2010 URBAN WATER MANAGEMENT PLAN

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EXECUTIVE SUMMARY

The 2010 Urban Water Management Plan (UWMP) is prepared by the Casitas Municipal Water District (CMWD) and to be submitted to the California Department of Water Resources (DWR) in accordance with the Urban Water Management Act (Act), all subsequent amendments adopted through December 2009, California Water Code, Sections 10610 through 10656, which were added by Statute in 1983, Chapter 1009, and became effective on January 1, 1984. The Act was known as Assembly Bill (AB) 797 while pending before the Legislature. The Act requires every urban water supplier that provides water for municipal purposes to more than 3,000 connections or supplying more than 3,000 acre-feet (ac-ft) of water annually, to adopt and submit a plan every five years to the California Department of Water Resources (DWR). Further, the Act specifies that Plans be filed with the DWR at least once every five years in years ending in five and zero. In compliance with the Act, CMWD filed prior Plans with the DWR in 1985, 1990, 1995, 2000 and 2005. CMWD's current 2010 Plan, contained in this report, is an update of the 2005 Plan and will be submitted to the DWR after approved by the CMWD Board of Directors. The Act has evolved since its passage in 1983. Since 2000, there have been substantial changes to the Act, with the most recent occurring in 2009. There are many new requirements and provisions in the Act:

- Requirement that the water purveyor of a public water system prepare a water supply assessment to be included in the environmental documentation of certain large proposed projects.
- Requirement for affirmative written verification from the water purveyor of a public water system that sufficient water supplies are available for certain large residential subdivisions of property prior to approval of a tentative map.
- Requirement for a description of water management tools in the plan that maximizes resources and minimizes imported water supplies.
- Requirement to notify all cities and counties within service area that a plan or amendment to the plan is being prepared.
- Requirement for additional information if groundwater is identified as an existing or planned water source.
- Requirement to describe specific water supply projects, programs, and implementation schedules to meet projected demands over the 20-year planning horizon.
- Requirement to describe opportunities for development of desalinated water as a long term supply.
- Requirement for data sharing between suppliers and wholesale agencies and a provision allowing suppliers to rely on information provided by wholesaler.
- Provision allowing DWR to take into consideration a water supplier's implementation plans and achievements for water conservation when evaluating application for grants and loans.
- Requirement to discuss recycled water opportunities.
- Requirement to describe water quality over a 20-year horizon and the manner in which quality affects management strategies and supply reliability.
- Requirement to notify all cities and counties within the service area of the time and place of the public hearing on plan adoption.

- Requirement to file the plan or any subsequent plan amendment with all cities and counties within service area.
- Requirements that DWR make a supplier ineligible to receive Prop 204 or Prop 13 funding if supplier does not comply with the Act.

The 2010 UWMP plan reports the activities of the CMWD to secure a safe, reliable water supply for the district. The structure of the 2010 Plan is based upon the information required by the Urban Water Management Planning Act (Act) for the 2010 update, as coordinated by the California Department of Water Resources (DWR). This document has been laid out according to DWR's guidance manual to ensure and easily verify that the information presented here meets all of the DWR requirements.

SECTION 1 – PLAN PREPARATION

Coordination

CMWD has coordinated its UWMP planning efforts with a number of agencies to ensure the accuracy of the data and issues presented in this plan. Table 2 lists the agencies that provided assistance with the development of this UWMP. Public comment was solicited on the Plan in the form of public forums for the general public, taxpayers, water users, local governments, and state agencies.

This plan provides information on present and future water supplies and demands, and provides an assessment of CMWD's water resource needs. It serves as a long-range planning document for CMWD's water supply. Droughts, limited supplies, environmental demands - all of these factors must be taken into consideration to provide a safe and reliable water supply for western Ventura County. The intention of the 2010 Plan is to demonstrate CMWD's water supply reliability over the next 25 years in 5-year increments. The plan addresses CMWD's water system and includes a description of water supply sources, magnitudes of historical and projected water use, and a comparison of water supply to water demands during normal, single-dry, and multiple-dry years. It also describes CMWD's efforts to implement water conservation and water efficient uses for urban and agricultural water supplies. The plan is CMWD's commitment to a long-term plan to ensure water reliability into the future.

City and County Notification and Participation (§ 10621(b))

The CMWD notified all the agencies listed in Table 1 of planned public meeting dates and times during the preparation of the 2010 UWMP that were scheduled as part of the process for updating the plan to encourage representatives from those agencies to attend CMWD's public meetings (Table 2). CMWD invited comments from all agencies as well. An initial letter was mailed on April 1, 2010 to all of the agencies listed in Table 1 below. In accordance with the requirement to provide notice to all cities and counties at least 60 days prior to the public hearing, a second letter was mailed to the City of Ventura, City of Ojai and County of Ventura on April 5, 2011 that indicated a copy of a plan would be available on CMWD's website and at the CMWD office on June 3, 2011. The letter also indicated that the public hearing was scheduled at 3:00 p.m. on Wednesday, June 22, 2011 at the District Office located at 1055 Ventura Avenue, Oak View, California 93022 at which time it was held.

CMWD encouraged 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. CMWD's Spring 2010 newsletter was sent out in June of 2010 to all 30,000 households within the District. It provided all of the planning, meeting times and locations for the Urban Water Management Plan. It was also noted in the Ventura County Watershed U – classes in the spring of 2010. And, it was posted to CMWD's website at www.casitaswater.org. The Winter 2011 newsletter also noted the intention of CMWD to hold a public hearing in May or June of 2011 regarding the adoption of the 2010 UWMP. The District noticed and advertised the public hearing in accordance with all of the requirements of the Urban Water Management Planning Act.

TABLE 1 - AGENCIES NOTIFIED

Agencies Notified by Letter
City of Ojai – City Manager and Mayor
Ventura County Resource Conservation District
Ventura County Watershed Protection District
Faria Beach Homeowner's Association
Ventura County Supervisors
Sulphur Mountain Road Water Association
Rincon Water & Road Works
Hermitage Mutual Water Company
Carpinteria Valley Water District
Ojai Valley Land Conservancy
Siete Robles Mutual Water Company
Ventura River County Water District
Sisar Mutual Water Company
Rancho Del Cielo Mutual Water Company
Golden State Water Company
City of Ventura – Utilities Manager
Ojai Basin Groundwater Management Agency
Tico Mutual Water Company
Senior Canyon Mutual Water Company
Meiners Oaks County Water District
City of Ventura – Public Works Director, City Council, Mayor
Ojai Valley Sanitary District

Table 2 - Coordination with Appropriate Agencies

Check at least one box per row	Participated in UWMP development	Commented on draft	Attended public meetings	Contacted for assistance	Received copy of draft	Sent notice of intention to adopt	Not Involved / No Information
City of Ventura	X	X		X	X	X	
County of Ventura				X	X	X	
City of Ojai					X	X	
Ojai Valley Land Conservancy							X
Carpinteria Valley Water District							X
Golden State Water Company	X			X	X	X	
Hermitage Mutual Water Company					X	X	
Meiners Oaks County Water District				X	X	X	
Rancho Del Cielo Mutual Water Company							X
Rincon Water & Road Works					X	X	
Senior Canyon Mutual Water Company				X	X	X	
Sisar Mutual Water Company					X	X	
Sulphur Mountain Road Water Assoc.							X
Casitas Mutual Water Company							X
Tico Mutual Water Company					X	X	
Ventura River County Water District	X	X	X	X	X	X	
Ojai Basin Groundwater Management Agency				X			
Siete Robles Mutual Water Company					X	X	
Ojai Valley Sanitary District		X		X	X	X	

Plan Adoption, Submittal, and Implementation

It is imperative for CMWD to maximize its water resources, efficiencies, and minimize losses because the water comes from 100% local sources. The 2010 UWMP updates the CMWD implemented strategies included in the 2005 UWMP. These plans assist CMWD to address local water supply management issues. The implementation of these plans includes actively cultivating community participation in water management activities that encourage greater water use efficiency within the District. Implementing the water conservation strategies included in the plans will assist the District to delay as long as possible the need to import water. Some of these implementation activities include:

- Announced Urban Water Management Planning schedule and contact information at the Watershed U – Ventura River training in April 2010 that was attended by approximately 100 participants.
- Sent out quarterly newsletters that include information on water conservation to all residents within the District.
- Provided water conservation information to all new customers to the District.
- Participated in local community events to provide information on water conservation.
- Spoke to local community groups about water conservation.
- Provided information on website on how to use water more efficiently.
- Supplied curriculum to elementary schools in the District on water conservation.
- Provided free residential water audits to residents within the district.
- Provided free commercial, industrial, and institutional water audits within the district.
- Provided free water conservation devices to residents, businesses, institutions, industrial entities in district.
- Provided free audits to agricultural customers.
- Provided rebates to residential and commercial customers for High Efficiency Washing Machines; High Efficiency Toilets; Smart Irrigation Controllers; and, high efficiency sprinkler nozzles for landscapes.

In 2004, CMWD began participating in the Ventura County Integrated Regional Water Management Plan group now called the Ventura County Watershed Coalition. This effort included developing a list of all potential projects among regional water agencies and organizations that could benefit from seeking regional cooperation. CMWD submitted an application through the Ventura County Watershed Coalition for Proposition 50 regional grant funds and was awarded a grant to improve the reliability of Senior Canyon Mutual Water Company's groundwater resources so they would rely less on CMWD's surface water supply. This project will improve conjunctive use of local groundwater and surface water supplies. This proposal was done in conjunction with the Senior Canyon Mutual Water Company. CMWD also participated in the development of the county-wide landscape water efficiency website ventura.watersavingplants.com. This website promotes native and drought tolerant plants on a regional basis and makes it easier for residents to plan water efficient landscapes. It offers visitors the ability to maintain a plant database, browse numerous garden plans, and provides information on a large number of native and drought tolerant plants to include plant requirements for sun, soil, and water.

In accordance with the Act and also to encourage involvement of public and community groups, CMWD held a public hearing on June 22, 2011 in CMWD's board room before adoption by the Board of Directors. The plan was than submitted to the California Department of Water Resources within the 30 day requirement. Proof of this public hearing is provided in **Appendix A**, which contains a copy of the resolution adopting the 2010 Urban Water Management Plan.

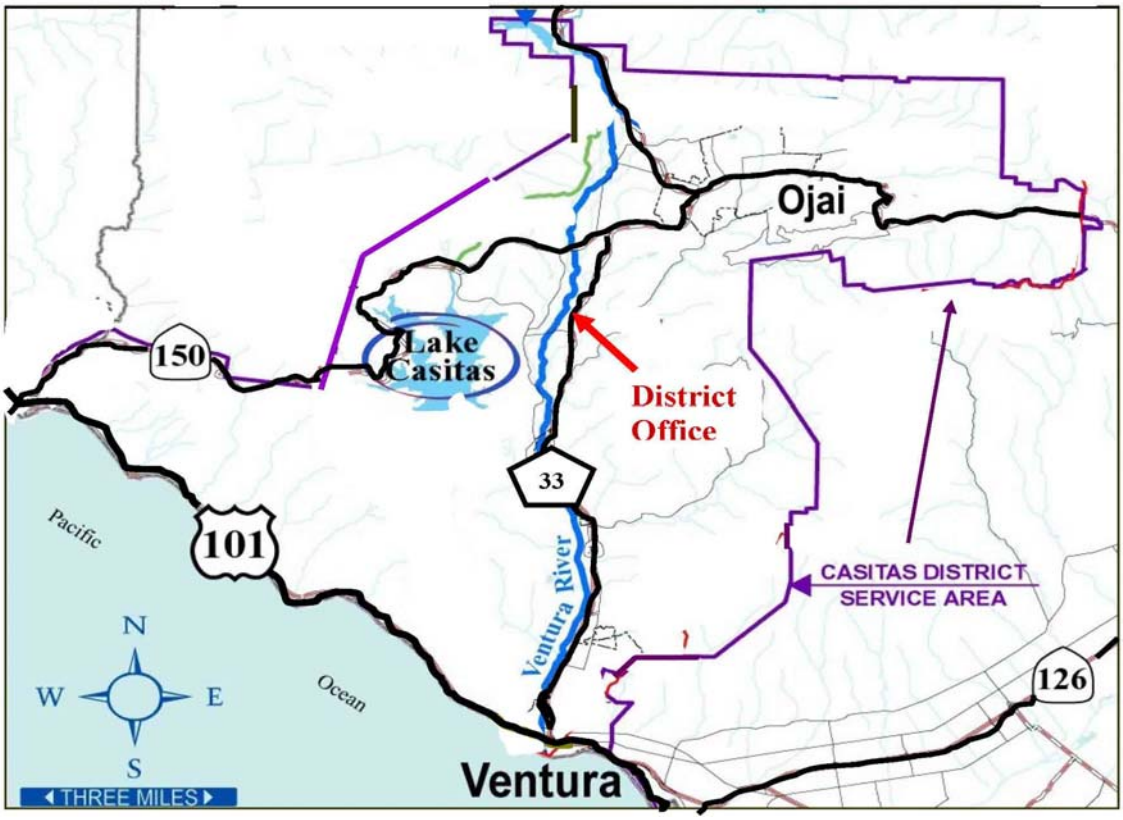
Other Information

Please direct any questions regarding this plan to Ron Merckling, Water Conservation/Public Affairs Manager for CMWD at (805) 649-2251 Extension 118 or rmerckling@casitaswater.com

SECTION 2: SYSTEM DESCRIPTION

CMWD lies in Southern California's semi-arid coastal plain. Specifically, the district is located in western Ventura County (Figure 1) where there is a history of drought, water supply shortages and efforts to develop local water supplies. The area has and continues to be solely dependent upon local water supplies. Local rainfall contributes to the Ventura Watershed by replenishing local groundwater sources and the Ventura River. CMWD's population growth and urban water demand have changed nominally in recent years and this trend is expected to continue.

Figure 1 – CMWD Municipal Water District Service Area



History

The western portion of Ventura County, California, which includes unincorporated portions of Ventura County and the cities of Ojai and San Buenaventura, struggled with water shortage issues in the early to mid 1900s. At the beginning of the 1900s western Ventura County began to experience growth in agriculture and population. The primary growth areas, the City of Ventura and Ojai Valley, relied on either diverting river flows or groundwater pumping to satisfy water demands. By the 1930s, the local agriculture and cities began to experience drought conditions and question the reliability of their water supplies. The first half of the 20th century experienced several drought periods and caused western Ventura County to consider various options to increase local water supply reliability.

In 1933, the State issued Bulletin No. 46, Ventura County Investigation, in response to the filing of applications to appropriate water from the extreme headwaters of Sespe Creek and import Sespe Creek water by way of a proposed tunnel to the Ventura River watershed. Bulletin No. 46 identified that the agriculture of the Ventura River Basin had grown to 4,535 acres. Bulletin No. 46 considered, with the lack of any other data, that the 1892 through 1932 period is assumed to have established a normal or long-time average rainfall and run-off, and that all conclusions as to water supply are made on this assumption. It was further recognized in Bulletin No. 46 that Ventura County went through two successions of wet and dry cycles, each cycle persisting for approximately twenty years that were evenly divided between a wet or dry period.

The conclusion of Bulletin No. 46 was that the Ventura River Basin would provide ample supply if the city had the ability through its facilities to extract water from the Ventura River. Likewise in the Ojai Valley, groundwater appeared to be more than sufficient to meet demand on the groundwater basin. Bulletin No. 46 did recognize that fluctuations in the water table with wet and dry cycles are drastic, but when the water table is high there is waste by seepage out of the basin and it was suggested that spreading of water for basin recharge may come about as development increases.

The significance of the Bulletin No. 46 conclusion was that there appeared to be plenty of water to meet the demands over the course of the study period. Bulletin No. 46 did not address the conditions that were experienced during the two ten-year dry cycles; This may have promoted local action to consider to appropriate additional water supplies from the Sespe Creek, which is in a different watershed and miles away from the Ventura River Basin. Bulletin No. 46 appears to oversimplify the comparison between the average water availability and the average demand for the forty year period, nevertheless, Bulletin No. 46 recommended actions that were developed in the following decade – primarily for more local water source (Matilija Dam) for recharging the Ojai groundwater basin during drought conditions.

By 1940, the County of Ventura began a series of reconnaissance and water supply evaluation studies to consider a variety of dam site alternatives to develop a surface water supply on the Ventura River that could buffer the drought and augment groundwater supplies. The drought period of 1944 through 1951 was first responded to by the Ventura County Flood Control District with a joint flood control and water storage-spreading project known as the Matilija Dam Project. The Matilija Dam was erected in the Matilija Creek and completed in 1948. By 1950, with little water stored behind the Matilija Dam and the continuation of drought conditions, the County of Ventura pursued additional investigations through consulting engineers and the State of California, as described in Bulletin No. 12, which recommended the development of surface water supplies to augment the local groundwater basins. Bulletin No. 12 went one step further in viewing the water needs and water quality issues of the entire Ventura County, and by also suggesting water importation from the Colorado River and Feather River (which became the County's interest in the development of the California State Water Project to bring Northern California water to Southern California). Bulletin 12, page 3-59, states:

> "As has been stated, the security of existing developments and economies in Ventura County is threatened by water supply shortages which develop during periods of drought, by perennial lowering of ground water levels, and by the intrusion of sea water into pumped aquifers. Furthermore, the growth and enhancement of the economy of portions of the County have been impeded by the lack of firm water supplies. Elimination of present water resources problems and provision for indicated increased future water requirements of the County will require the development of additional water supplies."

In 1952, the formation of the Ventura River Municipal Water District (VRMWD, which later was renamed Casitas Municipal Water District CMWD in 1971) was quick to follow with a request of the U.S. Bureau of Reclamation to make a water requirement and water supply study for western Ventura County. The people of the VRMWD had been noting the progress of the Cachuma Project in Santa Barbara County and were pleased with the "know how" handling of the Cachuma Project. By March 1953, VRMWD and the Bureau of Reclamation entered into a cooperative investigation contract. By the fall of 1953, Bureau investigators completed reconnaissance-level studies to determine the approximate long-range water requirements, comparison of the merits of available dam sites, and determination of the river diversion and storage capacity required to meet the long-term water needs of the area (Bennett, 1967). The feasibility study also considered the recreational benefits that the project would have for the area.

The Bureau's feasibility report recognized the need for water supply development, as stated in the following:

1) Page 6, "Development of an additional firm water supply is urgently needed in the Ventura River Project Area. Although the overall safe yields of the ground-water basins are approximately in balance with the amounts used, maldistribution of the use in relation to the supply now exists. Consequently, additional quantities are needed to serve some areas of insufficient ground-water storage capacity. This situation applies particularly to the developed lands lying around the edge of the Ojai Valley where wells went dry during the recent drought."
2) Page 7, "The City of Ventura is in critical need of additional water supplies under conditions of present development."
3) Page 8, "Ventura County is receiving more than its proportionate share of the present population growth of the State. This is due to its favorable location, agriculture, industrial, and commercial activities, and climatic and scenic attractions. This growth is expected to continue."

As an appendix to the feasibility report, the Bureau developed operational studies for the Ventura River Project. In the Water Resources Appendix, the Bureau describes the runoff characteristics of the Ventura River Basin as follows on Page 16: "Runoff from stream in the Ventura River Basin is derived almost entirely from rainfall, consequently exhibits the same monthly and seasonal variations as the rainfall. Since there is no accumulation of snow in the watershed, all streams diminish fairly rapidly in flow at the conclusion of the rainfall season. Small summer flows are maintained in the upper reaches of the larger watersheds by springs (Plate 15). Following severe storms, discharge in the

Ventura River has been known to increase in a few hours from practically no flow to a rate of thousands of cubic feet per second. Seasonal runoff has varied from a maximum in excess of 400 percent of the mean to a minimum of less than 5 percent of the mean."

In the Bureau's determination of the Ventura River Project's safe yield (USBR 1954b), the Bureau summarized its approach to the safe yield as follows: "In general, for smaller reservoirs the most intense drought is critical, while for larger reservoirs the drought with the greatest product of length times mean deficiency is critical. Reconnaissance studies indicated that for CMWD Reservoir at 250,000 acre-feet the greatest drought of record (length times mean deficiency) is critical."

The Ventura River Project received the support of many federal agencies and moved with a sense of urgency to be authorized by Congress, design, and completion of facility construction by 1959. The key elements of the Ventura River Project are Casitas Dam and Reservoir (Lake Casitas), the Robles Diversion and Canal on the Ventura River, and the water distribution system that consist of pipelines, pump plants, storage tanks and chlorination stations. Under a repayment Contract with the USBR, CMWD was assigned the responsibilities for the operation and maintenance of the Ventura River Project and the perpetual right to use all water that becomes available through the construction and operation of the Project, subject to the satisfaction of vested rights.

During the first 30 years of the Ventura River Project, Lake Casitas filled for the first time in 1978 and demands for water developed to full safe yield levels by 1990. The Project serves as a primary supply for many direct customers and as a supplemental, or backup supply, for groundwater users during times of drought.

Description of the Physical system - Distribution Facilities and Water Treatment

CMWD's water supply comes completely from local water sources. The main source of water supply for CMWD is Lake Casitas, which has a full capacity of 254,000 acre-feet of water. The reservoir when full covers a surface area of 2,760 acres and has 32 miles of shoreline. It is 200 feet at its deepest spot. The source water for Lake Casitas is direct rainfall on the lake surface, local watershed runoff from Coyote and Santa Ana Creeks and from diversions from the Ventura River made through the Robles Diversion Facility and canal. The maximum diversion rate at the Robles Diversion Facility is 500 cubic feet per second.

CMWD also maintains and operates one well with an approximately 300 acre-feet per year capacity. The water from the well exceeds the State's maximum contaminate level for nitrate and is blended with lake water to an acceptable level of nitrate before delivery to the CMWD customers.

CMWD's service area, while holding 5,000 acre-feet of annual State Water entitlement, is not able to receive those annual entitlements due to the lack of any physical connection (pipeline or canal) to the State Water Project to bring State Water into the service area. Due to the cost of the physical connection, estimated in 1990 at over $100 million, and cost of State Water, the service area has not proceeded with the physical connection to the State Water system.

CMWD's distribution system includes approximately ninety-seven miles of main and distribution pipelines, nine pumping plants, four chlorination stations, and thirty million gallons of treated water stored in fourteen steel reservoirs located throughout the District. CMWD meters all of its direct service customers, including meters on all connections to other water agencies. Resale water agencies in the district meter their own customers. Balancing reservoirs placed throughout the system at various elevations presently regulate water system pressures within CMWD's distribution system. These elevations are determined from the requirements of various zones of service ranging from sea level to 1,500 feet above sea level. Because of the variations in terrain and microclimates in the CMWD service area, the water requirements of individual customers within the various zones vary widely. Some areas of the District that have excessive pressures require pressure-reducing stations. The vast majority of customers are furnished between 50 to 80 pounds per square inch pressure at their meters.

In 1995, CMWD added to the original facilities a sixty-five million gallon per day pressure filtration treatment plant that enables CMWD to meet the regulations set forth in the State of California Surface Water Treatment Rules. The plant continues to meet its original water quality objectives. CMWD further treats filtered water with a chloramination process and additives for corrosion control, as directed by the State Department of Health Services.

Service Area Climate:

The climate in CMWD's district boundaries is Mediterranean, which is characterized by cool, wet winters and warm, dry summers. However, climate does vary significantly based on distance from the Pacific Ocean, elevation, area drainage and slope aspect. The closest comparable standard monthly Average Evapotranspiration (ETo) available for 2009 comes from the CIMIS station located in Santa Paula Table 3. Precipitation, as reported by the National Oceanic and Atmospheric Administration (NOAA), a federal agency, weather station located at Ojai, averages 21.7" annually. Average precipitation at the NOAA Ventura station near the coast is 14.5." Annual historical rainfall is 23.49" as reported by the Lake Casitas Recreation Area Weather Station from 1958 to 2009, shown in Table 4. Nearly eighty percent (80%) of annual rainfall occurs from December to March. Winter low temperatures can fall below freezing in inland areas and hit above 100 degrees Fahrenheit in the summer, driving higher water demand from customers. Temperatures along the coast are moderated by the ocean and seldom reach the inland extremes. Coastal marine fog occurs throughout the year but usually is present from May until July, generally burning off in the inland areas, but may persist all day on the coast. Hot, dry easterly winds (Santa Anas) typically occur in the fall, which increases evapotranspiration (ET) and increases agricultural and landscape water use.

Table 3 - AVERAGE CLIMATE DATA FOR 2009

Month	Avg. Max. Temp. F	Avg. Min. Temp. F	Total Precipitation (Inches per month)	ETo (Inches per month)
January	73.6	46.4	0.61	3.81
February	67.5	42.2	3.19	2.60
March	69.4	42.9	0.54	4.27
April	72.0	42.9	0.18	4.80
May	74.3	50.5	0.00	5.57
June	74.1	54.0	0.10	5.18
July	79.4	54.7	0.00	6.71
August	80.9	55.2	0.00	5.62
September	83.3	55.6	0.01	4.97
October	78.0	49.7	2.64	4.04
November	75.6	42.9	0.01	3.21
December	66.4	40.7	3.50	2.17
Annual	75.54	48.14	.90	4.41
ETo Data based on: http://wwwcimis.water.ca.gov/cimis/sampMonthlyReport.do?src=samp Info – This information is from nearest CIMIS station (Santa Paula, CA).				

TABLE 4 - AVERAGE RAINFALL *RAINFALL IN INCHES, WATER YEAR OCTOBER 1 THRU SEPTEMBER 30

WATER YEAR	CASITAS DAM	CASITAS RCREATION	MATILIJA DAM	YEARLY MEAN
1958-59	10.22	11.84	16.62	12.89
59-60	15.79	14.70	14.45	14.98
1960-61	8.77	8.42	13.24	10.14
61-62	37.75	33.96	39.21	36.97
62-63	18.70	17.54	20.07	18.77
63-64	13.62	12.04	16.13	13.93
64-65	23.26	22.77	22.83	22.95
65-66	25.23	25.23	30.30	26.92
66-67	34.43	32.30	44.78	37.17
67-68	16.61	16.44	15.20	16.08
68-69	46.57	47.55	69.94	54.69
69-70	16.70	16.52	18.98	17.40
1970-71	19.72	19.71	22.65	20.69
71-72	11.94	13.72	15.49	13.72
72-73	34.79	34.56	45.91	38.42
73-74	19.95	18.43	22.16	20.18
74-75	23.83	24.05	26.83	24.90
75-76	17.90	17.23	20.85	18.66
76-77	12.90	11.98	13.75	12.88
77-78	49.05	49.66	63.04	53.92
78-79	25.80	25.64	28.66	26.70
79-80	34.06	35.15	42.43	37.21
1980-81	16.24	16.99	21.88	18.37
81-82	19.35	20.34	25.35	21.68
82-83	51.14	48.22	58.65	52.67
83-84	17.91	16.63	19.34	17.96
84-85	17.30	15.93	19.00	17.41
85-86	33.49	32.20	41.32	35.67
86-87	10.86	9.83	11.44	10.71
87-88	18.62	18.40	21.58	19.53
88-89	11.73	11.85	13.65	12.41
89-90	9.46	8.86	12.48	10.27
1990-91	24.43	23.59	26.01	24.68
91-92	29.75	28.53	34.27	30.85
92-93	41.20	43.31	60.38	48.30
93-94	16.08	14.69	16.27	15.68
94-95	49.84	49.04	58.17	52.35
95-96	18.8	16.91	22.78	19.50
96-97	24.37	25.27	27.8	25.81
97-98	59.54	58.78	64.27	60.86
98-99	12.68	10.67	12.56	11.97
99-00	24.35	21.94	26.79	24.36
2000-01	29.36	27.86	33.45	30.22
01-02	9.28	8.77	10.10	9.38
02-03	24.83	23.69	30.58	26.37
03-04	17.03	14.33	18.84	16.73
04-05	54.66	51.28	74.44	60.13
05-06	26.52	25.84	34.58	28.98
06-07	8.60	7.15	9.23	8.33
07-08	26.19	24.58	33.62	28.13
08-09	14.82	12.91	16.56	14.76
AVERAGE	**24.24**	**23.49**	**29.00**	**25.57**
MAXIMUM	**59.54**	**58.78**	**74.44**	**60.86**
MINIMUM	**8.60**	**7.15**	**9.23**	**8.33**

Service Area Population

Population growth in the district paralleled population growth in Southern California up until 1960. The District's population in 1960 was 45,000. The population forecast for the District's service area reflects a very low growth period through the year 2035. CMWD serves directly and indirectly a population of 68,557. There is a large population within the District's boundaries that are served by other water agencies from groundwater sources. CMWD's largest customer, the City of Ventura, is projected to have a 0.96% population increase and the Ojai area is projected to have a 0.43% increase during each of the next five years according to data from the Ventura County Local Agency Formation Commission (LAFCO) shown in Tables 5 and 6. This average indicates a population growth of about 0.70%, which is higher than the 0.04% rate indicated by the US Census data from 2000 to 2009 for the district's census tracts. CMWD is the backup water supply for nine water purveyors within the District and for some individual agricultural customers with groundwater wells. CMWD has over 3,000 customers in total with 2,715 direct urban customers and almost 300 agricultural customers.

The population five year growth increments within CMWD boundaries are depicted in Table 6. They show population increases from 63,934 in the year 2000 to 82,914 in 2035. The growth rate for the incremental years is predicted to be about six percent each decade. These population increases are dependent on both local groundwater and on CMWD's surface water supply. The potential growth areas are within the cities of Ventura and Ojai, which are not directly served by CMWD.

TABLE 5 - COUNTY SUB-AREA POPULATION (NOT CMWD SERVICE AREA)*

Sub Area	2010	2015	2020	2025	2030	2035
Ojai Area	32,901	33,866	34,190	34,925	35,676	36,294**
Ventura Area	119,652	125,454	130,696	136,969	142,491	148,210**

*Projected from data at http://www.ventura.lafco.ca.gov/pdf/MSR/CSA3414MSRFinal.pdf.
**Assumed 2020-2025 projection rate for 2025-2035 projection rate.
***Assumes projection rate for 2010-2025 continues for 2025-2035 period.

TABLE 6 – POPULATION AND WATER DEMAND PROJECTIONS: ACRE-FEET PER YEAR

Year	Population[1]	Urban Water Demand	Agricultural Demand	Unaccounted Water	Total Demand
2000	63,934	10,274	9,115	3,671	23,060
2010	68,557	9,603.4	6,398	447	16,398
2015	70,847	7,748[2]	7,922[3]	447[4]	17,354[5]
2020	73,137	7,748[2]	7,922[3]	447[4]	17,354[5]
2025	75,725	7,748[2]	7,922[3]	447[4]	17,354[5]
2030	78,312	7,748[2]	7,922[3]	447[4]	17,354[5]
2035	82,914	7,748[2]	7,922[3]	447[4]	17,354[5]

[1]Based on Countywide population forecast adopted by Ventura Council of Governments on May 24, 2001.

[2]Average Urban Water Demand from 1999-2009, strongly dependent upon weather, population growth unlikely to effect because of low growth projects.

[3]Average agricultural demand from 1999-2009, average not expected to change excepting influence of weather trends.

[4]Assumes improvements made in 2010 will continue.

[5]Average water demand from 1999-2009. Water demand is expected to increase during drought and decrease during wet conditions so a more accurate number to use would be the safe yield number.

SECTION 3 – SYSTEM DEMANDS

Water Demand

Water consumption within the CMWD service area has remained relatively constant in recent years with minimal population growth, no new water demands, and water demand variations notably related to local annual rainfall conditions.

The historical record of annual water deliveries from Lake Casitas is illustrated in Figure 2. The graph shows a large increase in water demand during drought conditions, especially during the several years of drought conditions that occurred from 1988 to1991. By the early 1990s, the number of new accounts added annually diminished considerably as the area became nearly built out. Overall average water demand has remained relatively steady since the late 1990s except for the rise in dry year water demand, Figure 3 illustrates how large rainfall years are associated with low water demand and low rainfall years are associated with increases in district water demand. Resale and agricultural customer groups have a much stronger influence on CMWD water demands during low rainfall periods, as compared to the CMWD's residential customers that show very little response to weather conditions. Agricultural and residential customers have a higher rate of increase in water demand versus residential customers during low annual rainfall years because their primary groundwater sources become depleted quickly and they then must rely on CMWD's surface water supplies. CMWD's water demand has historically increased during drought conditions due to the nature of CMWD being a backup water supply to local groundwater resources that quickly diminish during drought conditions. CMWD's Lake Casitas reservoir is managed as a long term water supply with a 21 year safe yield of 20,840 acre-feet based on the historical 1944-1965 drought cycle under certain conditions as highlighted in the "Water Supply and Use Status Report", December 2004.

Water demand includes water delivered to the various CMWD customer classifications, minor losses in the distribution system due to leaks, and flushing of the system for water quality maintenance. CMWD water demand can vary dramatically from year to year. Water demand can range from 16,135 acre-feet in 1993 to a maximum of 26,253 acre-feet in 1989 at the height of a drought, see Figures 2 and 3. Water demand is closely tied to rain conditions as shown in Figure 3. During wet years, there is a major reduction in water demand compared to dry years. During dry years, demand can increase dramatically when local groundwater sources utilized by agriculture and other customers are no longer available. Customers increase their reliance on CMWD's surface water during these dry years Table 7 illustrates water demand from 1975 to 2009 in acre-feet per year.

Figure 2 - Total Water Demand

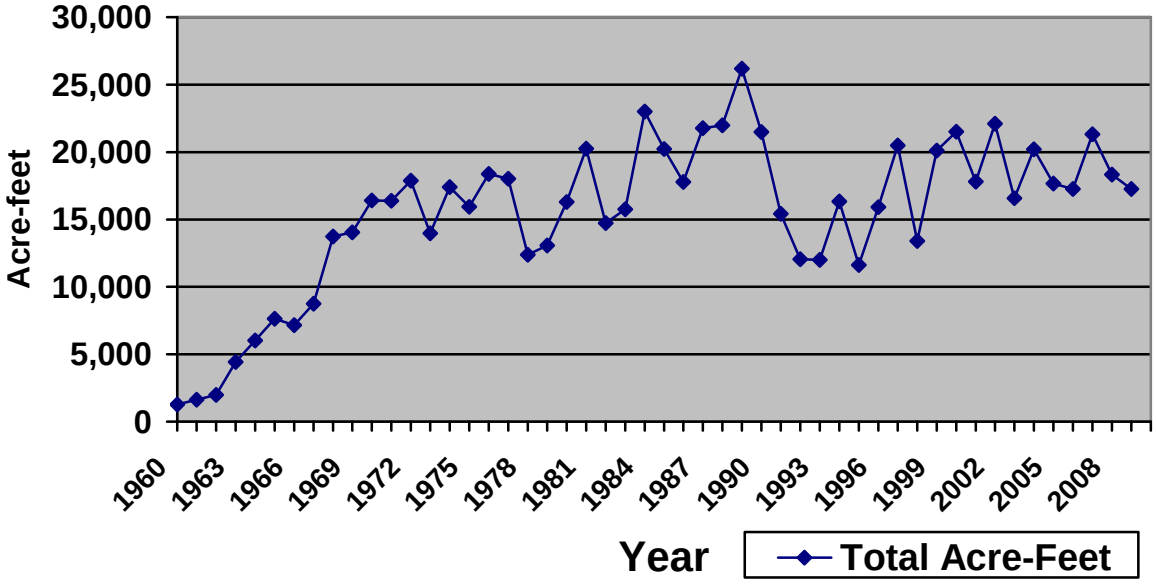


Figure 3 - CMWD Water Deliveries to System and Rainfall

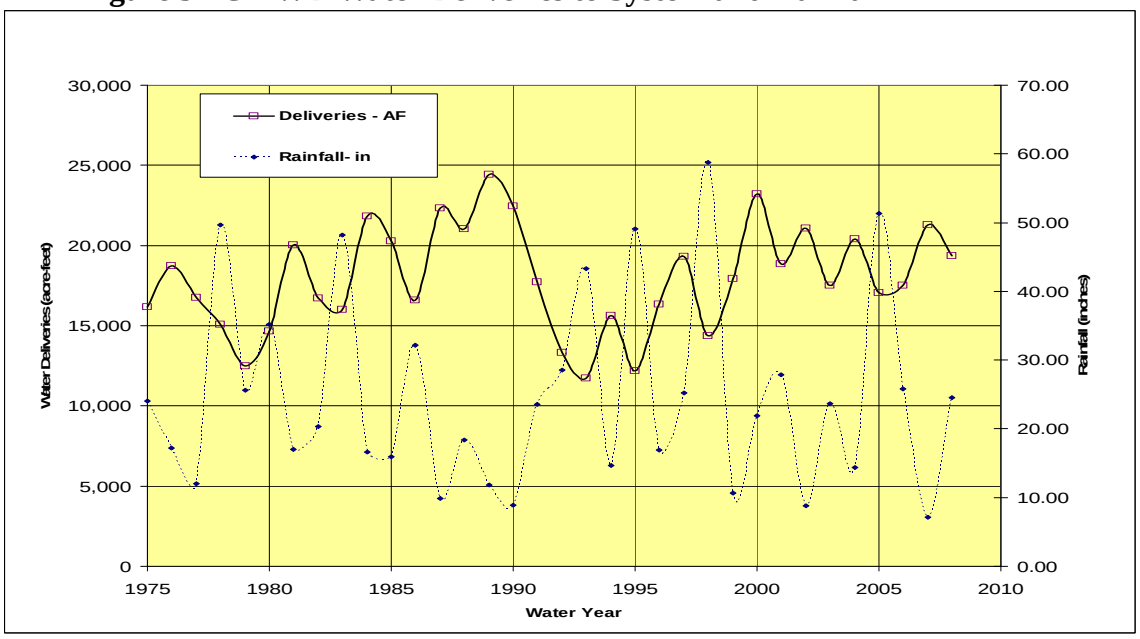


Table 7 - CMWD DELIVERIES AND METERED USE WITH RAINFALL – WATER YEAR

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11	(12
										Total	System
Water	Rainfall	Deliveries to	----------Metered Water Use (AF)----------							Metered	Losses
Year	On Lake	Main Conveyence								Water Use	(3) - (11)
	Surface	System	Agriculture	Residential	Business	Resale	Resale	Other	Industry	in System	
	(AF)	Water Year				Pumped	Gravity			Water Year	
		(AF)								(AF)	
1975	5,019	16,156									
1976	3,782	18,725	5,681	776	454	783	8,381	904	265	17,244	1,481
1977	3,352	16,779	6,283	677	416	736	8,105	671	208	17,096	-317
1978	9,879	15,080	5,037	729	420	745	7,094	382	254	14,661	419
1979	5,395	12,499	5,205	759	443	779	5,098	500	221	13,005	-506
1980	7,393	14,651	5,628	796	436	944	6,882	519	229	15,434	-783
1981	4,002	20,012	6,678	927	396	1,311	8,997	677	198	19,184	828
1982	5,645	16,702	5,693	828	417	1,070	7,269	675	154	16,106	596
1983	11,699	16,026	4,094	884	378	607	7,976	547	178	14,664	1,362
1984	2,924	21,832	8,650	1,209	611	985	9,742	852	232	22,281	-449
1985	2,637	20,274	8,200	1,183	746	920	8,443	352	207	20,051	223
1986	5,589	16,606	6,873	1,199	538	556	6,343	379	170	16,058	548
1987	3,142	22,339	9,732	1,372	650	826	9,107	476	196	22,359	-20
1988	3,715	21,032	8,489	1,416	620	685	8,496	458	162	20,326	706
1989	1,399	24,416	10,449	1,530	688	849	9,510	401	162	23,589	827
1990	1,447	22,454	9,830	1,353	678	1,632	6,672	448	130	20,743	1,711
1991	4,496	17,723	8,118	1,237	644	2,149	3,411	583	113	16,255	1,468
1992	5,620	13,189	6,698	1,272	507	1,461	1,370	307	72	11,687	1,502
1993	7,849	11,694	5,814	1,213	515	1,029	1,708	316	108	10,703	991
1994	3,458	15,555	7,421	1,369	566	1,361	2,968	361	126	14,172	1,383
1995	10,895	12,107	5,897	1,322	526	1,108	1,813	674	127	11,467	640
1996	6,897	16,135	6,799	1,506	588	1,651	2,502	549	120	13,715	2,420
1997	4,304	18,996	7,345	1,636	917	2,091	5,251	460	122	17,822	1,174
1998	12,632	14,372	5,230	1,433	550	1,177	5,708	313	122	14,533	-161
1999	2,552	17,942	7,291	1,719	616	759	6,229	405	92	17,111	831
2000	4,784	23,060	9,115	1,826	638	751	6,435	533	91	19,389	3,671
2001	5,879	18,743	7,518	1,619	620	373	6,299	647	51	17,127	1,616
2002	1,924	21,066	9,003	1,738	725	712	6,628	467	111	19,385	1,681

2003	4,726	16,476	7,483	1,550	617	399	4,891	357	60	15,356	1,120
2004	2,890	20,088	8,902	1,702	623	594	5,432	431	176	17,859	2,229
2005	10,282	16,953	6,357	1,504	617	623	6,819	387	170	16,478	475
2006	5,765	17,331	6,484	1,415	674	444	6,053	376	124	15,569	1,762
2007	1,686	21,014	9,358	1,732	756	591	6,730	456	49	19,672	1,343
2008	5,159	19,137	8,416	1,785	672	679	5,375	440	60	17,427	1,710
2009	3,646	17,610	7,211	1,549	650	524	5,137	407	46	15,523	2,087

In 1989, CMWD's supply and demand studies indicated water demand was approaching the safe annual yield and any significant increase above existing levels could ultimately lead to demand out-stripping supplies. A continued water supply deficit could lead to future supply shortages during long-term drought conditions. In 1992, CMWD's Water Efficiency and Allocation Program was adopted by the District's Board of Directors to encourage efficient use of water to reduce overall water demand and to ensure the safe annual yield of supply would not exceed the critical 21,920 acre-feet per year average (as it was determined at that time). Average demand is not anticipated to increase above the current safe yield of 20,840 that is derived from the "Water Supply and Use Status Report" completed in December of 2004. Steps are now being taken by the District to limit future demand including changes in the District's allocation program. The Ojai City Council adopted a growth management plan that restricted housing and population growth to less than 1 percent annually through 2010. Census data reported in 2011 indicated that the City of Ojai had a 5% decrease in population.

Regression Analysis:
Future water demand projections for each classification can be approximated by using regression analysis. Regression analysis is a statistical term where one or more variables are measured to predict a pattern for how those variables will likely react or occur in the future. In other words, past data allows for a basic predictive model for future data. A cautionary note of reference, utilized by financial analyst, "past performance does not guarantee future results." The word 'regression' literally means 'a move backwards,' but in statistics it can be viewed to mean 'a move forward.' Linear regression allows the use of data on past customer water usage to create a graph line that can show a trend toward future water usage for a customer. A line formula is developed using regression analysis to plot a trend line for future water usage, where $y = x + 1$, where y = water usage, x = year, 1 = where the line intercepts graph lines, and the number before the x = the slope of the line. This line is created using past annual water usage for each customer group. The line can help predict future water usage trends, all other variables being equal, for customers. One potential variable that could influence this analysis could be the impact of long-term climate change. It is still not clear what that impact will be at this time.

Some CMWD's customer classifications have particular circumstances that have influenced past usage that may make this analysis less reliable as a predictor for future water usage. For example, the agricultural and residential customer base was in a development period from 1960 through 1990. In 1990, the District began to limit expansion of water service and impose water allocation purchase for any future expansion of water use. This water use trend of the development period is not representative

of the growth trend of the past ten years and is not likely to be similar to the growth trend of the next ten years. For this reason, the demand projections are partially based on trends of each classification for the 2000 through 2009 period. Other factors such as County of Ventura and Cities' growth projections will also be considered in the future water demand projections.

The following explanation on the predicted future water usage for each customer group explains the result of the regression analysis performed. It then explains what other possible variables could influence these results. This analysis provides some reliable guidance methodology that can be used to help determine the most likely changes in future water usage among all customers.

Customer Classification:

Residential Classification – Residential customers are typically single-family residences. The residential classification also includes a limited amount of multi-residential accounts. CMWD is providing additional residential water allocations only if additional water supply is identified. CMWD is also implementing water conservation best management practices that are likely to reduce water usage as well. Linear regression analysis ($y = -12.47x + 1723.8$, where 1999 = 1, x = year, y = usage) indicates a trend of slight decreasing water usage. Limited growth in new housing due to economic and land planning factors are also likely contributing factors to this decrease. The number of new customers over the last five years averaged five per year, most being residential customers and some agricultural-residential customers.

Agricultural Classification – The Bureau of Reclamation has classified approximately 12,500 acres of land as irrigable lands within CMWD district boundaries. CMWD provides water service to approximately 5,700 acres irrigated lands. Some agricultural lands are served by well water or receive water from other water agencies. Based on CMWD's 2009 crop report data, CMWD provides water directly to 3,445 acres and supplements groundwater use on approximately 2,168 acres of irrigated crop lands. The total irrigated lands which are receiving CMWD water is 5,613 acres which is primarily avocado and citrus orchards, and a limited amount of flowers, strawberries, apples and walnuts. Agricultural water demand will fluctuate depending on weather conditions, but generally demands an annual average of two and a half acre-feet per acre for inland areas and two acre-feet per acre on the coast. The portion of CMWD's safe annual yield allocated to agricultural is 8,880 acre-feet or 44 percent of the safe annual yield. Agricultural is not expected to increase over the next twenty years. Agricultural expansion requires approval and purchase of additional allocation, which is cost prohibitive for most agricultural interests. CMWD has not had any new agricultural allocations purchased in the last several years. CMWD is implementing the Significant Watering Efficiency Assistance Program (SWEAP) to assist agricultural customers in improving irrigation efficiencies. Linear regression analysis ($y = -34.886x + 8131$, where 1999 = 1, x = year, y = usage) indicates a slight decrease in water demand.

Business Classification – Businesses directly served by the District range from small restaurants, gas stations, beauty shops and small strip malls to two local golf courses. CMWD is implementing water conservation best management practices that are likely to reduce some water usage. CMWD

does not anticipate any growth in this area even though linear regression analysis (y = 5.5564x + 621.86, where 1999 = 1, x = year, y = usage) shows a slight trend toward increasing usage.

Industrial Classification – A limited number of industrial customers are served directly by the District. Industrial services are primarily oil field and gas production facilities. High-pressure water injection for oil recovery is the primary use of the industrial demand. The changes in the economics of the oil industry may result in greater oil pumping, which could result in greater water usage in this sector. Recently, a large oil producer converted a part of its CMWD water demand to an alternative groundwater source and lessened the demand for CMWD water. The linear regression trend line (y = -2.0355x + 105.86 where 1999 = 1, x = year, y = usage) indicates a slight decreasing usage.

Interdepartmental Classification – This classification is for the District's own services, which includes the Lake Casitas Recreation Area, Dam tender's house, and CMWD's office. This usage represents a small portion of CMWD's overall usage.

Institutional/government Classification– This classification includes government and non-profit organizations. The linear regression trend line (y = -9.9018x + 505.37 where 1999 = 1, x=year, y=usage) indicates a slight decrease in usage in the future. Water demand in this category is not expected to change much since the number of customers is unlikely to change.

Multi-family and Landscape Classification – CMWD does not currently separate customer accounts with these categories.

Resale Classification - Within CMWD's boundaries there are nine other public and private water agencies known as resale customers (Table 9). The majority of the resale agencies are primarily dependant upon available local groundwater as their main source of water supply. They rely on CMWD as a supplemental and drought contingency water supply.

During dry years, resale water demand for CMWD water supply can increase dramatically when local groundwater sources that are utilized by resale agencies become diminished or no longer available. Resale customers then rely more on CMWD's surface water, and in some cases rely exclusively on water deliveries from Lake Casitas until groundwater supplies are replenished by rainfall events. Depending on the severity and duration of the drought period, it could be anticipated that any one or more resale agency will have limited groundwater supply and may rely on CMWD for the balance of essential water supply needs of each agency.

Given the nature of the resale service and water use trends, the use of a regression analysis is not a good tool to make projections of future water demands. CMWD has contacted each of the agencies to gather information on future projections of water use. Except for the City of Ventura, the resale agencies are subject to the low growth projections that are same as that for CMWD. Therefore, for the purpose of projecting future resale water demands placed on CMWD, the Plan will reflect the information gathered from each water agency and project from a normal, non-drought, water use year.

