC up to 100 TAF/month, Dec-Mar, others up to 84 TAF/month	Same as Study 1	Same as Study 1	Same as Study 4
FACILITIES					
Freeport Regional Water Project	None	Same as Study 1	Same as Study 1	Same as Study 1	Included[9]
Banks Pumping Capacity	6680 cfs	Same	Same	Same	Same
Tracy Pumping Capacity	4200 cfs + deliveries upstream of DMC constriction	Same	Same	Same	Same
REGULATORY STANDARDS					
Trinity River					
Minimum Flow below Lewiston Dam	Trinity EIS Preferred Alternative (369-815 TAF/YR)	369-453 TAF/YR	Same as Study 1	Same as Study 1	Same as Study 1
Trinity Reservoir End-of-September Minimum Storage	Trinity EIS Preferred Alternative (600 TAF as able)	Same	Same	Same	Same
Clear Creek					
Minimum Flow below Whiskeytown Dam	Downstream water rights, 1963 USBR Proposal to FWS and NPS, and FWS use of CVPIA 3406(b)(2) water	Same	Same	Same	Same
Upper Sacramento River					
Shasta Lake End-of-September Minimum Storage	SWRCB WR 1993 Winter-run Biological Opinion (1900 TAF)	Same	Same	Same	Same

8 Delta diversions include operations of Los Vaqueros Reservoir and represents average annual diversion

9 Includes modified EBMUD operations of the Mokelumne River

	Study 1 **2001 Study,** **2003 Report**	**Study 4** **2005 Study,** **Updated Studies**	**Study 2** **2021A Study,** **2003 Report**	**Study 3** **2021B Study,** **2003 Report**	**Study 5** **2025 Study,** **Updated Studies**
Minimum Flow below Keswick Dam	Flows for SWRCB WR 90-5 and 1993 Winter-run Biological Opinion temperature control, and FWS use of CVPIA 3406(b)(2) water	Same	Same	Same	Same
Feather River					
Minimum Flow below Thermalito Diversion Dam	1983 DWR, DFG Agreement (600 CFS)	Same	Same	Same	Same
Minimum Flow below Thermalito Afterbay outlet	1983 DWR, DFG Agreement (750 – 1700 CFS)	Same	Same	Same	Same
American River					
Minimum Flow below Nimbus Dam	SWRCB D-893 (see accompanying Operations Criteria), and FWS use of CVPIA 3406(b)(2) water	Same	Same	Same	Same
Minimum Flow at H Street Bridge	SWRCB D-893	Same	Same	Same	Same
Lower Sacramento River					
Minimum Flow near Rio Vista	SWRCB D-1641	Same	Same	Same	Same
Mokelumne River					
Minimum Flow below Camanche Dam	FERC 2916-029, 1996 (Joint Settlement Agreement) (100 – 325 CFS)	Same	Same	Same	Same
Minimum Flow below Woodbridge Diversion Dam	FERC 2916-029, 1996 (Joint Settlement Agreement) (25 – 300 CFS)	Same	Same	Same	Same
Stanislaus River					
Minimum Flow below Goodwin Dam	1987 USBR, DFG agreement , and FWS use of CVPIA 3406(b)(2) water	Same	Same	Same	Same
Minimum Dissolved Oxygen	SWRCB D-1422	Same	Same	Same	Same

	Study 1 2001 Study, 2003 Report	Study 4 2005 Study, Updated Studies	Study 2 2021A Study, 2003 Report	Study 3 2021B Study, 2003 Report	Study 5 2025 Study, Updated Studies
Merced River					
Minimum Flow below Crocker-Huffman Diversion Dam	Davis-Grunsky (180 – 220 CFS, Nov – Mar), and Cowell Agreement	Same	Same	Same	Same
Minimum Flow at Shaffer Bridge	FERC 2179 (25 – 100 CFS)	Same	Same	Same	Same
Tuolumne River					
Minimum Flow at Lagrange Bridge	FERC 2299-024, 1995 (Settlement Agreement) (94 – 301 TAF/YR)	Same	Same	Same	Same
San Joaquin River					
Maximum Salinity near Vernalis	SWRCB D-1641	Same	Same	Same	Same
Minimum Flow near Vernalis	SWRCB D-1641, and Vernalis Adaptive Management Program per San Joaquin River Agreement	Same	Same	Same	Same
Sacramento River-San Joaquin River Delta					
Delta Outflow Index (Flow and Salinity)	SWRCB D-1641	Same	Same	Same	Same
Delta Cross Channel Gate Operation	SWRCB D-1641	Same	Same	Same	Same
Delta Exports	SWRCB D-1641, FWS use of CVPIA 3406(b)(2) water and CALFED Fisheries Agencies use of EWA assets	Same	Same	Same	Same
OPERATIONS CRITERIA					
Subsystem					
Upper Sacramento River					
Flow Objective for Navigation (Wilkins Slough)	3,500 – 5,000 CFS based on Lake Shasta storage condition	3,250 – 5,000 CFS based on CVP Ag	Same as Study 1	Same as Study 1	Same as Study 4
American River					
Folsom Dam Flood Control	SAFCA, Interim re-operation of	Same	Same	Same	Same

	Study 1 2001 Study, 2003 Report	Study 4 2005 Study, Updated Studies	Study 2 2021A Study, 2003 Report	Study 3 2021B Study, 2003 Report	Study 5 2025 Study, Updated Studies
	Folsom Dam, Variable 400/670 (without outlet modifications)				
Flow below Nimbus Dam	Operations criteria corresponding to SWRCB D-893 required minimum flow	Same	Same	Same	Same
Sacramento Water Forum Mitigation Water	None	Same as Study 1	Sacramento Water Forum (up to 47 TAF/YR in dry years)10	Same as Study 2	Same as Study 2
Feather River					
Flow at Mouth	No criteria	Maintain the DFG/DWR flow target above Verona or 2800 cfs for Apr– Sep dependent on Oroville inflow and FRSA allocation	Same as Study 1	Same as Study 1	Same as Study 4
Stanislaus River					
Flow below Goodwin Dam	1997 New Melones Interim Operations Plan	Same	Same	Same	Same
San Joaquin River					
Flow near Vernalis	San Joaquin River Agreement in support of the Vernalis Adaptive Management Program	Same	Same	Same	Same
System-wide					
CVP Water Allocation					
CVP Settlement and Exchange	100% (75% in Shasta Critical years)	Same	Same	Same	Same
CVP Refuges	100% (75% in Shasta Critical years)	Same	Same	Same	Same
CVP Agriculture	100% - 0% based on supply (reduced by 3406(b)(2) allocation)	Same	Same	Same	Same
CVP Municipal & Industrial	100% - 50% based on supply (reduced by 3406(b)(2) allocation)	Same	Same	Same	Same

10 This is implemented only in the PCWA Middle Fork Project releases used in defining the CalSim II inflows to Folsom Lake

	Study 1 2001 Study, 2003 Report	Study 4 2005 Study, Updated Studies	Study 2 2021A Study, 2003 Report	Study 3 2021B Study, 2003 Report	Study 5 2025 Study, Updated Studies
SWP Water Allocation					
North of Delta (FRSA)	Contract specific	Same	Same	Same	Same
South of Delta	Based on supply; Monterey Agreement	Same	Same	Same	Same
CVP/SWP Coordinated Operations					
Sharing of Responsibility for In-Basin-Use	1986 Coordinated Operations Agreement	Same	Same	Same	Same
Sharing of Surplus Flows	1986 Coordinated Operations Agreement	Same	Same	Same	Same
Sharing of Restricted Export Capacity	Equal sharing of export capacity under SWRCB D-1641; use of CVPIA 3406(b)(2) only restricts CVP exports; EWA use restricts CVP and/or SWP exports as directed by CALFED Fisheries Agencies	Same	Same	Same	Same
Transfers					
Dry Year Program	None	Same	Same	Same	Same
Phase 8	None	Same	Same	Same	Same
MWDSC/CVP Settlement Contractors	None	Same	Same	Same	Same
CVP/SWP Integration					
Dedicated Conveyance at Banks	None	Same	Same	Same	Same
NOD Accounting Adjustments	None	Same	Same	Same	Same
CVPIA 3406(b)(2)	May 2002 benchmark study assumptions	Dept of Interior 2003 Decision	Same as Study 1	Same as Study 1	Same as Study 4
Allocation	800 TAF/YR (600 TAF/YR in Shasta Critical years)	800 TAF/YR, 700 TAF/YR in 40-30-30 Dry Years, and 600 TAF/YR in 40-30-30 Critical years	Same as Study 1	Same as Study 1	Same as Study 4
Actions	AFRP flow objectives (Oct-Jan), CVP export reduction (Dec-Jan), 1995 WQCP (up to 450	1995 WQCP, Fish flow objectives (Oct-Jan), VAMP (Apr 15- May 16)	Same as Study 1	Same as Study 1	Same as Study 4

	Study 1 2001 Study, 2003 Report	Study 4 2005 Study, Updated Studies	Study 2 2021A Study, 2003 Report	Study 3 2021B Study, 2003 Report	Study 5 2025 Study, Updated Studies
	TAF/YR), VAMP (Apr 15- May 16) CVP export restriction, Post (May 16-31) VAMP CVP export restriction, Ramping of CVP export (Jun), Pre (Apr 1-15) VAMP CVP export restriction, CVP export reduction (Feb-Mar), Additional Upstream Releases (Feb-Sep)	CVP export restriction, 3000 CFS CVP export limit in May and June (D1485 Striped Bass continuation), Post (May 16-31) VAMP CVP export restriction, Ramping of CVP export (Jun), Upstream Releases (Feb-Sep)			
Accounting adjustments per May 2003 Interior Decision	None	No limit on responsibility for non-discretionary D1641 requirements no Reset with the Storage metric and no Offset with the Release and Export metrics	Same as Study 1	Same as Study 1	Same as Study 4
CALFED Environmental Water Account					
Actions	Total exports restricted to 4,000 cfs, 1 wk/mon, Dec-Mar (wet year: 2 wk/mon), VAMP (Apr 15- May 16) export restriction, Pre (Apr 1-15) and Post (May 16-31) VAMP export restriction, Ramping of export (Jun)	Dec-Feb reduce total exports by 50 TAF/month relative to total exports without EWA; VAMP (Apr 15- May 16) export restriction on SWP; Post (May 16-31) VAMP export restriction on SWP and potentially on CVP if B2 Post-VAMP action is not taken; Ramping of exports (Jun)	Same as Study 1	Same as Study 1	Same as Study 4
Assets	50% of use of JPOD, 50% of any CVPIA 3406(b)(2) or ERP releases pumped by SWP, flexing of Delta Export/Inflow Ratio (not explicitly modeled), dedicated 500 CFS increase of Jul – Sep Banks PP capacity, north-of-Delta (35 TAF/Yr) and south-of-Delta purchases (50 – 200 TAF/Yr), 100 TAF/Yr from south-of-Delta source shifting agreements, and 200 TAF/YR south-of-Delta groundwater	Fixed Water Purchases 250 TAF/yr, 230 TAF/yr in 40-30-30 dry years, 210 TAF/yr in 40-30-30 critical years. The purchases range from 0 TAF in Wet Years to approximately 153 TAF in Critical Years NOD, and 57 TAF in Critical Years to 250 TAF in Wet Years SOD. Variable assets include the following: used of 50% JPOD export	Same as Study 1	Same as Study 1	Same as Study 4

	Study 1 **2001 Study,** **2003 Report**	**Study 4** **2005 Study,** **Updated Studies**	**Study 2** **2021A Study,** **2003 Report**	**Study 3** **2021B Study,** **2003 Report**	**Study 5** **2025 Study,** **Updated Studies**
	storage capacity	capacity, acquisition of 50% of any CVPIA 3406(b)(2) releases pumped by SWP, flexing of Delta Export/Inflow Ratio (post-processed from CalSim II results), dedicated 500 CFS pumping capacity at Banks in Jul – Sep			
Debt restrictions	No planned carryover of debt past Sep, no reset of unpaid debt, debt carried past Sep paid back by Feb	Delivery debt paid back in full upon assessment; Storage debt paid back over time based on asset/action priorities; SOD and NOD debt carryover is allowed; SOD debt carryover is explicitly managed or spilled; NOD debt carryover must be spilled; SOD and NOD asset carryover is allowed.	Same as Study 1	Same as Study 1	Same as Study 4

Table A-2 2001 American River Demand Assumptions

Location / Purveyor	ALLOCATION TYPE (MAXIMUM)					
	CVP AG	CVP MI	CVP Settlement / Exchange	Water Rights / Non-CVP / No Cuts	CVP Refuge	Total
Auburn Dam Site (D300)						
Placer County Water Agency	0	0	0	8,500	0	8,500
Total	0	0	0	8,500	0	8,500
Folsom Reservoir (D8)						
Sacramento Suburban	0	0	0	0	0	0
City of Folsom (includes P.L. 101-514)	0	0	0	20,000	0	20,000
Folsom Prison	0	0	0	2,000	0	2,000
San Juan Water District (Placer County)	0	0	0	10,000	0	10,000
San Juan Water District (Sac County) (includes P.L. 101-514)	0	11,200	0	33,000	0	44,200
El Dorado Irrigation District	0	7,550	0	0	0	7,550
El Dorado Irrigation District (P.L. 101-514)	0	0	0	0	0	0
City of Roseville	0	32,000	0	0	0	32,000
Placer County Water Agency	0	0	0	0	0	0
Total	0	50,750	0	65,000	0	115,750
Folsom South Canal (D9)						
So. Cal WC/ Arden Cordova WC	0	0	0	3,500	0	3,500
California Parks and Recreation	0	100	0	0	0	100
SMUD (export)	0	0	0	15,000	0	15,000
South Sacramento County Agriculture (export, SMUD transfer)	0	0	0	0	0	0
Canal Losses	0	0	0	1,000	0	1,000
Total	0	100	0	19,500	0	19,600

Location / Purveyor	ALLOCATION TYPE (MAXIMUM)					
	CVP AG	CVP MI	CVP Settlement / Exchange	Water Rights / Non-CVP / No Cuts	CVP Refuge	Total
Nimbus to Mouth (D302)						
City of Sacramento	0	0	0	63,335	0	63,335
Arcade Water District	0	0	0	2,000	0	2,000
Carmichael Water District	0	0	0	8,000	0	8,000
Total	0	0	0	73,335	0	73,335
Sacramento River (D162)						
Placer County Water Agency	0	0	0	0	0	0
Total	0	0	0	0	0	0
Sacramento River (D167/D168)						
City of Sacramento	0	0	0	38,665	0	38,665
Sacramento County Water Agency (SMUD transfer)	0	0	0	0	0	0
Sacramento County Water Agency (P.L. 101-514)	0	0	0	0	0	0
EBMUD (export)	0	0	0	0	0	0
Total	0	0	0	38,665	0	38,665
Total from the American River	0	50,850	0	166,335	0	217,185

Table A-3 2020 American River Demand Assumptions

Location / Purveyor	ALLOCATION TYPE (MAXIMUM)						Folsom Unimpaired Inflow (FUI)			Notes
	CVP AG	CVP MI	CVP Settlement / Exchange	Water Rights / Non-CVP / No Cuts	CVP Refuge	Total	FUI = Total TAF (Mar – Sep) + 60 TAF			
Auburn Dam Site (D300)										
Placer County Water Agency	0	35,000	0	35,500	0	70,500	70,500	70,500	70,500	1/2/3/12
Total	**0**	**35,000**	**0**	**35,500**	**0**	**70,500**	**70,500**	**70,500**	**70,500**	
Folsom Reservoir (D8)										
Sacramento Suburban	0	0	0	29,000	0	29,000	29,000	0	0	4/5/11
City of Folsom (includes P.L. 101-514)	0	7,000	0	27,000	0	34,000	34,000	34,000	20,000	1/2/3
Folsom Prison	0	0	0	5,000	0	5,000	5,000	5,000	5,000	
San Juan Water District (Placer County)	0	0	0	25,000	0	25,000	25,000	25,000	10,000	1/2/3/11
San Juan Water District (Sac County) (includes P.L. 101-514)	0	24,200	0	33,000	0	57,200	57,200	57,200	44,200	1/2/3
El Dorado Irrigation District	0	7,550	0	17,000	0	24,550	24,550	24,550	22,550	1/2/3
El Dorado Irrigation District (P.L. 101-514)	0	7,500	0	0	0	7,500	7,500	7,500	0	1/2/3
City of Roseville	0	32,000	0	30,000	0	62,000	54,900	54,900	39,800	1/2/3/11/12
Placer County Water Agency	0	0	0	0	0	0	0	0	0	11
Total	**0**	**78,250**	**0**	**166,000**	**0**	**244,250**	**237,150**	**208,150**	**141,550**	
Folsom South Canal (D9)										
So. Cal WC/ Arden Cordova WC	0	0	0	5,000	0	5,000	5,000	5,000	5,000	
California Parks and Recreation	0	5,000	0	0	0	5,000	5,000	5,000	5,000	
SMUD (export)	0	15,000	0	15,000	0	30,000	30,000	30,000	15,000	1/2/3
South Sacramento County Agriculture (export, SMUD transfer)	0	0	0	0	0	0	0	0	0	1/2/3
Canal Losses	0	0	0	1,000	0	1,000	1,000	1,000	1,000	
Total	**0**	**20,000**	**0**	**21,000**	**0**	**41,000**	**41,000**	**41,000**	**26,000**	
Nimbus to Mouth (D302)										
City of Sacramento	0	0	0	96,300	0	96,300	96,300	96,300	50,000	6/7/8
Arcade Water District	0	0	0	11,200	0	11,200	11,200	11,200	3,500	13

Location / Purveyor	ALLOCATION TYPE (MAXIMUM)						Folsom Unimpaired Inflow (FUI)			Notes
	CVP AG	CVP MI	CVP Settlement / Exchange	Water Rights / Non-CVP / No Cuts	CVP Refuge	Total	FUI = Total TAF (Mar – Sep) + 60 TAF			
Carmichael Water District	0	0	0	12,000	0	12,000	12,000	12,000	12,000	
Total	**0**	**0**	**0**	**119,500**	**0**	**119,500**	**119,500**	**119,500**	**65,500**	
Sacramento River (D162)										
Placer County Water Agency	0	0	0	0	0	0	0	0	0	
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Sacramento River (D167/D168)										
City of Sacramento	0	0	0	34,300	0	34,300	34,300	34,300	80,600	8
Sacramento County Water Agency (SMUD transfer)	0	30,000	0	0	0	30,000				10
Sacramento County Water Agency (P.L. 101-514)	0	15,000	0	0	0	15,000				10
EBMUD (export)	0	133,000	0	0	0	133,000				
Total	**0**	**178,000**	**0**	**34,300**	**0**	**212,300**	**34,300**	**34,300**	**80,600**	
Total demands from the American River	**0**	**133,250**	**0**	**342,000**	**0**	**475,250**	**468,150**	**439,150**	**303,550**	

Notes

1/ Wet/average years for this diverter are defined as those years when the projected March through November unimpaired inflow to Folsom Reservoir is greater than 950,000 af.

2/ Drier years for this diverter are defined as those years when the projected March through November unimpaired inflow to Folsom Reservoir is less than 950,000 af but greater than 400,000 af.

3/ Driest years for this diverter are defined as those years when the projected March through November unimpaired inflow to Folsom Reservoir is less than 400,000 af.

4/ Wet/average years for this diverter are defined as those years when the projected March through November unimpaired inflow to Folsom Reservoir is greater than 1,600,000 af.

5/ Drier years for this diverter are defined as those years when the projected March through November unimpaired inflow to Folsom Reservoir is less than 1,600,000 af.

6/ Wet/average years as it applies to the City of Sacramento are time periods when the flows bypassing the E. A. Fairbairn Water Treatment Plant diversion exceed the "Hodge flows."

7/ Drier years are time periods when the flows bypassing the City's E.A. Fairbairn Water Treatment Plant diversion do not exceed the "Hodge flows."

8/ For modeling purposes, it is assumed that the City of Sacramento's total annual diversions from the American and Sacramento River in year 2030 would be 130,600 af.

10/ The total demand for Sacramento County Water Agency would be up to 78,000 af. The 45,000 af represents firm entitlements; the additional 33,000 af of demand is expected to be met by intermittent surplus supply. The intermittent supply is subject to Reclamation reduction (50%) in dry years.

11/ Water Rights Water provided by releases from PCWA's Middle Fork Project; inputs into upper American River model must be consistent with these assumptions.

12/ Demand requires "Replacement Water" as indicated below

13/ Arcade WD demand modeled as step function: one demand when FUI > 400, another demand when FUI < 400.

Appendix B. Results of Report Studies

A study to estimate the supply reliability of the State Water Project is done using a computer program that simulates the operation of the SWP on a monthly basis over a 73-year historical record of rainfall and runoff (1922–1994). The simulation model integrates all the relevant water resource components and calculates key water management parameters, such as:

- the amount of water released from reservoirs in the Sacramento-San Joaquin valleys,
- the amount of water required to maintain Delta water quality standards,
- the amount of water to be pumped from the Delta by the SWP and the Central Valley Project (CVP), and
- the amount of water that can be delivered by each of these projects.

The information required to run the simulation is referred to as the "model input." The most significant categories of input are:

- the physical description of the water system facilities (maximum pumping or release capacity, maximum reservoir storages, etc.);
- institutional requirements (delivery contract requirements, Delta water quality standards, the operations agreement between the SWP and CVP, endangered species requirements, and other requirements of federal and state laws, etc);
- hydrology (river and stream flows adjusted for water use in the source areas); and
- the level of SWP water demand.

CalSim II is the current version of the computer simulation model used to estimate SWP delivery reliability. All versions of CalSim employ commercially available linear programming software as a solution device. The application of the software, graphical user interface, and input/output devices are discussed in the documentation for CalSim.[11]

The model studies selected for this report answer two questions.

1. "What is the estimated current delivery reliability of the SWP?" and
2. "What is the estimate for SWP deliveries in the year 2025, if there were no new facilities or improvements to existing facilities, SWP water demand increased, and the institutional requirements existing today were in place?"

Depending upon a person's expectation of what the future holds, this estimate of SWP delivery capability could be viewed as either too low or too high. The estimate could be viewed as too low because the Department of Water Resources (DWR) is planning to have facilities in place by 2025 that will increase the reliability of the SWP. The estimate could be viewed as too high because there is the potential for exports to be required to be reduced to protect endangered Delta fish species.

The key study assumptions are shown in Table B-1 and listed in more detail in Chapter 4 and Appendix A. Additional discussions of these studies are on DWR's Modeling Branch's Website for the *SWP Delivery Reliability Report 2002* (DWR 2003) studies and on the US Bureau of Reclamation's Website for Operations Criteria and Plan (OCAP) studies

[11] CalSim documentation may be obtained through the DWR Modeling Branch's website: http://modeling.water.ca.gov.

(http://modeling.water.ca.gov/hydro/studies/SWPReliability/index.html and http://www.usbr.gov/mp/cvo/ocap_page.html, respectively).

Table B-1 Key study assumptions

Study	Study name	Level of development (year)	SWP Table A demand (maf/year)	SWP Article 21 demand (taf/month)	Model version
SWP Delivery Reliability Report (2003)					
1	2001 Study	2001	3.0–4.1	0–84, Apr–Nov 50–134, Dec–Mar	May 2002 benchmark
2	2021A Study	2021	3.3–4.1	0–84, Apr–Nov 50–134, Dec–Mar	May 2002 benchmark
3	2021B Study	2021	4.1	0–84, Apr–Nov 50–134, Dec–Mar	May 2002 benchmark
Updated Studies					
4	2005 Study	2005	2.3–3.9	0–84, Apr–Nov 100–184, Dec–Mar	2004 OCAP
5	2025 Study	2025	3.9–4.1	0–84, Apr–Nov 100–184, Dec–Mar	2004 OCAP

maf = million acre-feet

OCAP = 2004 Long-Term Central Valley Project Operations Criteria and Plan

taf = thousand acre-feet

Study Results

The annual delivery amounts calculated by the supply reliability studies are contained in Tables B-3 through B-7 at the back of this appendix. The tables show the demand level in thousand acre-feet (taf), the amount of delivery from the Delta, and percent of full Delta Table A calculated for each year of simulation for the five studies. Delta Table A refers to the total of the Table A amounts for each of the SWP contractors receiving water from the Delta. Of the 29 SWP contractors, 26 receive their deliveries from the Delta. The total maximum Table A amount for all SWP contractors is 4.173 maf/year. Of this amount, 4.133 maf/yr is the maximum Delta Table A amount.

To simplify the use of this report, the calculation of delivery in percent of full Delta Table A is based on the maximum Delta Table A total of 4.133 maf for all five studies. The demands for studies 1 and 4 were developed assuming slightly earlier conditions when the maximum Delta Table A amounts totaled slightly less than 4.133 maf (4.114 maf and 4.112 maf, respectively). To show the effect of these minor differences in Table A totals, the annual deliveries in percent of full Delta Table A for study 1 (Table B-3) are calculated with the earlier Delta Table A total of 4.114 maf and also with the maximum Delta Table A total of 4.133 maf. Similarly, study 4 results in Table B-6 are calculated with the earlier and maximum Delta Table A totals. The tables show that most years have the same delivery percentage for both Table A totals.

These values must be interpreted within the confines of the assumptions upon which they are calculated. For example, for the year 1958 in study 5, the annual delivery is calculated to be 4,133 taf or 100 percent of maximum Delta Table A (see Table B-7). This result should be stated as follows:

> If the rainfall were the same as it was in 1958 but (1) the level of water use in the source area was increased to the level it would be in 2025; (2) SWP facilities and operation requirements were the same as they are today; and (3) SWP contractor demands were at their maximum Delta Table A level, the SWP would deliver approximately 4,133 taf or 100 percent of the maximum Delta Table A.

Actually, the conditional statement associated with the result for any particular year is even more complicated than this because the result is also dependent upon the rainfall that has occurred in previous years. For example, if the previous year (1957) were wet, runoff for 1958 for the same amount of rainfall would be greater than if 1957 were dry. In addition, reservoir storage for the beginning of 1958 would vary depending upon the weather conditions in 1957. This linkage makes each year's simulation dependent on the previous year's and, hence, links the entire historical series.

Table B-2 contains a summary of the delivery estimates for the SWP for important dry periods in history computed by the studies. Studies 4 and 5 were selected to represent the estimated 2005 and 2025 deliveries, respectively. This information can be helpful in analyzing the delivery reliability of a specific water system that receives a portion of its water supply from the SWP. The series of data contained in Tables B-3 through B-7 are also helpful in analyzing longer periods of time that contain not only dry periods but wetter periods, which can replenish water supplies.

Finally, to help analyze the chance of receiving a given level of delivery in any particular year, a probability distribution curve is useful. It simply shows the percent of the years the annual delivery estimate is at or above a given value. The probability distribution curves for the five studies are included as figures B-1 and B-2. For example, for study 5 (Figure B-2), the curve indicates that in 75 percent of the years, the annual delivery reliability is estimated to be at or above 65 percent of the maximum Delta Table A amount or 2.70 maf. Similarly, annual delivery reliability during 50 percent of the years is estimated to be at or above 85 percent of the maximum Delta Table A or 3.50 maf. The curve also shows that in 25 percent of the years, annual delivery reliability is estimated to be at 100 percent of the maximum Delta Table A.

Table B-2 SWP average and dry year Table A delivery from the Delta for studies 4 and 5

Year	SWP Table A delivery from the Delta (in percent of maximum Table A)					
	Average 1922-1994	Single dry year 1977	2-year drought 1976-1977	4-year drought 1931-1934	6-year drought 1987-1992	6-year drought 1929-1934
2005	68%	4%	41%	32%	42%	37%
2025	77%	5%	40%	33%	42%	38%

Table B-3 SWP Water Delivery from the Delta for Study 1 (taf)

Year	Model variable Table A demand	Model Table A delivery	Percent of maximum Table A - 4.114 maf	Percent of future maximum Table A - 4.133 maf	Model Article 21 supply
1922	3,407	3,389	82%	82%	175
1923	3,717	3,727	91%	90%	143
1924	3,961	1,014	25%	25%	0
1925	3,940	1,502	36%	36%	0
1926	3,777	2,951	72%	71%	0
1927	3,543	3,504	85%	85%	220
1928	3,897	3,337	81%	81%	155
1929	3,952	1,037	25%	25%	0
1930	3,922	2,697	66%	65%	92
1931	3,971	1,141	28%	28%	0
1932	3,673	1,620	39%	39%	199
1933	3,939	1,663	40%	40%	134
1934	3,981	1,689	41%	41%	0
1935	3,697	3,439	84%	83%	81
1936	3,769	3,638	88%	88%	0
1937	3,451	3,297	80%	80%	87
1938	3,418	3,439	84%	83%	470
1939	3,673	3,475	84%	84%	227
1940	3,713	3,544	86%	86%	102
1941	3,013	3,036	74%	73%	100
1942	3,583	3,599	87%	87%	513
1943	3,632	3,545	86%	86%	447
1944	3,563	3,449	84%	83%	0
1945	3,613	3,479	85%	84%	136
1946	3,710	3,724	91%	90%	3
1947	3,954	2,653	64%	64%	0
1948	3,959	2,681	65%	65%	2
1949	3,864	2,568	62%	62%	2
1950	3,812	2,909	71%	70%	0
1951	3,779	3,794	92%	92%	311
1952	3,078	3,108	76%	75%	103
1953	3,790	3,801	92%	92%	272
1954	3,833	3,803	92%	92%	98
1955	3,761	1,694	41%	41%	0
1956	3,639	3,649	89%	88%	261
1957	3,759	3,331	81%	81%	96
1958	3,481	3,492	85%	84%	441
1959	4,055	3,506	85%	85%	265
1960	4,114	1,795	44%	43%	0
1961	4,114	2,873	70%	70%	0
1962	3,689	3,158	77%	76%	21
1963	3,634	3,630	88%	88%	223
1964	3,907	3,262	79%	79%	5
1965	3,586	3,256	79%	79%	98
1966	3,722	3,731	91%	90%	147
1967	3,439	3,424	83%	83%	497
1968	3,792	3,548	86%	86%	402
1969	3,157	3,151	77%	76%	100
1970	3,714	3,727	91%	90%	406
1971	3,837	3,845	93%	93%	0
1972	4,012	3,057	74%	74%	2
1973	3,611	3,592	87%	87%	261
1974	3,650	3,664	89%	89%	297
1975	3,720	3,737	91%	90%	415
1976	4,014	3,150	77%	76%	110
1977	3,948	804	20%	19%	0
1978	3,126	3,036	74%	73%	100
1979	3,527	3,509	85%	85%	140
1980	3,197	3,208	78%	78%	100
1981	3,834	3,532	86%	85%	124
1982	3,451	3,471	84%	84%	386
1983	3,007	3,036	74%	73%	200
1984	3,692	3,706	90%	90%	408
1985	3,753	3,540	86%	86%	0
1986	3,345	3,023	73%	73%	51
1987	3,905	2,894	70%	70%	0
1988	4,026	968	24%	23%	0
1989	4,097	2,903	71%	70%	0
1990	3,961	1,101	27%	27%	0
1991	3,957	983	24%	24%	0
1992	3,880	1,199	29%	29%	0
1993	3,559	3,505	85%	85%	133
1994	3,739	3,272	80%	79%	9
Average	3,712	2,962	72%	72%	134
Maximum	4,114	3,845	93%	93%	513
Minimum	3,007	804	20%	19%	0

Table B-4 SWP Water Delivery from the Delta for Study 2 (taf)

