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Bill Pfanner
Project Manager
California Energy Commission
1516 Ninth Street, MS-15
Sacramento, CA 95814

June 02, 2008

Re: Sentinel Power Plant, CPV

Dear Mr. Pfanner,

I am writing to voice some very serious concerns regarding the water supply plan for the Sentinel Power Plant (CPV). A short disclosure before I get started; while am currently serving as President of the Board of Directors for Mission Springs Water District (MSWD), I am referencing my own opinion in this letter/package. The Board of Directors for MSWD has not had any agreements come before it for vote, nor has the Board taken a formal position either for, neutral, or against the CPV project. Again, opinions presented by me are mine alone.

I have enclosed quite a compilation of information from many Federal, State, County, and other Government organizations, as well as articles from major and local newspapers, magazines, water districts and related organizations, websites and others. Please take some time to review the information enclosed, as I feel it will more than adequately demonstrate the severity of the water crisis that not only the State of California is in, but more specifically, the Coachella Valley and the Mission Creek Subbasin (basin). Most importantly, are; the Desert Water Agencies' (DWA) Engineers Report, the California State Water Resources Control Board's Water Quality Control Policy, the presentation by Elissa Lynn, Senior Meteorologist, California Department of Water Resources and several letters from Elected Officials.

To start, and take the "most important list" above in order; 1) The DWA's Engineer's Report dated April 2008, repeats itself over and over again (with multiple supporting documents and statistics) that the Mission Creek Subbasin is in a state of overdraft, and has been so since 1955. The numbers are clearly stated in the report, but basically show that this basin has been over drafted by more than 327,000 acre feet (AF) or 17% of overall storage capacity. We simply cannot afford to have the CPV project draw fresh water from this basin, especially with a very sketchy replenishment plan. Let's face it; the Colorado River is <u>not</u> a reliable or sustainable source of recharge water in our current drought. 2) The Water Quality Control Policy sites several times that fresh potable drinking water will not be used for power plant cooling. While there are a few exceptions, I do not believe that all options have been fully explored or exhausted. I have made comments on the cover page to that report and highlighted several areas for your attention. 3) The slide presentation is from Elissa Lynn, who serves as the Senior Meteorologist, California Department of Water Resources. I have no doubt that she is the absolute authority for water resources in the State, and she repeats herself over and over that California is in a serious drought, and sees no end in sight. Since this basin is over drafted, on top of a drought with no relief in sight, we simply do not have water to waste on cooling. 4) Letters of support from Senator Jim Battin, County Supervisor Marion Ashley, (enclosed) as well as verbal presentations from Assemblywoman Bonnie Garcia, and former Mayor Ron Oden of Palm Springs all make reference to the CPV project using recycled or reclaimed water. I wonder how many of those elected officials would support this project knowing that the plan is attempting to use fresh water instead of reclaimed water. Personally, I believe that CPV never intended on using reclaimed water, but used the "reclaimed water" catch-phrase as a bogus enticement to draw support from high level officials. Another example, is during the time of the first CEC meeting in Desert Hot Springs when these public officials made comments, the CPV was making the rounds to the Chamber of Commerce, service groups, etc., and mailed a post card/flyer to the residents claiming to use reclaimed water, and gathering their support as well. Very shortly afterwards, the Horton Plant upgrade (source for the reclaimed water) was removed as a negotiating option, and in a letter/presentation to the MSWD Board of Directors at the Feb. 14, 2008 meeting, Mr. Kris Helm (a CPV Representative) said "Moreover,

our prior efforts to identify opportunities to develop recycled water out of the Horton Plant to conserve fresh water elsewhere have yet to identify any economical opportunities". Simply translated, "...yet to identify..." means that there was never a firm commitment to use reclaimed water, only a ploy to gain public support.

I do not understand the proposal to draw fresh water from the Mission Creek Subbasin, and create a water conservation plan in another City, which draws its' water from a different basin. This does not make sense on many levels; how does it benefit "this" basin, how does it benefit the residents who depend on this basin, how does it benefit the MSWD? Keep in mind, that Desert Hot Springs is classified as a "disadvantaged community", which means that the residents here are at or below poverty level for the most part. What will happen if CPV is allowed to draw fresh water from this basin, and it leads to compounding problems? Who will pay for a solution? The rate payer... that's who... the residents who cannot afford huge rate hikes to fix a problem that cannot be ignored. The Water Quality Control Policy states that fresh water could possibly be allowed if any other sources of cooling are "economically unfeasible". ...economically unfeasible for whom? Continued over drafting of this basin will lead to a less accessible water table resulting in higher pumping fees, rebuilding of existing wells to reach lower levels, more strain on the existing system, higher labor costs for the MSWD, and more. Why should MSWD and it's rate payers take on an "economically unfeasible" situation, so CPV doesn't have to?

I understand the need for more electricity. I used electricity to type this letter. But, the water crisis currently at hand far outweighs a potential "brown out" for a few minutes, or even hours. Substituting one shortage for another is simply unacceptable and unproductive. Asking the rate payers of MSWD to pay exorbitant rates, so that a company can make a profit is also unacceptable. Sometimes a plan "just doesn't pencil out". If CPV cannot build their project using a dry system, then maybe they need to go back to the drawing board and start over using different machinery or technology. It is certainly better and easier to stop a project before it gets started, than it is to go back after the fact, and try to change a project after it has been licensed, built out, and in operation.

I hope this letter and the information enclosed will help to reinforce your existing policies, and remind you of the severe crisis that we are in. I have no doubt that you know very well the condition of the State's water crisis, but maybe I was able to offer one little tidbit of information that helped you make your determination.

I spoke with Mr. Chris Dennis a couple of weeks ago, and discussed some of the information that I would be sending to you. I believe he is interested in reviewing the information. Would you please make a copy available for him?

In summary, it is obvious that I oppose the CPV plan using fresh water for cooling purposes. I am not a "NIMBY" complainer. If the plant can use a dry system for cooling, then they are more than welcome to build here in my opinion, but using our limited supply of fresh potable water for tower cooling is unacceptable.

Please feel free to use this information as you wish. There is no private or proprietary information included; all was taken from public sources (listed in 2nd paragraph). You are also free to post this on your website or use it in-house at Staff level; it's strictly your call. I understand there is a lot of information to scan or copy.

Respectfully submitted,

Randy M. Duncan

This "Desert Water Agency Engineers Report" dated April 2008 is probably the single most compelling piece of evidence showing a severe overdraft for the Mission Creek Sub basin.

I would like to quote a few paragraphs, and call your attention to pretty much every single word of Chapter 3, Water Supply. Please keep in mind that this report was compiled by Desert Water Agency, using historical data, and their wells, Engineers and Accountants, not by Mission Springs Water District, Myself, or any compensated 3rd party:

Chapter I, Executive Summary, page I-4: "In summary, the Mission Creek Sub basin is in a condition of overdraft even though ground water levels have generally stabilized, thus, there is a continuing need for ground water replenishment. Even though DWA has requested of the California Dept. of Water Resources (DWR) project table A allocation of 50, 000 AF, the DWR expects to deliver on 35% thereof..."

Chapter III, Water Supply, p. III-1: "Such increasing annual production has resulted in cumulative long-term ground water overdraft, as evidenced by the steady decline of the water table within the Mission Creek Subbasin".

p. III-3: Refers to a "final hydrogeologic evaluation, well siting, and recharge potential feasibility study, Mission Creek groundwater Subbasin, Riverside Co., Ca., prepared by Richard C. Slade & Associates, May 2000": the hydrographs for wells in the basin generally do not show any response to rainfall in the region... This lack of response to rainfall in the basin appears to indicate that rainfall does not have a significant influence on recharge in the basin..." A second study by Psomas 2004 "concurs that the influence of direct precipitation on the aquifer is negligible". Evidently, the small amount of rain we *do* receive each year, does little to no good for the basin.

p. III-3 "Most estimates of natural outflow equal or exceed the corresponding estimate of natural inflow for the basin, thus leaving natural water supply for this basin at essentially zero. It goes on to quote the Slade report again: "all of the wells in the subbasin exhibit a steady decline in their recorded water-level measurements" and "...water levels in the groundwater subbasin have steadily declined between 1955 and 1997 on the order of approximately 63 feet". Data collected by Krieger & Stewart indicate "water levels for the period 1992 through 2003 declined at least 10 feet and as much as 26 feet as a result of pumpage".

P. III-4 shows AF storage in the basin from 1955 to 2007. The storage in 1955 was 2,015,733, and in 2007 was 1,688,000. Those numbers represent a loss of 327,733 AF or 17% of overall storage capacity. "Based on a polynominal curve fit to the

above data, the annual average reduction in stored ground water within the subbasin is approximately 10,900 AF".

p. III-5 "Several studies performed at the request of MSWD have verified that the Mission Creek Subbasin is in a condition of overdraft".

p. III-6 Makes reference to the monitoring wells levels rising by 180 feet, but then have declined back towards previous levels due to water migration downstream. See exhibit 6.

p. III-6 Referring to plate 3 of report: "Said plate shows that annual overdraft will continue to increase for the foreseeable future".

p. III-8 "The Mission Creek Subbasin is in an overdraft condition and will remain so, even with the importation and exchange of available State Water Project water, until the increased maximum State Water Project Table A allocations can be accomplished". ...Increase...come on, we can't even get our "normal" allocation for many, many years to come, let alone an increase.

Exhibit 6 Monitoring Well. This chart shows the temporary effect of recharge water on a monitoring well. From Feb. 05 to Jan. 06, you can see how a "bubble" of recharge water artificially raised the water level from roughly 560 ft. to about 370 ft., but then quickly dropped back to nearly 450 ft. within 1 year of migration, while production from the well continues to gradually increase.

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ENGINEER'S REPORT

GROUND WATER REPLENISHMENT AND ASSESSMENT PROGRAM FOR THE MISSION CREEK SUBBASIN

DESERT WATER AGENCY
2008/2009

APRIL 2008

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CHAPTER I
EXECUTIVE SUMMARY

CHAPTER I
EXECUTIVE SUMMARY

If ground water replenishment with imported water (artificial recharge) is excluded, annual ground water overdraft (ground water extractions or water production in excess of natural ground water replenishment or recharge) within the Mission Creek Subbasin of the Coachella Valley Ground Water Basin (see Plate 1) is currently estimated to range between 9,000 and 10,000 acre feet per year (AF/Yr), depending upon actual non-consumptive return flows. Supplementing natural ground water replenishment resulting from rainfall runoff with artificial recharge is therefore necessary to reduce annual and cumulative overdraft.

Increases in cumulative overdraft, without artificial recharge, will result in declining ground water levels and increasing pump lifts, thereby increasing energy consumption for ground water extraction. Extreme cumulative overdraft has the potential of causing ground surface settlement, and could also have an adverse impact upon ground water quality and storage volume. Artificial recharge offsets annual ground water overdraft and the concerns associated therewith and arrests or reduces the effects of cumulative ground water overdraft.

Since 1973, CVWD and DWA have been using Colorado River water exchanged for State Water Project water to replenish ground water in the Whitewater River Subbasin of the Upper Coachella Valley Ground Water Basin; and since 2002, they have been using Colorado River water exchanged for State Water Project water to replenish ground water in the Mission Creek Subbasin of the Upper Coachella Valley Ground Water Basin.

The Area of Benefit for the ground water replenishment program is that portion of the Mission Creek Subbasin and upstream tributaries--either subbasins or streams--which lie within the boundaries of Desert Water Agency (Plate 2). The costs involved in carrying out the ground water replenishment program are essentially recovered through water replenishment assessments applied to all ground water and surface water production within the Area of Benefit, aside from specifically exempted production. Production is defined as either extraction of ground water from the Mission Creek Subbasin and upstream tributaries, or diversion of surface water that would otherwise naturally replenish the Mission Creek Subbasin and upstream tributaries, all within the Area of Benefit.

The following are specifically exempted from assessment: producers extracting ground water from either the Mission Creek Subbasin and upstream tributaries at rates less than 10 AF/Yr; and producers diverting

surface water without diminishing stream flow and ground water recharge of the Mission Creek Subbasin and upstream tributaries by more than 10 AF/Yr.

Because ground water production continues to exceed ground water replenishment, and ground water overdraft continues to occur within the Mission Creek Subbasin, continued artificial recharge is necessary to either eliminate or reduce the effects of annual and cumulative overdraft, and reduce the resultant threat to the ground water supply.

Desert Water Agency has requested its maximum 2008 Table A State Water Project water allocation (formerly known as "entitlement") of 50,000 AF pursuant to its State Water Project Contract, which was increased in quantity from 38,100 AF in 2004 to 50,000 AF in 2005, for the purpose of ground water replenishment. Coachella Valley Water District plans to do the same with its maximum 2008 Table A water allocation, which was increased in quantity from 23,100 in 2003 to 33,000 AF in 2004 and to 121,100 AF in 2005. In addition, for 2008, the two agencies jointly agreed to each request up to 3,202 AF of State Water Project surplus water under the Turn-Back Water Pool Program, as available, as well as up to 2,400 AF (total) of water under the recently-ratified Yuba River Accord. It appears that approximately 150 AF of Turn-Back Water Pool Program water will be available to the Coachella Valley agencies during 2008. Currently, actual availability of water under the Yuba River Accord in 2008 is uncertain.

By virtue of the 2003 Exchange Agreement, Metropolitan Water District assigned 11,900 AF of its annual Table A allocation to Desert Water Agency and 88,100 AF of its annual Table A allocation to Coachella Valley Water District; however, Metropolitan Water District retained the option to call-back or recall the assigned annual Table A water allocations, in accordance with specific conditions, in any year. In implementing the 2003 Exchange Agreement, Metropolitan Water District advised Coachella Valley Water District and Desert Water Agency that it would probably recall the 100,000 AF assigned to the two Coachella Valley agencies from 2005 through 2009. In fact, it did recall 100,000 AF in 2005, but did not recall any water in 2006 or 2007. According to preliminary communications with Metropolitan Water District staff, it is unlikely that Metropolitan Water District will recall any water in 2008.

According to current (as of April 4, 2008) projections for 2008, California Department of Water Resources (CDWR) may be able to deliver 35% of Table A water allocation requests, which would result

in deliveries of approximately 59,850 AF of Table A water to the Coachella Valley agencies, 17,500 AF for Desert Water Agency and 42,350 AF for Coachella Valley Water District. As mentioned previously, approximately 150 AF of Turn-Back Water Pool water (Pool A) will be available to the Coachella Valley agencies for the 2008 calendar year. The total quantity of water available for artificial recharge in the Upper Coachella Valley during 2008 will range between approximately 59,850 and 62,400 AF.

The maximum replenishment assessment rate permitted by Desert Water Agency Law for the 2008/2009 fiscal year is $92.74/AF. The $92.74 rate is based on estimated Applicable State Water Project Charges of $5,871,983 (see Table 3 for Desert Water Agency applicable charges for 2008 and 2009) and estimated combined assessable production of 63,320 AF for the Whitewater River and Mission Creek Subbasins (51,150 AF within the Whitewater River Subbasin and 12,170 AF within the Mission Creek Subbasin).

Pursuant to the terms of the Water Management Agreement between Coachella Valley Water District and Desert Water Agency, Desert Water Agency's Allocated State Water Project Charges amount to $4,926,357, which with estimated assessable production of 63,320 AF results in an effective replenishment assessment rate component for Table A water of $78.00/AF for the 2008/2009 fiscal year (see Table 4).

Desert Water Agency completed construction of the Mission Creek Recharge Basin facilities in June 2002, at a construction cost of $3,978,850, with Desert Water Agency's allocated share being $2,731,807. Beginning in 2004/2005, Desert Water Agency began to recover said costs through a replenishment assessment rate component of $12.00/AF, applicable to users within the Mission Creek Subbasin. Desert Water Agency's allocated share of the facilities construction cost is shown as a deficit (see Table 5).

Nevertheless, Desert Water Agency has elected to set the replenishment assessment rate at $72.00 for the 2008/2009 fiscal year. At that rate, Mission Springs Water District's replenishment assessment for the Mission Creek Subbasin will be about $750,960; for other producers in the Mission Creek Subbasin, it will be about $125,280. Based on the aforementioned replenishment assessment rate and estimated assessable production of 12,170 AF for the Mission Creek Subbasin, Desert Water Agency will bill approximately $876,240 through the replenishment assessment. As a result, the cumulative deficit will be increased from approximately $5,050,000 to approximately $5,140,00 (see Table 5).

In summary, the Mission Creek Subbasin is in a condition of overdraft even though ground water levels have generally stabilized (cumulative overdraft offset by artificial recharge is estimated to be roughly 123,000 AF); thus, there is a continuing need for ground water replenishment. Even though Desert Water Agency has requested of the California Department of Water Resources its full State Water Project Table A allocation of 50,000 AF, the California Department of Water Resources expects to deliver only 35% thereof, essentially 17,500 AF, and Desert Water Agency has elected to set the ground water replenishment assessment rate for 2008/2009 at $72.00/AF.

CHAPTER II
INTRODUCTION

CHAPTER II
INTRODUCTION

Desert Water Agency's Ground Water Replenishment and Assessment Program was established to augment ground water supplies and arrest or retard declining water table conditions within the Upper Coachella Valley, specifically within the Mission Creek Subbasin of the Upper Coachella Valley Ground Water Basin (see Plate 1).

The Program was implemented pursuant to a joint Water Management Agreement (executed April 8, 2003) between the Coachella Valley Water District (CVWD) and the Desert Water Agency (DWA). Previously, a similar program had been implemented within the Whitewater River Subbasin pursuant to a similar Water Management Agreement.

CVWD and DWA entered into a Settlement Agreement with the Mission Springs Water District (MSWD) in December, 2004, which affirmed the water allocation procedure that had been established earlier by CVWD and DWA, and which established a Management Committee, consisting of the General Managers of CVWD, DWA, and MSWD, to review production and recharge activities. An Addendum to the Settlement Agreement states that the water available for recharge each year shall be divided among the management areas proportionate to the previous year's production from within each management area (see Appendix B).

The Water Management Agreements call for maximum importation of State Water Project Contract Table A water allocations (formerly entitlements) by CVWD and DWA for replenishment of ground water basins or subbasins within defined Water Management Areas. The Agreements also require collection of data necessary for sound management of all water resources within these same Water Management Areas.

The Water Management Agreements were developed following numerous investigations regarding the ground water supply within the Coachella Valley; said investigations are addressed in previous reports (Engineer's Reports on Ground Water Replenishment and Assessment Program for the Whitewater River Subbasin for Desert Water Agency, 1978/1979 through 1983/1984). These investigations all concluded that ground water overdraft (ground water extractions or water production in excess of natural ground water replenishment or recharge) existed within the Upper Coachella Valley Ground Water Basin.

Since 1973, CVWD and DWA have been using Colorado River water to replenish ground water in the Water Management Area for the Whitewater River Subbasin of the Upper Coachella Valley Ground Water Basin. The two agencies are permitted by law to replenish ground water basins and to levy and collect water replenishment assessments from any ground water extractor or surface water diverter (aside from exempt producers) within their jurisdictions who benefits from replenishment of ground water.

For the Whitewater River Subbasin, DWA began its ground water assessment program in fiscal year 1978/1979 and CVWD began its ground water assessment program in fiscal year 1980/1981. For the Mission Creek Subbasin, the two agencies initiated their ground water assessment programs simultaneously in fiscal year 2004/2005. The two agencies are not required to implement the assessment procedure jointly or identically; however, they have each continuously levied an annual assessment on water produced within their respective jurisdictions since inception of their ground water assessment programs.

Due to continuing overdraft conditions in the Mission Creek Subbasin, located northerly of the Whitewater River Subbasin, DWA began constructing facilities to replenish the Mission Creek Subbasin in October 2001. Facilities were essentially completed in June 2002, at a construction cost of $3,975,850. Recharge activities commenced in November 2002. During 2002, approximately 4,733 AF were recharged using the Mission Creek Recharge Facilities. Recharge quantities for subsequent years are set forth in Exhibit 8.

Desert Water Agency Law requires the filing of an Engineer's Report regarding the Replenishment Program before DWA can levy and collect ground water replenishment assessments. The report must address the condition of ground water supplies, the need for ground water replenishment, the Area of Benefit, water production within said Area, and replenishment assessments to be levied upon said water production. It must also contain recommendations regarding the Replenishment Program.

For the Mission Creek Subbasin, the Area of Benefit consists of the northwesterly portion of the Mission Creek Subbasin, and tributaries thereto, situated within DWA's boundaries (see Plate 2). There are no known active stream diversions on tributaries to Mission Creek Subbasin.

While the replenishment assessments outlined on the following pages are based on and limited to water production within DWA's Area of Benefit, available water supply, estimated water requirements, and ground water replenishment are referenced herein to the entire Mission Creek Subbasin. The Mission Creek Subbasin is utilized jointly by CVWD and DWA for water supply purposes, and the two agencies jointly manage said Subbasin's water supplies.

CHAPTER III
WATER SUPPLY

CHAPTER III
WATER SUPPLY

Pursuant to the Water Management Agreement between CVWD and DWA, the Water Management Area encompasses the entire Mission Creek Subbasin (Plate 1). The Area of Benefit for DWA's replenishment program consists of the northwesterly portion of the Mission Creek Subbasin situated within DWA's boundaries (Plate 2). The Area of Benefit for CVWD's replenishment program consists of the southeasterly portion of the Mission Creek Subbasin situated within CVWD's boundaries. Mission Springs Water District (MSWD), which extracts ground water to serve its customers, is situated essentially within DWA's Area of Benefit.

Annual water production (ground water extractions) within the Mission Creek Subbasin increased from an average of approximately 500 AF/yr in the late 1950s and 1960s to approximately 2,300 AF/yr in 1978. It has increased relatively steadily since then to approximately 17,400 AF/yr in 2006, then dropping slightly to about 16,700 AF/yr in 2007. Such increasing annual production has resulted in cumulative long-term ground water overdraft, as evidenced by the steady decline of the water table within the Mission Creek Subbasin.

During the past five calendar years (2003 through 2007), average annual water production within the Mission Creek Subbasin has been about 16,000 AF/yr; approximately 27% within CVWD and approximately 73% within DWA. Records of historic pumpage by private pumpers are not available; therefore, current pumpage by private pumpers is estimated at approximately 3,170 AF/yr, with about 1,740 AF/yr within DWA's Area of Benefit (see Table 6).

Consumptive use in the Upper Coachella Valley is estimated to be about 65% of total water production (per USGS Water Resources Investigation No. 91-4142). Annual production in the Mission Creek Subbasin has averaged 16,000 AF/yr for the past five years, resulting in average consumptive use of about 10,000 AF/yr and average non-consumptive return of about 6,000 AF/yr during the same period.

Non-consumptive return is water returned to the aquifer after use (for example, irrigation water percolating into the ground and treated wastewater discharged to percolation ponds). Although non-consumptive return in the Upper Coachella Valley has been estimated at approximately 35% (per USGS Water Resources Investigation No. 91-4142), there is some evidence that non-consumptive return is now significantly higher than 35%, perhaps 40%, 45%, or even 50%.

The non-consumptive return proportion of developed water is now being re-evaluated in light of current ground water basin conditions and operations. If non-consumptive return were 40%, 45%, or even 50%, as it may well be, current non-consumptive return would be significantly greater, another 700 AF/Yr or so for each 5% increase.

Average annual reduction in stored ground water was 4,700 AF/Yr from 1955 through 2007, and 7,500 AF/Yr from 1998 through 2007 (see Exhibit 5). Annual metered production and non-consumptive return are plotted on Plate 3, which provides an indication of consumptive use and cumulative overdraft.

From 1973 through 2007, CVWD and DWA have replenished the Upper Coachella Valley Ground Water Basins (specifically the Whitewater River and Mission Creek Subbasins) with approximately 1,990,044 AF (1,934,112 AF to Whitewater River Subbasin and 55,932 AF to Mission Creek Subbasin) of exchange deliveries (Colorado River water exchanged for State Water Project water, including advance deliveries converted to exchange deliveries, but excluding advance deliveries not yet converted to exchange deliveries). Including advance deliveries not yet converted to exchange deliveries, artificial recharge with Colorado River water (exchange and advance deliveries) has approximated 2,101,646 AF, (approximately 2,045,714 AF delivered to the Whitewater River Subbasin and approximately 55,932 AF delivered to the Mission Creek Subbasin). See Exhibits 3, 4, 7 and 8 in the Appendix.

The Mission Creek Subbasin consists of water-bearing strata underlying the Mission Creek upland, generally in the vicinity of the communities of North Palm Springs and Desert Hot Springs. The subbasin is bounded on the south by the Banning Fault, on the north and east by the Mission Creek Fault, and on the west by non-water-bearing rocks of the San Bernardino Mountains. To the southeast, the subbasin merges with the Indio Hills. The Mission Creek Subbasin Water Management Area is illustrated in Plate 1.

The Mission Creek and Banning Faults, as well as the boundaries of the consolidated and semi-consolidated strata of the San Bernardino Mountains and Indio Hills, are indicated on the *Geologic Map of California, Santa Ana Sheet* (1966). The southerly boundary of the Mission Creek Subbasin, the Banning Fault, is a branch of the San Andreas Fault; it forms a significant restriction to ground water flow from the Mission Creek Subbasin into the adjacent Garnet Hill Subbasin.

Natural inflow to the Mission Creek Subbasin is primarily from infiltration and percolation of natural runoff from Mission Creek, Big Morongo Creek, and Little Morongo Creek. The exact quantity of inflow and recharge from these sources is uncertain; the USGS (1974) estimates 3,500 AF/yr, MTU (1998) estimates 5,360 AF/yr, CDWR (1964) estimates 6,000 AF/yr, and Psomas (2004) estimates approximately 6,800 AF/yr from surface water infiltration plus roughly 4,000 AF/yr of subsurface inflow from Mission Creek alluvium west of Indian Avenue. DWA (1980) estimates long-term average recharge of between 640 and 1,300 AF/yr from Mission Creek alone. Therefore, inflow and recharge estimates from surface water supplies range between 3,500 and 10,800 AF/yr.

According to *Final Hydrogeologic Evaluation, Well Siting, and Recharge Potential Feasibility Study Mission Creek Groundwater Subbasin, Riverside County, California* prepared by Richard C. Slade & Associates LLC, May 2000 (Slade), "...the hydrographs for wells in the Mission Creek Groundwater Subbasin generally do not show any response to rainfall in the region... This lack of response to rainfall in the Mission Creek Groundwater Subbasin appears to indicate that rainfall does not have a significant influence on recharge in the basin and/or that current pumping volumes exceed the recharge." Psomas (2004) concurs that the influence of direct precipitation on the aquifer is negligible.

Natural outflow from the Mission Creek Subbasin is essentially underflow across the Banning Fault. The exact quantity of outflow from the Subbasin is uncertain; the USGS (1974) and MTU (1998) both estimate about 5,500AF/yr underflow across the Banning Fault and MTU (1998) further estimates phreatophytic evapotranspiration of about 1,400 AF/yr. Psomas (2004) used a figure of 3,200 AF/yr from subsurface outflow, about 1,500 AF/yr for phreatophytic evapotranspiration, and about 70 AF/yr for surface water outflow.

Most estimates of natural outflow equal or exceed the corresponding estimates of natural inflow for the Mission Creek Subbasin, thus leaving natural water supply for this basin at essentially zero. Regardless of the specific quantities estimated in the various studies, water levels in the Mission Creek Subbasin declined through 2004, with outflow exceeding inflow. Again, according to Slade (2000), "all of the wells in the Subbasin exhibit a steady decline in their recorded water-level measurements", and "...water levels in the groundwater subbasin have steadily declined between 1955 and 1997 on the order of approximately 63 feet; of this amount, approximately 30 feet occurred between 1978 and 1998", and "...for the next 20 years...water levels will decline at a rate of approximately 3 feet per year", and for the following 30 years "...water levels should decline at an increased rate of approximately 6 feet per year",

and "...it appears that the groundwater reservoir will need to be augmented by recharge from imported water". Data collected by Krieger & Stewart indicate water levels within the Mission Creek Subbasin for the period 1992 through 2003 declined at least 10 feet and as much as 26 feet as the result of pumpage. However, due to ground water replenishment efforts, ground water levels within the Mission Creek Subbasin have, on the average, been relatively stable from 2005 through 2007.

According to Slade (2000), hydrographic data of MSWD wells indicate that the quantity of ground water stored in the northwesterly three-quarters of the Mission Creek Subbasin in 1997 was approximately 1,333,800 AF. Based on data in GTC's report (1979), Slade estimates that there were approximately 1,440,600 AF of stored ground water within the same area in 1978, and 1,511,800 AF in 1955. Based on GTC's estimated change of 2,400 AF/yr in stored ground water between 1955 and 1970, there were approximately 1,475,800 AF of stored ground water in 1970.

Based on water levels provided by MSWD and GTC's factor of 3,560 AF of storage loss per foot of water level decline (later used by Slade), an additional 67,640 AF of storage was depleted between 1998 and 2007, about 7,500 AF/yr average. The area's reduction in storage from 1955 through 2007 was approximately 245,640 AF, roughly 16% of the storage in 1955 (see Exhibit 5). Between 2004 and the end of 2007, the decline in groundwater has decreased to a negligible quantity, when averaged over the MSWD service area.

Extrapolating from the northwesterly three-quarters of the Subbasin to the entire Subbasin (assuming uniform aquifer characteristics), the ground water stored within the entire Subbasin would have been as follows: 2,015,733 AF in 1955, 1,967,733 AF in 1970, 1,920,800 AF in 1978, 1,778,400 AF in 1997, and 1,688,000 in 2007.

The aforementioned average changes in storage from 1998 through 2007 range between 6,800 AF/yr for the northwesterly three-quarters of the Subbasin and 9,000 AF/yr for the entire Subbasin. The extrapolated change in storage may be somewhat higher than actual since aquifer characteristics are not uniform throughout the Subbasin, the southeast quarter of the Subbasin consists of much less permeable material than the northwest three-quarters; however, it sets a reasonable upper limit.

Based on a polynomial curve fit to the above ground water storage data, the annual reduction in stored ground water within the Subbasin projected to 2007 is approximately 10,900 AF, compared with the

average 9,000 AF/yr figure for 1998 through 2007 derived in the previous paragraph. The consumptive use in 2007 was approximately 10,800 AF. Historically, overdraft can reasonably be estimated by consumptive use; for all practical purposes, they are roughly equivalent.

Taking consumptive use as an estimate of overdraft, estimated cumulative gross overdraft from 1978 through 2007 approximates 179,000 AF, and estimated cumulative net overdraft, accounting for artificial replenishment, was about 123,000 AF for the same period. By comparison, based on declining water levels and GTC's storage loss factor, the loss of storage within the northwest three-quarters of the Subbasin between 1978 and 2007 was approximately 174,000 AF.

Several studies performed at the request of Mission Springs Water District have verified that the Mission Creek Subbasin is in a condition of overdraft. A preliminary water balance for the subbasin was performed by Psomas in 2004, which included such inputs as direct precipitation, surface water inflow, subsurface inflow, and non-consumptive return flows, concluded that the subbasin was in overdraft by approximately 3,900 AF/yr. According to the *Draft Program Environmental Impact Report for the Mission Springs Water District Water Master Plan Project*, prepared by Tom Dodson Associated in February 2008, a study performed by the consulting firm GSI prepared ground water contours showing the drop in ground water levels between 1991 and 2004, which were used to estimate an overdraft of about 4,400 AF/yr. Psomas also prepared a ground water flow model for the Mission Creek Subbasin in 2007, which predicted a continued drop in ground water levels of approximately three feet per year.

Increases in cumulative overdraft without artificial recharge will result in declining ground water levels and increasing pump lifts, necessitating the lowering of pump bowls in existing wells, thereby increasing energy consumption for ground water extraction, with extreme cumulative overdraft having the potential of causing ground surface settlement, and adversely impacting ground water quality. Supplementing natural ground water replenishment resulting from rainfall runoff with artificial recharge is therefore necessary to reduce the impacts of annual and cumulative overdraft.

DWA and CVWD completed construction of the Mission Creek Recharge Facilities in June 2002, and recharge activities commenced in November 2002; with about 4,700 AF of water introduced into the recharge basins in 2002, 5,600 AF 2004, 25,000 AF in 2005, 20,000 AF in 2006, and 1,000 AF in 2007 (see Exhibit 8).

Total artificial recharge (both Whitewater River and Mission Creek Subbasins) for 2007 was 17,020 AF (102,660 AF of Table A allocation water (60% allocation) with 102,442 AF of advance deliveries converted to exchange deliveries, 802 AF of Pool A water, and 16,000 AF of water delivered to the Whitewater River Subbasin per the 12/23/03 quantification settlement between MWD and CVWD). Of the 17,020 AF of artificial recharge delivered in 2007, 1,011 AF was delivered to the Mission Creek Subbasin. In that year, the artificial recharge of approximately 1,000 AF was less than the estimated annual overdraft (9,000 to 10,000 AF, depending upon actual non-consumptive return) by approximately 8,000 AF to 9,000 AF.

Since commencement of the recharge program, ground water rose approximately 180 feet in the vicinity of the recharge basins, specifically within the Recharge Basin Monitoring Well (see Exhibit 6) by the end of 2006. It has since declined approximately 80 feet due to migration of the recharged water out into the surrounding aquifer. During the time of the recharge effort from late 2002 to July 2007, water levels in a downstream production well, MSWD Well 30, declined about 10 feet but then rose over 20 feet (see Exhibit 6). They have since declined approximately 5 feet due to migration of the recharged water out into the surrounding aquifer.

Historic and projected water supplies and water requirements for the Mission Creek Subbasin are set forth in Plate 3, including water supply projections based on reliability estimates derived from the draft 2007 State Water Project Reliability Report. Said plate shows that annual overdraft will continue to increase for the foreseeable future. Available water supplies are expected to approximate the "water supply" curves (depending on future reliability of State Water Project supplies) and anticipated water requirements are expected to approximate the "water requirements" curve, both as shown in Plate 3. The projections for water requirements and water supplies based on draft 2007 reliability projections are based on worst case conditions and exclude all surplus water deliveries which may become available during any particular year.

Projected water supply demands upon the Mission Creek Subbasin shown in Plate 3 are based on statistical analysis of historic metered production data (1978 through 2007) extrapolated through 2030, and indicate an anticipated increase in net demand (consumptive use) of about 469 AF/yr. The projected consumptive use values set forth in Plate 3 represent expected minimum future ground water demands in the basin. Due to the lack of adequate natural recharge, and a suspected natural deficit, the entire

quantity of the consumptive use portion of the projected water requirements should be considered as overdraft.

To further alleviate continuing overdraft conditions, CVWD obtained an additional 9,900 AF/Yr of Table A water allocation from Tulare Lake Basin Water Storage District, another State Water Project contractor, thus increasing its annual Table A water allocation to 33,000 AF/Yr, effective January 1, 2004.

In addition, CVWD and DWA recently obtained a further 100,000 AF/Yr (88,100 AF/Yr for CVWD and 11,900 AF/Yr for DWA) of Table A water allocation through a new exchange agreement (the 2003 Exchange Agreement) among CVWD, DWA, and MWD, all State Water Project contractors. The new exchange contract, which became effective January 1, 2005, permits MWD to call-back or recall the assigned annual Table A water allocation of 100,000 AF/Yr in 50,000 AF/Yr increments during periods of constrained, limited, or low water supply conditions; however, it gives CVWD and DWA opportunity to secure increased quantities of surplus water in addition to increased quantities of Table A water during normal or high water supply conditions.

In implementing the 2003 Exchange Agreement, Metropolitan Water District advised Coachella Valley Water District and Desert Water Agency that it would probably recall the 100,000 AF/Yr assigned to the two Coachella Valley agencies from 2005 through 2009. It did, in fact, recall the full 100,000 AF/Yr in 2005, but it did not recall any water in 2006 or 2007. MWD must notify CVWD and DWA of its intentions regarding call-back or recall of the 100,000 AF or 50,000 AF increment thereof. According to preliminary communications with Metropolitan Water District staff, it is unlikely that Metropolitan Water District will recall any water in 2008.

CVWD and DWA recently negotiated transfer of an additional 16,000 AF/Yr (12,000 AF/Yr for CVWD and 4,000 AF/Yr for DWA) of Table A water allocation from Kern County Water Agency and an additional 7,000 AF/Yr (5,250 AF/Yr for CVWD and 1,750 AF/Yr for DWA) from Tulare Lake Basin Water Storage District, both State Water Project contractors, with deliveries expected to commence in 2010. CVWD's and DWA's Table A water allocations will therefore be increased to 138,350 AF/Yr and 55,750 AF/Yr, respectively, for a combined total of 194,100 AF/Yr (71% CVWD and 29% DWA). With full deliveries of these Table A water allocations (with no MWD call-back or recall, and with no CDWR reduced Table A deliveries), plus natural supply and non-consumptive return flow, annual water supply

will be significantly greater than annual water requirements. With reduced deliveries of Table A water allocations (with MWD call-back or recall), annual water supply will be insufficient to meet annual water requirements without ground water from storage.

Continuous availability of maximum Table A allocations will require complete development of the State Water Project, which currently has only about half of the water supply capacity needed to meet maximum Table A allocation obligations during droughts; available water supplies are being further threatened by new and increasing constraints on the development of new water supply facilities and on the operation of existing facilities. In particular, the Wanger decision regarding protection of the Delta Smelt, concerns about reliability of the delta levees, and other concerns led the California Department of Water Resources to issue a revised draft State Water Project Reliability Report in 2007, in which the reliability of State Water Project supplies was determined to be reduced by roughly 10% from previous estimates issued in 2005. Without the construction of additional Sacramento-San Joaquin Delta facilities and of certain water storage reservoirs, the water supply capability of the State Water Project will remain limited and contractors will have to share the reduced available supplies, especially during droughts. The long-term reliability of State Water Project supplies, estimated at 85% of maximum Table A allocations in previous reports, is herein estimated at 75% of maximum Table A allocations.

With implementation of state and federal efforts to restore the Bay Delta Ecosystem, improve Bay Delta water management, and increase associated conveyance and storage facilities, State Water Project water supplies will be more reliable. They will not continue to decline and deteriorate with time; they may even increase, particularly with conveyance and storage improvements. Bay Delta protection and restoration is a monumental undertaking, currently estimated at about $10 billion dollars, about two thirds of the current present-worth-value of the State Water Project, which, of economic necessity, will take years to implement. Eventually, it will improve State Water Project water supply reliability and quality and may even increase quantity.

The Mission Creek Subbasin is in an overdraft condition and will remain so, even with the importation and exchange of available State Water Project water, until the increased maximum State Water Project Table A allocations can be accomplished. Recharge of the maximum Table A allocation in the Whitewater River and Mission Creek Subbasins would arrest the effects of annual overdraft in both basins by 2010, although the effects of overdraft in future years are less certain due to the difficulty of projecting long-term growth and reliability of State Water Project supplies.

In the meantime, the effects of continued annual ground water overdraft, although recently offset by artificial ground water replenishment, will increase pump lifts (depths to recoverable ground water) and the energy required to extract ground water, and, although unlikely with increased ground water replenishment, may also cause ground surface settlement and ground water storage volume reduction (due to aquifer subsidence). Water quality could be adversely affected if basin conditions (ground water gradients and ground water flowlines) are altered by continued, significant ground water overdraft. Continued ground water replenishment is needed to arrest or reduce declining water levels and to avoid the detrimental conditions that could result therefrom.

CHAPTER IV
REPLENISHMENT ASSESSMENT

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REPLENISHMENT ASSESSMENT

Desert Water Agency Law, in addition to empowering DWA to replenish ground water basins and to levy and collect water replenishment assessments within its area of jurisdiction, amongst others, defines production and producers for ground water replenishment purposes as follows:

> Production: The extraction of ground water by pumping or any other method within the Agency, or the diversion within the Agency of surface supplies which naturally replenish the ground water supplies within the Agency and are used therein.
>
> Producer: Any individual, partnership, association, group, lessee, firm, private corporation, public corporation, or public agency including, but not limited to, the Desert Water Agency, that extracts or diverts water as defined above.

Producers that extract or divert 10 AF of water or less in any one year are considered minimal producers and their production is exempt from assessment.

Desert Water Agency Law also states that assessments may be levied upon all water production within an Area of Benefit, provided assessment rates are uniform throughout. The amount of any replenishment assessment cannot exceed the sum of certain State Water Project charges, specifically the Delta Water Charge, the Variable Component of the Transportation Charge, and the Off-Aqueduct Power Component of the Transportation Charge, pursuant to the Contract between DWA and the State of California. The aforesaid charges are set forth in each year's CDWR Bulletin on the State Water Project (CDWR Series 132, Appendix B, Tables B-16B, B-18, and B-21).

Prior to 2002, ground water replenishment with Colorado River Water (exchanged for State Water Project water) had been limited to recharge of the Whitewater River Subbasin. In 2002, DWA and CVWD commenced recharge activities in the Mission Creek Subbasin, in addition to continuing their ongoing activities in the Whitewater River Subbasin. The Area of Benefit for Ground Water Replenishment and Assessment herein is defined as that portion of the Mission Creek Subbasin and tributaries thereto lying within DWA's boundaries (Plate 2).

The ground water replenishment assessment and the replenishment assessment rate for Table A water for 2008/2009 are based on the following:

1. All ground water production, with certain exceptions, within DWA is metered. All ground water production by MSWD is metered. There is no surface water production within the Mission Creek watershed within DWA.

2. The State Water Project Delta Water Charge (Delta Water Charge), the Variable Component of the State Water Project Transportation Charge (Variable Transportation Charge), and the Off-Aqueduct Power Component of the State Water Project Transportation Charge (Off-Aqueduct Power Charge), as set forth in Appendix B of California Department of Water Resources Bulletin 132-07 (dated October 2007) and hereafter referred to as Applicable State Water Project Charges.

3. The proportionate share of the Applicable State Water Project Charges allocable to CVWD and DWA in accordance with the Water Management Agreement (executed April 8, 2003) between CVWD and DWA, hereafter referred to as Allocated State Water Project Charges. The applicable charges are essentially apportioned between CVWD and DWA in accordance with relative water production within those portions of each entity lying within the Water Management Area.

4. Certain charges or costs other than those derived pursuant to items 1, 2, and 3 above. Currently, for the Mission Creek Area of Benefit, a separate charge is being levied for reimbursement for DWA's share of the cost of construction of the Mission Creek Recharge Basins.

The replenishment assessment rate comprises two components: (1) the Allocated State Water Project charges attributable to the current annual Table A allocation, and (2) certain other charges or costs related to ground water recharge, such as reimbursement for past surplus water charges for which assessments had not been levied or construction and operation of facilities necessary for ground water recharge.

The replenishment assessment rate, when applied to estimated assessable production (all production, excluding that which is exempt, within the Area of Benefit), results in a replenishment assessment which

must not exceed the maximum permitted by Desert Water Agency Law (the Applicable State Water Project Charges). Due to the interdependent nature of the imported water supply for the Whitewater River and Mission Creek Subbasins, the Allocated State Water Project charges component of the replenishment assessment rate is uniform throughout the Whitewater River and Mission Creek Areas of Benefit; however, due to the independent and separate nature of various other aspects of the ground water replenishment program within the Whitewater River and Mission Creek Subbasins, the Other Charges and Costs component need not be uniform (it is specific to each subbasin).

A. ESTIMATED ASSESSABLE WATER PRODUCTION

Estimated assessable production within DWA's Mission Creek Subbasin Area of Benefit consists of ground water extractions. Estimated assessable ground water production is based on the prior calendar year's water production, either metered or estimated. MSWD production is metered and recorded by MSWD staff. During the last half of 2003, meters were installed at the production facilities of Hidden Springs Country Club, Mission Lakes Country Club, and Sands RV Resort; DWA staff read and record metered water production quantities registered by these meters. Estimated assessable water production is set forth in Table 6.

In 2007, production within DWA's Area of Benefit within the Mission Creek Subbasin is about 2.7 times that within CVWD's Area of Benefit, 12,169 AF versus 4,457 AF, whereas production within CVWD's Area of Benefit within the Whitewater River Subbasin is about three times that within DWA's Area of Benefit, 157,503 AF versus 53,618 AF. Of the total production within the Whitewater River and Mission Creek Subbasins, 227,837 AF, 28.9% has occurred within DWA.

B. WATER REPLENISHMENT ASSESSMENT RATE

The water replenishment assessment rate consists of two components, one being attributable to State Water Project annual Table A water allocations and the other being attributable to other charges or costs necessary for ground water replenishment. Each component is discussed below.

1. Component Attributable to State Water Project Table A Water Allocation Charges

In accordance with the current Water Management Agreements, CVWD and DWA combine their State Water Project Table A allocations, exchange them for Colorado River water, and replenish the Mission Creek and Whitewater River Subbasins with exchanged Colorado River water. CVWD and DWA each assume the full burden for portions of their respective Fixed State Water Project Charges (Capital Cost Component and Minimum Operating Component of Transportation Charge); however, the two agencies share their Applicable State Water Project Charges (Delta Water, Variable Transportation, and Off-Aqueduct Power Charges) on the basis of relative production.

Although DWA could base its replenishment assessment rate on its Applicable State Water Project Charges, it only needs to recover its share (based on relative production) of the combined Applicable State Water Project Charges for both CVWD and DWA (i.e. its Allocated State Water Project Charges). CVWD makes up the difference in accordance with the Water Management Agreement.

The Applicable State Water Project Charges for CVWD and DWA for Table A water are set forth in Tables 1 and 2, respectively. Unit Charges for Delta Water, Variable Transportation, and Off-Aqueduct Power Charges are based on estimates presented in Appendix B of CDWR Bulletin 132-07.

Since MWD can call-back or recall the 100,000 AF of Table A allocation it transferred to CVWD and DWA and since CDWR has been unable to deliver maximum Table A allocations for four of the past five years, the amounts of the Applicable State Water Project Charges for 2008/2009 are being computed based on long-term reliability factors; effectively 75% of maximum State Water Project allocations with the MWD transfer

portion being further reduced to 35% to account for possible future recalls pursuant to the 2003 Exchange Agreement.

The derivations of the Applicable State Water Project charges are set forth in Tables 1 and 2. The "Maximum Table A Water Allocation" shown in Tables 1 and 2 is the currently existing Table A Water Allocation per CDWR Bulletin 132-07, Appendix B, Table B-4 (contractual quantities based on requests for same by CVWD and DWA) with no reliability factors being applied. The "Probable Table A Water Allocation" is the currently existing Table A Water Allocation with the MWD transfer portion reduced to 35% to reflect the long-term average with probable recalls by MWD, pursuant to the 2003 Exchange Agreement and its implementation. The "Probable Table A Water Delivery" is based on 75% reliability of the Probable Table A Water Allocation including MWD transfer reduced to 35% for long-term average pursuant to the 2003 Exchange Agreement and its implementation.

Applicable State Water Project Charges proportioned in accordance with the Water Management Agreements, more particularly in accordance with relative production within CVWD and DWA, yield Allocated State Water Project Charges. Over the past five years, 2003 through 2007, DWA has been responsible for approximately 74% of the water produced from the Mission Creek Subbasin.

In the past, Allocated State Water Project Charges have been apportioned to DWA and CVWD based on production from the Whitewater River Subbasin Management Area. Since 2002/2003, Allocated State Water Project Charges have been apportioned to DWA and CVWD based on production from the combined Mission Creek Subbasin and Whitewater River Subbasin Management Areas. In 2007, DWA was responsible for approximately 28.9% of the combined water production from the Whitewater River and Mission Creek Subbasins. On the assumption that DWA's relative production for 2008 and thereafter will be about the same as for 2007, DWA's share of the combined Applicable State Water Project Charges (i.e. Allocated Charges) will be as set forth in Table 3.

Table 3 shows that DWA's estimated Allocated Charges (its share of combined Applicable Charges for Table A water) are anticipated to decrease about 4% between 2008 and 2009, increase by about 27% between 2009 and 2010, and decrease by about 1% between 2010 and 2011. DWA's estimated Allocated Charges will change as estimates presented in future annual editions of California Department of Water Resources Bulletin 132 change.

Table 3 also shows that DWA's estimated 2008 Allocated Charges are about 99% of DWA's estimated Applicable Charges. Since water replenishment assessments must be used for ground water replenishment purposes only, implementation of the maximum permissible replenishment assessment rate based on DWA's Applicable Charges would result in the collection of excess funds that would have to be applied to replenishment charges during subsequent years.

Rather than collect excess funds one year and apply the excess funds to replenishment charges in subsequent years, DWA attempts to establish from year to year the replenishment assessment rate that will result in collection of essentially the funds necessary to meet its annual ground water replenishment charges. DWA therefore bases the Table A portion of its replenishment assessment on estimated Allocated Charges, rather than estimated Applicable Charges.

Pursuant to current Desert Water Agency Law, the maximum permissible replenishment assessment rate that can be established for fiscal year 2008/2009 is $92.74/AF, based on DWA's estimated Applicable Charges (Delta Water Charge, Variable Transportation Charge, and Off-Aqueduct Power Charge) of $5,871,983(average of estimated 2008 and 2009 Applicable Charges) and estimated 2008/2009 combined assessable production of 63,320 AF within the Whitewater River and Mission Creek Subbasins.

According to the terms of the Water Management Agreement between DWA and CVWD, the effective replenishment assessment rate component for Table A water for the 2008/2009 fiscal year, is $78.00/AF, based on DWA's estimated 2008/2009 Allocated Charges of $4,926,357 and estimated 2008/2009 assessable production of 63,320 AF within the Whitewater River and Mission Creek Subbasins (see Table 4).

Assuming that assessable water production will continue to increase by 1,177 AF/yr during the next five years, projected effective replenishment assessment rates pursuant to the Water Management Agreement are expected to increase from $78.00 in 2008/2009 to $85.00/AF in 2009/2010, then to $93.00 in 2010/2011 through 2012/2013, then to gradually decrease thereafter, as shown in Table 4.

2. Component Attributable to Other Charges and Costs Necessary for Ground Water Replenishment

Charges and costs necessary for ground water replenishment could include the costs for construction, operation, maintenance, and repair of ground water recharge facilities, reimbursement for past State Water Project Table A water allocations and surplus water allocations for which insufficient assessments had been levied, acquisition or purchases of water from sources other than the State Water Project, the cost of importing and recharging water from sources other than the State Water Project, and the cost of treatment and distribution of reclaimed water.

Currently, Other Charges and Costs for the Mission Creek Subbasin are limited to past costs for the construction of the Mission Creek Recharge Basins. DWA and CVWD began constructing the Mission Creek Recharge Basin facilities in October 2001. Facilities were essentially completed in June 2002, at a construction cost of over $3,975,850. DWA's allocated share of the cost for constructing the facilities is $2,731,807. Beginning in 2004/2005, DWA began recovering said costs through a component of the replenishment assessment rate (see Table 5) applicable to users within the Mission Creek Subbasin (see Table 5).

The proposed rate for the component attributable to Other Charges and Costs, specifically for recovery of DWA's proportionate share of costs to construct the Mission Creek Recharge Basins, is $12.00/AF.

3. Proposed 2008/2009 Replenishment Assessment Rate

As shown in Table 5, the replenishment assessment rate proposed for 2008/2009 is $72.00/AF. Anticipated replenishment assessment rates for 2008/2009 through 2034/2035 are also shown. Note that the proportion of replenishment water delivered to the Mission Creek Subbasin in 2002-2007 has been higher, with respect to Subbasin production, than that delivered to the Whitewater River Subbasin by more than twice, as shown in Exhibit 7.

C. ESTIMATED WATER REPLENISHMENT ASSESSMENT FOR 2008/2009

Estimated water replenishment assessments for 2008/2009, based on a replenishment assessment rate of $72/AF and estimated assessable water production of 12,170 AF within the Mission Creek Subbasin, will amount to approximately $876,240 (see Tables 5 and 6). The adjusted assessment is expected to increase the replenishment assessment account deficit from $5,048,133 to $5,135,416.

MSWD will be the major producer within the Mission Creek Subbasin Area of Benefit, with assessable production of approximately 10,429 AF; three other producers will be responsible for the remaining 1,740 AF of estimated assessable production. MSWD will also be the major assessee with an estimated replenishment assessment of $750,960. The three other producers will be responsible for the remaining $125,280.

MSWD will be responsible for approximately 86% of both the estimated assessable water production and the estimated replenishment assessment in the Mission Creek Subbasin Area of Benefit; the other four producers will be responsible for the remaining 14%.

CHAPTER V
STATE WATER PROJECT
TABLE A WATER ALLOCATIONS AND SURPLUS WATER PURCHASES

CHAPTER V
STATE WATER PROJECT
TABLE A WATER ALLOCATIONS AND SURPLUS WATER DELIVERIES

Table A water allocations are based primarily on hydrologic conditions and legal constraints and vary considerably from year to year. 2007 Table A water deliveries were 60% of maximum Table A allocations. As of April 4, 2008 Table A water deliveries are projected to be 35% of maximum Table A allocations. Long-term average Table A allocations are predicted to be approximately 75% of maximum Table A allocations.

Even though CVWD and DWA have requested and will continue to request their maximum annual Table A allocations, the "Probable Table A Water Allocations" and "Probable Table A Water Deliveries" have been adjusted herein for long-term-reliability for estimating purposes. The Probable Table A Water Allocations are herein assumed to be equal to the Maximum Table A Water Allocations with the MWD transfer portion reduced to 35% to represent a long-term average transfer quantity pursuant to the 2003 Exchange Agreement, and "Probable Table A Water Deliveries" are herein assumed to be 75% of Probable Table A Water Allocations to represent long-term average delivery reliability.

In addition to Table A water, CVWD and DWA have agreed to jointly request up to 3,202 AF each of State Water Project surplus water from CDWR (Turn-Back Water Pool Program and Contract Article 21 Provisions) and up to a total of approximately 2,400 AF under the recently-ratified Yuba River Accord to supplement artificial recharge of the Whitewater River and Mission Creek Subbasins.

Turn-Back Water Pool water is surplus water that was originally Table A water scheduled for delivery to other State Water Contractors, but those Contractors subsequently determined the water to be surplus to their needs. Surplus water in the Turn-Back Water Pool Program is allocated between two pools based on time of purchase: Pool A water must be purchased by March 1 of each year and Pool B water must be purchased between March 1 and April 1 of each year. Pool A water is more expensive than Pool B water.

Since fiscal year 1999/2000, requests for Turn-Back Water Pool water have exceeded water available. In 2003, CVWD and DWA were able to purchase 457 AF of Pool A water and 58 AF of Pool B water. In 2004, CVWD and DWA were unable to obtain any Pool A water, but they did obtain 191 AF of Pool B water. In 2005, due to heavy rainfall, CVWD and DWA were able to obtain 585 AF of Pool A water

and 3,253 AF of Pool B water. CVWD and DWA did not request or receive any pool water in 2006. Last year, they received 802 AF of Pool A water and no Pool B water. In 2008, CVWD and DWA expect to receive approximately 150 AF of Pool A water and no Pool B water. The total quantity of water available for artificial recharge in the Upper Coachella Valley during 2008, including the delivery of 35% of the Maximum Table A Allocation, approximately 150 AF of Pool A water, and approximately 2,400 AF under the Yuba River Accord, will approximate 62,400 AF.

Any surplus water secured by CVWD and DWA is exchanged for a like quantity of Colorado River water. Charges for surplus water are allocated between the two agencies in accordance with the terms of the Water Management Agreement. DWA secures funds for its allocated charges for surplus water payments from its Unscheduled State Water Project Deliveries Reserve Account. Although no replenishment assessment component has been levied for reimbursement of the reserve account in the past and is not proposed for the current year, one may be levied in the future, if applicable.

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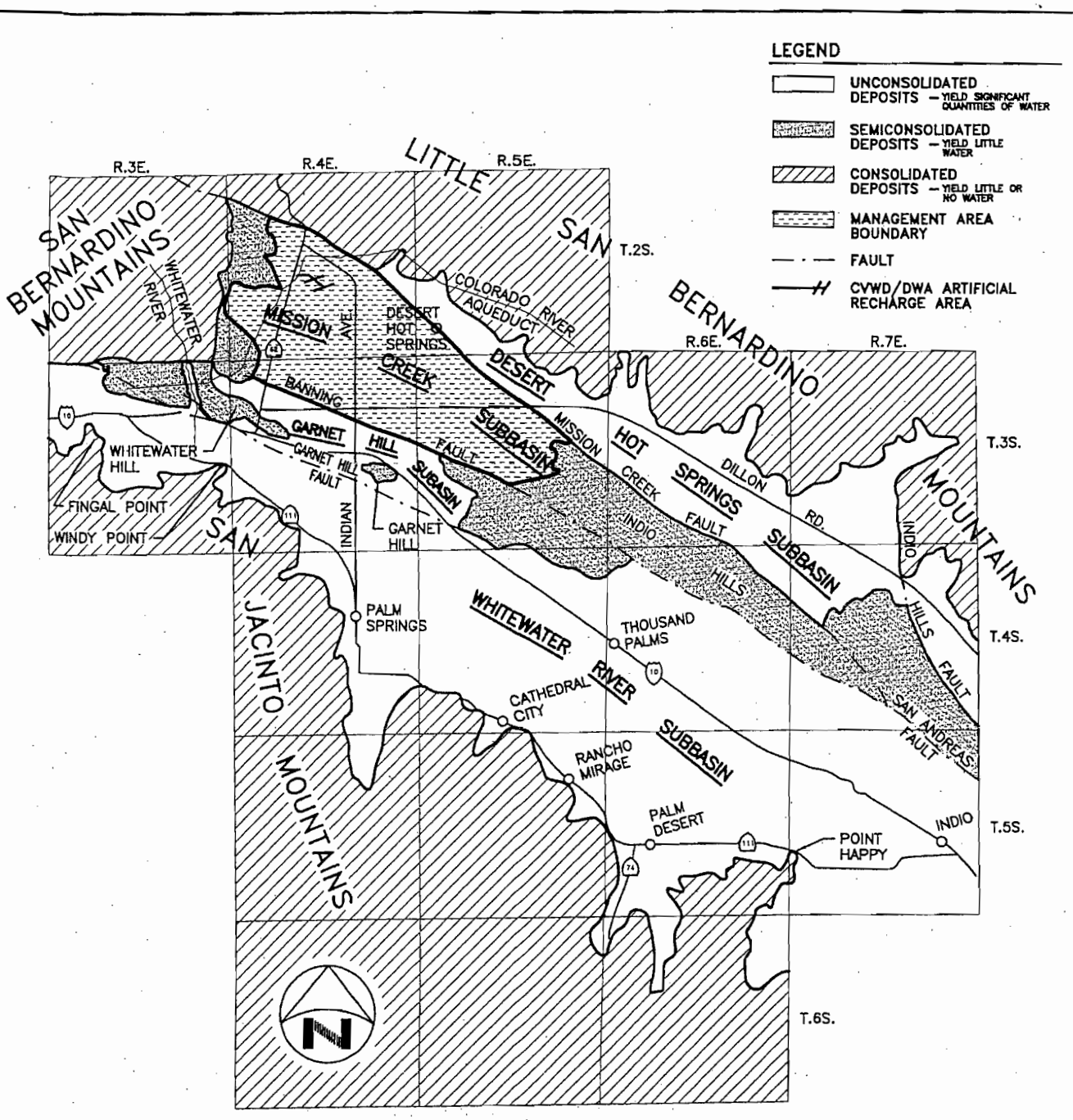
PLATES



NOTES:

1. THE BASE MAP WAS PREPARED BY THE UNITED STATES DEPARTMENT OF THE INTERIOR, GEOLOGICAL SURVEY, WATER RESOURCES DIVISION IN 1971, TO SHOW THE UPPER COACHELLA VALLEY GROUNDWATER BASIN AND ITS SUBBASINS. ADDITIONAL GEOLOGICAL INFORMATION FROM THE GEOLOGIC MAP OF CALIFORNIA SANTA ANA SHEET, CALIFORNIA DEPARTMENT OF CONSERVATION, DIVISION OF MINES AND GEOLOGY 1966, HAS BEEN ADDED.