The year of 2008 has been selected to represent the normal base year and the agency information is provided in Table 8.

Table 8 - Water Use by Resale Agencies (2008)

Agency Name	Public/ Private	Groundwater (AF)	CMWD Water (AF)	Total Agency Usage (AF)	Population in District	No. of Connections in District
City of Ventura*	Public	N/A**	5,083	5,083	30,000	9,138
Golden State W.C.	Private	1,749	439	2,188	8,202	2,775
Ventura River C.W.D.	Public	1,133	222	1,355	6,850	2,150
Meiners Oaks W.D.	Public	1,113	2	1,114	4,200	1,286
Senior Canyon M.W.C.	Private	305	289	595	800	257
Tico M.W.C.	Private	13	5	18	77	38
Sisar M.W.C.	Private	11	1	12	325	105
Hermitage M.W.C.	Private	15	477	492	35	22
Siete Robles M.W.C.	Private	42	0	42	245	98

*Water usage from CMWD is based on in-district usage.
**In 2008 the City of Ventura did not have groundwater production due to storm damage to water wells.

Table 9 - Sales to Other Water Agencies

Agency Name	2005	2010	2015	2020	2025	2030	2035
City of Ventura	7,867	5,500	6000	6,100	6,200	6,500	7,000
Golden State W.C.	403.63	122.93	125	125	125	125	125
Ventura River C.W.D.	254	190	190	190	190	190	190
Meiners Oaks C.W.D.	6	2	2	2	2	2	2
Senior Canyon M.W.C)	406	217	200	200	200	200	200
Tico M.W.C.	7	5	5	5	5	5	5
Sisar M.W.C.	6	1	1	1	1	1	1
Hermitage M.W.C.	3	4	4	4	4	4	4
Siete Robles M.W.C.	.04	.01	.01	.01	.01	.01	.01
Total	8,953	6,042	6527	6,627	6,727	7,027	7,527

The following is a description of the various agencies that are Resale classification customers of the CMWD.

1. **City of Ventura –** The City service area is partially within the CMWD boundary and partially outside of the CMWD boundary. This Plan only considers the part of the City service area that is within the CMWD boundary. The City has a portfolio of water resources that includes water well extractions in the Ventura River near Foster Park, rights to reclaim water from the Ojai Valley Sanitary District treatment Plant, several connections to a CMWD pipeline, and groundwater sources from the east end of Ventura. The City and CMWD have a 1995 water service agreement to secure a minimum of 6,000 acre-feet annual purchase of water from Casitas to the City. In recent years, the City has lost two large water customers and has seen reductions in water purchases from oil production. The City completed its Water Master Plan in March 2011 and 2010 Urban Water Management Plan in June 2011. In preparation of these plans, the City has indicated that there is a potential for specific projects and land use changes that will cause water use to increase from 5,083 acre-feet in 2008 to potentially over 7,000 acre-feet in the next 25 years.

2. **Golden State Water Company –** Service area is approximately the limits of the City of Ojai. GSWC relies on groundwater extractions from the Ojai groundwater basin and supplements the groundwater supply with additional water from CMWD service connections. Groundwater is the preferred and least expensive of the two water sources. GSWC has the highest water rates of any agency in the CMWD boundary, which has led to limited use by its customers. According to the United States census, the City of Ojai has seen a 5% reduction in population in the last ten years, which should influence future water demand.

3. **Ventura River Water County Water –** Service to a limited boundary area which is not expected to have any appreciable growth in water demands over the next thirty years. VRCWD relies primarily on two wells in the Ventura River and only relies on CMWD when groundwater sources become depleted. VRCWD is proactive with its customers in requesting timely water use reductions to lessen the demand for CMWD water. Future demand increases on CMWD's water supply would be dependent upon increased drought frequency.

4. **Meiners Oaks Water District –** Service to a limited boundary area which is not expected to have any appreciable growth in water demands over the next thirty years. MOWD relies primarily on two wells in the Ventura River and has only relied on CMWD during infrequent system emergencies (i.e., 1985 Wheeler Fire). Future demand increases on CMWD's water supply would be dependent upon increased severe drought frequency.

5. **Senior Canyon Mutual Water Company –** Service to a limited boundary located in the east end of the Ojai Valley. The SCMWC customer base is a mix of residential, large residential and agricultural land use. The primary source of water supply are three wells in the Ojai ground water basin and diversions from a tunnel and creek source. SCMWC uses CMWD as a

secondary source of water to buffer peak demands and as a drought contingency supply. The SCMWC water demands have remained fairly consistent from year to year, and can be expected to remain consistent in the future without any other foreseen changes to land use. System improvements could decrease reliance on CMWD's water supply.

6. **Tico Mutual Water Company** – Service area is a limited boundary area in Mira Monte. The TMWC customer base is small residential with no prospects of water use expansion. The TMWC water source is one small water well in the Mira Monte area and one 2-inch service connection to CMWD as a backup supply. Water use in TMWC has remained consistent over the past ten years and is expected to remain so in the future.

7. **Sisar Mutual Water Company** – Service to a limited boundary that is partially in the CMWD boundary, located in the northeast area of the Upper Ojai Valley. SMWC has been self-reliant on its water wells and on a one 4-inch connection to CMWD as an emergency water source. Water use in SMWC has remained consistent over the past ten years and is expected to remain relatively constant in the future. They have no further ability to grow.

8. **Hermitage Mutual Water Company** – Service to a limited boundary in the foothills north of the Ojai Valley. The HMWC customer base is primarily agriculture with several large residential estates. The primary source of water is from wells in the Ojai groundwater basin and a 6-inch supplemental connection to CMWD. Water use is driven by agricultural water demands, attributed to local annual rainfall conditions and conditions in the Ojai groundwater basin. The HMWC water demands have remained fairly consistent from year to year, and can be expected to remain consistent in the future without any other foreseen changes to land use.

9. **Siete Robles Mutual Water Company** – Service is to a limited housing tract that is located southeast of the City of Ojai. The source of water for SRMWC is a well in the Ojai groundwater basin, and one service connection to CMWD. SRMWC has been self-reliant on its well water except during high nitrate events or emergency well repair periods. The residential housing tract is fully developed with no expectation for additional water use.

TABLE 10 - PAST, CURRENT AND PROJECTED WATER DELIVERIES INCLUDED URBAN AND AGRICULTURE

Year		Water Use Sectors	Single family	Multi-family	Commercial	Industrial	Instit/ Gov	Land-scape	Ag	Resale	Total
2000	Metered	# of accounts	2,594	0	97	10	91	0	260	9	3,061
		Deliveries AF/Y	1,826	0	638	91	533	0	9,115	7,186	19,389
	Unmetered	# of accounts	0	0	0	0	0	0	0	0	0
		Deliveries AF/Y	0	0	0	0	0	0	0	0	0
2005	Metered	# of accounts	2,682	0	107	12	97	0	260	9	3,167
		Deliveries AF/Y	1,877	0	725	170	399	0	8,370	7,442	20,494
	Unmetered	# of accounts	0	0	0	0	0	0	0	0	0
		Deliveries AF/Y	0	0	0	0	0	0	0	0	0
2010	Metered	# of accounts	2,718	0	116	12	105	0	260	9	3,220
		Deliveries AF/Y	2,076	0	775	197	364	0	8,755	6,458	18,209
	Unmetered	# of accounts	0	0	0	0	0	0	0	0	0
		Deliveries AF/Y	0	0	0	0	0	0	0	0	0
2015	Metered	# of accounts	2,772	0	125	12	113	0	260	9	3,291
		Deliveries AF/Y	2,275	0	824	254	328	0	9,139	6,301	19,347
	Unmetered	# of accounts	0	0	0	0	0	0	0	0	0
		Deliveries AF/Y	0	0	0	0	0	0	0	0	0
2020	Metered	# of accounts	2,827	0	135	13	121	0	260	9	3,365
		Deliveries AF/Y	2,473	0	874	311	293	0	9,524	5,937	20,102
	Unmetered	# of accounts	0	0	0	0	0	0	0	0	0
		Deliveries AF/Y	0	0	0	0	0	0	0	0	0
2025	Metered	# of accounts	2,883	0	144	13	129	0	260	9	3,438
		Deliveries AF/Y	2,672	0	923	368	257	0	9,908	5,573	20,855
	Unmetered	# of accounts	0	0	0	0	0	0	0	0	0
		Deliveries AF/Y	0	0	0	0	0	0	0	0	0
2030	Metered	# of accounts	2,940	0	153	13	137	0	260	9	3,512
		Deliveries AF/Y	2,870	0	972	425	222	0	10,293	5,209	21,809
	Unmetered	# of accounts	0	0	0	0	0	0	0	0	0
		Deliveries AF/Y	0	0	0	0	0	0	0	0	0
2035	Metered	# of accounts	2,999	0	163	13	145	0	260	9	3,589
		Deliveries AF/Y	3,027	0	972	482	185	0	10,355	4,845	21,247
	Unmetered	# of accounts	0	0	0	0	0	0	0	0	0
		Deliveries AF/Y	0	0	0	0	0	0	0	0	0

The District is not anticipating any significant changes in population growth within its service area boundaries within the next twenty five years. The low population growth is likely to limit overall customer water demand in the future because most of this growth is likely to occur in resale agencies service area, which will allow other agencies groundwater sources to supplement the increased demand. Resale agencies seeking additional water supplies from CMWD will need to negotiate additional water allocations from CMWD or find other water supplies including water conservation and additional groundwater sources.

Projected Lower Income Housing Demand

Ventura County's General Plan includes background information and data in Chapter 3 of the Land Use Appendix on low income housing in unincorporated areas of the county, which includes the CMWD service area. Section 3.3.6 identifies water supply constraints regarding CMWD. Section 3.3.7 contains the "Land Inventory" that discusses where different income level housing could be located. Beginning on page 107 there is a discussion concerning where, and the types of, lower-income housing that can be built in the unincorporated area. The figure 3.3.7-10 in Section 3.3.7 regarding the Land Inventory generally depicts where there are vacant properties that could accommodate lower and moderate-income dwellings, which does not include the CMWD service area.

The county is currently working on re-zoning to 20 units per acre as required by the state. None of the parcels identified are located within CMWD, however, there are some parcels that could accommodate farm worker complexes or second dwelling units that are considered to be a form of lower-income housing. CMWD has not had one additional agricultural account in the last five years and does not anticipate any additional agricultural accounts over the next 25 years. Since there is no agricultural growth and very little or decreasing residential populations CMWD does not anticipate any low income housing over the next 25 years, see table 11 below.

Table 11 - Low Income Projected Water Demand

Low Income Water Demands	2015	2020	2025	2030	2035
Single-Family residential	0	0	0	0	0
Multi-Family residential	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**

Water Use Reduction Plan

CMWD is focused on limiting current deliveries to maintain the safe annual yield average of 20,840 acre-feet during a historical drought period or 19,780 acre-feet during a drought recovery period. No water shortages requiring mandatory rationing of water have to date been mandated. Although, CMWD has yet to enact the rationing stages of the Water Efficiency and Allocations Program, controls on the expansion of water use remain in effect since 1991 in an effort to protect the district's supplies from long-term drought conditions. The District continues to implement an aggressive water conservation program and to offer assistance to all customer groups to help improve water use efficiency.

Wholesale Water Supplier Water Demand Reduction Programs

CMWD has pursued a coordinated regional effort with both resale agencies and with water agencies throughout the County of Ventura to pool resources, submit grants, and implement projects to conserve and preserve local water supplies. The Ventura County Watershed Coalition (VCWC) has multiple opportunities to collaborate and enhance supply and delivery systems for the benefit of all. The coalition has received $25 million in implementation grants from Proposition 50 Integrated Regional Water Management Plan Group Funding. One subcommittee of this group is the Water Efficiency Committee. CMWD has pool funding with agencies throughout the county to sponsor an

interactive website to help residents plan drought tolerant landscapes. CMWD currently is working on a Proposition 84 implementation grant that again works with agencies throughout the county to conduct landscape water audits. These projects would not be as cost effective for CMWD to fund independently.

Retail Water Supplier Water Demand Reduction Programs

CMWD has implemented a four tier residential rate structure. Tiered rate structures are one of the most effective means to target wasteful use. The residential rate structure currently used is as depicted in Table 12 below.

Table 12 - Residential Tiered Rate Structure

Units (HCF)	Gravity Rate $	Pumped Rate $
0-20	.567	.831
21-34	1.003	1.267
35-100	1.404	1.668
101 +	2.200	2.464

This structure creates a financial incentive for customers to conserve water. The benefits of this rate structure are that those customers that limit their water usage pay less per unit than those that use more on an increasing scale.

CMWD provides a condition for every will-serve letter for the purpose of obtaining a Ventura County building permit, with the requirement to install water conserving plumbing fixtures.

CMWD has implemented a Smart Irrigation Controller rebate program for an amount up to $350 per applicant. These weather based controllers are showing on average a more than 15% reduction in water usage from those applicants that have installed them. CMWD has targeted larger landscape customers in its marketing efforts. The program requires a customer to have more than 2,000 square feet and more than 4 irrigation valves to participate.

CMWD is a member of the California Urban Water Conservation Council (CUWCC) and as a result plans to provide detailed Demand Management Measure (DMM) information when it is available. CMWD is working to implement all of the water conservation best management practices as defined by the CUWCC. The major tools that CMWD is using to conserve water include a tiered rate structure that encourages greater water use efficiency that reduces higher use customer consumption, active membership in the CUWCC and implementation of their water conservation best management practices, and working with resale agencies and other water agencies on a regional basis with shared water conservation programming and funding for regional projects.

Baselines and Targets

According to the Guidebook, an urban retail water supplier (excepting resale and agricultural water sales), that provides potable municipal water to more than 3,000 end users or that supplies more than 3,000 acre-feet of potable water annually at retail for municipal purposes, must set a 2020 water use target and a 2015 interim target using one of four methods according to the Water Conservation Act of 2009. Three of these are defined in Section 10608.20 (a) (1), with the fourth developed by DWR. The methodologies, water use targets, and reporting that apply to urban retail water suppliers as defined in the Act, therefore, do not apply to CMWD. CMWD delivered 2,651acre-feet of potable water to its 2,715 direct retail end users in 2009. CMWD's annual retail urban water use averaged 2,866 acre-feet from 2000 to 2009. While CMWD deliveries are below the threshold that is stipulated in the Act, CMWD will develop these targets on a voluntary basis.

US Census Data and Number of Residential Connections Used to Project District Population

CMWD is a wholesale, agricultural, and an urban water supplier. The population projections and Gallons Per Capita Day (GPCD) methodology incorporated here adheres to the California Department of Water Resources (DWR), "*Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use (For the Consistent Implementation of the Water Conservation Act of 2009)*, October 1, 2010.

The population projection for this plan utilizes US census data for those areas of the district that receive urban water deliveries. The GPCD calculations used in this plan incorporate the number of residential connections and group residents reported in each of the US census tracts located directly in the district. The United States Census 2000 Summary File Data was used to calculate population number averages per average number of persons living in single and multi-family housing, and group residences in each of the census tracts that are located within the district. The census tracts were then aligned with pump zones within the district for which the number of multi-family and single family connections are available in the current year, 2010. The population average per single and multifamily residential unit for each census tract were than multiplied by the number of metered accounts in each census tract for single and multi-family units respectively. The United States Census Bureau census tract family household size ratios are used in Table 13 and are compared to water or pump zones in CMWD's distribution system and to the particular number of group residents found in each census tract. The ratios in Table 13 are multiplied by the number of residential single family and multi-family units found in each water zone or census tract in Table 14 to find a total population for 2010. A population figure for the year 2000 was not possible since the number of residential customers within each census tract is only known presently. To calculate populations for previous years, Table 14 uses the 4% US Census population growth figure over the ten year period for these census tracts as a basis for a reverse linear regression in population. It assumes that each zone had the same rate of population growth, which would equate to a .4% growth rate per year over the ten year period.

Agricultural, Resale and the attributed water losses for agricultural and resale customers in the system are removed proportionately from the urban water usage in the system, as shown in Table 15. Table 15, is a five year baseline calculation for the average Gallons Per Capita Day and Table 16 is a 10 year baseline calculation utilizing the same methodology

TABLE 13 - TOTAL CMWD URBAN RETAIL SERVICE POPULATION 2010

Census Tract*	Group Pop.**	Casitas Pump Zone	Single-Family units	Single Family House-hold Size	Total Single Family Pop	Multi-family units (18 Res. Meters)	Multi-Family House-hold Size	Total Mult-Family Pop.	Total Pop.
9.01	**61**	8	66	2.45	**162**	0	1.95	**0**	223
9.02	**57**	4	101	2.77	**280**	383	2.12	**812**	1,149
9.03	**383**	5,6	63	2.81	**177**	0	2.59	**0**	560
10.01	**64**	9	266	2.7	**718**	0	2.57	**0**	782
10.02	**53**	3	512	2.69	**1,377**	40	2.76	**110**	1,540
11.01	**148**	2	609	2.78	**1,693**	77	3.00	**231**	2,072
11.02	**90**	2	609	2.76	**1,681**	77	2.49	**192**	1,963
12.04	**26**	1	100	3.06	**306**	56	2.9	**162**	494
12.05	**11**	9	266	2.2	**585**	0	2.56	**0**	596
Total	**893**				**6,979**			**1,507**	**9,379**

Footnote: *Numbers provided by US Census for each tract at www.census.gov, American FactFinder, Census 2000 Summary File 1 (SF-1).
**Group residents are nursing homes, hospitals, or other institutional residence.

Figure 4 - Census Tract Map including Casitas Municipal Water District Census Tracts

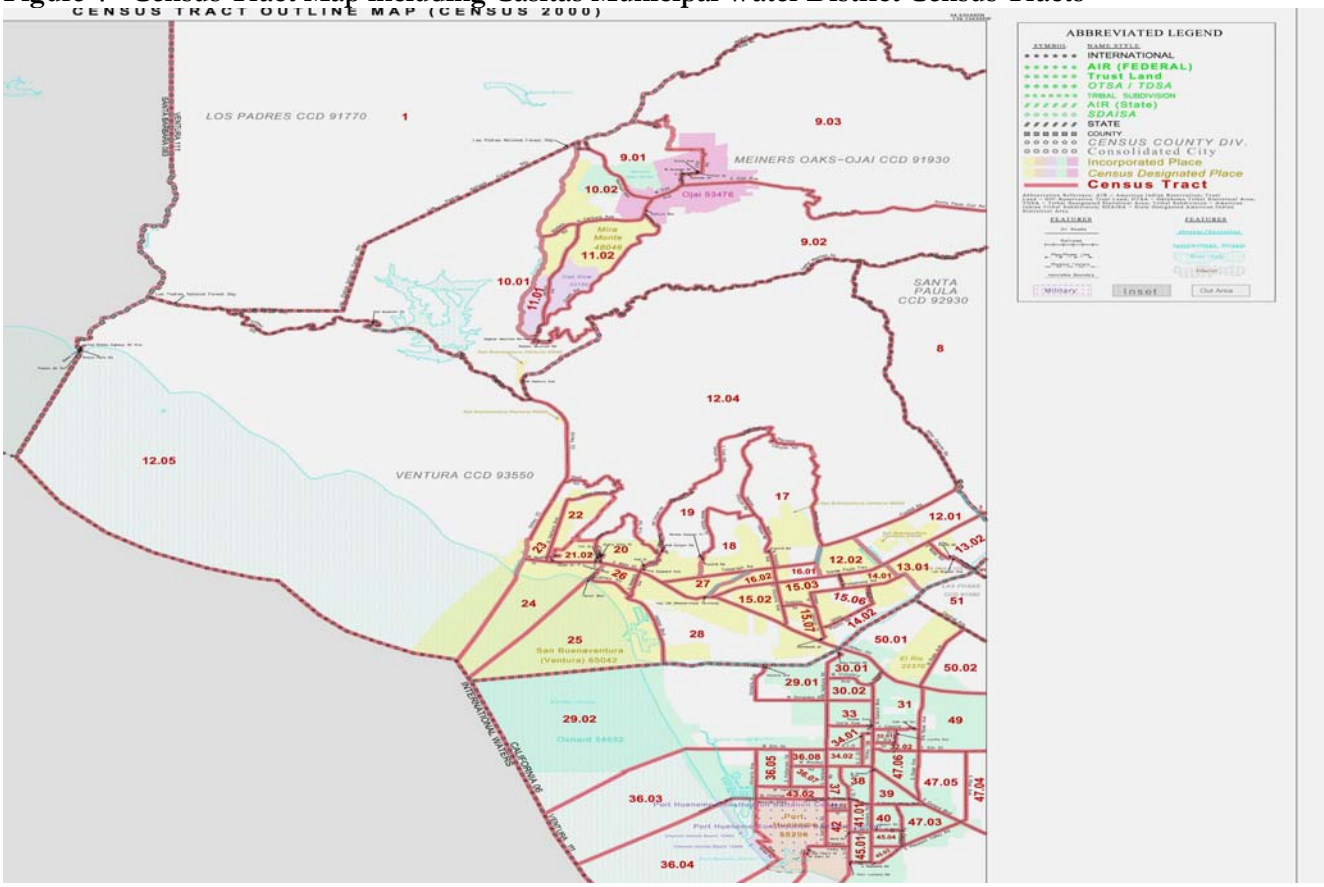


TABLE 14: TOTAL CMWD DIRECT SERVICE AREA URBAN POPULATION GROWTH

Number of Residential Customers			
Year	# of Customers	% Change Per Year	Total Population CMWD direct service area
2000	2,602	0.4	9,004
2001	2,673	0.4	9,046
2002	2,675	0.4	9,088
2003	2,675	0.4	9,130
2004	2,762	0.4	9,172
2005	2,680	0.4	9,214
2006	2,692	0.4	9,256
2007	2,694	0.4	9,298
2008	2,691	0.4	9,340
2009	2,707	0.4	9,379

US Census information indicated 4% population growth for census tracts identified between 2000 and 2009.

Urban Retail Water Use Targets:

The Water Conservation Act of 2009 requires two baseline periods be determined during the calculation of the base daily per capita water use. The two baseline periods utilized for CMWD are as follows:

- The 5-year base line period from 2004- through 2008 (Table 15), which is used to determine whether the 2020 per capita water use targets meets the legislative requirements minimum water use reduction requirements of at least a 5 percent reduction per capita water use.
- The 10- year base period from 1999 to 2008 (Table 16).

The 5- year base line period's 5% reduction calculation of 291.65 Gallons Per Capita Day (GPCD) is greater than the 20% reduction for the 10- year base line period, which is 255.36 GPCD, therefore, CMWD is required to use the 10- year base line period for developing its GPCD targets. This means CMWD's 2020 urban water use target will be 255.36 GPCD and its 2015 target will be 287.28 GPCD, which represents a 10% reduction target goal. The GPCD figure is much higher than the California average. There will be significant challenge for meeting a 20% reduction given that CMWD has a disproportionate number of commercial and institutional large urban water users compared to a small number of direct residential

TABLE 15 - AVERAGE DAILY PER CAPITA GALLONS 5 YEAR BASELINE - WATER YEAR

	1	2	3	4	5	6	7	8	9
					3/2	5 x 4	2-(3+6)	7/365 days x 325,851 gallons	8/1
CMWD MWD	October 1 to September 30		Agricultural and Resale Water Use	System Water Loss AF	% Ag/Resale System Water Loss	Ag/Resale Share of System Water Loss AF	Gross Water Use (AF)* Urban Retail	Gross Water Use (gal per day) Urban Retail	Daily Per Capita Water Use
Base Years	Service Area Pop.	Volume from own Sources							
2004	9,172	20,088	14,928	2,293	0.74	1,704	3,456	3,085,320	336
2005	9,214	16,953	13,799	533	0.81	434	2,720	2,428,404	264
2006	9,256	17,331	12,981	1,774	0.75	1,329	3,021	2,697,212	291
2007	9,298	21,014	16,679	1,279	0.79	1,015	3,320	2,963,768	319
2008	9,340	19,137	14,470	1,658	0.76	1,254	3,413	3,047,041	326
*Includes unaccounted for water use. Metered deliveries to urban retail customers for this period averaged 2,826 acre-feet.per year.									
Average Daily Per Capita Usage Baseline for 5 years									307.2

Base Daily Per Capita Water Use Calculation for Section 10608.20

TABLE 16 - AVERAGE DAILY PER CAPITA GALLONS 10 YEAR BASELINE – WATER YEAR

	1	2	3	4	5	6	7	8	9	10
					3/2	5 x 4	2-(3+6)	7/365 days x 325,851 gallons	8/1	
CMWD MWD	October 1 to September 30		Agricultural and Resale Water Use	System Water Loss	% Ag/Resale System Water Loss	Ag/Resale Shareof System Water Loss	Gross Water Use (AF)* Urban Retail	Gross Water Use (gal. per day) Urban Retail	Daily Per Capita Water Use	Rainfall in inches
Base Years	Service Area Population	Volume from own Sources								
1999	8,968	17,942	14,279	831	0.80	661	3,002	2,679,705	298	10.67
2000	9,004	23,060	16,301	3,671	0.71	2,595	4,164	3,717,369	412	21.94
2001	9,046	18,743	14,190	1616	0.76	1,223	3,330	2,972,435	329	27.86
2002	9,088	21,066	16,343	1,681	0.78	1,304	3,419	3,052,180	336	8.77
2003	9,130	16,476	12,773	1,068	0.78	828	2,875	2,566,665	281	23.69
2004	9,172	20,088	14,928	2,293	0.74	1,704	3,456	3,085,320	336	14.33
2005	9,214	16,953	13,799	533	0.81	434	2,720	2,428,404	264	51.28
2006	9,256	17,331	12,981	1,774	0.75	1,329	3,021	2,697,212	291	25.84
2007	9,298	21,014	16,679	1,279	0.79	1,015	3,320	2,963,768	319	7.15
2008	9,340	19,137	14,470	1,658	0.76	1,254	3,413	3,047,041	326	24.58
*Includes unaccounted for water use. Metered deliveries to urban retail customers for this period averaged 2,866 acre-feet.										
Average Daily Per Capita Baseline for 10 years									319.2	

SECTION 4 – SYSTEM SUPPLIES

WATER SOURCES

CMWD relies on surface water and groundwater sources to meet the water demands of the area. The following is a description of each water source, source limitations (physical or political), and water quality for each source. Table 17 describes the current and projected quantities in the CMWD water portfolio.

Table 17 - Current and Planned Water Supplies – AF/Y

Water Supply Sources	2010	2015	2020	2025	2030	2035/opt
Wholesale water providers	0	0	0	0	0	0
Supplier produced groundwater	300	300	300	300	300	300
Supplier surface diversions	20,540	20,540	20,540	20,540	20,540	20,540
Transfers in or out	0	0	0	0	0	0
Exchanges in or out	0	0	0	0	0	0
Recycled Water (current and projected use)	0	0	0	0	0	0
Desalination	0	0	0	0	0	0
Other	0	0	0	0	0	0

Surface Water Supply

The primary source of water for the CMWD is from the collection and storage of precipitation and runoff from the local Ventura River watersheds. After a series of prolong droughts in the first half of the 20th century, the United States Bureau of Reclamation (Bureau) improved western Ventura County's water supply reliability by constructing the Ventura River Project (Project). The key elements of the Project are Casitas Dam, Robles Diversion and canal, and other associated water distribution facilities. Since 1959, CMWD has operated and maintained the Project under a repayment contract to the United States and in conformance with the guidelines, standard operating procedures, and standards of the Bureau. In the initial sizing of the Project, the Bureau considered the Project requirement to provide an adequate water supply during the longest period of drought on record. The Project that was built has a surface water storage volume of 250,000 acre-feet, known as Lake Casitas, which took approximately twenty years to initially fill to maximum capacity.

The quantity of Project water is dependent on local rainfall and runoff from the Coyote watershed that is upstream of Casitas Dam and the Matilija watershed that is partially diverted from the Ventura River to storage behind Casitas Dam. The Project has been modeled several times in the past to determine a safe yield of the Project storage, and recently CMWD has considered additional influences on water supply resulting from the Biological Opinion for the Robles Fish Passage and the planning in progress to remove Matilija Dam. According to the peer reviewed CMWD "Water Supply and Use Status Report," December 7, 2004, the safe yield of the Project during a twenty-one year drought period is 20,840 acre-feet.

The local watersheds are primarily located in the Los Padres National Forest and lands purchased by the United States for protection of the water quality in Lake Casitas. The watersheds within the Forest area do accommodate a small number of residential homes with individual septic systems and minimal public access for recreation. CMWD has also sought cooperative measures to prevent mining and other water quality impact activities in the Forest watersheds. The water quality from the Coyote and Matilija watersheds is not influenced by industrial or municipal waste discharges.

Lake Casitas is formed by the collection of watershed runoff and diversions behind Casitas Dam. The Bureau sized Casitas Dam to hold 250,000 acre-feet of water at maximum capacity and to perform as a reliable water supply during the course of a long-term drought. All water extractions from Lake Casitas are made at Casitas Dam through the intake structure, pipelines, and treated to meet State water quality standards prior to the delivery to the first water customer. The water quality in Lake Casitas is typical for any deep lake. The key water quality issues that are addressed by CMWD are algae blooms resulting in taste and odors, turbidity, dissolved oxygen levels, protection from human contamination and invasive species. Lake Casitas does provide a limited recreational opportunity, but does not allow body contact activities with the waters of Lake Casitas. CMWD manages the recreational aspect of Lake Casitas and provides strict oversight to assure lake water quality is maintained at all times.

Groundwater Supplies

CMWD acquired the Mira Monte Mutual Water Company in November 1982 along with its well. The water company had gone out of business and deeded the well to CMWD because of high nitrate content of the well. Treatment techniques to make it a stand alone potable supply are cost prohibitive. CMWD made improvements to blend the high-nitrate well water with lake water, reducing the level of nitrate to acceptable levels, and amended the domestic water permit with the State Department of Health Services. The well has demonstrated an ability to provide 300 acre-feet per year of water supply. The blending process has been subject to interruption, which resulted in shut-downs during the past five-years. In 2009, repairs to the well resulted in zero production. The well has since been repaired. Specifically, the problems with the well production included:

- Equipment failures at the Mira Monte well dictated an engineering study, which resulted in the replacement of the pump and electrical motor controls.
- Wireless communication problems. Intermittent radio frequency disruption required an enhanced computer program that could address communication loss problems without causing a water quality issue from developing. Well production is now immediately halted when a signal disruption occurs.
- Newly enacted public health regulations (Groundwater Treatment Rule) required implementation of a new program to continuously monitor, record and report the ph, chlorine residual, water temperature and hourly CT calculations of the well's water just prior to blending. When data collection is not working, well production ceases until repaired.

Table 18 - Amount of Groundwater pumped – AF/Y

Basin Name (s)	2005	2006	2007	2008	2009
Mira Monte Well (Ventura River Groundwater Basin)	103	201	278	224	0
% of Total Water Supply	.01	.01	.01	.01	.01

Table 19 - Amount of Groundwater Projected to be Pumped – AF/Y

Basin Name (s)	2010	2011	2012	2013	2014
Mira Monte Well (Ventura River Groundwater Basin)	300	300	300	300	300
% of Total Water Supply	.01	.01	.01	.01	.01

Table 20 - Amount of Groundwater Projected to be Pumped – AF/Y

Basin Name(s)	2015	2020	2025	2030	2035/opt
Mira Monte Well (Ventura River Groundwater Basin)	300	300	300	300	300
% of Total Water Supply	.01	.01	.01	.01	.01

CMWD is the backup water supply to several groundwater purveyors of the Ventura River and Ojai groundwater basins. The groundwater basins are known to be in a depleted state after four years of below average rainfall, as occurred during the 1986 through 1990 period. Once these basins have depleted, water demand shifts from the groundwater basins to the surface water supply of Lake Casitas. In 1990, CMWD and consultant Don Kienlen reviewed and summarized the yields from the groundwater basins and the demand transfer to surface water supply. The following is a summary of the conditions in each of the groundwater basin areas within the CMWD boundary.

Upper Ventura River Basin

The upper Ventura River Basin extends from Matilija Dam to Robles Diversion Dam. The basin is extremely limited, making most wells in this reach of river under the influence of surface water. The average usage above the Robles Dam over the years is approximately 2,800 acre-feet.[1] (*Ojai Groundwater Basin Study for CMWD*, Murray, Burns, & Kienlen, MBK, August 1988). A large portion of the upper river extraction is for local agriculture, only a portion of which would rely on Casitas in the case of a long term drought. The Meiners Oaks Water District's average annual extraction from this reach is 229 acre-feet, and may require Casitas backup supply in the event of a future long-term drought.

Lower Ventura River Basin

The lower Ventura River Basin is that portion of the Ventura River which extends from Robles Diversion Dam to the Pacific Ocean. The lower Ventura River Basin had an average yield during the period of 1944-1983 of 7,493 acre-feet.[2] (*Water Supply and Demand Study: Status Report*, by R. Barnett June 6, 1989). During this historic period, the City of Ventura extracted an average annual yield of 5,506 acre-feet and the other wells between Robles Dam and Foster Park extracted and average annual yield of 1,987 acre-feet. During dry cycle periods when the full yield is not available water supply must be obtained from alternate sources such as Lake Casitas. The City of Ventura forecasts extractions from the Ventura River at Foster Park for 2010-2025 years at 6,700 acre-feet per

year. The City primarily uses this water in areas outside of the CMWD boundaries and balances the City's water supply needs inside of the CMWD boundary.

Ojai Ground Water Basin

The Ojai Groundwater basin is located in the Ojai Valley. The source water for the basin is local rainfall and runoff that is captured by the alluvium of the Ojai Valley. Storage in the Ojai Groundwater basin has been estimated to have a capacity as high as 68,722 acre-feet, with a low of 40,700 acre-feet, which occurred in 1951.[3] (Murray, Burns, & Kienlen, MBK, 1989). The average annual extraction from the Basin (2004-2008, OBGMA 2008 Annual Report) was 4,823 acre-feet.

The Ojai Basin Ground Water Management Agency (OBGMA) was formed in 1992 to protect the Ojai ground water basin. The water extracted from the basin is used 54% by agriculture, 41% by the Golden State Water Company which serves potable water to the City of Ojai, and 5% by individual residential and landscaping usage.

[1] *Ojai Groundwater Basin Study for CMWD*, Murray, Burns, & Kienlen, MBK, August 1988.
[2] *Water Supply and Demand Study: Status Report*, by R. Barnett June 6, 1989.
[3] Murray, Burns, & Kienlen, MBK, 1989.

TRANSFER OPPORTUNITIES

Given the location of the CMWD service area and the lack of physical connections to other water resources in California, there are limited opportunities for water transfers for CMWD. The two opportunities that CMWD has are described in the following sections.

State Water Project Entitlement

CMWD administers the Ventura County entitlement to State water and has contracts with the City of San Buenaventura (the City) and United Water Conservation District (WCD) to redistribute the 20,000 acre-foot entitlement between these three agencies. The CMWD entitlement to State Water is 5,000 acre-feet, based on 100% State allocation of annual scheduled deliveries. As of the date of this Plan, CMWD has not made a physical connection to the State Water Project that would allow State Water to reach the CMWD boundary. Several studies were completed on the feasibility of bringing state water to the District to include the following:

- *Final Program Environmental Impact Report for Joint Agencies Water Supply Project*, April 1992, prepared by Woodward-Clyde for CMWD, the City, and United WCD;
- *Alternatives Evaluation Study for a Joint Agency Water Supply Project*, November 1991, prepared by Boyle Engineering for CMWD, the City, and United WCD;
- *Alternatives Selection Study for a Joint Agency Water Supply Project*, March 1991, prepared by Boyle Engineering for CMWD, the City, and United WCD;
- *Optimization Study of State Water Importation*, May 1990, prepared by Kennedy/Jenks/Chilton, May 1990;

- *Evaluation of Alternatives Involving a Castaic Lake Delivery Point, Importation of State Project Water to Ventura County,"* December 1988;
- *Feasibility of Importing state project water into Ventura County,* June 1987, prepared by James M. Montgomery Consulting Engineers;
- *Feasibility Study for Importation of State Project Water, ,* December 1975, prepared by Engineering Science; and
- *A Report on the Feasibility of Water Supply Development,* October 1968, prepared by Bureau of Reclamation.

The preferred pipeline project estimated in the Montgomery study conducted in 1987 projected a total cost of $109 million dollars (ENR Index 6000). CMWD's cost would be a proportion of this overall cost that would be shared with the partnering agencies. For example, if three other major water purveyors were involved with this project, CMWD's cost would be 25% of the $109 million total. Alternative methods to bring State Water to western Ventura County were also considered in 1990 (Optimization Study of State Water Importation, Kennedy/Jenks/Chilton, May 1990). The alternative methods involved groundwater banking, interagency coordination, water transfers and exchanges.

Water transfers and/or exchanges with other agencies in Ventura County associated with the State Water Project may provide opportunities to shift away from the reliance on Lake Casitas' water during times of depleted water storage in Lake Casitas. The City of Ventura has stated an ability to temporarily move away from Casitas' water supply, i.e., during extremely low water storage levels at Lake Casitas, to the credits the City has in the Fox Canyon basin. There has been recent (2010) uncertainty as to the availability of these water credits. The success of this approach to water transfer would be contingent upon the availability and reliability of other water resources, i.e. State water and local groundwater banks, during an extended drought period. During the last decade, the reliability of the State Water Project has been questioned and work is ongoing to improve reliability of the State Water supply.

Local Groundwater Transfer

In 1985, CMWD made arrangements for an emergency transfer of groundwater from the Ojai Basin to CMWD customers in the Ojai area. There can be conditions in which Lake Casitas is at minimum storage and local aquifers are replenished by a single rainfall event, and the needs of the Ojai area can only be met by inter-agency agreements to utilize the Ojai Basin. CMWD has worked with many of the local groundwater agencies during times of emergencies to provide alternative emergency supplies. The proximity of system interconnections and political decisions make these types of arrangement physically possible. These periods are likely to be short term, less than six months in duration.

DESALINATED WATER OPPORTUNITIES

CMWD is located on the Pacific Ocean coastline of Ventura County, California. This proximity to the Pacific Ocean does provide an opportunity for the District to consider development of desalinated water supplies to supplement surface water supplies and to provide potential increased system

reliability, most notably for coastal communities within the district. However, for CMWD to move forward with a desalination project a public consensus would need to be developed, followed by a feasibility study to determine whether the project will have a positive cost-benefit result. As of April 2010, there is no active proposal in place for a desalination feasibility study.

The City of Ventura and the Rincon beach communities represent water service areas for which desalination water supplies could possibly be applicable.

City of Ventura

A portion of the City of Ventura is within the boundaries of CMWD. The city purchases approximately 6,000 acre-feet of water each year from the District's surface water supply, which is used toward the annual water demand for the western portion of the city, inside of the District's boundaries. The City had considered desalination in the early 1990's drought, but did not proceed with the project.

There may be opportunities for future joint-agency coordination to build a desalination plant to supplement local surface water and groundwater supplies. The city's growth projections and the ability of the city's groundwater supplies to keep up with growth are the driving factors that may lead to desalinated water in the CMWD and City service areas. The production rate and location of a desalination plant would need to be addressed in a feasibility study.

Rincon Service Area

The Rincon service area includes oil and gas production facilities, residential beach communities, and rural agricultural lands southwest of Lake CMWD to the Pacific Ocean. The coastal communities lie in a 10-mile stretch between the City of Ventura and the Santa Barbara County line. The key water demands of the area include the residential communities of La Conchita, Mussel Shoals, Seacliff, Faria and Solimar Beaches, and the oil production industry (Conoco, Aera Oil, Mobil Oil, and several other small oil and natural gas production companies in the coastal zone). The residential and industrial annual water demand for the Rincon coastal service area is approximately 300 acre-feet. The oil industry could potentially increase water demand based on rising costs of fossil fuels and the profitability of increasing oil production rates. The coastal zone has approximately 100 acres of agricultural production that is comprised of lemon orchards and flower fields.

The sole source of potable water for the Rincon coastal area is Lake Casitas. Potable water is pumped from the base of Casitas Dam through a single water transmission pipeline to the inland agricultural areas and to coastal communities. There is an increased energy cost in serving this area because water must be pumped up a 900-foot lift. There are water reliability concerns for this area because in the past the main pipeline serving the area has been severed by landslides following a heavy rainstorm, which temporarily left coastal communities and industries without water supply.

A desalination supply to the coastal communities would not be reliant upon the pumping and transmission pipelines from Lake Casitas, which are susceptible to short-term outages during storm events. Desalination would decrease demand on existing local water supplies. An initial estimate of the coastal community desalination plant production was 1 Million Gallons per Day (MGD or 1,121 acre-

feet per year (AF/Y). The plant site and need for additional pipelines, pumping and storage facilities would require further analysis. The sources of water may include direct withdrawal from the Pacific Ocean, shoreline rain collectors or wells, and may include various locations from the Ventura River estuary to Mussel Shoals. The brine water outfall discharges may be constructed as new facilities or further investigations may discover existing ocean discharge pipelines that may be converted to brine discharge lines. The District may also determine that this project may be feasible if a partnership were to be developed with oil companies and land developers of the Rincon service area, or the City of Ventura.

RECYCLED WATER OPPORTUNITIES

No recycling activities are currently in operation; however, developing a policy for the sale of, and/or storage of reclaimed water in the winter months, while continuing to discharge to the Ventura River during the summer months is addressed in the Sanitary District's 2011 Strategic Plan. The Ojai Valley Sanitary District and the City of Ventura provide wastewater collection and treatment within CMWD's boundaries. The City of Ventura provides a level three treatment for approximately 10,000 acre-feet per year and has initiated several successful recycling projects. The Ojai Valley Sanitary District provides level three treatment for approximately 3,000 acre-feet per year, see Table 21 and 22. The Sanitary District built a thirty million dollar tertiary treatment upgrade to its existing plant several years ago.

The wastewater treated by the Ojai Valley Sanitary District is placed back in the Ventura River for the benefit of the aquatic habitat and the Endangered Southern California Steelhead. Any additional treated water that could be utilized for any other purpose would require the completion of an Environment Impact Report. By agreement for the land use for the Ojai Valley Sanitation Plant, the City of Ventura has retained the first right to reclaim the effluent water from this facility. It is likely that any reclaimed water development from the City of Ventura facility will benefit the City of Ventura's water portfolio. There appears to be no other opportunities for CMWD to be directly involved and benefitted by reclaimed water, given the lack of any other opportunities to acquire reclaimed water.

Table 21 - Wastewater Generation and Collection – Ojai Valley Sanitary District (OVSD)

WASTEWATER GENERATION AND COLLECTION						
Wastewater collected and treated in service area (MGD)	2005	2010	2015	2020	2025	2030
	2.29	2.34	2.39	2.44	2.49	2.54

Table 22 - Wastewater treatment MGD – Ojai Valley Sanitary District (OVSD)

WASTEWATER TREATMENT *(MILLION GALLONS PER DAY)*					
TREATMENT PLANT	(CITY)	AVG DAILY (2010)	MAXIMUM DAILY (2010)	YEAR OF PLANNED BUILD-OUT	PLANNED MAX. DAILY VOLUME
OVSD	OJAI, CA	2.0 MGD	5.37 MGD	N/A	3.0 MGD

The wastewater treated by the Ojai Sanitation District is placed back in the Ventura River for the benefit of the Endangered Southern California Steelhead. Any additional treated water that could be utilized for any other purposes would need to be approved

FUTURE WATER PROJECTS

CMWD currently does not have any specific future water projects that will develop more water for the system. CMWD plans to utilize the program management of the safe yield of Lake Casitas to balance water supplies within the CMWD boundary, understanding also that water demands placed on CMWD are likely to exceed safe yield levels during periods of long-term drought.

1. Extended Water Conservation for Municipal and Industrial Customers.

CMWD is to continue California Urban Water Conservation Council (CUWCC) Best Management Practices (BMPs) in the District and to continue to expand the ongoing program to support water conservation with all the customers of the District. A High Efficiency Toilet (HET) distribution program saved 6 acre-feet per year. It is expected that future HET rebate programs will save a total of about 18 acre-feet of water per year.

2. The SWEAP Program:

The SWEAP program is a three-stage program, which is to address about 20% of the agricultural users of the District. The first stage is to identify the top 20% of agriculture customers who appear to be using more water than can be justified on their crop report. The District continues to work with this first-stage group to reach better agricultural water use. This has been completed in the 2005 to 2010 period.

The second stage of the program is to develop a loan/grant program to assist the customer in reducing their water demand to the amount needed based upon 2.5 acre-feet of water per acre per year. This would provide money to recondition wells, put in pressure regulators on the sprinkler systems, put in mini sprinklers, put in ground cover to prevent evaporation of the water, or other incentives to reduce demand. This program has been implemented.

The third stage is to implement an increasing block rate to cause the agricultural customer to get his water use below the 2.5 acre-feet per acre. This increasing block rate will be implemented in the first stage of the Allocation Program. While the first stage consists of voluntary water conservation, CMWD will use the incentive of additional cost to help the customer get their water use down below the threshold of 2.5 acre-feet per acre per year. This may require the assignment of individual agricultural user allocations and additional cost incentives to keep annual water use at or below the allocation amount. This program has not been implemented.

3. MOUs for Each Purveyor:

Another idea is to develop a Memorandum of Understanding for each purveyor. These memorandums could provide that a particular type of water waste ordinance be used, it could require the use of any water reserves before coming onto CMWD, and it could require participation in a public

relations program for water conservation. If an incentive were attached to the program, it may cause other systems to join. CMWD plans to work with other water purveyors to coordinate such a plan in the future.

4. Status of 2005 UWMP Suggested Projects:

There are additional water supply projects that were suggested in the 2005 UWMP that CMWD has implemented and some that are in need of further investigation. Examples of such projects include:

- Resale water company system retrofit and/or rehabilitation to assist water agencies to rely less on CMWD's water – CMWD is assisting Senior Canyon Mutual Water Company to improve.
- San Antonio Recharge Basin - project is in progress of design and implementation in 2011.
- Renegotiate agreement with City of Ventura – renegotiations are in progress.
- Aggressive leak detection and repair program – CMWD is conducting this program.
- Excavate the north end of Lake Casitas during low water storage – not implemented, environmental and financial feasibility and justification assessment is needed.

SECTION 5: WATER SUPPLY RELIABILITY AND WATER SHORTAGE CONTINGENCY PLANNING

WATER SUPPLY RELIABILITY

This section of the Urban Water Management Plan provides a description of the water management tools and options used by CMWD that will maximize resources and minimize the need to import water from other regions. This section assesses the CMWD's ability to provide reliable future water supplies in the event of any circumstance that may pose significant challenges.

The primary sources of water for western Ventura County are the watersheds of the Ventura River. The precipitation in the Ventura River watershed is extremely unpredictable and characterized by long periods of little or no rainfall followed by short periods of intense precipitation with high runoff peaks. During the drought periods of the 1930s and 1940s, western Ventura County cities and agriculture recognized that local groundwater sources and surface diversions alone were not reliable and were inadequate for both agricultural use and for municipal and industrial purposes. The development of an additional water supply was urgently needed in western Ventura County for stabilization of present agriculture and other economic activities, for new irrigated lands, for new industry, a rapidly expanding population, and for new economic opportunities (USBR Feasibility Study, 1954). By 1954, western Ventura County had requested the United State Bureau of Reclamation to prepare a water supply project feasibility study that led to the planning, design and construction of the Ventura River Project.

The Bureau of Reclamation's plan for providing a water supply for the Ventura River Project area included a storage reservoir to be filled from erratic stream flows with the capacity to hold water over a period of several dry years; diversion works to divert water into the reservoir, and a conduit system to convey the water to points of use. The Bureau of Reclamation determined in its analysis a safe yield and prediction of future water demands of 28,000 acre-feet annually that would be needed from the supplemental water supply, that a 250,000 acre-foot capacity reservoir was needed to provide this level of demand. The construction of the Ventura River Project was completed and the responsibilities for operation were given to CMWD in 1959. The Ventura River Project was to be operated in conjunction with the Matilija Dam water supply. By 1978, the 254,000 acre-foot reservoir (formally known as Lake Casitas) filled to full capacity.

On September 28, 1982, the California State Water Resources Control Board issued to CMWD a License for Diversion and Use of Water of the Ventura River and Coyote Creek in Ventura County. License No. 11834 establishes the date of August 16, 1954, as the priority for the water right and the amount of water to which the right is entitled and limited to the amount actually beneficially used for the stated purposes. The total amount of water to be placed to beneficial use (direct diversion plus withdrawal from storage) shall not exceed 28,500 acre-feet per year.