Year	Model variable Table A demand	Model Table A delivery	Percent of maximum Table A - 4.133 maf	Model Article 21 supply
1922	4,133	4,043	98%	0
1923	4,133	3,670	89%	0
1924	3,980	972	24%	0
1925	4,133	1,445	35%	0
1926	4,133	2,856	69%	113
1927	4,133	4,032	98%	124
1928	4,133	3,255	79%	3
1929	3,971	1,070	26%	0
1930	4,133	2,734	66%	27
1931	4,133	1,086	26%	0
1932	4,116	1,855	45%	39
1933	4,133	1,966	48%	6
1934	4,133	1,564	38%	0
1935	3,907	3,562	86%	59
1936	4,133	3,655	88%	5
1937	4,133	3,189	77%	65
1938	4,133	4,128	100%	192
1939	3,948	3,443	83%	1
1940	4,133	3,856	93%	22
1941	3,481	3,472	84%	0
1942	3,881	3,894	94%	378
1943	4,120	3,591	87%	375
1944	3,711	3,443	83%	2
1945	3,948	3,574	86%	123
1946	3,969	3,772	91%	0
1947	3,973	2,602	63%	0
1948	4,133	2,587	63%	2
1949	3,996	2,656	64%	0
1950	4,133	2,895	70%	0
1951	4,094	3,994	97%	230
1952	3,510	3,538	86%	100
1953	4,063	3,989	97%	236
1954	4,133	3,830	93%	6
1955	3,995	1,735	42%	0
1956	4,133	4,127	100%	129
1957	4,029	3,069	74%	3
1958	3,942	3,910	95%	335
1959	4,133	3,477	84%	167
1960	4,133	2,021	49%	0
1961	4,133	2,815	68%	0
1962	3,933	3,153	76%	2
1963	4,133	4,046	98%	134
1964	4,030	3,050	74%	0
1965	3,966	3,234	78%	3
1966	4,046	3,844	93%	61
1967	4,033	3,979	96%	167
1968	4,128	3,583	87%	398
1969	3,583	3,556	86%	93
1970	4,004	3,929	95%	398
1971	4,133	4,082	99%	0
1972	4,133	2,727	66%	0
1973	4,119	3,699	89%	211
1974	4,090	4,107	99%	147
1975	4,113	4,088	99%	209
1976	4,032	2,789	67%	0
1977	4,133	830	20%	0
1978	3,898	3,706	90%	100
1979	4,133	3,512	85%	89
1980	3,751	3,462	84%	74
1981	4,133	3,400	82%	0
1982	4,009	4,027	97%	101
1983	3,343	3,370	82%	200
1984	4,061	4,079	99%	379
1985	3,905	3,326	80%	0
1986	3,898	3,011	73%	52
1987	3,923	2,837	69%	0
1988	4,045	992	24%	0
1989	4,133	2,895	70%	0
1990	4,133	1,151	28%	0
1991	4,133	999	24%	0
1992	4,133	1,155	28%	0
1993	4,133	4,018	97%	156
1994	4,133	3,042	74%	0
Average	4,026	3,083	75%	78
Maximum	4,133	4,128	100%	398
Minimum	3,343	830	20%	0

Table B-5 SWP Water Delivery from the Delta for Study 3 (taf)

Year	Model fixed Table A demand	Model Table A delivery	Percent of maximum Table A - 4.133 maf	Model Article 21 supply
1922	4,133	4,043	98%	0
1923	4,133	3,670	89%	0
1924	4,133	972	24%	0
1925	4,133	1,446	35%	0
1926	4,133	2,856	69%	113
1927	4,133	4,031	98%	124
1928	4,133	3,255	79%	3
1929	4,133	1,070	26%	0
1930	4,133	2,734	66%	27
1931	4,133	1,086	26%	0
1932	4,133	1,855	45%	39
1933	4,133	1,967	48%	6
1934	4,133	1,564	38%	0
1935	4,133	3,729	90%	59
1936	4,133	3,669	89%	0
1937	4,133	3,165	77%	71
1938	4,133	4,129	100%	197
1939	4,133	3,444	83%	1
1940	4,133	3,856	93%	22
1941	4,133	4,084	99%	0
1942	4,133	4,122	100%	75
1943	4,133	3,584	87%	318
1944	4,133	3,465	84%	3
1945	4,133	3,547	86%	123
1946	4,133	3,801	92%	0
1947	4,133	2,597	63%	0
1948	4,133	2,586	63%	2
1949	4,133	2,654	64%	0
1950	4,133	2,893	70%	0
1951	4,133	3,996	97%	222
1952	4,133	4,133	100%	14
1953	4,133	3,931	95%	244
1954	4,133	3,860	93%	33
1955	4,133	1,779	43%	0
1956	4,133	4,126	100%	111
1957	4,133	3,067	74%	3
1958	4,133	4,063	98%	306
1959	4,133	3,467	84%	97
1960	4,133	2,007	49%	0
1961	4,133	2,818	68%	0
1962	4,133	3,153	76%	2
1963	4,133	4,046	98%	134
1964	4,133	3,050	74%	0
1965	4,133	3,233	78%	3
1966	4,133	3,853	93%	56
1967	4,133	4,069	98%	115
1968	4,133	3,584	87%	398
1969	4,133	4,078	99%	13
1970	4,133	3,933	95%	358
1971	4,133	4,082	99%	0
1972	4,133	2,725	66%	0
1973	4,133	3,699	89%	211
1974	4,133	4,133	100%	143
1975	4,133	4,102	99%	211
1976	4,133	2,775	67%	0
1977	4,133	830	20%	0
1978	4,133	3,915	95%	100
1979	4,133	3,493	85%	98
1980	4,133	3,465	84%	75
1981	4,133	3,387	82%	0
1982	4,133	4,133	100%	63
1983	4,133	4,133	100%	160
1984	4,133	4,101	99%	369
1985	4,133	3,322	80%	0
1986	4,133	3,006	73%	62
1987	4,133	2,835	69%	0
1988	4,133	993	24%	0
1989	4,133	2,895	70%	0
1990	4,133	1,151	28%	0
1991	4,133	999	24%	0
1992	4,133	1,155	28%	0
1993	4,133	4,018	97%	156
1994	4,133	3,042	74%	0
Average	4,133	3,130	76%	68
Maximum	4,133	4,133	100%	398
Minimum	4,133	830	20%	0

Table B-6 SWP water delivery from the Delta for Study 4 (taf)

Year	Model variable Table A demand	Model Table A delivery	Percent of maximum Table A - 4.112 maf	Percent of future maximum Table A - 4.133 maf	Model Article 21 supply
1922	3,750	3,743	91%	91%	104
1923	3,251	3,251	79%	79%	106
1924	3,489	1,244	30%	30%	0
1925	3,353	1,870	45%	45%	0
1926	3,393	2,981	72%	72%	54
1927	3,860	3,845	93%	93%	213
1928	3,458	3,384	82%	82%	134
1929	2,907	1,108	27%	27%	0
1930	3,326	2,855	69%	69%	117
1931	2,933	1,018	25%	25%	0
1932	3,139	1,406	34%	34%	242
1933	3,427	1,330	32%	32%	512
1934	3,470	1,541	37%	37%	206
1935	3,798	3,769	92%	91%	229
1936	3,596	3,573	87%	86%	0
1937	3,492	3,362	82%	81%	80
1938	3,344	3,344	81%	81%	714
1939	3,262	3,262	79%	79%	349
1940	3,239	3,219	78%	78%	154
1941	2,526	2,527	61%	61%	246
1942	3,167	3,167	77%	77%	918
1943	3,104	3,104	75%	75%	623
1944	3,090	3,091	75%	75%	0
1945	3,112	3,101	75%	75%	359
1946	3,215	3,215	78%	78%	249
1947	3,422	3,292	80%	80%	0
1948	3,395	2,942	72%	71%	0
1949	3,313	2,264	55%	55%	0
1950	3,465	3,199	78%	77%	0
1951	3,497	3,497	85%	85%	388
1952	2,585	2,588	63%	63%	275
1953	3,323	3,323	81%	80%	513
1954	3,294	3,294	80%	80%	523
1955	3,228	2,207	54%	53%	0
1956	3,581	3,586	87%	87%	324
1957	3,235	3,235	79%	78%	257
1958	2,980	2,980	72%	72%	1,106
1959	3,547	3,480	85%	84%	366
1960	3,555	1,865	45%	45%	0
1961	3,580	2,659	65%	64%	97
1962	3,690	3,262	79%	79%	0
1963	3,823	3,818	93%	92%	202
1964	3,492	3,323	81%	80%	0
1965	3,059	3,059	74%	74%	177
1966	3,282	3,282	80%	79%	518
1967	2,950	2,946	72%	71%	923
1968	3,324	3,329	81%	81%	552
1969	2,636	2,632	64%	64%	275
1970	3,257	3,257	79%	79%	552
1971	3,341	3,341	81%	81%	0
1972	3,457	3,342	81%	81%	414
1973	3,097	3,092	75%	75%	384
1974	3,184	3,184	77%	77%	854
1975	3,229	3,229	79%	78%	903
1976	3,471	3,265	79%	79%	189
1977	3,421	159	4%	4%	0
1978	3,623	3,603	88%	87%	300
1979	3,512	3,501	85%	85%	160
1980	2,715	2,709	66%	66%	138
1981	3,358	3,358	82%	81%	546
1982	2,890	2,890	70%	70%	801
1983	2,497	2,498	61%	60%	400
1984	3,227	2,766	67%	67%	552
1985	3,214	3,214	78%	78%	0
1986	2,321	2,297	56%	56%	120
1987	2,896	2,896	70%	70%	546
1988	2,967	856	21%	21%	0
1989	3,551	3,174	77%	77%	0
1990	3,628	1,099	27%	27%	0
1991	3,425	1,052	26%	25%	0
1992	3,366	1,426	35%	34%	0
1993	3,862	3,848	94%	93%	159
1994	3,689	3,306	80%	80%	0
Average	3,290	2,818	69%	68%	262
Maximum	3,862	3,848	94%	93%	1,106
Minimum	2,321	159	4%	4%	0

Table B-7 SWP water delivery from the Delta for Study 5 (taf)

Year	Model variable Table A demand	Model Table A delivery	Percent of maximum Table A -4.133 maf	Model Article 21 supply
1922	4,133	4,133	100%	21
1923	4,133	4,133	100%	0
1924	4,133	382	9%	0
1925	4,133	1,491	36%	190
1926	4,133	2,721	66%	279
1927	4,133	4,133	100%	301
1928	4,133	3,379	82%	0
1929	4,133	1,118	27%	0
1930	4,133	2,738	66%	141
1931	4,133	1,072	26%	0
1932	4,133	1,572	38%	112
1933	4,133	1,337	32%	547
1934	4,133	1,471	36%	242
1935	4,133	4,061	98%	218
1936	4,133	3,729	90%	0
1937	4,133	3,369	82%	70
1938	4,133	4,133	100%	200
1939	4,133	3,450	83%	0
1940	4,133	4,116	100%	114
1941	3,898	3,908	95%	0
1942	4,133	4,133	100%	123
1943	4,133	3,787	92%	487
1944	4,133	3,542	86%	0
1945	4,133	3,889	94%	118
1946	4,133	3,828	93%	0
1947	4,133	2,771	67%	0
1948	4,133	2,940	71%	0
1949	4,133	2,025	49%	0
1950	4,133	3,400	82%	0
1951	4,133	4,133	100%	252
1952	3,898	3,912	95%	0
1953	4,133	4,133	100%	296
1954	4,133	4,133	100%	0
1955	4,133	1,505	36%	0
1956	4,133	4,133	100%	352
1957	4,133	3,565	86%	0
1958	4,133	4,133	100%	229
1959	4,133	3,787	92%	107
1960	4,133	1,607	39%	0
1961	4,133	2,712	66%	299
1962	4,133	3,311	80%	1
1963	4,133	4,133	100%	161
1964	4,133	2,889	70%	0
1965	4,133	3,465	84%	47
1966	4,133	4,133	100%	178
1967	4,133	4,133	100%	157
1968	4,133	3,797	92%	465
1969	3,898	3,910	95%	63
1970	4,133	4,122	100%	493
1971	4,133	4,133	100%	0
1972	4,133	2,721	66%	0
1973	4,133	4,032	98%	259
1974	4,133	4,133	100%	69
1975	4,133	4,133	100%	134
1976	4,133	3,137	76%	0
1977	4,133	187	5%	0
1978	3,898	3,902	94%	300
1979	4,133	3,773	91%	144
1980	3,898	3,513	85%	86
1981	4,133	3,797	92%	71
1982	4,133	4,133	100%	171
1983	3,898	3,909	95%	357
1984	4,133	4,133	100%	490
1985	4,133	3,413	83%	0
1986	3,898	2,857	69%	83
1987	4,133	3,307	80%	183
1988	4,133	423	10%	0
1989	4,133	3,513	85%	91
1990	4,133	855	21%	0
1991	4,133	850	21%	0
1992	4,133	1,461	35%	102
1993	4,133	4,133	100%	255
1994	4,133	3,153	76%	0
Average	4,110	3,178	77%	124
Maximum	4,133	4,133	100%	547
Minimum	3,898	187	5%	0

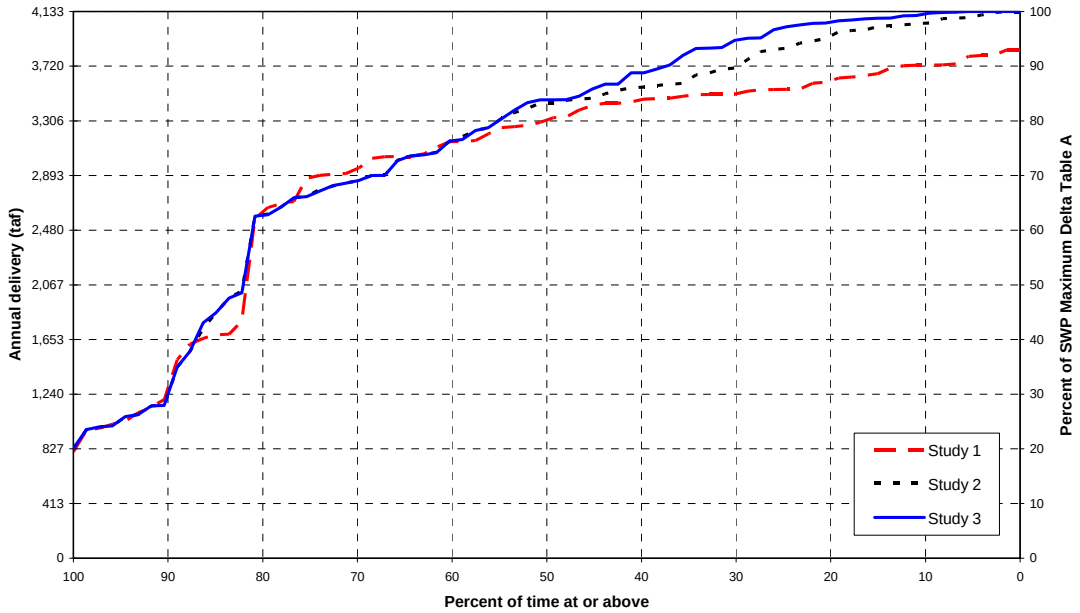

Figure B-1 SWP Delta Table A delivery probability for studies 1, 2 and 3

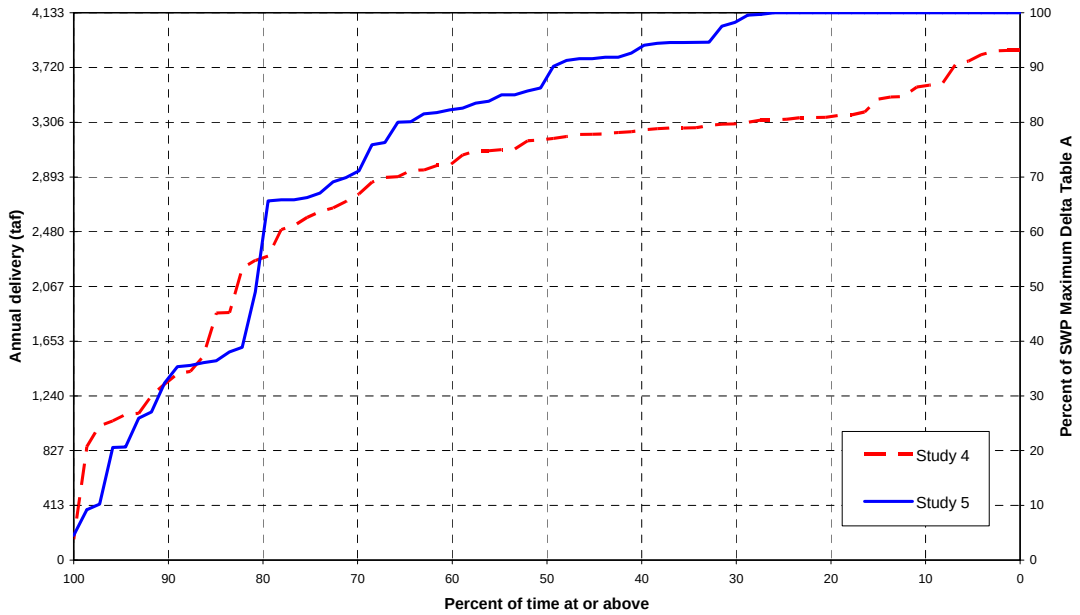

Figure B-2 SWP Delta Table A delivery probability for studies 4 and 5

Appendix C. State Water Project Table A Amounts

What is State Water Project Table A?

The contracts between the Department of Water Resources and the 29 State Water Project water contractors define the terms and conditions governing the water delivery and cost repayment for the SWP. Table A is an exhibit to these contracts. Comprehension of Table A is important in understanding the information in this report. To understand the table, it is necessary to understand how the contracts work.

All water-supply related costs of the SWP are paid by the contractors, and Table A serves as a basis for allocating some of the costs among the contractors. In addition, Table A plays a key role in the annual allocation of available supply among contractors. When the SWP was being planned, the amount of water projected to be available for delivery to the contractors was 4.2 million acre-feet (maf) per year. This was referred to as the minimum project yield, and it was recognized that in some years the project would be unable to deliver that amount and in other years project supply could exceed that amount. The 4.2 maf number was used as the basis for apportioning available supply to each contractor and as a factor in calculating each contractor's share of the project's costs. This apportionment is accomplished by Table A in each contract. Table A lists by year and acre-feet the portion of the 4.2 maf deliverable to each contractor. Other contract provisions permit changes to an individual contractor's Table A under special circumstances. The total of the maximums in all the contracts now equals 4.173 maf.

A copy of the consolidated Table A from all the contracts follows this explanation. The amounts listed in Table A cannot be viewed as an indication of the SWP water delivery reliability, nor should these amounts be used to support an expectation that a certain amount of water will be delivered to a contractor in any particular time span. Table A is simply a tool for apportioning available supply and cost obligations under the contract. In this report, reference to "Table A amounts" means the amounts listed in Table A. Contractors also receive other classifications of water from the project, as distinguished from Table A (for example, Article 21 water, and turnback pool water). These other contract provisions are discussed in Appendix D.

Table C-1 Maximum Annual SWP Table A Amounts

SWP Contractors	Maximum Table A
DELIVERED FROM THE DELTA	
North Bay	
Napa County FC&WCD	29,025
Solano County WA	47,756
Subtotal	**76,781**
South Bay	
Alameda County FC&WCD, Zone 7	80,619
Alameda County WD	42,000
Santa Clara Valley WD	100,000
Subtotal	**222,619**
San Joaquin Valley	
Oak Flat WD	5,700
County of Kings	9,305
Dudley Ridge WD	57,343
Empire West Side ID	3,000
Kern County WA	998,730
Tulare Lake Basin WSD	95,922
Subtotal	**1,170,000**
Central Coastal	
San Luis Obispo County FC&WCD	25,000
Santa Barbara County FC&WCD	45,486
Subtotal	**70,486**
Southern California	
Antelope Valley-East Kern WA	141,400
Castaic Lake WA	95,200
Coachella Valley WD	121,100
Crestline-Lake Arrowhead WA	5,800
Desert WA	50,000
Littlerock Creek ID	2,300
Mojave WA	75,800
Metropolitan WDSC	1,911,500
Palmdale WD	21,300
San Bernardino Valley MWD	102,600
San Gabriel Valley MWD	28,800
San Gorgonio Pass WA	17,300
Ventura County FCD	20,000
Subtotal	**2,593,100**
DELTA SUBTOTAL	**4,132,986**
Feather River	
County of Butte	27,500
Plumas County FC&WCD	2,700
City of Yuba City	9,600
Subtotal	**39,800**
GRAND TOTAL	**4,172,786**

Appendix D. Recent State Water Project Deliveries

SWP Contract Water Types

The State Water Project contracts define several classifications of water available for delivery to contractors under specific circumstances. All classifications are considered "project" water. Many contractors make frequent use of these additional water types to increase or decrease the amount available to them under Table A.

Table A Water

Each contract's Table A is the amount in acre-feet that is used to determine the portion of available supply to be delivered to that contractor. Table A water is water delivered according to this apportionment methodology and is given first priority for delivery.

Article 21 Water

Article 21 of the contracts permits delivery of water excess to delivery of Table A and some other water types to those contractors requesting it. It is available under specific conditions discussed in Chapter 5. Article 21 water is apportioned to those contractors requesting it in the same proportion as their Table A.

Turnback Pool Water

Contractors may choose to offer their allocated Table A water excess to their needs to other contractors through two pools in February and March. Contributing contractors receive a reduction in charges, and taking contractors pay extra.

Carryover Water

Pursuant to the long-term water supply contracts, the Department of Water Resources (DWR) has offered contractors the opportunity to carry over a portion of their allocated water approved for delivery in the current year for delivery during the next year. The carryover program was designed to encourage the most effective and beneficial use of water and to avoid obligating the contractors to use or lose the water by December 31 of each year. The water supply contracts state the criteria of carrying over Table A water from one year to the next. Normally, carryover water is water that has been exported during the year, has not been delivered to the contractor during that year, and has remained stored in the SWP share of San Luis Reservoir to be delivered during the following year. Storage for carryover water no longer becomes available to the contractors if it interferes with storage of SWP water for project needs.

Updated Historical Deliveries

The tables in this appendix list annual historical deliveries by various water classifications for each contractor for 1995 through 2004. Similar delivery tables for years 1995 through 2002 are included in the *State Water Project Delivery Reliability Report 2002*. Amounts listed for these years are slightly different due to accounting adjustments made by DWR's State Water Project Analysis Office.

1995

	Table A	Art. 21	Turnback	Carryover	Total
County of Butte	203				203
Plumas County FC&WCD	308				308
City of Yuba City	910				910
Napa County FC&WCD	5,182				5,182
Solano County WA	21,345				21,345
Alameda County FC&WCD, Zone 7	30,091				30,091
Alameda County WD	17,793				17,793
Santa Clara Valley WD	28,756				28,756
Oak Flat WD	5,169				5,169
County of Kings	4,000				4,000
Dudley Ridge WD	57,700			2,986	60,686
Empire West Side ID	957	106		568	1,631
Kern County WA	1,089,063	59,671		2,795	1,151,529
Tulare Lake Basin WSD	71,679	4,553		25,637	101,869
Antelope Valley-East Kern WA	47,286				47,286
Castaic Lake WA (+Rch 31A, 5 & 7)	25,660			1,573	27,233
Coachella Valley WD	23,100				23,100
Crestline-Lake Arrowhead WA	409				409
Desert WA	38,100				38,100
Littlerock Creek ID	480				480
Mojave WA	3,722				3,722
Metropolitan WDSC	396,600			19,442	416,042
Palmdale WD	6,961				6,961
San Bernardino Valley MWD	696				696
San Gabriel Valley MWD	12,922				12,922
Totals	**1,889,092**	**64,330**	**0**	**53,001**	**2,006,423**
Total South of Delta	**1,887,671**	**64,330**	**0**	**53,001**	**2,005,002**

1996

	Table A	Art. 21	Turnback	Carryover	Total
County of Butte	257				257
Plumas County FC&WCD	360				360
City of Yuba City	820				820
Napa County FC&WCD	4,893				4,893
Solano County WA	29,144			855	29,999
Alameda County FC&WCD, Zone 7	18,903				18,903
Alameda County WD	19,662				19,662
Santa Clara Valley WD	88,829			1,021	89,850
Oak Flat WD	4,904				4,904
County of Kings	4,000				4,000
Dudley Ridge WD	52,491	4,457			56,948
Empire West Side ID	1,371			497	1,868
Kern County WA	1,117,060	15,653		52,350	1,185,063
Tulare Lake Basin WSD	118,500	8,537	71,268	38,570	236,875
San Luis Obispo County FC&WCD	100				100
Antelope Valley-East Kern WA	56,356				56,356
Castaic Lake WA (+Rch 31A, 5 & 7)	32,500				32,500
Coachella Valley WD	23,100		39,119		62,219
Crestline-Lake Arrowhead WA	485				485
Desert WA	38,100		64,522		102,622
Littlerock Creek ID	494				494
Mojave WA	7,427				7,427
Metropolitan WDSC	553,259			40,121	593,380
Palmdale WD	11,434				11,434
San Bernardino Valley MWD	6,064				6,064
San Gabriel Valley MWD	15,989				15,989
Totals	**2,206,502**	**28,647**	**174,909**	**133,414**	**2,543,472**
Total South of Delta	**2,205,065**	**28,647**	**174,909**	**133,414**	**2,542,035**

1997

	Table A	Art. 21	Turnback	Carryover	Total
County of Butte	185				185
Plumas County FC&WCD	231				231
City of Yuba City	1,005				1,005
Napa County FC&WCD	4,341				4,341
Solano County WA	35,530				35,530
Alameda County FC&WCD, Zone 7	27,522				27,522
Alameda County WD	24,063				24,063
Santa Clara Valley WD	95,601				95,601
Oak Flat WD	5,238				5,238
Dudley Ridge WD	51,623	7,141	12,544		71,308
Kern County WA	1,092,543	10,264			1,102,807
Tulare Lake Basin WSD	21,156	1,213			22,369
San Luis Obispo County FC&WCD	1,199				1,199
Santa Barbara County FC&WCD	7,439				7,439
Antelope Valley-East Kern WA	61,752	641			62,393
Castaic Lake WA (+Rch 31A, 5 & 7)	27,712				27,712
Coachella Valley WD	23,100		35,000		58,100
Crestline-Lake Arrowhead WA	651				651
Desert WA	38,100		15,000		53,100
Littlerock Creek ID	444				444
Mojave WA	10,374				10,374
Metropolitan WDSC	738,990				738,990
Palmdale WD	11,861				11,861
San Bernardino Valley MWD	9,654				9,654
San Gabriel Valley MWD	16,002	2,173			18,175
Ventura County FCD	1,850				1,850
Totals	**2,308,166**	**21,432**	**62,544**	**0**	**2,392,142**
Total South of Delta	**2,306,745**	**21,432**	**62,544**	**0**	**2,390,721**

1998

	Table A	Art. 21	Turnback	Carryover	Total
County of Butte	527				527
City of Yuba City	1,054				1,054
Napa County FC&WCD	5,359				5,359
Solano County WA	21,377	9,982		407	31,766
Alameda County FC&WCD, Zone 7	17,941				17,941
Alameda County WD	19,075				19,075
Santa Clara Valley WD	62,526			884	63,410
Oak Flat WD	4,401				4,401
County of Kings	3	12			15
Dudley Ridge WD	52,919	984		1,747	55,650
Empire West Side ID				542	542
Kern County WA	856,906			1,684	858,590
Tulare Lake Basin WSD	11,367	9,310			20,677
San Luis Obispo County FC&WCD	3,592				3,592
Santa Barbara County FC&WCD	18,618				18,618
Antelope Valley-East Kern WA	52,926				52,926
Castaic Lake WA (+Rch 31A, 5 & 7)	20,093				20,093
Coachella Valley WD	23,100		55,000		78,100
Crestline-Lake Arrowhead WA	187				187
Desert WA	38,100		20,000		58,100
Littlerock Creek ID	404				404
Mojave WA	3,925				3,925
Metropolitan WDSC	359,213			33,672	392,885
Palmdale WD	8,752				8,752
San Bernardino Valley MWD	1,878				1,878
San Gabriel Valley MWD	9,310				9,310
Ventura County FCD	1,850				1,850
Totals	**1,595,403**	**20,288**	**75,000**	**38,936**	**1,729,627**
Total South of Delta	**1,593,822**	**20,288**	**75,000**	**38,936**	**1,728,046**

1999

	Table A	Art. 21	Turnback	Carryover	Total
County of Butte	286				286
City of Yuba City	1,096				1,096
Napa County FC&WCD	4,550	754			5,304
Solano County WA	37,753				37,753
Alameda County FC&WCD, Zone 7	46,000	2,910			48,910
Alameda County WD	34,871	2,781			37,652
Santa Clara Valley WD	67,465	15,480			82,945
Oak Flat WD	4,871				4,871
County of Kings	4,000				4,000
Dudley Ridge WD	51,870	4,990	6,566		63,426
Empire West Side ID	3,000	176			3,176
Kern County WA	1,077,755	58,241	42,154		1,178,150
Tulare Lake Basin WSD	118,500	49,898	121,337		289,735
San Luis Obispo County FC&WCD	3,743				3,743
Santa Barbara County FC&WCD	20,137				20,137
Antelope Valley-East Kern WA	69,073				69,073
Castaic Lake WA (+Rch 31A, 5 & 7)	32,899				32,899
Coachella Valley WD	23,100		27,380		50,480
Crestline-Lake Arrowhead WA	1,132				1,132
Desert WA	38,100		20,000		58,100
Littlerock Creek ID	342				342
Mojave WA	5,144				5,144
Metropolitan WDSC	829,777	22,840			852,617
Palmdale WD	13,278				13,278
San Bernardino Valley MWD	12,874				12,874
San Gabriel Valley MWD	18,000				18,000
Ventura County FCD	1,850				1,850
Totals	**2,521,466**	**158,070**	**217,437**	**0**	**2,896,973**
Total South of Delta	**2,520,084**	**158,070**	**217,437**	**0**	**2,895,591**

2000

	Table A	Art. 21	Turnback	Carryover	Total
County of Butte	586				586
City of Yuba City	901				901
Napa County FC&WCD	3,136	297		1,525	4,958
Solano County WA	32,882	1,040		1,417	35,339
Alameda County FC&WCD, Zone 7	53,877	3,740			57,617
Alameda County WD	33,598	2,380			35,978
Santa Clara Valley WD	70,433	18,381		13,174	101,988
Oak Flat WD	4,494			14	4,508
County of Kings	3,600				3,600
Dudley Ridge WD	38,673	7,454	12,193	2,884	61,204
Empire West Side ID	1,271	528			1,799
Kern County WA	825,856	78,908	233,202	13,193	1,151,159
Tulare Lake Basin WSD	98,595	56,818	27,073	15,827	198,313
San Luis Obispo County FC&WCD	3,962				3,962
Santa Barbara County FC&WCD	22,741				22,741
Antelope Valley-East Kern WA	83,577				83,577
Castaic Lake WA (+Rch 31A, 5 & 7)	40,680				40,680
Coachella Valley WD	20,790	17,820	3,713		42,323
Crestline-Lake Arrowhead WA	1,194				1,194
Desert WA	34,290	17,820	6,124		58,234
Mojave WA	9,135				9,135
Metropolitan WDSC	1,273,729	103,124		169,529	1,546,382
Palmdale WD	8,221			839	9,060
San Bernardino Valley MWD	18,399				18,399
San Gabriel Valley MWD	14,000	475			14,475
Ventura County FCD	4,050				4,050
Totals	**2,702,670**	**308,785**	**282,305**	**218,402**	**3,512,162**
Total South of Delta	**2,701,183**	**308,785**	**282,305**	**218,402**	**3,510,675**

2001

	Table A	Art. 21	Turnback	Carryover	Total
County of Butte	513				513
City of Yuba City	1,065				1,065
Napa County FC&WCD	4,293	996	82	1,723	7,094
Solano County WA	17,756	2,304		1,021	21,081
Alameda County FC&WCD, Zone 7	22,307		308	5,990	28,605
Alameda County WD	13,695	10	107	4,192	18,004
Santa Clara Valley WD	35,689			12,233	47,922
Oak Flat WD	2,089		22	101	2,212
County of Kings	1,560				1,560
Dudley Ridge WD	18,467	933	347	6,815	26,562
Empire West Side ID		253		1,107	1,360
Kern County WA	363,204	23,233	6,502	92,052	484,991
Tulare Lake Basin WSD	40,830	8,755	769	7,889	58,243
San Luis Obispo County FC&WCD	4,184		99		4,283
Santa Barbara County FC&WCD	14,285	396	296		14,977
Antelope Valley-East Kern WA	45,071		899		45,970
Castaic Lake WA (+Rch 31A, 5 & 7)	30,471	850	618		31,939
Coachella Valley WD	9,009		91		9,100
Crestline-Lake Arrowhead WA	1,057				1,057
Desert WA	14,859		151		15,010
Mojave WA	4,433				4,433
Metropolitan WDSC	686,545	10,415	7,949	200,000	904,909
Palmdale WD	8,170			2,257	10,427
San Bernardino Valley MWD	26,488				26,488
San Gabriel Valley MWD	6,534				6,534
Ventura County FCD	1,850				1,850
Totals	**1,374,424**	**48,145**	**18,240**	**335,380**	**1,776,189**
Total South of Delta	**1,372,846**	**48,145**	**18,240**	**335,380**	**1,774,611**

2002

	Table A	Art. 21	Turnback	Carryover	Total
County of Butte	419				419
City of Yuba City	1,181				1,181
Napa County FC&WCD	2,022	827	283	3,743	6,875
Solano County WA	28,223	2,242			30,465
Alameda County FC&WCD, Zone 7	40,707	1,484	556	8,113	50,860
Alameda County WD	24,250	83	862	2,331	27,526
Santa Clara Valley WD	55,896	202	2,053	3,311	61,462
Oak Flat WD	3,841	50	76	134	4,101
County of Kings	2,800		54		2,854
Dudley Ridge WD	38,688	1,861	1,177	1,994	43,720
Empire West Side ID	1,278	26		101	1,405
Kern County WA	670,884	21,951	20,543	15,680	729,058
Tulare Lake Basin WSD	73,785	3,749	2,289	5,385	85,208
San Luis Obispo County FC&WCD	4,355				4,355
Santa Barbara County FC&WCD	24,166	436	324	3,455	28,381
Antelope Valley-East Kern WA	53,907		1,008	3,256	58,171
Castaic Lake WA (+Rch 31A, 5 & 7)	61,880	280		6,657	68,817
Coachella Valley WD	16,170	111	474		16,755
Crestline-Lake Arrowhead WA	2,189				2,189
Desert WA	26,670	189	781		27,640
Mojave WA	4,346				4,346
Metropolitan WDSC	1,273,205	9,624	14,335	97,940	1,395,104
Palmdale WD	8,359		437		8,796
San Bernardino Valley MWD	68,268			3,801	72,069
San Gabriel Valley MWD	18,353			4,698	23,051
Ventura County FCD	4,998				4,998
Totals	**2,510,840**	**43,115**	**45,252**	**160,599**	**2,759,806**
Total South of Delta	**2,509,240**	**43,115**	**45,252**	**160,599**	**2,758,206**

2003

	Table A	Art. 21	Turnback	Carryover	Total
County of Butte	551				551
City of Yuba City	1,324				1,324
Napa County FC&WCD	6,026	376	180	1,055	7,637
Solano County WA	25,135	2,280		1,918	29,333
Alameda County FC&WCD, Zone 7	30,695		656	13,099	44,450
Alameda County WD	31,086		354	5,150	36,590
Santa Clara Valley WD	90,620	936	841	14,104	106,501
Oak Flat WD	4,059	19	48	140	4,266
County of Kings	3,600	58	34		3,692
Dudley Ridge WD	49,723	1,928	482	1,452	53,585
Empire West Side ID	1,074	175		187	1,436
Kern County WA	841,697	27,891	8,419	22,380	900,387
Tulare Lake Basin WSD	94,376	6,243	938	4,284	105,841
San Luis Obispo County FC&WCD	4,417	36			4,453
Santa Barbara County FC&WCD	24,312	339	43	2,274	26,968
Antelope Valley-East Kern WA	52,730		250	7,049	60,029
Castaic Lake WA (+Rch 31A, 5 & 7)	49,895	991	90	4,760	55,736
Coachella Valley WD	14,045	204	194		14,443
Crestline-Lake Arrowhead WA	1,563				1,563
Desert WA	23,168	330	321		23,819
Mojave WA	10,907			3,528	14,435
Metropolitan WDSC	1,550,356	17,622	16,920	134,845	1,719,743
Palmdale WD	9,701			1,846	11,547
San Bernardino Valley MWD	25,371	200		1,844	27,415
San Gabriel Valley MWD	13,034	200			13,234
San Gorgonio Pass WA	116				116
Ventura County FCD	5,000				5,000
Totals	**2,964,581**	**59,828**	**29,770**	**219,915**	**3,274,094**
Total South of Delta	**2,962,706**	**59,828**	**29,770**	**219,915**	**3,272,219**

2004

	Table A	Art. 21	Turnback	Carryover	Total
County of Butte	1,440				1,440
City of Yuba City	1,434				1,434
Napa County FC&WCD	5,030	1,450	52	1,602	8,134
Solano County WA	15,991	7,787		47	23,825
Alameda County FC&WCD, Zone 7	38,895			11,466	50,361
Alameda County WD	20,959		214	6,714	27,887
Santa Clara Valley WD	52,867	2,983	508		56,358
Oak Flat WD	4,324		29	276	4,629
County of Kings	5,850	3,157	46		9,053
Dudley Ridge WD	36,676	7,393	291	1,886	46,246
Empire West Side ID	1,310	626		1,626	3,562
Kern County WA	641,368	86,513	5,075	38,729	771,685
Tulare Lake Basin WSD	58,125	15,299	489	5,638	79,551
San Luis Obispo County FC&WCD	4,096	69			4,165
Santa Barbara County FC&WCD	29,358		122		29,480
Antelope Valley-East Kern WA	50,532			9,199	59,731
Castaic Lake WA (+Rch 31A, 5 & 7)	46,358	1,618		35,785	83,761
Coachella Valley WD	8,631		89	6,745	15,465
Crestline-Lake Arrowhead WA	2,006				2,006
Desert WA	9,966		102	11,122	21,190
Mojave WA	13,176				13,176
Metropolitan WDSC	1,195,807	91,601	10,223	215,000	1,512,631
Palmdale WD	10,549			1,613	12,162
San Bernardino Valley MWD	35,523			20,631	56,154
San Gabriel Valley MWD	15,600				15,600
San Gorgonio Pass WA	837				837
Ventura County FCD	5,250				5,250
Totals	**2,311,958**	**218,496**	**17,240**	**368,079**	**2,915,773**
Total South of Delta	**2,309,084**	**218,496**	**17,240**	**368,079**	**2,912,899**

Appendix E. Technical Memorandum Report Summaries: Historical SWP/CVP Operations Simulation and CalSim II Model Sensitivity Analysis

Study

This appendix presents summaries of the findings of the *CalSim II Simulation of Historical SWP/CVP Operations* and a *CalSim II Model Sensitivity Analysis Study*. The entire reports are available at the websites listed at the end of this appendix.