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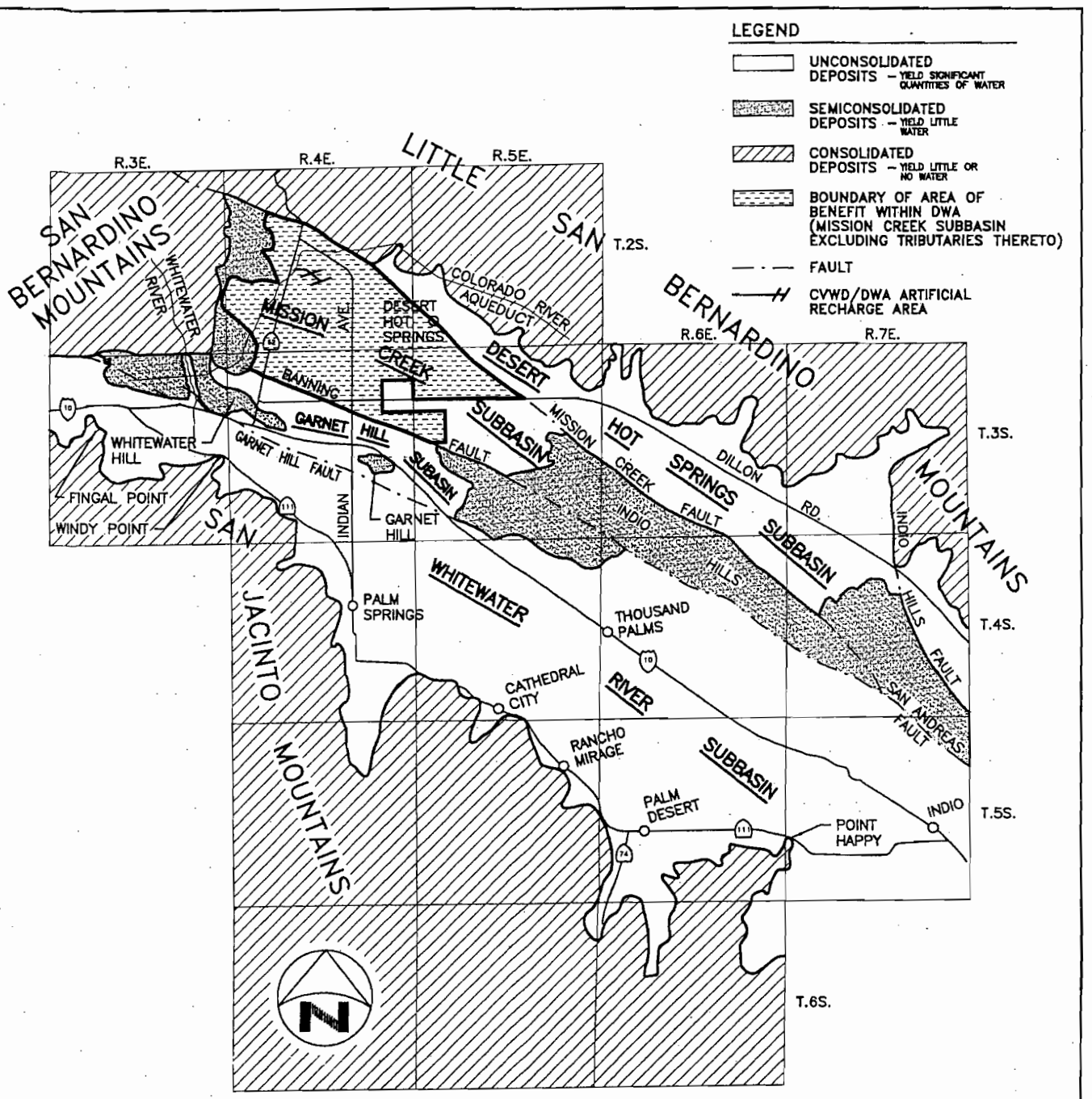
DESERT WATER AGENCY

MISSION CREEK SUBBASIN WATER MANAGEMENT AGREEMENT WATER MANAGEMENT AREA

PLATE 1

SCALE: 1"=5mi.± DATE: 03/11/08 DRAWN BY: TMW CHECKED BY: DFS W.O.: 101-57.6



NOTES:

1. THE BASE MAP WAS PREPARED BY THE UNITED STATES DEPARTMENT OF THE INTERIOR, GEOLOGICAL SURVEY, WATER RESOURCES DIVISION IN 1971, TO SHOW THE UPPER COACHELLA VALLEY GROUNDWATER BASIN AND ITS SUBBASINS. ADDITIONAL GEOLOGICAL INFORMATION FROM THE GEOLOGIC MAP OF CALIFORNIA SANTA ANA SHEET, CALIFORNIA DEPARTMENT OF CONSERVATION, DIVISION OF MINES AND GEOLOGY 1966, HAS BEEN ADDED.

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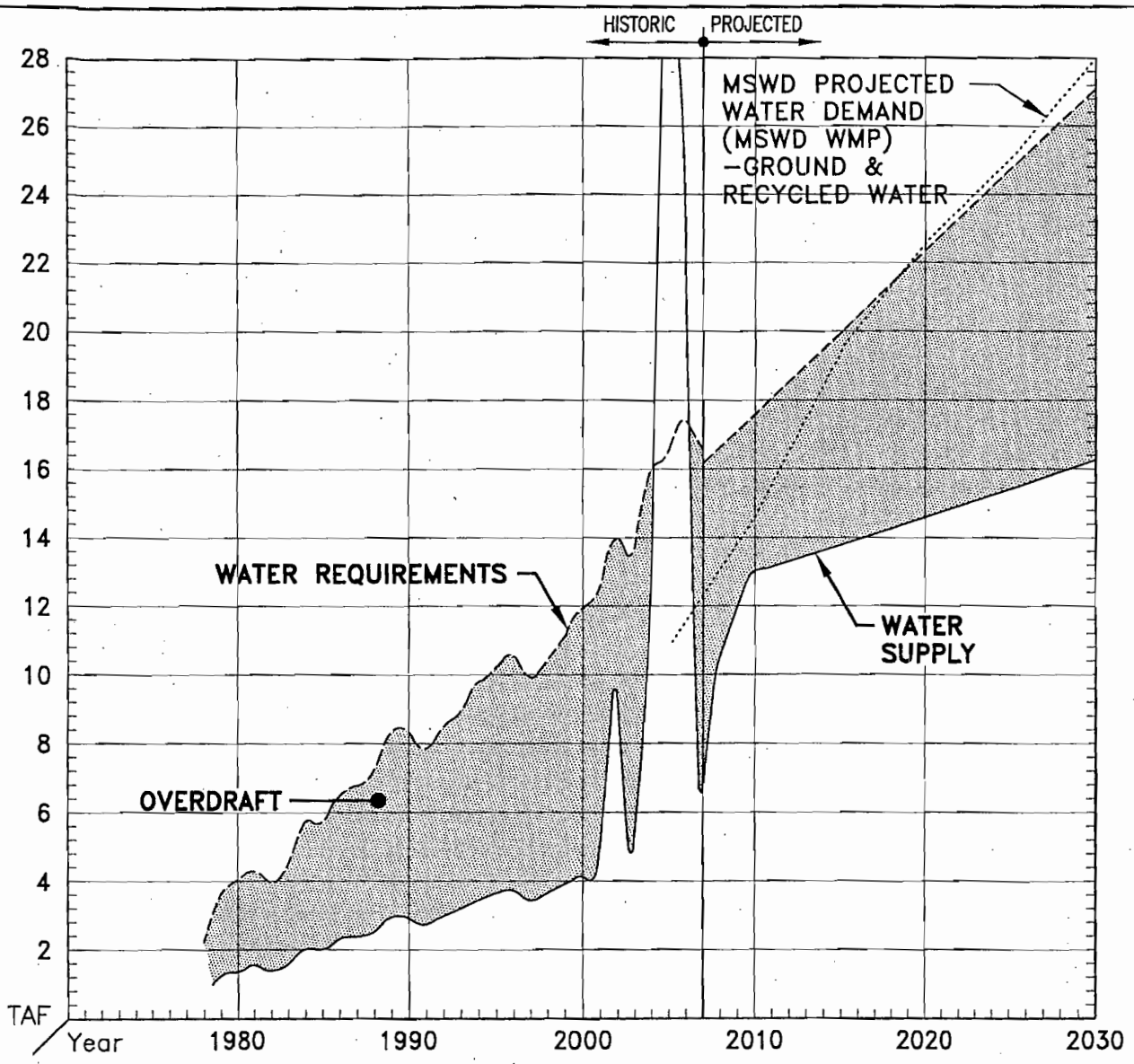
DESERT WATER AGENCY

MISSION CREEK SUBBASIN GROUNDWATER REPLENISHMENT PROGRAM AREA OF BENEFIT

PLATE 2

SCALE: 1"=5mi.± DATE: 03/11/08 DRAWN BY: TMW CHECKED BY: DFS W.O.: 101-57.6



YEARS	1980	1990	2000	2010	2020	2030
NET INFLOW (ACRE FEET)	1,400	2,900	4,100	12,700	14,300	15,900
NONCONSUMPTIVE RETURN	1,400	2,900	4,100	5,900	7,500	9,100
ARTIFICIAL RECHARGE	0	0	0	6,800	6,800	6,800
NATURAL INFLOW	5,500	5,500	5,500	5,500	5,500	5,500
NATURAL OUTFLOW	(5,500)	(5,500)	(5,500)	(5,500)	(5,500)	(5,500)

NOTES:

1. PROJECTED WATER REQUIREMENTS ARE BASED ON OVERALL TREND (LINEAR REGRESSION).
2. NONCONSUMPTIVE RETURN IS BASED ON 65% CONSUMPTIVE USE (35% NONCONSUMPTIVE RETURN).
3. PROJECTED ARTIFICIAL RECHARGE IS BASED ON PROBABLE DELIVERIES FROM STATE WATER PROJECT USING ESTIMATES BASED ON 2007 (DRAFT) STATE WATER PROJECT RELIABILITY REPORT.

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DESERT WATER AGENCY

HISTORIC AND PROJECTED
WATER REQUIREMENTS AND WATER SUPPLIES
FOR THE MISSION CREEK SUBBASIN

PLATE 3

SCALE: N/A DATE: 04/16/08 DRAWN BY: SPK CHECKED BY: DFS W.O.: 101-57.6

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TABLES

TABLE 1
COACHELLA VALLEY WATER DISTRICT
APPLICABLE STATE WATER PROJECT CHARGES (1)

Year	Table A Water Allocation		Probable Table A Water Delivery (3)	Delta Water Charge		Variable Transportation Charge		Off-Aqueduct Power Charge		CVWD Applicable Table A Charges	
	Maximum AF	Probable (2) AF	AF	Amount (4) $	Unit $/AF	Amount (5) $	Unit $/AF	Amount (6) $	Unit $/AF	Amount $	Unit (7) $/AF
2008	121,100	121,100	42,385	3,377,479	27.89	6,381,909	150.57	2,585,061	60.99	12,344,450	291.25
2009	121,100	63,835	47,876	1,780,358	27.89	5,213,218	108.89	3,045,871	63.62	10,039,447	209.70
2010	138,350	81,085	60,814	2,261,461	27.89	7,780,543	127.94	3,280,307	53.94	13,322,311	219.07
2011	138,350	81,085	60,814	2,261,461	27.89	7,657,091	125.91	3,218,277	52.92	13,136,828	216.02
2012	138,350	81,085	60,814	2,261,461	27.89	8,357,060	137.42	3,217,061	52.90	13,835,581	227.51
2013	138,350	81,085	60,814	2,261,461	27.89	9,493,674	156.11	1,917,465	31.53	13,672,600	224.83
2014	138,350	81,085	60,814	2,261,461	27.89	10,348,718	170.17	392,250	6.45	13,002,429	213.81
2015	138,350	81,085	60,814	2,261,461	27.89	10,590,150	174.14	232,309	3.82	13,083,920	215.15
2016	138,350	81,085	60,814	2,261,461	27.89	11,291,335	185.67	199,470	3.28	13,752,266	226.14
2017	138,350	81,085	60,814	2,261,461	27.89	10,610,827	174.48	191,564	3.15	13,063,851	214.82
2018	138,350	81,085	60,814	2,261,461	27.89	11,473,169	188.66	79,666	1.31	13,814,296	227.16
2019	138,350	81,085	60,814	2,261,461	27.89	11,915,287	195.93	79,058	1.30	14,255,806	234.42
2020	138,350	81,085	60,814	2,261,461	27.89	11,094,298	182.43	85,140	1.40	13,440,898	221.02
2021	138,350	81,085	60,814	2,261,461	27.89	11,091,257	182.38	131,358	2.16	13,484,076	221.73
2022	138,350	81,085	60,814	2,261,461	27.89	10,688,669	175.76	124,669	2.05	13,074,798	215.00
2023	138,350	81,085	60,814	2,261,461	27.89	10,887,530	179.03	88,788	1.46	13,237,780	217.68
2024	138,350	81,085	60,814	2,261,461	27.89	11,325,999	186.24	65,071	1.07	13,652,531	224.50
2025	138,350	81,085	60,814	2,261,461	27.89	11,193,425	184.06	6,690	0.11	13,461,575	221.36
2026	138,350	81,085	60,814	2,261,461	27.89	11,375,867	187.06	9,122	0.15	13,646,450	224.40
2027	138,350	81,085	60,814	2,261,461	27.89	11,241,468	184.85	15,812	0.26	13,518,740	222.30
2028	138,350	81,085	60,814	2,261,461	27.89	11,183,086	183.89	9,730	0.16	13,454,277	221.24
2029	138,350	81,085	60,814	2,261,461	27.89	11,083,352	182.25	9,730	0.16	13,354,542	219.60
2030	138,350	81,085	60,814	2,261,461	27.89	11,084,568	182.27	0	0.00	13,346,028	219.46
2031	138,350	81,085	60,814	2,261,461	27.89	11,023,146	181.26	0	0.00	13,284,606	218.45
2032	138,350	81,085	60,814	2,261,461	27.89	11,016,456	181.15	0	0.00	13,277,917	218.34
2033	138,350	81,085	60,814	2,261,461	27.89	12,216,316	200.88	0	0.00	14,477,777	238.07
2034	138,350	81,085	60,814	2,261,461	27.89	11,257,888	185.12	0	0.00	13,519,348	222.31
2035	138,350	81,085	60,814	2,261,461	27.89	12,421,868	204.26	0	0.00	14,683,328	241.45

(1) As set forth in California Department of Water Resources (DWR) Bulletin 132-07, Appendix B (Appendix B)

(2) Probable Table A water allocation is based on currently existing CVWD allocation augmented by TLBWSD and KCWA transfers, with the MWD transfer portion reduced to 35% to reflect long-term average pursuant to the 2003 Exchange Agreement and its implementation.

(3) Probable Table A water delivery is based on 75% reliability of the probable CVWD allocation augmented by TLBWSD and KCWA transfers, including 75% reliability of MWD transfer reduced to 35% for long-term average, pursuant to the 2003 Exchange Agreement and its implementation.

(4) Amount is based on probable Table A water allocation and Delta Water Charge per Table B-20 A & B) of Appendix B

(5) Amount is based on probable Table A water delivery and applicable Variable Transportation Unit Charge per Table B-17 of Appendix B.

(6) Amount is based on probable Table A water delivery and Off-Aqueduct Power Unit Charge derived by dividing data in Table B-16B by data in Table B-5B of Appendix B.

(7) Amount of applicable Table A charges divided by probable Table A water delivery.

KRIEGER & STEWART INCORPORATED
ENGINEERING CONSULTANTS

TABLE 2
DESERT WATER AGENCY
APPLICABLE STATE WATER PROJECT CHARGES (1)

	Table A Water Allocation		Probable Table A Water Delivery (3)	Delta Water Charge		Variable Transportation Charge		Off-Aqueduct Power Charge		DWA Applicable Table A Charges	
Year	Maximum AF	Probable (2) AF	AF	Amount (4) $	Unit $/AF	Amount (5) $	Unit $/AF	Amount (6) $	Unit $/AF	Amount $	Unit (7) $/AF
2008	50,000	50,000	17,500	1,394,500	27.89	2,634,975	150.57	1,067,325	60.99	5,096,800	291.25
2009	50,000	42,265	31,699	1,178,771	27.89	3,451,704	108.89	2,016,690	63.62	6,647,165	209.70
2010	55,750	48,015	36,012	1,339,138	27.89	4,607,375	127.94	1,942,487	53.94	7,889,001	219.07
2011	55,750	48,015	36,012	1,339,138	27.89	4,534,271	125.91	1,905,755	52.92	7,779,164	216.02
2012	55,750	48,015	36,012	1,339,138	27.89	4,948,769	137.42	1,905,035	52.90	8,192,942	227.51
2013	55,750	48,015	36,012	1,339,138	27.89	5,621,833	156.11	1,135,458	31.53	8,096,430	224.83
2014	55,750	48,015	36,012	1,339,138	27.89	6,128,162	170.17	232,277	6.45	7,699,578	213.81
2015	55,750	48,015	36,012	1,339,138	27.89	6,271,130	174.14	137,566	3.82	7,747,834	215.15
2016	55,750	48,015	36,012	1,339,138	27.89	6,686,348	185.67	118,119	3.28	8,143,606	226.14
2017	55,750	48,015	36,012	1,339,138	27.89	6,283,374	174.48	113,438	3.15	7,735,950	214.82
2018	55,750	48,015	36,012	1,339,138	27.89	6,794,024	188.66	47,176	1.31	8,180,338	227.16
2019	55,750	48,015	36,012	1,339,138	27.89	7,055,831	195.93	46,816	1.30	8,441,785	234.42
2020	55,750	48,015	36,012	1,339,138	27.89	6,569,669	182.43	50,417	1.40	7,959,224	221.02
2021	55,750	48,015	36,012	1,339,138	27.89	6,567,869	182.38	77,786	2.16	7,984,793	221.73
2022	55,750	48,015	36,012	1,339,138	27.89	6,329,469	175.76	73,825	2.05	7,742,432	215.00
2023	55,750	48,015	36,012	1,339,138	27.89	6,447,228	179.03	52,578	1.46	7,838,944	217.68
2024	55,750	48,015	36,012	1,339,138	27.89	6,706,875	186.24	38,533	1.07	8,084,546	224.50
2025	55,750	48,015	36,012	1,339,138	27.89	6,628,369	184.06	3,961	0.11	7,971,468	221.36
2026	55,750	48,015	36,012	1,339,138	27.89	6,736,405	187.06	5,402	0.15	8,080,945	224.40
2027	55,750	48,015	36,012	1,339,138	27.89	6,656,818	184.85	9,363	0.26	8,005,320	222.30
2028	55,750	48,015	36,012	1,339,138	27.89	6,622,247	183.89	5,762	0.16	7,967,147	221.24
2029	55,750	48,015	36,012	1,339,138	27.89	6,563,187	182.25	5,762	0.16	7,908,087	219.60
2030	55,750	48,015	36,012	1,339,138	27.89	6,563,907	182.27	0	0.00	7,903,046	219.46
2031	55,750	48,015	36,012	1,339,138	27.89	6,527,535	181.26	0	0.00	7,866,673	218.45
2032	55,750	48,015	36,012	1,339,138	27.89	6,523,574	181.15	0	0.00	7,862,712	218.34
2033	55,750	48,015	36,012	1,339,138	27.89	7,234,091	200.88	0	0.00	8,573,229	238.07
2034	55,750	48,015	36,012	1,339,138	27.89	6,666,541	185.12	0	0.00	8,005,680	222.31
2035	55,750	48,015	36,012	1,339,138	27.89	7,355,811	204.26	0	0.00	8,694,949	241.45

(1) As set forth in California Department of Water Resources (DWR) Bulletin 132-07, Appendix B (Appendix B)

(2) Probable Table A water allocation is based on currently existing DWA allocation augmented by TLBWSD and KCWA transfers, with the MWD transfer portion reduced to 35% to reflect long-term average pursuant to the 2003 Exchange Agreement and its implementation.

(3) Probable Table A water delivery is based on 75% reliability of the probable DWA allocation augmented by TLBWSD and KCWA transfers, including 75% reliability of MWD transfer reduced to 35% for long-term average, pursuant to the 2003 Exchange Agreement and its implementation.

(4) Amount is based on probable Table A water allocation and Delta Water Charge per Table B-20 A & B) of Appendix B

(5) Amount is based on probable Table A water delivery and applicable Variable Transportation Unit Charge per Table B-17 of Appendix B.

(6) Amount is based on probable Table A water delivery and Off-Aqueduct Power Unit Charge derived by dividing data in Table B-16B by data in Table B-5B of Appendix B.

(7) Amount of applicable Table A charges divided by probable Table A water delivery.

KRIEGER & STEWART INCORPORATED
ENGINEERING CONSULTANTS

TABLE 3
DESERT WATER AGENCY
ESTIMATED ALLOCATED STATE WATER PROJECT CHARGES FOR TABLE A WATER
(PROPORTIONED APPLICABLE CHARGES) (1)

Year	CVWD Applicable Table A Charges $	DWA Applicable Table A Charges $	Combined Applicable Table A Charges $	CVWD Allocated Table A Charges $	DWA Allocated Table A Charges $	DWA Incremental Increase (Decrease) $	%
2008	12,344,450	5,096,800	17,441,250	12,405,961	5,035,289		
						(217,864)	(4)
2009	10,039,447	6,647,165	16,686,612	11,869,187	4,817,425		
						1,306,281	27
2010	13,322,311	7,889,001	21,211,312	15,087,606	6,123,706		
						(85,259)	(1)
2011	13,136,828	7,779,164	20,915,993	14,877,546	6,038,447		
						321,188	5
2012	13,835,581	8,192,942	22,028,523	15,668,889	6,359,635		
						(74,916)	(1)
2013	13,672,600	8,096,430	21,769,030	15,484,311	6,284,719		
						(308,050)	(5)
2014	13,002,429	7,699,578	20,702,007	14,725,338	5,976,669		
						37,458	1
2015	13,083,920	7,747,834	20,831,754	14,817,627	6,014,127		
						307,211	5
2016	13,752,266	8,143,606	21,895,872	15,574,534	6,321,338		
						(316,435)	(5)
2017	13,063,851	7,735,950	20,799,801	14,794,899	6,004,903		
						344,948	5
2018	13,814,296	8,180,338	21,994,634	15,644,783	6,349,851		
						202,944	3
2019	14,255,806	8,441,785	22,697,591	16,144,796	6,552,795		
						(374,580)	(6)
2020	13,440,898	7,959,224	21,400,123	15,221,907	6,178,215		
						19,847	0
2021	13,484,076	7,984,793	21,468,869	15,270,807	6,198,062		
						(188,128)	(3)
2022	13,074,798	7,742,432	20,817,230	14,807,296	6,009,934		
						74,916	1
2023	13,237,780	7,838,944	21,076,724	14,991,874	6,084,850		
						190,644	3
2024	13,652,531	8,084,546	21,737,077	15,461,583	6,275,494		
						(87,774)	(1)
2025	13,461,575	7,971,468	21,433,043	15,245,324	6,187,720		
						84,979	1
2026	13,646,450	8,080,945	21,727,394	15,454,696	6,272,699		
						(58,703)	(1)
2027	13,518,740	8,005,320	21,524,060	15,310,064	6,213,996		
						(29,631)	0
2028	13,454,277	7,967,147	21,421,424	15,237,059	6,184,365		
						(45,844)	(1)
2029	13,354,542	7,908,087	21,262,630	15,124,108	6,138,521		
						(3,913)	0
2030	13,346,028	7,903,046	21,249,074	15,114,466	6,134,608		
						(28,234)	0
2031	13,284,606	7,866,673	21,151,280	15,044,905	6,106,374		
						(3,074)	0
2032	13,277,917	7,862,712	21,140,629	15,037,329	6,103,300		
						551,525	9
2033	14,477,777	8,573,229	23,051,006	16,396,180	6,654,825		
						(440,549)	(7)
2034	13,519,348	8,005,680	21,525,028	15,310,753	6,214,276		
						535,033	8
2035	14,683,328	8,694,949	23,378,278	16,628,969	6,749,309		

(1) Proportioned in accordance with 2007 Water Management Area production percentages; CVWD is responsible for 71.13% and DWA is responsible for 28.87% of combined production within the Whitewater River and Mission Creek Subbasins (see Exhibit 1 in the Appendix).

TABLE 4
DESERT WATER AGENCY
PROJECTED REPLENISHMENT ASSESSMENT RATES
PURSUANT TO WATER MANAGEMENT AGREEMENT
BETWEEN
COACHELLA VALLEY WATER DISTRICT AND DESERT WATER AGENCY

Year	DWA Allocated Table A Charges $	Estimated Assessable Production (1) AF	Estimated Effective Table A Assessment Rate (2) Fiscal Year $/AF	Rounded Table A Assessment Rate $/AF
2008/2009	4,926,357	63,320	77.80	78.00
2009/2010	5,470,566	64,498	84.82	85.00
2010/2011	6,081,077	65,675	92.59	93.00
2011/2012	6,199,041	66,853	92.73	93.00
2012/2013	6,322,177	68,030	92.93	93.00
2013/2014	6,130,694	69,208	88.58	89.00
2014/2015	5,995,398	70,385	85.18	85.00
2015/2016	6,167,733	71,563	86.19	86.00
2016/2017	6,163,121	72,740	84.73	85.00
2017/2018	6,177,377	73,918	83.57	84.00
2018/2019	6,451,323	75,095	85.91	86.00
2019/2020	6,365,505	76,273	83.46	83.00
2020/2021	6,188,139	77,450	79.90	80.00
2021/2022	6,103,998	78,628	77.63	78.00
2022/2023	6,047,392	79,805	75.78	76.00
2023/2024	6,180,172	80,983	76.31	76.00
2024/2025	6,231,607	82,160	75.85	76.00
2025/2026	6,230,210	83,338	74.76	75.00
2026/2027	6,243,348	84,515	73.87	74.00
2027/2028	6,199,181	85,693	72.34	72.00
2028/2029	6,161,443	86,870	70.93	71.00
2029/2030	6,136,565	88,048	69.70	70.00
2030/2031	6,120,491	89,225	68.60	69.00
2031/2032	6,104,837	90,403	67.53	68.00
2032/2033	6,379,063	91,580	69.66	70.00
2033/2034	6,434,551	92,758	69.37	69.00
2034/2035	6,481,793	93,936	69.00	69.00

(1) Includes growth rate of 1177 AF/year.

(2) Necessary to pay DWA's estimated Allocated Table A Charges.

TABLE 5
DESERT WATER AGENCY
MISSION CREEK SUBBASIN
HISTORIC, PROPOSED, AND PROJECTED REPLENISHMENT ASSESSMENT RATES, COLLECTIONS, PAYMENTS, AND ACCOUNT BALANCE

	Assessment Rate			Assessments				Proportionate Share of State Project Payments Made	Proportionate Share of Recharge Basin			Assessments Collected Less State Project Payments Made Surplus (Deficit)	
Fiscal Year	Table A Allocation $/AF	Other Charges or Costs (1) $/AF	Total $/AF	Estimated (2) $	Levied (3) $	Collected (4) $	Delinquent (5) $	Table A $	Cost $	Cost Reimbursed $	%	Annual $	Cumulative $
03/04	35.00	0.00	35.00	336,000	397,708	397,708	0	807,110	2,731,807	0	0%	(3,141,208)	N/A
04/05	34.00	12.00	46.00	464,140	529,108	529,108	0	733,034	--	146,040	5%	(203,926)	(3,345,134)
05/06	38.00	12.00	50.00	596,000	635,562	635,562	0	1,113,191	--	292,080	11%	(477,629)	(3,822,764)
06/07	51.00	12.00	**63.00**	761,040	789,471	789,471	0	1,170,032	--	438,120	16%	(380,561)	(4,203,325)
07/08	102.00	(34.00)	**63.00**	794,430	402,501	402,501	0	1,247,310	--	24,340	1%	(844,808)	(5,048,133)
08/09	78.00	(6.00)	72.00 (6)	876,240 (7)	876,240	876,240	0	946,838 (8)	--	-48,680	-2%	(70,598)	(5,118,731)
09/10	85.00	(11.00)	74.00	917,327	917,327	917,327	0	1,051,434	--	-182,550	-7%	(134,106)	(5,252,837)
10/11	93.00	(14.00)	79.00	997,188	997,188	997,188	0	1,168,773	--	-352,930	-13%	(171,585)	(5,424,422)
11/12	93.00	(3.00)	90.00	1,156,406	1,156,406	1,156,406	0	1,191,445	--	-389,440	-14%	(35,040)	(5,459,462)
12/13	93.00	(1.00)	92.00	1,202,925	1,202,925	1,202,925	0	1,215,112	--	-401,610	-15%	(12,187)	(5,471,649)
13/14	89.00	4.00	93.00	1,237,048	1,237,048	1,237,048	0	1,178,309	--	-352,930	-13%	58,738	(5,412,911)
14/15	85.00	8.00	93.00	1,258,095	1,258,095	1,258,095	0	1,152,306	--	-255,570	-9%	105,789	(5,307,121)
15/16	86.00	8.00	94.00	1,292,897	1,292,897	1,292,897	0	1,185,428	--	-158,210	-6%	107,469	(5,199,652)
16/17	85.00	10.00	95.00	1,328,151	1,328,151	1,328,151	0	1,184,542	--	-36,510	-1%	143,810	(5,056,043)
17/18	84.00	12.00	96.00	1,363,858	1,363,858	1,363,858	0	1,187,282	--	109,530	4%	176,576	(4,879,467)
18/19	86.00	12.00	98.00	1,414,451	1,414,451	1,414,451	0	1,239,934	--	255,570	9%	174,515	(4,704,952)
19/20	83.00	12.00	95.00	1,392,652	1,392,652	1,392,652	0	1,223,440	--	401,610	15%	169,209	(4,535,743)
20/21	80.00	12.00	92.00	1,369,494	1,369,494	1,369,494	0	1,189,350	--	547,650	20%	180,140	(4,355,602)
21/22	78.00	12.00	90.00	1,360,091	1,360,091	1,360,091	0	1,173,178	--	693,690	25%	186,908	(4,168,694)
22/23	76.00	12.00	88.00	1,349,783	1,349,783	1,349,783	0	1,162,299	--	839,730	31%	187,478	(3,981,216)
23/24	76.00	12.00	88.00	1,369,699	1,389,699	1,369,699	0	1,187,819	--	985,770	36%	181,873	(3,799,343)
24/25	76.00	12.00	88.00	1,389,615	1,389,615	1,389,615	0	1,197,705	--	1,131,810	41%	191,902	(3,607,441)
25/26	75.00	12.00	87.00	1,393,513	1,393,513	1,393,513	0	1,197,436	--	1,277,850	47%	196,068	(3,411,372)
26/27	74.00	12.00	86.00	1,396,959	1,396,959	1,396,959	0	1,199,961	--	1,423,890	52%	196,988	(3,214,384)
27/28	72.00	12.00	84.00	1,383,483	1,383,483	1,383,483	0	1,191,472	--	1,569,930	57%	191,999	(3,022,385)
28/29	71.00	12.00	83.00	1,385,797	1,385,797	1,385,797	0	1,184,219	--	1,715,970	63%	201,566	(2,820,819)
29/30	70.00	12.00	82.00	1,387,659	1,387,659	1,387,659	0	1,179,438	--	1,862,010	88%	208,208	(2,612,611)
30/31	69.00	12.00	81.00	1,389,068	1,389,068	1,389,068	0	1,176,348	--	2,008,050	74%	212,705	(2,399,906)
31/32	68.00	12.00	80.00	1,390,024	1,390,024	1,390,024	0	1,173,340	--	2,154,090	79%	216,669	(2,183,236)
32/33	70.00	12.00	82.00	1,443,333	1,443,333	1,443,333	0	1,226,045	--	2,300,130	84%	217,271	(1,965,965)
33/34	69.00	12.00	81.00	1,444,063	1,444,063	1,444,063	0	1,236,710	--	2,446,170	90%	207,336	(1,758,629)
34/35	69.00	12.00	81.00	1,482,394	1,462,394	1,462,394	0	1,245,790	--	2,592,210	95%	216,587	(1,542,043)

(1) Includes charge for DWA's proporrtionate share of recharge basin cost amortized at zero interest over 20 years and discretionary reductions.
(2) Assessments Estimated are based on applicable assessment rate and estimated assessable production from annual report for that year.
(3) Assessments Levied are based on applicable assessment rate and actual assessable production, except for the previous year, current year, and subsequent years where amounts remain estimated.
(4) Assessments Collected are based on payments made for Assessments Levied, except for the previous year, current year, and subsequent years where amounts remain estimated.
(5) Assessments Delinquent are based on Assessments Levied less payments made.
(6) Proposed assessment rate based on two components: 1) State Water Project Table A water, and 2) Charge for Recharge Basin Cost Reimbursement.
(7) For 2008/2009, Assessments Estimated are based on Proposed Assessment Rate and Estimated Assessable Production for Mission Creek Subbasin.
(8) For 2008/2009 and beyond, Payments Made are estimated based on estimated allocated Table A charges, proportioned to Estimated Assessable Production for Mission Creek Subbasin.

TABLE 6
DESERT WATER AGENCY
GROUNDWATER REPLENISHMENT AND ASSESSMENT PROGRAM
ESTIMATED MISSION CREEK SUBBASIN MANAGEMENT AREA WATER PRODUCTION
AND
ESTIMATED WATER REPLENISHMENT ASSESSMENTS
2008/2009

ESTIMATED COMBINED MANAGEMENT AREA ASSESSABLE WATER PRODUCTION AND WATER REPLENISHMENT ASSESSMENTS

Management Area	Estimated Assessable Water Production (Acre Feet)	Water Replenishment Assessment Rate ($/AF)	Water Replenishment Assessment ($)	Water Replenishment Assessment (Percent)
Mission Creek Subbasin	12,170	72	876,240	19%
Whitewater River Subbasin	51,150	72	3,682,800	81%
Combined Subbasins	63,320		4,559,040	100%

ESTIMATED MISSION CREEK SUBBASIN MANAGEMENT AREA WATER PRODUCTION AND WATER REPLENISHMENT ASSESSMENTS

Producer	2007 WATER PRODUCTION Groundwater Extraction (Acre Feet)	Surface Water Diversion (Acre Feet)	Combined Water Production (Acre Feet)	Estimated 2008/2009 Assessable Water Production (Acre Feet) (1)	Estimated Water Replenishment Assessment @ $72/Acre Foot ($)	(Percent)
Mission Creek Subbasin						
Mission Springs Water District	10,429	0	10,429	10,430	750,960	86%
Hidden Springs Country Club	254	0	254	250	18,000	2%
Mission Lakes Country Club	1,190	0	1,190	1,190	85,680	10%
Sands RV Resort	296	0	296	300	21,600	2%
Total	12,169	-	12,169	12,170	876,240	100%

(1) Rounded to nearest 10 Acre Feet.

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ENGINEERING CONSULTANTS

EXHIBIT 1
DESERT WATER AGENCY
HISTORIC WATER PRODUCTION
FOR REPLENISHMENT ASSESSMENT FOR
DESERT WATER AGENCY AND COACHELLA VALLEY WATER DISTRICT
MISSION CREEK SUBBASIN (MCS) AND WHITEWATER RIVER SUBBASIN (WRS) WATER MANAGEMENT AREAS

	CVWD PRODUCTION		DWA PRODUCTION				COMBINED CVWD & DWA PRODUCTION				MCS PRODUCTION PERCENTAGES		COMBINED WRS & MCS PRODUCTION PERCENTAGES	
	GWE		GWE		SWD		GWE		SWD					
	WRS	MCS	WRS	MCS	WRS	COMB	WRS	MCS	WRS	COMB				
YEAR	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	CVWD	DWA	CVWD	DWA
2002	163,278	4,371	46,004	9,597	4,221	59,822	209,282	13,968	4,221	227,471	31.29	68.71	73.70	26.30
2003	153,976	3,450	43,463	10,073	4,627	58,163	197,439	13,523	4,627	215,590	25.51	74.49	73.02	26.98
2004	158,556	3,891	48,093	11,920	4,758	64,771	206,649	15,811	4,758	227,218	24.61	75.39	71.49	28.51
2005	153,548	4,248	46,080	12,080	4,799	62,959	199,628	16,328	4,799	220,754	26.01	73.99	71.48	28.52
2006	160,281	4,758	48,967	12,608	4,644	66,219	209,248	17,366	4,644	231,258	27.40	72.60	71.37	28.63
2007	157,503	4,547	50,128	12,169	3,490	65,787	207,631	16,716	3,490	227,837	27.20	72.80	71.13	28.87

Abbreviations:

GWE = Groundwater Extractions
SWD = Surface Water Diversions
COMB = Combined

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KRIEGER & STEWART INCORPORATED
ENGINEERING CONSULTANTS

EXHIBIT 2
DESERT WATER AGENCY

COMPARISON OF
HISTORIC AND PROPOSED GROUND WATER REPLENISHMENT ASSESSMENT RATES
FOR THE MISSION CREEK SUBBASIN MANAGEMENT AREA
DESERT WATER AGENCY AND COACHELLA VALLEY WATER DISTRICT

YEAR	DWA $/AF	DWA % INCREASE	CVWD $/AF	CVWD % INCREASE	DWA MORE OR (LESS) THAN CVWD
03/04	$35.00	N/A	$59.80	N/A	($24.80)
04/05	$46.00	31%	$59.80	0%	($13.80)
05/06	$50.00	9%	$59.80	0%	($9.80)
06/07	$63.00	37%	$65.78	10%	($2.78)
07/08	$63.00	37%	$72.36	21%	($9.36)
08/09	$72.00 *	44%	$76.60 *	28%	($4.60)

* Proposed Replenishment Assessment Rate

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KRIEGER & STEWART INCORPORATED
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EXHIBIT 3
METROPOLITAN WATER DISTRICT/COACHELLA VALLEY WATER DISTRICT/DESERT WATER AGENCY
WATER EXCHANGE AGREEMENT AND ADVANCE DELIVERY AGREEMENT
SUMMARY OF EXCHANGE AND ADVANCE DELIVERIES, JULY 1973 THROUGH DECEMBER 1999 (1)

A. JULY 1973 THROUGH JUNE 1984

YEAR	COMBINED CVWD/DWA SWP ENTITLEMENT	CVWD/DWA DELIVERIES TO MWD (SWP)	MWD DELIVERIES TO CVWD/DWA (SPREADING GROUNDS)	ANNUAL MWD DELIVERY SURPLUS (DEFICIT)	CUMULATIVE MWD DELIVERY SURPLUS (DEFICIT)
1973 (JUL-DEC)	14,800	14,800	7,475	(7,325)	(7,325)
1974	16,400	16,400	15,396	(1,004)	(8,329)
1975	18,000	18,000	20,126	2,126	(6,203)
1976	19,600	19,600	13,206	(6,394)	(12,597)
1977	21,421	0	0	0	(12,597)
1978	23,242	25,384	0	(25,384)	(37,981)
1979	25,063	25,063	25,192	129	(37,852)
1980	27,884	27,884	26,341	(1,543)	(39,395)
1981	31,105	31,105	35,251	4,146	(35,249)
1982	34,326	34,326	27,020	(7,306)	(42,555)
1983	37,547	37,547	53,732	16,185	(26,370)
1984 (JAN-JUN) (2)	N/A	25,849	50,912	25,063	(1,307)
TOTALS:	269,388	275,958	274,651		

B. JULY 1984 THROUGH DECEMBER 1999

YEAR	COMBINED CVWD/DWA SWP ENTITLEMENT DELIVERY	TOTAL CVWD/DWA DELIVERY TO MWD (SWP)	MWD DELIVERY TO CVWD/DWA (SPREADING GROUNDS)	MWD ADVANCE DELIVERY	MWD ADVANCE DELIVERY CONVERTED TO EXCHANGE DELIVERY
1984 (JUL-DEC) (3)	40,768	14,919	32,796	16,570	---
1985	43,989	43,989	251,994	208,005	---
1986	47,210	47,210	288,201	240,991	---
1987	50,931	50,931	104,334	53,403	---
1988	54,652	54,652	1,096	---	53,556
1989	58,373	58,374	12,478	---	45,896
1990	61,200	61,200	31,721	---	29,479
1991	61,200	19,125	14	---	19,111
1992	61,200	27,540	40,870	13,330	---
1993	61,200	61,200	60,153	---	1,047
1994	61,200	37,359	36,763	---	596
1995	61,200	61,200	61,318	118	---
1996 (4)	61,200	164,841	138,266	---	26,575
1997 (5)	61,200	138,330	113,677	---	24,653
1998 (6)	61,200	156,356	132,455	---	23,901
1999 (7)	61,200	108,580	90,601	---	17,979
TOTALS:	907,923	1,105,806	1,396,737	532,417	242,793

(1) AS REPORTED BY METROPOLITAN WATER DISTRICT IN ITS MONTHLY "EXCHANGE WATER DELIVERY IN ACRE-FEET" REPORTS.

(2) ADVANCE DELIVERY AGREEMENT BETWEEN MWD AND CVWD/DWA BECAME EFFECTIVE 7/1/84; DISCREPANCIES IN EXCHANGE DELIVERIES BETWEEN MWD AND CVWD/DWA AFTER 7/1/84 ADJUSTED PER SAID AGREEMENT

(3) EFFECTIVE DATE OF ADVANCE DELIVERY AGREEMENT BETWEEN MWD AND CVWD/DWA WAS 7/1/84; 16,570 AF ADVANCE DELIVERY FIGURE REFLECTS 7/84 - 12/84 DELIVERIES TO MWD OF 14,919 AF AND 7/84 - 12/84 DELIVERIES TO CVWD/DWA OF 32,796 AF, LESS CUMULATIVE MWD DELIVERY DEFICIENCY OF 1,307 AF AS OF 7/1/84.

(4) 1996 COMBINED CVWD/DWA ENTITLEMENT AND EXCHANGE DELIVERIES INCREASED BY PURCHASE OF 103,641 AF THROUGH DWR'S 1996 TURN-BACK WATER POOL PROGRAM (SPECIFICALLY POOL B WATER).

(5) 1997 COMBINED CVWD/DWA ENTITLEMENT AND EXCHANGE DELIVERIES INCREASED BY PURCHASE OF 50,000 AF THROUGH DWR's 1997 TURN-BACK WATER POOL PROGRAM (SPECIFICALLY POOL B WATER) AND BY PURCHASE OF 27,130 AF OF KAWEAH RIVER AND TULE RIVER FLOOD FLOW WATER.

(6) 1998 COMBINED CVWD/DWA ENTITLEMENT AND EXCHANGE DELIVERIES INCREASED BY PURCHASE OF 75,000 AF THROUGH DWR's 1998 TURN-BACK WATER POOL PROGRAM (SPECIFICALLY POOL B WATER) AND BY PURCHASE OF 20,156 AF OF KAWEAH, TULE, AND KINGS RIVERS RIVER FLOOD FLOW WATER.

(7) 1999 COMBINED CVWD/DWA ENTITLEMENT AND EXCHANGE DELIVERIES INCREASED BY PURCHASE OF 47,380 AF THROUGH DWR's 1999 TURN-BACK WATER POOL PROGRAM (SPECIFICALLY POOL B WATER).

NOTE: ALL FIGURES ARE IN ACRE FEET

EXHIBIT 4
METROPOLITAN WATER DISTRICT/COACHELLA VALLEY WATER DISTRICT/DESERT WATER AGENCY
WATER EXCHANGE AGREEMENT AND ADVANCE DELIVERY AGREEMENT
SUMMARY OF EXCHANGE AND ADVANCE DELIVERIES, JANUARY 2000 THROUGH DECEMBER 2007 (1)

YEAR	TOTAL CVWD/DWA EXCHANGE DELIVERY TO MWD (SWP) AF	MWD EXCHANGE DELIVERY TO CVWD/DWA RECHARGE BASINS AF	MWD ADVANCE DELIVERY TO CVWD/DWA RECHARGE BASINS AF	MWD ADVANCE DELIVERY CONVERTED TO EXCHANGE DELIVERY TO CVWD/DWA AF
2000 (2)	100,557	45,477	---	55,080
2001 (3)	24,110	707	---	23,403
2002 (4)	44,395	38,168	---	6,227
2003 (5)	38,260	961	---	37,299
2004 (6)	18,788	18,788	---	0
2005 (7)	91,608	190,277	98,669	0
2006 (8)	171,100	118,860	---	52,240
2007 (9)	103,462	17,020	---	102,442
TOTALS:	592,280	430,258	98,669	276,691

CUMULATIVE MWD ADVANCE DELIVERIES, 7/84 THROUGH 12/06:	631,086
CUMULATIVE MWD ADVANCE DELIVERIES CONVERTED TO EXCHANGE DELIVERIES, 7/84 THROUGH 12/06:	519,484
BALANCE OF MWD ADVANCE DELIVERIES AVAILABLE TO BE CONVERTED TO EXCHANGE DELIVERIES:	111,602
ARTIFICIAL RECHARGE THROUGH EXCHANGE DELIVERIES AND ADVANCE DELIVERIES SINCE 1973:	2,101,646
ARTIFICIAL RECHARGE THROUGH EXCHANGE DELIVERIES SINCE 1973:	1,990,044

(1) AS REPORTED BY METROPOLITAN WATER DISTRICT IN ITS MONTHLY "EXCHANGE DELIVERY SUMMARY IN ACRE-FEET" REPORTS AND ANNUAL SCHEDULES OF WATER DELIVERED TO DWA AND CVWD.

(2) 2000 CVWD/DWA EXCHANGE DELIVERY TO MWD CONSISTS OF 55,080 AF OF TABLE A WATER (90% ALLOCATION), 9,837 AF OF DWR's 2000 TURN-BACK WATER POOL PROGRAM (SPECIFICALLY POOL B) WATER AND 35,640 AF OF INTERRUPTIBLE (ARTICLE 21) WATER.

(3) 2001 CVWD/DWA EXCHANGE DELIVERY TO MWD CONSISTS OF 23,868 AF OF TABLE A WATER (39% ALLOCATION), AND 242 AF OF DWR's 2001 TURN-BACK WATER POOL PROGRAM (SPECIFICALLY POOL B) WATER.

(4) 2002 CVWD/DWA EXCHANGE DELIVERY TO MWD CONSISTS OF 42,840 AF OF TABLE A WATER (70% ALLOCATION), 1,255 AF OF DWR's 2002 TURN-BACKWATER POOL PROGRAM (436 AF OF POOL A AND 819 AF OF POOL B) WATER, AND 300 AF OF ARTICLE 21 WATER.

(5) 2003 CVWD/DWA EXCHANGE DELIVERIES TO MWD CONSIST OF 37,213 AF OF TABLE A WATER (90% ALLOCATION = 55,080 AF. LESS 17,867 NOT DELIVERED BY MWD AND CREDITED TO DWA AND CVWD IN 2004), 515 AF OF DWR's 2003 TURN-BACK WATER POOL PROGRAM (457 AF OF POOL A AND 58 AF OF POOL B) WATER, AND 532 AF OF ARTICLE 21 WATER.

(6) 2004 CVWD/DWA EXCHANGE DELIVERIES TO MWD CONSIST OF 18,597 AF OF TABLE A WATER (30% ALLOCATION), 191 AF OF DWR's 2004 TURN-BACK WATER POOL PROGRAM WATER (ALL FROM POOL B). 17,867 AF CREDITED TO DWA/CVWD FOR QUANTITY NOT DELIVERED BY MWD IN 2003.

(7) 2005 CVWD/DWA EXCHANGE DELIVERIES TO MWD CONSIST OF 87,770 AF OF TABLE A WATER (50% ALLOCATION), AND 3,838 AF OF DWR's 2005 TURN-BACK WATER POOL PROGRAM (585 AF OF POOL A AND 3,253 AF OF POOL B) WATER.

(8) 2006 CVWD/DWA EXCHANGE DELIVERIES TO MWD CONSIST OF 171,100 AF OF TABLE A WATER (100% ALLOCATION).

(9) 2007 CVWD/DWA EXCHANGE DELIVERIES TO MWD CONSIST OF 102,660 AF OF TABLE A WATER (60% ALLOCATION), AND 802 AF OF DWR's 2007 TURN-BACK WATER POOL PROGRAM WATER (ALL FROM POOL A). MWD DELIVERED AN

EXHIBIT 5

DESERT WATER AGENCY

MISSION CREEK SUBBASIN (1)

HISTORIC VOLUME OF GROUND WATER IN STORAGE (2)

Time Period	pre 1955	1955 - 1978	1979 - 1997	1998 - 2007	**1955 - 2007**
Number of Years		24	19	10	**52**
Water Level Decline, Ft. (3)		20	30	19	**69**
Period Reduction in Storage, AF		71,200	106,800	67,640	**245,640**
Annual Reduction in Storage, AF/Yr		3,000	5,600	6,800	**4,700**
Change in Storage		0.047	0.074	0.051	**0.162**
Remaining Storage, AF	1,511,800	1,440,600	1,333,800	1,266,160	**1,266,160**

(1) Northwest three-quarters of Subbasin: GTC (1979) & Slade (2000)

(2) Storage loss of 3,560 AF/ft of water level decline: GTC (1979) & Slade (2000)

(3) Mission Springs Water District data

EXHIBIT 6
DESERT WATER AGENCY
MISSION CREEK SUBBASIN
WATER WELL HYDROGRAPH
DESERT WATER AGENCY RECHARGE BASIN MONITORING WELL
AND
MISSION SPRINGS WATER DISTRICT PRODUCTION WELL #30

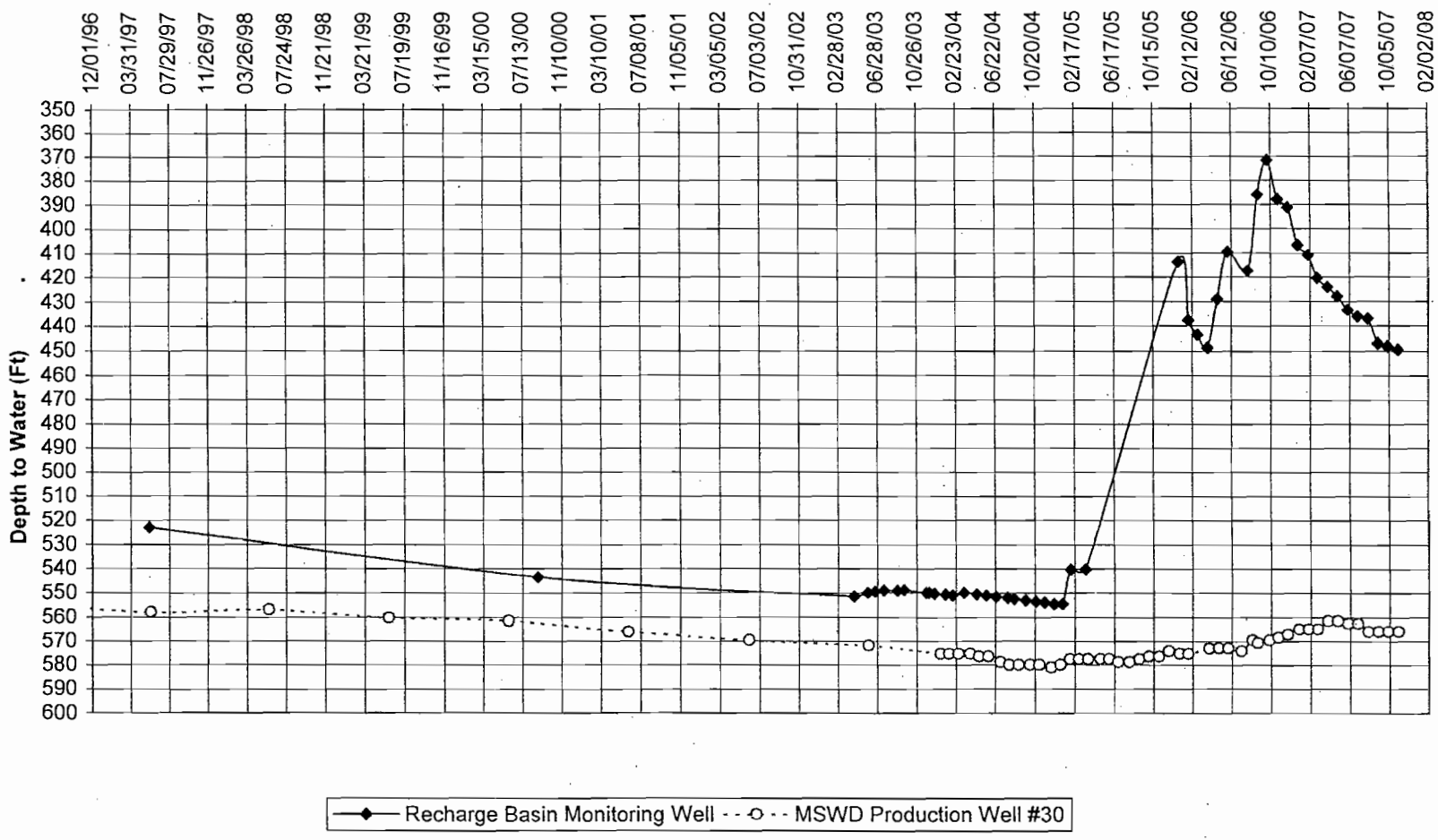

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EXHIBIT 7
DESERT WATER AGENCY
COMPARISON OF
WATER PRODUCTION AND GROUND WATER REPLENISHMENT
WHITEWATER RIVER SUBBASIN (WRS) AND MISSION CREEK SUBBASINS (MCS)

PRODUCTION (1)

YEAR	WRS AF Annual	WRS AF Cumulative	MCS AF Annual	MCS AF Cumulative	TOTAL AF Annual	TOTAL AF Cumulative	RATIO: MCS/WRS Annual	RATIO: MCS/WRS Cumulative
2002	213,503	213,503	13,968	13,968	227,471	227,471	6.5%	6.5%
2003	202,066	415,569	13,523	27,491	215,590	443,060	6.7%	6.6%
2004	211,407	626,976	15,811	43,302	227,218	670,279	7.5%	6.9%
2005	204,427	831,403	16,328	59,630	220,754	891,033	8.0%	7.2%
2006	213,892	1,045,295	17,366	76,996	231,258	1,122,291	8.1%	7.4%
2007	211,121	1,256,416	16,716	93,711	227,837	1,350,127	7.9%	7.5%

RECHARGE

YEAR	WRS AF Annual	WRS AF Cumulative	MCS AF Annual	MCS AF Cumulative	TOTAL AF Annual	TOTAL AF Cumulative	RATIO: MCS/WRS Annual	RATIO: MCS/WRS Cumulative
2002	33,435	33,435	4,733	4,733	38,168	38,168	14.2%	14.2%
2003	961	34,396	0	4,733	961	39,129	0.0%	13.8%
2004	13,224	47,620	5,564	10,297	18,788	57,917	42.1%	21.6%
2005	165,554	213,174	24,723	35,020	190,277	248,194	14.9%	16.4%
2006	98,959	312,133	19,901	54,921	118,860	367,054	20.1%	17.6%
2007	16,009	328,142	1,011	55,932	17,020	384,074	6.3%	17.0%

(1) Production in both DWA and CVWD service areas

DFS/blt
101-57P6-TBLS.XLS
4/14/2008

KRIEGER & STEWART INCORPORATED
ENGINEERING CONSULTANTS

EXHIBIT 8
DESERT WATER AGENCY
SUMMARY OF DELIVERIES
TO METROPOLITAN WATER DISTRICT AND
TO GROUND WATER RECHARGE BASINS (AF)

	DELIVERY TO MWD								DELIVERY TO RECHARGE BASINS		
	Table A	Surplus Water						Total			
YEAR	Allocation	Pool A	Pool B	Article 21	Flood	Other	Total		WRS (1)	MCS (2)	TOTAL
1973	14,800							14,800	7,475		7,475
1974	16,400							16,400	15,396		15,396
1975	18,000							18,000	20,126		20,126
1976	19,600							19,600	13,206		13,206
1977	0							0	0		0
1978	25,384							25,384	0		0
1979	25,063							25,063	25,192		25,192
1980	27,884							27,884	26,341		26,341
1981	31,105							31,105	35,251		35,251
1982	34,326							34,326	27,020		27,020
1983	37,547							37,547	53,732		53,732
1984	40,768							40,768	83,708		83,708
1985	43,989							43,989	251,994		251,994
1986	47,210							47,210	288,201		288,201
1987	50,931							50,931	104,334		104,334
1988	54,652							54,652	1,096		1,096
1989	58,374							58,374	12,478		12,478
1990	61,200							61,200	31,721		31,721
1991	19,125							19,125	14		14
1992	27,540							27,540	40,870		40,870
1993	61,200							61,200	60,153		60,153
1994	37,359							37,359	36,763		36,763
1995	61,200							61,200	61,318		61,318
1996	61,200		103641				103641	164,841	138,266		138,266
1997	61,200		50000		27130		77130	138,330	113,677		113,677
1998	61,200		75000		20156		95156	156,356	132,455		132,455
1999	61,200		47380				47380	108,580	90,601		90,601
2000	55,080		9837	35640			45477	100,557	45,477		45,477
2001	23,868		242				242	24,110	707		707
2002	42,840	436	819	300			1555	44,395	33,435	4,733	38,168
2003	37,213	457	58	532			1047	38,260	961	0	961
2004	18,597		191				191	18,788	13,224	5,564	18,788
2005	87,770	585	3253				3838	91,608	165,554	24,723	190,277
2006	167,847	0	3253				3253	171,100	98,959	19,901	118,860
2007	102,660	802	0				802	103,462	16,009	1,011	17,020
TOTAL (3)	1,594,332	2,280	293,674	36,472	47,286	0	379,712	1,974,044	2,045,714	55,932	2,101,646

NOTES
(1) Whitewater River Subbasin
(2) Mission Creek Subbasin
(3) Since 1973

APPENDIX B

ADDENDUM TO SETTLEMENT AGREEMENT
MANAGEMENT AREA DELIVERIES

The Settlement Agreement between Coachella Valley Water District (CVWD), Desert Water Agency (DWA) and Mission Springs Water District (MSWD) dated December 7, 2004 shall be supplemented by the following Addendum, and thus shall be deemed a part thereof:

The Mission Creek Groundwater Replenishment Agreement provides for the delivery to the Mission Creek Subbasin, for groundwater replenishment, of a proportionate share of the imported water delivered to CVWD and DWA for replenishment of the Upper Coachella Valley Groundwater Basin. To ensure that the Mission Creek Subbasin receives its proportionate share of that water, as set forth in the Mission Creek Replenishment Agreement, and to provide for the monitoring thereof, the following procedures shall be applied:

Each year CVWD and DWA shall calculate the combined total quantity of water produced during the previous year from the Whitewater River Management Area and the Mission Creek Management Area, and from sources tributary to those Management Areas, and shall determine from that the percentages of the total production from those Management Areas and their sources.

Water supplies available to CVWD and DWA each year, through their respective State Water Project Contracts, for the replenishment of those Management Areas will be allocated and delivered to the Management Areas for groundwater replenishment in the same percentages, subject to delivery capability and operational constraints in any particular year.

In the event that additional subbasins benefit from recharge programs within CVWD and DWA boundaries, the respective production and recharge delivery percentages from those management areas in those subbasins shall be included in the above described calculations, allocations, and deliveries.

Production and recharge quantities shall be reviewed by the parties to the Management Committee (MSWD, CVWD and DWA) through the Management Committee process. CVWD and DWA will endeavor to accomplish annual proportionate management area deliveries; however, when constrained by operating limitations, they may over deliver or under deliver water to the management areas from year to year as necessary to obtain as much imported water as may be available. Cumulative water deliveries between or among management areas shall be balanced as and when determined by the Management Committee, but no later than 20 years from the date of the settlement agreement and each 20 years thereafter.

The provisions of this Addendum may be enforced by any party hereto.

IN WITNESS WHEREOF, The Parties have caused this Addendum to be executed by their duly authorized representatives on the date first above written.

MSWD:

Mission Springs Water District,
a California county water district

By _____

Its: President

By _____

Its: Vice President

DWA:

Desert Water Agency,
a public agency of the State of California

By _____

Its: President

By _____

Its: Vice President

CVWD:

Coachella Valley Water District,
a California county water district

By _____

Its: President

By _____

Its: Vice President

While I am certainly not a Law Maker or even a Staff Member at your level, I would like to take the opportunity to point out several areas of concern, where the CPV Sentinel plant violates the:

WATER QUALITY CONTROL POLICY on the USE and DISPOSAL of INLAND WATERS USED for POWERPLANT COOLING.
ADOPTED JUNE 19, 1975.

