



Media Release

New Study Advances the Science of Measuring Crop Water Use in California's Delta

Application of this Research Will Improve Water Management

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SACRAMENTO – A new study organized by state agencies points toward significant improvement in understanding and managing agricultural water use in the Sacramento-San Joaquin Delta.

Measuring actual water use by crops in the Delta has always been a challenge. In the most recent drought (2012-2016), lack of accurate and timely estimates on crop water use in the complex setting of the Delta hampered both water resource management and water use regulation. In response, scientists from several state agencies and universities organized the first rigorous scientific effort to compare and improve seven emerging methods for estimating crop water use in the Delta.

The two-year study has now been released and an article describing the study and its findings is being prepared for publication in *San Francisco Estuary and Watershed Science*. A brief summary of the study, prepared by its authors, is available [on the Comparative Study for Estimating Crop Evapotranspiration in the Delta webpage](#). The brief summary includes links to the complete study and its technical appendices.

“Publication of this research report is an important benchmark in our evolving understanding of how water is actually consumed within the Delta,” said [Delta Watermaster](#) Michael George. “Already, farmers, water managers, environmentalists and regulators are developing practical applications for this sophisticated scientific research. We look forward to these applications providing information to guide future water conservation, improve crop yields, and better inform water rights administration.”

“This study provides valuable insight on Delta crop water use,” said State Water Resources Control Board Chair Felicia Marcus. “More important, the study demonstrates that cooperation among water users, project operators, academic



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researchers, environmental advocates, and regulatory agencies can help fill in the data gaps that hampered all of us in making timely responses to the acute water shortages we faced in the last multi-year drought. Application of this research promises to improve the water community's response to and ability to manage through future droughts."

The study compared seven crop consumptive use measurement techniques, including in-field instrumentation, regional weather stations, crop standard evapotranspiration data, computer analysis of satellite and aerial images as well as variations and combinations in how the techniques are applied.

The research underscores the complexity of measuring crop consumptive use with the variety of soil

types, land elevations, groundwater levels, wind conditions and microclimates within the Delta's sub-regions. By rigorously comparing the seven methods against standard datasets in the complex Delta environment, the study provides a basis for evaluating results derived from different approaches to crop water use estimation.

Among the major findings of the study:

- The consumptive use of water by crops in the Delta was estimated at 1.45 million acre feet in 2015 (a severe drought year), and 1.38 million acre feet in 2016 (a year with average precipitation).
- The three major crops--alfalfa, corn and pasture--averaged nearly half of all crop consumptive use in the Delta in both study years.
- Agricultural land use in the Delta changed from 2015 to 2016, including more fallowed land, decreases in the three major crops and increases in young orchards. The changes in crop patterns account for the reduced water consumption from 2015 to 2016, notwithstanding the increased precipitation in 2016.

These more refined estimates of actual crop water use during the study period improve insight into how the Delta functioned under extreme drought conditions. More important, however, is that the study led to refinements and improvements in each of the methodologies, which increases the value of each of the methods for future application. The study indicates that emerging remote sensing technologies promise accurate consumptive use estimates at lower cost, greater frequency, improved comparability and reduced intrusion.

The new study, organized by the Office of the Delta Watermaster, brought together research teams from The University of California at Davis, the University of California Merced, Cal Poly San Luis Obispo, California State University at Monterey Bay, the California Department of Water Resources, the United States Department of Agriculture and NASA Ames Research Center.

The study was supported by grants from the State Water Resources Control Board, the Delta Stewardship Council, the Delta Protection Commission, the Delta Conservancy, the North, Central and South Delta Water Agencies and UC Water. There were significant in-kind contributions from the Department of Water Resources, the Agricultural Extension Service, The Nature Conservancy, The Environmental Defense Fund and many Delta farming organizations. Critical land use surveys were provided by Land IQ under an innovative contract with the Department of Water Resources.

The [Office of the Delta Watermaster](#) was created as part of the Delta Reform Act of 2009. The Watermaster is an independent officer of the State, appointed to a four-year term by the State Water Resources Control Board, reporting jointly to the Water Board and to the Delta Stewardship Council.