1. CalSim II Simulation of Historical SWP/CVP Operations Technical Memorandum Report

Objective of Study

The purpose of the Historical Operations Study is to evaluate the ability of CalSim II to represent CVP and SWP operations, in general, and the delivery capability of the projects, in particular, through the monthly simulation of recent historical conditions.

Study Description

The period of simulation for the Historical Operations Study is water years 1975 to 1998. This 24-year period includes the 1976-77 and 1987-92 droughts, as well as the driest (1977) and the wettest (1983) years on record. The version of CalSim II used for this study is the benchmark study dated 30 September 2002, but with some inputs changed to reflect the historically changing conditions rather than a fixed level of development. Model inflows correspond to the historical flow from gage records, or are estimated from a hydrologic mass balance, or stream-flow correlation. Land use-based demands are calculated for annual varying land use, as determined from DWR's land surveys and county commissioners' reports. The operational logic has been revised to reflect the changing regulatory environment. The historical regulations have been simplified into three periods:

- October 1974 – September 1992: represented by State Water Resources Control Board (SWRCB) Water Right Decision 1485 (D-1485),
- October 1992 – September 1994: represented by D-1485 and the 1993 National Marine Fisheries Service (NMFS) winter-run Chinook salmon biological opinion (minimum carryover storage in Lake Shasta, and temperature related minimum instream flows downstream of Keswick Reservoir),
- October 1994 – September 1998: represented by SWRCB Water Right Decision 1641 (D-1641) and the 1993 winter-run biological opinion.

The Historical Operations Study is limited in geographical scope to a dynamic operation of the Sacramento Valley, the Delta, and the CVP-SWP facilities south of the Delta. Delta inflows from the San Joaquin Valley and East Side streams are constrained to their historical values. Imports from the Trinity River system are similarly constrained.

Results and Discussion

The key performance measures in evaluating CalSim II are considered to be SWP and CVP deliveries, project storage operations, and stream flows. During the study period of water years 1975-1998, SWP demands were historically much lower than current or projected level of

demands. Simulation of historically wet years, when the system was not supply constrained, may therefore be a poor indicator of the model's ability to accurately simulate future levels of development. Particular attention is therefore placed on model results during the six-year drought of 1987-1992. Results for four key performance parameters are summarized in the table below.

The table below shows that simulated SWP Table A and CVP south-of-Delta deliveries during the drought are less than historical values. Differences are, however, within 5 percent. Comparison of Sacramento Valley inflow to the Delta (flow at Freeport) is a good measure of how well the Sacramento Valley hydrology is simulated by CalSim II. Simulated Delta inflows are 0.3 percent greater than historical. Comparison of the Net Delta Outflow Index, a measure of how well the Sacramento-San Joaquin Delta is represented by CalSim II, appears favorable. Simulated values are 3.5 percent greater than historical during the 1987-1992 period. The table also shows that simulated long-term (1975-1998) average deliveries compare quite well and are within 7 percent of historical values.

	Dry-period average 1987-1992				Long-term average			
	Simulated	Historical	Difference		Simulated	Historical	Difference	
Performance parameter		taf/yr		%		taf/yr		%
SWP south-of-Delta Table A deliveries	1,930	2,030	-100	-4.9	1,810	1,790	20	1.1
CVP south-of-Delta deliveries	2,230	2,320	-90	-3.9	2,650	2,490	160	6.4
Sacramento Valley inflow to the Delta	9,700	9,670	30	0.3	19,830	19,920	-90	-0.5
Net Delta Outflow Index	5,270	5,090	180	3.5	19,070	19,690	-620	-3.1

The total volume of surface water to be held in storage or routed through the model network is the same as historical. Model inflows to the Delta can deviate from historical due to three reasons: storage regulation, groundwater pumping to supplement surface water diversions, and stream-aquifer interaction.

Differences in Delta inflows are primarily caused by differences in project storage regulation (i.e. Lake Shasta, Lake Oroville and Folsom Lake). Storage operations in CalSim II are driven by two sets of rule curves. The first set of rule curves determines how much of the available project water will be held as carryover storage and how much will be delivered to meet contractors' current-year demands. The second set of rule curves determines when and how-much water will be transferred from north of Delta storage to San Luis Reservoir. These two sets of rule curves are fixed throughout the period of simulation. The rule curves have been determined in prior simulations of CalSim II. They are subjective in nature, but balance the conflicting objectives to maximize long-term average annual deliveries, to maintain water deliveries during the critically dry period 1928-34, and to keep water levels in project reservoirs above minimum levels while meeting minimum flow requirements. Secondly, differences in Delta inflows are due to differences in upstream surface water diversions and return flows. The historical consumptive water demand must be met by the model. Differences in Delta inflow, after accounting for differences in upstream storage regulation, therefore reveal how well CalSim II matches the historical mix of surface water and groundwater to meet demands. Lastly inflows to the Delta are influenced by the stream-aquifer interaction.

For a given south-of-Delta demand and a given Delta inflow, differences in model and historical project exports are indicative of how well the model represents the regulatory operating constraints to which the projects must comply, and how the model simulates storage operations in the San Luis Reservoir.

Conclusions from the study can be framed in the form of answers to some frequently asked questions about CalSim II.

Does CalSim II overestimate the projects' ability to export water from the Delta?

For the supply constrained years 1987-1992, model exports from the Delta average 4,450 taf/yr compared to a historical six-year average of 4,460 taf/yr. This suggests that CalSim II's simulation of the Delta operations is representative of actual historical conditions.

Does CalSim II overestimate the availability of surface water in the Delta by meeting Sacramento Valley in-basin use through excessive groundwater pumping?

The mix of surface water and groundwater used by the model to meet Sacramento Valley consumptive demands depends primarily on project water allocation decisions and levels of minimum groundwater pumping that are specified in the model. Over the 24-year period average annual net groundwater extraction in CalSim II as compared to estimates based on the Central Valley Groundwater Surface water Model (CVGSM) is lower by 378 taf. The average annual net stream inflow from groundwater in CalSim II is 190 taf greater than estimated by the CVGSM for the same period. The combined effect of dynamically modeling groundwater operations in CalSim II (pumping, recharge and stream-aquifer interaction) leads to 188 taf/yr less water being available to the Delta. For the 1987-1992 period the combined effect results in 46 taf/yr additional water being available to the Delta.

How well does CalSim II represent stream flows?

Differences in long-term average annual flows at key stream locations are typically 1.2 percent or less. It is noted that differences are larger for the Sacramento River at the Ord Ferry gage. At this location a proportion of the water diverted upstream returns downstream so that simulated river flows are sensitive to assumed model water use efficiencies.

How well does CalSim II simulate the Sacramento Valley system?

The net Sacramento Valley accretion is calculated as the Sacramento Valley Delta inflow less releases from Whiskeytown Reservoir, Keswick Reservoir, Lake Oroville and Folsom Lake. The historical 24-year average annual net accretion is 5,950 taf/yr compared with a model value of 5,920 taf/yr.

Do different reservoir operating rules in CalSim II translate into differences in project deliveries?

Simulated month-to-month and year-to-year model results can vary significantly from historical operations. This is primarily due to differences in storage operations. However when averaged over a longer period, model operations (stream flows and deliveries) are very close to historical.

2. CalSim II Model Sensitivity Analysis Study Technical Memorandum Report

Background

The sensitivity analysis is an important component of any water resources planning model evaluation. It enhances understanding of the model, builds greater public confidence, and expands public acceptance of the model. The sensitivity analysis explores and quantifies the effects of various inputs on the model outputs. With a simple sensitivity analysis procedure, variations of model input parameters are generally investigated one at a time. With a more complex procedure, the investigation is conducted by changing a set of input parameters simultaneously. For this study, the simple sensitivity study procedure is used.

The *Sensitivity Analysis Study* responds to the commitment in *The State Water Project Delivery Reliability Report 2002* to conduct such a study and to issues raised during the public review of

that report. The sensitivity analysis study is also one of the recommendations by the CalSim II peer review sponsored by the CALFED Science Program in December 2003. The review panel recommended such a study would help identify key input parameters that have significant effects on the model output, and to provide a systematic way to measure the sensitivity of the model output to variations of key input parameters.

Study Objectives

There are three objectives of the CalSim II Sensitivity Analysis Study:

- to examine the behavior of the SWP-CVP system performance in response to variations in selected input parameters within CalSim-II
- to help SWP contractors and others understand the impact of key assumptions within CalSim II on the SWP delivery capability
- to aid CalSim II modelers for prioritizing future model development activities on the basis of sensitivities of input parameters

Study Description

The development of the CalSim II model is an ongoing effort. DWR and Reclamation periodically release updated versions of the model. This study uses the modified benchmark study of September 30, 2002, under the D-1641 regulatory environment as the base study.

The CalSim II model uses many input parameters to define the physical characteristics of the system, as well as the regulatory environment and operational parameters. Input parameters include time series, single dimensionless coefficients, or monthly distribution curves. Some input parameters are estimated from the historical data and others are user-input or calibrated values. After discussions with model developers and project operators, 21 model input parameters in four major categories and their reasonable ranges of variations were selected for this study. Similarly, there are many output variables in different categories, including reservoir storage, flows at key locations, Delta outflows, project exports and deliveries that characterize the overall outcome of any particular simulation run. After discussions with model users, project operators, and model developers, 22 key output variables that cover various aspects of the SWP-CVP system performance were selected.

In this study, two performance measures – Sensitivity Index (SI) and Elasticity Index (EI) – are used to quantify the model output sensitivity with respect to a certain model input parameter. The SI is a first-order derivative of a model output variable with respect to an input parameter. It can be used to measure the magnitude of change in an output variable per unit change in the magnitude of an input parameter from its base value. The EI is a dimensionless expression of sensitivity that measures the relative change in an output variable to a relative change in an input parameter. As an example, assuming SI = 0.5 and EI = 0.25 for the output variable of total Delta outflow with respect to the input parameter of Oroville inflow, means that for one thousand acre-feet (taf) increase in Oroville inflow, total Delta outflow increases by 0.5 taf; and for 1 percent increase in Oroville inflow, total Delta outflow increases by 0.25 percent, respectively.

Study Results and Discussions

The complete results of the study showing sensitivity and elasticity indices for each one of the selected output variables are listed in terms of their long-term (1922–1994) averages with respect to variations of input parameters. Table E-1 highlights the behavior of some of the key output variables that define the important aspects of SWP–CVP system performance. In Table E-1, the top row is the list of model input parameters and the left-most column is the list of model output variables. In general, each cell in the table contains two numbers except cells in Columns 8 and 9.

The number inside parentheses is the SI value and the number outside parentheses is the EI value. Signs in front of SI and EI values can be either positive or negative. In general, the positive sign indicates that the output variable changes in the same direction as the input parameter. For example, as shown in the Row 1 of Column 1 in the table, when SWP Table A demand increases, SWP total delivery, which is the sum of SWP Delta delivery and FRSA delivery, increases as well (SI = +0.39). SWP Delta Delivery is defined as SWP Table A deliveries to South-of-Delta plus deliveries to North Bay (Solano and Napa Counties) contractors. FRSA delivery is defined as the sum of deliveries to the Settlement Contractors in Feather River Service Area (FRSA) and Table A deliveries to Butte and Yuba Counties. The negative sign indicates that the output variable changes in the opposite direction as the input parameter. For example, as shown in the Row 5 of Column 1 in the table, when SWP Table A demand increases, Article 21 delivery decreases (SI = -0.13). In order to highlight relative sensitivity of the various input parameters, a color coded cell background has been used. A red color cell background represents a relatively higher sensitivity or (SI >= 0.2); yellow background represents a moderate sensitivity or (0.1 <= SI <= 0.2); and white background shows a lower sensitivity or (SI <= 0.1).

An examination of Row 3 of Table E-1 highlights the behavior of SWP Delta delivery with respect to changes in some of the key input parameters. It shows that the SWP Table A demand, the Banks pumping limit, and the Oroville inflow affect SWP Delta delivery the most. Folsom inflow and historical land use display moderate effects on the SWP Delta delivery. A positive SI of 0.52 for the SWP Table A demand indicates that the SWP Delta delivery will increase by an average of 0.52 taf if the SWP Table A demand increases by 1 taf; and a positive EI of 0.55 for the SWP Table A demand indicates that the SWP Delta delivery will increase by an average of 0.55 percent if the SWP Table A demand increases by one percent. Similarly, a positive SI of 0.20 for the Oroville inflow indicates that the SWP Delta delivery will increase by an average of 0.20 taf if the Oroville inflow increases by 1 taf; and a positive EI of 0.26 for the Oroville inflow indicates that the SWP Delta delivery will increase by an average of 0.26 percent if the Oroville inflow increases by one percent.

No SI values are computed for input parameters of the SWP Delivery-Carryover Curve and the SWP San Luis Rule-curve (see Columns 8 and 9) because the equivalent changes in the commensurate units of taf are difficult to define for these two parameters. A more detailed discussion of their impact on the SWP Delta delivery is presented in the Memorandum Report.

Table E-1 Summary Excerpt of Elasticity Index (EI) and Sensitivity Index (SI) for Selected Variables

Model Output Response		Model Input Parameters											
		SWP Table A Demand	Article 21 Demand	Banks Pumping Limit	Historical Land Use	Projected Land Use	Crop ET	Basin Efficiency	SWP Delivery-Carryover Curve	SWP San Luis Rule Curve	Shasta Inflow	Oroville Inflow	Folsom Inflow
		1	2	3	4	5	6	7	8	9	10	11	12
1	SWP Total Delivery	0.31 (0.39)(1)	0.01 (0.16)	0.15 (1.45)	0.09 (-0.13)	-0.05 (-0.03)		-0.15 (0.10)	-0.01	0.02	0.07 (0.05)	0.18 (0.19)	0.05 (0.14)
2	CVP total Delivery	-0.01 (-0.01)	(2)	-0.01 (-0.12)	0.10 (-0.18)	0.14 (0.11)	0.16 (0.09)	-0.32 (0.26)			0.25 (0.22)	0.05 (0.07)	0.03 (0.09)
3	SWP Delta Delivery	0.55 (0.52)	0.00 (-0.01)	0.07 (0.48)	0.12 (-0.13)	-0.09 (-0.04)	-0.21 (-0.08)	-0.17 (0.08)	-0.02		0.08 (0.04)	0.26 (0.20)	0.05 (0.12)
4	FRSA Delivery	-0.01 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.17 (0.02)	0.78 (0.08)	-0.17 (0.02)	0.00		0.00 (0.00)	0.01 (0.00)	0.00 (0.00)
5	Article 21 Delivery	-2.62 (-0.13)	0.15 (0.17)	2.63 (0.96)		-0.45 (-0.01)		0.30 (-0.01)	0.08	0.46	0.34 (0.01)	-0.51 (-0.02)	0.16 (0.02)
6	CVP SOD Delivery	-0.01 (-0.01)		-0.02 (-0.10)	0.15 (-0.15)	-0.25 (-0.11)	-0.27 (-0.09)	-0.10 (0.04)			0.38 (0.18)	0.08 (0.06)	0.04 (0.08)
7	CVP NOD Delivery	0.00 (0.00)		0.00 (-0.02)	0.03 (-0.03)	0.59 (0.21)	0.66 (0.18)	-0.59 (0.22)			0.10 (0.04)	0.02 (0.01)	0.01 (0.01)
8	Total Delta Outflow	-0.08 (-0.35)	0.00 (-0.16)	-0.04 (-1.48)	0.07 (-0.36)	-0.09 (-0.22)	-0.18 (-0.30)	-0.07 (0.15)	0.00	0.00	0.27 (0.69)	0.20 (0.74)	0.07 (0.75)
9	Banks Export	0.35 (0.37)	0.01 (0.16)	0.20 (1.63)	0.11 (-0.14)	-0.11 (-0.06)	-0.20 (-0.08)	-0.14 (0.08)	-0.01	0.02	0.10 (0.06)	0.21 (0.18)	0.05 (0.14)
10	Tracy Export	-0.01 (-0.01)		-0.02 (-0.10)	0.16 (-0.15)	-0.25 (-0.10)	-0.28 (-0.09)	-0.10 (0.04)			0.39 (0.18)	0.09 (0.06)	0.04 (0.08)
11	Banks SWP Export	0.37 (0.38)	0.01 (0.16)	0.18 (1.46)	0.11 (-0.13)	-0.10 (-0.05)	-0.20 (-0.08)	-0.14 (0.07)	-0.01	0.02	0.08 (0.05)	0.22 (0.18)	0.06 (0.14)
12	Banks CVP Export	-0.53 (-0.02)	0.00 (0.00)	0.79 (0.17)	0.42 (-0.01)	-0.37 (-0.01)	-0.43 (0.00)	-0.31 (0.00)	0.00	0.02	0.86 (0.01)	0.04 (0.00)	

Note: (1) Values inside parentheses are SI and outside are EI.
(2) Blank cells indicate that SI and EI are non-monotonic functions of the input parameters and their averages are not meaningful. See Chapters 2 and 4 for details.

High Sensitivity	0.2 < |SI|
Moderate Sensitivity	0.1 <= |SI| <= 0.2
Low Sensitivity	|SI| < 0.1

Future Work

This sensitivity study is mainly focused on Sacramento Valley hydrology, Sacramento-San Joaquin Delta water quality, and SWP operations. Additional sensitivity studies focused on San Joaquin Valley hydrology and CVP operations may be done in the near future by Reclamation.

A simple sensitivity analysis procedure has been used for this study. In order to evaluate the combined effect of varying two or more input parameters on the model outputs, future studies with a more complex sensitivity analysis procedure, which investigates changes in a set of input parameters simultaneously, may be needed.

Linear programming solution methodology used in the CalSim II model has the potential to produce an array of sensitivity analyses as a by-product of the linear programming analysis automatically. Discussion of these results will provide a degree of transparency to model users and an internal diagnostic tool that the current CalSim II does not provide. Studying these by-products of the linear programming solution procedure will be considered during the development of the next generation of the CalSim II model.

The CALFED report, *A Strategic Review of CalSim-II and its Use for Water Planning, Management, and Operations in Central California* (December 2003), recommends a model uncertainty analysis be conducted. An uncertainty analysis is not the same as a sensitivity analysis. It takes a set of randomly chosen input values (that can include parameter values), passes them through a model to obtain the probability distributions (or statistical measures of the probability distributions) of the resulting outputs, while a sensitivity analysis attempts to determine the relative change in model output values given modest changes in model input values. The uncertainty analysis would help users of the model understand better the risks of various decisions and the confidence they can have in various model predictions. DWR is currently working on a contract with University of California, Davis to develop a strategy for the identification and reduction of the major sources of uncertainty in CalSim II modeling studies, and implement a recommended procedure for the quantification of uncertainties in a CalSim II study.

Websites for the Memorandum Reports:

1. [DWR] California Department of Water Resources, Bay-Delta Office. 2003. CalSim II Simulation of Historical SWP/CVP Operations. Technical Memorandum Report. Availability: http://science.calwater.ca.gov/pdf/CalSimII_Simulation.pdf

2. [DWR] California Department of Resources, Bay-Delta Office. 2005. CalSim II Model Sensitivity Analysis Study. Technical Memorandum Report. Availability: http://baydeltaoffice.water.ca.gov/

Appendix F. Guidelines for Review of Proposed Permanent Transfers of SWP Annual Table A Amounts

A copy of Notice to State Water Project Contractors Number 03-09 entitled "Guidelines for Review of Proposed Permanent Transfers of State Water Project Annual Table A Amounts" is shown below. These guidelines are being included per the Settlement Agreement, dated May 5, 2003, reached in the *Planning and Conservation League et al. v. Department of Water Resources, 83 Cal. App. 4th 892 (2000)*.

STATE OF CALIFORNIA • RESOURCES AGENCY • DEPARTMENT OF WATER RESOURCES

NOTICE TO

STATE WATER PROJECT CONTRACTORS

NUMBER: 03-09

DATE: 7/3/03

SUBJECT: Guidelines for Review of Proposed Permanent Transfers of State Water Project Annual Table A Amounts

FROM: INTERIM DIRECTOR, DEPARTMENT OF WATER RESOURCES

The Department of Water Resources is issuing the following guidelines prepared in connection with the Settlement Agreement, dated May 5, 2003, reached in *Planning and Conservation League et al. v. Department of Water Resources, 83 Cal. App. 4th 892 (2000)*. These guidelines are effective upon the superior court's approval of the Settlement Agreement on May 20, 2003.

1. Purpose: The purpose of these guidelines is to describe the process for DWR's review of proposed permanent transfers of State Water Project Annual Table A Amounts and, by so doing, provide disclosure to SWP contractors and to the public of DWR's process and policy for approving permanent transfer of SWP Annual Table A Amounts. Such disclosure should assist contractors in developing their transfer proposals and obtaining DWR review expeditiously, and assist the public in participating in that review.

2. Coverage: These guidelines will apply to DWR's approval of proposed permanent transfers of water among existing SWP contractors and, if and when appropriate, to proposed permanent transfers of water from an existing SWP contractor to a new SWP contractor.

3. Interpretation: These guidelines are in furtherance of the State policy in favor of voluntary water transfers and shall be interpreted consistent with the law, including but not limited to Water Code Section 109, the Burns-Porter Act, the Central Valley Project Act, the California Environmental Quality Act, area of origin laws, the public trust doctrine, and with existing contracts and bond covenants. These guidelines are not intended to change or augment existing law.

4. Revisions: Revisions may be made to these guidelines as necessary to meet changed circumstances, changes in the law or long-term water supply contracts, or to address conditions unanticipated when the guidelines are adopted. Revisions shall be in accordance with the Settlement Agreement.

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5. Distribution: The transfer guidelines shall be published by DWR in the next available edition of Bulletin 132, and also as part of the biennial disclosure of SWP reliability as described in the Settlement Agreement.

6. Contract Amendment: Permanent transfers of SWP water are accomplished by amendment of each participating contractor's long-term water supply contract. The amendment consists of amending the Table A upwards for a buying contractor and downwards for a selling contractor. The amendment shall be in conformity with all provisions of the long-term water supply contracts, applicable laws, and bond covenants. Other issues to be addressed in the contract amendment will be subject to negotiation among DWR and the two participating contractors. The negotiations will be conducted in public, pursuant to the Settlement Agreement and Notice to State Water Project Contractors Number 03-10.

7. Financial Issues: The purchasing contractor must demonstrate to DWR's satisfaction that it has the financial ability to assume payments associated with the transferred water. If the purchasing entity was not a SWP contractor as of 2001, special financial requirements pertain as described below, as well as additional qualifications.

8. Compliance with CEQA: Consistent with CEQA, the State's policy to preserve and enhance environmental quality will guide DWR's consideration of transfer proposals (Public Resources Code Section 21000). Identification of the appropriate lead agency will be based on CEQA, the CEQA Guidelines, and applicable case law, including *PCL v. DWR*. CEQA requires the lead agency at a minimum to address the feasible alternatives to the proposed transfer and its potentially significant environmental impacts (1) in the selling contractor's service area; (2) in the buying contractor's service area; (3) on SWP facilities and operations; and (4) on the Delta and areas of origin and other regions as appropriate. Impacts that may occur outside of the transferring SWP contractors' service areas and on fish and wildlife shall be included in the environmental analysis. DWR will not approve a transfer proposal until CEQA compliance is completed. The lead agency shall consult with responsible and trustee agencies and affected cities and counties and, when DWR is not the lead agency, shall provide an administrative draft of the draft EIR or Initial Study/Negative Declaration to DWR prior to the public review period. A descriptive narrative must accompany a checklist, if a checklist is used. The lead agency shall conduct a public hearing on the EIR during the public comment period and notify DWR's State Water Project Analysis Office of the time and place of such hearing in addition to other notice required by law.

9. Place of Use: The purchasing contractor must identify the place and purpose of use of the purchased water, including the reasonable and beneficial use of the water.

Typically, this information would be included in the environmental documentation. If a specific transfer proposal does not fit precisely into any of the alternatives listed below, DWR will use the principles described in these Guidelines to define the process to be followed. The information to be provided under this paragraph is in addition to the CEQA information described in Paragraph 8 of these guidelines.

a. If the place of use is within the contractor's service area, the contractor should disclose the purpose of the transferred water, such as whether the water is being acquired for a specific development project, to enhance overall water supply reliability in the contractor's service area, or some other purpose. If the transferred water is for a municipal purpose, the contractor should state whether the transfer is consistent with its own Urban Water Management Plan or that of its member unit(s) receiving the water.

b. If the place of use is outside the contractor's service area, but within the SWP authorized place of use, and service is to be provided by an existing SWP contractor, then, in addition to Paragraph 9(a) above, the contractor should provide DWR with copies of LAFCO approval and consent of the water agency with authority to serve that area, if any. In some instances, DWR's separate consent is required for annexations in addition to the approval for the transfer.

c. If the place of use is outside the SWP authorized place of use and service is to be provided by an existing SWP contractor, the contractor should provide information in Paragraph 9(a) and 9(b). Prior to approving the transfer, DWR will consider project delivery capability, demands for water supply from the SWP, and the impact, if any, of the proposed transfer on such demand. If DWR approves the transfer, DWR will petition State Water Resources Control Board for approval of expansion of authorized place of use. Water will not be delivered until the place of use has been approved by the SWRCB and will be delivered in compliance with any terms imposed by the SWRCB.

d. If the place of use is outside the SWP authorized place of use and service is not to be provided by an existing SWP contractor, DWR will consider the transfer proposal as a proposal to become a new SWP contractor. Prior to adding a new SWP contractor, DWR will consider project delivery capability, demands for water supply from the SWP, and the impact, if any, of the proposed transfer on such demand. DWR will consult with existing SWP contractors regarding their water supply needs and the proposed transfer. In addition to the information in Paragraph 9(a), 9(b), and 9(c), the new contractor should provide information similar to that provided by the original SWP contractors in the 1960's Bulletin 119 feasibility report addressing hydrology, demand for water supply, population growth, financial feasibility, etc.

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DWR will evaluate these issues independently and ordinarily will act as lead agency for CEQA purposes. In addition, issues such as area of origin claims, priorities, environmental impacts and use of water will be addressed. The selling contractor may not be released from financial obligations. The contract will be subject to a CCP 860 validation action initiated by the new contractor. If DWR approves the transfer, DWR will petition the SWRCB for approval of expansion of authorized place of use. Water will not be delivered until the place of use has been approved by the SWRCB and will be delivered in compliance with any terms imposed by the SWRCB.

10. DWR Discretion: Consistent with the long-term water supply contract provisions, CEQA, and other provisions of law, DWR has discretion to approve or deny transfers. DWR's exercise of discretion will incorporate the following principles:

    a. As required by CEQA, DWR as an agency with statewide authority will implement feasible mitigation measures for any significant environmental impacts resulting from a transfer if such impacts and their mitigation are not addressed by other public agencies and are within DWR's jurisdiction.

    b. DWR will invoke "overriding considerations" in approving a transfer only as authorized by law, including but not limited to CEQA, and, to the extent applicable, the public trust doctrine and area of origin laws.

If you have any questions or need further information, please contact Dan Flory, Chief of DWR's State Water Project Analysis Office, at (916) 653-4313 or Nancy Quan of his staff at (916) 653-0190.

