

DROUGHT

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SPECIAL REPORT

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MORE frequent,
severe **DROUGHTS**
probable in the **WEST**

Rich Pedroncelli/Associated Press

In this photo taken May 18, irrigation pipes sit along a dried canal on a field farmed by Gino Celli near Stockton, Calif. Celli, who farms 1,500 acres and manages 7,000 acres, has senior water rights and draws his irrigation water from the Sacramento-San Joaquin River Delta.

RED BLUFF, Calif. — In a time of persistent drought, Kevin Greer's calendar is full.

Greer visits farms throughout the northern Sacramento Valley with his mobile irrigation lab — a dusty brown truck outfitted with buckets, beakers, hoses and other equipment to test whether growers are making the most of every drop of water they use.

As the current drought has developed into one of the worst in history, Greer has near-daily farm visits scheduled for the rest of the summer and into fall. And as a warming trend is expected to lead to more frequent and severe droughts, he believes his services will be needed more than ever.

"The problem is that people have short memories," said Greer, who operates the lab for the Tehama County Resource Conservation District. "We've come a long way and seen a lot of growers do a lot of things with efficiency."

"Every winter brings a different story in the spring and summer," he said. "But with the population of California pushing up to 40 million and with more and more pressure being put on water resources, I don't see (the need for conservation) going away soon even if we do have a big winter."

Drought common

Droughts in the West certainly aren't new; in fact, they're a "fundamental feature of the climate of western North America," researchers Daniel Griffin of the University of Minnesota and Kevin Anchukaitis of the Massachusetts-based Woods Hole Oceanographic Institution wrote in a recent paper examining the current drought.

Current lack of water has developed into one of the worst in history

By **TIM HEARDEN**
Capital Press

Just in the last century, parts of the West have experienced decade-long dry periods such as during the Dust Bowl era and the 1950s which caused economic and agricultural upheaval, the scientists wrote.

In California, which is bearing the brunt of the current drought, natural evidence points to 37 different droughts of three years or longer having occurred in the last 1,200 years, they wrote.

However, the current drought has been the worst during that period, with 2014 surpassing what tree-ring evidence has found to be the driest years in history — 1580, 1782, 1829 and 1941 — because of persistent below-average soil moisture and record-high temperatures, Griffin and Anchukaitis wrote.

"In terms of cumulative severity, it is the worst drought on record... more extreme than longer (four to nine year) droughts," they wrote.

More to come

And things could get much worse. According to paleoclimate records, the last 150 years have been wetter than the last 2,000 years on average, and average global temperatures have



Tim Hearden/Capital Press

Kevin Greer of the Tehama County, Calif., Resource Conservation District pulls out buckets and hoses he uses to test growers' irrigation efficiency. As droughts are expected to become more frequent and severe, he believes there will be a continued demand for his mobile irrigation lab.

been considerably higher at times within the last 6,000 years than they are now, including during a medieval period about 1,100 to 600 years ago, explained Lynn Ingram, an earth science and geography professor at the University of California-Berkeley.

After fluctuating over the past few centuries, global temperatures have been on the upswing again since the 1960s, causing reduced snowpack and evap-

oration rates, drier soils, more frequent wildfires and increased dust levels, Ingram said in an online workshop. In the future, more energy and more water vapor in the atmosphere could bring larger floods and deeper droughts, she said.

"The expectations are that it's going to continue to get warmer," said Mike Anderson, California's state climatologist. "We'll see a future drought that again sets

records for temperature. The characteristics may include setting low marks at different time windows... for snowpack."

California's snowpack typically supplies about 30 percent of the state's water needs as it melts in the spring and summer, but statewide electronic readings April 1 found only 1.4 inches of water content, or 5 percent of the historical average of 28.3 inches for the date, the state Department of Water Resources reported.

This year's April 1 snowpack was the smallest in state records dating back to 1950, and last year's tied with 1977 for the second worst, Anderson said. He expects it will more consistently rank near the bottom in dry years because of a warming climate.

"That has a significant impact on water supply, particularly here in the West," he said, noting that a drought has taken hold in Oregon in Washington despite close to average precipitation because of a meager snowpack.

How do scientists know what will happen in the future? By studying more than a century of instrument readings as well as tree rings, fossil and sediment records and other evidence found in nature to determine trends.

For instance, anthropologist Scott Stine of California State University-East Bay looked at expanding and contracting levels of Mono Lake near Yosemite National Park over hundreds of years to determine periods of drought. He examined submerged tree stumps throughout the Sierra Nevada to figure out when water levels were so low or rivers were so dried up that a tree could grow for decades.