The period of 1959 through 1989 was a water use development period during which CMWD made numerous water service connections to serve water to western Ventura County. By 1989, during the third year of a four year drought period, water demands from Lake Casitas approached and exceeded

the safe yield value of Lake Casitas. In 1990, CMWD took specific actions to control the expansion of water use beyond a level experienced in 1989 and further evaluated the safe yield of the Ventura River Project (Kienlen and Barnett, 1990). As of 2011, Lake Casitas provides a source of water for approximately 5,600 acres of orchard-type agriculture, approximately 2,600 other service connections that includes resale, residential, commercial, industrial, institutional customers, and supplemental water supply to the local wholesale water agencies and agriculture users of groundwater during drought periods.

In response to the additional need for water after the CMWD action of 1990 to curb water use expansion, CMWD re-activated the 300 acre feet per year Mira Monte well. The water from this well contain levels of nitrate that exceed the maximum contaminate levels established by the State of California. In order to utilize this water, the CMWD blends or dilutes the well water with water from Lake Casitas to reduce the nitrate level. The well produced 204 acre-feet in 2006, 272 acre-feet in 2007,146 acre-feet in 2008, and 0 acre-feet in 2009 due to repair issues that have since been corrected. CMWD anticipates production to occur to 300 acre-feet annually if no unforeseeable conditions arise.

In 2003, CMWD recognized two specific projects, the decommissioning of Matilija Dam and the application of a fish passage at Robles Diversion Dam, that were likely to impact water supply. CMWD proceeded to evaluate the water supply impacts of each project, as described in the 2004 Water Supply and Use Report. The proposed decommissioning of Matilija Dam had gone through several years of study and consideration by federal, state and local agencies and appeared to be on a rapid track to decommissioning. The storage capacity behind Matilija Dam had diminished by way of collective siltation and was further described as an obstruction to the migration of steelhead trout to the upper reaches of the Matilija Creek. The initial options for natural transport of sediments downstream of Matilija Dam pose a water quality and quantity impact to CMWD's diversions to Lake Casitas. As of March 2011, efforts are continuing to find an appropriate project to attain the objectives of decommissioning the dam.

The application of a fish passage facility at Robles Diversion Dam had specific conditions in the Biological Opinion that water be taken from the diversion and provided downstream of the Robles Diversion for steelhead trout migration and passage. The Robles Fish Passage Facility was constructed at Robles Diversion Dam in 2005 and operational in 2006, at which time the full effect of the Biological Opinion became the standard operating procedure for flow at Robles Diversion Dam. The Biological Opinion may be subject to further revision upon determination of scientific data that would support changes to the current Biological Opinion and any such revision may impact diversions to and safe yield of Lake Casitas. Presently, CMWD's "Water Use and Supply Status Report" estimates a 360 acre-foot annual water demand excess over safe yield under the current Biological Opinion so any additional impacts on water supply could further strain long term water supplies.

The District has evaluated the reliability of the Lake Casitas water supply and its vulnerability to climatic and seasonal variations in weather, changes in water demands, and changes to water supply operations. "The Water Supply and Use Status Report", December 7, 2004 is attached to this document, as Appendix D. It considered the historical hydrology of the Ventura River for the period 1945 through 2003 and historical water demands for the period of 1983 through 2003. The hydrology periods studied provide an extensive drought period, associated with the diminishment of local water supply as illustrated in Figure 5, followed by a series of wet years that result in the restoration of the Lake Casitas water supply as illustrated by Figure 6. The Report also reviewed historical water demands to provide an indication of water demand growth and the influence of climate on agricultural water use within CMWD's service area.

The 2004 "Water Supply and Use Status Report" also evaluated the impact to water supplies that could result from federal requirements to release additional water for fisheries and the removal of Matilija Dam from the water system. The change in annual safe yield of the Ventura River Project was calculated to be 1,930 acre-feet per year, providing a resultant annual safe yield of 20,840 acre-feet.

Figure 5 – Lake Casitas Storage Model based on the 1944-1965 Drought Period

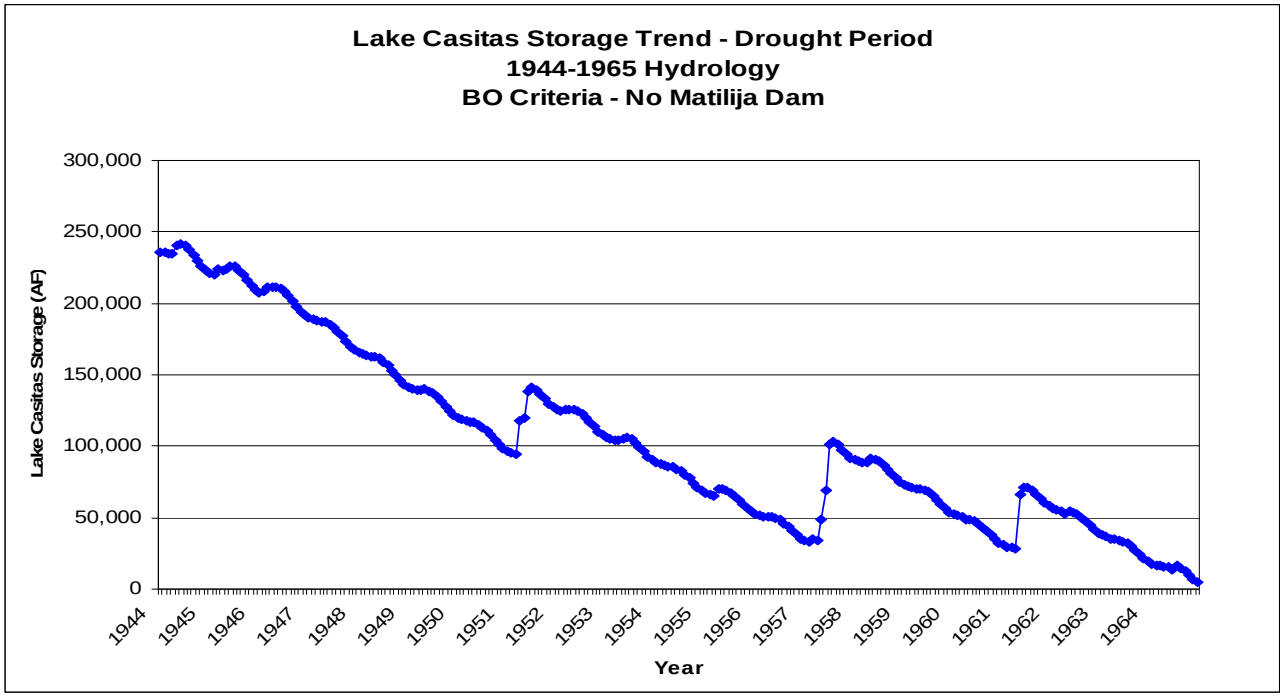
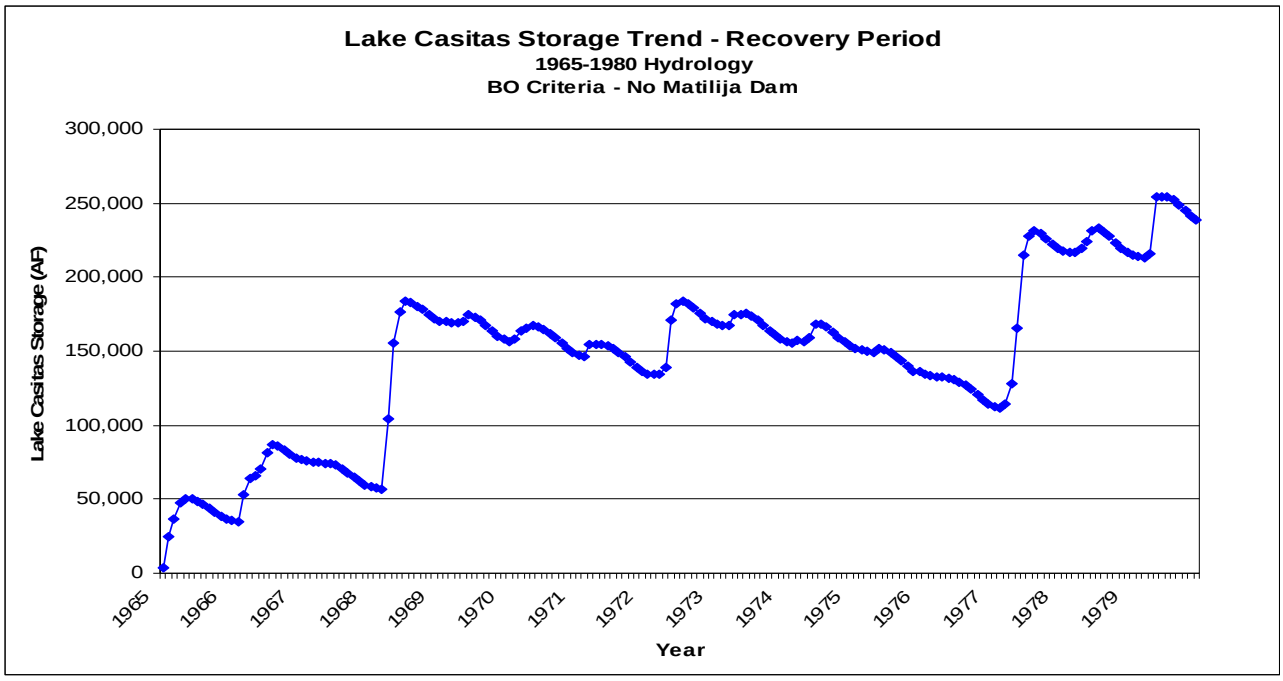


Figure 6 – Lake Casitas Storage Model based on the 1965-1980 Recovery Period.



In addition to the local surface water and groundwater resources, western Ventura County has carried the cost for an entitlement to State Water since 1972. CMWD is the administrator of the Ventura County's 20,000 acre-foot entitlement which is distributed to CMWD, City of Ventura, and United Water Conservation District (5,000, 10,000 and 5,000 acre-feet respectively). To date, the City of Ventura and CMWD have not received any of the entitlement into the respective service areas, or western Ventura County.

WATER SHORTAGE CONTINGENCY PLANNING ANALYSIS

This section of the Urban Water Management Plan provides the actions to be taken 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.

Preparation for Catastrophic Interruption in Water Supply – Water Code Section 10632 (c):

Catastrophic events include non-drought related events. In the occurrence of a catastrophic event involving facilities and/or water service area sources, CMWD personnel must respond to the emergency in an organized and methodical manner. CMWD has as its resource tool for emergency response the Casitas Dam Emergency Action Plan and the CMWD Emergency Response Plan. Each plan has been prepared and practiced with federal, state, and county emergency response agencies to provide a coordinated response to emergency conditions. CMWD has also performed vulnerability assessments for each facility and have improved facilities to lessen the potential impacts of

catastrophic events. The Casitas Dam is of special interest and coordination with the United States Bureau of Reclamation due to its importance and risk. Each emergency plan provides specific levels of response for various conditions, making the response fit appropriately to the degree of the emergency, and providing for an escalation or de-escalation of the response to match conditions found in the event area. The emergency plan will be implemented at the local level, damage assessments conducted and reported, and if warranted, actions will be taken by CMWD during and following the emergency event, and CMWD may request additional assistance through the Ventura County Office of Emergency Services.

A key element to the Emergency Response Plan is the Communications section, which provides the pubic communications strategy, water quality notification plan, and directions for public and agency notifications in the event of a water emergency. In the event of a catastrophic interruption of water supply, the respective emergency plan will be implemented and the affected areas notified of water supply outages and/or water quality actions. CMWD notification plan considers the use of direct telephone notification, media outlets (radio and television), posting individual service hang tags, and notification over the emergency broadcast network. CMWD keeps and updates the contact information on an annual basis, or as the customer of record changes.

The CMWD water system relies on Lake Casitas as the main source of water supply and the groundwater basin agencies as the backup water sources to Lake Casitas. It should be noted that the groundwater supplies are generally limited in storage capacity and ability to instantaneously delivery water to the CMWD system, and interagency agreement is sought for specific and limited emergency conditions. CMWD does have interconnection with most groundwater agencies in the CMWD service area. Beyond the Lake Casitas source, CMWD has approximately 22 million gallons of water storage in the distribution system to provide approximately three days of reserve water supply. CMWD also has four portable water tanks (water buffalos), 500 gallons each, for placing in residential areas during isolated water outages. CMWD has also employed contract water trucks to provide water to residential areas during major water outages. CMWD will respond to water outages with a pipeline repair crew, contract pipeline crews, engineers, water quality and customer service personnel, and may request assistance from local, state, and federal agencies, as warranted.

Prohibitions, Penalties and Consumption Reduction Methods – Water Code Section 10632 (d-f):

In the event of a short-term emergency for which CMWD has a definite plan and schedule to restore its system to pre-disaster condition, CMWD may implement water use restrictions in accordance with the adopted Water Waste Prohibition Ordinance (Appendix F). CMWD may further make requests of agricultural and resale accounts to move to alternate water sources and curtail water demands. If the emergency conditions persist, CMWD may consider a shift to a more restrictive Stage of the Water Allocation and Efficiency Program, applying limits to water use allocations and incentive rates to meet water use goals during the emergency. Additional restrictions may be considered and implemented upon direction from the CMWD Board to include, but not limited to, prohibiting the use of potable water for street cleaning. Additional action may include, but not limited to, the installation of flow restrictors or the shutoff of service in order to maintain enough water supply in the system for health and safety purposes.

Analysis of Revenue Impacts from Reduced Sales During Shortages – Water Code Section 10632 (g):

Section 10632(g) of the Act requires an analysis of the impacts of the actions and conditions described in subdivisions 10632 (a) to (f) resulting from a catastrophic water shortage on the revenues and expenditures of the urban water supplier and proposed measures to overcome those impacts, such as development of reserves and rate adjustments. The extent of the impact is to be related to a maximum of 50 percent loss of water supply (§10632 (a)).

In the preparation of the CMWD financial budget, CMWD averages the previous three years of water use to project a revenue estimate for the upcoming year. The annual commodity income from 15,866 acre-feet of water sold from the CMWD sources is $6,650,796 (CMWD FY 2010-2011 Budget) and the fixed water service charge income of $1,992,717. The total revenue from water sales and service charges anticipated in the FY 2010-11 Budget are $8,643,512. In the event of a catastrophic interruption of water supply that would reduce the annual revenue to 50 percent, CMWD could see a budget deficit of approximately $4,241,011, as provided in Table 23. For CMWD, the key reduction in costs are directly associated with the reduction in chemical purchase due to less water to treat and provide as potable water, and less energy to pump water to the various zones of service. In each case, the reduction in water sales is in direct relation to the reduction in chemical and electrical power purchases.

Table 23 – CMWD Budgetary Revenue and Expenditures Impact

15,866 Acre-Feet	**15,866 AF 100%**	**7,943 AFY – 50%**
Revenue:		
Commodity Charges	$ 6,650,796	$ 3,325,398
Fixed Charges	$ 1,992,717	$ 1,992,717
Total Water Revenue:	$ 8,643,513	$ 5,318,115
Expenses:		
Salaries/ benefits	$ 4,969,539	$ 4,969,539
Fixed Services/Supplies	$ 3,650,097	$ 3,003,297
Variable Services/Supplies	$ 3,172,580	$1,586,290
Total Water Expense:	$11,792,216	$9,559,126.00
Budget Deficit	($ 3,148,703)	($ 4,241,011)

CMWD has un-restricted reserves of $9,260,461.86 in designated funds for cash flow, storm damage, variation in water sales, and capital improvements. The CMWD Board of Directors could direct a portion of these funds be used to balance the budget. An increase in water rates could be considered by CMWD with further understanding of the resultant revenue that may or may not be generated by this action. An increase in rates may result in less water demand and generate no more additional revenue to offset the budget deficit.

Water Shortage Contingency Plan

Adoption of Resolution

An emergency resolution shall be adopted by the CMWD Board of Directors and the General Manager to address a particular water shortage with the appropriate guidelines, procedures and regulations and to announce to the public the implementation of the Water Shortage Contingency plan. The provisions of the resolution shall be developed and implemented in a manner to provide water service during emergency conditions to all of CMWD's customers in a fair and equitable manner and in recognition of the given conditions. Please see Appendix H Draft Water Shortage Contingency Resolution.

Water Priorities: The CMWD board declares by adoption of this Urban Water Management Plan the following water priorities for the distribution of CMWD's water during an emergency condition for both alert levels are:

- Residential and residential resale to water agencies without alternate water sources.
- Irrigation and irrigation resale without alternate water sources
- Residential resale to water agencies with alternate water sources
- Irrigation and irrigation resale with alternate water sources
- Industrial and industrial resale
- Oil recovery program
- Other

Declaration of Emergency

1.Declare Level One Alert
The General Manager shall have the authority to declare a Level One Alert for an emergency condition and to implement the provisions of the emergency ordinance related to the Level One Alert.

2. Declare a Level Two Alert
The CMWD Board may declare by resolution either a level one or two alert and implement the appropriate provisions of that alert level.

Definition of a Level One Alert:

An emergency condition that will occur in the event of a catastrophe or disaster caused by a natural phenomenon or man-made event such that the availability of the water supply from
Lake Casitas or the distribution system, on a short-term basis, has become unreliable as determined by the General Manager.

Total Available Water Supply: The total amount of water, as determined by the CMWD board, to be distributed during an emergency condition at either alert level.

Declaration of a Level One Alert may Result from the following:

- Earthquakes
- Power outages
- Chemical/toxic spills in Lake Casitas
- California Department of Health Services' determination groundwater basins are contaminated
- Sudden deterioration of water quality in Lake Casitas
- Interruption of service due to pipeline breaks, loss of pumping plants, chlorination stations, etc.
- Immediate hazard to public health
- Uncontrolled watershed burn resulting in flooding, thereby impacting water served from lake CMWD because of:
    1. High turbidity
    2. Bacteriological quality
    3. High organic content
    4. Damage to distribution system

Provisions to be Implemented During a Level One Alert

For a period of time as determined by the General Manager, the General Manager may:

- Direct the implementation of appropriate portions of the Interim Control Measures to Insure Domestic Water Quality as adopted by the CMWD Board on August 28, 1985, relative to the storage and distribution of CMWD water.
- Implement the media campaign to inform all or affected CMWD customers that CMWD water is not to be used for non-life-support purposes; e.g., washing down driveways, sidewalks, etc., or watering any landscaping, etc.
- Direct all irrigation customers and all water agencies, when possible, to utilize their groundwater or other surface water sources and/or cease using water from Lake Casitas.
- Direct all oil companies to stop taking CMWD water for oil recovery or other non-life-sustaining purposes.
- Direct all other water agencies, which are customers of CMWD to practice water conservation measures similar to those contained herein.
- If appropriate, issue a boil water order to affected CMWD customers and resale agencies.
- Other orders as may be deemed appropriate under the existing circumstances.

Definition: Level Two Alert:

A long-term or district-wide emergency condition has occurred and the availability of water supply from Lake Casitas has become unreliable, as determined by the CMWD Board.

Declaration of a Level Two Alert may Result from the Following:

- Low water level of Lake Casitas such as Lake Casitas at or near reaching the 50% full level.
- Low water levels in the groundwater basins.
- Increases in demand for CMWD water.
- Abandonment of wells due to low groundwater levels in basins and/or well refurbishing costs.
- Surface diversion resources diminished.
- Records indicate rates of withdrawals of water from Lake Casitas are in excess of the safe yield and low lake levels exist.

Provisions to be Implemented During a Level Two Alert:
For a period of time as determined by the CMWD Board, the CMWD Board:

- Shall establish the baseline water usage for each service connection.
- Shall establish a water allocation program based on historical uses of CMWD water or other fair and equitable bases, which will establish the amount of water that can be obtained from CMWD by each customer of CMWD, including other water agencies.
- May implement or adjust an increasing-block rate structure for any classification of water service.
- Shall require all water agencies taking water from CMWD to implement water conservation and restrictive water use measures similar to those implemented by CMWD.
- May request water from other water agencies – as appropriate – to wheel water from their supplies through CMWD pipelines to the agencies and customers currently being served from CMWD supplies.
- May direct all customers and all other water agencies to utilize their groundwater or other water resources as their sole water source when practicable, and not take any CMWD water during the period of time so established.
- May direct the oil companies to cease taking any CMWD water for secondary oil recovery purposes or other non-life-sustaining purposes.
- May request the Ventura County Board of Supervisors and the Cities of Ojai and San Buenaventura to place a moratorium for all building permits, lot splits or subdivisions within CMWD boundaries.
- Shall direct all customers of CMWD who have wells to report the condition of their wells to CMWD when reasonably requested, including the capacity of the well and the quality of the water.

Consumption Reduction Methods:

The primary method for consumption reduction is built into the water rate mechanism for each stage with charges for excess water use above the allocation amount. Further, CMWD is only allowing expansion of water service through the issuance of additional water allocations, only when water is made available by CMWD and subject to CMWD allocation fees.

WATER QUALITY IMPACTS ON RELIABILITY

The water quality of Lake Casitas may significantly vary as the lake storage transitions from full stage to minimum pool. Surface water supply from Lake Casitas is treated by filtration and chloramination prior to the delivery to the distribution system. The treatment process ensures that the water meets all state and federal regulations. At lower levels of Lake Casitas storage there are specific lake water quality issues that will challenge CMWD's ability to treat and deliver potable water from Lake Casitas. During the condition of low lake level the water quality can unfavorably change due to the concentrating of nutrients resulting in lake eutrophication, increased algae blooms, reduction in dissolved oxygen, and increased turbidity during storm event that could significantly impact filtration treatment process and the rate of water production for the distribution system. CMWD has also been concerned about the release of organic-laden silts from Matilija Dam that, if not properly mitigated during the Matilija Dam decommissioning, can add to the mass balance of nitrogen and phosphorous compounds and increased turbidity of water flowing into Lake Casitas.

Specific actions that CMWD has considered and implemented are lake management strategies such as algae control and lake aeration. The level of the lake management implementation may increase as the problem intensifies during low storage conditions.

CMWD's groundwater source represents only 300 acre-feet of water per year compared to the nearly 20,000 acre-feet from Lake Casitas. The well water is blended with lake water at a high ratio with surface water to ensure the maximum contamination level for nitrate is met. The resulting blended water is well below the maximum contamination level for nitrate. Drought impacts to the well water quality are not understood completely. CMWD has an agreement with a neighboring well agency to cease pumping at a specific groundwater elevation. Over the past twenty years, the groundwater elevation has remained above the agreement level. Additional consideration for on-site treatment and additional blending may be required to mitigate the drought caused water quality in the Mira Monte Well.

DROUGHT PLANNING

This section of the Urban Water Management Plan describes the reliability of the water supply and vulnerability to seasonal or climatic caused water shortages, to the extent practicable, provide data for an average water year, a single dry water year, and multiple dry water years, and describe action to be taken by the urban water supplier in response to drought caused water supply shortages.

Stages of Action – Water Code Section 10632 (a):

The CMWD Board of Directors adopted the Water Allocation and Efficiency Program on January 8, 1992 in response to the need to balance supplies and demand through an equitable plan of distribution of existing supplies. Various customer groups, retail agencies and citizens of CMWD's service area reviewed the program in June 12, 1992. The Program reflects the input of those participating in the review process. CMWD's program incrementally provides adequate time and warning for customers to prepare for water use changes. The goal of the Program is to maximize the efficient use of water while maintaining the quality of life, health and safety of the service area. The Program is described in detail in the CMWD's Rates and Regulations for Water Service, specifically Section 15. The CMWD program includes voluntary and mandatory stages, changes to incentive water rates, adjustment of allocations and procedures for appeals. Table 24 provides a summary of the effective triggering of each stage of water reduction goals and incentives. CMWD may implement any of the actions listed in the Level 1 or 2 Alert in the proceeding section of this plan to encourage further reductions in water demand.

The implementation of any Stage of the Program requires an assessment of conditions (lake elevation, water demand trends and proximity to the lake's safe annual yield, and yields available in local groundwater basins) and the recommendation by the General Manager to the Board of Directors to implement any particular stage. The Board of Directors has the authority to implement this water use management strategy to the degree and duration it believes is necessary to maintain a safe water supply for the community.

TABLE 24 - WATER STORAGE STAGES, TRIGGERING MECHANISMS & REDUCTION GOALS

Customer Class	Stage	Lake Casitas Storage Trigger (AF)	Water Use Reduction Goals	Conservation Incentive
Residential	1	254,000	20%	Voluntary
	2	127,000	20%	Mandatory
	3	100,000	30%	Rate Incentive
	4	75,000	40%	Rate Incentive
	5	65,000	50%	Mandatory
Business	1	254,000	20%	Voluntary
	2	127,000	20%	Mandatory
	3	100,000	30%	Rate Incentive
	4	75,000	40%	Rate Incentive
	5	65,000	50%	Mandatory
Resale	1	254,000	20%	Voluntary
	2	127,000	20%	Mandatory
	3	100,000	30%	Rate Incentive
	4	75,000	40%	Rate Incentive
	5	65,000	45%	Mandatory
Agriculture	1	254,000	♦	Voluntary
	2	127,000	♦	Mandatory
	3	100,000	♦	Rate Incentive
	4	75,000	♦	Rate Incentive
	5	65,000	85% of ET	Mandatory
Temporary	1	254,000	•	
	2	127,000	•	
	3	100,000	•	
	4	75,000	•	
	5	65,000	No Service Provided	

♦Not to exceed evapotranspiration (ET) requirements. •Penalty per unit over estimated allocation.

CMWD has been developing allocations for all its customers. When the allocation ordinance was adopted in 1992, the ordinance set the allocation of all customers at 80% of 1989 usage. Allocation assignment is the connection of the individual customer water use to the safe yield. As CMWD has deemed water is available for allocating to new or expanded use, CMWD has created a waiting list and offered the opportunity to purchase limited water allocations to waiting list applicants. An example of water becoming available is the adaption of the Mira Monte Well to the CMWD system, providing 300 acre-feet of new water to be allocated to the service area. For the Program, the allocation becomes the point at which excess water use charges are applied to the customer's water bill, encouraging the customer to reduce water use to level that is at or below the allocation.

CMWD water allocations are assigned to properties or water purveyors, are not transferable from one property or water purveyor to another, and may not be sold or traded by Casitas customers. CMWD Board of Directors reserve the right to alter allocations for any customer class at any time and the term allocation shall not mean an entitlement or imply a water right.

Evaluation of prior stage measures:

CMWD has been in Stage 1, Voluntary Conservation, since the adoption of the program.

Modification of the 2003 Rates and Regulations for Water Service

ARRANGEMENTS FOR REGULAR WATER SERVICE
CMWD is in a state of permanent delay in issuing new services. Both the 1991 reports on water supply and the "Water Supply and Use Status Report" of December 7, 2004 indicate a shortage in supply during a drought. CMWD, in its will serve letters to the County, promises to supply the customer reliably for forty years. The purpose of this requirement is to provide for only the services that CMWD can supply during a long-term drought. Upon report from staff about the availability of water, the Board may release additional water for services for new or existing customers of CMWD.

CONDITIONS OF PRIORITY AND PRIORITIES FOR NEW SERVICE AND EXPANDED EXISTING SERVICE AFTER A DELAY. No new service will be provided to customers until the Board of Directors has determined that new supplies are available. The determination of supplies being available shall be made upon staff recommendation at a regular Board of Directors meeting. The determination that water is or is not available shall be within the determination of the Board of Directors. The determination that a supply is available shall be based upon more detailed information about existing supplies, the availability of new supplies, new water supply projects, or contracts or proposed contracts for additional supplies where, in the opinion of the Board of Directors, the supply of water is definite enough to provide the assurance to the County of Ventura that there is a forty year supply. When the Board of Directors determine that additional new water supplies are available, either from the safe yield of the existing CMWD project supply or additional new supplies, supplies shall be allocated in accordance with the following criteria:

AVAILABILITY OF ALLOCATIONS:
PURPOSE OF USE: As water becomes available, 50 percent shall be allocated to applicants for agricultural uses and 50 percent shall be allocated to applicants for municipal and industrial uses. In the event applicants for one type of use are satisfied without utilizing the entire designated allocation, 20 percent of the remaining water will be allocated to other uses each year. Agricultural and commercial uses are defined in CMWD's Rates and Regulations. Municipal and Industrial uses are all other water uses.

SIZE OF ALLOCATION: As water becomes available, no single property owner or applicant for the given type of service (municipal, industrial or agricultural) shall receive a new water allocation greater than 10 percent of the total new available supply or the minimum standard residential allocation as defined in CMWD's Water Efficiency and Allocation Program (Section 15.3.1), whichever is greater. If the applicant's allocation requirements are not fully met, the applicant may maintain a position of priority until more water is available.

All applicants seeking priority listing shall provide CMWD with a detailed description of the project or use of water for which the water is sought. Applicant shall provide information on peak flow and annual water requirements. CMWD shall determine meter size and amount of allocation based upon reasonable and necessary needs and CMWD's Rates and Regulations.

Additional Changes in the Ordinance shall be as follows:

EXPANSION OF SERVICE: Customers requiring additional water for second dwellings, also known as "granny flats", development of additional Agricultural lands, or any other projects requiring an increase in water use shall apply for an additional allocation and shall be required to pay all associated application and connection fees. An addition of a house to an agricultural property shall not be an expansion of service if the customer demonstrates to CMWD any of the following:

1. That the property is fully planted or planted and covered with buildings and roads to the extent that agricultural plantings must be removed to accommodate the new house.
2. The property owner agrees in a recordable writing that he is limiting the use of the property to either the number of trees on the property in 1989, 1989 trees plus trees added with additional allocation after 1989, or the water provided by contract with CMWD for agricultural; and that number will be permanently reduced to offset the water use of the proposed construction of the house that is planned.

NEW HOUSES. Each new dwelling structure added to any land with service from CMWD shall be required to pay a Capital Facility Charge (CFC) and New Water Capital Facility Charge (NWCFC) for a ¾-inch meter despite any allocations above. No connection fee shall be charged if an agricultural property owner can demonstrate in accordance with section 4.2.12 that water use will be reduced.

Addition of Water Waste Ordinance Program

List the mandatory prohibitions against specific water use practices during water shortages. Prohibitions often include excessive run-off, cleaning paved surfaces with potable water, failure to repair leaks, surface irrigation during restricted hours, etc.

Estimate of Minimum Water Supply for Next Three Years – Water Code Section 10632 (b):

In order to provide this assessment, a beginning point for water availability needs to be established and drought water use trends be applied to determine the resultant water availability at the end of the three-year period. As of April 7, 2011, Lake Casitas is storing approximately 218,630 acre-feet. The local area has received an above average rainfall during the winter of 2011 and the groundwater basins of the area are at near full condition. CMWD is at Stage 1 of the Water Allocation and Efficiency Program. The 2004 Water Supply and Use Status Report, Table 1, for the condition of the Robles BO operating criteria with Matilija provided a 21,330 acre-foot annual safe yield of Lake Casitas (without the 300 acre-foot Mira Monte Well supply), an average annual evaporation and rainfall loss in Lake Casitas of 2,630, and inflow to Lake Casitas from Ventura River diversions and tributaries for the drought period of 1944-1965. Table 25 provides the change in the amount of water stored in Lake Casitas, as of April 7, 2011, and the application of average extractions and inflow conditions stated above.

TABLE 25 – THEORETICAL THREE-YEAR DROUGHT WATER SUPPLY PROJECTIONS

Year	**2011**	**2012**	**2013**
Start of Year Lake Casitas Storage (AF)	218,630	207,530	196,430
Lake Casitas Safe Yield (AF)	-21,330	-21,330	-21,330
Lake Casitas Inflow (AF)	12,860	12,860	12,860
Lake Casitas Rain/Evaporation (AF)	-2,630	-2,630	-2,630
End of Year Lake Casitas Storage (AF)	207,530	196,430	185,330

The theoretical model for the 1944-1965 drought period included three years during which rainfall exceeded average rainfall. Therefore the change in Lake Casitas storage during the 1944-1965 drought period is influenced by the addition of those rainfall years and may not necessarily represent the three driest years during a drought period.

A more recent drought period was experienced at CMWD from 1988 thru 1990. During this period, Lake Casitas storage began at 208,687 acre-feet and transitioned downward through 78,546 acre-feet. A similar change in storage could be applied to existing conditions at Lake Casitas to determine the resultant storage level and the need for implementing staged water reduction goals during the next three years should a similar drought (1988-90) occur during the next three years. By starting at the April 7, 2011, storage level for Lake Casitas at 218,630 acre-feet and applying annual storage reductions that occurred during 1988, 1989 and 1990, a resultant Lake Casitas storage at the end of three years would be 140,084 acre-feet. It should be noted that the annual water deliveries to the CMWD users did increasingly exceed safe yield during the 1988-1990 period due to the shift from diminishing groundwater supplies to available surface water supplies. Under the Program adopted in 1992, CMWD would fulfill the responsibility to provide a back-up water supply to the local groundwater users and may have a period during which deliveries exceed safe yield.

TABLE 26 – 1988-1990 BASED THREE-YEAR DROUGHT WATER SUPPLY PROJECTIONS

Year	**2011**	**2012**	**2013**
Start of Year Lake Casitas Storage (AF)	218,630	201,879	169,631
Lake Casitas Reduction in Storage (AF)	-16,751	-32,248	-29,547
End of Year Lake Casitas Storage (AF)	201,879	169,631	140,084

In either case presented in Tables 25 or 26, the storage in Lake Casitas remains within Stage 1 through 2013. A continuation of the drought beyond the third year or failure to recover fully prior to the onset of subsequent drought years could reduce the water stored in Lake Casitas to levels that cause the implementation of Stages 2 through 5.

Table 27 - Factors resulting in inconsistency of supply							
Water Supply Sources	**Name**	**Limitation Quantification**	**Legal**	**Environmental**	**Water Quality**	**Climatic**	**Additional Information**
Surface Water	Lake Casitas		BO Diversion Requirements				
Groundwater	Mira Monte Well				High Nitrates require blending		Maintenance required

Water Use Reduction Monitoring– Water Code Section 10632 (i):

During the implementation of the Program, CMWD will perform water use monitoring procedures. CMWD monitors water use throughout the CMWD service area through SCADA at the Casitas Dam source, all pump plants and reservoirs. In addition, all service connections to the CMWD distribution system are metered and monitored on a month or bi-monthly basis. CMWD can detect irregularly high water use within a pressure zone, and inquire and identify the location of the irregular water use.

Significant customer increases in water use are investigated by CMWD staff.
In general the monitoring of water use is performed during each stage as follows, but may be intensified if conditions warrant:

Stages 1 through 4:

Water supply conditions, production data and reservoir elevations are recorded daily. Daily and monthly totals are supplied through the Engineering Department and incorporated into the Water Supply Report. Monthly reports include usage and total allocations for each customer category. A list of individual customers whose usage exceeds their allocation is submitted to the Water Conservation Supervisor for monitoring and outreach to assist the customer in attaining the water use reduction goals.

Stage 5:

Water use monitoring will occur as in Stages 1 through 4 and water production data from the Casitas Dam will be reported to the General Manager on a daily basis.

Water Service Reliability – Water Code Section 10635(a)

A requirement of the Urban Water Management Plan is to provide an assessment of water service reliability during each of the next water years based on the driest three-year historic sequence, and provide data for an average water year, a single dry water year, multiple dry water years.

AVERAGE YEAR:

An average year as defined in the Department of Water Resources Urban Water Management Plan guide book is a year in the historical sequence that most closely represents median runoff levels and patterns. It is defined as the median runoff over the previous 30 years or more. Table 27 lists the annual rainfall that has been measured and recorded at Casitas Dam for the period of 1980 to 2010. The average rainfall for the thirty year period at Casitas Dam is 24.99 inches. The year in this sequence that most closely represents this median was the 2002-03 Water Year, when there was 24.83 inches of rain. The **2003 calendar year water delivery from Lake Casitas was 16,571 acre-feet**. The minimum storage level of Lake Casitas in WY 2002-03 was 183,447 acre-feet.

Table 28 - 30 Year Historic Rainfall at Casitas Dam

Water Year	Rainfall (Inches)		Water Year	Rainfall (Inches)		Water Year	Rainfall (Inches)
80-81	16.24		90-91	24.42		2000-01	29.36
81-82	19.35		91-92	29.75		01-02	9.28
82-83	51.14		92-93	41.20		02-03	**24.83***
83-84	17.91		93-94	16.08		03-04	17.03
84-85	17.30		94-95	49.84		04-05	54.66
85-86	33.49		95-96	18.8		05-06	26.52
86-87	10.86		96-97	24.37		06-07	8.60
87-88	18.62		97-98	59.54		07-08	26.19
88-89	11.73		98-99	12.68		08-09	14.82
89-90	9.46		99-00	24.35		09-10	31.13

***Average Year**

SINGLE DRY YEAR:

Lake Casitas has been sized, constructed, and operated as both a primary water source and a backup water supply for the groundwater basins of western Ventura County. It is a long-term storage facility so any single rainfall year does not change the projected safe yield of a long term period. The driest rainfall year in the watershed in the last 30 years occurred in 2007 when only 8.6 inches of rain fell at Casitas Dam. Water demands from Lake Casitas spiked upward from the 2006 demand by 4073 acre-feet to a total annual demand of **21,326 acre-feet in 2007**. Lake Casitas storage was above 200,000 acre-feet during 2007.

MULTIPLE DRY YEAR:

The historical record provides information regarding 'a multiple dry year' occurrence in a drought period, which results in an escalation of water demands. During multiple dry years, surface flow in the Ventura River becomes non-existent and the groundwater in the Ventura River and Ojai Basins are diminished due well extractions, natural drainage, and a lack of replenishment from rainfall. Water demands on Lake Casitas have been observed to escalate significantly due to multiple years of insufficient rainfall and the transition from groundwater sources to the Lake casitas supply. Further escalation in Lake Casitas demands resulted from the water demands by 5,600 acres of agriculture that needed to supplement the lack of rainfall with an alternate water supply in order to continue to produce crops. The representative multiple dry years for which water use data is available for comparative analysis is the period of 1987 through 1990 (Table 29). The water use for single dry year of 2007 is provided as a guide for the first dry year, followed by the historic 1987 through 1990 actual water use for the 5-Year Multiple Dry Year projections.

TABLE 29 - WATER USE FOR MULTIPLE DRY YEAR

	Avg. Yr	Single Dry Year	Year 1	Year 2	Year 3	Year 4
Water Year	2003	2007	1987	1988	1989	1990
Local Yearly Rainfall (in.)	24.99	8.6	9.83	18.40	11.85	8.86
Actual Water Use (AF/Y)	16,571	21,326	22,339	21,032	24,416	22,454

The summary of water use demand data is provided in Table 29, for application to the projections required for the Plan.

Table 30 - Basis of Water Year Data	
Water Year Type	**Base Year(s)**
Average Water Year	**2003 – Actual Water Use = 16,571 AF**
Single-Dry Water Year	**2007 – Actual Water Use = 21,326 AF**
Multiple-Dry Water Years	**2007 and the period of 1987 thru 1990 Actual Water Use = 21,326 AF, 22,339AF, 21,032AF, 24,416AF, and 22,454AF**

The significant change in water demand occurred during the fourth consecutive dry year. It is recognized, actual water use in 1990 was skewed downward due to water use decisions made by the City of Ventura to move to an alternate water source during this year and the following five years. The City of Ventura was concerned that there was no filtration treatment of Lake Casitas water during these years. Thus the demand on the Lake Casitas water supply was diminished significantly from 1990 through 1996 due to the temporary shift to alternate water sources by the City of Ventura. The water use model developed in the 2004 "Supply and Use Status Report" provides a prediction of water use escalation as a factor of yearly rainfall and considers the use based on the City of Ventura not making the shift to alternate water supplies. Based on the Report, Lake Casitas water demands would have escalated to above 26,000 acre-feet during the fourth year of the 1987 to 1990 drought.

Water Service Reliability – Projected Normal Water Year Supply And Demand

The annual normal Water Year Supply is from CMWD's "Supply and Use Status Report.' It is reported as the safe annual yield, which is **20,840 acre-feet annually**.

TABLE 31 - PROJECTED AVERAGE WATER YEAR SUPPLY – AF/Y

	2010	2015	2020	2025	2030	2035/opt
Supply	20,840	20,840	20,840	20,840	20,840	20,840
% of Normal Year	100%	100%	100%	100%	100%	100%

From Table 29, the Average Year occurred in 2003 and the actual water use in that year was 16,571 acre-feet. This value is to be the projected normal water year demand from the District supply.

TABLE 32 - PROJECTED AVERAGE WATER YEAR DEMAND – AF/Y

	2010	2015	2020	2025	2030	2035/opt
Demand	16,571	16,571	16,571	16,571	16,571	16,571
% of Normal Year	100%	100%	100%	100%	100%	100%

TABLE 33 - PROJECTED AVERAGE YEAR SUPPLY & DEMAND COMPARISON – AF/Y

	2010	2015	2020	2025	2030	2035/opt
Supply	20,840	20,840	20,840	20,840	20,840	20,840
Demand	16,571	16,571	16,571	16,571	16,571	16,571
Difference (supply minus demand)	4,269	4,269	4,269	4,269	4,269	4,269
Difference as % of Supply	20%	20%	20%	20%	20%	20%
Difference as % of Demand	26%	26%	26%	26%	26%	26%

Water Service Reliability – Projected Single-Dry-Year Supply And Demand Comparison

Projected single Dry Year water year is from 2007 as mentioned in Table 29. The supply is estimated to be the safe annual yield as reported in CMWD's "Supply and Use Status Report.

TABLE 34 - PROJECTED SINGLE DRY YEAR SUPPLY & DEMAND COMPARISON – AF/Y

	2010	2015	2020	2025	2030	2035/opt
Supply	20,840	20,840	20,840	20,840	20,840	20,840
Single Dry Year Demand	21,326	21,326	21,326	21,326	21,326	21,326
Difference (supply minus demand)	(486)	(486)	(486)	(486)	(486)	(486)
Difference as % of Supply	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%
Difference as % of Demand	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%

Water Service Reliability – Projected Multiple-Dry-Year Supply And Demand Comparisons

The following tables project and compare supply and demand for multiple dry year periods. Because supply and demand will vary during the 20-year projection, the law requires UWMPs to project the impact of multiple-dry year periods for each 5-year period during the 20-year projection.

TABLE 35- PROJECTED SUPPLY DURING A MULTIPLE DRY YEAR PERIOD

	1	2	3	4	5
Supply	20,840	20,840	20,840	20,840	20,840
Projected normal Supply	20,840	20,840	20,840	20,840	20,840
% of Projected Average	100%	100%	100%	100%	100%

TABLE 36 - PROJECTED DEMAND MULTIPLE DRY YEAR PERIOD COMPARED WITH AVERAGE DEMAND PROJECTION

	2016	2017	2018	2019	2020
Demand – 2007, 1987 to 1990	21,326	22,339	21,032	24,416	22,454
Projected Average Demand	16,571	16,571	16,571	16,571	16,571
% of Projected Average	129%	135%	127%	147%	136%

TABLE 37- PROJECTED SUPPLY & DEMAND COMPARISON DURING MULTIPLE DRY YEAR PERIOD OF 2011 THRU 2015 –AF/Y

	2011	2012	2013	2014	2015
Supply	20,840	20,840	20,840	20,840	20,840
Demand	21,326	22,339	21,032	24,416	22,454
Difference (supply minus demand)	(486)	(1,499)	(192)	(3,576)	(1,614)
Difference as % of Supply	(2.3%)	(7.2%)	(1.0%)	(17.2%)	(7.7%)
Difference as % of Demand	(2.3%)	(6.70%)	(1.0%)	(14.6%)	(7.2%)

The following tables project a multiple dry year period occurring between 2016-2020 and compares the projected supply and demand during those years.

TABLE 38 - PROJECTED SUPPLY & DEMAND COMPARISON DURING MULTIPLE DRY YEAR PERIOD OF 2016 THRU 2020 –AF/Y

	2016	2017	2018	2019	2020
Supply totals	20,840	20,840	20,840	20,840	20,840
Demand totals	21,326	22,339	21,032	24,416	22,454
Difference (supply minus demand)	(486)	(1,499)	(192)	(3,576)	(1,614)
Difference as % of Supply	(2.3%)	(7.2%)	(1.0%)	(17.2%)	(7.7%)
Difference as % of Demand	(2.3%)	(6.70%)	(1.0%)	(14.6%)	(7.2%)

TABLE 39 - PROJECTED SUPPLY & DEMAND COMPARISON DURING MULTIPLE DRY YEAR PERIOD 0F 2021 THRU 2025- AF/Y

	2021	2022	2023	2024	2025
Supply totals	20,840	20,840	20,840	20,840	20,840
Demand totals	21,326	22,339	21,032	24,416	22,454
Difference (supply minus demand)	(486)	(1,499)	(192)	(3,576)	(1,614)
Difference as % of Supply	(2.3%)	(7.2%)	(1.0%)	(17.2%)	(7.7%)
Difference as % of Demand	(2.3%)	(6.70%)	(1.0%)	(14.6%)	(7.2%)

TABLE 40 - PROJECTED SUPPLY & DEMAND COMPARISON DURING MULTIPLE DRY YEAR PERIOD OF 2026 THRU 2030- AF/Y

	2026	2027	2028	2029	2030
Supply totals	20,840	20,840	20,840	20,840	20,840
Demand totals	21,326	22,339	21,032	24,416	22,454
Difference (supply minus demand)	(486)	(1,499)	(192)	(3,576)	(1,614)
Difference as % of Supply	(2.3%)	(7.2%)	(1.0%)	(17.2%)	(7.7%)
Difference as % of Demand	(2.3%)	(6.70%)	(1.0%)	(14.6%)	(7.2%)

TABLE 41 - PROJECTED SUPPLY & DEMAND COMPARISON DURING MULTIPLE DRY YEAR PERIOD OF 2031 THRU 2035- AF/Y

	2031	2032	2033	2034	2035
Supply totals	20,840	20,840	20,840	20,840	20,840
Demand totals	21,326	22,339	21,032	24,416	22,454
Difference (supply minus demand)	(486)	(1,499)	(192)	(3,576)	(1,614)
Difference as % of Supply	(2.3%)	(7.2%)	(1.0%)	(17.2%)	(7.7%)
Difference as % of Demand	(2.3%)	(6.70%)	(1.0%)	(14.6%)	(7.2%)

SECTION 6: DEMAND MANAGEMENT MEASURES

CMWD has a strong commitment to water use efficiency. CMWD is a signatory to the Memorandum of Understanding (MOU) with the California Urban Water Conservation Council (CUWCC). This essentially declares CMWD's intent to implement all cost effective water conservation Best Management Practices (BMPs) as noted by the CUWCC. CMWD is a retail water agency, wholesale water agency and an agricultural water agency. CMWD actively implements BMPs for all of its customer groups and continues to increase its efforts each year.

DMM A: Water Survey Programs

CMWD began its water survey programs for single-family and multi-family residential customers for direct retail customers and for whole agency customers beginning in February of 2010 with the addition of a Water Conservation Coordinator position at the district. CMWD has contracted with Resource Action Programs for services to provide residential survey programs starting in 2006 and continuing to present that utilize students to conduct residential water surveys with state approved water education curriculum provided by the Waterwise and Livingwise programs. These programs include low flow showerheads, toilet leak detection tablets, kitchen and faucet aerators, rulers to measure toilet tank size and a measuring device to detect the number of inches of water applied in a given location of a landscape over a specified period of time. The CMWD's direct survey program also includes evaluating all indoor and outdoor water use. A meter test is provided to check for leaks, landscape is thoroughly inspected for irrigation efficiency and plant type. Low flow showerheads, kitchen aerators, bathroom aerators are provided if needed. All water appliances are inspected. All toilets and faucets are inspected for leaks. The customer is provided with a report on what improvements that they can do, both inside and outside the home, to improve water use efficiency and they are shown how much their water and dollar savings would be if they implemented all recommendations. The report also indicates all of the rebate opportunities provided by Casitas for appliances and smart irrigation controllers.

Table 42: Water Surveys Completed

Actual	2006	2007	2008	2009	2010
Number of Single Family			519	539*	502* 5
Number of Multi-Family (only 18 accounts in district)					1
Wholesale Agencies					**7**
Actual Water Savings – AFY			**10.97***	**20.94***	**14.12***

*School program, unknown how many are multi-family or from resale agencies.