APPENDIX E

ORDINANCE NO. 44

AN ORDINANCE OF THE BOARD OF DIRECTORS OF CRESTLINE-LAKE ARROWHEAD WATER AGENCY DECLARING AN EMERGENCY WATER SHORTAGE AND ESTABLISHING A WATER CONSERVATION PROGRAM

WHEREAS, Crestline-Lake Arrowhead Water Agency (hereinafter "Agency"), a public agency created by special act of the California State Legislature pursuant to Act 9099a of Deering's Water Code - Uncodified Acts (hereinafter the "Crestline-Lake Arrowhead Water Agency Law"), provides water service directly to the consumer within certain retail service areas located within its boundaries, and also supplemental water on a wholesale basis to other water purveyors, also located within the Agency's boundaries, for retail delivery to their own customers; and

WHEREAS, the Agency is one of thirty State Water Contractors in the State of California which obtain water from the State Water Project, and all of the water which the Agency delivers comes from Silverwood Lake, a facility of the State Water Project; and

WHEREAS, the Agency has been advised by the Department of Water Resources, which operates the State Water Project, that five consecutive years of drought have created Statewide drought emergency conditions which will prevent the State from delivering to the Agency all of the water which the Agency has requested from the State Water Project for 1991; and

WHEREAS, the Agency is authorized by Section 11 (13) and (14) of the Crestline-Lake Arrowhead Water Agency Law to restrict the use of Agency water during a threatened or existing water shortage, and to prohibit the waste or the use of Agency water during such periods for any purpose other than domestic uses or such other uses as may be determined by the Agency to be necessary; and

WHEREAS, the Agency is further authorized by Water Code Sections 350, et seq., to declare a water shortage emergency and by Water Code Sections 375-377 to adopt water conservation programs; and

WHEREAS, this Board of Directors determines that the adoption of water conservation rules and regulations is necessary to (1) protect the health, safety, and welfare of the inhabitants and customers of the Agency, (2) assure the maximum beneficial use of the water supplies of the Agency, and (3) ensure that there will be sufficient water supplies to meet the basic needs of human consumption, sanitation and fire protection; and

WHEREAS, the Board of Directors further determines that the specific rules, regulations and restrictions established herein are necessary as emergency measures to cope with an existing water supply shortage which may become even worse in the near future;

NOW, THEREFORE, BE IT ORDAINED by the Board of Directors of Crestline-Lake Arrowhead Water Agency as follows:

Section 1. Purpose and Findings.

This Board of Directors finds that a drought emergency and existing water shortage exists which require the enactment and enforcement of this Ordinance. The Agency has received notice from the Department of Water Resources of the State of California that scheduled deliveries to the Agency from the State Water Project during calendar year 1991 must be reduced 15% below the deliveries requested by the Agency, and that more severe reductions will likely be imposed if drought conditions continue during the first few months of 1991. These reductions will directly impact the wholesale and retail customers of the Agency, many of whom rely exclusively upon the Agency for their water supply. Therefore, the Agency must immediately impose regulations and restrictions and implement a water conservation program designed to reduce consumption within the Agency's service area in order to preserve a supply of water necessary to protect the health, safety and welfare of the

customers within the Agency's service area. The Agency's first priority in the implementation of these regulations and restrictions will be preservation of sufficient water to satisfy domestic consumptive needs, ensure adequate fire protection, and preserve the health and safety of the inhabitants and customers of the Agency.

Section 2. Definitions.

"Agency" -- Crestline-Lake Arrowhead Water Agency.

"Board" -- Board of Directors of the Agency.

"Retail customer" -- A customer receiving water service directly from the Agency, through a service connection, for his own use and not for resale or delivery to others.

"Waste" -- Any unreasonable or non-beneficial use of water or any unreasonable method of use of water, including, but not limited to, the specific uses prohibited and restricted by this Ordinance as hereinafter set forth.

"Water users" -- Any person, firm, partnership, association, corporation or entity using water obtained from the water system of Crestline-Lake Arrowhead Water Agency.

"Wholesale customer" -- A customer having a connection to the Agency's water system which purchases water from the Agency for resale or delivery to its own users, customers, or shareholders through its own

water system; the term "wholesale customer" shall include camps.

Section 3. Water Supply Plan for Emergency Water Shortage - Wholesale Customers.

Using 1990 as a base year, the Agency will determine the amount of water which the Agency delivered to each wholesale customer during each month of 1990. Each such customer shall then be allowed to receive from the Agency, each month, at the Agency's standard rate for wholesale water then in effect, a percentage of the quantity of water which the Agency delivered to that wholesale customer during the corresponding month of the base year. The percentage shall be determined by the stage of emergency declared by the Board, as follows:

STAGE OF EMERGENCY DECLARED BY BOARD	PERCENTAGE OF WATER DELIVERED DURING CORRESPONDING MONTH OF BASE YEAR
STAGE 1 EMERGENCY	95%
STAGE 2 EMERGENCY	90%
STAGE 3 EMERGENCY	80%
STAGE 4 EMERGENCY	70%
STAGE 5 EMERGENCY	60%

During a Stage 1 Emergency, water delivered for any month in excess of the applicable percentage shall be charged at twice the Agency's standard rate for wholesale water in effect at the time of delivery. For Stage 2 through Stage 5 Emergencies, water delivered for any month in excess of the applicable percentage shall be subject to such surcharges as the Board may establish by separate ordinance or resolution, at the time each such stage of emergency is declared by the Board.

Section 4. Water Supply Plan for Emergency Shortage - Retail Customers.

A. Surcharge for Excess Consumption. All retail customers are presently charged a minimum monthly charge which entitles them to use a certain quantity of water without payment of an additional charge. During a Stage 1 Emergency, the quantity of water which they are currently entitled to use for payment of the minimum monthly charge shall become the base quantity which they shall be entitled to use without payment of a surcharge. Consumption in excess of the base quantity during a Stage 1 Emergency shall be charged at twice the Agency's standard rate for such service. For Stage 2 through Stage 5 Emergencies, consumption in excess of the base quantity shall be subject to such surcharges as the Board may establish by separate ordinance or resolution at the time each such stage of emergency is declared by the Board.

B. Prohibited Uses. In addition, this Board finds the following uses constitute waste and are therefore prohibited for the Agency's retail customers:

(i) Running water into streets or gutters.

(ii) Washing automobiles or equipment with running water (as opposed to use of a bucket, other container or a commercial wash establishment using recycled or reclaimed water).

(iii) Washing down buildings (except windows), walks, driveways or streets.

(iv) Sprinkling for dust control.

(v) Water displays or ornamental water use (fountains, etc.) except when the display uses reclaimed or recycled water.

(vi) Dripping faucets, or other leaks, or unattended or excessively running hoses.

(vii) Watering lawns, parks, playgrounds or ballfields more than twice per week, which watering must occur after 9:00 p.m. and before 3:00 a.m.; provided there shall be no prohibition against watering with reclaimed water.

C. Installation and Use of Shut-off Valves. Each retail customer of the Agency is hereby required to install a shut-off valve on the customer's side of the meter, outside of the meter box, to allow on-site plumbing to be drained as necessary to prevent loss of water from frozen or broken pipes. It shall be the customer's responsibility to turn off the shut-off valve upon leaving the premises, and to insulate exposed pipes and valves to protect the pipes and valves against breaks when freezing conditions occur.

D. Construction Water Use. Although construction water use will not be prohibited altogether, such use will now incur the following rates and charges:

(i) $5 per day for rental of meter; and

(ii) $0.25 per cubic foot of water consumed.

Section 5. Adjustment of Base Quantities.

The base quantities established for wholesale and retail customers pursuant to Section 3 and Section 4 of this Ordinance may be adjusted by the Board, as the Board in

its discretion deems necessary, in order to equitably apply the provisions of this Ordinance and to achieve the purposes and objectives set forth herein. Customers seeking an adjustment must apply to the Board in writing and provide documentation to demonstrate that the adjustment is necessary in order to avoid inequitable application of the Ordinance. Upon granting or denying a requested adjustment, the decision of the Board shall be final.

Section 6. Use of Surcharge Revenues.

The surcharge revenues collected by the Agency as a result of customer consumption in excess of the base quantities set forth in Section 3 and Section 4 of this Ordinance shall be used by the Agency to assist in defraying the cost of measures employed by the Agency to cope with the water shortage emergency which necessitates the adoption of this Ordinance.

Section 7. Moratorium on Service Commitments and Connections.

Consistent with the provisions of Resolution No. 454, as adopted by the Board on January 14, 1991, or as subsequently revised, the Agency shall be prohibited from making any oral or written commitments to provide any new retail service and shall not approve the installation of a turnout to any new wholesale customer. Any such commitment shall be without authority from this Board and, therefore, shall be void and unenforceable. Furthermore, the Agency's wholesale customers are urged to impose a temporary moratorium on new service commitments.

Section 8. Declaration of Stage 1 Emergency.

This Board hereby declares a Stage 1 Emergency, effective as of March 1, 1991, thus placing into effect the provisions of this Ordinance. The Board may subsequently declare different stages of emergency without the necessity of amending the provisions of this Ordinance.

Section 9. Use of Water Saving Kits.

The Agency shall provide a water saving kit, free of charge, to each retail customer of the Agency who needs and requests one, so long as the Agency's stockpile of kits lasts. Retail customers are urged to use such kits and are alerted to the surcharges set forth in Section 4 for excess consumption. Furthermore, the Agency's wholesale customers are urged to assist their own retail customers in obtaining and installing water saving devices to minimize water consumption within their service areas.

Section 10. Lawns, Parks, Playgrounds and Ballfields.

Retail customers, schools and camps which receive water directly from the Agency shall be prohibited from watering lawns, parks, playgrounds or ballfields more than twice per week. All such watering must occur after 9:00 p.m. and before 3:00 a.m. There shall be no prohibition against watering with reclaimed water.

Section 11. Compliance.

Failure to comply with the provisions of this Ordinance shall constitute a misdemeanor punishable under Section 13 of the Crestline-Lake Arrowhead Water Agency Law and under Water Code Section 377. Upon conviction of such a misdemeanor, that person shall be punished by imprisonment in the county jail for not more than thirty (30) days or by a fine of not more than One Thousand Dollars ($1000), or both by such fine and imprisonment. The Agency reserves the right to take such civil enforcement action or other action as may be available or appropriate to compel compliance with the provisions of this Ordinance, including the right to discontinue service to customers who violate the provisions of this Ordinance.

Section 12. Rules and Regulations.

This Ordinance shall augment, and not supersede, the provisions set forth in the Agency's Rules and Regulations. Customers are urged to pay particular attention to Section 3.13(d) of the Rules and Regulations, which specifically prohibits the waste of water by causing or permitting the overflow of water storage reservoirs.

Section 13. Severability.

If any section, subsection, sentence, clause or phrase of this Ordinance is for any reason held to be unconstitutional or invalid by a court of competent jurisdiction, such decision shall not affect the remaining portions of this Ordinance and those shall remain in full force and effect.

Section 14. Repeal of Ordinance Nos. 11 and 13.

Ordinance Nos. 11 and 13 are hereby repealed.

Section 15. CEQA Exemption.

This Board finds and determines that the adoption of this Ordinance and implementation of the measures set forth herein are exempt from environmental assessment pursuant to Section 3.08 of the Agency's Local Guidelines for Implementing the California Environmental Quality Act, and directs the Agency's General Manager to file a Notice of Exemption with the County Clerk for the County of San Bernardino.

Section 16. Publication and Notice.

A copy of this Ordinance shall be published one time in a newspaper of general circulation within the Agency within ten (10) days after the adoption hereof pursuant to

Government Code Section 6061. In addition, copies shall be mailed to each wholesale customer of the Agency, the State Department of Water Resources, the State Department of Health Services, the State Water Resources Control Board (Division of Water Rights), the Association of California Water Agencies, the Board of Supervisors of the County of San Bernardino, the Building and Planning Departments of the County of San Bernardino, firefighting entities having jurisdiction within the Agency, and such State legislators as the General Manager of the Agency may deem appropriate.

ADOPTED this 14th day of February, 1991.

ATTEST:

Dorothy E. Boston
Secretary of the Board of Directors
CRESTLINE-LAKE ARROWHEAD WATER AGENCY

Thomas O. Thomas
President of the Board of Directors
CRESTLINE-LAKE ARROWHEAD WATER AGENCY

CERTIFICATION

I, Dorothy E. Horton, Secretary of the Board of Directors of the Crestline-Lake Arrowhead Water Agency, hereby certify that the foregoing is a full, true and correct copy of the Ordinance adopted by the Board of Directors of said Agency at the special meeting of said Board held on the 14th day of February, 1991, by the following vote:

AYES:	Director Barnes, Massey, Rucker and Newcombe
NOES:	None
ABSENT:	Director Horning
ABSTAIN:	None

Dorothy E. Horton

Dorothy E. Horton, Secretary

ORDINANCE NO. 45

AN ORDINANCE OF THE BOARD OF DIRECTORS OF CRESTLINE-LAKE ARROWHEAD WATER AGENCY AMENDING ORDINANCE NO. 44 DECLARING AN EMERGENCY WATER SHORTAGE AND ESTABLISHING A WATER CONSERVATION PROGRAM

WHEREAS, Ordinance No. 44 of the Crestline-Lake Arrowhead Water Agency establishes a water conservation program which requires the implementation of different measures and different penalties for each stage of emergency as set forth in the ordinance; and

WHEREAS, Section 8 of Ordinance No. 44 declared a Stage 1 Emergency effective as of March 1, 1991; and

WHEREAS, unusally heavy snowfall in March rendered it impossible to implement all of the measures required during a Stage 1 Emergency, and this Board of Directors has determined that the implementation of such measures should become effective as of May 1, 1991;

NOW, THEREFORE, BE IT ORDAINED by the Board of Directors of Crestline-Lake Arrowhead Water Agency as follows:

1. The text of Section 8 of Ordinance No. 44 is hereby amended to provide as follows:

This Board hereby declares a Stage 1 Emergency, effective as of May 1, 1991, thus placing into effect the provisions of this Ordinance. The Board may subsequently declare different stages of emergency without the necessity of amending the provisions of this Ordinance.

2. This Ordinance shall be effective immediately upon adoption.

ADOPTED this 4th day of April, 1991.

President, Board of Directors
CRESTLINE-LAKE ARROWHEAD WATER AGENCY

ATTEST:

Secretary, Board of Directors
CRESTLINE-LAKE ARROWHEAD WATER AGENCY

APPENDIX F

RESOLUTION NO. 475

RESOLUTION OF THE BOARD OF DIRECTORS OF CRESTLINE-LAKE ARROWHEAD WATER AGENCY ADOPTING AN URBAN WATER SHORTAGE CONTINGENCY PLAN

WHEREAS, the Crestline-Lake Arrowhead Water Agency (hereinafter "Agency") provides water service directly to consumers within certain retail service areas located within the Agency's boundaries, and also provides supplemental water on a wholesale basis to other water purveyors, also located within the Agency's boundaries, for retail delivery to their own customers; and

WHEREAS, in January, 1991, the Agency adopted a water conservation program in the form prescribed and approved by the State Water Resources Control Board, in coordination with the Department of Water Resources, in order to satisfy certain conditions set forth in permits from the State Water Resources Control Board authorizing the Agency to divert and appropriate water from Houston Creek in the San Bernardino Mountains; and

WHEREAS, the water conservation program was submitted to the State Water Resources Control board in January, 1991, was approved, and is currently on file with the State; and

WHEREAS, due to the effects of the ongoing drought in the State of California, on February 14, 1991, the Agency also adopted

Ordinance No. 44, the effective date of which was subsequently amended by Ordinance No. 45 adopted on April 4, 1991, declaring a water shortage emergency and establishing a water conservation program, which remains in effect and which prohibits certain uses of water within the Agency's retail service areas and allocates the Agency's limited water supply among existing customers of the Agency; and

WHEREAS, Section 10631(e) of the California Water Code, as amended by the State Legislature in 1991, now requires the Agency to provide the Department of Water Resources with an urban water shortage contingency plan ("Plan"), and the Department of Water Resources has also requested that the Plan conform to a prescribed format; and

WHEREAS, the water conservation program adopted in January, 1991, and Ordinance Nos. 44 and 45 adopted in February and April, 1991, are both consistent with and contain many elements of the Plan and are still in effect within the Agency; and

WHEREAS, the Agency wishes the Plan to augment and become a part of the water conservation program currently on file with the State Water Resources Control Board;

NOW, THEREFORE, BE IT RESOLVED that the Board of Directors of Crestline-Lake Arrowhead Water Agency hereby approves and adopts the following Urban Water Shortage Contingency Plan:

SECTION 1. Coordinated Planning

> California Water Code Section 10620(d)(2) - Each urban water supplier shall coordinate the preparation of its Urban Water Shortage Contingency Plan with other urban water suppliers and public agencies in the area, to the extent practicable.

Crestline-Lake Arrowhead Water Agency ("CLAWA" or the "Agency") provides both wholesale and retail water service to its customers. CLAWA is one of thirty State Water Contractors in the State of California. All the water which CLAWA delivers comes from Silverwood Lake, a facility of the State Water Project.

In January 1991, the Agency coordinated with the State Water Resources Control Board and the Department of Water Resources in preparing and adopting its Water Conservation Program, which was required in order for the Agency to comply with conditions imposed on Permit Nos. 20418 and 20419 of the State Water Resources Control Board allowing the Agency to divert water from Houston Creek, when available.

In addition, the Agency also conducted a series of public meetings prior to adoption of Ordinance Nos. 44 and 45, which declared a water shortage emergency and established a mandatory water conservation program. These ordinances are currently in effect (Appendix, Exhibit A). During the adoption process, the Agency coordinated efforts with its wholesale customers. Some of the larger wholesale customers who were involved with the adoption process are:

Crestline Village County Water District
Running Springs Water District
Lake Arrowhead Community Services District (Deer Lodge Park Area)
Arrowbear Park County Water District
City of Big Bear Lake (Rimforest Division)
Valley of Enchantment Mutual Water Company
Cedarpines Park Mutual Water Company

Before adopting this Urban Water Shortage Contingency Plan ("Plan"), CLAWA's Board of Directors conducted a properly noticed public hearing on February 6, 1992, to provide for public

participation in the Plan preparation process. The final version of this Plan was reviewed and adopted by CLAWA on February 6, 1992.

SECTION 2. Past, Current and Projected Water Use (1991-94)

> California Water Code Section 10631(e)(1) - Past, current and projected water use and, to the extent records are available, a breakdown of those uses on the basis of residential single family, residential multi-family, industrial, commercial, governmental, and agricultural use.

CLAWA serves about nine percent of its water on a retail basis for residential use. Approximately eighty-two percent of its water is provided to water utilities on a wholesale basis. One percent of its water is provided for commercial activities and about six percent is delivered for governmental use. There is no agricultural use. The Agency estimates about two percent water loss. (See Appendix, Exhibit B).

CLAWA has entitlement of up to 5,800 acre feet of water annually from the State Water Project pursuant to its contract with the State of California, Department of Water Resources. In addition, in 1990, CLAWA supplemented its State Water Project supply by receiving permits from the State Water Resources Control Board to divert up to 1,302 acre feet of water annually from Houston Creek, which flows naturally into Silverwood Lake.

In 1989, the estimated permanent population in CLAWA's service area was 20,600. That number is expected to increase to 32,000 by the year 2010. (See Appendix, Exhibit C) The percentage of CLAWA's total water deliveries, by month, is illustrated in the Appendix, Exhibit D. Exhibit E in the Appendix details how many acre feet of water the Agency actually delivered in each month of 1989.

At the present time, CLAWA estimates that its minimum water budget for 1992 will total 1,950 acre feet per year. By means of extreme conservation measures and better than anticipated local production (from local mountain wells), the Agency's customers were able to use less than this minimum budget in 1991. As of the date of adoption of this Plan, the Department of Water Resources has only approved delivery of 410 acre feet from the State Water Project for all of 1992. This quantity falls far short of the minimum amount necessary for the Agency to provide an adequate water supply for basic health, sanitation and fire protection.

The Agency has contacted the Department of Water Resources to request reconsideration of its proposed delivery limit in 1992 in

order to ensure a water supply which will at least provide adequate water for health, sanitation and fire protection.

Additionally, last year the Agency was able to obtain some supplemental water from the State's Emergency Drought Water Bank. The Agency intends to seek supplemental water from this source in 1992, if necessary.

SECTION 3. Worst Case Water Supply Availability for 12, 24 and 36 Months

California Water Code Section 10631(e)(2) - An estimate of the minimum water supply available at the end of 12, 24 and 36 months, assuming the worst case water supply shortages.

CLAWA has a contract entitlement to 5,800 acre feet of water per year from the State Water Project. However, CLAWA has experienced a cutback in deliveries from the State Water Project due to the current six-year drought. The following paragraph estimates worst case water supply availability for 12, 24 and 36 months.

As of this date, the Department of Water Resources has approved delivery of 410 acre feet for this year (20% of the Agency's requested deliveries for 1992). However, it is possible that a continued or worsening drought condition could halt all further deliveries from the State Water Project. As these deliveries normally comprise the Agency's entire water supply, such an event would force the Agency to suspend deliveries to all customers. Although some of the Agency's customers do receive a minimum amount of local production from local wells, that production is entirely dependent upon rainfall in the local mountains and does not represent a reliable permanent source. The additional water occasionally appropriated from Houston Creek is also not available during periods of drought.

However, the Agency does not believe the Department of Water Resources will leave the Agency without an adequate supply to meet minimum health, sanitation and fire protection levels. Last year, the Department of Water Resources committed to provide, through several different sources, 1,950 acre feet for the year, and the Agency anticipates a similar delivery may be available in 1992.

SECTION 4. Stages of Action

California Water Code Section 10631(e)(3) - Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage.

CLAWA enacted an emergency water shortage and water conservation ordinance in 1991. (Appendix, Exhibit A) That ordinance establishes emergency stages and reduction goals for both wholesale and retail customers. (See Section 6)

As currently applied, each customer's supply, wholesale and retail, is reduced by a percentage of the customer's 1990 monthly use, with the percentage decreasing for each successive stage of emergency. During a stage one emergency, presently declared, customers are limited to 95% of their 1990 consumption. Consumption in excess of that percentage during a stage one emergency is charged at twice the Agency's standard rate for such service.

For stage two through stage five emergencies, consumption in excess of the allowable quantity is subject to such surcharges as the Board may establish by separate ordinance or resolution at the time each such stage of emergency is declared by the Board. The Board anticipates imposing such surcharges on excess consumption as are necessary in order to reduce actual consumption to the quantity available.

SECTION 5. Mandatory Prohibitions on Water Use

California Water Code Section 10631(e)(4) - Mandatory provisions to reduce water use which include prohibitions against specific wasteful practices, such as gutter flooding.

In its mandatory water conservation ordinance, presently in effect, CLAWA declared that the following uses constitute waste and prohibited these uses:

1. Running water into streets or gutters.

2. Washing automobiles or equipment with running water (as opposed to use of a bucket, other container or a commercial wash establishment using recycled or reclaimed water).

3. Washing down buildings (except windows), walks, driveways or streets.

4. Sprinkling for dust control.

5. Water displays or ornamental water use (fountains, etc.) except when the display uses reclaimed or recycled water.

6. Dripping faucets, or other leaks, or unattended or excessively running hoses.

SECTION 6. Consumption Limits

California Water Code Section 10631(e)(5) - Consumption limits in the most restricted stages. Each urban water supplier may use any type of consumption limit in its Water Shortage Contingency Plan that would reduce water use and is appropriate for its area. Examples of consumption limits that may be used include, but are not limited to, percentage reductions in water allotments, per capita allocations, an increase in block rate schedule for high usage of water with incentives for conservation or restrictions on specific uses.

CLAWA has established the following allocation method for retail and wholesale customers.

STATE OF EMERGENCY DECLARED BY BOARD	PERCENTAGE OF WATER DELIVERED DURING CORRESPONDING MONTH OF BASE YEAR
STAGE 1 EMERGENCY	95%
STAGE 2 EMERGENCY	90%
STAGE 3 EMERGENCY	80%
STAGE 4 EMERGENCY	70%
STAGE 5 EMERGENCY	60%

Consumption in excess of the percentage allocated during a stage one emergency is charged at twice the Agency's standard rate for such service. For stage two through stage five emergencies, consumption in excess of the base quantity shall be subject to such surcharges as the Board may establish by separate ordinance or resolution at the time each such stage of emergency is declared by

the Board. The Board will make the surcharges as high as necessary in order to reduce actual consumption to allowable limits.

SECTION 7. Penalties or Charges for Excessive Use

California Water Code Section 10631(e)(6) - Penalties or charges for excessive use.

Surcharges

During a stage one emergency, water delivered to customers in excess of percentage allocated is subject to a charge of twice the Agency's standard rate for wholesale water in effect at the time of delivery. For stage two through stage five emergencies, water delivered for any month in excess of the applicable percentage shall be subject to such surcharges as the Board may establish by separate ordinance or resolution, at the time each such stage of emergency is declared by the Board.

Penalties

In addition to the surcharges for excess consumption, failure to comply with the provisions of CLAWA's ordinance declaring an emergency water shortage and establishing a water conservation program is a misdemeanor punishable under Section 13 of the Crestline-Lake Arrowhead Water Agency Law and under Water Code Section 377. Upon conviction of such a misdemeanor, that person shall be punished by imprisonment in the county jail for not more than thirty (30) days or by a fine of not more than One Thousand Dollars ($1,000.00), or both by such fine and imprisonment. In addition, the Agency has reserved the right to take such civil enforcement action or other action as may be available or appropriate to compel compliance with the provisions of its Ordinance, including the right to discontinue service to customers who willfully violate the provisions of its Ordinance.

SECTION 8. Analysis of Revenue and Expenditure Impacts

California Water Code Section 10631(e)(7) - Analysis of the impacts of the Plan on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.

Costs of obtaining water through the Agency's contract with the State are determined by the purchase price of the water imposed by the Department of Water Resources at the point of delivery, energy costs incurred in pumping the water through the Agency's system (i.e. the energy involved in pumping the water up from Silverwood

Lake), and costs of operating and maintaining the Agency's treatment and delivery facilities.

The Agency levies a tax on all property within the Agency's service area to pay its obligations under its contract with the State of California for water deliveries through the State Water Project. This tax covers all State Water Project contract obligations whether or not water is delivered.

The Agency has a standby charge program currently in place which can be used to pay ongoing costs of administration, personnel, operation and maintenance. The Agency uses funds obtained from imposition of these standby charges to cover any shortfall which occurs when revenues from water sales do not cover all operating expenses. Thus, the Agency has a revenue program in place which will ensure that the Agency remains solvent during periods of severe water shortage when water sales are curtailed.

SECTION 9. Implementation of the Plan

> California Water Code Section 10631(e)(8) - A draft water shortage contingency resolution or ordinance to carry out the Urban Water Shortage Contingency Plan.

In 1991, CLAWA adopted Ordinance No. 44, which declared a water shortage emergency and established a water conservation program. This ordinance can be found in the Appendix as Exhibit A. This plan hereby incorporates Ordinance No. 44 by reference, as amended by Ordinance No. 45 and as it may be subsequently further amended or replaced.

SECTION 10. Water Use Monitoring Procedures

> California Water Code Section 10631(e)(9) - A mechanism for determining actual reductions in water use pursuant to the urban Water Shortage Contingency Plan.

The Agency reads each customer's meter monthly. The Agency then uses a computer program to compare each customer's actual consumption with the customer's allowable consumption. The Agency then imposes its surcharge on any customer whose actual consumption exceeds the allowable consumption.

SECTION 11. Plan Adoption Standards

California Water Code Section 10631(a) - Each urban water supplier shall, not later than January 31, 1992, prepare, adopt, and submit to the department an amendment to its Urban Water Management Plan which meets the requirements of subdivision (e) of Section 10631.

CLAWA prepared this Water Shortage Contingency Plan during January 1992. The Plan was adopted on February 6, 1992 (see Appendix, Exhibit F) and will be submitted to the Department of Water Resources on February 7, 1992. The Plan includes all the information necessary to meet the requirements of subdivision (e) of California Water Code Section 10631.

SECTION 12. Public Inspections and Meetings

California Water Code Section 10642 - Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. A privately owned water supplier shall provide an equivalent notice within its service area. After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

A public hearing and the availability of copies of the draft Plan were properly noticed in a newspaper of general circulation pursuant to Government Code Section 6066. Copies of the draft Plan were available for public review at CLAWA's offices. CLAWA held a public hearing on the Plan on February 6, 1992. The Plan was adopted on February 6, 1992, following the public hearing.

SECTION 13.

California Water Code Section 10656 - An urban water supplier that does not submit an amendment to its Urban Water Management Plan pursuant to subdivision (a) of Section 10621 to the Department of Water Resources is ineligible to receive drought assistance from the State until the Urban Water Management Plan is submitted pursuant to Article 3 (commencing with Section 10640) of Chapter 3.

CLAWA will submit this Plan to the Department of Water Resources on February 7, 1992.

BE IT FURTHER RESOLVED that a copy of this Resolution, and the Urban Water Shortage Contingency Plan adopted herein, shall be filed with the State Water Resources Control Board and shall augment and become a part of the water conservation program currently on file in satisfaction of conditions imposed upon Permit Nos. 20418 and 20419 of the State Water Resources Control Board.

ADOPTED this 6th day of February, 1992

President of the Board of Directors, CRESTLINE-LAKE ARROWHEAD WATER AGENCY

ATTEST:

Secretary of the Board of Directors, CRESTLINE-LAKE ARROWHEAD WATER AGENCY

CERTIFICATION

I, Dorothy E. Horton, Secretary of the Board of Directors of the Crestline-Lake Arrowhead Water Agency, hereby certify that the foregoing is a full, true and correct copy of the Resolution adopted by the Board of Directors of said Agency at the regular meeting of said Board held on the 6th day of February, 1992, by the following vote:

AYES: Directors Rucker, Newcombe, Massey, McCrory and Pleasant

NOES: None

ABSENT: None

ABSTAIN: None

Dorothy E. Horton

Dorothy E. Horton, Secretary

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WATER CONSERVATION PROGRAM

FOR THE

CRESTLINE-LAKE ARROWHEAD WATER AGENCY

- - - - -

SUBMITTED TO:

STATE WATER RESOURCES CONTROL BOARD

DIVISION OF WATER RIGHTS

P.O. BOX 2000

SACRAMENTO, CALIFORNIA 95810

- - - - -

January 1991

INTRODUCTION

The Crestline-Lake Arrowhead Water Agency ("CLAWA") has prepared this water conservation program pursuant to permit numbers 20418 and 20419 issued by the State Water Resources Control Board ("SWRCB"). Condition number 16 of both permits provides that CLAWA shall prepare and implement a water conservation program.

In preparing this program, CLAWA has used the "Suggested Outline for the Preparation of a Water Conservation Program: Minor Urban Water Purveyors" provided by the SWRCB, Division of Water Rights (dated September 1984). Since CLAWA directly serves water to 3,000 or fewer customers and provides 3,000 or less acre feet of water annually, it is considered a "minor" urban water purveyor for purposes of this water conservation program.

I. STATEMENT OF WATER CONSERVATION GOALS.

A. General Statement of Conservation Goals.

Since its organization in 1962, CLAWA has recognized the importance of using its water supplies efficiently and has encouraged its more than 30 wholesale purveyor customers and all of its approximately 1,000 retail customers to do the same. CLAWA's water supply is from the State Water Project ("SWP"). This water travels over 600 miles from Northern California to Silverwood Lake where CLAWA takes the water and uses four booster stations to pump the water uphill a total of 3,800 feet and through its transmission facilities located across the San Bernardino Mountains. CLAWA also holds two permits from the SWRCB to divert water from Houston Creek which flows naturally into Silverwood Lake.

Since its water travels so far, CLAWA has always viewed its water supply as a valuable resource and has concentrated its past, present and future planning efforts

on efficient management of this resource. In fact, CLAWA recently received a certificate from the Association of California Water Agencies ("ACWA") recognizing CLAWA's efforts to use its water efficiently pursuant to ACWA's "Water Management Awareness Program." A photocopy of an article from the December 24, 1990 issue of the "ACWA News" is attached as Exhibit "A" documenting that award.

B. Description of Conservation Actions.

Pursuant to the outline provided by the Division of Water Rights for the preparation of a water conservation program, "minor" urban water purveyors which supply between 2,000 to 3,000 acre feet of water annually must adopt five conservation actions. CLAWA falls within this category and will adopt the five conservation actions discussed below.

1. Water saving devices and kits.

In 1978, CLAWA purchased and distributed water conservation kits to all customers within its own retail service area. These kits included toilet displacement devices, shower flow restrictors, dye tablets for detecting leaks and water conservation pamphlets. CLAWA purchased water conservation kits again in 1988 consisting of the same materials. CLAWA distributed these kits to retail customers who could be contacted at their premises. Those who could not be contacted received notices from CLAWA that the kits were available for their use.

In addition, a kit was mailed to each of CLAWA's wholesale purveyor customers along with a notice encouraging each of them to implement similar water conservation measures

within their own retail service areas. A number of these wholesale customers obtained water conservation kits for distribution to their retail customers. In some cases, these kits were obtained from CLAWA's stockpile; in at least one case, a wholesale customer arranged separately to purchase water conservation kits from another source.

As part of this January 1991 water conservation program, CLAWA will continue to provide these water conservation kits at no charge to any interested customer. CLAWA will also send a notice to its customers periodically reminding them that these conservation kits are available.

2. Public information program.

CLAWA will also implement a public information program regarding water conservation. This program will consist of several components.

First, CLAWA will include a "fact sheet" regarding water conservation along with the water quality report it sends annually to its customers. As noted in the Department of Water Resources' "Water Conservation Reference Manual, Urban Conservation Measures" (March 1984), fact sheets are easy to update and work well for "changeable information." CLAWA's fact sheet will indicate how water users can conserve water (e.g., around the home) and will describe the measures CLAWA itself is using to conserve its overall supply.