The policy sites section 25216.3 of the Warren-Alquist Act, water code section 462, which states:

"...conduct studies and investigations on the availability and quality of waste water and uses of reclaimed waste water for beneficial purposes including, but not limited to...and cooling for thermal electric power plants".

MSWD clearly produces wastewater that CPV Sentinel can use. While the District does not produce 100% of demand at this time, current growth will certainly exceed that demand very shortly, and whatever MSWD can offer now will certainly be better than 100% usage of fresh water.

Under "Basis of Policy" Item 3: This plant would certainly have a negative impact on the inland waters. Perhaps relocating to the coast and using salt water would better serve the plants purposes. How about the Salton Sea? There is one power plant down there already, and CPV could possible use the "once through" cooling system, and have a positive impact on cleaning up the Salton Sea.

Item 4: The first sentence says enough: "There is a limited supply of inland water resources in California". The item goes on to state "there is NO available water for new allocations in some basins". I think that for pretty much all of Southern California, this statement certainly applies. I must applaud the forward thinking of the Board that adopted this policy back in 1975 to have the foresight to see the traumatic impact that water would face in just a few years from when this policy was adopted.

Item 8: Again, the Board could tell that the Delta was in dire straits, and would be unable to sustain the water demands for Southern California in just a few short years. Now with the rising sea levels, the Delta faces another challenge on top of the break-down in structure.

Under "Principals" Item 1: The Board listed its' priorities for water sources to be used as cooling. Wastewater is at the top of the list. I can't see where this option has been fully explored. Period. Preferred source No.3 on their list is "brackish water from natural sources or irrigation return flow"...this is a perfect description of the Salton Sea...just a few miles down the road, in the same County, in the same Coachella Valley, and has an existing power plant that they can hook in to. Preferred source No.5 is "other inland water"...how about storing Colorado River water in semi-submerged storage tanks, or extending the pipeline from the existing recharge ponds to the plant site, or a combination of both? If Desert Water Agency is confident that there is plenty of water for this project, how about building a well or two in the Whitewater recharge pond area, and running a direct pipeline to the plant? That would eliminate fresh water use from the Mission Creek basin all together. Another option is to use two wells that MSWD currently has that has a higher than wanted Uranium level. This water is still well within the limits for potable water, but if it can be used rather than our pristine service water, it too is an option.

Item 2: "...other methods of cooling would be environmentally undesirable or economically unsound". Economically unsound for whom? If this plant is permitted to use fresh water, and it eventually does have a negative impact on the basin, then the ratepayers of Mission Springs Water District will have to pay for a solution. Please keep in mind that Desert Hot Springs is already at the top of the list of "Disadvantaged Communities". The residents here are generally blue collar workers "or less", and would have to pay for any clean-up, importation, or other solution to try to rebuild this basin through huge rate increases, or worse yet, wind up with a very poor quality, highly chlorinated water supply.

Item 7: This paragraph states several times that waste water should be "explored" and "studied and investigated". Again, waste water is available for their use. I personally have asked two different CPV Representatives for some sort if data supporting their claim that reuse water is not acceptable for their cooling needs, and the most I have ever received is a promise that the info will be delivered. Needless to say, that information has never been supplied. If it is simply a change in treatment or process from what was proposed, I think this should be an easy fix.

WATER QUALITY CONTROL POLICY

on the

USE and DISPOSAL of INLAND WATERS

USED for POWERPLANT COOLING

ADOPTED JUNE 19, 1975

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CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 75-58

WATER QUALITY CONTROL POLICY ON THE USE
AND DISPOSAL OF INLAND WATERS USED FOR
POWERPLANT COOLING

WHEREAS:

1. Basin Planning conducted by the State Board has shown that there is presently no available water for new allocations in some basins.

2. Projected future water demands, when compared to existing developed water supplies, indicate that general freshwater shortages will occur in many areas of the State prior to the year 2000.

3. The improper disposal of powerplant cooling waters may have an adverse impact on the quality of inland surface and groundwaters.

4. It is believed that further development of water in the Central Valley will reduce the quantity of water available to meet Delta outflow requirements and protect Delta water quality standards.

THEREFORE, BE IT RESOLVED, that

1. The Board hereby adopts the "Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Powerplant Cooling".

2. The Board hereby directs all affected California Regional Water Quality Control Boards to implement the applicable provisions of the policy.

3. The Board hereby directs staff to coordinate closely with the State Energy Resources Conservation and Development Commission and other involved state and local agencies as this policy is implemented.

CERTIFICATION

The undersigned, Executive Officer of the State Water Resources Control Board, does hereby certify that the forgoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on June 19, 1975.

Bill B. Dendy
Executive Officer

WATER QUALITY CONTROL POLICY ON THE USE AND DISPOSAL OF INLAND WATERS USED FOR POWERPLANT COOLING

Introduction

The purpose of this policy is to provide consistent statewide water quality principles and guidance for adoption of discharge requirements, and implementation actions for powerplants which depend upon inland waters for cooling. In addition, this policy should be particularly useful in guiding planning of new power generating facilities so as to protect beneficial uses of the State's water resources and to keep the consumptive use of freshwater for powerplant cooling to that minimally essential for the welfare of the citizens of the State.

This policy has been prepared to be consistent with federal, state, and local planning and regulatory statutes, the Warren-Alquist State Energy Resources Conservation and Development Act, Water Code Section 237 and the Waste Water Reuse Law of 1974.

Section 25216.3 of the Warren-Alquist Act states:

"(a) The commission shall compile relevant local, regional, state, and federal land use, public safety, environmental, and other standards to be met in designing, siting, and operating facilities in the State: except as provided in subdivision (d) of Section 25402, adopt standards, except for air and water quality,...."

Water Code Section 237 and Section 462 of the Waste Water Reuse Law, direct the Department of Water Resources to:

237. "...either independently or in cooperation with any person or any county, state, federal, or orhter agency, including, but not limited to, the State Energy Resources Conservation and Development Commission, shall conduct studies and investigations on the need and availability of water for thermal electric powerplant cooling purposes, and shall report thereon to the Legislature from time to time...."

462. "...conduct studies and investigations on the availability and quality of waste water and uses of reclaimed waste water for beneficial purposes including, but not limited to ... and cooling for thermal electric powerplants."

Decisions on waste discharge requirements, water rights permits, water quality control plans, and other specific water quality control implementing actions by the State and Regional Boards shall be consistent with provisions of this policy.

The Board declares its intent to determine from time to time the need for revising this policy.

Definitions

1. Inland Water – all waters within the territorial limits of California exclusive of the waters of the Pacific Ocean outside of enclosed bays, estuaries, and coastal lagoons.

2. Fresh Inland Waters – those inland waters which are suitable for use as a source of domestic, municipal, or agricultural water supply and which provide habitat for fish and wildlife.

3. Salt Sinks – areas designated by the Regional Water Quality Control Boards to receive saline waste discharges.

4. Brackish Waters – includes all waters with a salinity range of 1,000 to 30,000 mg/l and a chloride concentration range of 250 to 12,000 mg/l. The application of the term "brackish" to a water is not intended to imply that such water is no longer suitable for industrial or agricultural purposes.

5. Steam-Electric Power Generating Facilities – electric power generating facilities utilizing fossil or nuclear-type fuel or solar heating in conjunction with a thermal cycle employing the steam-water system as the thermodynamic medium and for the purposes of this policy is synonomous with the word "powerplant".

6. Blowdown – the minimum discharge of either boiler water or recirculating cooling water for the purpose of limiting the buildup of concentrations of materials in excess of desirable limits established by best engineering practice.

7. Closed Cycle Systems – a cooling water system from which there is no discharge of wastewater other than blowdown.

8. Once-Through Cooling – a cooling water system in which there is no recirculation of the cooling water after its initial use.

9. Evaporative Cooling Facilities – evaporative towers, cooling ponds, or cooling canals, which utilize evaporation as a means of wasting rejected heat to the atmosphere.

10. Thermal Plan – "Water Quality Control Plan for Control of Temperature In the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California".

11. Ocean Plan – "Water Quality Control Plan for Ocean Waters of California".

Basis of Policy

1. The State Board believes it is essential that every reasonable effort be made to conserve energy supplies and reduce energy demands to minimize adverse effects on water supply and water quality and at the same time satisfy the State's energy requirements.

2. The increasing concern to limit changes to the coastal environment and the potential hazards of earthquake activity along the coast has led the electric utility industry to consider siting steam-electric generating plants inland as an alternative to proposed coastal locations.

3. Although many of the impacts of coastal powerplants on the marine environmental are still not well understood, it appears the coastal marine environment is less susceptible than inland waters to the water quality impacts associated with powerplant cooling. Operation of existing coastal powerplants indicate that these facilities either meet the standards of the State's Thermal Plan and Ocean Plan or could do so readily with appropriate technological modifications. Furthermore, coastal locations provide for application of a wide range of cooling technologies which do not require the consumptive use of inland waters and therefore would not place an additional burden on the State's limited supply of inland waters. These technologies include once-through cooling which is appropriate for most coastal sites, potential use of saltwater cooling towers, or use of brackish water where more stringent controls are required for environmental considerations at specific sites.

4. There is a limited supply of inland water resources in California. Basin planning conducted by the State Board has shown that there is no available water for new allocations in some basins. Projected future water demands when compared to existing developed water supplies indicate that general fresh-water shortages will occur in many areas of the State prior to the year 2000. The use of inland waters for powerplant cooling needs to be carefully evaluated to assure proper future allocation of inland waters considering all other beneficial uses. The loss of inland waters considering all other beneficial uses. The loss of inland waters through evaporation in powerplant cooling facilities may be considered an unreasonable use of inland waters when general shortages occur.

5. The Regional Boards have adopted water quality objectives including temperature objectives including temperature objectives for all surface waters in the State.

6. Disposal of once-through cooling waters from powerplants to inland water is incompatible with maintaining the water quality objectives of the State Board's "Thermal Plan" and "Water Quality Control Plans."

7. The improper disposal of blowdown from evaporative cooling facilities may have an adverse impact on the quality of inland surface and ground waters and on fish and wildlife.

8. An important consideration in the increased use of inland water for powerplant cooling or for any other purpose in the Central Valley Region is the reduction in the available quantity of water to meet the Delta outflow requirements necessary to protect Delta water quality objectives and standards. Additionally, existing contractual agreements to provide future water supplies to the Central Valley, the South Coastal Basin, and other areas using supplemental water supplies are threatening to further reduce the Central Valley outflow necessary to protect the Delta environment.

9. The California Constitution and the California Water Code declare that the right to use water from a natural stream or watercourse is limited to such water as shall be reasonably required for beneficial use and does not extend to the waste or unreasonable use or unreasonable method of use or unreasonable method of diversion. Section 761, Article 17.2, Subchapter 2, Chapter 3, Title 23, California Administrative Code provides that permits or licenses for the appropriation of water will contain a term which will subject the permit or license to the continuing authority of the State Board to prevent waste, unreasonable use, unreasonable method of use, or unreasonable method of diversion of said water.

10. The Water Code authorizes the State Board to prohibit the discharge of wastes to surface and ground waters of the State.

Principles

1. It is the Board's position that from a water quantity and quality standpoint the source of powerplant cooling water should come from the following sources in this order of priority depending on site specifics such as environmental, technical and economic feasibility consideration: (1) wastewater being discharged to the ocean, (2) ocean, (3) brackish water from natural sources or irrigation return flow, (4) inland wastewaters of low TDS, and (5) other inland waters.

2. Where the Board has jurisdiction, use of fresh inland waters for powerplant cooling will be approved by the Board only when it is demonstrated that the use of other water supply sources or other methods of cooling would be environmentally undesirable or economically unsound.

3. In considering issuance of a permit or license to appropriate water for powerplant cooling, the Board will consider the reasonableness of the proposed water use when compared with other present and future needs for the water source and when viewed in the context of alternative water sources that could be used for the purpose. The Board will give great weight to the results of studies made pursuant to the Warren-Alquist State Energy Resources Conservation and Development Act and carefully evaluate studies by the Department of Water Resources made pursuant to Sections 237 and 462, Division 1 of the California Water Code.

4. The discharge of blowdown water from cooling towers or return flows from once-through cooling shall not cause a violation of water quality objectives or waste discharge requirements established by the Regional Boards.

5. The use of unlined evaporation ponds to concentrate salts from blowdown waters will be permitted only at salt sinks approved by the Regional and State Boards. Proposals to utilize unlined evaporation ponds for final disposal of blowdown waters must include studies of alternative methods of disposal. These studies must show that the geologic strata underlying the proposed ponds or salt sink will protect usable groundwater.

6. Studies of availability of inland waters for use in powerplant cooling facilities to be constructed in Central Valley basins, the South Coastal Basins or other areas which receive supplemental water from Central Valley streams as for all major new uses must include an analysis of the impact of such use on Delta outflow and Delta water quality objectives. The studies associated with powerplants should include an analysis of the cost and water use associated with the use of alternative cooling facilities employing dry, or wet/dry modes of operation.

7. The State Board encourages water supply agencies and power generating utilities and agencies to study the feasibility of using wastewater for powerplant cooling. The State Board encourages the use of wastewater for powerplant cooling where it is appropriate. Furthermore, Section 25601(d) of the Warren-Alquist Energy Resources Conservation and Development Act directs the Commission to study, "expanded use of wastewater as cooling water and other advances in powerplant cooling" and Section 462 of the Waste Water Reuse Law directs the Department of Water Resources to "...conduct studies and investigations on the availability and quality of waste water and uses of reclaimed waste water for beneficial purposes including, but not limited to... and cooling for thermal electric powerplants."

Discharge Prohibitions

1. The discharge to land disposal sites of blowdown waters from inland powerplant cooling facilities shall be prohibited except to salt sinks or to lined facilities approved by the Regional and State Boards for the reception of such wastes.

2. The discharge of wastewaters from once-through inland powerplant cooling facilities shall be prohibited unless the discharger can show that such a practice will maintain the existing water quality and aquatic environment of the State's water resources.

3. The Regional Boards may grant exceptions to these discharge prohibitions on a case-by-case basis in accordance with exception procedures included in the "Water Quality Control Plan for Control of Temperature In the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California.

Implementation

1. Regional Water Quality Control Boards will adopt waste discharge requirements for discharges from powerplant cooling facilities which specify allowable mass emission rates and/or concentrations of effluent constituents for the blowdown waters. Waste discharge requirements for powerplant cooling facilities will also specify the water quality conditions to be maintained in the receiving waters.

2. The discharge requirements shall contain a monitoring program to be conducted by the discharger to determine compliance with waste discharge requirements.

3. When adopting waste discharge requirements for powerplant cooling facilities the Regional Boards shall consider other environmental factors and may require an environmental impact report, and shall condition the requirement in accordance with Section 2718, Subchapter 17, Chapter 3, Title 23, California Administrative Code.

4. The State Board shall include a term in all permits and licenses for appropriation of water for use in powerplant cooling that requires the permittee or licensee to conduct ongoing studies of the environmental desirability and economic feasibility of changing facility operations to minimize the use of fresh inland waters. Study results will be submitted to the State Board at intervals as specified in the permit term.

5. Petitions by the appropriator to change the nature of the use of appropriated water in an existing permit or license to allow the use of inland water for powerplant cooling may have an impact on the quality of the environment and as such require the preparation of an environmental impact statement or a supplement to an existing statement regarding, among other factors, an analysis of the reasonableness of the proposed use.

6. Applications to appropriate inland waters for powerplant cooling purpose shall include results of studies comparing the environmental impact of alternative inland sites as well as alternative water supplies and cooling facilities. Studies of alternative coastal sites must be included in the environmental impact report. Alternatives to be considered in the environmental impact report, including but not limited to sites, water supply, and cooling facilities, shall be mutually agreed upon by the prospective appropriator and the State Board staff. These studies should include comparisons of environmental impact and economic and social benefits and costs in conformance with the Warren-Alquist State Energy Resources Conservation and Development Act, the California Coastal Zone Plan, the California Environmental Quality Act and the National Environmental Policy Act.

This is a presentation given by Elissa Lynn, Senior Meteorologist, Ca. Dept. Water Resources, at the May 7th, 2008 ACWA conference in Monterey, Ca. (Association of California Water Agencies)

A lot of these slides don't mean much without the verbal presentation, but take a look at her qualifications, and look at the slides which I have highlighted. Most are pretty self-explanatory.

This presentation is available for you to see at the www.ACWA.com website.

Climate Change in California

Elissa Lynn
Senior Meteorologist, CA Dept. Water Resources

Climate Change in California

May 7, 2008

Elissa Lynn
Senior Meteorologist, CA Dept. Water Resources
elynn@water.ca.gov

Background

- M.S., Atmospheric Sciences
- Thesis: Climate Modeling
- B.A., Physics
- Weather/ Climate researcher

Background

- 17 year TV Meteorologist
- Emmy Award, Literacy Award
- Teacher/ College Instructor
- State Meteorologist; Outreach

Why so complicated?

Data collection

Computer model variability

Feedback mechanisms?

What can we do?

CA's Water Season

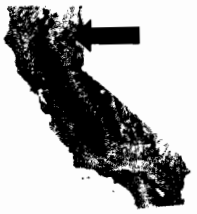
	% of normal to date
• Precipitation	74 %
• Snowpack	68 %
• Reservoir Storage	82 %
• Runoff to April 1	55 %

CA's Water Season

% of normal to date

• Precipitation 74 %

(Northern Sierra 8 Station)



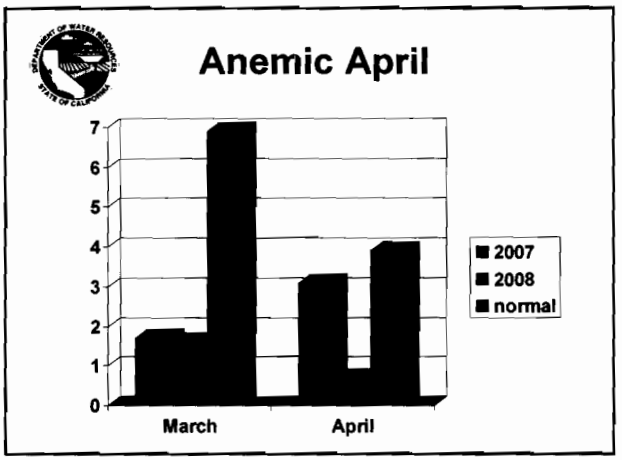
Mt. Shasta City
Shasta Dam
Mineral
Brush Creek
Quincy
Sierraville
Pacific House
Blue Canyon

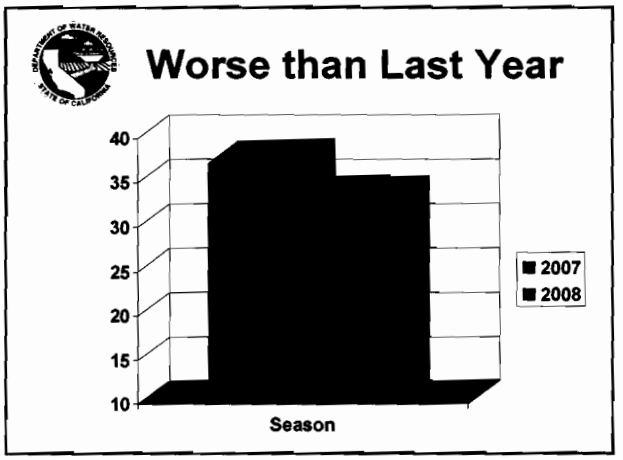
CA's Water Season

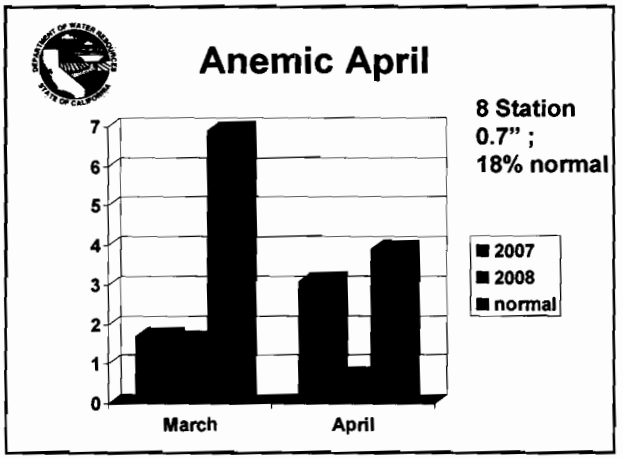
	% of normal to date
• Precipitation	74 %
(Northern Sierra 8 Station)	
• Snowpack	68 %
• Reservoir Storage	82 %
• Runoff to April 1	55 %

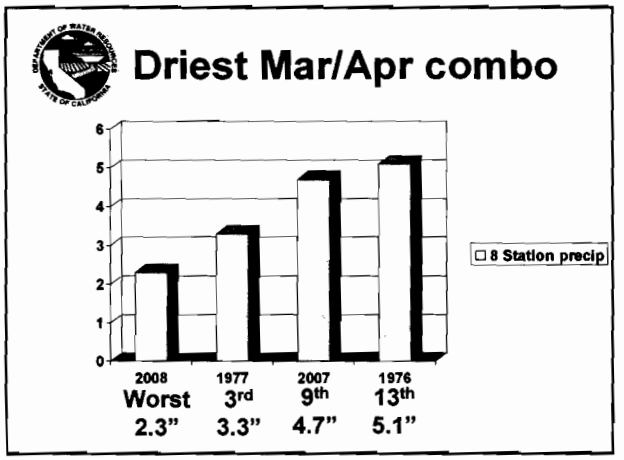
Malicious March

6th Driest	8 Station Index precip
5th Driest	Statewide
↓ 21%	Snowpack Reduction
50%	Sac, SJQ River Runoff


Anemic April
7
6
5
4
3
2
1
0
March
April
2007
2008
normal


Worse than Last Year
40
35
30
25
20
15
10
Season
2007
2008


Anemic April
8 Station
0.7" ;
18% normal
7
6
5
4
3
2
1
0
March
April
2007
2008
normal


Driest Mar/Apr combo
6
5
4
3
2
1
0
2008
Worst
2.3"
1977
3rd
3.3"
2007
9th
4.7"
1976
13th
5.1"
8 Station precip

Driest March/April

Sacramento
Redding
Stockton
Modesto
Reno
Truckee
Tahoe City (2nd driest)

DROUGHT?

Hydrologic "Ingredients"
- Rainfall
- Snowpack
- Runoff
- Soil Moisture
- Duration

Other
- Supply availability
- Long-range trends
- Social, Economic impacts

DROUGHT?

Hydrologic "Ingredients"
- Rainfall
- Snowpack
- Runoff
- Soil Moisture
- Duration

DROUGHT?

Hydrologic "Ingredients"
- Rainfall
- Snowpack
- Runoff
- Soil Moisture
- Duration

Other
- Supply availability
- Long-range trends
- Social, Economic impacts

Water Supply Index
*May 1, 2008 Forecasts

- Sacramento River Runoff forecast
  - "DRY" median water year type index
- San Joaquin Valley forecast
  - "DRY" water year type index

Wet, Above Normal, Below Normal, Dry, Critical

Water Year Index Type

	Sacramento	San Joaquin

Water Supply Index
*May 1, 2008 Forecasts

- Sacramento River Runoff forecast
  - "DRY" median water year type index
- San Joaquin Valley forecast
  - "DRY" water year type index

Being done today; either could slip to Critical
Last year ended Dry, Critical

Wet, Above Normal, Below Normal, Dry, Critical

Water Year Index Type

	Sacramento	San Joaquin
1976	Critical	Critical
1977	Critical	Critical

Wet, Above Normal, Below Normal, Dry, Critical

Water Year Index Type

	Sacramento	San Joaquin
1976	Critical	Critical
1977	Critical	Critical
1987	Dry	Critical
1988	Critical	Critical
1989	Dry	Critical
90,91,92	Critical	Critical

Wet, Above Normal, Below Normal, Dry, Critical

Water Year Index Type

	Sacramento	San Joaquin
1976	Critical	Critical
1977	Critical	Critical
1987	Dry	Critical
1988	Critical	Critical
1989	Dry	Critical
90,91,92	Critical	Critical
2001	Dry	Dry
2002	Dry	Dry
2007	Dry	Critical
2008	Dry (?)	Dry (?)

Wet, Above Normal, Below Normal, Dry, Critical

Water Year Index Type

	Sacramento	San Joaquin
1976	Critical	Critical
1977	Critical	Critical
1987	Dry	Critical
1988	Critical	Critical
1989	Dry	Critical
90,91,92	Critical	Critical
2001	Dry	Dry
2002	Dry	Dry

Water Year Runoff Forecast Projection

61% of normal

Statewide Water Year Runoff Forecast as of May 1, 2008
Courtesy: Snow Surveys Section, DWR

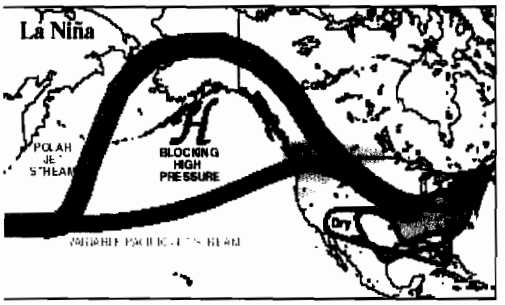
Water Year Runoff Forecast
Projection

Good news!

Average flow projections: 15-20% higher than '87-'92

Statewide Water Year Runoff Forecast as of May 1, 2008
Courtesy: Snow Surveys Section, DWR

La Nina



Reservoir Storage
Oct. 1 estimate

Bad news

65% of normal Reservoir Storage

Courtesy: Maury Roos, Chief Hydrologist, DWR

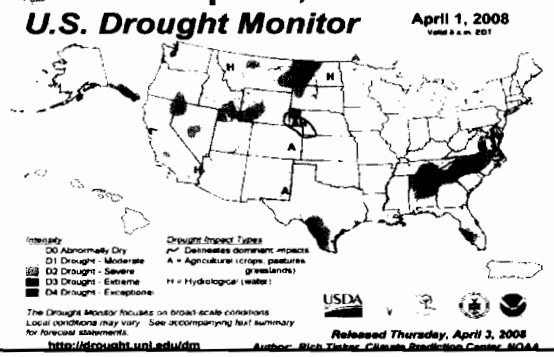
La Nina in California - So far, not as predicted!

- Northern California:
  (Highly variable weather patterns)
  - Wet: October-December
  - Dry: January-March
- Southern California: DRY

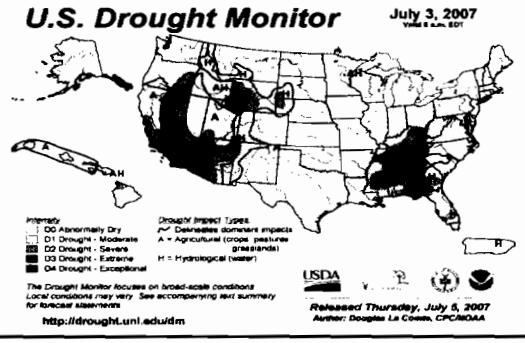
2008 Rain Season

Eureka	94%
San Francisco	81%
Sacramento	79%
Los Angeles	79%
San Diego	67%

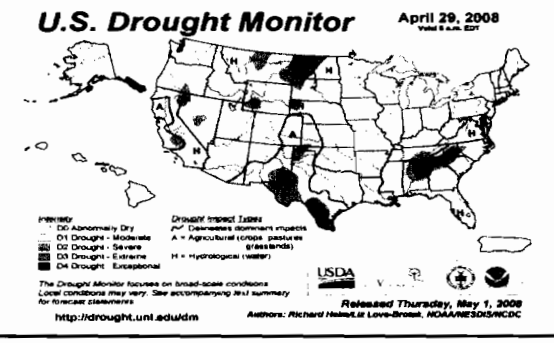
Peak Improvement April 1, 2008



Drought (Soil Moisture) July 3, 2007



Worsening Again



Water Supply FACTORS

Why so low?

Water Supply FACTORS

Dry Antecedent Conditions

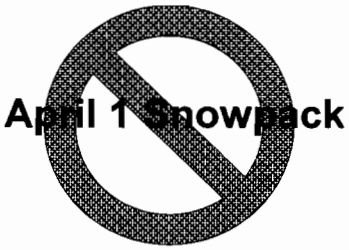
DRY, CRITICAL last year
(Sac, San Joaquin)

Dry Fall;

October	120%	3.6"
November	19%	1.2"
December	86%	7.2"

Water Supply FACTORS

Why so low?



Water Supply FACTORS

Weird Winter

Cold Storms: ALL snow
- La Nina track
  - storms 'skip' the valley
  - get snow, but little rain
- Rainfall only 75%

⇨Low rain-driven runoff; high <u>or</u> low elevation

Water Supply FACTORS

Dry, Rough Spring

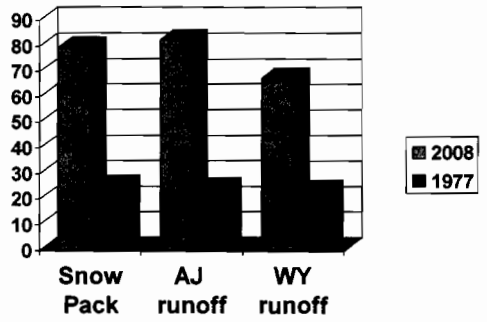
Moisture starved set up
- La Nina effect? No MJO

March was cold
- Snowpack still "looked good" on April 1

Sublimation
- Sunny spring

No additional snow March or April
- (normally add 10%+)

Compared to 1976-77



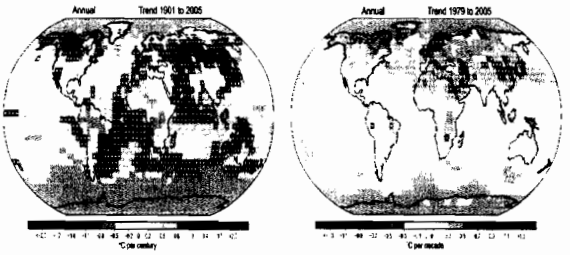
Water Supply FACTORS

Projection Unknowns

Soil-Moisture Modeling is difficult

Will likely lose more snowmelt
- to dry ground than other years
  - with 100% April 1 Snowpack

Climate Change



Climate Change vs. Global Warming

Climate Change vs. Global Warming

NOT just hotter
Precipitation Changes; more/less

Climate Change vs. Global Warming

NOT just hotter

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Precipitation Changes; more/less
Different spatial distribution of rain

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Sea-level Rise
Air Quality

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Climate Change vs. Global Warming

NOT just hotter
Precipitation Changes; more/less
Different spatial distribution of rain
Changing snow levels
Sea-level Rise
Air Quality
Atmosphere/Ocean Circulation

Temperature Trends

GLOBALLY:
10 WARMEST YEARS SINCE 1997

128 year record; Climatic Data Center

Temperature Trends

CALIFORNIA:
1934 STILL HOTTEST

Source: CA State Climatologist

Temperature Trends

UNITED STATES:
6 OF 10 WARMEST SINCE 1998

Source: NASA, NCDC, AMS

Climate Change

Does not SCALE well

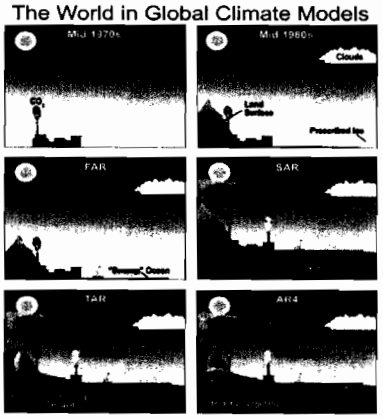
Regional Impacts vary

Very hard to 'model'
at state or regional level

The World in Global Climate Models

IPCC:

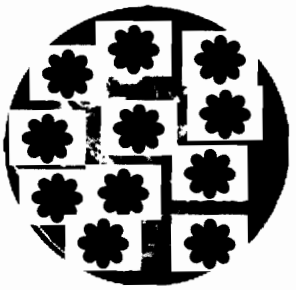
Intergovernmental
Panel on
Climate
Change



Daisy World

Daisy World

Daisy World



MODELING stuff

Mathematical Equations represent the atmosphere

MODELING stuff

Mathematical Equations represent the atmosphere

Some processes poorly understood,
not to mention poorly handled

Can't model things we don't understand

MODELING stuff

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Long-range trends, larger-scale answers

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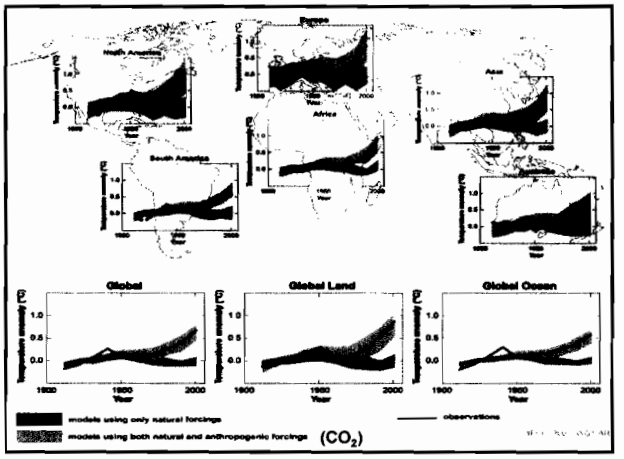
Long-range trends, larger-scale answers

Increased sophistication over time



MODELING stuff

Mathematical Equations represent the atmosphere

Some processes poorly understood,
not to mention poorly handled

Can't model things we don't understand

Long-range trends, larger-scale answers

Increased sophistication over time

Real World responding faster!

IPCC Precipitation Models

2080-2099
vs.
1980-1999

SUMMER projection California:
LIKELY Precipitation Decrease
(>66% of simulations)

IPCC Precipitation Models

2080-2099
vs.
1980-1999

WINTER projection California:
Northern: Little change
Southern: Likely Drier

Medieval Mega Droughts

Is the Party OVER?

Medieval Mega Droughts

Medieval Mega Droughts

~ 900 A.D.
200 year drought

~1350 A.D.
150 year drought

Runoff 40-75%
LOWER!

Scott Stine, Cal State, East Bay

Observed Impacts in California

1° F Increase/ 100 yrs
Warmer at night
Warmer in winter

[redacted]

Observed Impacts in California

1° F Increase/ 100 yrs

[redacted]

Observed Impacts in California

1° F Increase/ 100 yrs
Warmer at night
Warmer in winter
7" sea level rise

[redacted]

Observed Impacts in California

1° F Increase/ 100 yrs
Warmer at night
Warmer in winter
7" sea level rise
Earlier Snowmelt

[redacted]

Observed Impacts in California

1° F Increase/ 100 yrs
Warmer at night
Warmer in winter
7" sea level rise
Earlier Snowmelt
Snowpack Loss: 10% already
Increasing River Peak Flows

[redacted]

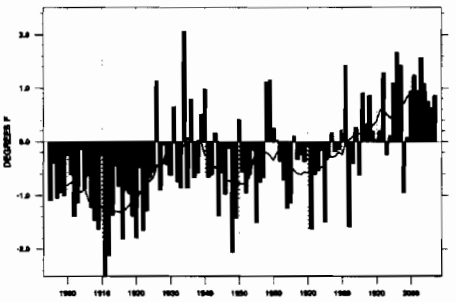
Observed Impacts in California

1° F Increase/ 100 yrs
Warmer at night
Warmer in winter
7" sea level rise
Earlier Snowmelt
Snowpack Loss: 10% already

[redacted]

CA Mean Temperatures

°F



Source: Western Region Climate Center

Department of Water Resources Areas of Concern

Flood Management
Data Collection
System Re-Operation
Research Needs
Water, Energy, Emissions
Water Management/ Storage
Ecosystem Stewardship

Climate Change Impacts DWR Efforts

Conducting California Climate Data Research, Monitoring, Assessments

Major Policy Document being drafted (2008)

Part of the next CA Water Plan (2009)

Climate Action Team Member

Climate Change Impacts DWR Efforts

20-person DWR Climate Matrix Team

336 page Incorporating/Water Mgmt. (2006) *

4 page Public Information Guide (2007) *

*available on-line

DVD

"Changing Climate, Water Wise"

8 min

For California...

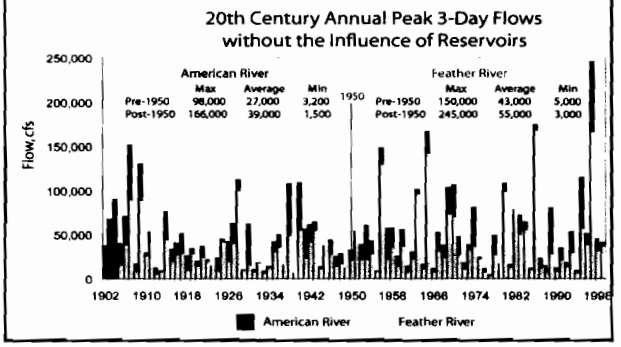
Past not indicator of future

Greater uncertainty in water supply

Solution - NOT just one strategy

Aging infrastructure will be further stressed

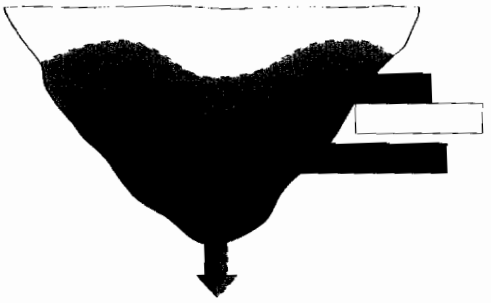
Peak 3-day River Flows

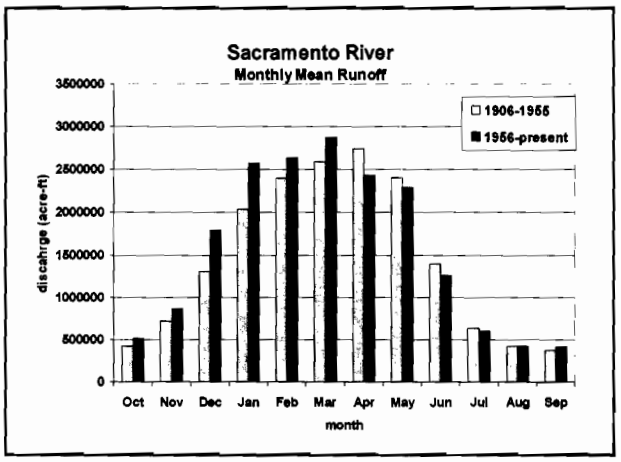


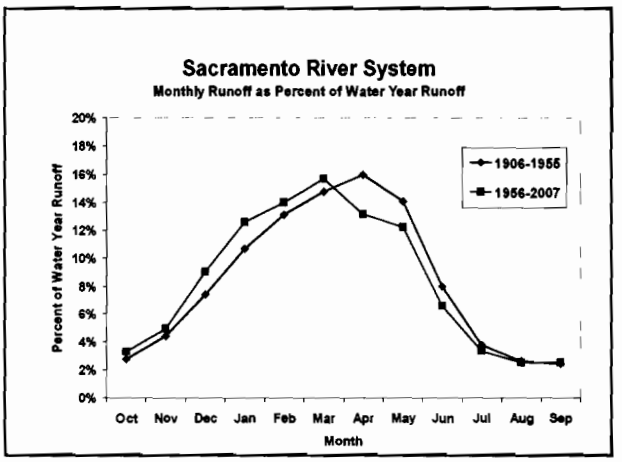
Snowpack Reduction

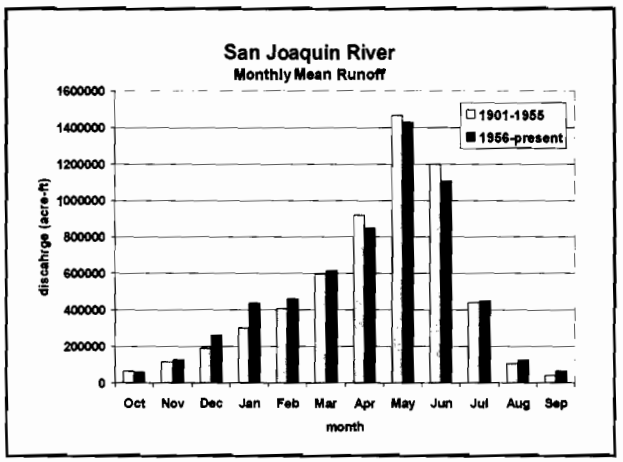
Source: Scripps Institute of Oceanography

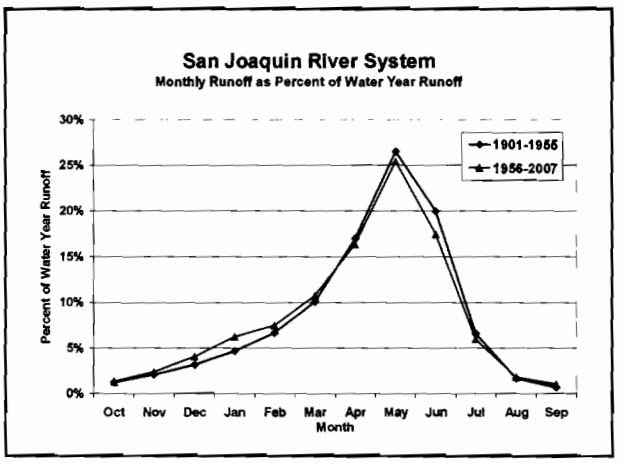
More as Rain⇨ bigger flood



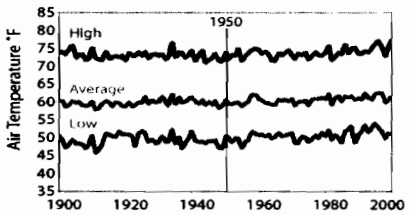

Sacramento River
Monthly Mean Runoff
1906-1955
1956-present
discahrge (acre-ft)
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
month


Sacramento River System
Monthly Runoff as Percent of Water Year Runoff
1906-1955
1956-2007
Percent of Water Year Runoff
20%
18%
16%
14%
12%
10%
8%
6%
4%
2%
0%
Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
Month

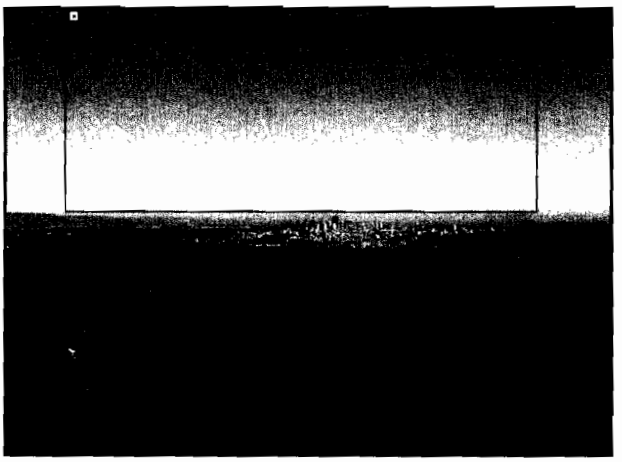

San Joaquin River
Monthly Mean Runoff
1901-1955
1956-present
discahrge (acre-ft)
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
month


San Joaquin River System
Monthly Runoff as Percent of Water Year Runoff
1901-1955
1956-2007
Percent of Water Year Runoff
30%
25%
20%
15%
10%
5%
0%
Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
Month

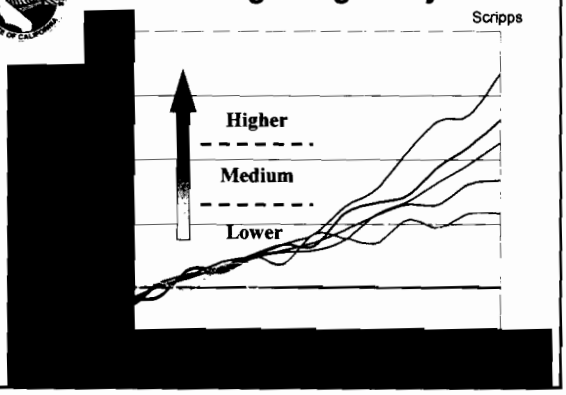
CA temps
1900-1950 vs. 1950-2000



Highs	▲0.6° F
Average	▲0.9° F
Lows	▲1.4° F



CA Warming Range Projections



Sea Level Rise

- Thermal expansion of the ocean #1
- Melting of polar ice caps, glaciers
- Vertical land movement

DWR Recommendations

Prepare for
- Higher flood flow
- Smaller snowpack
- Longer dry spells, droughts

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Fund critical weather monitoring programs

Preserve, Enhance, Restore Ecosystem

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DWR Recommendations

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- **Longer dry spells, droughts**

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Provide sustainable funding for water and flood management, research, & storage

Thank You

Steve Nemeth	Dana Fernandez
Mike Anderson	Eric Butler
Jamie Anderson	Cindy Matthews
Matt Winston	Jeremy Arrich
Dave Rizzardo	Crystal Davis
Art Hinojosa	Ally Wu
Elizabeth Morse	John Andrew

Weather and Climate Email Newsletter *

http://listhost2.water.ca.gov/mailman/listinfo/weather_and_climate_news

Weekly through the winter:
- Storm summaries
- Weather Forecasts
- Other timely information

Vol. 36, No. 10
May 19, 2008

Challenges Loom as State Faces Second Dry Year

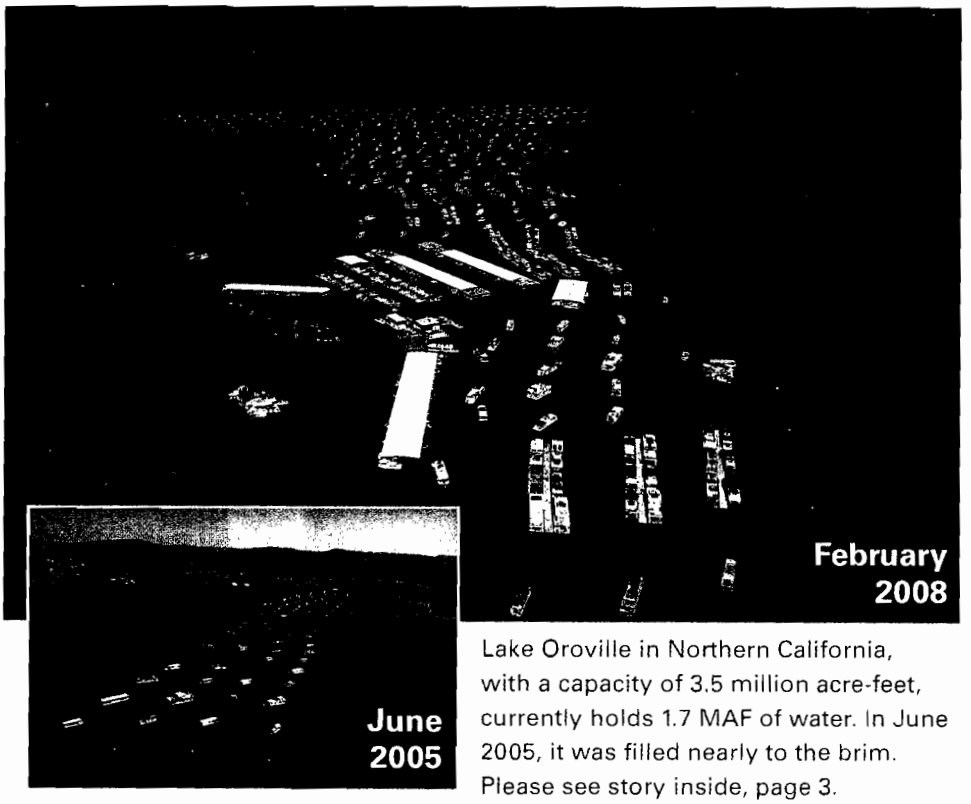
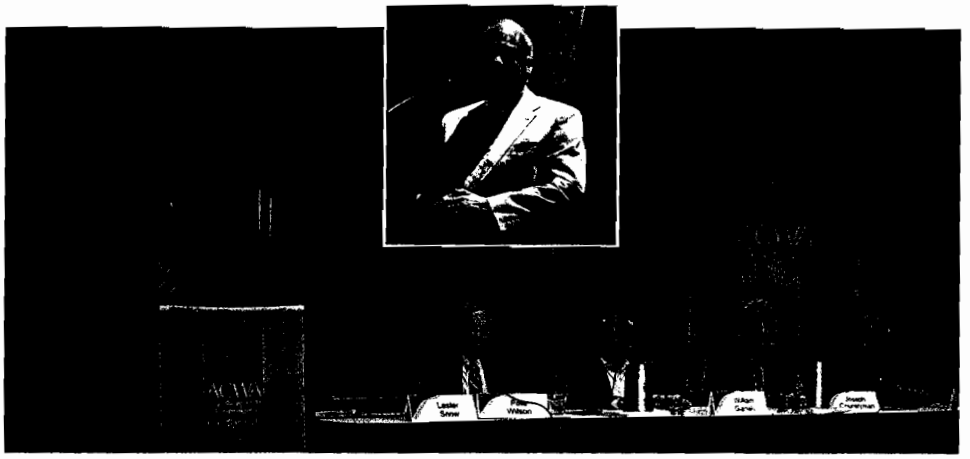


Photo credits: California Department of Water Resources

Lake Oroville in Northern California, with a capacity of 3.5 million acre-feet, currently holds 1.7 MAF of water. In June 2005, it was filled nearly to the brim. Please see story inside, page 3.

ACWA Program Pays Tribute to Former Director, California Department of Water Resources



An ACWA Spring Conference luncheon program featured a tribute to David N. Kennedy (inset photo), director of the California Department of Water Resources from 1983-1998, who died in December. (l-r) DWR Director Lester Snow; former Gov. Pete Wilson; former DWR Director Bill Gianelli; Joe Countryman, MBK Engineers and former chief, Civil Design Branch, U.S. Army Corps of Engineers; and former DWR Chief Deputy Director Bob Potter. Please see story inside, page 4.

What's Inside:

2 Governor Releases May Budget Revise

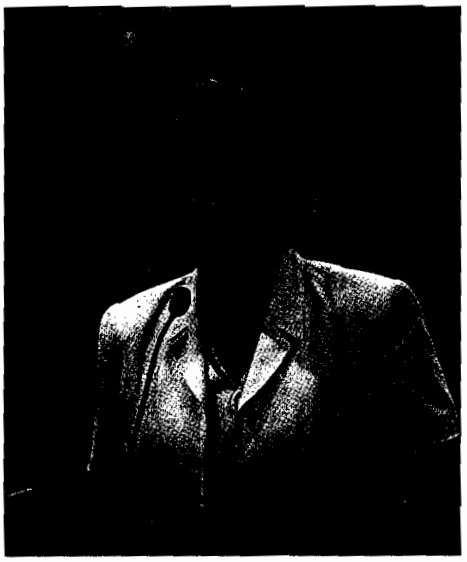
6 Welcome By Assembly Member Laird

7 "Green" Programs Highlighted

8 Commissioner's Forum at ACWA Conference

10 Clair Hill Award Winner Announced

Snow Survey Confirms Another Dry Year for California 'Perfect Storm' of Water Supply Challenges, ACWA Says



Elissa Lynn, senior meteorologist, Department of Water Resources.

The Department of Water Resources May 1 said runoff projections show the state is in its second dry year in a row and could face a critical situation if the dry spell continues next year.

DWR Senior Meteorologist Elissa Lynn said at a Capitol news conference that March and April combined were the driest on record for California and contributed to a significant lowering of runoff projections.

Though the state received plenty of snowfall in January and February, most of the water content is being absorbed by parched soil as a result of last year's extremely dry conditions.

In addition, Lynn said some of the water content may be going directly from snow to vapor under sunny skies in a process known as sublimation, depriving streams and reservoirs of the usual benefits of snowmelt.

Lynn keynoted at ACWA's conference. Please see story, page 5.

Resources Secretary Mike Chrisman said the dry conditions are a reminder that California needs a comprehensive solution to address its long-term needs. "This reminds us on a daily basis that we're up against a tough situation in California," he said.

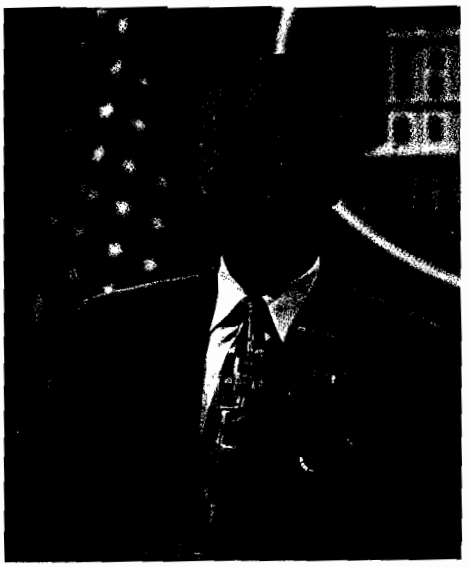
"We need to recognize that we're in a water shortage and begin to act accordingly."

The department's final snow survey of 2008 indicated snow water content of 67% of normal for the date, statewide. Snow depth and water content declined since April, when statewide snowpack water content figures were just under 100% of normal, despite a dry March.

Electronic sensor readings showed northern Sierra snow water equivalents at 88% of normal for this date, central Sierra at 61%, and southern Sierra at 60%.

Storage in California's major reservoirs is also low because of last year's dry conditions. Lake Oroville, the principal storage reservoir for the State Water Project, is at 48% of capacity, and 58% of average storage for this time of year.

"Today's snow survey findings further underscore the need for action now," said Gov. Arnold Schwarzenegger in a statement issued following the snow survey. "I have proposed a comprehensive approach to address our statewide water crisis that includes water conservation, more surface and groundwater storage and new investments in our aging water infrastructure."



Mike Chrisman, secretary, California Resources Agency.

Low Runoff Adds to Challenge

The dry conditions and court-ordered restrictions on Delta water exports already are squeezing supplies this year, with SWP customers expected to receive just 35% of their requested deliveries.

ACWA member agencies are preparing for reduced supplies and calling on customers to step up conservation efforts. East Bay Municipal Utility District declared a water shortage emergency on May 13 and instituted mandatory water rationing to reduce overall water use by 15% this year.

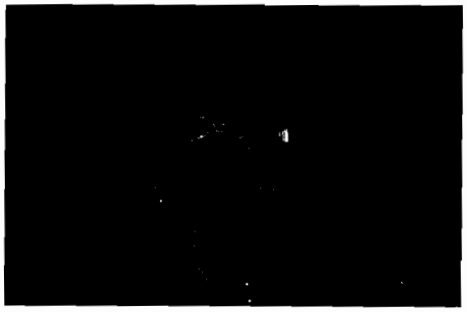
Other ACWA members are implementing restrictions on outdoor water use.

Water Supply Challenges

ACWA Executive Director Timothy Quinn said the dry conditions and court-ordered reductions in deliveries amount to a perfect storm of challenges for local water agencies this year. "We are starting to see impacts, and they will continue to mount this year," Quinn said. "These impacts are tangible evidence of the need for a comprehensive water solution that invests in the sustainability of our system so we have the water we need for our economy and the environment."

ACWA has prepared an informational piece on the dry conditions and emerging impacts on water agencies. It will be updated periodically in the coming months. The piece is available at www.acwa.com/mediazone/waterfacts/dryconditionshandout.pdf. — *ACWA Communications Supervisor Lisa Lien-Mager*

ACWA Conference Kicks Off with Program on Dry Conditions, Climate Change



Department of Water Resources

State Meteorologist Elissa Lynn

State Meteorologist Elissa Lynn provided the latest on dry conditions and how climate change may affect California's water supplies May 7 at a program kicking off ACWA's 2008 Spring Conference & Exhibition in Monterey.

Lynn told a crowd of more than 650 local water officials that the state is in the second year of what is definitely a dry spell, if not a drought. Revised figures due from the Department of Water Resources were expected to classify the year as critically dry. "Is it a drought? Not yet, but we'll see," she said.

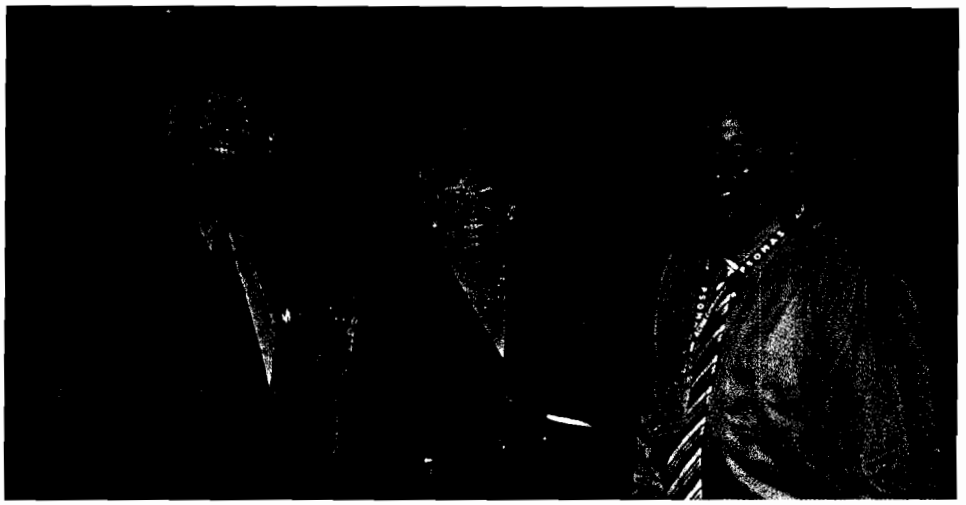
March and April combined were the driest on record for California, and may be a preview of what's to come as rain and snowfall patterns change. Climate change already has reduced the Sierra snowpack by about 10%, and another 15% could be lost by 2050, Lynn said. That's significant because the state's water system depends on the snowpack to be there and melt at certain times.

"We are looking at greater uncertainty in our water supply," she said. "The solution is not going to be just one strategy."

Climate change is a better term for what is taking place than global warming, Lynn said, because "not every place is getting hotter on a summer day." In Sacramento, for example, temperatures are likely to warm slightly in winter months and at night. There will be changes in precipitation patterns, potentially longer droughts, higher peak flood flows, and further increases in sea level, which already has risen seven inches at the Golden Gate Bridge over the past 100 years.

Preparing for these changes and adapting the state's water system may be one of the biggest challenges of the 21st century, she said.

Lynn's presentation is available at www.acwa.com. — *ACWA Communications Supervisor Lisa Lien-Mager*



(l-r) ACWA Executive Director Timothy Quinn, State Meteorologist Elissa Lynn, who keynoted the ACWA Spring Conference Opening Breakfast on climate change, and ACWA President Glen Peterson.

Mark Your Calendars for ACWA's Next Conference!

Dec. 2-5

ACWA's 2008 Fall Conference & Exhibition is **Dec. 2-5** at the Long Beach Convention & Entertainment Center and surrounding hotels.

Photography, Service to ACWA Honored

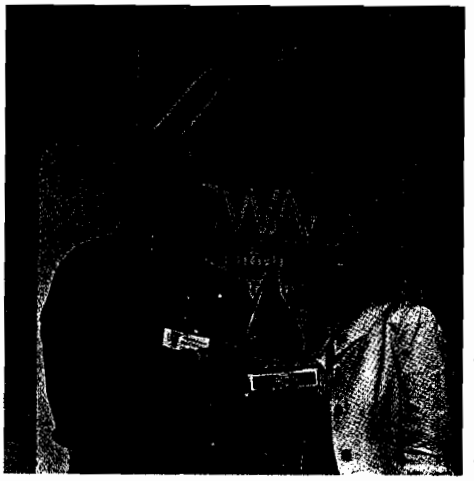


Photo credit: Sheri Van Wert, ACWA

Dale Kolke, supervisor, Photography, California Department of Water Resources, was recognized by ACWA for his tireless efforts over the years to photograph water-related events, including ACWA conferences and other events.

"Dale has been our man behind the camera," said Jennifer Persike, ACWA director of strategic coordination and public affairs. "His work is second to none."

Look for more conference coverage in the next issue!

This packet contains several letters:

The first is from Senator Jim Battin dated Oct. 2, 2007. Senator Battin writes "CPV Sentinel will support the Districts water quality goals by making it possible for MSWD to clean recharge water beyond the present secondary levels to tertiary levels..." "CPV Sentinel will benefit MSWD budget goals by paying for new wells, piping systems, and premium rates for water".