Table 43: Water Surveys Planned					
Planned	2011	2012	2013	2014	2015
Number of Single-Family	500* 30	500* 30	500* 30	500* 30	500* 30
Number of Multi-Family (only 18 accounts in district)	1	1	1	1	1
Wholesale Agencies	10	10	10	10	10
Actual Water Savings – AFY	**20**	**20**	**20**	**20**	**20**

*School program, unknown how many are multi-family or from resale agencies.

CMWD will be hiring a full-time Water Conservation Specialist starting in July of 2011. This position will work to increase the number of surveys being completed each year.

DMM B – Residential Plumbing and Retrofit

Table 44: Plumbing Fixtures					
Actual	2006	2007	2008	2009	2010
Number of Single-Family			637*	692* 79	540* 318
Number of Multi-Family (only 18 accounts in district)					
Wholesale Agencies					
Actual Water Savings – AFY			**15.77**	**18.75**	**18.64**

*Provided in education program. Unknown how many went to multi-family.

Table 45: Plumbing Fixtures					
Planned	2011	2012	2013	2014	2015
Number of Single-Family	550* 100	550* 100	550* 100	550* 100	550* 100
Number of Multi-Family (Only 18 accounts in district)	10	10	10	10	10
Wholesale Agencies	100	100	100	100	100
Actual Water Savings – AFY	**20**	**20**	**20**	**20**	**20**

*Provided in education program. Unknown how many went to multi-family.

CMWD provides free low flow showerheads, faucet aerators, toilet flappers, leak detection kits, and shower timers to all residents with the district. CMWD advertises these fixtures in the newsletter and on the website. CMWD requires applicants to sign a sheet and to indicate how many and what type of devices they are taking so that water conservation estimates can be determined. When CMWD provides its residential surveys the number and types of devices are recorded. The school program also records the number and type of devices that were reported to have been installed.

DMM C – System Water Audits, Leak Detection and Repair

CMWD's system water audit and leak detection and repair program is a multifaceted effort that has been in place for over ten years. It includes the utilization of sound testing to check for mainline leaks on an annual basis; annual testing of customer meters and master meter testing to include repairs and replacements as needed; recording of flushing and leak repair losses; metering of all water uses; and measurement of master meters at each pump zone to determine if leaks occur in any geographic area. Pressure management for water loss minimization is limited to do service needs in hilly areas. Total unaccounted for system losses in 2009 were 135.56 acre-feet or .77%. Total unaccounted for system losses in 2010 were 396.60 acre-feet or 2.42%. Without CMWD's leak detection and repair program it is likely losses would be much greater.

DMM D - Metering with Commodity Rates

CMWD meters all of its 3,179 accounts. All new accounts are metered. All customers are charged on a volumetric basis with over 70% of all charges based on a commodity charge. Casitas has been metering all customers for decades.

DMM E – Large Landscape Conservation Programs and Incentives

CMWD has 6 dedicated irrigation meters. CMWD only has a few dozen large landscaped customers. CMWD started its Large Landscape program in 2005, when 5 landscape audits were completed. CMWD has joined several other agencies in Ventura County in an implementation grant through the Proposition 84 bond that will provide for county-wide landscape program. We have been notified that this program has been funded and anticipate that it will begin over the next couple of years. CMWD will also utilize its new water Conservation Specialist position which will be hired in July 2011 to conduct landscape audits. Previous landscape survey audits have been completed by outside consultants. Each survey included an evaluation of the irrigation efficiency, area of landscape, area of turf, and distribution uniformity, observed leaks, timer settings, irrigation time settings, and the development of a water budget. A copy of the landscape reports were provided to the each of the customers.

CMWD contacted by phone large landscape customers with the highest usage to offer free landscape surveys. Electronic copies in a PDF format are saved on file for each survey performed.

Table 46: Large Landscapes					
Actual	2006	2007	2008	2009	2010
Number of surveys completed	3	0	0	5	1
Number of budgets developed	3	0	0	5	1
Number of follow-up visits	0	0	0	0	0
Actual Water Savings – AFY					

Table 47: Large Landscapes					
Planned	2011	2012	2013	2014	2015
Number of surveys completed	4	4	4	4	4
Number of budgets developed	4	4	4	4	4
Number of follow-up visits	4	4	4	4	4
Actual Water Savings – AFY					

DMM F – High-Efficiency Washing Machine Rebate Program

CMWD began its washing machine rebate program in 2007. CMWD joined the Smart Rebate program that is run by the California Urban Water Conservation Council (CUWCC). CMWD provides advertising but leaves the processing of rebates to the CUWCC. The estimated water savings per year is based on the average washing machine usage of 40 gallons per load, with 8 wash loads a week and 40% reduction in water usage per load for a High Efficiency Washing Machine. So, the annual calculated savings per residential washing machine rebate would be 6,656 gallons or .02 acre-feet.

Table 48: Washing Machine Rebates					
Actual	2006	2007	2008	2009	2010
$ per rebate		**$150 per Residential and $400 per commercial**			
Number of rebates paid		26 Residential 2 Commercial	25 Res. 0 Comm.	28 Res. 0 Comm.	28 Res. 0 Comm.
Actual Water Savings – AFY		**.53**	**.51**	**.57**	**.57**

Table 49: Washing Machine Rebates					
Planned	2011	2012	2013	2014	2015
$ per rebate	**$150 per Residential and $400 per commercial**				
Number of rebates paid	36 Res. 2 Comm.	36 Res. 2 Comm.	36 Res. 2 Comm.	36 Res. 2 Comm.	36 Res. 2 Comm.
Actual Water Savings – AFY	**.73**	**.73**	**.73**	**.73**	**.73**

DMM G – Public Information Programs

CMWD's public information program started in 2003. It currently includes sending out 2 annual newsletters that include information on water conservation to all 30,000 residents in the district. 2 additional bill stuffers are sent out each year as well to ensure that there is a quarterly contact with customers. Every bill statement has a water conservation message on it. The website and Facebook sites are updated several times a quarter with water conservation videos, articles, or with program updates. Press releases or media contacts are made each quarter. Water bills include information on previous usage. CMWD recently removed all of its turf from the main office and replaced it with drought tolerant plants. The office is located on a main thoroughfare within the district. The high visibility for the drought tolerant plantings sets a significant example for customers.

CMWD has a speaker's bureau program that is advertised in the newsletters. District staff members attend multiple community meetings throughout the year and discuss water conservation issues as part of their presentations. CMWD staffs tables at community events and offers give-a-ways such as free toilet flappers, low flow showerheads, and faucet aerators.

Table 50: Public Information

Actual	2006	2007	2008	2009	2010
a. Paid Advertising	No	No	Yes	No	No
b. Public Service Announcement	No	No	No	No	No
c. Bill inserts, Newsletters, brochures	Yes	Yes	Yes	Yes	Yes
d. Bill comparing previous water usage	No	No	No	Yes	Yes
e. Demonstration Garden	No	No	No	No	Yes
f. Special Events, media events.	Yes	Yes	Yes	Yes	Yes
g. Speakers Bureau	Yes	Yes	Yes	Yes	Yes
h. Coordination with other government entities.	Yes	Yes	Yes	Yes	Yes

Table 51: Public Information					
Planned	2011	2012	2013	2014	2015
a. Paid Advertising	Yes	Yes	Yes	Yes	Yes
b. Public Service Announcement	Yes	Yes	Yes	Yes	Yes
c. Bill inserts, Newsletters, brochures	Yes	Yes	Yes	Yes	Yes
d. Bill comparing previous water usage	Yes	Yes	Yes	Yes	Yes
e. Demonstration Garden	Yes	Yes	Yes	Yes	Yes
f. Special Events, media events.	Yes	Yes	Yes	Yes	Yes
g. Speakers Bureau	Yes	Yes	Yes	Yes	Yes
h. Coordination with other government entities.	Yes	Yes	Yes	Yes	Yes

CMWD – School Education Programs

CMWD started its school education program in 2005. CMWD currently contracts with Resource Action programs to provide state approved curriculum on water conservation to both 5th and 6th grade classrooms. CMWD also provides educational materials to K-12 teachers upon request. CMWD in 2010 started working with the Ojai Rotary Club to provide water conservation classrooms on a boat in Lake Casitas. CMWD plans to expand its education program with the hiring of a new water conservation coordinator in July of 2011.

CMWD reached 706 K-6 students with state education framework materials on water conservation in 2010. CMWD reached 55 students in grades 7-12 in 2010. CMWD anticipates expanding the number of students reached over the next five years.

DMM I – Conservation Programs for Commercial, Industrial and Institutional (CII)

CMWD has been implementing its CII program since 2004. CMWD has contacted all of the highest usage customers and has offered and provided surveys to those customers. The CII surveys included an inspection and an in-depth analysis of water usage at each facility evaluating all water use devices and processes. Final reports with recommendations and calculated benefits were provided to each customer. A lack of staff resources in the past has prevented a thorough evaluation of the effectiveness

of this demand management measure. All CII customers are offered High Efficiency Washing Machine Rebates of $400 and High Efficiency Toilet Rebates for $200. Smart Irrigation Controller rebates for $350 are also provided to CII customers. Free showerheads, faucet aerators and toilet flappers are also provided. Starting in July of 2011 a new full-time water conservation coordinator position will assist with this process.

Table 52: CII Conservation Program					
Actual	2006	2007	2008	2009	2010
Number of surveys completed	10	0	0	2	6
Were incentives provided?	Yes	Yes	Yes	Yes	Yes
Number of follow-up visits					
Actual Water Savings – AFY					

Table 53: CII Conservation Program					
Planned	2011	2012	2013	2014	2015
Number of surveys completed	4	4	4	4	4
Were incentives provided	Yes	Yes	Yes	Yes	Yes
Number of follow-up visits	4	4	4	4	4
Actual Water Savings – AFY					

DMM J – Wholesale Agency Programs

CMWD started providing its retail water agencies with water conservation assistance in 2004. CMWD participates with the SMART rebates program through the CUWCC, which makes it very difficult to identify which rebates are provided to which retail agencies for High Efficiency Washing machines (HEW) and for High Efficiency Toilets (HET), but CMWD does market those rebates to all customers through newsletter mailings, which go to every household in the district that includes all nine retail agencies. CMWD also offers its Smart irrigation controller rebates to the nine retail agencies and is able to track which agency receives a rebate. CMWD's Water Conservation Manager has contacted retail agencies about water conservation programs available and has coordinated a group table at the Ojai Day Festival for several years. It is not possible to determine which students participating in CMWD's education programs belong to which retail agency since most of the agencies share the same school district. CMWD is able to track the residential surveys it provides by retail agency. There are only a few retail agencies of the nine that have CII customers but CMWD has offered surveys to some of the larger CII customers in those agencies.

Table 54: Wholesale Agency Programs	**Number of Agencies Assisted**				
Program Activities	2006	2007	2008	2009	2010
DMM A (1) : Water Surveys	9	0	0	9	9
DMM B (2) : Residential Retrofits	9	9	9	9	9
DMM C (3) : System Audits	0	0	0	0	0
DMM D (4) : Meter/Commodity Rates	0	0	0	0	0
DMM E (5) : Landscape Programs	9	0	0	9	9
DMM F (6) : Washing Machines	0	9	9	9	9
DMM G (7) : Public Information	9	9	9	9	9
DMM H (8) : School Education	9	9	9	9	9
DMM I (9) : CII Conservation Programs	9	0	0	9	9
DMM L (12) : WC Coordinator	9	9	9	9	9
DMM M (14) : ULFT Replacement (HET for 2008-2009)	9	9	9	9	9

Table 55: Wholesale Agency Programs	Number of Agencies to be Assisted				
Program Activities	2011	2012	2013	2014	2015
DMM A (1) : Water Surveys	9	9	9	9	9
DMM B (2) : Residential Retrofits	9	9	9	9	9
DMM C (3) : System Audits	0	0	0	0	0
DMM D (4) : Meter/Commodity Rates	0	0	0	0	0
DMM E (5) : Landscape Programs	9	9	9	9	9
DMM F (6) : Washing Machines	9	9	9	9	9
DMM G (7) : Public Information	9	9	9	9	9
DMM H (8) : School Education	9	9	9	9	9
DMM I (9) : CII Conservation Programs	9	9	9	9	9
DMM L (12) : WC Coordinator	9	9	9	9	9
DMM M (14) : ULFT Replacement (HET only)	9	9	9	9	9

DMM K – Conservation Pricing

CMWD has implemented conservation pricings for decades. CMWD in 2008 increased its three tier residential rate structure to a four tier rate structure as an additional water conservation incentive.

Table 56 Retailers	Water Rate Structure
Residential	Inclined block
Commercial	Uniform
Industrial	Uniform
Institutional/Government	Uniform
Agricultural	Uniform
Other	Uniform

Table 57 Wholesalers	Water Rate Structure
Retail	Uniform

DMM L – Water Conservation Coordinator

CMWD has a full-time Water Conservation Manager and a part-time Water Conservation Coordinator. CMWD is in the process of hiring another full-time position as a Water Conservation Specialist. CMWD also utilizes several consulting firms to assist with the implementation of all of the Water Conservation Best Management Practices. These positions perform landscape, residential, and commercial surveys. They administer rebate programs, public information programs, wholesale programs, special events and education programs.

DMM M – Water Waste Prohibition

CMWD has an adopted Water Waste Prohibition, see Appendix F.

DMM N – Residential Ultra-Low Flush Toilet Replacement Programs

CMWD has been implementing a regional ULFT rebate and/or distribution program since 2004 targeting residential and CII customers. Since 2007, CMWD's program has focused solely on providing rebate incentives for retrofitting non-efficient devices with either ULFT's or High Efficiency Toilets (HETS) – toilets using 1.28 gallons per flush or less. CMWD currently only provides rebates for the HETs through the SMART rebate program administered by the California Urban Water Conservation Council.

PART II UWMP SUPPORTING INFORMATION

APPENDIX A: – ADOPTION RESOLUTION

CASITAS MUNICIPAL WATER DISTRICT

RESOLUTION NO. 11-12

RESOLUTION ADOPTING THE URBAN WATER MANAGEMENT PLAN FOR CASITAS MUNICIPAL WATER DISTRICT

WHEREAS, the California Legislature in its 1983-84 Regular Session, adopted the Urban Water Management Planning Act; and

WHEREAS, said Act requires all urban water purveyors with greater than 3,000 service connections or water use of more than 3,000 acre feet per year served directly to consumers to prepare and submit an urban water management plan to the California Department of Water Resources every five years; and

WHEREAS, the plan shall be reviewed periodically, at least every five years, and Casitas shall make any amendments or changes to its plan which are indicated by the reviews; and

WHEREAS, the original plan was adopted and sent to the California Department of Water Resources in March, 1996.

WHEREAS, the reviewed plan must be filed with the California Department of Water Resources within thirty days of adoption;

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the Casitas Municipal Water District as follows:

1. The plan entitled "Urban Water Management Plan for Casitas Municipal Water District" dated June 22, 2011 has been reviewed, modified and is on file in Casitas' office and is hereby adopted.

2. A copy of the Urban Water Management Plan is to be forwarded to the California Department of Water Resources.

APPROVED this 22nd day of June, 2011.

President,
Casitas Municipal Water District

ATTEST:

Secretary,
Casitas Municipal Water District

APPENDIX A CONTINUED: RESOLUTION SETTING A PUBLIC HEARING

CASITAS MUNICIPAL WATER DISTRICT

RESOLUTION NO. 11-10

RESOLUTION SETTING THE TIME AND PLACE OF A PUBLIC HEARING FOR INPUT REGARDING THE URBAN WATER MANAGEMENT PLAN

WHEREAS, Casitas is interested in public comments regarding the adoption of the Urban Water Management Plan;

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the Casitas Municipal Water District as follows:

1. A public hearing will be conducted for the purpose of hearing all interested parties regarding the Urban Water Management Plan.

2. The place of said hearing is hereby fixed at Casitas' Office, 1055 Ventura Avenue, in the town of Oak View. The date and time for said hearing is hereby fixed as June 22, 2011, at 3:00 p.m.

3. The Clerk of the Board of Casitas is hereby directed to give notice of said hearing by publishing a notice of the time and place of the hearing in the local newspapers.

ADOPTED this 25th day of May, 2011.

President, Casitas
Municipal Water District

ATTEST:

Secretary, Casitas
Municipal Water District

APPENDIX B: URBAN WATER MANAGEMENT PLANNING ACT

Established: AB 797, Klehs, 1983
Amended: AB 2661, Klehs, 1990
AB 11X, Filante, 1991
AB 1869, Speier, 1991
AB 892, Frazee, 1993
SB 1017, McCorquodale, 1994
AB 2853, Cortese, 1994
AB 1845, Cortese, 1995
SB 1011, Polanco, 1995
AB 2552, Bates, 2000
SB 553, Kelley, 2000
SB 610, Costa, 2001
AB 901, Daucher, 2001
SB 672, Machado, 2001
SB 1348, Brulte, 2002
SB 1384 Costa, 2002
SB 1518 Torlakson, 2002
AB 105, Wiggins, 2003
SB 318, Alpert, 2004
SB x 7_7, Steinberg 2009

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 plans prepared pursuant to this part. A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, and 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 acre-feet 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 over drafted or has projected that the basin will become over drafted 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.
(1) 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 non-economic 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 acre-feet 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 C: OTHER SOURCES

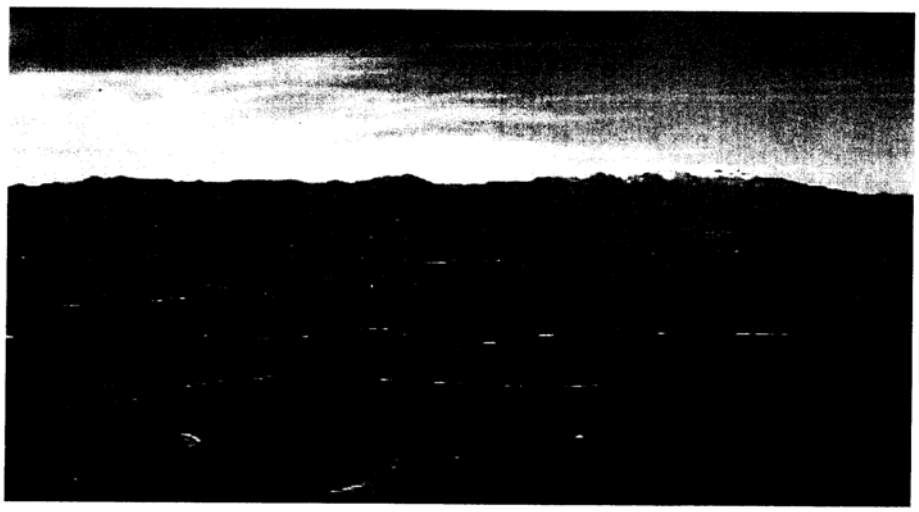
- California Environmental Quality Act - http://ceres.ca.gov/ceqa/
- California Land Use Planning Information Network - http://ceres.ca.gov/planning/
- The Governor's Office of Planning and Research - http://www.opr.ca.gov/
- US Bureau of Reclamation Lower Colorado Regional Office - http://www.usbr.gov/lc/region/
- US Bureau of Reclamation Mid-Pacific Region - http://www.usbr.gov/mp/
- California Department of Water Resources Bay Delta Office State Water Project Delivery Reliability Report - http://swpdelivery.water.ca.gov/
- California Department of Water Resources Division of Planning and Local Assistance Groundwater Management in California - http://wwwdpla.water.ca.gov/cgi-bin/supply/gw/management/hq/main.pl

APPENDIX D: CMWD WATER SUPPLY AND DEMAND STUDY

CASITAS MUNICIPAL WATER DISTRICT

WATER SUPPLY AND USE STATUS REPORT

December 7, 2004



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CASITAS MUNICIPAL WATER DISTRICT

WATER SUPPLY AND USE STATUS REPORT

PURPOSE

The purpose of this report is to provide information on the status of water supply and use for the Casitas Municipal Water District (Casitas) and suggest strategies for meeting water use in the future.

BACKGROUND

Quantifying water supply and use patterns in the Ventura River Basin can be a complicated task. To aide in the understanding of these patterns and their implications to water management activities, this section provides useful definitions of water supply and use terms, describes previous water supply and use studies, and summarizes recent changes to water supply and use within the district.

USEFUL DEFINITIONS

Water Supply: Quantity of water managed by Casitas.
This term refers to the quantity of surface water and groundwater resources managed by Casitas within the Ventura River Basin.

Safe Yield: Rate at which the available water supply can be "safely" depleted.
This term was defined by Meinzer (1) as "the rate at which water can be withdrawn from an aquifer for human use without depleting the supply to such an extent that the withdrawal at this rate is harmful to the aquifer itself, or to the quantity of water, or is no longer economically feasible." The calculation of safe yield for Casitas is based on the storage volume of Lake Casitas (the aquifer), the surface water and groundwater supply managed by Casitas, and the length of time that the water supply needs to last (i.e. longest drought on record). The safe yield value is an interpolated value that is held constant over the period of the critical drought, bringing the level of storage to the desired minimum volume.

Water Use: Quantity of water delivered from Lake Casitas to the conveyance system, as measured at the start of the system at Casitas Dam.
This term is used to describe the volume of water that is directly taken from the available water supply. Casitas measures the rate of water use by quantifying the amount of water delivered to the water distribution system from Lake Casitas. The measurement of water use is performed through the use of accurate flow tube sensors.

Metered Water Sales: Quantity of water that is metered and sold at the individual service connections in the water distribution system.

This term refers to the summation of the quantity water measured through water service connections within the Casitas district. The metered water sales are categorized by the type of customer (i.e. residential, business, resale, and agriculture) and summarized on an annual basis.

Water Allocation: Quantity of water assigned to service connections.
This term refers to the primary tool used by Casitas to manage the quantity of water used by customers (i.e. metered water sales). Service connections are assigned an allocation (limited quantity of water). Residential, business, industrial, resale, and interdepartmental service connections have individual allocations. Agricultural service connections are combined into a single allocation for the entire group. The allocation program was designed as a price-driven water conservation measure that provides for a base cost that escalates once metered water sales exceed service connection allocations.

PREVIOUS WATER SUPPLY AND USE STUDIES

The ability of local water supplies to meet demands was evaluated by the Bureau of Reclamation, in the 1954 evaluation of Ventura River Project, and later by the District during the 1989 drought period. Each of these evaluations considered the ability of Lake Casitas storage, under the hydrology determined as the most critical drought period of record, to meet the water demands of the District's service area. The critical drought period of record is considered to have occurred during 1944 through 1965. The findings of each report are summarized in a memorandum prepared by Richard Barnett, dated June 7, 1989, were as follows:

1) The safe yield of Lake Casitas without an integrated Matilija Dam was 21,500 acre-feet, and 21,920 with Matilija Dam as a part of the system;
2) The estimated total water supplies in the District service area was 30,907 acre-feet and the water demands for the same service area were approximately 30,320 acre-feet;
3) The District should consider implementing a variety of alternatives for balancing water supply and demand.

RECENT WATER SUPPLY/USE CHANGES

In 1989, the District's service area was in the middle of a short-term drought that began in 1987 and ended in March 1992. The Ventura River and Ojai groundwater basins were being depleted and Lake Casitas water storage dropped to near fifty percent capacity. The District-wide water usage was beginning to escalate because of the lack of rainfall and the depletion of groundwater supplies. The Casitas Municipal Water District recognized that water use was very rapidly approaching the availability of supply (Barnett Memorandum, June 7, 1989) and that the District needed to apply strategies to meet future water needs. The District moved to a temporary moratorium on providing new water service connections. The moratorium continued for approximately two years until an additional 300 acre-feet of water was developed from Mira Monte Well. The Mira Monte Well supply, therefore, was available for issuance of new water service connections.

During the 1990's, the drought pattern ended with the occurrence of three heavy rainfall years (1992, 1995, and 1998). Lake Casitas and the groundwater basins filled to full capacity. The District continued to issue new service connections on the basis of water made available from the Mira Monte Well supply. The addition of new water service connections in the District's service area grew slowly, averaging approximately 25 new service connections each year for the 1990's.

One major water use change occurred in 1991. The City of San Buenaventura reduced their use of Casitas water due of the lack of filtration treatment of Lake Casitas water supplies. The City purchased 9,510 acre-feet during 1989 and reduced water purchases to only 1,370 acre-feet in 1992. The reduction in metered water sales by the City continued until 1997, when the District finally met the filtration requirements. The City and the District came to agreement that the annual metered water sales to the City from Casitas supplies would be a minimum of 6,000 acre-feet.

In 1997, the National Marine Fisheries Service (NMFS) listed anadromous steelhead in Southern California as endangered under the Endangered Species Act. The Ventura River Basin has been identified as important spawning habitat for Southern California steelhead. A result of this listing was the requirement for the District to construct a fish passage facility at the Robles Diversion Dam and change the Robles Diversion operational release criteria to one that provided additional downstream release of flows for fish passage. The issuance of the Biological Opinion (BO) by the NMFS in March 2003 set into place the revised operational criteria for the Robles Diversion Dam and Fish Passage Facility. The change of operational criteria for the Robles Diversion Facility has caused Casitas to take immediate management actions to ensure the protection of long-term water supplies.

On April 23, 2003, Casitas suspended the issuance of new water service connections. The suspension has remained in effect through June 8, 2004. It will remain in effect as long as deemed necessary by the Casitas Board of Directors. Since suspending new service connections, Casitas has implemented water conservation measures, evaluated potential supplies of additional water, and initiated an evaluation of water supply and use within the district. The purpose of this narrative is to present results of the water supply/use analysis.

Another significant potential change to Casitas water supplies is the future disposition of Matilija Dam. This facility is presently being evaluated for the potential decommissioning and removal. Sediment deposition in the Matilija Reservoir has reduced the water storage volume behind Matilija Dam to approximately 600 acre-feet. NMFS has made the determination that the dam structure is a barrier to steelhead migration. The goals of the project proponents are to promote the migration of steelhead to the upper reaches of the Matilija Creek and enhance movement of sediment to Ventura County beaches. The removal of the Matilija Dam could impact water supply and water quality for both the short term and long term. It is important, therefore, for Casitas to have a clear understanding of these potential impacts.

CURRENT WATER SUPPLY AND USE STUDY

This study evaluated the: (1) potential impact of the Robles BO operating criteria and the removal of Matilija Dam on the Casitas water supply, (2) the effect of predicted water use on the Casitas water supply, and (3) levels of reductions in water use required to balance water supply and use. The study applies hydrology information from 1945 through 1965 as the critical drought period and information from 1966 through 1980 as the reservoir recovery period. These periods have empirical hydrology information that provide an opportunity to model different operating scenarios for the Robles Diversion Facility.

WATER SUPPLY

The Casitas water supply was evaluated with a reservoir routing model. It included application of the Robles BO Operating Criteria and the 1959 Trial Operating Criteria for Robles Diversion Facility during the drought and reservoir recovery periods. The evaluation also considered the benefit of Matilija Dam to water supply. The methods, assumptions, and summaries that were applied and developed for the water supply evaluations are outlined in **Appendix A**.

WATER USE

Predictions for Casitas water use were developed for the drought and reservoir recovery periods. Empirical information on the quantity of water delivered to the conveyance system was limited to the post 1959 period. Therefore, a model to predict Casitas water use for the drought (1945-1965) and reservoir recovery (1966-1980) periods was developed. The predicted water use is based on recent historical trends o water use in the District's service area and annual rainfall records for both periods. The methods, assumptions, and summaries that were applied and developed for the water use predictions are outlined in **Appendix B**.

BALANCING USE WITH SUPPLY

To determine the level of reduction required to balance water use (Appendix B) with water supply (Appendix A), for any operational scenarios that predicted a water shortage, four different scenarios were evaluated. These included: (1) a constant percent reduction in use, (2) a staged reduction in use, (3) an inverse staged reduction in use, and (4) a volume reduction in use. Implementation of any reduction in use, at this point, would rely on the Casitas Allocation Program. Casitas adopted the water allocation program to primarily provide water use guidelines and reductions in the event of a prolonged drought. **Appendix C** provides an assessment of the current level of allocation issued by the District and direction on further action on this program.

FINDINGS

CRITICAL DROUGHT PERIOD (1945-1965)

The critical drought study period represents the longest drought on record. Within the Ventura River Basin the longest drought on record occurred between the 1945 and 1965 water years. A numerical summary of the analytical results for the critical drought period is provided in Table 1.

Water Supply and Safe Yield: With the Matilija Dam remaining in operation, the reservoir routing model predicted the annual Lake Casitas safe yield for the 1959 Trial Operating Criteria and the Biological Opinion Operating Criteria at 22,770 and 21,630 acre-feet, respectively. The reduction of the annual safe yield, when moving from the 1959 Operating Criteria to the Robles BO Operating Criteria, is approximately 1,140 acre-feet. The total difference of safe yield volume of water that would accumulate through the change in operational criteria at Robles Diversion Dam over the 21-year critical dry period is 23,940 acre-feet. In the event Matilija Dam is decommissioned and removed, the available supply under the Robles BO Operating Criteria will be further reduced by

790 acre-feet. Under this scenario, the annual safe yield supply for the drought period would be 20,840 acre-feet. The difference between the annual safe yield available supplies under the 1959 Trial Operating Criteria with Matilija Dam and the Robles BO Operating Criteria without Matilija Dam is 1,930 acre-feet.

Predicted Water Use. Predicted water use patterns for this study period illustrated that consecutive dry year water demands could place stress water supplies in Lake Casitas. Based on the rainfall patterns of the critical drought period, the predicted average annual water use is 21,200 acre-feet, as shown on Table B6. The maximum to minimum values of predicted annual water use, based on consecutive dry year trend equation, is 27,057 and 15,610 acre-feet, respectively.

Comparison between Water Supply and Water Use. Water supplies exceeded water use, throughout the study period, in all but one operational scenario: Robles BO operating criteria without benefit of Matilija (Table 1). In this case, water use could exceed supplies by approximately 360 acre-feet per year. Over the 21-year study period, this annual difference could accumulate to a deficiency of supply in the amount of 7,560 acre-feet.

RESERVOIR RECOVERY PERIOD (1966 TO 1980)

The recovery period represents the hydrologic patterns immediately following the critical drought study period. For this analysis, it occurred from the time Lake Casitas would be at its lowest storage volume (as a result of drought conditions) until the reservoir was at full storage capacity. This time period was occurred form the 1965 through the 1980 water years. In actual perspective, this was the actual period that Lake Casitas went from a newly created lake to full capacity. A numerical summary of the analytical results for the reservoir recovery period is provided in Table 2.

Water Supply and Yield: Yield, for this study period, was determined by iteratively applying a constant rate of depletion to the water supply in Lake Casitas until a value was reached where the reservoir filled at the same point in time as the D20 study (February 1980). This approach was applied to each of the operational scenarios. Under the wetter conditions of this study period, the yield values vary from a maximum of 24,180 acre-feet under the 1959 Trial Operating Criteria with Matilija Dam, to a minimum of yield value of 19,780 acre-feet under the BO Operating Criteria without Matilija Dam.

Predicted Water Use. The higher rainfall years represented in the recovery study period tended to reduce water use within the District's service area. The average annual predicted water use for the period is 18,820 acre-feet, as shown on Table B9. The maximum to minimum range of predicted water use, based on consecutive dry year trend equation, are 22,704 and 15,249 acre-feet, respectively. These reduction in predicted water use, from that experienced during the drought cycle, is primarily due to lower quantities of water used for agriculture. For orchard crops, less water is required from Lake Casitas during the wet periods.

Comparison between Water Supply and Water Use. Under all four of the operational criteria conditions studied for the reservoir recovery period, the available yield (water supply) values are higher than the predicted water use values. The conclusion that could be developed is that under actual use conditions, the storage of Lake Casitas may restore to full capacity in less time than with theoretical yield values. The rate at which the reservoir fills would be diminished by moving from

the historical 1959 Operational Criteria to the Robles BO Operating Criteria, and is further diminished with the loss of Matilija Dam. The risk of having Lake Casitas fill at a slower rate is that the reservoir may not achieve full storage capacity before onset of another long-term drought period.

BALANCING WATER USE WITH AVAILABLE SUPPLIES

The application of the Biological Opinion Criteria, at this time, is in place and will be the method by which the District operates the Robles Diversion Dam and Fish Passage Facility. The loss of reservoir storage resulting from the decommissioning of Matilija Dam or the sediment deposition of the remaining storage volume appears to be inevitable. Given these conditions, the District must continue to balance water use with the available water supply. In addition to the many options that have been prescribed by past studies and staff recommendations, this evaluation has further reviewed the application of mandatory reductions to water use during the study period.

Reduced Water Use through Conservation and/or Mandatory Use Curtailment. The District reviewed four different methods of water use reduction (Table 3). The key differences between the methods are the level of reduction and the time at which each reduction was applied. The goal of the reduction is to bring the average annual water use during the critical dry period to as close to the safe yield level of supply availability found with the Robles BO Operating Criteria (20,869 acre-feet) without the benefit of Matilija Reservoir.

The four different magnitudes and sequences of water use reductions were applied to the supply in such a manner that resulted in depleting Lake Casitas to minimum pool storage by the end of the critical dry period. The patterns of each water use reduction are presented in Table 3, along with the summaries for the safe yield and predicted water use values.

Prior to the implementation of any of these programs, the District should carefully consider the acceptability of water use reduction impacts to the water user, the realistic ability to attain such reductions, and the desirable frequency of causing the reductions. It is important to distinguish between curtailment and conservation. Conservation measures should focus on the long-term and lasting efficiencies that do not affect the quality of life. Curtailment measures focus on short term, temporary actions that may impact quality of life. The course of the District should consider the acceptability of the impacts on the quality of life cause by either conservation or curtailment.

OTHER FACTORS

During the study, there were several other issues that deserved acknowledgement and consideration by the District. These issues were not included in the development of the study's data or computations, but may be relevant points to include in the development of strategies and assessment of risks for managing the District's water supplies.

Minimum Lake Elevation. All studies on the Lake Casitas safe yield considered the extraction of water from Lake Casitas to a minimum pool. There may be some impacts that could arise when minimum pool is approached in Lake Casitas, such as:

Water Quality – the degree of the water quality impacts are unknown at this time. There is a potential for concentrating salts, organics, elements (manganese and/or boron) and nutrients as the water volume diminishes to minimum pool. Warm, shallow water may also promote the growth of algae, which in turn could lead to taste and odor problems in the drinking water supply. Storm runoff events into the minimum pool may have elevated turbidity that may exceed the capability of existing water treatment plant. Plant growth in the exposed beach areas of the lake may add to organic loading as the lake recovers its storage and the plant materials decay.

Water Delivery to the Distribution System –a certain level of water storage in Lake Casitas in order to adequately supply water to the distribution system. The District will have to consider other pump facilities (and associated costs), perhaps even barge pumps set into the lake, in order to move water through the treatment plant into the distribution system.

Recreation – the recreational opportunities are likely to be diminished at minimum pool. Boating and fishing would likely be curtailed, and the lack revenue generation from these activities may impact the District's ability to maintain recreation.

The study has indicated that the change of the minimum pool setting has a direct relationship to the safe yield value. For each 20,000 acre-feet of storage above minimum pool it is desired to add to the lake storage, there is a 1,000 acre-foot reduction impact to the safe yield value. The reduction of the safe yield of Lake Casitas in order to lessen the chance of impacts of minimum pool may not be the District's preferred solution.

Losses at Robles Diversion Dam. The District is in the process of constructing the fish passage facility. There may be inherent operational problems at the facility that could interfere with ability to divert water to Lake Casitas. These factors have not been quantified and were not included in the study conditions for diversion. The key problems that may occur are (1) the loss of water transfer through the fish screens, the plugging of the fine meshed screen that is used to protect fish from entering the Robles-Casitas Canal, and (2) silt deposition in the diversion facility that may be associated with the loss of Matilija Dam. This may be a target area for the District to document and develop data during future operations of the Robles Diversion and Fish Passage Facility.

Increase in Groundwater Extractions above Robles Diversion Dam. The study included the level of groundwater extraction that has historically occurred above Robles Diversion Dam. If there is an increase in the amount of groundwater extractions, there may be some impact to the amount of water available for diversion to Lake Casitas.

Socio-economic Impacts Associated with Water Use Reductions. The study has developed the values for safe yield and water use, and further reviewed the trends from applying water reductions. There are several issues that the decision-makers must consider when applying the water reduction measures. What level of water use reduction is attainable? What are the acceptable and unacceptable impacts to the water user's lifestyle and economic interest (agriculture, oil industry, tourism, and the residences of the service area)? Are the requests for water use reduction frequent and/or of long duration? These are questions that should be addressed as the District moves forward with the management of water supplies.

Variability of Supply. The Ventura River system is a highly variable water system with erratic and unpredictable periods of drought and rainfall. It should be noted that there is a large variation in the annual diversions, and thus the ability to restore supply, in both the drought and recovery periods. Table 4 provides a summary of the mean annual diversions, the range and confidence interval (CI) for diversions, under various study conditions. The water supply is highly variable in its occurrence over time. Small changes to climate or the natural sequences of rainfall events from the actual events of both periods can have an impact on the availability of water supply.

System Losses: Water losses occur within the Casitas water distribution system. Theoretically, the difference between water deliveries to the conveyance system and metered water sales represents system losses. **Appendix D** provides an explanation of water losses within the distribution system. Appendix D also provides an explanation of the significant differences between terms used by Casitas, and their relationship to actual data that is recorded by Casitas.

CONCLUSIONS AND RECOMMENDATIONS

The methods and model presented in this study provide decision-makers a tool for determining the level and timing of water use reductions needed to ensure a safe water supply. Water supply and use in the Casitas Municipal Water District has reached a balance and may be moving towards imbalance with the recently proposed changes to the water supply system.

During the course of developing the reservoir model and applying the individual runoff data, staff noted the sensitivity of the regional hydrology to each storm event or series of rainfall events. Given this potential for variation, it needs to be noted that small changes in hydrological patterns could result in different conclusions from this study.

In order to continue to meet future water demands and drought-proof the Casitas Municipal Water District service area, Casitas should actively develop and pursue a water conservation management program and while developing and implementing a strategy to secure alternative water supplies. Casitas should also perform a thorough accounting of the service connection allocations issued to date and propose to make adjustments to those allocations, where adjustments can be reasonably made, to benefit long-term water supply and continued water use by the customer.

Table 1. Predicted available water supply and water use for the Casitas Municipal Water District based on hydrologic conditions for the longest drought on record in the Ventura River Basin (1945-1965 water years).

Predicted Water Supply and Use Drought Period (1945-1965 WY)	1959 Operating Criteria		Robles BO Operating Criteria	
	With Matilija	Without Matilija	With Matilija	Without Matilija
Average Annual Volume of Water[1] (AF/YR)				
Ventura River Supply				
Ventura River Flows (Inflow to Robles Facility)	16,850	16,850	16,850	16,850
Water Loss (Robles Facility Operations)	(1,290)	(1,290)	(1,290)	(1,290)
Water Bypassed at Robles Facility	7,560	8,020	8,700	9,490
Water Diverted to Lake Casitas	8,000	7,540	6,860	6,070
Lake Casitas Supply				
Water Captured from Tributaries	6,000	6,000	6,000	6,000
Net Water Loss (Evaporation-Rainfall)	(2,630)	(2,630)	(2,630)	(2,630)
District Supply and Use: 21-Year Period				
Safe Yield: Available Supply[2] (Lake Casitas plus Mira Monte Well)	22,770	22,310	21,630	20,840
Water Use: Deliveries to Water Distribution System	21,200	21,200	21,200	21,200
Difference between supply and use	1,570	1,110	430	(360)
Total Volume of Water[1] (AF)				
Ventura River Supply				
Ventura River Flows (Inflow to Robles Facility)	353,850	353,850	353,850	353,850
Water Loss (Robles Facility Operations)	(27,090)	(27,090)	(27,090)	(27,090)
Water Bypassed at Robles Facility	158,760	168,420	182,700	199,290
Water Diverted to Lake Casitas	168,000	158,340	144,060	127,470
Lake Casitas Supply				
Water Captured from Tributaries	126,000	126,000	126,000	126,000
Net Water Loss (Evaporation-Rainfall)	(55,230)	(55,230)	(55,230)	(55,230)
District Supply and Use: 21-Year Period				
Safe Yield: Available Supply[2] (Lake Casitas plus Mira Monte Well)	478,170	468,510	454,230	437,640
Water Use: Deliveries to Water Distribution System	445,200	445,200	445,200	445,200
Difference between supply and use	32,970	23,310	9,030	(7,560)

1:Predicted values were based on methods outlined in Appendix A and B. Values presented in this table were rounded to the closest 10 AF. Furthermore, they are subject to revision following peer review.

2:These estimates were based on the same hydrologic period used in the Kienlen D20 study: October 1, 1944 through October 1, 1966. The safe yield was calculated by setting an annual extraction value that forced the reservoir to decrease from 237,890 AF to 4,800 for this period.

Table 2. Predicted available water supply and water use for the Casitas Municipal Water District based on hydrologic conditions for the period immediately following the longest drought on record in the Ventura River Basin (1966-1980 water years).

Predicted Water Supply and Use Recovery Period (1966-1980 WY)	1959 Operating Criteria		Robles BO Operating Criteria	
	With Matilija	Without Matilija	With Matilija	Without Matilija
Average Annual Volume of Water[1] (AF/YR)				
Ventura River Supply				
Ventura River Flows (Inflow to Robles Facility)	45,590	45,590	45,590	45,590
Water Loss (Robles Facility Operations)	(1,690)	(1,690)	(1,690)	(1,690)
Water Bypassed at Robles Facility	22,100	22,850	25,000	26,460
Water Diverted to Lake Casitas	21,800	21,050	18,900	17,440
Lake Casitas Supply				
Water Captured from Tributaries	21,700	21,700	21,700	21,700
Net Water Loss (Evaporation-Rainfall)	(3,670)	(3,670)	(3,670)	(3,670)
District Supply and Use: 15-Year Period				
Yield: Available Supply[2] (Lake Casitas plus Mira Monte Well)	24,180	23,500	21,180	19,780
Water Use: Deliveries to Water Distribution System	18,820	18,820	18,820	18,820
Difference between supply and use	5,360	4,680	2,360	960
Total Volume of Water[1] (AF)				
Ventura River Supply				
Ventura River Flows (Inflow to Robles Facility)	683,850	683,850	683,850	683,850
Water Loss (Robles Facility Operations)	(25,350)	(25,350)	(25,350)	(25,350)
Water Bypassed at Robles Facility	331,500	342,750	375,000	396,900
Water Diverted to Lake Casitas	327,000	315,750	283,500	261,600
Lake Casitas Supply				
Water Captured from Tributaries	325,500	325,500	325,500	325,500
Net Water Loss (Evaporation-Rainfall)	(55,050)	(55,050)	(55,050)	(55,050)
District Supply and Use: 15-Year Period				
Yield: Available Supply[2] (Lake Casitas plus Mira Monte Well)	362,700	352,500	317,700	296,700
Water Use: Deliveries to Water Distribution System	282,300	282,300	282,300	282,300
Difference between supply and use	80,400	70,200	35,400	14,400

1: Predicted values were based on methods outlined in Appendix A and B. Values presented in this table were rounded to the closest 10 AF. Furthermore, they are subject to revision following peer review.

2: These estimates were based on the same hydrologic period used in the Kienlen D20 study to fill the reservoir: October 1966 through February 1980. The yield was calculated by setting an annual extraction value that allowed the reservoir to increase from 4,800 AF to 254,000 AF within this period.

Table 3. Comparisons for the level of reductions in water use needed to balance water supply and use during a critical drought period without the benefit of Matilija Reservoir.

	Predicted Values		Water Use Reduction Scenarios			
Water Year	Safe Yield (AF)	Water Use (AF)	Constant 1.70% (AF)	Staged 1.47, 2.63% (AF)	Inverse 4, 2.[illegible]% (AF)	Constant 880 AF (AF)
1945	20,840	18,936	18,614	18,936	18,179	18,576
1946	20,840	19,616	19,283	19,616	18,831	19,256
1947	20,840	19,697	19,362	19,697	18,909	19,337
1948	20,840	23,102	22,709	23,102	22,178	22,742
1949	20,840	23,966	23,559	23,966	23,007	23,606
1950	20,840	24,459	24,043	24,459	23,481	24,099
1951	20,840	27,057	26,597	26,597	26,516	26,697
1952	20,840	16,382	16,104	16,104	16,054	16,022
1953	20,840	22,305	21,926	21,926	21,859	21,945
1954	20,840	22,312	21,933	21,933	21,866	21,952
1955	20,840	24,402	23,987	23,987	23,914	24,042
1956	20,840	18,751	18,432	18,263	18,751	18,391
1957	20,840	21,309	20,947	20,755	21,309	20,949
1958	20,840	15,610	15,345	15,204	15,610	15,250
1959	20,840	21,688	21,319	21,124	21,688	21,328
1960	20,840	23,531	23,131	22,919	23,531	23,171
1961	20,840	25,175	24,747	24,520	25,175	24,815
1962	20,840	16,437	16,158	16,010	16,437	16,077
1963	20,840	19,604	19,271	19,094	19,604	19,244
1964	20,840	21,791	21,421	21,224	21,791	21,431
1965	20,840	19,068	18,744	18,572	19,068	18,708
All Years						
Total	437,640	445,[illegible]98	437,630	438,009	437,758	437,[illegible]36
Mean	20,840	21,200	20,840	20,858	20,846	20,840
Maximum	20,840	27,057	26,597	26,597	26,516	26,697
Minimum	20,840	15,610	15,345	15,204	15,610	15,250

1. Changes to the level of use reduction correspond with periods when Lake Casitas would drop below 127,000 and 65,000 Af of storage.

Table 4. Variability of Diversions for Study Conditions – Drought and Recovery Periods.

	Annual Diversion Rate (Acre-ft)					
	With Matilija			Without Matilija		
	Mean	95%CI	Range	Mean	95%CI	Range
Drought Period						
1959 Criteria	7,996	±6,087	0 to 57,990	7,534	±5,988	0 to 57,595
Robles BO Criteria	6,861	±5,169	0 to 49,689	6,066	±4,944	0 to 48,058
Difference	1,134	±953	0 to 8,302	1,469	±1,128	0 to 9,557
Recovery Period						
1959 Criteria	21,801	±11,549	589 to 68,645	21,050	±11,430	334 to 66,872
Robles BO Criteria	18,905	±9,953	589 to 58,553	17,438	±9,777	334 to 57,871
Difference	2,895	±1,924	0 to 10,262	3,612	±1,854	0 to 10,331

Appendix A – Casitas MWD Water Supply Predictions

Introduction

The reliability of water storage in Casitas Reservoir to adequately meet water use patterns through drought periods is dependent on the hydrology of the Ventura River Basin and the water use demands placed on reservoir storage. It is not possible to predict future weather patterns, and thus the hydrology, to an exact degree. The observation of recent weather and hydrology of the basin may provide adequate information that can be applied to a reservoir routing study. Determining the reliability of a water storage reservoir requires the review of relevant historical hydrology of the drainage basin and the assumption that the hydrology will repeat itself, in some manner, on a reliable basis (Figure A1). Further, determining the reliability of a water storage reservoir must also consider and apply system changes and influences that have or will occur in the foreseeable future.

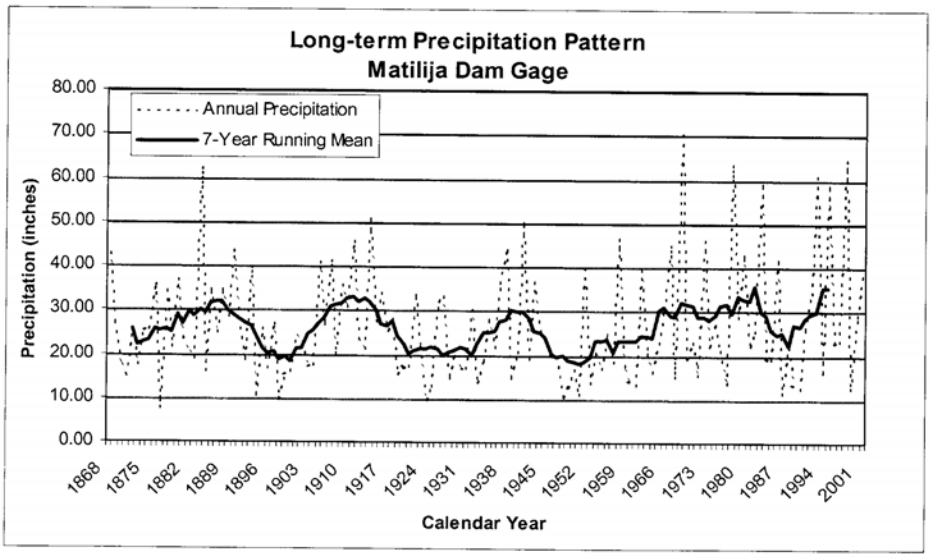


Figure A1. Long-term precipitation pattern as recorded at the Matilija Gage 1868-2001.

