

# Implementation of the Agricultural Water Management Planning Act

## A Review of Agricultural Water Management Plans

### AUTHORS

Claire O'Connor  
*Natural Resources Defense Council*

Dr. Juliet Christian-Smith  
*Pacific Institute*



## About the Pacific Institute

The Pacific Institute is one of the world's leading independent nonprofit research organizations working to create a healthier planet and sustainable communities. Based in Oakland, Calif., the Institute conducts interdisciplinary research and partners with stakeholders to produce solutions that advance environmental protection, economic development, and social equity—in California, nationally, and internationally. [www.pacinst.org](http://www.pacinst.org).

## About NRDC

The Natural Resources Defense Council (NRDC) is an international nonprofit environmental organization with more than 1.4 million members and online activists. Since 1970, our lawyers, scientists, and other environmental specialists have worked to protect the world's natural resources, public health, and the environment. NRDC has offices in New York City, Washington, D.C., Los Angeles, San Francisco, Chicago, Bozeman, and Beijing. Visit us at [www.nrdc.org](http://www.nrdc.org) and follow us on Twitter @NRDC.

NRDC's policy publications aim to inform and influence solutions to the world's most pressing environmental and public health issues. For additional policy content, visit our online policy portal at [www.nrdc.org/policy](http://www.nrdc.org/policy).

## About the authors



**Claire O'Connor** is an attorney\* and the Agricultural Water Policy Analyst in the NRDC Santa Monica Office. She focuses on designing and implementing solutions to water challenges that are good for both farmers and people who eat the food that farmers grow. Claire grew up as the fifth generation of family farmers in rural Nebraska. Her family taught her the importance of protecting natural resources so that future generations can carry on the family business. Today, her work focuses on using those same principles to promote food that is safe, healthy, and sustainable. She is a graduate of Georgetown University Law Center and the University of Nebraska-Lincoln.

\*Admitted in California



**Dr. Juliet Christian-Smith** is a senior research associate at the Pacific Institute and the lead author of several Institute reports and the book *A Twenty-First Century U.S. Water Policy* (Oxford Press, 2012). Her interests include sustainable water management, comparative analyses of water governance structures, and climate change adaptation and mitigation.

She is currently an Editor of Sustainability Science and a Steering Committee Member of the California Roundtable on Water and Food Supply.

Prior to coming to the Institute, she was on a Fulbright Fellowship studying the implementation of the European Union Water Framework Directive. During graduate school, she worked on several water policy projects in California through the University of California Cooperative Extension, managing the field work and data collection for an empirical study of agricultural water demand in California.

Dr. Christian-Smith holds a Ph.D. in Environmental Science, Policy and Management from the University of California at Berkeley and a B.A. in Biology from Smith College.

*NRDC Director of Communications:* Edwin Chen

*NRDC Deputy Director of Communications:* Lisa Goffredi

*NRDC Policy Communications Director:* Alex Kennaugh

*Lead Editor:* Elise Marton

*Design and Production:* [www.suerossi.com](http://www.suerossi.com)

Cover image: Tail water recovery ditch near rice field in Northern California @ Gary Kramer

© 2013 Natural Resources Defense Council

## INTRODUCTION

At the end of 2009, the California Senate passed a slate of water-related bills. One of these, the Water Conservation Act of 2009 (Senate Bill X7-7), laid out new per capita water conservation requirements for urban water suppliers and mandatory and conditional efficient water management practices and water planning requirements for agricultural water suppliers. Here we focus on the new requirements for agricultural water suppliers contained in Part 2.8 of the bill, known as the Agricultural Water Management Planning Act, hereafter referred to as the Act (see Appendix A for the full text).

The Act applies in the first instance to larger agricultural water suppliers, specifically those with at least 25,000 irrigated acres, and will apply to districts that are 10,000 to 25,000 irrigated acres when additional funding is available. According to the California Department of Water Resources (DWR), there are approximately 79 agricultural water suppliers in the state to which the act applies regardless of funding availability; however, as of August 2013, DWR had received only 25 plans.<sup>1</sup> Here we review and compare eight of the plans submitted to DWR, asking the following questions:

- Are there exemplary agricultural water management plans that can serve as a template for other agricultural water suppliers?
- How are districts implementing the mandatory efficient water management practices?
- What types of conditional efficient water management practices are being implemented?
- Do the plans comport with the plan process, components, and format suggested in the legislation and accompanying guidebook?

We chose plans that were accessible online, reflected geographic diversity, and followed a variety of plan formats (Central Valley Project plans, SB X7-7 individual plans, and SB X7-7 regional plans).<sup>2</sup> Ultimately we chose:

- Alta Irrigation District (Tulare County)
- Chowchilla Water District (Madera County)
- Modesto Irrigation District (Stanislaus County)
- Oakdale Irrigation District (Stanislaus County)
- Sacramento Valley Regional Plan<sup>3</sup>
- South San Joaquin Irrigation District (San Joaquin County)
- Tulare Irrigation District (Tulare County) and
- Turlock Irrigation District (Stanislaus County).

This analysis is divided into five main sections:

- Agricultural water management plan submission
- Mandatory efficient water management practice implementation
- Conditional efficient water management practice implementation
- Public participation process
- Plan organization

In each section, we discuss the relevant portion of the legislation that describes the requirements and then discuss adoption, calling out the best examples from the subset of plans that we reviewed. Finally, we offer some general conclusions and recommendations for improving future planning processes.

## AGRICULTURAL WATER MANAGEMENT PLAN SUBMISSION

### Legislation

The Act requires that applicable agricultural water suppliers adopt an agricultural water management plan by the end of 2012, submit their second plan by the end of 2015, and update their plan every five years after that.<sup>4</sup> Pursuant to Section 10852 of the Act, districts that do not comply with planning requirements and deadlines may not be eligible for state grants and loans.

### Adoption

At the time of this writing, only 25 agricultural water suppliers had submitted agricultural water management plans.<sup>5</sup> This represents a 30 percent compliance rate, meaning the vast majority of water districts are currently out of compliance.



## Examples

Nineteen agricultural water suppliers submitted plans on or before January 30, 2013: San Benito County Water District, Orland-Artois Water District, Nevada Irrigation District, Alta Irrigation District, Chowchilla Irrigation District, Tulare Irrigation District, Modesto Irrigation District, South San Joaquin Irrigation District, Turlock Irrigation District, Arvin-Edison Water Storage District, Westlands Water District, Coachella Valley Water District, Dudley Ridge Water District, Columbia Canal Company, Del Puerto Water District, South Sutter Water District, Yuba County Water Agency, Oakdale Irrigation District, and Laguna Irrigation District.

## MANDATORY EFFICIENT WATER MANAGEMENT PRACTICES

### Legislation

There are two mandatory efficient water management practices (EWMPs) that apply to all large irrigation districts. These two mandatory EWMPs require that districts: 1) measure the volume of water delivered to customers, and 2) base water prices at least in part on the volume of water delivered.<sup>6</sup>

These mandatory EWMPs were further defined by the Agricultural Water Measurement Regulation, which clarifies the accuracy standards for devices that measure water deliveries to customers at two points: at the farm gate or upstream of the farm gate (Appendix B).

The preferred method of compliance is for irrigation districts to measure the volume of deliveries at the farm gate.<sup>7</sup> Existing volumetric measurement devices must be certified to be accurate within  $\pm 12$  percent. New or replacement devices must be certified to be accurate within  $\pm 5$  percent by volume in the laboratory if using a laboratory certification, or  $\pm 10$  percent by volume in the field if using a non-laboratory certification.<sup>8,9</sup>

### Adoption

Of the plans reviewed, six had clear implementation plans to measure the volume of water delivered to farm turnouts within the accuracy ranges described above by the next plan cycle in 2015 (Tulare Irrigation District, Modesto Irrigation District, Alta Irrigation District, Reclamation District 108, Oakdale Irrigation District, and Turlock Irrigation District). Several plans described projects to improve flow measurement at the system level (rather than at delivery points) but did not describe how this would meet the requirements of Section 597.3 (Glenn Colusa Irrigation District and Anderson Cottonwood Irrigation District). One plan stated that “direct measurement to fields is not always feasible” and provided no further explanation of how the district planned to comply with the law (South San Joaquin Irrigation District).