The chronological timeline grid presented at a Board meeting by the District Engineer shows that CPV withdrew it's negotiations for tertiary treatment in August of 2007. Two months before the Senator's letter was written. A presentation (copy attached behind Senator Battin's letter) given to the MSWD Board of Directors by Kris Helm on 2-14-2008 states: "Moreover, our prior efforts to identify opportunities to develop recycled water out of the Horton Plant to conserve freshwater elsewhere have yet to identify any economical opportunities" which tells me that they had never seriously planned on upgrading the Horton Plant, because they had "yet" to identify any economical opportunities.

At no time did CPV Sentinel ever commit to paying for "new wells, piping systems or premium rates for water", like the Senator believes they have.

The second letter is from Supervisor Marion Ashley, also dated Oct. 2, 2007. He writes: "As MSWD Borard members, your primary focus is on a clean water supply and efficient use of water resources. CPV Sentinel accomplishes both of these objectives through state of the art technology, fees and water treatment efforts".

Again, all water treatment negotiations were long gone before this letter was written. Mr. Ashley goes on to talk about specific problems at the Horton plant and states "The water plan that is being developed between MSWD Staff and CPV representatives will require that CPV Sentinel upgrade the Horton WWTP to tertiary levels.

My opinion is that if Senator Battin or Supervisor Ashley knew that the wastewater treatment offer was never a serious option before their support was solicited, they probably would not have been so willing to ask that either of us approve this project.
(SEE DESERT SUN ARTICLE — LAST PAGE)

(SEE also "WATER CRISIS ROUND TABLE" Hosted by Supervisor Ashley)

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Senate

California Legislature

JIM BATTIN
SENATOR
THIRTY-SEVENTH SENATE DISTRICT

COMMITTEES:
ELECTIONS, REAPPORTIONMENT AND CONSTITUTIONAL AMENDMENTS
VICE-CHAIR
APPROPRIATIONS
ENERGY, UTILITIES AND COMMUNICATIONS
GOVERNMENTAL ORGANIZATION
SELECT COMMITTEES:
CALIFORNIA-EUROPEAN TRADE
CALIFORNIA'S HORSE RACING INDUSTRY
JOINT COMMITTEES:
ARTS

October 2, 2007

Board of Directors
Mission Springs Water District
66575 2nd Street
Desert Hot Springs, CA 92240

Ladies and Gentlemen:

I am writing to extend my full support of the CPV Sentinel Standby Power Plant. As elected officials we share an obligation to safeguard our constituents, and to seek opportunities to protect and improve their quality of life. The CPV Sentinel Standby Power Plant both meets and exceeds those worthy goals.

The Plant is the solution to the Coachella Valley's critical electric power supply issues, and will provide a needed economic boost to Desert Hot Springs and the region as a whole. CPV Sentinel will deliver these benefits with efficiency, proficiency and in the most environmentally sensitive manner.

CPV Sentinel specifically benefits the Mission Springs Water District rate payers as well because the project will help protect its valuable water resources. CPV Sentinel will support the District's water quality goals by making it possible for MSWD to clean recharge water beyond the present secondary levels to tertiary levels and thus improve water basin quality. CPV Sentinel will benefit MSWD budget goals by paying for new wells, piping systems, and premium rates for water. This is a valuable windfall for the District and ratepayers. The clean, state-of-the-art technology used by the Plant will use water so efficiently that it will have no significant impact on the projected thirty year Mission Springs water surplus.

The economic benefits to Desert Hot Springs and valley wide are just as important. It will generate $25,000,000 in new sales tax revenues with $3,000,000 dedicated specifically to Desert Hot Springs. Additionally, $5,000,000 in annual property taxes will be paid by the Plant. The project will also generate new jobs that will further contribute to the local economy and the quality of life in the Coachella Valley.

Energy blackouts and brownouts can have a terrible impact on public safety especially in the Coachella Valley where the loss of air conditioning can be fatal to the elderly and infirm. As you may recall, I sponsored legislation during the energy crisis California endured to prohibit rolling blackouts from being targeted in our valley where temperatures are not just uncomfortable, but deadly. Regretfully, the PUC has chosen not to implement that legislation and cited a loophole as an excuse. It is up to us – to you - to ensure the safety of our residents by providing local power sources that we can count on. CPV Sentinel is an

important element in avoiding blackouts and brownouts in the Coachella Valley. CPV Sentinel will safeguard our local electric power supply by generating power on an as needed basis – power that will stay here in our communities when we need it most.

Thank you for the opportunity to extend my support of the CPV Sentinel Standby Power Plant project. Please do not hesitate to contact me if I may be of any additional assistance to you with this or any other state related matter.

Sincerely,

James F Battin, J

JIM BATTIN
Senator,
37th District

JB/kg

Bd Presentation 2-14-08

I am Kris Helm, a consultant to CPV Sentinel working on water resources solutions for the proposed power plant. Mr. Bob Hren is on vacation and Mr. Mark Turner asked that I appear before your Board to update you on progress that is being made toward ensuring that the water supply solution for the power plant benefits existing water users.

Sentinel will be submitting an amended water supply plan to the CEC this week. It embodies two new MOU's with the Desert Water Agency.

The first MOU provides for Sentinel to import new water into the Mission Creek Sub Basin to more than offset our pumping. The agreement provides that Sentinel will purchase new imported water supplies equal to 108% of its groundwater pumping. Sufficient water will be recharged in the sub-basin to fully offset Sentinel's pumping. The new water purchased by Sentinel will be over and above the water that would otherwise be recharged into the basin under the settlement agreement or any new procedures that are implemented pursuant to the groundwater management plan which is under development. In addition, Sentinel will pay all DWA charges including a tax increment and the replenishment assessment, as though it did not bring in new water. Under the Settlement Agreement's provisions, this ensures that more water will be recharged in the sub basin, net of pumping, than if the Sentinel project were not built. Sentinel's payment of the tax increment and replenishment assessment will also contribute, to DWA's future water management programs, including purchase of new water supplies.

The second MOU provides for additional actions over and above the importation of new water supplies. This MOU provides that Sentinel will fund new freshwater conservation programs in partnership with DWA. These new water recycling and demand reduction programs will benefit all water users within DWA including the Mission Springs Water District. The MOU provides that Sentinel will not fund programs that would otherwise be funded by DWA but will instead ensure that new projects are undertaken to conserve at least as much freshwater as the water consumed by Sentinel. The specific projects to be undertaken will be described in the next few months in close consultation with local governmental agencies and the CEC.

Sentinel is no longer pursuing the purchase of effluent from the MSWD Horton Wastewater plant as a source of recharge water to offset the project's pumping of groundwater from the sub-basin. Moreover, our prior efforts to identify opportunities to develop recycled water out of the Horton Plant to conserve freshwater elsewhere have yet to identify any economical opportunities. Nonetheless, we look forward to working with MSWD to identify any projects which could provide water resources management benefits to the region.

We believe that our actions in water resources represent an exemplary model for the future in which a new consumer provides benefits to existing water users instead of potential burdens upon existing water supplies. While we recognize that your support for our project overall may differ from individual to individual, we hope that your Board as a body would strongly support the water resources solutions that CPV Sentinel is proposing as part of our project's development. We of course look forward to continued discussions with your staff on how we could potentially improve our proposals and enhance the water resources benefits of our project.

I am available to answer any questions you may have today or in the future. Thank you for the opportunity to present this update to your Board.

County of Riverside

SUPERVISOR MARION ASHLEY
FIFTH DISTRICT

October 2, 2007

Board of Directors
Mission Springs Water District
66575 2nd Street
Desert Hot Springs, Ca. 92240

Ladies and Gentlemen:

I am writing you to express my support for the CPV Sentinel Standby Power Project, proposed within the Mission Springs Water District service area. The project is the answer to protecting vulnerable Coachella Valley residents and key essential safety services from power blackouts. I urge you to join me supporting CPV Sentinel.

I am pleased to report that the CPV Sentinel project is moving forward. Recently the permit application was deemed complete by the California Energy Commission (CEC). The CEC has initiated its exhaustive twelve month due diligence to evaluate the environmental impacts of the project and allow the public to express its view.

The CPV Sentinel Standby Power Project benefits the Coachella Valley in so many ways. The benefits to the local economy are substantial – not just during construction, but throughout the operating life of the project. Project construction alone will generate over $25 Million in new sales tax revenues. Currently, the direct sales tax revenue benefit to the City of Desert Hot Springs will be $3 Million. In addition it may be possible to create an Enterprise Zone and/or a Redevelopment Zone so the area may capture a far greater share of the CPV Sentinel tax revenue, including a substantial part of the annual $5 million property tax paid by Sentinel, for needed local services and to boost the local economy in the Mission Springs Water District service area.

CPV Sentinel creates needed local jobs. For example, during construction there will be 350 on-site jobs with a payroll of $40,000,000.00 plus an additional 380 indirect regional jobs. When the project is operational, fourteen highly skilled permanent jobs with a $1,300,000.00 annual payroll will be added. Clearly, the CPV Sentinel project will have a powerful positive presence in the local economy.

The project location is ideally suited to serve the Coachella Valley when help is needed most. The project site is on land already zoned for an electric power generating facility and is strategically sited adjacent to the existing Devers substation – the key hub through which flows virtually all the electricity supporting the Coachella Valley. The value of this site to our region is that when demand for electricity is highest and power outages may occur, the CPV Sentinel Standby Power Plant will generate electricity that will first safeguard the local power supply – only excess power will be routed to more distant locations as needed.

COUNTY ADMINISTRATIVE CENTER • FIFTH FLOOR • 4080 LEMON STREET • P.O. BOX 1645 • RIVERSIDE, CA 92502-1645
TELEPHONE (951) 955-1050 • FAX (951) 955-9030 • INTERNET: district5@co.riverside.ca.us
MORENO VALLEY DISTRICT OFFICE • 14375 NASON STREET, SUITE 207 • MORENO VALLEY, CA 92555
PERRIS DISTRICT OFFICE • 137 S. PERRIS BOULEVARD, #137C • PERRIS, CA 92570

County of Riverside

SUPERVISOR MARION ASHLEY
FIFTH DISTRICT

As Mission Springs Water District Board members your primary focus is on a clean water supply and efficient use of water resources. CPV Sentinel accomplishes both of those objectives through state of the art technology, fees and water treatment efforts.

CPV Sentinel is a state-of-the-art natural gas powered facility. It is environmentally friendly energy with high efficiency and minimal emissions. Water cooling is essential to the project. The amount of water consumed is minimal, especially when weighed against the energy safeguards the project provides the Coachella Valley. Under its power sales contracts, permits and water supply contracts, CPV Sentinel will be licensed to operate a maximum of 30 percent of any given year. The expected lifetime operating level will be 15 percent of any year. At such operating levels only 550 acre feet of water will be used annually to cool the CPV Sentinel facility – about the same amount used to irrigate a nine-hole golf course. CPV Sentinel is a prudent use of water supplies.

The CPV Sentinel project will benefit MSWD by helping to solve one of the District's greatest water quality issues and community concerns – the odor from the current waste water discharged from the Horton Waste Water Treatment Plant. The water plan that is being developed between MSWD Staff and CPV representatives will require that CPV Sentinel upgrade the Horton WWTP to tertiary levels. This plan benefits the District by improving its water quality, helps solve waste water odor problems and gives the District the opportunity to sell treated wastewater to the project and others.

CPV Sentinel will also more than pay its fair share for its water supply. It will pay for needed new supply wells and necessary transmission pipes and give these capital improvements to MSWD free of charge. CPV Sentinel will pay for all water pumped to its facility at full potable water rates, which include the recharge fee to import more water into the basin. The District has done an excellent job of projecting water demand and supply in its Urban Water Management Plan. That Plan shows that even in the year 2030, there is a surplus of over 40 percent water supply over demand. With CPV Sentinel, this water surplus stays well above 38 percent. CPV Sentinel will not constrain any future growth in Desert Hot Springs or any part of the MSWD service area.

In conclusion, the CPV Sentinel project is a benefit to the Mission Springs Water District, its ratepayers, Desert Hot Springs, and the residents of the entire Coachella Valley. The project's value to the local economy, local government and our quality of life cannot be overstated. It is necessary and must be built. CPV Sentinel is an important project to all of us.

I urge you to direct your staff to complete its assessments and bring the water agreement to a vote by the Board at the earliest opportunity. Time is of the essence to keep the CPV Sentinel project moving forward. I am dedicated to seeing that my constituents, and yours, receive the benefits and safeguards of this critically important project.

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County of Riverside

SUPERVISOR MARION ASHLEY
FIFTH DISTRICT

I welcome any questions or concerns that you may have.

Sincerely,

Marion Ashley

Marion Ashley
Supervisor, 5th District
Riverside County

CC. Mary M. Gibson, President
Randy Duncan, Vice President
John Furbee
Dorothy Glass
Nancy Wright

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mydesert.com

January 27, 2008

Are we running out of water?

Keith Matheny
The Desert Sun

The Coachella Valley's growth and progress was built and sustained on the plentiful groundwater beneath it.

"We've been able to pretend we don't live in a desert for the last 100 years," said former Palm Desert Mayor Buford Crites. "That illusion is about to end."

In a two-part series, The Desert Sun takes a look at an increasingly desperate water situation throughout the West that is about to hit home.

Years of groundwater overuse is causing the valley to sink - literally. The subsidence, if unchecked, could cause millions of dollars in damage to roads, pipelines and other infrastructure.

The valley's two main outside water sources, Northern California and the Colorado River, are in jeopardy.

The valley's share of State Water Project water from Northern California is being cut by about one-third after a recent federal court ruling affecting 25 million Californians. And the worst drought in 500 years has flows on the Colorado about half of normal.

Any major development in the valley that doesn't have its water supply already accounted for could have trouble getting off the ground due to current water supply uncertainties, officials said. Similar issues halted major projects in western Riverside County earlier this month.

Some of the country's fastest-growing areas are also its driest. The competition for increasingly scarce future water sources between the Coachella Valley and Phoenix, Las Vegas, Los Angeles and San Diego will drive up costs, water officials said.

"Are we going to run out of water? No; we're going to run out of cheap water," said David Luker, general manager of the Desert Water Agency.

Many are calling for increased water conservation and other action now to ensure adequate, stable water supplies.

A "water summit" with government and water officials from both Riverside and San Bernardino counties is set for Friday at the Morongo Casino, Resort & Spa.

"This has the potential to be the biggest water crisis we have had in the last 50 years or more," Riverside County Supervisor Marion Ashley said.

"I think it's hard to overestimate the potential for a disaster here."

ESTABLISHED IN 1918 AS A PUBLIC AGENCY

COACHELLA VALLEY WATER DISTRICT

POST OFFICE BOX 1058 • COACHELLA, CALIFORNIA 92236 • TELEPHONE (760) 398-2651 • FAX (760) 398-3711

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ASST. GENERAL MANAGER
JULIA FERNANDEZ, SECRETARY
DAN PARKS, ASST. TO GENERAL MANAGER
REDWINE AND SHERRILL, ATTORNEYS

January 11, 2008

Randy Duncan, President
Mission Springs Water District
66575 Second Street
Desert Hot Springs, California 92240

Dear President Duncan:

Regional Water Leaders invite you to: A WATER CRISIS ROUNDTABLE
and complimentary luncheon
9:00 a.m. – 1:00 p.m. on Friday, February 1, at Casino Morongo

Please join a frank and open discussion with Regional Water Leaders
Concerning the Worsening Water Crisis in Our Region

With severe cutbacks of water imported from the Delta simultaneous with a severe drought in the Colorado River Basin, the New Year has dawned with sobering news for local government leaders in Riverside and San Bernardino Counties.

Wracked by nearly ten years of severe drought, water delivery to many farmers in Western Riverside County has been cut by Metropolitan Water District of Southern California by 30 percent. A federal court ruling on endangered species in the Bay-Delta has cut drinking water supplies for this region by another 30 percent.

Our region is facing a very real and growing water crisis. The time has come for a frank and open discussion about the looming challenges facing our communities and the actions leaders should be taking now to avoid more severe impacts later.

You are invited by Riverside County Supervisor Marion Ashley and the General Managers of water agencies providing wholesale water supplies for this region (Inland Empire Utilities Agency, Eastern Municipal Water District, Coachella Valley Water District, San Bernardino Valley and Western Municipal Water District) to attend a Water Crisis Roundtable with local government leaders starting at 9:00 a.m., Friday, February 1, at Casino Morongo. All General Managers and members of city councils, Boards of Supervisors, Planning Commissions, and retail water agencies are encouraged to attend. A complimentary light lunch will be served. Please RSVP to Rebecca Holtzclaw, Western Municipal Water District, at (951) 789-5061 or by e-mail at rholtzclaw@wmwd.com.

An overview of the challenges will be provided from the federal, state, regional and local perspective, followed by a serious discussion about the actions needed in every jurisdiction to ensure our region mitigates the impacts of water shortage as effectively as possible.

Please join us on February 1. Your leadership is needed to help reduce impacts of the worsening water crisis in our region.

Yours very truly,

Steve Robbins
General Manager-Chief Engineer

TRUE CONSERVATION
USE WATER WISELY

SR:il/Robbins/08/jan/Regional Wtr Leaders Wtr Crisis Roundtable invitation

These slides are from the California Department of Water Resources, Division of Environmental Services.

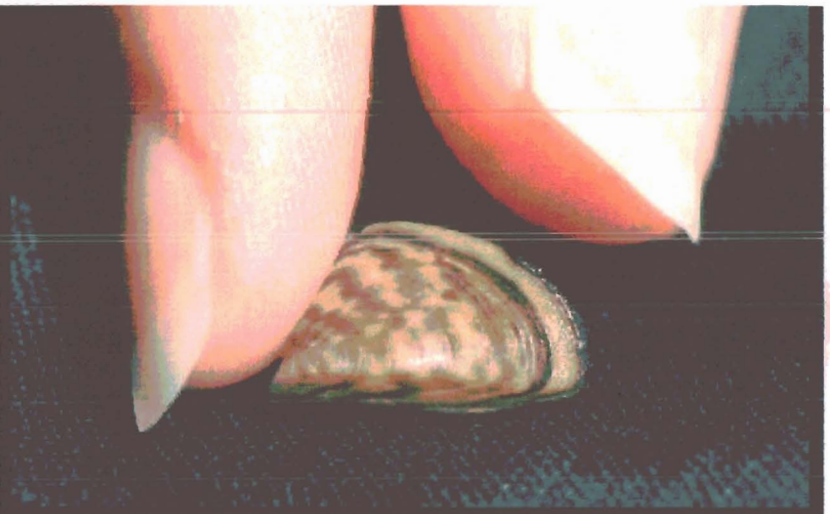
They demonstrate the serious threat that the Quagga and Zebra mussel's pose to the already critical Colorado River.

Quagga and Zebra Mussel Survey Training

Tanya Veldhuizen and Brianne Noble
California Department of Water Resources
Division of Environmental Services
(tanyav@water.ca.gov; bnoble@water.ca.gov)

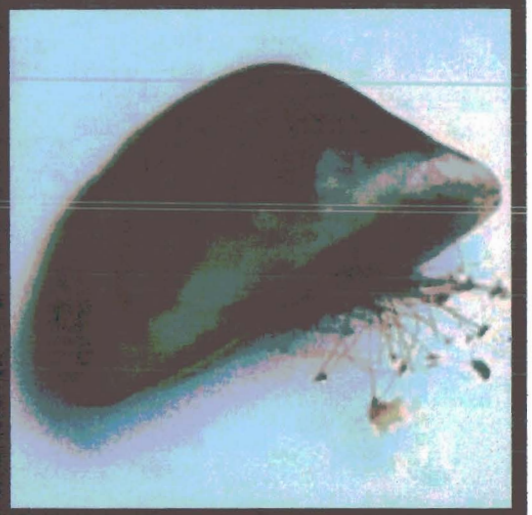
Description

- freshwater (< 3 ppt)
- small (< 5 cm or 2 in)
- banded or solid color pattern
- external fertilization
  - (quaggas spawn - 9 to 20 C)
  - (zebras spawn - 12 to 20 C)
- free-floating larval stage (called "veligers")
- filter feed on phytoplankton

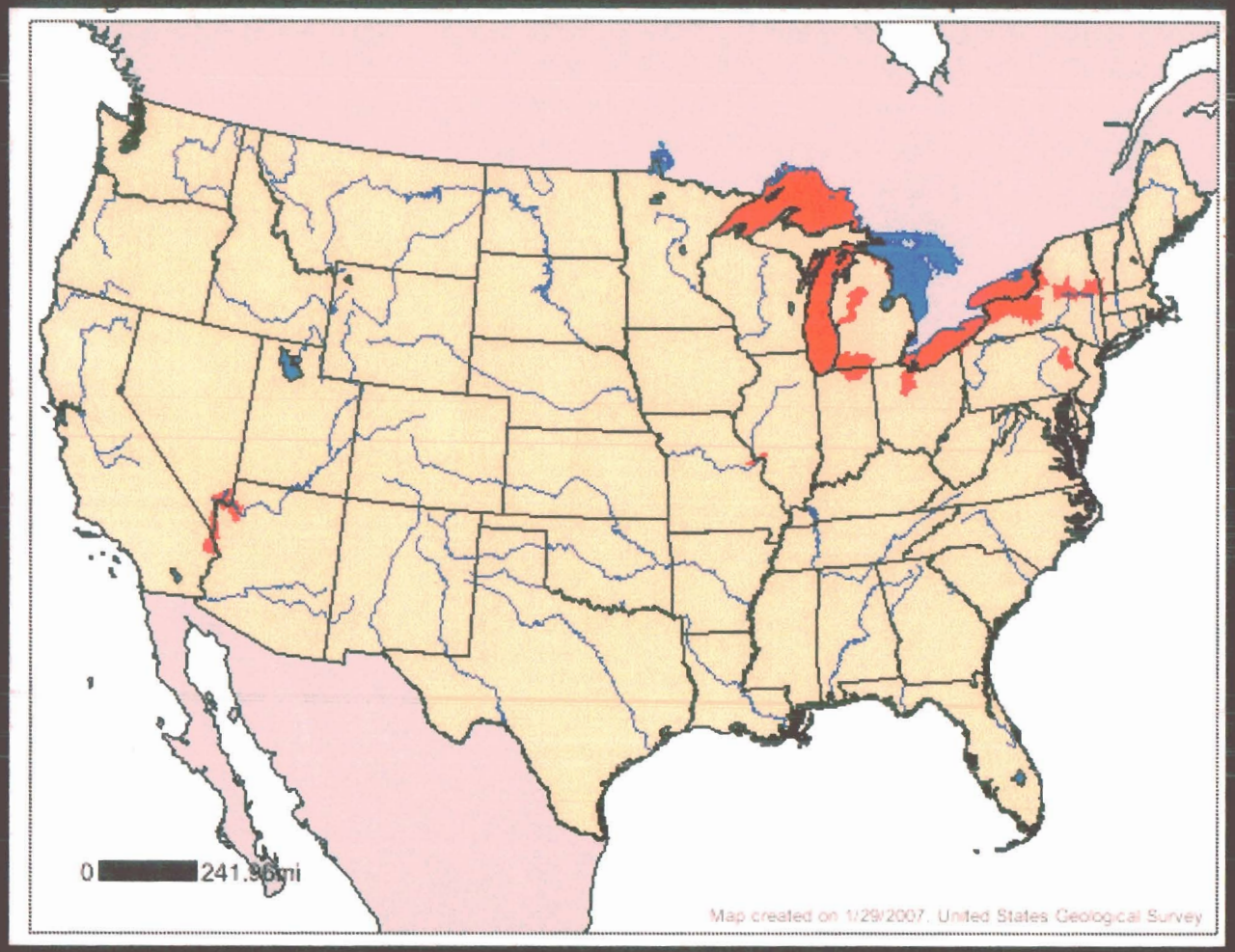


Great Invaders

- early maturation
  - mature by end of first year
- high fecundity
  - produce up to 1 million eggs, about 3% survival
- adaptable
  - wide physiological tolerance range
- colonize a variety of habitats
  - rivers, lakes, ponds
- dispersal mechanism
  - planktonic veligers, adults attach to hard substrates



2007 – Quagga Distribution



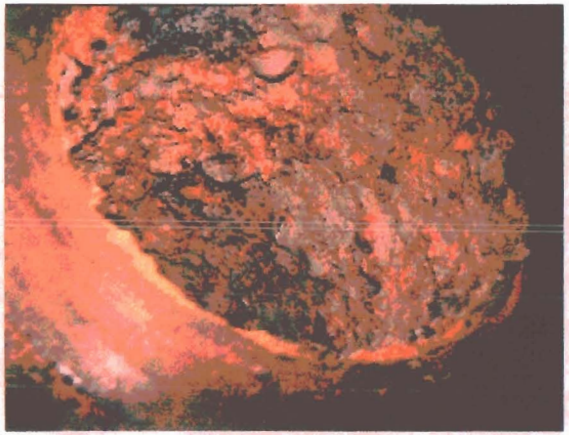
Jan 6 – Lake Mead, Jan 17 – L Havasu,
Jan 19 – L Mohave

Economic Impacts

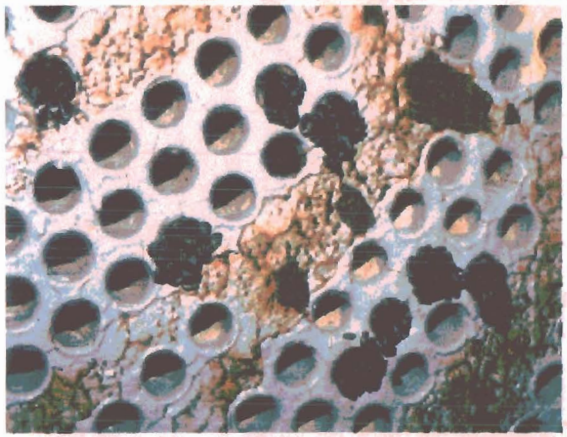
- Clogging
  - water intakes
  - trash racks
  - screens
  - boat motors

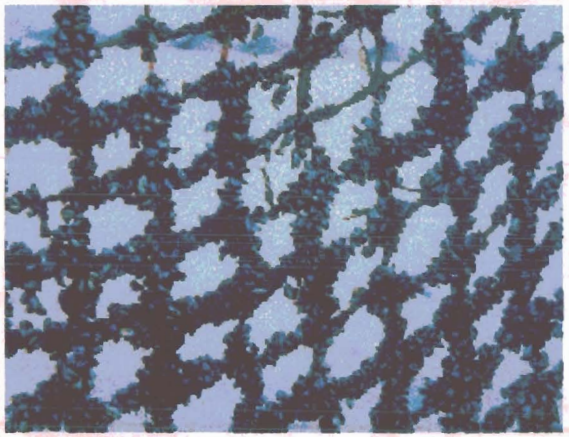
$40 million/year in maintenance costs to SWP facilities alone

(DWR draft estimate)



Zebra mussels encrusting various structures





The following is a copy of the brochure we distributed in Washington D.C. to ask the Federal Government for assistance with our "septic tank abatement project" (aka sewers) with a total estimated price tag of almost $70,000,000.00

The residents of Desert Hot Springs voted to approve this project to protect our drinking water.

CPV quotes "economically unfeasible" to use a dry cooling system. Economically unfeasible...for whom? We are spending almost $70 Million dollars just to provide a sewer system to protect our drinking water!

ACWA

ACWA's Biweekly Newsletter

Association of California Water Agencies
Since 1910
Leadership
Advocacy
Information

ACWA

Vol. 36, No. 5
March 10, 2008

ACWA Members Converge on Capitol Hill for Annual Washington, D.C., Conference

Photo credit: Melissa Hensley, ACWA Senior Meetings & Membership Specialist

ACWA members and staff traveled to Washington, D.C., for ACWA's annual conference Feb. 26-28. An article and photos begin on page 6.

ACWA Urges Legislature to Continue Work on Water Solutions, Calls Delta Crisis Too Serious to Delay Action on Comprehensive Water Package

ACWA has urged lawmakers to continue working with Gov. Arnold Schwarzenegger to reach agreement on a bipartisan plan to address a deepening crisis in the Delta.

"Everyone understands the Delta is rapidly deteriorating," ACWA Executive Director Timothy Quinn said in a statement Feb. 29.

"ACWA strongly supports moving forward based on a bipartisan agreement in the Legislature to deal with this crisis."

Continued on page 2

LAO Suggests New Property Tax Shift to Address Budget Gap; $188 Million Would Come from Water, Wastewater Districts to Fund Parole Realignment

The Legislative Analyst's Office (LAO) released an alternative budget proposal Feb. 20 that calls for a new ERAF-like property tax shift to help fund realignment of the state's parole system.

The proposal, included in the LAO's annual "Perspectives and Issues" report on the state budget, would reallocate $188 million in property tax revenues from water and wastewater districts

Continued on page 5

What's Inside:

2 Executive Director's Column

6 U.S. Sen. Boxer Receives ACWA Award

11 How to Use Outreach Action Center

12 Climate Alliance Formed

13 Regulatory / Energy News

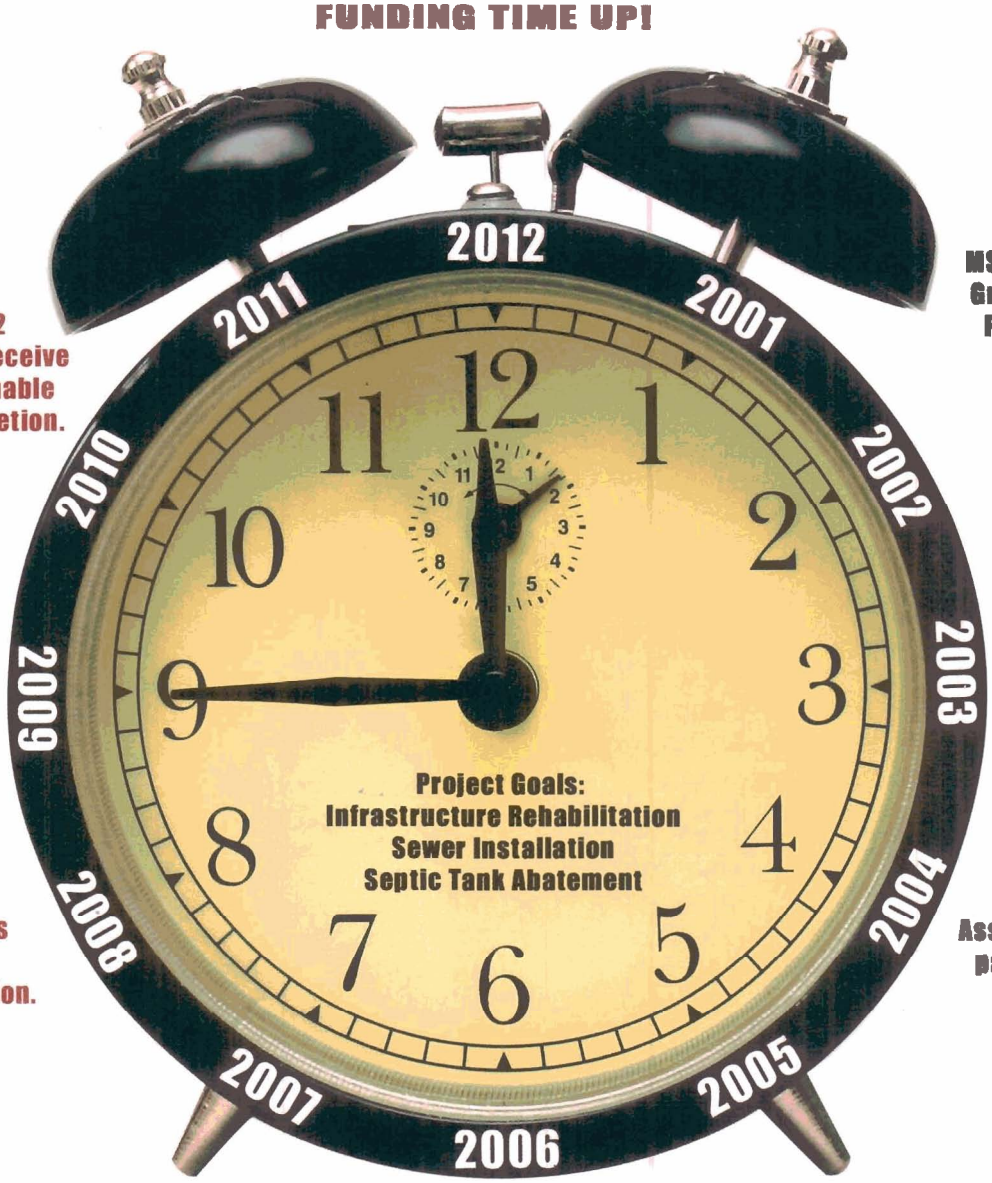
We're Working Hard To Protect Our Groundwater

But Time is Running Out.

2012
Assessment District 12
FUNDING TIME UP!

2000
MSWD begins work on Groundwater Quality Protection Project.

2010-2012
last years to receive funding to enable project completion.



2008-2012
Last years to acquire appropriations to enable project completion.

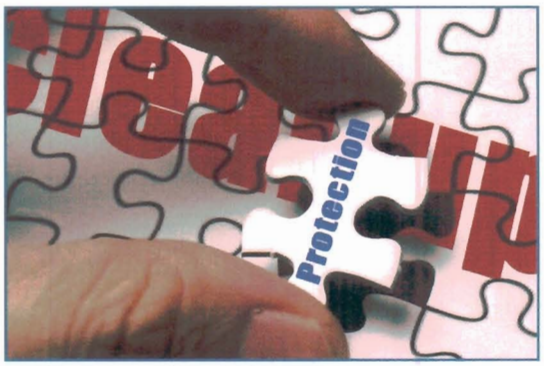
2004
Assessment District 12 passed, with 10 year completion goal.

2006
MSWD Groundwater Quality Protection Project Phase I completed.

Mission Springs Water District (MSWD) Groundwater Quality Protection Project: FY 2009

The purpose of MSWD's Groundwater Quality Protection Project is to protect our groundwater supply and eliminate a potential source of pollution by installing a municipal sewer system and abating individual septic systems that overlie sensitive groundwater resources in the greater Desert Hot Springs area—allowing for long-term protection of the groundwater resources.

In its "*1999 Groundwater Report to Congress*," the U.S. Environmental Protection Agency affirmed that pollution prevention is by far a more sensible, reasonable, cost effective, and preferred alternative to pollution clean-up. The report stated that the cost of protecting water quality from degradation is one tenth (1/10) to one one-hundredth (1/100) the cost of cleanup.



The cost of protecting water quality from degradation is one tenth (1/10) to one one-hundredth (1/100) the cost of clean up.

In its Groundwater Quality Protection Project, Mission Springs Water District (MSWD) builds on this holistic approach to water resource management through an entrepreneurial sharing of costs by federal, state and local interests. The project addresses long-term water supply and groundwater quality issues within the MSWD service areas and relies on multi-agency cooperation over the next five to eight years. MSWD's groundwater supplies are at the headwaters of the water supply serving nearly 400,000 people.

1. Water Supply Protection: This element will eliminate known pollution sources (septic tanks) and construct wastewater collection and treatment systems. It will also protect the regional groundwater resources which are essential to public health and the economic viability of the region.

2. Water Reclamation: This element reduces overall groundwater demand and ensures maximum efficient usage of regional groundwater resources by utilizing recycled water, rather than drinking water for all non-potable applications.

3. Funding Strategy: This element ensures the procurement of funds by way of implementing an entrepreneurial funding strategy. This strategy involves obtaining $28 million of community support through the assessment district formed in 2004 and acquiring funds through highly competitive state grant programs such as California Propositions 40, 50 and 84 Water Bonds.

4. Underground Storage Capacity Protection: This element ensures the ability to provide an adequate supply of safe water to meet rapidly growing demand in the region, as well as enhance overall water storage capability during wet years to offset increased demand during times of cyclical drought.

The Mission Creek and Desert Hot Springs Aquifers are the main sources of the greater Desert Hot Springs area's award winning drinking water and world-renowned spa mineral water. The long-term quality of these regional groundwater resources plays a critical role in enabling the greater Desert Hot Springs region to reach its full economic potential.

In 1996, MSWD commissioned the United States Geological Survey (USGS) and Michigan Technological University to conduct a study on the migration of wastewater discharged from privately owned individual wastewater disposal systems (septic tanks) and the effects, or potential effects, the discharging had on regional groundwater resources. The study, "*Transport of Contaminates from Wastewater Disposal Systems near Mission Creek Sub Basin, Desert Hot Springs, CA*" identified thousands of individual wastewater disposal systems that lie above the Mission Creek and Desert Hot Springs aquifers. The study concluded that wastewater discharged from individual disposal systems poses a significant threat to the public groundwater resources found within the greater Desert Hot Springs area of Riverside County, California. The study recommended that measures be implemented to protect water quality and that the means for abatement of individual wastewater disposal systems be pursued with all diligence.

The California Regional Water Quality Control Board (RWQCB-7) stipulates in its *Watershed Management Initiative Chapter and Colorado River Basin Water Quality Control Plan* that contamination of these groundwater resources due to the use of individual wastewater disposal systems is an issue of regional concern and violates CWC Section 13281. The RWQCB-7 identifies the protection of groundwater resources throughout the greater Desert Hot Springs area to be of high priority and regional significance. The RWQCB-7 recommends that funding be allocated to eliminate the use of individual wastewater disposal systems.

PROJECT DESCRIPTION

MSWD provides drinking water to a population of approximately 27,000 in its 135 square mile district. Sewer service is available to about 45% of those residents. MSWD is located in the northwest portion of the Coachella Valley, Riverside County, California. The majority of the District's service area lies within the boundaries of the 41st Congressional District (Congressman Jerry Lewis), with a portion in the 45th District (Congresswoman Mary Bono Mack). Population projections indicate a growth rate of at least 3% per year to about 54,000 by 2020 and ultimate build out of about 102,000. However, the region has experienced a growth rate that significantly outpaced these projections and caused an alarming increase in demand upon existing water and sewer facilities.

The city of Desert Hot Springs is an economically challenged community and falls into the lowest ranking of median household incomes in all of Riverside County, California. Residents of the greater Desert Hot Springs area have recognized the great importance of the Groundwater Quality Protection Project and are willing to invest the limited resources they have in order to protect and ensure that their most precious resource – water – is readily available for future generations.

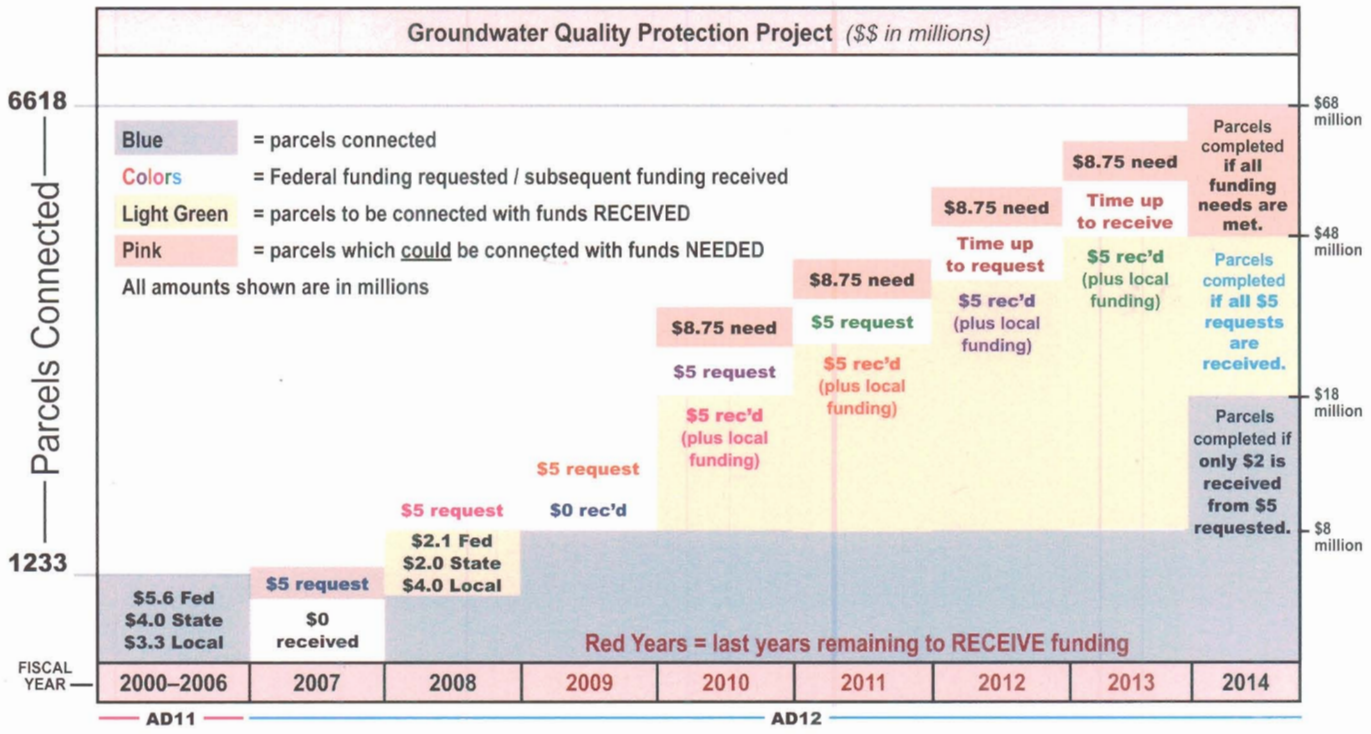
MSWD's Groundwater Quality Protection Project involves constructing municipal wastewater collection and treatment systems that will eliminate individual wastewater disposal systems that overlie the Mission Creek and Desert Hot Springs aquifers.

MSWD has made significant entrepreneurial efforts in securing funding for the Groundwater Quality Protection Project. Through formation of an assessment district, local residents voted and agreed to contribute $28 million toward the project. Other beneficial efforts include acquiring State grant funding from highly competitive water bond programs such as California Propositions 40, 50, and 84.

Over the past five years, Congress has appropriated $5.6 million in federal funds to match $3.3 million from community stakeholders and $4 million through the state water bonds. These funds have enabled MSWD to complete Phase I of the Project successfully. MSWD upgraded its wastewater infrastructure by building 17 miles of wastewater pipeline and abating roughly 744 individual wastewater disposal systems.

Phase II of the project requires building over 57 miles of wastewater pipelines over the next five to seven years and eliminating roughly 4,000 individual wastewater disposal systems—extending the municipal wastewater collection system to an additional 6,600 properties. Individual wastewater disposal systems are infiltrating the region at a fast pace due to rapid growth in the area. In order for the project to achieve its yearly goals, annual assistance for water and wastewater infrastructure improvements in the millions of dollars will be required. The total cost to complete the Groundwater Quality Protection Project is approximately $68 million.

PROJECT PROGRESS



TIME IS OF THE ESSENCE

The Background: MSWD's Groundwater Quality Protection Project involves constructing a municipal wastewater collection and treatment system that will eliminate individual wastewater disposal systems that overlie the Mission Creek and Desert Hot Springs aquifers. To do this, MSWD in 2004 formed an Assessment District to approximately match federal, state and local funding received for the Groundwater Quality Protection Program. The District needs to replace roughly 4000 individual sewage disposal systems that lie in a very concentrated area over the primary inflow of the groundwater that supplies nearly 400,000 people.

The 2007 WRDA passage includes a $35,000,000 construction authorization - but the timing of this authorization has some critical influence on this Project's success.

The Challenge: Providing water to an economically deprived area is certainly a formidable task. More important at this point are the timing constraints that, when evaluated, allow only a few years to complete this project. Timing is an issue for two reasons:

1. The AD-12 used to match the funding received was voted on in 2004 with a 10-year life span. We are now in the fourth year of this ten year project. In a best case scenario, our request this year will result in funding that will be received in the year 2010. The deadline for AD-12 will require that construction be completed prior to the tenth year, which realistically means that we have only three to four years left before AD-12 expires.

2. Another timing problem occurs with rapid area development. Tract housing developers are required to install sewers. However, infill occurs at the same rate as all other development. If sewers are not available to serve the infill, more individual systems will be installed, exacerbating the problem. MSWD is not the land use agency and therefore does not have the authority to place a moratorium on these systems. Although the District is meeting with the City and County to discourage allowing new individual septic systems to be built, the best solution is to have this area sewered before another wave of development occurs.

The Conclusion: Hopefully this funding, along with our own funding commitment, will be in place before the deadline arrives. In the meantime, efforts are being made to research and procure alternative funding. To date, the District has more than matched the federal funding with self funding and state grants, etc. MSWD is working with various communities to encourage more self funding in areas that can afford to do so.

APPROPRIATIONS REQUESTS

U.S. EPA, INTERIOR, ENVIRONMENT and Related Agencies S.T.A.G. Program

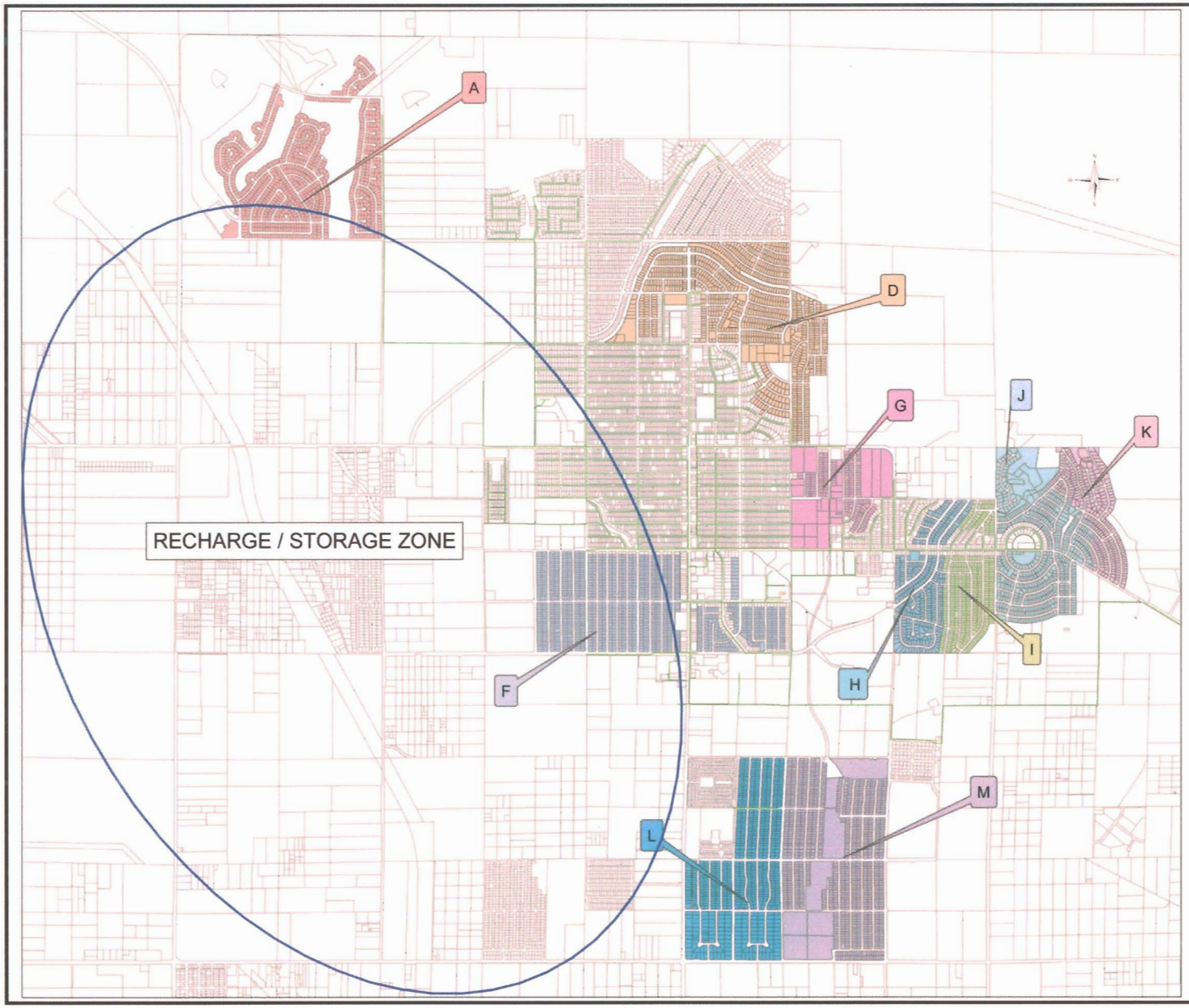
Groundwater Quality Protection Project, Phase II: Continued Improvements

For FY 2009, MSWD respectfully **requests $2 million** from the EPA State and Tribal Assistance Grant (STAG) program for its Groundwater Quality Protection Project—Phase II—continued water and wastewater infrastructure improvements.

ARMY CORPS OF ENGINEERS — Energy and Water Development, and Related Agencies

Groundwater Quality Protection Project:
Authorization, Section 219-(23) – Construction Assistance

MSWD's authorization as an environmental infrastructure project was amended to allow for construction assistance. Study and technical assistance was authorized in WRDA 2000 as Section 219-(23) "Resource protection and wastewater infrastructure, Desert Hot Springs, California." WRDA in 2007 authorized construction assistance at $35 million. Now that MSWD has received authorization, it is **requesting $5 million in appropriations** to continue with construction in Phase II of its Groundwater Quality Protection Project.



MSWD
Mission Springs Water District

GROUNDWATER QUALITY PROTECTION PROJECT

PROPOSED ASSESSMENT DISTRICT 12
ESTIMATED PROJECT COSTS

- --Service Area A--$5,370,000
- --Service Area D--$5,700,000
- --Service Area F--$5,660,000
- --Service Area G--$1,830,000
- --Service Area H--$2,100,000
- --Service Area I-- $1,680,000
- --Service Area J-- $3,130,000
- --Service Area K-- $1,670,000
- --Service Area M--$5,120,000

* MSWD Capacity Fees (6,600 parcels)	--$16,632,000
* Septic System Abatement (4,000 parcels)	--$ 9,400,000
Treatment Plant Expansion	--$ 4,838,000

AD12 - Completed: Area L

- --Service Area L-- $4,870,000

TOTAL PROJECT: --$68,000,000

The Mission Creek and Desert Hot Springs Aquifers are the main sources of the greater Desert Hot Springs area's award winning drinking water and world-renowned spa mineral water. The long-term quality of these regional groundwater resources plays a critical role in enabling the greater Desert Hot Springs region to reach its full economic potential.

Wastewater discharged from individual disposal systems poses a significant threat to the public groundwater resources found within the greater Desert Hot Springs area of Riverside County, California.

The minimum number of individual wastewater disposal systems needed to eliminate annually is more than 600. The amount of wastewater pipeline to be installed annually spans over 8 miles.

In order for MSWD's Groundwater Quality Protection Project to achieve its yearly goals, annual assistance for water and wastewater infrastructure improvements in the millions of dollars will be required.

MSWD
Mission Springs Water District

www.MSWD.org

66575 Second St.
Desert Hot Springs, CA 92240

ANCIENT FOREST FRIENDLY

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The following is a list of award winners from the Berkeley Springs International Water Tasting Awards.

available at www.berkeleysprings.com/water/awards

We have won the following awards in the years listed for the Municipal Water category:

2008-Silver Medal
2004-Gold Medal
2003-Bronze Medal
2001-Silver Medal
1999-Gold Medal

To sum it up, that's:

2 Gold Medal's
2 Silver Medal's
1 Bronze Medal

1-800-447-8797 Berkeley Springs, West Virginia

Berkeley Springs International Water Tasting Awards

Photos of the 2008 International Water!

2008 Award Winners

Municipal Water
Gold: **TIE... Metropolitan Water District of Southern California**
Clearbrook Waterworks District, British Columbia, Canada
Silver: **TIE... Desert Hot Springs, CA**
Village of Montrose, British Columbia, Canada
Bronze: **Rutland, Vermont**
4th -- **Independence, Missouri**
5th -- **Montpelier, Ohio**

Non-Carbonated Bottled Water
Gold: **Tumai Water, Martinsburg, WV**
Silver: **Eldorado Natural Spring Water, Eldorado Springs, CO**
Bronze: **Prairie Crystal Canadian Pure Spring Water, Marchand, Manitoba, Canada**
4th -- **83ppm Natural Spring Water, Village Blanchard, New Brunswick, Canada**
5th -- **Almost Heaven, Berkeley Springs, WV**

Purified Drinking Water
Gold: **Great Blue, Federalsburg, MD**
Silver: **Clear Creek Water Company, Farmington, NM**
Bronze: **Tie: Blue Moon Water, Brandon, Manitoba, Canada**
Saskatchewan Clear, Saskatoon, Saskatchewan, Canada
4th -- **Element H2O, Chantilly, VA**
5th --**The Original Cherokee Great Smoky Mountain Drinking Water, Cherokee, NC**

Carbonated Bottled Water
Gold: **Salvus Mineralwasser Medium, Emsdetten, Deutschland**
Silver: **Zema Voda, Tesanj, Bosnia**
Bronze: **Waiwera Artesian Water, Waiwera Infinity Thermal Spa Resort, Auckland, New Zealand**
4th --**Tie: Tesanjski Dijamant, Tesanj, Bosnia**
Seltzer Water, Pittsburgh, PA
5th- - **Canadian Gold, Marchand, Manitoba, Canada**

The People's Choice for Package Design
Gold: **Mist Premium Spring Water of Vanleer, TN based in Atlanta, GA**
Silver: **Aquadeco, Gold Mountain, Ontario, Canada based in New York, NY**
Bronze: **Tumai Water, Martinsburg, WV**
4th -- **Daytona Beach, FL**
5th -- **Mountain Valley Vintage Glass, Hot Springs, AR.**

2007 Award Winners

Municipal Water
Gold: **Montpelier, Ohio**
Silver: **Clearbrook, BC, Canada**
Bronze: **Elkford, BC, Canada**
4th: **Campbell River, BC, Canada**
5th: **Metropolitan Water District of Southern California**

Non-Carbonated Bottled Water
Gold: Tie: **I Am Healthy, by Aquamantra, Mount Palomar, California & Muskoka Natural Spring Water, Gravenhurst, Ont, Canada**
Silver: **John Deere Artisan Water, Grayling, MI & Ramona Springs, Washago, Ont, Canada**
Bronze: **ESKA, St Mathieu d'Harricana, PQ, Canada**
4th: **Aquaroyale, Baguio, Philippines**
5th: **Woolrich Spring Water, Woolrich, PA**

Purified Drinking Water
Gold: **Coral Water, Rost Labs, FL**
Silver: **Crystal Mountain Natural Spring Water, Huntsville, AL**
Bronze: **Daytona Beach, FL**
4th: **Chill, Mechanicsville, Virginia**
5th: **Stone Clear Premium, Vanleer,TN**

Carbonated Bottled Water
Gold: **Sparkling StoneClear Springs, Vanleer, TN**
Silver: **Esparanza, Tesanj, Bosnia**
Bronze: **Tesanjski Dijamant, Tesanj, Bosnia**
4th: **Hana Sparkling, Tesanj, Bosnia**
5th: **Tesanjski Kiseljak, Tesanj, Bosnia**

The People's Choice for Package Design
Gold: **Aquadeco, Mount Ararat, Armenia**
Silver: **Dabau Luxury Water, New York City, NY**
Bronze: **StoneClear Springs Natural Spring Water, Vanleer, TN**
4th: **Waiwera Infinity Artesian Water, New Zealand**
5th: **Aquarius Oxygen Water, Eugene, OR**

2006 Award Winners

Municipal Water
Gold: **Montpelier, Ohio**
Silver: **Kent, Ohio**
Bronze: **Sparwood, BC, Canada**
4th: **MHOG Water Plant, Howell, Michigan**
5th: **Rice Lake, Wisconsin**

Non-Carbonated Bottled Water
Gold: **Great Glacier, Oxford, Wisconsin**
Silver: **Ontario Gold Beverage, Barrie, Ont. Canada**
Bronze: Tie: **Virginia's Best, Edinburg, Virginia & Llanllyr SOURCE, United Kingdom**
4th: **LeSage Natural Wells, Lesage, West Virginia**
5th: **Amaro, Montreal, Canada**

Purified Drinking Water
Gold: **Claire Bale, Oak Creek, Wisconsin**
Silver: **StoneClear Springs Natural, Vanleer, Tennessee**
Bronze: **Water Boyz, Santa Fe, NM**
4th: **Chill, Mechanicsville, Virginia**
5th: **Daytona Beach, Florida**

Carbonated Bottled Water
Gold: **Antipodes, Bay of Plenty, New Zealand**
Silver: **Dobra Voda Sparkling, Republic of Macedonia**
Bronze: **Celvik Tesanj, Bosnia**
4th: **Pian della Mussa, Balme, Italy**

5th: Tie: **Dobra Voda Medium, Republic of Macedonia & Tesanjski Dijamant, Tesanj, Bosnia**

The People's Choice for Package Design
Gold: **Waiwera Infinity Artesian Water, New Zealand**
Silver:**Icelandic Glacial Bottled Water, Thorlakshoen, Iceland**
Bronze: **FLO, First Liquid Obsession, Vanleer, Tennessee**
4th: **StoneClear Springs Bottling Company, Vanleer, Tennessee**
5th: **Antipodes, Bay of Plenty, New Zealand**

2005 Award Winners

Municipal Water
Best in the World Gold: **Town of Gibsons, BC, Canada**(432 points)
Best in the United States: **Daytona Beach, FL**(417 points)
Silver: **Putaruru, New Zealand** (408 points)
Bronze: Tie--**Rice Lake, WI & Metropolitian Water District of Southern CA**(406 points)
4th: **Washington County, VA**(405 points)
5th: **Chilliwack, BC, Can**(401 points)

Non-Carbonated Bottled Water
Gold: **Lesage Natural Wells, Lesage, WV**(453 points)
Silver: **Knohun Kirkas, Knohu, Finland**(447 points)
Bronze: **Akali, Mt. Rainier National Park, WA**(441 points)
4th: **Real Water, Bearpaw Ridge, BC, Canada** (440 points)
5th: **Prairie Spring Natural Spring Water, Moose Jaw, Sask, Can** (433 points)

Purified Drinking Water
Gold: **Imibe, Broadview, Saskatchewan, Canada** (443 points)
Silver: **Chill, Mechanicsville, VA** (440 points)
Bronze: **Saskatchewan Clear, Saskatoon, Saskatchewan, Canada** (430 points)
4th: **Clear Creek Water Company, Farmington, NM**(429 points)
5th: **Tie--Water Boyz, Santa Fe, NM & Pure StoneClear Springs, Vanleer, TN**(424 points)

Carbonated Bottled Water
Gold: **Roua Muntilor, Covasna, Romania** (491 points)
Silver: **Alpa2O Sparkling Mineral Water, Zug, Switzerland** (444 points)
Bronze: **3 Way Tie--Pure StoneClear Springs Sparkling, Vanleer, TN & Tesanjski Dijamant, Tesanj, Bosnia & Vranica G. Vakuf, Bosnia** (442 points)

The People's Choice for Package Design
Gold: **Juliana, Jesenice, Slovenia**
Silver: **StoneClear Springs Sparkling, Vanleer, Tennessee**
Bronze: **Biota Colorado Pure Spring Water, Ouray, Colorado**
4th: **Stillhouse Springs, Blue Ridge, GA**
5th: **Oregon Rain, Newberg, OR**

2004 Award Winners

Municipal Water
Gold: **Desert Hot Springs, California** (419 points)
Silver: **Daytona Beach, Florida** (412 points)
Bronze: **Kent, Ohio** (410 points)
4th: **San Francisco, California** (404 points)
5th: **Dubuque, Iowa**(396 points)

Non-Carbonated Bottled Water
Gold: **Ice Mist, Mornrp, Sweden**(458 points)
Silver: **Real Water, Bearpaw Ridge, BC, Canada** (455 points)
Bronze [Tie]: **Ontario Gold Beverage, Barrie, Canada** and **StoneClear Premium Spring Water, Vanleer, TN**(450 points)
4th: **Fountain Natural Spring Water, Keyser, WVA** (442 points)
5th: **Laure Pristine Spring Water, Johnson City, TN** (441 points)

Purified Drinking Water
Gold: **Pure StoneClear Springs Water, Vanleer, TN.** (439 points)
Silver: **Blue Moon Water Systems, Brandon, Manitoba, Canada** (418

WATER AWARDS CREATED BY AMINGO GLASS

Hand-crafted fused-glass slump bowls are created each year by **Amingo Glass of Hedgesville, WV** as awards for the best water at the annual Berkeley Springs International Water Tasting. The iridized glass creates swirling patterns in the shallow bowls. The Berkeley Springs International Water Tasting logo and the winner's name and category are sand

points)
Bronze: **Saskatchewan Clear, Saskatoon, Canada** (413 points)
4th [Tie]: **Clear Creek Water Company, Farmington, NM** and **Imibe, Broad View Saskatchewan, Canada** (407 points)
5th: **Cool Wave Water, Upper Marlboro, MD** (401 points)

blasted into the glass after the winners are named. At Amingo Glass, the slump bowls are another creation in careers that have featured everything from hand blown goblets and jewelry to life-sized flamingo stained glass windows.