The District has compiled, to the best of their knowledge, the assumptions and historical data to develop a reservoir routing model that will consider the changes and influences that are foreseen at this time.

Background

The Ventura River watershed encompasses approximately 228 square miles in western Ventura County as illustrated in Figure A2. The area is subject to a Mediterranean type climate, with long periods of no rainfall followed by short periods of intense rainfall and high runoff peaks (1). The hydrology of the Ventura River system has been well documented since the early 1900's.

In the early 1940's, the agricultural communities in the Ventura River basin realized the inability of the local groundwater supplies to support water uses during drought periods. The first move to supplementing groundwater supplies was construction of Matilija Dam in the late 1940's. It was not long before the community leaders determined that the Matilija Dam project had limited value to water supplies and replenishment of the Ojai groundwater basin, particularly during long-term drought conditions. The next step, that the local communities pursued, to develop reliable water supplies was the construction of the Ventura River Project, under the guidance and initial funding of the United States Bureau of Reclamation.

The key components of the Ventura River Project were the Robles Diversion Dam, Robles-Casitas Canal, Casitas Dam, Casitas Reservoir, and the water distribution system (pipelines, pump plants, and steel reservoirs). Casitas Reservoir provides 254,000 acre-feet of reservoir water storage while Robles diversion system provides a maximum of 500 cubic feet per second conveyance capacity from the Ventura River to Casitas Reservoir. Figure A3 presents a representation of the river and water delivery system. The Casitas Reservoir and Robles diversion system became operable in January 1959. Since the initial operation of the Robles Diversion Dam and canal, the District operated diversions and downstream releases in accordance with a given set of guidelines, formally referred to as the 1959 Trial Operating Criteria (hereafter 1959 Operating Criteria) for the Robles Diversion Dam. The operating criteria provided for a minimum of 20 cfs bypass, when more than 20 cfs was available at Robles Diversion Dam, and criteria for bypassing less than 20 cfs when downstream aquifers were in full condition.

In 1998, the listing of the steelhead as an endangered species, and the desire to return the species to the Ventura River, led to changes in the operating criteria for Robles Diversion Dam (Robles Biological Opinion Operating Criteria: hereafter Robles BO Operating Criteria). In 2002, there developed an interest in the removal of Matilija Dam and restoration of steelhead migration to all mainstem reaches of the Ventura River. The County of Ventura is presently considering the full-scale removal of Matilija Dam.

Water Supply Prediction Components

An adequate water supply study must identify the periods and provide adequate data, and/or relatively sound basis for assumptions, to apply to the reservoir routing for each

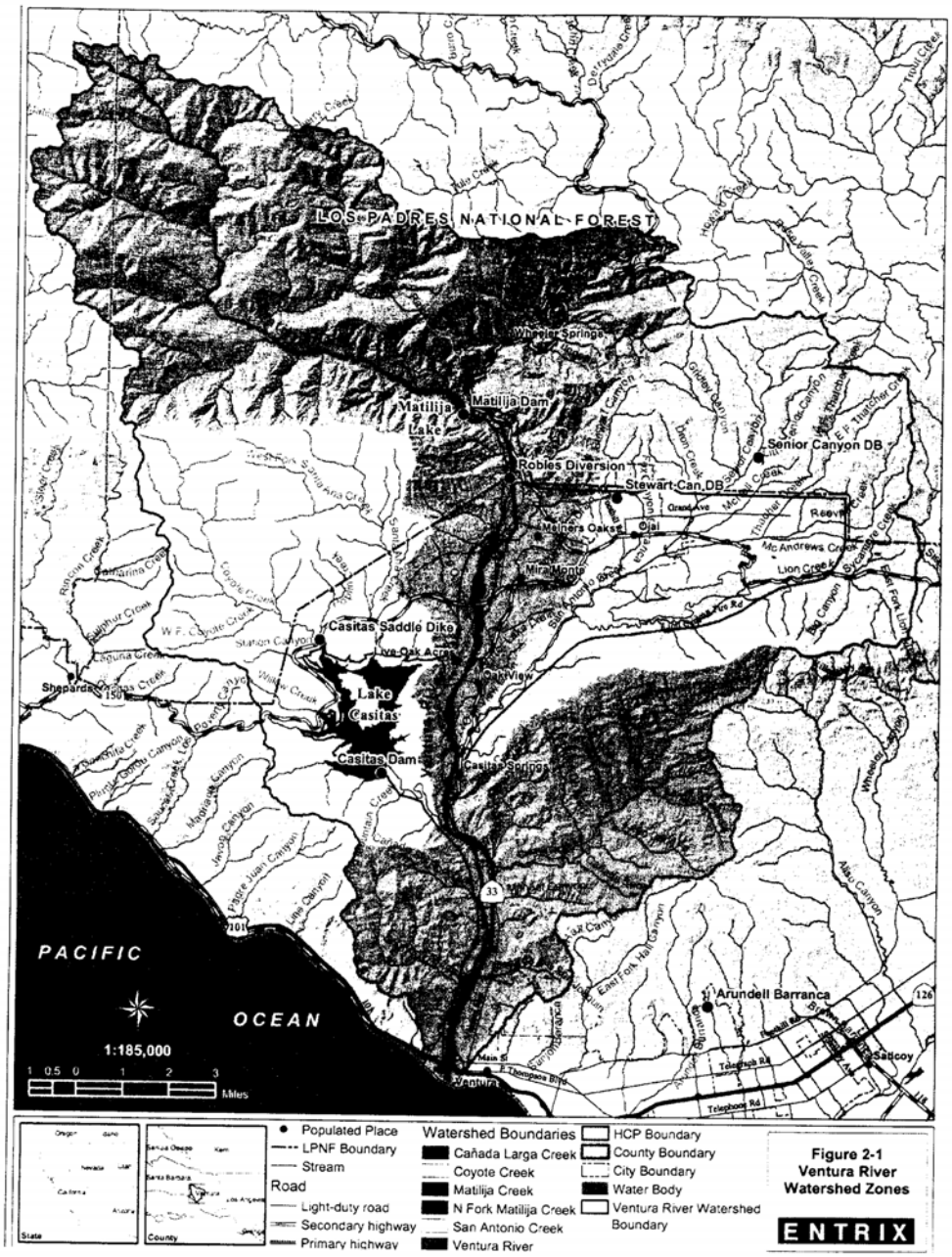


Figure A2. Ventura River Watershed (excerpt from the Habitat Conservation Plan – Entrix)

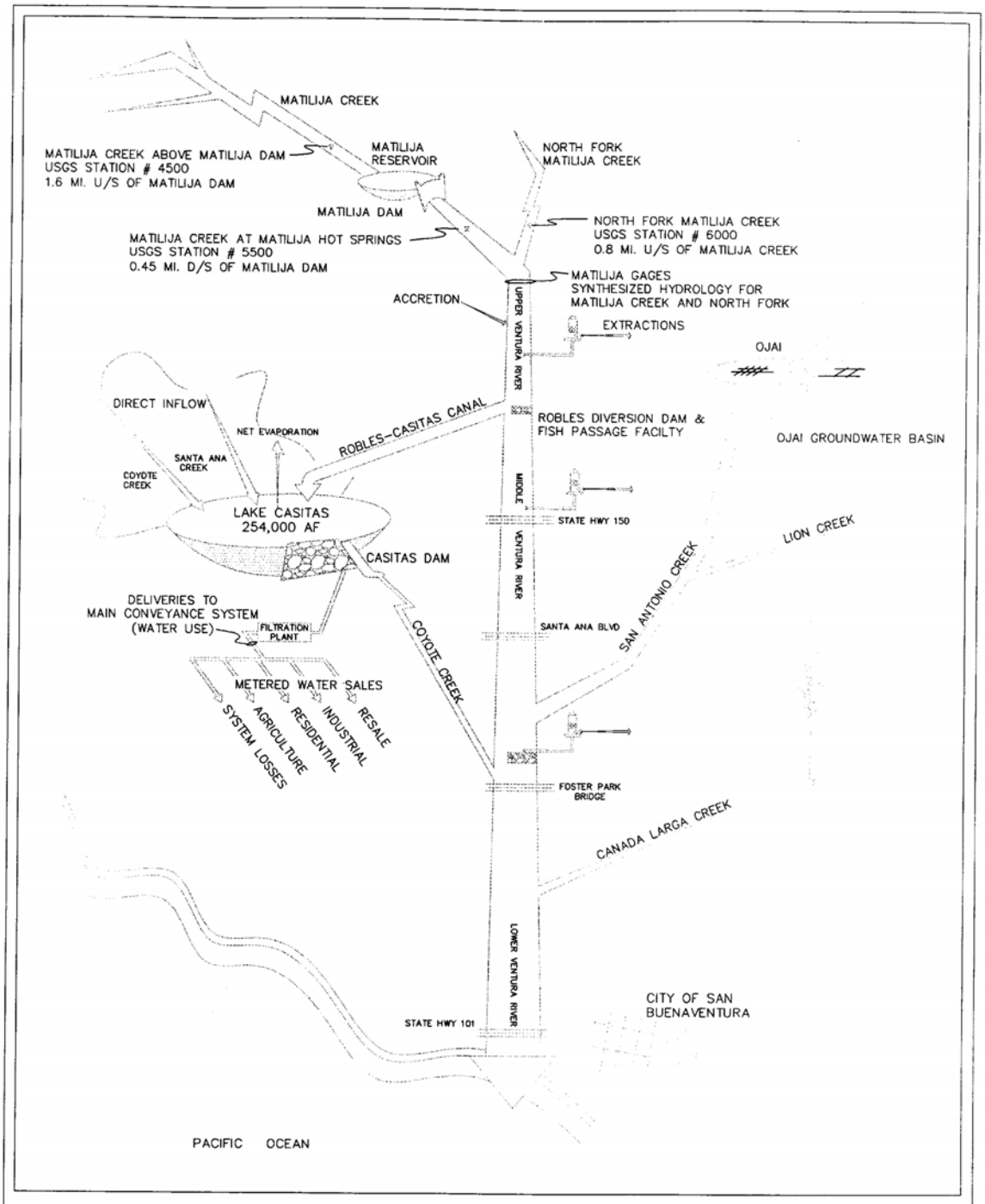


Figure A3. KEY ELEMENTS OF THE VENTURA RIVER WATER SUPPLY

period. The outline provided in this appendix provides the supply data and assumptions that were applied in the reservoir routing analysis.

There are two specific periods that the District is concerned with in the reservoir routing and determination of supply reliability. The first period is the longest period of drought. Assuming the reservoir is at full capacity, test the ability of the reservoir to withstand the longest drought of recent record. The second period is the recovery period of the reservoir from minimum storage level, after the reservoir has experienced the longest drought period, to full stage and ready for the next drought sequence.

The District has identified the period of 1944 through 1965 as the longest period of drought. The hydrology of the period is well documented. Other factors such as the current demands for the water supply are represented by the data gathered for the period. Such data will have to be extrapolated from current conditions to meet the hydrology of the study period.

The period of 1946 to 1980 has been identified as the recovery period. It is known that the Ventura River hydrology during the 1959 to 1978 period contributed to the initial filling of Casitas Reservoir to full capacity. Other factors and data, such as the demand for water supply and evaporation rates, may not be available from the study period or are not representative of current levels of influence. These factors must be reasonably developed from current data and trends, and then applied to the reservoir routing study. Many of these factors have been developed during prior studies and should be considered for this study.

Water Supply Prediction Methods

The analysis of water supply for Casitas Municipal Water District was derived from the methods used by Kienlen in the late 1980s and early 1990 to evaluate a series of alternatives for utilizing water supplies in the Ventura River Basin (Murray, Burns and Kienlen 1990). These methods developed a water balance model for the Ventura River Basin and Lake Casitas that accounted for: 1) surface flows in the Ventura River, Matilija Creek, North Fork Matilija Creek, Coyote Creek, and Santa Ana Creek; 2) groundwater and surface water extraction above Robles diversion; 3) flow accretion above Robles Diversion; 4) operational efficiency of the Robles Diversion; 5) evaporation and rainfall at Lake Casitas; and 6) an estimate of the available supply from Lake Casitas on an annual basis expressed as annual yield. For this analysis, the approach used by Kienlen for the D20 study was used as a basis for the calculations in this analysis. Since Kienlen performed the D20 analysis additional water supplies have been developed, new operational criteria for Robles have been established, methods have been refined, and understanding the role of Matilija Reservoir to Casitas water supply has become more important. Therefore, the methods and/or assumptions used in the Kienlen D20 analysis were modified as appropriate based on current and/or relevant information and methods.

Ventura River Inflow to Robles

This is an estimate of the volume of water flowing into the Robles facility. It is based on the hydrologic records from USGS gauging stations, operational criteria for Matilija Reservoir, an estimate of the volume of accretion flow between the gages and robles, and an estimate of the volume of water that is depleted between the gages and Robles.

In review of the data from each gaging station and understanding that the Matilija Dam changed flows entering the Robles Diversion Dam location, the model had to consider development of the Ventura River hydrology with and without the influence of Matilija Dam. Records of flow above Matilija Dam had been gathered until 1969, at which time the station had been destroyed and not replaced. The synthesis of the hydrology has been determined by developing an unencumbered flow (no Matilija Dam) at the Matilija Creek at Matilija Hot Springs station and then combining with the flow recorded at the North Fork Matilija Creek station. Where no records of flow were gathered for above Matilija Dam (the period of 1969 to 1980), a correlation was used to develop the unencumbered flow. The correlations are described in the equations outlined in the following sections. This method provided the baseline hydrology for the upper Ventura River without the influence of the Matilija Dam, which is one of the conditions that was later applied to the scenarios of this study. From the baseline hydrology and the operational criteria for Matilija Dam, a second hydrology was synthesized for the condition of Matilija Dam in operation for the entire study period. To provide accurate estimates for these values, calculations were based on daily values.

The combination of the synthesized hydrology for the Matilija Creek with the records for North Fork of the Matilija Creek has provided the flow values for water at the confluence of the Matilija Creek and the North Fork Matilija Creek. The term used for the combination of the records is "Matilija Gages". To develop the quantity of water that is available at the Robles Diversion Dam, the factors for accretion, upstream flow depletion and facility losses are applied to the "Matilija Gages" hydrology record.

<u>Drought Period Hydrology – October 1 1944 through September 30 1965</u>

1) Matilija Creek hydrology
    a. Empirical USGS gage records
        i. #5500: Matilija Hot Springs - October 1 1944 – May 31 1948
        ii. #4500: Above Matilija - June 1 1948 – September 30 1965

2) North Fork Matilija Creek hydrology
    a. Empirical USGS gage records
        i. #6000: October 1 1944 – September 30 1965

<u>Reservoir Recovery Period Hydrology – October 1 1965 through September 30 1980</u>

1) Matilija Creek hydrology
    a. Empirical USGS gage records

i. #4500: October 1 1965 – September 30 1969
ii. #5500: October 1 1973 – October 31 1973

b. Daily flows predicted from NF Matilija daily USGS records
i. Loss at Matilija Reservoir = 0.1167%
01) Added to Annual AF estimate for #5500
ii. Equation: #5500 = ((Annual AF 5500/Annual AF 4500)*#4500)
iii. Estimated: October 1 1969 – September 30 1973
iv. Estimated: November 1 1973 – September 30 1980

2) North Fork Matilija Creek hydrology
a. Empirical USGS gage records
i. #6000: October 1 964 – September 30 1973
ii. #6000: November 1 1973 – September 30 1978

b. Flows predicted from Matilija Creek USGS daily records
i. Equation: #6000 = (0.00003*(#5500^2))+(0.3158*#5500)
ii. Estimated: October 1 1973 – October 31 1973

Matilija Reservoir Operations: Influence and Benefit

1) Storage Capacity
a. Maximum storage: 650 AF
b. Minimum storage: 250 AF

2) Operational Criteria
a. Fill with storm events and available flows
b. Reduce to minimum storage once full
i. Generally post storm events (Figure A2)
ii. Release up to 100-150 cfs

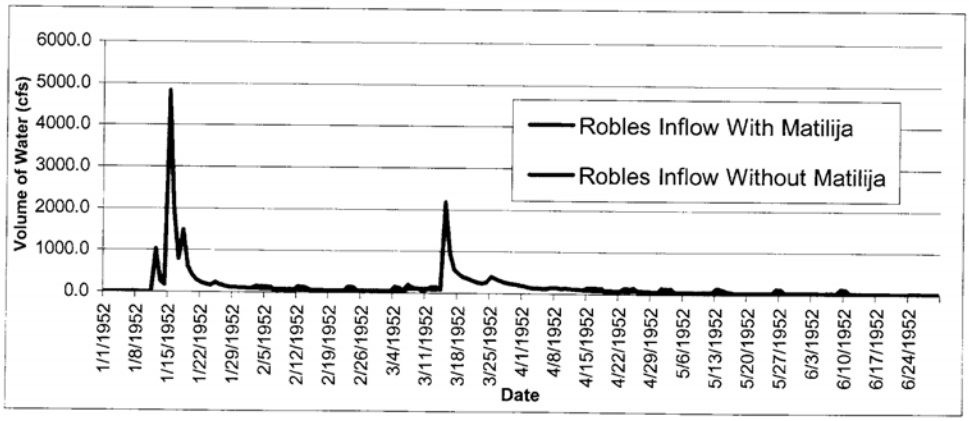


Figure A4. Potential effect of Matilija Reservoir operations on Ventura River flows.

Flow Accretion

This is an estimate of the volume of water that is gained between the USGS gauging stations and the Robles Diversion. Accretion flows would generally occur in association with storm events.

1) Variable – associated with rain events

2) Applied to average daily combined flow at Matilija and North fork Matilija Creek gages

3) Correction Factors: Applied to estimated average daily flow
   a. 0.05 increase applied to combined records from #5500 and #6000 gages
   b. 0.11 increase applied to combined records from #4500 and #6000 gages

Flow Depletion /Extraction

This is an estimate of the volume of water that is depleted between the gauges and Robles diversion. The volume of these depletions are generally related to water extractions via wells and surface diversions to beneficial water use, and replenishment of the groundwater aquifer.

1) Characteristics: variable on a monthly basis
   i. October: 7.58% of annual extraction volume
   ii. November: 5.35% of annual extraction volume
   iii. December: 4.34% of annual extraction volume
   iv. January: 4.75% of annual extraction volume
   v. February: 0.328% of annual extraction volume
   vi. March: 4.94% of annual extraction volume
   vii. April: 7.01% of annual extraction volume
   viii. May: 10.41% of annual extraction volume
   ix. June: 14.06 % of annual extraction volume
   x. July: 16.18% of annual extraction volume
   xi. August: 12.10% of annual extraction volume
   xii. September: 9.99% of annual extraction volume
   b. Related to substrate permeability/groundwater recharge and extraction
   c. Dependent upon direct diversions

2) Annual Estimates were used from the Kienlen D20 study
   a. Drought period:
      i. Up to 2800 AF/yr
      ii. Average of 2,168 AF/yr for 1944-1965 period (11.8% of gages)
   b. Wet period:
      i. Up to 2,800 AF/yr
      ii. Average of 1,628 AF/yr for 1966 – 1980 period (3.7% of gages)
   c. Applied to average daily combined flow values from Matilija and North fork Matilija Creek gages

Robles Diversion Operations

This is an estimate of the volume of water flowing out of the Robles facility. It is based on the volume of water flowing into the facility (described above), water losses associated with facility operations, the volume of water available for diversion, diversion operational criteria, and the volume of water that bypasses the facility. To provide accurate estimates for these values, calculations were based on daily values.

Facility Losses

This is the volume of water loss from operating the diversion. It reduces the volume of water available for diversion. It is assumed that the majority of this volume of water goes subsurface and recharges groundwater aquifers.

1) Estimates used from Kienlen D20 Study
    a. Drought period: average 1,321 AF (7.7% of inflow)
    b. Wet period: average 1,628 AF (3.7% of inflow)
    c. Applied to average daily flow coming into the Robles facility

2) BOR (1959) estimated operational loss for the diversion at 5%

Water Available for Diversion

This is an estimate of the volume of water coming into the Robles Facility minus the volume of water loss due to operating the facility.

Volume of Water Diverted

This is the volume of water diverted into the Robles/Casitas Canal based on the 1959 and Robles BO operating criteria.

1) 1959 Operating Criteria estimates:
    a. Operating period
        i. October 1 through June 30
        ii. Initiated after surface flows occur at Santa Ana Blvd Bridge
        iii. Diversion cease when storage volume in Lake Casitas reaches 248,616 acre-feet (2 feet from spill elevation)
    b. Diversion volume
        i. Maximum diversion: 500 cfs
        ii. Minimum diversion: 5 cfs
    c. Minimum release (if available)
        i. Surface flow at Santa Ana Blvd. Bridge: release 3 cfs
            1. Assume after 2nd storm, and
            2. Drought period: Cumulative Robles inflow >11,000 AF/yr
            3. Recovery period: Cumulative Robles inflow >26,000 AF/yr
        ii. No surface flow at Santa Ana Blvd. Bridge: release 20 cfs
            1. Kienlen study assumed 20 cfs release/bypass at all times

2) Robles BO operating criteria estimates
   a. Operating period
      i. Fish passage operating period criteria
         1. January 1 – June 30
         2. Initiate after 1st storm event
         3. Initiate if sandbar has breached
      ii. 1959 operating criteria
         1. Apply whenever fish passage criteria are not met
         2. Initiated after October 1
      iii. General criteria
         1. Diversions cease when the storage volume in Lake Casitas is 248,616 acre-feet (2 feet below spill elevation)
   b. Diversion volumes
      i. Maximum diversion: 500 cfs
      ii. Minimum criteria: 5 cfs
   c. Fish releases (if available)
      (This is the quantity of water released off of the diversion canal to satisfy fish requirements outlined in the Robles BO and based on the volume of water flowing into the Robles Facility)
      i. Ratcheted release over 12 day period from 171 cfs to 30 cfs
      ii. Associated with storm events
      iii. Reduced fish releases would occur if Lake Casitas storage volume drops to < 100,000 AF and again at <65,000 AF through agreement and based on an equitable sharing of the temporary reduction in water allocations to customers (i.e. demonstrated reduction in water use)
      iv. Will cease if Lake Casitas storage volume is < 17,000 AF and until it reaches a volume of 65,000 AF
   d. Minimum release (if available)
      i. 30 cfs after first storm event and until June 30

Volume of Water Bypassed.

This is the total volume of water that bypasses the Robles Diversion facility. It includes the volume of water that is not diverted and bypasses the facility as well as the volume of water that is released from the Robles/Casitas canal for steelhead migration in the Ventura River.

1) Estimation
   a. Kienlen D20 study: bypass = Total inflow – loss – diversions
   b. Drought period: 50.7% of inflow
   c. Wet period: 52.9% of inflow
   d. Entire period: 52.1% of inflow

Lake Casitas Supply
The supply of water in Lake Casitas is dependent upon inflows from the Robles/Casitas canal, Santa Ana Creek, Coyote Creek, and unnamed tributaries as well as reductions associated with evaporation.

Volume from Robles/Casitas Canal
This is the volume of water diverted to Lake Casitas from the Robles Diversion. It is based on the calculations described above.

Santa Ana Creek
This analysis used estimates from the Kienlen D20 study.

Coyote Creek
This analysis used estimates from the Kienlen D20 study

Unnamed Tributaries
This analysis used estimates from the Kienlen D20 study.

Net Evaporation
This analysis used estimates from the Kienlen D20 study.

Mira Monte Well Supply

Annual yield estimated at 300 AF per year.

Safe Yield: Drought Period – Casitas Municipal Water District

Safe yield is a risk management tool used to estimate the volume of water that can be withdrawn from a water supply to the extent that the withdrawal is not harmful to recreation, water quality, or physical facilities. Methods for this assessment were based on the previous safe yield studies conducted by the BOR and Kienlen. However, this study accounted for three additional supply factors that were not included in the Kienlen analysis: 1) under the 1959 operating criteria minimum releases could be 3 cfs under specific conditions; 2) Mira Monte well supply; and Matilija Reservoir supply.

1) Estimates based of Kienlen D20 study variables and values:
    a. Timeframe: 21 years – 1945-1965 water years
    b. Minimum pool: approximately 4800 AF (based on D20 study)
    c. Monthly Distribution of Yield:
        i. October: 7.12% of annual yield
        ii. November: 6.07% of annual yield
        iii. December: 6.09% of annual yield
        iv. January: 6.69% of annual yield
        v. February: 4.5% of annual yield
        vi. March: 6.41% of annual yield

vii. April: 7.59% of annual yield
viii. May: 9.55% of annual yield
ix. June: 10.99 % of annual yield
x. July: 13.2% of annual yield
xi. August: 12.04% of annual yield
xii. September: 9.75% of annual yield

2) Water supply from the Mira Monte well was included in the safe yield estimate:
   a. 300 AF per year
   b. Applied at a constant rate for each month

3) Water supply from Matilija Reservoir was estimated.

4) Safe yield estimates made for four scenarios
   a. 1959 Operating Criteria
      i. With and without Matilija
   b. Robles BO Operating Criteria
      i. With and Without Matilija

Yield: Recovery Period – Casitas Municipal Water District

Yield is used to estimate the volume of water that can be withdrawn from a water supply to the extent that the withdrawal allows the reservoir to fill in a timely fashion. Methods for this assessment were based on the timeframe in which the reservoir filled following the longest period on record from previous studies conducted by Kienlen. However, this study accounted for three additional supply factors that were not included in the Kienlen analysis: 1) under the 1959 operating criteria minimum releases could be 3 cfs under specific conditions; 2) Mira Monte well supply; and Matilija Reservoir supply.

2) Estimates based of Kienlen D20 study variables and values:
   a. Timeframe: 15 years – 1966-1980 water years
   b. Initial pool: approximately 4800 AF (based on D20 study)
   c. Monthly Distribution of Yield:
      i. October: 7.12% of annual yield
      ii. November: 6.07% of annual yield
      iii. December: 6.09% of annual yield
      iv. January: 6.69% of annual yield
      v. February: 4.5% of annual yield
      vi. March: 6.41% of annual yield
      vii. April: 7.59% of annual yield
      viii. May: 9.55% of annual yield
      ix. June: 10.99 % of annual yield
      x. July: 13.2% of annual yield
      xi. August: 12.04% of annual yield
      xii. September: 9.75% of annual yield

2) Water supply from the Mira Monte well was included in the safe yield estimate:
   a. 300 AF per year
   b. Applied at a constant rate for each month

3) Water supply from Matilija Reservoir was estimated.

4) Safe yield estimates made for four scenarios
   c. 1959 Operating Criteria
      i. With and without Matilija
   d. Robles BO Operating Criteria
      i. With and Without Matilija

Water Supply Prediction Results

The following Tables and Figures present summary information from the analysis described above.

Table A1. Predicted water supply for the 1945-1965-drought period based on the 1959 operating criteria and with the benefit of Matilija Reservoir.

Water Year	Predicted Water Supply (AF)										
	Ventura River							Lake Casitas			District
	Flows Above Robles Diversion			Robles Operations							
	Matilija Gages	Accretion	Extraction	Inflow	Loss	Bypass	Diversion	Tributaries	Net Loss	Storage Volume	Available Supply
1945	19222	961	2652	17531	1350	8198	7984	6812	4711	225510	22770
1946	23289	1164	2611	21842	1682	9339	10821	3377	4529	212710	22770
1947	12435	622	2035	11021	849	4932	5241	2654	4255	193881	22770
1948	2822	171	1728	1264	97	1167	0	48	3901	167559	22770
1949	3564	392	1712	2243	173	1839	232	131	3537	141916	22770
1950	4785	526	1722	3589	276	2748	565	1378	3145	118244	22770
1951	1810	199	1356	652	50	602	0	89	2682	93182	22770
1952	58089	6390	2611	61868	4764	21709	35395	27231	3582	129758	22770
1953	10343	1138	2342	9139	704	5838	2597	2270	2940	109215	22770
1954	9916	1091	2183	8823	679	4251	3892	3520	2599	91559	22770
1955	5139	565	2002	3702	285	3183	234	703	2078	67949	22770
1956	10412	1145	2131	9426	726	4835	3866	5792	1773	53365	22770
1957	6822	750	1811	5761	444	2867	2451	1008	1260	33095	22770
1958	93554	10291	2702	101142	7788	35365	57990	32125	3204	97537	22770
1959	13670	1504	2157	13016	1002	6487	5527	2909	2374	81130	22770
1960	4406	485	1668	3222	248	2591	383	936	1834	58298	22770
1961	2243	247	1189	1300	100	1185	16	150	1307	34687	22770
1962	57999	6380	2514	61865	4764	32151	24950	27154	2379	61943	22770
1963	7323	806	2317	5811	447	3731	1633	2338	1554	41891	22770
1964	4432	487	1702	3217	248	2216	753	863	1029	20008	22770
1965	8501	935	1935	7500	578	3544	3379	4537	636	4819	22770
Total	360775	36249	43081	353943	27254	158779	167911	126025	55309		478170
Mean	17180	1726	2051	16854	1298	7561	7996	6001	2634	97060	22770

Table A2. Predicted water supply for the 1945-1965-drought period based on the 1959 operating criteria and without the benefit of Matilija Reservoir.

Water Year	Predicted Water Supply (AF)										
	Ventura River							Lake Casitas			District
	Flows Above Robles Diversion			Robles Operations							
	Matilija Gages	Accretion	Extraction	Inflow	Loss	Bypass	Diversion	Tributaries	Net Loss	Storage Volume	Available Supply
1945	19179	959	2652	17486	1346	8245	7894	6812	4711	225881	22309
1946	23283	1164	2611	21836	1681	10826	9329	3377	4529	212050	22309
1947	12552	628	2035	11145	858	5911	4376	2654	4255	192817	22309
1948	2830	171	1728	1273	98	1175	0	48	3901	166956	22309
1949	3496	385	1712	2169	167	1874	128	131	3537	141670	22309
1950	4858	534	1722	3671	283	2882	506	1378	3145	118400	22309
1951	1810	199	1356	653	50	602	0	89	2682	93799	22309
1952	58270	6410	2611	62068	4779	23640	33649	27231	3582	129089	22309
1953	10060	1107	2342	8824	679	6601	1543	2270	2940	107955	22309
1954	9941	1094	2183	8852	682	4810	3360	3520	2599	90227	22309
1955	5169	569	2002	3736	288	3319	128	703	2078	66973	22309
1956	10460	1151	2131	9479	730	5659	3091	5792	1773	52074	22309
1957	6732	741	1811	5662	436	3050	2176	1008	1260	31990	22309
1958	93605	10297	2702	101200	7792	35812	57595	32125	3204	96498	22309
1959	13591	1495	2157	12929	995	7013	4920	2909	2374	79945	22309
1960	4424	487	1668	3243	250	2810	183	936	1834	57374	22309
1961	2292	252	1189	1355	104	1190	61	150	1307	34269	22309
1962	57924	6372	2514	61782	4757	32798	24226	27154	2379	61262	22309
1963	7321	805	2317	5809	447	4014	1348	2338	1554	41386	22309
1964	4503	495	1702	3296	254	2263	780	863	1029	19991	22309
1965	8435	928	1935	7428	572	3928	2928	4537	636	4813	22309
Total	360735	36240	43081	353895	27250	168422	158223	126025	55309		468489
Mean	17178	1726	2051	16852	1298	8020	7534	6001	2634	96449	22309

Table A3. Predicted water supply for the 1945-1965-drought period based on the Robles BO operating criteria and with the benefit of Matilija Reservoir.

Water Year	Predicted Water Supply (AF)										
	Ventura River							Lake Casitas			District
	Flows Above Robles Diversion			Robles Operations							
	Matilija Gages	Accretion	Extraction	Inflow	Loss	Bypass	Diversion	Tributaries	Net Loss	Storage Volume	Available Supply
1945	19222	961	2652	17531	1350	10206	5976	6812	4711	224636	21635
1946	23289	1164	2611	21842	1682	10547	9614	3377	4529	211763	21635
1947	12435	622	2035	11021	849	4932	5241	2654	4255	194068	21635
1948	2822	171	1728	1264	97	1167	0	48	3901	168880	21635
1949	3564	392	1712	2243	173	1839	232	131	3537	144371	21635
1950	4785	526	1722	3589	276	2748	565	1378	3145	121834	21635
1951	1810	199	1356	652	50	602	0	89	2682	97906	21635
1952	58089	6390	2611	61868	4764	28626	28478	27231	3582	128698	21635
1953	10343	1138	2342	9139	704	5838	2597	2270	2940	109290	21635
1954	9916	1091	2183	8823	679	4778	3366	3520	2599	92241	21635
1955	5139	565	2002	3702	285	3183	234	703	2078	69766	21635
1956	10412	1145	2131	9426	726	5532	3168	5792	1773	55618	21635
1957	6822	750	1811	5761	444	3148	2169	1008	1260	36201	21635
1958	93554	10291	2702	101142	7788	43667	49688	32125	3204	93474	21635
1959	13670	1504	2157	13016	1002	7627	4388	2909	2374	77062	21635
1960	4406	485	1668	3222	248	2591	383	936	1834	55364	21635
1961	2243	247	1189	1300	100	1185	16	150	1307	32888	21635
1962	57999	6380	2514	61865	4764	34519	22582	27154	2379	58910	21635
1963	7323	806	2317	5811	447	3985	1379	2338	1554	39738	21635
1964	4432	487	1702	3217	248	2335	634	863	1029	18871	21635
1965	8501	935	1935	7500	578	3544	3379	4537	636	4817	21635
Total	360775	36249	43081	353943	27254	182600	144090	126025	55309		454335
Mean	17180	1726	2051	16854	1298	8695	6861	6001	2634	96971	21635

Table A4. Predicted water supply for the 1945-1965-drought period based on the Robles BO operating criteria and without the benefit of Matilija Reservoir.

Water Year	Predicted Water Supply (AF)										
	Ventura River							Lake Casitas			District
	Flows Above Robles Diversion			Robles Operations							
	Matilija Gages	Accretion	Extraction	Inflow	Loss	Bypass	Diversion	Tributaries	Net Loss	Storage Volume	Available Supply
1945	19179	959	2652	17486	1346	12287	3852	6812	4711	223307	20840
1946	23283	1164	2611	21836	1681	12594	7560	3377	4529	209175	20840
1947	12552	628	2035	11145	858	5911	4376	2654	4255	191410	20840
1948	2830	171	1728	1273	98	1175	0	48	3901	167017	20840
1949	3496	385	1712	2169	167	1874	128	131	3537	143200	20840
1950	4858	534	1722	3671	283	2882	506	1378	3145	121399	20840
1951	1810	199	1356	653	50	602	0	89	2682	98266	20840
1952	58270	6410	2611	62068	4779	31687	25602	27231	3582	126976	20840
1953	10060	1107	2342	8824	679	6601	1543	2270	2940	107310	20840
1954	9941	1094	2183	8852	682	5788	2382	3520	2599	90072	20840
1955	5169	569	2002	3736	288	3319	128	703	2078	68286	20840
1956	10460	1151	2131	9479	730	6701	2049	5792	1773	53813	20840
1957	6732	741	1811	5662	436	3345	1881	1008	1260	34902	20840
1958	93605	10297	2702	101200	7792	45349	48058	32125	3204	91341	20840
1959	13591	1495	2157	12929	995	8755	3178	2909	2374	74515	20840
1960	4424	487	1668	3243	250	2810	183	936	1834	53411	20840
1961	2292	252	1189	1355	104	1190	61	150	1307	31775	20840
1962	57924	6372	2514	61782	4757	35778	21247	27154	2379	57256	20840
1963	7321	805	2317	5809	447	4388	974	2338	1554	38475	20840
1964	4503	495	1702	3296	254	2299	743	863	1029	18512	20840
1965	8435	928	1935	7428	572	3928	2928	4537	636	4801	20840
Total	360735	36240	43081	353895	27250	199265	127379	126025	55309		437640
Mean	17178	1726	2051	16852	1298	9489	6066	6001	2634	95487	20840

Table A5. Predicted water supply for the 1966-1980-recovery period based on the 1959 operating criteria and with the benefit of Matilija Reservoir.

Water Year	Predicted Water Supply (AF)										
	Ventura River							Lake Casitas			District
	Flows Above Robles Diversion			Robles Operations							
	Matilija Gages	Accretion	Extraction	Inflow	Loss	Bypass	Diversion	Tributaries	Net Loss	Storage Volume	Available Supply
1966	55445	2772	2446	55771	2064	18020	35687	21289	1387	37926	24177
1967	56372	2819	2767	56423	2088	8722	45613	27258	2437	85911	24177
1968	8024	401	2536	5889	218	4450	1221	2392	1765	65310	24177
1969	171353	8568	2793	177128	6554	104275	66300	78737	4630	183497	24177
1970	16807	840	2725	14922	552	7731	6639	4662	3767	168904	24177
1971	20184	1009	2481	18712	692	10504	7516	7225	3640	158148	24177
1972	10739	537	2046	9230	341	4269	4619	5394	3345	142578	24177
1973	58322	2916	2754	58484	2164	22499	33821	33070	4342	184252	24177
1974	18424	921	2426	16919	626	8593	7700	7417	3936	173398	24177
1975	23671	1184	2658	22197	821	9419	11957	10670	3940	170361	24177
1976	9711	486	2167	8029	297	4278	3454	3239	3584	151212	24177
1977	4977	249	1925	3301	122	2590	589	1056	3164	127285	24177
1978	135760	6788	2615	139933	5178	66111	68645	73222	5366	244222	24177
1979	27918	1396	2800	26514	981	9193	16340	11740	4872	246144	24177
1980	69835	3492	2800	70527	2610	51007	16911	38299	4892	237956	24177
Total	687544	34377	37939	683982	25307	331662	327012	325670	55067	2377102	362655
Mean	45836	2292	2529	45599	1687	22111	21801	21711	3671	158473	24177

Table A6. Predicted water supply for the 1966-1980-recovery period based on the 1959 operating criteria and without the benefit of Matilija Reservoir.

Water Year	Predicted Water Supply (AF)										
	Ventura River							Lake Casitas			District
	Flows Above Robles Diversion			Robles Operations							
	Matilija Gages	Accretion	Extraction	Inflow	Loss	Bypass	Diversion	Tributaries	Net Loss	Storage Volume	Available Supply
1966	55495	2775	2437	55495	4299	18672	35094	21289	1387	37045	23497
1967	56267	2813	2767	56267	4336	10198	44031	27258	2437	82243	23497
1968	8040	402	2536	8040	455	5032	655	2392	1765	61768	23497
1969	171355	8929	2793	171355	13667	104284	66293	78737	4630	178779	23497
1970	16800	1848	2725	16800	1226	8790	5574	4662	3767	163672	23497
1971	20191	2221	2481	20191	1535	10589	7437	7225	3640	153137	23497
1972	10730	1180	2046	10730	760	4230	4649	5394	3345	138184	23497
1973	58322	6415	2754	58322	4773	23802	32518	33070	4342	178101	23497
1974	18421	2026	2426	18421	1388	9739	6551	7417	3936	166596	23497
1975	23675	2604	2658	23675	1819	10837	10542	10670	3940	162404	23497
1976	9930	1092	2167	9930	682	4935	3018	3239	3584	143424	23497
1977	4817	530	1925	4817	263	2683	334	1056	3164	119950	23497
1978	135694	14926	2615	135694	11396	67816	66872	73222	5366	233727	23497
1979	27929	3072	2800	27929	2172	9567	15977	11740	4872	235179	23497
1980	69813	3491	2803	69813	2609	51683	16209	38299	4892	237452	23497
Total	687478	54326	37934	687478	51378	342858	315755	325670	55067	2291661	352455
Mean	45832	3622	2529	45832	3425	22857	21050	21711	3671	152777	23497

Table A7. Predicted water supply for the 1966-1980-recovery period based on the Robles BO operating criteria and with the benefit of Matilija Reservoir.

Water Year	Predicted Water Supply (AF)										
	Ventura River							Lake Casitas			District
	Flows Above Robles Diversion			Robles Operations							
	Matilija Gages	Accretion	Extraction	Inflow	Loss	Bypass	Diversion	Tributaries	Net Loss	Storage Volume	Available Supply
1966	55445	2772	2446	55771	2064	18020	35687	21289	1387	36443	21184
1967	56372	2819	2767	56423	2088	16551	37784	27258	2437	79612	21184
1968	8024	401	2536	5889	218	4450	1221	2392	1765	62024	21184
1969	171353	8568	2793	177128	6554	112021	58553	78737	4630	175431	21184
1970	16807	840	2725	14922	552	7850	6520	4662	3767	163732	21184
1971	20184	1009	2481	18712	692	10504	7516	7225	3640	155997	21184
1972	10739	537	2046	9230	341	4269	4619	5394	3345	143441	21184
1973	58322	2916	2754	58484	2164	32221	24099	33070	4342	178309	21184
1974	18424	921	2426	16919	626	10153	6140	7417	3936	168952	21184
1975	23671	1184	2658	22197	821	11490	9885	10670	3940	166838	21184
1976	9711	486	2167	8029	297	4911	2821	3239	3584	150121	21184
1977	4977	249	1925	3301	122	2590	589	1056	3164	129207	21184
1978	135760	6788	2615	139933	5178	76373	58383	73222	5366	239268	21184
1979	27918	1396	2800	26514	981	11264	14269	11740	4872	242051	21184
1980	69835	3492	2800	70527	2610	52424	15493	38299	4892	239269	21184
Total	687544	34377	37939	683982	25307	375094	283581	325670	55067	2330695	317760
Mean	45836	2292	2529	45599	1687	25006	18905	21711	3671	155380	21184

Table A8. Predicted water supply for the 1966-1980-recovery period based on the Robles BO operating criteria and without the benefit of Matilija Reservoir.

Water Year	Predicted Water Supply (AF)										
	Ventura River							Lake Casitas			District
	Flows Above Robles Diversion			Robles Operations							
	Matilija Gages	Accretion	Extraction	Inflow	Loss	Bypass	Diversion	Tributaries	Net Loss	Storage Volume	Available Supply
1966	55495	2775	2437	55832	2066	22510	31256	21289	1387	37022	19775
1967	56267	2813	2767	56313	2084	18095	36135	27258	2437	78056	19775
1968	8040	402	2536	5906	219	5032	655	2392	1765	61296	19775
1969	171355	8929	2793	177130	6554	112706	57871	78737	4630	173461	19775
1970	16800	1848	2725	14915	552	10129	4234	4662	3767	160696	19775
1971	20191	2221	2481	18719	693	10589	7437	7225	3640	153876	19775
1972	10730	1180	2046	9221	341	4230	4649	5394	3345	142637	19775
1973	58322	6415	2754	58484	2164	32465	23855	33070	4342	177592	19775
1974	18421	2026	2426	16916	626	12084	4205	7417	3936	167422	19775
1975	23675	2604	2658	22201	821	13301	8079	10670	3940	164412	19775
1976	9930	1092	2167	8259	306	5521	2433	3239	3584	148531	19775
1977	4817	530	1925	3133	116	2683	334	1056	3164	128772	19775
1978	135694	14926	2615	139863	5175	78146	56542	73222	5366	236013	19775
1979	27929	3072	2800	26526	981	15573	9971	11740	4872	235179	19775
1980	69813	3491	2803	70500	2609	53978	13914	38299	4892	238762	19775
Total	687478	54326	37934	683918	25305	397043	261570	325670	55067	2303725	296625
Mean	45832	3622	2529	45595	1687	26470	17438	21711	3671	153582	19775

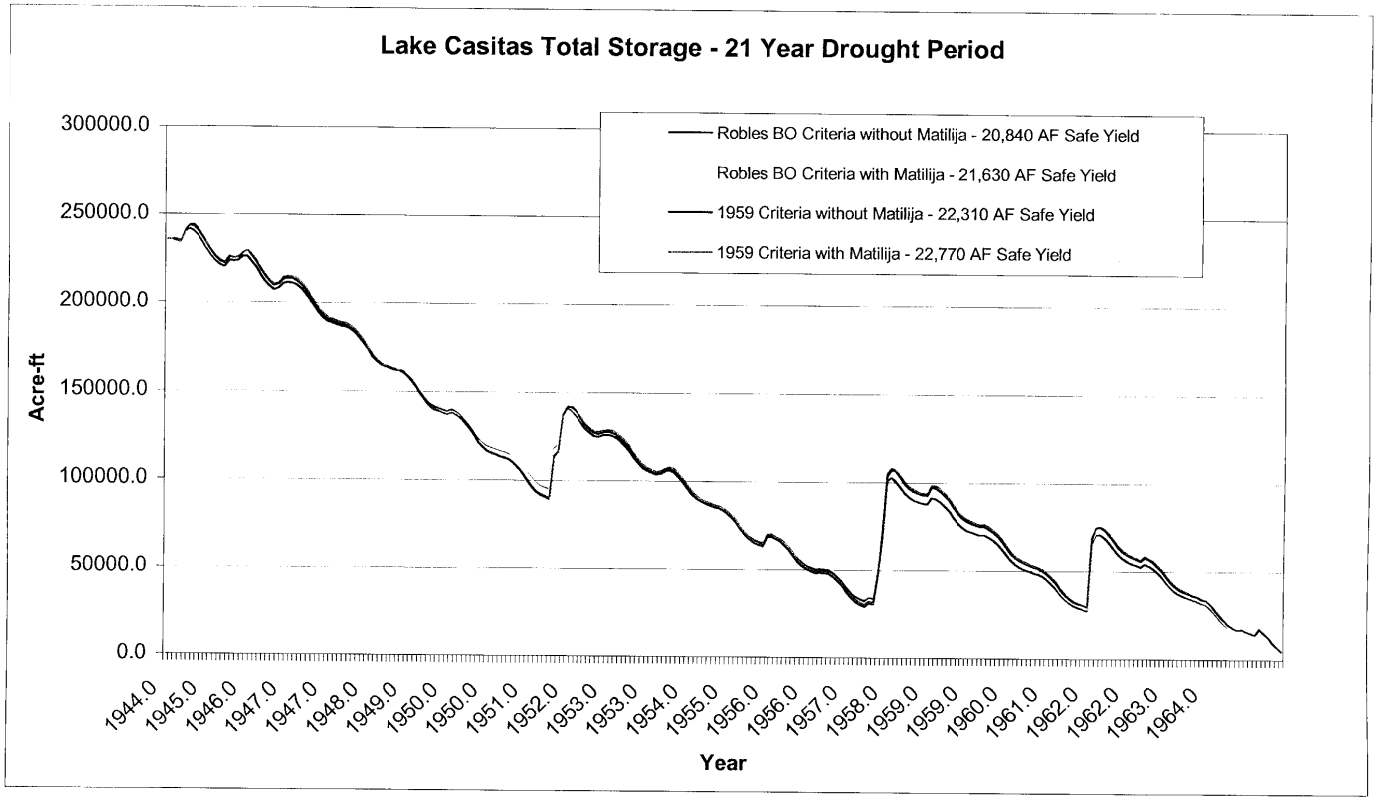


Figure A5. Comparisons of the storage volume in Lake Casitas based on different operating and safe yield scenarios for the longest drought on record.