In terms of volumetric pricing, five of the irrigation districts reviewed are currently volumetrically pricing or have completed a Proposition 218 notification process to implement volumetric pricing (Chowchilla Irrigation District,

South San Joaquin Irrigation District, Alta Irrigation District, Tulare Irrigation District, and Turlock Irrigation District). Modesto Irrigation District stated that it has a volumetric rate structure; however, this district actually charges a flat rate to all customers who use 3 acre-feet per acre or less during an irrigation season (referred to as the “base irrigation water allocation”). A volumetric rate of \$14.75 per acrefoot is triggered only when a customer requests more than the base allocation. Discussions with Modesto staff revealed the district is developing a cost-of-service based rate structure, which it plans to submit to its board prior to the 2015 irrigation season.

Two districts were in a planning process, preparing to conduct a Proposition 218 election for a new rate structure (Reclamation District 108 and Oakdale Irrigation District). Two districts did not describe how they planned to comply with volumetric pricing (Glenn Colusa Irrigation District and Anderson Cottonwood Irrigation District).

## Examples

### Measurement

Reclamation District 108 presents a useful example of a district that measures water deliveries. This district is in the process of modifying all 600 field turnouts and pump discharges to provide turnout measurements that meet the accuracy standards required by the state regulation. This includes the addition of a concrete weir box on all field turnouts and either a weir box or, if not possible, a flow meter on each lift pump. The weir boxes will include a bracket to facilitate the use of portable acoustic Doppler flow meters, which will be used by district water workers to take point measurements whenever the flow through the field turnout is changed (Figure 1). The acoustic Doppler was lab-tested and certified at the California State University Chico Agricultural Teaching and Research Center in July 2012 as meeting the accuracy requirements of the regulation. The flow meters also serve to record each data point and automatically transfer the information to a server in the district office where quality control, monthly reporting, and billing is performed. The plan proposes to complete the capital improvements and data management processes prior to the 2016 irrigation season.



Figure 1: Reclamation District 108's new water measurement system.

### Volumetric Pricing

Alta Irrigation District began volumetric pricing more than a decade ago after its own cost-of-service studies found that large water demands had higher associated costs. Alta uses submerged orifice plates and propeller meters to measure water at turnouts (Figure 2). Water pricing is a combination of a flat fee and a volumetric charge. Irrigators pay a per-acre

fee of \$19.95 (in 100 percent entitlement areas), which covers fixed costs such as insurance and debt service. In addition, the district charges a “volumetric water surcharge” of \$4.10 per acre-foot of water to cover variable costs (Table 1). The price structure went through a Proposition 218 election and was supported by a majority (62 percent) of landowners.

Figure 2. District staff measuring water at a turnout in the Alta Irrigation District.

Photo: © Chris Kapheim



Photo: © Chris Kapheim

Table 1: Alta Irrigation District water prices				
FUTURE DISTRICT OPERATIONAL BUDGETS				
Volumetric Water Surcharge	\$3.65	\$3.76	\$3.90	\$4.10
Fiscal Year	06/07	07/08	08/09	09/10
<b>Water Run Revenues</b>				
Water Surcharge	\$365,000	\$376,000	\$390,000	\$410,000
Water Surcharge Penalty	\$500	\$500	\$500	\$500
Pine Flat Power Income 50%	\$84,476	\$84,476	\$84,476	\$84,476
<b>Total Water Run Revenues</b>	<b>\$449,976</b>	<b>\$460,976</b>	<b>\$474,976</b>	<b>\$494,976</b>
<b>Water Run Costs</b>				
Maintenance Ditchtender Trucks	\$8,000	\$8,400	\$8,800	\$9,200
Fuel – Ditchtender Trucks	\$30,000	\$33,000	\$36,000	\$39,000
Cell Phone – Ditchtenders	\$6,000	\$6,000	\$6,000	\$6,000
Answering Service	\$400	\$400	\$400	\$400
Algicide	\$24,000	\$24,000	\$24,000	\$24,000
Operational Payroll	\$263,423	\$270,535	\$277,840	\$285,342
Payroll Tax/Benefits	\$84,885	\$87,177	\$89,531	\$91,948
Drop Boards	\$6,100	\$6,400	\$6,800	\$7,200
<b>Total Water Run Costs</b>	<b>\$422,808</b>	<b>\$435,913</b>	<b>\$449,371</b>	<b>\$463,060</b>
Add reserves for maintenance of pipelines	\$25,000	\$25,000	\$25,000	\$25,000
<b>Net Operational Cash Flow</b>	<b>\$2,168</b>	<b>\$63</b>	<b>\$805</b>	<b>\$6,886</b>

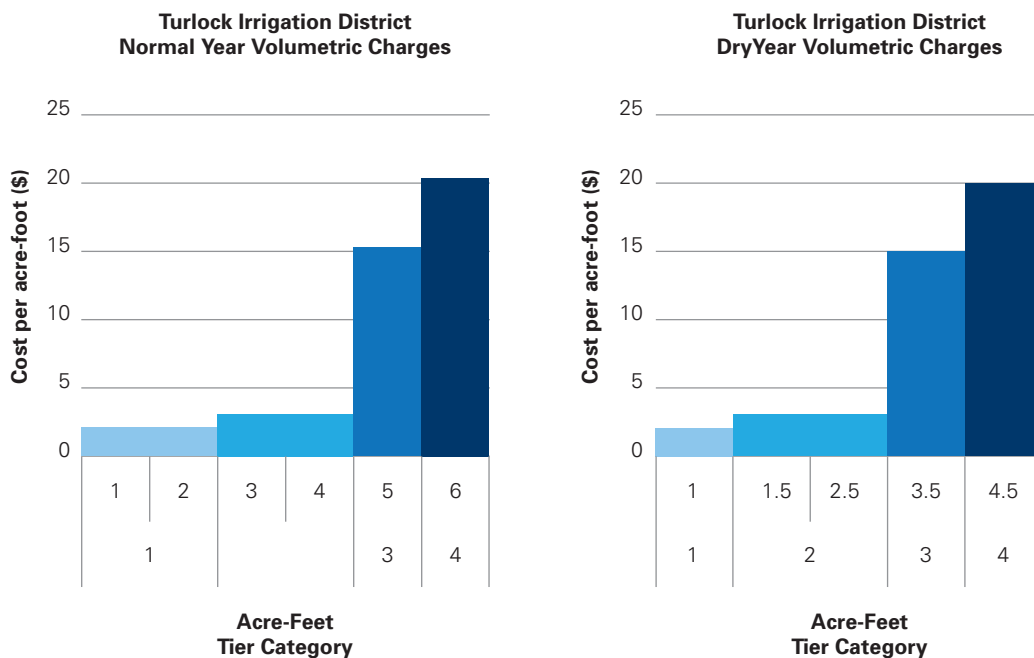




Turlock Irrigation District's board approved a new volumetric rate structure at the district's June 12, 2012, meeting. The board reported that it received only five official protests (following Proposition 218 notification requirements), which represented less than 1 percent of the district's customers.<sup>10</sup> The new rate structure has four tiers and two sets of rates, one for normal water years and one for dry years (Table 2). In 2012, Turlock Irrigation District provided information and outreach to customers about the new rate structure. In 2013, the district began charging irrigators according to the new rate structure.

A presentation at the June 12 board meeting explained that the new rate structure would help to address a gap between revenue (from water sales) and water service costs. The district reduced its expenses, but fuel, material, and regulatory costs continue to rise, creating a gap between the revenue collected for water services and the true cost of those services. The new rate structure halves the revenue gap from about \$1 million in normal years to \$500,000. The remaining revenue shortfall is currently subsidized by energy customers, as the district is also an energy provider.

**Table 2: Turlock Irrigation District water prices**



*A flat rate of \$23 per acre is assessed in addition to these volumetric charges.*

*A flat rate of \$26 per acre is assessed in addition to these volumetric charges.*

## CONDITIONAL EFFICIENT WATER MANAGEMENT PRACTICES

### Legislation

In addition to the mandatory efficient water management practices described above, Section 10608.48(c) of the Water Conservation Act of 2009 explains that agricultural water suppliers must implement 14 additional practices unless implementation is not “locally cost effective” or not “technically feasible.” These conditional efficient water management practices are listed in Table 3, below.