Second, in the past, CLAWA has posted outdoor signs near public streets and roadways throughout its service area reminding its consumers to conserve water. CLAWA will refurbish and repaint these signs and will assure that the signs are placed in strategic locations.

Third, CLAWA will issue press releases on a periodic basis in the local newspaper urging water conservation and suggesting ways to reduce water use.

Fourth, CLAWA will send each customer an annual notice reminding customers to winterize their pipes to prevent breakage and leaking during the winter months. This notice will also indicate that CLAWA is entitled to shut off service to property if it suspects breaks or leaks.

3. Corrosion control.

Corrosion of water mains and pipes can eventually result in leaks and other problems. Therefore, CLAWA will include corrosion control measures in its overall water conservation program. As part of this corrosion control effort, CLAWA plans to expand and improve its treatment plant in order to meet anticipated drinking water quality requirements. The design and construction of phase 1 of this treatment plant has already been approved by CLAWA's Board. Use of this plant is expected to significantly lessen the corrosivity index of CLAWA's water.

CLAWA will also begin a program to refurbish its main line appurtenances. As part of this refurbishment, the main line appurtenances will be replaced with more corrosion resistant materials such as brass.

4. Valve exercising program.

CLAWA began a valve exercising program in 1989 by hiring a contractor to examine each valve in its wholesale distribution system and to exercise, grease and repair valves where necessary. Thus, if CLAWA has a leak problem, it will be able to isolate the problem relatively quickly to minimize water waste.

CLAWA will continue to check every valve every two to three years and will extend this program to cover inspection of retail valves as well.

5. Reclamation.

CLAWA plans to install a clarifying unit in its treatment plant to remove turbidity from the backwash water. The backwash water will then be reclaimed and recirculated back to the headwaters of the treatment plant. This new feature will require the use of a lift station which will boost backwash water up to two water storage tanks and then to the clarifying unit. Using this new clarifying unit will result in reclaiming all backwash water from the treatment plant which was previously lost.

C. Compliance Schedule Pursuant to the Terms of Water Rights Permit.

Approval of this conservation program by the end of January 1991 will satisfy condition 16 of both of CLAWA's permits (nos. 20418 and 20419). CLAWA will implement each of the conservation actions listed above pursuant to the implementation schedule described in Section VIII of this program.

II. GENERAL INFORMATION REGARDING PLACE OF USE.

A. Map.

The SWRCB, Division of Water Rights, has requested a map showing the boundaries of place of use, points of diversion and a schematic of CLAWA's water distribution system. This map is attached as Exhibit "B".

B. Characteristics of Place of Use.

The Division of Water Rights has also requested information regarding present and projected population (20 years by five year increments) and present and projected land use patterns.

The service area of CLAWA covers much of the San Bernardino Mountains. It is bounded by the City of San Bernardino on the south, the High Desert on the north, Cedarpines Park on the west, and Arrowbear/Green Valley on the east. The Agency's boundary contains about 56,000 acres, approximately one-half of which is United States Forest Service land not subject to development except for infrequent land exchange parcels converted to private ownership.

In 1989, the Agency served an estimated permanent population of 20,600. Due to a large seasonal influx, the Agency served an estimated maximum seasonal

population of 25,200. Of the estimated permanent population, about 2,600 people reside within the Agency's retail service areas, and the remaining 18,000 estimated population are provided wholesale supplemental water from CLAWA via eighteen separate retail water purveyors located within the Agency's boundary.

The present land use for the developed portions of CLAWA is primarily single-family residential, with small amounts of multiple-unit residential, camps, commercial and public authorities. There is no industrial use.

The Agency estimates that future permanent population within CLAWA may be as set forth in Table 1 below:

TABLE 1

YEAR	ESTIMATED PERMANENT POPULATION
1995	22,000
2000	26,000
2005	30,000
2010	32,000

III. PURVEYOR'S WATER RIGHTS.

CLAWA's water supply comes from the State Water Project. CLAWA takes its water from Silverwood Lake and pumps it uphill to its water storage reservoirs. CLAWA has an entitlement to 5,800 acre feet of water annually pursuant to its contract with the State. CLAWA diverts this water throughout the year.

In 1990, CLAWA supplemented its State Water Project supply by receiving appropriative permits from the State Water Resources Control Board to divert up to 1,302

acre feet of water annually from Houston Creek which flows naturally into Silverwood Lake.

CLAWA has no pre-1914, court decreed or underground water rights. All of CLAWA's water is used for municipal use.

IV. WATER CONVEYANCE AND DISTRIBUTION SYSTEM.

CLAWA diverts its water from Silverwood Lake by using four booster stations to pump the water uphill a total of 3,800 feet and through its transmission facilities across the San Bernardino Mountains. Water tanks for storage are located strategically throughout the mountains. Water is regulated through the system by meters at each purveyor's turnout and at each turnout serving a retail service area of CLAWA. A map depicting CLAWA's conveyance and distribution system is attached as Exhibit "B".

CLAWA has approximately 1,000 retail customers and more than 30 wholesale purveyor customers. CLAWA's system is completely metered.

V. WATER BUDGET ANALYSIS.

A. Monthly estimate of past, present, and projected water use showing per capita demands.

TABLE 2

YEAR	ANNUAL WHOLESALE DELIVERIES/CONSUMPTION (MILLION GALLONS/YEAR)	ESTIMATED PERMANENT POPULATION (PEOPLE)	PER CAPITA DEMAND (GAL/PERSON/YR)
1986	459.2	12,756	36,000
1989	741.6	20,600	36,000
2010	1,152.0	32,000	36,000

Table 3	
MONTH	TYPICAL PERCENTAGE OF ANNUAL WATER USE
January	8.3
February	7.4
March	5.2
April	7.1
May	8.4
June	9.2
July	11.9
August	11.7
September	10.7
October	7.2
November	6.1
December	6.8
ANNUAL TOTAL:	100%

B. Monthly breakdown of use by development category.

Section 5 of CLAWA's 1989 Annual Report to the Department of Health Services, a copy of which is attached herewith as Exhibit "C," shows a monthly breakdown of use by residential, commercial, camps, public authority, and wholesale to water utilities.

C. Present monthly water supply during average and critical years.

CLAWA's "present" monthly water supply is illustrated by State Water Project

deliveries to the Agency during 1989, which was during the third consecutive year of drought conditions in California, as shown in the following Table 4.

TABLE 4	
1989	**SWP DELIVERIES TO CLAWA (ACRE-FEET)**
January	184
February	166
March	115
April	152
May	178
June	197
July	254
August	251
September	229
October	152
November	141
December	151
TOTAL:	**2,170 ACRE-FEET**

D. Water budget for average and critical year.

At the present time, CLAWA estimates a minimum water budget totaling 2,170 acre-feet per year. Reviewing the Agency's recent delivery records, the trend for water deliveries appears to be leveling off somewhat. Factors which may be causing a slight reduction in water deliveries are water pricing, water conservation, effects of reported inflationary recession, the Agency's appropriation of water from Houston Creek (whenever available), and the continuing effect of the Agency's

Purveyor Turnout Resolution (included in Exhibit "D" attached herewith). Factors which would have the opposite effect and perhaps cause an increase in water deliveries would be the continuation of the existing state-wide drought, and the peak winter-time demand experienced by the Agency's wholesale and retail customers caused by leaks due to freezing on the customer side of residential meters.

E. Present and projected water supply deficiencies.

In general, CLAWA has been fortunate not to have suffered major deficiencies in its water supply program in the past. Since CLAWA obtains the majority of its water supply from the State Water Project, it has been able to provide its users with a steady and stable source of water without deficiencies thus far. All of CLAWA's supplies are for municipal purposes, so past deficiencies in deliveries of agricultural water from the State Water Project have not seriously impacted CLAWA.

CLAWA supports the Department of Water Resources' ("DWR") efforts to complete State Project facilities so that full entitlements can be delivered to all state contractors. In the event that there may be future deficiencies imposed by lack of rainfall or by DWR in its operations of the State Water Project, CLAWA proposes to allocate water deliveries to existing wholesale purveyors based upon historic use, with each wholesale purveyor receiving the same percentage cutback in deliveries. CLAWA also proposes to aggressively enforce water conservation measures imposed on CLAWA's own retail customers as described in this program.

VI. WATER MANAGEMENT PRACTICES.

A. Existing Water Conservation Actions, Ordinances, or Practices Within the Service Area.

As noted above, CLAWA recently received a certificate from the Association

of California Agencies ("ACWA") recognizing CLAWA's efforts to conserve water. All of CLAWA's existing water conservation actions, ordinances and practices within its service area are outlined in CLAWA's application for this certificate. Rather than repeating this information, CLAWA has attached its application materials as Exhibit "E."

B. Existing and Projected Water Prices and Rate Structure.

Pages 2 through 8 of the attached Exhibit F detail CLAWA's existing wholesale and retail water rates effective 7-1-90, and for comparison purposes also show the now superseded rates effective 7-1-89. Note, for example, that the present rate for purveyor wholesale (PE 3) is $695.00 per acre-foot, and that many retail, residential current rates (RL 1, etc.) are equivalent to $1,372.14 per acre-foot.

Enclosed as Exhibit "G" are copies of letters from the Agency's consulting engineers to CLAWA dated 1-23-90 and 9-7-90 regarding analysis of CLAWA's rates for wholesale water, including the following cost components: purchased water cost (DWR charge), power costs for pumping, water treatment cost, and transmission and distribution costs. Note that power cost for pumping makes up about 61% of the wholesale water rate.

Depending upon future costs for power for pumping, and other applicable cost components, projected water rates may increase significantly over present water rates.

C. Estimate of Present Unaccounted for Water.

Referring to Exhibit "C" herein, for the year 1989, CLAWA's annual water production totaled 741.59 million gallons, and the annual metered deliveries to wholesale and retail customers totaled 716.06 million gallons; indicating a 3.44% water loss (unaccounted for water).

D. Potential Cost Effective Water Conservation Actions Proposed to Alleviate Shortages, Deficiencies, or Growth Induced Demands.

All cost effective water conservation actions that CLAWA currently proposes to implement pursuant to the conditions of its water rights permits are set forth above. With regard to potential cost effective conservation actions, CLAWA is contemplating the implementation of a mandatory water conservation program which would contain disincentives designed to reduce water consumption.

VII. IMPLEMENTATION SCHEDULE.

A. Measure 1 (Water saving devices and kits): Implementation to begin immediately.

B. Measure 2 (Public information): Implementation to begin immediately.

C. Measure 3 (Corrosion control): Implementation to begin immediately.

D. Measure 4 (Valve exercising program): Implementation to begin immediately.

E. Measure 5 (Reclamation): Implementation to be completed before the end of 1992.

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ACWA NEWS

Association of California Water Agencies
Since 1910

Vol. 18, No. 26 December 24, 1990

17 Districts Awarded Water Management Certification

ACWA awarded water management certification to 17 water districts for positive water managing achievements and a long-standing commitment to efficient water use.

The awards were presented during the association's fall conference in Palm Springs, November 28-30. Recipients of the award, administered annually by ACWA, have implemented a variety of water management measures. A total of 114 ACWA member districts have received the certification since the program began in 1985.

"California's water districts strive to make the most efficient use of water," ACWA Executive Director John P. Fraser said. "Our certification process is an important part of recognizing efforts that make a difference."

Agencies receiving certification include: Borrego Water District, San Diego County; Cawelo Water District, Kern County; Crestline-Lake Arrowhead Water Agency, San Bernardino County; Descanso

(See WATER MANAGEMENT, page 3)

ACWA Offers Board Members Seminar Feb. 8

AN ACWA seminar outlining the role of the board member and the responsibilities included in this elected position will be held February 8, 1991, at the Hyatt Regency at the San Francisco Airport.

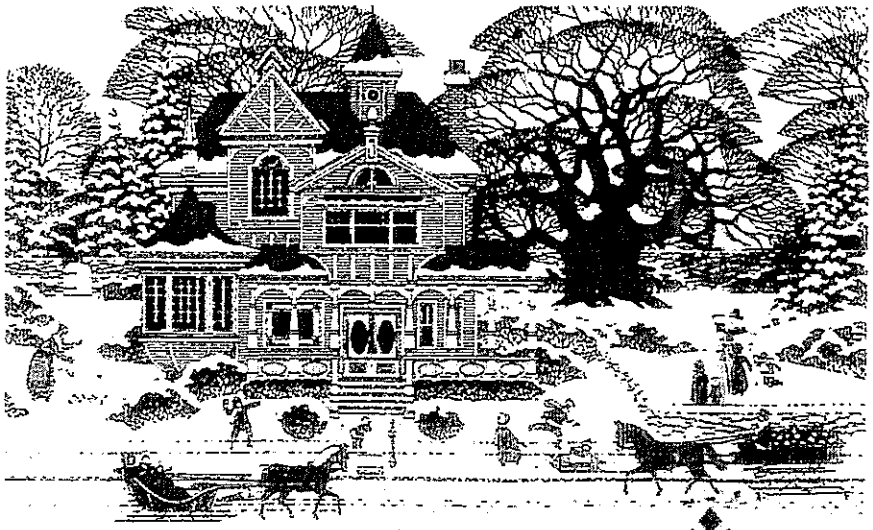
This all-day *"Board Members' Roles and Responsibilities"* seminar will help to:

▲ Make less overwhelming the requirements of laws and regulations on local government officials;

▲ Provide elected directors with an awareness of basic legal requirements; and

(See ACWA SEMINAR, page 3)

Happy Holidays



INSIDE:

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WATER MANAGEMENT

(Continued from front page)

Community Water District, San Diego County; El Toro Water District, Orange County; Georgetown Divide Public Utility District, El Dorado County; Gravely Ford Water District, Madera County; Indian Wells Valley Water District, Kern County; and Kings River Conservation District, Fresno County.

Also receiving the award were Laguna Beach County Water District, Orange County; Lincoln Avenue Water Company, Los Angeles County; Lost Hills Water District, Kern County; Reclamation District #999, Yolo County; San Juan Suburban Water District, Placer County; Southern San Joaquin Municipal Utility District, Kern County; Summerland County Water District, Santa Barbara County; and Yuima Municipal Water District, San Diego County.

ACWA SEMINAR

(Continued from front page)

▲ Define the various roles and responsibilities facing directors as they strive to serve the public.

Several topics already on the agenda are: *"Conducting and Participating in Effective and Efficient Meetings," "You and the Fair Political Practices Commission (FPPC)," "How Directors and Managers Can Work More Effectively Together," "Board Members' Roles in Policy Development and Implementation," "The Brown Act,"* and *"Directors' Issues: Compensation, Ethics."*

Pre-registration cost for ACWA members is $100; non-members, $200. On-site cost for members is $125; non-members, $250. Pre-registration closes January 31. A brochure describing this seminar was mailed last week. If you didn't receive one and would like a copy, please call the ACWA office.

ACWA Offers Information on Written Injury Prevention Program

IN 1989, legislation (Senate Bill 198) passed which requires every employer to have a written injury prevention program by January 1, 1991. If your district does not yet have a written program or if you have questions regarding the requirements, information is available through the ACWA office.

The materials include a copy of the law, samples of written programs, checklists for putting together your program, and employee safety training. Telephone numbers for free consultation services through the California Occupational Safety and Health Administration (CAL/OSHA) are also included. If you would like an information packet, please call the ACWA office.

(Articles on SB 198 have been included in past issues of *ACWA News*. Please see page 11 of the October 29 issue and page 3 of the April 30 issue.)

ASSOCIATION OF CALIFORNIA WATER AGENCIES

in accordance with

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(mention you are an ACWA MEMBER)

Crestline-Lake Arrowhead
Water Agency
Roxanne Holmes
P. O. Box 3880
Crestline, CA 92325

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES

URBAN WATER UTILITY STATISTICS

CALENDAR YEAR: 1989

SERVING CITY(IES) OF:

COUNTY OF: San Bernardino

SYSTEM NAME:

1. CLASSIFICATION AND NUMBER OF ACTIVE ACCOUNTS: Wholesale & Retail Outside of ID's

	~~INSIDE CITY LIMITS~~ FLAT-RATE	~~INSIDE CITY LIMITS~~ METERED	~~OUTSIDE CITY LIMITS~~ ID's FLAT-RATE	~~OUTSIDE CITY LIMITS~~ ID's METERED
RESIDENTIAL		5		913
COMMERCIAL		5		154
~~INDUSTRIAL (MFG.)~~ Camps		6		0
PUBLIC AUTHORITY		8		0
OTHER (Specify) Water Utilities (Whsle		18		0
TOTAL		42		1067

2. RESIDENTIAL:

PLEASE INDICATE: (a) Number of single family dwellings you serve 25 est.

(b) Number of all other dwelling units you serve (Retail) 946

3. ESTIMATED RESIDENT (PERMANENT) POPULATION SERVED:

~~INSIDE CITY LIMITS~~ Whsle & Retail Outside of ID's 18,000 est.

~~OUTSIDE CITY LIMITS~~ ID's 2,600

4. MONTHLY WATER PRODUCTION: 1/ (In millions of gallons)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR TOTAL
WATER INTO SYSTEM (Tower)	61.25	55.07	38.45	51.81	62.56	68.10	87.97	86.67	79.50	53.11	46.92	50.18	741.59
WASTE WATER RECLAMATION	0	0	0	0	0	0	0	0	0	0	0	0	0

1/ Because of normal system losses "Water Production" will be greater than "Total Delivered".

5. METERED DELIVERIES: (In millions of gallons)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR TOTAL
RESIDENTIAL ~~Apartments (Multiplex)~~	6.37	5.08	4.23	5.86	7.40	7.65	8.03	7.34	10.1	5.75	4.80	4.42	77.03
~~Single-Family~~	–	–	–	–	–	–	–	–	–	–	–	–	–
COMMERCIAL	0.027	0.021	0.021	0.038	0.059	0.045	0.14	0.17	0.10	0.060	0.096	0.087	0.86
~~INDUSTRIAL (MFG.)~~ (CAMPS)	0.24	0.047	0.48	0.54	1.23	1.76	1.93	2.33	1.13	0.52	0.20	0.15	10.56
PUBLIC AUTHORITY	1.44	1.08	1.33	2.78	5.53	4.94	6.17	5.74	5.85	4.12	1.26	1.06	41.3
OTHER WHSLE (WATER UTILITIES)	56.4	47.2	37.3	40.5	51.7	53.7	68.6	62.2	54.5	43.4	36.3	34.5	586.3
TOTAL DELIVERED 1/ (Your Service Area)	64.48	53.43	43.36	49.72	65.92	68.09	84.87	77.78	71.68	53.85	42.66	40.22	716.06

6. DELIVERY(IES) TO OTHER AGENCY(IES): X Yes ___ No NAME(S) OF AGENCY(IES): See Attachment 1

7. UNUSUAL EVENT, (i.e., annexation, major price change, new industry, etc.): None

8. DO YOU READ METERS MONTHLY X BIMONTHLY ___ OTHER

NAME, TITLE AND PHONE NUMBER OF OFFICIAL RESPONSIBLE FOR DATA: See Attachment A Webb Associates (714) 686-1070

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ASSOCIATION OF CALIFORNIA WATER AGENCIES
Water Management Awareness Program

APPLICATION FOR CERTIFICATION

1. AGENCY

Name CRESTLINE-LAKE ARROWHEAD WATER AGENCY

Address P.O. BOX 3880; 24116 CREST FOREST DRIVE
CRESTLINE, CA 92325

Telephone (714) 338-1779

Number of Employees 9

Person Filing Application THOMAS BARNES

Title PRESIDENT, BOARD OF DIRECTORS

Signed Thomas L. Barnes

ACWA USE ONLY

Application Number _____

Date Received from Applicant _____

Date Mailed to Evaluators _____

Reviewed by:	Name	Certification Recommended
1.		
2.		
3.		
4.		
5.		

CERTIFIED: _____

Reviewers Notified: _____

Applicant Notified: _____

2. Statement of Agency Water Management Goals and Objectives.

Since its organization in 1962, the Crestline-Lake Arrowhead Water Agency ("CLAWA") has recognized the importance of using its water supplies efficiently and has encouraged its more than thirty wholesale purveyor customers and all of its approximately 1,000 retail customers to do the same. CLAWA's main source of water supply is from the State Water Project. This water travels over 600 miles from the San Francisco Bay Delta to Silverwood Lake, where CLAWA takes the water and then pumps it uphill a total of 3,800 feet using four booster stations through its transmission facilities across the San Bernardino Mountains. As a result, CLAWA has always viewed its water as a valuable resource, and has concentrated its past, present and future planning efforts on efficient management of this resource.

CLAWA's water management goals and objectives are set forth in its governing Rules and Regulations. These Rules and Regulations describe CLAWA's supplies, distribution system, and its duties and obligations. Pursuant to these Rules and Regulations, the Agency is empowered to discontinue its water service to any wholesale or retail customer who fails to comply with or abide by the Rules and Regulations. (Section 3.03 CLAWA Rules and Regulations. Relevant portions of CLAWA's Rules and Regulations are attached hereto as Exhibit "A".)

Section 3.08 states:

> "To the extent permitted by law, the Agency shall have the power to allocate its available supply, in the event of any emergency or water shortage, on such basis as it determines to be equitable and in the best interests of all concerned."

Section 3.13(c) states that it shall be a violation of the Rules and Regulations to "cause or permit the waste of water from the Agency's water system or to maintain or cause or permit to be maintained any leaky outlets, apparatus, or plumbing fixtures through which water is permitted to drop or run to waste." Section 3.13(d) states that it shall be a violation of the Rules and Regulations "to cause or permit the overflow of water storage reservoirs."

These particular sections of CLAWA's Rules and Regulations demonstrate that CLAWA's water management goals and objectives are to maximize the beneficial use of its water supply by carefully regulating its allocation and discouraging its waste. As is discussed in other sections of this application, CLAWA has emphasized these goals and objectives through several important water management measures.

3. Water Use

ANNUAL USE (662 *MG)*

	High	Average	Low
Past			
Last 15 years	400	300	200
Present			
Last 3 years	750	625	500
Future			
Anticipated 15 years	1,890	1,695	1,500

To the extent records are available, state the quantity and average percentage use by: *MG

1988 Calendar Year	Quantity	Percent	Percent Metered	
(a) Residential	61	9	100	
Internal:				
External:				
(b) ~~Industrial~~ Water Utilities:	553	82	100	Wholesale
(c) Commercial	5	1	100	
(d) Governmental	43	6	100	
(e) Agricultural	-0-	-0-	-0-	
(f) Unaccounted For	12	2	---	
TOTAL:	674	100	100	

Water Type:

(a) Groundwater	-0-	-0-	-0-
(b) Surface Water	674	100	100

(1) Source: LAKE SILVERWOOD

(2) Water Right: 1,890 MG STATE CONTRACT ENTITLEMENT

(3) Purchased: 674

Urban:

Number of Service Connections 1,040

Population Served 25,000

Agricultural:

Number of Service Connections -0-

Acreage Served 55,000

Specify units of water use

4. Describe the frequency and magnitude of past, present or projected water supply deficiencies, including steps taken or planned to mitigate such deficiencies.

a. Past or Present Deficiencies

In general, CLAWA has been fortunate not to have suffered major deficiencies in its water supply program in the past. CLAWA obtains the majority of its water supply from the State Water Project. As a result, CLAWA has been able to provide its users with a steady and stable source of water without deficiencies thus far. All of CLAWA's supplies are for municipal purposes, so past deficiencies in deliveries of agricultural water from the State Water Project have not seriously impacted CLAWA.

b. Projected Deficiencies

CLAWA supports the Department of Water Resources' ("DWR") efforts to complete State Project facilities so that full entitlements can be delivered to all state contractors. In the event that there may be future deficiencies imposed by lack of rainfall or by DWR in its operations of the State Water Project, CLAWA proposes to allocate water deliveries to existing wholesale purveyors based upon historic use, with each wholesale purveyor receiving the same percentage cutback in deliveries. CLAWA also proposes to aggressively enforce water conservation measures imposed on CLAWA's own retail customers as hereafter described.

5. Identify Water Management Measures Currently Adopted and Being Practiced.

a. Conservation Ordinances

At present, CLAWA has several water management measures in practice within its service area. During the 1976-1977 drought, the Board of Directors of CLAWA adopted Ordinance No. 11. Pursuant to this ordinance, the Board implemented a comprehensive water conservation program. The following voluntary measures were imposed: The immediate cessation of all nonessential water use and water waste and the reduction of water consumption by 10% monthly by all water users. The following uses of water were recommended to stop immediately:

Running water into streets or gutters;

Washing automobiles or equipment with running water;

Washing down buildings, walks, driveways or streets;

Sprinkling for dust control;

Using water for display or recreation;

Allowing dripping faucets;

Allowing leaks of any sort; and

Excessive running of water for any domestic use.

In addition to the voluntary restrictions set forth above, the Board also prohibited the use of water for construction activities. Use of water for this purpose was a misdemeanor.

This program, largely voluntary, proved to be effective in coping with the emergency which confronted CLAWA in 1976-77. Many of the essential components of this water conservation program are still in effect today. In September of 1977, pursuant to Ordinance No. 13, the Board voted to continue the water conservation program provided in Ordinance No. 11 with one modification: use of water for construction was no longer prohibited outright as a misdemeanor. However, the remaining provisions referred to above are still in full force and effect. (Ordinance No. 13 is attached hereto as Exhibit "B.") The Board is currently updating its water conservation plan.

b. Reservoir Overflow.

Another water management measure currently being practiced by CLAWA is the prevention of overflow of reservoirs. CLAWA's Rules and Regulations state that it shall be a violation of the Rules and Regulations to "cause or permit the overflow of storage reservoirs." (See Section 3.13(d) of CLAWA's Rules and Regulations attached hereto as Exhibit "A".) This regulation comports with CLAWA's policy of preventing the waste of water within its service area and requires CLAWA's purveyors to manage the storage of their water allocation in a prudent manner.

c. Use of Local Surface Runoff

CLAWA recently began to incorporate the use of local surface runoff into its overall water management

program. In 1977, CLAWA applied to the State Water Resources Control Board for two permits to appropriate up to 1302 acre feet per year from Houston Creek, which flows naturally into Silverwood Lake. After thirteen years of effort and many unforeseen obstacles, these permits were finally issued in 1990. The permits allow CLAWA to use what was previously unappropriated and unused water. Since CLAWA's deliveries to its water users currently total approximately 2200 acre feet per year, the addition of this local surface supply provides an important supplement to CLAWA's State Water Project supply. Use of this new supply will also free up State Project water -- which CLAWA would have otherwise used -- for use in other parts of the State now suffering from drought conditions. In addition, more State Project water is now available for power generation at Devil Canyon Power Plant.

d. Operational Procedures and Criteria

CLAWA first developed criteria for operations of its purveyor turnouts in 1988 and adopted a resolution in 1988 setting forth these criteria. Most recently, on February 26, 1990, CLAWA's Board adopted Resolution No. 443 (attached hereto as Exhibit "C"). This resolution assists CLAWA in managing its water by setting forth operational procedures and criteria for the use of turnouts by CLAWA's purveyors. CLAWA plans to update these procedures and criteria annually.

Resolution No. 443 contains several important water management measures. The most important provision is that during any fiscal year, CLAWA will not deliver water to any meter at a flow rate in excess of the highest average flow rate either delivered by CLAWA through that meter or calculated by CLAWA to have been delivered through that meter during any consecutive seven-day period of the previous year. If a purveyor did not take delivery of water during the previous year, CLAWA will establish a maximum flow rate that may be delivered. CLAWA has set a maximum flow rate for each purveyor in Resolution No. 443. The Board has the discretion to adjust the maximum permissible flow rate upon a showing of significant change in the purveyor's service requirements or in the availability of alternative water supplies.

Other important measures in Resolution No. 443 are the following:

1. Meters at each purveyor's turnout shall not be operated at less than certain minimum flow rates. These minimum flow rates are set forth in Resolution No. 443 and were developed by CLAWA based on the size and type of meter involved.

2. Each purveyor is entitled to four adjustments in the rate of flow per connection per month without charge. However, a purveyor will be charged for any additional adjustments. Resolution No. 443 sets forth the minimum amount of permissible changes in these adjustments.

3. Purveyors are prohibited from using any device which would alter the rate of flow through the connection such as automatic valves, altitude valves, manual valves or other devices. Any purveyor that violates this provision is subject to an additional charge for water delivered during the period of this violation. A purveyor also has 30 days to remove the device after receiving written notice or the General Manager can terminate water service to that purveyor. Water service will not be resumed until the purveyor demonstrates its ability and willingness to comply with the Resolution.

4. Each purveyor must monitor the rate of flow through each of its connections and must advise CLAWA at least twice each month if it wishes to continue its current rate of flow or wishes to adjust the flow. This provision places a certain amount of responsibility on each purveyor to manage its own allocation of water. Moreover, at least once a month, CLAWA will examine each purveyor connection to ensure that it is flowing water at the intended rate.

e. Water Conservation Kits

In 1978, CLAWA purchased and distributed water conservation kits to all of the customers within its own retail service areas. These kits included toilet displacement devices, shower flow restrictors, dye tablets for detecting leaks, and water conservation pamphlets.

CLAWA again purchased water conservation kits in 1988 consisting of the same materials. CLAWA distributed the kits in 1988 to retail customers who could be contacted at their premises. Those who could not be contacted received notices from CLAWA that the kits were available for their use. In addition, a kit was mailed to each of CLAWA's wholesale purveyor customers along with a notice encouraging each of them to implement similar water conservation measures within their own retail service areas. A number of these wholesale customers obtained water conservation kits for distribution to their retail customers. In some cases, these kits were obtained from CLAWA's stockpile; in at least one case, a wholesale customer arranged separately to purchase water conservation kits from another source.

CLAWA continues to provide water conservation kits at no charge to any interested customer.

f. Metering/Monitoring Quantity

All of CLAWA's customers, whether retail or wholesale, are provided water through meters which are regularly serviced and replaced as necessary to ensure the accurate recording of water quantity delivered. Moreover, CLAWA'S rate structure is based upon the quantity of water delivered, not upon a flat rate regardless of quantity delivered.

CLAWA's customers and purveyors already use their water in an extremely efficient way compared to other

areas. CLAWA's annual average water consumption is 160 gallons per connection per day. In other areas of California, water agencies are attempting to reduce their water consumption down to 250-300 gallons per connection per day. For example, the attached news article (Exhibit "D") indicates that the City of Ventura's water rationing ordinance limits each household to 294 gallons per day.

CLAWA's water rates are also extremely high compared to other areas. This rate structure contributes to efficient water use within its service area. CLAWA's rates are as follows:

- Purveyor/wholesale: $695/ acre foot
- Residential/retail: $1,372/acre foot
- Construction: $2,614/acre foot

g. System Maintenance

CLAWA keeps its service facilities in excellent condition so as to transport its water efficiently and without leakage. CLAWA's system as a whole is relatively new. The oldest portion of the retail system is only 12 years old and the wholesale system is only twenty years old.

Whenever requested to take over the operation of any retail system, CLAWA has required the users of that system to have financing in place to improve and refurbish the system. CLAWA will not provide service to those users until the retail system has been refurbished to excellent working condition. In this way, CLAWA can provide its high level of service to new retail users without disruptions or leaks.

6. Describe and Evaluate Alternative Water Management Measures.

Describe alternative water management measures evaluated which could improve the efficiency of water used by your agency, with an evaluation of the costs of these measures and other significant impacts, such as environmental, social, health, customer impact and technological factors.

There are certain alternative water management measures which could improve the efficiency of water use by CLAWA. One such measure would be for CLAWA to mandate the measures set forth in Ordinance No. 13, discussed above, which are currently voluntary. CLAWA could also reinstitute the misdemeanor provision in effect for Ordinance No. 11 prior to its amendment, and could update water conservation plans to better cope with the current drought. CLAWA could also better educate the public with press releases, customer meetings and public forums.

Because the Department of Water Resources could impose cutbacks in the delivery of State Project water for municipal and industrial uses, CLAWA has been contemplating an allocation program based on historic use. CLAWA would allocate a certain amount of water for each purveyor based on its historic use and would require each purveyor to reduce its water use by a certain percent. The burden would then be placed on each purveyor to reduce water consumption within its own retail service area in order to meet these reductions. CLAWA would also impose these cutbacks on its own retail improvement districts.

As noted above, CLAWA's system is well-maintained and is still relatively new. However, CLAWA's Board is currently studying the implementation of a leak detection program for its meters and other system appurtenances. The Board is also working on a rehabilitation program under which certain components of CLAWA's system would be refurbished as required on a priority basis.

All of the above described alternative water management measures are quite feasible from a cost and technological perspective. None of the measures would require building new facilities or implementing costly programs. (See infra Section 8.)

Moreover, none of the measures would cause significant environmental, social, or health impacts. The quality of CLAWA's water would not be affected. The measures would not place hardship on any purveyors or customers or displace any of CLAWA's employees.