Carbonated Bottled Water
Gold: **Borsec, Harghita County, Romania** (487 points)
Silver: **Kiseljak Princess, Bosnia** (479 points)
Bronze: **StoneClear Springs, Vanleer, TN** (476 points)

The People's Choice for Package Design
Gold: **One Litre, Northumberland County, Canada**
Silver: **Oaza, Tesanj, Bosnia**
Bronze: **StoneClear Springs, Vaneer, TN**
4th: **Daytona Beach Florida**
5th: **Chilliwack, British Columbia, Canada**

2003 Award Winners

Municipal Water
Gold: **Montpelier, Ohio** (464 points)
Silver:**Metropolitan Water District of Southern Calif, Los Angeles, CA,** (451 points)
Bronze: **Desert Hot Springs, CA** (435 points)
4th: **Canora, Saskatchewan, Canada** (426 points)
5th: **Kinross Charter Township, Kincheloe, MI** (422 points)

Non-Carbonated Bottled Water
Gold: **Mountain Valley Spring Water, Hot Springs, AR** (466 points)
Silver:**Whispering Springs Natural Spring Water, Pierceton, IN** (465 points)
Bronze:**Avita Artesian Spring Water, Grayling, MI** (463 points)
4th: **Whistler Water Pure Glacial Spring Water, Burnaby, BC, Canada** (460 points)
5th: **Good Hydration-Premium Quality Natural Spring Water, Grafton, Canada** (458 points)

Purified Drinking Water
Gold: **Clear Creek Water Company, Farmington, NM** (460 points)
Silver: **Blue Moon Water Systems, Brandon, Manitoba, Canada** (459 points)
Bronze: **Seven Mills Water, Manassas, VA**(452 points)
4th: **Crystal Refreshing Drinking Water, Belize City, Belize** (450 points)
5th [Tie]: **StoneClear Distilled, Vanleer TN** and **Claire Baie Drinking Water, Oak Creek, WI** (441 points)

Carbonated Bottled Water
Gold: **Harrogate Spa Water, Harrogate, United Kingdom** (508 points)
Silver: **Eden Spring Natural Mineral Water, Salukia Spring, Israel** (496 points)
Bronze:**BlueStar, Adobe Springs, CA** (485 points)
4th: **Kiseljak-Princess, Tesanj, Bosnia** (482 points)
5th: **OAZA-MAPEX, Bosnia** (478 points)

The People's Choice for Package Design
Gold: **StoneClear Springs, Vanleer,TN** (259 points)
Silver: **OAZA-MAPEX, Tesanj, Bosnia** (257 points)
Bronze: **BlueStar, Adobe Springs, CA** (251 points)
4th: **Eden Spring Natural Mineral Water, Salukia Spring, Israel** (234 points)
5th: **Ice Mist, Morarp, Sweden** (230 points)

2002 Award Winners

Municipal Water category:
Gold: **Barraute, Quebec, Canada** (438 points)
Silver: **Senneterre, Quebec, Canada,** (436 points)
Bronze: **Hesperia, California USA** (434 points)
4th: **West Gilgo Beach, New York USA** (433 points)
5th: **Montpelier, Ohio USA** (432 points)

The Non-Carbonated Bottled Water category:
Gold: **ICE MIST, Morarp, Sweden** (469 points)

Silver: **Canadian Mountain, Barrie, Ontario, Canada** (459 points)
Bronze: **Laure' Spring Water, Unicoi, Tennessee USA** (455 points)
4th: **Whistler Water Pure Glacial Spring Water, Burnaby, British Columbia, Canada** (454 points)
5th: **Mountain Valley Spring Water, Hot Springs, Arkansas USA** (403 points)

The Purified Drinking Water category:
Gold Tie: **Blue Moon Water Systems, Brandon, Manitoba, Canada & Cherokee Bottled Water, Cherokee, North Carolina USA** (444 points)
Silver: **Whispering Springs Purified Drinking Water, Pierceton, Indiana USA** (427 points)
Bronze: **Stoneclear Springs, Vanleer, Tennessee USA** (426 points)

The Carbonated Bottled Water category:
Gold: **Onza Tesanj, Tesanj Bosnia,** (510 points)
Silver: **Gleneagles Scottish Spring Water, Scotland** (497 points)
Bronze: **Highland Spring Scottish Spring Water, Blackford, Scotland** (496 points)

The People's Choice for Package Design category:
Gold: **Gleneagles Scottish Spring Water, Scotland**
Silver: **Onza Tesanj, Tesanj, Bosnia**
Bronze: **Valley of the Moon Natural Spring Water, Philipsburg, Montana USA**

2001 Award Winners

Municipal Water category:
Gold: **Amos, Québec, Canada** (373 points)
Silver: **Desert Hot Springs, California USA,** (367 points)
Bronze: **Dubuque, Iowa USA** (359 points)
4th Tie: **El Sobrante, California USA & Joshua Tree, California USA** (357 points each)
5th Tie: **Atlantic City, New Jersey USA & Huntington Station, New York USA** (356 points each)

The Non-Carbonated Bottled Water category:
Gold: **Simply Natural Canadian Spring Water, Middlebro, Manitoba, Canada** (417 points) (*This is a correction of the press release - originally listed as being from Dorian, Ontario*)
Silver: **Whispering Springs Natural Spring Water, Pierceton, Indiana USA** (414 points)
Bronze Tie: **Deer Park, New Tripoli, Pennsylvania, USA & Valley of the Moon Natural Spring Water, Philipsburg, Montana USA** (406 points each)
4th: **Sweet Springs Natural Mountain Water, Gap Mills, WV** (404 points)
5th: **Rocky Grove Drinking Water, Titusville, PA** (403 points)

The Purified Drinking Water category:
Gold: **Claire Bale, Oak Creek, Wisconsin, USA** (401 points)
Silver: **Whispering Springs Purified Drinking Water, Pierceton, Indiana, USA** (378 points)
Bronze: **Cherokee Bottled Water, Cherokee, North Carolina, USA** (369 points)

The Carbonated Bottled Water category:
Gold: **Perrier Sparkling Mineral Water, Vergeze, France** (461 points)
Silver: **Highland Springs Sparkling Water, Blackford, Scotland** (454 points)
Bronze: **Onza, Tesanj, Bosnia** (446 points)

The People's Choice for Package Design category:
Gold: **Obi Zulol, Republic of Tajikistan** (312 points)
Silver: **Valley of the Moon Natural Spring Water, Philipsburg, Montana** (286 points)
Bronze: **Onza Tesanj, Bosnia** (285 points)

AWARD CATEGORIES

There are now four separate categories of judging: Bottled Non-carbonated, Purified Drinking Water, Bottled Sparkling, and the Municipal Division.

Ballots for the **Peoples' Choice Package Design Award** will be available on Saturday, February 24, 2001.

Awards for the best water at the Berkeley Springs International Water Tasting are hand-crafted fused-glass slump bowls created by Amingo Glass of Hedgesville, WV.

2000 Award Winners

Packaging Design
Gold: **Oaza**, Tesanj, Bosnia (362 points)
Silver: **Air Water**, Talking Rain, Preston, WA (324 points)
Bronze: **Mission Springs Water**, Desert Hot Springs, CA (306 points)

Municipal Water
Gold: **Yucca Valley**, CA (410 points)
Silver: **Metropolitan Water District**, CA (399 points)
Bronze: **Pico Rivera**, CA (397 points)

Non-Carbonated Bottled Water
Gold: **Halstead Spring Water**, Speedwell, TN (423 points)
Silver: **Kentwood Artesian**, Atlanta, GA (415 points)
Bronze [Tie]: **McKenzie Mist**, Blue River, OR and **Le-Nature's Water**, Latrobe, PA (411 points)

Carbonated Bottled Water
Gold: **Calistoga Sparkling Mineral Water** (447 points)
Silver [Tie]: **Oaza**, Tesanj, Bosnia and **Mountain Valley Sparkling**, Hot Springs AR (434 points)
Bronze: **Oaza, Tesanj, Bosnia (green)** (429 points)

Visit our press release page for more information

The Berkeley Springs International Water Tasting & Competition
1999 Winners

Municipal Winners (total possible points: 528)
Gold: **Desert Hot Springs, CA** (411 points)
Silver: **Montpelier, OH** (401 points)
Bronze: **South Huntington, NY** (391 points)
4th: **Fairmont, WV** (384 points)
5th: **Eldorado Springs, CO** (380 points)

Bottled Non-Carbonated Winners (total possible points: 528)
Gold: **English Mountain, Dandridge, TN** (445 points)
Silver: **Mountaineer Pure, Charleston, WV** (437 points)
Bronze: **Vittel, France** (436 points)
4th: **Whispering Springs, Pierceton, IN** (434 points)
5th: **Acqua Pauna, Italy** (430 points)

Bottled Carbonated Winners (total possible points: 583)
Gold: **Harghita Naturally Sparkling Mineral Water, Romania** (459 points)
Silver: **SanPellegrino, Italy** (453 points)
Bronze: **Poland Spring, ME** (448 points)
4th: **Mountain Valley Sparkling Spring Water, Hot Springs AR** (436 points)
5th: **Quibell Sparkling Spring Water, Martinsville, VA**(429 points)

Packaging Design Winners (total possible points: 240)
Gold: **Quibell Sparkling Spring Water**(194 points)
Silver: **Hawaii Water Company** (186 points)
Bronze: **Olden** (181 points)
4th: **Whispering Springs** (180 points)
5th: **Lesage Natural Wells** (171 points)

Interesting Facts
(Press Releases)

<< Prev | Next >>

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The following is the cover page to the program directory for a May 1st, 2008 County Supervisors meeting. The following day, the Desert Sun came out with the attached article which starts out by saying:

"In less than seven years, drought-stricken Riverside County might not be able to supply drinking water to 360,000 people-roughly the population of the Coachella Valley..." The article goes on to quote Celeste Cantu, GM of the Santa Ana Watershed Project Authority to say "It's been difficult to say, hey, we really are in a crisis. We really are in a drought". And Terrance Fulp, Deputy Regional Director for the Bureau of Reclamation-Lower Colorado Region, "this is the driest period in 100 years". He goes on to illustrate that the State Water Resources announced that snow pack was at 67% of normal levels, and that the Colorado River, the valleys major water source, is "over-allocated".

The article continues with drought, conservation and more.

Fifth Annual
RIVERSIDE COUNTY WATER SYMPOSIUM

Morongo Casino Resort & Spa
9 a.m. to 3 p.m.

RIVERSIDE COUNTY WATER SYMPOSIUM

Presented by:

ALBERT A. WEBB ASSOCIATES

2008 EVENT PROGRAM

Hosted by Riverside County Supervisors Marion Ashley, Roy Wilson, Jeff Stone, John Tavaglione, Bob Buster and Riverside County Water Task Force Chairman John Hasel &

37th District Senator Jim Battin
40th District Senator Denise Moreno Ducheny
44th District Congressman Ken Calvert
45th District Congresswoman Mary Bono Mack
59th District Assemblyman Anthony Adams
64th District Assemblyman John Benoit
65th District Assemblyman Paul Cook
66th District Assemblyman Kevin Jeffries
Agricultural Water Management Council
American Society of Civil Engineers
Beaumont Chamber of Commerce
Beaumont-Cherry Valley Water District
Building Industry Association - Desert Chapter
Building Industry Association - Riverside Chapter
Cabazon Water District
California Citrus Mutual
California Department of Water Resources
California Latino Water Coalition
California Waterfowl Association
Cathedral City Chamber of Commerce
City of Banning
City of Beaumont
City of Canyon Lake
City of Coachella
City of Desert Hot Springs
City of Fontana
City of Hemet
City of Hemet Mayor Marc Searl
City of Indian Wells
City of Indio
City of Moreno Valley
City of Palm Desert
City of Palm Springs
City of Perris
City of Perris Mayor Daryl Busch
City of Riverside Public Utilities
Coachella Valley Association of Governments
Coachella Valley Water District
Desert Water Agency
Eastern Municipal Water District
Elsinore Valley Municipal Water District
Endangered Habitats League
Fern Valley Water District
Hemet-San Jacinto Action Group
Idyllwild Water District
Indio Water Authority
Inland Empire Waterkeeper
Jurupa Community Services District
Lee Lake Water District
Metropolitan Water District of Southern California
Mission Springs Water District
Moreno Valley Chamber of Commerce
National Association of Industrial and Office Properties
Palm Desert Chamber of Commerce
Rancho California Water District
Riverside County Economic Development Agency
Riverside County Farm Bureau
Riverside County Flood Control & Water Conservation District
Riverside County Water Task Force
San Gorgonio Pass Water Agency
Santa Ana Watershed Project Authority
Southern California Water Committee
Southwest California Economic Alliance
U.S. Bureau of Reclamation
Western Municipal Water District
Western Riverside Council of Governments

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The Desert Sun

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SERVING THE COACHELLA VALLEY SINCE 1927

mydesert.com/news updated throughout the day

tagecoach '08 rolls in tonight

RUCE FESSIER
UDITH SALKIN
ERT SUN

— By sunset today, the aro- barbecue and hand-rolled tes will waft across the Em- lo Club.

in Daisy Dukes will be in s of fellas wearing their best y boots and Stetsons.

they'll be stepping to the of crawdaddies, like John y, and country rockers, like gles.

will host to one of the most diverse country music festivals west of the Mississippi over the next three days. More than 85,000 people are expected to attend this year's Stagecoach Country Music Festival — about 30,000 more than last year.

It's a mass migration that started on Wednesday when the first RVs rolled onto the campgrounds.

"From 6 p.m. to midnight they just kept coming," said Debbie Collins of Norco, who came with her partner, Shannon Dimmitt, to see The Judds perform Saturday. "We came early to get a good spot."

Good thing, too, since by mid-afternoon Thursday the main campground was nearly 30 percent filled and the stream of incoming campers was nonstop.

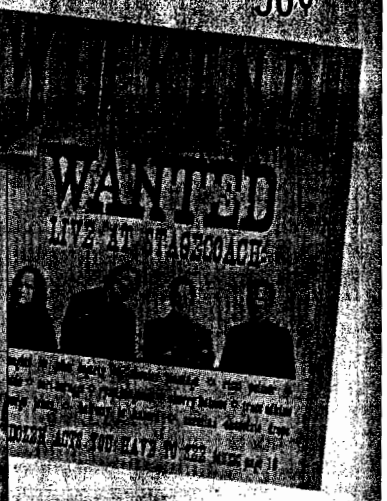
The Stagecoach Country Music Festival boasts a bill that features more than 60 artists, from living legends like Earl Scruggs and George Jones to up-and-coming acts like Jypsi and local girl Karista Smith. Classics like Glen Camp-

Please see STAGECOACH, A4

MYDESERT.COM

Who do you most want to see? Go to **mydesert.com/stagecoach** and choose your favorite among Stagecoach's headliners.

PLUS: Check our site tonight for complete coverage with live blogs, photo galleries and more.



MORE ON STAGECOACH

Who are the must-see acts? Check them out and read interviews with Taylor Swift and Don Henley in the **WEEKEND** section in today's Desert Sun.

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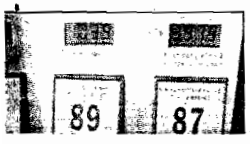

County: Water crisis on horizon

But conservation, desert landscaping can help avert shortage, say experts

BY ERICA SOLVIG
THE DESERT SUN

In less than seven years, drought-stricken Riverside County might not be able to supply drinking water to 360,000 people — roughly the population of the Coachella Valley's nine cities.

The good news: You can help prevent this dire scenario, through desert landscaping and conservation, officials at the fifth annual Riverside County Water Symposium said Thursday.

About 800 elected officials, water experts and community leaders gathered in Cabazon to share ideas on convincing residents to reduce their water usage and ways that local agencies can collaborate on recycling and conservation efforts.

"We've been a victim of our own success: People have taken water for granted," said Celeste Cantú, general manager of the Santa Ana Watershed Project Authority, which calculated the shortage projection.

"It's been difficult to say, 'Hey, we really are in a crisis. We really are in a drought.' "

According to Terrance Fulp, deputy regional director for the Bureau of Reclamation — Lower Colorado Region, this is the driest period in 100 years.

■ The state water resources on Thursday announced the snowpack water content is at only 67 percent of normal levels.

■ The Colorado River, the valley's major water source, is "over-allocated," Fulp said.

■ It could take years for officials to finalize a comprehensive plan for the Sacramento-San Joaquin Delta, which provides water to two-thirds of all Californians.

Please see WATER, A4

✔ ARE WE RUNNING OUT?

Read our special report about the valley's water situation at **mydesert.com/water**

FROM PAGE 1

WATER: Landscaping, lawns culprits

Continued from A1

■ And climate changes will make the Southwest even drier, putting further pressure on resources such as the Colorado River.

Even though this year's average water runoff is a bit higher than it has been in recent years, it's not enough to relieve the current conditions.

"We're in eight years of unprecedented drought," Fulp said.

Locals tackle crisis

Desert water agency officials said the possible water shortage is at the forefront for them.

Officials are looking at how to extend the state water project into the Coachella Valley, said Steve Robbins, general manager of the Coachella Valley Water District.

It was never brought this way because people never thought there could be a shortage on the Colorado River, he said.

DAILY QUESTION

Have you taken measures to cut back on your water usage? Cast your vote now at **mydesert.com**

Having the infrastructure in place would put the desert "in a position that when we have water available in the state system, we're able to move it" here as needed, Robbins said.

But that takes money — something water experts expect they'll lose under the governor's proposed budget amid a state budget shortfall that could reach $20 billion.

At CVWD, water rates could rise 14 percent in July and another 10 percent next year to make up for the shortfalls in state funding, board president Peter Nelson said.

Still, officials say the responsibility doesn't only rest on local agencies.

Per capita, water usage in Riverside County and the Inland Empire is about double what people in Orange County use, Western Municipal Water District general manager John Rossi said.

And roughly 70 percent of the available water use is watering lawns and landscaping, Cantú said.

If residents cut that use in half — through desert landscaping or proper watering of existing lawns — it would free up 35 percent of the available drinking water, she added.

A reliable water supply is vital to continued population growth, and to major industries such as agriculture and tourism.

"Our economy is dependent upon water," Nelson said. "We need to make the most of that resource to make the most of our economy."

Erica Solvig is a reporter for The Desert Sun. She can be reached at 778-4644 or at erica.solvig@thedesertsun.com.

STAGECOACH: Eagles to join country fest

Continued from A1

bell and the Judds, who are reuniting for just this event, are also on the schedule.

This second year of the festival features a bit of every offshoot of country, from traditional to alt-country to contemporary to bluegrass to rock and roots music, with a country twist.

The festival will also present a rare two-hour set tonight by The Eagles, who are making their first country music festival appearance.

"All the festivals we've done in the past have been rock music festivals," Eagles co-leader Don Henley said in an exclusive Desert Sun interview. "By contrast, the bill at Stagecoach is a virtual who's who of country music stars."

Promoter Paul Tollett of the Los Angeles-based Goldenvoice said he thinks Stagecoach is "the most varied country music festival out there."

Goldenvoice is the same promotion company that produced last weekend's Coachella Valley Music and Arts Festival, which drew more than 160,000 indie rock lovers.

Need tickets?

Single-day tickets are $95, single reserved seats are $200 through Ticketmaster.

Camping in the El Dorado fields is sold out, but family and tent camping sites are still available.

Unlike the kids who camped in tents last weekend, the country fans are roughing it in state-of-the-art motorhomes, campers and pick-up trucks towing pop-ups.

Some Stagecoach fans are reuniting with friends they made at last year's festival.

Cal Fire firefighter Matt Franklin wheeled around the campground on a John Deere cruiser bike near his RV on Thursday, heckling Sam Show of El Centro, who he met at last year at Stagecoach.

"We're waiting for a bunch of other guys we met last year to get here," he said.

While The Eagles were a draw, "Trace Adkins, that's who I came to see," Franklin said.

"I want to see the old guys like Earl Scruggs before they die," Show said. "This is probably the only chance I'll get."

It's also J.J. Witten's second year at the festival. The Indio firefighter was wandering around with his English bulldog Lacey Lee and looking forward to Thursday night's karaoke contest at the cantina tent at the far end of the camping field.

"I think Lacey might like it, too," he said.

By mid-afternoon, the main campground was about 30 percent filled. Camping in the El Dorado fields is sold out, but family and tent camping sites are still available.

Last year's inaugural festival drew 55,000 people in two days after ideal weather spurred walk-up traffic that almost doubled advance ticket sales.

With weather pleasant but windy, Goldenvoice's Tollett predicted daily attendance was "positively going to be bigger than last year."

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This article is from Western Water magazine. It focuses mainly on global warming, which is a whole other subject, but it also references the impact that warming trends have on snowpack, rain, drought, and other water related topics.

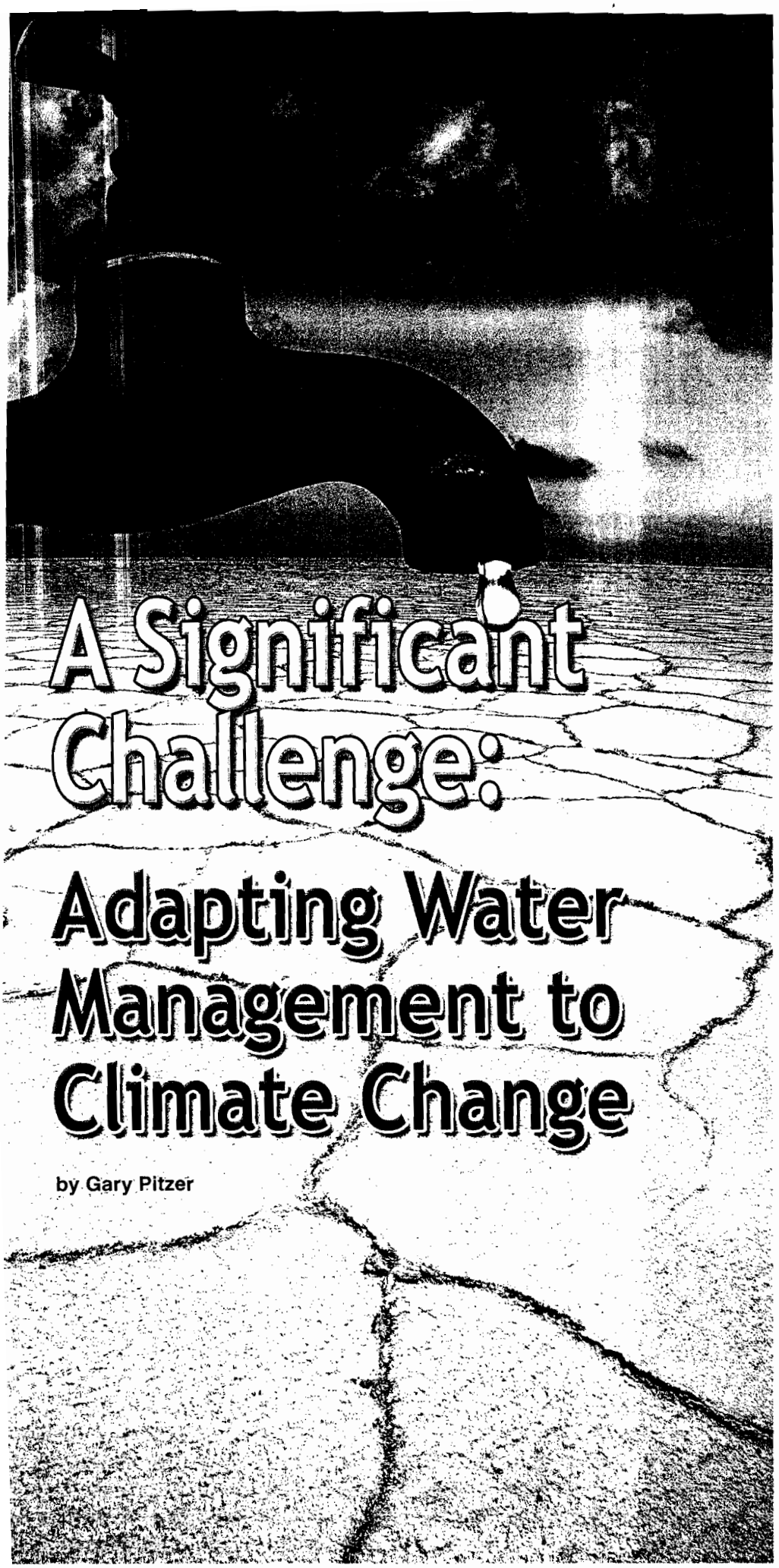
January/February 2008

WESTERN WATER

A Significant Challenge:

Adapting Water Management to Climate Change

Published by the Water Education Foundation



A Significant Challenge: Adapting Water Management to Climate Change

by Gary Pitzer

Climate is what we expect, weather is what we get.

– Mark Twain

Perhaps no other issue has rocketed to prominence in such a short time as climate change. A decade ago, discussion about greenhouse gas (GHG) emissions and the connection to warming temperatures was but a fraction of the attention now given to the issue. From the United Nations to local communities, people are talking about climate change – its characteristics and what steps need to be taken to mitigate and adapt to the anticipated impacts.

The impacts – from changes in the amount, timing and distribution of precipitation – will fall on many parts of society, including the storage, treatment and delivery of water to a growing population.

"The water industry is in the eye of the storm," said Kathy Caldwell, senior project manager with CH2M Hill, at the California Water Policy Conference Nov. 15 in Los Angeles. "No other industry is as affected as they are."

Coming amid a plethora of water-related news items such as restricted Delta pumping, lingering drought fears and the debate over new storage, climate change promises to shake the foundation of the many assumptions regarding California's water use. The changed future in terms of increasingly variable water supplies and the need to reduce carbon emissions compels leaders to re-think how water agencies move forward.

"We are the first responders to climate change effects," said David Behar, deputy to the assistant general manager at the San Francisco Public Utilities Commission. "It's time for us to get our act together … even as we are getting our own carbon house in order."

Although there is a tendency to view climate change as something that is coming, many experts say it has already arrived. "We ... know that there are major precipitation changes that are taking place," said Rajendra Pachauri, chair of the United Nations' Intergovernmental Panel on Climate Change (IPCC), in a September speech to the U.N. "In general, in the temperate regions there's an increase in precipitation, rainfall and snow, but in the tropical, subtropical and Mediterranean regions there is a decline."

The IPCC's research notes that the rate of change is more rapid than anything seen the last 10,000 years and that the concentration of GHG is greater than at any period during the last 600,000 years. "Most of the observed increase in globally-averaged temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG concentrations," the IPCC says.

California's water system is expected to change as the weather pattern shifts to less snow, more rain and earlier snowmelt. Consequently, reservoir operations will have to be further adapted to the concurrent and conflicting needs for increased water supply storage and increased flood storage space. The altered nature of the Sierra Nevada snowpack – the state's largest reservoir – has sparked the discussion regarding whether new storage capacity is needed to boost the state's water system.

"There are a lot of opportunities and a lot of directions to go in," said Lester Snow, director of the Department of Water Resources (DWR), at the California Climate Change and Water Adaptation Summit Oct. 3 in Santa Monica. "We need to make intelligent decisions. Climate change will keep moving forward even if we are not ready."

Determining how climate change will affect communities is an evolving process, spurred forward by an international conglomeration of scientists. In November, the IPCC released its fourth summary report, which synthesized the latest climate change science. While outlining some dire predictions such as a rapid rise in sea levels, the panel notes that measures can be taken to reduce the emissions that cause climate change and help absorb the impacts that result from changing global temperatures.

"There is high confidence that neither adaptation nor mitigation alone can avoid all climate change impacts; however, they can complement each other and together can significantly reduce the risks of climate change," the report says.

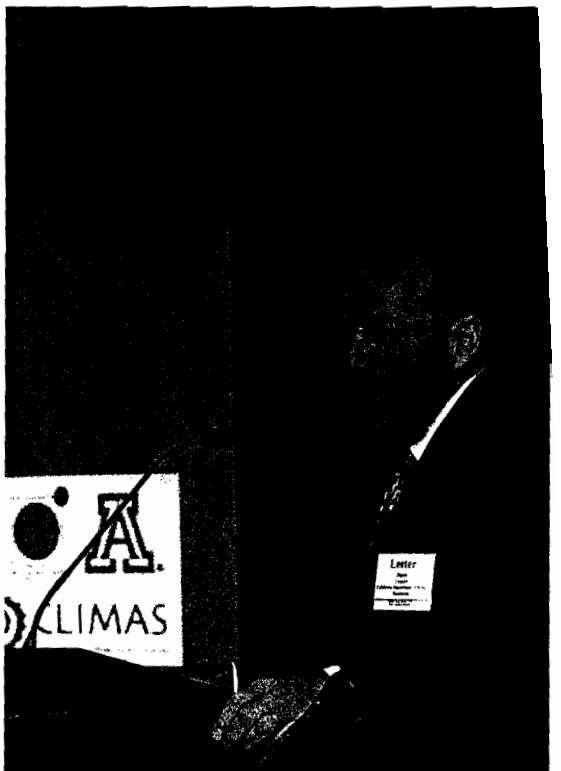
Snow and other water leaders throughout the West are working to ensure the expected climate change impacts are accounted for in future water planning.

"Adaptation is essential to respond to changes that are already occurring due to warming temperatures," Snow said. "The overwhelming scientific consensus is that these changes are already upon us, and that even if the world were somehow able to cease all emissions immediately, the Earth's temperature would continue to rise for at least another century as a result of the existing concentration of greenhouse gas emissions."

With that in mind, water managers are furthering their efforts on measures (including greater water use efficiency) already in use to adjust an already variable water picture while improving self-sufficiency. This is part of what is described as integrated regional management – a cooperative, locally driven process that is part of the overall drive to further diversify water supply sources.

While issues such as the crisis in the Delta have been an instigating factor, "climate change probably pushes the local and regional efforts even harder," said John Andrew, DWR's executive manager for climate change activities.

On the mitigation side, many efforts are underway to address GHG emissions. In 2006, California passed a landmark law (AB 32) that requires



"We need to make intelligent decisions. Climate change will keep moving forward even if we are not ready."

– Lester Snow, CA DWR

In 2006, California passed a landmark law (AB 32) that requires GHG emissions to be reduced to 1990 levels by 2020. By 2050, the state aims to reduce emissions 80 percent from the 1990 level.

GHG emissions to be reduced to 1990 levels by 2020, with mandatory caps beginning in 2012 for "significant sources." By 2050, the state aims to reduce emissions 80 percent from the 1990 level.

New water management strategies will be a part of the effort to reduce GHG emissions. "The climate change-energy connection is quite eye-opening," said Brad Udall, director of the University of Colorado and National Oceanic and Atmospheric Administration's (NOAA) Western Water Assessment in Boulder, Colo. "Water and energy use are inextricably linked."

The water-energy connection in California is often illustrated by the roughly 20 percent of total electrical demand that is used to bring water to consumers and send it away for sewage treatment. The correlation is important because the greater the demand for electric power, the more GHG emissions are pumped into the atmosphere.

In California, the extraction, conveyance, local distribution, treatment and use of water accounts for 19 percent of the total demand for electricity and 30 percent of the non-power plant natural gas consumption. Some electric power is generated by processes such as coal burning, which pumps heat-trapping carbon dioxide into the atmosphere causing what scientists call the "enhanced greenhouse effect."

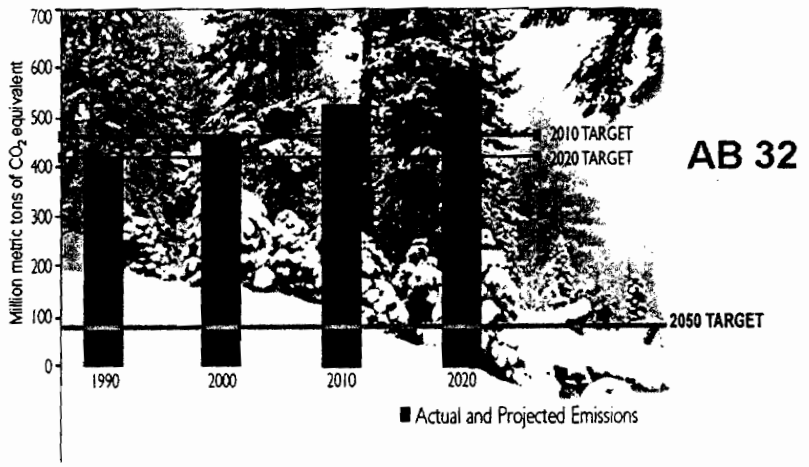
Meanwhile, the prospect of reduced runoff means that less water will be available for hydroelectric generation, a source of clean, renewable energy that accounts for about 15 percent of California's power supply. According to the California Energy Commission, hydropower production could decrease by as much as 30 percent as temperatures increase and precipitation decreases.

Because of the energy-water connection, water officials already are bracing for how they will comply with new climate-related requirements. Moderating a panel on the potential impacts of AB 32 on water agencies at the California Water Policy Conference, Otis Wollan, executive director of Public Officials for Water and Environmental Reform (POWER) and a Placer County Water Agency board member, asked whether the law would usher the same "shock and awe" that accompanied the Clean Water Act and the Endangered Species Act decades ago.

Climate change response proposals come amid a growing sense of urgency. "If we wait 10, 20, 30 years to reduce emissions, atmospheric concentrations will increase to potentially dangerous levels," said Robert Wilkinson, director of the water policy program at the University of California, Santa Barbara. "The cost is that with greater accumulation of greenhouse gas emissions, we will have more of an impact. So reducing now vs. reducing in the future reduces the cumulative amounts of gases in the atmosphere."

This issue of *Western Water* examines climate change – what's known about it, the remaining uncertainty and what steps water agencies are talking to prepare for its impact. Much of the information comes from the October California Climate Change and Water Adaptation Summit sponsored by the Water Education Foundation and DWR and

California Emission Reduction Targets



the November California Water Policy Conference sponsored by POWER. Additional information on climate change can be found in previous issues of *Western Water* ("An Inconvenient Future? Assessing the Impacts of Climate Change," September/October 2006) and *River Report* ("Preparing for an Uncertain Future: Climate Change and the Colorado River Basin," Winter 2007-08), both published by the Foundation.

'Climate Change is With Us Already'

Climate change affects weather by expanding high pressure zones, pushing the jet stream north and causing storms to be "less able" to drop down into California in the winter, said Gregg Garfin, deputy director for outreach at the University of Arizona's Institute for the Study of Planet Earth. He described the Earth's climate as essentially "a huge machine for moving water."

The impact extends to the Colorado River watershed, where gradual runoff from winter snow is vital in fulfilling the many demands for water. Plagued for years by drought, the region could be headed toward a permanently dry status based on modeling assumptions. "The most conservative of three recent estimates of Colorado River runoff, given projected climate changes, suggests a 6 to 7 percent reduction in runoff by mid-century, depending on emissions, and the least conservative suggests a 45 percent reduction by mid-century," Garfin said.

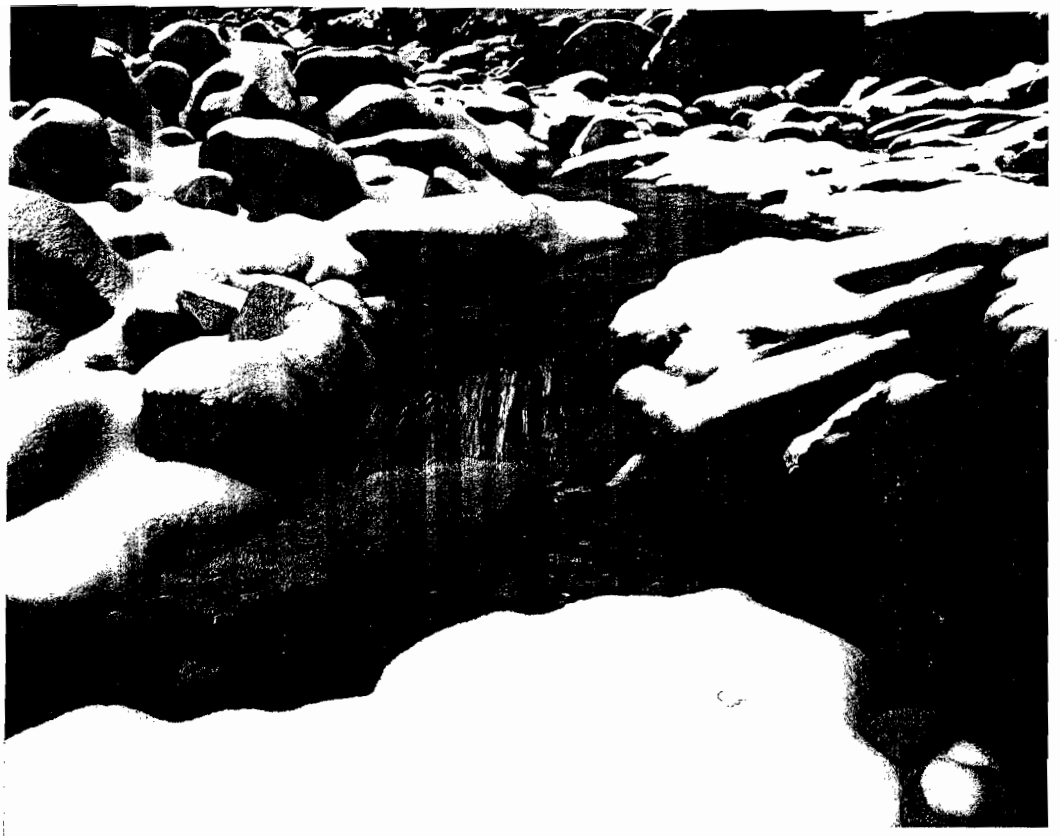
Climate change affects natural resources management, including the preservation of threatened and endangered species. Brian Johnson, California water policy director for Trout Unlimited, said existing conservation strategies can be adapted "to give fish the best chance to withstand the stress of climate change." As a means to preserve or enhance stream flows, the group is working with grape growers to find sites for small (49 acre-foot) off-stream ponds that can increase water supply reliability irrigation while helping to enhance fish habitat by allowing growers to time their diversions for the rainy season months.

"This is an idea that has been around for a few years, but we're just now at a point of trying to do it," Johnson said. "Regulatory uncertainty is a big issue, along with physical constraints and to some extent, money."

DWR notes that climate change "is already impacting" California's water and that the expected changes "will profoundly affect" water and natural resource management. "Adapting California's water management systems to climate change presents one of the most significant challenges for the 21st century," the agency says.

"So much of the climate change discussion is in the future tense but it's happening now," said Rick Soehren, chief of water use efficiency and transfers for DWR at the California Water Policy Conference. "Climate change is with us already and anything we can do to improve our [water supply] reliability is something worth considering."

Left to right: Lester Snow, Director, CA DWR; Brad Udall, Director, CU-NOAA Western Water Assessment; Jeanine Jones, Interstate Resources Manager, CA DWR and Gregg Garfin, Deputy Director, Institute for the Study of Planet Earth, University of Arizona at the Oct. 3, 2007 Climate Change Summit. Udall and Garfin were recognized by DWR for their Climate Science Services at the summit.



According to DWR, historical evidence and scientific studies have uncovered "disturbing trends," including a projected 25 percent reduction in the Sierra snowpack by 2050, greater variability in weather patterns, larger flood flows, a rising sea level and increased water temperatures. In particular, the frequency and intensity of peak river flows "can be an indicator of climate-related changes," with six of the highest one-day river flow levels recorded on the American River coming since the completion of Folsom Dam in 1955.

DWR highlights climate change in its 2005 *Water Plan Update*, which notes that the effects are something state government "must help predict and prepare for." The document's discussion of meeting future water demands "works well in addressing the uncertainty" associated with climate change, Andrew said.

Under a scenario of increased fossil fuel use, only a fraction of the existing Sierra snowpack will remain by the end of the century, said Norm Miller, associate director of the U.C. Berkeley Water Center. Consequently, less spring runoff to the Bay-Delta will mean less flushing of the salinity from the water. It is a "consensus statement," Miller said, that the Delta will be subject to a 1-foot to 3-feet rise in sea level while intense flooding events will occur with much greater frequency. David Ford, a consulting engineer, noted that because nearly 2 million Californians live in areas designated within the 100-year floodplain, existing flood management has to be revised to account for the coming changes.

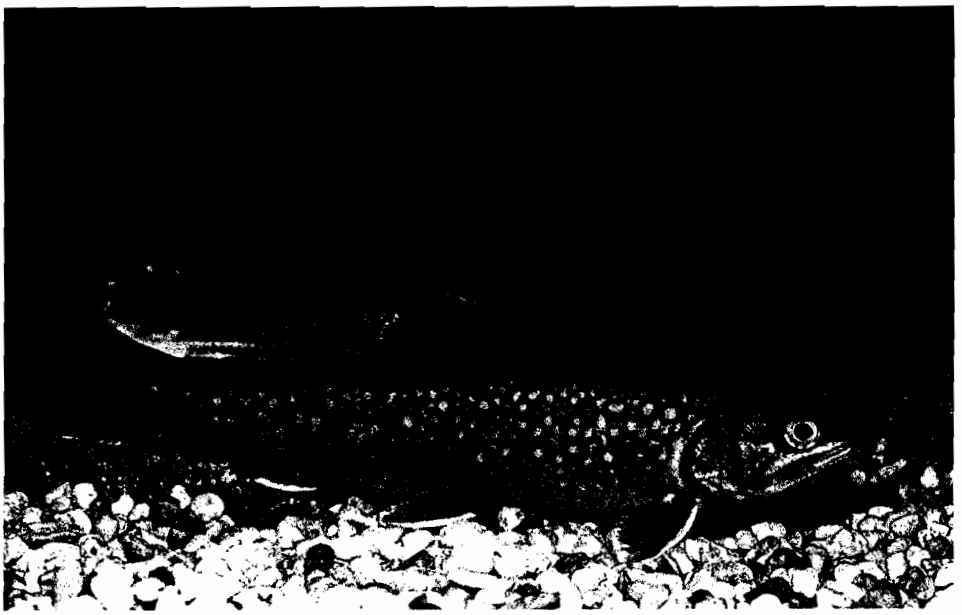
"We know that because of climate change, the flow frequency curve is going to change," Ford said. "There will be more extreme events, more flooding and more erosion. A 10 percent increase in the flow rate ... can have a significant impact on the performance of stormwater drainage facilities."

Storms deemed as 100-year events, meaning they have a 1 percent chance of occurring each year, will be more powerful and potentially more damaging. On the American River, if future flows follow present patterns of change, the high flows from a 100-year storm would increase to the point where the river "is no longer sized to cope" with such an onslaught, Ford said.

The predicted impacts of climate change on California's water supply are paralleled by the associated threats to the flood management system. The potential for devastating floods demands revamped management, from better ability to detect storms to a "really healthy observational network" that enables officials to see what's happening in watersheds from the mountains to the valley, Andrew said.

Wet Areas Wetter, Dry Areas Drier?

Noting that it's "amazing" how climate change has moved to a focal point in such a short time, Snow said there is



still a ways to go in terms of acquiring further knowledge and acceptance of current and future conditions. "The understanding of climate change is growing but it is not fully ingrained," he said. "There are still people who don't want to use the term 'climate change'."

However, the tide is turning. Even in politically conservative Utah, where a governor's advisory council was formed in 2006 to investigate ways to reduce GHG emissions, the conclusion has been reached that human-generated increases in GHG concentrations are the cause of most of the rise in temperatures seen the past 50 years.

"It is very unlikely that natural climate variation alone ... or carbon dioxide emissions from volcanoes have produced this recent warming," states an October 2007 report, *Climate Change and Utah: The Scientific Consensus*. The report is noteworthy for its finding that Utah's per capita GHG emissions are higher than the corresponding national rate and that the state is warming faster than the global average.

The accumulation of GHG is "tweaking the atmosphere in a subtle but very important way," Udall said. Globally, climate change causes greater evaporation, which is held in the warmer atmosphere as more water. Climate models and theory suggest that generally speaking, wet areas will get wetter while dry areas such as the Southwest will get drier, he said.

The increase of human-caused GHG emissions leaves no doubt about the linkage between their accumulation in the atmosphere and the advent of climate change, according to experts. "You prove the theory of global warming by not disproving it," Udall said. "No one has made a dent in the 100-plus year-old theory that increasing greenhouse gases will warm the planet and modify the hydrologic cycle."

There is not universal agreement that hydrologic regions are heading toward a permanently altered status.

Glossary of Selected Terms

Adaptation – Adaptation to climate change refers to adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

Climate – The average weather (usually taken over a 30-year time period) for a particular region and time period. Climate is not the same as weather, but rather, it is the average pattern of weather for a particular region. Weather describes the short-term state of the atmosphere.

Climate Change – The term 'climate change' is sometimes used to refer to all forms of climatic inconsistency, but because the Earth's climate is never static, the term is more properly used to imply a significant change from one climatic condition to another. In some cases, climate change has been used synonymously with the term, 'global warming;' scientists however, tend to use the term in the wider sense to also include natural changes in climate.

Emissions – The release of a substance (usually a gas when referring to the subject of climate change) into the atmosphere.

Enhanced Greenhouse Effect – Increased concentrations of carbon dioxide, methane, nitrous oxide and other photochemically important gases caused by human activities such as fossil fuel consumption that traps more infrared radiation, thereby exerting a warming influence on the climate.

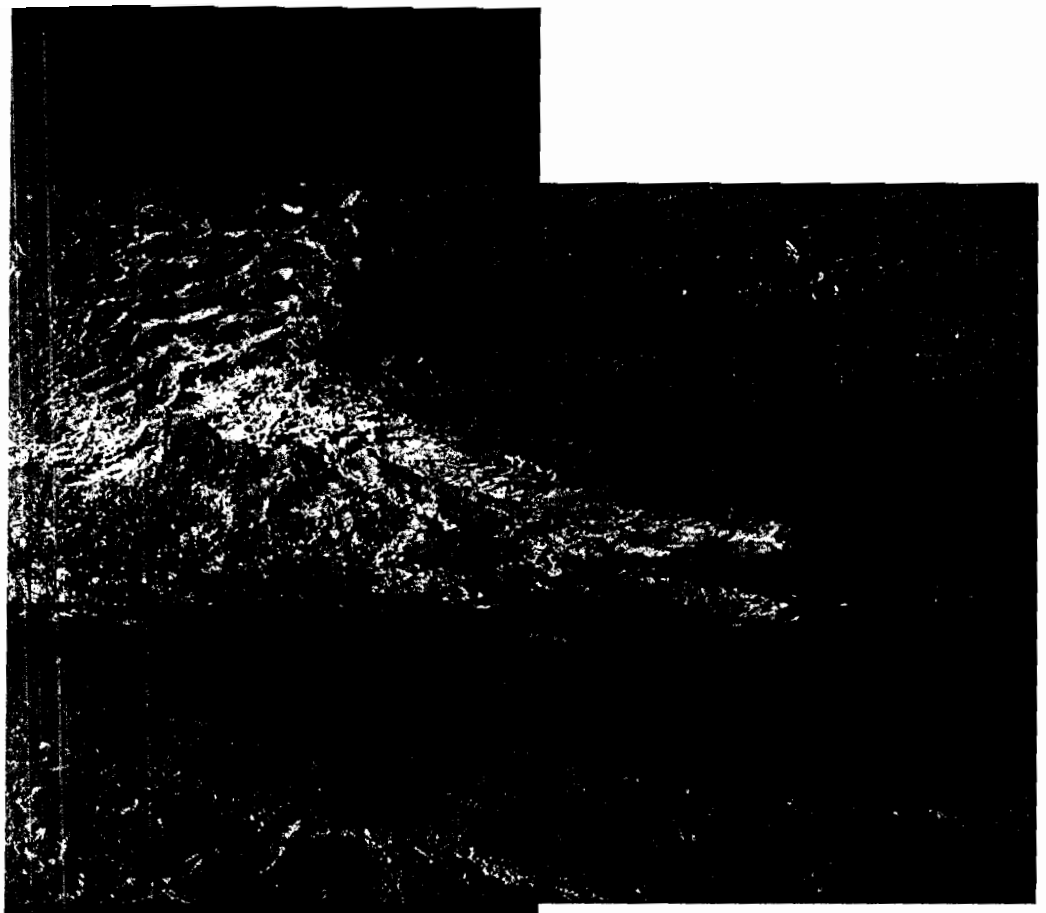
Fossil Fuel – A general term for combustible geologic deposits of carbon in reduced (organic) form and of biological origin. It includes coal, oil, natural gas, oil shale and tar sands. A major concern is that they emit carbon dioxide into the atmosphere when burnt, thus significantly contributing to the enhanced greenhouse effect

Intergovernmental Panel on Climate Change – The IPCC was established jointly by the United Nations Environment Programme and the World Meteorological Organization in 1988. The purpose of the IPCC is to assess information in the scientific and technical literature related to all significant components of the issue of climate change. The IPCC draws upon hundreds of the world's expert scientists as authors and thousands as expert reviewers.

Mitigation – The variety of strategies available today that, if implemented quickly, can rein in global warming and avoid the most severe consequences.

No Regrets – Measures whose benefits - such as improved performance or reduced emissions of local/regional pollutants, but excluding the benefits of climate change mitigation - equal or exceed their costs. They are sometimes known as "measures worth doing anyway."

Sources: Intergovernmental Panel on Climate Change, U.S. Environmental Protection Agency and the state of California



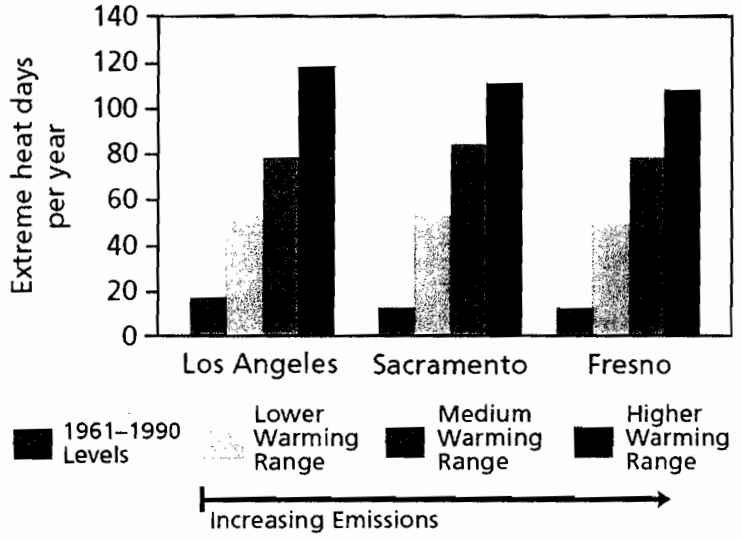
There is some research that predicts climate change will see wet areas get wetter, with an increase in flood risk.

"I am cautious about the certainty of wet areas getting wetter and dry areas drier," Wilkinson said. "This is the trend, but we may be in for surprises. The jury is still out [and] I am cautious on jumping on any one of these theories." Wilkinson pointed to Los Angeles, which in the past three years measured record-high rainfall followed by one of the driest years on record. "We don't understand all the dynamics of the system yet," he said. "The patterns and oscillations are tough to explain."

In the face of such uncertainty it is important to have "robust strategies" that account for either wet or dry conditions, including stormwater, which, "when you get it, you want to capture and use," Wilkinson said. The means by which reservoirs are managed for flood control and water supply will have to be "fundamentally re-examined" because the existing operations rules are based on a hydrology that is "increasingly irrelevant for the future," Andrew said.

The extent to which GHG emissions are controlled does not diminish the fact there will be an overall increase in concentrations due to lingering gases during the next century, said Garfin with the University of Arizona. The more "optimistic" scenarios predict a temperature increase of 3.5 degrees F by the end of the 21st century. The worst case scenario – a 10 degree F increase – would augur heat waves, heavy rains, more flooding, decreased snow, a greater demand for energy (to power air conditioners) and an increase in wildfire frequency.

Increase in Extreme Heat 2070-2099



The Logic of California's Hydrology

Udall, who noted the IPCC does not dwell much on adaptation options, said finding solutions will be challenging. "It's supply vs. demand," he said. "Most of the supply options have environmental impacts while demand management has limitations." Because of that, decision-makers need to be "intellectually honest on all the old battles," from the question of building new storage to deciding whether investment in nuclear power should be revived.

"My sense is that storage may not be the large option because most of the good sites are gone," Udall said.

Adaptation "is the biggest way of thinking about the climate change

challenge," said Gary Wolff, vice chair of the State Water Resources Control Board at the Climate Change Summit, adding that "mitigation is one form of adaptation." From the State Board's perspective, the prospect of altered hydrologic cycles is something that has yet to be examined.

"We will need the internal capacity to work on that [but] very few staff are grounded in climate science," he said.

Wolff's colleague on the board, Frances Spivy-Weber, said the State Board is "probably the slowest to be engaged in the AB 32 dialogue," but noted DWR has been involved "from the very beginning." While most of the State Board's role will be to create policy programs that provide incentives for agencies to work on climate change response, "we can use our authority ... to encourage and require people to take seriously climate change and greenhouse gas reductions," she said.

Water use efficiency "is one area where we know a lot about what to do now," Spivy-Weber said. She acknowledged that while some activities such as desalination and wellhead treatment are beneficial in diversifying the water source, they are energy-intensive and cause additional GHG emissions. Those emissions will have to be balanced with "significantly reduced" emissions from other sources, she said.

The State Board is equipped to deal with climate change effects through its regional basin plans that establish water quality objectives to reserve the "beneficial uses" of the vaters it regulates. Low flows – erhaps linked to earlier runoff – affect ne ability of rivers, lakes and streams absorb pollutants. That, in turn, uld mean more stringent discharge rmits for sewage treatment plants, development that could necessitate e investment of "billions" of dollars facility upgrades, Wolff said. rmanently altered flows could also ect the amount withdrawn under sting water rights.

"If we don't make adjustments, we be dooming our rivers to a slow starvation of water," Wolff said.

Changing flow patterns in the Russian River in Sonoma County are forcing agencies to look at options for its use, said Paul Helliker, general manager of the Marin Municipal Water District. Water conservation "is becoming more economically viable and reduces the need for electricity and alternative water supplies," he said.

While seeking greater water savings, Helliker said the time may have arrived to evaluate the existing water rights structure and determine "if it makes sense" in terms of the highest and best use of water.

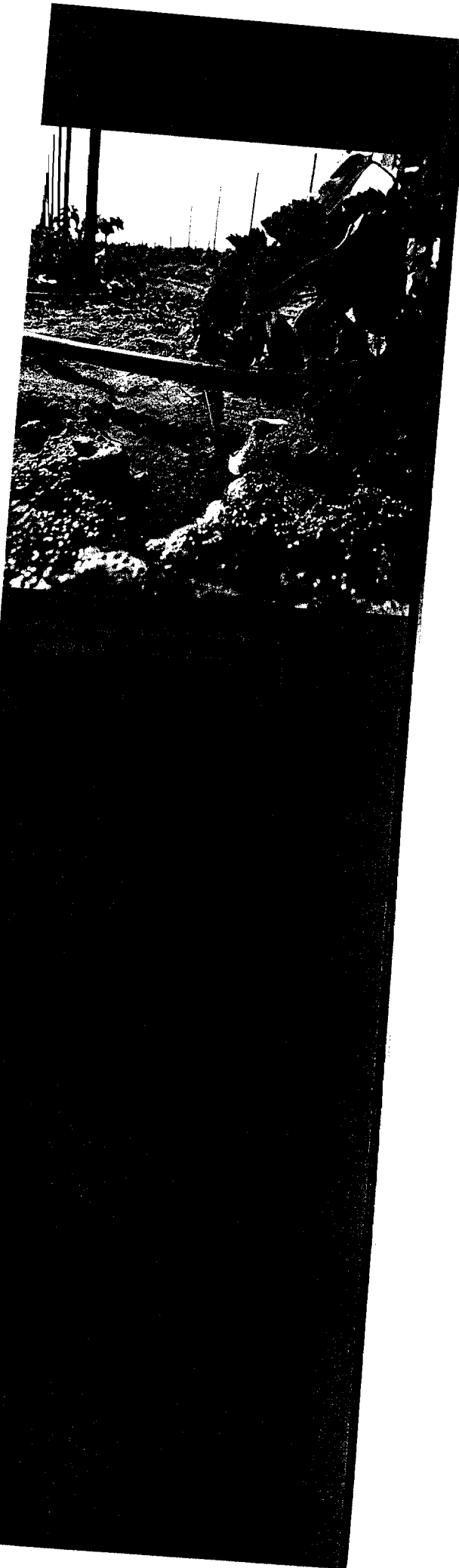
Timothy Brick, chair of the Metropolitan Water District of Southern California's (MWD) board of directors, said "it is appropriate to take a look at the way water is used in California," and that "hopefully it can be done in a way that does not affect agriculture in the long run."

Discussion of the water rights held by agricultural users has been "politically untouchable until now, but has got to be on the agenda for the future," Brick said at the California Water Policy Conference. Changing climatic conditions will compel officials to look at "the logic of the hydrology" of California, Wilkinson said. "It's a question of when, not if, we re-visit water rights," he said. "It's going to be a tricky thing but I don't think we can duck it."

Patrick O'Toole, president of the Family Farm Alliance, acknowledged the possibility of even more water being shifted from farms to cities, noting that "reallocation means our families leaving ... a rural culture."

"There is a large-scale crisis right now in the West because of this declining resource," O'Toole said. "Storage is a very important part of the suite of things we can do to address climate change."

Beyond the response, O'Toole asked whether the West can continue to sustain its rate of growth with limited water and the need to preserve the farming economy. "We need to



"There is a large-scale crisis right now in the West because of this declining resource. Storage is a very important part of the suite of things we can do to address climate change."

– Patrick O'Toole, Family Farm Alliance

make self-sufficiency of food production a national priority," he said. "We must find ways to protect farmland. If we allow rural America to disappear, that is an abomination."

Water officials are used to dealing with challenges, and climate change is no exception. Unlike other matters they face that may have more traditional solutions, the complexities and uncertainties of climate change have created a new framework to find answers. "The true element of leadership is the courage and conviction to come up with new answers," said Martha Davis, executive manager of policy development for the Inland Empire Utilities District.

Davis, who for 13 years ran the Mono Lake Committee, is among the cadre of environmentalists who have moved into water agency management, which "is a big change, and a very good one," Brick said. Doug Linney, an environmentalist who serves as a board member with the East Bay Municipal Utility District, credited Gov. Arnold Schwarzenegger's leadership on climate change – particularly his 2005 declaration that "We know the science, we see the threat and we know the time for action is now."

"Having a Republican stand up and say that really transformed how public policy would be shaped," Davis said.

Bridging the gap between recognizing the problem and forming a response is a work in progress with different obstacles. Brick, who noted that "lots of opportunities are being missed," said there is a role for regional water recycling facilities and for a new stormwater partnership based on MWD's current agreement that subsidizes its member agency recycling activities.

"I don't know why we can't do the same thing for stormwater, it's such a tremendous unused resource," Brick said.

As with the turmoil that accompanied California's Energy Crisis, so could similar shocks in water availability demand an accounting of the leadership or lack thereof. "When we had the Energy Crisis in 2001, people came running to city hall complaining about the lights going out and the rates going up 300 percent," said Michael Meacham, director of environmental services for the city of Chula Vista. "If we don't get in front of [climate change] and demonstrate leadership it's going to be very threatening to incumbents. The public expects more from us."