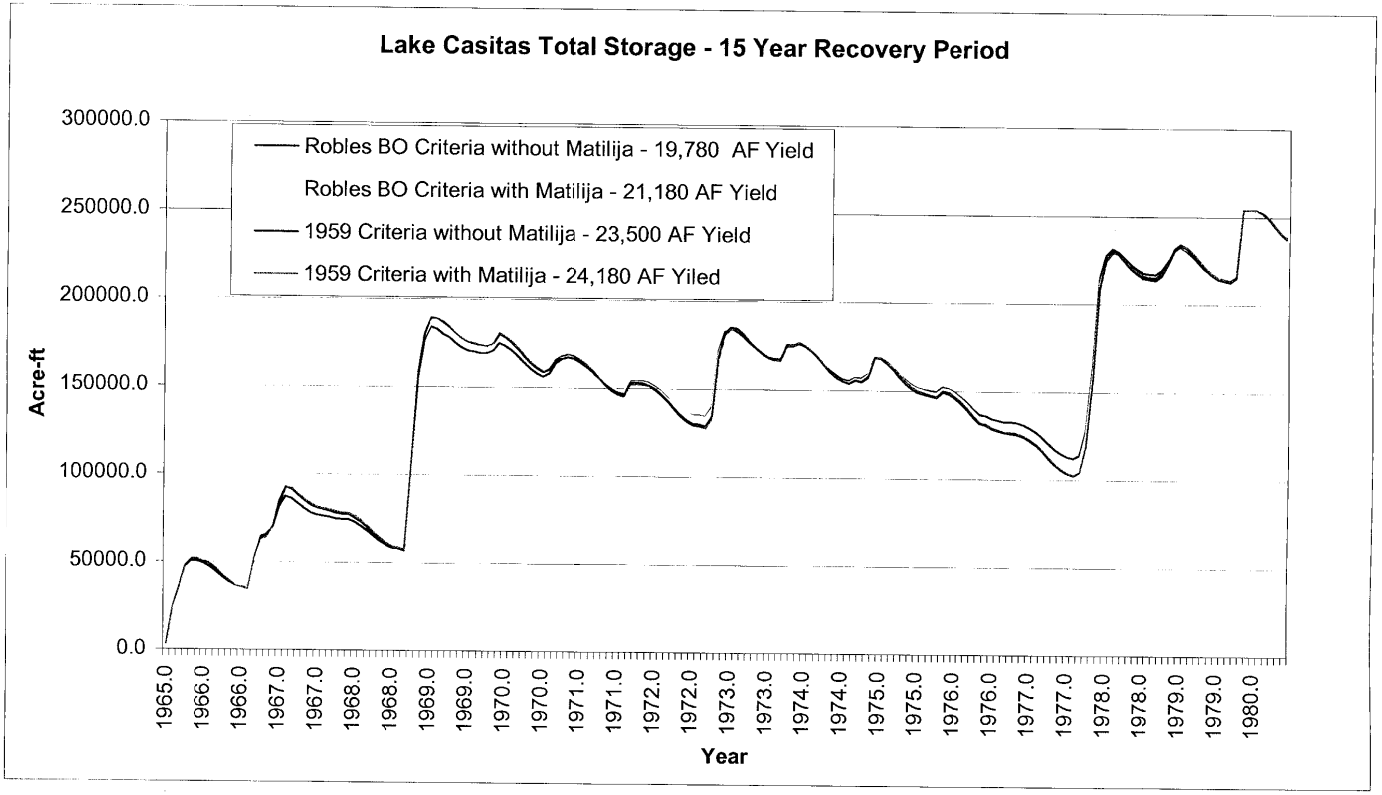


Figure A6. Comparisons of the storage volume in Lake Casitas based on different operating and yield scenarios for the recovery period following the longest drought on record.

Appendix B - Casitas MWD Water Delivery and Use Predictions

The information that is available for the 1945 through 1965 study period is limited to the rainfall and hydrology occurrences in the Ventura River. The Ventura River Project that brought about Lake Casitas and the District's service facilities did not become operational until 1959. Water deliveries from Lake Casitas and customer use during this study period are not available and would not have been at the same level as today. Therefore, the study must predict water deliveries based on present water use and the study period's hydrology.

The following was considered in the development of the water delivery for the study period:

1. The critical drought period is 1945 through 1965;
2. Each year is based on Water Year hydrology data;
3. Good data source for hydrology and annual rainfall exists for the study period;
4. Rainfall data used in this evaluation has been gathered at the Santa Ana weather station, from 1944 to 1959, and the Lake Casitas Recreation Area weather station from 1959 to present;
5. Limited water delivery data for the study period – the District began delivery of water from Lake Casitas in 1959.
6. Water use data during the study period should reflect current level and trends of water delivery and use.
7. Factors that tend to influence the amount of water deliveries are rainfall patterns, irrigation use, municipal and industrial use, resale use, and groundwater availability.
8. Growth may be a factor in the water deliveries and use. The initial years of District (1959-1977), the trend of water use was primarily based on growth and development. During the last 20 years, slow growth has been more representative of the deliveries and use trends.
9. The District does have detailed data on the hydrology, annual rainfall, water delivery and use for the period 1959 to 2002.
10. The District's data for the annual water delivery is in Calendar year format, need to convert data to a water year format in order to apply deliveries to the Supply model.
11. Consider the adjustment of the deliveries where unusual anomalies exist in the data. (The City of San Buenaventura, period 1991 to 1997, to reflect the current agreement to purchase 6,000 acre-feet on an annual basis. This period's actual deliveries to the City were temporarily reduced to below 6,000 acre-feet due to water quality reasons.)
12. The District deliveries include water delivered from Casitas Dam to the main conveyance system and the deliveries from the Mira Monte Water Well.

Historical Data

The Casitas Municipal Water District has an extensive collection of water use and hydrology data that can be applied to the water supply and use analysis. The data, in some cases, needed to be converted into a water year calendar time sequence in order be consistent with all other data and the time sequence used in the analysis.

The following is a representation of the historical data that has been assembled from District records for the analysis.

Table B1 - lists the water deliveries from Casitas Dam and the Mira Monte Well are presented in a water year calendar format. Also presented are the rainfall totals for each water year.

Figure B1 - illustrates the relationship between the District's deliveries and annual rainfall. It is noted that there appears to be a direct correlation between rainfall and the level of deliveries made by the District.

Figures B2 through B5 were developed to further define and explain the annual variance in water delivery. The District has compiled water use data for each of its major user types and larger customers. The user trends also illustrate the influence of rainfall and at times, the loss of alternative water supplies (i.e. groundwater supplies) on the use patterns. The review of individual use does validate the delivery-rainfall relationship that is illustrated in Figure B1.

Figure B2 - illustrates the water sales patterns for the District's agricultural customers. There appears to be a direct correlation between rainfall and the amount of water sales made to the District's agricultural customers. The District serves water to approximately 5,600 acres of orchard cropland and supplements agricultural groundwater use during periods of drought. When rainfall does not occur, water sales from the District's distribution system supplement the lack of rainfall. The figure also illustrates the coincidence of agricultural water sales with the deliveries from Casitas Dam.

Figure B3 - illustrates the water sales pattern for direct residential customers of the District. As a comparative illustration, the water sales pattern of the agricultural customers is presented. It appears that the residential water sales do not appear to be influenced by annual rainfall variations. It also appears that the growth pattern has been gradual over the recorded 26-year period.

Figure B4 - illustrates the water sales pattern for the two types of resale customers and any relationship between the sales and annual rainfall. The Resale Pumped customer is primarily to other water agencies, such as Ventura River County Water District and Southern California Water Company, that also rely on groundwater supplies to meet demands within their water service areas. The Resale Pumped customers have demanded Lake Casitas supplies generally when they are not able to meet all demands from their groundwater supplies (Ventura River and Ojai). A specific increase in demands from Lake Casitas is noted in the 1989 to 1991 period. The rise in demand was approximately 1300 acre-feet from the base demand in 1989 to the maximum demand in 1991. This change is primarily due to the depletion of groundwater supplies during the drought period.

Figure B4 - provides an insight to the water sales pattern of Resale Gravity. The primary customer in the Resale Gravity is the City of San Buenaventura (Ventura). The City has alternative groundwater supplies from the Ventura River and the groundwater basins in the eastern section of the City. The City has a series of agreements with the District concerning water service. The City has agreed to annually certify that water delivered from the Casitas

system does not supply customers that are outside of the boundaries of the Casitas Municipal Water District. The district boundaries are not contiguous with the City's boundaries, and therefore, many sections of the City of are not a part of the original financial setting for repayment of contracts for the Ventura River Project (Lake Casitas). This became an issue in 1990, at the height of a drought period. The City decided to become more reliant on its alternative supplies and drastically reduced its demand on Lake Casitas. The District's water sales to the City went from a high of 9,510 acre-feet in 1989 to a minimum purchase 1,370 acre-feet in 1992, and less than 2,000 acre-feet in each of the following years, until 1997. In 1995, the City and the District agreed to guarantee a stable purchase from the District. In this agreement, the City agreed to purchase at a minimum 6,000 acre-feet annually from Lake Casitas. The City began to meet the minimum demand in 1997 and have continued to do so since that time.

Figure B4 illustrates the water demand fluctuations that resulted from the abovementioned series of events. Besides the municipal and industrial use of the water within the City, the City has a sphere of water service influence that includes oil production. The oil production in this area requires water injection to force the oil out of the geologic formations. The period between the mid 1980's to the mid 1990's experienced a reduction in oil production, and thus a reduction in water demand. The City's in-District water use plummeted from a high of 10,886 acre-feet in 1987 to a low of 7,037 acre-feet in 2002. The City also has plans to develop its water well facilities on the Ventura River. It is likely that the City will be able to maintain a balance of deliveries from Lake Casitas with the use within the common City-District boundaries.

Figure B5 illustrates the historical sales to the Business, Industry, and Other customer types of the District. For the Industry customers, the sales patterns do not appear to be influence by rainfall patterns. The Business and Other customers are primarily irrigated golf courses, public and private schools, and recreational areas, and may be influenced by rainfall patterns. There are some Business and Other customers that rely on Lake Casitas supply to supplement rainfall in the irrigation of large turf areas that are associated with these customers. In general, the annual water delivery for each of these customers is generally less than 800 acre-feet and the annual variation of demand is seldom greater than 200 acre-feet. There does not appear to be a growth trend in the annual demands from these three customer types.

Water Deliveries Adjustment – City of San Buenaventura

Figure B4 illustrates that there may be several factors that have may have influenced the City of Ventura's water use, other than the influence of annual rainfall events. Several of those factors have been resolved by the agreement of a minimum water demand from Lake Casitas. In the recent years, the City has maintained its minimum demand on Lake Casitas at approximately 6,000 acre-feet. To develop a current Lake Casitas demand trend that may be extrapolated to other study periods, there must be an adjustment of the historical water use data to reflect the current level of demand by the City of Ventura. In Table B2, the water sales to the City of Ventura, for the period of 1991 to 1997, were adjusted to reflect the minimum City of Ventura demand on Lake Casitas of 6,000 acre-feet. The adjustment amount for the City of Ventura was also added to the District's deliveries to main conveyance, and further listed under the column entitled "Adjusted WY Deliveries to Main Conveyance." Figure B6 illustrates the adjustment to the annual water deliveries.

The period prior to 1990 has not been adjusted primarily because the city did not exceed its in-District demand by the deliveries from Lake Casitas. It should be noted that given a future extensive dry period, and/or re-emergence of the oil industry, the City of Ventura demands could potentially increase back to the water deliveries recorded in the 1980's.

Trending Deliveries

From the review of historical data, it appears that the annual rainfall is a key factor that has influenced the District water deliveries. It is also apparent that multiple years of dry conditions cause an escalation of the delivery occurring in any one year. In Table B3, the annual rainfall totals and corresponding water deliveries are ranked from lest rainfall to most recorded rainfall. The rainfall data has been gathered at the Lake Casitas Recreation Area and assumed to be a representative influence for the majority of the District's customers. Table B3 lists the data for the 1976 to 2002 and the 1984 to 2002 periods. The later period being more representative of current water use and growth trends.

The rainfall data is further separated and compared for each 10-inch increment of rainfall. The average of rainfall and deliveries for each 10-inch increment and each period is calculated in Table B3 and illustrated in Figures B7 and B8. A polynomial trend line has developed from the graphical representation of the average deliveries for each period. Table B4 uses the trend line from the 1984 to 2002 period and sequential 10-inch rainfall totals to determine the delivery from each rainfall total. The polynomial trend line equation from the 1984 to 2002 period was selected for the linear trend calculations.

In the study period, there are several consecutive dry years. The rainfall and delivery data in Table B1 and Figure B1, for the period of 1984 to 1990 demonstrates that when the system experiences multiple and consecutive dry rainfall years (less than 20 inches), the delivery for the following year tends to escalate with each consecutive dry year. Table B5 presents the rainfall and deliveries for the 1984 to 1990 period. Figures B9 and B10 illustrate the delivery data and linear trend line for the escalation of multiple consecutive dry years. In Figure B10, a shorter period of time is evaluated, removing the heavy rainfall of 1986 from influence on the trend line. Each year in Table B10 was assigned a consecutive dry year multiplier number, and from the trend lines, the deliveries for each year are calculated and compared to the actual delivery data. The slope of line (1,377) from 1986 to 1990 escalating trend line equation, Figure B10, was selected as a representative equation for application to multiple consecutive dry years found in the study period (1945-1965).

Modeling Deliveries for the Critical Dry Period

The objective of the close review of rainfall-delivery response and the development of trend line equations and escalation factors is to be able to predict deliveries for a period of time during which no delivery record exists. In Table B6, the annual rainfall at the Lake Casitas Recreation area is listed for each year of the study period. The polynomial trend equation

$$y=1.7488x^2 - 269.1x + 24300$$

is applied to each annual rainfall and the water delivery is calculated and recorded for each year. For each year during which the annual rainfall is less than 20 inches, a consecutive year multiplier and the escalation slope are applied to the linear trend equation in

$$y=1.7488x^2 - 269.1x + 24300 + (\text{Dry Year Multiplier})(1.377).$$

The water deliveries from each equation are shown in Table B6. Figure B11 illustrates the predicted water deliveries for each equation and the annual rainfall for each year of the study period.

The derivation of an equation to predict a finite number has risk in the confidence that the number would be comparable to actual results. In Table B7, the actual water deliveries for the period 1984 to 1990 is compared to the delivery numbers that are generated from the polynomial and escalating trend equations. As expected, the actual deliveries fall between the two equation lines during the period, as shown in Figure B12. The development of trend deliveries for the period of 1966 through 2003, Table B8 and Figure B13, illustrates a higher confidence of following actual use in the last ten years of historical data.

The deliveries that have been derived in Table B6 are accounted against the available Lake Casitas supply to determine the impacts on Lake Casitas.

Modeling Deliveries the Recovery Period

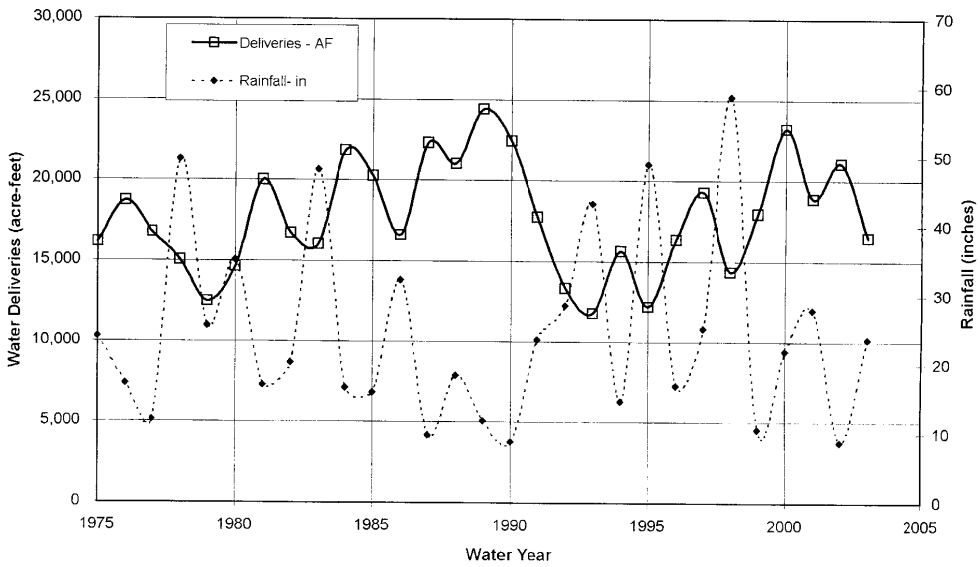
The supply and demand study for the critical dry period takes the water surface elevation of Lake Casitas to minimum pool. The modeling needs to demonstrate the ability of the hydrology to recover Lake Casitas storage to full capacity, during the wet trend period and under each of the two diversion operating criteria. There is an importance to restore the full capacity of Lake Casitas prior to the onset of another critical dry period. The actual occurrence following 1965, the end of the critical dry period, Lake Casitas reached full storage capacity in 1978. The modeling of the recovery period should include the hydrology experienced during the 1966 to 1978 period and compare the capacity response of Lake Casitas for each of the diversion operational criteria.

For the recovery period, the deliveries were determined from the same trend equations that were used in the critical dry period study. During this recovery period, 1977 was the only year receiving the additional escalating factor. Table B9 provides the prediction of water deliveries for the 1966 to 1978 period, and the actual deliveries made by the District. It is noted that the actual deliveries are much less than the predicted value, primarily because the actual water uses from Lake Casitas were in development and had not matured to the current level of use. The predicted deliveries are based on the current level of water use. Figure B14 illustrates the predicted deliveries for each year of the recovery period. The deliveries that are derived in Table B9 are accounted against the available supply in Lake Casitas for the recovery period.

Table B1 - Casitas Water Deliveries to the System and Rainfall at Lake Casitas Recreation Area

Water Year	Rainfall at LCRA (in.)	Deliveries to Main Conveyance System @ Casitas Dam (AF)	Deliveries to Main Conveyance System Mira Monte Well (AF)	Total Deliveries (AF)
1975	24.05	16,156		16,156
1976	17.23	18,725		18,725
1977	11.98	16,779		16,779
1978	49.66	15,080		15,080
1979	25.64	12,499		12,499
1980	35.15	14,651		14,651
1981	16.99	20,012		20,012
1982	20.34	16,702		16,702
1983	48.22	16,026	0	16,026
1984	16.63	21,832	0	21,832
1985	15.93	20,274	0	20,274
1986	32.2	16,606	0	16,606
1987	9.83	22,339	0	22,339
1988	18.4	21,032	0	21,032
1989	11.85	24,416	0	24,416
1990	8.86	22,454	0	22,454
1991	23.59	17,723	0	17,723
1992	28.53	13,189	129	13,318
1993	43.31	11,694	46	11,740
1994	14.69	15,555	85	15,640
1995	49.04	12,107	78	12,185
1996	16.91	16,135	221	16,356
1997	25.27	18,996	305	19,301
1998	58.78	14,372	0	14,372
1999	10.67	17,942	0	17,942
2000	21.94	23,060	169	23,229
2001	27.86	18,743	130	18,873
2002	8.77	21,066	0	21,066
2003	23.69	16278	198	16,476

Figure B1 - Casitas Water Deliveries to the System and Rainfall (1975 to 2003)



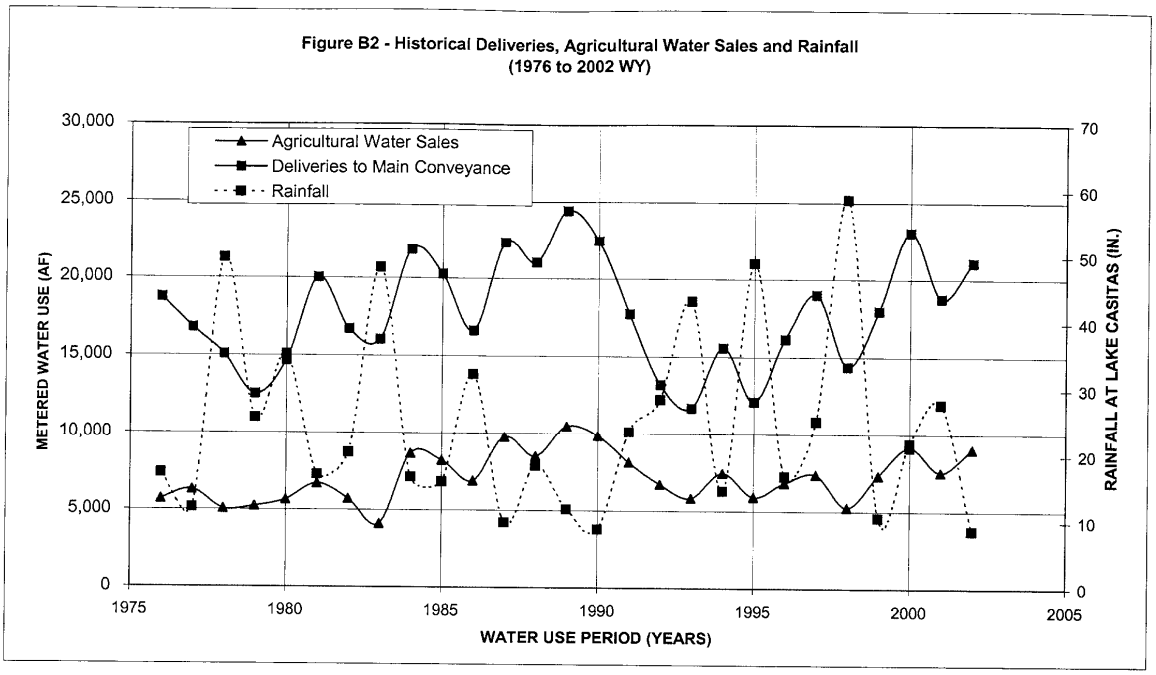


Figure B2 - Historical Deliveries, Agricultural Water Sales and Rainfall
(1976 to 2002 WY)
Agricultural Water Sales
Deliveries to Main Conveyance
Rainfall
METERED WATER USE (AF)
RAINFALL AT LAKE CASITAS (IN.)
WATER USE PERIOD (YEARS)
30,000
25,000
20,000
15,000
10,000
5,000
0
70
60
50
40
30
20
10
0
1975
1980
1985
1990
1995
2000
2005

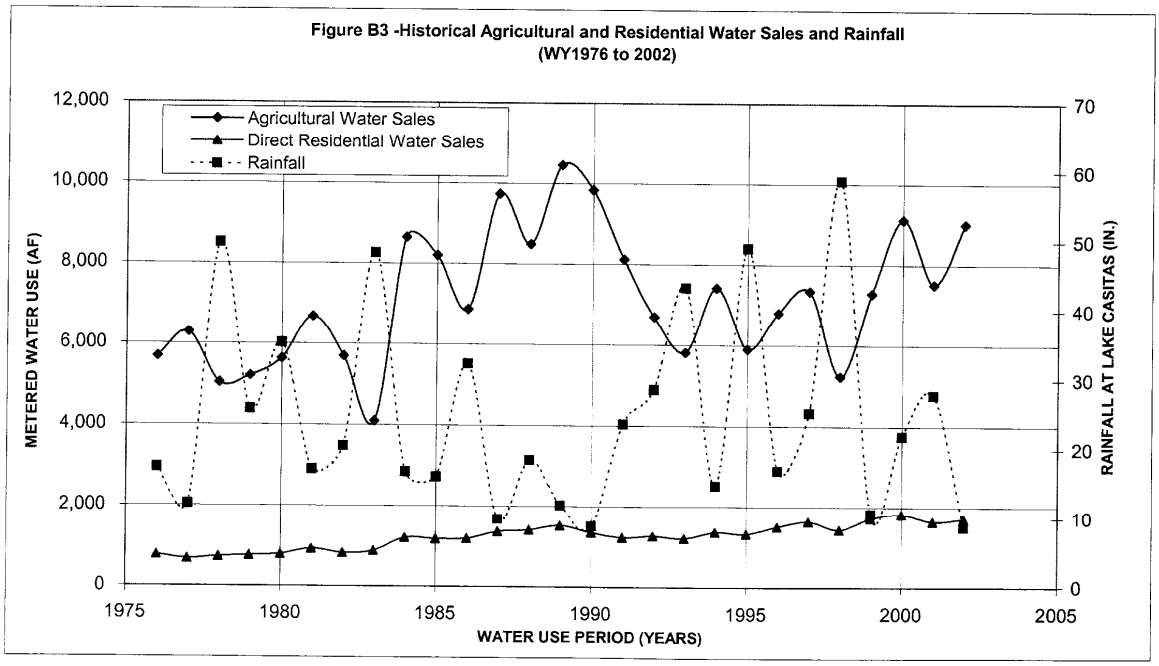


Figure B3 -Historical Agricultural and Residential Water Sales and Rainfall
(WY1976 to 2002)
Agricultural Water Sales
Direct Residential Water Sales
Rainfall
METERED WATER USE (AF)
RAINFALL AT LAKE CASITAS (IN.)
WATER USE PERIOD (YEARS)
12,000
10,000
8,000
6,000
4,000
2,000
0
70
60
50
40
30
20
10
0
1975
1980
1985
1990
1995
2000
2005

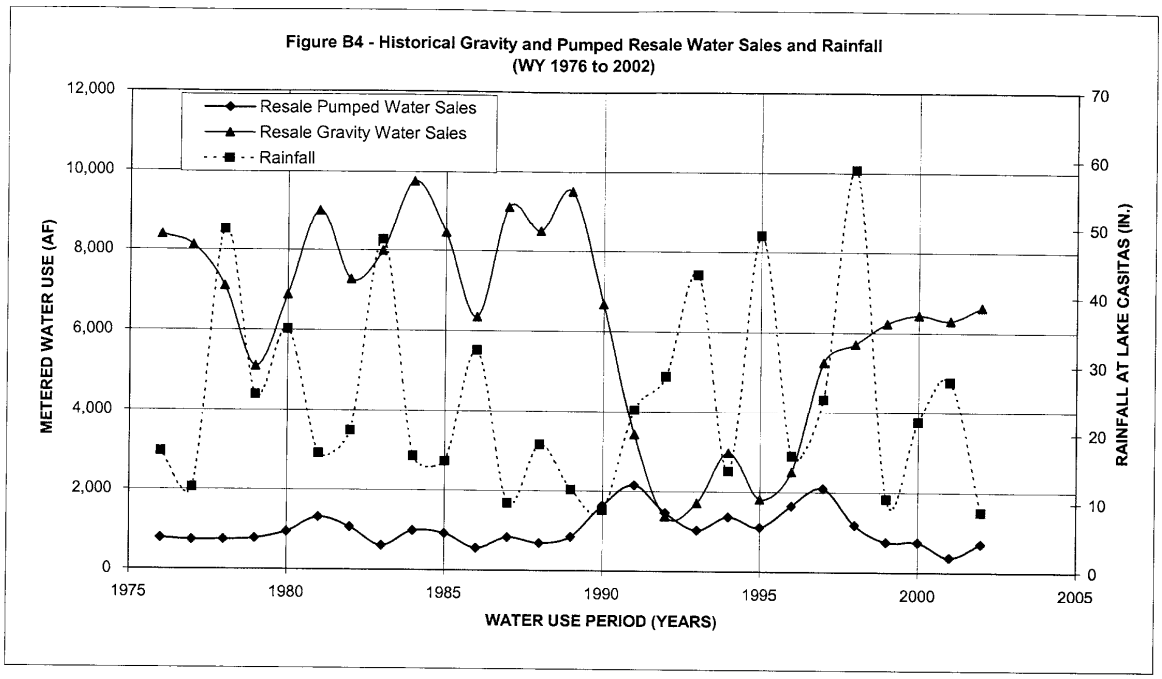


Figure B4 - Historical Gravity and Pumped Resale Water Sales and Rainfall
(WY 1976 to 2002)
Resale Pumped Water Sales
Resale Gravity Water Sales
Rainfall
METERED WATER USE (AF)
RAINFALL AT LAKE CASITAS (IN.)
WATER USE PERIOD (YEARS)
0
2,000
4,000
6,000
8,000
10,000
12,000
0
10
20
30
40
50
60
70
1975
1980
1985
1990
1995
2000
2005

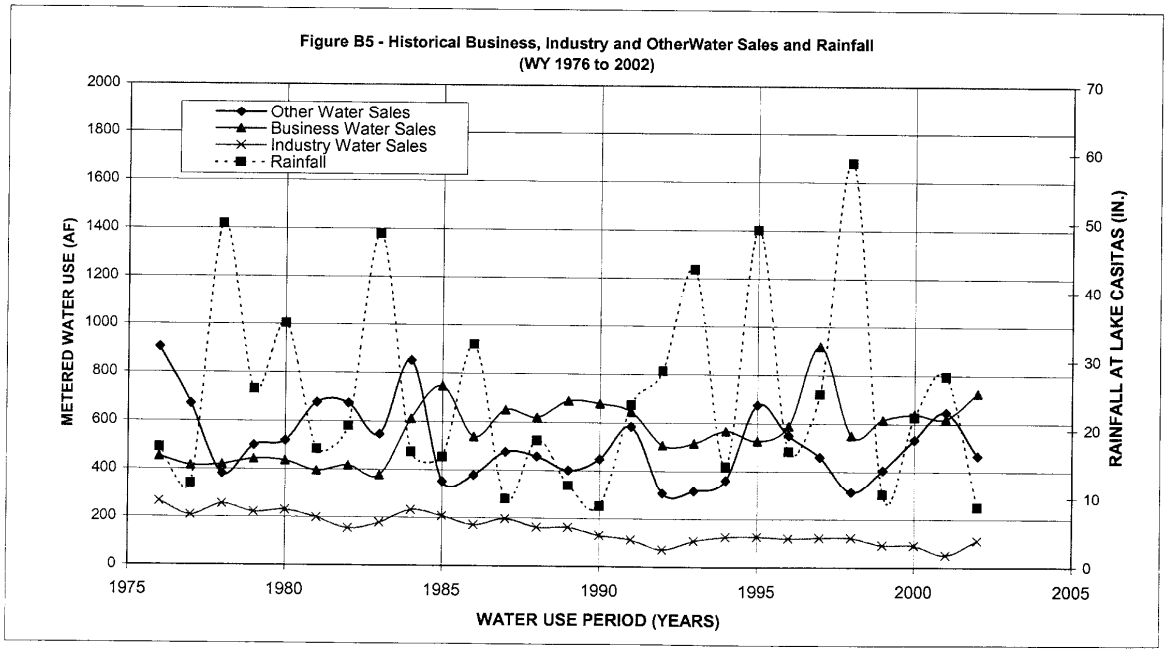


Figure B5 - Historical Business, Industry and OtherWater Sales and Rainfall
(WY 1976 to 2002)
Other Water Sales
Business Water Sales
Industry Water Sales
Rainfall
METERED WATER USE (AF)
RAINFALL AT LAKE CASITAS (IN.)
WATER USE PERIOD (YEARS)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
0
10
20
30
40
50
60
70
1975
1980
1985
1990
1995
2000
2005

Table B2 - Water Deliveries Adjustment - City of Ventura Agreement for Minimum 6,000 AF Annual Purchase

Water Year	Rainfall at LCRA (in.)	Deliveries to Main Conveyance (AF)	Water Sales to City of Ventura (AF)	Adjusted Deliveries for the City of Ventura (AF)	*Adjusted WY Deliveries to Main Conveyance (AF)
1975	24.05	16,156			16,156
1976	17.23	18,725			18,725
1977	11.98	16,779			16,779
1978	49.66	15,080			15,080
1979	25.64	12,499			12,499
1980	35.15	14,651			14,651
1981	16.99	20,012			20,012
1982	20.34	16,702			16,702
1983	48.22	16,026			16,026
1984	16.63	21,832			21,832
1985	15.93	20,274	8,591		20,274
1986	32.2	16,606	7,737		16,606
1987	9.83	22,339	7,822		22,339
1988	18.4	21,032	8,629		21,032
1989	11.85	24,416	8,875		24,416
1990	8.86	22,454	8,734		22,454
1991	23.59	17,723	5,073	927	18,650
1992	28.53	13,318	1,408	4,592	17,910
1993	43.31	11,740	1,605	4,395	16,135
1994	14.69	15,640	2,263	3,737	19,377
1995	49.04	12,185	3,943	2,057	14,242
1996	16.91	16,356	2953	3,047	19,403
1997	25.27	19,301	3622	2,378	21,679
1998	58.78	14,372	7,189		14,372
1999	10.67	17,942	6,030		17,942
2000	21.94	23,229			23,229
2001	27.86	18,873			18,873
2002	8.77	21,066	6,042		21,066
2003	23.69	16,476			

*Adjusted deliveries includes the difference between the City of Ventura's actual purchase of Lake Casitas water and the requirement for the annual purchase by the City of 6,000 AF from Casitas. City purchases during the 1990's were reduced due to water treatment deficiencies and other. In those years where 6,000AF were not purchased, the additional purchase to get 6,000 AF was added to the actual deliveries and stated in the *Adjusted Deliveies to Main Conveyance column.

FIgure B6 - Adjustment to Annual Water Deliveries - City of Ventura Agreement

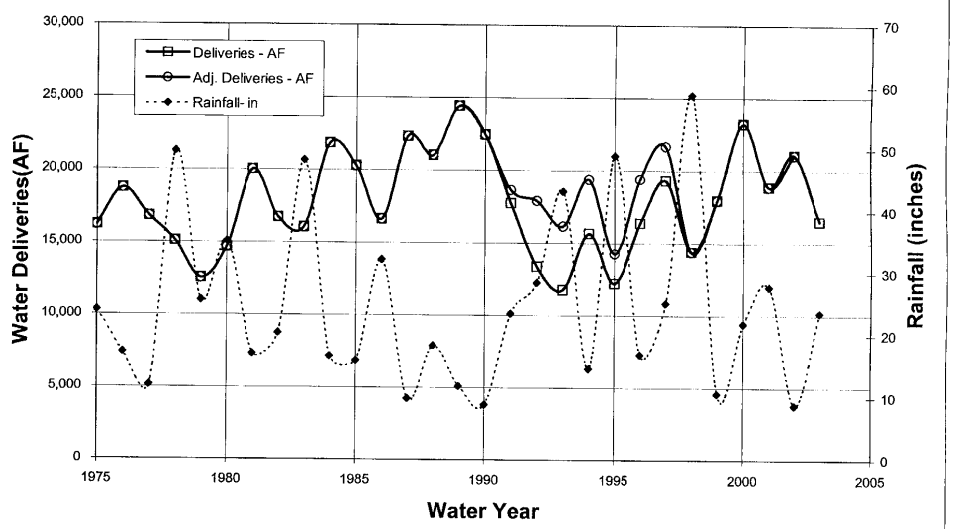


Table B3 - Casitas Municipal Water District Deliveries - Water Year Ranking
Rainfal Totals for Periods 1976 to 2002 and 1984 to 2002

Rainfall Increments	Water Year	Period 1976 to 2002: Rainfall at LCRA (Inches)	Period 1976 to 2002: Deliveries to Main Conveyence System Water Year (AF)	Period 1984 to 2002: Rainfall at LCRA (in.)	Period 1984 to 2002: Deliveries to Main Conveyence System Water Year (AF)
	2002	8.77	21,066	8.77	21,066
0-10 inches Rainfall	1990	8.86	22,454	8.86	22,454
	1987	9.83	22,339	9.83	22,339
	1999	10.67	17,942	10.67	17,942
	1989	11.85	24,416	11.85	24,416
	1977	11.98	16,779		
	1994	14.69	19,377	14.69	18,587
	1985	15.93	20,274	15.93	20,274
10-20 inches Rainfall	1984	16.63	21,832	16.63	21,832
	1996	16.91	19,403	16.91	19,633
	1981	16.99	20,012		
	1976	17.23	18,725		
	1988	18.40	21,032	18.40	21,014
	1982	20.34	16,702		
	2000	21.94	23,229	21.94	23,060
	1991	23.59	18,650	23.59	18,650
	2003	23.69	16,476	23.69	16,476
20-30 inches Rainfall	1997	25.27	21,679	25.27	21,679
	1979	25.64	12,499		
	2001	27.86	18,873	27.86	18,743
	1992	28.53	17,910	28.53	17,910
	1986	32.20	16,606	32.20	16,606
30-40 inches Rainfall	1980	35.15	14,651		
	1993	43.31	16,135	43.31	15,986
40-50 inches Rainfall	1983	48.22	16,026		
	1995	49.04	14,242	49.04	16,294
	1978	49.66	15,080		
> 50 inches Rainfall	1998	58.78	14,372	58.78	14,372
Average for 0-10 inches Rainfall		9.15	21,953	9.15	21,953
Average for 10-20 inches Rainfall		15.60	19,681	15.01	20,528
Average for 20-30 inches Rainfall		25.22	18,474	25.15	19,420
Average for 30-40 inches Rainfall		33.68	15,629	32.20	16,606
Average for 40-50 inches Rainfall		49.80	15,171	50.38	15,551
Average for greater than 50 inches Rainfall		58.78	14,372	58.78	14,372

Note the adjustment for the City of Ventura Agreement is included in the deliveries for the period 1990-1997.

Figure B7 - Average Water Deliveries based on 10-inch Rainfall Increments 1976 to 2002 period

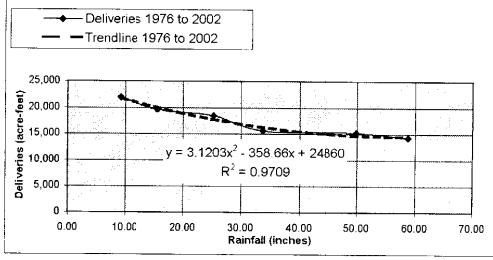


Figure B8 - Average Water Deliveries based on 10-Inch Rainfall Increments 1984 to 2002 Period

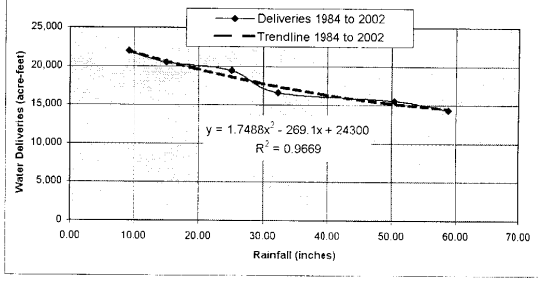


Table B4 - Trendline Comparison

Rainfall (in.)	Deliveries 1976-2002 (AF)	Deliveries 1984-2002 (AF)
10	21,585	21,784
20	18,935	19,618
30	16,908	17,801
40	15,506	16,334

Table B5 - Dry Period Escalation of Deliveries

Water Year	Rainfall at LCRA (Inches)	Deliveries to Main Conveyence System Water Year (AF)	Consec. Dry Year	Fig. 9 Trendline Applied to Rainfall (AF)	Fig. 10 Trendline Applied to Rainfall (AF)
1984	16.63	21,832	0	20,309	20,309
1985	15.93	20,274	1	20,978	21,834
1986	32.20	16,606	0	17,448	17,448
1987	9.83	22,339	0	21,824	21,824
1988	18.40	21,032	1	20,462	21,318
1989	11.85	24,416	2	22,399	24,111
1990	8.86	22,454	3	23,616	26,184

Figure B9 - Escalating Trend for 1984 to 1990 Dry Period

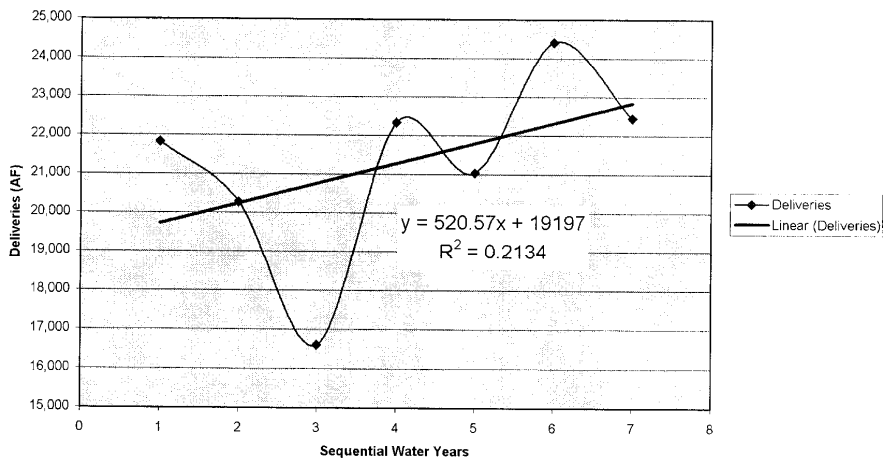


Figure B10 - Escalating Trend for 1986 to 1990 Dry Period

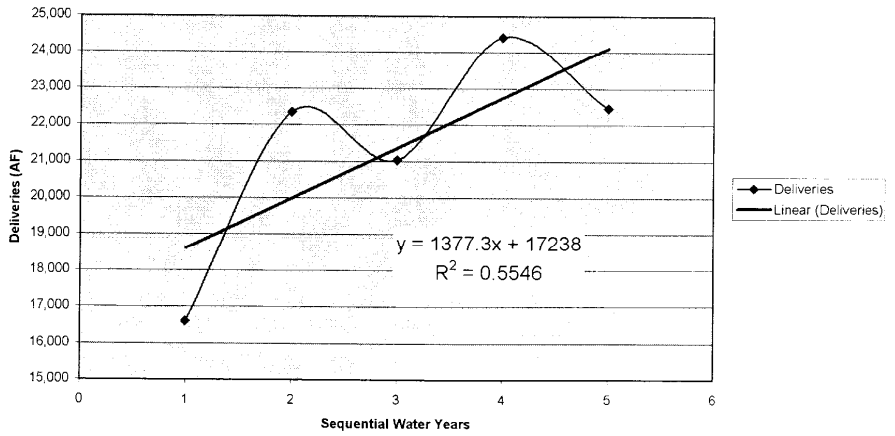
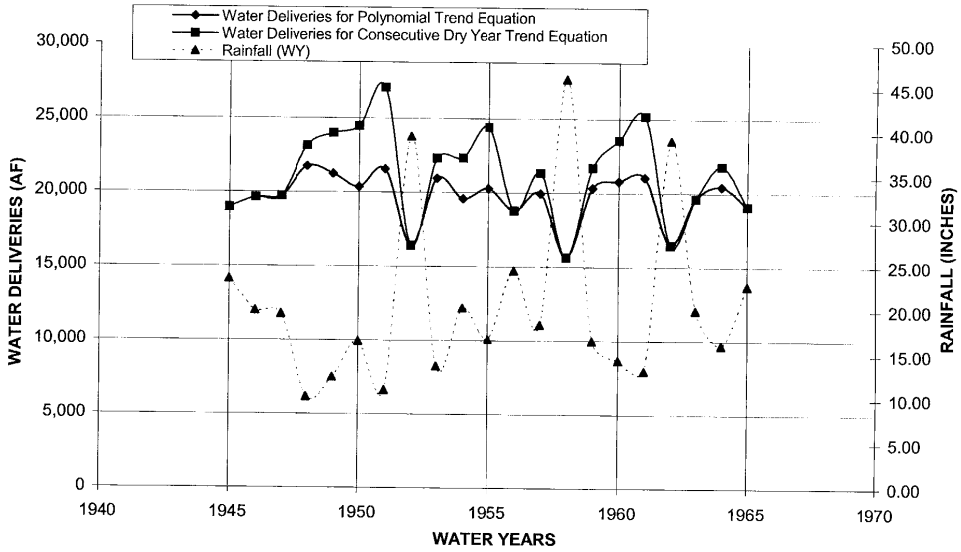


Table B6 - Estimated Water Delivery Based on Polynomial Trend and Escalating Trend Equations for Period 1945 thru 1965

Year	Rainfall at LCRA (inches)	Consec. Dry Year Multiplier	Water Deliveries: Polynomial Trend Eqn. (AF)	Water Deliveries: Consec. Dry Year Trend Eqn (AF)
1945	23.53		18,936	18,936
1946	20.01		19,616	19,616
1947	19.60	0	19,697	19,697
1948	10.25	1	21,725	23,102
1949	12.49	2	21,212	23,966
1950	16.54	3	20,328	24,459
1951	11.01	4	21,549	27,057
1952	39.63		16,382	16,382
1953	13.76	1	20,928	22,305
1954	20.30	2	19,558	22,312
1955	16.81	3	20,271	24,402
1956	24.53		18,751	18,751
1957	18.44	1	19,932	21,309
1958	46.11		15,610	15,610
1959	16.62	1	20,311	21,688
1960	14.45	2	20,777	23,531
1961	13.24	3	21,044	25,175
1962	39.21		16,437	16,437
1963	20.07		19,604	19,604
1964	16.13	1	20,414	21,791
1965	22.83		19,068	19,068
Total			412,150	445,198
Average	20.74		19,626	21,200

Figure B11 - Estimated Water Deliveries for Period 1945 thru 1965



Notes:

Polynomial Trend Equation Delivery - polynomial equation based on rainfall and historical water use data for the period of 1984 through 2002, with the adjustment of Resale Gravity during the 1991 through 1997 period remaining at a constant 6,000 AF demand throughout period of study. City would use alternate well supplies to supplement loss of Ventura River supply during the study period.

Consecutive Dry Year Trend Equation Delivery - use of polynomial trend equation to determine annual water demand, upon first year of less than 20 inches of rainfall add 1377 AF demand to the trend water demand. For the second consecutive year under 20 inches of rainfall, add 2 times 1377 AF to polynomial trend, for the third consecutive year, add three times 1377 AF to polynomial trend. Similar escalation applied to each of the following consecutive yuears of less than 20 inches of rainfall. Use of consecutive dry year multiplier to escalate delivery for each water year.

Deliveries Verification - apply the polynomial trend equation and the multiple dry year trend equation to the historical rainfall data for the period WY 1984 through WY 1990.
Compare the application of trend equations to historical water delivery data for the same period.

The multiple dry year trend equation data followed the actual delivery data, except for the 1990 water year. In 1990, extremely dry year, there may have been an additional reduction in deliveries to the City of Ventura (Resale Gravity) because of alternative supply use.
With only 8.86 inches of rainfall in the fourth year of a drought, deliveries would have been expected to rise above the previous year's deliveries.