### Adoption

Most districts whose plans were reviewed report adopting most of the conditional efficient water management practices as shown in Table 3. Districts provided very little discussion of the conditional efficient water management practices they did not implement, despite the fact that the Act requires districts to adopt all 14 of these practices unless a practice is not locally cost effective or not technically feasible. No district included rigorous analysis to support any claim that a non-adopted practice was not locally cost effective or not technically feasible; in fact, most districts gave no explanation at all for a failure to adopt some of the conditional efficient water management practices.

**Table 3: Condition EWMP adoption**

Conditional EWMP	Districts Adopted (Number Adopted)
Facilitate alternative land use for lands with exceptionally high water duties or whose irrigation contributes to significant problems, including drainage.	Modesto (1)
Facilitate use of available recycled water that otherwise would not be used beneficially, meets all health and safety criteria, and does not harm crops or soils.	Modesto, Oakdale, Tulare, Turlock (4)
Facilitate the financing of capital improvements for on-farm irrigation systems.	Chowchilla, Modesto, Oakdale, South San Joaquin, Tulare, Turlock (6)
Implement an incentive pricing structure that promotes one or more of the following goals: <ul style="list-style-type: none"> <li>• More efficient water use at the farm level</li> <li>• Conjunctive use of groundwater</li> <li>• Appropriate increase of groundwater recharge</li> <li>• Reduction in problem drainage</li> <li>• Improved management of environmental resources</li> <li>• Effective management of all water sources throughout the year by adjusting seasonal pricing structures based on current conditions</li> </ul>	Alta, Chowchilla, Modesto, Oakdale, Anderson Cottonwood, South San Joaquin, Turlock (7)
Expand line or pipe distribution systems, and construct regulatory reservoirs to increase distribution system flexibility and capacity, decrease maintenance, and reduce seepage.	Alta, Modesto, Oakdale, Anderson Cottonwood, South San Joaquin, Turlock (6)
Increase flexibility in water ordering by, and delivery to, water customers within operational limits.	Chowchilla, Modesto, Oakdale, Anderson Cottonwood, South San Joaquin, Tulare, Turlock (7)
Construct and operate supplier spill and tailwater recovery systems.	Modesto, Oakdale, South San Joaquin, Tulare, Turlock (5)
Increase planned conjunctive use of surface water and groundwater within the supplier service area.	Alta, Chowchilla, Modesto, Oakdale, Anderson Cottonwood, South San Joaquin, Turlock (7)
Automate canal control structures.	Chowchilla, Modesto, Oakdale, Anderson Cottonwood, South San Joaquin, Tulare, Turlock (7)
Facilitate or promote customer pump testing and evaluation.	Chowchilla, Modesto, Oakdale, South San Joaquin, Tulare, Turlock (6)
Designate a water conservation coordinator who will develop and implement the water management plan and prepare progress reports.	Modesto, Oakdale, South San Joaquin, Turlock (4)
Provide for the availability of water management services to water users. These services may include, but are not limited to, all of the following: <ul style="list-style-type: none"> <li>• On-farm irrigation and drainage system evaluations</li> <li>• Normal year and real-time irrigation scheduling and crop evapotranspiration information</li> <li>• Surface water, groundwater, and drainage water quantity and quality data</li> <li>• Agricultural water management educational programs and materials for farmers, staff, and the public</li> </ul>	Modesto, Oakdale, Reclamation District 108, South San Joaquin, Turlock (5)
Evaluate the policies of agencies that provide the supplier with water to identify the potential for institutional changes to allow more flexible water deliveries and storage.	Modesto, Oakdale, South San Joaquin, Turlock (4)
Evaluate and improve the efficiencies of the supplier’s pumps.	Modesto, Oakdale, South San Joaquin, Turlock (4)

## Example

Although districts report implementing most conditional efficient water management practices, the degree of adoption varies quite widely. Some successful examples of implementation of conditional efficient water management practices are highlighted in Table 4, below. These success stories illustrate some of the benefits districts have received by implementing the conditional efficient water management practices.

Table 4: Exemplary implementation of conditional efficient water management practices	
Conditional EWMP	Example
Alternative Land Use	Modesto currently facilitates alternative land use for areas with drainage problems.
Recycled Water Use	Turlock receives approximately 5,200 acre-feet of recycled water each year, the most of any district whose plan we reviewed. Its sources for recycled water include the City of Modesto, the City of Turlock, and the Hilmar Cheese Company. Some growers in the Turlock district also use dairy nutrient water, which partially offsets demand for nonrecycled water.
Capital Improvements	South San Joaquin introduced a cost-share program in 2011 that helps farmers invest in water-saving technologies, services, and management practices. During the 2012 irrigation season, South San Joaquin provided more than \$1 million worth of cost assistance that helped 100 landowners implement measures including delivery measurement, conversion to sprinkler or drip irrigation, tailwater recovery, irrigation scheduling, and moisture monitoring.
Incentive Pricing Structure	Turlock recently adopted a four-tier pricing structure with separate price points for dry and normal years. Turlock's new pricing structure will encourage greater efficiency at the farm level by offering lower rates for lower volumes of water; will promote conjunctive use of groundwater and appropriate groundwater recharge by encouraging farmers to use surface water during wet years and groundwater during dry years; will reduce problem drainage and improve management of environmental resources by encouraging on-farm efficiency; and will improve management of water resources by differentiating between dry and wet years. Additionally, Turlock is providing farmers with an opportunity to learn how the new rate structure will affect them and to alter their behavior in advance of rate changes, if they so desire.
Canal Lining or Piping	Anderson Cottonwood has undertaken a significant effort to upgrade inefficient pipelines and to pipe earthen canals and laterals that were prone to leakage. Since the effort began in 2008, Anderson Cottonwood has installed 4,110 feet of pipe.
Order and Delivery Flexibility	South San Joaquin's Division 9 project allows customers in that Division to receive pressurized water with arranged demand and online ordering. Division 9 is heavily planted in permanent crops that require low volumes of irrigation. Installation of the new pressurized system allows these growers the flexibility to use surface water supplies, rather than the overdrafted and saline groundwater supplies they were previously using due to constraints with surface water delivery systems. Growers in District 9 also have access to automated flow control valves and magnetic flow meters, soil moisture monitors, and historical water use data.
Spill and Tailwater Recovery	Oakdale recovers spill and tailwater through the use of 42 reclamation pumps that recover an average of 9,300 acre-feet of water each year. This water is either captured and reused within the district, or pumped to Modesto or South San Joaquin. Oakdale plans to invest additional money in outflow management and reclamation projects during the coming years, as well as invest in infrastructure (such as canal automation) that will reduce spillage.
Conjunctive Use	Modesto is employing conjunctive management techniques to reverse a trend of increasing groundwater consumption by irrigators who require frequent low volumes of water to service their pressurized systems. To encourage these growers to remain on canal water, Modesto is increasing automated control structures, using a Decision Support System to match demand with available water, encouraging groundwater recharge during wet years, and increasing on-demand and arranged on-demand delivery, among other things. Modesto recognizes that by improving conjunctive management, the district is preserving the ability to use groundwater to augment surface water supplies during dry years; if groundwater resources are mismanaged, the area's water supply reliability could be in jeopardy.
Automation of Canal Control Structures	Modesto has 45 automated control points and has identified an additional 30 points where automation could potentially be employed. Modesto recognizes automation to be an investment in customer service that will increase flexibility to meet the demands of the increasing number of customers who are switching to low-flow irrigation systems.
Customer Pump Testing	Modesto tests customers' private pumps on request and has installed water flow meters on approximately 70 percent of its own pumps.
Water Conservation Coordinator	Oakdale has had a designated water conservation coordinator since 1997. This coordinator is responsible for overseeing water conservation activities and ensuring that customers are not using water wastefully.
Water Management Services	South San Joaquin's On-Farm Water Conservation Program assists farmers with their water management by cost-sharing installation of water measurement devices and upgrades of irrigation systems, and by providing scientific irrigation scheduling data and other services that growers may propose.
Institutional Changes	Oakdale proactively reached out to a neighboring area outside of its district boundaries that was planning to begin pumping groundwater to new irrigators in a part of the state where groundwater is overdrafted. Oakdale annexed the area and began selling surface water to the area during wet years so groundwater would not have to be used. During dry years, the area does use groundwater, which gives Oakdale the flexibility it needs to continue to serve its original customers.
Supplier Pumps	Turlock tests district-owned and rented wells and trains employees on the proper testing methods. Turlock also has a dedicated capital fund to replace well pumps that are deemed inefficient.