'No-Regrets' Actions

Crafting an operations manual that incorporates the response to climate change means garnering greater knowledge of what is happening. Udall said "broader and greater" initiatives are needed to determine how changes will occur at the watershed level. Among those efforts is the Planning and Conservation League's (PCL) California Climate Outreach Campaign, which seeks to ensure local governments are not worsening GHG emissions.

"To some degree, we expect our efforts, focused at the local level, to have state level 'spin off' effects, but our project is essentially aimed at where we think we can have maxi-

mum impact – at the local level of community and local government action," PCL says.

The absence of information is troubling for water agencies that are wary about taking action in the face of uncertainty. "Right now, we don't have a lot of actionable science on climate change," said Behar with the San Francisco PUC. "For water agencies, climate change is about capital investment decisions."

DWR's Soehren acknowledged the "huge level of uncertainty" that exists with how climate change will affect water supplies and management. "We will be forced to make decisions with less than the level of certainty we'd like," he said. Taking those kinds of proposals to elected officials can be difficult because of the costs involved and because despite the efforts undertaken, GHG will continue to accumulate in the atmosphere.

"When you present that to elected officials, the chances of having action taken are not very good," Soehren said.

Meanwhile, there remain many "no-regrets" actions that could be taken, including water conservation, recycling and the diversification of sources. "All the actions are things water managers have been exposed to for a long time," Soehren said. "They can be done right now and are more cost-effective than new supply options. Some of our future is not so difficult."

Soehren noted that a "huge potential" of water savings exists through conservation but that "we're not picking up the ball nearly to the extent we should."

No-regrets actions have been mistakenly lumped in some quarters as "potentially everything that anybody might ever want to propose," Wilkinson said, adding, "if we define no regrets as those measures that are technically viable and cost-effective in the current context, that gives you a whole set of activities."

John Woodling, chief of DWR's Integrated Regional Water Management program, said improved watershed management and a diverse portfolio are key to building sustainability in an uncertain future. "There is not going to be a 'silver bullet,'" he said at the Climate Change Summit. "There won't be new surface storage on a scale that's going to meet all of the state's future demands."

Woodling is among those who have called for a tighter nexus between planned development and its impact on water availability. "We need much more integration of land use in regional water planning," he said. "Where we develop and how we develop drives a lot of how we use water."

Thinking Globally, Acting Locally

Local public agencies are responding to climate change through efforts designed to minimize their contribution to GHG emissions. However, they are cognizant of the need to adapt and mitigate to the changes in store. "No matter how much our jurisdictions reduce [emissions], the effects of climate change will still be upon us," said Greg Larson, director of planning and community development for the city of Santa Cruz.

The city has pledged to reduce emissions 30 percent by 2020 and to have all new buildings "carbon-neutral" by 2030, Larson said. Mandatory water conservation retrofits and a green building program that emphasizes water use efficiency and energy conservation are keys to attaining that goal. "Generally it saves the builder money as much as it saves the environment," Larson said.

Santa Cruz has been active in climate change response for at least 10 years, dating to its 1998 admission to the Cities for Climate Protection, an association of nearly 700 local governments worldwide involved in GHG emission reductions.

The city also is incorporating an anticipated sea level rise in its general plan update and working on a seawater desalination plant in which all energy

"Right now, we don't have a lot of actionable science on climate change. For water agencies, climate change is about capital investment decisions."

– David Behar, San Francisco PUC

"Getting water over the Tehachapis is a very energy-intensive matter and as we look at greenhouse gas emission reductions, we'll have to look at that."

– Lorraine White, California Energy Commission

use would be offset by a 1-megawatt photovoltaic system that harnesses solar radiation, Larson said.

California Attorney General Jerry Brown touched upon the importance of climate change response in a September speech to the League of California Cities, where he noted "the creativity of individual city councils will devise responses and ideas that will really take us a long way."

MWD's Brick said "tremendous potential" exists for water agencies to help limit GHG emissions through the development of renewable energy sources such as solar radiation. "I think the water industry needs to establish itself as a leader in renewable resources and I'd like to see the federal government encourage and support western water agencies in moving toward [that]," he said.

Grant Davis, assistant general manager with the Sonoma County Water Agency, said the "very progressive elements" within the state's water agencies are taking steps to identify their carbon emissions and to investigate alternative energy sources such as wave energy, which is an option for coastal regions like Sonoma County.

"The big challenge is justifying the decisions you are making and being willing to take the risk," he said. "There will be a high price initially but in the long run it will pay off."

Watch Your Step: The Carbon Footprint

While coping with the changed hydrograph, water agencies must also be aware of the extent to which water delivery contributes to the so-called "carbon footprint," or the contribution to GHG emissions. Officials responsible for implementing AB 32 believe flexibility and creativity are necessary to reduce the amount of GHG emissions associated with water service.

"It will require conservation, energy efficiency and to the extent nothing else works, adaptation," said Lucille van Ommering with the California Air Resources Board's Office of Climate Change.

"There was a bit of trepidation about how AB 32 was going to be implemented," Martha Davis said "We are now looking at opportunities to do more self-generation."

Water agencies are fortunate in that their direct emissions of GHG are not large enough to be included in AB 32 accounting, said Lon House, a water and energy consultant. "My opinion is that until ARB starts regulating it, it's not 'shock and awe,'" House said. "That gives you time to prepare."

Because of the pressure to reduce GHG emissions, opportunities for water agencies to self-generate their own power "will be embraced" by electric utilities, said House, noting that renewable energy sources such as small hydropower plants, wind and solar will come into play. He encouraged agencies to quantify the energy savings associated with conservation measures in order to possibly sell energy reduction credits.

"If [the credits] are in your water conservation program, they are your greenhouse gas savings, which may make some programs more cost-effective," House said.

Beyond that, efforts undertaken to reduce GHG emissions are inevitably linked to secondary benefits such as

improved air quality and rejuvenated groundwater storage. Martha Davis said it is important for agencies to consider the value of their actions along with the cost.

"We want to be a partner in heading off a future of reduced water supply," she said.

Still, a framework is needed that accounts for the benefits of actions pursued by water agencies to save water and energy. "We need to recognize that there are statewide benefits if we do water conservation and recycled water in Southern California," she said.

The potential of reduced GHG emissions through water conservation is a key component when the water-energy nexus is considered, especially the power needed to move water through the State Water Project (SWP) and over the mountains into Southern California. "Getting water over the Tehachapis is a very energy-intensive matter and as we look at greenhouse gas emission reductions, we'll have to look at that," said Lorraine White, energy specialist with the California Energy Commission. A "significant amount" of energy-saving potential exists by implementing best management practices (BMPs) "we already know about" for water use efficiency, she said.

Those BMPs are important when the projected increase in population and the associated need for more water is considered. Growth in the hotter inland region "means a higher greenhouse gas footprint overall," White said.

PCL supports the notion of water and energy demand neutrality for new developments. If new commercial and residential buildings would increase energy or water use, they would first be required to adopt on-site efficiency measures and then invest in off-site projects to bring the development's net demand to zero. Matt Vander Sluis, PCL's global warming project manager, rejected the argument that some GHG emission increases are necessary as California's population growth spurs the demand for more energy and water. "There are emission limits that we can't exceed," he said. "If you think someone else will pick up the bill for that, you're wrong."

Building Our Way Out of Climate Change?

The altered hydrologic future has convinced many that new dams are

Because of the pressure to reduce GHG emissions, electric utilities are likely to turn to self-generation through wind, solar and other alternative sources.

There is an ongoing debate whether new storage is necessary to respond to the increased variability caused by climate change.

needed to capture flows before they drain through the valley into the ocean. The idea is central to Gov. Schwarzenegger's water plan but is far from a forgone conclusion. Opponents of new storage say it is not needed and that water needs can be met through a menu of more immediate and less costly projects. Within the realm of the climate change discussion, the debate "is a diversion and not a healthy diversion," Udall said, adding, "I suspect that in the long run, [new storage] is not what solves these problems."

DWR Director Snow, in an Oct. 17 op-ed piece, wrote that new storage is needed to deal with California's growing population and the effects of climate change. "Reservoirs will help stabilize the hydrograph and respond to the higher river peak flows we are experiencing in the winter," he wrote. "Capturing water in new reservoirs also provides an important source of drinking and irrigation water for Californians during dry years."

The discussion of storage needs has prompted a look on what potential exists for moving excess flows into underground aquifers for later use. "There is over 3 million acre-feet of storage available in the L.A. basin," said Gordon McCurry, senior hydrologist with Camp, Dresser and McKee. "Do we want to build new reservoirs or take advantage of the underground storage already available to us?"

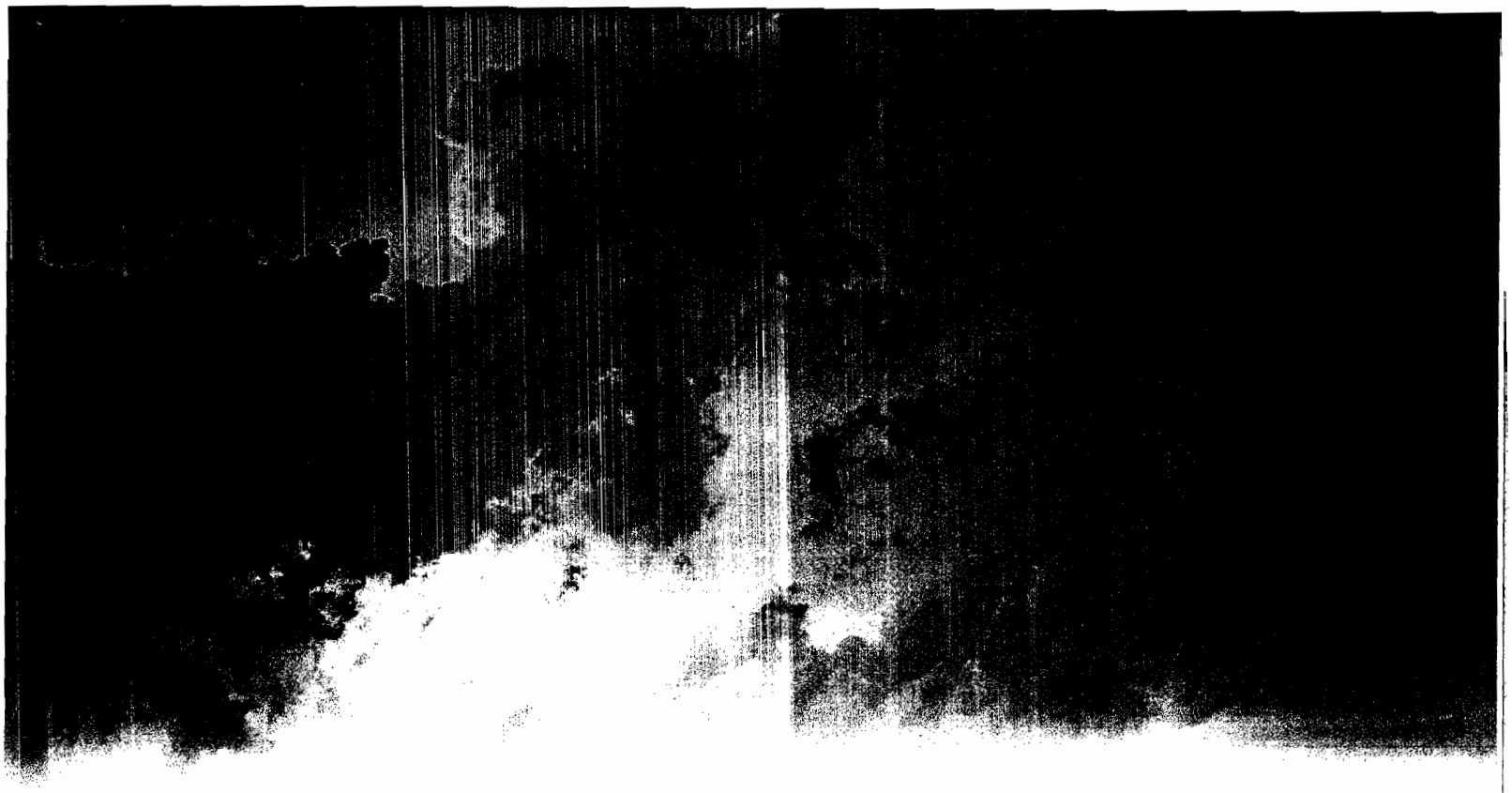
However, there remains the matter of uncertainty – specifically the knowledge of the total amount of existing groundwater that could be used as additional supply. "Groundwater currently acts as drought insurance," U.C. Berkeley's Miller said. "It will be costly if we don't take it out in the way that's most efficient."

Achieving the 'Art of the Possible'

Climate change has sparked a flurry of activity that observers say has to intensify to gain greater understanding of what is occurring and where the impacts will be felt the most. Much of the preparation for the future focuses several decades forward, as it is hoped efforts undertaken today to limit GHG emissions will have long-term benefits. "Temperature increases during the next 30 years are pretty locked in at this point from our previous GHG emissions," Udall said. "It's farther out where our current emissions will cause us regrets."

Spreading awareness of climate change and the need to come to grips with it is part of the agenda. "Getting people educated is a big part of the problem," Udall said. The economic value of all that is threatened by climate change vs. the amount of money spent on research "is grossly mismatched [so] we need to do a better job on this. We need much more science on how climate change will impact water systems."

While that science proceeds, it is important for that adaptation measures be used that do not rely on "precise



projections" of anticipated rain and snow, Udall said.

DWR's Andrew noted that budget cutbacks could affect existing data programs that are expanding the breadth of knowledge of climate change. "If it wasn't for data sets, we wouldn't know climate change was going on," he said. "We not only need to maintain [them], we need to invest quite a bit more money."

Wilkinson said "huge opportunities" exist for agencies to contribute water and energy to the system through greater efficiency although he acknowledged "there are constraints" to that process. "MWD and others can facilitate more trades and transfers," he said. "We need to clear the institutional barriers to pursue the art of the possible."

Acknowledging that California's water supply is not infinite, Wilkinson said that "shortage of supply is essentially a 'longage' of demand" and that more can be done to ease demand. "When we are facing constraints it sure makes sense to do cost-effective things with greater urgency than we see now," he said.

Behar suggested that greater price control could help reduce the demand for water, noting that it is an "incredibly underpriced resource" that is "very scarce and very cheap."

Changing the culture of water use is an incremental process, as officials seek to change the mindset that has led Californians to treat water as an endless commodity. "We are just really getting started on things," Brick said. "The reality is while per capita consumption is down we still use twice what Europeans use. Most people over-water by a factor of two."

Ultimately, the impacts of climate change are emblematic of the age-old dilemma of water scarcity that has existed since people looked to the arid West as a place to live. As evidenced by the region's unfettered boon, ways have been found to keep water flowing. But the prospect of a permanently altered system has upped the ante.

"This is the greatest challenge humanity has ever faced," Brick said. "Will we succeed? We have to." ❖

For More Information

Intergovernmental Panel on Climate Change
http://www.ipcc.ch/

Western Water Assessment
http://wwa.colorado.edu/

California Department of Water Resources
http://www.water.ca.gov/climatechange/

Utah Climate Change Report
http://www.deq.utah.gov/BRAC_Climate/docs/Final_Report/Sec-A-1_SCIENCE_REPORT.pdf

Family Farm Alliance
http://www.familyfarmalliance.org

The following package is a part of the agenda/outline for the ACWA conference in Washington D.C. this past February.

The information presented is only a brief outline of what was taught in each session. Enclosed you will read a summary on topics ranging from the Bay Delta, to Federal Projects, to the Colorado River. Each topic typically only has one page:

Delta Processes: CALFED, conveyance and the Delta Smelt.
Federal Court Rulings: Reduced water pumping by up to 75%, and housing construction projects placed on hold for lack of water.
Perchlorate: Detected in the Colorado River.
Invasive Species: Quagga and Zebra mussels growing at an unprecedented rate in the Colorado River may clog up or contaminate replenishment delivery.
Water Recycling: CPV has "promised" to deliver documented evidence on at least three separate occasions as to why they cannot use recycled water to cool their towers, however these document have yet to be delivered, despite their public promotion for the ability to use reclaimed water.

A Briefing on Key California Water Issues

February 2008

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CALIFORNIA WATER
February 2008

Infrastructure Investments / Water Bond Packages

Background

As part of his Strategic Growth Plan for California, Governor Schwarzenegger has proposed a comprehensive water bond package to fund investments in the state's water infrastructure. The package would fund additional surface and groundwater storage, Delta sustainability programs and expanded water use efficiency.

Despite intensive negotiations during a special legislative session in late 2007, lawmakers failed to reach agreement on a bond package that could go before California voters in February 2008. Though legislative leaders appeared to inch closer to agreement in several key areas, differences over specific dollar amounts for surface storage and the method of appropriating bond funding from year to year remain a stumbling block.

The concept of a comprehensive water package is still very much in play, however. In December, a business-labor coalition known as Californians for Clean and Reliable Water filed four versions of a water bond initiative with the Attorney General's office. The four versions, each of which would authorize $11.7 billion in bond funds, would provide substantial resources for water quality improvements, water use efficiency and local water resources development, Delta conveyance solutions, groundwater and surface water storage, and watershed and habitat projects.

The principal difference among the proposed initiatives is the degree to which specific infrastructure projects – primarily surface storage and Delta conveyance options – are identified and authorized.

Meanwhile, Governor Schwarzenegger and key lawmakers remain committed to developing a bipartisan legislative bond for the November 2008 ballot.

Though a looming $14 billion state budget deficit could overshadow the discussion this spring, some experts say a water bond package would be one of best economic levers the Legislature could pull this year. According to the California Alliance for Jobs, every $1 billion invested in infrastructure construction generates 20,000 jobs.

ACWA's Position

ACWA's 2005 water policy document, "No Time to Waste: A Blueprint for California Water," called for significant new investments in California's water system. The document recommended a long-term plan to address the Delta's sustainability, increase the state's water storage capacity and expand water use efficiency, all of which are included in the comprehensive water package put forward by the governor and the four initiatives proposed by the business-labor coalition.

ACWA continues to engage all interested parties in discussions to advance a bipartisan legislative bond for the November 2008 ballot.

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CALIFORNIA WATER
February 2008

Delta Processes

Background

State and federal officials gathered in August 2000 to sign the CALFED Record of Decision (ROD), marking a landmark step on the road to implementing a 30-year program to restore the ecological health of the Delta while improving water supply reliability.

Seven years later, the health of the Delta and the reliability of the state's water system are still very much in the spotlight as a litany of water supply challenges confronts the state.

Stage 1 of CALFED implementation drew to a close at the end of the 2007 with decidedly mixed results. While the program can point to successes in some areas, such as improved science and ecosystem restoration, achievements in other areas have been limited. Funding for many program elements has been lower than expected, and the program has struggled to identify quantifiable objectives in key areas.

In addition, several new problems have emerged since the ROD was signed, including the decline of species such as Delta smelt and significant challenges related to climate change.

While CALFED continues to provide an important forum for developing Delta-related science, the policy focus is turning to two other processes now under way to find long-term solutions: Delta Vision and the Bay-Delta Conservation Plan (BDCP).

The Delta Vision Blue Ribbon Task Force submitted its recommendations for a more sustainable Delta to Governor Schwarzenegger in December. The Task Force is charged with developing a strategic plan by the end of the 2008 to implement those recommendations.

The BDCP process is proceeding rapidly to refine a set of conservation actions, Delta conveyance improvements and management and funding commitments to protect and restore species while providing for future water supply reliability. The BDCP Steering Committee, a diverse group representing water exporters, environmental interests and state and federal agencies, recently released a "Points of Agreement" document to formalize its intended approach to a water conveyance system in the Delta.

The document says a new conveyance system, coupled with modifications to existing Delta export facilities, offers the most promising approach to improve operational flexibility and improve habitat and species protection.

The Steering Committee expects to identify major elements of its Habitat Restoration and Enhancement Program by March, as well as other conservation actions to address stressors such as non-native species and contaminants. By April, the group intends to develop and

analyze potential water conveyance designs and operations for a long-term conveyance system, including a new diversion in the North Delta and improvements to through-Delta conveyance.

In addition, the Steering Committee will identify short-term measures and actions that can be taken to begin immediately improving conditions for species.

ACWA's Position

ACWA strongly believes the Delta's ecosystem must be improved as part of a comprehensive approach to improving California's water supply and delivery system.

ACWA has consistently supported federal funding for CALFED to complement the state's own support for the cooperative effort. Continued federal funding in the areas of surface storage investigations, water use efficiency, water quality improvements and ecosystem restoration will be critical to addressing serious challenges facing the state's water system.

ACWA continues to engage in the Delta Vision and BDCP efforts to support solutions that are consistent with a comprehensive approach. The association is committed to supporting solutions that simultaneously:

- Protect and restore fisheries
- Improve water quality and water supply reliability
- Reduce vulnerability to natural disasters
- Include water rights protections and other measures to sure that all Californians benefit from solutions in the Delta.

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CALIFORNIA WATER
February 2008

Federal Court Rulings

Background

The need for a comprehensive water solution took on new urgency in 2007 when U.S. District Court Judge Oliver Wanger ordered significant reductions in water deliveries for much of the state to protect a threatened fish, the Delta smelt.

Judge Wanger issued a final ruling in December ordering the State Water Project (SWP) and the federal Central Valley Project (CVP) to restrict pumping operations for much of 2008 to protect the Delta smelt. The order also calls for additional monitoring and gives federal officials until September 2008 to craft a long-term plan to protect the threatened fish.

Under the order, the SWP and the CVP must limit pumping in the Delta when certain conditions are triggered until juvenile fish have moved away from the pumps, most likely sometime in June. The projects funnel water through the Delta to more than 25 million people in the Bay Area, Central and Southern California as well as millions of acres of farmland.

State water officials say the pumping restrictions could reduce water deliveries by 7% to 22% in dry years, and by 22% to 30% in average years. In December, state officials warned that SWP contractors may receive just 25% of their requested supplies in 2008 due to the combined effects of court-ordered restrictions and dry conditions.

In February, the delivery forecast was increased to 35% thanks to a series of storms that boosted the Sierra snowpack. The forecast would have increased to 50%, however, if the pumping restrictions were not in place.

The bottom line for now is that water agencies will have less Delta water available for delivery to their customers this year and will have to rely on conservation and emergency reserves. They will also have less water available to replenish reservoirs and groundwater basins for use in future drought years.

The final court order came four months after Judge Wanger ruled that the two projects adversely affect smelt and called for pumping restrictions during certain months to avoid further harm to the fish. The ruling came in a lawsuit by the Natural Resources Defense Council and other groups that challenged permits under which the SWP and CVP export water for the Delta.

The ruling already is affecting jobs and construction in some parts of the state. Decisions on new housing and retail developments in Riverside County, for example, are on hold because the necessary water supplies cannot be guaranteed. Growers in the San Joaquin Valley and in northern San Diego County are likely to forgo planting some crops this year because of water supply uncertainty.

Water agencies in many areas are calling on their customers to step up conservation efforts. Some communities, such as Long Beach, already have put mandatory conservation programs in place.

Meanwhile, a separate case is pending before the same judge that could further compound challenges to the state's water system. That case focuses on a different part of the system – the operation of the state's major surface storage reservoirs – and whether it is providing adequate flows and temperatures to protect Chinook salmon. Regardless of its outcome, the new case is likely to highlight the system's inability to meet the needs of both the environment and the economy.

ACWA's Position

ACWA believes the court-ordered reductions in water deliveries underscore the fact that the state's water system is in crisis, and it will take a comprehensive package of actions to resolve it. The package must improve water conveyance in the Delta, expand our statewide water storage capacity, and invest in water conservation and other strategies.

Association of California Water Agencies
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Leadership Advocacy Information

CALIFORNIA WATER
February 2008

No Time to Waste: A Blueprint for California Water
Highlights of ACWA's Action Plan for Meeting Future Water Needs

In 2005, The Association of California Water Agencies (ACWA) released a comprehensive water policy document, "No Time to Waste: A Blueprint for California Water." Developed with input from public water agencies throughout the state, the Blueprint recommended a suite of actions and investments to improve California's water system and identified emerging issues such as climate change that must be addressed.

The document was submitted to the Schwarzenegger Administration and distributed widely to members of the Legislature and Congress, statewide opinion leaders, the media, the Bush Administration, and state and federal agencies involved in water supply and regulatory policy.

The Blueprint recommendations collectively represent a comprehensive action plan to ensure California has the water supply system it will need in the coming decades. A key element is investing in the state's backbone water infrastructure – including conveyance and water storage improvements – to allow California to meet the needs of the environment and fisheries while still meeting the economy's need for adequate supplies of reliable, high-quality water.

Investments in local water resources, including expanded water use efficiency, water recycling and desalination, also are recommended.

Key Recommendations in ACWA's Blueprint

- Improve the existing Sacramento-San Joaquin River Delta water conveyance system to increase flexibility and enhance water supply, water quality, levee stability and environmental protection in the near term.
- Evaluate long-term threats to the Delta levee and conveyance system and pursue actions to reduce risks to the state's water supply and the environment.
- Ensure delivery of adequate Colorado River supplies for Southern California and defend California's rights on the Colorado River.
- Implement and fund the Sacramento Valley Water Management Program.
- Develop additional groundwater and surface water storage, including proposed surface storage projects if they are determined to be feasible.
- Support and fund local efforts to expand recycled water use and implement best management practices for urban and agricultural water use efficiency.

- Improve the quality of California's drinking water supplies to safeguard public health and enhance water quality for agriculture and the environment.
- Work with local agencies to overcome constraints associated with developing seawater and brackish groundwater desalination.
- Modernize the federal Endangered Species Act and other laws and regulations to allow water infrastructure projects, water supply and water quality activities to proceed while protecting species and habitats.
- Expedite the approval process for voluntary water transfers.
- Clarify and expand the state's role in flood control and promote multi-benefit flood control projects.
- Support integrated regional water management plans.

Additional Policy Principles on Delta Conveyance

In September 2007, ACWA adopted policy principles on Delta conveyance to amplify recommendations in the original 2005 Blueprint.

The new principles call for ACWA to support Delta conveyance options that simultaneously:

- Protect and restore fisheries
- Improve water quality and water supply reliability
- Reduce vulnerability to natural disasters
- Include water rights protections and other measures to ensure that all Californians benefit from solutions in the Delta.

FEDERAL PROJECTS GROUP

(CALFED, Water Recycling, BuRec)

CALFED

- ACWA supports continued federal funding for CALFED actions, particularly in the areas of surface storage investigations, water use efficiency, water quality improvements and ecosystem restoration to continue laying a foundation for a comprehensive solution to California's water problems.

- Specifically, ACWA recommends that Congress restore $40 million in funding for CALFED, consistent with last year's enacted level.

Water Recycling

- ACWA supports HR.3452, the clean renewable water supply bond act. This legislation creates a new tax credit bond program to help public agencies finance desalination, water recycling, and groundwater clean-up projects.

- ACWA supports increasing funding for the Title XVI water recycling program to at least $30 million per year.

BuRec Budget

- ACWA supports an amendment to the fiscal year 2009 budget resolution to increase the Bureau of Reclamation Water and Related Resources account by $150 million.

Climate Change

Background

In July of 2006, California's Department of Water Resources (DWR) in conjunction with the U.S. Bureau of Reclamation issued a report outlining potential impacts of climate change on California's water resources. The report examined four climate change scenarios and assessed their possible impacts on the State Water Project, the Central Valley Project, and the Delta. The scenarios were then used to evaluate how climate change could affect flood management. Though data gaps and other uncertainties limited the models' ability to forecast future precipitation, all four models predicted troubling changes to California's water resources.

California's mountain snow pack is particularly sensitive to climate variability and change. Currently snow pack serves as a natural reservoir and much of the State depends on its slow melting for water supply and flood management purposes. Predictions indicate up to 5 million acre-feet of storage capacity could be lost, straining the balance between water supply and flood protection needs.

Additionally, predicted rises in sea level will increase seawater intrusion into coastal aquifers and estuaries. Higher salinity will degrade water quality and threaten fragile ecosystems, such as the Bay-Delta.

ACWA's Position

DWR's effort is a good start. However, predictions indicate water resources throughout the west will be affected by climate change. The Bureau of Reclamation in conjunction with the U.S. Geological Survey (USGS) and Army Corps of Engineers should determine how a range of climate change scenarios would affect Bureau projects, develop contingency plans to protect life and property, and identify ways that they can be operated and augmented to adapt to future challenges.

S.2156, the "SECURE Water Act", is an excellent first step. It requires Reclamation to study and plan for the impacts of climate change, provides grants to state and local agencies for water conservation projects and other activities to mitigate the impacts of climate change, and expands USGS's National Streamflow Information Program. ACWA supports this bill and would like the Army Corps to institute a similar climate change preparedness program.

ACWA also supports HR.135, "The 21st Century Water Commission Act of 2007", to study the development of a comprehensive strategy to ensure an adequate and dependable water supply for the next 50 years. This legislation passed the Natural Resources Committee in December and is awaiting action by the Transportation Committee.

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CALIFORNIA WATER
February 2008

Water Infrastructure Funding and Legislation

Background

During the 110th Congress, ACWA is working to advance legislation that guarantees funding for the Clean Water and Safe Drinking Water State Revolving Funds without reliance on new taxes and fees.

Problems associated with aging water infrastructure are growing and expensive to fix. In California, there has been no investment in statewide infrastructure in 25-30 years. In January, the Environmental Protection Agency released its latest estimate of the amount of money needed to upgrade just the wastewater treatment system. According to the EPA, a staggering $202.5 billion is needed over the next 20 years to improve the collection and treatment of wastewater, reduce sewer overflows, and improve stormwater management. Without greater assistance from the federal government, water and sewer rates across the country could more than double.

In view of this pressing situation, ACWA supports appropriations and legislation to protect the SRF's such as the House passed HR 720. Legislation dealing with this issue should:

- Create a long-term source of federal funding for drinking water and wastewater projects;
- Authorize capitalization of the next generation of state financing authorities to distribute funds in fiscally responsible and flexible ways, including grants, loans, loan subsidies, and credit assistance;
- Focus on critical "core" water and wastewater infrastructure needs;
- Streamline federal administration of the funding programs at federal and state levels;
- Adequately finance strong state programs to implement the Clean Water Act and the Safe Drinking Water Act;
- Establish a new program for clean and safe water technology and management innovation to reduce infrastructure costs, prolong infrastructure life, and improve utilities' productivity;
- Provide expanded, targeted technical assistance to communities most in need.

ACWA's Position

ACWA recognizes that no single solution addresses the full range of water and wastewater infrastructure challenges. For this reason, all levels of government and the private sector must share responsibility for the solutions.

ACWA will support increased funding for the state revolving fund programs in fiscal year 2009, which enable improvements to drinking water quality facilities as well as watershed protection efforts. ACWA's foremost priorities lie in the protection of public health and the delivery of safe, reliable water at the lowest possible cost to Californians. ACWA will continue to communicate the urgent need for water infrastructure investment in order to sustain the health and security of California's and the American economy.

The Clean Water Act

Background

The Clean Water Act, passed by Congress in 1972, redefined the country's approach to water pollution control. The act, officially known as the Federal Water Pollution Control Act Amendments of 1972, created both a mechanism for setting water quality standards, as well as a funding source to help states comply with the standards. In short, it established the federal government as the chief enforcer of national water quality programs.

Federal regulatory jurisdiction is a recurrent flashpoint in CWA jurisdiction. The full extent of the CWA's reach continues to fuel court battles and debate in the resource community on states' rights. Issues like wetlands regulations, private property rights and water transfers hold the greatest relevance for California's water districts, particularly for the purposes of flood control.

ACWA's Position

ACWA believes that legislation to amend or reauthorize the Clean Water Act must preserve the right of states to regulate water allocation. States must be allowed to fashion their own watershed management programs with flexible, site-specific water quality plans and enforcement triggers.

ACWA opposes current legislative efforts, such as HR 2421 and S 1870, to expand federal jurisdiction over the nation's land and water resources by removing the term 'navigable' from the original CWA. ACWA believes that Congress clearly intended to exclude groundwater from the CWA, a view shared by many federal courts. However, because the bill's definition of "waters of the United States" references "all waters", it would seem to capture groundwater. The inclusion of groundwater under the purview of the CWA would have significant implications for publicly owned treatment works and water suppliers in California, with regard to both water rights and water quality.

ACWA members are also concerned about the potential impacts that increased federal regulation and jurisdiction could have on drinking water treatment practices, water transfers, irrigation reservoirs, storm water drainage systems, agricultural drainage channels, and irrigation canals. HR 2421 also has the potential to increase the need for NPDES and Section 404 wetlands permits. The resulting economic cost of compliance and disruption of service, and in California of duplicative nature, will be unprecedented.

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February 2008

Perchlorate

Background

Perchlorate is both a naturally occurring and man-made chemical known to interfere with the natural functioning of the thyroid gland by inhibiting the uptake of iodide. One-third of all perchlorate used in the United States is used in California and 90% of California's perchlorate use is related to the aerospace industry. Most perchlorate detections in water are related to contamination incidents; however, perchlorate is also naturally occurring and low level contamination is widespread. In California, perchlorate has been detected in almost 450 drinking water sources throughout the state.

The California Department of Public Health recently promulgated regulations for perchlorate including a maximum contaminant level (MCL) of 6 parts per billion (ppb). The public health goal (PHG) and notification level for California has also been set at 6 ppb. While there is currently no federal drinking water standard for perchlorate, several pieces of legislation have been introduced in Congress that would require the federal Environmental Protection Agency (EPA) to develop perchlorate regulations.

ACWA's Position

Last September California's Department of Public Health set a drinking water standard of 6 ppb. ACWA supports California's standard and is disappointed the EPA has failed to complete its review of perchlorate data in a timely manner. ACWA will continue to work with the EPA as it moves toward setting a standard for perchlorate in drinking water.

The most effective means of reducing perchlorate contamination of drinking water supplies is to prevent the release of perchlorate to the environment. ACWA supports all efforts to protect source waters from perchlorate and any other source of contamination. Additionally, ACWA believes the parties responsible for the contamination must pay for all costs related to treatment or replacement water. When responsible parties are not identified or are unable to pay, state and federal funds should be made available to help with treatment costs. It is unacceptable for water customers to shoulder the costs related to perchlorate contamination.

ACWA opposes efforts by the U.S. military to obtain exemptions from key environmental cleanup laws. If perchlorate is not remediated on a military base, it will eventually migrate off-site potentially contaminating public drinking water wells. This contamination could be extensive since military bases are large.

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nia Water Agencies

CALIFORNIA WATER
February 2008

Invasive Species

Background

Invasive species pose a multi-faceted risk to California's water supplies. Non-native plants such as, Arundo (giant reed), water hyacinth, and tamarisk (salt cedar), choke water infrastructure and draw away scarce water supplies. Exotic fish, mollusks, and other species can harm native species or their habitat, undermining ecosystem restoration in sensitive watersheds like the Sacramento and San Joaquin Bay-Delta.

Last January the quagga mussel, a freshwater mussel closely related to the zebra mussel, was discovered in Lake Mead. It has since spread to the Colorado River Aqueduct, five San Diego County reservoirs, and two reservoirs in Riverside County. This discovery raises the troubling possibility that municipal and industrial water intakes may soon be clogged and damaged by these fast-growing invaders. In the eastern United States, zebra and quagga mussels cause up to a half billion dollars per year in damage. Their appearance west of the continental divide could cause economic damage larger than in the East.

ACWA's Position

The discovery of quagga mussels in the West could have huge implications for water systems in California. ACWA supports efforts by state and federal governments to rapidly respond to this threat and eradicate the problem.

ACWA supports the Ballast Water Management Act of 2007 (S.1578 and HR 2423). This legislation requires the development of ballast water management plans and establishes national ballast water discharge standards without preempting state law.

Additionally, ACWA supports S.725, the National Aquatic Invasive Species Act of 2007. This legislation improves federal resources devoted to detecting and combating invasive species and creates a national system for rapid early detection and monitoring. It also establishes grant programs for research and development.

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Water Recycling

Background

Water recycling, also known as reclamation or reuse, treats wastewater so that it can be safely used to irrigate landscape and replenish groundwater basins.

In 1992, Congress created the Title XVI program establishing water recycling as an ongoing part of the Bureau of Reclamation's mission. This highly leveraged program provides one federal dollar for every three local dollars invested in water recycling projects. However, Reclamation's support for the program has been tepid; only $7 million in funding was requested for FY'09.

Despite a lack of federal support, California's public water agencies continue to construct recycling projects. According to the California Department of Water Resources, over 525,000 acre-feet of wastewater is recycled each year. About half of that (48%) is used for agricultural irrigation. Another 20% is used for landscape irrigation, and about 12% is used for groundwater recharge.

Many large recycling projects have been completed over the past decade. One of the largest projects is a groundwater replenishment system developed by the Orange County Sanitation and Orange County Water Districts. Wastewater is first purified through a microfiltration system and disinfected using ultraviolet light. This treated water is then pumped to spreading ponds near the Santa Ana River for percolation into the groundwater basin.

So far this Congress, sixteen bills have passed the House of Representative's authorizing funding for water recycling projects in California. Only two of them are included in the omnibus natural resources bill (S.2483) poised to pass the Senate, the rest are still waiting for Senate approval.

ACWA's Position

ACWA embraces water recycling as a significant component of its comprehensive water policy proposal and recommends state and federal governments fund recycling projects. ACWA supports increasing Title XVI funding to at least $30 million dollars per year.

Last Congress, legislation to streamline the Title XVI program spurred Reclamation into action. Updates and improvements to the guidelines for Title XVI projects were completed in the fall of 2007. ACWA continues to monitor the program to ensure it meets the needs of the water community.

ACWA also supports HR 3452, the clean renewable water supply bond act, a new tax credit bond program to help public agencies finance desalination, water recycling, and groundwater cleanup projects. The bill was referred to the Ways and Means Committee and is awaiting a hearing.

The following is an article from "Dune" Magazine, a local desert magazine.

This article quotes Dave Luker of Desert Water Agency (DWA), Steve Robbins of Coachella Valley Water District (CVWD) and Arden Wallum of Mission Springs Water District (MSWD) as all saying we are already in a "severe overdraft" in the valley's basins, and how the Colorado River is becoming a lesser and lesser secure source of water for recharge capabilities through Lake Mead and Lake Powell because of their "alarmingly low water levels".

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How to Look **COOL** on the Best Public Links

HYDRODYNAMICS

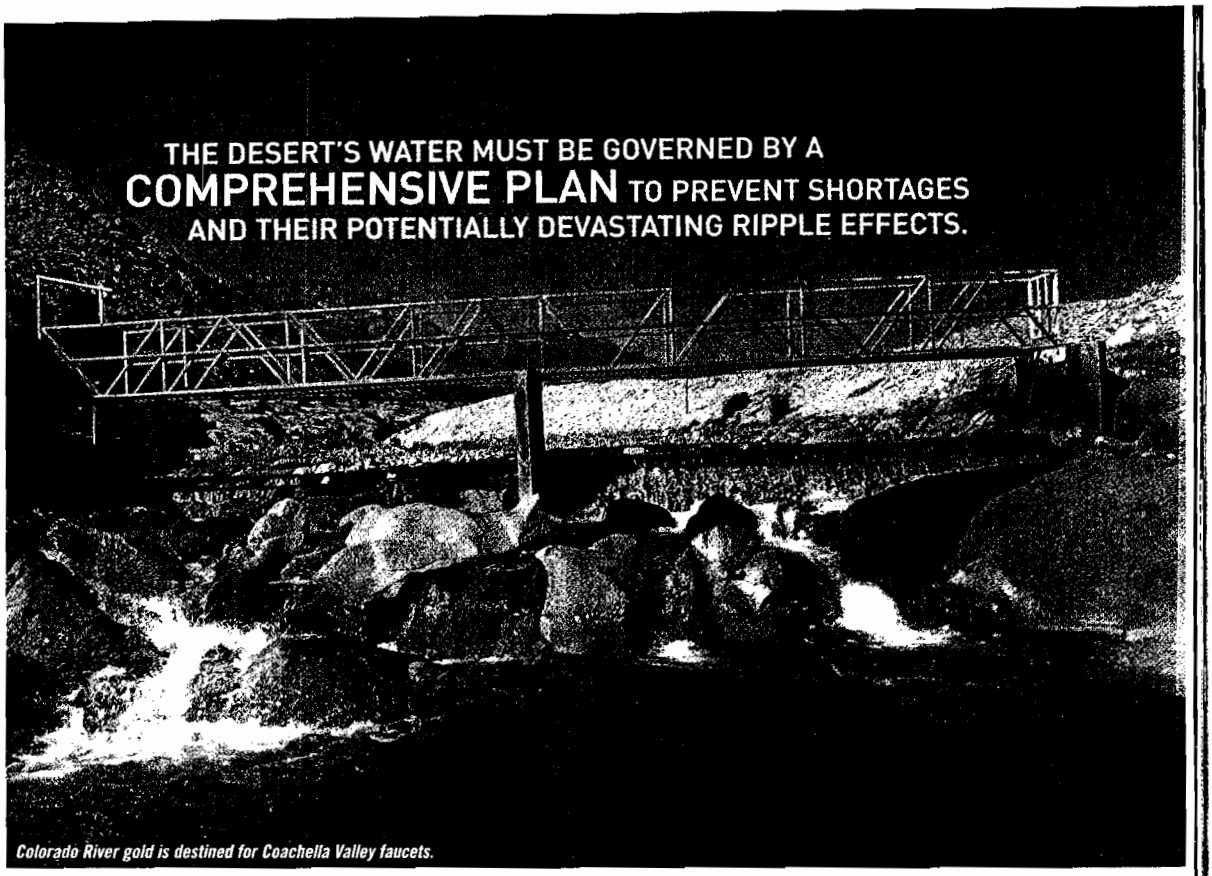
Engineering, environmental and political channels converge to deliver the Coachella Valley's abundant water. But their shifting courses may threaten the flow. **By Jan Silver Maguire**

A new home development in Indio boasts a 20-acre private lake. At a major resort in Palm Desert, gondolas navigate a decorative pond as they transport guests to dinner. A mall in Rancho Mirage is both named for, and derives its glamour from, an artificial river that runs through it. Private pools, largely unused other than for visual relief from the arid terrain, evaporate quietly in thousands of backyards. Many square miles of crops, vineyards and date groves suck moisture from mechanically moistened earth. And then there are the dozens of emerald golf courses—showered generously every day of the year.

The Coachella Valley flaunts its world-renowned status as a Desert oasis wherever one looks. So what is the main source from which this seemingly plentiful water springs?

We're walking on it.

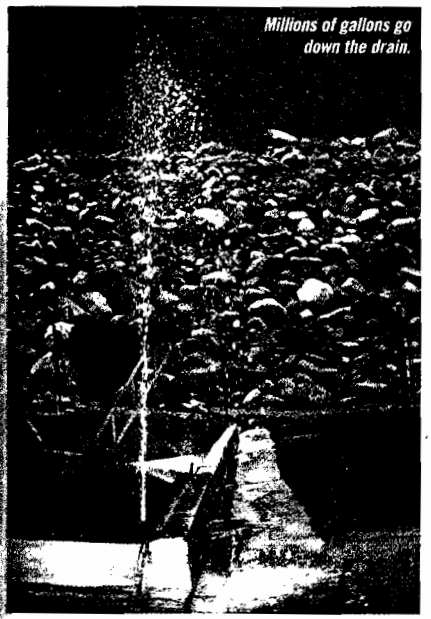
THE DESERT'S WATER MUST BE GOVERNED BY A **COMPREHENSIVE PLAN** TO PREVENT SHORTAGES AND THEIR POTENTIALLY DEVASTATING RIPPLE EFFECTS.



Colorado River gold is destined for Coachella Valley faucets.

Deep beneath the Coachella Valley lies a massive aquifer, a natural underground reservoir with a capacity estimated at nearly 40 million acre-feet. (An acre-foot of water is 325,851 gallons, so don't bother with your calculator—it will run out of digits.) Yet this aquifer is not full; it is, in fact, being depleted faster than it's being recharged, and new water is getting harder to find or buy. Media reports of a looming "water war" in the West have been appearing more frequently each year. And recent dire headlines about the Atlanta metropolitan area's down-to-a-trickle supplies have stirred unease nationwide.

In California, issues surrounding water—principally its acquisition, management and conservation—are among the most controversial and complex. Districts, states, farmers and developers increasingly are vying for precious resources like the Colorado River and the San Joaquin Bay Delta. As the competition churns, Sacramento has stagnated—locked in political debate as Governor Arnold Schwarzenegger attempts to push through a proposed $5.9 billion comprehensive water infrastructure plan that includes restoration of the Delta, which supplies clean water to 25 million people in Southern California. Moreover, in a move designed to protect the declining population of a tiny fish called the Delta smelt, this past August a federal judge imposed temporary restrictions on the amount of water taken from the Delta. Many water officials believe this decision could portend rationing and greater restrictions on water use.



Millions of gallons go down the drain.

For the Coachella Valley, the near- and long-term implications of recent federal and state decisions remain to be seen. But from a macro-perspective, it is clear that the Desert's water issues are inextricably tied to the Delta, the State of California and neighboring states. The Delta "probably is the lynchpin to water supply in the state," says David Luker, general manager of the Desert Water Agency (DWA), one of two local water purveyors—the other is the Coachella Valley Water District (CVWD)—that contracts for state water. The consensus is that the Desert's water issues must be governed by a comprehensive plan encompassing effective management, recycling and conservation to prevent shortages and their potentially devastating ripple effects.

STILL WATERS RUN DEEP

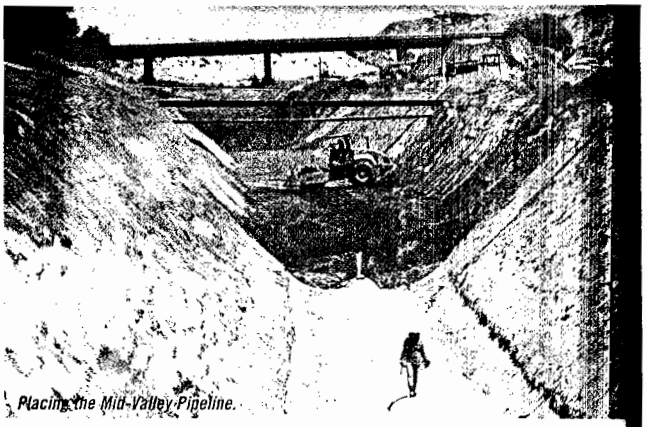
Historically, significant use of the Coachella Valley's water began with an agricultural bonanza at the turn of the twentieth century. Farmers took advantage of cheap land and bountiful sunshine, particularly in the eastern valley, to grow niche crops like dates, melons and citrus—tapping into the vast underground aquifer and artesian wells. But then an alarming decrease in local groundwater tables threatened the industry. A crisis was averted in 1949 when the US Bureau of Reclamation completed the Coachella Valley branch of the All-American Canal to import water from the Colorado River. Yet the Desert's subsequent evolution into a residential, resort and golfing destination began increasing the region's thirst anew. In fact, according to CVWD's 2002 Water Management Plan, valley water demand increased nearly seven-fold from 1936 to 1999.

Rodney Smith, Ph.D., senior vice president of Upland, California-based Stratecon, Inc., a strategic planning firm specializing in water and other natural resources, blames overdevelopment in the West—and in the Coachella Valley, particularly—for the stressed aquifer. "Groundwater was once the mother lode for this area," he notes. "But then agricultural development occurred, cities started springing up and it was very convenient to drill more wells and pump more water."
As the region's critical water source, the Coachella Valley aquifer extends from Whitewater in the northwest to the Salton Sea in the southeast, encompassing four main sub-basins—Mission Creek, Garnet Hill, Whitewater

River and Desert Hot Springs. Due primarily to the ongoing drought and a burgeoning population, water experts believe areas of the aquifer to be in an extended period of overdraft. A 2003/04 CVWD engineering report concluded that the Whitewater River sub-basin is overdrawn at a rate of 70,132 acre-feet, or nearly 23 billion gallons, per year.

A key component of the valley's plan to offset groundwater use continues to be importing water via two main sources: the State Water Project and the Colorado River. In the 1970s, CVWD and DWA joined the State Water Project to access additional supplies from Northern California. Since a direct pipeline does not exist to bring state water into the Coachella Valley, CVWD and DWA trade their State Water Project entitlements in an arrangement with the Metropolitan Water District of Southern California (MWD). MWD releases the water from the immensely strategic Colorado River Aqueduct as it intersects the Whitewater River. The water then flows beneath I-10 and eventually percolates into recharge ponds near Windy Point, at the northwestern end of Palm Springs.

In recent years, CVWD and DWA have sought access to extra state water entitlements, including a $20 million purchase of 9,900 acre-feet from the Tulare Basin Water Storage District in 2004—bringing the Coachella Valley's State Water Project entitlement total to 187,100 acre-feet per year. As *Dune* went to press, CVWD and DWA also were close to finalizing a deal with water districts in California's central valley region that will bring an additional 23,000 acre-feet of State Water Project entitlements to the Desert in 2010. According to CVWD general manager and chief engineer Steve Robbins, the two agencies also are evaluating the feasibility of piping water from Northern California directly to the Coachella Valley, "but high costs are associated with it," he says.


Placing the Mid-Valley Pipeline.

One increasingly divisive issue relates to California's historic dependence on Colorado River water in relation to neighboring states like Nevada and Arizona, which have recently sought their full entitlements to leverage explosive population growth and development. The Colorado River arguably is the most important source of regional groundwater recharge in the Coachella and Imperial valleys. Other recharge sources include surface runoff and subsurface inflow from the San Jacinto and Santa Rosa Mountains, the San Bernardino Mountains during wet years (creating the "natural" Whitewater River), and local precipitation—although it is important to note that the Coachella Valley's annual rainfall averages only three inches. Return flows from urban, golf course and agricultural irrigation also contribute to recharge.

In October 2003, a "peace treaty" known as the Quantification Settlement Agreement (QSA) was reached among the seven states that divvy the Colorado River. The agreement resulted in a 75-year plan for California's share. The QSA set Coachella Valley river water entitlement at 330,000 acre-feet per year, while directing significant water transfers from the Imperial Irrigation District to San Diego. It also served as a catalyst for Salton Sea restoration and a $200 million state-funded project to reline the earthen portions of the All-American and Coachella Canals to reduce loss of water from seepage.

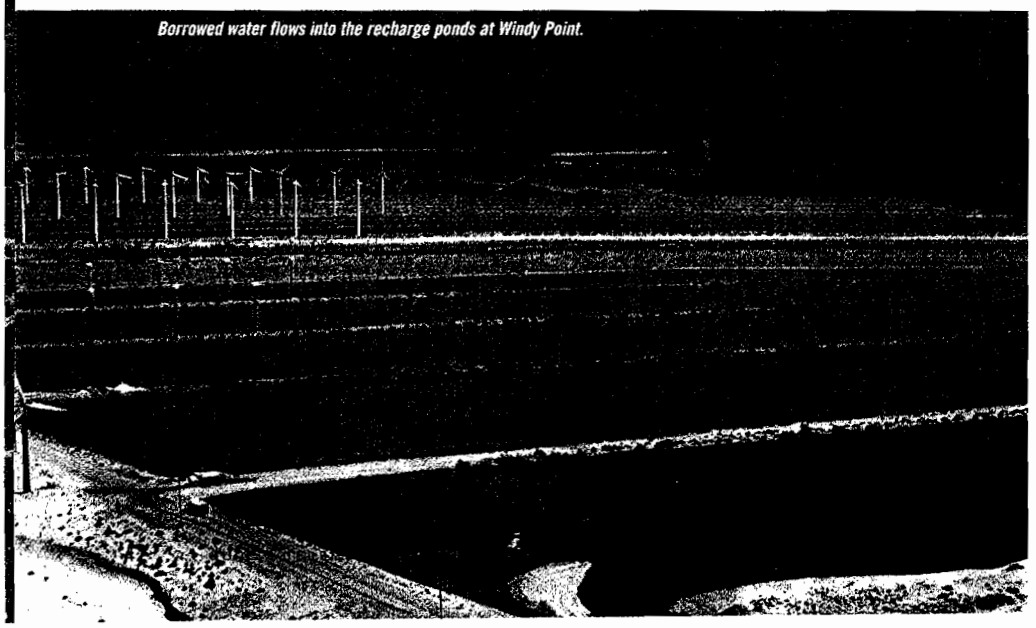
NOT WATER UNDER THE BRIDGE

Water management in the Coachella Valley faces many challenges. One is the reliability of imported water from both the Colorado River and State Water Project—particularly in light of the August court decision to suspend water usage from the Delta. Says Robbins: "The 35 percent reduction in the amount of water moving south of the Delta is a tremendous hit to the water industry as a whole." An important corollary, Robbins adds, is that it's now difficult, if not impossible, to conduct water supply assessments mandated by law. This, he believes, will have a direct and negative impact on construction—a substantial part of California's economy.

"We all have a stake in this," says Fred Bell, executive director of the Desert chapter of the California Building Industry Association, adding that while the situation is serious, it is still manageable. Bell also stresses the need for conservation. "The building industry, residents... anyone who does business in California has to deal with water conservation in some fashion."

A 2004 report prepared by Terra Nova Planning & Research, Inc., for the Coachella Valley Multiple Species Habitat Conservation Plan, supports Bell's admonishment, warning that "serious social, environmental and economic consequences" could result from the groundwater basin's overdraft condition. Said consequences could include the loss of groundwater in storage, diminishing water quality, seawater intrusion, increased costs associated with drilling and installing deeper wells and larger pumps, and land subsidence—or sinking of the land surface, which can cause ground fissures, sinkholes and structural damage.

Borrowed water flows into the recharge ponds at Windy Point.

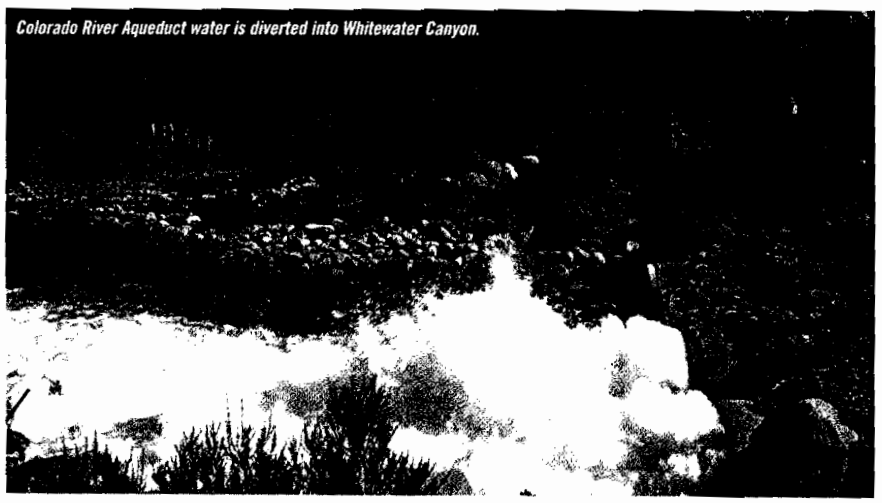


Another challenge, partially aggravated by the palm tree-filled promotions of resorts and developers, is our collective belief in a limitless water supply and our procrastination when it comes to fixing leaky sprinklers and faucets. "I'm amazed that as much as we try to get people to conserve and as much as we see written about it, we still see water waste," says Luker, noting that 70-80 percent of the valley's water supply is used for landscape and golf course applications. To this end, DWA has transformed its facility and grounds to demonstrate how to maximize conservation techniques. Grass has been replaced with artificial turf and desert landscape, and recycled water is used for irrigation. Customers, as a result, gradually are jumping on the conservation bandwagon: Palm Springs High School playing fields and five golf courses in Palm Springs irrigate with recycled water, while 12 golf courses located within the CVWD use at least some recycled water for the same purpose.

To offset the ongoing reliance on groundwater, CVWD is constructing the $70 million Mid-Valley Pipeline. When completed by the end of 2010, it will route Colorado River water through the CVWD's Wastewater Reclamation Plant and help 50 golf courses in Indian Wells, Palm Desert and Rancho Mirage meet their irrigation needs with a mix of recycled and river water. A second advantage to using recycled water, DWA's Luker notes, is that it saves electricity: "Pumping all the water from below ground creates a higher power demand than if we use surface water from the wastewater recycling plant in Palm Springs."

While recycled or reclaimed wastewater is not suitable for human consumption, how safe is Colorado River water to drink? Expert opinions vary. Arden Wallum, general manager of Mission Springs Water District (MSWD)—which draws 100 percent of its water supply from groundwater—ranks the area's water quality level, from highest to lowest, as follows: groundwater, State Water Project water and Colorado River water. "They're bringing Colorado River into our recharge ponds," say Wallum, "and replenishing our groundwater with this poor-quality water. We're concerned that our groundwater quality will deteriorate." To illustrate this, at least one geologist studying the issue has found total dissolved solids (TDS) to be approximately four times greater in Colorado River water than in average drinking water.

Eddie Rigdon, group manager of water systems operations for the Metropolitan Water District, acknowledges that while there is a high level of TDS in the Colorado River—now roughly at 700 milligrams per liter (versus an average of less than 300 in water pumped for domestic purposes from the valley's groundwater basin)—this is due to the natural particulate-gathering of water as it travels. MWD laboratory staff treats water


Colorado River Aqueduct water is diverted into Whitewater Canyon.

WATER MANAGEMENT IN THE VALLEY
THE H2OVERLORDS

COACHELLA VALLEY WATER DISTRICT (CVWD)
Coachella, CA

Established in 1918 to protect the valley's groundwater basin and seek supplemental sources of imported water, CVWD is a local government agency overseen by five directors elected to four year-terms by district voters. Its service area is approximately 1,000 square miles—mostly within the central and eastern Coachella Valley in Riverside County, although boundaries extend into Imperial County. CVWD services include providing drinking water to more than 100,000 homes and businesses, sanitation services and wastewater recycling.
www.cvwd.org

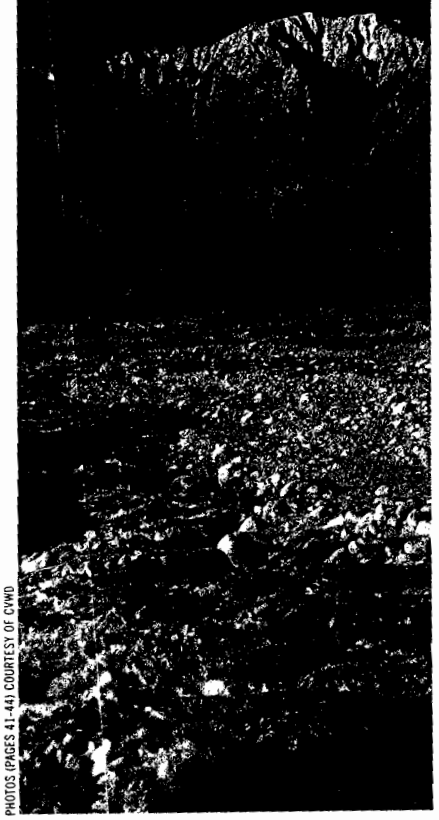
DESERT WATER AGENCY (DWA)
Palm Springs, CA

DWA, a nonprofit public agency, was formed in 1961 to qualify for receiving imported water through the California Water Plan. It is governed by a five-member board of directors and serves a 325-square-mile area covering all of Palm Springs, parts of Cathedral City, and some unincorporated areas of Riverside County. DWA provides a range of services including domestic water, water recycling, sewer, and engineering and planning.
www.dwa.org

MISSION SPRINGS WATER DISTRICT (MSWD)
Desert Hot Springs, CA

Formerly known as the Desert Hot Springs County Water District, MSWD was created in 1953 as a publicly owned water district to meet the critical need for fresh water in the Desert Hot Springs area. The district is managed by a five-member board of directors and spans 135 square miles, including the City of Desert Hot Springs, West Palm Springs, Palm Springs Crest and 10 small communities in Riverside County. Among its services are domestic water, sanitary sewage collection and treatment, and groundwater basin management.
www.mswd.org

WHETHER OR NOT YOU SUBSCRIBE TO GLOBAL WARMING, SCIENTISTS ARE PURPORTING MORE EVIDENCE OF IT—LIKE THE **SHRINKING SNOWPACK** IN THE ROCKIES AND SIERRA NEVADAS.