Table B7 - Deliveries Verification

WY	Rainfall (in.)	Actual (AF)	Polynomial Trend Eqn. (AF)	Dry Yr. Multiplier	Multiple Dry Year Trend Equation (AF)
1984	16.63	21,823	20,309	1	21,686
1985	15.93	20,274	20,457	2	23,211
1986	32.2	16,606	17,448	0	17,448
1987	9.83	22,339	21,824	1	23,201
1988	18.4	21,033	19,941	2	22,695
1989	11.85	24,416	21,357	3	25,488
1990	8.86	22,454	22,053	4	27,561

Figure B12 - Deliveries Verification - Conparison of Trend Equations and Actual Deliveries

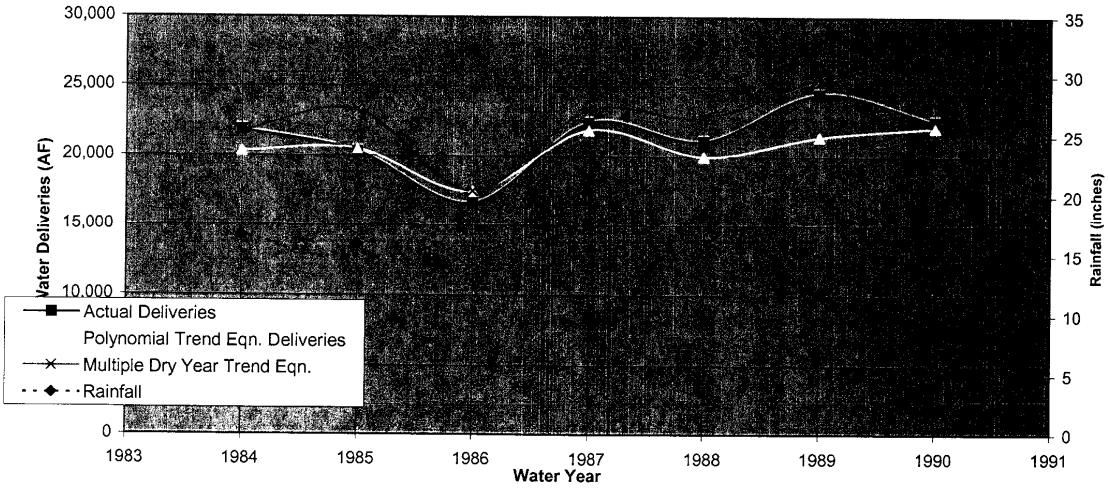
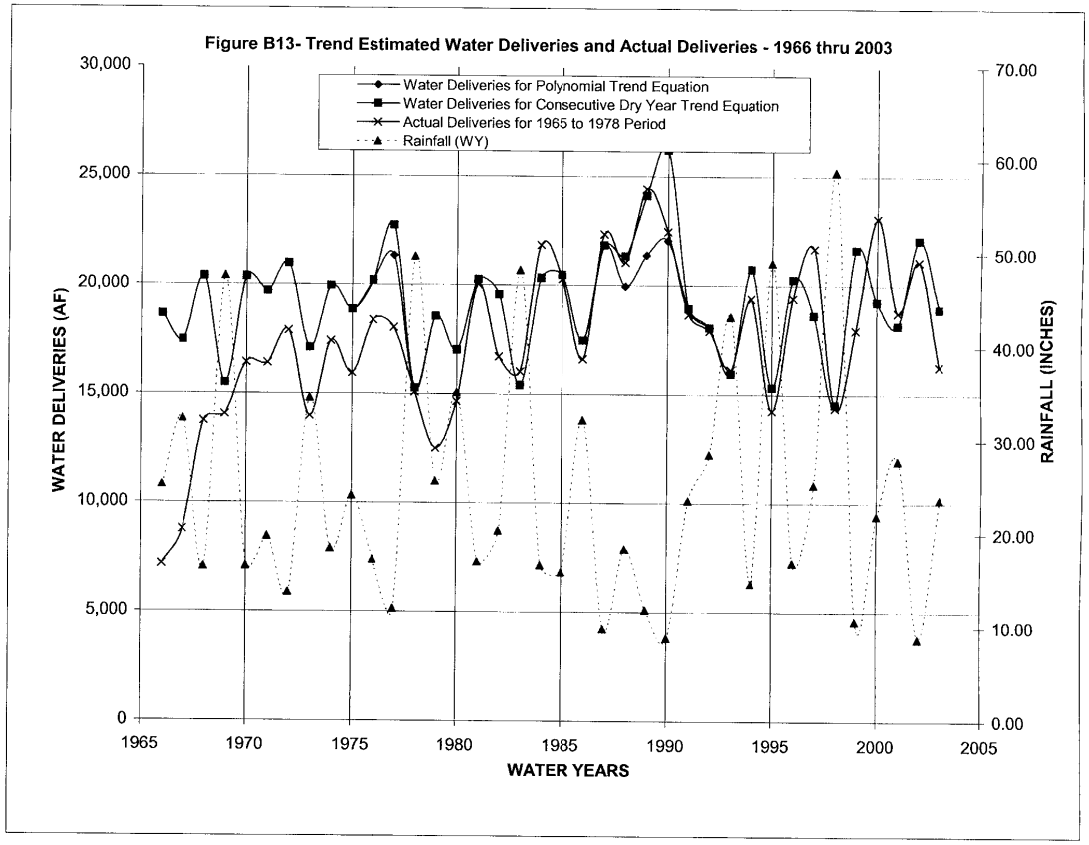


Table B8 - Trend and Actual Water Delivery Comparison -1966 through 2003

Year	Rainfall at LCRA (inches)	Consec. Dry Year Multiplier	Water Deliveries: Polynomial Trend Eqn. (AF)	Water Deliveries: Consec. Dry Year Trend Eqn (AF)	Water Deliveries: Actual (AF)
1966	25.23		18,624	18,624	7,162
1967	32.30		17,433	17,433	8,759
1968	16.44		20,349	20,349	13,729
1969	47.55		15,458	15,458	14,040
1970	16.52		20,332	20,332	16,417
1971	19.71		19,675	19,675	16,392
1972	13.72		20,937	20,937	17,878
1973	34.56		17,089	17,089	13,963
1974	18.43		19,934	19,934	17,400
1975	24.05		18,840	18,840	15,937
1976	17.23	0	20,183	20,183	18,371
1977	11.98	1	21,327	22,704	18,035
1978	49.66		15,249	15,249	15,080
1979	25.64		18,550	18,550	12,499
1980	35.15		17,002	17,002	14,651
1981	16.99		20,233	20,233	20,012
1982	20.34		19,550	19,550	16,702
1983	48.22		15,390	15,390	16,026
1984	16.63		20,309	20,309	21,832
1985	15.93		20,457	20,457	20,274
1986	32.2		17,448	17,448	16,606
1987	9.83	0	21,824	21,824	22,339
1988	18.4	1	19,941	21,318	21,032
1989	11.85	2	21,357	24,111	24,416
1990	8.86	3	22,053	26,184	22,454
1991	23.59		18,925	18,925	18,650
1992	28.53		18,046	18,046	17,910
1993	43.31		15,926	15,926	16,135
1994	14.69		20,724	20,724	19,377
1995	49.04		15,309	15,309	14,242
1996	16.91		20,250	20,250	19,403
1997	25.27		18,617	18,617	21,679
1998	58.78		14,525	14,525	14,372
1999	10.67		21,628	21,628	17,942
2000	21.94		19,238	19,238	23,060
2001	27.86		18,160	18,160	18,743
2002	8.77		22,074	22,074	21,066
2003	23.69		18,906	18,906	16,278
Total			376,920	378,297	315,159
Average			18,879	18,985	14,859

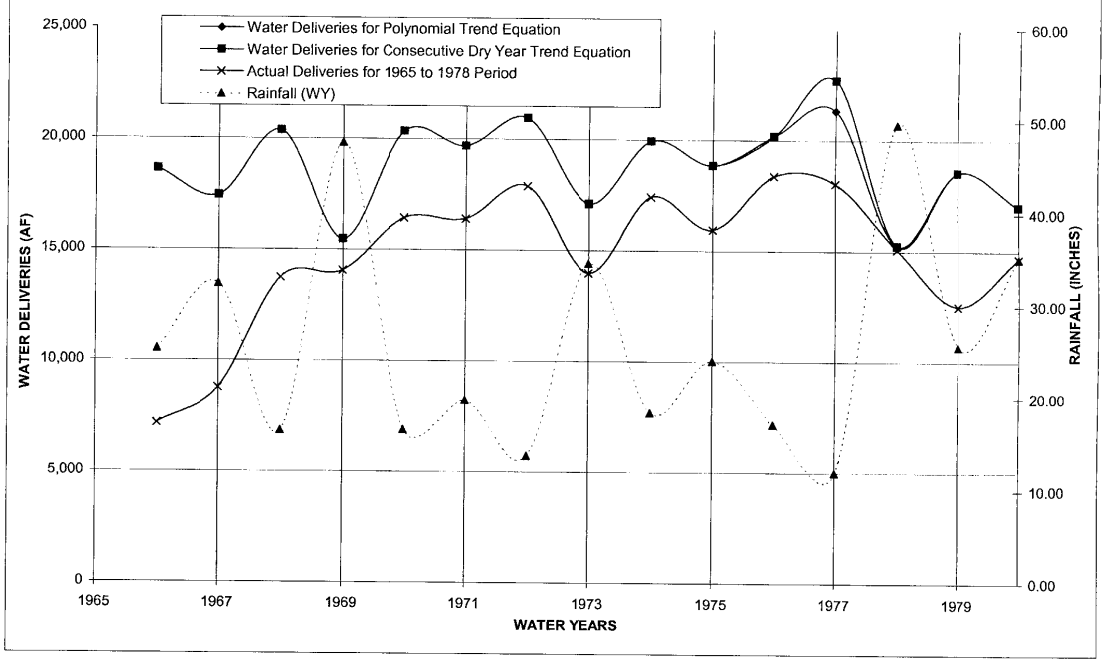


Note that the period 1978 thru 1980 was a rare multiple wet year occurrence that is not reflected in the trend equations. Therefore, the Estimated water deliveries are higher than Actual deliveries.

Table B9 - Recovery Study Period - 1966 through 1980

Year	Rainfall at LCRA (inches)	Consec. Dry Year Multiplier	Water Deliveries: Polynomial Trend Eqn. (AF)	Water Deliveries: Consec. Dry Year Trend Eqn (AF)	Water Deliveries: Actual (AF)
1966	25.23		18,624	18,624	7,162
1967	32.30		17,433	17,433	8,759
1968	16.44		20,349	20,349	13,729
1969	47.55		15,458	15,458	14,040
1970	16.52		20,332	20,332	16,417
1971	19.71		19,675	19,675	16,392
1972	13.72		20,937	20,937	17,878
1973	34.56		17,089	17,089	13,963
1974	18.43		19,934	19,934	17,400
1975	24.05		18,840	18,840	15,937
1976	17.23	0	20,183	20,183	18,371
1977	11.98	1	21,327	22,704	18,035
1978	49.66		15,249	15,249	15,080
1979	25.64		18,550	18,550	12,499
1980	35.15		17,002	17,002	14,651
Total for 1966-80			280,981	282,358	220,313
Avg. for 1966-80			18,732	18,824	14,688

Figure B14- Estimated Water Deliveries for Recovery Period 1966 thru 1980



Note that the period 1978 thru 1980 was a rare multiple wet year occurrence that is not reflected in the trend equations. Therefore, the Estimated water deliveries are higher than Actual deliveries.

Appendix C - Casitas MWD Water Allocation Assignments

In the aftermath of the District's water shortage emergency of 1989, the District developed a method for implementing a reduction of water use during times of drought. The method considered priorities for water service, equality among similar types of customers, water rate incentives to keep water use from overwhelming available water supplies, and the manner in which the District would meet the additional demands for new water service. The concepts contained in the methods emerged as the District's Water Allocation Program.

The allocation program is a price-driven water conservation measure that can provide a base water use at a reasonable cost rate and escalates water cost rates once the base use (allocation) is exceeded by the customer. The application of the allocation program provides the customer the financial decision to pay more for their water use or conserve water. Without the application of the price-driven structure, the allocation has no bearing on limiting the actual water use that is applied by individual customers. It should be noted that, to date, the District has not implemented the price-driven allocation structure.

The District has assigned water allocations to various users types and individual customers. The initial water allocations were based on the water use from 1989, less twenty percent of that 1989 annual metered use. The District assigned individual allocation to each customer in the residential, business, industrial, resale, and interdepartmental classifications of service. The agricultural classification was assigned an overall allocation based on eighty percent of the total agricultural metered use of 1989. A summary of the allocation assignment is presented in the Standard Current Allocation Status, dated November 12, 1991.

In 1992, the District made available 300 acre-feet of water to be allocated in a limited and controlled manner. The additional water came from the reactivation of the Mira Monte Well and the installation of blending pipeline. The well had historically provided approximately 300 acre-feet to the Mira Monte Mutual Water Company, but use had been discontinued in the early 1980's because of elevated nitrate content in the well water. From 1992 to April 23, 2003, the District issued limited water allocations to new and existing customers.

In 2003, the District made 7 acre-feet of allocations available for assignment to new customers. The allocations came from the removal of the last fourteen homes from the Teague Memorial Watershed. Prior to April 2004, the District had assigned the 7 acre-feet.

In this review of the allocation status, it was found that tracking of the allocations is made difficult by the changes that occurred in tracking systems and personnel responsibilities. In comparing the initial 1991 allocation to the District's accounting records for total allocation as of May 3, 2004, there are several discrepancies in the data. This is an area that needs further attention by staff prior to the application of the allocation program stages. The comparison for the individual user types is presented in Table C1. There are

three distinct user types in Table C1 that have extreme changes in allocations from 1991 to present. Also presented in Table C1 is the fiscal year 2002-2003 water use data for each user type. This data provides an indication of the level of use and a comparison to the allocation assignment for each user type.

The first user type is the Agriculture-Domestic (AD). AD accounts are the agricultural accounts that also have a residence on the same property. These customers are billed at the residential rate for the base amount of water use and billed at the agricultural rate for all water use above the base usage. In 1991, this user type was considered a part of the agricultural user type, and included in the 8,880 acre-foot allocation for the agricultural user type. The District's Administration records does separate the AD from the Agricultural (AG) user type, but the listed totals from the combination of the two types does not equal the initial 1991 allocation assignment for AG. The District's Administration records should reflect the 8,880 acre-feet of original allocation assignment and any additional allocation assignments that occurred after1992.

The second noted change is in the Interdepartmental (DI) user type category. This particular category is an accounting of the District's metered water use at the Lake Casitas Recreation Area, flushing points, main office, and other District facilities. The use number for 1989 may have also included drought water transfers to the City of Santa Barbara. A recent review of the accounting of the calendar year 1989 metered use for Interdepartmental is 190.35 acre-feet, not the 354 acre-feet expressed in the 1991 "Standard Current Allocation Status". The allocation assignment appears to need further consideration, given the discrepancy between the 1991 allocation assignment and current District records.

The third change is in the Residential allocation assignment, where allocations have increased by 472 acre-feet since 1991. This change appears to be high and a verification of the change is recommended. The change of 472 acre-feet could mean that as many as 1004 minimum allocation changes would have to been made over that last 12 years. This number appears to be high and should be reviewed further by staff. One specific change that did occurred in the residential allocation block was the change of the Taormina Community's single 0.47 allocation into 73 individual 0.47 allocations. This change occurred when the District took over the Taormina service area and the service moved from a single master water meter, with one 0.47 acre-foot allocation, to 73 single water meters at each residence, each with an individual 0.47 allocation.

In summary, it appears that there is a need for the District to perform a detailed accounting of the allocation assignments.

STANDARD
CURRENT ALLOCATION
STATUS

November 12, 1991

Customer Type	1989	October 1 Allocation	Current Allocation
Agriculture	11,096	10,081 (-9)	10,081/8,880*
Residential	1,548	1,906 (+23)**	1,238
Business	718	575 (-20)	575
Industrial	160	130 (-20)	130
Interdepartmental	354	282 (-20)	282
Others	213	170 (-20)	170
RESALE ~~Residential~~ Pumped	953	763 (-20)	763
Gravity RESALE	10,066	6,610 (-35)	7,090
Total	25,110	20,518	20,330/19,129
Losses	1,158	1,315	1,315
Total Releases	26,268	21,833	21,645/20,444
Safe Yield	21,920	21,920	21,920/21,920
Remaining	<4,348>	87	275/ 1,476

Issues:

* Small trees on Agricultural properties
** New Residential growth due to pre-April 11,1990 will serves

All values are in Acre Feet

Table C1 - District Allocation Assignments

	User Code	ALLOCATION ASSIGNMENT: 1991 Allocation Assignment (AF)	District's Records: 5/3/2004 Total Allocation (AF)	Allocation Change 1991-2004 (AF)	WATER USE: CY 1989 (AF)	WATER USE: FY 2002-03 (AF)
AD	Agriculture Domestic	0	17	17		4,597
AG	Agriculture	8880	604	-8,276	11,096	3,378
C	Business	575	605	30	718	681
DI	Interdepartmental	282	46	-236	354	173
F	Fire	0	0	0	0	0
HY	Hydrants	0	0	0	0	0
I	Industrial	130	146	16	160	58
OT	Other	170	192	22	213	233
R	Residential	1238	1,710	472	1,548	1,648
RS	Resale	7853	7,717	-136	11,019	7,084
TE	Temporary	0	0	0	0	18
	Sub-Total------->	19,128	11,037	-8,091	25,108	17,870
	Mira Monte Well Allocation	300				
	Total Allocations	**19,428**				

Note the "Water Use" is the summation of all individual metered water uses for each user types served by the District.

CASITAS Municipal Water District

INTER-DEPARTMENTAL
MEMORANDUM

DATE: June 6, 1994

TO: General Manager

FROM: Conservation Supervisor

SUBJECT: Allocation Totals - Mira Monte Well

Attached to this memo is a list of customers who have purchased allocations from the water made available by the Mira Monte well project. The first list sorts and totals the allocations by customer classification. The second list sorts and totals the allocations by agency.

ALLOCATION TOTALS - MIRA MONTE WELL

Class (Type)	Last Name	A.F. Allocation
Agriculture	Hudson	2.50
	Roll	10.0
Total:		12.50
Business	Cuccia	1.30
	Farmont Corp.	2.98
	Happy Valley Foundation	0.99
	Happy Valley School	4.00
	Ojai Valley School	6.50
Total:		15.77
Residential	Droney	0.47
	Erickson (John)	0.47
	Farmont Corp.	1.98
		1.98
		1.98
		1.98
		1.98
		1.98
	Fruchey	0.99
	Gorman	1.98
	Habitat for humanity	0.47
	Hart	0.47
	Humphrey	0.47
	Klein	0.99
	Kreitzers	0.99
	Mangum	0.99
	Marietta	0.99
	Miles	0.47
	Necochea	0.99
	Oquist	0.99
	Patterson	0.47
	Peets	0.47
	Prain	0.47
	Reyes	0.99
	Richardson (Gilbert)	0.47
	Robinson	0.47
	Ross (Hamm-J)	2.00
	Sanders	0.47
	Sherman	0.47
	Tenpenny	0.47
	Vork	0.47
	Walbridge	0.99
	Warren	0.47
	West	0.47
Total:		32.76
Total:		61.03

Agency	Last Name	Class (Type)	A.F. Allocation
asitas	Cuccia	Business	1.30
	Erickson (John)	Residential	0.47
	Farmont Corp.	Residential	1.98
		Residential	1.98
		Business	2.98
		Residential	1.98
		Residential	1.98
		Residential	1.98
		Residential	1.98
	Fruchey	Residential	0.99
	Gorman	Residential	1.98
	Habitat for humanity	Residential	0.47
	Happy Valley Foundation	Business	0.99
	Happy Valley School	Business	4.00
	Hart	Residential	0.47
	Humphrey	Residential	0.47
	Klein	Residential	0.99
	Marietta	Residential	0.99
	Miles	Residential	0.47
	Necochea	Residential	0.99
	Ojai Valley School	Business	6.50
	Patterson	Residential	0.47
	Peets	Residential	0.47
	Reyes	Residential	0.99
	Richardson (Gilbert)	Residential	0.47
	Robinson	Residential	0.47
	Roll	Agriculture	10.0
	Ross (Hamm-J)	Residential	2.00
	Sanders	Residential	0.47
	Sherman	Residential	0.47
	Vork	Residential	0.47
	Warren	Residential	0.47
Total:			52.69
Meiners Oaks	Kreitzers	Residential	0.99
	Mangum	Residential	0.99
	Oquist	Residential	0.99
	Prain	Residential	0.47
	Tenpenny	Residential	0.47
	Walbridge	Residential	0.99
Total:			4.90
Rincon Road and Water	Hudson	Agriculture	2.50
Total:			2.50
Senior Canyon	West	Residential	0.47
Total:			0.47
Taormina	Droney	Residential	0.47
Total:			0.47
tal:			61.03

Mira Monte Well Allocations
Totals as of June 1994

Last Name	Class (Type)	APN	A.F. Allocation
Cuccia	Business	034-0-140-165, 295, 405	1.30
Droney	Residential	017-0-342-045	0.47
Erickson (John)	Residential	060-0-420-295	0.47
Farmont Corp.	Business	011-0-052-170	2.98
	Residential	011-0-052-180	1.98
	Residential	011-0-052-220	1.98
	Residential	011-0-260-010	1.98
	Residential	011-0-260-020	1.98
	Residential	011-0-260-030	1.98
	Residential	011-0-260-040	1.98
Fruchey	Residential	034-0-010-620	0.99
Gorman	Residential	011-0-220-285	1.98
Habitat for humanity	Residential	061-0-034-245	0.47
Happy Valley Foundation	Business	030-0-130-045, 105	0.99
Happy Valley School	Business	030-130-045, 105	4.00
Hart	Residential	060-0-072-325	0.47
Hudson	Agriculture	008-0-180-505	2.50
Humphrey	Residential	061-0-250-095	0.47
Klein	Residential	028-0-112-10, 13	0.99
Kreitzers	Residential	010-0-050-130	0.99
langum	Residential	018-0-150-195	0.99
Marietta	Residential	061-0-150-030, 270	0.99
Miles	Residential	061-0-013-120	0.47
Necochea	Residential	061-0-055-255	0.99
Ojai Valley School	Business	030-0-020-075	6.50
Oquist	Residential	?	0.99
Patterson	Residential	061-0-012-225	0.47
Peets	Residential	061-0-042-085	0.47
Prain	Residential	017-0-121-270	0.47
Reyes	Residential	030-0-220-275	0.99
Richardson (Gilbert)	Residential	060-0-390-055	0.47
Robinson	Residential	030-0-070-105	0.47
Roll	Agriculture	?	10.0
Ross (Hamm-J)	Residential	035-240-11, 15, 16	2.00
Sanders	Residential	061-0-043-08	0.47
Sherman	Residential	061-0-140-055	0.47
Tenpenny	Residential	017-0-061-250	0.47

Mira Monte Well Allocations
Totals as of June 1994

Last Name	Class (Type)	APN	A.F. Allocation
Vork	Residential	061-0-055-565	0.47
Walbridge	Residential	017-0-180-580	0.99
Warren	Residential	061-0-055-605	0.47
West	Residential	029-0-020-080	0.47

Appendix D – System Losses

There have been several terms used in the past to describe the rate of water consumption. The terms most commonly used are "Safe Yield", "Deliveries to Main Conveyance System", and "Metered Water Sales". Quite often, these terms have been used in an interchangeable fashion without the clear understanding of the difference between these terms and their relationships. The following are definitions for each term.

Safe Yield – defined by Meinzer (1) as "the rate at which water can be withdrawn from an aquifer for human use without depleting the supply to such an extent that withdrawal at this rate is harmful to the aquifer itself, or to the quality of the water, or is no longer economically feasible." The concept of safe yield has received considerable criticism and there has been suggestion that the term be abandoned because of its frequent interpretation as a permanent limitation on the permissible withdrawal (2).

Safe yield must be recognized as a quantity determined for a set of controlling conditions and subject to change as a result of changing economic or physical conditions (3). The controlling conditions in determining the safe yield may include precipitation, evaporation, water quality, inflows and outflows over the term of a selected period of time.

The safe yield quantity is a theoretical constant value that is derived from stochastic evaluation of the hydrology. The assumption that is made in stochastic hydrology methods is that the time-hydrology sequence for a known period will repeat itself with some degree of reliability.

Deliveries to Main Conveyance System – The Casitas Municipal Water District continuously measures the rate of water delivered from Casitas Dam to the start of the distribution system. The delivery measurements are performed through the use of accurate flow tube sensors that are located at the discharge side of each filter vessel. Each flow tube sensor is regularly calibrated for accuracy. The collected flow tube data is transformed to quantities (acre-feet) of water delivered from Lake Casitas, each and every day of the year.

For the purposes of this study, the terms "Water Use" and "Deliveries" are synonymous with the term "deliveries to main conveyance system". The study is referencing the water that is directly taken from the Lake Casitas supply.

Metered Water Sales – Metered water sales is the summation of all individual water service meters in the water distribution and piping system. In the Casitas Municipal Water District water distribution system, at each point of connection by the consumer, the District has installed individual water meters to continuously measure each consumer's water use. Each meter in the District is calibrated and read bi-monthly to assure operation of the meters. It should be noted that meters can stop reading flow due to a mechanical malfunction, but rarely do meters record a higher value than the actual usage.

Differences between Terms. From the definitions, it is established that the value for safe yield is developed through stochastic hydrology evaluations and it is a theoretical value, and that the

deliveries (or water use) and metered water sales are developed through continuous monitoring of actual annual water consumption.

The difference between deliveries and metered water sales values is commonly referred to as a "system loss". In any water distribution system, there are several factors that can collectively attribute to the loss of water. These factors include, but are not limited to pipeline and service lateral leaks, pump packing leakage, meter failures and/or loss of meter accuracy, accounting errors, and water theft. Even slight errors in meter calibrations or accounting can magnify the losses that are calculated for an entire year.

In Table D1 are the deliveries and metered water sales recorded by the Casitas Municipal Water District for the period of 1976 through 2002, and the system losses that are a result of the difference between the deliveries and metered water sales. It is noted that with the exception of 1992, 1996, and 2000, the loss of water in the Casitas distribution system is generally less than ten percent of the annual deliveries to the system. Given that the higher loss years were not associated with disaster years and loss of pipelines during storm events, the loss is likely attributed to calibration and/or accounting errors.

The District has maintained an annual evaluation of the distribution system to assure that the pipelines are sound and as leak-free as possible. Indeed, the pipelines have been maintained in good condition. There have been occasional pipeline and service line leaks, followed by immediate response to repair by District staff.

1. *Meinzer, O.E.: Outline of Groundwater Hydrology, U.S. Geological Survey Water-Supply Pap. 494, 1923.*
2. *Kazmann, R.G.: "Safe Yield" in Ground-WaterDevelopment, Realility or Illusion?, J. Irrigation Drain. Div. ASCE, vol. 82, November 1956*; see also discussion by *Mcguinness, Ferris, and Kramsky, in ibid., vol 82, May 1957.*
3. *R. K. Linsley, Jr., M. A. Kohler, J.L.H. Paulhus: Hydrology for Engineer, 3rd ed., McGraw-Hill Book Company, page 195.*

Table D1 - Water Deliveries, Metered Use and System Losses

Water Year	Deliveries to Main Conveyance System Water Year (AF)	Water Sales in System Water Year (AF)	System Losses Water Year (AF)	% Loss
1976	18,725	17,244	1,481	8%
1977	16,779	17,096	(317)	-2%
1978	15,060	14,661	399	3%
1979	12,499	13,005	(506)	-4%
1980	14,651	15,434	(783)	-5%
1981	20,012	19,184	828	4%
1982	16,702	16,106	596	4%
1983	16,026	14,664	1,362	8%
1984	21,832	22,281	(449)	-2%
1985	20,274	20,051	223	1%
1986	16,606	16,058	548	3%
1987	22,339	22,359	(20)	0%
1988	21,032	20,326	706	3%
1989	24,416	23,589	827	3%
1990	22,454	20,743	1,711	8%
1991	17,723	16,255	1,468	8%
1992	13,318	11,687	1,631	12%
1993	11,740	10,703	1,037	9%
1994	15,640	14,172	1,468	9%
1995	12,185	11,467	718	6%
1996	16,356	13,715	2,641	16%
1997	19,301	17,822	1,479	8%
1998	14,372	14,533	(161)	-1%
1999	17,942	17,111	831	5%
2000	23,229	19,389	3,840	17%
2001	18,873	17,152	1,721	9%
2002	21,066	19,365	1,701	8%
Average	17,820	16,895	925	
Maximum	24,416	23,589	3,840	
Minimum	11,740	10,703	(783)	

Average losses 1976 to 1990	440
Average losses 1999 to 2002	2,023

Note that (##) is a system gain.

Appendix E - Peer Reviews

Upon completion of the initial draft of the Casitas Water Supply and Use Report, the District contracted with Entrix and MBK Engineers to perform an independent peer reviews and evaluations of the report. A written peer review has been prepared by each contractor and submitted to the District. Copies of each peer review are included in this section of the report. The District has considered each peer review and provided a written statement regarding the peer review issues. The written statement on each of the review issues is included in this section of the report. In some cases the comments have resulted in changes to the report, while other comments may have been further clarified or discounted by the District.

District Comment to the Peer Reviews

The District has reviewed each and every recommendation and comment contained in each peer review. The following are the District's actions and responses to each of the issues that were developed from the two peer reviews:

MBK Engineers

General

1) Monthly depletion factor allows Robles inflow to become a negative number, considering limiting to a minimum of zero.
   District comment - The negative inflows are a result of the formulas in developing the river hydrology, influenced by the assumptions made for the flow accretion above Robles Diversion Dam. The negative numbers result when no flow conditions are present above Robles Diversion Dam, generally during the months of July thru October. The range from –0.1 to -0.2 cfs, with one maximum one-day negative number of –3.0 cfs noted for the 1966-1980 period. The occurrence of a negative number in the model is infrequent and occurs during periods that do not influence the quantity of water available for diversion to Lake Casitas. Agreed that the minimum flow should be no less than zero, but minor changes to the model suggested by MBK does not impact the resulting numbers for available supply at Lake Casitas. No adjustments to these numbers have been made by the District.

2) Recommend using monthly evaporation rate applied to end of month lake surface area, more accurately reflect evaporation from Lake Casitas for varying storage levels.
   District comment - For consistency purposes, the District used the evaporation rates from the D-20 study. Agreed that the evaporation rate from a full reservoir is different than that from a near empty reservoir, but the evaporation rates from the reservoir in the D-20 study and a similar reservoir levels in each of the scenarios should be comparable and very near equal. Minor adjustments as suggested will not result in any significant changes to the trends or lake storage values. No adjustments to these numbers are made by the District.

Report

1) Recommend adding a table contents to the report.
   District comment - A Table of Contents will be added to the final report.

2) Recommend clarifying the synthesis of Matilija Creek hydrology.
   District comment – the final report shall include the reasoning and logic behind the synthesis of the Matilija Creek hydrology.

3) Explain more thoroughly the flow accretion methodology, identifying that these factors are multipliers.
   District comment – The method for accretion is explained in Appendix A. Add to the description of accretion that the water gained is from minor watersheds located between the USGS gaging stations and Robles Diversion Dam. Clarification of many

factors in this report is gained by showing the location of the gaging stations on the maps.

4) Recommend showing locations of each gaging station on the map.
   District comment – The map will be revised to show the locations of the key gaging stations in the upper Matilija Creek and Ventura River. The description of these locations will also assist in the explanation of the synthesis of Matilija Creek hydrology. The final report will have the locations of the Matilija Creek stations.

5) Recommend renaming the column heading currently labeled as "Matilija Gages" to the more accurate "Matilija Creek below North Fork Matilija Creek".
   District comment – Rather than confusing the report with the naming of yet a fourth labeled station (non-existent station) being generated from the synthesis of Matilija Creek hydrology, the report will describe the resulting synthesis of the Matilija Creek hydrology as combining to "Matilija Gages". The use of the term "Matilija Gages" is further clarified by the added discussion regarding the synthesis of the Matilija Creek hydrology. The heading on the tables will remain the same.

6) On graphs A19 and A20, consider eliminating the symbols on the graph lines. Difficult to differentiate lines.
   District Comment – the lines in Figures A5 and A6 have been revised, minus the line symbols. The final report will contain the revised figures.

Entrix

Overall Approach

1) Need to explain the differences in Tables A1 to A4 start and end points of the drought period and recovery period, and why they differ for each scenario.
   District Comment – The Peer Reviewer is comparing the start-end points of the D-20 study with the start-end points used in the present analysis. The approach taken in the report was to start the hydrology with the beginning of a water year, October 1945 as in the start of the drought cycle, and end the drought cycle at the end of a water year, September 30, 1965. The D-20 report hydrology sequence started in May 1944 with a full level of storage in Lake Casitas. During the period of May 1944 to October 1944 there were no diversion or rainfall events that would have, under the different scenarios of Robles operating criteria and/or loss of Matilija Dam, caused a change in the rate of decline in Lake Casitas storage levels. The initial starting level of Lake Casitas storage begins with the same storage for October 1, 1994 contained in the D-20 study.

   The storage volumes for Lake Casitas stated in each of the tables is a water year-end value. So by varying the scenario with Robles Operating criteria and with without

Matilija Dam), the water year-end value will vary. The District believes that the period assignment made in the present analysis is appropriate and does not skew the resultant safe yield estimates.

2) Include more information on how he Mira Monte well supply was applied to the supply numbers.

   District comment – Under the sections "Safe Yield: Drought Period" and "Yield: Recovery Period", the application of the Mira Monte Well supply is described as having been included in the safe yield estimate. The rate of application is stated as being 300 acre-feet per year, constant rate for each month. No further explanation is provided in the final report.

3) Recovery period, if a shorter recovery period occurs, a lower safe yield value than presented would be required to recover the lake in the shorter time. The effect of the length of the recovery period on predicted safe yield could be addressed in a sensitivity analysis.

   District Comment – The analysis performed by the District considered the hydrology and water use patterns that are likely to occur during the recovery period under each scenario for Robles and Matilija Dam and by these occurrences, running the sequence out until full storage capacity is reached at Casitas Dam. The risk is in the event that the recovery cycle is not prolonged to the full term necessary to restore Lake Casitas storage capacity, i.e. the drought cycle restarts in year 8 of the recovery period instead of starting in year 15. This should be a key point for further consideration, but not a part of this analysis.

Water Supply

1) Useful to provide a description of the methods used to derive the factors and assumptions used in both the D20 study and this analysis.

   District Comment – The methods for each of the factors is outlined in Appendix A. The description of development of the factors would detract from the actual purpose of the analysis, therefore the District has provided the factors and assumptions without the description of the factor development.

Other

2) Minimum Pool – District should monitor conditions at various stages in lake Casitas and use this data to assist in managing potential effects in the future should concerns arise.

   District Comment – So noted. As later discussed with the reviewer, a definite outcome of this analysis should be the heightened awareness of the impacts of lowering lake storage and the need to monitor and plan for the eventuality of these occurrence and minimize the impacts to the water users.

3) Water Loss at Robles associated with the fish screens – sediment at base of screens is most likely problem that will reduce efficiency of the screens. Loss of max. 1,000 AF/day if diversions through fish screens are completely impaired. District should monitor conditions in the channel and after each storm to determine potential impact.

District Comment – So noted. The value of this assessment stresses the importance of good operation and maintenance practices at Robles Diversion Dam and how other factors (i.e. incoming water impurities such as plant material or sediment) could impact the ability to divert water to Lake Casitas, and thereby impact available water supply in Lake Casitas.

4) Increased groundwater extraction – largest impact to the District's supply would likely occur during early storm events prior to recharge of the unconfined aquifer upstream of Robles. Not likely to have significant impact.

   District Comment – So noted. Present water rights are limited at this time and recharge of the upper groundwater basin is not likely to differ much given the flashy nature of the upper Ventura River/Matilija Creek system.

Water Demand

1) Over-prediction of water use for the period of 1970 to 2003, in comparing the actual water use with the predictive equation. Provides a factor of safety in evaluating water use versus supply.

   District Comment – The reference to over-estimation is evident in Table B8. One of the primary objectives in the development of the water use patterns for each cycle was to adequately predict water use based on the present-day levels of demand. It was recognized very early on that from 1959 through the mid-1980s the water use from Lake Casitas was in a development stage. Therefore, the actual water use data from this development period could not be relied upon to make an estimate the of present day water use applied to the model scenarios. In comparing the predicted water use to the actual water use for the period of 1984 to 2003, there is an over-estimation of 6,168 acre feet for the twenty-year period, an annual average of 294 acre-feet. Given the correlations and variability of water use based on the high variability of rainfall events, and their influence on the agricultural water use within the District, the District feels that the methods applied to predict water use, and the resulting data, provide a sound basis for this study.

2) Recommend a discussion of the maximum obligation to the City of Ventura and oil industry, that may add to the water use at a future date.

   District Comment – The City of San Buenaventura and the Casitas Municipal Water District do have a contract that requires the City to annually purchase a minimum of 6,000 acre-feet of Lake Casitas water. The City must also certify that the amount of water purchased from Casitas matches, or is less than, the water consumption within the joint Casitas-City boundaries. This limits the City purchase to no more than this area's annual water consumption. The water use trends considered the City's water use escalation that occurred during the drought of the late 1980's, so this type of escalation related to weather factors is considered in the model. The placement of long-term and permanent demands, such as an insurgence of oil production, may require additional consideration because it was not predicted by the current model and not included in this final report.

Water Conservation

1) The report should explain the objective of these measures and indicate the intent of these measures is not provide a comprehensive evaluation of potential water conservation and reduction measures for the District.

District Comment – It was not the intent of this study to develop and present detailed and focused water conservation measures. Rather, in Table 3, the report presents four concepts on the level of reduction needed to balance water supply and demand during the critical drought period, given the scenario of the BO criteria and without the benefit of Matilija Dam. It is likely that detailed and focus water conservation measures and water use planning will result from the details of this report.

MBK ENGINEERS
Water Resources • Flood Control • Water Rights

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November 1, 2004

Mr. Steve Wickstrum
Casitas Municipal Water District
11311 Santa Ana Road
Ventura, CA 93001

Subject: Review of "Casitas Municipal Water District Water Supply and Use Status Report"

Dear Steve:

We have completed our review of the report entitled "Casitas Municipal Water District Water Supply and Use Status Report" (report). Based on our review, we believe overall the report is well done and technically accurate. There are a few relatively minor items which we suggest correcting before finalizing the report. However, applying these suggested corrections is not anticipated to greatly affect the results or findings of the report.

The remainder of this correspondence details the findings of our review. We have divided our review into two components. The first part of our review focuses on the analysis performed (modeling) to support the findings in the report. The second portion of our review focuses on the report itself and the presentation of the findings from the analysis.

Analysis

Overall, the analysis supporting this report was appropriately applied and is technically accurate. We commend the preparers on the systematic approach taken in modeling the different scenarios. As a reviewer, this made the methods, approach, and quality of the work easier to verify. This clarity is also important for the eventual acceptance of this work by others.

Particularly noteworthy is the methodology utilized for predicting the water deliveries. With this innovative methodology, not only are the predicted deliveries based on rainfall patterns, but also the longer-term hydrology (drought sequence). It is one thing to recognize this trend, but this analysis incorporates these trends into a predictive tool. This level of sophistication is uncommon, even in tools developed by professional full-time modeling personnel.

We had some questions and concerns of a relatively minor nature regarding the technical analysis supporting the report. These are as follows:

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- The monthly depletion factor allows the Robles inflow to become a small negative number during some periods. Please consider limiting the Robles inflow to a minimum of zero, since negative inflows do not physically make sense.

- The Lake Casitas net water loss (evaporation minus rainfall) should not be the same for all scenarios, since the storage levels in Lake Casitas are different for each of these scenarios and evaporation depends upon surface area, and thus storage. We recommend using a monthly evaporation rate (in inches) that can be applied to the end-of-month surface area of Lake Casitas. This will more accurately reflect the expected evaporation from the Lake and will shows the differences in evaporative losses between the different scenarios. We would be happy to provide guidance with the evaporation rates, if this path is pursued.

Report

We conclude that, overall, this is a concise, clearly written report that identifies the key issues of the water supply and its use by the District. The report provides the main methodology and primary results without adding unnecessary details of the analysis to the main body of the report. The appendices are properly organized and presented, so the reader can review the additional details of the analysis, if desired.

There are a few areas of the report which we believe require clarification. As such, we have recommended clarification or corrective action to these sections. These are detailed, as follows:

- A table of contents in the front of the report would allow portions of the report to be quickly accessed as a reference. We recommend adding a table of contents to the report.

- It is not entirely clear how the Matilija Creek hydrology was synthesized for the period of time without an operable Matilija Creek gage (i.e., when neither USGS #4500 nor #5500 were operable). The report mentions that USGS #5500 was prorated by the annual volume of USGS #4500. Shouldn't this reference to USGS #4500 actually be to USGS #6000, the North Fork Matilija Creek gage? It is also not clear how the annual volumes could be prorated when one of the gages was not operable. The ratio changes from water year to water year, so we assume that these are not long-term average volumes used in prorating. We recommend that this section be clarified in the analysis and report.

- We recommend that the flow accretion methodology used in this study be explained more thoroughly. There are two factors applied depending upon which Matilija Creek gage was operable. We assume this is due to geographical differences between the two gages. Judging from the accretion multipliers applied, USGS #4500 must be further upstream. We recommend showing the locations of all three USGS gages used in this study on a map. Identifying that these factors are multipliers should also be explained in the report.

- In the summary tables A1-A8, we recommend renaming the column heading currently labeled as "Matilija Gages" to the more accurate "Matilija Creek below North Fork Matilija Creek".

- For the graphs on page A19-A20, please consider eliminating the symbols on the graph lines. It is very difficult to differentiate between the plotting lines with the relative density of these symbols and the closeness of the lines themselves

As mentioned in our review, we believe this is a well written and organized report that can be completed with the minor modifications we have suggested. We hope this review allows you to proceed with your analysis, results, and report in their desired capacities. If you have any questions regarding our review or its findings, please contact me at your convenience.

Sincerely,
MBK ENGINEERS

Marc Van Camp

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Since 1984 - Environmental Excellence

November 18, 2004

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CASITAS
MUNICIPAL WATER DISTRICT

Mr. Steve Wickstrum
Principal Civil Engineer
Casitas Municipal Water District
1055 North Ventura Avenue
Oakview, CA 93022

Re: Peer Review of the Casitas Water Supply and Use Report

Dear Mr. Wickstrum,

ENTRIX, Inc. (ENTRIX) has prepared this letter report to present the results of the peer review of the preliminary draft *Casitas Water Supply and Use Report* (Report) dated June 11, 2004. The Report's objective is to assess the Casitas Municipal Water District's (District) water supply given recent and future changes in water supply and demand including water releases associated with the Robles BO and the potential decommissioning of Matilija Dam. The Report is to be used by the District's governing body to assist in making decisions regarding future water management.

The objective of this peer review is to determine whether the Report accurately projects future water supply and water demand conditions and to evaluate the applicability and appropriateness of the methods utilized to make these projections.

This review presents a brief overview of the Report, a description of the methods used in the review, and the review results. The results of the review are organized into four primary categories: 1) the overall approach of the analysis; 2) the water supply analysis; 3) the water demand analysis; and, 4) the conservation and reduction measures required to balance water supply and use.

Overview of the Draft *Casitas Water Supply and Use Report*

The Report was developed to assess the potential impacts to the District's water supply associated with the recently adopted operating criteria specified in the Biological Opinion for the Robles Fish Ladder and with the potential removal of Matilija Dam. The Report also evaluates the effect of predicted water use on the District water supply, and conservation and reduction measures required to balance water supply and use. The study evaluated four separate operating scenarios:

- Water supply and use during the critical drought period, defined as between water years 1945 through 1965, with Matilija Dam;

- Water supply and use during the same critical drought period without Matilija Dam;
- Water supply and use during the reservoir recovery period, defined as between water years 1966 through 1980, with Matilija Dam; and,
- Water supply and use during the same reservoir recovery period without Matilija Dam.

The results of the Report indicate that the predicted water supply exceeds the estimated water demand for all modeled scenarios, with the exception of critical drought period under the Robles BO operating criteria without the benefit of Matilija Dam. This scenario, which is the most likely, could result in a deficit of approximately 360 acre-feet per year.

Review Methods

The review considered the draft Report, supporting documentation such as spreadsheets used to develop the water supply and bypass estimates, and the *Water Supply and Demand Status Report* prepared by the District's Engineering Department Manager on June 7, 1989. The review consisted of an evaluation of the overall approach used to determine safe yield and the methods, assumptions, and results used in developing the water supply and water demand estimates. The project team involved in the review consisted of the following personnel:

- David Blankenhorn, R.G. – Mr. Blankenhorn served as the project manager and was responsible for reviewing all aspects of the Report. He is a State of California Registered Geologist with over 9 years of experience working on various hydrology projects. Mr. Blankenhorn has significant experience in conducting hydrologic studies in Southern California including the Ventura River Watershed. He was the lead hydrologist in the preparation of the Ventura River HCP for which he evaluated surface water and groundwater hydrology within the lower Ventura River basin and the effects of water diversions and groundwater withdrawl on surface water flows. In addition, Mr. Blankenhorn conducted an evaluation of surface water flows and guidelines for water releases at the Robles Diversion in support of the Biological Assessment prepared by ENTRIX.
- Dr. Daniel Tormey, R.G. – Dr. Tormey assisted in the overall review and evaluation of the Report. He has analyzed water supply issues for withdrawal from the San Joaquin-Sacramento River delta, and locally in the Ventura County area. He has extensive experience analyzing hydrology and sediment transport in California coastal streams and the Sierra Nevada. Dr. Tormey has also conducted a water supply and water demand study in support of a wellfield design for a proposed golf course in the Sacramento area.

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Mr. Wickstrum
Principal Civil Engineer
Casitas Municipal Water District
November 18, 2004
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- Woody Trihey - Mr. Trihey assisted in the review of the design for the fish screen and evaluated potential impacts to the District water diversions following installation of the screen. He is a hydraulic engineer with significant hydrology and fish passage enhancement experience including the evaluation of fish screens.

- Dr. Gretchen Greene – Dr. Greene reviewed and evaluated the overall approach of the Report and the methodology used in the water demand analysis. She is a Senior Economist with significant experience in evaluating future water demand.

The review focused on four primary areas: 1) the overall approach of the analysis; 2) the water supply analysis; 3) the water demand analysis; and, 4) the conservation and reduction measures required to balance water supply and use. The Report was evaluated to determine the applicability and appropriateness of the methods and assumptions utilized in its preparation. The review of the water supply analysis included an evaluation of the mean daily flow data used in the water supply analysis, flow losses and additions between the existing stream gauges and the Robles Diversion, estimates of storage and release from Matilija Dam, bypass flows at Robles Diversion associated with the 1959 and BO operating criteria, losses in the Robles Diversion canal, losses at Lake Casitas, and input from tributaries to Lake Casitas. The evaluation of the water demand analysis included a review of the methodology used to predict future water use and a comparison to historic demand data. In addition, the water supply reduction/conservation measures required to balance water supply and use were reviewed to determine the level of reduction associated with each method.

Review Results

The results of the review are described below. The discussion is organized into the four primary review areas: 1) the overall approach of the analysis; 2) the water supply analysis; 3) the water demand analysis; and, 4) the conservation and reduction measures required to balance water supply and use. The comments do not include details such as spelling and typographical errors as it is assumed that the document will be edited prior to the final draft.

Overall Approach

The overall approach of the study is sound. The study uses a planning scenario the longest drought on record in the Ventura River Basin which was between 1944 and 1965. The safe yield for this period is determined using empirical stream gage data in conjunction with the recent and potential changes in operating conditions associated with the Robles BO and the potential decommissioning of Matilija Dam. The water demand is predicted based on recent use data. The study also evaluates the recovery period following the drought between 1966 and 1980 to determine the safe yield until the reservoir recovers to full storage capacity.

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Mr. Wickstrum
Principal Civil Engineer
Casitas Municipal Water District
November 18, 2004
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Several issues, however, need to be clarified in the document as follows:

- In the drought period analysis (Tables A1 to A4), the starting storage in Lake Casitas in year 1945 ranges between approximately 223,000 to 226,000 acre-feet (AF) and the minimum storage is fixed at approximately 4,800 AF. Based on discussions with the District, the starting and ending volumes for each scenario were derived using the storage values utilized in the D20 study at the beginning (October 1, 1944) and ending (September 30, 1965) of the analysis in order to be consistent with that study. Since these values effect the safe yield estimates for each scenario, the document should explain the basis for these values since they differ from the maximum usable storage capacity of 250,000 AF specified in the 1989 memo and the minimum storage capacity of 100 AF used in the D20 study which reportedly corresponds to the estimated storage volume in December 1965 rather than September 1965. In addition, the document should explain why these values vary between each modeled scenario.

- In the recovery period analysis (Tables A5 to A8), the starting storage in Lake Casitas in year 1966 ranges between approximately 36,000 to 38,000 AF and the maximum storage ranges between approximately 237,000 and 239,000 AF. As with the drought period analysis, the District indicated that the starting and ending volumes for each scenario were derived using the storage values utilized in the D20 study at the beginning (October 1, 1965) and ending (September 30, 1980) of the analysis in order to be consistent with that study. Since these values effect the safe yield estimates for each scenario, the document should explain the basis for these values since they differ from the maximum usable storage capacity of 250,000 AF specified in the 1989 memo and the minimum storage capacity of 100 AF used in the D20 study. In addition, the document should explain why these values vary between each modeled scenario.

- Based on discussions with the District, the water supply/safe yield estimates provided in Tables A1 through A8 include the supply provided by the Mira Monte well. However, the Report does not clearly specify that the supply from this well is included in the analysis. Accordingly, a column should be included in these tables to account for the supply from this well <u>or</u> a note should be added to the tables to indicate that the supply from this well is included in the analysis.

- The study results indicate that the lowest safe yield values occur during the recovery periods under the Robles BO operating criteria (21,180 AF with Matilija and 19,780 AF without Matilija). Although the predicted water demand for this period is less than the estimated safe yield, the predicted safe yield for this period would appear to be the limiting factor on water use allocation. The lower safe yield values for the recovery period appear to be caused by increased bypass flows associated with the Robles BO operating criteria and the constraint of the modeling approach which limits the number of

years (15 years) to achieve full capacity. If a shorter time is allowed for recovery, corresponding to a shorter period between droughts, the safe yield value would be lower than presented in the Report. The effect of the length of the recovery period on predicted safe yield could be addressed in a sensitivity analysis.

The issues described above affect the principal objective of the Report which is to predict safe yield and future water use allocation. Accordingly, these areas should be clearly explained to assist in planning efforts.

Water Supply

The water supply assumptions and methodology appear sound and empirical data is used where available to model or validate the water supply under the different operating scenarios. However, the analysis relies heavily on the assumptions and factors developed as part of the D20 study. The basis for these assumptions was not available for review; therefore, it was not possible to verify their accuracy/applicability of these factors. It would be useful to provide a description of the methods used to derive these factors.