## PUBLIC PARTICIPATION

### Legislation

The Act requires districts to provide the public with notice of pending plans as well as an opportunity to comment on draft plans. Specifically, districts must make draft plans available for public review, hold public hearings on draft plans, and provide notice of the times and places that hearings will be held.<sup>11</sup> Plans must be available on the Internet once they have been adopted by districts, either on individual district websites or through the Department of Water Resources' website.<sup>12</sup>

### Adoption

Not all plans reviewed included a discussion of districts' public participation processes. Of the plans reviewed, Alta Irrigation District, Oakdale Irrigation District, South San Joaquin Irrigation District, and Turlock Irrigation District did discuss public participation. Modesto Irrigation District included a copy of its public hearing notice in its plan but did not disclose where the notice was published. Chowchilla Irrigation District, the Sacramento Valley Regional Plan, and Tulare Irrigation District did not discuss public participation in their plans.

All plans reviewed in this report were publicly available on the Internet. However, several adopted plans that are not included in this report were not available on the Internet, and the Department of Water Resources denied public access to those plans pending its own internal review process.

### Example

Oakdale Irrigation District developed a Water Resources Plan in 2005 that covered many of the same topics required for the 2012 AWMP. Because Oakdale previously engaged its customers and community on planning issues, the district had a positive experience with public participation in the AWMP process.

Oakdale showed a commitment to community engagement during the development of its 2005 Water Resources Plan, actively engaging the public through presentations at community group meetings and other public gatherings. All decisions were made at public meetings, and the district received many public comments. Some portions of the plan were controversial in the community, such as the district's plan to finance system improvements through water transfers. However, by the time the plan was approved, public education by the district had alleviated many of the concerns that were raised during the development process. In general, the district now feels that the community accepts and appreciates the district's Water Resources Plan.

When Oakdale began to develop its 2012 AWMP, much of the work had already been done. The district viewed the AWMP as a "report card" to measure its progress toward achieving the goals set out in the earlier Water Resources Plan. Oakdale once again engaged the community on the AWMP by holding public meetings. It received some comments but did not find that the AWMP was as

controversial as the original Water Resources Plan, attributing the difference to the public education effort it had conducted during the development of the earlier plan. Oakdale's public education and engagement effort serves as an example of how effectively reaching out to the public, providing a transparent and open planning process, and developing a thorough and well-thought-out plan can benefit districts for years to come.

## PLAN ORGANIZATION AND COMPONENTS

### Legislation

To conform with legislative requirements, complete AWMPs must include a report on which EWMPs were implemented, estimates of water use efficiency improvements since the last report, and projections of improvements expected in 5 and 10 years.<sup>13</sup> If a district decides not to implement an EWMP, the district must include documentation that demonstrates how implementation would either be technically infeasible or not locally cost effective.<sup>14</sup>

Furthermore, all plans must include the following components:

- a description of the service area;
- a description of the quantity and quality of water resources;
- a list of water uses within the service area;
- an analysis of climate change's impacts on the service area; and
- a description of previous water management activities.<sup>15</sup>

### Adoption

The majority of plans adequately described the agricultural water supplier and the service area along with the quantity and quality of water resources of the agricultural water supplier. However, several plans did not follow the format suggested in the Department of Water Resources guidebook (Alta Irrigation District and Sacramento Valley Regional Plan). In addition, several plans did not adequately address mandatory and conditional EWMPs. Only two plans adequately addressed climate change impacts on future water supplies, a key issue for agricultural water providers (Modesto Irrigation District and Turlock Irrigation District).

### Example

Turlock Irrigation District's plan carefully followed the Department of Water Resources' suggested format. In addition, the plan provided a helpful table at the very beginning that cross-referenced sections of the California Water Code to Turlock's 2012 AWMP.

Turlock was among the few districts to adequately discuss climate change and provide a synthesis of readily available data, such as unimpaired river flows, from the California Data Exchange Center. In addition, the plan included a table summarizing the district's strategies to mitigate climate change impacts (see Table 5, following). Finally, the plan

listed resources for water planning and climate change preparedness, including:

- Sensitivity of Upper Tuolumne River Flow to Climate Change Scenarios. Hydrocomp, Inc.; San Francisco Public Utilities Commission; and Turlock Irrigation District. January 2012. (Hydrocomp et al. 2012)
- Progress on Incorporating Climate Change into Planning and Management of California’s Water Resources. California Department of Water Resources Technical Memorandum. July 2006. (DWR 2006)
- Climate Change and Water. Intergovernmental Panel on Climate Change. June 2008. (IPC 2008)
- Managing an Uncertain Future: Climate Change Adaptation Strategies for California’s Water. California Department of Water Resources Report. October 2008. (DWR 2008)
- 2009 California Climate Change Adaptation Strategy. California Natural Resources Agency Report to the Governor. December 2009. (CNRA 2009)
- Climate Change and Water Resources Management: A Federal Perspective. U.S. Geological Survey. (USGS 2009)
- Managing an Uncertain Future. California Water Plan Update 2009. Volume 1, Chapter 5. March 2010. (DWR 2010a)
- Climate Change Characterization and Analysis in California Water Resources Planning Studies. California Department of Water Resources Final Report. December 2010. (DWR 2010b)
- Climate Change Handbook for Regional Water Planning. Prepared for U.S. Environmental Protection Agency and California Department of Water Resources by CDM. November 2011. (CDM 2011)
- Climate Action Plan—Phase 1: Greenhouse Gas Emissions Reduction Plan. California Department of Water Resources. May 2012. (DWR 2012)
- Climate Change and Integrated Regional Water Management in California: A Preliminary Assessment of Regional Perspectives. Department of Environmental Science, Policy and Management. University of California at Berkeley. June 2012. (UCB 2012)

**Table 5: Turlock Irrigation District Strategies to Mitigate Climate Change Impacts**

Source	Strategy	Status
California Water Plan (DWR 2009)	Reduce water demand	The District is implementing all technically feasible and locally cost-effective EWMPs identified by SBx7-7 to achieve water use efficiency improvements in District operations and to encourage on-farm improvements. Additional actions to reduce water demand are considered on an ongoing basis as part of TID’s water management activities.
	Improve operational efficiency and transfers	As described above and elsewhere in this AWMP, the District has and continues to implement improvements to increase operational efficiency.
	Increase water supply	The District has increased its available water supply through conjunctive management of available groundwater supplies and through reuse of drainage water. Additionally, irrigators within TID recycle treated municipal wastewater, reuse dairy nutrient water, and recapture drain water. In the future, the District will seek additional opportunities to increase available water supply, including increased conjunctive management through consideration of opportunities to increase conjunctive management through consideration of opportunities to increase groundwater recharge to increase available groundwater supply to compensate for reduced April through July runoff.
	Improve water quality	The District will continue to monitor surface water and groundwater quality as part of its active water quality monitoring program, and the coordination with monitoring programs conducted by others, including: quarterly ag suitability monitoring at Turlock Lack and spills, sampling and analysis of TID-owned and rented wells, quarterly ag suitability monitoring of subsurface drain discharges to the TID distribution system, real-time monitoring of canal and drain spill locations, analysis of water quality at various locations under the Irrigated Lands Program, and monitoring as required as part of TID’s use of aquatic herbicides.
	Practice resource stewardship	The District intrinsically supports the stewardship of agricultural lands within and surrounding its service area through its irrigation operations and resulting groundwater recharge. The District will participate in studies of aquatic life and habitat to better understand potential impacts of climate change
	Improve flood management	The District is required to follow the flood management criteria established by the Army Corps of Engineers at Don Pedro Reservoir. In addition, its irrigation and drainage systems provide a passive system to collect and convey winter runoff. If runoff characteristics change substantially within the District in the future, modifications to the irrigation and/or drainage system to increase capacity or mitigate other impacts will be considered.
	Other strategies	Other strategies include crop idling, irrigated land retirement, and rainfed agriculture. Under severely reduced water supplies, growers could consider these strategies; however, it is anticipated that climate change impacts will be mitigated through the other strategies described.