PHOTOS (PAGES 41-44) COURTESY OF CVWD

from its source and throughout the distribution system and regularly conducting analyses to ensure a safe drinking supply. "The California Department of Health Sciences has some of the highest water quality standards in the United States, and we regularly meet or exceed requirements below national pollutant levels," says Rigdon.

It is also important to take into account the forces of nature that contribute to water supply, demand and infrastructure, such as global warming, drought conditions and the valley's seismic predisposition. Whether or not you subscribe to global warming, scientists increasingly are purporting evidence of this phenomenon—disappearing glaciers, higher atmospheric levels of methane and carbon dioxide, and, more significantly for California, the shrinking snowpack in the Rocky and Sierra Nevada mountain ranges. A July 2007 report by the Natural Resources Defense Council assessing the effects of global warming on water supplies in the West states that current drought conditions are a taste of things to come.

IN THE PIPELINE

In 2002, the Coachella Valley Water District finalized a comprehensive blueprint called *The Coachella Valley Water Management Plan* to ensure that the region continues to meet its current and future demands for high-quality water. The plan's overarching objective is to improve all areas of water management, such as controlling groundwater overdraft, searching for steady supplies of imported water, maximizing recycled water use for outdoor needs, and increasing water conservation measures. Since its inception, CVWD has launched a series of programs designed to meet plan requirements. One conservation-based program is designed to reduce dependence on groundwater by providing loans and assistance for the installation of water-saving irrigation and landscape systems.

Desert Water Agency has adopted much of the *Water Management Plan*. It implements many recycling and conservation projects of its own while participating in renewable energy initiatives. The agency currently has two hydroelectric plants—one in Whitewater and one in Snow Creek, at the foot of Mount San Jacinto. "We're very active in power generation," says DWA's Luker. "We're looking to expand that and also supply energy for our water reclamation project to offset operating costs. It's a good thing for California because it takes demand off the grid and makes power available for other uses."

Meanwhile, state water officials are forging ahead with plans to ensure that water supplies keep up with ongoing development locally. "What makes sense is to manage growth—meaning that you grow without depleting your resources," says Dick Kelly, mayor of Palm Desert, a regional leader in the water conservation movement. Among many measures the city has undertaken are stringent landscape ordinances requiring the use of drip irrigation systems instead of sprinklers in public landscaping and requiring developers to use drought-tolerant plants. Kelly also notes that his is the only city in California with a program to reduce energy consumption by 30 percent in the next five years.

The alarmingly low water levels at Lake Powell, at the Utah/Arizona border, and Nevada's Lake Mead beg another question: How much do cyclical weather patterns affect our supply and storage capacities? "History is replete with cycles of wet-versus-dry periods," explains Stratecon's Rodney Smith. "Last century, when you had people devising expectations of water supplies, we were in a relatively wet period. A lot of these storage projects were developed when we were in the midst of very favorable conditions."

And what about the consumer's water costs? Coachella Valley residents are lucky at the moment—paying approximately 80 cents per 100 cubic feet (748 gallons), while residents in Pasadena about 90 miles to the west pay two to three times as much. Yet the majority of water experts agree that it's only a matter of time before Desert residents see increases. MSWD's Wallum says imported water will become very expensive. "We were buying water in the late 1990s at $1,000 per acre-foot; the going price now is $3,000." MWD's Rigdon foresees rate hikes due to growing associated costs, like maintenance and transport. "Energy is a big component of moving water," he explains. "As energy prices go up, so will the cost of water."

"The dynamics of water in California are changing, and we recognize that we have to change," acknowledges CVWD's Robbins. He and his colleagues agree that a major paradigm shift also is needed on the public's part. "The cultural belief is that water is cheap and plentiful. But whether you have lived here for 30 years or 30 days, don't take water for granted." ◂

For more information, see the California Department of Water Resources (www.water.ca.gov) and "California's Water: A Crisis We Can't Ignore" (www.calwatercrisis.org), a public education program launched by the Association of California Water Agencies.

For simple everyday water conservation tips, visit www.wateruseitwisely.com.

The rest of this package is an assortment of ads and articles I have collected from The Sacramento Bee newspaper, ACWA website, the Los Angeles Times, EBMUD website, The San Diego Union-Tribune, The Wall Street Journal, The Desert Sun newspaper and the National Geographic magazine.

sacbee.com
The Web Site of The Sacramento Bee

This story is taken from Sacbee / Opinion.

John Garamendi: State's water needs require bold approach

By John Garamendi - Special to The Bee
Published 12:00 am PDT Monday, May 12, 2008

Like a splash of cold water to the face, the recent startling reports from state water surveyors should be enough to wake up our state.

As The Bee reported May 2, the Sierra snowpack stands at just 67 percent of average levels, and March and April were the driest in recorded history. Local governments have been told to prepare for rationing. But as we proceed rapidly into a world changed by global warming, a spring like 2008's may be the new normal.

Climate change is anticipated to have three major impacts on California's future water supply. First, the Sierra Nevada snowpack, California's primary water reservoir, is anticipated to shrink 30 percent to 90 percent by the end of the century. Second, warmer temperatures will produce warmer winter storms – the classic Pineapple Express – which will lead to more precipitation falling as rain instead of snow, increased threat of flooding, more pressure on our already vulnerable levee systems and serious issues surrounding our ability to store water. And third, rising sea levels will lead to an influx of salt water on our coastline and rivers, affecting water quality, habitat and further reducing our already limited freshwater supply.

Add to this the pressure California's population growth (600,000 people per year) is placing on water resources, not to mention the declining health of the Sacramento-San Joaquin Delta and shrinking supplies from the Colorado River. The simple truth is California's water infrastructure cannot withstand the dual stresses of climate change and population growth. We must adapt and manage our water more efficiently.

Our water managers rely on 75 years of historical data to predict water patterns and manage our reservoirs and flood-control systems. In the context of climate change, this historic data is obsolete. Water managers need real-time information that allows them to adjust the water storage and flood capacity of our reservoirs based on information collected daily and hourly in the event of a major storm.

To meet these challenges, I have worked with leading hydrologists, meteorologists and space scientists from around the nation to develop a pilot program for "adaptive" water and flood management of the American River watershed, a plan that could eventually be used in all California river systems. This innovative initiative – which I call H20, 2.0 – uses existing technologies and could be fully implemented in one year, tested over four years and then used to replace the historic average methodology in making critical water and flood decisions. The cost is expected to be less than $4 million over the four-year period.

California's water future could look like this: Snowpack depth, density and water potential, the rate of snowmelt, actual hourly rainfall, temperature of incoming storms, snow fall elevation and related rainfall potential, ability of soil to absorb moisture, and other watershed conditions are remotely monitored and measured in real time using a network of ground-based instrumentation. This data is complemented by satellite photography, ground and satellite radar, and drone aircraft to monitor offshore storms. These measurements are instantaneously fed into advanced computerized statistical models, giving scientists and water managers the information needed to better predict water flows and control them in real time – which means we can maximize our water supply by retaining water behind the dams when real time information indicates a low risk of flooding, or release water from the reservoirs earlier when real time information indicates the likelihood of a flood.

With the bad news on the Sierra snowpack last week, it is clear that California must find new ways to operate its dams and conveyance infrastructure to improve water supply reliability while simultaneously lowering flood risks. Given the state's current budget crisis, our efforts to improve water supply and flood protection must also be cost-effective and innovative.

While just one piece of the overall water puzzle, H20, 2.0 represents the next generation of thinking in resource management. This project can provide critical data that enables the state's water managers to make more efficient use of our limited water resources for agricultural, urban and environmental uses.

H20, 2.0 has the potential to offer both greater water supply and improved flood management at a small cost. The good news is that California's water future could begin today.

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May 6, 2008

Water Leaders Gather This Week for Latest on Dry Conditions
Nearly 2,000 Local Water Officials Expected at ACWA Conference in Monterey

Monterey ? With dry conditions and court-ordered restrictions cutting into supplies, water officials from every part of the state will hear the latest on the water supply picture Wednesday at the Association of California Water Agencies? 2008 Spring Conference & Exhibition. The event, which began Tuesday at the Monterey Conference Center and continues through Friday, is expected to draw close to 2,000 local water officials as well as state and federal water leaders.

The conference gets under way as water agencies are preparing for a challenging water year. California logged the driest March / April on record, and runoff from the once-promising snowpack is predicted to be far below normal. In addition, recent court decisions aimed at protecting species are affecting water deliveries. The State Water Project expects to deliver just 1.5 million acre-feet of water this year, the lowest amount in 16 years.

At a program beginning at 8 a.m. Wednesday, Elissa Lynn, senior meteorologist with the California Department of Water Resources, will provide an update on water conditions and emerging challenges associated with climate change.

Other key programs include:

Wednesday, May 7:
? Keynote address: Elissa Lynn, senior meteorologist, California Department of Water Resources, will discuss water conditions and climate change in California, 8 a.m.
? ?Making ?Green? Work for the Environment and the Bottom Line,? noon.
? ?New Rules for the Delta: The Wanger Decision, Delta Vision and Beyond,? 10-11:50 a.m.
? Town hall meeting ?Wanger and Beyond: Managing Water in a Legal Maze,? 2:15-3:45 p.m.

Thursday, May 8:
? ?Assessing Futures in the Sacramento-San Joaquin River Delta,? 10-11:50 a.m.
? ?Quagga Mussels: Prevention vs. Maintenance,? 10-11:50 a.m.
? Tribute to Dave Kennedy, longtime DWR director who passed away in December, noon.

Friday, May 9, Program:
? ?Local Elected Officials Speak out on Need for Water Solutions,? 8:30 a.m.

ACWA is a statewide association of public agencies whose 450 members are responsible for about 90% of the water delivered in California. For more information, visit www.acwa.com.

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May 1, 2008

Dry Year Adds to ?Perfect Storm? of Challenges, ACWA Says
Water Restrictions, Lost Jobs Underscore Need for Comprehensive Solution

Sacramento ? Association of California Water Agencies (ACWA) Executive Director Timothy Quinn issued the following statement regarding today?s snowpack survey results.

?Today?s snow measurements confirm that California is in for another dry year. Coming on the heels of a dry 2007 and court-ordered restrictions on water deliveries for much of the state, it looks like we are facing a perfect storm of challenges that local water agencies will be hard-pressed to navigate this year.

?For the first time in a long time, California is losing jobs and income because our water supply system is inadequate. These impacts are tangible evidence of the need for a comprehensive water solution that invests in the sustainability of our system so we will have the water we need for our economy and the environment.

?The solution has to improve local water supply reliability and the environmental integrity of the system to provide the right temperatures and flows for species without leaving communities high and dry. Getting there requires investments in water storage and facilities that can safely deliver water around the Delta.?

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The Web Site of The Sacramento Bee

This story is taken from Sacbee / News.

Roseville raises drought alert: More districts to follow as spring comes up dry

By Chris Bowman - cbowman@sacbee.com
Published 12:00 am PDT Thursday, May 1, 2008

Roseville became the first city in more than a dozen years Wednesday to activate a drought alert in the river-laced Sacramento region.

It probably won't be the last.

Managers of water utilities serving more than 225,000 northeastern Sacramento County residents said they, too, will broadcast similar calls for voluntary conservation later this month, thanks to two back-to-back years of stingy rain and snow.

January's respectable Sierra snowpack is melting remarkably early and quickly this spring, which is projected to be the driest on record, according to the state Department of Water Resources.

"We had a fairly good January and February, and it looked like we were going to have a pretty good water year, but then the rains stopped," said Derrick Whitehead, water supply manager for Roseville, population 107,000.

As a result, federal operators of Folsom Lake aren't loosening water allocations to Roseville and other downstream cities as they usually do this time of year.

Storage in Folsom stands at 76 percent of the 15-year average, U.S. Bureau of Reclamation monitors show.

While the depth of the snowpack feeding the American River reservoir is almost exactly average, the runoff is abnormally low. The topsoil, extremely dry from a rain-short 2007, is absorbing much of the snowmelt that otherwise would replenish the American River, bureau officials said.

Roseville is counting on Placer County Water Agency reservoirs upstream of Folsom Lake to make up for most of federal shortfall, and relying on conscientious residents and businesses to erase the remaining deficit.

The city adopted a five-stage drought alert system in early February after federal officials announced that municipal supplies from Folsom and other Central Valley Project reservoirs would be 75 percent of contracted levels.

The all-voluntary "stage one" alert, scheduled to be mailed to Roseville property owners in

the next two weeks, calls for greater vigilance, including:

• Cutting water use by 10 percent.

• Curbing over-irrigation of lawns.

• Using brooms in place of hoses to clean pavement.

• Asking restaurants to serve water only upon request – an action that saves little water but helps deliver the conservation message, officials said.

The city is providing water-use audits and water-efficient hose nozzles and shower heads free of charge.

"A 10 percent reduction for each household is really easy to accomplish," said Lisa Amaral, Roseville's conservation manager. "It doesn't really require a lot of effort and doesn't impact your overall quality of life."

Roseville has not called for water conservation since 1994, when the Sacramento region was still recovering from the 1991 drought, Whitehead said.

The water supply outlook for other local cities varies according to water rights and dependence on federal water supplies.

Sacramento, for example, is well endowed with legal rights to river water that more than meets its demands.

San Juan Water District – serving 120,000 residents in parts of Carmichael, Citrus Heights, Fair Oaks, Granite Bay and Orangevale – relies on Folsom Lake for about 20 percent of its needs.

As with Roseville, San Juan will rely on Placer County Water Agency contracts to get by this summer and fall, said Shauna Lorence, the district's general manager.

Lorence said she would rather tap citizen awareness than activate the district's emergency well water supplies.

"Shutting off the hose and paying attention to irrigation will make a big difference," Lorence said.

El Dorado Irrigation District officials said their Gold Rush-era rights to American River water will more than offset the dip in federal supplies to El Dorado Hills.

Officials with water districts serving Folsom and Rancho Cordova said they, too, have other sources to cover the federal shortfall.

Those districts, however, have decided to ask customers to join their water-short neighbors in the conservation effort, said Paul Schubert, district manager for Golden State Water Co., which serves Rancho Cordova and Gold River.

"We will be following suit, not so much because we are affected, but to get a regional message out there so people aren't confused about the need to conserve," Schubert said.

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April 7, 2008

Cuts in Water Deliveries Affecting Jobs, Water Rates
Ecological Crisis in Delta Leading Many Agencies to Dip into Reserves

Sacramento ? With deep cuts in water deliveries ordered this year to help protect a threatened fish species, the Association of California Water Agencies (ACWA) today said impacts are beginning to ripple across the state and will likely continue until action is taken to improve the sustainability of the state?s water supply system.

?For the first time in a long time, California is losing income and jobs because our water supply system is in crisis,? ACWA Executive Director Timothy Quinn said. ?Every day that goes by without a solution is another day of environmental deterioration and lost water supply.?

ACWA member agencies report that court-ordered restrictions on water deliveries through the Sacramento-San Joaquin River Delta are creating drought-like conditions despite the fact that snowpack levels were near normal last month. Runoff from the mountain snowpack is expected to be below average due to dry soil conditions and warm temperatures that evaporated some of the water content in March.

Agencies stand to receive just 35% of their requested water deliveries from the State Water Project (SWP), forcing many to dip into dry-year reserves and seek out expensive alternative supply sources where possible. In some cases, reserves already are low following a string of dry years and a 10-day shutdown of the SWP pumps last summer to protect the Delta smelt.

Among the impacts reported to date:

? Communities such as Long Beach have put mandatory conservation programs in place, and many others are ramping up voluntary conservation efforts.

? Decisions on new housing and retail developments in Riverside County are on hold because the necessary water supplies cannot be guaranteed. One of the delayed projects, a major distribution center, was expected to generate 1,000 jobs.

? Growers in northern San Diego County are stumping citrus and avocado trees due to water shortages. Water supply uncertainties and steep increases in water rates may permanently change the face of an agricultural industry that contributes more than $5 billion annually to the local economy.

? The state?s largest water wholesaler, Metropolitan Water District of Southern California, will increase its water rates by 14% next year due in part to the cost of acquiring water to off-set reduced SWP supplies. The rate increases will affect millions of households in Southern California.

? Water agencies in the San Francisco Bay Area and elsewhere are dipping into reserves, which means they will have less water available to meet needs if next year is dry. They also have less water available to replenish groundwater basins that were drawn down in recent dry years.

Quinn said the impacts underscore the urgent need to address the Delta and local supply reliability as part of a comprehensive water solution. The solution must include actions to improve the sustainability of the state?s water system so it can meet the needs of the environment and the economy.

The solution also must include substantial investments in conservation, water recycling, local and regional water storage and desalination to improve local water supplies and reduce pressure on the Delta.

?We have an outdated system that no longer works for species, jobs or local communities,? Quinn said. ?It?s time to invest in the environmental integrity of that system.?

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November 26, 2007

State Water Allocation Underscores Water Crisis
Bleak Forecast One of Many Issues Facing California?s Water System

Sacramento, CA ? The Association of California Water Agencies (ACWA) today said the state?s bleak forecast for 2008 water deliveries underscores the serious challenges facing California?s water supply and delivery system.

?One of the most daunting problems confronting our state today is the growing uncertainty of our water system,? ACWA Executive Director Timothy Quinn said. ?This forecast is indicative of the widespread challenges we face in delivering a reliable supply of water to cities, farms, businesses and ecosystems.?

The Department of Water Resources today released an initial water supply allocation for 2008 that calls for State Water Project contractors to receive just 25% of their requested supplies. The allocation, which is significantly less than the 60% supply initially projected for calendar year 2007, is due to dry conditions and operational constraints at the State Water Project pumping facilities in the Sacramento-San Joaquin River Delta.

Since September, ACWA has been conducting a statewide public education program to raise awareness among Californians of critical water challenges. The challenges include an ecological crisis in the Delta, court-ordered cuts in deliveries from the state?s largest water projects to protect an endangered fish, ongoing dry conditions and climate change.

More information about the public education program, ?California?s Water: A Crisis We Can?t Ignore,? can be found at the program Web site, www.calwatercrisis.org

ACWA is a statewide association of public agencies whose 450 members are collectively responsible for 90% of the water delivered in California. For more information, visit www.acwa.com

Contacts: Jennifer Persike, Director of Strategic Coordination and Public Affairs, 916/441-4545, or 916/296-3981 (cell)

California's Water: A Crisis We Can't Ignore

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January 30, 2008

State Water Reliability Report Underscores Water Crisis
Projected Decline in Future Water Deliveries Reinforces Need for Action

Sacramento ? The Association of California Water Agencies (ACWA) today said a new report projecting a steady decline in the reliability of the State Water Project underscores once again the serious challenges facing California?s water supply and delivery system.

?This report spells out in hard numbers that the State Water Project will be less reliable in the future unless steps are taken to restore the Delta and improve the way we convey water,? ACWA Executive Director Timothy Quinn said. ?Unless we move forward with a comprehensive solution, we are headed for a very uncertain future for our economy and our environment.?

The Department of Water Resources today released a draft report that predicts continued erosion of the reliability of State Water Project deliveries if no action is taken. The report says court-ordered restrictions on Delta pumping will result in decreased SWP deliveries unless new measures are taken. Climate change is also adding to the uncertainty.

Quinn said water uncertainties already are affecting jobs and construction in some parts of the state. Decisions on some new housing developments in Riverside County are on hold, for example, while growers in northern San Diego County are facing a 30% cut in water deliveries this year.

?These problems will not be solved until we make some major changes,? Quinn said. ?ACWA continues to call for a comprehensive fix that improves the Delta?s ecosystem and provides the reliable water supplies our economy needs.?

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Los Angeles Times

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From the Los Angeles Times

L.A. prepares massive water-conservation plan

The initiative would punish water wasters and limit such activities as watering lawns and washing vehicles. And it would revive a controversial effort to recycle sewage water.

By Rich Connell
Los Angeles Times Staff Writer

May 15, 2008

With vital and often-distant water sources shrinking, Los Angeles officials today will revive a controversial proposal to recycle wastewater as part of a plan to curb usage and move the city toward greater water independence.

The aggressive, multiyear proposal could do much to catch the city up to other Southern California communities that have launched advanced recycling programs.

Mayor Antonio Villaraigosa's effort could cost up to $2 billion and affect a wide range of daily activities. For example, residents would be urged to change their clothes' washers, and new restrictions would be placed on how and when they could water lawns and clean cars.

Financial incentives and building code changes would be used to incorporate high-tech conservation equipment in homes and businesses. Builders would be pushed to install waterless urinals, weather-sensitive sprinkler systems and porous parking lot paving that allows rain to percolate into groundwater supplies.

Just to meet a 15% increase in demand by 2030, officials say 32 billion gallons a year will have to be saved or recaptured -- enough to cover the San Fernando Valley with a foot of water.

Prohibitions during the 1990s drought -- banning residents from washing driveways and sidewalks, letting sprinklers flood into gutters and watering grass in midday -- would be enforced again, with additional restrictions. One part of the proposal would limit lawn watering to certain days of the week.

"This is a radical departure for the city of Los Angeles," said Department of Water and Power General Manager David Nahai. "I think overall this plan is going to be a beacon for other cities."

In fact, cities facing the same challenges, including Long Beach, have already moved to curtail residential and commercial water usage and punish waste. Orange County and other Southern California agencies are also recycling treated sewage water back into the drinking supply.

Los Angeles' plan -- a copy of which was made available to The Times -- would invest in projects to capture and store rainfall and clean up a sprawling, contaminated water supply beneath the San Fernando Valley. About $1 billion would be allocated for reclamation, including a politically sensitive plan to use treated wastewater to recharge underground drinking supplies serving the Valley, Los Feliz and the Eastside.

A similar system was approved and built in the 1990s, then abandoned after critics labeled it a "toilet-to-tap" scheme.

The city learned from its earlier "aborted attempt" at water recycling, Nahai said.

"This is a new day," he said. "We have new technology. We're going to reach out very aggressively to the public and engage them as to the facts."

One critic said voters should decide whether the water supply will be blended with treated wastewater. "It's grossly unfair for the mayor, the City Council or the DWP to decide consumers are going to be using this recycled water," said Gerald A. Silver, president of Homeowners of Encino.

But Millie Hamilton, an Encino Neighborhood Council member and docent at the city's Tillman Water Reclamation Plant, said recycling is safe, needed and nothing new. "There is no new water on this planet," said Hamilton, who was referred to The Times by the mayor's office. "We are drinking the same water the dinosaurs drank. All our water has been and is being recycled."

The ambitious water plan carries political risks for the mayor, but also could burnish his record as an environmental leader in a bid for higher office. A number of key details remain to be worked out and vetted by the City Council, including the cost of various elements and how they would be financed.

On the heels of a recent DWP water rate hike, Nahai said no additional increases are anticipated. Most parts of the program can be funded from state water grants, the DWP's existing budget and going after polluters who have fouled city groundwater. But future fee increases may be needed, he acknowledged.

David Coffin, a Westchester Neighborhood Council member who tracks water issues, said the plan misses a larger point: controlling growth.

"I don't think they're going to make any headway. They're adding 14,000 to 16,000 housing units a year in the face of water shortages. How are they going to supply all those people?"

Administration officials say the point is to act now so the city can meet increased demand through a combination of conservation and recycling. They note that Los Angeles is an arid metropolis that has grown by dipping long straws in far-flung water supplies.

But recent court rulings, environmental agreements and competition from other urban centers are cutting flows or sharply increasing costs of water from the Owens Valley, the Sacramento-San Joaquin River Delta and the Colorado River.

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Drought Management Program

EBMUD Adopts Drought Management Program
Mandatory Rationing in Effect

Two dry winters have resulted in the biggest water supply threat to EBMUD in nearly 20 years. The District received roughly half of its normal runoff this year and projects its water storage will be over 200,000 acre-feet short of the water desired by October 1 of this year (the beginning of a new rain year). To safeguard its shrinking supply, EBMUD has declared a severe water shortage emergency. Mandatory water rationing is now in effect.

EBMUD is seeking a 15 percent overall reduction in water use, with specific goals for different types of customers.

Customer Group	Water Use Reduction Goal
Single-Family Residential	19%
Multi-Family Residential	11%
Irrigation	30%
Commercial	12%
Institutional	9%
Industrial	5%

Water Use Prohibitions

The drought program approved by the Board prohibits the following:

- using water for decorative ponds, lakes and fountains except those that recycle the water
- washing vehicles with hoses that do not contain shutoff nozzles
- washing sidewalks, patios and similar hard surfaces
- irrigating outdoors on consecutive days or more than three days a week (EBMUD recommends watering in the evening or before dawn)

- lawn or garden watering that results in excessive runoff
- sewer and hydrant flushing and washing streets with potable (drinking) water supplied by EBMUD except for essential purposes
- the use of potable water for construction if alternatives are available
- the use of potable water for soil compaction and dust control when another source is available

Customers who violate these rules may be subject to fines, water flow restrictions, or loss of water service. Information on proposed drought rates will be mailed to bill payers in the coming weeks.

EBMUD appreciates your everyday efforts to save water and your extra efforts to protect the water supply during the drought.

Proposed Drought Rates

Adoption of a new drought rate structure will be considered by EBMUD's Board of Directors for approval at its July 8 meeting and public hearing.

Under that proposal, water volume charges for most EBMUD single family residential water customers will increase by 10 percent. These customers will be asked to cut their water use by 19 percent (based on the average of their last three years of water bills). Customers who achieve this goal will see a reduction in their overall water bill. But those who still use more than 90 percent of what they normally use will face a $2 surcharge for each unit of water they consume beyond that threshold. (One unit of water is 748 gallons.)

Customers who use small amounts of water, less than 100 gallons a day, would be exempt from the 10 percent volume increase and the surcharge. Surcharges and increases will take effect for other customer groups as well on August 1, if the proposed rate plan is approved by the Board.

For more information, view the Notice of Proposed Drought Water Rates.

EBMUD Is Here To Help

- Rebates and Conservation Programs for Residents
- Rebates and Conservation Programs for Businesses
- WaterSmart Tips for Residents
- WaterSmart Tips for Large Irrigators

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Builders facing water pressure

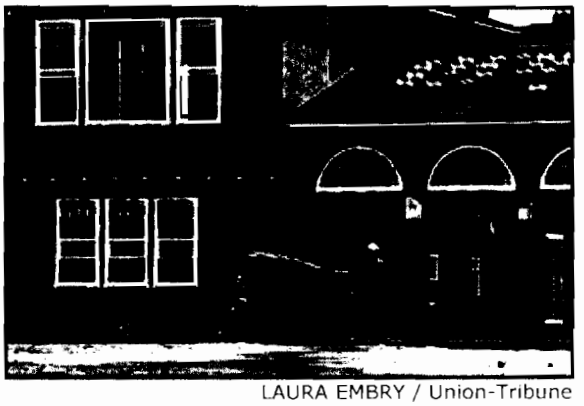
New developments urged, or required, to offset impact

By Mike Lee
and Michael Gardner
STAFF WRITERS

May 22, 2008

California officials have long assumed that there always will be enough water to serve the state's growing population, which is now more than 38 million people.

But that's no longer a safe bet because of drought, environmental rules restricting water supplies, greater demand from nearby states and the escalating cost of the increasingly precious commodity.



LAURA EMBRY / Union-Tribune
Silvario Lopez watered the ground in front of new homes at Eastlake Vistas in Chula Vista yesterday. The development is using reclaimed wastewater for irrigation.

In response, water agencies across California are starting to make a dramatic shift in how they review applications for new developments. Some are demanding that future housing tracts and shopping centers will have little or no impact on a region's water supply.

Builders are being asked or forced to prove that they can offset their impact to existing users by using reclaimed wastewater, conserving water or creating new sources of it.

In San Diego County, water officials are scrutinizing a proposal for enlarging the Westfield UTC mall in La Jolla, analyzing plans to construct a community of more than 700 houses near Escondido and considering whether to make developers pay a fee to fund water service for their projects.

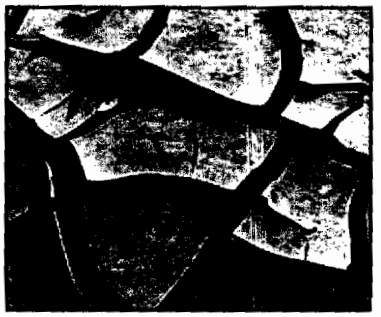
"Our traditional water supply concepts are being challenged and the future water supply is uncertain. . . . We better make sure that we have water to meet the growth plans" and existing demand, said Mitch Dion, general manager of the Rincon del Diablo Municipal Water District in Escondido.

Many residents welcome tougher measures to make new or expanded developments "water neutral."

"I resent being forced into (conservation) with calls to don't waste water and seeing it going to new development," said Glenn Carroll, who lives in Fallbrook and was once a water agency official in Central California.

His frustrations could increase this month as water agencies bombard the region with TV, radio and print ads from a new $1.8 million conservation campaign.

The countywide goal for 2008 is to save the equivalent amount of water used by 112,000 homes in a year. Mandatory cutbacks have started for farmers and could be extended to others by early next year if conservation lags or drought forecasts worsen, several water officials said.

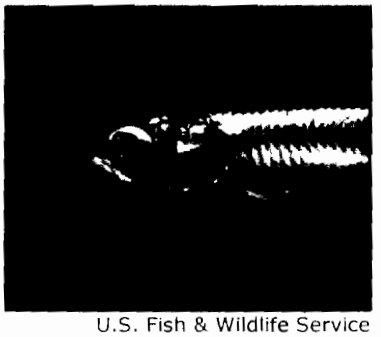


Photos.com
DROUGHT: California's dry spell is putting increasing pressure on water districts.

Just a few months ago, Southern California's water experts cast the current shortages as a short-term problem. They were extremely hesitant to disrupt the economy with water restrictions, and they expressed confidence in their long-term plans for obtaining water from desalination and additional imports.

Such views are changing, said Michael Cowett, a lawyer for several water districts in the county.

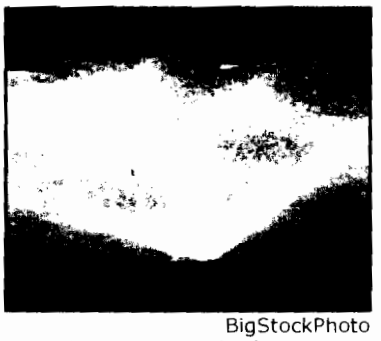
"Unless the weather trends over the past decade just reverse themselves, we are not going to have the kind of supply we have been used to," Cowett said.



U.S. Fish & Wildlife Service
CONSERVATION: Protecting the Delta smelt has slowed down water deliveries.

More aggressive conservation is expected in the county and throughout the state. Some water districts could impose higher rates on residential and commercial users, and some have mandated cutbacks that, for example, prevent restaurants from serving water unless diners ask for it and limit lawn watering to certain hours.

The Legislature anticipated some of the concerns related to new building projects in 2002, when two laws went into effect that forced water districts to assess the availability of water for developments equaling 500 units or more.



BigStockPhoto
RECLAMATION: Lack of potable water could mean greater use of recycled wastewater.

"We can't just say if you build it, there will be water," said Sen. Sheila Kuehl, D-Santa Monica, who wrote one of the bills.

The state laws did increase reviews of major projects, but statewide growth continues to skyrocket. That's partly because water agencies generally still take what cities and regional planners predict for population growth, then do whatever they can to satisfy the projected demand.

Water officials also approve requests for increased supply because they expect more water sources to come online by the time large developments are built.

That approach has been called into question by the state's nagging dry spell and the reduction of water deliveries from Northern California because of a court order to protect a threatened fish, the Delta smelt.

The changing attitudes are perhaps most evident at the Eastern Municipal Water District in Perris, which approved 85 water availability requests for developments between 2002 and last October. That's when the district stopped issuing assurances because of increasingly unstable supplies.

Last month, Eastern Municipal's officials announced that approvals would start to flow again – but only with strict water efficiency commitments from developers for future projects. Those mandates include using drought-tolerant plants for all landscaping and installing the most advanced water-saving devices indoors and outdoors.

LAURA EMBRY / Union-Tribune
As a conservation measure, reclaimed water is being used in the irrigation system in the EastLake Vistas development in Chula Vista.

At about the same time, expansion plans for the UTC mall were jeopardized because they could create a substantially greater water demand for the area.

San Diego city's water officials told Westfield that no additional potable water was available for the $900 million project, which is supposed to add 750,000 square feet of retail, parking and condo space.

"That adverse situation forced us to reconsider our design and everything we were doing," said Jonathan Bradhurst, a senior vice president of U.S. development for the company. "That has resulted in a project that will consume not one additional drop of drinking water and yet it will effectively double the development size."

EDUARDO CONTRERAS / Union-Tribune
Plans for the Westfield UTC mall had to be rethought so that the project would use less water, said Jonathan Bradhurst, a senior vice president at Westfield.

Westfield plans to make good by watering its gardens with recycled wastewater and installing highly efficient toilets and irrigation systems. The company also pledged to offset any remaining increase in demand by paying to connect various irrigation systems elsewhere to the city's network of pipes carrying recycled wastewater.

The company will present its water conservation strategy to the city Planning Commission today.

To the north, developer New Urban West of Santa Monica has proposed a community of 742 homes just west of Escondido and committed to what Dion at the water district called a "nominal" impact on water supplies. The plans at Harmony Grove Village include a wastewater treatment plant to provide recycled water for irrigation.

Water managers could get more power soon. One of the most closely watched water bills in Sacramento is AB 2153, which would require developers to prove no net gain in water use. Mitigation could include investments in recycling and fixing leaky pipes within the water district's service area.

It's unclear how such demands would mesh with growth plans prepared by cities and counties.

"This is probably the issue of the day – whether you can limit growth by shutting off water supply or making it more difficult to build a home," said Tim Coyle, a top official at the California Building Industry Association.

Coyle said that there's only so much lawmakers can force developers to do as they try to meet housing demands. He said the state will continue to attract newcomers, "all with straws in their mouth."

Several water and economy experts said that the current housing slump has a silver lining because water agencies aren't handling nearly as many requests for new developments as they were earlier in the decade. That gives them months or possibly years to shore up water supplies before demand for new water spikes.

At that point, expect to see more flare-ups between developers, local policies that encourage growth and water managers who are increasingly wary about overstating how much they can provide.

"When the economy starts to warm up again, you'll see more potential for friction," said Jeff Kightlinger, general manager of the Metropolitan Water District in Los Angeles.

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Water Challenges Abound as California Deals with Another Dry Year

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Top: Lake Oroville will continue to drop this year.

Above: Avocado trees stumped due to water shortages in northern San Diego County. Photo credit: Tony Lo Presti, Valley Center MWD

Association of California Water Agencies

ACWA

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www.acwa.com

Where We Are Today

The snowpack that looked so promising a few months ago has dwindled in the wake of the driest April on record. Hydrologists say runoff could be low enough to label 2008 "critically dry."

State water experts report that watersheds are so dry that snowmelt is quickly soaking into the ground before making its way into streams and reservoirs. Melting snow is also evaporating at a faster pace than usual.

Key reservoirs such as Shasta and Folsom are significantly lower than this time last year, and will likely drop further in the coming months. Lake Oroville, one of the state's largest reservoirs, may drop to its lowest level in history.

Rain and Snowfall Facts

- Statewide snowpack declined from near-normal levels April 1 to around 67% at the end of April. This compares to about 40% of average last year.
- Rainfall for the year is about at 75% of average. March and April set a new record for low rainfall.
- Current runoff projections call for 2008 to be a dry year.

Complicating Factors

A December court order aimed at protecting Delta smelt is reducing water deliveries, and a more recent decision involving salmon could further affect water project operations.

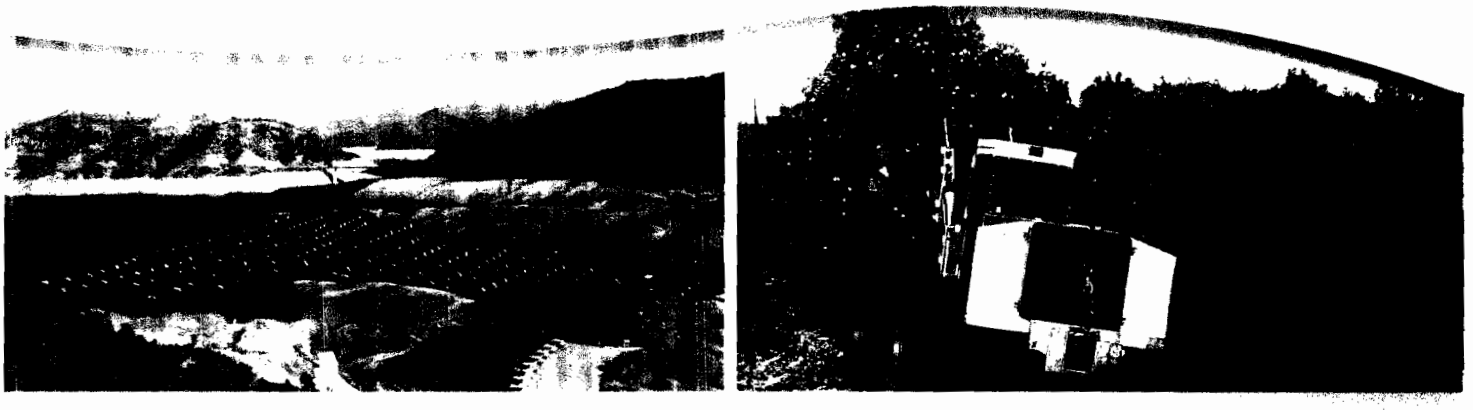
Reservoirs began the year with below-normal storage. Oroville has 1.3 million acre-feet (MAF) less in storage than the same time last year, while Shasta holds 1 MAF less than last year.

Such dry conditions are a red flag for fire danger. In an unusually early start to the fire season, Southern California logged two wildfires in April.

May 2008

First in a Series... ***This is the first in a series of water supply updates ACWA will provide in the coming months.***

Water Challenges Abound as California Deals with Another Dry Year



Top left: Lake Oroville, with a capacity of 3.5 MAF, currently holds just 1.7 MAF of water and will drop further this summer and fall.

Top right: A citrus tree is removed from a San Diego County orchard in response to water shortages.

Impacts on Local Communities

Reduced water supplies will force many local water agencies to rely on conservation and / or dip into their water reserves to meet needs this year.

- East Bay Municipal Utility District has warned its 1.3 million customers that it may impose mandatory water rationing soon to maintain adequate water reserves this year.
- The City of Long Beach has imposed mandatory conservation, while many other communities are ramping up voluntary conservation.
- Metropolitan Water District (MWD) of Southern California expects to draw down its reserves by as much as one quarter this year. At that rate, the district could deplete its stored water reserves in just a few years.
- MWD will raise water rates by 14% next year due in part to the cost of acquiring additional water.
- Decisions on new commercial developments in Riverside County are on hold because the necessary water supplies cannot be guaranteed.
- Agencies that must tap into their reserves this year will have less water to meet needs next year. They also have less water to replenish groundwater basins.
- Growers in northern San Diego County are stumping avocado trees and pulling out citrus trees due to water shortages – a blow for an agricultural industry that pumps more than $5 billion annually into the local economy.
- About one-third of the farmland within Westlands Water District is being fallowed this year. At least 500 jobs have been lost as a result.
- In Kern County, growers are fallowing 4,000 acres of annual crops and turning to banked groundwater supplies to irrigate permanent crops. Over 40,000 acres of pistachios are receiving less than optimal water, which will reduce yields and cost the local economy $30 million.

Additional Resources for Reporters

The following people and websites can provide more information about the state's water crisis:

Charles C. Hardy, East Bay MUD, (510) 587-0141
Elissa Lynn, Department of Water Resources, (916) 574-2221
Jeff McCracken, U.S. Bureau of Reclamation, (916) 978-5100
Bob Muir, MWD, (213) 217-6930, (213) 324-5213 (cell)
Jennifer Persike, ACWA, (916) 441-4545
Jeanne Varga, Kern County Water Agency, (661) 634-1423
Mike Wade, California Farm Water Coalition, (916) 391-5030
Sarah Woolf, Westlands Water District, (559) 341-0174

California Department of Water Resources, www.water.ca.gov
Cooperative Snow Surveys, www.cdec.water.ca.gov/snow/
U.S. Bureau of Reclamation, CVP Water Supply Report (info on reservoir levels), www.usbr.gov/mp/cvo/

THE WALL STREET JOURNAL. ONLINE

May 15, 2008

Sewer to Spigot: Recycled Water

By ANJALI ATHAVALEY
May 15, 2008; Page D1

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A growing number of cities and counties grappling with water shortages are turning to a solution that may be tough for some homeowners to stomach: purifying wastewater so that residents can drink it.

In an effort to replenish its groundwater supply, Los Angeles is slated to announce Thursday a plan that will recycle 4.9 billion gallons of treated wastewater to drinking standards by 2019. In San Diego, the city council voted in favor of a pilot project that would pump recycled sewage water into a drinking-water reservoir, despite a veto from the mayor over the system's cost. Miami-Dade County, Fla., is planning a system that would pump 23 million gallons a day of purified wastewater into the ground; the water will eventually travel to a supply well and be reclaimed for drinking use.

Orange County Water District

Orange County, Calif., pumps a portion of its treated wastewater to the Miller Basin, where it percolates into deep aquifers and eventually mixes with the drinking water supply (main photo); local officials taste water that's been treated (inset).

Water recycling is just one of a number of tactics parched cities -- many of which have faced water shortages for years -- are using. "Demand is growing, and supply is pretty much staying static," says Wade Miller, executive director of the WateReuse Association, a nonprofit in Alexandria, Va., that promotes water recycling.

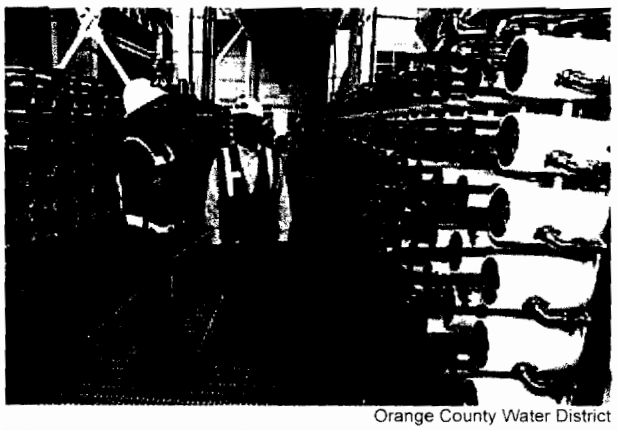
Cities ranging from San Diego to Denver already recycle wastewater for irrigation and industrial use. Some communities, such as the Tampa Bay area of Florida, desalinate seawater, which is generally more expensive than recycling. Many cities are also pushing water-conservation initiatives such as implementing restrictions on when residents can water lawns or offering rebates for high-efficiency washers and toilets.

But cities considering large-scale systems that recycle wastewater to drinking standards may face an uphill battle. Such initiatives -- dubbed "toilet to tap" proposals by critics -- have encountered resistance in the past as a result of cost and the overall yuck factor. In 2001, Los Angeles scrapped a $55 million wastewater-recycling project that would have provided the equivalent of the annual water needs of 200,000 city residents. A similar proposal in San Diego was derailed in the late 1990s amid an outcry that

poor neighborhoods would be forced to use the wastewater from rich neighborhoods.

The cost of such projects may also be tough for residents to swallow. In Miami-Dade County, the estimated price tag on a new wastewater-recycling system is $350 million. It is unclear how this will affect the water bills of residents, though local officials expect rates to rise.

The concept of recycling wastewater to meet drinking-water standards isn't new. A handful of cities in the U.S. and abroad have done it on smaller scales and sometimes with older technology. In most cases, the water is disinfected and pumped into an aquifer or reservoir where it remains for a period of time before being distributed to the public through drinking-water wells -- a concept known as indirect potable reuse.



Orange County Water District

Wastewater in Orange County is treated with reverse osmosis to remove viruses, salts and pharmaceuticals.

Recurring droughts and growing populations are increasing the allure of recycling. In Los Angeles, groundwater contamination in the San Fernando Valley, where the majority of the city's groundwater supply is produced, has limited water available for pumping. "If we don't commit ourselves to conserving and recycling water, we will tap ourselves out," says Los Angeles Mayor Antonio Villaraigosa in a statement.

A new system in Orange County, Calif., where water demand is expected to increase 16% between 2010 and 2030, is the largest and most high-tech in the world. The system, which was launched in January, produces 70 million gallons a day, enough water for 500,000 people a year. It cost $481 million to construct and costs $29 million a year to operate. (The county says it offset part of the cost with $90 million in federal and state grants). Other cities that are planning their own projects say they are using the Orange County system as a standard.

It is a three-step process: Sewer water that has already been treated by the county's sanitation district goes through a microfilter to remove solids and bacteria. It then undergoes a reverse-osmosis treatment, which passes the water through a membrane filter that removes viruses, salts, pharmaceuticals and other materials. Finally, it is treated with ultraviolet light and hydrogen peroxide to get rid of contaminants that are left.

The water is then pumped into a groundwater basin where it mixes with other water and filters through materials like sand, gravel, and clay. It takes about a year for the water to travel to a drinking-water well -- so county residents aren't yet drinking water that has been treated with the new system. The Orange County Water District, which manages the county's groundwater basin, compares its quality to that of distilled water.

Parts of Orange County, though, have been drinking treated wastewater since the 1970s through a system called Water Factory 21, which used reverse osmosis on a smaller scale. That system, when it existed, recycled just five million gallons a day.

Doctors and engineers say recycled water is safe to drink. Indeed, reverse osmosis coupled with ultraviolet light and hydrogen peroxide treats wastewater beyond what federal and state drinking standards require, they say.

That wasn't always the case. A National Research Council committee concluded in a 1998 report that reclaimed or purified wastewater can be used to supplement drinking-water sources only as a "last resort" and "after a thorough health and safety evaluation." But Jim Crook, the chair of the committee, says that since that report was issued, there have been a great deal of advances in treatment of wastewater, such as the use of ultraviolet light after reverse osmosis.

"We know a lot more than we did back then, and we can treat it to higher levels," says Mr. Crook, who is a member of an independent advisory panel created to review the Orange County system and a similar independent panel that looked at wastewater recycling in San Diego a few years ago. In Orange County, the purified wastewater is cleaner than the county's groundwater supply, he says.

Recent reports of trace amounts of pharmaceuticals found in drinking water are spurring increased scrutiny of public drinking water supply -- a factor that could affect public opinion of new wastewater-recycling plans. "Many of the pharmaceutical compounds taken nowadays by adults are excreted unchanged in urine, says Jack Skinner, an internal-medicine specialist in Newport Beach, Calif., who serves on a state committee that is evaluating drinking-water standards. "They show up in the wastewater just because of the sheer volume of people taking pharmaceutical compounds now." He adds that endocrine disrupters -- a series of compounds found in birth-control pills and plastics -- have caused birth defects in wildlife and are of particular concern to the public.

But reverse osmosis followed by treatment with ultraviolet light and hydrogen peroxide effectively removes pharmaceutical compounds and endocrine disrupters, as well as any viruses, such as hepatitis, that are spread through oral contact with fecal particles, Dr. Skinner says.

The high price tag of the new recycling systems can also be a hurdle. In San Diego, Mayor Jerry Sanders vetoed a plan to launch a pilot program to recycle wastewater back into the public-drinking-water supply last year. "The mayor determined it was not the best use of financial resources at this time," says Bill Harris, the mayor's spokesman, adding that the city has infrastructure problems that require more immediate attention.

Preliminary estimates of San Diego's pilot project are between $6 million and $8 million. If the pilot project is successful, the cost estimate of a larger-scale project is $237.6 million, according a San Diego study on water reuse released in 2006.

Another issue affecting public perception in San Diego? The proposed project would pump purified wastewater into a reservoir instead of an aquifer. That prevents it from undergoing the same natural filtration process as treated wastewater in Orange County's system.

But the City Council voted to override the mayor's veto in December and forge ahead with the pilot project. "We're just not in a position to turn our nose up at any option to increase water supply," says City Council President Scott Peters.

Skeptics may feel squeamish about drinking what used to be toilet water, Mr. Peters says, but San Diego already receives at least some wastewater from other cities that discharge treated sewage water into the Colorado River. "The Colorado River is not filled with Dasani," Mr. Peters says. "That's where we get our water from."

In Orange County, officials say there was no organized opposition to its groundwater-

replenishment system. The county's water district says it minimized outcry with an aggressive public-outreach program that educated local officials, environmental groups, regulatory agencies and the public about the benefits of wastewater recycling.

People who learned about the system early on and were involved in county politics say they have no health concerns. "The public gets a little nervous about it," says Ralph Bauer, 77, a retired research chemist and former Huntington Beach mayor who was on the City Council from 1992 to 2002. But "you can actually make the water purer than what you would get out of rivers and lakes."

Still, some residents find it unsettling. "I would never touch it, nor would I give it to my dog to drink," says Carina Sampson, a 29-year-old hairstylist in Anaheim, Calif., who found out about Orange County's groundwater-replenishment system through a friend a few months ago. Anaheim is one of the areas that will eventually receive water that has passed through the new wastewater-treatment process.

Ms. Sampson and her Chihuahua both drink bottled water exclusively. She says of the recycled waste: "I just find it repulsive regardless of what it goes through."

Public opinion of wastewater reuse can shift when people are presented with more details. In a September 2007 survey conducted by the San Diego Institute for Policy Research, 50% of the 1,000 adults in San Diego County who were polled said they opposed turning wastewater into drinking water. Forty-four percent said they supported it, and 6% said they were unsure.

Respondents who weren't strongly committed one way or the other were then presented with an additional piece of information: San Diego gets more of its water supply from the Colorado River than anywhere else. The river gets 400 million gallons of treated wastewater discharged into it each day. That means residents are already drinking treated wastewater.

The survey shows that 64% of these "swing" respondents said they were "more inclined to support" turning wastewater into drinking water. "We found that if just a little bit more education goes on, people's opinion is malleable," says Erik Bruvold, president and chief executive of the San Diego research firm.

Indeed, in Orange County, some opponents changed their minds. California State Assemblyman Michael Duvall, from the Orange County community of Yorba Linda, originally was against groundwater replenishment because of the cost of the system. But after learning just how much water could be recycled, he says, he became a supporter.

"It tastes like distilled water," says Mr. Duvall, who has sampled the water on more than one occasion and has brought family and fellow lawmakers to the plant. "It's about as pure as it can possibly be."

Write to Anjali Athavaley at anjali.athavaley@wsj.com[1]

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THE DESERT SUN PALM SPRINGS, CALIFORNIA

January 27, 2008

Are we running out of water?

Keith Matheny
The Desert Sun

The Coachella Valley's growth and progress was built and sustained on the plentiful groundwater beneath it.

"We've been able to pretend we don't live in a desert for the last 100 years," said former Palm Desert Mayor Buford Crites. "That illusion is about to end."

In a two-part series, The Desert Sun takes a look at an increasingly desperate water situation throughout the West that is about to hit home.

Years of groundwater overuse is causing the valley to sink - literally. The subsidence, if unchecked, could cause millions of dollars in damage to roads, pipelines and other infrastructure.

The valley's two main outside water sources, Northern California and the Colorado River, are in jeopardy.

The valley's share of State Water Project water from Northern California is being cut by about one-third after a recent federal court ruling affecting 25 million Californians. And the worst drought in 500 years has flows on the Colorado about half of normal.

Any major development in the valley that doesn't have its water supply already accounted for could have trouble getting off the ground due to current water supply uncertainties, officials said. Similar issues halted major projects in western Riverside County earlier this month.

Some of the country's fastest-growing areas are also its driest. The competition for increasingly scarce future water sources between the Coachella Valley and Phoenix, Las Vegas, Los Angeles and San Diego will drive up costs, water officials said.

"Are we going to run out of water? No; we're going to run out of cheap water," said David Luker, general manager of the Desert Water Agency.

Many are calling for increased water conservation and other action now to ensure adequate, stable water supplies.

A "water summit" with government and water officials from both Riverside and San Bernardino counties is set for Friday at the Morongo Casino, Resort & Spa.

"This has the potential to be the biggest water crisis we have had in the last 50 years or more," Riverside County Supervisor Marion Ashley said.

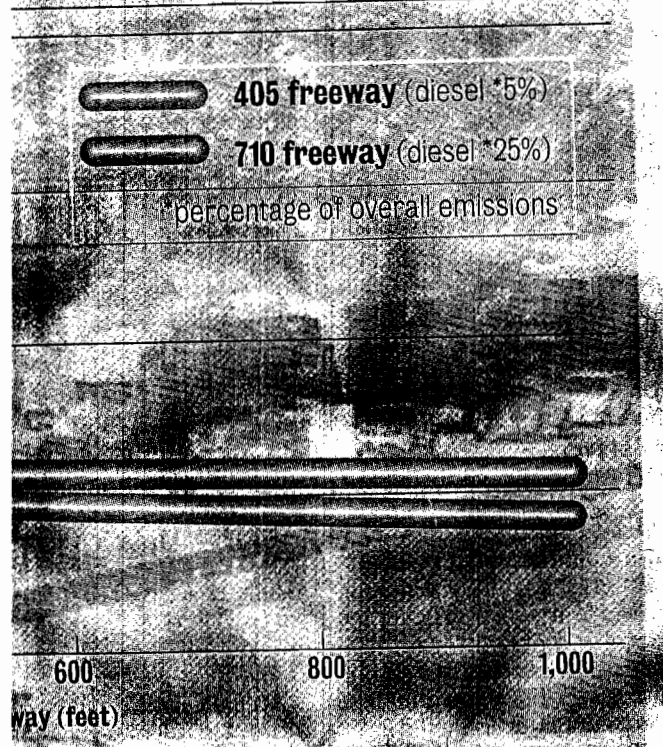
"I think it's hard to overestimate the potential for a disaster here."

first Inland Empire
invited to the state
sys m, now in its second

urday night.
The Huskies' stiffest compe-
SEE **CENTENNIAL**/A10

Raymond White, 88, Ricky Marvray, 20, and their Centennial teammates jump at the chance to play in the state bowl game.

red feet from a freeway, a study found.



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children living within 550 feet of heavy traffic.

■ Diesel exhaust contains fine particles, a type of pollution linked with early deaths among people with heart disease. Some research has shown that heavy exposure can trigger heart attacks, and that long-term exposure contributes to plaque build-up in arteries.

NDBOOK, VARIOUS STUDIES

CHRIS RAMOS/THE PRESS-ENTERPRISE

Deal OK'd on water for West

COLORADO RIVER: If the flow is short, California, Arizona and Nevada will share the reductions.

BY RANDAL C. ARCHIBOLD
NEW YORK TIMES NEWS SERVICE

LOS ANGELES — Facing the worst drought in a century and the prospect that climate change could yield long-term changes on the Colorado River, the lifeline for several Western states, federal officials have reached a new pact with the states on how to allocate water if the river runs short.

State and federal officials praised the agreement, which Interior Secretary Dirk Kempthorne was expected to sign Thursday, as a landmark akin to the Colorado River Compact of 1922 that first divvied up how much water the seven states served by the river — California, Nevada, Arizona, Colorado, Utah, New Mexico, and Wyoming — receive annually.

INLAND IMPACT

The Colorado River is a key water source for:

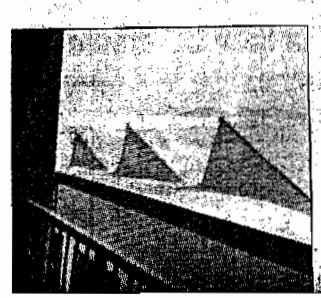
- Western Riverside County
- Southwestern San Bernardino County
- Coachella Valley farmers

The new accord, outlined by federal officials in a telephone news conference, spells out how three down-river states, California, Arizona and Nevada, will share the pain of river shortages.

It puts in place new measures to encourage conservation and manage the two primary reservoirs, Lake Mead and Lake Powell, which have gone from nearly full to just about half empty since 1999.

The accord is expected to forestall litigation that was likely to have arisen as fast-growing states jockey for the best way to
SEE **WATER**/BACKPAGE

DISTANCE



said Barry Wallerstein, the air district's executive officer.

At the same time, regional transportation leaders want to establish housing near commuter-train stations in an effort to boost ridership and cut freeway congestion — and the state has millions in bond funds available to bolster such

Immigration rules GOP Spanish debate

CAMPAIGN: Presidential candidates avoid harsh rhetoric while trying to win over Hispanics.

IN MAIN NEWS

■ 29,000 join Oprah Winfrey at a rally for Sen. Barak Obama. **A4**

The polite debate came less than four weeks before the first

THE ASSOCIATED PRESS

d Rudy Giuliani exchange greetings at the Spanish language debate at the Hispanics, who have become an increasingly significant source of votes.

lots of attention but with little venom

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lead to a national identification card for all Americans "which I absolutely oppose."

Said Romney: "Those who have come illegally, in my view, should be given the opportunity to get in line with everybody else, but there should be no special pathway for those that have come here illegally to jump ahead of the line or to be come permanent residents or citizens."

In this, the heart of Cuban-American country where Fidel Castro is ostracized, Paul was loudly booed when he called for improved relations with Cuba.

"We're at a time when we need to talk to Cuba and travel and trade with Cuba," he said.

As he spoke, other Republican presidential campaigns e-mailed reporters news releases pointing out that Huckabee has supported an end to the Cuban embargo. It's a position shared by a number of Republicans and Democrats, particularly in the Midwest, where farmers say a new opening with the island nation would provide an expanded market for their goods.

The candidates, with the exception of Paul, denounced Venezuelan leader Hugo Chavez as a tyrant.

Asked how to deal with Chavez, both Giuliani and McCain made reference to Spain's King Juan Carlos recent retort to Chavez during a November summit in Chile of Latin American nations and Spain and Portugal. "Porque no te callas?" (Why don't you shut up?)

Univision, the Spanish-language television network, and the University of Miami hosted the debate. The questions were posed in Spanish by Univision anchors Jorge Ramos and Maria Elena Salinas and simultaneously translated into English for the candidates. Their responses were then simultaneously translated into Spanish for broadcast.

Initially scheduled for September, the debate had to be rescheduled because only Sen. John McCain had agreed to appear. This time, the only candidate who refused to attend was Tom Tancredo, a long-shot candidate who has made a tough immigration stance the centerpiece of his campaign.

WATER: Major deal for the West

CONTINUED FROM A1

keep the water flowing to their residents and businesses in increasingly dry times. It would be in effect through 2026 and could be revised during that time.

Some environmental groups said the pact did not go far enough to encourage conservation and discourage growth.

But federal officials said they took the best of several proposals by the states, environmental organizations and others, and emphasized the importance of all seven states agreeing with the result.

'ON THE SAME PAGE'

"I think for the first time in 85 years we are on the same page," said Herb Guenther, the director of water resources in Arizona, which had initially balked at some terms of the agreement and was threatening legal action over it.

But with water levels in reservoirs dropping, a record eight-year drought, the prospect that climate change could bring more dry spells and new scientific analyses suggesting the West could be drier than has been traditionally believed, the states were pushed to act.

These factors "forced the issue to the head and we decided to do something unique and different," Guenther said.

The agreement, the product of 2½ years of negotiation and study, establishes criteria for the Interior Department to declare a shortage on the river, which would occur when the system is unable to produce the 7.5 million acre-feet of water, enough to supply 15 million homes for a year, that the three down river states are entitled to.

Water deliveries would be decreased based on how far water levels drop in Lake Mead and Lake Powell.

The Bureau of Reclamation, which manages the river system, predicts about a 5 percent chance of such a shortage being declared by 2010, but it all depends on how much the states are able to conserve and, of course, the weather.

The probability projection "does not imply it can't happen," said Terry Fulp, a bureau official involved in managing the river.

Water districts, anticipating an eventual cutback of Colorado River water, have been storing large amounts of water and the accord encourages them to continue to do so.

CALIFORNIA RESERVOIR

The pact includes a bundle of agreements with the states, including approval for water managers in the Las Vegas area, which gets 90 percent of its water from the Colorado, to get a greater share of Lake Mead water in exchange for financing a reservoir in California to capture large amounts of river water destined for Mexico but beyond that country's entitlement by treaty.

"It's hugely important for us," said Scott Huntley, a spokesman for the Southern Nevada Water Authority.

"This really does provide the bridge for us to get into the next decade."