Meanwhile, Ingram's Laboratory for Environmental and Sedimentary Isotope Geochemistry at Berkeley has taken samples of sediment layers to test historical salinity levels at different places in the San Francisco Bay, whose watershed covers about 40 percent of California.

University of Arizona researcher Tom Swetnam examined fire scars in tree rings in giant sequoias in Yosemite to determine when wildfires were more common, suggesting periods of drought.

All the evidence pointed to several "megadroughts" including two century-long dry periods, said Ingram, who co-authored a book titled "The West Without Water: What Past Floods, Droughts and Other Climate Clues Tell Us About Tomorrow."

During a medieval warm period, evidence in the Four Corners region of the Southwest and along the California coast points to abandoned communities and collapsed civilizations, she said.

"Archaeological evidence shows that there was starvation, malnutrition and even conflict and violence between groups as resources dried up and dwindled," Ingram said in her presentation. "They had increased competition for resources and finally mass migration in search of water and other resources."

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Columbia-Snake River Irrigators Association: Failed Water Management in the Odessa Subarea

Successful water resources management requires competence and honesty. Competence depends on comprehending sound technical and financial information; and honesty means not deceiving others, or worse, deceiving yourself. Neither the Pacific Northwest Region Office, USBR nor the East Columbia Basin Irrigation District have embraced this standard in "reviewing" the new System 1 Water Service Contract requested by Irrigators and CSRIA, for the Odessa Subarea. There are two issues at play here: water use efficiency and the prudent use of financial resources, the irrigators' money.

The first issue is the wise and effective use of water. It would take an extraordinary level of incompetence to not optimize, via state authorized water spreading and well established practice, the new surface water allocation for the Odessa Subarea, given that Western water resources are under great physical constraints and public demands. The USBR has been loudly criticized for inefficient water use, leading to uneconomical projects. The lack of USBR sensitivity to these factors is, in this circumstance, mind-numbing.

Prompted by the USBR-District, a recent "opinion" letter from Ecology legal staff suggesting that optimizing water use efficiency (water spreading) in the Odessa Subarea is inconsistent with the legislative intent for Subarea water use is phenomenal nonsense and it is completely counter to Ecology Management's original approval of the provisions that are contained in the System 1 WSC submitted to the USBR. This letter's source reflects Derek Sandison's (Office of Columbia River, Ecology) irrational reversal of support for irrigator direct project financing and development—an action contrary to best management practices for water use and to financial integrity for the project. Mr. Sandison's judgment here was profoundly misguided, and it will now be on the shoulders of the Ecology Director, and legislative leaders, to reverse this damage to water management reality.

The second issue involves basic financial literacy. The Irrigators have fully secured \$42 million of private sector financing to initiate System 1 construction; and up to about \$100 million is available to proceed with a broader systems package. The District is still stumbling along, and even the progress on East Low Canal modifications is moving very slowly—but this may be intentional given the District's disorientation surrounding system development and financing.

The PNRO-USBR/District's proposed "normative process" for project development and financing is a product of considerable self-deception. There is no cost advantage to this ephemeral and fiscally insecure concept: there is no cost advantage to having the District build the systems more acres would be subjected to higher costs, actually discouraging participation the annualized systems' costs would be higher than the direct private irrigators' costs; the total 30-year debt service costs would be substantially higher than the private; and there is no tangible public sector revenue bonding package even on the table.

To the extent that the District is offering limited water contracts that include "normative development fee" costs, those costs are fictitious in substance, and likely fraudulent relative to state legal provisions that do not allow irrigation districts to access fees that exceed actual benefits to the ground served. The Odessa Subarea surface water supply objective is to put water on the ground, not to put excessive funds in the District's coffers.

Unfortunately, the lack of District concern for Irrigator costs goes further. The District spurned CSRIA's efforts to secure additional state funding (\$20 million) to finish East Low Canal modifications below Lind Coulee, to allow for access to water for all South of I-90 systems. Allocation of this additional funding was contingent upon the USBR releasing the System 1 WSC, but this would have effectively eliminated any feeble justification for even pondering a "normative fee process." Thus, the District preferred to increase costs to Irrigators rather than allow the Irrigators to proceed with system(s) construction. How does this inexplicable action represent the Irrigators' best interests or leverage their direct financing capability?

Each day, it becomes increasingly apparent to observers, that the USBR-District are disregarding an effective standard for water resources management. This carries with it a patronizing disservice to the Irrigators, the broader Irrigated Agriculture Industry, and their dependent communities. The wells are going dry, farmers and communities suffer as the USBR-District folly continues.