## CONCLUSIONS AND RECOMMENDATIONS

A number of observations may be drawn from the review of agricultural water management plans that large irrigation districts submitted to DWR pursuant to the Act.

The most striking observation of the first round of legislatively mandated agricultural water management planning is the low level of compliance. Only approximately 30 percent of eligible districts completed an AWMP; an even smaller number completed their plans by the December 31, 2012, deadline. The small number of districts in compliance with the Act suggests that greater emphasis needs to be placed on both the benefits of planning and the consequences of being noncompliant. Additional resources may be required to assist districts in meeting the Act's obligations, which include adopting updated plans by December 31, 2015, and every five years thereafter.

These observations were corroborated in interviews with districts that did complete a plan, either by the December 31, 2012, deadline or in the first half of 2013. Several irrigation districts noted that the first round of agricultural water management plans were due within months of the final regulatory rules' being published, suggesting that the timeline was inadequate for the majority of districts to understand what they were required to do and how to achieve it. Many districts noted that planning requirements were unclear and overwhelming and suggested that additional assistance be provided prior to the 2015 planning cycle. Several district representatives noted that broader compliance with the Act would help to show the progress and achievements of agricultural water suppliers in advancing sustainable water management.

To improve participation and compliance in future planning cycles, we offer the following recommendations:

**1. DWR should provide guidance for 2015 plans in a timely manner.** DWR's guidance document for the first round of plans was released within weeks of the statutory due date for plan submission. In addition, financial resources were not offered to districts involved in agricultural water management planning until after the due date had passed. Guidance provided by the agency should also include tools for assessing the cost-effectiveness of conditional EWMPs. Several individual interviews with district staff pointed to the lack of timely guidance and resources as contributing to the low number of districts submitting plans.

- 2. Regional peer-to-peer workshops hosted by independent facilitators should be offered to assist districts with the planning process and with implementation of mandatory and conditional EWMPs.** Although each district faces its own unique challenges, both with planning and with EWMP implementation, providing an opportunity for districts to share their own success stories and strategies for overcoming challenges would be an effective way to ensure that districts are getting the maximum benefit from the planning process.
- 3. DWR should create an online clearinghouse of plans to ensure transparency.** While the legislation requires that agricultural water suppliers post plans online for public comment or submit an electronic version of the adopted plan to DWR to make available for public review on the department's website, as of late August 2013, no plans had been posted online by DWR. Additionally, an online clearinghouse for plans would facilitate data-sharing among state agencies, improving government efficiency and reducing districts' reporting responsibilities.
- 4. DWR should convene an annual conference on agricultural water management planning best practices.** This could be done in conjunction with existing conferences, such as those convened by the Association of California Water Agencies, to discuss how to improve agricultural water planning. The conference would provide a forward-looking approach to planning, along with new EWMPs, measurement technologies, assessment tools, equipment, pricing practices, finance strategies, etc.
- 5. DWR should hold noncompliant districts accountable.** Despite the Act's clear requirement that large irrigation districts submit an AWMP to be eligible for state grants and loans, in April 2013, DWR considered grant applications from many districts that did not submit a plan. DWR should hold these noncompliant districts accountable and refuse to consider their grant and loan requests until they submit a plan.



# APPENDIX A: THE AGRICULTURAL WATER MANAGEMENT PLANNING ACT

## Chapter 1. General Declarations and Policy

10801. The Legislature finds and declares all of the following:

- (a) The waters of the state are a limited and renewable resource.
- (b) The California Constitution requires that water in the state be used in a reasonable and beneficial manner.
- (c) Urban water districts are required to adopt water management plans.
- (d) The conservation of agricultural water supplies is of great statewide concern.
- (e) There is a great amount of reuse of delivered water, both inside and outside the water service areas.
- (f) Significant noncrop beneficial uses are associated with agricultural water use, including streamflows and wildlife habitat.
- (g) Significant opportunities exist in some areas, through improved irrigation water management, to conserve water or to reduce the quantity of highly saline or toxic drainage water.
- (h) Changes in water management practices should be carefully planned and implemented to minimize adverse effects on other beneficial uses currently being served.
- (i) Agricultural water suppliers that receive water from the federal Central Valley Project are required by federal law to prepare and implement water conservation plans.
- (j) Agricultural water users applying for a permit to appropriate water from the board are required to prepare and implement water conservation plans.

10802. The Legislature finds and declares that all of the following are the policies of the state:

- (a) The conservation of water shall be pursued actively to protect both the people of the state and the state's water resources.
- (b) The conservation of agricultural water supplies shall be an important criterion in public decisions with regard to water.
- (c) Agricultural water suppliers shall be required to prepare water management plans to achieve conservation of water.

## Chapter 2. Definitions

10810. Unless the context otherwise requires, the definitions set forth in this chapter govern the construction of this part.

10811. "Agricultural water management plan" or "plan" means an agricultural water management plan prepared pursuant to this part.

10812. "Agricultural water supplier" has the same meaning as defined in Section 10608.12.

10813. "Customer" means a purchaser of water from a water supplier who uses water for agricultural purposes.

10814. "Person" means any individual, firm, association, organization, partnership, business, trust, corporation, company, public agency, or any agency of that entity.

10815. "Public agency" means any city, county, city and county, special district, or other public entity.

10816. "Urban water supplier" has the same meaning as set forth in Section 10617.

10817. "Water conservation" means the efficient management of water resources for beneficial uses, preventing waste, or accomplishing additional benefits with the same amount of water.

## Chapter 3. Agricultural Water Management Plans

### Article 1. General Provisions

10820.

- (a) An agricultural water supplier shall prepare and adopt an agricultural water management plan in the manner set forth in this chapter on or before December 31, 2012, and shall update that plan on December 31, 2015, and on or before December 31 every five years thereafter.
- (b) Every supplier that becomes an agricultural water supplier after December 31, 2012, shall prepare and adopt an agricultural water management plan within one year after the date it has become an agricultural water supplier.
- (c) A water supplier that indirectly provides water to customers for agricultural purposes shall not prepare a plan pursuant to this part without the consent of each agricultural water supplier that directly provides that water to its customers.

10821.

- (a) An agricultural water supplier required to prepare a plan pursuant to this part shall notify each city or county within which the supplier provides water supplies that the agricultural water supplier will be preparing the plan or reviewing the plan and considering amendments or changes to the plan. The agricultural water supplier may consult with, and obtain comments from, each city or county that receives notice pursuant to this subdivision.
- (b) The amendments to, or changes in, the plan shall be adopted and submitted in the manner set forth in Article 3 (commencing with Section 10840).

### Article 2. Contents of Plans

10825.

- (a) It is the intent of the Legislature in enacting this part to allow levels of water management planning commensurate with the numbers of customers served and the volume of water supplied.
- (b) This part does not require the implementation of water conservation programs or practices that are not locally cost effective.

10826. An agricultural water management plan shall be adopted in accordance with this chapter. The plan shall do all of the following:

- (a) Describe the agricultural water supplier and the service area, including all of the following:
  - (1) Size of the service area.
  - (2) Location of the service area and its water management facilities.
  - (3) Terrain and soils.
  - (4) Climate.
  - (5) Operating rules and regulations.
  - (6) Water delivery measurements or calculations.
  - (7) Water rate schedules and billing.
  - (8) Water shortage allocation policies.
- (b) Describe the quantity and quality of water resources of the agricultural water supplier, including all of the following:
  - (1) Surface water supply.
  - (2) Groundwater supply.
  - (3) Other water supplies.
  - (4) Source water quality monitoring practices.
  - (5) Water uses within the agricultural water supplier's service area, including all of the following:
    - (A) Agricultural.
    - (B) Environmental.
    - (C) Recreational.
    - (D) Municipal and industrial.
    - (E) Groundwater recharge.
    - (F) Transfers and exchanges.
    - (G) Other water uses.
  - (6) Drainage from the water supplier's service area.
  - (7) Water accounting, including all of the following:
    - (A) Quantifying the water supplier's water supplies.
    - (B) Tabulating water uses.
    - (C) Overall water budget.
  - (8) Water supply reliability.
- (c) Include an analysis, based on available information, of the effect of climate change on future water supplies.
- (d) Describe previous water management activities.
- (e) Include in the plan the water use efficiency information required pursuant to Section 10608.48.