But John Weisheit, conservation director for Living Rivers, a Utah-based environmental group, said the agreement sends the message to the states that growth trumps sensible water management.

Weisheit said the conservation should have been stressed and the government's computer modeling was overly optimistic about future water supply.

"There is more water on paper than there actually is on the landscape," he said.

"They are looking at this in a way that will allow more development even though the water is not theoretically there."

NEW YORK TIMES NEWS SERVICE

Lake Mead, a primary reservoir along the Colorado River, has gone from nearly full to just about half empty since 1999.

LOTTERY

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TIME: 1.42.13

PREVIOUS SUPER LOTTO PLUS

MONDAY DECEMBER 10, 2007

DESERT EDITION

THE PRESS-ENTERPRISE

PARTLY SUNNY 61/44 FORECAST: B10

INLAND SOUTHERN CALIFORNIA'S NEWSPAPER

Centennial gets state title shot

OTBALL: The Corona school's championship bid, a st for the Inland area, is no surprise to the team.

BY BRANDON MEACHUM
THE PRESS-ENTERPRISE

ORONA — In the packed Pizza ace restaurant around the er from Corona's Centen- High School, more than members of the football n, family and friends wait- agerly to hear the news. yes filled with hope were d to the television screen. ths gaped open in nervous cipation. Then finally, the uncement: The Huskies had earned an invitation to the Division I state bowl game Saturday night at the Home Depot Center in Carson.

"I was very nervous. I thought they were going to pick Birmingham," running back Ryan Bass said after the bowl pairings were released. "But it was a good decision, and I think we deserved it more."

The quiet gathering quickly transformed into a sea of jumping players, high-fiving and hugging their teammates and relatives, and shouting "we deserve this," and "let's go."

The selection makes Centennial the first Inland Empire school to be invited to the state bowl system, now in its second year. The pairings for the three state bowl games were determined by commissioners of the CIF's 10 sections based on criteria that included strength of schedules, win-loss records and common opponents.

Centennial became eligible for the state bowl game after winning the Inland Division championship crown — the school's fourth CIF title in eight seasons — by defeating rival Corona Santiago 42-7 Saturday night.

The Huskies' stiffest compe-

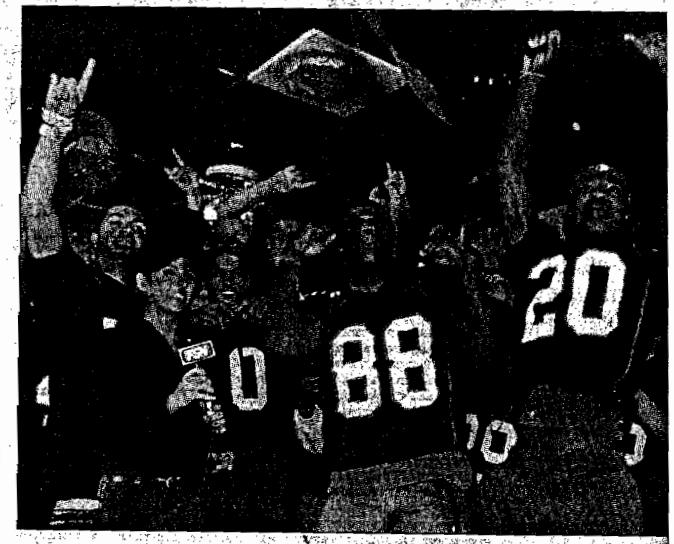
SEE CENTENNIAL/A10

ON THE WEB

PE.com ■ Corona's Centennial Huskies learn they're going to the game. **PE.com**

IN SPORTS DAY

■ Full state bowl pairings and schedule. **C1**



CAITLIN M. KELLY/THE PRESS-ENTE

Raymond White, 88, Ricky Marvray, 20, and their Centennial teammates jump at the chance to play in the state bowl game.

REEWAY POLLUTION: Pollution dissipates a few hundred feet from a freeway, a study found.

crease in concentration of diesel fine-particle emissions

Deal OK'd on water

California's Water . . .
A Crisis We Can't Ignore

Water is vital. But the reality is that drought and climate change have already left us with a glass that is half empty.

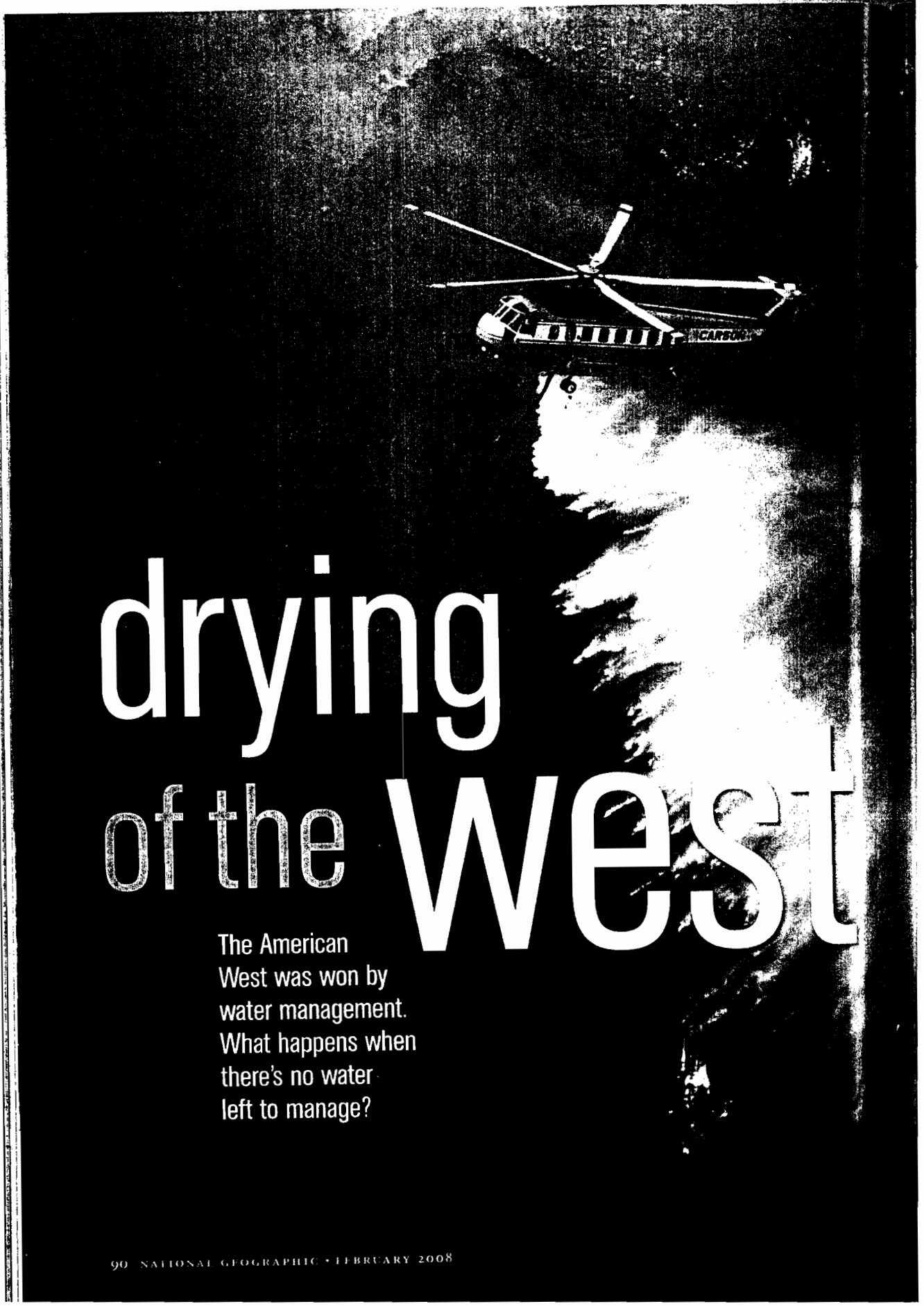
And our state's fragile water storage and delivery systems are barely holding their own.

Anything that upsets this precarious balance will carry serious consequences for the people of California . . . and for our economy and environment.

ACWA An awareness program from the Association of California Water Agencies

Learn more at www.calwatercrisis.org

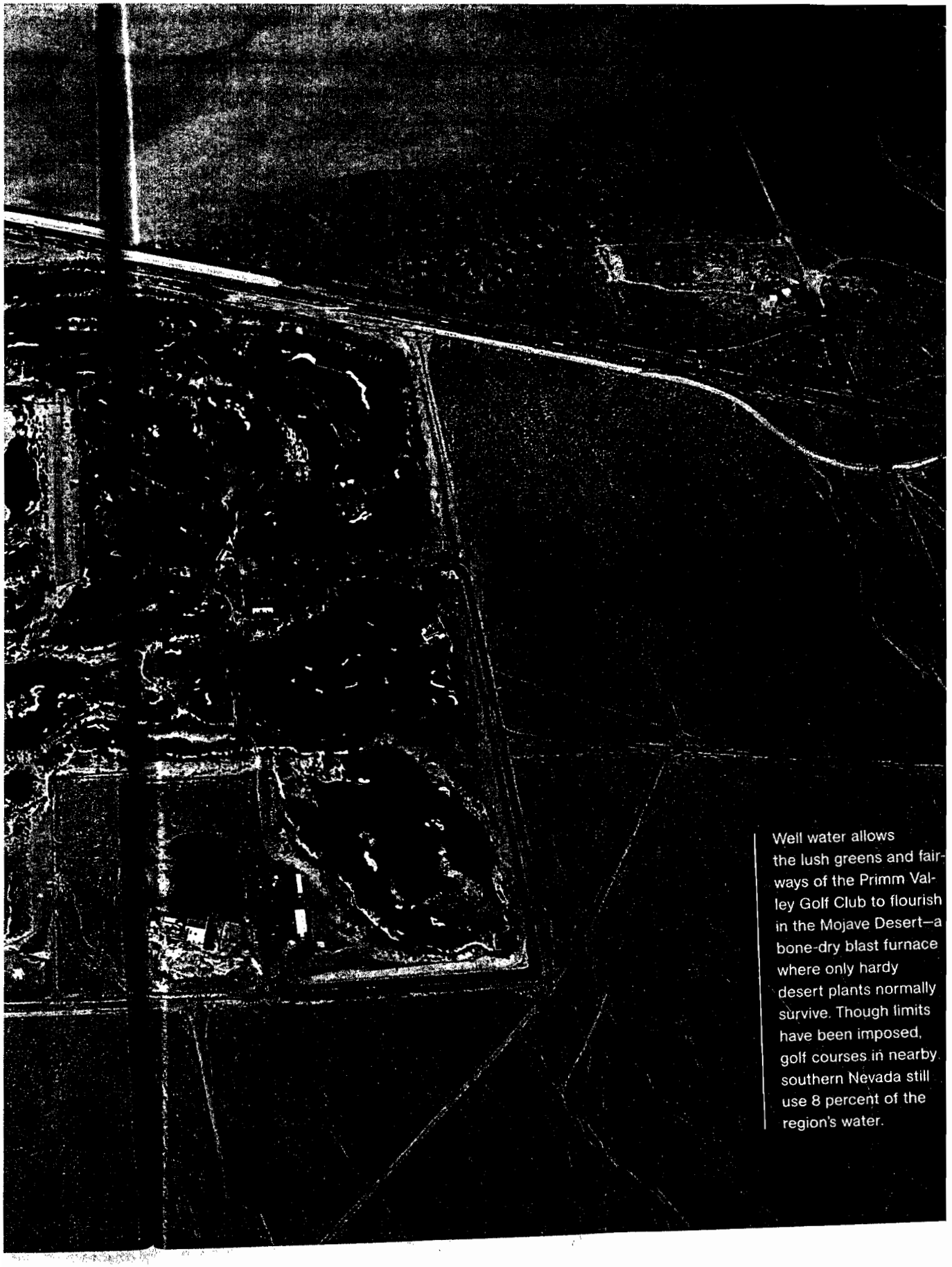
Because we can't take water for granted.



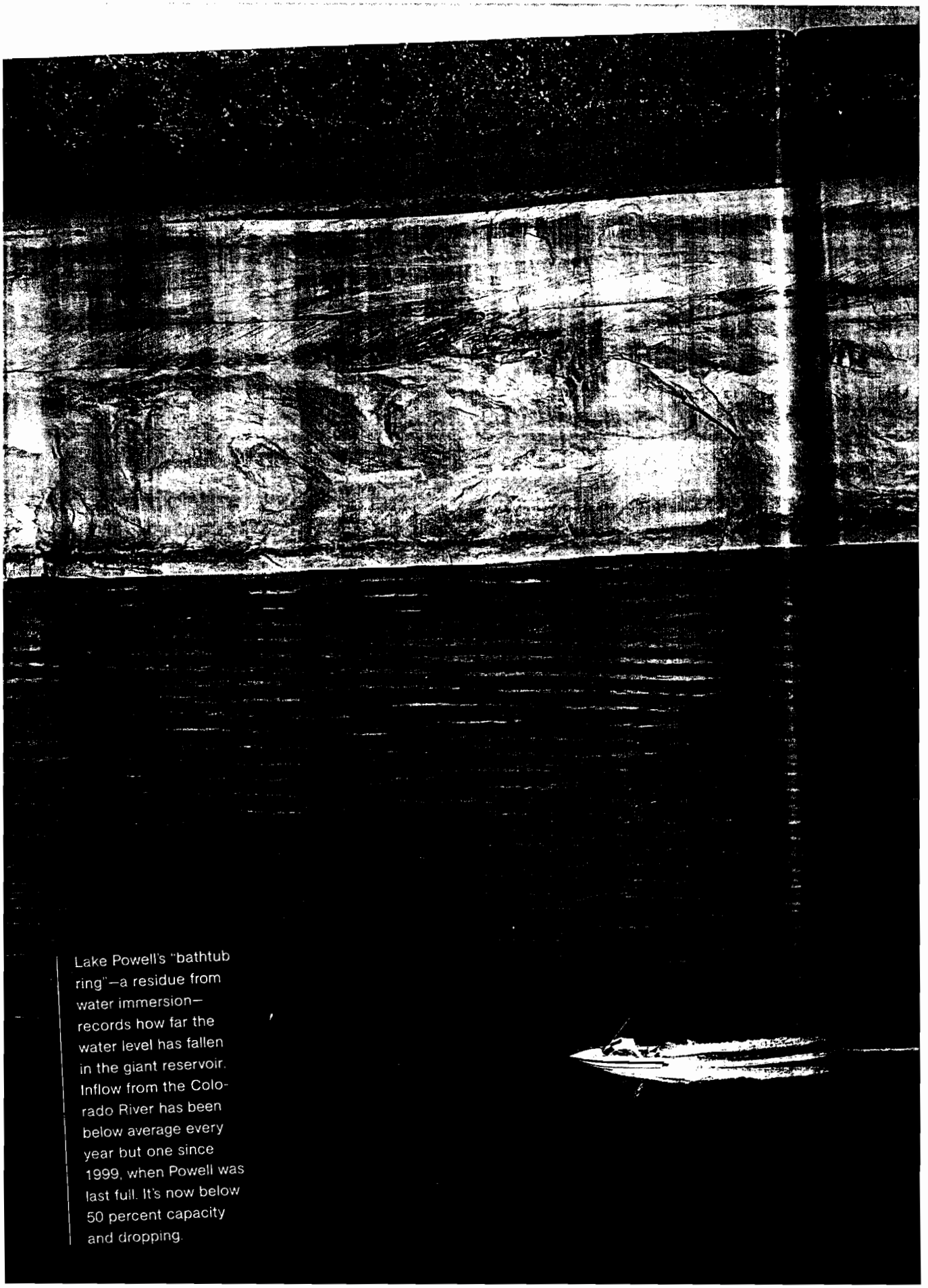
drying of the west

The American West was won by water management. What happens when there's no water left to manage?

In drought-parched Los Padres National Forest in southern California, a heli-tanker douses a hot spot in the huge Zaca fire that erupted in July 2007, scorching 240,000 acres. Years of sparse rain primed the region for the second largest fire in California history.



Well water allows the lush greens and fairways of the Primm Valley Golf Club to flourish in the Mojave Desert—a bone-dry blast furnace where only hardy desert plants normally survive. Though limits have been imposed, golf courses in nearby southern Nevada still use 8 percent of the region's water.



Lake Powell's "bathtub ring"—a residue from water immersion—records how far the water level has fallen in the giant reservoir. Inflow from the Colorado River has been below average every year but one since 1999, when Powell was last full. It's now below 50 percent capacity and dropping.

By Robert Kunzig
Photographs by Vincent Laforet

When provided with continuous nourishment, trees, like people, grow complacent.

Tree-ring scientists use the word to describe trees like those on the floor of the Colorado River Valley, whose roots tap into thick reservoirs of moist soil. Complacent trees aren't much use for learning about climate history, because they pack on wide new rings of wood even in dry years. To find trees that feel the same climatic pulses as the river, trees whose rings widen and narrow from year to year with the river itself, scientists have to climb up the steep, rocky slopes above the valley and look for gnarled, ugly trees, the kind that loggers ignore. For some reason such "sensitive" trees seem to live longer than the complacent ones. "Maybe you can get too much of a good thing," says Dave Meko.

Meko, a scientist at the Laboratory of Tree-Ring Research at the University of Arizona, has been studying the climate history of the western United States for decades. Tree-ring fieldwork is hardly expensive—you need a device called an increment borer to drill into the trees, you need plastic straws (available in a pinch from McDonald's) to store the pencil-thin cores you've extracted from bark to pith, and you need gas, food, and lodging. But during the relatively wet 1980s and early '90s, Meko found it difficult to raise even the modest funds needed for his work. "You don't generate interest to study drought unless you're in a drought," he says. "You really need a catastrophe to get people's attention," adds colleague Connie Woodhouse.

Then, in 2002, the third dry year in a row and the driest on record in many parts of the Southwest, the flow in the Colorado fell to a quarter of its long-term average. That got people's attention.

The Colorado supplies 30 million people in seven states and Mexico with water. Denver, Las Vegas, Phoenix, Tucson, Los Angeles, and San Diego all depend on it, and starting this year so will Albuquerque. It irrigates four million acres of farmland, much of which would otherwise be desert, but which now produces billions of dollars' worth of crops. Gauges first installed, in the 19th century provide a measure of the flow of the river in acre-feet, one acre-foot being a foot of water spread over an acre, or about 326,000 gallons. Today the operation of the pharaonic infrastructure that taps the Colorado—the dams and reservoirs and pipelines and aqueducts—is based entirely on data from those gauges. In 2002 water managers all along the river began to wonder whether that century of data gave them a full appreciation of the river's eccentricities. With the lawns dying in Denver, a water manager there asked Woodhouse: How often has it been this dry?

Over the next few years Woodhouse, Meko, and some colleagues hunted down and cored the oldest drought-sensitive trees they could find growing in the upper Colorado basin, both living and dead. Wood takes a long time to rot in a dry climate; in Harmon Canyon in eastern Utah, Meko found one Douglas fir log that had laid down its first ring as a sapling in 323 B.C. That was an extreme case, but the scientists still collected enough old wood to push their estimates of annual variations in the flow of the Colorado back deep into the Middle Ages. The results came out last spring. They showed that the Colorado has not always been as generous as it was throughout the 20th century.

The California Department of Water Resources, which had funded some of the research, published the results as an illustrated poster. Beneath a series of stock southwestern postcard shots, the spiky trace of tree-ring data oscillates nervously across the page, from A.D. 762 on the left to 2005 on the right. One photo shows the Hoover Dam, water gushing from its outlets. When the dam was being planned in the 1920s to deliver river water to the farms of the Imperial Valley and the nascent sprawl of Los Angeles, the West, according to the tree rings, was in one of the wettest quarter centuries of the past millennium. Another photo shows the booming skyline of San Diego, which doubled its population between 1970 and 2000—again, an exceptionally wet period along the

The wet 20th century, the wettest of the past millennium, the century when Americans built an incredible civilization in the desert, is over.

river. But toward the far left of the poster, there is a picture of Spruce Tree House, one of the spectacular cliff dwellings at Mesa Verde National Park in southwestern Colorado, a pueblo site abandoned by the Anasazi at the end of the 13th century. Underneath the photo, the graph reveals that the Anasazi disappeared in a time of exceptional drought and low flow in the river.

In fact, the tree rings testified that in the centuries before Europeans settled the Southwest, the Colorado basin repeatedly experienced droughts more severe and protracted than any since then. During one 13-year megadrought in the 12th century, the flow in the river averaged around 12 million acre-feet, 80 percent of the average flow during the 20th century and considerably less than is taken out of it for human use today. Such a flow today would mean serious shortages, and serious water wars. "The Colorado River at 12 million acre-feet would be real ugly," says one water manager.

Unfortunately, global warming could make things even uglier. Last April, a month before Meko and Woodhouse published their latest results, a comprehensive study of climate models reported in *Science* predicted the Southwest's gradual descent into persistent Dust Bowl conditions by mid-century. Researchers at the National Oceanic and Atmospheric Administration (NOAA), meanwhile, have used some of the same models to project Colorado streamflow. In their simulations, which have been confirmed by others, the river never emerges from the current drought. Before mid-century, its flow falls to seven million acre-feet—around half the amount consumed today.

The wet 20th century, the wettest of the past millennium, the century when Americans built an incredible civilization in the desert, is over. Trees in the West are adjusting to the change, and not just in the width of their annual rings: In the recent drought they have been dying off and burning in wildfires at an unprecedented rate. For most people in the region, the news hasn't quite sunk in. Between 2000 and 2006 the seven states of the Colorado basin added five million people, a 10 percent population increase. Subdivisions continue to sprout in the desert, farther and farther from the cities whose own water supply is uncertain. Water managers are facing up to hard times ahead. "I look at the turn of the century as the defining moment when the New West began," says Pat Mulroy, head of the Southern Nevada Water Authority. "It's like the impact of global warming fell on us overnight."

In July 2007 a few dozen climate specialists gathered at Columbia University's Lamont-Doherty Earth Observatory to discuss the past and future of the world's drylands, especially the Southwest. Between sessions they took coffee and lunch outside, on a large sloping lawn above the Hudson River, which gathers as much water as the Colorado from a drainage area just over a twentieth the size. It was overcast and pleasantly cool for summer in New York. Phoenix was on its way to setting a record of 32 days in a single year with temperatures above 110 degrees. A scientist who had flown in from the West Coast reported that he had seen wildfires burning all over Nevada from his airplane window.

On the first morning, much of the talk was about medieval megadroughts. Scott Stine of California State University, East Bay, presented vivid evidence that they had extended beyond

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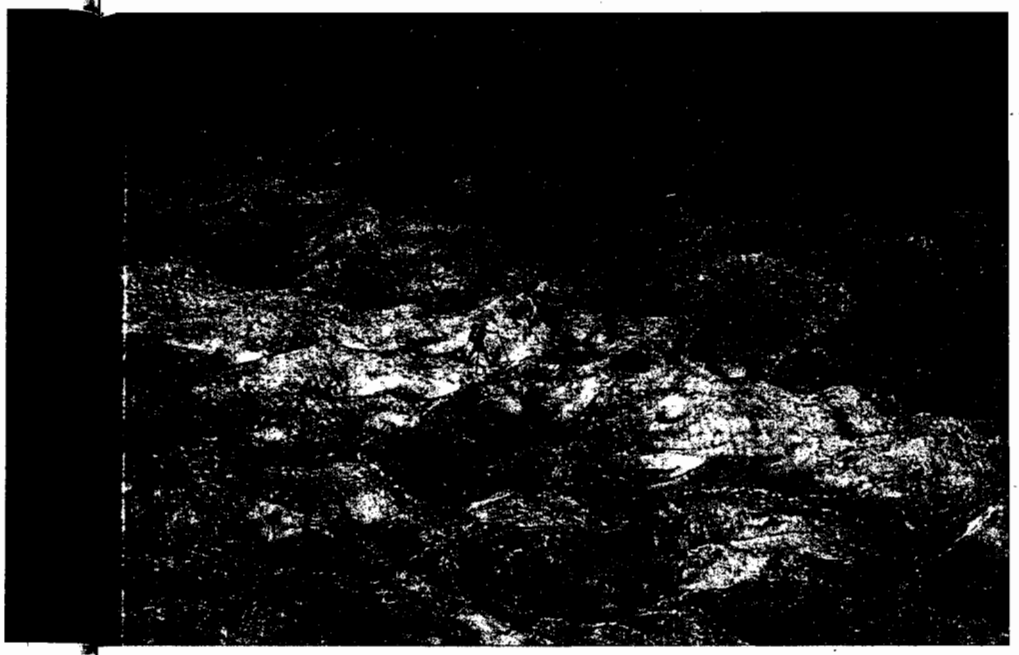
Robert Kunzig's book Fixing Climate, *with Wallace Broecker, will be published in April. Vincent Laforet won a 2002 Pulitzer Prize for feature photography.*

the Colorado River basin, well into California. Stine works in and around the Sierra Nevada, whose snows are the largest source of water for that heavily populated state. Some of the runoff drains into Mono Lake on the eastern flank of the Sierra. After Los Angeles began diverting the streams that feed Mono Lake in the 1940s, the lake's water level dropped 45 vertical feet.

In the late 1970s, tramping across the newly exposed shorelines, Stine found dozens of tree stumps, mostly cottonwood and Jeffrey pine, rooted in place. They were gnarled and ancient looking and encased in tufa—a whitish gray calcium carbonate crust that precipitates from the briny water of the lake. Clearly the trees had grown when a severe and long-lasting drought had lowered the lake and exposed the land where they had taken root; they had died when a return to a wetter climate in the Sierra Nevada caused the lake to drown them. Their rooted remains were now exposed because Los Angeles had drawn the lake down.

Stine found drowned stumps in many other places in the Sierra Nevada. They all fell into two distinct generations, corresponding to two distinct droughts. The first had begun sometime before 900 and lasted over two centuries. There followed several extremely wet decades, not unlike those of the early 20th century. Then the next epic drought kicked in for 150 years, ending around 1350. Stine estimates that the runoff into Sierran lakes during the droughts must have been less than 60 percent of the modern average, and it may have been as low as 25 percent, for decades at a time. "What we have come to consider normal is profoundly wet," Stine said. "We're kidding ourselves if we think that's going to continue, with or without global warming."

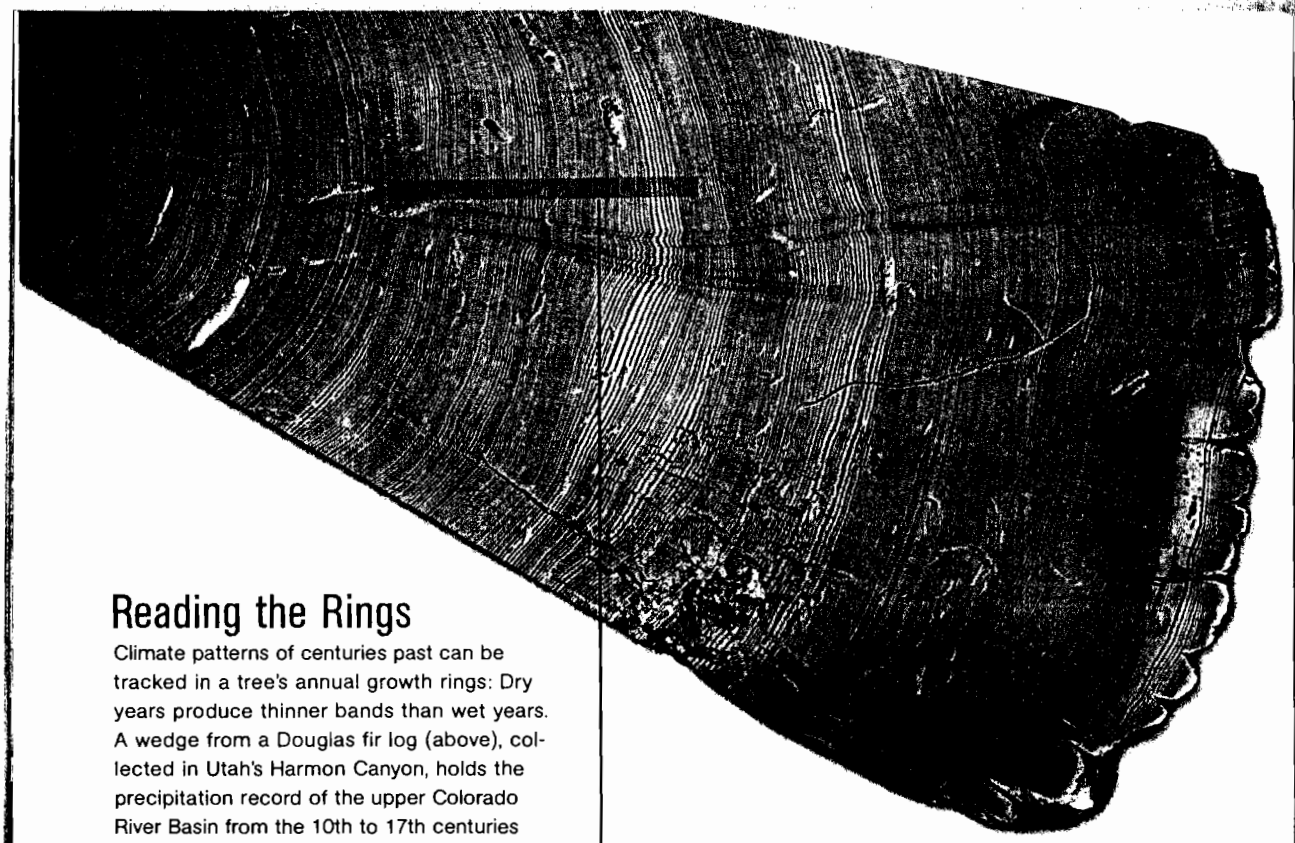
No one is sure what caused the medieval megadroughts. Today Southwestern droughts follow the rhythm of La Niña, a periodic cooling of the eastern equatorial Pacific. La Niña alternates every few years with its warm twin, El Niño, and both make weather waves around the globe. A La Niña cooling of less than a degree Celsius was enough to trigger the recent drought, in part because it shifted the jet stream and the track of the winter storms northward, out of the Southwest. Richard Seager, of Lamont, and his colleagues have shown that all the western droughts in the historical record,



including the Dust Bowl, can be explained by small but unusually persistent La Niñas. Though the evidence is slimmer, Seager thinks the medieval megadroughts too may have been caused by the tropical Pacific seesaw getting stuck in something like a perpetual La Niña.

The future, though, won't be governed by that kind of natural fluctuation alone. Thanks to our emissions of greenhouse gases, it will be subject as well to a global one-way trend toward higher temperatures. In one talk at Lamont, climate theorist Isaac Held, from NOAA's Geophysical Fluid Dynamics Laboratory in Princeton, gave two reasons why global warming seems almost certain to make the drylands drier. Both have to do with an atmospheric circulation pattern called Hadley cells. At the Equator, warm, moist air rises, cools, sheds its moisture in tropical downpours, then spreads toward both Poles. In the subtropics, at latitudes of about 30 degrees, the dry air descends to the surface, where it sucks up moisture, creating the world's deserts—the Sahara, the deserts of Australia, and the arid lands of the Southwest. Surface winds export the moisture out of the dry subtropics to temperate and tropical latitudes. Global warming will intensify

As the West dries out, the landscape is transformed. Without cold winters to kill off their larvae, mountain pine beetles infest up to 90 percent of lodgepole pines in Colorado forests, like this one near Granby (above left). The dead trees raise the risk of wildfires. In much of the West warmer, drier winters have reduced snowpack, a crucial water source. On California's Mount Shasta (above) a hiker traverses a snow patch diminished by milder temperatures.

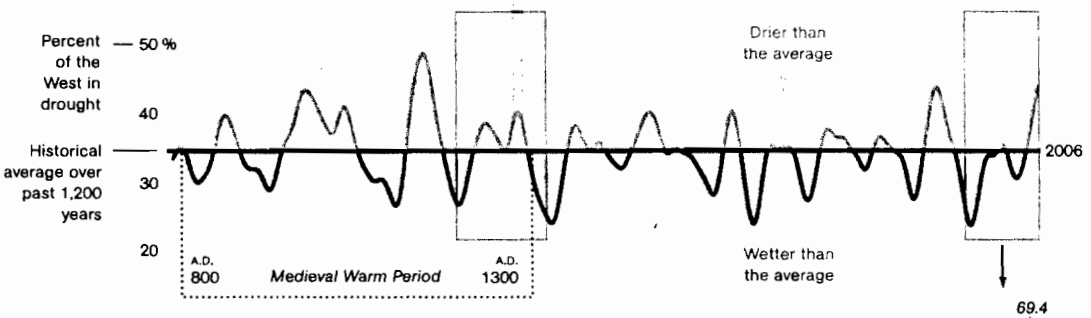


Reading the Rings

Climate patterns of centuries past can be tracked in a tree's annual growth rings: Dry years produce thinner bands than wet years. A wedge from a Douglas fir log (above), collected in Utah's Harmon Canyon, holds the precipitation record of the upper Colorado River Basin from the 10th to 17th centuries A.D. The enlarged section below highlights a decade-long drought in the late 1200s that likely drove the Anasazi from Mesa Verde.

PHOTO: LABORATORY OF TREE-RING RESEARCH, UNIVERSITY OF ARIZONA. LENGTH OF WEDGE SHOWN IS 12 INCHES.

Using tree-ring data from a variety of wood samples from across the West, scientists have graphed the region's climate fluctuations (below), finding the most prolonged droughts during the medieval period, when parts of the world experienced warmer temperatures.



Population Rise in a Wet 20th Century
The unusually wet past century amply met the water needs of a flood of newcomers to the West. But the 21st dawns drier, as population continues to rise.

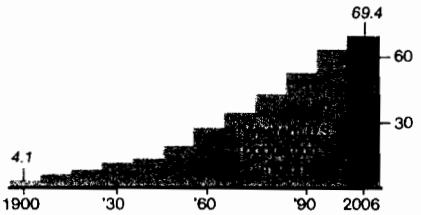
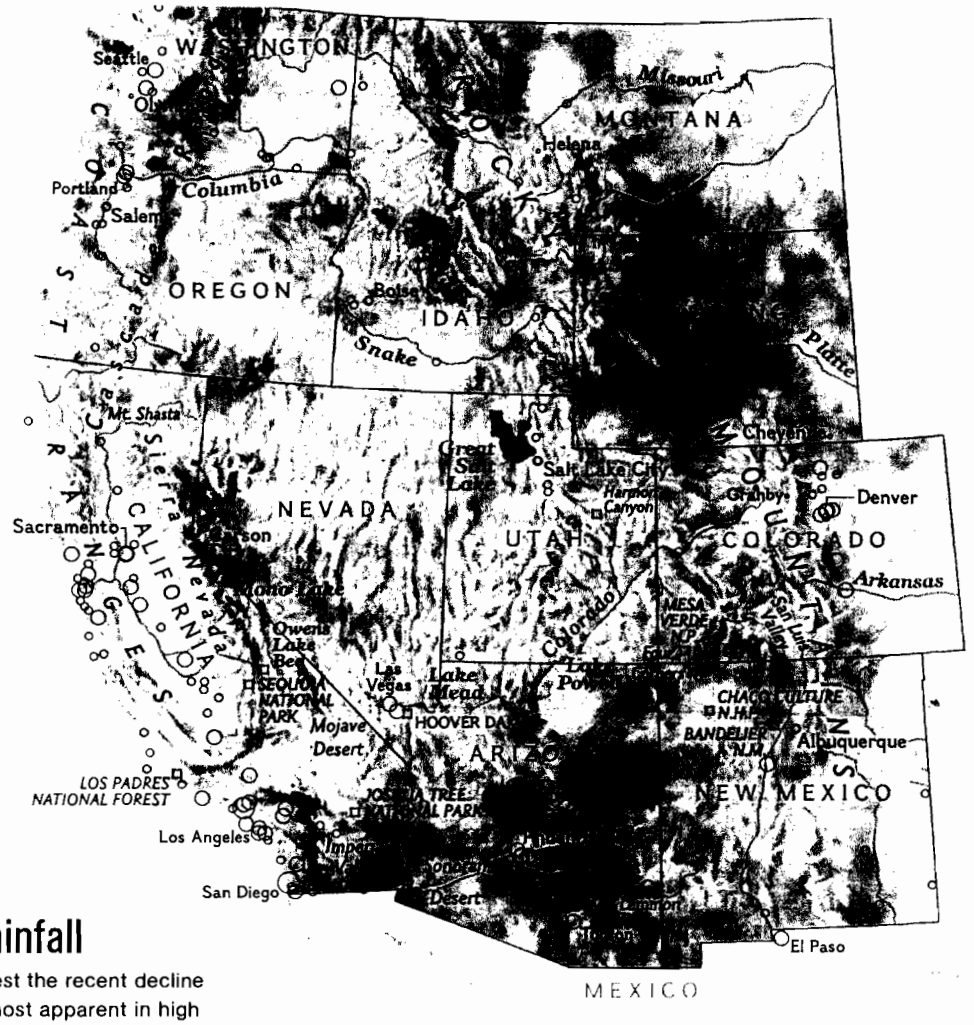


CHART ABOVE IS SMOOTHED USING A 50-YEAR MOVING AVERAGE. DATA: EDWARD COOK, TREE-RING LABORATORY, LAMONT-DOHERTY EARTH OBSERVATORY, COLUMBIA UNIVERSITY; U.S. CENSUS BUREAU. REPORTING AND GRAPHICS BY TOM ZELLER, JR., NGM ART



Vanishing Rainfall

Over much of the West the recent decline in rain and snow is most apparent in high mountain ranges, which normally receive the bulk of the region's precipitation. From there, rain and snowmelt recharge rivers, reservoirs, and aquifers.

Once and Future Drought

The West is naturally dry, but just how dry it can get is only now being understood. In contrast to the 20th century, revealed by tree rings as the wettest of the past millennium, an era called the Medieval Warm Period was dominated by deep droughts. Those megadroughts lowered the flow of the Colorado River to less than the volume currently drawn from it by 30 million people from Los Angeles to Denver for consumption and irrigation.

Natural cycles of drought in the West, especially the Southwest, are thought to be triggered mainly by the Pacific Ocean phenomenon called La Niña, a pulse of cooler equatorial water that periodically shifts the jet stream and its winter storms to the north. With the effects of La Niña expected to be compounded in coming decades by global warming, the politics of sharing the Colorado—and all western water resources—will only intensify.

the whole process. The upshot is, the dry regions will get drier, and the wet regions will get wetter. "That's it," said Held. "There's nothing subtle here. Why do we need climate models to tell us that? Well, we really don't."

A second, subtler effect amplifies the drying. As the planet warms, the poleward edge of the Hadley cells, where the deserts are, expands a couple of degrees latitude farther toward each Pole. No one really knows what causes this effect—but nearly all climate models predict it, making it what modelers call a robust result. Because the Southwest is right on the northern edge of the dry zone, a northward shift will plunge the region deeper into aridity.

As the meeting neared its close, Held and Seager stood out on the lawn, discussing Hadley cells and related matters through mouthfuls of coffee and doughnuts. The two men had lately become collaborators, and a few months before had published with colleagues the sobering *Science* paper analyzing the results of 19 different simulations done by climate modeling groups around the world. They then averaged all these results into an "ensemble."

The ensemble shows precipitation in the Southwest steadily declining over the next few decades, until by mid-century, Dust Bowl conditions are the norm. It does not show the Pacific locked in a perpetual La Niña. Rather, La Niñas would continue to happen as they do today (the present one is expected to continue at least through the winter of 2008), but against a background state that is more profoundly arid. According to the ensemble model, the descent into that state may already have started.

People are not yet suffering, but trees are. Forests in the West are dying, most impressively by burning. The damage done by wildfires in the U.S., the vast majority of them in the West, has soared since the late 1980s. In 2006 nearly ten million acres were destroyed—an all-time record matched the very next year. With temperatures in the region up four degrees F over the past 30 years, spring is coming sooner to the western mountains. The snowpack—already diminished by drought—melts earlier in the year, drying the land and giving the wildfire season a jump start. As hotter summers encroach on autumn, the fires are ending later as well.

The fires are not only more frequent; they are also hotter and more damaging—though not entirely because of climate change. According to Tom Swetnam, director of the University of Arizona tree-ring lab, the root cause is the government's policy, adopted early in the 20th century, of trying to extinguish all wildfires. By studying sections cut from dead, thousand-year-old giant sequoias in the Sierra Nevada and from ponderosa pines all over Arizona and New Mexico, Swetnam discovered that most southwestern forests have always burned often—but at low intensity, with flames just a few feet high that raced through the grasses and the needles on the forest floor. The typical tree bears the marks of many such events, black scars where flames ate through the bark and perhaps even took a deep wedge out of the tree, but left it alive to heal its wound with new growth. Suppressing those natural fires has produced denser forests, with flammable litter piled up on the floor, and thickets of shrubs and young trees that act as fire ladders. When fires start now, they don't stay on the ground—they shoot up those ladders to the crowns of the trees. They blow thousand-acre holes in the forest and send mushroom clouds into the air.

One day last summer, Swetnam took a few visitors up Mount Lemmon, just north of Tucson, to see what the aftermath of such events looks like. In May 2002 the Bullock fire roared up the northeast slope of Mount Lemmon, consuming 30,000 acres. Firefighters stopped it at the Catalina Highway, protecting the village of Summerhaven. But the very next year, the Aspen fire started on the slope just below the village, destroying nearly half of the 700-odd houses in Summerhaven and burning 85,000 acres, all the way down to the outskirts of Tucson. The entire mountainside beyond the village remains covered with the gray skeletons of ponderosa pines, like one big blast zone. "Ponderosa pine is not adapted to these crown fires," Swetnam

"Sequoias may not survive in Sequoia National Park. What do you do? Do you irrigate these things? Or do you let a 2,000-year-old tree die?"

–Craig Allen, landscape ecologist

said, contemplating the site from the scenic overlook above the village. "It has heavy, wingless seeds that don't go very far. When you get a large hole like this, it will take hundreds of years to fill in from the edges."

Mount Lemmon's forests are also experiencing a slower, broader change. The Catalina Highway starts out flat, at an altitude of 2,500 feet in the Sonoran Desert, with its saguaros and strip malls. As the road leaves the last of Tucson behind, it climbs steeply through the whole range of southwestern woodland ecosystems —first scrub oak, then piñon and juniper, then ponderosa pine and other conifers, until finally, after less than an hour and a climb of 7,000 feet, you reach the spruce and fir trees on the cool peak. There is a small ski area there, the southernmost in the United States, and its days are certainly numbered.

As Swetnam explained, the mountain is one of an archipelago of "sky islands" spread across southeastern Arizona, New Mexico, Texas, and into Mexico—mountains isolated from one another by a sea of desert or grassland. Like isles in the ocean, these islands are populated in part by endemics—species that live nowhere else. The sky-island endemics are cool- and wet-loving species that have taken refuge on the mountaintops since the last ice age. They are things like the corkbark fir, or the endangered red squirrel that lives only on nearby Mount Graham. Their future is as bleak as that of the ski area. "They'll be picked off the top," said Swetnam. "The islands are shrinking. The aridity is advancing upslope."

All over the Southwest, a wholesale change in the landscape is under way. Piñons and scrubbier, more drought-resistant junipers have long been partners in the low woodlands that clothe much of the region. But the piñons are dying off. From 2002 to 2004, 2.5 million acres turned to rust in the Four Corners region alone. The immediate cause of death was often bark beetles, which are also devastating other conifers. The Forest Service estimates that in 2003, beetles infested 14 million acres of piñon, ponderosa, lodgepole pine, and Douglas fir in the American West.

Bark beetles tend to attack trees that are already stressed or dying from drought. "They can smell it," says Craig Allen, a landscape ecologist at Bandelier National Monument in the Jemez Mountains of New Mexico. Global climate change may be permanently teasing the piñons and junipers apart, and replacing piñon-juniper woodland with something new. At Bandelier, Allen has observed that junipers, along with shrubs such as wavyleaf oak and mountain mahogany, now dominate the beetle-ravaged landscape: pockets of green gradually spreading beneath a shroud of dead piñons.

Just as there are global climate models, there are global models that forecast how vegetation will change as the climate warms. They predict that on roughly half of Earth's surface, something different will be growing in 2100 than is growing there now. The models are not good, however, at projecting what scientists call "transient dynamics"—the damage done by droughts, fires, and beetle infestations that will actually accomplish the transformation. Large trees cannot simply migrate to higher latitudes and altitudes; they are rooted to the spot. "What happens to what's there now?" Allen wonders. "Stuff dies quicker than it grows."

Over the next few decades, Allen predicts, people in the Southwest will be seeing a lot of death in the old landscapes while waiting for the new ones to be born. *(Continued on page 108)*

"This is a dilemma for the Park Service," he says. "The projections are that Joshua trees may not survive in Joshua Tree National Park. Sequoias may not survive in Sequoia National Park. What do you do? Do you irrigate these things? Or do you let a 2,000-year-old tree die?"

While the trees die, the subdivisions proliferate. "Our job was to entice people to move to the West, and we did a darn good job," says Terry Fulp, who manages water releases at Hoover Dam. The federal Bureau of Reclamation built the dam in the 1930s primarily to supply the vegetable farms of the Imperial Valley and only secondarily to supply the residents of Los Angeles. Farmers had first claim to the water—they still do—but there was plenty to go around. "At Lake Mead, we basically gave the water away," says Fulp. "At the time, it made perfect sense. There was no one out here." After Reclamation built Hoover and the other big dams, more people came to the desert than anyone ever expected. Few of them are farmers anymore, and farming, crucial as it is to human welfare, is now a small part of the economy. But it still uses around three-quarters of the water in the Colorado River and elsewhere in the Southwest.

In the wet 1920s, as the dam was being planned, seven states drew up the Colorado River Compact to divvy up 15 million acre-feet of its water. California, Nevada, and Arizona—the so-called Lower Basin states—would get half, plus any surplus from the Upper Basin states of Wyoming, Colorado, New Mexico, and Utah. The compact also acknowledged Mexico's rights to the water. Surpluses were almost always on hand, because the Upper Basin states have never fully used the 7.5 million acre-feet they are entitled to under the compact. They are only entitled to use it, in fact, if in so doing they don't prevent the Lower Basin states from getting *their* 7.5 million—the compact is unfair that way. But in the wet 20th century, it didn't seem to matter.

In 1999 both Lake Mead and Lake Powell —created in 1963 upstream of Lake Mead to ensure that the Upper Basin would have enough water even in drought years to meet its obligation to the Lower Basin—were nearly full, with 50 million acre-feet between them. Two years later, representatives of the states in the basin completed long and difficult negotiations with the Bureau of Reclamation on new guidelines for dividing up the surpluses from Lake Mead. Then came the drought. Both lakes are now only half full. "Those guidelines are almost a joke now," says the Southern Nevada Water Authority's Pat Mulroy. "All of a sudden, seven states that had spent years in surplus discussions had to turn on a dime and start discussing shortages."

Mulroy, a crisp, tanned, fiftysomething blonde with a tailored look and a forceful personality, has run the Las Vegas water district since 1989. During that time she has watched the area's population growth consistently outstrip demographic projection. The population is almost two million now, having grown by 25 percent during the drought years; Mulroy is convinced it will go to three million. Before the drought, she and her colleagues nevertheless thought their water supply, 90 percent of it from Lake Mead, was safe for 50 years. In 2002 they were celebrating the opening of a second water intake from Lake Mead, 50 feet lower than the old one, which more than doubled their pumping capacity. Now they are scrambling to insert a third "straw" even deeper into the sinking lake. Las Vegas is also trying to reduce its dependence on the Colorado. The SNWA is exercising water rights and buying up ranches in the east-central part of the state. It plans to sink wells and tap groundwater there and pump as much as 200,000 acre-feet of it through a 250-mile pipeline to the city. There is considerable local opposition, of course, and an environmental impact statement must be prepared—but there is "zero chance," Mulroy says grimly, that the pipeline won't be built.

Other southwestern cities are also realizing their vulnerability to drought. Phoenix, hellish as it is in summer and bisected by the dry bed of the Salt River, is better off than most—for the moment. "In 2002 Phoenix was virtually the only city in the Southwest that had no mandatory

The West was built by dreamers. As the climate that underpinned that expansive vision vanishes, the vision needed to replace it has not yet emerged.

restrictions," says Charlie Ester, water resources manager at the Salt River Project in Phoenix. "We didn't need them." Phoenix pumps groundwater whenever it needs to, though it is under a state mandate to stop depleting the aquifer. And it gets a little over a third of its water from the Colorado River via the Central Arizona Project, a 336-mile-long canal. But the Salt River remains its biggest source. The riverbed is dry in the city because the SRP has half a dozen dams in the mountains north and east of the city, which convert the Salt and its tributary, the Verde, into chains of terraced lakes.

Phoenix would thus seem to possess that holy grail of water managers: a diversified portfolio. But Ester was still disconcerted to see his lake levels dropping in the drought, until they were less than half full. After he called the tree-ring lab, Dave Meko and climatologist Katie Hirschboeck looked into the tree-ring records for the Salt and Verde Rivers' watersheds.

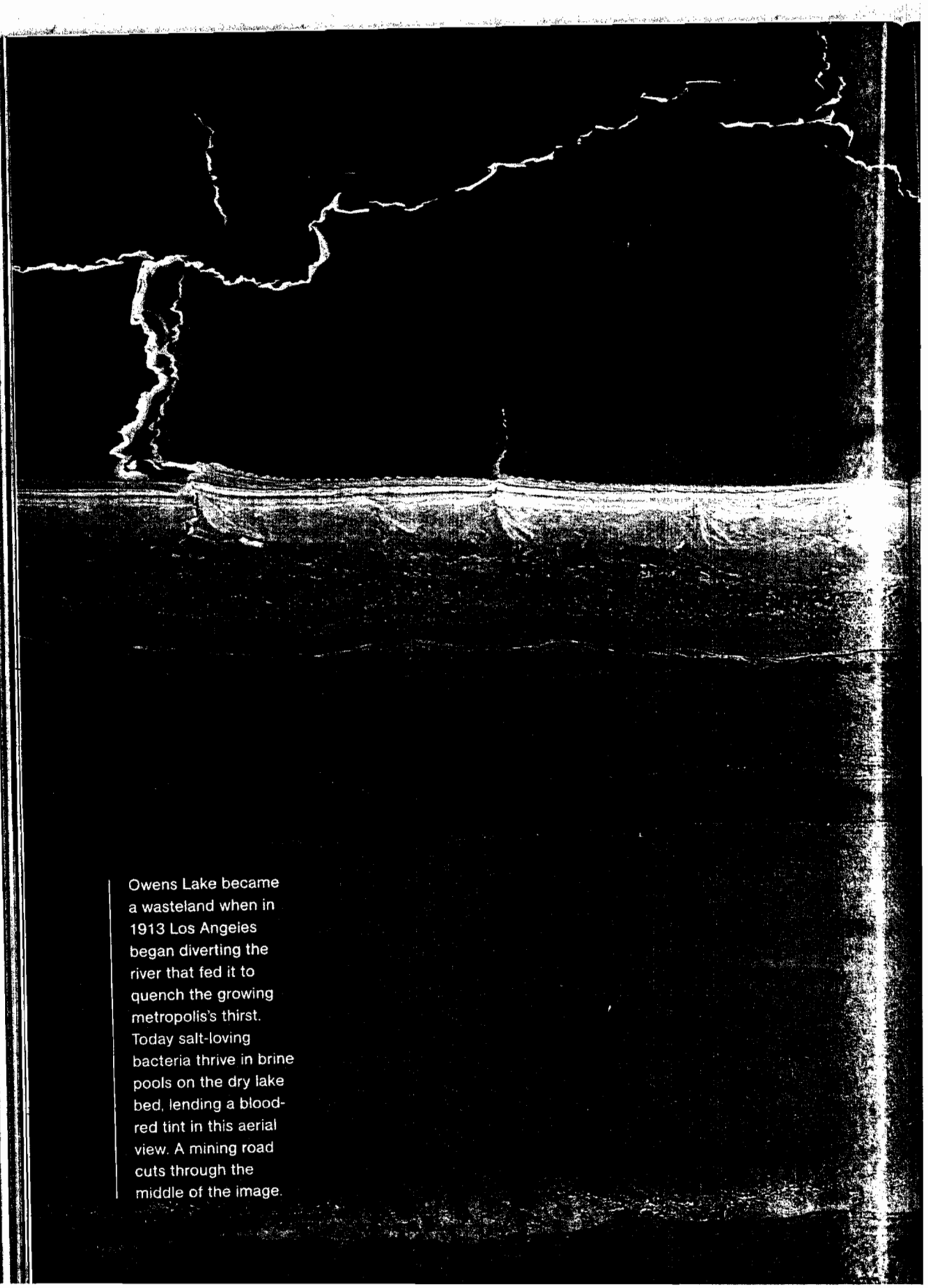
"They found they were virtually identical," Ester says. "There were only three years out of 800 where the Colorado was wet and the Salt was dry or vice versa. What that means is, if we have a bad drought in Arizona, and the Salt dries up, we can't rely on the Colorado to bail us out. So what are we going to do? Well, we're going to hurt. Or move."

Since the Hoover Dam was built, there has never been a water shortage on the Colorado, never a day when there was simply not enough water in Lake Mead to meet all the downstream allocations. Drought, and a realistic understanding of the past, have made such a day seem more imminent. Under the pressure of the drought, the seven Colorado basin states have agreed for the first time on how to share prospective shortages. Arizona will bear almost all the pain at first, because the Central Arizona Project, which came on line in 1993, has junior rights. Nevada will lose only a small percentage of its allotment.

Meanwhile California would give up nothing, at least until Lake Mead falls below 1,025 feet, nearly 200 feet below "full pool." At that point, negotiations would resume. According to Bureau of Reclamation calculations, a return of the 12th-century drought would force Lake Mead well below that level, perhaps even to "dead pool" at 895 feet—the level at which water no longer flows out of the lake without pumping. Reclamation officials consider this extremely unlikely. But their calculations do not take into account the impact of global warming.

Every utility in the Southwest now preaches conservation and sustainability, sometimes very forcefully. Las Vegas has prohibited new front lawns, limited the size of back ones, and offers people two dollars a square foot to tear existing ones up and replace them with desert plants. Between 2002 and 2006, the Vegas metro area actually managed to reduce its total consumption of water by around 20 percent, even though its population had increased substantially. Albuquerque too has cut its water use. But every water manager also knows that, as one puts it, "at some point, growth is going to catch up to you."

Looking for new long-term sources of supply, many water managers turn their lonely eyes to the Pacific, or to deep, briny aquifers that had always seemed unusable. Last August, El Paso inaugurated a new desalination plant that will allow the city to tap one such aquifer. The same month, the Bureau of Reclamation opened a new research center devoted to desalination in Alamogordo, New Mexico. The cost of desalination has dropped dramatically—it's now around four dollars per thousand gallons, or as little as $1,200



Owens Lake became a wasteland when in 1913 Los Angeles began diverting the river that fed it to quench the growing metropolis's thirst. Today salt-loving bacteria thrive in brine pools on the dry lake bed, lending a blood-red tint in this aerial view. A mining road cuts through the middle of the image.

A viable desert home during a long wet spell may be uninhabitable when the rains stop. The ancient Anasazi created a flourishing culture in New Mexico's Chaco Canyon, epitomized by Pueblo Bonito (above). Then prolonged drought hit the region in 1130. By the time it ended 30 years later, the Anasazi were gone. Sprawling cities in the present-day Southwest like Scottsdale (above right) grew by the millions during half a century of above-average rainfall. But with no end to the present drying trend in sight, the region faces an uncertain future.

per acre-foot—but that is still considerably more than the 50 cents per acre-foot that the Bureau of Reclamation charges municipal utilities for water from Lake Mead, or the zero dollars it charges irrigation districts. The environmental impacts of desalination are also uncertain—there is always a concentrated brine to be disposed of. Nevertheless, a large desalination plant is being planned in San Diego County. In Las Vegas, Mulroy envisions one day paying for such a plant on the coast of California or Mexico, in exchange for a portion of either's share of the water in Lake Mead. "The problem is, if there's nothing in Lake Mead, there's nothing to exchange," she says.

A more obvious solution for cities facing shortages is to buy irrigation water from farmers. In 2003 the Imperial Irrigation District was pressured into selling 200,000 of its three million acre-feet of Colorado water to San Diego, as part of an overall deal to get California to stop exceeding its allotment. San Diego paid nearly $300 per acre-foot for water that the farmers in the Imperial Valley get virtually for free. The government favors such market mechanisms, says the Bureau of Reclamation's Terry Fulp, "so people who really want the water get it." At that

price, the irrigation water in the Imperial Valley is worth nearly as much as its entire agricultural revenue, which is around a billion dollars a year. But not everyone favors drying up farms so that more water will be available for subdivisions. The valley is one of the poorest regions in California, yet the richest farmers stand to benefit most from the sale. Many more people fear the loss of jobs and, ultimately, of a whole way of life.

The West was built by dreamers. The men who conceived Hoover Dam were, in the words beneath a flagpole on the Nevada side, "inspired by a vision of lonely lands made fruitful." As the climate that underpinned that expansive vision vanishes, the vision needed to replace it has not yet emerged. In a drying climate, the human ecosystems established in a wetter one will have to change—die and be replaced by new ones. The people in the Southwest face the same uncertain future, the same question, as their forests: What happens to the stuff that's there now?

In the second half of the 13th century, as a drying trend set in, people who had lived for centuries at Mesa Verde moved down off the mesa into the canyons. They built villages around water sources, under overhangs high up in the walls of the cliffs, and climbed back up the cliffs to farm; their handholds in the rock are still visible. Some of the villages were fortified, because apparently their position on a cliff face was not defense enough. Those cliff dwellings, abandoned now for seven centuries but still intact and eerily beautiful, are what attract so many visitors today. But they are certainly not the product of an expansive, outward-looking civilization. They are the product of a civilization in a crouch, waiting to get hit again. In that period, the inhabitants of the Mesa Verde region began carving petroglyphs suggesting violent conflict between men armed with shields, bows and arrows, and clubs. And then, in the last two or three decades of the century, right when the tree rings record one of the most severe droughts in the region, the people left. They never came back. □

Water Woes See more images of the causes and consequences of drought at **ngm.com.**

This video was produced by the Pacific States Marine Fisheries Commission. (www.psmfc.org)

It concentrates on the effect of Zebra and Quagga mussels within the fishing and recreation and agricultural communities, but contains a lot of information on the compounding damaging effect these mussels have on ecosystems and the growing effect it will have on our water supply.

If these mussels have a devastating effect of rivers, lakes and reservoirs in the western United States, it would severely affect the water supply that we count on from the Colorado River.

This video is the result of a collaborative effort between state and federal agencies and organizations brought together under the 100th Meridian Initiative. The purpose of this effort is to prevent the spread of quagga and zebra mussels into the western US. Major funding was provided by the US Fish and Wildlife Service and Pacific States Marine Fisheries Commission.

There are two distinct parts to this video:

Part 1 (29 minutes) provides the viewer with background information about quagga and zebra mussel origins, distribution, biology and transport vectors; a detailed assessment of the impacts they can have on the ecology, economy and culture as told by representatives from various regions of the country and from all affected user groups; and ideas on how to avoid being part of the problem and becoming a part of the solution. This segment is designed to be shown to all audiences including state, federal and local resource management agency personnel, law makers, policy makers, service organizations and all user groups.

Part 2 (17 minutes) is a watercraft inspection and decontamination training video. It includes a detailed step-by-step demonstration of how to conduct an inspection of various types and sizes of trailered watercraft for the presence of quagga and zebra mussels. It also includes a similarly detailed demonstration of watercraft and equipment decontamination using both a low cost portable wash system and a large permanent system.

The recent discoveries of quagga mussels in the lower Colorado Basin and zebra mussels in Colorado and central California have magnified the importance of public education and outreach to make certain that everyone gets involved in efforts to assure that we *Don't Move A Mussel!*

Produced by:
Pacific States Marine Fisheries Commission
Produced at Videoland Productions Lacey, WA 360-491-1332
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DON'T MOVE A MUSSEL

DVD

DON'T MOVE A MUSSEL

The invasion of quagga and zebra mussels from the eastern US could be devastating to lakes, reservoirs and rivers of the western US.

They are here... and how we control their spread on trailered watercraft presents a huge challenge.

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