Other water management measures would not be as effective in CLAWA's service area. For example, CLAWA has not found it necessary to impose restrictions on new development or landscape irrigation. Because of the geography of the San Bernardino Mountains, large-scale housing developments are not possible. New development occurs on a relatively small scale and the benefits of requiring conservation devices in these few homes would be minimal. Also as discussed in detail later, the residents

in CLAWA's service area do not usually landscape their property; thus, imposing limits on water use for landscaping is not necessary. There are also no industrial users in CLAWA's service area which tend to consume more water than municipal users.

7. Water Management Measures Anticipated to Be Practiced.

Measure	Expected Implementation Date	Cost
Please see responses to Item 6 and see below.		

What changes in quantity of water use are expected from the listed "anticipated practices?"

Explain:

Precise implementation dates and costs for each measure have yet to be determined. As specific programs are authorized by the Board, a timetable and financial analysis will be prepared.

8. Describe the evaluation of the financial feasibility of the proposed measures.

In CLAWA's estimation, the proposed measures for water management are financially feasible. None of the proposed measures would be costly to implement. More aggressive enforcement of Ordinance No. 13 would require only that CLAWA personnel make surveys of water use in their area.

Likewise, requiring each purveyor to reduce its water use would not be costly. CLAWA already monitors the quantity of water delivered to each purveyor, and already imposes restrictions on the rate of flow that may be delivered. It would be quite easy and inexpensive to limit total quantity as well.

As for the cost of press releases, public forums and meetings with customers, the only expense would be the resulting staff time and professional consultant time involved.

9. Describe your public involvement procedures.

CLAWA maintains an excellent rapport with the local media, and in times of crisis has always been able to count on the media to deliver important messages to the residents of the San Bernardino Mountains. In the past, CLAWA has issued press releases which have succeeded in reaching most of CLAWA's customers. In addition, CLAWA's Board of Directors has conducted workshops with the public to discuss issues of concern. CLAWA's Board already meets publicly at least once each year with all of its wholesale purveyor customers to review their compliance with CLAWA's Rules and Regulations affecting turnout operations. The Board would not hesitate to conduct similar meetings in the future if warranted by the circumstances.

10. Describe the evaluation of the public's acceptance of the proposed measures.

In CLAWA's opinion, its water purveyors and water users would react positively to implementation of the proposed water management measures. As discussed above, CLAWA serves water users in the San Bernardino Mountains. There is a high energy cost associated with importing water pursuant to the State Water Project since this water must be lifted from Silverwood Lake (elevation 3,355 feet) to an elevation of about 7,155 feet at Green Valley. Thus, the price of water is very high compared to other State Water Project contractors (currently $695 per acre foot for wholesale deliveries). As a result, CLAWA's water users are acutely aware that water is a precious commodity in this area. Measures which would assist in using this water more wisely and more efficiently would be accepted positively by the great majority of the water users in this area.

Moreover, the public is well aware of the fact that we are currently in the fourth year of a statewide drought. This drought has heightened the importance of using water efficiently within CLAWA's service area. It is now becoming widely accepted that management strategies must be implemented to maximize the long-term use of any water supply.

Further, none of the proposed measures is particularly draconian and none would pose a great hardship for CLAWA's water users. Unlike some areas of Southern

California, most people in the Crestline-Lake Arrowhead area do not landscape their property. The natural vegetation in the mountains is very picturesque and most people who live there choose not to alter the natural vegetation on their property. As a result, it is not necessary for people to give up the watering of their lawns or ornamental plants with the implementation of these management measures.

11. Additional Comments.

CLAWA appreciates the opportunity to present its water management practices and goals to ACWA. CLAWA looks forward to continuing to serve its water users in an efficient manner and will continue to implement new programs which will help it to maximize its water supplies.

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R U L E S

A N D

R E G U L A T I O N S

(As Amended February 7, 1980)
(As Amended July 3, 1980)
(As Amended October 2, 1980)
(As Amended May 13, 1982
(As Amended August 1, 1985)
(As Amended February 4, 1988)
(As Amended July 7, 1988)
(As Amended April 27, 1989)
(As Amended July 12, 1989)

CRESTLINE-LAKE ARROWHEAD WATER AGENCY

--oOo--

EXHIBIT "A"

CHAPTER III

GENERAL PROVISIONS

3.01. Effective Date. These Rules and Regulations shall become effective July 1, 1971, and shall remain in effect until amended or repealed by the Board.

3.02. Authority of Manager. The General Manager may prescribe and enforce any policies, rules, or regulations not in conflict or inconsistent with these Rules and Regulations which are necessary to implement the provisions hereof.

3.03. Effect of Rules and Regulations. All water supplied or made available by the Agency shall be subject to these Rules and Regulations, and any amendments thereto, and to rates and charges adopted by the Agency. Any person may review these Rules and Regulations, upon request, and may obtain a copy upon payment of the Agency's charge for reproduction. Each water user shall accept service upon the terms set forth herein and shall abide by these Rules and Regulations, including any amendments which may from time to time be adopted by the Board. The Agency may discontinue water service for failure to comply with or abide by such Rules and Regulations.

3.04. State Contract. All water service provided by the Agency shall be subject to the terms of its contract with the State of California, dated June 22, 1963, as amended, and all water users shall accept service upon the terms and conditions set forth therein.

3.05. Water Supply and Pressure. The Agency's water supply comes from the State of California, and the Agency's ability to deliver water depends first upon the quantity which can be obtained from the State, and second upon the capacity and effectiveness of its own transmission system. No guarantees can be made that the Agency always will be able to supply all of the water which may be needed, or that it will be able to deliver a continuous supply of water, or that it will be able to maintain any particular amount of water pressure. The Agency shall not be liable to any water user or person supplied thereby for any interruption, shortage, or insufficiency of supply, nor for any loss, damage, or personal injury occasioned thereby. The Agency shall not be liable for any loss, damage, or personal injury caused by or arising out of high, low, or fluctuating pressures, and the water user shall hold the Agency harmless from any such liability. It is the responsibility of the water user to install and maintain such pressure-regulating devices as may be necessary to reduce pressure.

3.06. Right to Suspend Service Temporarily. The Agency, whenever it shall find it necessary for the purpose of making repairs or improvements to its system, shall have the right to suspend temporarily the delivery of water, but in all such cases, the Agency shall attempt to provide affected water users with such notice as may be reasonable under the circumstances, and the making of such repairs or improvements shall be accomplished as rapidly as feasible.

3.07. Water Quality. The quality of the water supplied by the Agency depends upon the quality of the supply received from the State of California, except as modified by the Agency's treatment and distribution. The Agency will attempt to provide a safe and potable supply of water, complying with all Health Department requirements, but cannot guarantee any particular quality.

3.08. Shortage. To the extent permitted by law, the Agency shall have the power to allocate its available supply, in the event of any emergency or water shortage, on such basis as it determines to be equitable and in the best interests of all concerned.

3.09. Responsibilities of Water User. Once the Agency has delivered water into the mains or system of any water user, the Agency shall have no responsibility or liability for any loss, damage, or personal injury to the prop-

erty of such water user, or to the water user himself, or to any person supplied by such water user, arising out of the Agency's water service, and the water user shall indemnify and hold the Agency harmless from any such liability.

3.10. Meter Accuracy. All water delivered by the Agency shall be metered. All meters and control valves on the water mains of the Agency shall be owned, operated, and maintained by the Agency. Any customer may have any meter through which he receives water tested by the Agency at any time upon deposit of the estimated cost of performing the test. The customer shall have the right to be represented by a qualified observer at and during any such tests. In the event that any such test discloses an error exceeding two percent, an adjustment shall be made in the charges to the customer affected, covering the known or estimated period of duration of such error, but in no event exceeding a period of six months, and the deposit for performing the test will be refunded by the Agency. If the test discloses an error less than two percent, no adjustments in charges shall be made, and the customer requesting such test shall forfeit the deposit for performing the test.

3.11. Interference with Service Connections. Any person making improvements or changes, including road repairs, which result in the cutting, refitting, raising, lowering, relocating, or damaging in any way, of service

connections, Agency mains, fire hydrants, stub pipes, meters, valves, or any other parts of the Agency water system, shall be liable to the Agency for all costs or damages incurred by the Agency in making such changes and repairs.

3.12. Changes in Water User's Equipment. Water users who wish to make any material change in the size, character, or extent of the equipment or operations utilizing water service, or whose change in operations will result in an increase in the use of water, shall apply to the Board for approval of the change in service conditions. The Board may deny approval, or may impose conditions which the Board deems necessary to protect the integrity of the Agency's system.

3.13. Unauthorized Use of the Agency's Water System and Waste of Water. It shall be a violation of these Rules and Regulations:

(a) To tap or make any connection into the Agency's mains or into any public or private fire-protection services;

(b) To open the valve or extract water from fire hydrants or other Agency facilities except for the suppression of fire, or except when written consent is given by the Agency for temporary construction water use;

(c) To cause or permit the waste of water from the Agency's water system or to maintain or cause or permit

to be maintained any leaky outlets, apparatus, or plumbing fixtures through which water is permitted to drop or run to waste;

(d) To cause or permit the overflow of water storage reservoirs.

3.14. Service to Property Not Subject to Agency Taxes. Water supplied to the following properties shall be furnished at special rates reflecting insofar as possible both the actual cost to the Agency of delivering such water and the tax revenues which would accrue to the Agency if the property served were subject to taxation:

(a) The Forest Service or any other agency of the United States;

(b) The State of California or any of its political subdivisions;

(c) Other public agencies for use on their own property;

(d) Any property exempt from ad valorem taxation.

3.15. Service to Property Which Was Previously Tax-Exempt. As a condition of obtaining a water service connection, either from the Agency or from a customer of the Agency, for water service to any area, parcel, or lot which was not subject to payment of Agency taxes and standby charges during all of the time since the date that the Agency was formed in 1962, the owner of such area, parcel, or lot

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ORDINANCE NO. 13

AN ORDINANCE OF THE BOARD OF DIRECTORS OF CRESTLINE-LAKE ARROWHEAD WATER AGENCY CONTINUING AGENCY WATER CONSERVATION PROGRAM ESTABLISHED BY ORDINANCE NO. 11 AND AMENDING SAID ORDINANCE TO PERMIT USE OF WATER FOR CONSTRUCTION ACTIVITIES

WHEREAS, on June 2, 1977, the Board of Directors of the Crestline-Lake Arrowhead Water Agency ("Agency") adopted Ordinance No. 11 establishing a water conservation program restricting or eliminating certain water uses; and

WHEREAS, paragraph 8 of said Ordinance provides that in September of 1977, this Board will determine whether to continue the program in its present form, to amend it, or to make it mandatory in all respect; and

WHEREAS, this Board has reviewed said Ordinance and has determined to continue the voluntary water conservation program provided therein, and has further determined to amend said Ordinance to permit the use of water for construction activities;

BE IT ORDAINED by the Board of Directors of Crestline-Lake Arrowhead Water Agency as follows:

EXHIBIT "B"

1. Ordinance No. 11 shall be and is hereby amended by deleting paragraphs 4 and 7 thereof.

2. Said Ordinance as amended shall remain in full force and effect, and in May of 1978 this Board will determine whether to continue the water conservation program provided for therein, amend it, or to make it mandatory in all respects.

ADOPTED this 1st day of September, 1977.

President of the Board of Directors
of Crestline-Lake Arrowhead Water
Agency

ATTEST:

Secretary of the Board of Directors
of Crestline-Lake Arrowhead Water
Agency

I HEREBY CERTIFY that the foregoing Ordinance was duly and regularly adopted and passed by the Board of Directors of Crestline-Lake Arrowhead Water Agency at a regular meeting held on the 1st day of September, 1977, by the following vote of the members thereof:

AYES:

NOES:

ABSENT:

ABSTAINED:

_____
Secretary of Crestline-Lake
Arrowhead Water Agency

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ORDINANCE NO. 11

AN ORDINANCE OF THE BOARD OF DIRECTORS OF CRESTLINE-LAKE ARROWHEAD WATER AGENCY ESTABLISHING AGENCY WATER CONSERVATION PROGRAM RESTRICTING OR ELIMINATING CERTAIN WATER USES

WHEREAS, a serious drought now exists in parts of this State; and

WHEREAS, water supplies within the Agency are threatened and a water shortage presently exists here; and

WHEREAS, this Board of Directors has determined that current water conservation efforts must be continued and intensified to meet the emergency that now exists; and

WHEREAS, this Ordinance is enacted pursuant to Article 14, Section 3 of the California Constitution; California Water Code Sections 350-358; Sections 11(13) and 11(14) of the Agency's Principal Act; and Section 3.08 of the Agency's Rules and Regulations;

BE IT ORDAINED by the Board of Directors of Crestline-Lake Arrowhead Water Agency as follows:

1. This Board finds that a drought emergency and an existing water shortage exists and requires the enactment and enforcement of this Ordinance.

2. Water use by water purveyors within the Agency and by Agency residents and taxpayers must be curtailed. This Board is attempting by this Ordinance to establish a series of water use restrictions which will be carried out in the main by voluntary efforts. If however such a voluntary

program does not result in curtailed water use, this Board is prepared to enact a totally mandatory water conservation program and to invoke the criminal misdemeanor provisions of Water Code Appendix Section 104-13.

3. The Agency water conservation program shall be:

A. All nonessential water use, and water waste, should stop immediately.

B. All Agency water users should cut water consumption by 10 percent per month.

C. The following uses or practices should stop immediately:

Running water into streets or gutters;

Washing automobiles or equipment with running water (as opposed to use of a bucket or other container);

Washing down buildings (except windows), walks, driveways or streets;

Sprinkling for dust control;

Water displays or recreation (fountains, wading pools, children running through the sprinklers and the like);

Dripping faucets;

Leaks of any sort;

Excessive running of water for any domestic use.

4. In addition to the voluntary restrictions set forth in the Agency water conservation program above, the following uses are hereby found to be nonessential and are hereby prohibited:

A. Use of water for construction activities such as trenching, drilling or compacting, flushing culverts or pipes, or washing cement barrels or trucks. This prohibition does not prevent use of water for testing purposes or for dust control purposes in connection with construction activities.

5. This Ordinance shall be in full force and effect immediately upon its adoption.

6. The Secretary shall publish this Ordinance once in The Timberline Journal, a newspaper of general circulation printed, published and circulated within the Agency. Such publication shall occur within 10 days after adoption of this Ordinance.

7. Any violation of Section 4 of this Ordinance is a misdemeanor pursuant to Section 13 of the Agency's Principal Act, and pursuant to such section any person, firm or corporation convicted thereof shall be punished by being imprisoned in the County Jail for not more than 30 days or by fine of not more than $300, or by both such fine and imprisonment.

8. The General Manager shall report periodically to this Board on the results of the Agency water conservation program, and in September of 1977 this Board will determine whether to continue the program in its present form, to amend it, or to make it mandatory in all respects.

ADOPTED this 2nd day of June, 1977.

President, Board of Directors
Crestline-Lake Arrowhead Water Agency

ATTEST:

Secretary
Crestline-Lake Arrowhead
Water Agency

I hereby certify that the foregoing Ordinance was duly and regularly adopted and passed by the Board of Directors of Crestline-Lake Arrowhead Water Agency at a regular meeting held on the 2nd day of June, 1977, by the following vote of the members thereof:

AYES:
NOES:
ABSENT:
ABSTAINED:

Secretary of Crestline-Lake Arrowhead
Water Agency

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RESOLUTION NO. 443

RESOLUTION OF THE BOARD OF DIRECTORS OF THE CRESTLINE-LAKE ARROWHEAD WATER AGENCY REVISING OPERATIONAL PROCEDURES AND CRITERIA FOR USE OF PURVEYOR TURNOUTS

WHEREAS, Resolution No. 435 of the Crestline-Lake Arrowhead Water Agency was adopted in 1989 to set forth the Agency's operational procedures and criteria for use of purveyor turnouts for fiscal year 1989-90; and

WHEREAS, upon review, this Board of Directors finds that the operational procedures and criteria have been effective in accomplishing the objectives which prompted the adoption of Resolution No. 435; and

WHEREAS, pursuant to Resolution No. 435, it is also incumbent upon the Board at this time to adjust flow rates to reflect actual consumption during the previous year;

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the Crestline-Lake Arrowhead Water Agency that effective July 1, 1990, the following operational procedures and criteria shall apply to water service from the Agency's purveyor turnouts:

1. Agency meters at purveyors' turnouts shall not be operated at less than the rates of flow set forth on Exhibit "A" attached hereto and incorporated herein, which shall be the minimum flow rates which this Board of Directors deems practical for each type and size of meter used for purveyor connections.

2. During any fiscal year, the Agency shall not deliver water to any purveyor at any metered turnout at a rate of flow which exceeds the highest average rate of flow either delivered by the Agency through that meter or calculated by the Agency to have been delivered through that meter during any consecutive seven (7) day period (168 hours) during the immediately previous calendar year (excluding from the calculation any excess flows permitted by the Agency on an emergency basis or to prevent hardship during

any such seven day period), rounded either up or down, at the option of the Agency, to the nearest five (5) gallons per minute for 2-inch meters and to the nearest ten (10) gallons per minute for larger meters. In the event that a new or existing purveyor did not take delivery of any water through a meter during the previous calendar year, the Agency shall establish the maximum rate of flow that may be delivered through each such meter for each fiscal year. For the fiscal year beginning July 1, 1990, the maximum rates of flow that may be delivered by the Agency through each of the Agency's purveyor connections have been calculated and shall be those set forth on Exhibit "B" attached hereto and incorporated herein. The Board of Directors, in its discretion, may adjust the maximum permissible rate of flow upward or downward upon a showing of significant change in the purveyor's service requirements or in the availability of alternative water supplies relied upon to satisfy such service requirements.

3. Each purveyor shall be entitled to four (4) adjustments per connection per month without additional charge by the Agency, provided that such adjustment occurs during the Agency's normal business hours, and further provided that subject to the provisions of Section 7 of this Resolution, a purveyor may apply the aggregate total number of such adjustments each month to any one or more of the purveyor's connections as that purveyor might select. There will be a charge of $50 per adjustment for each adjustment of a purveyor's connection at the instance and request of the purveyor in excess of the aggregate total number permitted herein, provided that each such adjustment occurs during the Agency's normal business hours. There will be a charge of $100 per adjustment for any adjustment by Agency personnel at the instance and request of the purveyor which is performed outside of the Agency's normal business hours or which is provided as an emergency request with less than the twenty-four (24) hour notice required by the Agency's Rules and Regulations, regardless of whether any adjustments have been made previously during the month. For purposes of this Section, the term "turnout adjustment" shall include the Agency's on-site visit required by Section 7 of this Resolution.

4. The minimum permissible change in the rate of flow through any purveyor connection shall be five (5) gallons per minute for a 2-inch meter, and ten (10) gallons per minute for any meter larger than 2-inch; provided, however, that any change in

the rate of flow may be limited as necessary to comply with Sections 1 and 2 of this Resolution.

5. A purveyor may not use any devices on the purveyor's side of the connection designed to alter the rate of flow through the connection. Devices which may not be used in this manner shall include automatic valves, altitude valves, manual valves, and any other devices which may be used to vary the rate of flow through a purveyor turnout. Any purveyor that violates this provision shall be subject to an additional charge of $0.05 per cubic foot of water delivered during the period of the violation, which shall be an additional charge for utilizing capacity in the Agency's facilities to meet its peak demands. Upon discovery that a purveyor has installed any device prohibited by this Section, the General Manager shall give the purveyor thirty (30) days written notice to remove the illegal device. If the device has not been removed within thirty (30) days after delivery of such notice, the General Manager shall terminate water service to that purveyor, and shall not resume such service until the purveyor can demonstrate its ability and willingness to comply with this Resolution and the Agency's Rules and Regulations.

6. The requested rate of flow through a purveyor connection may not be altered or terminated for a period of at least twenty-four (24) hours following a requested turn-on or adjustment.

7. At least once during the first half of each month and once during the second half of each month, each purveyor shall review the rate of flow through each of its connections and advise the Agency if it wishes to continue that same rate of flow or adjust the flow through that connection upward or downward. Regardless of whether the purveyor requests a change in the rate of flow through each such connection, at least once each month the Agency shall examine each purveyor connection to ensure that it is actually flowing water at the intended rate, and such examination shall constitute a turnout operation for purposes of Section 3 of this Resolution.

8. Except as otherwise provided in Section 3, a purveyor shall not register with the Agency more than one (1) request per turnout per day, with each such request

involving no more than one (1) turn-on and one (1) turn-off no less than twenty-four hours thereafter.

9. Each request for water service through a purveyor turnout, or for a change in the rate of flow through a purveyor turnout, must state the requested rate of flow in gallons per minute and the total requested delivery of water in gallons.

10. The Agency's General Manager may temporarily relieve any purveyor of any of the operational procedures and criteria set forth herein as she deems necessary, in her sole discretion, to cope with temporary hardship or emergency. However, each such event shall be reported to the Agency's Board of Directors at its next subsequent meeting. Any other exception to these operational procedures and criteria must be granted by the Agency's Board of Directors, and may be granted only upon a presentation of conclusive evidence that the purveyor has commenced and is diligently pursuing the measures necessary to achieve compliance with this Resolution and the Agency's Rules and Regulations.

11. As of July 1, 1990, this Resolution shall supersede the provisions of Resolution No. 435. The provisions of this Resolution shall be supplementary to, and shall not be deemed to replace or supersede, the provisions of the Agency's Rules and Regulations, as amended from time to time.

ADOPTED this 26th day of February, 1990.

President, Board of Directors
CRESTLINE-LAKE ARROWHEAD WATER AGENCY

ATTEST:

Secretary, Board of Directors
CRESTLINE-LAKE ARROWHEAD WATER AGENCY

CERTIFICATION

I, Dorothy E. Horton, Secretary of the Board of Directors of the Crestline-Lake Arrowhead Water Agency, hereby certify that the foregoing is a full, true and correct copy of the Resolution adopted by the Board of Directors of said Agency at the special meeting of said Board held on the 26th day of February, 1990, by the following vote:

AYES:

NOES:

ABSENT:

ABSTAIN:

_____

Dorothy E. Horton, Secretary

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EXHIBIT "A"

AGENCY'S PURVEYOR TURNOUTS

MINIMUM FLOW RATES

Meter Size	Meter Type(1)	Minimum Flow Rates (GPM)(2)
2"	P.D.	5.0
2"	C.	5.0
2"	T.	10.0
3"	C.	10.0
3"	T.	20.0
4"	C.	20.0
4"	T.	30.0
6"	C.	30.0

(1) P.D. = Positive Displacement
C. = Compound
T. = Turbine
(2) Practical under field conditions.

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EXHIBIT "B"
AGENCY'S PURVEYOR TURNOUTS
(1)MAXIMUM FLOW RATES DURING ANY
CONSECUTIVE SEVEN (7) DAY PERIOD
FOR THE FISCAL YEAR BEGINNING JULY 1, 1990

ACCOUNT NAME	METER SIZE(3) AND TYPE	MAXIMUM FLOW RATES (GPM(2)
AWUA	4"C	120
APCWD	3"C	10 (Per Exhibit)
AMWC	2"C	50(4)
AVMSC	2"C	25(4)
BMCMWC	2"C	5 (Per Exhibit A)
Camp Cedar Cr.	4"C	20 (Per Exhibit A)
CPPMWC	2"T	35(4)
Camp Seel	4"C	20
CVCWD-LD	6"C	190
CVCWD-CF	6"C	405
Camp Paiv.	2"C	5(4)
Stew. Ranch	3"C	10(4)
GVMSC	6"C	30 (Per Exhibit A)
CVCWD-LGCF	4"C	180
CVCWD-ZUR	2"T	45
Pond. Pines Camp	2"C	5
Mile High Park	6"C	30 (Per Exhibit A)
RSCWD-AV	3"T	20
RSCWD-FOR	4"T	120
RSCWD-NOB	4"T	360
SFMWD	2"C	10
DWP-RIMFOR	2"T	105(4)
Pilot Rock	3"C	10 (Per Exhibit A)
USDA-Dogwood	2"C	5 (Per Exhibit A)
USDA-Switz	2"C	5 (Per Exhibit A)
VOEMWC	2"T	70(4)
VVPMWC	2"C	40
Str. Lodge MWC	2"PD	10
CVCWD-Pine	2"C	20
CVCWD-Pine	4"T	30 (Pr Exhibit A)
LACSD-DLP	4"C	30
UP LIT BEAR MC	2"C	5 (Per Exhibit A)
Thous Pine Camp	2"T	15

See Page 2 of 2 for footnotes.

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EXHIBIT B (Continued)

Footnotes:

(1) Also, rates of flow shall not exceed the following values, based upon AWWA and the Meter Manufacturer's Guidelines:

METER SIZE	METER TYPE (3)	MAXIMUM FLOW (GPM)
2"	P.D.	80
2"	C.	80
2"	T.	160
3"	C.	160
3"	T.	350
4"	C.	250
4"	T.	1,000
6"	C.	500

(2) As determined by Agency.

(3) P.D. = Positive Displacement
C. = Compound
T. = Turbine

(4) Excludes excess flow temporarily granted by Agency during the immediately previous calendar year.

2. SPECIAL REQUIREMENTS FOR EACH PURVEYOR

ACCOUNT NAME	METER SIZE [1] AND TYPE	MINIMUM FLOW RATES [2] (GPM)	MAXIMUM FLOW RATES (GPM) [3,4,5,6]	MINIMUM REQUESTED CHANGE IN FLOW RATES (GPM)
AWUA	4"T	30	200	10
APCWD	3"C	10	100	10
AMWC	2"C	5	115	5
AVMSC	2"C	5	80	5
BMCMWC	2"C	5	50	5
Camp Cedar Crest	4"C	20	100	10
CPPMWC	2"T	10	100	5
CVWD-Seeley	4"T	30	200	10
CVWD L.D.-4"	4"T	30	300	10
CVWD L.D.-2"	2"T	10	80	5
CVWD C.F.	6"T	50	475	10
Camp Paivika	2"C	5	50	5
GVMWC	6"C	30	200	10
Pond.Pines Camp	2"C	5	50	5
CVWD-Mi Hi -4"	4"T	30	200	10
CVWD-Mi Hi -2"	2"T	10	80	5
RSWD-AV	3"T	20	105	10
RSWD-FOR	4"T	30	200	10
RSWD-NOB	6"T	50	400	10
SFMWC (Sky Forest)	2"C	5	50	5
DWP-RIMFOR	2"T	10	120	5
Pilot Rock	3"C	10	80	10
USDA-Dogwood	2"C	5	80	5
USDA-Switz	2"C	5	50	5
VOEMWC-4"	4"T	30	120	10
VOEMWC-2"	2"T	10	85	5
VVPMWC	2"T	10	80	5
Str. Lodge MWC	2"C	5	50	5
CVWD-Pine -4"	4"T	30	200	10
CVWD-Pine -2"	2"C	5	120	5
LACSD DLP-4"	4"T	30	100	10
LACSD DLP-2"	2"T	10	80	5
UP Lit.Br.MC	2"C	5	50	5
Thous.Pine Cp.	2"T	10	80	5
CALV. CHAP.	2"C	5	50	5
Camp Pali	3"T	20	60	10
LACSD BR-4"	4"T	30	500	10
LACSD BR-2"	2"T	10	100	5

[1] C. = Compound; T. = Turbine

[2] Practical under field conditions.

[3] Maximum allowable flow rate beginning July 1, 2005. In no event shall rates of flow exceed maximum flows based upon meter capacity.

[4] Excludes excess flow temporarily granted by Agency during the immediately previous calendar year.

[5] Excludes excess flow due to peaking from Agency's system, in violation of this Resolution.

[6] Deliveries up to the maximum flow rates listed may not in all cases be possible in the field due hydraulic limitations downstream of meter.

CRESTLINE-LAKE ARROWHEAD WATER AGENCY
SAN BERNARDINO COUNTY, CALIFORNIA
SUMMARY OF RESOLUTION NO. 652 EFFECTIVE 7/1/2005
ESTABLISHING OPERATIONAL PROCEDURES
AND CRITERIA FOR USE OF PURVEYOR TURNOUTS
(Refer also to Agency's Rules & Regulations Sections 4.04 & 4.05)

1. GENERAL REQUIREMENTS FOR ALL PURVEYORS (FOR EACH TURNOUT)

   a. Up to and including four (4) turnout operations[1] per month - at no additional charge during Agency's normal business hours. However, Agency's mandatory visit of each turnout once each month constitutes 1 of said 4 turnout operations.
   b. $50 charge for each additional turnout operation requested and performed during Agency's normal business hours; $100 charge when requested and performed outside of Agency's normal business hours, or for more than one turnout operation per day in the event of an emergency, or in an emergency for any turnout operation with less than the required 24 hour notice.
   c. Altitude valves, throttled valves, or devices designed to alter flow rate, or which diminish the Agency's ability to adjust flow at the turnout valve, may not be used by purveyor. Violation causes additional charge of $0.05/c.f. for water delivered during period of violation effective 7/1/2005. Thirty (30) day notice to remove illegal device, followed by termination of water service upon noncompliance.
   d. Minimum run time 24 hours.
   e. Water delivery may not exceed a period of 1/2 month without renewal of request.
   f. Maximum one (1) request per day per turnout operation.
   g. Request for water delivery must state flow in gallons per minute, and total delivery in gallons.
   h. Temporary exceptions may be approved by Agency's General Manager to cope with temporary hardship or emergency. Any other exception must be approved by Agency's Board.

[1] Purveyor may apply the aggregate total number of such adjustments each month to any one or more of the purveyors connections, as that purveyor might select; subject to the Agency's one mandatory visit of each turnout per month.

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RESOLUTION NO. 652

RESOLUTION OF THE BOARD OF DIRECTORS OF THE CRESTLINE-LAKE ARROWHEAD WATER AGENCY ADOPTING OPERATIONAL PROCEDURES AND CRITERIA FOR USE OF PURVEYOR TURNOUTS FOR FISCAL YEAR 2005-2006

WHEREAS, Resolution No. 636 of the Crestline-Lake Arrowhead Water Agency was adopted in 2004 to set forth the Agency's operational procedures and criteria for use of purveyor turnouts for fiscal year 2004-2005; and

WHEREAS, upon review, this Board of Directors finds that the operational procedures and criteria have been effective in accomplishing the objectives which prompted the adoption of Resolution No. 636;

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the Crestline-Lake Arrowhead Water Agency that effective July 1, 2005, the following operational procedures and criteria shall apply to water service from the Agency's purveyor turnouts:

(1) Agency meters at purveyors' turnouts shall not be operated at less than the rates of flow set forth on Exhibit "A" attached hereto and incorporated herein, which shall be the minimum flow rates which this Board of Directors deems practical for each type and size of meter used for purveyor connections.

(2) During fiscal year 2005-2006, the Agency shall not deliver water to any purveyor at any metered turnout at a rate of flow which exceeds the assigned rate of flow set forth on Exhibit "B" attached hereto and incorporated herein. The Board of Directors, in its discretion, may adjust the maximum permissible rate of flow upward or downward upon a showing of significant change in the purveyor's service requirements or in the availability of alternative water supplies relied upon to satisfy such service requirements, or for other good cause.

(3) Each purveyor shall be entitled to four (4) adjustments per connection per month without additional charge by the Agency, provided that such adjustment occurs during the Agency's normal business hours, and further provided that subject to the provisions of Section 7

of this Resolution, a purveyor may apply the aggregate total number of such adjustments each month to any one or more of the purveyor's connections as that purveyor might select. There will be a charge of $50 per adjustment for each adjustment of a purveyor's connection at the instance and request of the purveyor in excess of the aggregate total number permitted herein, provided that each such adjustment occurs during the Agency's normal business hours. There will be a charge of $100 per adjustment for any adjustment by Agency personnel at the instance and request of the purveyor which is performed outside of the Agency's normal business hours or which is provided as an emergency request with less than the twenty-four (24) hour notice required by the Agency's Rules and Regulations, regardless of whether any adjustments have been made previously during the month. For purposes of this Section, the term "turnout adjustment" shall include the Agency's on-site visit required by Section 7 of this Resolution.

(4) The minimum permissible change in the rate of flow through any purveyor connection shall be five (5) gallons per minute for a 2-inch meter, and ten (10) gallons per minute for any meter larger than 2-inch; provided, however, that any change in the rate of flow may be limited as necessary to comply with Sections 1 and 2 of this Resolution.

(5) A purveyor may not use any devices on the purveyor's side of the connection designed to alter the rate of flow through the connection. Devices which may not be used in this manner shall include automatic valves, altitude valves, manual valves, and any other devices which may be used to vary the rate of flow through a purveyor turnout. Any purveyor that violates this provision shall be subject to an additional charge of $0.05 per cubic foot of water delivered during the period of the violation, which shall be an additional charge for utilizing capacity in the Agency's facilities to meet its peak demands. Upon discovery that a purveyor has installed any device prohibited by this Section, the General Manager shall give the purveyor thirty (30) days written notice to remove the illegal device. If the device has not been removed within thirty (30) days after delivery of such notice, the General Manager shall terminate water service to that purveyor, and shall not resume such service until the purveyor can demonstrate its ability and willingness to comply with this Resolution and the Agency's Rules and Regulations.