10827. Agricultural water suppliers that are members of the Agricultural Water Management Council, and that submit water management plans to that council in accordance with the "Memorandum of Understanding Regarding Efficient Water Management Practices By Agricultural Water Suppliers In California," dated January 1, 1999, may submit the water management plans identifying water demand management measures currently being implemented, or scheduled for implementation, to satisfy the requirements of Section 10826.

10828.

- (a) Agricultural water suppliers that are required to submit water conservation plans to the United States Bureau of Reclamation pursuant to either the Central Valley Project Improvement Act (Public Law 102-575) or the Reclamation Reform Act of 1982, or both, may submit those water conservation plans to satisfy the requirements of Section 10826, if both of the following apply:
  - (1) The agricultural water supplier has adopted and submitted the water conservation plan to the United States Bureau of Reclamation within the previous four years.
  - (2) The United States Bureau of Reclamation has accepted the water conservation plan as adequate.
- (b) This part does not require agricultural water suppliers that are required to submit water conservation plans to the United States Bureau of Reclamation pursuant to either the Central Valley Project Improvement Act (Public Law 102-575) or the Reclamation Reform Act of 1982, or both, to prepare and adopt water conservation plans according to a schedule that is different from that required by the United States Bureau of Reclamation.

10829. An agricultural water supplier may satisfy the requirements of this part by adopting an urban water management plan pursuant to Part 2.6 (commencing with Section 10610) or by participation in areawide, regional, watershed, or basinwide water management planning if those plans meet or exceed the requirements of this part.

### *Article 3. Adoption and Implementation of Plans*

10840. Every agricultural water supplier shall prepare its plan pursuant to Article 2 (commencing with Section 10825).

10841. Prior to adopting a plan, the agricultural water supplier shall make the proposed plan available for public inspection, and shall hold a public hearing on the plan. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned agricultural water supplier pursuant to Section 6066 of the Government Code. A privately owned agricultural water supplier shall provide an equivalent notice within its service area and shall provide a reasonably equivalent opportunity that would otherwise be afforded through a public hearing process for interested parties to provide input on the plan. After the hearing, the plan shall be adopted as prepared or as modified during or after the hearing.

10842. An agricultural water supplier shall implement the plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan, as determined by the governing body of the agricultural water supplier.

10843.

- (a) An agricultural water supplier shall submit to the entities identified in subdivision (b) a copy of its plan no later than 30 days after the adoption of the plan. Copies of amendments or changes to the plans shall be submitted to the entities identified in subdivision (b) within 30 days after the adoption of the amendments or changes.
- (b) An agricultural water supplier shall submit a copy of its plan and amendments or changes to the plan to each of the following entities:
  - (1) The department.
  - (2) Any city, county, or city and county within which the agricultural water supplier provides water supplies.
  - (3) Any groundwater management entity within which jurisdiction the agricultural water supplier extracts or provides water supplies.
  - (4) Any urban water supplier within which jurisdiction the agricultural water supplier provides water supplies.
  - (5) Any city or county library within which jurisdiction the agricultural water supplier provides water supplies.
  - (6) The California State Library.
  - (7) Any local agency formation commission serving a county within which the agricultural water supplier provides water supplies.

10844.

- (a) Not later than 30 days after the date of adopting its plan, the agricultural water supplier shall make the plan available for public review on the agricultural water supplier's Internet Web site.
- (b) An agricultural water supplier that does not have an Internet Web site shall submit to the department, not later than 30 days after the date of adopting its plan, a copy of the adopted plan in an electronic format. The department shall make the plan available for public review on the department's Internet Web site.

10845.

- (a) The department shall prepare and submit to the Legislature, on or before December 31, 2013, and thereafter in the years ending in six and years ending in one, a report summarizing the status of the plans adopted pursuant to this part.
- (b) The report prepared by the department shall identify the outstanding elements of any plan adopted pursuant to this part. The report shall include an evaluation of the effectiveness of this part in promoting efficient agricultural water management practices and recommendations relating to proposed changes to this part, as appropriate.
- (c) The department shall provide a copy of the report to each agricultural water supplier that has submitted its plan to the department. The department shall also prepare reports and provide data for any legislative hearing designed to consider the effectiveness of plans submitted

pursuant to this part.

- (d) This section does not authorize the department, in preparing the report, to approve, disapprove, or critique individual plans submitted pursuant to this part.

#### **Chapter 4. Miscellaneous Provisions**

10850.

- (a) Any action or proceeding to attack, review, set aside, void, or annul the acts or decisions of an agricultural water supplier on the grounds of noncompliance with this part shall be commenced as follows:
  - (1) An action or proceeding alleging failure to adopt a plan shall be commenced within 18 months after that adoption is required by this part.
  - (2) Any action or proceeding alleging that a plan, or action taken pursuant to the plan, does not comply with this part shall be commenced within 120 days after submitting the plan or amendments to the plan to entities in accordance with Section 10844 or the taking of that action.
- (b) In an action or proceeding to attack, review, set aside, void, or annul a plan, or an action taken pursuant to the plan by an agricultural water supplier, on the grounds of noncompliance with this part, the inquiry shall extend only to whether there was a prejudicial abuse of discretion. Abuse of discretion is established if the agricultural water supplier has not proceeded in a manner required by law, or if the action by the agricultural water supplier is not supported by substantial evidence.

10851. The California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) does not apply to the preparation and adoption of plans pursuant to this part. This part does not exempt projects for implementation of the plan or for expanded or additional water supplies from the California Environmental Quality Act.

10852. An agricultural water supplier is not eligible for a water grant or loan awarded or administered by the state unless the supplier complies with this part.

10853. No agricultural water supplier that provides water to less than 25,000 irrigated acres, excluding recycled water, shall be required to implement the requirements of this part or Part 2.55 (commencing with Section 10608) unless sufficient funding has specifically been provided to that water supplier for these purposes.



## APPENDIX B: AGRICULTURAL WATER MEASUREMENT REGULATION

### California Code of Regulations

#### Title 23. Waters

#### Division 2. Department of Water Resources

#### Chapter 5.1. Water Conservation Act of 2009

#### Article 2. Agricultural Water Measurement

##### §597. Agricultural Water Measurement

Under the authority included under California Water Code §10608.48(i)(1), the Department of Water Resources (Department) is required to adopt regulations that provide for a range of options that agricultural water suppliers may use or implement to comply with the measurement requirements in paragraph (1) of subdivision (b) of §10608.48.

*For reference, §10608.48(b) of the California Water Code states that:*

*Agricultural water suppliers shall implement all of the following critical efficient management practices:*

*(1) Measure the volume of water delivered to customers with sufficient accuracy to comply with subdivision (a) of Section 531.10 and to implement paragraph (2).*

*(2) Adopt a pricing structure for water customers based at least in part on quantity delivered.*

*For further reference, §531.10(a) of the California Water Code requires that:*

*(a) An agricultural water supplier shall submit an annual report to the department that summarizes aggregated farm-gate delivery data, on a monthly or bi-monthly basis, using best professional practices.*

#### Notes:

(1) Paragraphs (1) and (2) of §10608.48(b) specify agricultural water suppliers' reporting of aggregated farm-gate water delivery and adopting a volumetric water pricing structure as the purposes of water measurement. However, this article only addresses developing a range of options for water measurement.

(2) Agricultural water suppliers reporting agricultural water deliveries measured under this article shall use the "Agricultural Aggregated Farm – Gate Delivery Reporting Format for Article 2" (Rev. 6-20-12), developed for this article and hereby incorporated by reference.

(3) The Department shall report on the availability of new commercially available water measurement technologies and impediments to implementation of this article when reporting to the Legislature the status of adopted Agricultural Water Management Plans in plan submittal years 2012, 2015 and every five years thereafter as required by California Water Code §10845. The Department shall also report the findings to the California Water Commission.

Note: Authority cited: Section 10608.48, Water Code.  
Reference: Sections 531.10, 10608.48 (b), 10608.48 (i), 10608.52 (b) and 10845 Water Code.

##### §597.1. Applicability

(a) An agricultural water supplier providing water to 25,000 irrigated acres or more, excluding acres that receive only recycled water, is subject to this article.