The assumptions and methodology used for the supply model need to be described in greater detail to allow for easier understanding and comprehension of the analysis. Following an initial review of the document, a meeting was held on September 29, 2004 to clarify the methods and assumptions used to develop the water supply estimates. The meeting was attended by Steve Wickstrum, Leo Lentsch, and Chip Blankenhorn. A copy of the issues discussed in the meeting is provided in Attachment A.

The Report also describes several concerns that could affect water supply which were not quantitatively captured in the analysis. These concerns include the following:

- Impacts associated with operations near minimum pool in Lake Casitas. Operations under these conditions could affect water quality, water delivery, and recreation.
- Water loss at Robles Dam associated with decreased efficiency of water transfer through the fish screens and plugging of the fish screens with fine sediment.
- Increased groundwater extraction above Robles Diversion Dam which may result in increased flow of surface water to groundwater, thereby reducing inflow to Lake Casitas.

A brief discussion of these issues is provided below.

Minimum pool impacts. It seems that the most important planning issue is related to the water delivery and distribution infrastructure. If not previously addressed by the District, the District should determine the stages at which the infrastructure could be affected and develop

a contingency plan in the event that this occurs. With regards to water quality and recreation, the District should monitor conditions at various stages in Lake Casitas and use this data to assist in managing potential affects in the future should the concerns arise.

Water loss at Robles associated with the fish screens. ENTRIX reviewed the fish screen design and contacted the design engineer (Tim Buller at Wood-Rogers) to evaluate this issue. Based on a review of the design and discussions with the design engineer, it appears that the existing trash rack should be sufficient to trap large debris moving into the diversion canal. The fish screens include a traveling brush cleaning system which should prevent clogging due to brush. The design engineer indicated that the screen was designed to maintain an approach velocity of approximately 0.4 ft/s and a minimum sweeping velocity of approximately 0.8 ft/s in accordance with California Department of Fish and Game requirements. However, the design engineer indicated that the sweeping velocity would likely be greater than 0.8 ft/s and could be up to 1.5 ft/s. Based on the existing information, the flow velocities appear to be sufficient to transport silts and clays in suspension, but may not be sufficient to transport sands, if present. A thorough analysis of potential impacts would need to consider the suspended sediment concentration and particle sizes in suspension. The slot spacing of the fish screen is 1.75 mm which is within the coarse sand range and is likely greater than the particle sizes that would be in suspension. If an impact were to occur, it would likely be due to sediment deposition at the base of the fish screen and the existing design accommodates for approximately 1 foot of deposition by offsetting the base of the screen 1 foot from the bottom of the canal. There is a potential for this area to be filled during the seasonal operation period which could impact the diversion efficiency and/or the diversion operation if sediment removal is required. The maximum impact on water diversions would be the loss of approximately 1,000 AF/day which is the equivalent to a water diversion rate of 500 cfs (the maximum capacity of the diversion canal) over a 24-hour period. This situation could occur if the entire screen is clogged with sediment and/or debris or the diversion needs to shut-down for maintenance to remove sediment/debris. The District should monitor conditions in the channel during and after each storm event to determine any potential impact.

Increased groundwater extraction above Robles diversion dam. Increased groundwater extraction would result in a decrease of the water table elevation and would result in greater infiltration to the subsurface. The greatest use of groundwater would likely occur during the dry season when the diversion is not typically in operation. Assuming that the water table is lowest at the end of the dry season, the largest impact to the District's supply would likely occur during early storm events prior to recharge of the unconfined aquifer situated upstream of Robles. The aquifer in this portion of the basin typically fills relatively quickly, so increased losses would not likely have a significant impact on water supply at Robles.

ENTRIX

Mr. Wickstrum
Principal Civil Engineer
Casitas Municipal Water District
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Water Demand

The water demand analysis utilizes a correlation between water use and precipitation to develop a polynomial equation to predict future water demand. The basis for this correlation is sound in that historic data indicates that water use varies significantly with precipitation, primarily because agricultural use is the dominant water user and crops require less irrigation when there is high precipitation. The goodness of fit (R^2 value) for the water demand-precipitation correlation is approximately 0.97, which indicates a strong correlation between these variables.

The predicted water demand equation also includes a dry year multiplier to account for increased water demand associated with consecutive years with less than 20-inches of rainfall. Such a factor makes intuitive sense, since one would expect increasing water demand as a drought advances. The dry year multiplier was developed using the slope of a best fit line correlating recorded water use during the 1986 to 1990 drought. The multiplier is applied by multiplying the number of years with less than 20-inches of rainfall following an initial year with less than 20-inches of rainfall. The goodness of fit (R^2 value) for the dry year multiplier correlation is approximately 0.56, which indicates a relatively poor correlation between variables. The use of the dry year multiplier is good in that it adds a factor of safety to the water use-precipitation equation, but the relatively poor correlation indicates that other factors may be controlling the variation in water demand. In addition, the data used to develop the dry year multiplier includes the actual water use by the City of Ventura (City) between 1986 and 1990 which ranged between 7,737 and 8,875 AF. The dry year multiplier could be refined by adjusting the water use data to include only the minimum requirement to the City of 6,000 AF/year. However, this adjustment is unlikely to improve the correlation.

An evaluation of the predicted water demand and actual demand between 1970 and 2003 indicates that in general this equation overpredicts the actual annual demand by an average of approximately 1,300 AF. The data also indicates that actual water use exceeded the predicted demand in eight years over this period. Although water use is sometimes underpredicted by the equation, the total surplus between the predicted and actual demand between 1970 and 2003 is approximately 44,750 AF.

The predicted water demand for each model scenario utilizes the average water use for the drought period (21,200 AF) and for the recovery period (18,820 AF). The model water demand for each year is derived from the annual precipitation data for these periods. Based on the comparison of the predicted versus actual water demand, these values likely overestimate the water use for these periods which provides a factor of safety in evaluating water use versus supply.

ENTRIX

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Principal Civil Engineer
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One of the issues that was discussed in the meeting held on September 29, 2004 was the supply obligation to the City of Ventura. As discussed in the report, the minimum obligation to the City is 6,000 AF per year; however, the maximum obligation is not specified. The Report states that water use by the City could increase significantly if oil production increases and/or if there is an extensive dry-period. A discussion of the maximum obligation to the City should be included in the document to assist in determining the potential affects on water supply and demand in the future.

Water Conservation and Reduction Measures

The Report discusses several water conservation and reduction measures that could be implemented to balance safe yield with predicted water use. However, the focus of these measures is not clearly described. Based on discussions with the District, the objective of these measures is to evaluate options which could be implemented to balance the predicted safe yield with the predicted water use for the critical drought period under the Robles BO operating criteria without the benefit of Matilija Dam. This scenario, which is the most likely, could result in a deficit of approximately 360 acre-feet per year. Accordingly, the Report evaluates options which would provide a reduction of approximately 360 AF/year. The Report should explain the objective of these measures and indicate that the intent of these measures is not to provide a comprehensive evaluation of potential water conservation and reduction measures for the District.

Closure

ENTRIX appreciates the opportunity to perform this work for the District. Please call Dan Tormey or Chip Blankenhorn at (805) 644-5948 with any questions or comments.

Sincerely,

ENTRIX, Inc.

David B. Blankenhorn, R.G.
Senior Project Engineer/Geologist

Daniel Tormey, Ph.D., R.G.
Principal

ENTRIX

ATTACHMENT A
SEPTEMBER 29, 2004 MEETING MEMO

ENTRIX

MEMO

ENTRIX, Inc.
2140 Eastman Avenue, Suite 200
Ventura, CA 93003
(805) 644-5948

To: Steve Wickstrum, Casitas Municipal Water District

From: Chip Blankenhorn, ENTRIX

Date: September 29, 2004

Re: **Initial Questions/Comments**

The purpose of this memo is to outline initial questions/comments on the *Water Supply and Use Status Report* dated June 11, 2004. After your review, I would like to discuss these with you prior to preparing our draft peer review report. The questions/comments are separated water supply and water demand/use as follows:

I. Water Supply

In general, the water supply estimates utilize factors developed as part of the Kienlen D20 study, but the report does not discuss the derivation of these factors. Accordingly, it is difficult to evaluate the applicability of these factors. These factors include the following:

- Reservoir Recovery Period Hydrology:
  - Item 1b is described as "daily flows predicted from NF Matilija daily USGS records". I am presuming that this is a typo since the header is for Matilija Creek hydrology and gages #4500 and #5500 are situated on Matilija Creek.
  - Item 1b*i* (loss factor at Matilija Reservoir) – how was this factor derived?
  - Item 1b*ii* - estimation of daily flows for #5500 are calculated by adjusting the flows at #4500 by a ratio of the annual water supply at each gage. Does this ratio represent the average over the overlapping period of record?
  - Item 2b*i* – how was the equation for #6000 derived?
- Matilija Reservoir Operations – how were the max. and min. storage capacity estimates derived?
- Flow Accretion – how were these factors derived?
- Flow depletion/extraction – how were these factors derived?
- Robles Diversion Operations – how were the facility losses derived and is there more recent data to assist in this estimation?

- Volume of water bypassed – how were these factors derived and how were they utilized in the study? If we are accounting for inflow from gage data, diversions at Robles, and bypass flows associated with the fish releases, then it seems like we can directly calculate annual bypass flows.

- Lake Casitas:

  - How were the estimates from the tributaries derived and what are the estimates from the D20 study (not provided)?

  - Also, with regards to net evaporation, the USBR study utilized an estimate of 3.08 feet/year and the D20 study used 1.9 feet/year. Is more recent data available to update this factor? Also, does the surface area that this factor is applied to vary annually based on storage levels or is an average value used?

  - It does not appear that sedimentation in Lake Casitas was addressed with regards to impacts on storage? Is there data available to estimate the approximate rate of sedimentation which can be used to evaluate potential impacts?

II. Water Use/Demand

- In general, it appears that it is primarily agricultural water use that changes in response to precipitation. Also, there appears to be a slight increasing trend in residential water demand between 1976 and 2002 and a relatively steep demand in gravity water sales between 1997 and 2002. Accordingly, it might be more useful to model these variables separately and sum them to assist in predicting future demand.

- Water sales to the City seem to be a wildcard as future use may revert to pre-1990 if the oil production increases and/or there is an extensive dry-period. What are the obligations to the city beyond the 6000 AF/year minimum?

APPENDIX E: RULE CHANGE FOR AGRICULTURE HOME ALLOCATION METHODOLOGY

DRAFT

Section 15.10 Residences on Agricultural Properties

Section 15.10.1 Allocation to all Agricultural Properties:

In 1992, CMWD allocated 8,880 acre feet to all agricultural properties in the district. This was 80% of the amount of water used for agriculture during the 1989 calendar year drought. At the time, CMWD was unable to set individual agricultural allocations because the agricultural customers said that they had a system of rotating crops and that tended to keep the amount of water demand from agricultural customers the same, even though they added and removed crops. The intent here was to allow agricultural properties to change their demands as long as the total for all properties did not change. The issue here was that neither the total agricultural water acreage would expand, nor would there be conversion from agriculture to residential or some other property type.

Section 15.10.2 Agricultural Property with Residences:

It has been the case in 1992, that agricultural properties came with houses. CMWD had established a combination water rate to charge residential use on an agricultural property the same as a house would spend up to 17 units of usage. It has been the position of the Board that every owner of an agricultural property would want to live on the property and CMWD should make provision for such houses to come out of the water that is allocated to the agricultural properties in general. This program was not to allow agriculture to convert into houses.

Section 15.10.3 Providing Agricultural Property with a Residence:

An agricultural property owner can use allocation from the agricultural property to build a house as long as the property owner follows all of the rules in section 15.10 of this ordinance.

Section 15.10.31 Agricultural Property Allocation:

Nothing in this section should be interpreted to prohibit an agricultural property owner from obtaining an allocation for a house on his property off the priority list for allocations.

Section 15.10.32 No Expansions of Other Kinds since 1992:

No allowance for allocation shall come out of the agricultural allocation if there has been any expansion on the property since 1992 except for the construction of up to, but not more than, two buildings of any kind. Additionally, expansion shall not be considered if additional allocation was purchased for that expansion prior to the expansion or after the expansion.

Section 15.10.33 Expansion if House built then sold to others or Agricultural Land sold and then a house is built:

It shall be deemed an expansion if agricultural allocation was used to build a house and that house and or property were sold off since 1992. The limits on building houses shall include houses built and sold off. If agricultural land only is sold and the new owner requests to add a house, the property will relate back to the property sold. If that property already cumulatively has two houses, all new buildings shall be charged allocation charges and meter charges as though they were houses only.

Section 15.10.34 Size of Meter and Allocation:

To build houses on an agricultural property using agricultural water allocation, each property shall have a meter properly sized for the historical water usage on the property. If it is not sized properly for the allocation, the house shall be go to the priority list for allocation for building houses, and no use of the agricultural water allocation will be allowed.

Section 15.10.35 Usage History on the Property:

To build a house, the usage on the property shall show that the water usage for the property does not exceed 2.5 acre feet of water per acre at any time during the last 10 years.

Section 15.10.36 Out of District Usage:

No agricultural property with Out of District Usage will be provided a will serve for a house if they have out of District Usage.

Section 15.10.37 Agricultural Properties where the full acreage is not under agriculture:

If the agricultural property is one where the full acreage is not under full agriculture except for roads and buildings, then the property owner and CMWD will agree on an allocation for the property based upon the historical usage over the last ten years. Any water use over that agreed allocation will be charged at $1.50 per unit or as the Board may set a higher rate in this code in the future.

Section 15.10.4. Allocation from reduction of agriculture on property:

If, and only if, all the conditions of section 15.10 are complied with, then an agricultural property owner may use allocation from removal of agricultural from his property for the house, and no additional capital facilities charges will be due to obtain a will serve letter for the house

APPENDIX F: WATER WASTE ORDINANCE

REGULATION FOR PROHIBITING OF WATER WASTE

Section 22 WASTEFUL WATER USE All water provided to customers of Casitas Municipal Water District shall be put to reasonable beneficial use. No water provided by Casitas Municipal Water District shall be wasted.

Prohibitions and charges for improper use of water shall be based on the current stage of the Water Efficiency and Allocation Program.

Section 22.1DEFINITION Waste of water includes, but is not limited to, the following:

All stages:

1. Permitting water to leak from any device or facility on his/her property and the failure to repair any water leak in a timely manner.

2. Use of non-recirculating systems in all new and renovations of existing conveyer car washes.

3. Use of non-recirculating systems in all new and renovations of existing commercial laundry facilities.

4. Use of non-recirculating decorative water fountains.

5. Use of water in single pass cooling systems.

Stage 3 1.Use of water for cleaning of sidewalks, driveways or other paved or hard surface.

1. The observable use of water for any purpose **without reasonable control over the application of using the water for a beneficial use that** results in water flowing down sidewalks, driveways, streets, gutter, ditch or other surface..For example, the washing of cars, boats, trailers, aircraft, or other vehicles by hose without a shutoff nozzle and bucket except to wash such vehicles at commercial or fleet vehicle washing facilities using water recycling equipment.

2. Use of water for decorative fountains and ponds.

3. Outside landscape or garden watering after 9:00 a.m. and before 6:00 p.m.

5. Washing Streets with District water except in cases of emergency or essential operations.
6. Failure of any customer to use a viable alternative water source that is available without a contract for a specified amount of water service from the district.

Section 22.2 **ENFORCEMENT** as of June 30, 2008, a District customer allegedly engaged in the wasting of the District's water as defined in Section 22.1 during Stage 5 shall be responded to as set forth below.

1. The Water Conservation Manager will mail a written letter of notification to the customer. It will inform the customer of alleged water waste, the importance of water conservation and that their water rate shall increase by $1 per unit over their current water rate for each unit of usage that exceeds their water allocation.

APPENDIX H: Draft Water Shortage Contingency Resolution

CASITAS MUNICIPAL WATER DISTRICT

Resolution_____

A DRAFT RESOLUTION OF THE BOARD OF DIRECTORS OF THE CASITAS MUNICIPAL WATER DISTRICT ADOPTING SPECIFIED MEAUSURES TO ADDRESS CRITACAL WATER SHORTAGE CONDITIONS

WHEREAS, the Board of Directors of the Casitas Municipal Water District (Casitas), at its regular meeting held on _____, received a staff report that indicated water supply conditions warranted _____; and

WHEREAS, it is prudent and responsible to take appropriate action to reduce water demand; and

WHEREAS, the 2010 Urban Water Management Plan's Water Shortage Contingency and Drought analysis section authorizes the Board of Directors, by Resolution, to curtail water use in times of drought, shortages or emergencies; and

WHEREAS, on June 23, 2011 the Board of Directors approved Resolution ---- adopting the Final Urban Water Management Plan (UWMP), 2010 for Casitas; and

WHEREAS, the 2010 UWMP included a Water Shortage and Drought analysis, that contemplates 5 stages of water shortage with increasing severity, with Stage 1 calling for voluntary actions, and stages 2-5 requiring progressive levels of mandatory conservation measures.

NOW, THEREFORE BE IT RESOLVED, by the Casitas Municipal Water District's Board of Directors finds that current conditions require immediate action and calls on all customers to reduce consumption by ---------, and for more particular measures as described in Exhibit A.

ADOPTED this ---th day of _____.

_____
President, Casitas
Municipal Water District

ATTEST:

_____
Secretary, Casitas
Municipal Water District

APPENDIX H: COMMENTS AND CORRESPONDENCE

June 15, 2011

Ron Merckling, Water Conservation Manager
Via email

President and Members of the Board of Directors
Casitas Municipal Water District
1055 Ventura Ave
Oak View, CA 93022

RE: Casitas Municipal Water District's 2010 Urban Water Management Plan

Dear Board of Directors:

The City of Ventura appreciates the opportunity to review and comment on Casitas' Draft 2010 Urban Water Management Plan (UWMP). We understand that the plan focuses on that portion of Ventura's service area that is within Casitas' boundary. As noted in your plan, there is a potential for specific projects and land use changes within our service area and your boundary which could potentially increase the City's in-district demand to 7,000 acre-feet in the next 25 years.

After reviewing your draft plan we offer the following comments to provide clarification:

- Page 26, Table 8 – Water Use by Resale Agencies (2008), No. of Connections in District for the City of Ventura is reported as 20,000. The actually number of connections is 9,138.

- Page 27, 1. **City of Ventura**. The third sentence in the paragraph should read as follow: "The City has a portfolio of water resources that includes water well extractions in the Ventura River near Foster Park, rights to reclaim water from the Ojai Valley Sanitary District treatment plant, several connections to a CMWD pipeline, and groundwater sources from the east end of Ventura."

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- Page 27, 1. **City of Ventura**. The sixth sentence in the paragraph should read as follow: "The City completed its Water Master Plan in March 2011 and 2010 Urban Water Management Plan in June 2011."

We appreciate you considering these comments and hope you will address them in your revised final plan. If you should have any questions please contact Karen Waln at (805) 677-4128 or kwaln@venturawater.net.

Sincerely,

Shana E. Epstein
General Manager
Ventura Water

cc: Ariel Calonne, City Attorney
Susan Rungren, Principal Engineer
Dave Ward, Community Development Planning Manager

OJAI VALLEY SANITARY DISTRICT
A Public Agency
1072 Tico Road, Ojai, California 93023
(805) 646-5548 • FAX (805) 640-0842
www.ojaisan.org

June 15, 2011

Steve Wickstrum, General Manager
Casitas Municipal Water District
1055 Ventura Ave.
Oak View, CA 93022

2010 URBAN WATER MANAGEMENT PLAN – COMMENTS

Ojai Valley Sanitary District staff has reviewed the draft of your 2010 Urban Water Management Plan and are submitting the following comments and suggestions for your consideration.

1. Add the Ojai Valley Sanitary District to Tables 1 & 2 on pages 8 & 9.

2. Change the section "**Recycled Water Opportunities**" as follows:

   Sanitation should be changed to "**Sanitary**" throughout this section.

   New sentence in first paragraph - No recycling activities are currently in operation; however, developing a policy for the sale of, and/or storage of reclaimed water in the winter months, while continuing to discharge to the Ventura River during the summer months is addressed in the Sanitary District's 2011 Strategic Plan.

   Change to Table 22 - 2010 Average Daily = 2.00 MGD
   2010 Maximum Daily = 5.37 MGD

   New Second paragraph – The wastewater treated by the Ojai Valley Sanitary District is placed back in the Ventura River for the benefit of the aquatic habitat and the Endangered Southern California Steelhead. Any additional treated water that could be utilized for any other purposes would require the completion of an Environment Impact Report.

Thank you for the opportunity to comment on your draft document. If you have any questions or need additional information please call either of us at 646-5548.

Brenda Krout
Co-Interim General Manager

Ronald E. Sheets
Co-Interim General Manager

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CMWD MWD 2010 URBAN WATER MANAGEMENT PLAN

The Following Comments are from Bert Rapp, General Manager for the Ventura River County Water District:

The following is a description of the various agencies that are Resale classification customers of the CMWD.

1. **City of Ventura** – The City service area is partially within the CMWD boundary and partially outside of the CMWD boundary. This Plan only considers the part of the City service area that is within the CMWD boundary. The City has a portfolio of water resources that includes water well extractions in the Ventura River near Foster Park, rights to reclaim water from the Ojai Valley Sanitation Plant, several connections to a CMWD pipeline, and groundwater sources from the east end of Ventura. The City and CMWD have a 1995 water service agreement to secure a minimum of 6,000 acre-feet annual purchase of water from Casitas to the City. In recent years, the City has lost two large water customers and has seen reductions in water purchases from oil production. The City is in the process of preparing its Water Master Plan and Urban Water Management Plan. In preparation of these plans, the City has indicated that there is a potential for specific projects and land use changes that will cause water use to increase from 5,083 acre-feet in 2008 to potentially over 7,000 acre-feet in the next 25 years.

2. **Golden State Water Company** – Service area is approximately the limits of the City of Ojai. GSWC relies on groundwater extractions from the Ojai groundwater basin and supplements the groundwater supply with additional water from CMWD service connections. Groundwater is the preferred and least expensive of the two water sources. GSWC has the highest water rates of any agency in the CMWD boundary, which has led to limited use by its customers. According to the United States census, the City of Ojai has seen a 5% reduction in population in the last ten years, which should influence future water demand.

3. **Ventura River Water County Water** – Service to a limited boundary area which is not expected to have any appreciable growth in water demands over the next thirty years. VRCWD relies primarily on two wells in the Ventura River ~~and one well in the Mira Monte area~~ and only relies on CMWD when groundwater sources become depleted. VRCWD is proactive with its customers in requesting timely water use reductions to lessen the demand for CMWD water. Future demand increases on CMWD' water supply would be dependent upon increased drought frequency.

4. **Meiners Oaks Water District** – Service to a limited boundary area which is not expected to have any appreciable growth in water demands over the next thirty years. MOWD relies primarily on two wells in the Ventura River and has only relied on CMWD during infrequent system emergencies (i.e., 1989 Wheeler Fire). Future demand increases on CMWD' water supply would be dependent upon increased severe drought frequency.

5. **Senior Canyon Mutual Water Company** – Service to a limited boundary located in the east end of the Ojai Valley. The SCMWC customer base is a mix of residential, large residential and agricultural land use. The primary source of water supply are three wells in the Ojai ground water basin and diversions from a tunnel and creek source. SCMWC uses CMWD as a

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CMWD MWD 2010 URBAN WATER MANAGEMENT PLAN

Table 18 - Amount of Groundwater pumped – AF/Y

Basin Name (s)	2005	2006	2007	2008	2009
Mira Monte Well (Ventura River Groundwater Basin)	103	201	278	224	0
% of Total Water Supply	.01	.01	.01	.01	.01

Table 19 - Amount of Groundwater Projected to be Pumped – AF/Y

Basin Name (s)	2010	2011	2012	2013	2014
Mira Monte Well (Ventura River Groundwater Basin)	300	300	300	300	300
% of Total Water Supply	.01	.01	.01	.01	.01

Table 20 - Amount of Groundwater Projected to be Pumped – AF/Y

Basin Name(s)	2015	2020	2025	2030	2035/opt
Mira Monte Well (Ventura River Groundwater Basin)	300	300	300	300	300
% of Total Water Supply	.01	.01	.01	.01	.01

CMWD is the backup water supply to several groundwater purveyors of the Ventura River and Ojai groundwater basins. The groundwater basins are known to be in a depleted state after four years of below average rainfall, as occurred during the 1986 through 1990 period. Once these basins have depleted, water demand shifts from the groundwater basins to the surface water supply of Lake Casitas. In 1990, CMWD and consultant Don Kienlen reviewed and summarized the yields from the groundwater basins and the demand transfer to surface water supply. The following is a summary of the conditions in each of the groundwater basin areas within the CMWD boundary.

Upper Ventura River Basin

The upper Ventura River Basin extends from Matilija Dam to Robles Diversion Dam. The basin is extremely limited, making most wells in this reach of river under the influence of surface water. The average usage above the Robles Dam over the years is approximately 2,800 acre-feet.[1] (*Ojai Groundwater Basin Study for CMWD*, Murray, Burns, & Kienlen, MBK, August 1988). A large portion of the upper river extraction is for local agriculture, only a portion of which would rely on Casitas in the case of a long term drought. The Meiners Oaks Water District's average annual extraction from this reach is 229 acre-feet, and may require Casitas backup supply in the event of a future long-term drought.

Lower Ventura River Basin

The lower Ventura River Basin is that portion of the Ventura River which extends from Robles Diversion Dam to the Pacific Ocean. The lower Ventura River Basin had an average yield during the period of 1944-1983 of 7,493 acre-feet.[2] (*Water Supply and Demand Study: Status Report,* by R. Barnett June 6, 1989). During this historic period, the City of Ventura extracted an average annual yield of 5,506 acre-feet and the other wells between Robles Dam and Foster Park extracted and average annual yield of 1,987 acre-feet. During dry cycle periods when the full yield is not available water supply must be obtained from alternate sources such as Lake Casitas. The City of Ventura forecasts extractions from the Ventura River at Foster Park for 2010-2025 years at 6,700 acre-feet per

IS THIS INCREASE LOGICAL GIVEN THE LOW YEILD FROM THEIR NEW WELL?

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CMWD MWD 2010 URBAN WATER MANAGEMENT PLAN

THESE TABLES DO NOT INCLUDE CITY OF VENTURA DATA

feet per year (AF/Y). The plant citing and need for additional pipelines, pumping and storage facilities would require further analysis. The sources of water may include direct withdrawal from the Pacific Ocean, shoreline rainy collectors or wells, and may include various locations from the Ventura River estuary to Mussel Shoals. The brine water outfall discharges may be constructed as new facilities or further investigations may discover existing ocean discharge pipelines that may be converted to brine discharge lines. The District may also determine that this project may be feasible if a partnership was to be developed with oil companies and land developers of the Rincon service area, or the City of Ventura.

RECYCLED WATER OPPORTUNITIES

The Ojai Valley Sanitation District and the City of Ventura provide wastewater collection and treatment within CMWD's boundaries. The City of Ventura provides a level three treatment for approximately 10,000 acre-feet per year and has initiated several successful recycling projects, see Tables 21 and 22. The Ojai Valley Sanitation District provides level three treatment for approximately 3,000 acre-feet per year. The Sanitation District built a thirty million dollar tertiary treatment upgrade to its existing plant several years ago. No recycling activities are currently in operation, but opportunities are being explored with local industries and environmental groups. By agreement for the land use for the Ojai Valley Sanitation Plant, the City of Ventura has retained the first right to reclaim the effluent water from this facility. It is likely that any reclaim water development from the City of Ventura facility will benefit the City of Ventura's water portfolio. There appears to be no other opportunities for CMWD to be directly involved and benefitted by reclaim water, given the lack of any other opportunities to acquire reclaim water.

Table 21 - Wastewater Generation and Collection

WASTEWATER GENERATION AND COLLECTION						
	2005	2010	2015	2020	2025	2030
Wastewater collected and treated in service area (mgd)	2.29	2.34	2.39	2.44	2.49	2.54

Table 22 - Wastewater treatment MGD

WASTEWATER TREATMENT *(MILLION GALLONS PER DAY)*					
TREATMENT PLANT NAME	LOCATION (CITY)	AVERAGE DAILY (2000)	MAXIMUM DAILY (2000)	YEAR OF PLANNED BUILD-OUT	PLANNED MAX. DAILY VOLUME
OJAI VALLEY SANITARY DISTRICT	OJAI, CA	2.24 MGD	4.91 MGD	N/A	3.0 MGD

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CMWD MWD 2010 URBAN WATER MANAGEMENT PLAN

Addition of Water Waste Ordinance Program

List the mandatory prohibitions against specific water use practices during water shortages. Prohibitions often include excessive run-off, cleaning paved surfaces with potable water, failure to repair leaks, surface irrigation during restricted hours, etc.

Estimate of Minimum Water Supply for Next Three Years – Water Code Section 10632 (b):

In order to provide this assessment, a beginning point for water availability needs to be established and drought water use trends be applied to determine the resultant water availability at the end of the three-year period. As of April 7, 2011, Lake Casitas is storing approximately 218,630 acre-feet. The local area has received an above average rainfall during the winter of 2011 and the groundwater basins of the area are at near full condition. CMWD is at Stage 1 of the Water Allocation and Efficiency Program. The 2004 Water Supply and Use Status Report, Table 1, for the condition of the Robles BO operating criteria with Matilija provided a 21,330 acre-foot annual safe yield of Lake Casitas (without the 300 acre-foot Mira Monte Well supply), an average annual evaporation and rainfall loss in Lake Casitas of 2,630, and inflow to Lake Casitas from Ventura River diversions and tributaries for the drought period of 1944-1965. Table 25 provides the change in the amount of water stored in Lake Casitas, as of April 7, 2011, and the application of average extractions and inflow conditions stated above.

TABLE 25 – THEORETICAL THREE-YEAR DROUGHT WATER SUPPLY PROJECTIONS

Year	2011	2012	2013
Start of Year Lake Casitas Storage (AF)	218,630	207,530	196,430
Lake Casitas Safe Yield (AF)	-21,330	-21,330	-21,330
Lake Casitas Inflow (AF)	12,860	12,860	12,860
Lake Casitas Rain/Evaporation (AF)	-2,630	-2,630	-2,630
End of Year Lake Casitas Storage (AF)	207,530	196,430	**185,330**

The theoretical model for the 1944-1965 drought period included three years during which rainfall exceeded average rainfall. Therefore the change in Lake Casitas storage during the 1944-1965 drought period is influenced by the addition of those rainfall years and may not necessarily represent the three driest years during a drought period.

A more recent drought period was experienced at CMWD from 1988 thru 1990. During this period, Lake Casitas storage began at 208,687 acre-feet and transitioned downward through 78,546 acre-feet. A similar change in storage could be applied to existing conditions at Lake Casitas to determine the resultant storage level and the need for implementing Staged water reduction goals during the next three yea4rs should a similar drought (1988-90) occur during the next three years.. By starting at the April 7, 2011, storage level for Lake Casitas at 218,630 acre-feet and applying annual storage reductions that occurred during 1988, 1989 and 1990, a resultant Lake Casitas storage at the end of three years would be 140,084 acre-feet. It should be noted that the annual water deliveries to the CMWD users did increasingly exceed safe yield during the 1988-1990 period due to the shift from diminishing groundwater supplies to available surface water supplies. Under the Program adopted in

Ojai Valley Green Coalition

BOARD OF DIRECTORS
- Caryn Bosson
- Noel Douglas
- Dale Hanson
- Kerry Miller
- Kathy Nolan
- Deborah Pendrey
- Tyler Suchman
- Sabrina Venskus
- David White

June 22, 2011

Subject: Comment to Casitas Municipal Water District 2010 Urban Management Plan

Dear CMWD Board of Directors:

Thank you for the opportunity to review and comment on Casitas' draft 2010 Urban Management Plan. We appreciate that the plan is comprehensive and provides good background, while also a good reference for other organizations concerned with water and watershed issues. Most sources cited were 20 to 30 years old and valuable from a historical standpoint, but we hope there are studies and resources with more current information to be used for implementing the urban management plan.

Several of our members did review the plan and have the following comments to offer:

- 'Recycled Water Opportunities' section starting on page 42 – looks at the output side of water use and we agree has minimal opportunity for Casitas. However, while the water is still with your customer, we would suggest there is ample opportunity for water recycling through education and incentives for greywater and rainwater harvesting. These techniques are successfully being used in other parts of California and are a viable part of water conservation goals.

- We encourage Casitas to pursue sooner than later plans to produce 'MOU's for Each Purveyor' (p. 43 #3). Statistics show us, we are not voluntarily using water conservation and efficiency practices at a level we absolutely need to be.

- The description of past outreach starting on page 66 with surveys, audits, rebates, free fixtures, literature, etc. is to be commended within what would appear to be a limited capacity and is a good start. We think your planned numbers of those served is conservative and the new staff person can easily outpace the target numbers. Identifying heavy water users across the board first and working down the water chain may give you more bang for your effort, rather than broadcasting to specific segments, such as residential or industry. And you may very well already be using this strategy.

- Also, regarding outreach we would suggest a major section is missing (unless we just missed it) and that is Collaboration with more nonprofit organizations. As you know funders look for this, individuals respond better and the effort is given more clout, and most importantly organizations can support and help move each other's mission forward. We have organizations already integrated into the school system, those working on improving our watershed, which helps Casitas in the long run, and others working on the water aspects of energy conservation – as we all know water conservation is energy conservation. Casitas may come out ahead to fund organizations to better do their work, which in turn does your work for you.

323 E. Matilija St.
Suite 110-114
Ojai CA 93023
805-669-8445

OjaiValleyGreenCoalition.org

In conclusion, we consider the Casitas Municipal Water District to be a major player and an important partner in the Ojai Valley's need to become sustainable and resilient to future increased pressures on our resources, as those same resources dwindle. To that end Casitas should not want to be nor can it be an island onto itself. All water users and water purveyors must be considered in the equations and invited to be part of the solution.

On behalf of the Coalition board of directors and members, thank you again for the opportunity to comment and we look forward to future collaborations.

Sincerely,

Deborah Pendrey

Deborah Pendrey
Executive Director

APPENDIX I: Letters to County and Cities providing 60 Day Notice

April 5, 2011

Mr. Robert Clark
City Manager
City of Ojai, City Hall
401 South Ventura Street
Ojai, CA 93024

Subject: 2010 Urban Water Conservation Plan

Dear Mr. Clark,

The Urban Water Management Planning Act requires every urban water supplier that provides water to more than 3,000 customers or supplies more than 3,000 acre-feet of water annually to prepare and adopt an Urban Water Management Plan (UWMP) and to periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate their water supply, water reliability, and water conservation efforts.

As an urban water supplier, Casitas is required pursuant to Section 10642 of the UWMP Act to notify all cities or counties within our service area at least 60 days prior to a public hearing on the plan, which has been scheduled for **3:00 p.m. on Wednesday, June 22, 2011 in the regular meeting of the Board of Directors, located at 1055 Ventura Avenue, Oak View, California 93022.** Casitas plans to review the 2010 UWMP and will consider amendments and changes, as appropriate prior to adoption during this meeting. Casitas encourages input and comments on the 2010 UWMP by providing input and comments. The final plan will be available for review on Friday, June 3, 2011 at the Casitas' main office located at the 1055 Ventura Avenue address. Casitas may consider future amendments to the plan at anytime in the future in accordance with the noticing requirements.

In accordance with Section 10635 (b) of the Urban Water Management Planning Act, Casitas will provide each city and county a copy of the 2010 UWMP within 60 days after submission of the 2010 UWMP to the Department of Water Resources.

If you have any questions regarding the update of Casitas' UWMP please feel free to contact me at (805) 649-2251 Ext 118 or at rmerckling@casitaswater.com.

Sincerely,

Ron Merckling
Water Conservation Manager

1055 Ventura Ave. • Oak View, CA 93022 • (805) 649-2251 • Fax (805) 649-3001 • www.casitaswater.org

April 5, 2011

Mr. Michael Powers
County Executive Officer
County of Ventura
800 S. Victoria Avenue, #15
Ventura, California 93003

Subject: 2010 Urban Water Conservation Plan

Dear Mr. Powers,

The Urban Water Management Planning Act requires every urban water supplier that provides water to more than 3,000 customers or supplies more than 3,000 acre-feet of water annually to prepare and adopt an Urban Water Management Plan (UWMP) and to periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate their water supply, water reliability, and water conservation efforts.

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If you have any questions regarding the update of Casitas' UWMP please feel free to contact me at (805) 649-2251 Ext 118 or at rmerckling@casitaswater.com.

Sincerely,

Ron Merckling
Water Conservation Manager

April 5, 2011

Mr. Rick Cole
City Manager
City of Ventura, City Hall
501 Poli Street
Ventura, California 93002-0099

Subject: 2010 Urban Water Conservation Plan

Dear Mr. Cole,

The Urban Water Management Planning Act requires every urban water supplier that provides water to more than 3,000 customers or supplies more than 3,000 acre-feet of water annually to prepare and adopt an Urban Water Management Plan (UWMP) and to periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate their water supply, water reliability, and water conservation efforts.

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If you have any questions regarding the update of Casitas' UWMP please feel free to contact me at (805) 649-2251 Ext 118 or at rmerckling@casitaswater.com.

Sincerely,

Ron Merckling
Water Conservation Manager

1055 Ventura Ave. • Oak View, CA 93022 • (805) 649-2251 • Fax (805) 649-3001 • www.casitaswater.org

APPENDIX J: Letters Notifying Resale Agencies of Public Hearing

June 1, 2011

Mr. Robert Clark
City Manager
City of Ojai
401 South Ventura Street
Ojai, California 93024

Subject: Casitas Municipal Water District's 2010 Urban Water Conservation Plan

Dear Mr. Clark,

The Urban Water Management Planning Act requires every urban water supplier that provides water to more than 3,000 customers or supplies more than 3,000 acre-feet of water annually to prepare and adopt an Urban Water Management Plan (UWMP) and to periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate their water supply, water reliability, and water conservation efforts.

The Casitas Municipal Water District, as an urban retail and wholesale water agency plans to hold a public hearing at **3:00 p.m. on Wednesday, June 22, 2011 in the regular meeting of the Board of Directors, located at 1055 Ventura Avenue, Oak View, California 93022.** Casitas plans to review the proposed 2010 UWMP and will consider amendments and changes, as appropriate prior to adoption during this meeting. Casitas encourages input and comments on the 2010 UWMP. Additional copies of the final draft plan are now available at Casitas' main office located at the 1055 Ventura Avenue, Oak View, California 93022 or at www.casitaswater.org. Casitas may consider future amendments to the plan at anytime in the future in accordance with the noticing requirements of the UWMP Act.

If you have any questions regarding the update of Casitas' UWMP please feel free to contact me at (805) 649-2251 Ext 118 or at rmerckling@casitaswater.com.

Sincerely,

Ron Merckling
Water Conservation Manager

1055 Ventura Ave. • Oak View, CA 93022 • (805) 649-2251 • Fax (805) 649-3001 • www.casitaswater.org

June 1, 2011

Mr. Mike Hollebrands
General Manager
Meiners Oaks County Water District
202 W. El Roblar
Ojai, California 93023

Subject: Casitas Municipal Water District's 2010 Urban Water Conservation Plan

Dear Mr. Hollebrands,

The Urban Water Management Planning Act requires every urban water supplier that provides water to more than 3,000 customers or supplies more than 3,000 acre-feet of water annually to prepare and adopt an Urban Water Management Plan (UWMP) and to periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate their water supply, water reliability, and water conservation efforts.

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If you have any questions regarding the update of Casitas' UWMP please feel free to contact me at (805) 649-2251 Ext 118 or at rmerckling@casitaswater.com.

Sincerely,

Ron Merckling
Water Conservation Manager

June 1, 2011

Mr. Larry Catlett
General Manager
Senior Canyon Mutual Water Company
603 W. Ojai Avenue, STE A
Ojai, California 93023

Subject: Casitas Municipal Water District's 2010 Urban Water Conservation Plan

Dear Mr. Catlett,

The Urban Water Management Planning Act requires every urban water supplier that provides water to more than 3,000 customers or supplies more than 3,000 acre-feet of water annually to prepare and adopt an Urban Water Management Plan (UWMP) and to periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate their water supply, water reliability, and water conservation efforts.

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If you have any questions regarding the update of Casitas' UWMP please feel free to contact me at (805) 649-2251 Ext 118 or at rmerckling@casitaswater.com.

Sincerely,

Ron Merckling
Water Conservation Manager

June 1, 2011

Attn: Francis Fitting
Tico Mutual Water Company
1790 South Rice Road
Ojai, California 93023-3806

Subject: Casitas Municipal Water District's 2010 Urban Water Conservation Plan

Dear Ms. Fitting,

The Urban Water Management Planning Act requires every urban water supplier that provides water to more than 3,000 customers or supplies more than 3,000 acre-feet of water annually to prepare and adopt an Urban Water Management Plan (UWMP) and to periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate their water supply, water reliability, and water conservation efforts.

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If you have any questions regarding the update of Casitas' UWMP please feel free to contact me at (805) 649-2251 Ext 118 or at rmerckling@casitaswater.com.

Sincerely,

Ron Merckling
Water Conservation Manager

June 1, 2011

Siete Robles Mutual Water Company
603 W. Ojai Avenue, STE A
Ojai, California 93023-3732

Subject: Casitas Municipal Water District's 2010 Urban Water Conservation Plan

To Whom It May Concern:

The Urban Water Management Planning Act requires every urban water supplier that provides water to more than 3,000 customers or supplies more than 3,000 acre-feet of water annually to prepare and adopt an Urban Water Management Plan (UWMP) and to periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate their water supply, water reliability, and water conservation efforts.

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If you have any questions regarding the update of Casitas' UWMP please feel free to contact me at (805) 649-2251 Ext 118 or at rmerckling@casitaswater.com.

Sincerely,

Ron Merckling
Water Conservation Manager

June 1, 2011

Mr. Ken Petersen
District Manager
Golden State Water Company
1002-A East Ojai Avenue
Ojai, California 93023

Subject: Casitas Municipal Water District's 2010 Urban Water Conservation Plan

Dear Mr. Petersen:

The Urban Water Management Planning Act requires every urban water supplier that provides water to more than 3,000 customers or supplies more than 3,000 acre-feet of water annually to prepare and adopt an Urban Water Management Plan (UWMP) and to periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate their water supply, water reliability, and water conservation efforts.

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If you have any questions regarding the update of Casitas' UWMP please feel free to contact me at (805) 649-2251 Ext 118 or at rmerckling@casitaswater.com.

Sincerely,

Ron Merckling
Water Conservation Manager

June 1, 2011

Ms. Virginia Bogus
Sisar Mutual Water Company
P.O. Box 68
Santa Paula, California 93060

Subject: Casitas Municipal Water District's 2010 Urban Water Conservation Plan

Dear Ms. Bogus:

The Urban Water Management Planning Act requires every urban water supplier that provides water to more than 3,000 customers or supplies more than 3,000 acre-feet of water annually to prepare and adopt an Urban Water Management Plan (UWMP) and to periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate their water supply, water reliability, and water conservation efforts.

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Sincerely,

Ron Merckling
Water Conservation Manager

1055 Ventura Ave. • Oak View, CA 93022 • (805) 649-2251 • Fax (805) 649-3001 • www.casitaswater.org

June 1, 2011

Mr. Bert Rapp
General Manager
Ventura River County Water District
409 Old Baldwin Road
Ojai, California 93023

Subject: Casitas Municipal Water District's 2010 Urban Water Conservation Plan

Dear Mr. Rapp:

The Urban Water Management Planning Act requires every urban water supplier that provides water to more than 3,000 customers or supplies more than 3,000 acre-feet of water annually to prepare and adopt an Urban Water Management Plan (UWMP) and to periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate their water supply, water reliability, and water conservation efforts.

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If you have any questions regarding the update of Casitas' UWMP please feel free to contact me at (805) 649-2251 Ext 118 or at rmerckling@casitaswater.com.

Sincerely,

Ron Merckling
Water Conservation Manager

June 1, 2011

Hermitage Mutual Water Company
2376 Hermitage Road
Ojai, California 93023

Subject: Casitas Municipal Water District's 2010 Urban Water Conservation Plan

To Whom It May Concern:

The Urban Water Management Planning Act requires every urban water supplier that provides water to more than 3,000 customers or supplies more than 3,000 acre-feet of water annually to prepare and adopt an Urban Water Management Plan (UWMP) and to periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate their water supply, water reliability, and water conservation efforts.

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If you have any questions regarding the update of Casitas' UWMP please feel free to contact me at (805) 649-2251 Ext 118 or at rmerckling@casitaswater.com.

Sincerely,

Ron Merckling
Water Conservation Manager

June 1, 2011

Rincon Water & Road Works
655 Aliso
Ventura, California 93001

Subject: Casitas Municipal Water District's 2010 Urban Water Conservation Plan

To Whom It May Concern:

The Urban Water Management Planning Act requires every urban water supplier that provides water to more than 3,000 customers or supplies more than 3,000 acre-feet of water annually to prepare and adopt an Urban Water Management Plan (UWMP) and to periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate their water supply, water reliability, and water conservation efforts.

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Sincerely,

Ron Merckling
Water Conservation Manager

June 1, 2011

Ms. Norma Camacho, Director
Watershed Protection District
800 S. Victoria Avenue
Ventura, California 93009

Subject: Casitas Municipal Water District's 2010 Urban Water Conservation Plan

Dear Ms. Norma Camacho:

The Urban Water Management Planning Act requires every urban water supplier that provides water to more than 3,000 customers or supplies more than 3,000 acre-feet of water annually to prepare and adopt an Urban Water Management Plan (UWMP) and to periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate their water supply, water reliability, and water conservation efforts.

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If you have any questions regarding the update of Casitas' UWMP please feel free to contact me at (805) 649-2251 Ext 118 or at rmerckling@casitaswater.com.

Sincerely,

Ron Merckling
Water Conservation Manager

June 1, 2011

Ms. Karen Waln
Management Analyst
Ventura Water
501 Poli Street
Ventura, California 93002

Subject: Casitas Municipal Water District's 2010 Urban Water Conservation Plan

Dear Ms. Waln,

The Urban Water Management Planning Act requires every urban water supplier that provides water to more than 3,000 customers or supplies more than 3,000 acre-feet of water annually to prepare and adopt an Urban Water Management Plan (UWMP) and to periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate their water supply, water reliability, and water conservation efforts.

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If you have any questions regarding the update of Casitas' UWMP please feel free to contact me at (805) 649-2251 Ext 118 or at rmerckling@casitaswater.com.

Sincerely,

Ron Merckling
Water Conservation Manager

APPENDIX K: Sample Letter sent to stakeholders regarding planning process for developing 2010 UWMP

March 31, 2010

City Manager Jere A. Kersnar
City Manager
City of Ojai
401 South Ventura Street
Ojai, CA 93024

Subject: 2010 Urban Water Conservation Plan

Dear City Manager Jere A. Kersnar,

At this time, the Casitas Municipal Water District is developing its 2010 Urban Water Management Plan (UWMP). This plan will update Casitas' 2005 UWMP in accordance with the California Urban Water Management Planning Act (Water Code §§ 10610 et seq.), which requires we submit a new plan every five years. We invite your comments or suggestions on updating our plan.

If you are a recipient of Casitas' water, we request that you provide information from your agency on your projected water use in five-year increments for a period of 20 years or as far as data is available. This information will assist us in completing our plan.

You are invited to attend Casitas' Water Resources Committee, which will meet at 9:00 a.m. on the third Monday of each month at the District's main office located at 1055 Ventura Avenue in Oak View. It is at this meeting that the Committee will review progress on completing the 2010 UWMP. Members of the public are encouraged to provide comment at these meetings. Please be sure to check our website at casitaswater.org to confirm meeting times as they may change. Once the plan is completed, Casitas will make copies available for public review and then host a public hearing prior to final approval by the Board of Directors.

Casitas is committed to continuing to give our customers safe and reliable high-quality drinking water. We believe it is important that we work together to ensure an adequate long-term water supply for our community. I am available to speak with you to further discuss our efforts to update our 2010 UWMP. If you have any other questions or concerns, feel free to contact me at 805-649-2251 Ext 118 or at rmerckling@casitaswater.com.

Sincerely,

Ron Merckling
Water Conservation Coordinator

1055 Ventura Ave. • Oak View, CA 93022 • (805) 649-2251 • Fax (805) 649-3001 • www.casitaswater.org

APPENDIX L: CUWCC BMP REPORTS