(6) The requested rate of flow through a purveyor connection may not be altered or terminated for a period of at least twenty-four (24) hours following a requested turn-on or adjustment.

(7) At least once during the first half of each month and once during the second half of each month, each purveyor shall review the rate of flow through each of its connections and advise the Agency if it wishes to continue that same rate of flow or adjust the flow through that connection upward or downward. Regardless of whether the purveyor requests a change in the rate of flow through each such connection, at least once each month the Agency shall examine each purveyor connection to ensure that it is actually flowing water at the intended rate, and such examination shall constitute a turnout operation for purposes of Section 3 of this Resolution.

(8) Except as otherwise provided in Section 3, a purveyor shall not register with the Agency more than one (1) request per turnout per day, with each such request involving no more than one (1) turn-on and one (1) turn-off no less than twenty-four hours thereafter.

(9) Each request for water service through a purveyor turnout, or for a change in the rate of flow through a purveyor turnout, must state the requested rate of flow in gallons per minute and the total requested delivery of water in gallons.

(10) The Agency's General Manager may temporarily relieve any purveyor of any of the operational procedures and criteria set forth herein as she deems necessary, in her sole discretion, to cope with temporary hardship or emergency. However, each such event shall be reported to the Agency's Board of Directors at its next subsequent meeting. Any other exception to these operational procedures and criteria must be granted by the Agency's Board of Directors, and may be granted only upon a presentation of conclusive evidence that the purveyor has commenced and is diligently pursuing the measures necessary to achieve compliance with this Resolution and the Agency's Rules and Regulations.

(11) As of July 1, 2005, this Resolution shall supersede the provisions of Resolution No. 636. The provisions of this Resolution shall be supplementary to, and shall not be deemed to replace or supersede, the provisions of the Agency's Rules and Regulations, as amended from time to time.

ADOPTED this 2nd day of June, 2005.

President, Board of Directors
CRESTLINE-LAKE ARROWHEAD WATER AGENCY

ATTEST:

Secretary, Board of Directors
CRESTLINE-LAKE ARROWHEAD WATER AGENCY

CERTIFICATION

I, Patricia Kirtley, Secretary of the Board of Directors of the Crestline-Lake Arrowhead Water Agency, hereby certify that the foregoing is a full, true and correct copy of the Resolution adopted by the Board of Directors of said Agency at the special meeting of said Board held on the 2nd day of June, 2005, by the following vote:

AYES:

NOES:

ABSENT:

ABSTAIN:

_____

Patricia Kirtley, Secretary

EXHIBIT "A"

AGENCY'S PURVEYOR TURNOUTS

MINIMUM FLOW RATES

Meter Size	Meter Type [1]	Minimum Flow Rates (GPM) [2]
2"	C.	5.0
2"	T.	10.0
3"	C.	10.0
3"	T.	20.0
4"	C.	20.0
4"	T.	30.0
6"	C.	30.0
6"	T.	50.0

[1] C. = Compound; T. = Turbine

[2] Practical under field conditions.

EXHIBIT "B"
AGENCY'S PURVEYOR TURNOUTS
MAXIMUM[1] FLOW RATES DURING ANY
CONSECUTIVE SEVEN (7) DAY PERIOD
FOR THE FISCAL YEAR BEGINNING JULY 1, 2005

ACCOUNT NAME	METER SIZE [2] AND TYPE	MAXIMUM FLOW RATES (GPM) [3,4,5]
AWUA	4"T	200
APCWD	3"C	100
AMWC	2"C	115
AVMSC	2"C	80
BMCMWC	2"C	50
Camp Cedar Crest	4"C	100
CPPMWC	2"T	100
CVWD-Seeley	4"T	200
CVWD-LD-4"	4"T	300
CVWD-LD-2"	2"T	80
CVWD-CF	6"T	475
Camp Paivika	2"C	50
GVMSC	6"C	200
Ponderosa Pines Camp	2"C	50
CVWD-Mi Hi -4"	4"T	200
CVWD-Mi Hi -2"	2"T	80
RSWD-AV	3"T	105
RSWD-FOR	4"T	200
RSWD-NOB	6"T	400
SFMWC (Sky Forest)	2"C	50
DWP-RIMFOR	2"T	120
Pilot Rock	3"C	80
USDA-Dogwood	2"C	80
USDA-Switz	2"C	50
VOEMWC-4"	4"T	120
VOEMWC-2"	2"T	85
VVPMWC	2"T	80
Str. Lodge MWC	2"C	50
CVWD-Pine -4"	4"T	200
CVWD-Pine -2"	2"C	120
LACSD-DLP-4"	4"T	100
LACSD-DLP-2"	2"T	80
UP LIT BEAR MC	2"C	50
Thous Pine Camp	2"T	80
Calv. Chap.	2"C	50
Camp Pali	3"T	60
LACSD BR-4"	4"T	500
LACSD BR-2"T	2"T	100

See Page 2 of 2 for footnotes.

EXHIBIT B (Continued)

FOOTNOTES:

[1] Also, rates of flow shall not exceed the following values, based upon AWWA and the Meter Manufacturer's Guidelines:

METER SIZE	METER TYPE [2]	MAXIMUM FLOW (GPM)
2"	C.	80
2"	T.	160
3"	C.	160
3"	T.	350
4"	C.	250
4"	T.	1,000
6"	C.	500
6"	T.	2,000

[2] C. = Compound; T. = Turbine

[3] As determined by Agency.

[4] Excludes excess flow temporarily granted by Agency during the immediately previous calendar year.

[5] Excludes excess flow due to peaking from Agency's system, in violation of this Resolution.

JUNE 2005

CRESTLINE-LAKE ARROWHEAD WATER AGENCY

PURVEYOR ANNUAL CONNECTION FEE (Annual Deposit)[1]

Meter Size & Type [2]	Avg. Maximum Flow Rate (GPM)	2003-2004 Levy ($/Yr)	2004-2005 Levy ($/Yr)	2005-2006 Levy ($/Yr) [3,4]
2" C.	120	$210	$210	$210
2" T.	180	310	310	310
3" C.	240	415	415	415
3" T.	400	695	695	695
4" C.	375	650	650	650
4" T.	1,125	1,950	1,950	1,950
6" C.	750	1,295	1,295	1,295
6" T.	2,250	3,880	3,880	3,880

[1] Credited towards water delivered.

[2] C. = Compound; T. = Turbine

[3] Levy to assist Agency in recovering O&M costs for purveyor turnouts where annual water deliveries are either zero or a small quantity of water.

[4] No increase from 2004-2005 levy.

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B

WEDNESDAY
APRIL 19, 1989 V(GOLD)

Ventura County

Los Angeles Times

HIGHLIGHTS

Ventura County

WATER FIELD The Metropolitan Water District of Southern California approved an emergency measure to ship water to Ventura County if its own water supplies permit. B3

RATIONING CHANGE The Ventura City Council is considering whether to amend the city's water rationing plan to permit a developer to build 58 new condominiums in exchange for installing low-flow toilets and shower heads elsewhere in the city. B3

STRENGTHS CHARGED Charges of nepotism within the Ventura County District attorney's office have heated up a long-running feud between the county's top prosecutor and the county Civil Service Commission. B3

INMATE INCARCERATION Ventura County plans to step up enforcement of minor drug offenses and vary jail sizes of those convicted in an attempt to put public land to that county jail facilities would not be further crowded. B3

HOUSE FIRE Fire swept through a Simi Valley home, causing $10,000 damage and killing one of several pets

MWD Agrees to Send Water to County

Emergency: The plan would supply 12,000 homes for two years. But the first drop isn't expected until October.

By JOANNA M. MILLER
TIMES STAFF WRITER

The Metropolitan Water District of Southern California approved an emergency measure Tuesday to ship enough water south to serve more than 12,000 Ventura County homes for the next two years, but conditioned the agreement on the capacity of its water treatment facilities, which operate at peak during summer months.

At a meeting in Los Angeles, the district agreed to send 6,200 acre-feet to Ventura County and another 1,000 acre-feet to Santa Barbara County each year for the next two years.

"The chances are very good that you would get some of the water," said Robert Campbell, a district spokesman. "It's likely that you would get all of it, but the question is when."

Campbell said it is highly unlikely that any water would be available during summer months when the district's Jensen Filtration plant, which purifies water from the California Aqueduct, is operating at capacity.

Nevertheless, officials welcomed the possibility of any new water coming into the county, even if it is not the maximum amount that the district has agreed to provide under optimum conditions.

"Every acre-foot we are able to supply from state water is an acre-foot saved from our ground water," said Don Dawson, assistant general manager of the United Water Conservation District, which would receive up to 5,600 acre-feet of MWD water under the new proposal.

It would have cost us $4,000 an acre-foot, the company would send about 1,000 acre-feet to Port Hueneme, which depends totally on United's well water for its municipal supplies, Dawson said.

He said United would send another 2,600 acre-feet to the city of Oxnard, which gets one-third of its water from United.

United also supplies water to 800 Ventura County growers on the Oxnard Plain and provides a small amount of the water used by the city of Ventura.

United pumped about [illegible] acre-feet of ground water last year, a drastic shortfall with consumer households, have been tapped hard as growers pump more water to make up for the lack of rain over the last four years.

The agreement, which could bring up to 1,150 acre-feet per year to the city of Ventura, will help the city meet its water demands during the fourth year of the statewide drought, said Carol Carter, assistant to the city manager.

"It's more than a drop in the bucket for us."

Please see WATER, B3

Ken Von and son Brian at near Lake Casitas. Light rain fell north of the lake.

THE DROUGHT HOUSING

Rationing Law May Be Eased to Help Project

By JOANNA M. MILLER
TIMES STAFF WRITER

The Ventura City Council is considering amending the city's tough new water rationing law to clear the way for construction of 58 new condominiums despite a water shortage that has brought other new building projects to a halt.

Under the amendment, already tentatively approved, Western Village would become the first development to a pilot program that would require developers to save water as much water elsewhere in the city as their new projects use.

Based on the city's allotment of 195 gallons per day per residential unit, the 58 condominiums would use about 11,000 gallons per day. In the pilot program, Western would be required to refit enough Ventura homes or businesses elsewhere in the city with low-flow toilets and shower heads to save about 11,000 gallons a day.

"You get long-term benefits," said Council member Donald Villanueva, who argued both sides of the issue Monday night. But he also worried that the public perception of new construction would [illegible]

Please see DROUGHT, B3

Dispute Over Nepotism

EXHIBIT "D"

DROUGHT: Law May Be Amended

Continued from B1
are rationing their water.

Councilwoman Cathy Bean argued against the Weston project. Any retrofitting program should be sponsored by the city and not tied to new development, she said.

"New development has no track record of water use," she said. And if the drought were to worsen, "there would simply be more people to use less water."

The council voted 5 to 2, with Bean and Gary Tuttle dissenting, to direct city staff to prepare an amendment to the water rationing ordinance that would allow the Weston project. The amendment is scheduled to return to the council on June 18.

The city's water rationing ordinance, the first of its kind in the county, limits families of up to four people to 294 gallons per day if they live in houses, and limits families of up to three people to 198 gallons per day if they live in apartments. Residents can apply to the city for increased allocations if they have more people than the specified number, if they have medical needs or have mature fruit trees. Before they can receive an increased allotment, however, residents must refit their homes with water-saving toilets and shower heads.

Penalties for excessive use range up to 10 times the normal water rate. The ordinance became effective on Thursday, but no penalties will be assessed until June.

The ordinance also includes a moratorium on new water hookups, a provision that essentially halted development that was not approved before Jan. 29.

Weston received special consideration from the council on Monday because the project was scheduled to go before the Planning Commission for approval in December. But Weston voluntarily agreed to postpone the date with the Planning Commission at the request of city staff.

"It's a problem with equity since it was a staff request to postpone," Villeneuve said.

A Weston representative, attorney Phil Cohen, agreed again Monday to the council's postponement of approval for the project until June 18, after the water-rationing ordinance is amended.

As the staff researches and writes the amendment, it will recommend how to set up the water program for Weston.

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RESOLUTION NO. 446

RESOLUTION OF THE BOARD OF DIRECTORS OF THE CRESTLINE-LAKE ARROWHEAD WATER AGENCY APPROVING APPLICATION FOR CERTIFICATION PURSUANT TO ACWA'S WATER MANAGEMENT PROGRAM

WHEREAS, the Association of California Water Agencies (ACWA) has encouraged each of its members to develop and implement a sound water management program; and

WHEREAS, ACWA has also encouraged each member agency that has developed a water management program to make application to ACWA for certification of that program; and

WHEREAS, over the years the Crestline-Lake Arrowhead Water Agency ("Agency") has developed a water management program, portions of which are set forth in various provisions of the Agency's rules and regulations, water conservation ordinances adopted by this Board of Directors, resolutions establishing procedures and criteria for use of purveyor turnouts, and minutes of past meetings of this Board of Directors in which policy statements have been memorialized; and

WHEREAS, the application for certification of the Agency's water management program by ACWA has provided an excellent opportunity to set forth in one document the various components of the Agency's water management program, and to formally approve the various expressions of policy in that document which are calculated to prudently manage and conserve the Agency's precious water resources;

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the Crestline-Lake Arrowhead Water Agency as follows:

1. The policy statements set forth in the application for ACWA's certification of the Agency's water management program accurately reflect Agency policy and are hereby formally approved.

2. The President of the Board of Directors is authorized to sign the application on behalf of the entire Board of Directors.

3. The General Manager is directed to file the application with ACWA, along with a certified copy of this resolution.

ADOPTED this 3rd day of May, 1990.

President, Board of Directors
CRESTLINE-LAKE ARROWHEAD WATER AGENCY

ATTEST:

Secretary, Board of Directors
CRESTLINE-LAKE ARROWHEAD WATER AGENCY

CERTIFICATION

I, Dorothy E. Horton, Secretary of the Board of Directors of the Crestline-Lake Arrowhead Water Agency, hereby certify that the foregoing is a full, true and correct copy of the Resolution adopted by the Board of Directors of said Agency at the regular meeting of said Board held on the 3rd day of May, 1990, by the following vote:

AYES: Directors Barnes, Massey, Horning, Rucker and Newcombe

NOES: None

ABSENT: None

ABSTAIN: None

Dorothy E. Horton, Secretary

CLAWA WATER RATES

Wholesale (rate class.)	Current Charge Effective 7/89	Proposed Charge Effective 7/90
Camps, County, Fat. Svc. Res. (PE2)	$1,440 AF .0330579 CF	$1,505(2) .0345500
Purveyors - (PE3)	$ 665 AF .0152663 CF	$ 695(1) .0159550
Forest Svcs. & High Sch. (PE4)	$ 800 AF .0183655 CF	$ 835(3) .0191690
Silverwood Lake (PE5)	$ 525 AF .0120523 CF	$ 550(2) .0126263
Hydrant Meters (PE6)	$2,504.70 AF .0575000 CF	$2,613.60(4) .0600000
Hydrant Meter Dep. (Refundable)	$1,150.00	$1,200.00(5)
Connection Fee	$ 115.00	$ 120(6)

PURVEYOR RETAIL

Retail	Current Charge	Proposed Charge
Cottonwood Ranger Sta. (PE1)	$92.00/2500 CF .0368000 CF ovrg.	$96.00/2500 CF .0384000 CF ovrg.
Heaps Peak - Arboretum (RM1)	$7.50/500 CF .0247626 CF ovrg.	$7.75/500 CF(7) .0258797 CF ovrg.
Forest Svc. Residence (RC2) 2" Meter	$84.50/2500 CF .0338000 CF ovrg.	$88.25/2500 CF(8) .0353000 CF ovrg.
3" Commercial (RNI) Owl Rock	$79.50/3200 CF .0248438 CF ovrg.	$83.00/3200 CF(8) .0259375 CF ovrg.
Arrowhead Drinking Water (RB1) 2" Serv.	$40.00/1600 CF .0250000 CF ovrg.	$41.75/1600 CF(8) .0260938 CF ovrg.
Calkins, William (RF1) 5/8" x 3/4"	$12.50/500 CF .0250000 CF ovrg.	$13.00/500 CF(8) .0260000 CF ovrg.
Altmeyer, Cris (RF1) 5/8" x 3/4" Res.	$12.50/500 CF .0250000 CF ovrg.	$13.00/500 CF(8) .0260000 CF ovrg.
Solid Waste 2" Commercial (RB1)	$39.75/1600 CF .0248438 CF ovrg.	$41.50/1600 CF(8) .0259375 CF ovrg.

87-26/Misc./2-14-90

PURVEYOR RETAIL - (Cont'd)

Retail	Current Charge	Proposed Charge
Munday, Amy (RF1) 5/8" x 3/4" Res.	$12.50/500 CF .0250000 CF ovrg.	$13.00/500 CF(8) .0260000 CF ovrg.
AT&T (RF1) 5/8" x 3/4" Res.	$12.50/500 CF .0250000 CF ovrg.	$13.00/500 CF(8) .0260000 CF ovrg.
Mt. Calvary Lutheran (RH1) 1" Serv.	$22.50/750 CF .0300000 CF ovrg.	$23.50/750 CF(8) .0313333 CF ovrg.
McWilliams, John W. (RF1) 5/8" x 3/4" Res.	$12.50/500 CF .0250000 CF ovrg.	$13.00/500 CF(8) .0260000 CF ovrg.

Munday, AT&T and McWilliams actually have a 2" meter.

IMPROVEMENT DISTRICTS "A", "B" & "C"

Retail	Current Charge	Proposed Charge
Improvement Dist. "A" 5/8" x 3/4" (RL1)	$15.00/500 CF .0300000 CF ovrg.	$15.75/500 CF(12) .0315000 CF ovrg.
Improvement Dist. "A" 1" Service (RG2)	$22.50/750 CF .0300000 CF ovrg.	$23.75/750 CF(12) .0315000 CF ovrg.
Improvement Dist. "B" 5/8" x 3/4" (RA1)	$15.00/500 CF .0300000 CF ovrg.	$15.75/500 CF(8) .0315000 CF ovrg.
Improvement Dist. "B" 2" & Commercial (CB1)	$48.00/1600 CF .0300000 CF ovrg.	$50.40/1600 CF(10) 0315000 CF ovrg.
Improvement Dist. "B" 1" Service (RH1)	$22.50/750 CF .0300000 CF ovrg.	$23.75/750 CF(8) .0315000 CF ovrg.
Improvement Dist. "B" Meter Inst. 5/8" x 3/4"	$850.00	$900.00(11)
Improvement Dist. "B" Meter Inst. 1"	$925.00	$975.00(11)
Improvement Dist. "B" (AA1) Apartments	$15.00/500 CF per unit .0300000 CF ovrg.	$15.75/500 CF(8) per unit .0315000 CF ovrg.

IMPROVEMENT DISTRICTS "A", "B" & "C" - (Cont'd)

Retail	Current Charge	Proposed Charge
Improvement Dist. "B" Trailer Court	$15.50/500 CF per unit .0300000 CF ovrg.	$15.75/500 CF(8) per unit .0315000 CF ovrg.
Imp. Dist. "B" Ledesma (CL1) 1 Comm. 3 Res.	$84.00/3100 CF .0300000 CF ovrg.	$87.75/3100 CF(9) .0315000 CF ovrg.
Improvement Dist. "C" (CL1) 2" & Commercial	$39.75/800 CF .0496875 CF ovrg.	$41.50/800 CF(8) .0518750 CF ovrg.
Improvement Dist. "C" 5/8" x 3/4" (RJ1)	$22.75/500 CF .0455000 CF ovrg.	$23.75/500 CF(8) .0475000 CF ovrg.
Improvement Dist. "C" 1" Service (RO1)	$34.25/750 CF .0456666 CF ovrg.	$35.75/750 CF(8) .0476667 CF ovrg.
Improvement Dist. "C" Meter Inst. 5/8" x 3/4"	$850.00	$900.00(11)
Improvement Dist. "C" Meter Inst. 1"	$925.00	$975.00(11)

PORTION OF IMPROVEMENT DISTRICT "D" INSIDE TRACT 9785 & 9785-1

Retail	Current Charge	Proposed Charge
TR 9785 & 9785-1 5/8" x 3/4" (RQ1)	$19.00/500 CF .0380000 CF ovrg.	$20.00/500 CF(13) .0400000 CF ovrg.
TR 9785 & 9785-1 1" Service (RS1)	$28.50/750 CF .0380000 CF ovrg.	$30.00/750 CF(13) .0400000 CF ovrg.
TR 9785 & 9785-1 Meter Inst. 5/8" x 3/4"	$750.00	$750.00(14)
TR 9785 & 9785-1 Meter Inst. - New Svcs. with 1"	$850.00	$850.00(15)

PORTION OF IMPROVEMENT DISTRICT "D" OUTSIDE OF TRACT 9785 & 9785-1

Name	Current Charge	Proposed Charge
Mtn. Senior Citizens (RQ1) 5/8" x 3/4" Res.	$19.00/500 CF .0380000 CF ovrg.	$20.00/500 CF(16) .0400000 CF ovrg.
Rim Ball Park (RT1) 2", Commercial	$60.80/1600 CF .0380000 CF ovrg.	$64.00/1600(16) .0400000 CF ovrg.
Calvary Chapel (RT1) 2", Commercial	$60.80/1600 CF .0380000 CF ovrg.	$64.00/1600 CF(16) .0400000 CF ovrg.
Grant, S.C. (RS1) 1"	$28.50/750 CF .0380000 CF ovrg.	$30.00/750 CF(16) .0400000 CF ovrg.
Fick, Murray (RQ1) 5/8" x 3/4" Res.	$19.00/500 CF .0380000 CF ovrg.	$20.00/500 CF(16) .0400000 CF ovrg.
Schroth, Robert (RS1) 1"	$28.50/750 CF .0380000 CF ovrg.	$30.00/750 CF(16) .0400000 CF ovrg.
Thomas Johnson (RQ1) 5/8" x 3/4" Res.	$19.00/500 CF .0380000 CF ovrg.	$20.00/500 CF(16) .0400000 CF ovrg.
Boyd, Bobbie (RQ1) 5/8" x 3/4" Res.	$19.00/500 CF .0380000 CF ovrg.	$20.00/500 CF(16) .0400000 CF ovrg.
Jehova Witness (RQ1)	$19.00/500 CF .0380000 CF ovrg.	$20.00/500 CF(16) .0400000 CF ovrg.
Schweitzer, Mark (RS1) 1"	$28.50/750 CF .0380000 CF ovrg	$30.00/750 CF(16) .0400000 CF ovrg.
Yurcak & Chin (RT1) 2" Res.	$60.80/1600 CF .0380000 CF ovrg.	$64.00/1600 CF(16) .0400000 CF ovrg.
Yurcak & Chin (Hayworth) (RS1) 1" Serv.	$28.50/750 CF .0380000 CF ovrg.	$30.00/750 CF(16) .0400000 CF ovrg.
Meyers, Lewis J. (RQ1) 5/8" x 3/4" Res.	$19.00/500 CF .0380000 CF ovrg.	$20.00/500 CF(16) .0400000 CF ovrg.
Nichols, James (RQ1) 5/8" x 3/4" Res.	$19.00/500 CF .0380000 CF ovrg.	$20.00/500 CF(16) .0400000 CF ovrg.
Mason, Kevin (RS1) 1" Res.	$28.50/750 CF .0380000 CF ovrg.	$30.00/750 CF(16) .0400000 CF ovrg.

PORTION OF IMPROVEMENT DISTRICT "D"
OUTSIDE OF TRACT 9785 & 9785-1 - (Cont'd)

Name	Current Charge	Proposed Charge
Reitz, Marylee (RP1) 1" plus 1 Res. Unit (one meter)	$47.50/1250 CF .0380000 CF ovrg.	$50.00/1250 CF(16) .0400000 CF ovrg.
Rim School District (Arrowhead Equestrian) (RQ1) 5/8" x 3/4" Res.	$19.00/500 CF .0380000 CF ovrg.	$20.00/500 CF(16) .0400000 CF ovrg.
New Service with 5/8" x 3/4" Meter Installation	$1,000.00	$1,000.00(18)
New Service with 1" Meter Installation	$1,100.00	$1,100.00(18)

WATER RATES - FEBRUARY 1990
FOOTNOTES

(1) Projected cost components for wholesale water total $695/A.F. for 1990-91. A $695/A.F. rate for purveyor wholesale is an increase of 4.511% over the $665/A.F. rate.

(2) Approximately 4.5±% increase - same as with purveyor wholesale.

(3) Approximately 4.5±% increase - same as with purveyor wholesale.

(4) Approximately 4.5±% increase - same as with purveyor wholesale. Includes pro-rata share of costs for utilizing Agency facilities including source of supply, treatment, pumping, transmission and storage tanks.

(5) 4.5±% increase in hydrant meter deposit.

(6) 4.5±% increase in hydrant meter connection fee.

(7) Minimum monthly charge increased 4.5±% - same as with purveyor wholesale. Overage rate also increased same 4.5±%

(8) Minimum monthly charge increased 4.5±% - same as with purveyor wholesale. Overage rate increased to equal the same cost per cu. ft. as with each monthly minimum charge.

(9) Minimum monthly charge increased 4.5±% - same as with purveyor wholesale. Overage rate increased to equal the same cost per cu. ft. as with balance of I.D. "B" rates.

(10) Overage rate increased to equal the same cost per cu. ft. as with balance of I.D. "B" rates. Minimum monthly charge computed as follows: Overage rate $0.0315 /cu. ft. x 1600 cu. ft. - $50.40.

(11) 4.5±% increase in meter installation charge.

(12) Minimum monthly charge and overage rate - same as same type of service rate in I.D. "B".

(13) Overage rate of $0.04/cu. ft. (set approximately midway between overage rates for I.D. "B" and "C"). 5/8" x 3/4" meter with 500 cu. ft. calculates to $20.00 minimum monthly charge. 1" meter with 750 cu. ft. calculates to $30.00 minimum monthly charge. Excludes monthly capacity charge added to monthly minimum amounts by Agency's Board of Directors per Government Code Section 66001.

(14) No change in 5/8" x 3/4" meter installation charge: $700 portion of $750 charge to be allocated to assist in payoff of Grandview Tank.*

---

*Excludes increased capacity charges to service connection fees added by Agency's Board of Directors per Government Code Section 66001.

,) No change in 1" meter installation charge: $750 portion of $850 charge to be allocated to assist in payoff of Grandview Tank.*

(16) Overage Rate of $0.04/cu. ft. - same as within Tracts 9785 & 9785-1. 5/8" x 3/4" meter with 500 cu. ft. calculates to $20.00 minimum monthly charge. 2" commercial with 1600 cu. ft. calculates to $64.00 minimum monthly charge. 1" meter with 750 cu. ft. calculates to $30.00 minimum monthly charge. 1" plus 1 resid. unit with 1250 cu. ft. calculates to $50.00 minimum monthly charge. Increase in rate to assist in payoff of pipelines, fire hydrants, etc., necessary for retail service, since the Grandview area has recently become a concentrated, growing area for retail water service by the Agency - and is now formed into Improvement District "D". Excludes monthly capacity charge added to monthly minimum amounts by Agency's Board of Directors per Government Code Section 66001.

(17) N/A.

(18) No change in 5/8" x 3/4" or for 1" service with meter installation. $300 portion of $1,000 or $1,100 charge to be allocated to assist in payoff of Grandview Tank, pipelines, fire hydrants, etc.*

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* Excludes increased capacity charges to service connection fees added by Agency's Board of Directors per Government Code Section 66001.

ALBERT A. WEBB ASSOCIATES
3788 McCray Street, Riverside, CA 92506 (714) 686-1070 FAX (714) 788-1256

JAN 24 1990

WO: 87-26
FILE: 1622.224

January 23, 1990

Crestline-Lake Arrowhead Water Agency
P. O. Box 3880
Crestline, CA 92325-3880

Attention: Roxanne Holmes, General Manager

Re: Updated Analysis of Rate for Wholesale Water

Gentlemen:

The purpose of this letter is to summarize our updated study regarding the rate for Agency's wholesale water and to confirm the results of our recent meeting and discussions with you.

As was done in our previous reviews in this regard, the basic components of the Agency's rate for wholesale water have some general relationship to the following operating expenses, which are summarized in the Agency's Audit Report.

Item One - Purchased water cost - DWR charge.

Item Two - Power purchased for pumping; plus supervision, labor, and maintenance.

Item Three - Water treatment cost; including supervision, labor, maintenance, water testing and chemicals.

Item Four - Transmission and distribution cost; including supervision, labor and maintenance.

The actual cost of purchasing water from DWR (Item One above) was $60,870 for 2,113 A.F. of water during the Fiscal Year 1988-89, which calculates to $28.81/A.F. During recent years we have seen this cost vary between about $10 to $90/A.F. as levied by DWR. For water purchased between July-November, 1989, the cost from DWR was $48.63/A.F. We estimate that this cost may average as high as $60/A.F. during the 1990-91 Fiscal Year.

cc Board
Bell
Mills
1-24-90
D.

87-26/Ltr./1/18/90

Deliveries of State Project water to the Agency totaled about 2,113 A.F. during 1988-89 (9.2% increase), and totaled about 1,027 A.F. during the first five (5) months of the present fiscal year, which is 6.4% ahead of the (965 A.F.) water deliveries during the same period last year. We estimate that water deliveries to the Agency may possibly total near 2,325 A.F. during 1990-91, or possibly more if drought conditions continue.

The actual cost of power for pumping water (see Item Two above) during the year 1988-89 was $719,479 (gas and electricity) which calculates to $340.50/A.F. During the first five (5) months of the present fiscal year, the actual cost of power for pumping was $326,030* which calculates to $317.46/A.F. After talking with representatives from both Edison and the Gas Company, we estimate that both electric and gas rates may be similar to 1988-89 rates, except for a possible 4% increase for fuel-adjustment costs.

Therefore, we estimate that during 1990-91 about 2,325 A.F. deliveries will be made costing $825,375 for power for pumping with a unit cost of $355/A.F. Pumping supervision, labor and maintenance cost $114,615 during 1988-89, which calculates to $54.24/A.F. We estimate that pumping supervision, labor and maintenance may cost near $70/A.F. during 1990-91, with the projected cost increase due to additional pumping maintenance anticipated.

Regarding water treatment (Item Three above), the actual cost recorded for Fiscal Year 1988-89, including water treatment, supervision, labor, routine maintenance, water testing and chemicals, totaled $70,989 for 2,113 A.F. of water, for a unit cost of $33.60/A.F. Costs for chemicals and water testing are expected to increase, and other major maintenance work is anticipated to be accomplished at the treatment plant; therefore, we estimate that this cost will be about $60/A.F. during 1990-91 Fiscal Year.

For transmission and distribution costs (Item Four above), the expenses for Fiscal Year 1988-89, including general fund transmission/distribution supervision, labor and routine maintenance, totaled $281,129 for 2,113 A.F. of water, for a unit cost of $133.05/A.F. Based on an estimated 2,325 A.F. of delivery during 1990-91, and considering anticipated maintenance, the applicable unit cost is projected at $150/A.F.

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* Gas cost $112,065; electric cost $213,965.

The current rate charged by the Agency for wholesale water deliveries is $665/A.F. We list below a summary of the component cost considerations and recommendations contained above regarding the rate for wholesale water.

Item	Description	Current Rate Components ($/AF)	1990-91 Projected Costs ($/AF)
1.	Purchased Water Cost - DWR Charge	$ 60	$ 60
2.	Pumping Cost	$415	$425
3.	Water Treatment Cost	$ 60	$ 60
4.	Transmission & Distribution Cost	$130	$150
	TOTALS	$665	$695 (4.5% Increase)

For the Fiscal Year ending 6/30/89, the Agency's Audit Report, under Operations on Page 19 thereof, lists $320,366 as an expense titled "Depreciation and Amortization". Bill Reineking advises that $115,518 of this amount is for amortization of the DWR capital cost component, and that the $204,848 balance is for depreciation. We note that based upon an estimated 2,325 A.F. delivery during 1990-91, and adding a unit cost of $50/A.F. to the rate for wholesale water, would raise an estimated $116,250 during said fiscal year towards the cost of additional maintenance and/or replacement work upon the water system made necessary over the years by the effects of depreciation. In the event the Agency added $50/A.F., towards cost of maintenance due to effects of depreciation, to the 1990-91 projected costs, the total wholesale water rate would be $745/A.F., which is a 12.0% increase over the current rate.

Please note from the above table that the present water rate of $665/A.F. does not fully cover the projected costs during 1990-91, even excluding costs of maintenance due to effects of depreciation.

We recommend that the Agency continue to monitor actual costs being accrued for the above four (4) items for the ensuing months, due to the many somewhat unpredictable variables involved.

We will be pleased to discuss any aspect of this matter further with you at your next Board Meeting.