(b) A wholesale agricultural water supplier providing water to another agricultural water supplier (the receiving water supplier) for ultimate resale to customers is subject to this article at the location at which control of the water is transferred to the receiving water supplier. However, the wholesale agricultural water supplier is not required to measure the receiving agricultural water supplier's deliveries to its customers.

(c) A water supplier providing water to wildlife refuges or habitat lands where (1) the refuges or habitat lands are under a contractual relationship with the water supplier, and (2) the water supplier meets the irrigated acreage criteria of Water Code §10608.12(a), is subject to this article.

(d) An agricultural water supplier providing water to less than 10,000 irrigated acres, excluding acres that receive only recycled water, is not subject to this article.

(e) An agricultural water supplier providing water to 10,000 or more irrigated acres but less than 25,000 irrigated acres, excluding acres that receive only recycled water, is not subject to this article unless sufficient funding is provided specifically for that purpose, as stated under Water Code §10853.

(f) A canal authority or other entity that conveys or delivers water through facilities owned by a federal agency is not subject to this article.

(g) Pursuant to Water Code §10608.8(d), an agricultural water supplier "that is a party to the Quantification Settlement Agreement, as defined in subdivision (a) of Section 1 of Chapter 617 of the Statutes of 2002, during the period within which the Quantification Settlement Agreement remains in effect," is not subject to this article.

(h) Pursuant to Water Code §10608.12(a), the Department is not subject to this article.

Note: Authority cited: Section 10608.48, Water Code.  
Reference: Sections 10608.12 (a), 10608.48 (d), 10608.48 (f), 10828, and 10853 Water Code.

##### §597.2. Definitions

**(a) For purposes of this article, the terms used are defined in this section.**

(1) "Accuracy" means the measured volume relative to the actual volume, expressed as a percent. The percent shall be calculated as  $100 \times (\text{measured value} - \text{actual value}) / \text{actual value}$ , where "measured value" is the value indicated by the device or determined through calculations using a measured value by the device, such as flow rate, combined with a

duration of flow, and “actual value” is the value as determined through laboratory, design or field testing protocols using best professional practices.

(2) “Agricultural water supplier,” as defined in Water Code §10608.12(a), means a water supplier, either publicly or privately owned, providing water to 10,000 or more irrigated acres, excluding acres that receive only recycled water. “Agricultural water supplier” includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells water for ultimate resale to customers. “Agricultural water supplier” does not include the Department.

(3) “Approved by an engineer” means a California-registered Professional Engineer has reviewed, signed and stamped the plans, design, testing, inspection, and/or documentation report for a measurement device as described in this article.

(4) “Best professional practices” means practices attaining to and maintaining accuracy of measurement and reporting devices and methods described in this article, such as operation and maintenance procedures and practices recommended by measurement device manufacturers, designers, and industry professionals.

(5) “Customer” means the purchaser of water from an agricultural water supplier who has a contractual arrangement with the agricultural water supplier for the service of conveying water to the customer delivery point.

(6) “Delivery point” means the location at which the agricultural water supplier transfers control of delivered water to a customer or group of customers. In most instances, the transfer of control occurs at the farm-gate, which is therefore, a delivery point.

(7) “Existing measurement device,” means a measurement device that was installed in the field prior to the effective date of this article.

(8) “Farm-gate,” as defined in Water Code §531(f), means the point at which water is delivered from the agricultural water supplier’s distribution system to each of its customers.

(9) “Irrigated acres,” for purposes of applicability of this article, is calculated as the average of the previous five-year acreage within the agricultural water supplier’s service area that has received irrigation water from the agricultural water supplier.

(10) “Manufactured device” means a device that is manufactured by a commercial enterprise, often under exclusive legal rights of the manufacturer, for direct off-the-shelf purchase and installation. Such devices are capable of directly measuring flow rate, velocity, or accumulating the volume of water delivered, without the need for additional components that are built on-site or in-house.

(11) “Measurement device” means a device by which an agricultural water supplier determines the numeric value of flow rate, velocity or volume of the water passing a designated delivery point. A measurement device may be a manufactured device, on-site built device or in-house built device.

(12) “New or replacement measurement device” means a measurement device installed after the effective date of this article.

(13) “Recycled water” is defined in subdivision (n) of §13050 of the Water Code as water that, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur, and is therefore considered a valuable resource.

(14) “Type of device” means a measurement device that is manufactured or built to perform similar functions. For example, rectangular, v-notch, and broad crested weirs are one type of device. Similarly, all submerged orifice gates are considered one type of device.

Note: Authority cited: Section 10608.48, Water Code.  
Reference: Sections 10608.12 (a), 10608.12 (m), 10608.48, and 10813 Water Code.

### **§597.3 Range of Options for Agricultural Water Measurement**

An agricultural water supplier subject to this article shall measure surface water and groundwater that it delivers to its customers pursuant to the accuracy standards in this section. The supplier may choose any applicable single measurement option or combination of options listed in paragraphs (a) or (b) of this section. Measurement device accuracy and operation shall be certified, tested, inspected and/or analyzed as described in §597.4 of this article.

#### **(a) Measurement Options at the Delivery Point or Farm-gate of a Single Customer**

An agricultural water supplier shall measure water delivered at the delivery point or farm-gate of a single customer using one of the following measurement options. The stated numerical accuracy for each measurement option is for the volume delivered. If a device measures a value other than volume, for example, flow rate, velocity or water elevation, the accuracy certification must incorporate the measurements or calculations required to convert the measured value to volume as described in §597.4(e).

(1) An existing measurement device shall be certified to be accurate to within  $\pm 12\%$  by volume.

and,

(2) A new or replacement measurement device shall be certified to be accurate to within: (A)  $\pm 5\%$  by volume in the laboratory if using a laboratory certification;

(B)  $\pm 10\%$  by volume in the field if using a non-laboratory certification.

#### **(b) Measurement Options at a Location Upstream of the Delivery Points or Farm-gates of Multiple Customers**

(1) An agricultural water supplier may measure water delivered at a location upstream of the delivery points or farm-gates of multiple customers using one of the measurement options described in §597.3(a) if the downstream individual customer’s delivery points meet either of the following conditions:

(A)The agricultural water supplier does not have legal access to the delivery points of individual customers or group of customers needed to install, measure, maintain, operate, and monitor a measurement device.

Or,

(B)An engineer determines that, due to small differentials in water level or large fluctuations in flow rate or velocity that occur during the delivery season at a single farm-gate, accuracy standards of measurement options in §597.3(a) cannot be met by installing a measurement device or devices (manufactured or on-site built or in-house built devices with or without additional components such as gauging rod, water level control structure at the farm-gate, etc.). If conditions change such that the accuracy standards of measurement options in §597.3(a) at the farm-gate can be met, an agricultural water supplier shall include in its Agricultural Water Management Plan, a schedule, budget and finance plan to demonstrate progress to measure water at the farm-gate in compliance with §597.3(a) of this article.

(2) An agricultural water supplier choosing an option under paragraph (b)(1) of this section shall provide the following current documentation in its Agricultural Water Management Plan(s) submitted pursuant to Water Code §10826:

(A)When applicable, to demonstrate lack of legal access at delivery points of individual customers or group of customers downstream of the point of measurement, the agricultural water supplier's legal counsel shall certify to the Department that it does not have legal access to measure water at customers delivery points and that it has sought and been denied access from its customers to measure water at those points.

(B) When applicable, the agricultural water supplier shall document the water measurement device unavailability and that the water level or flow conditions described in §597.3(b)(1)(B) exist at individual customer's delivery points downstream of the point of measurement as approved by an engineer.

(C) The agricultural water supplier shall document all of the following criteria about the methodology it uses to apportion the volume of water delivered to the individual downstream customers:

(i) How it accounts for differences in water use among the individual customers based on but not limited to the duration of water delivery to the individual customers, annual customer water use patterns, irrigated acreage, crops planted, and on-farm irrigation system,

and;

(ii) That it is sufficient for establishing a pricing structure based at least in part on the volume delivered,

and;

(iii) That it was approved by the agricultural water supplier's governing board or body.

Note: Authority cited: Section 10608.48, Water Code.

Reference: Sections 531.10, 10608.48 (i) (1), and 10826 Water Code.

#### **§597.4 Accuracy Certification, Records Retention, Device Performance, and Reporting**

##### **(a) Initial Certification of Device Accuracy**

The accuracy of an existing, new or replacement measurement device or type of device, as required in §597.3, shall be initially certified and documented as follows:

(1) For existing measurement devices, the device accuracy required in section 597.3(a) shall be initially certified and documented by either: (A)Field-testing that is completed on a random and statistically representative sample of the existing measurement devices as described in §597.4(b)(1) and §597.4(b)(2). Field-testing shall be performed by individuals trained in the use of field-testing equipment, and documented in a report approved by an engineer.

Or,

(B) Field-inspections and analysis completed for every existing measurement device as described in §597.4(b)(3). Field-inspections and analysis shall be performed by trained individuals in the use of field inspection and analysis, and documented in a report approved by an engineer.

(2) For new or replacement measurement devices, the device accuracy required in sections 597.3 (a)(2) shall be initially certified and documented by either:

(A)Laboratory Certification prior to installation of a measurement device as documented by the manufacturer or an entity, institution or individual that tested the device following industry-established protocols such as the National Institute for Standards and Testing (NIST) traceability standards. Documentation shall include the manufacturer's literature or the results of laboratory testing of an individual device or type of device.

Or,

(B) Non-Laboratory Certification after the installation of a measurement device in the field, as documented by either:

(i) An affidavit approved by an engineer submitted to the agricultural water supplier of either (1) the design and installation of an individual device at a specified location, or (2) the standardized design and installation for a group of measurement devices for each type of device installed at specified locations.

Or,

(ii) A report submitted to the agricultural water supplier and approved by an engineer documenting the field-testing performed on the installed measurement device or type of device, by individuals trained in the use of field testing equipment.

##### **(b) Protocols for Field-Testing and Field-Inspection and Analysis of Existing Devices**

(1) Field-testing shall be performed for a sample of existing measurement devices according to manufacturer's recommendations or design specifications and following best professional practices. It is recommended that the sample size be no less than 10% of existing devices, with a minimum of 5, and not to exceed 100 individual devices for



any particular device type. Alternatively, the supplier may develop its own sampling plan using an accepted statistical methodology.

(2) If during the field-testing of existing measurement devices, more than one quarter of the samples for any particular device type do not meet the criteria pursuant to §597.3(a), the agricultural water supplier shall provide in its Agricultural Water Management Plan, a plan to test an additional 10% of its existing devices, with a minimum of 5, but not to exceed an additional 100 individual devices for the particular device type. This second round of field-testing and corrective actions shall be completed within three years of the initial field-testing.

(3) Field-inspections and analysis protocols shall be performed and the results shall be approved by an engineer for every existing measurement device to demonstrate that the design and installation standards used for the installation of existing measurement devices meet the accuracy standards of §597.3(a) and operation and maintenance protocols meet best professional practices.

#### **(c) Records Retention**

Records documenting compliance with the requirements in §597.3 and §597.4 shall be maintained by the agricultural water supplier for ten years or two Agricultural Water Management Plan cycles.

#### **(d) Performance Requirements**

(1) All measurement devices shall be correctly installed, maintained, operated, inspected, and monitored as described by the manufacturer, the laboratory or the registered Professional Engineer that has signed and stamped certification of the device, and pursuant to best professional practices.

(2) If an installed measurement device no longer meets the accuracy requirements of §597.3(a) based on either field-testing or field-inspections and analysis as defined in sections 597.4 (a) and (b) for either the initial accuracy certification or during operations and maintenance, then the agricultural water supplier shall take appropriate corrective action, including but not limited to, repair or replacement to achieve the requirements of this article.

#### **(e) Reporting in Agricultural Water Management Plans**

Agricultural water suppliers shall report the following information in their Agricultural Water Management Plan(s):

(1) Documentation as required to demonstrate compliance with §597.3 (b), as outlined in section §597.3(b)(2), and §597.4(b)(2).

(2) A description of best professional practices about, but not limited to, the (1) collection of water measurement data, (2) frequency of measurements, (3) method for determining irrigated acres, and (4) quality control and quality assurance procedures.

(3) If a water measurement device measures flow rate, velocity or water elevation, and does not report the total volume of water delivered, the agricultural water supplier

must document in its Agricultural Water Management Plan how it converted the measured value to volume. The protocols must follow best professional practices and include the following methods for determining volumetric deliveries:

(A) For devices that measure flow-rate, documentation shall describe protocols used to measure the duration of water delivery where volume is derived by the following formula:  $\text{Volume} = \text{flow rate} \times \text{duration of delivery}$ .

(B) For devices that measure velocity only, the documentation shall describe protocols associated with the measurement of the cross-sectional area of flow and duration of water delivery, where volume is derived by the following formula:  $\text{Volume} = \text{velocity} \times \text{cross-section flow area} \times \text{duration of delivery}$ .

(C) For devices that measure water elevation at the device (e.g. flow over a weir or differential elevation on either side of a device), the documentation shall describe protocols associated with the measurement of elevation that was used to derive flow rate at the device. The documentation will also describe the method or formula used to derive volume from the measured elevation value(s). (4) If an existing water measurement device is determined to be out of compliance with §597.3, and the agricultural water supplier is unable to bring it into compliance before submitting its Agricultural Water Management Plan in December 2012, the agricultural water supplier shall provide in its 2012 plan, a schedule, budget and finance plan for taking corrective action in three years or less.

Note: Authority cited: Section 10608.48, Water Code.  
Reference: Sections 531.10, 10608.48 (i) (1), and 10826 Water Code.

## Endnotes

- 1 [www.water.ca.gov/wateruseefficiency/sb7/docs/2012\\_AWMPs\\_Received\\_18March2013.pdf](http://www.water.ca.gov/wateruseefficiency/sb7/docs/2012_AWMPs_Received_18March2013.pdf).
- 2 We were denied access to several plans by California Department of Water Resources staff because they were “under review.” The review process was described in a subsequent Agricultural Stakeholders Committee meeting as a process to ensure that the plans were complete, not to assess plan content.
- 3 Districts covered in the Sacramento Valley Regional Plan include Anderson-Cottonwood Irrigation District, Glenn-Colusa Irrigation District, Provident Irrigation District, Princeton-Codora-Glenn Irrigation District, Reclamation District No. 108, Reclamation District No. 1004, Meridian Farms Water Company, Sutter Mutual Water Company, and Natomas Central Mutual Water Company.
- 4 Section 10820(a).
- 5 [www.water.ca.gov/wateruseefficiency/sb7/docs/2012\\_AWMPs\\_Received\\_07-16-2013.pdf](http://www.water.ca.gov/wateruseefficiency/sb7/docs/2012_AWMPs_Received_07-16-2013.pdf).
- 6 Section 10608.48.
- 7 That is, the point where water reaches an individual customer’s field.
- 8 Section 597.3.
- 9 Districts that prefer to measure some value other than volume (e.g., flow) must include calculations that show their preferred measurement method meets the volumetric accuracy requirements. Section 597.3(a). Districts that lack legal access to farm gates or otherwise cannot measure volumetrically at the farm gate may measure upstream of the delivery point in certain circumstances. Section 597.3(b).
- 10 Proposition 218 requires that if a majority of customers protest a rate increase, it cannot go into effect.
- 11 Section 10841.
- 12 Section 10844.
- 13 Section 10608.48.
- 14 Ibid.
- 15 10826.



**Natural Resources Defense Council**

40 West 20th Street  
New York, NY 10011  
212 727-2700  
Fax 212 727-1773

Beijing

Chicago

Los Angeles

Bozeman

San Francisco

Washington

**[www.nrdc.org](http://www.nrdc.org)**



**Pacific Institute**

654 13th Street  
Preservation Park  
Oakland, CA 94612

510 251-1600

Fax 510-251-2203

**[www.pacinst.org](http://www.pacinst.org)**

[www.nrdc.org/water/ca-agricultural-water-planning.asp](http://www.nrdc.org/water/ca-agricultural-water-planning.asp)  
[www.nrdc.org/policy](http://www.nrdc.org/policy)  
[www.facebook.com/nrdc.org](https://www.facebook.com/nrdc.org)  
[www.twitter.com/nrdc](https://www.twitter.com/nrdc)