ON BEHALF OF ALBERT A. WEBB ASSOCIATES
Fred Hans Hanson

FHH:sb

cc: Mike Riddell, Best, Best & Krieger
Bill Reineking, RAMS

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ALBERT A. WEBB ASSOCIATES
3788 McCray Street, Riverside, CA 92506 (714) 686-1070 FAX (714) 788-1256

SEP 7 1990

WO: 87-26
FILE: 1622.224

September 7, 1990

Crestline-Lake Arrowhead Water Agency
P. O. Box 3880
Crestline, CA 92325-3880

Attention: Ms. Roxanne M. Holmes, General Manager

RE: 1989-90 Fiscal Year, Analysis of Basic Components of Rate for Wholesale Water

Gentlemen:

Per our recent discussion and per your instructions yesterday afternoon, and based upon the actual operating expenses summarized in the Agency's Audit Report dated June 30, 1990, we list herein our analysis of the basic cost components of rate for wholesale water for the 1989-90 Fiscal Year. This analysis is presented as an update to the actual and projected unit cost components in Webb letter to CLAWA dated 1/23/90.

During 1989-90 Fiscal Year, deliveries of State Project Water to the Agency totaled 1,897 A.F. plus 114 A.F. of water appropriated from Houston Creek via the Agency's Water-Right Permits; totaling 2,011 A.F. (which is 4.8% less than the 2,113 A.F. delivered during 1988-89 Fiscal Year).

The actual cost of purchasing water from DWR was $69,629 for 1,897 A.F. during 1989-90, which calculates to <u>$36.70/A.F.</u>

The actual cost of power for pumping water during 1989-90 was $644,635 (gas and electricity) for 2,011 A.F., which calculates to $320.55/A.F.; pumping supervision, labor and maintenance cost $86,600 during 1989-90, which calculates to $43.06/A.F.; totaling <u>$363.61/A.F.</u>

87-26/Ltr/9-7-90

Regarding water treatment, the actual cost for 1989-90 including water treatment, supervision, labor, routine maintenance, water testing and chemicals totaled $196,153 for 2,011 A./F., which calculates to $97.54/A.F.

For transmission and distribution costs, the expenses for 1989-90 including general fund transmission/distribution supervision, labor and routine maintenance totaled $346,428 for 2,011 A.F., which calculates to $172.27/A.F.

The current rate charged by the Agency for wholesale water deliveries is $695/A.F. We list below a summary of the component cost considerations regarding the rate for wholesale water:

Item	Description	Current Rate(1) Components ($/A.F.	Actual Cost Components 1989-90
1.	Purchased water Cost - DWR Charge	$ 60	$ 36.70
2.	Pumping Cost	$425	$363.61
3.	Water Treatment Cost	$ 60	$ 97.54
4.	Transmission & Distribution Cost	$150	$172.27
	TOTALS	$695	$670.12

(1) 1990-91 projected costs per Pg. 3 of Webb letter to CLAWA dated 1/23/90, and based upon estimated water deliveries of 2,325 A.F. during 1990-91.

Referring to the above table: The actual cost(1) of purchased water is about $23/A.F. less than the cost projected for 1990-91(2); the actual pumping cost(1) is about $61/A.F. less than the cost projected for 1990-91(2); the actual treatment cost(1) is about $38/A.F. more expensive than the cost projected for 1990-91(2); and the actual transmission/distribution cost(1) is about $22/A.F. more expensive than the cost projected for 1990-91(2). The total of the four (4) actual cost components(1) is only about $25/A.F. less than the current wholesale rate of $695/A.F.

Recently, maintenance and refurbishment costs of pumping equipment, treatment equipment and transmission/distribution appurtenant facilities have unavoidably increased(3) somewhat over previous expense levels, and we would expect this trend to continue over the near future, due to the continued effects of normal system depreciation along with additional expenses required to meet new governmental regulations such as from DHS, SCAQMD, etc. Power costs have been fairly stable over the last year or so, but we expect further increases in the near future from both Edison Company and the Gas Company. The ability to use Houston Creek water when available, assists in reducing purchased water costs, which for example during the 1989-90 Fiscal Year about 114 A.F. was appropriated from Houston Creek.

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(1) Actual cost components during 1989-90 Fiscal Year.
(2) Cost projected in Webb letter to CLAWA dated 1/23/90.
(3) For example, the maintenance costs experienced during recent weeks at Booster Station No. 1, involving unrelated outages on both gas engine driven pumping units and on two of the three electric motor driven pumping units.

We recommend that the Agency continue to monitor actual costs being accrued for the above four (4) items for the ensuing months, due to the many somewhat unpredictable variables involved.

We will be pleased to review any aspect of this matter further with you at any time.

ON BEHALF OF ALBERT A. WEBB ASSOCIATES
Fred Hans Hanson

FHH:sb

cc: Best, Best & Krieger, Mike Riddell
RAMS, Bill Reineking

NOTICE OF SPECIAL MEETING OF THE BOARD OF DIRECTORS
OF THE
CRESTLINE-LAKE ARROWHEAD WATER AGENCY

NOTICE IS HEREBY GIVEN: That a Special Meeting of the Board of Directors of the Crestline-Lake Arrowhead Water Agency will be held Monday, February 26, 1990 at 7:00 o'clock P.M. at the Agency office at 24116 Crest Forest Drive, Crestline, CA for the purpose of considering and action upon the following:

1. Purveyor Turnout Operations
2. 1990-91 Water Rates
3. 1990-91 Annual Purveyor Connection Fees

Dated: February 12, 1990

Dorothy E. Horton

Dorothy E. Horton, Secretary
Board of Directors
Crestline-Lake Arrowhead Water Agency

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RESOLUTION NO. 435

RESOLUTION OF THE BOARD OF DIRECTORS OF THE CRESTLINE-LAKE ARROWHEAD WATER AGENCY REVISING OPERATIONAL PROCEDURES AND CRITERIA FOR USE OF PURVEYOR TURNOUTS

WHEREAS, Resolution No. 435 of the Crestline-Lake Arrowhead Water Agency was adopted in 1989 to set forth the Agency's operational procedures and criteria for use of purveyor turnouts for fiscal year 1989-90; and

WHEREAS, upon review, this Board of Directors finds that the operational procedures and criteria have been effective in accomplishing the objectives which prompted the adoption of Resolution No. 435; and

WHEREAS, pursuant to Resolution No. 435, it is also incumbent upon the Board at this time to adjust flow rates to reflect actual consumption during the previous year;

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the Crestline-Lake Arrowhead Water Agency that effective July 1, 1990, the following operational procedures and criteria shall apply to water service from the Agency's purveyor turnouts:

1. Agency meters at purveyors' turnouts shall not be operated at less than the rates of flow set forth on Exhibit "A" attached hereto and incorporated herein, which shall be the minimum flow rates which this Board of Directors deems practical for each type and size of meter used for purveyor connections.

2. During any fiscal year, the Agency shall not deliver water to any purveyor at any metered turnout at a rate of flow which exceeds the highest average rate of flow either delivered by the Agency through that meter or calculated by the Agency to have been delivered through that meter during any consecutive seven (7) day period (168 hours) during the immediately previous calendar year (excluding from the calculation any excess flows permitted by the Agency on an emergency basis or to prevent hardship during

any such seven day period), rounded either up or down, at the option of the Agency, to the nearest five (5) gallons per minute for 2-inch meters and to the nearest ten (10) gallons per minute for larger meters. In the event that a new or existing purveyor did not take delivery of any water through a meter during the previous calendar year, the Agency shall establish the maximum rate of flow that may be delivered through each such meter for each fiscal year. For the fiscal year beginning July 1, 1990, the maximum rates of flow that may be delivered by the Agency through each of the Agency's purveyor connections have been calculated and shall be those set forth on Exhibit "B" attached hereto and incorporated herein. The Board of Directors, in its discretion, may adjust the maximum permissible rate of flow upward or downward upon a showing of significant change in the purveyor's service requirements or in the availability of alternative water supplies relied upon to satisfy such service requirements.

3. Each purveyor shall be entitled to four (4) adjustments per connection per month without additional charge by the Agency, provided that such adjustment occurs during the Agency's normal business hours, and further provided that subject to the provisions of Section 7 of this Resolution, a purveyor may apply the aggregate total number of such adjustments each month to any one or more of the purveyor's connections as that purveyor might select. There will be a charge of $50 per adjustment for each adjustment of a purveyor's connection at the instance and request of the purveyor in excess of the aggregate total number permitted herein, provided that each such adjustment occurs during the Agency's normal business hours. There will be a charge of $100 per adjustment for any adjustment by Agency personnel at the instance and request of the purveyor which is performed outside of the Agency's normal business hours or which is provided as an emergency request with less than the twenty-four (24) hour notice required by the Agency's Rules and Regulations, regardless of whether any adjustments have been made previously during the month. For purposes of this Section, the term "turnout adjustment" shall include the Agency's on-site visit required by Section 7 of this Resolution.

4. The minimum permissible change in the rate of flow through any purveyor connection shall be five (5) gallons per minute for a 2-inch meter, and ten (10) gallons per minute for any meter larger than 2-inch; provided, however, that any change in

the rate of flow may be limited as necessary to comply with Sections 1 and 2 of this Resolution.

5. A purveyor may not use any devices on the purveyor's side of the connection designed to alter the rate of flow through the connection. Devices which may not be used in this manner shall include automatic valves, altitude valves, manual valves, and any other devices which may be used to vary the rate of flow through a purveyor turnout. Any purveyor that violates this provision shall be subject to an additional charge of $0.05 per cubic foot of water delivered during the period of the violation, which shall be an additional charge for utilizing capacity in the Agency's facilities to meet its peak demands. Upon discovery that a purveyor has installed any device prohibited by this Section, the General Manager shall give the purveyor thirty (30) days written notice to remove the illegal device. If the device has not been removed within thirty (30) days after delivery of such notice, the General Manager shall terminate water service to that purveyor, and shall not resume such service until the purveyor can demonstrate its ability and willingness to comply with this Resolution and the Agency's Rules and Regulations.

6. The requested rate of flow through a purveyor connection may not be altered or terminated for a period of at least twenty-four (24) hours following a requested turn-on or adjustment.

7. At least once during the first half of each month and once during the second half of each month, each purveyor shall review the rate of flow through each of its connections and advise the Agency if it wishes to continue that same rate of flow or adjust the flow through that connection upward or downward. Regardless of whether the purveyor requests a change in the rate of flow through each such connection, at least once each month the Agency shall examine each purveyor connection to ensure that it is actually flowing water at the intended rate, and such examination shall constitute a turnout operation for purposes of Section 3 of this Resolution.

8. Except as otherwise provided in Section 3, a purveyor shall not register with the Agency more than one (1) request per turnout per day, with each such request

involving no more than one (1) turn-on and one (1) turn-off no less than twenty-four hours thereafter.

9. Each request for water service through a purveyor turnout, or for a change in the rate of flow through a purveyor turnout, must state the requested rate of flow in gallons per minute and the total requested delivery of water in gallons.

10. The Agency's General Manager may temporarily relieve any purveyor of any of the operational procedures and criteria set forth herein as she deems necessary, in her sole discretion, to cope with temporary hardship or emergency. However, each such event shall be reported to the Agency's Board of Directors at its next subsequent meeting. Any other exception to these operational procedures and criteria must be granted by the Agency's Board of Directors, and may be granted only upon a presentation of conclusive evidence that the purveyor has commenced and is diligently pursuing the measures necessary to achieve compliance with this Resolution and the Agency's Rules and Regulations.

11. As of July 1, 1990, this Resolution shall supersede the provisions of Resolution No. 435. The provisions of this Resolution shall be supplementary to, and shall not be deemed to replace or supersede, the provisions of the Agency's Rules and Regulations, as amended from time to time.

ADOPTED this 26th day of February, 1990.

_____
President, Board of Directors
CRESTLINE-LAKE ARROWHEAD WATER AGENCY

ATTEST:

_____
Secretary, Board of Directors
CRESTLINE-LAKE ARROWHEAD WATER AGENCY

CERTIFICATION

I, Dorothy E. Horton, Secretary of the Board of Directors of the Crestline-Lake Arrowhead Water Agency, hereby certify that the foregoing is a full, true and correct copy of the Resolution adopted by the Board of Directors of said Agency at the special meeting of said Board held on the 26th day of February, 1990, by the following vote:

AYES:

NOES:

ABSENT:

ABSTAIN:

_____

Dorothy E. Horton, Secretary

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EXHIBIT "A"

AGENCY'S PURVEYOR TURNOUTS

MINIMUM FLOW RATES

Meter Size	Meter Type(1)	Minimum Flow Rates (GPM)(2)
2"	P.D.	5.0
2"	C.	5.0
2"	T.	10.0
3"	C.	10.0
3"	T.	20.0
4"	C.	20.0
4"	T.	30.0
6"	C.	30.0

(1) P.D. = Positive Displacement
C. = Compound
T. = Turbine
(2) Practical under field conditions.

February 1990
Misc/87-307

EXHIBIT "B"
AGENCY'S PURVEYOR TURNOUTS
(1)MAXIMUM FLOW RATES DURING ANY
CONSECUTIVE SEVEN (7) DAY PERIOD
FOR THE FISCAL YEAR BEGINNING JULY 1, 1990

ACCOUNT NAME	METER SIZE(3) AND TYPE	MAXIMUM FLOW RATES (GPM(2)
AWUA	4"C	120
APCWD	3"C	10 (Per Exhibit)
AMWC	2"C	50(4)
AVMSC	2"C	25(4)
BMCMWC	2"C	5 (Per Exhibit A)
Camp Cedar Cr.	4"C	20 (Per Exhibit A)
CPPMWC	2"T	35(4)
Camp Seel	4"C	20
CVCWD-LD	6"C	190
CVCWD-CF	6"C	405
Camp Paiv.	2"C	5(4)
Stew. Ranch	3"C	10(4)
GVMSC	6"C	30 (Per Exhibit A)
CVCWD-LGCF	4"C	180
CVCWD-ZUR	2"T	45
Pond. Pines Camp	2"C	5
Mile High Park	6"C	30 (Per Exhibit A)
RSCWD-AV	3"T	20
RSCWD-FOR	4"T	120
RSCWD-NOB	4"T	360
SFMWD	2"C	10
DWP-RIMFOR	2"T	105(4)
Pilot Rock	3"C	10 (Per Exhibit A)
USDA-Dogwood	2"C	5 (Per Exhibit A)
USDA-Switz	2"C	5 (Per Exhibit A)
VOEMWC	2"T	70(4)
VVPMWC	2"C	40
Str. Lodge MWC	2"PD	10
CVCWD-Pine	2"C	20
CVCWD-Pine	4"T	30 (Pr Exhibit A)
LACSD-DLP	4"C	30
UP LIT BEAR MC	2"C	5 (Per Exhibit A)
Thous Pine Camp	2"T	15

See Page 2 of 2 for footnotes.

February 1990
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EXHIBIT B (Continued)

Footnotes:

(1) Also, rates of flow shall not exceed the following values, based upon AWWA and the Meter Manufacturer's Guidelines:

METER SIZE	METER TYPE (3)	MAXIMUM FLOW (GPM)
2"	P.D.	80
2"	C.	80
2"	T.	160
3"	C.	160
3"	T.	350
4"	C.	250
4"	T.	1,000
6"	C.	500

(2) As determined by Agency.

(3) P.D. = Positive Displacement
C. = Compound
T. = Turbine

(4) Excludes excess flow temporarily granted by Agency during the immediately previous calendar year.

CRESTLINE-LAKE ARROWHEAD WATER AGENCY
SAN BERNARDINO COUNTY, CALIFORNIA
SUMMARY OF RESOLUTION NO. EFFECTIVE 7/1/90
ESTABLISHING OPERATIONAL PROCEDURES
AND CRITERIA FOR USE OF PURVEYOR TURNOUTS
(Refer also to Agency's Rules & Regulations Sections 4.04 & 4.05)

1. GENERAL REQUIREMENTS FOR ALL PURVEYORS (FOR EACH TURNOUT)

a. Up to and including four (4) turnout operations (1) per month - at no additional charge during Agency's normal business hours. However, Agency's mandatory visit of each turnout once each month constitutes 1 of said 4 turnout operations.

b. $50 charge for each additional turnout operation requested and performed during Agency's normal business hours; $100 charge when requested and performed outside of Agency's normal business hours, or for more than one turnout operation per day in the event of an emergency, or in an emergency for any turnout operation with less than the required 24 hour notice.

c. Altitude valves, throttled valves, or devices designed to alter flow rate, or which diminish the Agency's ability to adjust flow at the turnout valve, may not be used by purveyor. Violation causes additional charge of $0.05/c.f. for water delivered during period of violation effective 7/1/90. 30 day notice to remove illegal device, followed by termination of water service upon noncompliance.

d. Minimum run time 24 hours.

e. Water delivery may not exceed a period of 1/2 month without renewal of request.

f. Maximum one (1) request per day per turnout operation.

g. Request for water delivery must state flow in gallons per minute, and total delivery in gallons.

h. Temporary exceptions may be approved by Agency's General Manager to cope with temporary hardship or emergency. Any other exception must be approved by Agency's Board.

(1) Purveyor may apply the aggregate total number of such adjustments each month to any one or more of the purveyor's connections, as that purveyor might select; subject to the Agency's one mandatory visit of each turnout per month.

2. SPECIAL REQUIREMENTS FOR EACH PURVEYOR

ACCOUNT NAME	METER SIZE(1) AND TYPE	MINIMUM FLOW(2) RATES (GPM)	MAXIMUM FLOW RATES (GPM) (3)	MINIMUM REQUESTED CHANGE IN FLOW RATES (GPM)
AWUA	4"C	20	120 (was 170)	10
APCWD	3"C	10	*10	10
AMWC	2"C	5	50(4)(was 45)	5
AVMSC	2"C	5	25(4)	5
BMCMWC	2"C	5	5	5
Camp Ced.Cr.	4"C	20	20	10
CPPMWC	2"T	10	35(4)	5
Camp Seel.	4"C	20	20	10
CVCWD L.D.	6"C	30	190	10
CVCWD C.F.	6"C	30	405 (was 390)	10
Camp Paiv.	2"C	5	5(4)	5
Stew. Ranch	3"C	10	10(4)	10
GVMWC	6"C	30	30	10
CVCWD-LGCF	4"C	20	180 (was 140)	10
CVCWD-ZUR	2"T	10	45 (was 50)	5
Pond.Pines Cmp.	2"C	5	5	5
Mile Hi Park	6"C	30	30	10
RSWD-AV	3"T	20	20 (was 30)	10
RSWD-FOR	4"T	30	120 (was 160)	10
RSWD-NOB 4"	4"T	30	360 (was 320)	10

FOOTNOTES

*No water deliveries made during 1989.

(1) P.D. = Positive Displacement
C. = Compound
T. = Turbine

(2) Practical under field conditions.

(3) Maximum allowable flow rate beginning July 1, 1990. In no event shall rates of flow exceed maximum flows based upon meter capacity.

(4) Excludes excess flow temporarily granted by Agency during the immediately previous calendar year.

2. SPECIAL REQUIREMENTS FOR EACH PURVEYOR (Continued)

ACCOUNT NAME	METER SIZE(1) AND TYPE	MINIMUM FLOW(2) RATES (GPM)	MAXIMUM FLOW RATES (GPM) (3)	MINIMUM REQUESTED CHANGE IN FLOW RATES (GPM)
SFMWC (Sky Forest)	2"C	5	10 (was 20)	5
DWP-RIMFOR	2"T	10	105(4)	5
Pilot Rock	3"C	10	*10	10
USDA-Dogwood	2"C	5	5	5
USDA-Switz	2"C	5	5	5
VOEMWC	2"T	10	70(4)	5
VVPMWC	2"C	5	40 (was 35)	5
Str. Lodge MWC	2"PD	5	10	5
CVCWD-Pine 2"	2"C	5	20 (was 15)	5
CWCMD-Pine 4"	4"T	30	30	10
LACSD DLP	4"C	20	30	10
UP Lit.Br.MC	2"C	5	5	5
Thous.Pine Cp.	2"T	10	15 (was 20)	5

FOOTNOTES

*No water deliveries made during 1989.

(1) P.D. = Positive Displacement
C. = Compound
T. = Turbine

(2) Practical under field conditions.

(3) Maximum allowable flow rate beginning July 1, 1990. In no event shall rates of flow exceed maximum flows based upon meter capacity.

(4) Excludes excess flow temporarily granted by Agency during the immediately previous calendar year.

SUMMARY OF CLAWA DELIVERIES RE PURVEYOR TURNOUT RESOLUTION - MAXIMUM CALCULATED FLOW RATES

Account Name	Meter Size & Type	During 1989 Cal. Yr. Pk. Mo. (100 CF)		PWPM Calc.(3) GPM(1)	Annual Number of Purveyor Requests	During 1988 Cal. Yr. Pk. Mo. (100 CF)	PWPM Calc. (GPM)(1)
AWUA	4" C	5,559.0	May	115.2	11	8,210.0	170.1
APCWD	3" C	-0-	---	-0-	-0-	-0-	-0-
AMWC	2" C	2,826.1	Sep	58.6	14	2,227.1	46.2
AVMSC	2" C	3,379.8	Jan	70.0	23	2,760.8	57.2
BMCMWC	2" C	98.8	Jan	2.0	15	135.1	2.8
CampCedarCr.	4" C	446.5	Mar	9.3	10	285.8	5.9
CPPMWC	2" T	2,007.6	Jan	41.6	21	1,845.5	38.2
Camp Seel.	4" C	1,165.8	Jun	24.2	2	954.9	19.8
CVCWD-LD	6" C	9,418.0	Jul	195.2	22	9,241.0	191.5
CVCWD-CF	6" C	19,581.6	Jul	405.8	38	18,782.1	389.2
Camp Paiv.	2" C	712.6	Aug	14.8	22	574.6	11.9
Stew. Ranch	3" C	629.4	Jun	13.0	35	881.6	18.3
GVMSC	6" C	1,894.0	Jan	39.2	36	797.5	16.5
CVCWD LG CF	4" C	8,895.7	May	184.3	13	7,180.5	148.8
CVCWD ZUR.	2" T	2,244.9	Jul	46.5	9	2,481.7	51.4
Pond.Pines Camp	2" C	357.9	Jul	7.4	8	299.7	6.2
Mile High Park	6" C	322.0	Jul	6.7	-0-	340.0	7.0
RSCWD-AV	3" T	1,179.0	Jul	24.4	14	1,210.6	25.1
RSCWD-For	4" T	5,636.4	May	116.8	40	6,760.7	140.1
(RSCWD-Nob)	(3" T)	(2)	---	---	---	7,436.8	154.1

(1)Includes 11.7% peaking factor.
(2)Turnout removed.
(3)Includes effect of any excess flow temporarily granted by Agency.

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SUMMARY OF CLAWA DELIVERIES RE PURVEYOR TURNOUT RESOLUTION - MAXIMUM CALCULATED FLOW RATES
(Continued)

Account Name	Meter Size & Type	During 1989 Cal. Yr. Pk. Mo. (100 CF)		PWPM Calc.(3) GPM(1)	Annual Number of Purveyor Requests	During 1988 Cal. Yr. Pk. Mo. (100 CF)	PWPM Calc. (GPM)(1)
(RSCWD-Nob)	(3" C)	(2)	---	---	---	3,069.4	63.6
RSCWD-Nob	4" T	17,558.8	Jul	363.9	24	7,167.1	148.5
SFMWC	2" C	423.8	Jul	8.8	2	1,080.5	22.4
DWP Rim For.	2" T	5,686.6	Jan	117.8	17	5,263.5	109.1
Pilot Rock	3" C	-0-	---	-0-	-0-	-0-	-0-
USDA Dogwood	2" C	180.9	Aug	3.7	47	139.6	2.9
USDA Switz.	2" C	63.0	May	1.3	14	267.0	5.5
VOEMWC	2" T	3,680.9	Jul	76.3	34	3,480.9	72.1
VVPMWC	2" C	1,932.2	Jul	40.0	18	1,790.8	37.1
Str. Lodge MWC	2" PD	556.7	Jun	11.5	15	456.7	9.5
CVCWD-Pine	2" C	1,151.7	Aug	23.9	13	772.9	15.0
CVCWD-Pine	4" T	199.2	May	4.1	11	143.0	3.0
LACSD-DLP	4" C	1,582.9	Jul	32.8	17	1,387.7	28.8
UpLitBear MC	2" C	97.1	Oct	2.0	5	-0-	-0-
ThousPineCamp	2" T	842.7	Aug	17.5	12	1,095.3	22.7
	TOTALS	---		2,078.6 GPM		---	2,040.5 GPM

(1)Includes 11.7% peaking factor.
(2)Turnout removed.
(3)Includes effect of any excess flow temporarily granted by Agency.

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FEBRUARY, 1990

CRESTLINE-LAKE ARROWHEAD WATER AGENCY

PURVEYOR ANNUAL CONNECTION FEE (Annual Deposit)(3)

Meter Size & Type (1)	Average Maximum Flow Rate GPM (2)	Levy 1983-87 ($/Yr.)	1988-89 1989-90 Levy ($/Yr.)	1990-91 Levy ($/Yr.)(4)
2" P.D.	90	$80	$135	$140
2" C.	120	80	180	190
2" T.	180	80	270	280
3" C.	240	175	360	375
3" T.	400	175	600	630
4" C.	375	315	565	590
4" T.	1,125	315	1,690	1,770
6" C.	750	710	1,125	1,175

(1) P.D. = Positive Displacement
C. = Compound
T. = Turbine
(2) Average Maximum Flow Rate.
(3) Credited toward water delivered.
(4) Levy to assist Agency in recovering O&M costs for purveyor turnouts where annual water deliveries are either zero or a small quantity of water.

ASSOCIATION OF CALIFORNIA WATER AGENCIES
Water Management Awareness Program

APPLICATION FOR CERTIFICATION

1. AGENCY

Name CRESTLINE-LAKE ARROWHEAD WATER AGENCY

Address P.O. BOX 3880; 24116 CREST FOREST DRIVE
CRESTLINE, CA 92325

Telephone (714) 338-1779

Number of Employees 9

Person Filing Application THOMAS BARNES

Title PRESIDENT, BOARD OF DIRECTORS

Signed Thomas A. Barnes

ACWA USE ONLY

Application Number _____

Date Received from Applicant _____

Date Mailed to Evaluators _____

Reviewed by:	Name	Certification Recommended
1.		
2.		
3.		
4.		
5.		

CERTIFIED: _____

Reviewers Notified: _____

Applicant Notified: _____

2. Statement of Agency Water Management Goals and Objectives.

Since its organization in 1962, the Crestline-Lake Arrowhead Water Agency ("CLAWA") has recognized the importance of using its water supplies efficiently and has encouraged its more than thirty wholesale purveyor customers and all of its approximately 1,000 retail customers to do the same. CLAWA's main source of water supply is from the State Water Project. This water travels over 600 miles from the San Francisco Bay Delta to Silverwood Lake, where CLAWA takes the water and then pumps it uphill a total of 3,800 feet using four booster stations through its transmission facilities across the San Bernardino Mountains. As a result, CLAWA has always viewed its water as a valuable resource, and has concentrated its past, present and future planning efforts on efficient management of this resource.

CLAWA's water management goals and objectives are set forth in its governing Rules and Regulations. These Rules and Regulations describe CLAWA's supplies, distribution system, and its duties and obligations. Pursuant to these Rules and Regulations, the Agency is empowered to discontinue its water service to any wholesale or retail customer who fails to comply with or abide by the Rules and Regulations. (Section 3.03 CLAWA Rules and Regulations. Relevant portions of CLAWA's Rules and Regulations are attached hereto as Exhibit "A".)

Section 3.08 states:

> "To the extent permitted by law, the Agency shall have the power to allocate its available supply, in the event of any emergency or water shortage, on such basis as it determines to be equitable and in the best interests of all concerned."

Section 3.13(c) states that it shall be a violation of the Rules and Regulations to "cause or permit the waste of water from the Agency's water system or to maintain or cause or permit to be maintained any leaky outlets, apparatus, or plumbing fixtures through which water is permitted to drop or run to waste." Section 3.13(d) states that it shall be a violation of the Rules and Regulations "to cause or permit the overflow of water storage reservoirs."

These particular sections of CLAWA's Rules and Regulations demonstrate that CLAWA's water management goals and objectives are to maximize the beneficial use of its water supply by carefully regulating its allocation and discouraging its waste. As is discussed in other sections of this application, CLAWA has emphasized these goals and objectives through several important water management measures.

3. Water Use

ANNUAL USE (662 MG)*

	High	Average	Low
Past			
Last 15 years	400	300	200
Present			
Last 3 years	750	625	500
Future			
Anticipated 15 years	1,890	1,695	1,500

To the extent records are available, state the quantity and average percentage use by: * MG

1988 Calendar Year	Quantity	Percent	Percent Metered
(a) Residential	61	9	100
Internal:			
External:			
(b) ~~Industrial~~ Water Utilities:	553	82	100 Wholesale
(c) Commercial	5	1	100
(d) Governmental	43	6	100
(e) Agricultural	-0-	-0-	-0-
(f) Unaccounted For	12	2	---
TOTAL:	674	100	100

Water Type:

(a) Groundwater	-0-	-0-	-0-
(b) Surface Water	674	100	100

(1) Source: LAKE SILVERWOOD

(2) Water Right: 1,890 MG STATE CONTRACT ENTITLEMENT

(3) Purchased: 674

Urban:

Number of Service Connections 1,040

Population Served 25,000

Agricultural:

Number of Service Connections -0-

Acreage Served 55,000

*Specify units of water use

4. Describe the frequency and magnitude of past, present or projected water supply deficiencies, including steps taken or planned to mitigate such deficiencies.

a. Past or Present Deficiencies

In general, CLAWA has been fortunate not to have suffered major deficiencies in its water supply program in the past. CLAWA obtains the majority of its water supply from the State Water Project. As a result, CLAWA has been able to provide its users with a steady and stable source of water without deficiencies thus far. All of CLAWA's supplies are for municipal purposes, so past deficiencies in deliveries of agricultural water from the State Water Project have not seriously impacted CLAWA.

b. Projected Deficiencies

CLAWA supports the Department of Water Resources' ("DWR") efforts to complete State Project facilities so that full entitlements can be delivered to all state contractors. In the event that there may be future deficiencies imposed by lack of rainfall or by DWR in its operations of the State Water Project, CLAWA proposes to allocate water deliveries to existing wholesale purveyors based upon historic use, with each wholesale purveyor receiving the same percentage cutback in deliveries. CLAWA also proposes to aggressively enforce water conservation measures imposed on CLAWA's own retail customers as hereafter described.

APPENDIX G

APPENDIX G

REFERENCES

The following documents were referred to as general information sources during preparation of this plan. They are available for public review at the locations abbreviated after each listing and spelled out at the end of this section. Some of these documents are also available at public libraries and at other public agency offices in the area.

Cited as:	**Source:**
CLAWA 1963	Crestline-Lake Arrowhead Water Agency. Revised Eligibility Report on Imorted Water Requirements and Financial Analysis of Ability to Meet Capital Recovery Costs. Prepared by Albert A. Webb Associates. 1963. *(Available at CLAWA)*
CLAWA 1991	Crestline-Lake Arrowhead Water Agency. Water Conservation Program for the Crestline-Lake Arrowhead Water Agency. January 1991. *(Included in Appendix)*
CLAWA 1992	Crestline-Lake Arrowhead Water Agency. Resolution No. 475. Resolution of the Board of Directors of Crestline-Lake Arrowhead Water Agency Adopting an Urban Water Shortage Contingency Plan. February 6, 1992. *(Included in Appendix)*
CLAWA 2004	Crestline-Lake Arrowhead Water Agency. 2004 Annual Reports to the Drinking Water Program (for Year Ending December 31, 2004). CLAWA Wholesale, DHS System No. 3610114; CLAWA *(Available at DHS)*
CSan 1992	Crestline Sanitation District. Master Plan Update. Prepared by Engineering-Science, Inc. February 1992. *(Available at CSan)*
CUWCC 1994	California Urban Water Conservation Council. Memorandum of Understanding Regarding Urban Water Conservation in California. Amended September, 1991; February 10, 1993; March 9, 1994. Current as of April 1996. *(Available at CLAWA)*
LAFCO 1996	Local Agency Formation Commission for the County of San Bernardino. Resolutions, maps and legal descriptions covering establishment of, and amendments to, CLAWA's sphere of influence and boundary since establishment of the sphere of influence in 1973. LAFCO Case Nos. 1327, 1463-I, 1536-I, and 1595-I. Compiled by LAFCO March 1996. *(Available at LAFCO)*
PMC 1990	Planning and Management Consultants, Ltd. Seasonal Components of Urban Water Use in Southern California. Final

Report. Submitted to the Metropolitan Water District of Southern California. February 1990. *(Available at DWR)*

SCAG 2005 Southern California Association of Governments. Regional Comprehensive Plan and Guide. Growth Management. Forecast of Population, Housing, and Employment. *(Available at SCAG)*

SCAG 2005 Southern California Association of Governments. SCAG growth forecast data and 2000 census data by census tract and place for Regional Statistical Area 30. September 2005. *(Available at SCAG)*

USGS 1988 U.S. Department of the Interior, Geological Survey. Topographic maps, 7.5 minute series, California--San Bernardino County. Lake Arrowhead Quadrangle, 1971, photorevised 1988. *(Available at Planning)*: