2012 Sacramento Valley Regional Water Management Plan Annual Update

Preface

This *2012 Sacramento Valley Regional Water Management Plan Annual Update* (2012 RWMP Annual Update) was prepared by the Sacramento River Settlement Contractors (SRSC) in cooperation with the U.S. Bureau of Reclamation, in accordance with the *Regional Criteria for Evaluating Water Management Plans for the Sacramento River Contractors* (Regional Criteria). This 2012 RWMP Annual Update is the third update to the *Sacramento Valley Regional Water Management Plan* (RWMP) that was completed in 2007. The Regional Criteria specify that beginning one year after acceptance of the RWMP, the participating SRSCs will jointly file an annual update every subsequent year to report on implementation actions taken, along with any additions and revisions to the RWMP. Accordingly, this 2012 RWMP Annual Update includes updated information and status on numerous topics included as part of the RWMP.

Following are the participants in the RWMP and this 2012 RWMP Annual Update:

- Anderson-Cottonwood Irrigation District (ACID)
- Glenn-Colusa Irrigation District (GCID)
- Provident Irrigation District (PID)
- Princeton-Codora-Glenn Irrigation District (PCGID)
- Reclamation District No. 108 (RD 108)
- Reclamation District No. 1004 (RD 1004)
- Meridian Farms Water Company (MFWC)
- Sutter Mutual Water Company (SMWC)
- Natomas Central Mutual Water Company (NCMWC)

Pelger Mutual Water Company was a participant in the RWMP but elected not to participate in the 2010/2011 and 2012 RWMP Annual Update.

This 2012 RWMP Annual Update summarizes activities and updates to projects and practices identified in the RWMP and focuses on the following:

- Development of individual SRSC water budgets
- Inclusion of new projects and update of proposed project status
- Review of all Quantifiable Objectives (QO) and Targeted Benefits (TB) and recommendation that all projects be designated and tracked by sub-basin
- Update of all water management practices
- Update of Sacramento Valley Water Management Coalition monitoring program
- Update of typical proposed project baseline flow approach

This document is intended to be used in conjunction with the existing RWMP (an electronic copy is provided in Appendix A to this 2012 RWMP Annual Update), the 2009 RWMP Annual Update (an electronic copy is provided in Appendix B to this 2012 RWMP Annual Update), and the 2010/2011 RWMP Annual Update (an electronic copy is provided in Appendix C to this 2012 RWMP Annual Update). Preface Table 1 identifies all section headings included in the RWMP and indicates which subsections have been revised as part of this 2012 RWMP Annual Update. A brief description of the changes made for each section is also provided. Where a revision is made to the RWMP, the revised paragraph is shaded. Relevant surrounding text is also provided, excluding tables and figures that did not require revision.

PREFACE TABLE 1
Document Organization and Description of Changes
2012 Sacramento Valley Regional Water Management Plan Annual Update

RWMP Section	Information Needing to Be Updated in this 2012 RWMP Annual Update?
1.0 Regional Description and Resources	Yes, see subsections below
1.1 History and Sub-basin Description	No
1.1.1 Redding Sub-basin	No
1.1.2 Colusa Sub-basin	No
1.1.3 Butte Sub-basin	No
1.1.4 Sutter Sub-basin	No
1.1.5 American Sub-basin	No
1.1.6 Colusa Drain Mutual Water Company	No
1.2 Surface Water and Groundwater Resources	No
1.2.1 Surface Water Resources	No
1.2.2 Groundwater Resources	No
1.3 Typical District Facilities	No
1.4 Topography and Soils	No
1.4.1 Topography	No
1.4.2 Soils	No
1.5 Climate	No
1.6 Natural and Cultural Resources	No
1.6.1 Natural Resources	No
1.6.2 Cultural Resources	No
1.7 Operating Rules, Regulations and Agreements that Affect Water Availability	No
1.7.1 Surface Water Resources	No
1.7.2 Groundwater Resources	No

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RWMP Section	Information Needing to Be Updated in this 2012 RWMP Annual Update?
1.8 Water Measurement, Pricing, and Billing	Yes, see subsections below
1.8.1 Measurement Practices	No
1.8.2 Pricing Structures and Billing	Updated each SRSC's pricing rates in Table 1-6
1.9 Water Shortage Allocation Policies	No
1.9.1 CVP Sacramento River Contract Supply Requirements	No
1.9.2 Criteria for Defining Water Availability	No
1.10 Water Quality	No
1.10.1 Surface Water Quality	No
1.10.2 Groundwater Quality	No
2.0 Sub-basin Water Use, Supply, and District Descriptions	Yes, see subsections below
2.1 Redding Sub-basin	No
2.1.1 Water Supply within the Redding Sub-basin	No
2.1.2 Water Use within the Redding Sub-basin	No
2.1.3 Anderson-Cottonwood Irrigation District	No
2.2 Colusa Sub-basin	No
2.2.1 Water Supply within the Colusa Sub-basin	No
2.2.2 Water Use within the Colusa Sub-basin	No
2.2.3 Glenn-Colusa Irrigation District	No
2.2.4 Provident Irrigation District	No
2.2.5 Princeton-Codora-Glenn Irrigation District	No
2.2.6 Reclamation District No. 108	No
2.3 Butte Sub-basin	No
2.3.1 Water Supply within the Butte Sub-basin	No
2.3.2 Water Use within the Butte Sub-basin	No
2.3.3 Reclamation District No. 1004	No
2.4 Sutter Sub-basin	No
2.4.1 Water Supply within the Sutter Sub-basin	No
2.4.2 Water Use within the Sutter Sub-basin	No
2.4.3 Meridian Farms Water Company	No

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RWMP Section	Information Needing to Be Updated in this 2012 RWMP Annual Update?
2.4.4 Sutter Mutual Water Company	No
2.4.5 Pelger Mutual Water Company	No
2.5 American Sub-basin	No
2.5.1 Water Supply within the American Sub-basin	No
2.5.2 Water Use within the American Sub-basin	No
2.5.3 Natomas Central Mutual Water Company	No
2.6 Water Balance Summary	Updated water balance summary information for participating SRSCs
3.0 Regional Water Measurement Program	Yes, see subsections below
3.1 Plan Identification	Updated plan information
3.2 Proposed Cooperative Water Measurement Study Measurement Plan Evaluation	No
3.3 Plan Selection	No
3.3.1 Year 1 (2006-2007) Progress Report	No
3.3.2 Year 2 (2007-2008) Progress Report	No
3.3.3 Final Report	No
4.0 Analysis of Sub-region Water Management Quantifiable Objectives	Yes, see subsections below
4.1 Development of CALFED Targeted Benefits	No
4.1.1 Purpose	No
4.1.2 Targeted Benefits and Quantifiable Objectives	No
4.1.3 Sacramento Valley Water Quality Coalition	No
4.2 Participating Sacramento River Settlement Contractor Identification of Applicable Targeted Benefits and Associated Quantifiable Objectives	Yes, see subsections below
4.2.1 Sacramento River Basinwide Water Management Plan	No
4.2.2 Sacramento Valley Water Management Agreement and Program	No
4.2.3 Development of Quantifiable Objectives	Table 4-6 updated targeted benefits and proposed actions; Table 4-7 updated targeted benefits and implemented actions; Table 4-8 updated QOs for proposed actions
4.2.4 Redding Sub-basin	No
4.2.5 Colusa Sub-basin	No

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RWMP Section	Information Needing to Be Updated in this 2012 RWMP Annual Update?
4.2.6 Butte Sub-basin	No
4.2.7 Sutter Sub-basin	No
4.2.8 American Sub-basin	No
5.0 Identification of Actions to Implement and Achieve Proposed Quantifiable Objectives	Yes, see subsections below
5.1 Redding Sub-basin	Updated project descriptions in Table 5-1; see subsections below
5.2 ACID Churn Creek Lateral Improvements Project	Updated project description, schedules, and budget
5.3 ACID Main Canal Modernization Project	Updated project description, schedules, and budget; provided monitoring information
5.4 ACID Conjunctive Water Management Program	Updated project description, schedules, and budget; provided monitoring information
5.4.4 ACID Olney Creek Watershed Restoration Project	No
5.4.5 Cottonwood Creek Fish Passage Improvement and Siphon Replacement Project	Provided monitoring information
5.4.6 System Improvement Program	Updated project description, project completion list, and budget; provided monitoring information
5.4.7 Clear Creek Siphon Rehabilitation Project	Provided project description, schedules, and budget
5.5 Colusa Sub-basin	Updated potential QOs in Table 5-5; see subsections below
5.6 GCID Water Conservation and Management Project	No
5.7 GCID Conjunctive Water Management Program	No
5.8 GCID Colusa Basin Drain Regulating Reservoir Project	No
5.8.4 GCID Drain Water Outflow Measurement Program	Updated project description; provided monitoring information
5.8.5 GCID Main Canal Milepost 35.6 Regulating Reservoir Project	No
5.8.6 RD 108 Strategic Plan for Groundwater Resources Characterization	No
5.9 RD 108 Conjunctive Water Management Program	Updated project schedules
5.10 RD 108 Flow Control and Measurement Project	No
5.10.4 RD 108 Northern Area Groundwater Study	Updated project schedules

PREFACE TABLE 1
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RWMP Section	Information Needing to Be Updated in this 2012 RWMP Annual Update?
5.10.5 RD 108 Recycled Water Improvement Project	No
5.10.6 RD 108 Recycled Water Management Project	No
5.10.7 RD 108 Irrigation Scheduling	Updated project schedules
5.10.8 RD 108 Rice Water Conservation Program	Updated project description
5.11 PCGID Conjunctive Water Management Program	Updated project description and budget
5.12 PID Conjunctive Water Management Program	Updated project description
5.13 Butte Sub-basin	Updated project descriptions and QOs in Table 5-13; see subsections below
5.14 RD 1004 Canal Lining Project	No
5.15 RD 1004 Conjunctive Water Management Program	Updated project description, schedules, and budget; provided monitoring information
5.15.4 RD 1004 White Mallard Dam and Fish Ladder Replacement Project and Five-Points Project	Updated project description, schedules, and budget; provided monitoring information
5.15.5 RD 1004 Flowmeter Replacement Program	No
5.15.6 RD 1004 Recirculation Pump 8 Rebuild Project	Updated project budget
5.15.7 RD 1004 ITRC Water Gate Project	No
5.15.8 RD 1004 10-Foot by 8-Foot Weirs Installation Project	No
5.16 Sutter Sub-basin	Provided new project information in Table 5-16; see subsections below
5.17 MFWC Conjunctive Water Management Program	Updated project description, schedules, and budget
5.17.4 MFWC Phase 2 Fish Screen Project	Updated project schedules
5.18 SMWC, PMWC, and RD 1500 Joint Sutter Basin Drainwater Reuse Project	No
5.19 SMWC Canal Lining Project	No
5.20 SMWC, PMWC, and RD 1500 Joint Sutter Basin Groundwater Management Program	Updated project description, schedules, and budget; provided monitoring information
5.21 SMWC Internal Water Supply Program	Provided project description, schedules, and budget
5.22 PMWC Conjunctive Water Management Program	No
5.22.4 PMWC Canal Lining Project	No

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2012 Sacramento Valley Regional Water Management Plan Annual Update

RWMP Section	Information Needing to Be Updated in this 2012 RWMP Annual Update?
5.23 American Sub-basin	Updated project title in Table 5-22; see subsections below
5.24 NCMWC Conjunctive Water Management Program	Updated project description and schedules
5.24.4 NCMWC American Basin Fish Screen and Habitat Improvement Project – Sankey Diversion	Updated project schedules
5.24.5 NCMWC SCADA Project for the Natomas Basin	Updated project description, schedules, and budget
6.0 Establishment of Monitoring Program	No
6.1 Cooperative Study Update	No
6.2 Water Quality and the Sacramento Valley Water Quality Coalition	No
6.2.1 Sacramento Valley Management Plan	No
6.2.2 Diazinon Management Plan	No
6.2.3 Groundwater	No
7.0 Proposed Budget and Allocation of Regional Costs	Updated the conservation budget on the basis of estimates of staff, time, and materials used for conservation; included estimated amount spent last year (Table 7-1) and projected budget and staff time summary for next 2 years (Table 7-2)
8.0 RWMP Coordination	No
9.0 References	No

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Figures

Acronyms and Abbreviations

1995 WQCP	1995 Water Quality Control Plan for the San Francisco Bay/ Sacramento-San Joaquin River Delta Estuary
AB 3030 Plan	Assembly Bill 3030 Groundwater Management Plan
AB	Assembly Bill
ac-ft	acre-feet
ac-ft/yr	acre-feet per year
ACID	Anderson-Cottonwood Irrigation District
AFSP	Anadromous Fish Screen Program
Ag WUE	Agricultural Water Use Efficiency Element
Bay-Delta	San Francisco Bay/Sacramento-San Joaquin River Delta
bgs	below ground surface
BWMP	Sacramento River Basinwide Water Management Plan
CALFED	CALFED Bay-Delta Authority
CASGEM	California Statewide Groundwater Elevation Monitoring
cfs	cubic feet per second
CIMIS	California Irrigation Management Information System
Coalition	Sacramento Valley Water Quality Coalition
Cooperative Study	Cooperative Water Measurement Study
CVP	Central Valley Project
Delta	Sacramento-San Joaquin River Delta
Department	California Department of Water Resources
ESA	Endangered Species Act
ET	evapotranspiration
ETo	reference evapotranspiration
GCID	Glenn-Colusa Irrigation District
gpm	gallons per minute
ITRC	Irrigation Training and Research Center

M&I	municipal and industrial
maf	million acre-feet
MFWC	Meridian Farms Water Company
mg/L	milligrams per liter
MID	Maxwell Irrigation District
M.P.	milepost
MRPP	Monitoring and Reporting Program Plan
msl	mean sea level
N/A	not applicable
NCMWC	Natomas Central Mutual Water Company
NRCS	U.S. Department of Agriculture, Natural Resources Conservation Service
O&M	operation and maintenance
PCGID	Princeton-Codora-Glenn Irrigation District
Phase 8 Settlement	California Bay-Delta Phase 8 Settlement
PID	Provident Irrigation District
PMWC	Pelger Mutual Water Company
QO	quantifiable objective
RD	Reclamation District
Reclamation	U.S. Bureau of Reclamation
Regional Criteria	Regional Criteria for Evaluating Water Management Plans for the Sacramento River Contractors
Regional Plan	Sacramento Valley Regional Water Management Plan
SCADA	supervisory control and data acquisition
SMWC	Sutter Mutual Water Company
SRSC	Sacramento River Settlement Contractor
SVWMP	Sacramento Valley Water Management Program
SWP	State Water Project
SWRCB	State Water Resources Control Board
taf/yr	thousand acre-feet per year
TB	targeted benefit

TCCA	Tehama-Colusa Canal Authority
TIDC	Tisdale Irrigation and Drainage Company
TM	technical memorandum
TMDL	Total Maximum Daily Load
True ISM	True Irrigation Scheduling Management
USFWS	U.S. Fish and Wildlife Service
Water Board	Central Valley Regional Water Quality Control Board
WUE	Agricultural Water Use Efficiency Program

SECTION 1.0

Regional Description and Resources

Section 1.0 revisions to the RWMP are highlighted below in shaded text. An update of water pricing was completed for each SRSC.

1.1 History and Sub-basin Description

1.2 Surface Water and Groundwater Resources

1.3 Typical District Facilities

1.4 Topography and Soils

1.5 Climate

1.6 Natural and Cultural Resources

1.7 Operating Rules, Regulations, and Agreements that Affect Water Availability

1.8 Water Measurement, Pricing, and Billing

1.8.1 Measurement Practices

1.8.2 Pricing Structures and Billing

1.8.2.1 Existing Pricing Structures

1.8.2.2 Indirect Price Signals Related to Water Use

Water pricing is only one of several direct and indirect cost signals to which a grower might be subject. For a farmer who pays a flat rate, the sum of the base charge and annual irrigation charge as referenced in Table 1-6, for water use as an SRSC customer, may still have a monetary impact through such things as quantity and cost of fertilizers, pesticides, and herbicides. Increased water use may increase costs for these inputs. Poor water management by over irrigating may reduce yields and resulting gross revenue. If the farmer operates a private well or drain pump, the electrical power costs are a direct cost related to water use. Districts must cover operating and capital expenses with revenue from customers. Excessive irrigation results in increased pumping costs from the Sacramento River, the drain system, and wells. These costs are ultimately passed directly back to the growers, albeit at an average rate for all district customers. Many SRSC operating staff have authority to shut off delivery to a customer whose field is observed to be poorly irrigated and allowed to have excessive tailwater runoff.

TABLE 1-6
Existing SRSC Pricing Structures
2012 Sacramento Valley Regional Water Management Plan Annual Update

SRSC	Pricing Structure
ACID	Base charge of $75.00 per acre per year. Annual application fee of $115.00 per parcel. Irrigation delivery is on rotation basis.
GCID	Base charge of $7.63 per acre per year. Annual irrigation charge of $70.55 per acre (rice).
PID	Base charge of $2.00 per acre per year. Annual irrigation charge of $60.00 per acre (rice).
PCGID	Base charge of $10.00 per acre per year. Annual irrigation charge of $115.00 per acre (rice). $7.00 to $9.00 per acre per irrigation for other crops.
RD 108	Annual irrigation charge of $68.20 per acre for rice. $16.80 per irrigation (first of season) and $9.65 per irrigation (subsequent) for other crops. In addition, RD 108 has 3,783 acres of lands that are charged volumetrically at a rate of $15.15 per ac-ft.
RD 1004	Per-ac-ft charge of $10.75, measured at customer turnout.
MFWC	Base charge of $22.00 per acre per year. Annual irrigation charge of $120.00 per acre (rice).
SMWC	Base charge of $33.00 per landowner stock acre. Several years ago implemented a per-acre per-crop charge (example, $87.00 per irrigated acre for rice). Previously charged on a per-ac-ft basis measured at customer turnout.
NCMWC	Base charge and administration fee on all acres of $49.58 and $35.99 to cover fixed cost of the Company; plus a water toll on irrigated acres based on type of crop. Irrigation charge of $7.10 per ac-ft based on ETAW and applied water demand. Rice decomposition flooding charge is an additional $7.10 per ac-ft.

Information specific to each participating SRSC's pricing structure, including the basis of the water charges and copies of current billing forms used by each, can be found in Section 2.0.

1.9 Water Shortage Allocation Policies

1.10 Water Quality

SECTION 2.0

Sub-basin Water Use, Supply, and District Descriptions

Section 2.0 revisions to the RWMP are highlighted below in shaded text.

2.1 Redding Sub-basin

2.1.1 Water Supply within the Redding Sub-basin

2.1.2 Water Use within the Redding Sub-basin

2.1.3 Anderson-Cottonwood Irrigation District

2.1.3.1 History

2.1.3.2 Service Area and Distribution System

2.1.3.3 Water Supply

Surface Water.

Settlement Contract Historical Diversions.

Non-contract Period (November – March).

Other Surface Water Sources.

Groundwater.

Other Water Supplies.

2.1.3.4 Water Use

District Water Requirements.

Urban.

Environmental.

Groundwater Recharge.

Topography and Soils.

Transfers and Exchanges.

Other Uses.

2.1.3.5 District Facilities

2.1.3.6 ACID Operating Rules and Regulations

2.1.3.7 Water Measurement, Pricing, and Billing

2.2 Colusa Sub-basin

2.2.1 Water Supply within the Colusa Sub-basin

2.4 Sutter Sub-basin

Topography and Soils.

Transfers and Exchanges.

Other Uses.

2.4.4.5 District Facilities

Diversion Facilities.

Conveyance System.

Storage Facilities.

Spill Recovery.

2.4.4.6 Company Operating Rules and Regulations

2.4.4.7 Water Measurement, Pricing, and Billing

2.4.5 Pelger Mutual Water Company

2.4.5.1 History

2.4.5.2 Service Area and Distribution System

2.4.5.3 Water Supply

2.4.5.4 Water Use.

2.4.5.5 District Facilities.

2.4.5.6 District Operating Rules and Regulations

2.4.5.7 Water Measurement, Pricing, and Billing

2.5 American Sub-basin

2.5.1 Water Supply within the American Sub-basin

2.5.2 Water Use within the American Sub-basin

2.5.3 Natomas Central Mutual Water Company

2.5.3.1 History

2.5.3.2 Service Area and Distribution System

2.5.3.3 Water Supply

Surface Water.

Settlement Contract Historical Diversions.

Non-contract Period (November – March).

Other Surface Water Sources.

Groundwater.

Other Water Supplies.

2.5.3.4 Water Use

District Water Requirements.

Urban.

Environmental.

Groundwater Recharge.

Topography and Soils.

Transfers and Exchanges.

Other Uses.

2.5.3.5 District Facilities

Diversion Facilities.

Conveyance System.

Storage Facilities.

Spill Recovery.

2.5.3.6 District Operating Rules and Regulations

2.5.3.7 Water Measurement, Pricing, and Billing

2.6 Water Balance Summary

Water balance summaries were developed for each participating SRSC and are included in Appendix D for the 2012 irrigation year. These summaries are based on the Agricultural Water Inventory Tables ("Standard Tables") contained in the Water Management Planner developed by Reclamation to meet the 2011 Standard Criteria for Agricultural and Urban Water Management Plans. The tables from the Water Management Planner were modified to display and identify information unique to the SRSCs, including rice production. The summaries are limited to the April through October period covered by the SRSC contracts.

Surface water supplies are based on records of the SRSC diversions from Reclamation's monthly water accounting and the SRSC's records. District groundwater pumping is based on SRSC records. Private groundwater pumping is estimated by the SRSCs.

Precipitation data are based on the average monthly precipitation reported by California Irrigation Management Information System (CIMIS) for the Nicolaus, Davis, and Colusa stations for the Sacramento Valley and the Gerber CIMIS station for the Redding Sub-basin.

Crop evapotranspiration tables were prepared using crop coefficients (Kc values) developed from the January 2003 report California Crop and Soil Evapotranspiration, ITRC Report 03-001, prepared by the Irrigation Training and Research Center at Cal Poly San Luis Obispo and monthly 2012 reference ET (ETo) from CIMIS. For the SRSCs in the Sacramento Valley, Kc values were developed using the Zone 12 data from the ITRC Report and the average 2012 ETo reported by CIMIS at its Nicolaus and Davis stations. The crop evapotranspiration for the Redding Sub-basin are based on the Zone 14 data from the ITRC Report and 2012 ETo data reported for the Gerber CIMIS station. Evaporation for use in estimating distribution system evaporation and seepage is estimated at 1.1 times the monthly ETo. Effective precipitation is estimated at 60 percent of the irrigation season precipitation.

Leaching requirements were developed using the methods and equations described by R.S. Ayers and D.W. Westcot published in FAO Irrigation and Drain Paper 29, Rev. 1. As identified in the footnotes to Table 5 of the water balances, the crop consumptive use values do not include water required for initial flooding, re-flooding, or flow-through on rice acres.

It should be recognized that these source data were considered the most accurate and current information available at the district level for the 2012 irrigation year. Information provided in the original BWMP was developed by and obtained from the Department for a normalized 1995 cropping pattern for a projected normal and drought condition. The unit ET of applied water assumed for each district in the BWMP compares favorably with the ITRC and CIMIS assumptions and data used to develop the balance summaries for the 2012 irrigation year.

Table 6 of the water balances summarizes the inflows and outflows from the individual SRSCs, including an estimate of available soil moisture, inflow from precipitation, and evapotranspiration precipitation by crops. Figure 2-57 summarizes the SRSC water balances. The various sources of the district outflows have been estimated by the SRSCs. The sub-total without recirculation was utilized as a closure term. Positive values indicate unaccounted for losses such as percolation to groundwater. Negative values may indicate losses such as seepage into the water balance boundaries from high water tables. Table 6 also shows the quantities of water recaptured and recirculated for reuse within the SRSC's service areas.

In addition to the individual water balance tables, a regional-level summary of SRSC diversion and return flows for the 2012 irrigation year was prepared. Figure 2-58 is a schematic that illustrates the relationships between participating SRSCs, and shows diversions from and return flows attributable to the participating SRSCs to and from the Sacramento River. Return flows to the river are available for a variety of uses including re-diversion and/or environmental benefits. The regional-level summary of SRSC diversion and return flows also identifies the average diversion and average consumptive use per cropped acre for the 2012 irrigation year within the participating SRSC service areas.

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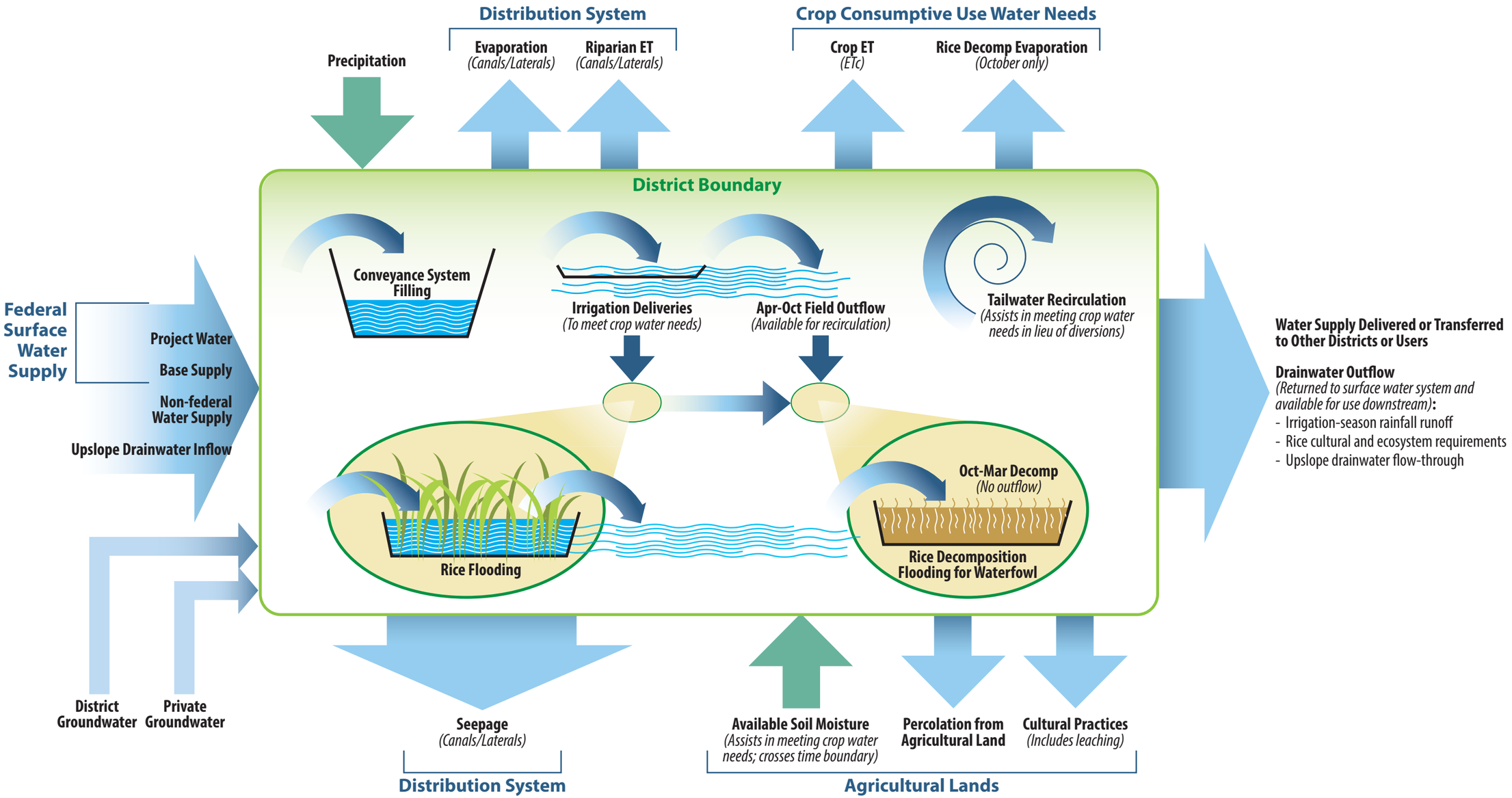


Note: All district inflows and outflows except for rice decomp evaporation are April through October. Rice decomp evaporation is October only.

FIGURE 2-57
SCHEMATICS OF DISTRICT WATER BALANCE
2012 SACRAMENTO VALLEY REGIONAL WATER MANAGEMENT PLAN ANNUAL UPDATE

SUMMARY	
SRSC 2012 Diversions* =	1,374,532 AF
SRSC 2012 Return Flows (available for use downstream)* =	348,049 AF
Total 2012 Recirculation/Reuse by SRSCs =	429,078 AF

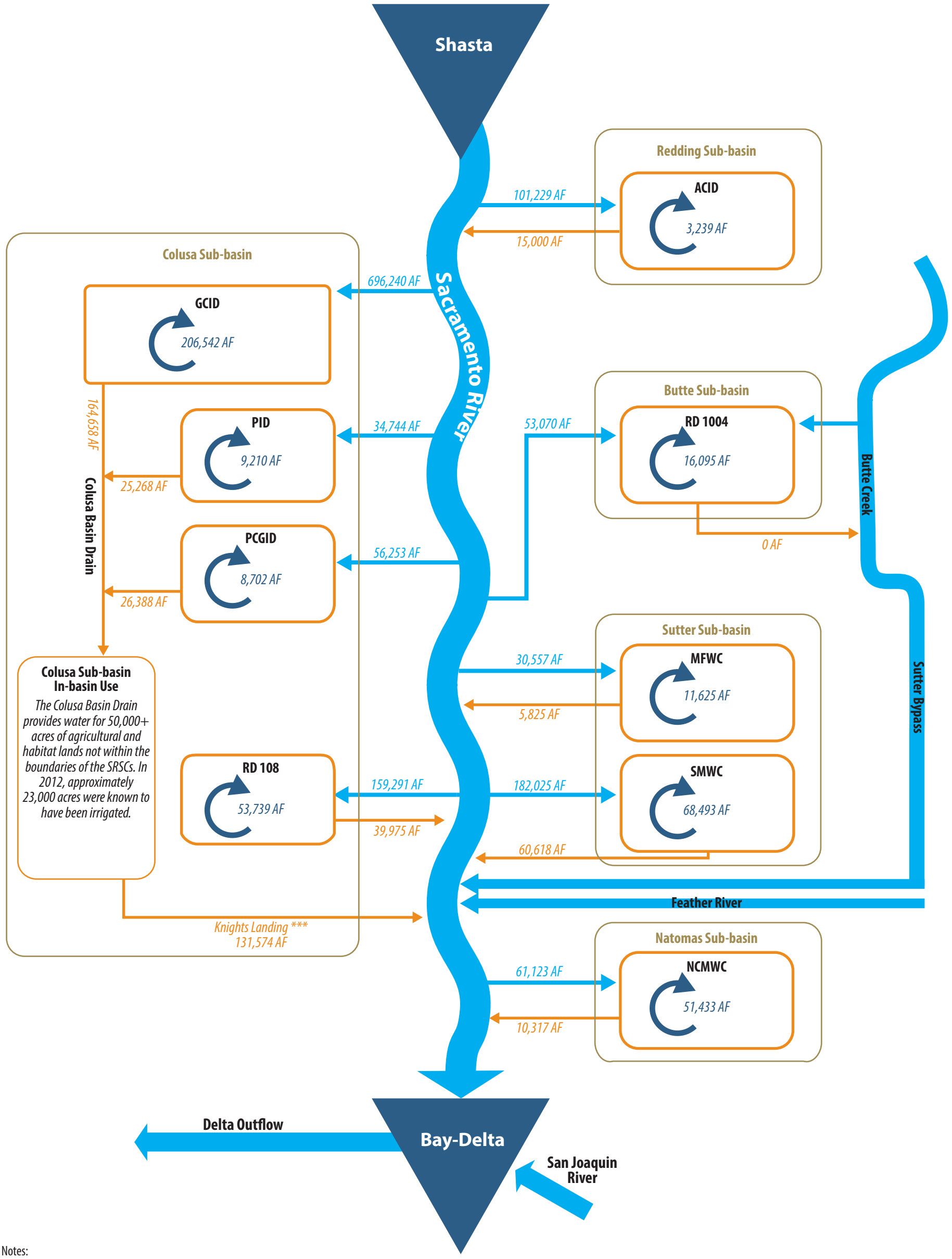
SUMMARY (Cont.)	
Total Cropped Acres for 2012** =	341,762 AC
Average Diversion for 2012 = (SRSC Diversion ÷ Total Cropped Acres)	4.02 AF/AC
Average Consumptive Use for 2012 = ((SRSC Diversion-SRSC Return Flow) ÷ Total Cropped Acres)	3.00 AF/AC

LEGEND

DIVERSIONS

RETURN FLOW

Total Recirculated for Reuse



Notes:

* Diversions and return flows are from 2012 SRSC water balance tables.

** Total cropped acres for 2012 includes 23,000 acres within the Colusa Sub-basin that rely on return flows from the SRSCs for surface water supplies.

***Return to river at Knights Landing is based on data obtained from the Department's Water Data Library. Data are not available for 2012; therefore, quantity shown is April through September only.

AC = acre

AF = acre-feet

FIGURE 2-58
SCHEMATICS AND SUMMARY OF 2012 SRSC DIVERSIONS AND RETURN FLOWS
2012 SACRAMENTO VALLEY REGIONAL WATER MANAGEMENT PLAN ANNUAL UPDATE

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SECTION 3.0

Regional Water Measurement Program

Section 3.0 revisions to the RWMP are highlighted below in shaded text.

3.1 Plan Identification

As stated in Reclamation's Regional Criteria (Reclamation, 2004):

Each Participating contractor shall implement one of the following measurement options:

1. *Fully measure with a reasonable degree of accuracy the volume of water delivered by each Participating contractor to each of its respective customers, and implement procedures that provide incentives for improved management of water within 5 years of contract renewal; or*

2. *Implement a mutually acceptable water measurement program (including timeframes and budget needs) within 3 years of the renewal of the Participating contractors' contract with Reclamation, with full Implementation within 5 years thereof. This option should be at least as effective as option 1 and will be substantiated based on field documentation derived from the measurement study(s) conducted in relevant Sub-regions. Please attach a description of the study(s) including the study objectives, along with an estimated timeline and budget.*

The participating SRSCs will implement the second option. The first phase of this program is titled the Cooperative Water Measurement Study Work Plan, which was funded by Reclamation, completed in 2003, and is included as Appendix B of the 2007 Final Sacramento Valley RWMP.

The next phase of the Cooperative Study is funded partially through Chapter 7 Proposition 50 funds for the CALFED Water Use Efficiency Program (Section B Agricultural Research and Development Projects), and partially by a Reclamation Water Conservation Field Service Program Grant. Coordination of participants and preparation of Cooperative Study components have been ongoing since January 2006. Field study began at the start of the 2006 irrigation season. All Cooperative Study elements are described below (refer to the 2009 RWMP Annual Update).

District-specific water measurement plans and programs are included in Appendix E to this 2012 RWMP Annual Update.

3.2 Cooperative Water Measurement Study Measurement Plan Evaluation

3.3 Plan Selection

3.3.1 Year 1 (2006) Progress Report

3.3.2 Final Report

3.3.3 Cooperative Study Conclusions Overview

SECTION 4.0

Analysis of Sub-region Water Management Quantifiable Objectives

Section 4.0 revisions to the RWMP are highlighted below in shaded text. A re-evaluation of TBs applicable to each SRSC and identification/summary of all actions to meet QOs for each applicable TB were completed.

The method used to number and identify proposed projects has been revised to better reference the sub-basin within which a particular project is proposed. The SRSCs have determined that this system is more appropriate given the reuse of water at the sub-basin level to identify and describe TBs rather than the CALFED numbers used in previous updates.

Tables 4-1, 4-2, 4-3, 4-4, and 4-5 (located at the end of this section) list the new RWMP sub-basin number for each sub-basin with the original CALFED number and the corresponding targeted benefit.

The list of TBs, proposed actions, and quantifiable objectives presented in Table 4-6 (located at the end of this section) includes all projects currently identified to date within each sub-basin by individual SRSCs. A list of implemented actions, formerly listed as proposed actions in Table 4-6, and associated TBs and quantifiable objectives are presented in Table 4-7 (located at the end of this section). In some instances, a proposed action listed in Table 4-6 is undergoing a phased implementation approach and the entire action is yet to be completed. Hence, only the implemented action is listed in Table 4-7. A comparison of the target QO amount with actions proposed and implemented by the SRSCs is shown in Table 4-8 (located at the end of this section).

4.1 Development of CALFED Targeted Benefits

4.2 Participating Sacramento River Settlement Contractor Identification of Applicable Targeted Benefits and Associated Quantifiable Objectives

4.2.1 Sacramento River Basinwide Water Management Plan

4.2.2 Sacramento Valley Water Management Agreement and Program

4.2.3 Development of Quantifiable Objectives

4.2.4 Redding Sub-basin

4.2.4.1 Identification of Applicable Targeted Benefits

4.2.4.2 Determination of Non-applicability

Anderson-Cottonwood Irrigation District.

4.2.5 Colusa Sub-basin

4.2.5.1 Identification of Applicable Targeted Benefits

4.2.5.2 Determination of Non-applicability

Glenn-Colusa Irrigation District.

Princeton-Codora-Glenn Irrigation District.

Provident Irrigation District.

Reclamation District No. 108.

4.2.6 Butte Sub-basin

4.2.6.1 Identification of Applicable Targeted Benefits

4.2.6.2 Determination of Non-applicability

Reclamation District No. 1004.

4.2.7 Sutter Sub-basin

4.2.7.1 Identification of Applicable Targeted Benefits

4.2.7.2 Determination of Non-applicability

Sutter Mutual Water Company.

Pelger Mutual Water Company.

Meridian Farms Water Company.

4.2.8 American Sub-basin

4.2.8.1 Identification of Applicable Targeted Benefits

4.2.8.2 Determination of Non-applicability

Natomas Central Mutual Water Company.

TABLE 4-1
Targeted Benefits in Redding Sub-basin
2012 Sacramento Valley Regional Water Management Plan Annual Update

CALFED Number	RWMP Sub-basin Number	Targeted Benefit
4	R-1	Provide flow to improve aquatic ecosystem conditions in Cottonwood Creek
6	R-2	Provide flow to improve aquatic ecosystem conditions in the Sacramento River below Keswick
7	R-3	Decrease nonproductive ET to increase water supply for beneficial uses
8	R-4	Provide long-term diversion flexibility to increase water supply for beneficial uses on suitable lands

TABLE 4-2
Targeted Benefits in Colusa Sub-basin
2012 Sacramento Valley Regional Water Management Plan Annual Update

CALFED Number	RWMP Sub-basin Number	Targeted Benefit
20	C-1	Provide flow to improve ecosystem conditions in the Sacramento River below Keswick
21	C-2	Reduce Group A pesticides to enhance and maintain beneficial uses of water in the Colusa Drain
22	C-3	Reduce pesticides to enhance and maintain beneficial uses of water in the Colusa Basin Drain
23	C-4	Reduce pesticides to enhance and maintain beneficial uses of water in the Sacramento River
26	C-5	Provide long-term diversion flexibility to increase the water supply for beneficial use for suitable lands
27	C-6	Provide long-term diversion flexibility to increase the water supply for beneficial use for wetlands
28	C-7	Provide long-term diversion flexibility to increase water supply for Sacramento and Delevan National Wildlife Refuges
29	C-8	Provide long-term diversion flexibility to increase the water supply for beneficial uses for salt affected soils

TABLE 4-3
Targeted Benefits in Butte and Sutter Sub-basins
2012 Sacramento Valley Regional Water Management Plan Annual Update

CALFED Number	RWMP Sub-basin Number	Targeted Benefit
30	BS-1	Provide flow to improve aquatic ecosystem conditions in the Sacramento River below Keswick
31	BS-2	Reduce pesticides to enhance and maintain beneficial uses of water in the Sacramento River
83	BS-3	Reduce pesticides to enhance and maintain beneficial uses of water in the Sacramento Slough
33	BS-4	Decrease nonproductive ET to increase water supply for beneficial uses for suitable lands
34	BS-5	Provide long-term diversion flexibility to increase water supply for beneficial uses for suitable lands
35	BS-6	Provide long-term diversion flexibility to increase water supply for beneficial uses for wetlands

TABLE 4-4
Targeted Benefits in Lower Feather River and Yuba River
2012 Sacramento Valley Regional Water Management Plan Annual Update

CALFED Number	RWMP Sub-basin Number	Targeted Benefit
37	FY-1	Provide flow to improve aquatic ecosystem conditions in Butte Creek
42	FY-2	Reduce salinity to enhance and maintain beneficial uses of water in the Sacramento Slough near Verona
43	FY-3	Reduce temperatures to enhance and maintain aquatic species populations in Butte Creek
46	FY-4	Decrease nonproductive ET to increase water supply for beneficial uses for affected lands
47	FY-5	Provide long-term diversion flexibility to increase water supply for beneficial uses for suitable lands
48	FY-6	Provide long-term diversion flexibility to increase water supply for beneficial uses for wetlands

TABLE 4-5
Targeted Benefits in American Sub-basin
2012 Sacramento Valley Regional Water Management Plan Annual Update

CALFED Number	RWMP Sub-basin Number	Targeted Benefit
57	A-1	Provide flow to improve ecosystem conditions in the Sacramento River below Keswick
58	A-2	Reduce pesticides to enhance and maintain beneficial uses of water in the Natomas East Main Drain
59	A-3	Reduce pesticides to enhance and maintain beneficial uses of water in the Sacramento River
63	A-4	Decrease nonproductive ET to increase water supply for beneficial uses.
64	A-5	Provide long-term diversion flexibility to increase the water supply for beneficial uses for suitable lands
65	A-6	Provide long-term diversion flexibility to increase the water supply for beneficial use for wetlands

TABLE 4-6
Summary of Applicable Targeted Benefits and Proposed Actions
2012 Sacramento Valley Regional Water Management Plan Annual Update

Targeted Benefit	Analyze	Priority	Anticipated Year of Implementation	RWMP Sub-basin (CALFED Sub-region)	Participating SRSCs	Proposed Action	Maximum Contribution to QO from Proposed Action (ac-ft)	Locally Beneficial Portion of Action[a]	Action-specific Monitoring Plan	Funding Sources
R-2 In-stream flow benefit in Sacramento River **R-3** Decrease nonproductive ET	2005	2005	TBD[d]	Redding (1)	ACID	Lining of leaky canal lateral	8,700	$150,000	Action-specific monitoring plan will be included in construction contract	Proposition 50 award of $144,000 June 2005, for feasibility study
R-2 In-stream flow benefit in Sacramento River **R-4** Provide long-term diversion flexibility	2005	2005	2012	Redding (1)	ACID	Reduce spill through system automation	20,000	$40,000	Action-specific monitoring plan will be included in construction contract	Proposition 50 award of $1.775 million June 2005, for Phase 1 of construction
R-2 In-stream flow benefit in Sacramento River	TBD[d]	TBD[d]	TBD[d]	Redding (1)	ACID	Replace existing canal creek crossing with new siphon beneath Olney Creek	2,100	$62,500	Action-specific monitoring plan will be included in construction contract	TBD
R-2 In-stream flow benefit in Sacramento River	2011	2011	2014-15	Redding (1)	ACID	Repair and stabilize siphon segment crossing beneath Clear Creek	5,400	$1,750,000	Action-specific monitoring plan will be included in construction contract	ACID; TBD
R-2 In-stream flow benefit in Sacramento River	2013	2013	2013	Redding (1)	ACID	Repair leaky siphon joints; excavate and re-compact siphon cover on upslope segment of Clear Creek siphon	1,800	$202,000	Action-specific monitoring plan will be included in construction contract	ACID
R-2 In-stream flow benefit in Sacramento River **R-3** Decrease nonproductive ET	2011	2011	2013-15	Redding (1)	ACID	Replace degraded pipelines; construct pipelines to replace laterals and canals subject to leakage	3,000	$1,366,000[c]	Action-specific monitoring plan will be included in construction contract	ACID
C-1 In-stream flow benefit in Sacramento River **C-5, C-6, and C-8** Provide long-term diversion flexibility for wetlands, salt-affected soils, and other suitable lands	2007	2008	2012	Colusa (3)	GCID	GCID Water Conservation and Management Project implementation. The project includes a water distribution system (SCADA) system expansion and Ethernet upgrade, and Main Canal and Main Pump Station automation; replacement of three older check structures on the Main Canal with new automated check structures; SCADA integration with drain outflow measurement and recapture stations	40,000	$1,772,200	Monitor diversions, spills, and system outflows	Proposition 50 WUE Grant award of $2.7 million in January 2008
C-1 In-stream flow benefit in Sacramento River **C-5, C-6, and C-8** Provide long-term diversion flexibility for wetlands, salt-affected soils, and other suitable lands	2005	2005	TBD[d]	Colusa (3)	GCID	Construct up to 16 groundwater extraction wells	30,000	$17,200,000	Well output will be monitored	Submitted for Proposition 50, Chapter 8 funding for Integrated Regional Water Management
C-1 In-stream flow benefit in Sacramento River **C-2, C-3, and C-4** Reduce pesticides **C-5, C-6, and C-8** Provide long-term diversion flexibility for wetlands, salt-affected soils, and other suitable lands	2005	2005	TBD[d]	Colusa (3)	GCID	Construct 500 ac-ft regulating reservoir on Main Canal	500	$3,500,000	Action-specific monitoring plan will be included in construction contract	TBD
C-1 In-stream flow benefit in Sacramento River **C-5, C-6, and C-8** Provide long-term diversion flexibility for wetlands, salt-affected soils, and other suitable lands	2005	2005	2012	Colusa (3)	RD 108	Install up to three production wells for groundwater management program	8,000	$128,800	Well output will be monitored	Received Proposition 50, Chapter 8 funding for Integrated Regional Water Management

TABLE 4-6
Summary of Applicable Targeted Benefits and Proposed Actions
2012 Sacramento Valley Regional Water Management Plan Annual Update

Targeted Benefit	Analyze	Priority	Anticipated Year of Implementation	RWMP Sub-basin (CALFED Sub-region)	Participating SRSCs	Proposed Action	Maximum Contribution to QO from Proposed Action (ac-ft)	Locally Beneficial Portion of Action[a]	Action-specific Monitoring Plan	Funding Sources
C-1 In-stream flow benefit in Sacramento River **C-5, C-6, and C-8** Provide long-term diversion flexibility for wetlands, salt-affected soils, and other suitable lands	2005	2005	TBD[d]	Colusa (3)	PCGID	Develop a conjunctive water management program	5,000	TBD[c]	Well output will be monitored	PCGID will fund the program with District monies
C-1 In-stream flow benefit in Sacramento River **C-5, C-6, and C-8** Provide long-term diversion flexibility for wetlands, salt-affected soils, and other suitable lands	2005	2005	TBD[d]	Colusa (3)	PID	Develop a conjunctive water management program	5,000	TBD[c]	Well output will be monitored	PID will fund the program with District monies
BS-1 In-stream flow benefit in Sacramento River **BS-4** Decrease nonproductive ET **BS-6** Provide long-term diversion flexibility	2005	2005	TBD[d]	Butte and Sutter, Lower Feather River and Yuba River (4,5)	RD 1004	Line canal	7,000	$120,000[b]	Action-specific monitoring plan will be included in construction contract	Funding will be pursued through future rounds of Water Use Efficiency Grant Funding
BS-1 In-stream flow benefit in Sacramento River **BS-4** Decrease nonproductive ET **BS-5, BS-6, FY-5, and FY-6** Provide long-term diversion flexibility to increase water supply for beneficial use of wetlands and other suitable lands	2005	2005	2015[d]	Butte and Sutter, Lower Feather River and Yuba River (4,5)	RD 1004	Construct one groundwater production well	2,400	$200,000	Well output will be monitored	RD 1004
BS-1 In-stream flow benefit in Sacramento River **BS-4** Decrease nonproductive ET **FY-1** In-stream flow benefit in Butte Creek	2003	2004	2015	Butte and Sutter, Lower Feather River and Yuba River (4,5)	RD 1004	White Mallard Dam SCADA telemetry and measurement instrumentation	17,000	$5,000	Creek diversion will be monitored	RD 1004 and other funding sources are being pursued
BS-1 In-stream flow benefit in Sacramento River **BS-5 and BS-6** Provide long-term diversion flexibility to increase water supply for beneficial use of wetlands and other suitable lands	2012	2013	2013	Butte and Sutter (4)	MFWC	Construct one groundwater production well	1,000	$130,000	Well output will be monitored	MFWC

TABLE 4-6
Summary of Applicable Targeted Benefits and Proposed Actions
2012 Sacramento Valley Regional Water Management Plan Annual Update

Targeted Benefit	Analyze	Priority	Implement	RWMP Sub-basin (CALFED Sub-region)	Participating SRSCs	Proposed Action	Maximum Contribution to QO from Proposed Action (ac-ft)	Locally Beneficial Portion of Action[a]	Action-specific Monitoring Plan	Funding Sources
BS-1 In-stream flow benefit in Sacramento River	2001	2006	2014	Butte and Sutter (4)	MFWC	Install fish screen on main Meridian diversion. Enlarge Main Canal and remove one river diversion	TBD	TBD[b]	Output will be monitored	Federal and state
BS-1 In-stream flow benefit in Sacramento River **BS-5 and BS-6** Provide long-term diversion flexibility to increase water supply for beneficial use of wetlands and other suitable lands	2005	2005	TBD[d]	Butte and Sutter (4)	SMWC, PMWC and RD 1500	Recycle irrigation	25,000	$12,000[b]	Lift pumps that recycle drainage water will be monitored	Funding for feasibility study will be pursued through future rounds of WUE Grant funding
BS-1 In-stream flow benefit in Sacramento River **BS-5 and BS-6** Provide long-term diversion flexibility to increase water supply for beneficial use of wetlands and other suitable lands	2009	TBD	TBD[d]	Butte and Sutter (4)	SMWC, PMWC, and RD 1500	Expansion of the existing drainwater reuse system	5,000	TBD[b]	TBD	Funding will be pursued through future rounds of federal and state grant funding opportunities
BS-1 In-stream flow benefit in Sacramento River **BS-4** Decrease nonproductive ET	2012	2012	2015	Butte and Sutter (4)	SMWC	Line canal	1,000	$14,000[b]	Action-specific monitoring plan will be included in construction contract	Submitted for Proposition 50, Chapter 8 funding for Integrated Regional Water Management
BS-1 In-stream flow benefit in Sacramento River **BS-5 and BS-6** Provide long-term diversion flexibility to increase water supply for beneficial use of wetlands and other suitable lands	2011	2011	2015	Butte and Sutter (4)	SMWC, PMWC, and RD 1500	Install six production wells for groundwater management program	5,000	$200,000[b]	Well output will be monitored	Submitted for Proposition 50, Chapter 8 funding for Integrated Regional Water Management
A-1 In-stream flow benefit in Sacramento River **A-4** Decrease nonproductive ET **A-5 and A-6** Provide long-term diversion flexibility	2005	2005	TBD[d]	American (7)	NCMWC	Construct 13 groundwater extraction wells	15,000	$200,000[b]	Well output will be monitored	Submitted for Proposition 50, Chapter 8 funding for Integrated Regional Water Management
A-1 In-stream flow benefit in Sacramento River **A-4** Decrease nonproductive ET **A-5 and A-6** Provide long-term diversion flexibility	2007	2010	2010-2012	American (7)	NCMWC	Install new pump station and fish screen on Sacramento River	1,400	$0	River diversion will be monitored	CALFED and Reclamation awarded $1.5 million for design and permitting
A-1 In-stream flow benefit in Sacramento River **A-4** Decrease nonproductive ET **A-5 and A-6** Provide long-term diversion flexibility	2007	2007	2010 (additional phases remain)	American (7)	NCMWC	Improve flow monitoring in Natomas Basin	4,500	$187,000	Flows within NCMWC and between districts will be monitored	Proposition 50 WUE Grant awarded $163,000; NCMWC paid the remaining $187,000
Total SRSC Contribution							213,800	$27,270,500		

[a]Cost-benefit analysis will be performed if funding is not received to determine what portion of project, if any, is economically feasible for a local agency to undertake. The presentation of these local and external benefits and the associated costs will be included in the annual updates at the time the QOs are analyzed.

[b]Local funding amount varies depending on type and application of project. Historical average of local contribution varies from 5 to 20 percent of project cost provided through in-kind services by the Company/District. Five percent of estimated project cost was used for projects yet to apply for funding. The local contribution for these projects will be updated as funding is sought and acquired.

[c]Project is 100 percent District funded. Exact amount will be determined at project completion.

[d]Subject to appropriation of funding.

Note:

WUE = Agricultural Water Use Efficiency Program

TABLE 4-7
Summary of Applicable Targeted Benefits and Implemented Actions
2012 Sacramento Valley Regional Water Management Plan Annual Update

Targeted Benefit	Implemented	RWMP Sub-basin (CALFED Sub-region)	Participating SRSCs	Implemented Action	Estimated Contribution to QO from Action (ac-ft)	Locally Beneficial Portion of Action	Action-specific Monitoring Plan	Funding Sources
R-1 Remove flow impediment in Cottonwood Creek	2010	Redding (1)	ACID	Remove and replace siphon segment crossing beneath Cottonwood Creek	8,900	$288,000	Action-specific monitoring plan will be included in construction contract	ACID and the USFWS Anadromous Fish Restoration Program provided $130,000
R-2 In-stream flow benefit in Sacramento River **R-3** Decrease nonproductive ET	2012 (additional phases remain)	Redding (1)	ACID	Replace degraded pipelines; construct pipelines to replace laterals and canals subject to leakage	4,000	See Table 4-6	Action-specific monitoring plan will be included in construction contract	ACID
R-2 In-stream flow benefit in Sacramento River **R-4** Provide long-term diversion flexibility	2012	Redding (1)	ACID	Crowley Gulch Siphon Project	1,785	$40,000	See Section 5.0	ACID and Proposition 50 WUE Grant ($1.775 million)
R-2 In-stream flow benefit in Sacramento River **R-4** Provide long-term diversion flexibility	2013	Redding (1)	ACID	Two groundwater production wells	5,600	$185,000	Well output will be monitored	Proposition 50, Chapter 8 award of $1.4 million for Integrated Regional Water Management; Omnibus Public Land Management Act of 2009, Title IX Bureau of Reclamation, Authorizations, Subtitle F – Secure Water, Public Law 111-11 award of $185,000
C-1 In-stream flow benefit in Sacramento River	2010	Colusa (3)	GCID	Measure GCID drainwater outflow to reduce tailwater spills; GCID completed construction of 12 drainwater outflow measuring sites in 2010; Construct an automated inflatable Obermeyer steel gated weir on the Colusa Basin Drain to maximize year-round diversions to crops and wildlife habitat	10,745	$650,000	Flows will be monitored to reduce spills	GCID and a Reclamation Water Conservation Grant provided $200,000
C-5, C-6, and C-8 Provide long-term diversion flexibility for wetlands, salt-affected soils, and other suitable lands	2012	Colusa (3)	RD 108	Characterize the groundwater system underlying the northern portion of the District	0	$31,000	Collect and organize groundwater data to develop information	Proposition 84 Grant to provide $245,000
C-1 In-stream flow benefit in Sacramento River **C-5, C-6, and C-8** Provide long-term diversion flexibility for wetlands, salt-affected soils, and other suitable lands	2009	Colusa (3)	RD 108	Replace flashboard checks with long-crested weirs, an ITRC flap gate, and Rubicon flume gates	2,000	$300,000	Action-specific monitoring plan will be included in construction contract	RD 108 and a Reclamation Water Conservation Grant provided $300,000
C-1 In-stream flow benefit in Sacramento River **C-5, C-6, and C-8** Provide long-term diversion flexibility for wetlands, salt-affected soils, and other suitable lands	2011	Colusa (3)	RD 108	Increase capacity of recycled water	13,000	$50,000	Flows will be monitored to recapture spills and reduce outflows	RD 108 and a Reclamation CALFED Grant provided $560,000

TABLE 4-7
Summary of Applicable Targeted Benefits and Implemented Actions
2012 Sacramento Valley Regional Water Management Plan Annual Update

Targeted Benefit	Implemented	RWMP Sub-basin (CALFED Sub-region)	Participating SRSCs	Implemented Action	Estimated Contribution to QO from Action (ac-ft)	Locally Beneficial Portion of Action	Action-specific Monitoring Plan	Funding Sources
C-1 In-stream flow benefit in Sacramento River **C-5, C-6, and C-8** Provide long-term diversion flexibility for wetlands, salt-affected soils, and other suitable lands	2011	Colusa (3)	RD 108	Improve operations of recycled water pump stations	3,700	$235,000	Flows will be monitored to recapture spills and reduce outflows	RD 108 and a Reclamation CALFED Grant provided $560,000
C-5, C-6, and C-8 Provide long-term diversion flexibility for wetlands, salt-affected soils, and other suitable lands	2009	Colusa (3)	RD 108	Groundwater resources characterization	0	$0	Well output, groundwater monitoring wells, and subsidence will be monitored	RD 108
C-1 In-stream flow benefit in Sacramento River **C-5, C-6, and C-8** Provide long-term diversion flexibility for wetlands, salt-affected soils, and other suitable lands	2012	Colusa (3)	RD 108	Irrigation scheduling	5,500	$31,000	Applied water to the field will be monitored	RD 108 and a Reclamation Water Conservation Grant provided $25,000
C-1 In-stream flow benefit in Sacramento River **C-5, C-6, and C-8** Provide long-term diversion flexibility for wetlands, salt-affected soils, and other suitable lands	2007	Colusa (3)	RD 108	Rice water conservation program	5,000	$0	Diversions and outflows will be monitored	RD 108
BS-1 In-stream flow benefit in Sacramento River **BS-4** Decrease nonproductive ET **FY-1** In-stream flow benefit in Butte Creek	2007 (additional phases remain)	Butte and Sutter, Lower Feather River and Yuba River (4,5)	RD 1004	Remove and replace White Mallard Dam and fish ladder on Butte Creek; install weir and fish screen	17,000	$25,000	Creek diversion will be monitored	Ducks Unlimited provided $5 million
BS-1 In-stream flow benefit in Sacramento River **BS-4** Decrease nonproductive ET **BS-5, BS-6, FY-5, and FY-6** Provide long-term diversion flexibility to increase water supply for beneficial use of wetlands and other suitable lands	2011 and 2013	Butte and Sutter, Lower Feather River and Yuba River (4,5)	RD 1004	Construct two groundwater production wells	4,200	$370,000	Well output will be monitored	RD 1004
BS-1 In-stream flow benefit in Sacramento River **BS-4** Decrease nonproductive ET **BS-5, BS-6, FY-5, and FY-6** Provide long-term diversion flexibility to increase water supply for beneficial use of wetlands and other suitable lands **FY-1** In-stream flow benefit in Butte Creek	Ongoing	Butte and Sutter, Lower Feather River and Yuba River (4,5)	RD 1004	Upgrade field-level flowmeters	1,600	$67,500	Field-level turnouts will be monitored, allowing RD 1004 to charge water users by the ac-ft	Individual farmers paid for initial flowmeters at approximately $1,000 each in 1992; upgrades cost an estimated $67,500; and meter maintenance, estimated at $7,000/year, is paid for by the District

TABLE 4-7
Summary of Applicable Targeted Benefits and Implemented Actions
2012 Sacramento Valley Regional Water Management Plan Annual Update

Targeted Benefit	Implemented	RWMP Sub-basin (CALFED Sub-region)	Participating SRSCs	Implemented Action	Estimated Contribution to QO from Action (ac-ft)	Locally Beneficial Portion of Action	Action-specific Monitoring Plan	Funding Sources
BS-1 In-stream flow benefit in Sacramento River **BS-5 and BS-6** Provide long-term diversion flexibility to increase water supply for beneficial use of wetlands and other suitable lands **FY-1** In-stream flow benefit in Butte Creek	2009 (additional phases remain)	Butte and Sutter, Lower Feather River and Yuba River (4,5)	RD 1004	Rebuild recirculation pump	3,800	$43,200	Lift pump that recycles drainage water will be monitored	RD 1004
BS-1 In-stream flow benefit in Sacramento River **BS-4** Decrease nonproductive ET **FY-1** In-stream flow benefit in Butte Creek	2009	Butte and Sutter, Lower Feather River and Yuba River (4,5)	RD 1004	Install new check structure and ITRC water gate	70	$2,500	None, gate is designed to automatically provide constant water elevation	RD 1004 and Reclamation Grant
BS-1 In-stream flow benefit in Sacramento River **FY-1** In-stream flow benefit in Butte Creek		Butte and Sutter, Lower Feather River and Yuba River (4,5)	RD 1004	Install a pair of weirs	1,200	$15,000	Increased system control will be provided with new weirs	Reclamation Grant
BS-1 In-stream flow benefit in Sacramento River **BS-5 and BS-6** Provide long-term diversion flexibility to increase water supply for beneficial use of wetlands and other suitable lands	2012 (additional phases remain)	Butte and Sutter (4)	MFWC	Construct two groundwater production wells	1,500	$135,000	Well output will be monitored	MFWC and Proposition 50, Chapter 8 funding for Integrated Regional Water Management
BS-1 In-stream flow benefit in Sacramento River **BS-5 and BS-6** Provide long-term diversion flexibility to increase water supply for beneficial use of wetlands and other suitable lands	2012 (additional phases remain)	Butte and Sutter (4)	SMWC, PMWC, and RD 1500	Installed one groundwater monitoring well and one groundwater production well	1,600	$200,000	Well output will be monitored	Submitted for Proposition 50, Chapter 8 funding for Integrated Regional Water Management
BS-1 In-stream flow benefit in Sacramento River **BS-5 and BS-6** Provide long-term diversion flexibility to increase water supply for beneficial use of wetlands and other suitable lands	2007-2012	Butte and Sutter (4)	SMWC	Internal Water Supply Program	20,000	$473,000	No plans to monitor	SMWC
A-1 In-stream flow benefit in Sacramento River **A-4** Decrease nonproductive ET **A-5 and A-6** Provide long-term diversion flexibility	2010 (additional phases remain)	American (7)	NCMWC	Improve flow monitoring in Natomas Basin (phased approach)	4,500	$187,000	Flows within NCMWC and between districts will be monitored	NCMWC and Proposition 50 WUE Grant
Total SRSC Contribution					**140,830**	**$3,395,000**		

TABLE 4-8
Summary of SRSCs' Contribution to Quantifiable Objectives
2012 Sacramento Valley Regional Water Management Plan Annual Update

	SRSC Contribution to QO (taf/yr)		
RWMP Sub-basin Number	**Proposed Actions**	**Implemented Actions**	**Target QO (taf/yr)[a]**
R-1	-	8.9	TBD
R-2	41.0	11.39	44 – 180
R-3	11.7	4.0	6.5[a]
R-4	20	7.39	TBD
C-1	88.5	39.95	44 – 180
C-2	0.5	-	TBD
C-3	0.5	-	TBD
C-4	0.5	-	TBD
C-5	88.5	39.95	TBD
C-6	88.5	39.95	7.9
C-7	-	-	TBD
C-8	88.5	39.95	TBD
BS-1	63.4	50.97	44 – 180
BS-2	-	-	TBD
BS-3	-	-	TBD
BS-4	27.4	21.27	4.6 taf[b]
BS-5	38.4	32.70	TBD
BS-6	45.4	32.70	4.5
FY-1	17.0	23.67	TBD
FY-2	-	-	TBD
FY-3	-	-	TBD
FY-4	-	-	11.1[b]
FY-5	-	5.8	TBD
FY-6	-	5.8	10.5
A-1	20.9	4.5	44 – 180
A-2	-	-	TBD
A-3	-	-	TBD
A-4	20.9	4.5	<1 taf[b]
A-5	20.9	4.5	TBD
A-6	20.9	4.5	1

[a]Source: CALFED Water Use Efficiency Draft Details of Quantifiable Objectives (December 2000).

[b]Plus additional water generated through reduction in application through improved irrigation systems.

SECTION 5.0

Identification of Actions to Implement and Achieve Proposed Quantifiable Objectives

Section 5.0 revisions to the RWMP are highlighted below in shaded text. An update of all previously identified projects was completed, and any new projects identified by the SRSCs since the completion of the initial RWMP were added, including description, schedule, budget, and funding sources.

The SRSCs are in the process of implementing water measurement compliance programs to comply with state and/or federal requirements. Implementation of these programs is anticipated to consume resources that may have otherwise been available to implement proposed actions.

5.1 Redding Sub-basin

Table 5-1 lists and describes potential projects in the Redding Sub-basin.

TABLE 5-1
Potential Projects in the Redding Sub-basin
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Title	District	Sub-basin	Description	Potential QO (ac-ft)	Applicable TBs
ACID Churn Creek Lateral Improvements Project	ACID	Redding	Construct a pipeline to replace a leaky canal lateral in a section east of the Sacramento River.	8,700	R-2, R-3
ACID Main Canal Modernization Project[a]	ACID	Redding	Automate the system to reduce spills.	20,000	R-2, R-4
ACID Conjunctive Water Management Program[a]	ACID	Redding	Construct two groundwater extraction wells.	5,600	R-2, R-4
ACID Olney Creek Watershed Restoration Project	ACID	Redding	Replace existing hydraulic structure with an inverted siphon.	2,100	R-2
Cottonwood Creek Fish Passage Improvement and Siphon Replacement Project[a]	ACID	Redding	Replace siphon crossing beneath Cottonwood Creek.	8,900	R-1
System Improvement Program[a]	ACID	Redding	Replace degraded pipelines and pipe laterals and canals subject to leakage.	4,000	R-2, R-3
Clear Creek Siphon Rehabilitation Project	ACID	Redding	Repair and stabilize portion of existing siphon beneath Clear Creek.	5,400	R-2

[a]Project has been fully or partially implemented as described in the following sections.

5.2 ACID Churn Creek Lateral Improvements Project

5.2.1 Project Description

ACID proposes to improve its Churn Creek lateral system to increase water delivery and on-farm use efficiencies. The project will have an estimated water savings of up to 8,700 ac-ft and enable landowners to more efficiently apply water. By improving the ACID delivery system, landowners could modify on-farm water application systems from flood irrigation to sprinkler irrigation. Sprinkler irrigation under existing delivery conditions is not viable, but landowners might potentially apply three to four times less water with sprinkler irrigation.

A new pipeline will be the key component to a new pressurized system to serve the Churn Creek Bottom area and replace the existing unlined open ditch. A pressurized system will allow landowners, if feasible to their operations, to modify irrigation practices to significantly reduce water consumption. ACID has been working with Reclamation to introduce a sprinkler pilot program in this area of the District. The new pipeline would extend from the pumping plant on the Sacramento River, eastward to the current junction box structure at Smith Road. This pipeline would replace three canal laterals and extend along the current alignment of these laterals. Additionally, a canal lateral that begins immediately east of Interstate 5 would be replaced with a pipeline. In total, 14 miles of pipeline would be installed, 1.4 miles to replace the existing Churn Creek lateral and 12.6 miles of appurtenant laterals.

This project would also upgrade the current pumping station, located on the Sacramento River, to provide adequate pressure and flow. Two options will be examined for this upgrade. The first option would be to upgrade the existing pumps to provide gravity flow to turnouts located on the lateral. This option includes installing pumps at each turnout to supply the desired pressure and flow for sprinkler systems. The other option is to replace or expand the existing pumps at the pump station to provide necessary pressure and flow to all the ACID turnouts.

Conversion of the Churn Creek Lateral to a pressurized pipeline system as described above is an ambitious proposal that will be quite expensive, and for which no funds are currently available. ACID has developed a less ambitious interim proposal that would provide significant water savings and the achievement of Targeted Benefits. Phase 2A is currently unfunded but is more economically feasible than the pressurization of the system, and implementation, therefore, is more likely. This phase of the ACID Churn Creek Lateral Improvements Project will include the lining of approximately 0.5 mile of the upper portion of ACID's Churn Creek lateral in an area of high soil porosity, and could be implemented in phases as funding is available. The canal prism, including the side slopes and invert, would be shaped, smoothed, and compacted prior to lining. Two options for lining have been considered for feasibility and cost: (1) a rubber polymer geomembrane lining or (2) fiber-reinforced concrete lining, which is the preferred alternative. ACID is continuing its efforts to develop funding for this project.

Targeted Benefits for this project are listed in Table 4-6.

5.2.2 Schedule

The project schedule shown in Table 5-2 will commence upon appropriation of funding. The proposed schedule assumes that funding requests and appropriations occur within one phase. This project would likely be completed in several phases. Depending on the actual availability of funding, the implementation timeframe for completion of tasks could extend beyond the schedule shown in Table 5-2.

TABLE 5-2
ACID Churn Creek Lateral Improvements Project Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	**Project Status – Ongoing and Completed Work**
Feasibility	Phase 1 (feasibility study) was completed in 2003; given project conditions and assumptions have changed to some degree, an update of the current feasibility study would be required before commencing design.
Pilot Program	Conversion from flood to sprinkler irrigation, funded by Reclamation, was implemented between 2005 and 2007 on a voluntary basis by District customers.
Environmental Document	A programmatic draft environmental impact report was completed in January 2007, but has not been adopted by the Shasta County Water Agency. Supplemental documentation and permitting is expected to be required during design.
Phase 2A	Phase 2A has not been implemented because of lack of funding. Attempts to secure funding are ongoing.

Project Duration – Work to be Completed (Buildout)

5.2.3 Cost and Funding Sources

The estimated cost for the ACID Churn Creek Lateral Improvements Project feasibility study was $144,000. ACID received funding for the study through the Department's Agricultural Water Use Efficiency Program funded through State Proposition 50. As a result, preliminary findings for lateral improvements were developed. In addition, ACID has worked with Reclamation to fund phased improvements along the upper end of the Churn Creek lateral (see description of Phase 2A). In 2007, Reclamation awarded $30,000 funding to ACID, combined with local cost share, to improve 300 feet of the lateral. The project was delayed because of technical and easement issues, and this funding expired prior to implementation.

ACID continues to work with the Department to find ways to partner on projects that will result in improved management and efficiencies within the Churn Creek lateral system. Prior to the budget crisis and subsequent freeze on California bond funding, the Department had been responding favorably to the idea of continued funding for this project.

ACID sought funding to complete a portion of this project in 2011 through the Reclamation WaterSMART program, but the application was unsuccessful; efforts to develop funding will continue.

Funding sources are listed in Table 4-6.

5.3 ACID Main Canal Modernization Project

5.3.1 Project Description

In 2000, ACID recognized a need to improve its delivery system. In 2002, ACID completed a feasibility study in partnership with the Department that identified high-priority improvements for its Main Canal system. ACID is following through with its commitment to improve the efficiency of its system and is continuing to work in conjunction with the state to implement these system improvements in a phased approach. To conserve water and more efficiently use its surface water resource, ACID has identified the following five primary improvements:

- Lining of five high-seepage canal segments (approximately 2 miles of the 35-mile earthen Main Canal)
- Installation of five new automated check structures to provide much-needed (and currently lacking) water surface elevation control
- Installation of 12 new, automated turnouts with measurement flumes
- Replacement of two creek crossings to hydraulically separate the Main Canal from Olney Creek and Crowley Gulch
- Repair of two inverted siphon creek crossings at Clear Creek and Cottonwood Creek

These improvements, resulting in significantly better operational control, could also result in a combined estimated annual water savings of up to approximately 20,000 ac-ft when completed.

Targeted Benefits for this project are listed in Table 4-6.

5.3.2 Schedule

Preliminary design was completed for several of the above projects, and three of the projects were chosen for final design based on system priority and available funding: replacement of the Crowley Gulch crossing with an inverted siphon and two automated check structures. Bids were received in August 2011 and the Crowley Gulch siphon project was chosen for construction based on the bids and available funding.

TABLE 5-3
ACID Main Canal Modernization Project Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	Project Status – Ongoing and Completed Work
Feasibility Study	Completed.
Environmental Document, Phase 1	Environmental document is complete.
Permitting, Phase 1	Permitting is complete.
Final Design, Phase 1	Final design is complete.
Construction, Phase 1	Construction of the Crowley Gulch Siphon began in April 2012 and was completed in October 2012.

	Project Duration – Work to be Completed (Future Phases)											
	Year 1				Year 2				Year 3			
	1	2	3	4	1	2	3	4	1	2	3	4
Final Design, Buildout												
Environmental Documentation and Permitting, Buildout												
Construction, Buildout												

5.3.3 Cost and Funding Sources

The estimated construction cost for the ACID Main Canal Modernization Project was $10.8 million in 2002. This order-of-magnitude cost was determined as part of a feasibility study (Phase 1A, April 2002). Using a standard assumption of 4 percent escalation, this project is now estimated to cost approximately $12.3 million. The cost estimate will be refined during final design. ACID is seeking grant monies through the state to implement future phases of this project. Phase 1 of the project has been funded jointly by ACID and the Department through the Agricultural Water Use Efficiency Program for a total of $1,775,000. Phase 1 construction was completed in October 2012.

Funding sources are listed in Table 4-6.

5.3.3.1 Monitoring

Post-project conditions consider the benefits associated with the replacement of the Crowley Gulch crossing. Replacement of the existing deteriorating structure has prevented losses that do not contribute to beneficial use. Furthermore, implementation of the project has restored a more natural flow course by siphoning canal deliveries beneath Crowley Gulch. The project is functioning as planned, and the anticipated benefits have been realized.

ACID estimated the pre-project conveyance losses at Crowley Gulch to be about 5 cfs throughout the irrigation season. In the absence of pre-project flow data in Crowley Gulch, downstream of the project site, it is not possible to quantify system losses except through estimates based on the water balance and visual observations.

Since completion of the project and the introduction of irrigation flows through the siphon in September 2012, no observable system losses are present at this location. Irrigation deliveries through this conveyance facility occur approximately 180 days per year. Assuming pre-project losses of 5 cfs, the resulting volume of water conserved is 1,785 ac-ft.

5.4 ACID Conjunctive Water Management Program

5.4.1 Project Description

ACID is advancing a conjunctive water management program that would responsibly and efficiently develop a generally underused groundwater basin that is subject to extensive natural recharge. As an active participant on the Redding Area Water Council and in the SVWMP, ACID recognizes the need to conjunctively manage surface water and ground-water resources to meet projected regional demands and satisfy the Phase 8 Settlement Agreement.

The project would supply water to meet peak demands during drought years, and it could provide additional benefits during normal and wet years. Any solution to water supply and reliability needs here, in the area of origin, would potentially result in water supply, water quality, and environmental benefits to the Redding Sub-basin and the Bay-Delta region.

ACID has a Sacramento River diversion and an extensive conveyance system throughout the west side of the Redding Sub-basin, which overlies a highly productive aquifer. This combination of attributes offers ACID a unique opportunity to provide regional solutions to the sub-basin, which does not meet projected water supply demands in dry years, especially during CVP cut-back years. The ACID Conjunctive Water Management Program would accomplish the following goals and objectives:

- Establish a groundwater monitoring network (This effort is underway. ACID works with the Department to monitor 13 existing groundwater monitoring wells and continues to seek additional funding for expansion of the monitoring network.)
- Establish a groundwater production program that, in Phase 1, would provide up to 5,600 ac-ft/yr of supplemental water supply to offset surface water diversions from the Sacramento River
- Satisfy the water supply and reliability needs of agricultural water users in the ACID service area
- Help satisfy the water supply and reliability needs of in-basin water users in the Redding Basin Water Resources Management Plan
- Contribute to the Sacramento Valley Water Management Agreement

Targeted Benefits for this project are listed in Table 4-6.

5.4.2 Schedule

The project schedule shown in Table 5-4 will commence upon appropriation of funding.

TABLE 5-4
ACID Conjunctive Water Management Program Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	Project Status – Ongoing and Completed Work
Install Groundwater Monitoring Infrastructure	Continues; 13 monitoring wells are currently installed, providing baseline data for effective basin water management; data are collected by Department Northern District staff.
Feasibility and Pre-design	Completed; potential well locations were identified in 2000.
Groundwater Management Planning	Ongoing since the late 1990s.
Environmental Document	The final Environmental Assessment/Initial Study and Finding of No Significant Impact/Mitigated Negative Declaration was approved in November 2011.
Construction	Construction of two groundwater production wells was completed in August 2012, and the pumping stations will be completed in May 2013.

	Project Duration – Work to be Completed											
	Year 1				Year 2				Year 3			
	1	2	3	4	1	2	3	4	1	2	3	4
Final Design												
Permitting												
Construction												
Implementation	For at least 10 years, assuming there is no demonstrated impact to sustainability.											

Environmental assessments and documentation for this project were initiated in early 2011 to provide both state and federal compliance for the construction of two groundwater production wells. A new groundwater model – REDFEM – was developed by ACID and CH2M HILL to analyze potential impacts of the project and to provide supporting documentation for the California Environmental Quality Act and National Environmental Policy Act analyses. Reclamation produced a Finding of No Significant Impact and ACID produced a Mitigated Negative Declaration that were released for public review in September 2011. The documents were approved in November 2011.

Bids were received and a contractor chosen in May 2012; permitting was completed and construction initiated in June 2012. Construction of two groundwater production wells with a combined capacity of 6,000 gallons per minute was completed in August 2012. Provision of commercial power service to both sites was completed in November 2012, and the pumping stations were completed in May 2013. Additional wells and pump stations may be constructed in the future as funding allows.

5.4.3 Cost and Funding Sources

The cost for the development of the ACID Conjunctive Water Management Program is estimated to be $3.2 million. ACID sought public assistance to implement this program

through the Northern California Joint Exercise of Powers Proposition 50 Integrated Regional Water Management Implementation Grant.

ACID received $1,400,000 through the Proposition 50 Integrated Regional Water Management Implementation Grant for the construction of two groundwater production wells. Local cost-share requirement is approximately 10 to 15 percent of the total cost. Federal funding made available by Reclamation is being used to reimburse the local cost shares. Reclamation funding of project components is $185,000.

Funding sources are listed in Table 4-6.

5.4.3.1 Monitoring

Construction of the two groundwater production wells was completed in May 2013. The production well output will be monitored and documented in future updates to this RWMP.

5.4.4 ACID Olney Creek Watershed Restoration Project

5.4.4.1 Project Description

ACID proposes with its project partners to remove the Olney Creek structure, siphon the ACID Canal under the creek, and improve the Olney Creek banks.

At the intersection of the ACID Main Canal and Olney Creek, an approximate 80-year-old structure exists that was intended to convey ACID irrigation water above the creek bed during the irrigation season and flood flows from Olney Creek in the winter. Flow through the structure is directed by placing (or removing) flashboards on all four sides of the rectangular structure. The configuration of the structure and the use of the flashboards leave the structure subject to vandalism, resulting in unwanted spills and public safety issues. From a hydraulic and hydrologic standpoint, the configuration is undesirable, resulting in inefficient deliveries and spills to the creek that can cause unnaturally high flows during dry summer months and, in some cases, false attraction and subsequent stranding of salmon in otherwise dry or warmwater streams.

Furthermore, the canal banks have deteriorated to the point that they no longer provide adequate protection to residential areas in low-lying downstream areas. In the winter of 2005-2006, more than 20 mobile homes in a mobile home park incurred several feet of flood damage (ranging from 6 inches to 5 feet) due to a low point in an approximate 150-foot reach between a 1,900-foot levee and the ACID Main Canal.

ACID is working in cooperation with local and regional partners, including USFWS, CDFG, and the McConnell Foundation to help restore and rehabilitate the Olney Creek floodway in the vicinity of the creek's intersection with the ACID Main Canal.

The objectives for the ACID Olney Creek Watershed Restoration Project are as follows:

- Provide flood damage reduction through bank restoration to provide 25-year flood protection to more than 20 homes of a disadvantaged community downstream of a deteriorated creek bank.
- Restore the natural creek bed by hydraulically separating the ACID Main Canal from Olney Creek (i.e., siphoning the canal under the creek).

- Lessen public safety concerns by removing a potentially dangerous structure that is often vandalized during the irrigation season and rainy season.
- Prevent the conveyance of flood flows to areas outside of the Olney Creek watershed by hydraulically separating the creek from the canal.
- Prevent unnatural fish attraction flows within the creek caused by unintended canal spills, yet allow controlled flows as desired by the resource agencies by installing a turnout from the canal to the creek.
- Prevent debris buildup that can negatively affect water quality.

The total water loss can be up to 2,100 ac-ft/yr. Targeted Benefits for this project are listed in Table 4-6.

5.4.4.2 Schedule

The proposed schedule is shown in Table 5-4A.

TABLE 5-4A

ACID Olney Creek Watershed Restoration Project Schedule

2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	**Project Status – Ongoing and Completed Work**											
Administrative	Attempts to secure funding have so far been unsuccessful, but are ongoing as opportunities arise.											
	Project Duration – Work to be Completed											
	Year 1				**Year 2**				**Year 3**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Final Design												
Environmental Documentation												
Construction												

5.4.4.3 Cost and Funding Sources

This project has great appeal to several resource agencies because of the myriad of regional benefits. This project unsuccessfully sought funding from the Department in a grant round in 2008 through the watershed and parks and trails divisions, at which time the overall project cost estimate was $1.7 million. ACID subsequently recruited several partners for this project including USFWS, CDFG, the McConnell Foundation, and local landowners to seek alternative funding sources. In 2009, ACID partnered with an adjoining landowner and the Sacramento Watersheds Action Group for submittal of a project proposal for Proposition 84 funding. This proposal was also unsuccessful. ACID remains committed to seeking available funding sources for this project.

Funding sources are listed in Table 4-6.

5.4.5 Cottonwood Creek Fish Passage Improvement and Siphon Replacement Project

5.4.5.1 Project Description

The Cottonwood Creek siphon is a 48-inch-diameter inverted siphon, built around 1920, that carries the ACID Main Canal beneath Cottonwood Creek. The Cottonwood Creek Fish Passage Improvement and Siphon Replacement Project, completed in November 2010, replaced a 200-foot section of the existing siphon with a new siphon of similar size placed at a depth 8 feet below the original structure. Because the siphon had become exposed in the active stream channel due to streambed degradation, the regulatory agencies felt it was a potential impediment to passage of anadromous fish species.

This project improved the physical habitat for all life stages of anadromous fish, and the opportunity for adult fish to reach their spawning habitats in a timely manner, and restored natural channel and riparian habitat values. This project improved aquatic ecosystem conditions in Cottonwood Creek by removing a potential flow impediment. From ACID's perspective, the project also replaced an aged concrete pipeline that had been compromised due to its exposure in the active stream channel to sediment scouring and debris impacts, resulting in the avoidance of potential catastrophic failure.

Targeted Benefits for this project are listed in Table 4-7.

5.4.5.2 Schedule

The project schedule for funding is shown in Table 5-4B.

TABLE 5-4B
Cottonwood Creek Fish Passage Improvement and Siphon Replacement Project Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	**Project Status – Ongoing and Completed Work**
Administrative	Secured partial funding from USFWS in 2009.
Environmental and Permitting	Completed environmental compliance and permitting in late 2010.

	Project Duration – Work to be Completed											
	Year 1				**Year 2**				**Year 3**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Engineering												
Permitting												
Mobilization/Monitoring												

5.4.5.3 Cost and Funding Sources

This proposal was submitted in June 2008, for funding through the USFWS Anadromous Fish Restoration Program. The proposal was not awarded funding, but District management

was informed that this project had been moved to near the top of the Program's priority list for fiscal year 2009, and was awarded $130,000 in 2009.

All environmental compliance and permitting were completed in January through October 2010, and construction began in October 2010. Substantial completion of the project was achieved in November 2010 at a total cost of just over $400,000.

Funding sources are listed in Table 4-7.

5.4.5.4 Monitoring

ACID is satisfied that the estimated water savings for this project has been achieved. This determination is based on monitoring the Cottonwood Creek gaging station, located downstream of the siphon. In early October 2010 (pre-project), while water deliveries were conveyed through the siphon, the gaging station reported creek flows at approximately 105 cfs. Immediately following dewatering of the Main Canal and siphon, creek flows at the gaging station decreased to about 80 cfs. The difference in flow rate indicated that losses from the siphon, which had been contributing to in-stream flows, were approximately 25 cfs.

The Main Canal conveys water for approximately 180 days per year. Assuming pre-project losses of 25 cfs, the resulting volume of water conserved is 8,926 ac-ft.

5.4.6 System Improvement Program

5.4.6.1 Project Description

In 2008, ACID began a System Improvement Program to replace degraded or inefficient pipelines and to pipe earthen laterals and canals that were subject to leakage. Through October 2012, implementation of this Program resulted in the installation of approximately 6,000 linear feet of pipe, varying in size from 15- to 48-inch-inside diameter. A summary of the completed projects is provided in Table 5-4C.

TABLE 5-4C
System Improvement Program – Completed Projects
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Description	Diameter (inch) by Length (ft)
Lateral 29 – Perry's Pond	24 by 860
Clear Creek Siphon	Repair
Spring Gulch Flume – support pillar	Repair
Anderson Creek Arch Flume	Repair
Lateral 29 – west of Balls Ferry/Lone Tree Roads	24 by 160
Lateral 37 – south of Adobe Road	24 by 30
Lateral 35 – north of Balls Ferry/Adobe Roads	24 by 370
Lateral 37 – Adobe Road	18 by 440
Lateral 21 – southwest of Rupert Road	24 by 300
Lateral 27, east of Hawes Road	18 by 300

TABLE 5-4C
System Improvement Program – Completed Projects
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Description	Diameter (inch) by Length (ft)
Cottonwood Creek Siphon[a]	48 by 200
Crowley Gulch	72 by 125
Crowley Gulch	36 by 145
Lateral 21, between Deschutes Road and Gaines Lane	24 by 300
Pick-up Ditch	24 by 100
Lateral 33	18 by 80
Clear Creek Siphon	Study
Lateral 29.2, south of Kimberly Road	24 by 550
Lateral 33.2, Spoon Lane	18 by 120
Lateral 35, south of Venske Road	18 by 560
Lateral 41, north of 4th Street	18 by 140
Lateral 33, Webb Road	15 by 720
Lateral 37, east of Adobe Road	18 by 80
Lateral 2, Cedars Road	24 by 200
Drain Siphon, Main Canal at Eastside Road	18 by 20
March 2009, Lateral 21.3[b]	24 by 40
July 2009[b]	18 by 40
October 2009[b]	15 by 40
November 2009[b]	36 by 20

[a]The Cottonwood Creek Fish Passage Improvement and Siphon Replacement Project was implemented with partial funding and support from USFWS, in which 200 feet of 48-inch-diameter pipeline that had become exposed in the creek channel due to streambed degradation was replaced at a depth 8 feet below the streambed. The purpose of the project was to replace the damaged and leaking pipe and re-bury the siphon to improve fish passage; Cottonwood Creek provides critical habitat to numerous anadromous fish species.

[b]Unlisted installations/repairs.

5.4.6.2 Cost and Funding Sources

The cost of the program to date is approximately $2.46 million. Of this total, approximately $590,000 was paid directly from ACID reserve funds; $470,000 was provided by District labor and equipment; and the remainder was provided by non-District funds.

Funding sources are listed in Table 4-6.

5.4.6.3 Monitoring

There are no specific monitoring plans associated with the System Improvement Program.

5.4.7 Clear Creek Siphon Rehabilitation Project

5.4.7.1 Project Description

The ACID Clear Creek Siphon Rehabilitation Project will include the replacement of an existing siphon pipeline that crosses Clear Creek. The existing siphon is cast-in-place concrete constructed circa 1917, and the in-stream reach would be replaced using modern pipeline rehabilitation methods – either slip-lining, mesh/resin cast-in-place pipe, or a bridged pipe. Upslope bank stabilization and habitat restoration is an additional component of the project. Project funds would be used for materials and construction activities. This proposed project would use proven lining materials and technology to improve conveyance infrastructure and conserve water that is currently lost to leakage and seepage. In addition, benefits to endangered species would be provided by improvement of the Clear Creek in-stream habitat, restoration of upslope areas resulting in improved riparian habitat, erosion control, vegetation management, and availability of additional water.

ACID is likely to implement this project in two phases: (1) repair and rehabilitation of the upslope reach of pipe and (2) rehabilitation of the in-stream reach of pipe. Plans are being formulated to excavate eroded soils adjacent to the upslope section, repair all leaking joints, and replace and re-compact the excavated soils in fall 2013. This work will be undertaken with funding from District reserve funds. The in-stream repair plans are still being studied for technical feasibility, and the development of funding is ongoing.

5.4.7.2 Schedule

The project schedule is shown in Table 5-4D.

TABLE 5-4D
Clear Creek Siphon Rehabilitation Project Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	Project Status – Ongoing and Completed Work
Administrative	Began project development in 2011: completed surveys; feasibility study; technical memoranda; regulatory and technical consultations; preliminary design; preliminary contract cost quotations; and grant funding applications.
Environmental and Permitting	Completed preliminary regulatory consultations.
Construction	Phased approach: (1) Upslope repairs and stabilization in fall 2013. (2) In-stream rehabilitation, pending design and development of funding.

	Project Duration – Work to be Completed											
	Year 1				Year 2				Year 3			
	1	2	3	4	1	2	3	4	1	2	3	4
Engineering												
Permitting/Environmental Assessment												
Construction												

5.4.7.3 Cost and Funding Sources

The overall project cost is estimated at $1.75 million ($200,000 for Phase 1 and $1.55 million for Phase 2). ACID is planning to implement Phase 1 in fall 2013 using District reserves, and has been actively seeking funding for Phase 2 through both state and federal sources. ACID has not received any outside funding support; however, the District will continue to pursue project funding sources.

5.5 Colusa Sub-basin

Table 5-5 lists and describes potential projects in the Colusa Sub-basin.

TABLE 5-5
Potential Projects in the Colusa Sub-basin
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Title	District	Sub-basin	Description	Potential QO (ac-ft)	Applicable TBs
GCID Water Conservation and Management Project	GCID	Colusa	GCID Water Conservation and Management Project implementation. The project includes a water distribution system SCADA system expansion and Ethernet upgrade, and Main Canal and Main Pump Station automation. Replacement and modernization of three older checks with new automated main canal checks. SCADA integration with drain outflow measurement and recapture stations.	40,000	C-1, C-5, C-6, C-8
GCID Conjunctive Water Management Program	GCID	Colusa	Development of a ground-water program consistent with GCID and regional objectives, inclusive of both groundwater monitoring and extraction. Extraction could result from pumping of privately owned and/or up to 16 District wells.	30,000	C-1, C-5, C-6, C-8
GCID Drain Water Outflow Measurement Program[a]	GCID	Colusa	Construct 12 flow measurement sites with telemetry dedicated to the measurement of GCID system outflows. Construct an automated inflatable steel gated weir on the Colusa Basin Drain to measure flows made available by upslope irrigation districts for supply to water users downstream of the weir. The weir can aid in maximizing year-round diversions to crops and wildlife habitat.	10,745	C-1

TABLE 5-5
Potential Projects in the Colusa Sub-basin
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Title	District	Sub-basin	Description	Potential QO (ac-ft)	Applicable TBs
GCID Main Canal Milepost 35.6 Regulating Reservoir Project	GCID	Colusa	GCID proposes to regulate peak flows in the Main Canal and dampen flow fluctuations by constructing a 500-ac-ft regulating reservoir at Main Canal M.P. 35.6 right. The reservoir facilities will include a pump station on the Main Canal, an outlet control system, and flow volume instrumentation.	500	C-1, C-5, C-6, C-8
RD 108 Strategic Plan for Groundwater Resources Characterization	RD 108	Colusa	A comprehensive review of past studies and data covering the area in and around the District to identify the approach the District should take to gain a better understanding of the groundwater basin.	0	C-5, C-6, C-8
RD 108 Conjunctive Water Management Program[a]	RD 108	Colusa	Installation of up to three production wells for groundwater management program.	8,000	C-1, C-5, C-6, C-8
RD 108 Flow Control and Measurement Project[a]	RD 108	Colusa	Replace flashboard checks with long-crested weirs, an ITRC flap gate, and Rubicon flume gates.	2,000	C-1, C-5, C-6, C-8
RD 108 Northern Area Groundwater Study[a]	RD 108	Colusa	Characterize the groundwater system underlying the northern portion of the District.	0	C-5, C-6, C-8
RD 108 Recycled Water Improvement Project[a]	RD 108	Colusa	Increase capacity of existing recycled water pump stations.	15,000	C-1, C-5, C-6, C-8
RD 108 Recycled Water Management Project[a]	RD 108	Colusa	Improve the operations and management of three existing recycled water pump stations.	4,000	C-1, C-5, C-6, C-8
RD 108 Irrigation Scheduling Program[a]	RD108	Colusa	Develop software to help growers improve their irrigation efficiency by using weather and soil moisture information to predict crop water needs.	5,500	C-1, C-5, C-6, C-8
RD 108 Rice Water Conservation Program[a]	RD 108	Colusa	Implement a program that offers rice growers rebates to reduce or eliminate tailwater during the maintenance period of rice cultivation.	5,000	C-1, C-5, C-6, C-8
PCGID Conjunctive Water Management Program	PCGID	Colusa	Development of a conjunctive water management program.	5,000	C-1, C-5, C-6, C-8
PID Conjunctive Water Management Program	PID	Colusa	Development of a conjunctive water management program.	5,000	C-1, C-5, C-6, C-8

[a]Project has been fully or partially implemented as described in the following sections.

Note:

M.P. = milepost

5.6 GCID Water Conservation and Management Project

5.6.1 Project Description

This project is expected to conserve a maximum of 40,000 ac-ft of water annually.

GCID proposes to automate its main canal structures to increase water use efficiency. Operational spills would be reduced by automated water level control and replacing three old check structures on the main canal.

Further improvements include upgrading GCID's telemetry to a spread spectrum ethernet system, developing software for canal gate operation, standardizing software, installing sensors, providing mobile SCADA units and upgrading the central office hardware.

When possible, construction occurs outside of the irrigation season. The main canal conveys water year-round; however, many of the laterals do not require year-round deliveries. Canal bypasses would maintain main canal flows and deliveries during construction.

Targeted Benefits for this project are listed in Table 4-6.

5.6.2 Schedule

The project schedule shown in Table 5-6 will commence upon appropriation of funding. The construction of this project will be executed in phases and is not expected to be completed in its entirety within the duration of this RWMP.

TABLE 5-6
GCID Water Conservation and Management Project Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	**Project Status – Ongoing and Completed Work**
Feasibility and Pre-design	Completed as part of the wildlife refuge water supply.
Environmental Document	Programmatic document is completed; supplemental documentation and permitting is expected to be required during design.
Implementation	Implementation is in final stages and expected to be completed by 2015.

	Project Duration – Work to be Completed											
	Year 1				**Year 2**				**Year 3**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Final Design												
Supplemental Environmental Documentation and Permitting												
Implementation												

5.6.3 Cost and Funding Sources

The estimated construction cost for all phases of the GCID Water Conservation and Management Project was $8.7 million in 2001. Using a standard assumption of 4 percent escalation, this project is now estimated to cost approximately $11.9 million. GCID received

$2.7 million for automation and SCADA upgrades through California State Proposition 50 Grants. The development and implementation of this program will be documented in future updates to this RWMP.

Funding sources are listed in Table 4-6.

5.7 GCID Conjunctive Water Management Program

5.7.1 Project Description

GCID is moving forward with the expansion and development of an existing conjunctive water management program. GCID has evaluated the need for conjunctive management of its groundwater and surface water resource annually. In years of constrained surface water supply (due to infrastructure failures or drought years), GCID has worked with its land-owners to develop annual voluntary groundwater programs (e.g., the 2001 Forbearance Program). GCID is formalizing its groundwater programs into a conjunctive water manage-ment program that would provide for the coordinated operation of a network of existing and planned groundwater wells within the GCID service area. The system may be composed of private groundwater wells, five existing GCID wells, and up to 16 planned GCID wells. The total production capability of the program is expected to be approximately 30,000 ac-ft of water per year. Implementation of the program would be flexible as prescribed in an operating plan (to be developed), allowing the water to be produced in various scenarios.

Targeted Benefits for this project are listed in Table 4-6.

5.7.2 Schedule

The project schedule shown in Table 5-7 will commence upon appropriation of funding.

TABLE 5-7
GCID Conjunctive Water Management Program Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	Project Status – Ongoing and Completed Work
Install Groundwater Monitoring Infrastructure	In progress since the 1990s with Glenn County and more recently with SVWMP and Colusa County.
Installation of Groundwater Production Infrastructure	In progress; one well installed in 2005 as part of a pilot program. Three additional test wells were installed in 2010 as part of the Lower Tuscan Aquifer Study program.
Groundwater Management Planning	Ongoing since late 1990s.
Environmental Document	In progress; to be completed upon completion of pumping tests to analyze any significant impact to aquifer.

	Project Duration – Work to be Completed											
	Year 1				Year 2				Year 3			
	1	2	3	4	1	2	3	4	1	2	3	4
Final Design												
Permitting												
Construction												
Implementation	→ For at least 10 years, assuming there is no demonstrated impact to sustainability.											

5.7.3 Cost and Funding Sources

The cost for the development of the GCID Conjunctive Water Management Program is estimated to be $17.2 million. GCID is seeking grant funding to assist with implementation; however, program costs are anticipated to be assessed to GCID's landowners. The development and implementation of this program will be documented in future updates to this RWMP.

Funding sources are listed in Table 4-6.

5.8 GCID Colusa Basin Drain Regulating Reservoir Project

5.8.1 Project Description

Project description has been removed because GCID is no longer pursuing implementation of this project.

5.8.2 Schedule

Project schedule has been removed because GCID is no longer pursuing implementation of this project.

5.8.3 Cost and Funding Sources

Project budget has been removed because GCID is no longer pursuing implementation of this project.

5.8.4 GCID Drain Water Outflow Measurement Program

5.8.4.1 Project Description

GCID has completed construction of 12 flow measurement sites with telemetry that are dedicated to the measurement of GCID system outflows. This project would improve water management within GCID and, conceivably, throughout the sub-basin.

Only daily measurements were collected at the 12 locations where approximately 75 percent of drain water leaves the District. Upgrading to continuous measurements allows water operators to manage diurnal flow fluctuations to save an estimated 30 percent of the current main canal and lateral spills. This would result in an estimated savings of up to 15,000 ac-ft annually.

An additional project for this measurement program was to construct an automated crest control gate on the Colusa Basin Drain at its approximate north to south midpoint. This measuring site will measure flows made available by upslope irrigation districts for supply to water users downstream of the weir and provide information to refine the Colusa Sub-basin water balance.

The weir can aid in maximizing year-round diversions to crops and wildlife habitat.

5.8.4.2 Schedule

The project was completed in 2011.

5.8.4.3 Cost and Funding Sources

GCID sought funding through a Reclamation Water Conservation Grant in June 2007. The total project cost was estimated at $200,000 and would be split evenly between Reclamation and GCID. Construction was completed with higher than anticipated costs. The Colusa Basin Drain weir added an additional $500,000 to the project cost.

Funding sources are listed in Table 4-7.

Monitoring.

Measured drain water outflow, since completion of the measurement program (2012 was the first full season of post-project measurement data), is shown in Table 5-8. Initial results indicate the water savings resulting from implementation of the 12 flow measurement sites is approximately 6,900 ac-ft for the year of measurement. Drain water outflow will continue to be monitored, and the water savings is anticipated to fluctuate in response to weather conditions (such as, ambient temperature, wind, and precipitation), cropping patterns, cropped acreage, and changes in irrigation cultural practices.

TABLE 5-8
GCID Drain Water Outflow Measurement Program – Flow Measurement Sites
2012 Sacramento Valley Regional Water Management Plan Annual Update

Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
2011	9,444	35,332	36,079	35,941	45,988	32,247	9,768	204,799
2012	9,512	22,789	29,739	36,866	48,944	39,378	10,671	197,899
							Water Savings	6,900

Note:
Values are in ac-ft.

The installation of a crest control gate has resulted in the ability to maintain a constant water level at the recapture pump station and, therefore, increased utility of the recapture facility. Table 5-8A shows the recorded volume of water recaptured before and after the crest control gate was installed. Initial results indicate a water savings of approximately 3,845 ac-ft.

TABLE 5-8A
GCID Drain Water Outflow Measurement Program – Crest Control Gate
2012 Sacramento Valley Regional Water Management Plan Annual Update

Year	Recapture Volume (ac-ft)
Pre-project Average (2002 through 2010)	14,626
2011	16,509
2012	20,433
Post-project Average	18,471
Water Savings	3,845

5.8.5 GCID Main Canal Milepost 35.6 Regulating Reservoir Project

5.8.5.1 Project Description

GCID proposes to help regulate peak flows in the Main Canal and dampen fluctuations in flow by constructing a 500-ac-ft regulating reservoir. The reservoir facilities will include a pump station on the Main Canal, an outlet control system, and flow volume instrumentation. This project is currently in the feasibility stage and is not expected to be completed during the duration of this RWMP. The project will potentially provide the following benefits:

- Regulate Main Canal flows to increase water supply reliability (TBs C-5, C-6, C-7, and C-8)

Targeted Benefits for this project are listed in Table 4-6.

5.8.5.2 Schedule

To be determined and documented in future updates to this RWMP.

5.8.5.3 Cost and Funding Sources

To be determined and documented in future updates to this RWMP.

Funding sources are listed in Table 4-6.

5.8.6 RD 108 Strategic Plan for Groundwater Resources Characterization

5.8.6.1 Project Description

RD 108 performed a comprehensive review of past studies and data covering the area in and around the District, and a summary of the state of understanding of the groundwater system underlying the District was prepared. This information was used to identify opportunities for improving the understanding of the groundwater system, and to develop guidelines for further studies. The purpose of the Strategic Plan is to identify the approach the District should take to gain a better understanding of groundwater resources within the District and the constraints or limitations to utilizing the resource consistent with the Basin Management Plan Objectives set forth in the Groundwater Management Plan.

5.8.6.2 Schedule

The project was completed August 2009.

5.8.6.3 Cost and Funding

The cost for the Strategic Plan was $30,000 and was funded solely by RD 108.

Funding sources are listed in Table 4-7.

5.9 RD 108 Conjunctive Water Management Program

5.9.1 Project Description

The RD 108 proposes to develop a conjunctive water management program that will provide the flexibility to pump and convey groundwater in lieu of some of its surface water supply. Initially, RD 108 will develop a groundwater project with a project capacity of up to 8,000 ac-ft per year. Three groundwater production wells would be located within the service area near RD 108's existing canals. Additionally, existing groundwater monitoring wells would be retrofit with dataloggers. The production wells would likely have capacities that range from 2,000 to 3,500 gallons per minute (gpm). The project originally called for five production wells, but was scaled down to three new groundwater wells given reduced grant funding availability. This project would help RD 108 meet the following objectives:

- Increase RD 108 water supply reliability and flexibility
- Increase in-stream flows during dry years
- Increase in-basin water supply reliability and flexibility
- Help satisfy the requirements of the Phase 8 Settlement Agreement

Targeted Benefits for this project are listed in Table 4-6.

5.9.2 Schedule

The project schedule shown in Table 5-9 will commence upon appropriation of funding.

TABLE 5-9
RD 108 Conjunctive Water Management Program Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	**Project Status – Ongoing and Completed Work**
Install Groundwater Monitoring Infrastructure	12 monitoring wells are currently installed by the Department, numerous multi-completion monitoring wells in Colusa and Yolo Counties.
Pre-design	Complete.
Groundwater Management Plan	Completed in 2006; update adopted November 2008; updated in 2013.
Environmental Document	Completed in 2010.
Construction	Construction of three production wells will be completed in 2014.

	Project Duration – Work to be Completed											
	Year 1				**Year 2**				**Year 3**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Construction												
Implementation					For at least 10 years assuming there is no demonstrated impact to sustainability.							

5.9.3 Cost and Funding Sources

The cost for the development of the RD 108 Conjunctive Water Management Program is estimated to be $1.4 million. RD 108 received public assistance to implement this program through the SVWMP and California State Proposition 50 Grants. The development and implementation of this program will be documented in future updates to this RWMP.

Funding sources are listed in Table 4-6.

5.10 RD 108 Flow Control and Measurement Project

5.10.1 Project Description

RD 108 replaced flashboard checks with 23 long-crested weirs, one ITRC flap gate, and three Rubicon flume gates. Five acoustic velocity flowmeters were installed at strategic locations in the distribution canals, and approximately 80 farm turnouts were calibrated for improved flow measurement. The project improved water-level control and measurement, and provided simplified canal operation that resulted in approximately 2,000 ac-ft of water savings and $20,000 in pumping cost savings annually.

Targeted Benefits for this project are listed in Table 4-7.

5.10.2 Schedule

The project was completed December 2009.

5.10.3 Cost and Funding Sources

The total project cost for the RD 108 Flow Control and Measurement Project was $600,000. A Reclamation Water Use Efficiency Grant provided half of the cost.

Funding sources are listed in Table 4-7.

5.10.4 RD 108 Northern Area Groundwater Study

5.10.4.1 Project Description

This study will help characterize the groundwater system underlying the northern portion of the District and will include the following components:

- Inventorying wells within the area and compiling a database of this information
- Reviewing gas well geophysical logs and preparing a geologic cross section through the northern portion of the District
- Constructing a multiple-completion monitoring well near an existing production well
- Conducting aquifer testing, evaluating the data collected throughout the project
- Documenting all work and conclusions in a summary report

The information and understanding developed from this project will provide a technical basis for evaluating potential groundwater management actions and potential future projects in and around the northern portion of the District. Such projects could lead to increased flexibility in the source and timing of diversions.

5.10.4.2 Schedule

The project schedule is shown in Table 5-10A.

TABLE 5-10A
Northern Area Groundwater Study Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	Project Status – Ongoing and Completed Work											
	Project Duration – Work to be Completed											
	Year 1				Year 2				Year 3			
	1	2	3	4	1	2	3	4	1	2	3	4
Completed Inventory of Wells and Compiled Database												
Completed Geological Cross Section												
Completed Construction of Monitoring Wells												
Aquifer Testing completed in November 2012												
Report completed March 2013												

5.10.4.3 Cost and Funding Sources

Funding for this project was initially applied for under the AB 303 program; however, it was not accepted, and funding was approved under a Proposition 84 Grant. The total project cost is $276,000 with a District cost share of $31,000.

Funding sources are listed in Table 4-6.

5.10.5 RD 108 Recycled Water Improvement Project

5.10.5.1 Project Description

This project will increase the capacity of existing recycled water pump stations, resulting in conservation of both pumping energy and water diverted from the Sacramento River and a reduction of lower quality water pumped back to the river. Pumps and motors from three recently abandoned pump stations in the Sacramento River will be moved to the recycled water pump stations. Other improvements will include variable-frequency drives on certain recycled water pumps, flow measurement on pump discharges, and automation of turnouts delivering recycled water. It is estimated that this project will conserve 15,000 ac-ft/yr, reduce salinity of river return water by 15 percent, and reduce pumping costs by $80,000 per year. Actual water savings will be measured during the 2012 irrigation season.

5.10.5.2 Schedule

This project was completed February 2012.

5.10.5.3 Cost and Funding Sources

The total project cost for the RD 108 Recycled Water Improvement Project is estimated to be $1,200,000. A Proposition 50 Grant provided half of the cost.

Funding sources are listed in Table 4-7.

5.10.6 RD 108 Recycled Water Management Project

5.10.6.1 Project Description

This project improved the operations and management of three existing recycled water pump stations, resulting in conservation of both pumping energy and water diverted from the Sacramento River, and a reduction of lower quality water pumped back to the river. The improvements enhanced system performance by providing coordination and integration of recycled water pump stations with river diversions; providing remote monitoring and control of pump operations, water levels, and salinity levels; and preventing unscheduled pump shutdowns or pump damage from low water levels. Stilling wells were installed in the drains and canals for monitoring water levels, and salinity meters will be installed to help manage water quality. This project conserved 4,000 ac-ft/yr, reduced salinity of river return water by 4 percent, reduced pumping costs by $22,000 per year, and reduced operations cost by $5,000 per year.

5.10.6.2 Schedule

The project was completed December 2009.

5.10.6.3 Cost and Funding Sources

The total project cost for the RD 108 Recycled Water Management Project was $1,300,000. A Reclamation Water Conservation Field Services Grant provided $560,000.

Funding sources are listed in Table 4-7.

5.10.7 RD 108 Irrigation Scheduling Program

5.10.7.1 Project Description

This project will reduce both applied water and tailwater for a 10,000-acre area of non-rice crops by providing water users with scheduling information. It is estimated that this project will raise the average irrigation application efficiency from 62 to 70 percent, resulting in an annual conservation of approximately 5,500 ac-ft. Irrigation scheduling is an effective tool to help irrigators determine the timing and amount of each irrigation, thereby reducing the guesswork and tendency to over-irrigate. This project will use a computer program, called True Irrigation Scheduling Management (True ISM), that will generate weekly reports for irrigators. True ISM tracks the soil moisture for each field based on current CIMIS weather data, crop water use curves, effective root depths, and applied water data.

5.10.7.2 Schedule

The proposed schedule is as follows:

- Obtain software: COMPLETED
- Collect data: COMPLETED

- Set up True ISM: COMPLETED
- After operating two seasons with the True Point Solutions software, RD 108 decided the software was too cumbersome to use and was not well suited to District operations. RD 108 is in the process of implementing an extensive farm-gate measurement program that will produce weekly irrigation reports that can be used for irrigation scheduling.

5.10.7.3 Cost and Funding

The total project cost for the RD 108 Irrigation Scheduling is $56,000. A Reclamation Water Conservation Field Services Grant provided $25,000.

Funding sources are listed in Table 4-7.

5.10.8 RD 108 Rice Water Conservation Program

5.10.8.1 Project Description

RD 108 began a creative incentive program in 2007 to help encourage farmers to reduce rice tailwater on the farm. RD 108's boundaries are surrounded by levees, and all tailwater and stormwater has to be pumped out of the District; therefore, actions to reduce drainage also reduce pumping and energy costs for the District. RD 108's Water Conservation Program compensates water users (through rebates) who take actions that help reduce District diversions or drainage water and the associated costs.

As part of the water conservation program, the District provides rice farmers with a notched board to place in the drainage riser when irrigators are maintaining water levels in the rice field. This program saves approximately 0.5 cfs or 1 ac-ft per day during the maintenance period.

Rice farmers that are able to eliminate all spill from their fields during the maintenance receive a rebate of $12 per acre. Since the start of the program the District has almost 100 percent participation from its rice growers.

5.10.8.2 Schedule

The project began in 2007 and is still in place. In 2011, use of the notched board in the drains became a mandatory practice. Farmers who do not use the notched board or spill over the top of the board are charged for the additional volume of water used to irrigate their crop. However, rebates are still available for rice farmers who completely eliminate tailwater from their rice fields during the maintenance season.

5.10.8.3 Cost and Funding

This project is funded through water rates by the growers. Growers who are able to demonstrate that they use less water are eligible for a rebate or refund that is based on the volume of water conserved.

Funding sources are listed in Table 4-7.

5.11 PCGID Conjunctive Water Management Program

5.11.1 Project Description

The PCGID proposes to develop a conjunctive water management program that will provide up to 5,000 ac-ft of groundwater supply that could be used in lieu of a similar quantity of diverted surface water. PCGID proposes using three existing, district-owned groundwater production wells or possibly installing two new district wells. Program goals include the following:

- Increase system reliability for in-basin users
- Increase system flexibility for in-basin users
- Contribute to satisfying the requirements of the Phase 8 Settlement Agreement

New wells would only be installed if the five existing wells that the PCGID has identified are determined insufficient to meet the needs of the program (e.g., production is low or there are air quality issues). PCGID has begun replacing the diesel motors on their groundwater wells with new electric motors to eliminate potential future air quality issues. To date, PCGID has replaced three diesel motors with electric motors. PCGID, as a participant in the Sacramento Valley Water Management Program, Glenn County groundwater management, and Colusa County groundwater management, is seeking to establish appropriate levels of groundwater monitoring for successful and responsible management of the groundwater resource.

5.11.1.1 Phase I of the Conjunctive Water Management Program

In 2012, PCGID developed a well that was drilled circa 1990. The groundwater production well is anticipated to be in production from mid-April through August during dry and critical water years, with an assumed total production volume of approximately 1,600 ac-ft/yr.

Targeted Benefits for this project are listed in Table 4-6.

5.11.2 Schedule

The project schedule shown in Table 5-11 will commence upon appropriation of funding.

TABLE 5-11
PCGID Conjunctive Water Management Program Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	Project Status – Ongoing and Completed Work
Install Groundwater Monitoring Infrastructure	In progress; accomplished in conjunction with SVWMP, Glenn County, and Colusa County.
Pre-design	In progress.
Groundwater Management Planning	Ongoing since the late 1990s.
Environmental Document	Not needed until wells have been approved.

TABLE 5-11
PCGID Conjunctive Water Management Program Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	Project Status – Ongoing and Completed Work											
	Project Duration – Work to be Completed											
	Year 1				Year 2				Year 3			
	1	2	3	4	1	2	3	4	1	2	3	4
Final Design												
Permitting												
Construction												
Implementation	→ For at least 10 years assuming there is no demonstrated impact to sustainability.											

5.11.3 Cost and Funding Sources

PCGID will fund the program with district monies. If PCGID decides to install new groundwater production wells instead of using existing wells, they will not seek public funding. The development and implementation of this program will be documented in future updates to this RWMP.

The total Phase I cost for the PCGID Conjunctive Water Management Program was $45,500.

Funding sources are listed in Table 4-6.

5.12 PID Conjunctive Water Management Program

5.12.1 Project Description

The PID proposes to develop a conjunctive water management program that will provide up to 5,000 ac-ft of groundwater supply that could be used in lieu of a similar quantity of diverted surface water. PID proposes using three existing, district-owned groundwater production wells or possibly installing two new district wells to help achieve the goals of the program, which include the following:

- Increase system reliability for in-basin users
- Increase system flexibility for in-basin users
- Contribute to satisfying the requirements of the Phase 8 Settlement Agreement

New wells would only be installed if the four existing wells that PID has identified are determined to not meet the needs of the program (e.g., production is low or there are air quality issues). PID has initiated work to convert existing diesel motors to electric motors to eliminate future air quality issues that might arise. To date, PID has replaced one diesel motor with an electric motor at a cost of about $30,000. PID, as a participant in the Sacramento Valley Water Management Program, Glenn County groundwater management, and Colusa County groundwater management, is seeking to establish appropriate levels of groundwater monitoring for successful and responsible management of the groundwater resource.

Targeted Benefits for this project are listed in Table 4-6.

5.12.2 Schedule

The project schedule shown in Table 5-12 will commence upon appropriation of funding.

TABLE 5-12
PID Conjunctive Water Management Program Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	Project Status – Ongoing and Completed Work
Install Groundwater Monitoring Infrastructure	In progress; accomplished in conjunction with SVWMP, Glenn County, and Colusa County.
Pre-design	In progress.
Groundwater Management Planning	Ongoing since late 1990s.
Environmental Document	Not needed until wells have been approved.

	Project Duration – Work to be Completed											
	Year 1				Year 2				Year 3			
	1	2	3	4	1	2	3	4	1	2	3	4
Final Design												
Permitting												
Construction												
Implementation	→				For at least 10 years assuming there is no demonstrated impact to sustainability.							

5.12.3 Cost and Funding Sources

The PID will fund the program with district monies. If PID decides to install new groundwater production wells instead of using existing wells, they will not seek public funding. The development and implementation of this program will be documented in future updates to this RWMP.

Funding sources are listed in Table 4-6.

5.13 Butte Sub-basin

Table 5-13 lists and describes potential projects in the Butte Sub-basin.

TABLE 5-13
Potential Projects in the Butte Sub-basin
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Title	District	Sub-basin	Description	Potential QO (ac-ft)	Applicable TBs
RD 1004 Canal Lining Project	RD 1004	Butte, Yuba	Extend canal lining on approximately 1.5 miles of the main canal; the first 0.5 mile of main canal is a lined channel which dumps into an unlined slough.	7,000	BS-1, BS-4, FY-1, FY-4
RD 1004 Conjunctive Water Management Program	RD 1004	Butte, Yuba	Installation of up to four production wells.	6,600	BS-1, BS-4, BS-5, BS-6, FY-1, FY-3, FY-5, FY-6
RD 1004 White Mallard Dam and Fish Ladder Replacement Project and Five-Points Project[a]	RD 1004	Butte, Yuba	Removed and replaced White Mallard Dam on Butte Creek and install weir and fish screen near Five-Points.	17,000	BS-1, BS-5, BS-6, FY-3
RD 1004 Flowmeter Replacement Program[a]	RD 1004	Butte, Yuba	Upgrade analog turnout meters with digital meters.	1,600	BS-1, BS-4, BS-5, BS-6, FY-1, FY-5, FY-6
RD 1004 Recirculation Pump 8 Rebuild Project[a]	RD 1004	Butte, Yuba	Rebuild Recirculation Pump 8.	3,800	BS-1, BS-5, BS-6, FY-1
RD 1004 ITRC Water Gate Project[a]	RD 1004	Butte, Yuba	Install one self-adjusting check structure.	70	BS-1, BS-4, FY-1
RD 1004 10-Foot by 8-Foot Weirs Installation Project[a]	RD 1004	Butte, Yuba	Installed two 10-foot by 8-foot weirs at the downstream end of RD 1004's main canal.	1,200	BS-1, FY-1

[a]Project has been fully or partially implemented as described in the following sections.

5.14 RD 1004 Canal Lining Project

5.14.1 Project Description

This project is expected to conserve an estimated 10 to 15 percent of RD 1004's diverted surface water (approximately 5,600 to 8,400 ac-ft/yr). The project would promote water conservation by extending the lined portion of the RD 1004 Main Canal by approximately 1.5 miles. This project is the next phase of a traditional water use efficiency program started by RD 1004 in the late 1990s, when they lined approximately 0.5 mile of the uppermost portion of the Main Canal.

The RD 1004 Main Canal is subject to considerable conveyance losses through seepage, resulting in delivery inefficiencies. RD 1004 estimates that it currently loses as much as 60 cfs (the equivalent production of one pump) through the upper reaches of its Main Canal.

Targeted Benefits associated with this project are listed in Table 4-6.

5.14.2 Schedule

The project schedule shown in Table 5-14 will commence upon appropriation of funding.

TABLE 5-14
RD 1004 Canal Lining Project Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	Project Status – Ongoing and Completed Work
Phase 1 – New Diversion and Canal Lining	Completed.
Environmental Document	To commence upon funding; supplemental documentation (to be identified in the environmental impact report or environmental impact statement) might be required during final design.

	Project Duration – Work to be Completed											
	Year 1				Year 2				Year 3			
Quarter	1	2	3	4	1	2	3	4	1	2	3	Q4
Final Design												
Permitting and Environmental												
Construction												
Potential Mitigation					If mitigation for sensitive habitat or species is identified, mitigation monitoring might be required for up to 3 years.							

5.14.3 Cost and Funding Sources

The cost for the development of the RD 1004 Canal Lining Project is estimated to be $3 million. The cost estimate will be refined during the final design. RD 1004 is seeking public assistance to implement this program through the SVWMP and California State Proposition 50 Grants. The development and implementation of this program will be documented in future updates to this RWMP.

Funding sources are listed in Table 4-6.

5.15 RD 1004 Conjunctive Water Management Program

5.15.1 Project Description

RD 1004 proposes to develop a conjunctive water management program that will provide up to 6,600 ac-ft of groundwater supply that could be used in lieu of a similar quantity of diverted surface water. RD 1004 would install up to four groundwater production wells to help achieve the goals of the program, which include the following:

- Increase system reliability for in-basin users
- Increase system flexibility for in-basin users
- Contribute to satisfying the requirements of the Phase 8 Settlement Agreement

RD 1004, as a participant in the Sacramento Valley Water Management Program, is seeking to establish appropriate levels of groundwater monitoring for successful and responsible management of the groundwater resource.

Targeted Benefits associated with this project are listed in Tables 4-6 and 4-7.

5.15.2 Schedule

The project schedule is shown in Table 5-15.

TABLE 5-15
RD 1004 Conjunctive Water Management Program Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	**Project Status – Ongoing and Completed Work**
Identification of Appropriate Groundwater Monitoring Locations	In progress; accomplished in conjunction with the SVWMP.
Pre-design	In progress.
Groundwater Management Planning	Ongoing; accomplished in conjunction with the District and the counties.
Construction	Ongoing; first production well developed in 2011 and second in 2013.
Environmental Document	In progress; to be completed in 2013.

Project Duration – Work to be Completed

	Year 1				**Year 2**				**Year 3**			
Quarter	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Final Design												
Permitting												
Construction												
Implementation					For at least 10 years assuming there is no demonstrated impact to sustainability.							

5.15.3 Cost and Funding Sources

The cost for the development of the RD 1004 Conjunctive Water Management Program is estimated to be $1 million. RD 1004 is seeking public assistance to implement this program through the SVWMP and California State Proposition 50 Grants. However, the two production wells developed in 2011 and 2013 were funded by RD 1004 at a cost of approximately $310,000. RD 1004 estimates the later production well will cost an additional $60,000 to procure and install the mechanical and electrical equipment. The development and implementation of this program will be documented in future updates to this RWMP.

Funding sources are listed in Table 4-7.

5.15.3.1 Monitoring

The two groundwater production wells will be operated from July 1 through September 30, with an assumed total production volume of approximately 4,400 ac-ft/yr. Production well output will be monitored and documented in future updates to this RWMP.

5.15.4 RD 1004 White Mallard Dam and Fish Ladder Replacement Project and Five-Points Project

5.15.4.1 Project Description

The first phase of this project removed and replaced White Mallard Diversion Dam on Butte Creek, a tributary to the Sacramento River. The new dam provides a steady flow down a fish ladder, improving fish passage while more efficiently diverting water to RD 1004. This project improves fish passage, provides greater diversion flexibility, and leaves an estimated 17,000 ac-ft of water in the Sacramento River each year.

The second phase, the Five-Points Project, installed a weir and fish screen that serve to enhance water delivery capabilities, and protect fish and fish passage through the Butte Creek corridor.

The final phase, to commence upon appropriation of funding, includes SCADA telemetry and measurement instrumentation. The proposed telemetry system would tie the White Mallard Dam to the District's SCADA system and balance creek elevations to benefit fish and District needs.

Targeted Benefits for this project are shown in Table 4-7.

5.15.4.2 Schedule

The project schedule is shown in Table 5-15A.

TABLE 5-15A
RD 1004 White Mallard Dam and Fish Ladder Replacement Project and Five-Points Project Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	**Project Status – Ongoing and Completed Work**
Dam and Ladder Engineering Design	Completed in February 2004.
Dam and Ladder Environmental Document	Completed in February 2004.
Dam and Ladder Construction	Completed in October 2007.
Weir and Fish Screen Engineering Design	Completed.
Weir and Fish Screen Environmental Document	Completed.
Weir and Fish Screen Construction	Completed in December 2007.

	Project Duration – Work to be Completed											
	Year 1				**Year 2**				**Year 3**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Dam and Ladder Design												
Dam and Ladder Permitting												
Dam and Ladder Construction												

TABLE 5-15A
RD 1004 White Mallard Dam and Fish Ladder Replacement Project and Five-Points Project Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

	Year 4				Year 5				Year 6			
	1	2	3	4	1	2	3	4	1	2	3	4
Weir and Fish Screen Design												
Weir and Fish Screen Permitting												
Weir and Fish Screen Construction												

5.15.4.3 Cost and Funding Sources

The project was funded by Ducks Unlimited at a cost of $5 million ($1 million for the dam replacement and $4 million for the Five-Points Project). RD 1004 purchased right-of-way and surveying services at a cost to the District of $25,000. The cost of the proposed SCADA system is estimated to be $65,000. The development and implementation of the final phase of this program will be documented in the future updates to this RWMP.

Funding sources are listed in Table 4-7.

Monitoring.

Butte Creek diversions during the irrigation season (April through October) are summarized in Table 5-15AA. Initial results indicate a water savings, with respect to decreased Sacramento River Diversions, of approximately 4,633 ac-ft. However, these water savings may not be entirely attributable to the project. Water savings is anticipated to fluctuate in response to the water-year type, use of conjunctive water management resources, cropping patterns, cropped acreage, and changes in irrigation cultural practices.

TABLE 5-15AA
RD 1004 White Mallard Dam and Fish Ladder Replacement Project Five-Points Project Monitoring Program
2012 Sacramento Valley Regional Water Management Plan Annual Update

Year (April through October)	Volume (ac-ft)
Pre-project Average (2007 through 2009)	18,347
2010	21,016
2011	23,395
2012	24,530
Post-project Average	22,980
Water Savings	4,633

5.15.5 RD 1004 Flowmeter Replacement Program

5.15.5.1 Project Description

In 1992, RD 1004 installed propeller meters to measure flow on every turnout in their district. These meters started to break down as moving parts got split and worn. Annual maintenance became so expensive and time consuming that RD 1004 decided in 2001 to slowly replace the analog meters with digital ones. The new digital meters require significantly less maintenance and allow RD 1004 to keep up their practice of measuring and charging for water at the turnout level.

Updating the analog meters with the digital meters saves an estimated 1 to 2 percent of total diversions, estimated around 1,600 ac-ft per year.

Targeted Benefits for this program are listed in Table 4-7.

5.15.5.2 Schedule

The project schedule is shown in Table 5-15B.

TABLE 5-15B
RD 1004 Flowmeter Replacement Program Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	**Project Status – Ongoing and Completed Work**
Installation of Turnout Meters	Completed around 1992.
Upgrade of Turnout Meters	In progress; to be completed on an as-needed basis.

	Project Duration – Work to be Completed											
	Year 1				**Year 2**				**Year 3**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Installation of Turnout Meters												
Upgrade of Turnout Meters												

5.15.5.3 Cost and Funding Sources

Installing the original flowmeters around 1992 was paid for by the individual farmers at a cost of approximately $900 to $1,200 per turnout. RD 1004 has since paid for all maintenance, including the upgrades from analog to digital meters. Upgrading one meter costs roughly $500. With 135 meters in service, the total cost of upgrading all meters is approximately $67,500.

Operating the flowmeters requires significant maintenance costs, and even the digital low maintenance meters cost approximately $50 every year to keep running.

Funding sources are listed in Table 4-6.

5.15.6 RD 1004 Recirculation Pump 8 Rebuild Project

5.15.6.1 Project Description

This project includes redesigning and rebuilding Recirculation Pump 8, enhancing pump and sump efficiencies and allowing for higher recycled water flows. The pump is located in one of several key northern areas where drain water can be picked up and placed into a high-line delivery canal, reducing the need to pump additional water from the Sacramento River. The project also includes the installation of a new doplar flowmeter to accurately measure recycled water. Pump improvements result in an estimated water savings of 3,800 ac-ft.

Targeted Benefits for this project are shown in Table 4-7.

5.15.6.2 Schedule

The project schedule is shown in Table 5-15C.

TABLE 5-15C
RD 1004 Recirculation Pump 8 Rebuild Project Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	Project Status – Ongoing and Completed Work
Redesign and Rebuild Recirculation Pump 8	Completed January 2009.
Install Doplar Meter	To be installed in fall 2012.

	Project Duration – Work to be Completed											
	Year 1				Year 2				Year 3			
	1	2	3	4	1	2	3	4	1	2	3	4
Design												
Permitting												
Construction												

5.15.6.3 Cost and Funding Sources

The cost of rebuilding the pump was $40,000, and the cost of the doplar meter was $3,200. RD 1004 paid for the entirety of this $43,200 project.

Funding sources are listed in Table 4-7.

5.15.7 RD 1004 ITRC Water Gate Project

5.15.7.1 Project Description

Cal Poly has developed a fully mechanical check structure that automatically adjusts to water flow to maintain constant canal elevation upstream of itself. RD 1004 is participating in this program through Cal Poly and will install one gate in their system.

This gate will provide greater system control, thereby improving water management and saving an estimated 70 ac-ft of water.

Targeted Benefits for this project are shown in Table 4-7.

5.15.7.2 Schedule

Design was completed by Cal Poly as part of the program. The gate was installed and operational during fall 2009.

5.15.7.3 Cost and Funding Sources

The gate is provided through the ITRC program, which is funded by Reclamation. The installation cost, including the cost of the abutments that support the gate, is approximately $3,300, paid for by the District.

Funding sources are listed in Table 4-7.

5.15.8 RD 1004 10-Foot by 8-Foot Weirs Installation Project

5.15.8.1 Project Description

This project installed two 10-foot by 8-foot weirs at the downstream end of RD 1004's main canal. The weir raises water levels on their downstream side serving two primary purposes. Firstly, the high water surface diverts water through a new 84-inch screwgate turnout structure, also installed as part of this project. Secondly, the weirs allow the canal to remain full during winter floods. When kept full, the weight of the water in the canal counteracts the uplift force caused by high groundwater tables. Pervious soils and high water tables have caused significant damage to the canal lining since it was built in 1998. This damage results in significant seepage estimated at 1,200 ac-ft/yr.

Targeted Benefits for this project are shown in Table 4-7.

5.15.8.2 Schedule

Design for this project was completed by the weir manufacturer and RD 1004. The weir boxes took several weeks to fabricate and were installed in 4 days.

5.15.8.3 Cost and Funding Sources

The project was funded through a Reclamation grant from 1997. Most of this grant was used to pay for a District pumping plant, and a portion of the remainder was used to pay for the weir installation project. The cost of the weir and screwgate was approximately $30,000.

Funding sources are listed in Table 4-7.

5.16 Sutter Sub-basin

Table 5-16 lists and describes potential projects in the Sutter Sub-basin.

TABLE 5-16
Potential Projects in the Sutter Sub-basin
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Title	District	Sub-basin	Description	Potential QO (ac-ft)	Applicable TBs
MFWC Conjunctive Water Management Program	MFWC	Sutter	Installation of one groundwater production well.	1,000	BS-1, BS-5, BS-6
MFWC Conjunctive Water Management Program[a]	MFWC	Sutter	Installation of two groundwater production wells.	1,500	BS-1
MFWC Phase 2 Fish Screen Project	MFWC	Sutter	Phase II Fish Screen.	TBD	BS-1
SMWC Irrigation Recycling Project	SMWC, PMWC, and RD 1500	Sutter	Feasibility analysis of a tailwater recovery system.	25,000	BS-1, BS-5, BS-6
SMWC, PMWC, and RD 1500 Joint Sutter Basin Drainwater Reuse Project	SMWC, PMWC, and RD 1500	Sutter	Feasibility study identifying alternatives for expansion of the existing drainwater reuse system.	5,000	BS-1, BS-5, BS-6
SMWC Canal Lining	SMWC	Sutter	Canal lining to reduce diversions and eliminate spills.	1,000	BS-1, BS-4
SMWC, PMWC, and RD 1500 Joint Sutter Basin Groundwater Management Program	SMWC, PMWC, and RD 1500	Sutter	Groundwater investigation; installation of 12 monitoring wells and 6 production wells.	5,000	BS-1, BS-5, BS-6
SMWC Internal Water Supply Program	SMWC	Sutter	Internal water supply program.	TBD	BS-1, BS-5, BS-6

5.17 MFWC Conjunctive Water Management Program

5.17.1 Project Description

MFWC proposes to develop a conjunctive water management program that will provide groundwater supply that could be used in lieu of a similar quantity of diverted surface water. In spring 2009, MFWC installed two groundwater production wells. These two wells are expected to yield 1,500 ac-ft annually. MFWC installed two additional groundwater production wells in spring 2013. One of the wells is expected to produce between 2,400 and 2,700 gpm, and the other is expected to produce between 3,500 and 4,000 gpm. The groundwater production wells will help achieve the goals of the program, which include the following:

- Increase system reliability for in-basin users
- Increase system flexibility for in-basin users
- Contribute to satisfying the requirements of the Phase 8 Settlement Agreement

The MFWC, as a participant in the Sacramento Valley Water Management Program and through Sutter County is seeking to establish appropriate levels of groundwater monitoring for successful and responsible management of the groundwater resource.

Targeted Benefits for this project are listed in Table 4-6.

5.17.2 Schedule

The project schedule is shown in Table 5-17. Construction of the first phase of this program (two groundwater production wells) was completed in 2012.

TABLE 5-17
MFWC Conjunctive Water Management Program Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	**Project Status – Ongoing and Completed Work**
Groundwater Management Planning	Ongoing; accomplished in conjunction with Sutter County and the Department.
Preliminary Design	Completed; spring 2011.
Environmental Document	Completed; fall 2011.

	Project Duration – Work to be Completed											
	Year 1				**Year 2**				**Year 3**			
Quarter	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Final Design												
Permitting												
Construction												
Implementation	→				For at least 10 years assuming there is no demonstrated impact to sustainability.							

5.17.3 Cost and Funding Sources

The cost for the development of the MFWC Conjunctive Water Management Program is estimated to be $755,500. MFWC received public assistance to implement the first phase of this program (two groundwater production wells) through the SVWMP and California State Proposition 50 Grants. MFWC will fund the second phase of this program (one groundwater production well) with district monies. The development and implementation of this program will be documented in the future updates to this RWMP.

Funding sources are listed in Table 4-6.

5.17.4 MFWC Phase 2 Fish Screen Project

5.17.4.1 Project Description

The Phase 2 Fish Screen Project consists of demolition of the existing Drexler Diversion, construction of the Drexler Relift Pump Station, modifications to the Main Canal and Grimes Canal, and other canal modifications.

Targeted Benefits for this project are listed in Table 4-6.

5.17.4.2 Schedule

The project schedule is shown in Table 5-17A.

TABLE 5-17A
MFWC Phase 2 Fish Screen Project Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	Project Status – Ongoing and Completed Work
Design	Completed in October 2011.
Environmental and Permitting	Anticipated to be completed in fall 2013.
Construction	Solicit bids in summer 2014 and begin construction in fall 2014 after irrigation deliveries are completed.

	Project Duration – Work to be Completed											
	Year 1				Year 2				Year 3			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4
Final Design												
Environmental and Permitting												
Construction												

5.17.4.3 Cost and Funding Sources

The estimated cost of this project, $18,200,000, includes environmental mitigation, engineering, legal, rights-of-way, construction management, and construction. Construction of the fish screen at the Meridian site is being funded by the AFSP program (50 percent from the Reclamation and 50 percent from the California Department of Fish and Wildlife).

Funding sources are listed in Table 4-6.

5.18 SMWC, PMWC, and RD 1500 Joint Sutter Basin Drainwater Reuse Project

5.18.1 Project Description

SMWC, in conjunction with Reclamation District No. 1500 (RD 1500) and Pelger Mutual Water Company, is conducting a feasibility study that is identifying alternatives for expansion of the existing drainwater reuse system and the costs associated with the increased recapture. An enhanced drainage recapture program would enhance and optimize the use of applied surface water for irrigation purposes and minimize summer drainage that must be pumped out of the Sutter Basin. The project could require construction of check structures, modification of existing canals, and installation of new lift pumps within RD 1500 and SMWC.

The study was completed in 2009, and could be implemented pending the availability of public funds for implementation. The Department funded the study through the WUE. Initial estimates of potential increased drainwater reuse are on the order of 5,000 to 15,000 ac-ft annually. Actual increased reuse capacity will depend on the selected preferred alternative and available water supply (e.g., water-year type).

Targeted benefits for this project are listed in Table 4-6.

5.18.2 Schedule

The project schedule shown in Table 5-18 will commence upon appropriation of funding.

TABLE 5-18
SMWC, PMWC, and RD 1500 Joint Sutter Basin Drainwater Reuse Project Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	Project Status – Ongoing and Completed Work
Reconnaissance Investigation	Completed.
Feasibility Study	Completed.

	Project Duration – Work to be Completed											
	Year 1				Year 2				Year 3			
	1	2	3	4	1	2	3	4	1	2	3	4
Design												
Environmental Documentation and Permitting												
Construction												

5.18.3 Cost and Funding Sources

The feasibility study was partially funded by the Department through WUE for approximately $182,000. Upon completion of the study, a monitoring plan will need to be developed and implemented for pre-project development and post-project reporting. An additional $200,000 is estimated for completion of pre-design. An order-of-magnitude cost estimate for design and construction of the project will be developed as part of the study. The cost estimate will be refined during the final design. To conduct the pre-design, SMWC and its basin partners are seeking funds from state and federal sources in addition to working with the Sacramento Valley Water Management Program. Indications point to the economic and technical viability of this project, and the project partners will continue to pursue funds for the implementation of the entire project after a cost estimate has been completed as part of the current study effort. The development and implementation of this program will be documented in future updates to this RWMP.

Funding sources are listed in Table 4-6.

5.19 SMWC Canal Lining Project

5.19.1 Project Description

SMWC proposes lining approximately 1.3 miles of its lateral system. This project is expected to conserve 500 to 1,000 ac-ft of water per year. The canal lining would include one 0.6-mile section along Lateral F and one 0.7-mile section along Lateral D. Both of these sections are currently subject to significant seepage and annual bank failures.

Targeted Benefits for this project are listed in Table 4-6.

5.19.2 Schedule

The project schedule shown in Table 5-19 will commence upon appropriation of funding.

TABLE 5-19
SMWC Canal Lining Project Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	Project Status – Ongoing and Completed Work											
Environmental Document	To commence upon funding.											
	Project Duration – Work to be Completed											
	Year 1				Year 2				Year 3			
	1	2	3	4	1	2	3	4	1	2	3	4
Design												
Permitting												
Construction												

5.19.3 Cost and Funding Sources

The cost for the development of the SMWC Canal Lining Project is estimated to be $350,000. The cost estimate will be refined during the final design. SMWC is seeking public assistance to implement this program through the SVWMP and California State Proposition 50 Grants. The development and implementation of this program will be documented in future updates to this RWMP.

Funding sources are listed in Table 4-6.

5.20 SMWC, PMWC, and RD 1500 Joint Sutter Basin Groundwater Management Program

5.20.1 Project Description

SMWC, in partnership with RD 1500 and PMWC, proposes installing six groundwater production wells with an estimated capacity of 1,000 to 1,500 gpm, pumped over a 153-day period. This project is expected to provide a maximum annual contribution of 5,000 ac-ft of supplemental water supply. Also installed as part of this project would be six multi-completion groundwater monitoring wells. This project would help SMWC meet the following objectives:

- Increase SMWC supplemental water supply reliability and flexibility
- Increase in-stream flows during dry years
- Increase in-basin supplemental water supply reliability and flexibility
- Contribute to satisfying the requirements of the Phase 8 Settlement Agreement

Targeted Benefits for this project are listed in Table 4-6.

5.20.1.1 Phase I of the Groundwater Management Program

Phase I of the Sutter Basin Groundwater Management Program is underway. Sutter Basin Partners (consisting of RD 1500, SMWC, and PMWC) prepared a Groundwater Management Plan Update. The Groundwater Management Plan Update was adopted

February 28, 2012. The Groundwater Management Plan Update included the following objectives:

- Maintain Sutter Basin long-term agricultural viability.
- Promote resource sustainability.
- Increase long-term supplemental water supply reliability.
- Promote cooperative regional outreach and regulatory compatibility.

The Groundwater Management Plan Update was funded by the Department through the Northern California Joint Exercise of Powers Proposition 50 Integrated Regional Water Management Implementation Grant.

Additionally, in a cooperative effort between SMWC and the Department to expand the California Statewide Groundwater Elevation Monitoring (CASGEM) network within the Sutter Basin, SMWC installed a triple-completion groundwater monitoring well. Installation of the triple-completion groundwater monitoring well helps advance the groundwater management objectives listed above by expanding the groundwater monitoring infrastructure in the Sutter Basin. Additional data collected from this new well allows analysis of local aquifer characteristics at multiple depths within the groundwater system.

Phase I also includes the installation of one groundwater production well by PMWC. The PMWC project will include groundwater production from July 1 through September 30 during dry and critical water years, with an assumed total production volume of approximately 1,600 ac-ft/yr.

5.20.2 Schedule

The project schedule shown in Table 5-20 will commence upon appropriation of funding.

TABLE 5-20
SMWC, PMWC, and RD 1500 Joint Sutter Basin Groundwater Management Program Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	**Project Status – Ongoing and Completed Work**
Pre-design	Completed.
Groundwater Management Planning	Ongoing; accomplished in conjunction with RD 1500, PMWC, SVWMP, and Sutter County.
Environmental Document	To commence upon funding.

	Project Duration – Work to be Completed											
	Year 1				**Year 2**				**Year 3**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Install Groundwater Monitoring Infrastructure[a]	This task will be ongoing as additional monitoring infrastructure is continually installed; the first priority will be the six monitoring wells associated with the proposed 5,000-ac-ft project.											
Final Design												
Permitting												
Construction												
Implementation	→								For at least 10 years, assuming there is no demonstrated impact to sustainability.			

[a]Phase I of the Sutter Basin Groundwater Management Program is currently being implemented and is scheduled for completion in 2014.

5.20.3 Cost and Funding Sources

The cost for the development of the program is estimated to be $5 million. SMWC is seeking public assistance to implement this program through the SVWMP and California State Proposition 50 Grants. The development and implementation of this program will be documented in future updates to this RWMP.

Phase I, comprising the project components summarized above, is being funded by the Department through the Northern California Joint Exercise of Powers Proposition 50 Integrated Regional Water Management Implementation Grant. Combined Proposition 50 Integrated Regional Water Management grant funding for Phase I project components is $781,200. Local cost-share requirement is approximately 10 to 15 percent of the total cost. Federal funding made available by Reclamation is being used to reimburse the local cost shares. Reclamation funding of Phase I project components is $124,000.

Funding sources are listed in Table 4-6.

5.20.3.1 Monitoring

The SMWC groundwater monitoring well will be equipped with water-level monitoring instrumentation and will be added to the Sutter Basin CASGEM monitoring well network. The PMWC project will include groundwater production from July 1 through September 30 during dry and critical water years, with an assumed total production volume of approximately 1,600 ac-ft/yr. Production well output will be monitored and documented in future updates to this RWMP.

5.21 SMWC Internal Water Supply Program

5.21.1 Project Description

SMWC embarked on a supplemental water supply program in 2007, which involved upgrading its water supply pumps as well as the acquisition of additional booster pumps for water recycling. The purpose of the program was to enhance the efficiency of the Company's internal water supply and booster pump station system. The program improvements provide supplementary water and aid in achieving water conservation goals of each particular cropping year.

5.21.2 Schedule

This program was completed in July 2012.

5.21.3 Cost and Funding Sources

The cost for the SMWC Internal Water Supply Program is estimated to be $473,000 and was funded solely by SMWC.

Funding sources are listed in Table 4-7.

5.22 PMWC Conjunctive Water Management Program

This project has been removed because PMWC is no longer participating in this RWMP Annual Update.

5.22.1 Project Description

5.22.2 Schedule

5.22.3 Cost and Funding Sources

5.22.4 PMWC Canal Lining Project

This project has been removed because PMWC is no longer participating in this RWMP Annual Update.

5.22.4.1 Project Description

5.22.4.2 Schedule

5.22.4.3 Cost and Funding Sources

5.23 American Sub-basin

Table 5-22 lists and describes potential projects in the American Sub-basin.

TABLE 5-22
Potential Projects in the American Sub-basin
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Title	District	Sub-basin	Description	Potential QO (ac-ft)	Applicable TBs
NCMWC Conjunctive Water Management Project	NCMWC	American	Utilization of existing groundwater production wells, monitoring and analyzing results.	15,000	A-1, A-4, A-5, A-6
NCMWC American Basin Fish Screen and Habitat Improvement Project – Sankey Diversion	NCMWC	American	Install new pump station and fish screen on Sacramento River.	1,400	A-1, A-4, A-5, A-6
NCMWC SCADA Project for the Natomas Basin[a]	NCMWC	American	Improve flow monitoring in Natomas Basin.	4,500	A-1, A-4, A-5, A-6

[a]Project has been fully or partially implemented as described in the following sections.

5.24 NCMWC Conjunctive Water Management Program

5.24.1 Project Description

NCMWC proposes to develop a conjunctive water management program that would provide the flexibility to pump and convey groundwater in lieu of some of its surface water supply. This program would be implemented in phases. The initial phase will involve installation of one new well, and installation and upgrade of the infrastructure to connect the new well to NCMWC's conveyance system. The proposed production well would likely have a capacity that ranges from 2,500 to 3,500 gpm. This project would help NCMWC meet the following objectives:

- Increase Company water supply reliability and flexibility
- Increase in-stream flows during dry years

- Increase in-basin water supply reliability and flexibility

Targeted Benefits associated with this program are listed in Table 4-6.

5.24.2 Schedule

The project schedule shown in Table 5-23 will commence upon appropriation of funding.

TABLE 5-23
NCMWC Conjunctive Water Management Program Schedule
2012 Sacramento Valley Regional Water Management Plan Annual Update

Project Tasks	Project Status – Ongoing/Completed Work
Groundwater Management Planning and Monitoring	Ongoing.
Environmental Document	In progress; to be completed by spring 2014; supplemental documentation might be required.

	Project Duration – Work to be Completed											
	Year 1				Year 2				Year 3			
	1	2	3	4	1	2	3	4	1	2	3	4
Design												
Environmental Documentation/ Permitting												
Construction												
Implementation	For at least 10 years, assuming there is no demonstrated impact to sustainability of the basin.											

5.24.3 Cost and Funding Sources

The cost for the development of the NCMWC Conjunctive Water Management Program would be approximately $5 million. NCMWC is seeking public funding to help implement this program through the SVWMP and state and federal agencies. The development and implementation of this program will be documented in future updates to this RWMP.

Funding sources are listed in Table 4-6.

5.24.4 NCMWC American Basin Fish Screen and Habitat Improvement Project – Sankey Diversion

5.24.4.1 Project Description

This project involves the construction of a new 434-cfs pump station on the Sacramento River near Sankey Road. Each of the five pumps in the station will independently draw water through a positive-barrier fish screen, pump the water over the levee, and discharge it into the proposed new Sankey Highline Canal.

NCMWC's current system raises the water surface in the Natomas Cross Canal to draw water through two existing pumping plants. This canal runs into the Sacramento River approximately 1,000 feet upstream of the proposed pumping plant. The increase in

efficiency from replacing the existing diversion system with the single new facility would save 1,400 ac-ft of water annually.

Targeted Benefits associate with this project are listed in Table 4-6.

5.24.4.2 Schedule

The project is in the final stage of construction and is operational. Post-construction testing and evaluations are currently under way and anticipated to be completed by spring 2014.

5.24.4.3 Cost and Funding Sources

Approximately $1.5 million have been received from CALFED and Reclamation for design and permitting. NCMWC has cooperative agreements with CDFG, CALFED, and Reclamation for the remaining $44 million to build the Sankey Diversion Facilities. The development of this project will be documented in future updates to the RWMP.

Funding sources are listed in Table 4-6.

5.24.5 NCMWC SCADA Project for the Natomas Basin

5.24.5.1 Project Description

This project resulted in the installation of a SCADA system in the Natomas Basin. SCADA is used to continuously collect flow data at selected locations to better direct the flow of irrigation water throughout the basin. The system extends beyond NCMWC boundaries to include neighboring Reclamation District 1000 (RD 1000). Benefits include increased public safety, reduced power use, and increased water savings, estimated at 4,000 to 5,000 ac-ft/yr.

5.24.5.2 Schedule

The project was completed in August 2010.

5.24.5.3 Cost and Funding Sources

The total project cost for the NCMWC SCADA Project for the Natomas Basin was $350,000. A Proposition 50 WUE Grant provided $163,000, and NCMWC paid the remaining $187,000.

Funding sources are listed in Table 4-7.

SECTION 6.0

Establishment of Monitoring Program

No changes were made.

6.1 Cooperative Study Update

6.2 Water Quality and the Sacramento Valley Water Quality Coalition

6.2.1 Sacramento Valley Management Plan

6.2.2 Diazinon Management Plan

6.2.3 Groundwater

SECTION 7.0

Proposed Budget and Allocation of Regional Costs

Section 7.0 revisions to the RWMP are highlighted below in shaded text. SRSC's water conservation budgets were updated for 2012, 2013, and 2014.

The water conservation budget presented below (see Tables 7-1 and 7-2) for past and future years is based on estimates of staff time and materials used for conservation efforts by each of the participating SRSCs. Conservation activities were defined as actions or efforts associated with contributing to efficient water management.

TABLE 7-1
Estimated Amount Spent in 2012
2012 Sacramento Valley Regional Water Management Plan Annual Update

Budget Item	Total Budget, Including Staff Time ($)
	Year 2012
Conservation Staff	300,445
Measurement	884,576
CIMIS	13,265
Water Quality	142,854
Agricultural Education Program	74,429
Quantity Pricing	66,560
Policy Changes	92,160
Contractors' Pumps	4,812,817
Irrigation System Maintenance	7,052,535
Facilitate Financing of On-farm Systems	720
Line or Pipe Canals/Install Reservoirs	41,060
Delivery Flexibility	1,085,767
District Spill/Tailwater System	993,258
Optimize Conjunctive Use	2,046,551
Automate Canal Structures	756,949
Customer Pump Testing	3,136
Total	***18,367,081***

TABLE 7-2
Projected Budget and Staff Time Summary for 2013 and 2014
2012 Sacramento Valley Regional Water Management Plan Annual Update

Budget Item	**Total Budget, Including Staff Time ($)**	
	Year 2013	**Year 2014**
Conservation Staff	330,102	340,134
Measurement	1,153,413	1,445,533
CIMIS	38,342	19,484
Water Quality	150,544	146,000
Agricultural Education Program	73,301	76,556
Quantity Pricing	74,493	118,416
Policy Changes	154,545	108,653
Contractors' Pumps	5,851,326	5,593,485
Irrigation System Maintenance	7,228,537	6,988,515
Facilitate Financing of On-farm Systems	720	744
Line or Pipe Canals/Install Reservoirs	91,910	113,762
Delivery Flexibility	1,165,468	1,236,276
District Spill/Tailwater System	937,232	951,814
Optimize Conjunctive Use	1,792,047	1,216,969
Automate Canal Structures	706,145	686,470
Customer Pump Testing	153,300	106,370
Total	***19,901,425***	***19,149,181***

SECTION 8.0

RWMP Coordination

No changes were made.

SECTION 9.0

References

No changes were made.

Appendix A
Final Sacramento Valley Regional Water Management Plan Compact Disc

Appendix B
2009 Sacramento Valley Regional Water Management Plan Annual Update Compact Disc

Appendix C
2010/2011 Sacramento Valley Regional Water Management Plan Annual Update Compact Disc

Appendix D
2012 Sacramento River Settlement Contractor Water Balance Tables

APPENDIX D

2012 Sacramento River Settlement Contractor Water Balance Tables

Water balance tables for 2012 are presented for the following districts:

- 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
- Natomas Central Mutual Water Company

In addition, crop evapotranspiration tables are presented for Redding, Colusa, Butte, Sutter, and American Sub-basins.

Anderson-Cottonwood Irrigation District

TABLE 1

Anderson Cottonwood Irrigation District – 2012 Surface Water Supply
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	Federal Ag Water Supply[a]		Non-Federal Ag Water Supply[b] (acre-feet)	Upslope Drainwater[c] (acre-feet)	Total (acre-feet)
	Base Supply (acre-feet)	Project Water (acre-feet)			
Method	M-1	M-1	M-1	E-3	
April	3,103	0			3,103
May	19,761	0			19,761
June	18,101	0			18,101
July	17,553	0			17,553
August	16,151	0			16,151
September	15,543	0			15,543
October	11,017	0			11,017
TOTAL	101,229	0	0	0	101,229

[a]Federal Ag Water Supply from Reclamation Water Account Records.

[b]Non-Federal Ag Water Supply from District Records.

[c]Estimated by District based on observation and historical information.

TABLE 2

Anderson Cottonwood Irrigation District – 2012 Groundwater Supply
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	District Groundwater (acre-feet)	Private Groundwater[a] (acre-feet)
Method	M-1	E-1
April	0	0
May	0	0
June	0	0
July	0	0
August	0	0
September	0	0
October	0	0
TOTAL	0	0

[a]Estimated by District based on observation and historical information.

TABLE 3

Anderson Cottonwood Irrigation District – 2012 Total District Water Supply (excluding reuse)
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	Surface Water Total (acre-feet)	District Groundwater (acre-feet)	Total District Water Supply[a] (acre-feet)
Method	M-1		M-1
April	3,103	-	3,103
May	19,761	-	19,761
June	18,101	-	18,101
July	17,553	-	17,553
August	16,151	-	16,151
September	15,543	-	15,543
October	11,017	-	11,017
TOTAL	101,229	-	101,229

[a]In addition to the water supplies shown in Table 3, 3,239 acre-feet were recirculated by the District for reuse within its boundaries. This recirculation and reuse is an integral component of the District's total water supply.

Anderson Cottonwood Irrigation District – Distribution System Evaporation and Seepage Worksheet

2012	Precipitation[a]		Evaporation[b]	
	inches	feet	inches	feet
Jan	4.3	0.36	1.9	0.16
Feb	1.2	0.10	3.0	0.25
Mar	3.3	0.27	3.1	0.26
Apr	1.4	0.11	4.6	0.38
May	0.0	0.00	8.0	0.67
Jun	0.2	0.01	9.2	0.77
Jul	0.0	0.00	8.9	0.74
Aug	0.0	0.00	8.1	0.67
Sept	0.0	0.00	5.9	0.49
Oct	0.8	0.07	3.8	0.31
Nov	4.4	0.37	1.7	0.14
Dec	7.3	0.61	1.2	0.10
TOTAL-YR	22.8	1.90	59.4	4.95
TOTAL-Apr-Oct	**2.3**	**0.19**	**48.5**	**4.04**

[a]Precipitation is average precipitation reported for Gerber CIMIS Station.

[b]Monthly evaporation from Distribution System water surfaces is estimated as 1.1 x the reference ET (ETo) reported for the Gerber CIMIS Station.

TABLE 4

Anderson Cottonwood Irrigation District – 2012 Distribution System Evaporation and Seepage (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Canal, Pipeline, Lateral, Reservoir	Length[a] (feet)	Width[b] (feet)	Surface Area (acres)	Precipitation[c] (acre-feet)	Evaporation[d] (acre-feet)	Seepage[e] (acre-feet)	Total (acre-feet)
Canal	177,952	30	123	24	495	24,511	(24,983)
Laterals	871,324	10	200	39	808	11,202	(11,971)
TOTAL			323	63	1,303	35,713	(36,953)

[a]From District statistics.

[b]Average width of the conveyance facilities.

[c]Estimated inflow resulting from precipitation on canals, laterals, and drains during the irrigation season (April-October).

[d]Estimated evaporation from canals, laterals, and drains during the irrigation season.

[e]Estimated seepage from canals, laterals, and drains during the irrigation season.

TABLE 5

Anderson Cottonwood Irrigation District – 2012 Crop Consumptive Use Water Needs (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Crop Name	Acres[a] (crop acres)	Crop Etb (AF/Ac)	Effective Precipitation[c] (AF/Ac)	Effective Precipitation[c] (acre-feet)	ETAW (acre-feet)	Leaching Requirement (AF/Ac)	Leaching Requirement (acre-feet)
Alfalfa	231	3.35	0.06	14	760	0.11	25
Pasture	6,166	3.61	0.06	370	21,889	0.03	185
Walnuts	165	3.56	0.06	10	578	0.16	26
Crop Acres	6,562			394	23,227		236

Total Irrig. Acres 6,601 (If this number is larger than your known total, it may be due to double cropping.)

[a]Acres include lands, if any, irrigated by private wells.

[b]Crop Consumptive Use Water Needs do not include water required for initial flooding, reflooding, or flow-through on rice acres. This quantity is estimated to be approximately 1.25 to 1.5 acre-feet per acre (approximately 39,500 to 48,000 acre-feet in 2012).

[c]Effective Precipitation is estimated as 60% of monthly precipitation greater than 0.5 inch during crop growing season. Because of the nature of flooded areas, such as rice field and flooded habitat, irrigation-season precipitation increases the volume of water in the flooded basin, but it typically flows through the field and, therefore, is assumed to be unavailable to meet the crop water needs.

TABLE 6

Anderson Cottonwood Irrigation District – 2012 District Water Balance
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Water Supplies (excluding recirculation) [a]		
District Water Supply *(includes District Groundwater)*	Table 3	101,229
Private Groundwater	Table 2	0
Inflow from Precip[b]	Estimated	84
Available Soil Moisture[c]	Estimated	1,324
	Total Water Supplies =	**102,637**
Distribution System Evaporation and Seepage		
Seepage (Canals/Laterals)	Table 4	35,713
Evaporation - Precipitation (Canals/Laterals)	Table 4	1,241
Riparian ET[d] (Canals/Laterals)	Estimated	6,450
Conveyance System Filling[e] (Canals/Laterals)	Estimated	1,012
	Total Distribution System =	**44,415**
Crop Consumptive Use Water Needs [f]		
Evapotranspiration of Applied Water - ETAW *(includes Evap from Rice Straw Decomposition)*	Table 5	23,227
Evapotranspiration of Precip - ET_{pr}	Table 5	394
Cultural Practices *(includes Leaching Requirement)*	Table 5	236
	Total Crop Water Needs =	**23,857**
District Outflows		
Water Supply Delivered to Other Districts or Users	District Records	0
Irrigation Season Rainfall Runoff[g]	Estimated	1,197
Rice Cultural and Ecosystem Requirement[h]	Estimated	6,166
Upslope Drainwater Flow-through[i]	Estimated	0
Remainder Drainwater Outflow[j]	District Records	7,637
Total District Outflow *(from District Records)* =		**15,000**
Percolation from Agricultural Lands *(Total Supplies - Distribution System - Crop Water Needs - District Outflows)*		**19,365**
Internal Recirculation and Reuse (Not Included in the Water Balance)		
Total Quantity Recirculated for Reuse	District Records	**3,239**

[a]Water Supplies - Includes surface and groundwater supplies diverted or pumped into the District to meet Crop Consumptive Use Water Needs, District Operational needs, and water required for cultural practice needs (e.g., flooding, reflooding, and flow-through for rice cultivation). Does not include water recirculated by the District.

[b]Inflow from Precipitation is calculated as total April - October precipitation x Total Crop Acres minus Rice Straw Decomp acres.

[c]Available Soil Moisture is estimated as a 10% of Jan precip + 30% of Feb precip + 50% of Mar precip on Non-Rice and Non-Habitat acres.

[d]Riparian ET is estimated based on observation.

[e]Conveyance System Filling - Quantity estimated by the District required to initially fill conveyance canals and laterals. The conveyance systems are typically drained after October 31.

[f]Crop Consumptive Use Water Needs do not include quantities required for flood-up or flow-through for rice.

[g]Irrigation Season Rainfall Runoff - Portion of District Outflow estimated to be the result of rainfall that cannot be captured or recirculated. This water is available to downstream water users, for instream flow, and to meet Delta Outflow requirements.

[h]Rice Cultural and Ecosystem Requirement - Portion of District Outflow estimated to result from the cultural requirements for rice flood-up and flow-through. This water is available to downstream water users, for instream flow, and to meet Delta Outflow requirements.

[i]Upslope drainwater flow-through is 50% of April, May, and June upslope water, limited by the Total District Outflow.

[j]Drainwater Outflow - Outflow from operational spills and end-of-season drainage. This water is available to (and used by) downstream water users, for instream flow, and to meet Delta Outflow requirements.

TABLE 7

Anderson Cottonwood Irrigation District – 2012 Annual Water Quantities Delivered under Each Right or Contract (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Year	Federal Ag Water Supply[a]		Non-Federal Ag Water Supply[b] (acre-feet)	Upslope Drainwater[c] (acre-feet)	Total (acre-feet)	District	
	Base Supply (acre-feet)	Project Water (acre-feet)				Recapture (acre-feet)	Outflow[d] (acre-feet)
2003	107,752				107,752	3,394	4,170
2004	113,569				113,569	3,577	4,395
2005	102,018				102,018	3,214	3,948
2006	93,168				93,168	2,935	3,606
2007	111,903				111,903	3,525	4,331
2008	109,864				109,864	3,464	4,252
2009	106,922				106,922	3,368	4,138
2010	100,009				100,009	3,151	15,000
2011	89,814	0	0	0	89,814	3,150	15,000
2012	101,229	0	0	0	101,229	3,239	15,000
Total	1,036,248	0	0	0	1,036,248	33,017	73,839
Average	103,625	0	0	0	103,625	3,302	7,384

[a]Federal Ag Water Supply from Reclamation Water Account Records.

[b]Non-Federal Ag Water Supply from District Records; quantities prior to 2008 are estimated.

[c]Estimated by District based on observation and historical information.

[d]Outflow data for 2011 are estimated by District; data for prior years are not available.

Glenn-Colusa Irrigation District

TABLE 1

Glenn-Colusa Irrigation District – 2012 Surface Water Supply
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	Federal Ag Water Supply[a]		Non-Federal Ag Water Supply[b] (acre-feet)	Upslope Drainwater[c] (acre-feet)	Total (acre-feet)
	Base Supply (acre-feet)	Project Water (acre-feet)			
Method	M-1	M-1	M-1	E-3	
April	11,966	0	0	6,000	17,966
May	153,791	0	0	18,000	171,791
June	152,132	0	0	12,000	164,132
July	130,000	35,300	0	2,500	167,800
August	90,000	54,977	0	1,000	145,977
September	35,771	0	0	500	36,271
October	32,303	0	0	500	32,803
TOTAL	**605,963**	**90,277**	**0**	**40,500**	**736,740**

[a]Federal Ag Water Supply from Reclamation Water Account Records.

[b]Non-Federal Ag Water Supply from District Records.

[c]Estimated by District based on observation and historical information.

TABLE 2

Glenn-Colusa Irrigation District – 2012 Groundwater Supply
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	District Groundwater (acre-feet)	Private Groundwater[a] (acre-feet)
Method	**M-1**	**E-1**
April	0	434
May	344	869
June	0	1,738
July	0	2,173
August	0	2,173
September	0	869
October	0	434
TOTAL	**344**	**8,690**

[a]Estimated by District based on observation and historical information.

TABLE 3

Glenn-Colusa Irrigation District – 2012 Total District Water Supply (excluding reuse)
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	Surface Water Total (acre-feet)	District Groundwater (acre-feet)	Total District Water Supply[a] (acre-feet)
Method	M-1		M-1
April	17,966	0	17,966
May	171,791	344	172,135
June	164,132	0	164,132
July	167,800	0	167,800
August	145,977	0	145,977
September	36,271	0	36,271
October	32,803	0	32,803
TOTAL	**736,740**	**344**	**737,084**

[a]In addition to the water supplies shown in Table 3, 206,542 acre-feet were recirculated by the District for reuse within its boundaries. This recirculation and reuse is an integral component of the District's total water supply.

Glenn-Colusa Irrigation District – Distribution System Evaporation and Seepage Worksheet

2012	Precipitation[a]		Evaporation[b]	
	inches	feet	inches	feet
Jan	2.5	0.21	2.0	0.17
Feb	0.5	0.04	3.0	0.25
Mar	3.2	0.26	3.4	0.28
Apr	1.6	0.14	5.4	0.45
May	0.0	0.00	8.6	0.72
Jun	0.1	0.01	9.0	0.75
Jul	0.0	0.00	8.7	0.73
Aug	0.0	0.00	7.9	0.66
Sept	0.0	0.00	5.9	0.49
Oct	0.9	0.07	3.8	0.32
Nov	2.5	0.21	1.8	0.15
Dec	4.0	0.33	1.2	0.10
TOTAL-YR	15.31	1.28	60.6	5.05
TOTAL-Apr-Oct	**2.58**	**0.22**	**49.3**	**4.11**

[a]Average precipitation reported for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235). Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012.

[b]Monthly evaporation from Distribution System water surfaces is estimated as 1.1 x the average reference ET (ETo) reported for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235) x Kc based on ITRC Typical Year ETc for Zone 12. Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012.

TABLE 4

Glenn-Colusa Irrigation District – 2012 Distribution System Evaporation and Seepage (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Canal, Pipeline, Lateral, Reservoir	Length[a] (feet)	Width[b] (feet)	Surface Area (acres)	Precipitation[c] (acre-feet)	Evaporation[d] (acre-feet)	Seepage[e] (acre-feet)	Total (acre-feet)
Canal	341,200	70	548	118	2,252	13,708	(15,842)
Pipeline	26,400	2	0	0	0	0	0
Laterals	3,495,360	12	963	207	3,955	19,258	(23,006)
Watershed Drains	2,919,840	15	1,005	216	4,130	5,027	(8,941)
TOTAL			**2,517**	**541**	**10,337**	**37,993**	**(47,789)**

[a]From District statistics.

[b]Average width of the conveyance facilities.

[c]Estimated inflow resulting from precipitation on canals, laterals, and drains during the irrigation season.

[d]Estimated evaporation from canals, laterals, and drains during the irrigation season.

[e]Estimated seepage from canals, laterals, and drains during the irrigation season.

TABLE 5

Glenn-Colusa Irrigation District – 2012 Crop Consumptive Use Water Needs (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Crop Name	Acres[a] (crop acres)	Crop ET[b] (AF/Ac)	Effective Precipitation[c] (AF/Ac)	Effective Precipitation[c] (acre-feet)	ETAW (acre-feet)	Leaching Requirement (AF/Ac)	Leaching Requirement (acre-feet)
Alfalfa	1,451	3.31	0.08	116	4,687	0.11	160
Almonds	6,395	3.20	0.08	512	19,952	0.18	1,151
Beans	689	0.80	0.06	41	510	0.47	324
Corn	2,360	2.12	0.06	142	4,862	0.14	330
Cotton	285	2.56	0.08	23	707	0.02	6
Cover Crop	54	3.60	0.08	4	190	0.03	2
Grapes	64	2.15	0.06	4	134	0.18	12
Habitat	702	3.14	0.08	56	2,148	0.03	21
Misc. Deciduous	4	3.04	0.08	0	12	0.16	1
Oats	30	0.80	0.06	2	22	0.02	1
Olives	216	3.04	0.08	17	639	0.09	19
Onions	494	0.96	0.06	30	445	0.28	138
Pasture	3,802	3.60	0.08	304	13,383	0.03	114
Prunes	254	3.16	0.08	20	782	0.18	46
Rice	107,155	3.31	0.07	7,501	347,182	0.06	6,429
Rice Straw Decomp	5,000	0.50	0.02	100	2,400	0.00	0
Sudan	496	3.60	0.08	40	1,746	0.07	35
Sunflowers	1,290	1.86	0.06	77	2,322	0.06	77
Tomatoes	1,459	1.78	0.06	88	2,509	0.08	117
Vegetables	167	1.03	0.08	13	159	0.18	30
Vineseed	1,007	1.03	0.08	81	957	0.18	181
Walnuts	3,928	3.45	0.08	314	13,237	0.16	628
Wheat	208	0.80	0.06	12	154	0.03	6
Crop Acres	137,510			9,497	419,139		9,828

Total Irrig. Acres 141,612 (If this number is larger than your known total, it may be due to double cropping.)

[a]Acres include lands, if any, irrigated by private wells.

[b]Crop ET (ETc) was calculated as average ETo for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235) x Kc based on ITRC Typical Year ETc for Zone 12. Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012. Crop ET does not include water required for initial flooding, reflooding, or flow-through on rice acres. This quantity is estimated to be approximately 1.25 to 1.5 acre-feet per acre (approximately 133,000 to 160,000 acre-feet in 2012).

[c]Effective Precipitation is estimated as 60% of monthly precipitation greater than 0.5 inch during crop growing season. Because of the nature of flooded areas, such as rice field and flooded habitat, irrigation-season precipitation increases the volume of water in the flooded basin, but it typically flows through the field and, therefore, is assumed to be unavailable to meet the crop water needs.

TABLE 6

Glenn-Colusa Irrigation District – 2012 District Water Balance
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Water Supplies (excluding recirculation) [a]		
District Water Supply *(includes District Groundwater)*	Table 3	737,084
Private Groundwater	Table 2	8,690
Inflow from Precip[b]	Estimated	28,490
Available Soil Moisture[c]	Estimated	4,080
Total Water Supplies =		**778,344**
Distribution System Evaporation and Seepage		
Seepage (Canals/Laterals)	Table 4	37,993
Evaporation - Precipitation (Canals/Laterals)	Table 4	9,796
Riparian ET[d] (Canals/Laterals)	Estimated	6,450
Conveyance System Filling[e] (Canals/Laterals)	Estimated	6,000
Total Distribution System =		**60,239**
Crop Consumptive Use Water Needs [f]		
Evapotranspiration of Applied Water - ETAW *(includes Evap from Rice Straw Decomposition)*	Table 5	419,139
Evapotranspiration of Precip - ET_{pr}	Table 5	9,497
Cultural Practices *(includes Leaching Requirement)*	Table 5	9,828
Total Crop Water Needs =		**438,464**
District Outflows		
Water Supply Delivered to Other Districts or Users	District Records	33,241
Irrigation Season Rainfall Runoff[g]	Estimated	23,038
Rice Cultural and Ecosystem Requirement[h]	Estimated	107,155
Upslope Drainwater Flow-through[i]	Estimated	16,465
Remainder Drainwater Outflow[j]	Calculated	18,000
Total District Outflow *(from District Records)* **=**		**197,899**
Percolation from Agricultural Lands *(Total Supplies - Distribution System - Crop Water Needs - District Outflows)*		**81,741**
Internal Recirculation and Reuse (Not Included in the Water Balance)		
Total Quantity Recirculated for Reuse	District Records	**206,542**

[a]Water Supplies - Includes surface and groundwater supplies diverted or pumped into the District to meet Crop Consumptive Use Water Needs, District Operational needs, and water required for cultural practice needs (e.g., flooding, reflooding, and flow-through for rice cultivation). Does not include water recirculated by the District.

[b]Inflow from Precipitation is calculated as total April - October precipitation x Total Crop Acres minus Rice Straw Decomp acres.

[c]Available Soil Moisture is estimated as a 10% of Jan precip + 30% of Feb precip + 50% of Mar precip on Non-Rice and Non-Habitat acres.

[d]Riparian ET is estimated based on observation.

[e]Conveyance System Filling - Quantity estimated by the District required to initially fill conveyance canals and laterals. The conveyance systems are typically drained after October 31.

[f]Crop Consumptive Use Water Needs do not include quantities required for flood-up or flow-through for rice.

[g]Irrigation Season Rainfall Runoff - Portion of District Outflow estimated to be the result of rainfall that cannot be captured or recirculated. This water is available to downstream water users, for instream flow, and to meet Delta Outflow requirements.

[h]Rice Cultural and Ecosystem Requirement - Portion of District Outflow estimated to be due to the cultural requirements for rice flood-up and flow-through. This water is available to downstream water users, for instream flow, and to meet Delta Outflow requirements.

[i]Upslope drainwater flow-through is 50% of April, May, and June upslope water, limited by the Total District Outflow.

[j]Drainwater Outflow - Outflow from operational spills and end-of-season drainage. This water is available to (and used by) downstream water users, for instream flow, and to meet Delta Outflow requirements.

TABLE 7

Glenn-Colusa Irrigation District – 2012 Annual Water Quantities Delivered under Each Right or Contract (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Year	Federal Ag Water Supply[a]		Non-Federal Ag Water Supply[b] (acre-feet)	Upslope Drainwater[c] (acre-feet)	Total (acre-feet)	District	
	Base Supply (acre-feet)	Project Water (acre-feet)				Recapture (acre-feet)	Outflow (acre-feet)
2003	569,277	73,593	0	22,500	665,370	134,446	219,390
2004	665,314	59,491	0	22,500	747,305	179,137	227,987
2005	581,437	77,072	0	22,500	681,009	144,819	223,045
2006	538,589	77,144	0	22,500	638,233	159,934	220,871
2007	635,209	52,485	0	22,500	710,194	185,560	219,207
2008	691,219	55,423	0	22,500	769,142	204,255	183,373
2009	636,777	49,911	0	22,500	709,188	190,980	171,743
2010	572,352	91,017	0	22,500	685,869	194,677	229,665
2011	571,617	86,014	0	40,500	698,131	190,994	255,999
2012	605,963	90,277	0	40,500	736,740	206,542	197,899
Total	6,067,754	712,427	0	261,000	7,041,181	1,791,344	2,149,179
Average	606,775	71,243	0	26,100	704,118	179,134	214,918

[a]Federal Ag Water Supply from Reclamation Water Account Records.

[b]Non-Federal Ag Water Supply from District Records.

[c]Estimated by District based on observation and historical information.

Provident Irrigation District

TABLE 1

Provident Irrigation District – 2012 Surface Water Supply
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	Federal Ag Water Supply[a]		Non-Federal Ag Water Supply[b] (acre-feet)	Upslope Drainwater[c] (acre-feet)	Total (acre-feet)
	Base Supply (acre-feet)	Project Water (acre-feet)			
Method	M-1	M-1	M-1	E-3	
April	1,112		204	436	1,752
May	10,621		3,393	3,820	17,834
June	10,766		5,420	3,707	19,893
July	6,300	2,278	6,478	4,996	20,052
August	2,567	1,000	6,770	6,454	16,791
September	100		224	3,810	4,134
October	0		4,579	428	5,007
TOTAL	31,466	3,278	27,068	23,651	85,463

[a]Federal Ag Water Supply from Reclamation Water Account Records.

[b]Non-Federal Ag Water Supply from District Records.

[c]Estimated by District based on observation and historical information.

TABLE 2

Provident Irrigation District – 2012 Groundwater Supply
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	District Groundwater (acre-feet)	Private Groundwater[a] (acre-feet)
Method	M-1	E-1
April	28	0
May	714	0
June	220	0
July	0	0
August	0	0
September	0	0
October	62	0
TOTAL	1,024	0

[a]Estimated by District based on observation and historical information.

TABLE 3

Provident Irrigation District – 2012 Total District Water Supply (excluding reuse)
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	Surface Water Total (acre-feet)	District Groundwater (acre-feet)	Total District Water Supply[a] (acre-feet)
Method	M-1		M-1
April	1,752	28	1,780
May	17,834	714	18,548
June	19,893	220	20,113
July	20,052	-	20,052
August	16,791	-	16,791
September	4,134	-	4,134
October	5,007	62	5,069
TOTAL	85,463	1,024	86,487

[a]In addition to the water supplies shown in Table 3, 9,210 acre-feet were recirculated by the District for reuse within its boundaries. This recirculation and reuse is an integral component of the District's total water supply.

Provident Irrigation District – Distribution System Evaporation and Seepage Worksheet

2012	Precipitation[a]		Evaporation[b]	
	inches	feet	inches	feet
Jan	2.5	0.21	2.0	0.17
Feb	0.5	0.04	3.0	0.25
Mar	3.2	0.26	3.4	0.28
Apr	1.6	0.14	5.4	0.45
May	0.0	0.00	8.6	0.72
Jun	0.1	0.01	9.0	0.75
Jul	0.0	0.00	8.7	0.73
Aug	0.0	0.00	7.9	0.66
Sept	0.0	0.00	5.9	0.49
Oct	0.9	0.07	3.8	0.32
Nov	2.5	0.21	1.8	0.15
Dec	4.0	0.33	1.2	0.10
TOTAL-YR	15.3	1.28	60.6	5.05
TOTAL-Apr-Oct	**2.6**	**0.22**	**49.3**	**4.11**

[a]Average precipitation reported for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235). Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012.

[b]Monthly evaporation from Distribution System water surfaces is estimated as 1.1 x the average reference ET (ETo) reported for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235) x Kc based on ITRC Typical Year ETc for Zone 12. Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012.

TABLE 4

Provident Irrigation District – 2012 Distribution System Evaporation and Seepage (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Canal, Pipeline, Lateral, Reservoir	Length[a] (feet)	Width[b] (feet)	Surface Area (acres)	Precipitation[c] (acre-feet)	Evaporation[d] (acre-feet)	Seepage[e] (acre-feet)	Total (acre-feet)
Canal	65,472	35	53	11	216	1,315	(1,520)
Laterals	206,448	12	57	12	234	569	(790)
Watershed Drains	175,276	15	60	13	248	302	(537)
TOTAL			170	37	698	2,186	(2,847)

[a]From District statistics.

[b]Average width of the conveyance facilities.

[c]Estimated inflow resulting from precipitation on canals, laterals, and drains during the irrigation season (April-October).

[d]Estimated evaporation from canals, laterals, and drains during the irrigation season.

[e]Estimated seepage from canals, laterals, and drains during the irrigation season.

TABLE 5

Provident Irrigation District – 2012 Crop Consumptive Use Water Needs (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Crop Name	Acres[a] (crop acres)	Crop ET[b] (AF/Ac)	Effective Precipitation[c] (AF/Ac)	Effective Precipitation[c] (acre-feet)	ETAW (acre-feet)	Leaching Requirement (AF/Ac)	Leaching Requirement (acre-feet)
Rice	15,161	3.31	0.07	1,061	49,122	0.06	910
Rice Straw Decomp	5,400	0.50	0.02	108	2,592	0.00	0
Crop Acres	20,561			1,169	51,714		910

Total Irrig. Acres 15,095 (If this number is larger than your known total, it may be due to double cropping.)

[a]Acres include lands, if any, irrigated by private wells.

[b]Crop ET (ETc) was calculated as average ETo for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235) x Kc based on ITRC Typical Year ETc for Zone 12. Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012. Crop ET does not include water required for initial flooding, reflooding, or flow-through on rice acres. This quantity is estimated to be approximately 1.25 to 1.5 acre-feet per acre (approximately 19,000 to 22,750 acre-feet in 2012).

[c]Effective Precipitation is estimated as 60% of monthly precipitation greater than 0.5 inch during crop growing season. Because of the nature of flooded areas, such as rice field and flooded habitat, irrigation-season precipitation increases the volume of water in the flooded basin, but it typically flows through the field and, therefore, is assumed to be unavailable to meet the crop water needs.

TABLE 6

Provident Irrigation District – 2012 District Water Balance
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Water Supplies (excluding recirculation) [a]		
District Water Supply *(includes District Groundwater)*	Table 3	86,487
Private Groundwater	Table 2	0
Inflow from Precip[b]	Estimated	3,260
Available Soil Moisture[c]	Estimated	0
	Total Water Supplies =	**89,747**
Distribution System Evaporation and Seepage		
Seepage (Canals/Laterals)	Table 4	2,186
Evaporation - Precipitation (Canals/Laterals)	Table 4	661
Riparian ET[d] (Canals/Laterals)	Estimated	100
Conveyance System Filling[e] (Canals/Laterals)	Estimated	855
	Total Distribution System =	**3,802**
Crop Consumptive Use Water Needs [f]		
Evapotranspiration of Applied Water - ETAW *(includes Evap from Rice Straw Decomposition)*	Table 5	51,714
Evapotranspiration of Precip - ET_{pr}	Table 5	1,169
Cultural Practices *(includes Leaching Requirement)*	Table 5	910
	Total Crop Water Needs =	**53,793**
District Outflows		
Water Supply Delivered to Other Districts or Users	District Records	0
Irrigation Season Rainfall Runoff[g]	Estimated	3,260
Rice Cultural and Ecosystem Requirement[h]	Estimated	15,161
Upslope Drainwater Flow-through	Estimated	3,982
Remainder Drainwater Outflow[i]	Calculated	2,866
Total District Outflow *(from District Records)* **=**		**25,268**
Percolation from Agricultural Lands *(Total Supplies - Distribution System - Crop Water Needs - District Outflows)*		**6,884**
Internal Recirculation and Reuse (Not Included in the Water Balance)		
Total Quantity Recirculated for Reuse	District Records	**9,210**

[a]Water Supplies - Includes surface and groundwater supplies diverted or pumped into the District to meet Crop Consumptive Use Water Needs, District Operational needs, and water required for cultural practice needs (e.g., flooding, reflooding, and flow-through for rice cultivation). Does not include water recirculated by the District.

[b]Inflow from Precipitation is calculated as total April - October precipitation x Total Crop Acres minus Rice Straw Decomp acres.

[c]Available Soil Moisture is estimated as a 10% of Jan precip + 30% of Feb precip + 50% of Mar precip on Non-Rice and Non-Habitat acres.

[d]Riparian ET is estimated based on observation.

[e]Conveyance System Filling - Quantity estimated by the District required to initially fill conveyance canals and laterals. The conveyance systems are typically drained after October 31.

[f]Crop Consumptive Use Water Needs do not include quantities required for flood-up or flow-through for rice.

[g]Irrigation Season Rainfall Runoff - Portion of District Outflow estimated to be the result of rainfall that cannot be captured or recirculated. This water is available to downstream water users, for instream flow, and to meet Delta Outflow requirements.

[h]Rice Cultural and Ecosystem Requirement - Portion of District Outflow estimated to result from the cultural requirements for rice flood-up and flow-through. This water is available to downstream water users, for instream flow, and to meet Delta Outflow requirements.

[i]Drainwater Outflow - Outflow from operational spills and end-of-season drainage. This water is available to (and used by) downstream water users, for instream flow, and to meet Delta Outflow requirements.

TABLE 7

Provident Irrigation District – 2012 Annual Water Quantities Delivered under Each Right or Contract (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Year	Federal Ag Water Supply[a]		Non-Federal Ag Water Supply[b, c] (acre-feet)	Upslope Drainwater[c, d] (acre-feet)	Total (acre-feet)	District	
	Base Supply (acre-feet)	Project Water (acre-feet)				Recapture[d] (acre-feet)	Outflow[c] (acre-feet)
2003	49,730	7,228	0		56,958		
2004	45,948	0	12,931		58,879		
2005	35,050	4,500	7,028		46,578		
2006	33,282	4,500	5,597		43,379		
2007	39,263	3,385	8,779		51,427		
2008	47,280	1,747	0		49,027		
2009	35,471	4,500	11,883		51,854		
2010	31,879	4,500	6,727	70,534	113,640	10,233	49,935
2011	26,671	3,346	6,619	73,953	110,589	9,983	51,136
2012	31,466	3,278	27,068	23,651	85,463	9,210	25,268
Total	376,040	36,984	86,632	168,138	667,794	29,426	126,339
Average	37,604	3,698	8,663	56,046	66,779	9,809	42,113

[a]Federal Ag Water Supply from Reclamation Water Account Records.

[b]Non-Federal Ag Water Supply from District Records; quantities prior to 2008 are estimated.

[c]Estimated by District based on observation and historical information. The methods for estimating and accounting for quantities were refined in 2013.

[d]Data prior to 2010 are not available.

Princeton-Codora-Glenn Irrigation District

TABLE 1

Princeton-Codora-Glenn Irrigation District – 2012 Surface Water Supply
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	Federal Ag Water Supply[a]		Non-Federal Ag Water Supply[b] (acre-feet)	Upslope Drainwater[c] (acre-feet)	Total (acre-feet)
	Base Supply (acre-feet)	Project Water (acre-feet)			
Method	M-1	M-1	M-1	E-3	
April	1,551		110	374	2,035
May	14,422		2,780	1,280	18,482
June	11,659		4,698	1,060	17,417
July	7,116	5,950	4,307	2,259	19,632
August	2,780	7,000	4,304	2,650	16,734
September	1,468		1,054	5,233	7,755
October	4,307		655	0	4,962
TOTAL	43,303	12,950	17,908	12,856	87,017

[a]Federal Ag Water Supply from Reclamation Water Account Records.

[b]Non-Federal Ag Water Supply from District Records.

[c]Estimated by District based on observation and historical information.

TABLE 2

Princeton-Codora-Glenn Irrigation District – 2012 Groundwater Supply
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	District Groundwater (acre-feet)	Private Groundwater[a] (acre-feet)
Method	M-1	E-1
April	0	0
May	295	0
June	558	0
July	1,203	0
August	1,164	0
September	597	0
October	56	0
TOTAL	3,873	0

[a]Estimated by District based on observation and historical information.

TABLE 3

Princeton-Codora-Glenn Irrigation District – 2012 Total District Water Supply (excluding reuse)
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	Surface Water Total (acre-feet)	District Groundwater (acre-feet)	Total District Water Supply[a] (acre-feet)
Method	M-1		M-1
April	2,035	-	2,035
May	18,482	295	18,777
June	17,417	558	17,975
July	19,632	1,203	20,835
August	16,734	1,164	17,898
September	7,755	597	8,352
October	4,962	56	5,018
TOTAL	87,017	3,873	90,890

[a]In addition to the water supplies shown in Table 3, 8,702 acre-feet were recirculated by the District for reuse within its boundaries. This recirculation and reuse is an integral component of the District's total water supply.

Princeton-Codora-Glenn Irrigation District – Distribution System Evaporation and Seepage Worksheet

2012	Precipitation[a]		Evaporation[b]	
	inches	feet	inches	feet
Jan	2.5	0.21	2.0	0.17
Feb	0.5	0.04	3.0	0.25
Mar	3.2	0.26	3.4	0.28
Apr	1.6	0.14	5.4	0.45
May	0.0	0.00	8.6	0.72
Jun	0.1	0.01	9.0	0.75
Jul	0.0	0.00	8.7	0.73
Aug	0.0	0.00	7.9	0.66
Sept	0.0	0.00	5.9	0.49
Oct	0.9	0.07	3.8	0.32
Nov	2.5	0.21	1.8	0.15
Dec	4.0	0.33	1.2	0.10
TOTAL-YR	15.3	1.28	60.6	5.05
TOTAL-Apr-Oct	**2.6**	**0.22**	**49.3**	**4.11**

[a]Average precipitation reported for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235). Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012.

[b]Monthly evaporation from Distribution System water surfaces is estimated as 1.1 x the average reference ET (ETo) reported for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235) x Kc based on ITRC Typical Year ETc for Zone 12. Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012.

TABLE 4

Princeton-Codora-Glenn Irrigation District – 2012 Distribution System Evaporation and Seepage (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Canal, Pipeline, Lateral, Reservoir	Length[a] (feet)	Width[b] (feet)	Surface Area (acres)	Precipitation[c] (acre-feet)	Evaporation[d] (acre-feet)	Seepage[e] (acre-feet)	Total (acre-feet)
Canal	68,640	30	47	10	194	11,818	(12,002)
Laterals	219,384	15	76	16	310	5,666	(5,960)
Watershed Drains	113,520	15	39	8	161	1,955	(2,107)
TOTAL			162	35	665	19,439	(20,069)

[a]From District statistics.

[b]Average width of the conveyance facilities.

[c]Estimated inflow resulting from precipitation on canals, laterals, and drains during the irrigation season

[d]Estimated evaporation from canals, laterals, and drains during the irrigation season.

[e]Estimated seepage from canals, laterals, and drains during the irrigation season.

TABLE 5

Princeton-Codora-Glenn Irrigation District – 2012 Crop Consumptive Use Water Needs (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Crop Name	Acres[a] (crop acres)	Crop ET[b] (AF/Ac)	Effective Precipitation[c] (AF/Ac)	Effective Precipitation[c] (acre-feet)	ETAW (acre-feet)	Leaching Requirement (AF/Ac)	Leaching Requirement (acre-feet)
Alfalfa	20	3.31	0.08	2	65	0.11	2
Almonds	45	3.20	0.08	4	140	0.18	8
Beans	91	0.80	0.06	5	67	0.47	43
Corn	94	2.12	0.06	6	194	0.14	13
Cotton	60	2.56	0.08	5	149	0.02	1
Onions	0	0.96	0.06	0	0	0.28	0
Pasture	18	3.60	0.08	1	63	0.03	1
Prunes	81	3.16	0.08	6	249	0.18	15
Rice	8,172	3.31	0.07	572	26,477	0.06	490
Rice Straw Decomp	1,825	0.50	0.02	37	876	0.00	0
Sunflowers	47	1.86	0.06	3	85	0.06	3
Vineseed	0	1.03	0.08	0	0	0.18	0
Walnuts	853	3.45	0.08	68	2,875	0.16	136
Watermelon	9	1.27	0.00	0	11	0.04	0
Wheat	139	0.80	0.06	8	103	0.03	4
Crop Acres	11,454			717	31,354		716

Total Irrig. Acres 9,629 (If this number is larger than your known total, it may be due to double cropping.)

[a]Acres include lands, if any, irrigated by private wells.

[b]Crop ET (ETc) was calculated as average ETo for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235) x Kc based on ITRC Typical Year ETc for Zone 12. Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012. Crop ET does not include water required for initial flooding, reflooding or flow-through on rice acres. This quantity is estimated to be approximately 1.25 to 1.5 acre-feet per acre (approximately 10,000 to 12,250 acre-feet in 2012).

[c]Effective Precipitation is estimated as 60% of monthly precipitation greater than 0.5 inch during crop growing season. Because of the nature of flooded areas, such as rice field and flooded habitat, irrigation-season precipitation increases the volume of water in the flooded basin, but it typically flows through the field and, therefore, is assumed to be unavailable to meet the crop water needs.

TABLE 6

Princeton-Codora-Glenn Irrigation District – 2012 District Water Balance
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Water Supplies (excluding recirculation) [a]		
District Water Supply *(includes District Groundwater)*	Table 3	90,890
Private Groundwater	Table 2	0
Inflow from Precip[b]	Estimated	2,070
Available Soil Moisture[c]	Estimated	231
	Total Water Supplies =	**93,191**
Distribution System Evaporation and Seepage		
Seepage (Canals/Laterals)	Table 4	19,439
Evaporation - Precipitation (Canals/Laterals)	Table 4	630
Riparian ET[d] (Canals/Laterals)	Estimated	100
Conveyance System Filling[e] (Canals/Laterals)	Estimated	870
	Total Distribution System =	**21,039**
Crop Consumptive Use Water Needs [f]		
Evapotranspiration of Applied Water - ETAW *(includes Evap from Rice Straw Decomposition)*	Table 5	31,354
Evapotranspiration of Precip - ET_{pr}	Table 5	717
Cultural Practices *(includes Leaching Requirement)*	Table 5	716
	Total Crop Water Needs =	**32,787**
District Outflows		
Water Supply Delivered to Other Districts or Users	District Records	0
Irrigation Season Rainfall Runoff[g]	Estimated	1,757
Rice Cultural and Ecosystem Requirement[h]	Estimated	8,172
Upslope Drainwater Flow-through	Estimated	6,428
Remainder Drainwater Outflow[j]	Calculated	10,031
Total District Outflow *(from District Records)* **=**		**26,388**
Percolation from Agricultural Lands *(Total Supplies - Distribution System - Crop Water Needs - District Outflows)*		**12,977**
Internal Recirculation and Reuse (Not Included in the Water Balance)		
Total Quantity Recirculated for Reuse	District Records	**8,702**

[a]Water Supplies - Includes surface and groundwater supplies diverted or pumped into the District to meet Crop Consumptive Use Water Needs, District Operational needs, and water required for cultural practice needs (e.g., flooding, reflooding, and flow-through for rice cultivation). Does not include water recirculated by the District.

[b]Inflow from Precipitation is calculated as total April - October precipitation x Total Crop Acres minus Rice Straw Decomp acres.

[c]Available Soil Moisture is estimated as a 10% of Jan precip + 30% of Feb precip + 50% of Mar precip on Non-Rice and Non-Habitat acres.

[d]Riparian ET is estimated based on observation.

[e]Conveyance System Filling - Quantity estimated by the District required to initially fill conveyance canals and laterals. The conveyance systems are typically drained after October 31.

[f]Crop Consumptive Use Water Needs do not include quantities required for flood-up or flow-through for rice.

[g]Irrigation Season Rainfall Runoff - Portion of District Outflow estimated to be the result of rainfall that cannot be captured or recirculated. This water is available to downstream water users, for instream flow, and to meet Delta Outflow requirements.

[h]Rice Cultural and Ecosystem Requirement - Portion of District Outflow estimated to result from the cultural requirements for rice flood-up and flow-through. This water is available to downstream water users, for instream flow, and to meet Delta Outflow requirements.

[i]Drainwater Outflow - Outflow from operational spills and end-of-season drainage. This water is available to (and used by) downstream water users, for instream flow, and to meet Delta Outflow requirements.

TABLE 7

Princeton-Codora-Glenn Irrigation District – 2012 Annual Water Quantities Delivered under Each Right or Contract (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Year	Federal Ag Water Supply[a]		Non-Federal Ag Water Supply[b] (acre-feet)	Upslope Drainwater[c] (acre-feet)	Total (acre-feet)	District	
	Base Supply (acre-feet)	Project Water (acre-feet)				Recapture[d] (acre-feet)	Outflow[c] (acre-feet)
2003	46,467	11,747	0		58,214	7,731	
2004	50,181	10,991	0		61,172	9,156	
2005	44,961	15,659	0		60,620	7,088	
2006	40,671	14,600	0		55,271	4,860	
2007	50,875	14,800	0		65,675	5,276	
2008	52,810	16,398	0		69,208	5,682	
2009	50,800	13,847	0		64,647	6,078	
2010	44,869	14,428	0	23,736	83,033	5,531	27,428
2011	38,257	12,485	0	26,189	76,931	7,664	25,349
2012	43,303	12,950	17,908	12,856	87,017	8,702	26,388
Total	463,194	137,905	17,908	62,781	681,788	67,768	79,165
Average	46,319	13,791	1,791	20,927	68,179	6,777	26,388

[a]Federal Ag Water Supply from Reclamation Water Account Records.

[b]Non-Federal Ag Water Supply from District Records; quantities prior to 2008 are estimated.

[c]Estimated by District based on observation and historical information. Data prior to 2010 are not available

[d]Estimated by District based on observation and historical information.

Reclamation District 108

TABLE 1

Reclamation District 108 – 2012 Surface Water Supply
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	Federal Ag Water Supply[a]		Non-Federal Ag Water Supply[b] (acre-feet)	Upslope Drainwater[c] (acre-feet)	Total (acre-feet)
	Base Supply (acre-feet)	Project Water (acre-feet)			
Method	M-1	M-1	M-1	E-3	
April	2,586	0		3	2,589
May	39,137	0		61	39,198
June	42,698	0		140	42,838
July	31,500	5,512		451	37,463
August	16,500	12,455		452	29,407
September	7,838	0		53	7,891
October	1,065	0		0	1,065
TOTAL	141,324	17,967	0	1,160	160,451

[a]Federal Ag Water Supply from Reclamation Water Account Records.

[b]Non-Federal Ag Water Supply from District Records.

[c]Estimated by District based on observation and historical information.

TABLE 2

Reclamation District 108 – 2012 Groundwater Supply
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	District Groundwater (acre-feet)	Private Groundwater[a] (acre-feet)
Method	M-1	E-1
April	0	0
May	0	0
June	0	0
July	0	0
August	0	0
September	0	0
October	0	0
TOTAL	0	0

[a]Estimated by District based on observation and historical information.

TABLE 3

Reclamation District 108 – 2012 Total District Water Supply (excluding reuse)
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	Surface Water Total (acre-feet)	District Groundwater (acre-feet)	Total District Water Supply[a] (acre-feet)
Method	M-1		M-1
April	2,589	-	2,589
May	39,198	-	39,198
June	42,838	-	42,838
July	37,463	-	37,463
August	29,407	-	29,407
September	7,891	-	7,891
October	1,065	-	1,065
TOTAL	160,451	-	160,451

[a]In addition to the water supplies shown in Table 3, 53,739 acre-feet were recirculated by the District for reuse within its boundaries. This recirculation and reuse is an integral component of the District's total water supply.

Reclamation District 108 – Distribution System Evaporation and Seepage Worksheet

2012	Precipitation[a]		Evaporation[b]	
	inches	feet	inches	feet
Jan	2.5	0.21	2.0	0.17
Feb	0.5	0.04	3.0	0.25
Mar	3.2	0.26	3.4	0.28
Apr	1.6	0.14	5.4	0.45
May	0.0	0.00	8.6	0.72
Jun	0.1	0.01	9.0	0.75
Jul	0.0	0.00	8.7	0.73
Aug	0.0	0.00	7.9	0.66
Sept	0.0	0.00	5.9	0.49
Oct	0.9	0.07	3.8	0.32
Nov	2.5	0.21	1.8	0.15
Dec	4.0	0.33	1.2	0.10
TOTAL-YR	15.3	1.28	60.6	5.05
TOTAL-Apr-Oct	**2.6**	**0.22**	**49.3**	**4.11**

[a]Average precipitation reported for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235). Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012.

[b]Monthly evaporation from Distribution System water surfaces is estimated as 1.1 x the average reference ET (ETo) reported for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235) x Kc based on ITRC Typical Year ETc for Zone 12. Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012.

TABLE 4

Reclamation District 108 – 2012 Distribution System Evaporation and Seepage (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Canal, Pipeline, Lateral, Reservoir	Length[a] (feet)	Width[b] (feet)	Surface Area (acres)	Precipitation[c] (acre-feet)	Evaporation[d] (acre-feet)	Seepage[e] (acre-feet)	Total (acre-feet)
Canal	528,000	24	291	63	1,195	2,909	(4,041)
Laterals	158,400	24	87	19	358	873	(1,212)
Watershed Drains	0	0	0	0	0	0	0
TOTAL			378	81	1,553	3,782	(5,254)

[a]From District statistics.

[b]Average width of the conveyance facilities.

[c]Estimated inflow resulting from precipitation on canals, laterals, and drains during the irrigation season.

[d]Estimated evaporation from canals, laterals, and drains during the irrigation season.

[e]Estimated seepage from canals, laterals, and drains during the irrigation season.

TABLE 5

Reclamation District 108 – 2012 Crop Consumptive Use Water Needs (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Crop Name	Acres[a] (crop acres)	Crop ET[b] (AF/Ac)	Effective Precipitation[c] (AF/Ac)	Effective Precipitation[c] (acre-feet)	ETAW (acre-feet)	Leaching Requirement (AF/Ac)	Leaching Requirement (acre-feet)
Alfalfa	1,942	3.31	0.08	155	6,271	0.11	214
Beans	535	0.80	0.06	32	396	0.47	251
Cantaloupe	62	1.27	0.00	0	79	0.02	1
Cucumbers	222	1.27	0.00	0	282	0.03	7
Corn	1,526	2.12	0.06	92	3,143	0.14	214
Idle	627	0.16	0.03	19	81	0.00	0
Melons	225	1.27	0.00	0	286	0.04	9
Milo	47	2.12	0.06	3	98	0.02	1
Pasture	163	3.60	0.08	13	574	0.03	5
Rice	31,826	3.31	0.07	2,228	103,117	0.06	1,910
Rice Straw Decomp	0	0.50	0.02	0	0	0.00	0
Safflower	604	1.86	0.06	36	1,088	0.06	36
Squash	80	1.27	0.00	0	102	0.18	14
Sunflowers	1,859	1.86	0.06	112	3,345	0.06	112
Tomatoes	3,519	1.78	0.06	211	6,052	0.08	282
Vineseed	1,215	1.03	0.08	97	1,154	0.18	219
Watermelon	26	1.27	0.00	0	32	0.04	1
Walnuts	1,353	3.45	0.08	108	4,560	0.16	216
Wheat	2,160	0.80	0.06	130	1,598	0.03	65
Crop Acres	47,990			3,235	132,258		3,557
Total Irrig. Acres	51,574	(If this number is larger than your known total, it may be due to double cropping.)					

[a]Acres include lands, if any, irrigated by private wells.

[b]Crop ET (ETc) was calculated as average ETo for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235) x Kc based on ITRC Typical Year ETc for Zone 12. Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012. Crop ET does not include water required for initial flooding, reflooding, or flow-through on rice acres. This quantity is estimated to be approximately 1.25 to 1.5 acre-feet per acre (approximately 39,750 to 47,750 acre-feet in 2012).

[c]Effective Precipitation is estimated as 60% of monthly precipitation greater than 0.5 inch during crop growing season. Because of the nature of flooded areas, such as rice field and flooded habitat, irrigation-season precipitation increases the volume of water in the flooded basin, but it typically flows through the field and, therefore, is assumed to be unavailable to meet the crop water needs.

TABLE 6

Reclamation District 108 – 2012 District Water Balance
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Water Supplies (excluding recirculation) [a]		
District Water Supply *(includes District Groundwater)*	Table 3	160,451
Private Groundwater	Table 2	0
Inflow from Precip[b]	Estimated	10,318
Available Soil Moisture[c]	Estimated	2,423
	Total Water Supplies =	**173,191**
Distribution System Evaporation and Seepage		
Seepage (Canals/Laterals)	Table 4	3,782
Evaporation - Precipitation (Canals/Laterals)	Table 4	1,472
Riparian ET[d] (Canals/Laterals)	Estimated	1,000
Conveyance System Filling[e] (Canals/Laterals)	Estimated	1,605
	Total Distribution System =	7,859
Crop Consumptive Use Water Needs [f]		
Evapotranspiration of Applied Water - ETAW *(includes Evap from Rice Straw Decomposition)*	Table 5	132,258
Evapotranspiration of Precip - ET_{pr}	Table 5	3,235
Cultural Practices *(includes Leaching Requirement)*	Table 5	3,557
	Total Crop Water Needs =	**139,051**
District Outflows		
Water Supply Delivered to Other Districts or Users	District Records	0
Irrigation Season Rainfall Runoff[g]	Estimated	6,843
Rice Cultural and Ecosystem Requirement[h]	Estimated	31,826
Upslope Drainwater Flow-through[i]	Estimated	0
Remainder Drainwater Outflow[j]	Calculated	1,306
Total District Outflow *(from District Records)* **=**		**39,975**
Percolation from Agricultural Lands *(Total Supplies - Distribution System - Crop Water Needs - District Outflows)*		**(13,693)**
Internal Recirculation and Reuse (Not Included in the Water Balance)		
Total Quantity Recirculated for Reuse	District Records	**53,739**

[a]Water Supplies - Includes surface and groundwater supplies diverted or pumped into the District to meet Crop Consumptive Use Water Needs, District Operational needs, and water required for cultural practice needs (e.g., flooding, reflooding, and flow-through for rice cultivation). Does not include water recirculated by the District.

[b]Inflow from Precipitation is calculated as total April - October precipitation x Total Crop Acres minus Rice Straw Decomp acres.

[c]Available Soil Moisture is estimated as a 10% of Jan precip + 30% of Feb precip + 50% of Mar precip on Non-Rice and Non-Habitat acres.

[d]Riparian ET is estimated based on observation.

[e]Conveyance System Filling - Quantity estimated by the District required to initially fill conveyance canals and laterals. The conveyance systems are typically drained after October 31.

[f]Crop Consumptive Use Water Needs do not include quantities required for flood-up or flow-through for rice.

[g]Irrigation Season Rainfall Runoff - Portion of District Outflow estimated to be the result of rainfall that cannot be captured or recirculated. This water is available to downstream water users, for instream flow, and to meet Delta Outflow requirements.

[h]Rice Cultural and Ecosystem Requirement - Portion of District Outflow estimated to result from the cultural requirements for rice flood-up and flow-through. This water is available to downstream water users, for instream flow, and to meet Delta Outflow requirements.

[i]Upslope drainwater flow-through is 50% of April, May, and June upslope water, limited by the Total District Outflow.

[j]Drainwater Outflow - Outflow from operational spills and end-of-season drainage. This water is available to (and used by) downstream water users, for instream flow, and to meet Delta Outflow requirements.

TABLE 7

Reclamation District 108 – 2012 Annual Water Quantities Delivered under Each Right or Contract
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Year	Federal Ag Water Supply[a]		Non-Federal Ag Water Supply[b] (acre-feet)	Upslope Drainwater[c] (acre-feet)	Total (acre-feet)	District	
	Base Supply (acre-feet)	Project Water (acre-feet)				Recapture (acre-feet)	Outflow[c] (acre-feet)
2003	129,115	3,144		4,147	136,406	34,663	52,906
2004	157,751	0		4,566	162,317	60,623	54,576
2005	123,889	14,231		2,263	140,383	50,086	51,970
2006	153,886	0		5,571	159,457	54,230	79,837
2007	139,071	3,779		3,773	146,623	51,488	31,472
2008	174,949	4,389		779	180,117	46,161	43,865
2009	153,995	0		2,433	156,428	50,212	35,458
2010	124,132	20,245	0	2,984	147,361	84,430	22,080
2011	143,793	14,913	0	1,415	160,121	51,819	50,434
2012	141,324	17,967	0	1,160	160,451	53,739	39,975
Total	1,441,905	78,668	0	29,090	1,549,663	537,451	462,573
Average	144,191	7,867	0	2,909	154,966	53,745	46,257

[a]Federal Ag Water Supply from Reclamation Water Account Records.

[b]Non-Federal Ag Water Supply from District Records.

[c]Estimated by District based on observation and historical information.

Reclamation District 1004

TABLE 1

Reclamation District 1004 – 2012 Surface Water Supply
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	Federal Ag Water Supply[a]		Non-Federal Ag Water Supply[b] (acre-feet)	Upslope Drainwater[c] (acre-feet)	Total (acre-feet)
	Base Supply (acre-feet)	Project Water (acre-feet)			
Method	M-1	M-1	M-1	E-3	
April	111	0	207		318
May	10,727	0	2,893		13,620
June	12,151	0	4,183		16,334
July	6,100	6,236	5,272		17,608
August	3,600	3,812	4,707		12,119
September	1,921	0	3,296		5,217
October	8,412	0	2,837		11,249
TOTAL	43,022	10,048	23,395	0	76,465

[a]Federal Ag Water Supply from Reclamation Water Account Records.

[b]Non-Federal Ag Water Supply from District Records.

[c]Estimated by District based on observation and historical information.

TABLE 2

Reclamation District 1004 – 2012 Groundwater Supply
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	District Groundwater (acre-feet)	Private Groundwater[a] (acre-feet)
Method	M-1	E-1
April	0	
May	220	
June	283	
July	784	
August	483	
September	0	
October	40	
TOTAL	1,810	0

[a]Estimated by District based on observation and historical information.

TABLE 3

Reclamation District 1004 – 2012 Total District Water Supply (excluding reuse)
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	Surface Water Total (acre-feet)	District Groundwater (acre-feet)	Total District Water Supply[a] (acre-feet)
Method	M-1		M-1
April	318	-	318
May	13,620	220	13,840
June	16,334	283	16,617
July	17,608	784	18,392
August	12,119	483	12,602
September	5,217	-	5,217
October	11,249	40	11,289
TOTAL	76,465	1,810	78,275

[a]In addition to the water supplies shown in Table 3, 16,095 acre-feet were recirculated by the District for reuse within its boundaries. This recirculation and reuse is an integral component of the District's total water supply.

Reclamation District 1004 – Distribution System Evaporation and Seepage Worksheet

2012	Precipitation[a]		Evaporation[b]	
	inches	feet	inches	feet
Jan	2.5	0.21	2.0	0.17
Feb	0.5	0.04	3.0	0.25
Mar	3.2	0.26	3.4	0.28
Apr	1.6	0.14	5.4	0.45
May	0.0	0.00	8.6	0.72
Jun	0.1	0.01	9.0	0.75
Jul	0.0	0.00	8.7	0.73
Aug	0.0	0.00	7.9	0.66
Sept	0.0	0.00	5.9	0.49
Oct	0.9	0.07	3.8	0.32
Nov	2.5	0.21	1.8	0.15
Dec	4.0	0.33	1.2	0.10
TOTAL-YR	15.3	1.28	60.6	5.05
TOTAL-Apr-Oct	**2.6**	**0.22**	**49.3**	**4.11**

[a]Average precipitation reported for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235). Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012.

[b]Monthly evaporation from Distribution System water surfaces is estimated as 1.1 x the average reference ET (ETo) reported for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235) x Kc based on ITRC Typical Year ETc for Zone 12. Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012.

TABLE 4

Reclamation District 1004 – 2012 Distribution System Evaporation and Seepage (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Canal, Pipeline, Lateral, Reservoir	Length[a] (feet)	Width[b] (feet)	Surface Area (acres)	Precipitation[c] (acre-feet)	Evaporation[d] (acre-feet)	Seepage[e] (acre-feet)	Total (acre-feet)
Canals	25,872	135	80	17	329	2,000	(2,312)
Canals	28,512	51	34	7	138	838	(968)
Canals	23,232	41	22	5	89	540	(624)
Laterals	42,768	32	31	7	127	773	(894)
Laterals	63,096	22	32	7	131	797	(921)
Laterals	47,256	15	16	4	67	410	(473)
Drains	29,568	44	30	6	122	742	(857)
Drains	29,568	28	19	4	79	480	(555)
Drains	85,536	15	29	6	121	736	(851)
Drains	12,144	12	3	1	14	84	(97)
TOTAL			296	64	1,216	7,399	(8,551)

[a]From District statistics.

[b]Average width of the conveyance facilities.

[c]Estimated inflow resulting from precipitation on canals, laterals, and drains during the irrigation season.

[d]Estimated evaporation from canals, laterals, and drains during the irrigation season.

[e]Estimated seepage from canals, laterals, and drains during the irrigation season.

TABLE 5

Reclamation District 1004 – 2012 Crop Consumptive Use Water Needs (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Crop Name	Acres[a] (crop acres)	Crop ET[b] (AF/Ac)	Effective Precipitation[c] (AF/Ac)	Effective Precipitation[c] (acre-feet)	ETAW (acre-feet)	Leaching Requirement (AF/Ac)	Leaching Requirement (acre-feet)
Alfalfa	34	3.31	0.08	3	110	0.11	4
Beans	71	0.80	0.06	4	53	0.47	34
Corn	305	2.12	0.06	18	629	0.14	43
Habitat	5,470	3.14	0.08	438	16,739	0.03	164
Idle	684	0.16	0.03	21	89	0.00	0
Rice	14,177	3.31	0.07	992	45,933	0.06	851
Rice Straw Decomp	0	0.50	0.02	0	0	0.00	0
Safflower	6	1.86	0.06	0	12	0.06	0
Tomatoes	65	1.78	0.06	4	111	0.08	5
Wheat	71	0.80	0.06	4	53	0.03	2
Crop Acres	20,885			1,484	63,729		1,103

Total Irrig. Acres 20,201 (If this number is larger than your known total, it may be due to double cropping.)

[a]Acres include lands, if any, irrigated by private wells.

[b]Crop ET (ETc) was calculated as average ETo for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235) x Kc based on ITRC Typical Year ETc for Zone 12. Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012. Crop ET does not include water required for initial flooding, reflooding, or flow-through on rice acres. This quantity is estimated to be approximately 1.25 to 1.5 acre-feet per acre (approximately 17,7500 to 21,250 acre-feet in 2012).

[c]Effective Precipitation is estimated as 60% of monthly precipitation greater than 0.5 inch during crop growing season. Because of the nature of flooded areas, such as rice field and flooded habitat, irrigation-season precipitation increases the volume of water in the flooded basin, but it typically flows through the field and, therefore, is assumed to be unavailable to meet the crop water needs.

TABLE 6

Reclamation District 1004 – 2012 District Water Balance
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Water Supplies (excluding recirculation) [a]		
District Water Supply *(includes District Groundwater)*	Table 3	78,275
Private Groundwater	Table 2	0
Inflow from Precip[b]	Estimated	4,343
Available Soil Moisture[c]	Estimated	205
	Total Water Supplies =	**82,823**
Distribution System Evaporation and Seepage		
Seepage (Canals/Laterals)	Table 4	7,399
Evaporation - Precipitation (Canals/Laterals)	Table 4	1,152
Riparian ET[d] (Canals/Laterals)	Estimated	550
Conveyance System Filling[e] (Canals/Laterals)	Estimated	765
	Total Distribution System =	**9,866**
Crop Consumptive Use Water Needs [f]		
Evapotranspiration of Applied Water - ETAW *(includes Evap from Rice Straw Decomposition)*	Table 5	63,729
Evapotranspiration of Precip - ET_{pr}	Table 5	1,484
Cultural Practices *(includes Leaching Requirement)*	Table 5	1,103
	Total Crop Water Needs =	**66,316**
District Outflows		
Water Supply Delivered to Other Districts or Users	District Records	0
Irrigation Season Rainfall Runoff[g]	Estimated	0
Rice Cultural and Ecosystem Requirement[h]	Estimated	0
Upslope Drainwater Flow-through[i]	Estimated	0
Remainder Drainwater Outflow[j]	Calculated	0
Total District Outflow *(from District Records)* **=**		**0**
Percolation from Agricultural Lands *(Total Supplies - Distribution System - Crop Water Needs - District Outflows)*		**6,641**
Internal Recirculation and Reuse (Not Included in the Water Balance)		
Total Quantity Recirculated for Reuse	District Records	**16,095**

[a]Water Supplies - Includes surface and groundwater supplies diverted or pumped into the District to meet Crop Consumptive Use Water Needs, District Operational needs, and water required for cultural practice needs (e.g., flooding, reflooding, and flow-through for rice cultivation). Does not include water recirculated by the District.

[b]Inflow from Precipitation is calculated as total April - October precipitation x Total Crop Acres minus Rice Straw Decomp acres.

[c]Available Soil Moisture is estimated as a 10% of Jan precip + 30% of Feb precip + 50% of Mar precip on Non-Rice and Non-Habitat acres.

[d]Riparian ET is estimated based on observation.

[e]Conveyance System Filling - Quantity estimated by the District required to initially fill conveyance canals and laterals. The conveyance systems are typically drained after October 31.

[f]Crop Consumptive Use Water Needs do not include quantities required for flood-up or flow-through for rice.

[g]Irrigation Season Rainfall Runoff - Portion of District Outflow estimated to be the result of rainfall that cannot be captured or recirculated. This water is available to downstream water users, for instream flow, and to meet Delta Outflow requirements.

[h]Rice Cultural and Ecosystem Requirement - Portion of District Outflow estimated to be due to the cultural requirements for rice flood-up and flow-through. This water is available to downstream water users, for instream flow, and to meet Delta Outflow requirements.

[i]Upslope drainwater flow-through is 50% of April, May, and June upslope water, limited by the Total District Outflow.

[j]Drainwater Outflow - Outflow from operational spills and end-of-season drainage. This water is available to (and used by) downstream water users, for instream flow, and to meet Delta Outflow requirements.

TABLE 7

Reclamation District 1004 – 2012 Annual Water Quantities Delivered under Each Right or Contract
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Year	Federal Ag Water Supply[a]		Non-Federal Ag Water Supply[b] (acre-feet)	Upslope Drainwater[c] (acre-feet)	Total (acre-feet)	District	
	Base Supply (acre-feet)	Project Water (acre-feet)				Recapture[d] (acre-feet)	Outflow[e] (acre-feet)
2003	50,934	14,146	20,000	0	85,080	12,800	0
2004	56,400	8,727	20,000	0	85,127	12,800	0
2005	39,939	12,953	20,000	0	72,892	10,900	0
2006	33,584	13,497	20,000	0	67,081	10,100	0
2007	46,168	9,973	20,000	0	76,141	11,400	0
2008	47,605	9,761	20,158	0	77,524	11,600	0
2009	38,151	12,170	20,255	0	70,576	10,600	0
2010	48,218	11,250	23,473	0	82,941	12,500	0
2011	35,874	10,639	23,395	0	69,908	7,436	0
2012	43,022	10,048	23,395	0	76,465	16,095	0
Total	439,895	113,164	210,676	0	763,735	116,231	0
Average	43,990	11,316	21,068	0	76,374	11,623	0

[a]Federal Ag Water Supply from Reclamation Water Account Records.

[b]Non-Federal Ag Water Supply from District Records; quantities prior to 2008 are estimated.

[c]Estimated by District based on observation and historical information.

[d]Estimated by District based on observation and historical information (15% of Total Supply).

[e]District operates a closed system with little or no outflow; drainwater from rice fields is recaptured and delivered for rice straw decomposition and habitat lands.

Meridian Farms Water Company

TABLE 1

Meridian Farms Water Company – 2012 Surface Water Supply
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	Federal Ag Water Supply[a]		Non-Federal Ag Water Supply[b] (acre-feet)	Upslope Drainwater[c] (acre-feet)	Total (acre-feet)
	Base Supply (acre-feet)	Project Water (acre-feet)			
Method	M-1	M-1	M-1	E-3	
April	930	0		75	1,005
May	6,584	0		2,050	8,634
June	6,614	0		2,750	9,364
July	2,000	5,634		2,850	10,484
August	1,100	5,574		2,450	9,124
September	1,917	0		1,450	3,367
October	204	0		0	204
TOTAL	19,349	11,208	0	11,625	42,182

[a]Federal Ag Water Supply from Reclamation Water Account Records.

[b]Non-Federal Ag Water Supply from Company Records.

[c]Estimated by Company based on observation and historical information.

TABLE 2

Meridian Farms Water Company – 2012 Groundwater Supply
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	Company Groundwater (acre-feet)	Private Groundwater[a] (acre-feet)
Method	M-1	E-1
April	358	0
May	654	0
June	654	0
July	654	0
August	654	0
September	358	0
October	0	0
TOTAL	3,332	0

[a]Estimated by Company based on observation and historical information.

TABLE 3

Meridian Farms Water Company – 2012 Total Company Water Supply (excluding reuse)
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	Surface Water Total (acre-feet)	Company Groundwater (acre-feet)	Total Company Water Supplya (acre-feet)
Method	M-1		M-1
April	1,005	358	1,363
May	8,634	654	9,288
June	9,364	654	10,018
July	10,484	654	11,138
August	9,124	654	9,778
September	3,367	358	3,725
October	204	-	204
TOTAL	42,182	3,332	45,514

[a]In addition to the water supplies shown in Table 3, 11,625 acre-feet were recirculated by the Company for reuse within its boundaries. This recirculation and reuse is an integral component of the Company's total water supply.

Meridian Farms Water Company – Distribution System Evaporation and Seepage Worksheet

2012	Precipitation[a]		Evaporation[b]	
	inches	feet	inches	feet
Jan	2.5	0.21	2.0	0.17
Feb	0.5	0.04	3.0	0.25
Mar	3.2	0.26	3.4	0.28
Apr	1.6	0.14	5.4	0.45
May	0.0	0.00	8.6	0.72
Jun	0.1	0.01	9.0	0.75
Jul	0.0	0.00	8.7	0.73
Aug	0.0	0.00	7.9	0.66
Sept	0.0	0.00	5.9	0.49
Oct	0.9	0.07	3.8	0.32
Nov	2.5	0.21	1.8	0.15
Dec	4.0	0.33	1.2	0.10
TOTAL-YR	15.3	1.28	60.6	5.05
TOTAL-Apr-Oct	**2.6**	**0.22**	**49.3**	**4.11**

[a]Average precipitation reported for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235). Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012.

[b]Monthly evaporation from Distribution System water surfaces is estimated as 1.1 x the average reference ET (ETo) reported for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235) x Kc based on ITRC Typical Year ETc for Zone 12. Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012.

TABLE 4

Meridian Farms Water Company – 2012 Distribution System Evaporation and Seepage
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Canal, Pipeline, Lateral, Reservoir	Length[a] (feet)	Width[b] (feet)	Surface Area (acres)	Precipitation[c] (acre-feet)	Evaporation[d] (acre-feet)	Seepage[e] (acre-feet)	Total (acre-feet)
Canal	84,480	12	23	5	96	698	(789)
Pipeline	0	0	0	0	0	0	0
Laterals	100,320	12	28	6	114	829	(937)
Watershed Drains	0	0	0	0	0	0	0
Reservoir	0	0	0	0	0	0	0
TOTAL			51	11	209	1,527	(1,725)

[a]From Company statistics.

[b]Average width of the conveyance facilities.

[c]Estimated inflow resulting from precipitation on canals, laterals, and drains during the irrigation season.

[d]Estimated evaporation from canals, laterals, and drains during the irrigation season.

[e]Estimated seepage from canals, laterals, and drains during the irrigation season.

TABLE 5

Meridian Farms Water Company – 2012 Crop Consumptive Use Water Needs (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Crop Name	Acres[a] (crop acres)	Crop ET[b] (AF/Ac)	Effective Precipitation[c] (AF/Ac)	Effective Precipitation[c] (acre-feet)	ETAW (acre-feet)	Leaching Requirement (AF/Ac)	Leaching Requirement (acre-feet)
Alfalfa	368	3.31	0.08	29	1,189	0.11	40
Beans	553	0.80	0.06	33	409	0.47	260
Chestnuts	4	3.20	0.08	0	12	0.18	1
Corn	302	2.12	0.06	18	622	0.14	42
Grapes	20	2.15	0.06	1	42	0.18	4
Idle	26	0.16	0.03	1	3	0.00	0
Onions	20	0.96	0.06	1	18	0.28	6
Pasture	3	3.60	0.08	0	11	0.03	0
Persimmons	26	3.16	0.08	2	80	0.18	5
Prunes	69	3.16	0.08	6	213	0.18	12
Rice	5,165	3.31	0.07	362	16,735	0.06	310
Rice Straw Decomp	0	0.50	0.02	0	0	0.00	0
Safflower	411	1.86	0.06	25	740	0.06	25
Sunflowers	296	1.86	0.06	18	533	0.06	18
Tomatoes	175	1.78	0.06	11	301	0.08	14
Vegetables	0	1.03	0.08	0	0	0.18	0
Vineseed	96	1.03	0.08	8	91	0.18	17
Walnuts	852	3.45	0.08	68	2,871	0.16	136
Wheat	706	0.80	0.06	42	522	0.03	21
Crop Acres	9,092			625	24,392		911

Total Irrig. Acres 9,092 (If this number is larger than your known total, it may be due to double cropping.)

[a]Acres include lands, if any, irrigated by private wells.

[b]Crop ET (ETc) was calculated as average ETo for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235) x Kc based on ITRC Typical Year ETc for Zone 12. Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012. Crop ET does not include water required for initial flooding, reflooding, or flow-through on rice acres. This quantity is estimated to be approximately 1.25 to 1.5 acre-feet per acre (approximately 6,500 to 7,750 acre-feet in 2012).

[c]Effective Precipitation is estimated as 60% of monthly precipitation greater than 0.5 inch during crop growing season. Because of the nature of flooded areas, such as rice field and flooded habitat, irrigation-season precipitation increases the volume of water in the flooded basin, but it typically flows through the field and, therefore, is assumed to be unavailable to meet the crop water needs.

TABLE 6

Meridian Farms Water Company – 2012 Company Water Balance
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Water Supplies (excluding recirculation) [a]		
Company Water Supply (includes Company Groundwater)	Table 3	45,514
Private Groundwater	Table 2	0
Inflow from Precip[b]	Estimated	1,955
Available Soil Moisture[c]	Estimated	650
	Total Water Supplies =	**48,119**
Distribution System Evaporation and Seepage		
Seepage (Canals/Laterals)	Table 4	1,527
Evaporation - Precipitation (Canals/Laterals)	Table 4	198
Riparian ET[d] (Canals/Laterals)	Estimated	
Conveyance System Filling[e] (Canals/Laterals)	Estimated	422
	Total Distribution System =	**2,147**
Crop Consumptive Use Water Needs [f]		
Evapotranspiration of Applied Water - ETAW *(includes Evap from Rice Straw Decomposition)*	Table 5	24,392
Evapotranspiration of Precip - ET_{pr}	Table 5	625
Cultural Practices *(includes Leaching Requirement)*	Table 5	911
	Total Crop Water Needs =	**25,928**
Company Outflows		
Water Supply Delivered to Other Districts or Users	Company Records	0
Irrigation Season Rainfall Runoff[g]	Estimated	660
Rice Cultural and Ecosystem Requirement[h]	Estimated	5,165
Upslope Drainwater Flow-through[i]	Estimated	0
Remainder Drainwater Outflow[j]	Calculated	0
Total Company Outflow (from Company Records) =		**5,825**
Percolation from Agricultural Lands (Total Supplies - Distribution System - Crop Water Needs - Company Outflows)		**14,219**
Internal Recirculation and Reuse (Not Included in the Water Balance)		
Total Quantity Recirculated for Reuse	Company Records	**11,625**

[a]Water Supplies - Includes surface and groundwater supplies diverted or pumped into the Company to meet Crop Consumptive Use Water Needs, Company Operational needs, and water required for cultural practice needs (e.g., flooding, reflooding, and flow-through for rice cultivation). Does not include water recirculated by the Company.

[b]Inflow from Precipitation is calculated as total April - October precipitation x Total Crop Acres minus Rice Straw Decomp acres.

[c]Available Soil Moisture is estimated as a 10% of Jan precip + 30% of Feb precip + 50% of Mar precip on Non-Rice and Non-Habitat acres.

[d]Riparian ET is estimated based on observation.

[e]Conveyance System Filling - Quantity estimated by the Company required to initially fill conveyance canals and laterals. The conveyance systems are typically drained after October 31.

[f]Crop Consumptive Use Water Needs do not include quantities required for flood-up or flow-through for rice.

[g]Irrigation Season Rainfall Runoff - Portion of Company Outflow estimated to be the result of rainfall that cannot be captured or recirculated. This water is available to downstream water users, for instream flow, and to meet Delta Outflow requirements.

[h]Rice Cultural and Ecosystem Requirement - Portion of Company Outflow estimated to be due to the cultural requirements for rice flood-up and flow-through. This water is available to downstream water users, for instream flow, and to meet Delta Outflow requirements.

iUpslope drainwater flow-through is 50% of April, May, and June upslope water, limited by the Total Company Outflow.

[j]Drainwater Outflow - Outflow from operational spills and end-of-season drainage. This water is available to (and used by) downstream water users, for instream flow, and to meet Delta Outflow requirements.

TABLE 7

Meridian Farms Water Company – 2012 Annual Water Quantities Delivered under Each Right or Contract (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Year	Federal Ag Water Supply[a]		Non-Federal Ag Water Supply[b] (acre-feet)	Upslope Drainwater[c] (acre-feet)	Total (acre-feet)	Company	
	Base Supply (acre-feet)	Project Water (acre-feet)				Recapture (acre-feet)	Outflow[d] (acre-feet)
2003	10,240	7,550		3,766	21,556	3,766	8,703
2004	22,568	7,970		7,968	38,506	7,968	11,359
2005	15,272	9,903		5,767	30,942	5,767	8,272
2006	12,398	9,224		12,565	34,187	12,565	11,138
2007	17,506	5,130		11,927	34,563	11,927	3,396
2008	19,122	8,579		6,925	34,626	6,925	3,631
2009	17,090	8,611		7,420	33,121	7,420	3,165
2010	17,530	9,512	0	8,695	35,737	8,695	5,499
2011	16,792	10,565	0	10,915	38,272	10,915	6,750
2012	19,349	11,208	0	11,625	42,182	11,625	5,825
Total	167,867	88,252	0	87,572	343,691	87,572	67,738
Average	16,787	8,825	0	8,757	34,369	8,757	6,774

[a]Federal Ag Water Supply from Reclamation Water Account Records.

[b]Non-Federal Ag Water Supply from Company Records.

[c]Estimated by Company as 50% of total quantity pumped under License 7160.

[d]Estimated by Company based on observation and historical information.

Sutter Mutual Water Company

TABLE 1

Sutter Mutual Water Company – 2012 Surface Water Supply
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	Federal Ag Water Supply[a]		Non-Federal Ag Water Supply[b] (acre-feet)	Upslope Drainwater[c] (acre-feet)	Total (acre-feet)
	Base Supply (acre-feet)	Project Water (acre-feet)			
Method	M-1	M-1	M-1	E-3	
April	2,128	0			2,128
May	38,917	0			38,917
June	39,589	0			39,589
July	28,500	22,351			50,851
August	20,000	21,750			41,750
September	5,000	3,213			8,213
October	577	0			577
TOTAL	134,711	47,314	0	0	182,025

[a]Federal Ag Water Supply from Reclamation Water Account Records.

[b]Non-Federal Ag Water Supply from Company Records.

[c]Estimated by Company based on observation and historical information.

TABLE 2

Sutter Mutual Water Company – 2012 Groundwater Supply
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	Company Groundwater (acre-feet)	Private Groundwater[a] (acre-feet)
Method	M-1	E-1
April	0	0
May	0	0
June	0	0
July	0	0
August	0	0
September	0	0
October	0	0
TOTAL	0	0

[a]Estimated by Company based on observation and historical information.

TABLE 3

Sutter Mutual Water Company – 2012 Total Company Water Supply (excluding reuse)
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	Surface Water Total (acre-feet)	Company Groundwater (acre-feet)	Total Company Water Supply[a] (acre-feet)
Method	M-1		M-1
April	2,128	-	2,128
May	38,917	-	38,917
June	39,589	-	39,589
July	50,851	-	50,851
August	41,750	-	41,750
September	8,213	-	8,213
October	577	-	577
TOTAL	182,025	-	182,025

[a]In addition to the water supplies shown in Table 3, 68,493 acre-feet were recirculated by the Company for reuse within its boundaries. This recirculation and reuse is an integral component of the Company's total water supply.

Sutter Mutual Water Company – Distribution System Evaporation and Seepage Worksheet

2012	Precipitation[a]		Evaporation[b]	
	inches	feet	inches	feet
Jan	2.5	0.21	2.0	0.17
Feb	0.5	0.04	3.0	0.25
Mar	3.2	0.26	3.4	0.28
Apr	1.6	0.14	5.4	0.45
May	0.0	0.00	8.6	0.72
Jun	0.1	0.01	9.0	0.75
Jul	0.0	0.00	8.7	0.73
Aug	0.0	0.00	7.9	0.66
Sept	0.0	0.00	5.9	0.49
Oct	0.9	0.07	3.8	0.32
Nov	2.5	0.21	1.8	0.15
Dec	4.0	0.33	1.2	0.10
TOTAL-YR	15.3	1.28	60.6	5.05
TOTAL-Apr-Oct	**2.6**	**0.22**	**49.3**	**4.11**

[a]Average precipitation reported for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235). Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012.

[b]Monthly evaporation from Distribution System water surfaces is estimated as 1.1 x the average reference ET (ETo) reported for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235) x Kc based on ITRC Typical Year ETc for Zone 12. Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012.

TABLE 4

Sutter Mutual Water Company – 2012 Distribution System Evaporation and Seepage (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Canal, Pipeline, Lateral, Reservoir	Length[a] (feet)	Width[b] (feet)	Surface Area (acres)	Precipitation[c] (acre-feet)	Evaporation[d] (acre-feet)	Seepage[e] (acre-feet)	Total (acre-feet)
Main Canal	39,690	90	82	18	337	2,460	(2,779)
West Canal	52,530	90	109	23	446	3,256	(3,678)
Central Canal	50,640	75	87	19	358	2,180	(2,519)
East Canal	71,970	75	124	27	509	3,098	(3,580)
Laterals	533,390	12	147	32	604	3,673	(4,245)
Sub-laterals	146,060	8	27	6	110	268	(373)
TOTAL			575	124	2,364	14,935	(17,175)

[a]From Company statistics.

[b]Average width of the conveyance facilities.

[c]Estimated inflow resulting from precipitation on canals, laterals, and drains during the irrigation season.

[d]Estimated evaporation from canals, laterals, and drains during the irrigation season.

[e]Estimated seepage from canals, laterals, and drains during the irrigation season.

TABLE 5

Sutter Mutual Water Company – 2012 Crop Consumptive Use Water Needs (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Crop Name	Acres (crop acres)	Crop ET[a] (AF/Ac)	Effective Precipitation[b] (AF/Ac)	Effective Precipitation[b] (acre-feet)	ETAW (acre-feet)	Leaching Requirement (AF/Ac)	Leaching Requirement (acre-feet)
Alfalfa	301	3.31	0.08	24	972	0.11	33
Beans	949	0.80	0.06	57	702	0.47	446
Corn	3,826	2.12	0.06	230	7,882	0.14	536
Idle	23	0.16	0.03	1	3	0.00	0
Melons	217	1.27	0.00	0	276	0.04	9
Milo	698	2.12	0.06	42	1,438	0.02	14
Rice	27,858	3.31	0.07	1,950	90,260	0.06	1,671
Rice Decomp.	0	0.50	0.02	0	0	0.06	0
Safflowers	715	1.86	0.06	43	1,287	0.06	43
Sunflowers	6,051	1.86	0.06	363	10,892	0.06	363
Tomatoes	3,150	1.78	0.06	189	5,418	0.08	252
Vineseed	1,209	1.03	0.08	97	1,149	0.18	218
Walnuts	142	3.45	0.08	11	479	0.16	23
Wheat	1,157	0.80	0.06	69	856	0.03	35
Crop Acres	46,296			3,076	121,613		3,643
Total Irrig. Acres	44,945	(If this number is larger than your known total, it may be due to double cropping.)					

[a]Crop ET (ETc) was calculated as average ETo for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235) x Kc based on ITRC Typical Year ETc for Zone 12. Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012. Crop ET does not include water required for initial flooding, reflooding, or flow-through on rice acres. This quantity is estimated to be approximately 1.25 to 1.5 acre-feet per acre (approximately 35,000 to 42,000 acre-feet in 2012).

[b]Effective Precipitation is estimated as 60% of monthly precipitation greater than 0.5 inch during crop growing season. Because of the nature of flooded areas, such as rice field and flooded habitat, irrigation-season precipitation increases the volume of water in the flooded basin, but it typically flows through the field and, therefore, is assumed to be unavailable to meet the crop water needs.

TABLE 6

Sutter Mutual Water Company – 2012 Company Water Balance
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Water Supplies (excluding recirculation) [a]		
Company Water Supply *(includes Company Groundwater)*	Table 3	182,025
Private Groundwater	Table 2	0
Inflow from Precip[b]	Estimated	9,954
Available Soil Moisture[c]	Estimated	3,051
	Total Water Supplies =	**195,030**
Distribution System Evaporation and Seepage		
Seepage (Canals/Laterals)	Table 4	14,935
Evaporation - Precipitation (Canals/Laterals)	Table 4	2,240
Riparian ET[d] (Canals/Laterals)	Estimated	500
Conveyance System Filling[e] (Canals/Laterals)	Estimated	1,820
	Total Distribution System =	**19,495**
Crop Consumptive Use Water Needs [f]		
Evapotranspiration of Applied Water - ETAW *(includes Evap from Rice Straw Decomposition)*	Table 5	121,613
Evapotranspiration of Precip - ET_{pr}	Table 5	3,076
Cultural Practices *(includes Leaching Requirement)*	Table 5	3,643
	Total Crop Water Needs =	**128,331**
Company Outflows		
Water Supply Delivered to Other Districts or Users	Company Records	0
Irrigation Season Rainfall Runoff[g]	Estimated	5,989
Rice Cultural and Ecosystem Requirement[h]	Estimated	27,858
Upslope Drainwater Flow-through[i]	Estimated	0
Remainder Drainwater Outflow[j]	Calculated	26,771
Total Company Outflow *(from Company Records)* **=**		**60,618**
Percolation from Agricultural Lands *(Total Supplies - Distribution System - Crop Water Needs - Company Outflows)*		**(13,414)**
Internal Recirculation and Reuse (Not Included in the Water Balance)		
Total Quantity Recirculated for Reuse	Company Records	**68,493**

[a]Water Supplies - Includes surface and groundwater supplies diverted or pumped into the Company to meet Crop Consumptive Use Water Needs, Company Operational needs, and water required for cultural practice needs (e.g., flooding, reflooding, and flow-through for rice cultivation). Does not include water recirculated by the Company

[b]Inflow from Precipitation is calculated as total April - October precipitation x Total Crop Acres minus Rice Straw Decomp acres.

[c]Available Soil Moisture is estimated as a 10% of Jan precip + 30% of Feb precip + 50% of Mar precip on Non-Rice and Non-Habitat acres.

[d]Riparian ET is estimated based on observation.

[e]Conveyance System Filling - Quantity estimated by the Company required to initially fill conveyance canals and laterals. The conveyance systems are typically drained after October 31.

[f] Crop Consumptive Use Water Needs do not include quantities required for flood-up or flow-through for rice.

[g]Irrigation Season Rainfall Runoff - Portion of Company Outflow estimated to be the result of rainfall that cannot be captured or recirculated. This water is available to downstream water users, for instream flow, and to meet Delta Outflow requirements.

[h]Rice Cultural and Ecosystem Requirement - Portion of Company Outflow estimated to result from the cultural requirements for rice flood-up and flow-through. This water is available to downstream water users, for instream flow, and to meet Delta Outflow requirements.

[i]Upslope drainwater flow-through is 50% of April, May, and June upslope water, limited by the Total Company Outflow.

[j]Drainwater Outflow - Outflow from operational spills and end-of-season drainage. For SMWC drainwater includes an unknown quantity of connate water that percolates into the drainage system. All drainwater outflow is available to (and used by) downstream water users, for instream flow, and to meet Delta Outflow requirements.

TABLE 7

Sutter Mutual Water Company – 2012 Annual Water Quantities Delivered under Each Right or Contract (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Year	Federal Ag Water Supply[a]		Non-Federal Ag Water Supply[b] (acre-feet)	Upslope Drainwater[c] (acre-feet)	Total (acre-feet)	Company	
	Base Supply (acre-feet)	Project Water (acre-feet)				Recapture (acre-feet)	Outflow[d] (acre-feet)
2003	116,924	57,525			174,449	3,471	96,658
2004	162,114	66,211			228,325	29,624	
2005	136,706	54,241			190,947	12,344	
2006	143,983	73,001			216,984	24,799	
2007	167,922	56,467			224,389	38,231	
2008	169,435	30,275			199,710	45,248	
2009	153,526	35,436			188,962	57,303	
2010	142,185	58,326	0	0	200,511	62,316	77,886
2011	136,388	57,423	0	0	193,811	55,954	98,902
2012	134,711	47,314	0	0	182,025	68,493	60,618
Total	1,463,894	536,219	0	0	2,000,113	397,783	334,064
Average	146,389	53,622	0	0	200,011	39,778	83,516

[a]Federal Ag Water Supply from Reclamation Water Account Records. Includes Project water transferred into SMWC in 2006 and 2010.

[b]Non-Federal Ag Water Supply from Company Records.

[c]Estimated by Company based on observation and historical information.

[d]The Department quit measuring outflow at Karnak after 2003; SMWC and RD 1500 have calculated outflow since 2010. The quantities shown in this table for 2010 and 2011 have been revised to reflect the quantities pumped by RD 1500 that originate from the Rimlands and PMWC (not within SMWC).

Natomas Central Mutual Water Company

TABLE 1

Natomas Central Mutual Water Company – 2012 Surface Water Supply
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	Federal Ag Water Supply[a]		Non-Federal Ag Water Supply[b] (acre-feet)	Upslope Drainwater[b] (acre-feet)	Total (acre-feet)
	Base Supply (acre-feet)	Project Water (acre-feet)			
Method	M-1	M-1	M-1	E-3	
April	1,203	0			1,203
May	12,652	0			12,652
June	13,798	0			13,798
July	11,500	4,584			16,084
August	3,900	8,489			12,389
September	4,295	0			4,295
October	702	0			702
TOTAL	48,050	13,073	0	0	61,123

[a]Federal Ag Water Supply from Reclamation Water Account Records.

[b]Water from non-Company lands enters the drainage system throughout the April through October period. The quantity for 2012 is unknown at this time but is included in the quantity recycled and reused shown in Table 6.

TABLE 2

Natomas Central Mutual Water Company – 2012 Groundwater Supply
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	Company Groundwater (acre-feet)	Private Groundwater[a] (acre-feet)
Method	M-1	E-1
April	0	
May	17	
June	96	
July	0	
August	13	
September	0	
October	4	
TOTAL	131	0

[a]Estimated by Company based on observation and historical information.

TABLE 3

Natomas Central Mutual Water Company – 2012 Total Company Water Supply (excluding reuse)
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Month	Surface Water Total (acre-feet)	Company Groundwater (acre-feet)	Total Company Water Supplya (acre-feet)
Method	M-1		M-1
April	1,203	-	1,203
May	12,652	17	12,669
June	13,798	96	13,894
July	16,084	-	16,084
August	12,389	13	12,402
September	4,295	-	4,295
October	702	4	706
TOTAL	61,123	131	61,254

[a]In addition to the water supplies shown in Table 3, 51,433 acre-feet were recirculated by the Company for reuse within its boundaries. This recirculation and reuse is an integral component of the Company's total water supply.

Natomas Central Mutual Water Company – Distribution System Evaporation and Seepage Worksheet

2012	Precipitation[a]		Evaporation[b]	
	inches	feet	inches	feet
Jan	2.5	0.21	2.0	0.17
Feb	0.5	0.04	3.0	0.25
Mar	3.2	0.26	3.4	0.28
Apr	1.6	0.14	5.4	0.45
May	0.0	0.00	8.6	0.72
Jun	0.1	0.01	9.0	0.75
Jul	0.0	0.00	8.7	0.73
Aug	0.0	0.00	7.9	0.66
Sept	0.0	0.00	5.9	0.49
Oct	0.9	0.07	3.8	0.32
Nov	2.5	0.21	1.8	0.15
Dec	4.0	0.33	1.2	0.10
TOTAL-YR	15.3	1.28	60.6	5.05
TOTAL-Apr-Oct	**2.6**	**0.22**	**49.3**	**4.11**

[a]Average precipitation reported for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235). Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012.

[b]Monthly evaporation from Distribution System water surfaces is estimated as 1.1 x the average reference ET (ETo) reported for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235) x Kc based on ITRC Typical Year ETc for Zone 12. Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012.

TABLE 4

Natomas Central Mutual Water Company – 2012 Distribution System Evaporation and Seepage (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Canal, Pipeline, Lateral, Reservoir	Length[a] (feet)	Width[b] (feet)	Surface Area (acres)	Precipitation[c] (acre-feet)	Evaporation[d] (acre-feet)	Seepage[e] (acre-feet)	Total (acre-feet)
Bennet System	44,700	56	58	12	238	579	(804)
Northern System	146,400	54	180	39	741	1,805	(2,507)
Prichard Lake Sys	204,400	54	252	54	1,033	2,515	(3,494)
Elkhorn System	75,100	44	76	16	313	762	(1,059)
Riverside System	65,800	46	69	15	284	692	(961)
TOTAL			635	137	2,609	6,353	(8,825)

[a]From Company statistics.

[b]Average width of the conveyance facilities.

[c]Estimated inflow resulting from precipitation on canals, laterals, and drains during the irrigation season.

[d]Estimated evaporation from canals, laterals, and drains during the irrigation season.

[e]Estimated seepage from canals, laterals, and drains during the irrigation season.

TABLE 5

Natomas Central Mutual Water Company – 2012 Crop Consumptive Use Water Needs (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Crop Name	Acres[a] (crop acres)	Crop ET[b] (AF/Ac)	Effective Precipitation[c] (AF/Ac)	Effective Precipitation[c] (acre-feet)	ETAW (acre-feet)	Leaching Requirement (AF/Ac)	Leaching Requirement (acre-feet)
Alfalfa	527	3.31	0.08	42	1,702	0.11	58
Corn	185	2.12	0.06	11	381	0.14	26
Golf Course	150	3.38	0.13	20	488	0.03	5
Hay	160	0.80	0.06	10	118	0.03	5
Habitat	0	3.14	0.08	0	0	0.03	0
Kiwis	2	2.92	0.08	0	6	0.18	0
Marsh	605	3.27	0.08	48	1,930	0.00	0
Melons, Squash	180	1.27	0.00	0	229	0.04	7
Milo	127	2.12	0.06	8	262	0.02	3
Misc. Deciduous	8	3.04	0.08	1	24	0.16	1
Mixed Truck	91	1.03	0.08	7	86	0.18	16
Oats	200	0.80	0.06	12	148	0.02	4
Onions	1	0.96	0.06	0	0	0.28	0
Pasture	33	3.60	0.08	3	116	0.03	1
Peppers	10	1.78	0.06	1	17	0.08	1
Rice	14,280	3.31	0.07	1,000	46,267	0.06	857
Rice Straw Decomp	0	0.50	0.02	0	0	0.00	0
Safflower	322	1.86	0.06	19	580	0.06	19
Sunflower	372	1.86	0.06	22	670	0.07	26
Tomatoes	187	1.78	0.06	11	322	0.08	15
Vineseed	29	1.03	0.08	2	28	0.18	5
Wheat	944	0.80	0.06	57	699	0.03	28
Crop Acres	18,413			1,273	54,071		1,077
Total Irrig. Acres	18,413	(If this number is larger than your known total, it may be due to double cropping.)					

[a]Acres include lands, if any, irrigated by private wells.

[b]Crop ET (ETc) was calculated as average ETo for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235) x Kc based on ITRC Typical Year ETc for Zone 12. Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012. Crop ET does not include water required for initial flooding, reflooding, or flow-through on rice acres. This quantity is estimated to be approximately 1.25 to 1.5 acre-feet per acre (approximately 17,850 to 21,420 acre-feet in 2012).

[c]Effective Precipitation is estimated as 60% of monthly precipitation greater than 0.5 inch during crop growing season. Because of the nature of flooded areas, such as rice field and flooded habitat, irrigation-season precipitation increases the volume of water in the flooded basin, but it typically flows through the field and, therefore, is assumed to be unavailable to meet the crop water needs.

TABLE 6

Natomas Central Mutual Water Company – 2012 Company Water Balance
(April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Water Supplies (excluding recirculation) [a]		
Company Water Supply (includes Company Groundwater)	Table 3	61,254
Private Groundwater	Table 2	0
Inflow from Precip[b]	Estimated	3,959
Available Soil Moisture[c]	Estimated	684
	Total Water Supplies =	**65,897**
Distribution System Evaporation and Seepage		
Seepage (Canals/Laterals)	Table 4	6,353
Evaporation - Precipitation (Canals/Laterals)	Table 4	2,473
Riparian ET[d] (Canals/Laterals)	Estimated	252
Conveyance System Filling[e] (Canals/Laterals)	Estimated	611
	Total Distribution System =	**9,688**
Crop Consumptive Use Water Needs [f]		
Evapotranspiration of Applied Water - ETAW *(includes Evap from Rice Straw Decomposition)*	Table 5	54,071
Evapotranspiration of Precip - ET_{pr}	Table 5	1,273
Cultural Practices *(includes Leaching Requirement)*	Table 5	1,077
	Total Crop Water Needs =	**56,421**
Company Outflows		
Water Supply Delivered to Other Districts or Users	Company Records	0
Irrigation Season Rainfall Runoff[g]	Estimated	3,070
Rice Cultural and Ecosystem Requirement[h]	Estimated	7,247
Upslope Drainwater Flow-through[i]	Estimated	0
Remainder Drainwater Outflow[j]	Calculated	0
	Total Company Outflow (from Company Records) =	**10,317**
Subtotal Without Recirculation (Total Supplies - Distribution System - Crop Water Needs - Company Outflows)		**(10,530)**
Internal Recirculation and Reuse (Not Included in the Water Balance)		
Total Quantity Recirculated for Reuse	Company Records	**51,433**

[a]Water Supplies - Includes surface and groundwater supplies diverted or pumped into the Company to meet Crop Consumptive Use Water Needs, Company Operational needs, and water required for cultural practice needs (e.g., flooding, reflooding, and flow-through for rice cultivation). Does not include water recirculated by the Company.

[b]Inflow from Precipitation is calculated as total April - October precipitation x Total Crop Acres minus Rice Straw Decomp acres.

[c]Available Soil Moisture is estimated as a 10% of Jan precip + 30% of Feb precip + 50% of Mar precip on Non-Rice and Non-Habitat acres.

[d]Riparian ET is estimated based on observation.

[e]Conveyance System Filling - Quantity estimated by the Company required to initially fill conveyance canals and laterals. The conveyance systems are typically drained after October 31.

[f]Crop Consumptive Use Water Needs do not include quantities required for flood-up or flow-through for rice.

[g]Irrigation Season Rainfall Runoff - Portion of Company Outflow estimated to be the result of rainfall that cannot be captured or recirculated. This water is available to downstream water users, for instream flow, and to meet Delta Outflow requirements.

[h]Rice Cultural and Ecosystem Requirement - Portion of Company Outflow estimated to be due to the cultural requirements for rice flood-up and flow-through. This water is available to downstream water users, for instream flow, and to meet Delta Outflow requirements.

[i]Upslope drainwater flow-through is 50% of April, May, and June upslope water, limited by the Total Company Outflow.

[j]Drainwater Outflow - Outflow from operational spills and end-of-season drainage. This water is available to (and used by) downstream water users, for instream flow, and to meet Delta Outflow requirements.

TABLE 7

Natomas Central Mutual Water Company – 2012 Annual Water Quantities Delivered under Each Right or Contract (April through October Period Only)

2012 Sacramento Valley Regional Water Management Plan Annual Update

Year	Federal Ag Water Supply[a]		Non-Federal Ag Water Supply[b] (acre-feet)	Upslope Drainwater[c] (acre-feet)	Total (acre-feet)	Company	
	Base Supply (acre-feet)	Project Water (acre-feet)				Recapture (acre-feet)	Outflow[d] (acre-feet)
2003	57,806	19,340			77,146	3,312	-
2004	80,229	13,476			93,705	35,443	-
2005	58,239	22,000			80,239	33,030	-
2006	51,146	21,694			72,840	21,441	-
2007	51,847	13,008			64,855	39,502	-
2008	48,297	8,919			57,216	43,359	-
2009	41,778	10,997			52,775	44,224	-
2010	37,349	8,707	0	0	46,056	39,989	15,000
2011	35,685	8,322	0	0	44,007	59,923	15,115
2012	48,050	13,073	0	0	61,123	51,433	10,317
Total	510,426	139,536	0	0	649,962	371,657	40,432
Average	51,043	13,954	0	0	64,996	37,166	13,477

[a]Federal Ag Water Supply from Reclamation Water Account Records.

[b]Non-Federal Ag Water Supply from Company Records.

[c]Estimated by Company based on observation and historical information.

[d]Outflow data prior to 2010 are not available.

2012 Crop Evapotranspiration Table – Redding Sub-basin

Regional Water Management Plan Update

2012 Evapotranspiration and Effective Precipitation

2012 Sacramento Valley Regional Water Management Plan Annual Update

Year = 2012																	
			Apr	May	Jun	Jul	Aug	Sep	Oct	Total Growing Season ETc	Apr	May	Jun	Jul	Aug	Sep	Oct	Effective Precip
	Precip	Precip	1.35	0.02	0.16	0	0	0	0.8		1.35	0.02	0.16	0	0	0	0.8	
	Grass Reference ETo	Eto	4.18	7.31	8.38	8.08	7.35	5.34	3.43									60%
Crop Type	ITRC Representative Crop		(inches)	(inches)	(inches)	(inches)	(inches)	(inches)	(inches)	(AF	(inches)	(inches)	(inches)	(inches)	(inches)	(inches)	(inches)	(feet)
Alfalfa	Alfalfa Hay and Clover		4.72	6.70	7.85	7.32	6.97	4.93	1.65	**3.35**	0.51	0	0	0	0	0	0.18	0.06
Pasture	Pasture and Misc. Grasses		3.93	7.24	8.49	8.10	7.31	5.27	3.00	**3.61**	0.51	0	0	0	0	0	0.18	0.06
Walnuts	Walnuts		2.09	6.06	9.49	9.05	8.24	5.25	2.52	**3.56**	0.51	0	0	0	0	0	0.18	0.06

Source: Kc values for all crops except cover crop, rice decomp, and refuge/habitat from *California Crop and Soil Evapotranspiration* , ITRC Report 03-001, January 2003.

Notes:

Crop ET (ETc) was calculated as the average ETo for the CIMIS Station at Gerber (#8) x Kc based on ITRC Dry Year ETc for Zone 14.

ETc includes estimated ET from pre-irrigation per ITRC Report.

ETo was calculated as the average ETo reported by CIMIS in 2012 for the CIMIS Station at Gerber (#8).

Precipitation is the 2012 monthly precipitation reported for the CIMIS Station at Gerber (#8).

Effective precipitation was estimated as 60% of rainfall greater than 0.5 inch per month occurring during the growing season.

Surface Evaporation was estimated as 1.1 x Grass Reference ETo.

2012 Crop Evapotranspiration Table – Colusa, Butte, Sutter, and American Sub-basins

Regional Water Management Plan Update
2012 Evapotranspiration and Effective Precipitation
2012 Sacramento Valley Regional Water Management Plan Annual Update

Year = 2012																	
		Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Total Growing Season ETc	Apr	May	Jun	Jul	Aug	Sep	Oct	Effective Precip
	Precip	Precip	1.64	0	0.07	0.01	0	0	0.86		1.64	0	0.07	0.01	0	0	0.86	
	Grass Reference ETo	Eto	4.93	7.81	8.18	7.93	7.15	5.33	3.48									60%
Crop Type	ITRC Representative Crop		(inches)	(inches)	(inches)	(inches)	(inches)	(inches)	(inches)	(AF)	(inches)	(inches)	(inches)	(inches)	(inches)	(inches)	(inches)	(feet)
Alfalfa	Alfalfa Hay and Clover		4.58	7.13	7.57	7.14	6.31	4.86	2.16	**3.31**	0.68	0.00	0.00	0.00	0.00	0.00	0.22	**0.08**
Almonds	Almonds		2.63	6.94	7.35	7.17	6.65	4.66	2.96	**3.20**	0.68	0.00	0.00	0.00	0.00	0.00	0.22	**0.08**
Barley	Grain and Grain Hay		5.44	4.12	0.00	0.00	0.00	0.00	0.00	**0.80**	0.68	0.00	0.00	0.00	0.00	0.00	0.00	**0.06**
Beans	Grain and Grain Hay		5.44	4.12	0.00	0.00	0.00	0.00	0.00	**0.80**	0.68	0.00	0.00	0.00	0.00	0.00	0.00	**0.06**
Buckwheat	Grain and Grain Hay		5.44	4.12	0.00	0.00	0.00	0.00	0.00	**0.80**	0.68	0.00	0.00	0.00	0.00	0.00	0.00	**0.06**
Cantaloupe	Melons, Squash, and Cucumbers		0.00	1.07	1.60	5.03	5.93	1.56	0.00	**1.27**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Chestnuts	Almonds		2.63	6.94	7.35	7.17	6.65	4.66	2.96	**3.20**	0.68	0.00	0.00	0.00	0.00	0.00	0.22	**0.08**
Corn	Corn and Grain Sorghum		1.23	2.74	7.53	8.08	5.83	0.00	0.00	**2.12**	0.68	0.00	0.00	0.00	0.00	0.00	0.00	**0.06**
Cotton	Cotton		0.89	1.83	5.05	8.39	7.83	5.13	1.64	**2.56**	0.68	0.00	0.00	0.00	0.00	0.00	0.22	**0.08**
Cover Crop	Pasture and Misc. Grasses		4.09	7.73	8.12	7.82	7.06	5.27	3.08	**3.60**	0.68	0.00	0.00	0.00	0.00	0.00	0.22	**0.08**
Cucumbers	Melons, Squash, and Cucumbers		0.00	1.07	1.60	5.03	5.93	1.56	0.00	**1.27**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Golf Course										**3.38**								**0.13**
Grain	Grain and Grain Hay		5.44	4.12	0.00	0.00	0.00	0.00	0.00	**0.80**	0.68	0.00	0.00	0.00	0.00	0.00	0.00	**0.06**
Grapes	Grape Vines with 80% Canopy		1.01	3.76	6.36	6.34	5.19	3.09	0.00	**2.15**	0.68	0.00	0.00	0.00	0.00	0.00	0.00	**0.06**
Habitat			4.19	6.72	8.02	7.53	4.93	3.57	2.71	**3.14**	0.68	0	0	0	0	0	0.22	**0.08**
Hay	Grain and Grain Hay		5.44	4.12	0.00	0.00	0.00	0.00	0.00	**0.80**	0.68	0.00	0.00	0.00	0.00	0.00	0.00	**0.06**
Idle	Idle		0.20	0.23	0.23	0.15	0.36	0.07	0.63	**0.16**	0.20	0.00	0.00	0.00	0.00	0.00	0.22	**0.03**
Kiwi										**2.92**	0.68	0	0	0	0	0	0.22	**0.08**
Managed Marsh										**3.27**	0.68	0	0	0	0	0	0.22	**0.08**
Melons	Melons, Squash, and Cucumbers		0.00	1.07	1.60	5.03	5.93	1.56	0.00	**1.27**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Melons, Squash	Melons, Squash, and Cucumbers		0.00	1.07	1.60	5.03	5.93	1.56	0.00	**1.27**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Milo	Corn and Grain Sorghum		1.23	2.74	7.53	8.08	5.83	0.00	0.00	**2.12**	0.68	0.00	0.00	0.00	0.00	0.00	0.00	**0.06**
Misc. Deciduous	Misc. Deciduous		2.02	6.33	7.38	7.22	6.64	4.51	2.40	**3.04**	0.68	0.00	0.00	0.00	0.00	0.00	0.22	**0.08**
Mixed Truck	Small Vegetables		5.28	2.04	0.23	0.15	1.52	1.52	1.59	**1.03**	0.68	0.00	0.00	0.00	0.00	0.00	0.22	**0.08**
Oats	Grain and Grain Hay		5.44	4.12	0.00	0.00	0.00	0.00	0.00	**0.80**	0.68	0.00	0.00	0.00	0.00	0.00	0.00	**0.06**
Olives	Avocado		2.02	6.33	7.38	7.22	6.64	4.51	2.40	**3.04**	0.68	0.00	0.00	0.00	0.00	0.00	0.22	**0.08**
Onions	Onions and Garlic		4.43	5.83	1.24	0.00	0.00	0.00	0.00	**0.96**	0.68	0.00	0.00	0.00	0.00	0.00	0.00	**0.06**
Pasture	Pasture and Misc. Grasses		4.09	7.73	8.12	7.82	7.06	5.27	3.08	**3.60**	0.68	0.00	0.00	0.00	0.00	0.00	0.22	**0.08**
Pecans	Almonds		2.63	6.94	7.35	7.17	6.65	4.66	2.96	**3.20**	0.68	0.00	0.00	0.00	0.00	0.00	0.22	**0.08**
Peppers	Tomatoes and Peppers		0.69	4.02	8.74	6.96	0.97	0.00	0.00	**1.78**	0.68	0.00	0.00	0.00	0.00	0.00	0.00	**0.06**
Persimmons	Apple, Pear, Cherry, Plum, and Prune		2.10	6.71	7.64	7.60	6.84	4.80	2.26	**3.16**	0.68	0.00	0.00	0.00	0.00	0.00	0.22	**0.08**
Prunes	Apple, Pear, Cherry, Plum, and Prune		2.10	6.71	7.64	7.60	6.84	4.80	2.26	**3.16**	0.68	0.00	0.00	0.00	0.00	0.00	0.22	**0.08**
Pumpkins	Melons, Squash, and Cucumbers		0.00	1.07	1.60	5.03	5.93	1.56	0.00	**1.27**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Rice	Rice		0.67	7.61	9.91	9.68	8.69	2.50	0.63	**3.31**	0.67	0.00	0.00	0.00	0.00	0.00	0.22	**0.07**
Rice Decomp										**0.50**	0.00	0.00	0.00	0.00	0.00	0.00	0.22	**0.02**
Safflower	Safflower and Sunflower		4.62	8.97	7.76	0.94	0.00	0.00	0.00	**1.86**	0.68	0.00	0.00	0.00	0.00	0.00	0.00	**0.06**
Small Vegetables	Small Vegetables		5.28	2.04	0.23	0.15	1.52	1.52	1.59	**1.03**	0.68	0.00	0.00	0.00	0.00	0.00	0.22	**0.08**

Regional Water Management Plan Update

2012 Evapotranspiration and Effective Precipitation

2012 Sacramento Valley Regional Water Management Plan Annual Update

Year = 2012																	
		Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Total Growing Season ETc	Apr	May	Jun	Jul	Aug	Sep	Oct	Effective Precip
	Precip	Precip	1.64	0	0.07	0.01	0	0	0.86		1.64	0	0.07	0.01	0	0	0.86	
	Grass Reference ETo	Eto	4.93	7.81	8.18	7.93	7.15	5.33	3.48									60%
Crop Type	ITRC Representative Crop		(inches)	(inches)	(inches)	(inches)	(inches)	(inches)	(inches)	(AF)	(inches)	(inches)	(inches)	(inches)	(inches)	(inches)	(inches)	(feet)
Squash	Melons, Squash, and Cucumbers		0.00	1.07	1.60	5.03	5.93	1.56	0.00	**1.27**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Sudan	Pasture and Misc. Grasses		4.09	7.73	8.12	7.82	7.06	5.27	3.08	**3.60**	0.68	0.00	0.00	0.00	0.00	0.00	0.22	**0.08**
Sunflower	Safflower and Sunflower		4.62	8.97	7.76	0.94	0.00	0.00	0.00	**1.86**	0.68	0.00	0.00	0.00	0.00	0.00	0.00	**0.06**
Tomatoes	Tomatoes and Peppers		0.69	4.02	8.74	6.96	0.97	0.00	0.00	**1.78**	0.68	0.00	0.00	0.00	0.00	0.00	0.00	**0.06**
Vegetable	Small Vegetables		5.28	2.04	0.23	0.15	1.52	1.52	1.59	**1.03**	0.68	0.00	0.00	0.00	0.00	0.00	0.22	**0.08**
Vetch	Pasture and Misc. Grasses		4.09	7.73	8.12	7.82	7.06	5.27	3.08	**3.60**	0.68	0.00	0.00	0.00	0.00	0.00	0.22	**0.08**
Vineseed	Small Vegetables		5.28	2.04	0.23	0.15	1.52	1.52	1.59	**1.03**	0.68	0.00	0.00	0.00	0.00	0.00	0.22	**0.08**
Walnuts	Walnuts		1.58	6.15	9.15	8.67	7.79	5.18	2.88	**3.45**	0.68	0.00	0.00	0.00	0.00	0.00	0.22	**0.08**
Watermelon	Melons, Squash, and Cucumbers		0.00	1.07	1.60	5.03	5.93	1.56	0.00	**1.27**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Wheat	Grain and Grain Hay		5.44	4.12	0.00	0.00	0.00	0.00	0.00	**0.80**	0.68	0.00	0.00	0.00	0.00	0.00	0.00	**0.06**

Source: Kc values for all crops except cover crop, rice decomp, and refuge/habitat from *California Crop and Soil Evapotranspiration* , ITRC Report 03-001, January 2003.

Notes:

Shaded cells are growing season according to ITRC Report 03-001.

Crop ET (ETc) was calculated as average ETo for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235) x Kc based on ITRC Typical Year ETc for Zone 12. Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012.

ETo was calculated as the average ETo reported by CIMIS in 2012 for the Nicholas and Davis stations.

ETc includes estimated ET from pre-irrigation per ITRC report.

2012 precipitation is the average precipitation reported for CIMIS Stations at Davis (#6), Colusa (#32), and Verona (#235). Verona Station #235 came on line in mid-May 2012 and, therefore, is not included in the average for April and May 2012.

Effective precipitation was estimated as 60% of rainfall occurring during the growing season.

Appendix E
2012 Sacramento River Settlement Contractor Water Measurement Plans and Programs

APPENDIX E

Sacramento River Settlement Contractor Water Measurement Plans and Programs

Water measurement plans and programs are presented for the following districts:

- 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
- Natomas Central Mutual Water Company

Anderson-Cottonwood Irrigation District

Anderson-Cottonwood Irrigation District Proposed Water Measurement Program

Purpose

This document describes measurement, pricing, and billing practices within Anderson-Cottonwood Irrigation District (ACID or District), and describes the District's plan to comply with the provisions of its Settlement Contract and the measurement requirements of the Central Valley Project Improvement Act and the Bureau of Reclamation's (Reclamation's) *Regional Criteria for Evaluating Water Management Plans to The Sacramento River Contractors* (Regional Criteria).

Background

ACID diverts water by gravity from the right bank of the Sacramento River at Lake Redding, River Mile 246.0R. The District also diverts water at the South Bonnyview Pumping Plant (Churn Creek System) located on the left bank of the Sacramento River at River Mile 240.5L. Gravity diversions at Lake Redding provide water to the Main Canal, which serves the majority of the District's service area. Diversions at Churn Creek are pumped from the river and serve the portion of the District lying east of the Sacramento River. ACID's diversions from the Sacramento River are measured at both locations.

A supervisory control and data acquisition (SCADA) system allows ACID to monitor diversions on a real-time basis from the river to its Main Canal and to the Churn Creek System. The SCADA system also allows for real-time monitoring of water levels along the Main Canal at four locations: the radial headgate at Highway 44, the Anderson Creek Flume, Locust/County Road and Crowley Gulch, and Smith Road on the Churn Creek System.

ACID provides water for irrigation purposes to approximately 800 customers at approximately 950 individual field turnouts or farm-gates. The District is divided into four sub-regions, or areas, each with its own ditch tender. Ditch tenders are responsible for maintaining water levels and deliveries within their respective areas as well as starting, stopping, and recording deliveries to customers. Deliveries throughout ACID are made on a rotation of once every 2 weeks to each customer. Turnouts are sized and deliveries are based on the assumption that 5 cubic feet per second (cfs) will irrigate 1 acre in 1 hour.

Water users or customers are required to apply for water in March prior to the beginning of the irrigation season. Water orders identify the assessor parcel number(s) together with the number of acres to be irrigated. The District charges for water annually on the basis of the number of acres ordered. The water charge includes an application fee and is payable in two installments, the first due with the application in mid-March and the second due in mid-May. Payments are delinquent 30 days after they are due, and penalties and interest are applied to delinquent payments in accordance with the District's policies. (Copies of the Application and Agreement for 2013 Irrigation Season, and the District's Rules and Regulations are attached.)

Current Measurement Practices

River Diversions

Diversions from the Sacramento River at both Lake Redding and the South Bonnyview Pumping Plant locations are measured using meters installed and maintained by Reclamation. These meters provide both instantaneous flow rate and volumetric data that are transmitted via the SCADA system and remotely monitored daily (or more frequently) at the District's office. Additionally, the meters are read and data

recorded at least monthly by Reclamation staff. Maintenance and calibration of these meters are performed by Reclamation in accordance with their standard operating procedures.

Lateral Measurement

ACID measures flows at the headgates of 17 of its major laterals. These flows are measured when the headgates are opened or changed throughout each 2-week rotation period. Head measurements are made manually and flow rates are derived on the basis of size, type, and configuration of the headgate structure; the head or water levels in the canals; and rating tables applicable to the specific headgate or weir.

Turnout or Field-level Measurement

ACID measures deliveries to fields on the basis of the head or water levels in the delivery canals and headgate rating tables. Gate openings are set and water levels are observed and recorded daily by District staff. Delivery durations are based on the assumption that a flow of 5 cfs will irrigate 1 acre per hour. This delivery duration applies to each 2-week rotation. For example, a 10-acre field (typical) with a gate set to deliver 5 cfs would receive water delivery for 10 hours once every 2 weeks. Of the approximate 800 ACID customers, field sizes range from 1 acre to 606 acres with an average size of about 10 acres. Delivery flow rates range from 2 to 40 cfs with an average rate of about 5 cfs. Ratings for delivery gates are checked by ACID staff approximately every 4 years or when questions arise. Table 1 identifies the number and type of turnout measurement devices along with an estimated level of volumetric accuracy for each device.

TABLE 1
Summary of Turnout Structures

Measurement Type	Number[a]	Estimated Accuracy[b]	Reading Frequency	Maintenance Frequency
Rated Gate	950	< ±12%	Daily or when changes are made	Annually or as needed

[a] The number of each type of device will be verified during the inspection and certification process.

[b] The estimated accuracy is based on information contained in Reclamation's 2011 *Water Management Planner*, Chapter 9, Table 1, and the District's best estimate of canal and turnout conditions.

The District maintains a database that includes the name of the customer or tenant, parcel number, contact information, total acres, ordered acres for the current year, delivery flow rate, and the irrigation time or number of hours scheduled for each delivery. Actual hours of delivery are entered into the database from the records kept by the District's four ditch tenders. Although not currently tracked, the quantity of water delivered at each turnout can be calculated from the hours of delivery and the flow rate recorded in the database.

Turnout Measurement Accuracy Verification

To address the measurement requirements of the Regional Criteria, ACID intends to formalize its program to verify the accuracy of its existing measurement devices. The program will include inspection of delivery gates to confirm they are installed in accordance manufactures' specifications or industry-recognized standards and properly maintained to achieve accurate flow measurement, evaluation of delivery canal water-level fluctuations, initial testing of existing ratings for approximately 10 percent of the District's turnouts, and development of an ongoing operations and maintenance (O&M) program that will include checking approximately 10 percent of the delivery devices each year.

Pricing and Billing

In addition to annual assessments that are charged to all irrigated lands within its boundaries, ACID charges customers for water service on the basis of the number of acres for which water is requested. Customers must apply for water by mid-March. The application for water service identifies the water charges for the

year, as set by the District, as well as the payment schedule. A copy of the Application and Agreement for 2013 Irrigation Season is attached.

As noted previously, records currently maintained by the District allow for calculation of the quantity delivered at each turnout. The existing database could be modified to develop the information to allow for a volumetric pricing structure to be implemented. However, any change to ACID's current pricing structure will require action by the District's Board following a statutorily compliant rate-change proposal process.

Finance Plan

The initial cost estimate to develop and implement turnout measurement accuracy verification and to modify the existing database to incorporate volumetric pricing is approximately $35,000. This estimate assumes that the District will self-perform the work. The cost estimate may be revised as the verification program is developed and refined. ACID proposes to develop and implement the program over a 3-year period. Table 2 identifies a schedule of tasks and the estimated annual program costs. To offset the impact of these added costs on ACID and its customers, the District intends to seek funding through any grants that may be available from either the California Department of Water Resources or Reclamation.

TABLE 2
Proposed Schedule of Verification Tasks

Task	2014	2015	2016
Develop O&M procedures for gate ratings (includes reviewing existing procedures)	X		
Conduct measurements to check and verify ratings at approximately 100 turnouts per year	X	X	X
Develop or adjust ratings tables assigned to specific turnouts based on measurements		X	X
Develop volumetric pricing policy	X	X	
Develop or modify database to incorporate volumetric pricing	X	X	
Initial Estimate of Annual Costs	$13,000	$12,000	$10,000

Additional Water Use Efficiency Improvements

The above has been prepared to address specific requirements of the Central Valley Project Improvement Act and the Regional Criteria. ACID staff has identified additional improvements that they believe would provide equal or greater benefits to overall water use efficiency within the District. These include the following:

- Update its existing outdated SCADA system
- Expand the SCADA to include water-level monitoring at Laterals 21, 29, 35, 37, 41, and 46 and to include flow measurement in major laterals

These SCADA system improvements would allow District staff to better operate and manage its delivery system by monitoring and coordinating river diversions and canal operations within its areas, and the ability to reduce operational spills. Because of the costs associated with developing and implementing the turnout measurement program described above and ACID's limited resources, any improvements to the SCADA system will be dependent on finding an outside funding source.

Reference

Bureau of Reclamation (Reclamation). 2004. *Regional Criteria for Evaluating Water Management Plans for The Sacramento River Contractors*.

ACID Attachment

Anderson-Cottonwood Irrigation District

2810 Silver Street Anderson, California 96007
Telephone: 530-365-7329 e-mail: acidwater@sbcglobal.net
www.andersoncottonwoodirrigationdistrict.org

APPLICATION AND AGREEMENT FOR 2013 IRRIGATION SEASON

Payments for water service may be made in two installments.

First Installment (at least 50%)	**Due March 13, 2013**	*Delinquent after April 13, 2013*
Second Installment	**Due May 13, 2013**	*Delinquent after June 13, 2013*

If payments are not **received / postmarked** by the delinquent dates, an additional penalty of 25% will be added to the amount due; 50% will be added if not received after 30 days; and interest will be computed at the rate of 1.5% per month on the amount due. Irrigation deliveries will be withheld until the amount due, including any penalties and interest, is paid.

Applications received after the first delinquent date may be excluded from the first irrigation rotation.

Please complete this form and mail it (in its entirety) with your payment in the envelope provided.

APPLICATION WITH FIRST INSTALLMENT IS DUE BY WEDNESDAY - MARCH 13, 2013

ASSESSOR'S PARCEL NUMBER(S) OF PARCEL(S) BEING IRRIGATED _____

PHYSICAL ADDRESS OF PARCEL(S) BEING IRRIGATED _____

LANDOWNER INFORMATION

Name: _____

Mailing Address: _____

Telephone No: _____

Alternate Phone: _____

TENANT / IRRIGATOR INFORMATION

Name: _____

Mailing Address: _____

Telephone No: _____

Alternate Phone: _____.

As a condition for water service, the applicant and landowner agree to comply fully with the District's Rules and Regulations, policies, and with applicable state and Federal laws, orders, and regulations. The applicant and landowner agree that they assume full responsibility and liability for the use or misuse of water delivered to their property, including all damages to adjoining property due to failure to adequately control water delivered to their property. It is further agreed that the applicant's and landowner's signatures(s) hereon signifies that they have read and understand the District's Rules and Regulations and that they accept the terms and conditions for water service from the District. The District reserves the right to adjust the rates for water service if and when it is required based on district economic needs. The landowner further agrees that any charges for water used on his/her property by him/her or his/her tenant, but for which full payment is not received, may be added as an assessment on his property tax bill and hereby consents to that assessment.

Nothing contained in this application shall be construed as an assumption of liability on the part of the District, its Directors, officers, or employees for any damages occasioned through the improper construction, maintenance or use of District facilities, or the delivery or failure to deliver water, or the waste of water, or by permitting the flow of water, or turning water in any facility, or to any land.

Any dispute, claim or controversy arising out of or relating to this Application and Agreement or the breach, termination, enforcement, interpretation or validity thereof, including the determination of the scope or applicability of this agreement to arbitrate, shall be determined by arbitration in Redding, California before one arbitrator. The arbitration shall be administered by JAMS pursuant to its Comprehensive Arbitration Rules and Procedures. Judgment on the Award may be entered in any court having jurisdiction. This clause shall not preclude parties from seeking provisional remedies in aid of arbitration from a court of appropriate jurisdiction.

Landowner Signature _____

Dated: _____, **2013**

Tenant / Irrigator Signature _____

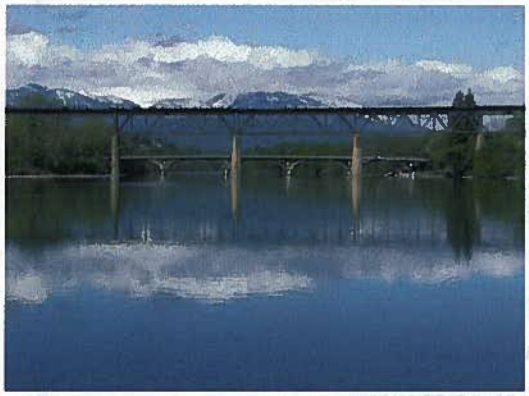
Dated: _____, **2013**

	ACRES	**2013 CHARGE**
Annual Application Fee		$ 115.00
Irrigated Acres	**$ 75.00 x** _____	+ $ _____
Total Charge for 2013 Irrigation Service*		= $ _____

1 Acre Minimum: $190.00

ANDERSON-COTTONWOOD IRRIGATION DISTRICT

RULES AND REGULATIONS



Governing the Distribution and Use of Water

Adopted: March 26, 1918
Revised: June 3, 1952
January 16, 1986
March 16, 1993
March 11, 2004
February 1, 2012

RULES AND REGULATIONS

INTRODUCTION

The Anderson-Cottonwood Irrigation District is a government agency acting under and by virtue of Division 11 of the California Water Code. It is governed by a Board of Directors ("Board") that is elected by the voters of the District. The District operates for the sole benefit of the lands and the people situated within the District boundaries. The benefits people within the District derive from the District will be measured by the extent to which the people within the District and the District's employees and Board of Directors cooperate to make the District a success.

These rules and regulations are adopted pursuant to California Water Code Section 22257 to effect an orderly and equitable distribution of water within the District, and a procedure for the operation, maintenance, repair and replacement of District facilities.

The District office is located at 2810 Silver Street, Anderson, California, 96007. The regular meetings of the Board of Directors are on the second Thursday of each month, beginning at 6 p.m.

The records of the District are open to the public for inspection during office hours, subject to certain confidentiality limits. Landowners and water users may avail themselves of this source of information.

The rates and terms of payment for water for non-irrigation purposes shall be determined by the Board from time to time in instances where such use is permitted by Board order.

RULE 5. WATER SERVICE BILLINGS

Water users who choose to use the two-installment payment option may be mailed a reminder approximately 30 days prior to the due date.

RULE 6. UNPAID CHARGES AND REFUSAL OF SERVICE

All charges for water service remaining unpaid on December 31st of each year in which irrigation water was used will be subject to a lien being filed at the County Recorder's office against the land upon which the water was used.

As provided for by Sections 25806 and 25807 of the Water Code of the State of California, unpaid water charges and penalties may be included on the County property tax bill by the County Auditor in the following tax year.

The District reserves the right to refuse or to discontinue service to any customer who is in default in the payment of water charges, and to any land upon which water charges are delinquent, until such delinquent charges and penalties have been paid in full.

If the District finds it necessary to temporarily or permanently terminate irrigation service to any property for violation of any of the rules set forth herein, there will be no credit given for water not taken as a result of that termination.

RULE 7. CONTROL OF WORKS

No gate, takeout, siphon, or other structure or device shall be installed or placed in any facilities of the District except with the written consent of the General Manager and then only in the manner directed by him. No persons shall interfere with any facilities of the District without permission of the General Manger or his authorized representative.

repeated unauthorized taking of water may result in the termination of service to the irrigator for the remainder of that year. In the event of either temporary or permanent termination of service, no refunds of water service charges will be granted.

RULE 11. RECAPTURE OF WATER

All water introduced into the District by the District facilities remains District water and is subject to rediversion and reuse by the District for the benefit of its customers. All such water, whether drainage or seepage water, intercepted and put to beneficial use will be charged for at the rates established by the District.

RULE 12. WATER USE

Water must be used continuously by the irrigator throughout the period of delivery. If water is wasted, or inefficiently or improperly used, the General Manager may refuse further delivery of water until the cause of waste or inefficient or improper use is removed. The General Manager may also levy appropriate monetary penalties for waste or inefficient or improper use.

RULE 13. PRIVATE IRRIGATION FACILITIES

Before water is delivered to a private or non-District irrigation facility, the facility shall be in proper condition to receive and convey water efficiently. All such facilities must be kept free from weeds and other obstructions to flow. Failure to comply with this rule will be sufficient cause for refusal to deliver water or to suspend deliveries to such facilities.

Water occurring on land due to improper maintenance of private irrigation facilities will be charged to the owner of that land. Written notice will be sent to the landowner receiving the water advising of the need to correct the maintenance problem. If no response or action is taken by the landowner to correct the improperly
maintained facility on his land, a charge and penalties may be levied against the land by the District.

RULE 17. DAMAGE TO DISTRICT FACILITIES

The cost of repair for any damage to District facilities caused by any person or by livestock may be charged to the responsible party including the owner of the livestock or the owner of the land.

RULE 18. NUISANCES

No tree or vine pruning, brush, weeds, grass, rubbish, swill, garbage, manure, or refuse, or dead animal matter from any barnyard, stable, dairy, or hog pen, or other material or substance that will become offensive to the senses or injurious to health or injuriously affect the quality of water, or obstruct the flow of water or result in the scattering of seeds or noxious weeds, plants, or grasses, shall be placed or dumped in any facility of the District or be placed or left so as to roll, slide, flow, or be washed or blown into any such facility. Any violation of this rule will subject the offender to prosecution. All employees of the District are especially urged to cooperate in its enforcement.

Installation of septic tanks, water closets or privies in a location which would result in pollution of the water in a facility of the District is a misdemeanor.

Unauthorized or unapproved drainage of imported water, including stormwater runoff, into District facilities is prohibited.

RULE 19. NON-LIABLITY FOR DAMAGES

Neither the District, its officers nor employees will be liable for any damage of any kind or nature resulting directly or indirectly from any facilities not owned by the District or the water flowing therein, or by reason of lack of capacity therein or for the negligent, wasteful, or other use or handling of water by users thereof.

All water furnished by the District flows through many miles of open ditches and is therefore subject to pollution, shortages, fluctuation in flow, and interruption in service. Ditchtenders are forbidden to make any agreements binding the District to serve an uninterrupted constant supply of water. All water furnished by the District will be on the basis of irrigation deliveries and every user putting the water to other uses does so at his own risk and by doing so

APPENDIX A

ANDERSON-COTTONWOOD IRRIGATION DISTRICT

POLICY FOR WATER DELIVERIES

(Revised November 13, 1997)

The purpose of this policy is to aid in better rotations. When a water user holds the water for an extended period of time, it results in extending the rotation.

It is the duty of the ditchtender to keep the water moving in a timely manner.

- The ditchtender may take the water when conditions warrant as determined by the ditchtender or directed to do so by the General Manager. Some of the conditions could be, but are not limited to:
  - Irrigator exceeding allotted time (see **Note**).
  - Irrigator is not in attendance.
- Any irrigator not taking water when his/her turn arrives may result in forfeiture to his/her irrigation right during that rotation.
- The irrigator shall release the water at the end of his/her allotted time. Taking water after the allotted time has expired may be considered an unauthorized taking of water which may result in the termination of service to the irrigator for the remainder of that irrigation season.
- It is the responsibility of the water user to have his/her system cleaned, repaired, sized, and ready to take and use the water in a timely manner.

Note: The District uses a rule of thumb that at a rate of five cubic feet per second, an acre of land can be irrigated in one hour.

Glenn-Colusa Irrigation District

Glenn-Colusa Irrigation District

SBX7-7 Water Measurement Compliance Program

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Glenn-Colusa Irrigation District

SBX7-7 Water Measurement Compliance Program

Purpose

In accordance with California Water Code §10106.48(b), Article 2, §597.1(a), GCID is proposing to implement a program to comply with specified requirements within the Agricultural Water Measurement Regulation. This SBX7-7 Water Measurement Compliance Program (Program), which will become a component of the District's Agricultural Water Management Plan, describes how GCID will comply with the SBX7-7 water measurement requirements and adopted regulations, attached hereto as "Exhibit 4." This Program will provide the following pursuant to §597.4 (e):

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: Volume = flow rate x 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: Volume = velocity x cross-section flow area x 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 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, the agricultural water supplier shall provide in its plan, a schedule, budget and finance plan for taking corrective action in three years or less.

Program Components

To comply with the SBX7-7 water measurement requirements and adopted regulations, the Program will include the following critical components:

- Proposed physical measurement alternatives and criteria.
- Proposed measurement protocols, customer billing, and reporting.
- Proposition 218 compliance to address new infrastructure costs and new rate methodologies incorporating in-part volumetric pricing.

Proposed Physical Measurement Alternatives and Criteria

The Program will employ water measurement using a combination of lateral level (upstream) turnout measurement to multiple customers, and measurement to individual customer turnouts. In development of the Program, the District will develop a master plan overview of existing and proposed measurement facilities identifying the water delivery service area served by the lateral level (upstream) measurement turnouts and the service area served by individual turnouts. This master plan will also identify the measurement device at the lateral level (upstream) turnout measurement point (main canal metered laterals, main canal unmetered laterals, main canal lift pumps/pump ditches, pump recapture sites, and gravity recapture sites), or individual turnout measurement points (main canal and certain individual customer turnouts that serve individual fields). The information regarding the proposed metering methods and equipment necessary to comply with the volumetric pricing requirement, are further discussed in "Exhibit 3" which provides general, non-exclusive options for the types of devices that could be utilized to meet §597.3(a), §597.3(b)(1), and elements of §597.4 (e)(2).

A combination of lateral level (upstream) turnout measurement and individual turnout measurement is required because the options in §597.3(a) cannot be met, at the majority of locations, by installing a manufactured or on-site built

device at each downstream individual customer delivery point. This is due to small differentials in water levels from laterals to the fields, and large fluctuations in flow rate that result in poorly functioning devices. This determination shall be evaluated and certified by an engineer in accordance with §597.3(b)(2)(B).

GCID's water conveyance system presents a wide range of physical conditions that make planning for and complying with the SBX7-7 water measurement requirements challenging. In order to address these challenges, GCID will conduct a Pilot Project (See "Exhibit 1") by installing metering equipment at representative sites to identify workable metering solutions, infrastructure modification requirements, and refine costs. Site modification and construction requirements, and costing derived from the Pilot Project will provide important information to support funding requirements and the required Proposition 218 process. The Pilot Project will be funded from the current GCID budget.

It is anticipated that the Pilot Project and subsequent Water Measurement Compliance Program will employ a combination of metering devices best suited to these various physical conditions. For lateral level (upstream) turnout measurement, the District will use a combination of measurement devices, which may include propeller meters, acoustic doppler meters, portable acoustic doppler meters, and weirs with pressure transducers:

A. Propeller meters with electronic flow rate and total quantity indicators will be used on existing and future measurement sites consistent with the accuracy standards established in Regulation §597.3(a)(b)(1). The propeller meters measure velocity in pressurized pipes, which based on the cross-sectional area of the pipe is converted to an instantaneous flow rate. The totalizer on the device will report the total volume of water delivered by summing all of the previous measured instantaneous volumes to yield the total volume measured to date. (Best professional practices shall ensure that manufacturer documentation describes protocols used to measure the duration of water delivery where volume is derived by the following formula: Volume = flow rate x duration of delivery).

B. Acoustic doppler velocity meters with electronic flow rate indicator and totalizer will be used on existing and future measurement sites consistent with the accuracy standards established in Regulation §597.3(a)(b)(1). The acoustic doppler meter averages velocity and cross-sectional area at the measurement site over a specified time interval, which yields an average flow rate for this specified time interval. The totalizer on the device will report the total volume of water delivered by taking this average flow over a period of time. (Best professional practices shall ensure that manufacturer documentation describes protocols used to

measure the duration of water delivery where volume is derived by the following formula: Volume = flow rate x duration of delivery.)

C. Portable acoustic doppler meters will be used on existing and future measurement sites consistent with the accuracy standards established in Regulation §597.2(a)(b)(1). The portable acoustic doppler meter averages velocity and cross-sectional area at the measurement site over a specified time interval, which yields an average flow rate for this specified time interval. The average flow rate multiplied by the accumulated time duration at a constant maintained flow will yield the total volume of water delivered during the period of constant flow. (Best professional practices shall ensure that manufacturer documentation describes protocols used to measure the duration of water delivery where volume is derived by the following formula: Volume = flow rate x duration of delivery).

D. Weirs with pressure transducer measurement devices will be used on existing and future measurement sites consistent with the accuracy standards established in Regulation §597.3(a)(b)(1). Weirs with pressure transducer measurement devices measure water elevation. This data is used in conjunction with industry standard equations and/or methodologies specific to the type of weir utilized with the pressure transducer elevation readings to determine flow. The flow shall be either programmed into a data logging device for direct report of volume, or the data will be processed in spreadsheets to obtain volume. (Best professional practices shall ensure that manufacturer documentation describes protocols used to measure the duration of water delivery where volume is derived by the following formula: Volume = flow rate x duration of delivery.) Weir measurement devices, including rectangular or v-notch weir measurement devices, will be certified by an engineer to meet the requirements of §597(a)(2)(B).

Similarly, for individual turnout measurement, the District will use a combination of measurement devices, which may include propeller meters, acoustic doppler meters, portable acoustic doppler meters, and weirs with pressure transducers:

A. Propeller meters with electronic flow rate and total quantity indicators will be used on existing and future measurement sites consistent with the accuracy standards established in Regulation §597.3(a)(b)(1).

B. Acoustic doppler meters with electronic flow rate indicator and totalizer will be used on existing and future measurement sites consistent with the accuracy standards established in Regulation §597.3(a)(b)(1).

C. Portable acoustic doppler meters will be used on existing and future measurement sites consistent with the accuracy standards established in Regulation §597.2(a)(b)(1).

D. Weir with pressure transducer measurement devices will be used on some existing and future measurement sites consistent with the accuracy standards established in Regulation §597.3(a)(b)(1). Rectangular or v-notch weir measurement devices will be certified to meet the water measurement requirements of §597.3(a)(2)(B); (b)(1).

"Exhibit 2" presents the projected timeline for implementation of this Program, factoring in the Pilot Project process, number of metering sites, monetary resources, limited annual construction periods and physical conditions, including weather, during GCID's 6-week winter maintenance period available for the installation of the metering equipment.

Proposed Measurement Protocols, Customer Billing, and Reporting

Currently, GCID has an active and robust measurement program throughout the distribution system including main diversion points, laterals, sublaterals, spill points, drain water recycling stations, etc. in order to effectuate good water management. Annually, the District completes a Water Measurement Report, which summarizes data on a monthly and yearly basis from all the water flow measurement points. This report is developed using a sophisticated and real-time Access database. The District has also made significant investments in Supervisory Control and Data Acquisition (SCADA), measurement reports, conjunctive use programs, conveyance improvements, and reuse facilities, all for the purpose of managing water supplies under a broad range of hydrology, delivery constraints, and ecosystem needs. This information is provided to the State Water Resources Control Board, Bureau of Reclamation, and Department of Water Resources.

A. Measurement Protocol

For this Program, the District will need to collect monthly measurement records, which will be used to develop billings to individual customers. Measurement records will be batched to the District's Water Information System to provide for a complete record of District deliveries, and then to the Water Accounting Program, which will be used to generate water user billings.

For lateral level (upstream) turnout and individual turnout measurement, the acreage and cropping pattern will be used to allocate and apportion flows to water users within a lateral or individual service area. Currently, the District generates an annual crop report that is included in the Water Measurement Report and also calculates the acreage of each crop within

each service area. This information is obtained from water users during the water application process and then is confirmed by District personnel during mid-year field inspections.

B. Customer Billing

Currently, the District utilizes a customer accounting program that bills water users based on a per-acre land based assessment, a standby charge, and volumetric consumption rate based on the planted crop applied water use and evapotranspiration rate. The rates are reviewed on an annual basis and may be increased at the discretion of the Board of Directors, and as approved by landowners pursuant to a Proposition 218 rate setting process.

With a new billing structure required to comply with SBX7-7 water measurement requirements, the District will need to migrate to a new Water Accounting Program that will enable information to be downloaded from the Water Information System and to allow for lateral level and individual turnout measurement, and apportionment processes. Additionally, the District currently bills in five installments but, since in-part volumetric pricing will be required, the billing structure and collection process of the volumetric component may need to change to a monthly billing cycle.

C. Reporting

As required in §531.10(a) of the California Water Code, the District will submit an annual report to the Department that summarizes aggregated farm-gate delivery data on a monthly basis using best professional practices.

Proposition 218 Compliance to Address New Infrastructure Costs and New Rate Methodologies Incorporating In-Part Volumetric Pricing

After the Pilot Project has been completed and the District has selected the type of equipment that will be necessary to comply with SBX7-7 water measurement requirements, the District will undertake a public outreach effort that will include a series of public landowner and water user meetings to educate stakeholders on the costs and the water rate increases that will be necessary to comply with the new law. Through a series of meetings with its water users, the District will ultimately settle on one preferred rate structure, and in accordance with the requirements of California's Proposition 218, an Engineer's Report will be prepared by a registered Civil Engineering Firm. After the Engineer's Report is completed, the District will hold a public meeting to review the Engineer's Report and proposed rate structure. This meeting will trigger the start of a 45-day time period that will allow all landowners to participate in a mail ballot election on the

proposed changes to the rate structure. At the end of the 45-day period, the District will hold a hearing to tally the mail ballot results and set the rates.

It is important to note that compliance with the SBX7-7 water measurement requirements will be based on the rate structure being approved by customers under Proposition 218 as required by Article XIIID of the California Constitution. Under Proposition 218, the District is not able to increase water rates or assessments to fund the Program without the approval of its landowners.

EXHIBIT 1: SBX7-7 METERING ALTERNATIVES PILOT PROJECT COST ESTIMATE FOR WATER YEAR 2013 TESTING

Delivery/Meter Location	Meter Model or System	Pipe Type and Diameter	Meter System Cost	SCADA System Cost and Integrator cost	Infrastructure Cost (includes installation)	Sub-total/Site District Labor & Equipment Not included
MC-58-L	Mace ADVM w/ Combo Sensor System	RCP 24"	$5,118	$4,400 +$400	$1,500	$11,418
MC-52-L	SonTek- IQ Pipe	RCP 18"	$9,925	$4,400+$400	$500	$15,225
MC-57-L	Mace ADVM w/ Insert Sensor	Smooth Steel 12"	$4,396	$4,400+$400	$1,000	$10,196
Lat. 22-1	McCrometer M1700 Digital Propeller Elect. Meter	RCP 30"	$2651	$4,400+$400	$500	$7,951
Lat. 26-2@ Co. Rd. 53 Bridge	SonTek-IQXP	6H'x10'Wx23'L Bridge Xing	$8,500	$4,400+$400	$1,000	$14,300* *($7,150/pipe)
Lat . 35-1	SonTek-SL	5'Hx7'Wx30'L Bridge Xing	$9,000	$4,400+$400	$1,000	$14,800* *($7,800/pipe)
MC 84-L	Mace AgriFlo XCI	24"RCP	$5,200	$4,000+$400	$1,000	$10,600* *($5,300/pipe)
Lat. 29-2	Mace AgriFlo XCI	48"RCP	$5,200	$4,000+$400	$500	$10,500
Lat. 30-1 Sta. 3+00	Long Throated Flume with Transducer	Open Channel 10ft. bottom width	$18,000	$4,000+$400	$500	$23,300** **Flood/Lat. Channel
MC 95-L	"V-Notch" weir w/ transducer	12" RCP	$2,600	$4,400+$400	$1000	$8,400
MC-M. 28.09R Lift Pump	McCrometer MO312 Digital Saddle Meter	12'Smooth Steel	$1989	$4,400+$400	$500	$7,289
MC 100-L	Mace ADVM w/ Insert Sensor	36" CMP	$4,396	$4,400+$400	$1,000	$10,196
Lat. 32-2	SonTek IQ	Open Channel	$7,800	$4,400+$400	$3,500 (liner)	$16,100* *($8,200/pipe)
MC-M.P. 44.93	SonTek IQPipe	Stone Corral 42" Canal Spill	$9,925	$1,000+$400	$500	$11,825
Remote Tracker ADVM w/Bluetooth and WWIN signal to Office Computer	SonTek ADV wireless velocity sensor/Panasonic CF-19 Laptop	All Types of Pipes fitted with weir box	$30,000 for a System that can measure 5-10 sites	$5,000 cost for integrator incorporating program downloads to GCID WIS	5 Weir boxes and Probe brackets @ $1,100/ea. = $5,500	$40,500/five sites equals $8,100 per site
Total for Pilot Project Testing Six Measurement Systems on Full, Partially Full, Open Channel and Lift Pump Scenarios for the 2013 Irrigation Season…… **$212,600**						

EXHIBIT 2: IMPLEMENTATION TIMELINE

Date	Action
December 2012	Complete SBX7-7 infrastructure planning and cost estimates
December 31, 2012	Complete SBX7-7 Water Measurement Compliance Program in preparation for submission to DWR pending USBR approval of Regional Water Management Plan
February 14, 2013	GCID Board of Directors review and consideration of the Regional Water Management Plan, and SBX7-7 Water Measurement Compliance Program
Phase I - Pilot Project	
March to May 2013	Conduct pilot program by installing various metering options at representative sites to assess construction requirements, confirm meter accuracy, and refine costs
May to October 2013	Operate Pilot Project metering site equipment to evaluate overall operation and accuracy
Phase II - Finalize Metering Program	
November 2013 to January 2014	Information from the Pilot Project will be used to: - Identify actual metering solutions by site - Prepare a detailed budget and schedule for implementation
Phase III - Public Outreach and Water Rate Structure	
February 2014	Hold landowner/public meetings on Project cost
March to September 2014	Develop assessment and water rate structure alternatives and continue to gather feedback from GCID water users
Phase IV – Proposition 218 Process	
October 2014 to January 2015	Complete Engineering Report in accordance with Proposition 218 assessment and water rate requirements
February 2015	Hold landowner/public meetings on results of Engineering Report and proposed rate structure
June 2015	Begin 45-day mandatory Proposition 218 notice period
August 2015	Hold final Proposition 218 hearing, and set rates

Phase V – Installation of Metering Infrastructure	
October 2015	Begin full-scale installation of metering infrastructure pending outcome of the Proposition 218 process It is anticipated that a maximum of 30 metering sites can be installed per year due to critical issues that impact design, construction, and installation of metering equipment, including: - Special conditions created by the presence of aquatic weed infestations - Year-round water service confines major construction activities to a 6-week period during January and February, and other limited periods when dry conditions allow - Weather conditions can limit construction activities during the winter months - Installation of metering infrastructure is dependent upon funding and successful completion of the Proposition 218 process

Flow Condition	Measurement Device	Type of Device	Manufacturer Accuracy for New Device	SBX7-7 Accuracy Criteria	Volumetric Conversion Protocol per **§597.4 (e)(3)**	Frequency of Measurements per **§597.4 (e)(2)(2)**	Installation Criteria per **Best Professional Practices**	Collection of Water Measurement Data per **§597.4 (e)(2)(1)**
Open Channel	Measurement Specialties *730S*	Pressure transducer with stilling well	▪ ±0.1 Full Scale Output by Best-Fit Straight Line	<u>As Applicable:</u> New: Requires §597.3 (a)(2); (b)(1) Existing: Requires §597.3 (a)(1); (b)(1)	Stage-Weir discharge relationship	5-15 minutes unless Best Professional Practices determine otherwise	Install in a location with minimal turbulence and appropriate pressure measuring range	Real-time remote acquisition and/or monthly physical connection with device storage for download
	Water Pilot *FMX 167*	Pressure transducer with stilling well	▪ Maximum measured error: ±0.2% of upper range value	<u>As Applicable:</u> New: Requires §597.3 (a)(2); (b)(1) Existing: Requires §597.3 (a)(1); (b)(1)	Stage-Weir discharge relationship	5-15 minutes unless Best Professional Practices determine otherwise	Install in a location with minimal turbulence and appropriate pressure measuring range	Real-time remote acquisition and/or monthly physical connection with device storage for download
	SonTek *IQ (Standard or Plus)*	Acoustic doppler current meter	▪ ±1% of measured velocity, ±0.5 cm/s (0.2 in/s) ▪ 0.1% of measured depth or ±0.003 m (0.01 ft) whichever is greater	<u>As Applicable:</u> New: Satisfies §597.3 (a)(2)(A); (b)(1)	Device reports total volume of water delivered using: $V = \sum_{i=1}^{n} v_i A_i T$	5-15 minutes unless Best Professional Practices determine otherwise	Install at least ten channel widths upstream and downstream of any flow disturbances (i.e. gates, curves, abrupt changes in elevation)	Real-time remote acquisition and/or monthly physical connection with device storage for download
	SonTek *SL 1500*	Acoustic doppler current meter	▪ ± 1% of measured velocity, ± 0.015 ft/s ▪ ±0.3cm (0.01 ft) of measured depth ±0.1%	<u>As Applicable:</u> New: Satisfies §597.3 (a)(2)(A); (b)(1) Existing: Requires §597.3 (a)(1); (b)(1)	Device reports total volume of water delivered using: $V = \sum_{i=1}^{n} v_i A_i T$	5-15 minutes unless Best Professional Practices determine otherwise	Straight and uniform canal stretch with minimal turbulence	Real-time remote acquisition and/or monthly physical connection with device storage for download
	SonTek *SW*	Acoustic doppler current meter	▪ ±1% of measured velocity, ± 0.015 ft/s ▪ ±0.1% of measured depth, ±0.3 cm (0.01 ft)	<u>As Applicable:</u> New: Satisfies §597.3 (a)(2)(A); (b)(1) Existing: Requires §597.3 (a)(1); (b)(1)	Device reports total volume of water delivered using: $V = \sum_{i=1}^{n} v_i A_i T$	5-15 minutes unless Best Professional Practices determine otherwise	Straight and uniform canal stretch with minimal turbulence	Real-time remote acquisition and/or monthly physical connection with device storage for download
	SonTek *IQ Pipe*	Acoustic doppler current meter	▪ ±1% of measured velocity, ±0.5 cm/s (0.2 in/s) ▪ 0.1% of measured depth or ±0.003 m (0.01 ft) whichever is greater	<u>As Applicable:</u> New: Satisfies §597.3 (a)(2) (A); (b)(1)	Device reports total volume of water delivered using: $V = \sum_{i=1}^{n} v_i A_i T$	5-15 minutes unless Best Professional Practices determine otherwise	10 pipe diameters in either direction from an obstruction or flow diversion	Real-time remote acquisition and/or monthly physical connection with device storage for download

Flow Condition	Measurement Device	Type of Device	Manufacturer Accuracy for New Device	SBX7-7 Accuracy Criteria	Volumetric Conversion Protocol per **§597.4 (e)(3)**	Frequency of Measurements per **§597.4 (e)(2)(2)**	Installation Criteria per **Best Professional Practices**	Collection of Water Measurement Data per **§597.4 (e)(2)(1)**
Full Pipe	McCrometer *Mc Propeller M1700*	Propeller Open Flow meter	▪ ±2% of measured velocity with repeatability of ±0.25%	<u>As Applicable:</u> New: Satisfies §597.3 (a)(2)(A); (b)(1) Existing: Requires §597.3 (a)(1); (b)(1)	Device reports total volume of water delivered using: $V = \sum_{i=1}^{n} v_i A_i T$	5-15 minutes unless Best Professional Practices determine otherwise	Positioning: 10 pipe diameters upstream	Real-time remote acquisition and/or monthly physical connection with device storage for download
	McCrometer *Bolt-On Saddle Flowmeter MO300 or M1400*	Propeller meter	▪ ±2% of measured velocity with repeatability of ±0.25%	<u>As Applicable:</u> New: Satisfies §597.3 (a)(2)(A); (b)(1) Existing: Requires §597.3 (a)(1); (b)(1)	Device reports total volume of water delivered using: $V = \sum_{i=1}^{n} v_i A_i T$	5-15 minutes unless Best Professional Practices determine otherwise	Positioning: 10 pipe diameters upstream and two diameters downstream of the meter	Real-time remote acquisition and/or monthly physical connection with device storage for download
	Mace *Doppler Velocity Insert*	Doppler ultrasonic velocity sensor	▪ ±1% of measured velocity, up to 10 ft/s	<u>As Applicable:</u> New: Satisfies §597.3 (a)(2)(A); (b)(1) Existing: Requires §597.3 (a)(1); (b)(1)	Device reports total volume of water delivered using: $V = \sum_{i=1}^{n} v_i A_i T$	5-15 minutes unless Best Professional Practices determine otherwise	Positioning is valve dependent: 6-15 pipe diameters upstream and 2-6 diameters downstream	Real-time remote acquisition and/or monthly physical connection with device storage for download
	SonTek *IQ Pipe*	Acoustic doppler current meter	▪ ±0.1% of full scale pressure ▪ ±1% of measured velocity, ±0.5 cm/s (0.2 in/s) ▪ 0.1% of measured depth or ±0.003 m (0.01 ft) whichever is greater	<u>As Applicable:</u> New: Satisfies §597.3 (a)(2)(A); (b)(1)	Device reports total volume of water delivered using: $V = \sum_{i=1}^{n} v_i A_i T$	5-15 minutes unless Best Professional Practices determine otherwise	10 pipe diameters in either direction from an obstruction or flow diversion	Real-time remote acquisition and/or monthly physical connection with device storage for download
	H2o Tech RemoteTracker	Acoustic doppler velocimeter	▪ ±4.6%	<u>As Applicable:</u> New: Satisfies §597.3 (a)(2)(A); (b)(1)	Device reports total volume of water delivered using: $V = \sum_{i=1}^{n} v_i A_i T$	5-15 minutes unless Best Professional Practices determine otherwise	Positioning: Weir box at turnout to ensure full pipe flow with bracket to position sensor at center of pipe	Real-time remote acquisition and/or monthly bluetooth connection with device storage for download

Please Note:

The Volumetric conversion protocol variables are defined below.

$$V = \sum_{i=0}^{n} v_i A_i T$$

V (Volume, ft^3)
Σ (summation sign)
n (final reported measurement for the year)
i=1 (first measurement)
v_i (velocity, ft/s)
A_i (cross sectional area, ft^2)
T (sample time duration of measurement)

Essentially, this equation states that the volume of water measured over a sample time will be totalized to all previous measured volumes to yield the total volume measured thus far at that time in the year.

Exhibit 4

State of California
The Natural Resources Agency
DEPARTMENT OF WATER RESOURCES
Division of Statewide Integrated Water Management
Water Use and Efficiency Branch

Agricultural Water Measurement

A regulation included under the authority of
Section 10608.48(i) (1) and(2) of the California Water Code

July 11, 2012

Edmund G. Brown Jr.	**John Laird**	**Mark W. Cowin**
Governor	Secretary for Natural Resources	Director
State of California	The Natural Resources Agency	Department of Water Resources

State of California
Office of Administrative Law

In re: **Department of Water Resources**	**NOTICE OF APPROVAL OF REGULATORY ACTION**
Regulatory Action:	**Government Code Section 11349.3**
Title 23, California Code of Regulations	**OAL File No. 2012-0531-01 SR**
Adopt sections: 597, 597.1, 597.2, 597.3, 597.4 **Amend sections:** **Repeal sections:**	

The Department of Water Resources proposed this action to adopt five sections and create a new article in title 23 of the California Code of Regulations for agricultural water measurement. The purpose of the regulatory action is to provide a range of options that agricultural water suppliers may use or implement to comply with the water measurement requirements in Water Code 10608.48(b)(1). These regulations implement amendments to the Water Code made in S.B. 7 (Stats. 2009, 7th Ex. Sess., ch. 4).

OAL approves this regulatory action pursuant to section 11349.3 of the Government Code. This regulatory action becomes effective on 7/11/2012.

Date: 7/11/2012

Richard L. Smith

Richard L. Smith
Senior Counsel

For: DEBRA M. CORNEZ
Director

Original: Mark Cowin
Copy: Kent Frame

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 x (measured value – actual value) / 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 ±12% by volume.

and,

(2) A new or replacement measurement device shall be certified to be accurate to within:

(A) ±5% by volume in the laboratory if using a laboratory certification;

(B) ±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: Volume = flow rate x 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: Volume = velocity x cross-section flow area x 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.

Agricultural Aggregated Farm-Gate[1] Delivery Reporting Format for Article 2

Due annually beginning no later than July 31, 2013 from agricultural water suppliers subject to Title 23, Division 2, Chapter 5.1, Article 2 of the CCR - Agricultural Water Measurement

1. Water Supplier Information

Name:

Address:

Phone Number:

Fax:

Total Number of Farm-Gates:

Number of Measured Farm-Gates:

Service Area Acreage:

2. Contact information

Name:

Title:

Address:

Phone Number:

Fax:

E-mail:

Submittal date:

3. Aggregated Farm-Gate Delivery Data[2]: (*provide monthly or bimonthly data, acre-feet*)

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Monthly Deliveries													

	Jul-Aug	Sep-Oct	Nov-Dec	Jan-Feb	Mar-Apr	May-Jun	Total
Bimonthly Deliveries							

4. Explanations, Comments and Best Professional Practices[3]:

Note: An agricultural water supplier's total water use may be different from Aggregated Farm-Gate deliveries because measurement at these points may not account for other practices (such as groundwater recharge/conjunctive use, water transfers, wheeling to other agencies, urban use, etc).

1. "Farm-gate" means the point at which water is delivered from the agricultural water supplier's distribution system to each of its individual customers as specified in the Agricultural Water Measurement Regulation (Title 23, Division 2, Chapter 5.1, Article 2 of the CCR).
2. "Aggregated farm-gate delivery data" means information reflecting the total volume of water an agricultural water supplier provides to its customers and is calculated by totaling its deliveries to customers.
3. "Best Professional Practices" is defined in Title 23, Division 2, Chapter 5.1, Article 2 of the CCR, Section 597.2.

Provident Irrigation District

Provident Irrigation District
Proposed Water Measurement Program

Purpose

This document describes measurement, pricing, and billing practices within Provident Irrigation District (PID or District), and describes the District's plan to comply with the provisions of its Settlement Contract and the measurement requirements of the Central Valley Project Improvement Act and the Bureau of Reclamation's (Reclamation's) *Regional Criteria for Evaluating Water Management Plans to The Sacramento River Contractors* (Regional Criteria).

Background

The District's contract with Reclamation authorizes diversions from the Sacramento River at one location along the right or western bank of the Sacramento River: River Mile (RM) 177.2R. In 2000, the District's diversion facilities were combined with those of Princeton-Codora-Glenn Irrigation District (PCGID), and a fish screen was installed. Currently, all diversions from the river are made at RM 177.2R. The District has state-issued water rights to divert water from the Sacramento River at this location outside of the season covered by the contract, as well as state-issued water rights to divert water from the Colusa Basin Drain. The District uses a system of canals, ditches, and drains to convey water diverted from the Sacramento River and the Colusa Basin Drain as well as other inflow and recirculated tailwater to its customers.

The District provides water for irrigation purposes to 111 customers at 218 individual field turnouts or farm-gates by gravity. The District's manager also serves as manager for PCGID. The District employs a secretary/office manager, three full-time ditch tenders, and equipment operators. The ditch tenders are responsible for maintaining water levels throughout the District, as well as starting and stopping deliveries to customers. Deliveries and changes are made by the ditch tenders on demand with 48-hour notice.

Water orders are due prior to the irrigation season, and the application for water must be accompanied with 25 percent payment for water. Remaining installments for water are due by the first of June, July, and August. Unpaid and delinquent water charges are subject to interest and penalties in accordance with District policies. Landowners are required to identify a "Designated Irrigator," which may be the landowner, a lessee, or other tenant. The Designated Irrigator is responsible for adhering to the District's Water Management and Conservation Policy and for any violations of this policy. A copy of the Designation of Responsible Party form is attached. Also attached are copies of the 2013 Water Order form, which includes the 2013 water rates and the District's Rules and Regulations.

Current Measurement Practices

River Diversions

As identified previously, the District diverts water from the Sacramento River at RM 177.2R through a facility jointly owned and operated by PCGID. Diversions from the Sacramento River are measured using meters installed and maintained by Reclamation. Water is diverted into a common pool, and additional meters measure the quantity of water flowing to the District and to PCGID. All of the meters at this facility, those used to measure the diversions from the river and those used to measure the distribution of water between the two districts, provide both instantaneous flow rate and volumetric data. Maintenance and calibration of all meters are performed by Reclamation in accordance with their standard operating procedures. The District has a limited supervisory control and data acquisition (SCADA) program that allows it to remotely monitor its diversions from the river.

Lateral Measurement

The District employs three ditch tenders who operate the canals and laterals to maintain water levels to assure sufficient head for gravity deliveries. Water levels are monitored at headgates as well as at check structures at various locations along the larger canals. Water levels throughout the system are maintained in accordance with the ditch tenders' experience and knowledge of the system, and the water requirements of crops. Although the District has the ability to remotely monitor water levels at select locations via its SCADA system, water levels and flows are not typically recorded.

Turnout or Field-level Measurement

All deliveries to individual fields are made by gravity through 218 screw-gates. Deliveries are set on the basis of water orders, the ditch tenders' experience and knowledge of the system and its demands, and communication with individual customers. Currently, the District does not measure or record information regarding deliveries to fields. Table 1 identifies the number and type of turnout measurement devices along with an estimated level of volumetric accuracy for each device.

TABLE 1
Summary of Turnout Structures

Measurement Type	Number[a]	Estimated Accuracy[b]	Reading Frequency	Maintenance Frequency
Rated Gate	218	±12%	Daily or when changes are made	Annually or as needed

[a] The number of devices will be verified during the inspection and certification process.

[b] The estimated accuracy is based on information contained in Reclamation's 2011 *Water Management Planner*, Chapter 9, Table 1, and the District's best estimate of canal and turnout conditions.

Turnout Measurement Program

To address the measurement requirements of the Regional Criteria and to comply with the provisions of its Settlement Contract, the District intends to implement a turnout measurement program. The measurement program will include the following:

1. Evaluation of typical operational canal water-level fluctuations
2. Development and implementation of a system and methodology for monitoring changes in canal levels related to turnouts
3. Verification of number, type, and size of gates
4. Acquisition or development of ratings for screw-gates
5. Field verification of accuracy of screw-gate ratings and modification of ratings as appropriate
6. Development of a system for field recording delivery data
7. Development of a database for recording deliveries
8. Development of operation and maintenance (O&M) procedures to assure accurate measurement of deliveries

The District anticipates it will need to rely on outside consultants, hire additional personnel, and purchase an additional vehicle in order to develop and implement the measurement program. The initial estimate of the cost to develop and implement the measurement program is approximately $170,000 over the next 5 years. It is estimated that the ongoing annual costs to maintain the program will be approximately $20,000 per year once the program is fully implemented.

The District proposes to implement the measurement program in phases. The first phase will be to conduct steps 1 through 6 from the list above within one of the systems within the District. This phased approach will allow evaluation of measurement options and challenges on a limited scale before expanding the program throughout the District. It is hoped the phased approach will help minimize the overall cost of the program. The program approach and associated costs will be reviewed and revised as the program is developed. Revisions and updates will be included in the annual updates to the Sacramento Valley Regional Water Management Plan.

Pricing and Billing

The District has two charges: an annual assessment applicable to all lands and a water charge applicable to lands that request water service. The charge for water service is based on the acreage to be planted. Because the only crop grown within the District is rice, all lands ordering irrigation water are charged the same price per acre. Water orders are due by mid-April, and payments for water charges are due in four installments by April 15, June 1, July 1, and August 1.

Any changes to the current pricing structure will require action by the District's Board of Directors. Once the measurement program has been developed and implemented, the District will consider changes in its current pricing policy that will incorporate some level of volumetric pricing.

Finance Plan

As identified above, the costs to develop and implement the turnout measurement program are estimated to be approximately $170,000. The District proposes to develop and implement the program over a 3-year period. Table 2 identifies a schedule of tasks and the estimated annual program costs. To offset the impact of these added costs on the District and its customers, the District intends to seek funding through any grants that may be available from either the California Department of Water Resources or Reclamation. Funding availability may affect the timing of the implementation of the program.

TABLE 2
Proposed Schedule of Verification Tasks

Major Tasks	2014	2015	2016	2017	2018
Evaluate canal water level fluctuation	X	X			
Develop and implement system and methodology for monitoring changes in canal levels related to turnouts	X	X	X		
Obtain or develop ratings for screw-gate deliveries	X	X			
Conduct field verification or accuracy of screw-gate ratings and modify ratings as appropriate	X	X	X	X	X
Conduct measurements to check and verify ratings at approximately 10 to 20 percent of District turnouts each year	X	X	X	X	X
Develop system and methodology for field recording delivery data	X	X			
Develop O&M procedures to assure continued accuracy of turnout measurement devices		X	X		
Purchase and develop database to incorporate volumetric pricing			X	X	X
Develop and implement volumetric pricing policy				X	X
Initial Estimate of Annual Costs	$35,000	$35,000	$25,000	$55,000	$20,000

The estimated costs identified in Table 2 for the development and initial implementation of the proposed measurement program are based on the assumption that a significant amount of the work will be conducted by a third party such as an outside engineer or consultant. However, the implementation of the measurement program will result in additional duties for the District's existing staff. Reading and recording deliveries will require additional time and effort by ditch tenders entering delivery data, and producing bills for water deliveries will result in additional work for office staff and the manager. The ongoing expense to maintain the measurement program, including the cost of an additional employee and vehicle, is estimated to be approximately $20,000 per year.

Additional Water Use Efficiency Improvements

The above has been prepared to address specific requirements of the Central Valley Project Improvement Act and the Regional Criteria. District staff has identified additional improvements that they believe would provide equal or greater benefits to overall water use efficiency within the District. These include the following:

- Update its existing outdated SCADA system
- Expand the SCADA to include water-level monitoring at key locations

These SCADA system improvements would allow District staff to better operate its delivery system by monitoring and coordinating river diversions and canal operations. Because of the costs associated with developing and implementing the turnout measurement program described above and the District's limited resources, any improvements to the SCADA system will be dependent on outside funding sources.

Reference

Bureau of Reclamation (Reclamation). 2004. *Regional Criteria for Evaluating Water Management Plans for The Sacramento River Contractors*.

PID Attachment

Provident Irrigation District

Water Management and Conservation Policy

Designation of Responsible Party

The "Designated Irrigator" listed below will be contacted in the event of any problems or violations of the Water Conservation Policy:

Designated Irrigator:

Name: _____ Mobil Phone #:_____

Address:_____

The person listed below accepts responsibility for any fines or violations related to the actions of the "Designated Irrigator" and desires all violation notices be sent to them.

Responsible Party for Violations: (Tenant Signature)

Name:_____ Home Phone#:_____

Address: _____ Mobil Phone#_____

UNPAID VIOLATIONS ARE THE RESPONSIBILITY OF THE LANDOWNER.

I hereby verify that I will agree to, and abide by the Provident Irrigation District Water Conservation Policy:

Tenant:_____

Landowner:_____

Make separate application for lands under each tenant's lease
and for each and every separate farm.

PROVIDENT IRRIGATION DISTRICT
APPLICATION FOR WATER FOR THE 2013 WATER SEASON

The undersigned hereby applies for water to be used during this irrigation season to grow_____on_____acres, subject to the rules and regulations as adopted by the Board of Directors of the District, which are hereby made part of this application, on land owned by _____ described as follows:_____
_____
_____

2013 WATER RATE FOR RICE-$60.00/AC.
Minimum of 1/4 payment due with the application ($15.00/AC)

Accompanied herewith is payment in the sum of $_____being $_____per acre, which is _____of the estimated cost of water for that crop. I hereby agree to pay the further sum of $_____per acre for said water on the first day of June, July, and August.

All water tolls and charges shall become delinquent fifteen days after the same become due and payable. If not paid prior to such delinquency, an interest charge of 1 1/2% per month shall be added. If delinquent water tolls and charges are not paid on or before the last Monday of December, an additional 10% penalty shall be added thereto and shall be and become part of such tolls and charges, in addition to the interest on delinquent payments.

The undersigned owner understands that unpaid District charges may be secured by a lien on his land, even if the services were provided for a tenant's or contract-holder's crop.

Dated_____ Owner_____

Contract Holder_____

Lessee_____
Address:_____

PROVIDENT IRRIGATION DISTRICT
Rules for Distribution and Use of Water
Adopted July 9, 2002

The Board of Directors of Provident Irrigation District have adopted these Rules and Regulations under authority of the provisions of California Water Code Section 22257, that provides for a district to establish and distribute a set of equitable rules for the distribution and use of water.

Rule 1. Control of System

The maintenance, and operation of the canals, drains and works of the District shall be under the exclusive management and control of the District Manager, appointed by the Board of Directors and no other person, except his employees and assistants shall have any right to interfere with said canals, drains and works in any manner, except in case of an order from the Board of Directors.

Rule 2. Ditchtenders and Other Employees

The District Manager will employ such ditchtenders and other assistants as he may deem necessary for the proper operation of the system subject to the approval of the Board of Directors. Each ditchtender shall have charge of his respective Section, and shall be responsible to the District Manager. From the rulings and the action of the ditchtender an appeal may be made to the District Manager. From the action of the District Manager an appeal may be made to the Board of Directors at any meeting of such Board.

Rule 3. Distribution of Water

All waters shall be apportioned ratably to each landowner upon the basis of the ratio which the last assessment against his land for District purposes bears to the whole sum assessed upon the lands of the District, or in such other manner as is allowed by law, to such landowners making application therefor, and making payments of the tolls and charges fixed by the Board. Upon failure of any landowner to make application for water, the water that would otherwise be allotted to such landowner may be alloted by the District to other landowners who make application therefor.

Any landowner may make application for additional water over and above the amount to which he is entitled under his assessment and if such application cannot be granted for the full amount applied for, such water as may be available shall be pro-rated between such applications in proportion to their said assessments in the District.

Rule 4. Application for Water

At such time as may be ordered by resolution of the Board of Directors, each landowner or tenant shall file an application for water on a form provided by the District, setting

forth the crops and acreage of each he is intending to irrigate. The application shall further contain the name of the owner of the land to be farmed, name of the tenant or tenants, acreage to be farmed within the District, amount and location of acreage for which the water is required and such other matters as the Board of Directors may desire. By making said application the applicant grants a right to the District for the irrigation season to control all ditches and laterals, and to install, maintain, control and regulate all meters, measuring devices, delivery gates or other structures in any ditch, canal or lateral necessary and on which the District does not otherwise have such rights, for the distribution, measurement and control of water, and to go upon the applicant's land for the purpose of measuring the area irrigated.

Any land that is farmed by a tenant is subject to the imposition of a claim by the District for any unpaid District rates, charges or assessments.

Rule 5. Delivery of Water

All orders for delivery or for shut-off of water must be made to the District's office by 2:00 p.m. on the day prior to the desired delivery or shut-off. The District will attempt to make delivery the same day, or by the next day for orders received after 2:00 p.m. The District's distribution system, however, is not designed to provide full service to every landowner simultaneously. Therefore, there may be times when water deliveries must be rotated, and that rotation will be imposed as equitably as possible by the District Manager. The District shall not be responsible for loss or damages incurred by reason of delays or interruptions in delivery of water service.

Water must be used continuously by the water user throughout the period of delivery, both day and night.

The District shall deliver no water unless proof of payment therefore required by these Rules and Regulations is made.

Rule 6. Measurements and Measuring Devices

The District shall be entitled to place such meters or other measuring devices, turnouts, gates, or other structures in the ditches, canals and laterals as it may consider necessary or proper.

Rule 7. Time for Fixing Rates of Tolls and Charges

The rates of tolls and charges for the use of water and other purposes may be fixed and determined annually by the Board of Directors. The rates of tolls and charges are payable at the District office.

If an applicant requests only a single irrigation, the entire amount of tolls and charges shall be paid before water is delivered. Should an applicant require a subsequent irrigation, the entire

amount of tolls and charges for that subsequent irrigation shall be paid before water is delivered. Where more that one irrigation or continuous irrigation (such as for rice) during a season will be required, the applicant shall pay a minimum of one-fourth of the tolls and charges upon filing his application and before water delivery is commenced. The remainder of the tolls and charges shall be paid, one-fourth each, on or before the first day of June, July and August.

All water tolls and charges shall become delinquent fifteen days after the same are due and payable. If not paid prior to such delinquency, an interest charge of 1 ½% per month shall be added. If delinquent water tolls and charges are not fully paid on or before the last Monday of December, an additional 10% penalty shall be added thereto and shall be and become part of such tolls and charges, in addition to the interest on delinquent payments, and such penalty will also bear interest thereafter.

In addition to any other rights under law, the District may secure any unpaid tolls and charges in accordance with California Water Code Section 25806, that allows, in the District's discretion, for such charges to be added to the next assessment on the land, or to be secured by the filing of a certificate of lien in the office of the county recorder of any county. Landowners should understand that one or more of these processes could ultimately result in their loss of title to their land.

If any applicant for or user of water or the land upon which the water is to be used is fifteen or more days delinquent in the payment of any District tolls or charges, or any installments thereof, water delivery to such applicant or land shall be refused or discontinued until such tolls or charges or installments thereof, plus interest and penalties as provided for in these Rules and Regulations, are paid. If water service has commenced for the irrigation season, but is to be discontinued under the terms of this Rule, the landowner, and tenant, if any, who signed the application for water for the year, will first be afforded the right to a hearing before the District Manager or Board of Directors, as set forth in a written notice to be given to the landowner and tenant. Addition of delinquent water toll or tolls to the assessment against the lands using such water shall not be considered as payment thereof. The District's option to discontinue water service is in addition to all other rights of enforcing payment of District tolls and charges, and shall not be construed as limiting the rights of the District to otherwise enforce collection of its tolls and charges.

If at any time during an irrigation season, a landowner or water user has been more than thirty days delinquent in the payment of district tolls or charges, the District will require that one hundred percent of the following irrigation season's estimated water tolls and charges for the land on which the prior year's tolls or charges were delinquent be deposited at the time an application for water service is filed for that subsequent irrigation season.

Rule 8. District Owned Property

The lands owned or controlled by the District may be leased or rented under such terms and conditions as may be prescribed and ordered by the Board of Directors from time to time; provided however, that unless different rules, regulations and rates are fixed, then these rules,

regulations and rates shall apply to water service to be delivered to such District-owned land.

Rule 9. Acreage Surveys

If the District finds it necessary to survey land for the purpose of determining the acreage planted and for which water was delivered, it will include all lands within the exterior boundaries of the area on which water has been allowed to stand, or use such other standards for measurement as are commonly used in the area in which the land is situated.

Rule 10. Abandoned Use of Water

Whenever the use of water is abandoned on any lands, such lands shall be required to pay the full installments of water tolls and charges due and payable at the time the District receives notice of such abandonment.

Rule 11. Condition of Ditches

Upon the application of a landowner or water user for the delivery of water, it shall be the duty of the District Manager to certify whether or not the applicant's ditches are in proper condition to receive water.

As provided in California Water Code Section 22257, all ditches must be kept free from weeds and other obstructions and shall be of sufficient capacity and properly constructed and maintained so as to carry water without danger of serious breaks or waste, and if not so unobstructed, constructed and maintained the District Manager may shut off delivery of water thereto. The District Manager will examine all ditches and may order them to be cleaned, repaired or reconstructed if necessary, before water is turned in. Refusal to comply with this rule will be sufficient cause for refusal to turn in water. Nothing herein shall be construed as an assumption of liability on the part of the District, its Directors, officers or employees for any damages occasioned through the improper construction, maintenance or use of any ditch or ditches or by reason of permitting the flow of water or turning water therein.

Rule 12. Waste of Water

Any landowner or water user wasting water either wilfully, carelessly, or on account of defective ditches will be refused the use of water until such conditions are remedied. Without limiting the foregoing, the District and its Board of Directors reserve the right to refuse or to limit delivery of water to any lands when it appears to the satisfaction of the Board of Directors that its proposed use, or method of use, will require such excessive quantities of water as will constitute waste or will damage adjacent land by seepage.

When it appears to the satisfaction of the Board of Directors that service of water to certain lands will probably result in seepage damage to adjacent lands the Board may require as a condition precedent to the delivery of water a written guarantee on the part of the landowner desiring

service that he will protect the District and hold it free and harmless from liability for any such damage.

Rule 13. Shortage of Water

When, through lack of water, lack of ditch capacity, or for any other reason, it is not possible to deliver throughout the District or any portion thereof the full supply of water required by the water users, such supply as can be delivered will be equitably pro-rated until such time as delivery of a full supply can be given. A pro-rata delivery means a simultaneous flow available at a point nearest the District system for the use of each and every landowner or water user in as nearly an exact proportion as can be determined of the total amount available or that can be delivered, based on the individual's right to receive water as fixed by acreage, crop to be irrigated, ditch capacity, or otherwise. The method may be applied to all, or a part of the system.

Rule14. Use of Laterals and Distribution Ditches

No District owned or operated lateral shall be used as a distribution ditch to directly irrigate alfalfa, clover, corn or similar strip check grown crop.

Rule 15. Complaints

All complaints as to service, lack of water, or other unsatisfactory conditions should be made immediately, in writing, addressed to the District office.

Rule 16. Access to Land and Ditches

The District and its agents shall have free access at all times to all lands irrigated from the canal system and to all canals, laterals and ditches for the purpose of inspection, examination, measurements, surveys or other necessary purposes of the District, with the right of installation, maintenance, control and regulation of all meters or other measuring devices, gates, turnouts, or other structures necessary or proper for the measurement and distribution of water.

The District assumes no liability for damages to persons or property occasioned through defective ditches, laterals, meters or measuring devices.

Rule 17. Use of District Right-of-Way

No trees or crops shall be planted on any District right-of-way, and all such trees or crops growing therein shall belong absolutely to the District. The District Manager may, upon such terms and conditions as he deems appropriate, grant permission in writing for annual crops to be planted in a District right-of-way. Such plantings shall be entirely at the risk of the landowner or tenant planting such crops.

Rule 18. Obstructions on Right-of-Way

No fences or other obstructions shall be placed across, upon or along any canal bank or District right-of-way without the written permission of the Board of Directors, subject to such conditions as the Board deems appropriate. Any obstructions placed without permission as herein required shall be removed by the District and the expense of such removal shall be assessed against the landowner.

Rule 19. Drains

Before allowing water to drain or waste into the drains constructed by the District, all landowners and water users must construct, install and maintain all necessary structures so as to protect such drains from erosion and damage. Such work must be done to the satisfaction of the District Manager.

Each landowner shall construct and maintain adequate drainage facilities to prevent damage to adjacent land.

Rule 20. Gates, Structures and Main Canal

No opening shall be made or structures placed in or on any District right-of-way, nor shall anyone alter District facilities without the written permission of the District Manager. All such structures or alterations must be constructed according to requirements of the District, at the expense of the landowner or water user, must be maintained in a condition satisfactory to the District Manager and must not be changed without the written permission of the District Manager.

If a landowner or water user desires to have work done at his expense by the District, the District will prepare an estimate in advance if the landowner or water user requests it. The total cost of all work shall be paid within 30 days of completion of the project.

Rule 21. Damage to Laterals

Any person causing damage to or permitting livestock to cause damage to any District right of way or facilities shall be required to reimburse this District for all expense incurred in repairing the same.

Rule 22. Enforcement of Rules

Refusal to comply with the requirements, any violations of any of these Rules and Regulations, or any interference with the proper discharge of the duties of any person employed by the District, shall be considered sufficient cause for shutting off the water, and water will not again be furnished until in the opinion of the District Manager full compliance has been made with all requirements herein set forth.

Rule 23. Non-Liability of District

The District will not be liable for any damage of any kind or nature resulting directly or indirectly to any private ditch or the water flowing therein or by reason of lack of capacity therein, or for negligent, wasteful or other use or handling of water by the users thereof. The District's responsibility shall absolutely cease when the water leaves the District's facilities, and the District will not be liable for shortage of water, either temporary or permanent, failure to deliver such water, or for the quality thereof.

Rule 24. Presumption of Knowledge by Landowners

All landowners in the District shall be conclusively presumed to have knowledge of these Rules and Regulations, of the provisions of the California Irrigation District Law, and of all proceedings had, and all orders and decisions made and entered in the District's records, including those already appearing therein and those that may hereafter be entered therein; and all such landowners are bound by them.

Rule 25. Borrowing Equipment

Tools or equipment will not be loaned unless the borrower first secures a properly signed order for same at the District office.

Rule 26. Rebates

Refunds or rebates for water applied for but not used will only be considered in the discretion of the Board of Directors and none will be granted unless application therefore is made within the current year during which payment was made.

The foregoing Rules and Regulations were adopted July 9, 2002, superceding all former Rules and Regulations.

Princeton-Codora-Glenn Irrigation District

Princeton-Codora-Glenn Irrigation District Proposed Water Measurement Program

Purpose

This document describes measurement, pricing, and billing practices within Princeton-Codora-Glenn Irrigation District (PCGID or District), and describes its plan to comply with the provisions of its Settlement Contract and the measurement requirements of the Central Valley Project Improvement Act and the Bureau of Reclamation's (Reclamation's) *Regional Criteria for Evaluating Water Management Plans to The Sacramento River Contractors* (Regional Criteria).

Background

The District's Contract with Reclamation authorizes diversions from the Sacramento River at one location along the right or western bank of the Sacramento River: River Mile (RM) 177.2R. In 2000, the District's diversion facilities were combined with those of Provident Irrigation District (PID), and a fish screen was installed. Currently all diversions from the river are made RM 177.2R. The District has state-issued water rights to divert water from the Sacramento River at this location outside of the season covered by the Contract as well as state-issued water rights to divert water from the Colusa Basin Drain. The District uses a system of canals, ditches, and drains to convey water diverted from the Sacramento River and the Colusa Basin Drain as well as other inflow and recirculated tailwater to its customers.

The District provides water for irrigation purposes to 97 customers at 312 individual field turnouts or farm-gates by gravity. The District's manager also serves as manager for PID. The District employs a secretary/office manager, three full-time ditch tenders, and equipment operators. The ditch tenders are responsible for maintaining water levels throughout the District, as well as starting and stopping deliveries to customers. Deliveries and changes are made by the ditch tenders on demand with 48-hour notice.

Water orders are due prior to the irrigation season, and the application for water must be accompanied with 25 percent payment for water. Remaining installments for water are due by the first of June, July, and August. Unpaid and delinquent water charges are subject to interest and penalties in accordance with District policies. Copies of the 2013 water order form, the 2013 water rates, and the District's Rules and Regulations are attached.

Current Measurement Practices

River Diversions

As identified previously, the District diverts water from the Sacramento River at RM 177.2R through a facility jointly owned and operated by PID. Diversions from the Sacramento River are measured using meters installed and maintained by Reclamation. Water is diverted into a common pool, and additional meters measure the quantity of water flowing to the District and to PID. All of the meters at this facility, those used to measure the diversions from the river and those used to measure the distribution of water between the two districts, provide both instantaneous flow rate and volumetric data. Maintenance and calibration of all meters are performed by Reclamation in accordance with their standard operating procedures. The District has a limited supervisory control and data acquisition (SCADA) program that allows it to remotely monitor its diversions from the river.

Lateral Measurement

The District employs three ditch tenders who operate the canals and laterals to maintain water levels to assure sufficient head for gravity deliveries. Water levels are monitored at headgates as well as at check structures at various locations along the larger canals. Water levels throughout the system are maintained in accordance with the ditch tenders' experience and knowledge of the system, and the water requirements of crops. Although the District has the ability to remotely monitor water levels at select locations via its SCADA system, water levels and flows are not typically recorded.

Turnout or Field-level Measurement

All deliveries to individual fields are made by gravity through 312 screw-gates. Deliveries are set on the basis of water orders, the ditch tenders' experience and knowledge of the system and its demands, and communication with individual customers. Currently, the District does not measure or record information regarding deliveries to fields. Table 1 identifies the number and type of turnout measurement devices along with an estimated level of volumetric accuracy for each device.

TABLE 1
Summary of Turnout Structures

Measurement Type	Number[a]	Estimated Accuracy[b]	Reading Frequency	Maintenance Frequency
Rated Gate	312	±12%	Daily or when changes are made	Annually or as needed

[a] The number of devices will be verified during the inspection and certification process.

[b] The estimated accuracy is based on information contained in Reclamation's 2011 *Water Management Planner*, Chapter 9, Table 1, and the District's best estimate of canal and turnout conditions.

Turnout Measurement Program

To address the measurement requirements of the Regional Criteria and to comply with the provisions of its Settlement Contract, the District intends to implement a turnout measurement program. The measurement program will include the following:

1. Evaluation of typical operational canal water-level fluctuations
2. Development and implementation of a system and methodology for monitoring changes in canal levels related to turnouts
3. Verification of number, type, and size of gates
4. Acquisition of development of ratings for screw-gates
5. Field verification of accuracy of screw-gate ratings and modification of ratings as appropriate
6. Development of a system for field recording delivery data
7. Development of a database for recording deliveries
8. Development of operation and maintenance (O&M) procedures to assure accurate measurement of deliveries

The District anticipates it will need to rely on outside consultants, hire additional personnel, and purchase an additional vehicle in order to develop and implement the measurement program. The initial estimate of the cost to develop and implement the measurement program is approximately $170,000 over the next 5 years. It is estimated that the ongoing annual costs to maintain the program will be approximately $20,000 per year once the program is fully implemented.

The District proposes to implement the measurement program in phases. The first phase will be to conduct steps 1 through 6 from the list above within one of the systems within the District. This phased approach will allow evaluation of measurement options and challenges on a limited scale before expanding the program throughout the District. It is hoped the phased approach will help minimize the overall cost of the program. The program approach and associated costs will be reviewed and revised as the program is developed. Revisions and updates will be included in the annual updates to the Sacramento Valley Regional Water Management Plan.

Pricing and Billing

The District has two charges: an annual assessment applicable to all lands and a water charge applicable to lands that request water service. The charge for water service is based on the acreage and crop to be planted. The price per acre for each crop is based on an assumed water need for each crop; that is, the water toll for high-water-use crops such as rice is much higher than low-water-use crops such as wheat or safflower. Water orders are due by mid-March, and payments for water charges are due in four installments by April 1, June 1, July 1, and August 1.

Any changes to the current pricing structure will require action by the District's Board of Directors. Once the measurement program has been developed and implemented, the District will consider changes in its current pricing policy that will incorporate some level of volumetric pricing.

Finance Plan

As identified above, the costs to develop and implement the turnout measurement program are estimated to be approximately $170,000. The District proposes to develop and implement the program over a 3-year period. Table 2 identifies a schedule of tasks and the estimated annual program costs. To offset the impact of these added costs on the District and its customers, the District intends to seek funding through any grants that may be available from either the California Department of Water Resources or Reclamation. Funding availability may affect the timing of the implementation of the program.

TABLE 2
Proposed Schedule of Verification Tasks

Major Tasks	2014	2015	2016	2017	2018
Evaluate canal water level fluctuation	X	X			
Develop and implement system and methodology for monitoring changes in canal levels related to turnouts	X	X	X		
Obtain or develop ratings for screw-gate deliveries	X	X			
Conduct field verification or accuracy of screw-gate ratings and modify ratings as appropriate	X	X	X	X	X
Conduct measurements to check and verify ratings at approximately 10 to 20% of District turnouts each year	X	X	X	X	X
Develop system and methodology for field recording delivery data	X	X			
Develop O&M procedures to assure continued accuracy of turnout measurement devices		X	X		
Purchase and develop database to incorporate volumetric pricing			X	X	X
Develop and implement volumetric pricing policy				X	X
Initial Estimate of Annual Costs	$35,000	$35,000	$25,000	$55,000	$20,000

The estimated costs identified in Table 2 for the development and initial implementation of the proposed measurement program are based on the assumption that a significant amount of the work will be conducted by a third party such as an outside engineer or consultant. However, the implementation of the measurement program will result in additional duties for the District's existing staff. Reading and recording deliveries will require additional time and effort by ditch tenders entering delivery data, and producing bills for water deliveries will result in additional work for office staff and the manager. The ongoing expense to maintain the measurement program, including the cost of an additional employee and vehicle, is estimated to be approximately $20,000 per year.

Additional Water Use Efficiency Improvements

The above has been prepared to address specific requirements of the Central Valley Project Improvement Act and the Regional Criteria. District staff has identified additional improvements that they believe would provide equal or greater benefits to overall water use efficiency within the District. These include the following:

- Update its existing outdated SCADA system
- Expand the SCADA to include water-level monitoring at key locations

These SCADA system improvements would allow District staff to better operate its delivery system by monitoring and coordinating river diversions and canal operations. Because of the costs associated with developing and implementing the turnout measurement program described above and the District's limited resources, any improvements to the SCADA system will be dependent on outside funding sources.

Reference

Bureau of Reclamation (Reclamation). 2004. *Regional Criteria for Evaluating Water Management Plans for The Sacramento River Contractors*.

PCGID Attachment

STANDARD WATER APPLICATION

Princeton-Codora-Glenn Irrigation District
P O. Box 98, Princeton, CA 95970
530-439-2248

The undersigned hereby applies for the irrigation of the below farm crops under and subject to the By-Laws, Rules and Regulations of Tolls and charges adopted (which are by this reference made a part of the application) or to be adopted by the Board of Directors of the District, and hereby grants the right to the Princeton-Codora-Glenn Irrigation District to use all ditches and laterals on the below described premises & to install, maintain for distribution, measurement & control of water for irrigation purposes and said District and its officers or employees shall not be liable for damages to persons or property occasioned through such exercise of such right, or for the negligent, wasteful or other use or handling of the water by the user thereof. *It is the sole responsibility of the undersigned to insure that all necessary Reclamation Reform Act documents are on file with the District office prior to delivery of water to the below listed lands.*

Application Due: By 4:00 PM April 15, 2013

Landowner:_____

Address: _____

City: _____ St. _____ Zip:_____

Description of Parcels of Lands to be Irrigated

Parcel No.	Gate No.	Crop	Acreage	Tenant	Amt. Due
Totals					

Irrespective of whether landowner or tenant is to pay for water, unpaid charges may, at the District's discretion, be added to the assessment to be levied, or otherwise secured as provided by law.
Water is to be paid by: Landowner _____ Tenant _____ Phone # of Irrigator:_____
This application must be signed by the landowner or his lawful agent, as authorized, in writing, on forms available at the District office. ***Payment for the 1st installment must accompany this application.***

Landowner:_____ Date:_____

2013 Water Toll Schedule

CROP	2013 WATER TOLLS
ALFALFA	$ 7.19 PER ACRE PER IRRIGATION
BEANS	$ 7.19 PER ACRE PER IRRIGATION
CORN (FIELD)	$ 7.19 PER ACRE PER IRRIGATION
CORN (MILO)	$ 8.75 PER ACRE PER IRRIGATION
COTTON	$ 7.19 PER ACRE PER IRRIGATION
ORCHARD (FLOOD)	$ 10.32 PER ACRE PER IRRIGATION
ORCHARD (FURROW)	$ 9.69 PER ACRE PER IRRIGATION
ORCHARD (SPRINKLER)	$ 8.82 PER ACRE PER IRRIGATION
ONIONS	$ 8.99 PER ACRE PER IRRIGATION
PASTURE	$ 8.99 PER ACRE PER IRRIGATION
RICE	$ 110.00 PER ACRE PER YEAR
SAFFLOWER	$ 8.99 PER ACRE PER IRRIGATION
SUGARBEETS	$ 8.99 PER ACRE PER IRRIGATION
SUNFLOWERS	$ 8.99 PER ACRE PER IRRIGATION
TOMATOES (FURROW)	$ 8.99 PER ACRE PER IRRIGATION
TOMATOES (SPRINKLER)	$ 8.99 PER ACRE PER IRRIGATION
VINESEEDS (FURROW)	$ 8.99 PER ACRE PER IRRIGATION
VINESEEDS (SPRINKLER)	$ 8.99 PER ACRE PER IRRIGATION
WHEAT	$ 8.75 PER ACRE PER IRRIGATION
ONE IRRIGATION	$ 12.82 PER ACRE PER IRRIGATION
OTHER CROPS	$ 8.82 PER ACRE PER IRRIGATION

PAYMENT SCHEDULE:

RICE	*1st Installment Due With Application* *Remainder due in 3 additional installments* ***(June, July, and September)***
ALL OTHER CROPS	FIRST IRRIGATION PAYMENT DUE WITH APPLICATION. ALL OTHER PAYMENTS DUE 10TH OF MONTH FOLLOWING IRRIGATION.
REFUNDS	Refunds or rebates for water applied for but not used will be considered by the Board of Directors at the next regular meeting following application therefore. Applications for refunds or rebates must be made in the year payment is made.

PRINCETON-CODORA-GLENN IRRIGATION DISTRICT
Rules for Distribution and Use of Water
Adopted: July 10, 2002

The Board of Directors of Princeton-Codora-Glenn Irrigation District have adopted these Rules and Regulations under authority of the provisions of California Water Code Section 22257, that provides for a district to establish and distribute a set of equitable rules for the distribution and use of water.

Rule 1. Control of System

The maintenance, and operation of the canals, drains and works of the District shall be under the exclusive management and control of the District Manager, appointed by the Board of Directors and no other person, except his employees and assistants shall have any right to interfere with said canals, drains and works in any manner, except in case of an order from the Board of Directors.

Rule 2. Ditchtenders and Other Employees

The District Manager will employ such ditchtenders and other assistants as he may deem necessary for the proper operation of the system subject to the approval of the Board of Directors. Each ditchtender shall have charge of his respective Section, and shall be responsible to the District Manager. From the rulings and the action of the ditchtender an appeal may be made to the District Manager. From the action of the District Manager an appeal may be made to the Board of Directors at any meeting of such Board.

Rule 3. Distribution of Water

All waters shall be apportioned ratably to each landowner upon the basis of the ratio which the last assessment against his land for District purposes bears to the whole sum assessed upon the lands of the District, or in such other manner as is allowed by law, to such landowners making application therefor, and making payments of the tolls and charges fixed by the Board. Upon failure of any landowner to make application for water, the water that would otherwise be allotted to such landowner may be allotted by the District to other landowners who make application therefor.

Any landowner may make application for additional water over and above the amount to which he is entitled under his assessment and if such application cannot be granted for the full amount applied for, such water as may be available shall be pro-rated between such applications in proportion to their said assessments in the District.

Rule 4. Application for Water

At such time as may be ordered by resolution of the Board of Directors, each

landowner or tenant shall file an application for water on a form provided by the District, setting forth the crops and acreage of each he is intending to irrigate. The application shall further contain the name of the owner of the land to be farmed, name of the tenant or tenants, acreage to be farmed within the District, amount and location of acreage for which the water is required and such other matters as the Board of Directors may desire. By making said application the applicant grants a right to the District for the irrigation season to control all ditches and laterals, and to install, maintain, control and regulate all meters, measuring devices, delivery gates or other structures in any ditch, canal or lateral necessary and on which the District does not otherwise have such rights, for the distribution, measurement and control of water, and to go upon the applicant's land for the purpose of measuring the area irrigated.

Any land that is farmed by a tenant is subject to the imposition of a claim by the District for any unpaid District rates, charges or assessments.

Rule 5. Delivery of Water

All orders for delivery or for shut-off of water must be made to the District's office by 2:00 p.m. on the day prior to the desired delivery or shut-off. The District will attempt to make delivery the same day, or by the next day for orders received after 2:00 p.m. The District's distribution system, however, is not designed to provide full service to every landowner simultaneously. Therefore, there may be times when water deliveries must be rotated, and that rotation will be imposed as equitably as possible by the District Manager. The District shall not be responsible for loss or damages incurred by reason of delays or interruptions in delivery of water service.

Water must be used continuously by the water user throughout the period of delivery, both day and night.

The District shall deliver no water unless proof of payment therefore required by these Rules and Regulations is made.

Rule 6. Measurements and Measuring Devices

The District shall be entitled to place such meters or other measuring devices, turnouts, gates, or other structures in the ditches, canals and laterals as it may consider necessary or proper.

Rule 7. Time for Fixing Rates of Tolls and Charges

The rates of tolls and charges for the use of water and other purposes may be fixed and determined annually by the Board of Directors. The rates of tolls and charges are payable at the District office.

If an applicant requests only a single irrigation, the entire amount of tolls and charges

shall be paid before water is delivered. Should an applicant require a subsequent irrigation, the entire amount of tolls and charges for that subsequent irrigation shall be paid before water is delivered. Where more that one irrigation or a continuous irrigation (such as for rice) during a season will be required, the applicant shall pay a minimum of one-fourth of the tolls and charges upon filing his application and before water delivery is commenced. The remainder of the tolls and charges shall be paid, one-fourth each, on or before the first day of June, July and August.

All water tolls and charges shall become delinquent fifteen days after the same are due and payable. If not paid prior to such delinquency, an interest charge of 1 ½% per month shall be added. If delinquent water tolls and charges are not fully paid on or before the last Monday of December, an additional 10% penalty shall be added thereto and shall be and become part of such tolls and charges, in addition to the interest on delinquent payments, and such penalty will also bear interest thereafter.

In addition to any other rights under law, the District may secure any unpaid tolls and charges in accordance with California Water Code Section 25806, that allows, in the District's discretion, for such charges to be added to the next assessment on the land, or to be secured by the filing of a certificate of lien in the office of the county recorder of any county. Landowners should understand that one or more of these processes could ultimately result in their loss of title to their land.

If any applicant for or user of water or the land upon which the water is to be used is fifteen or more days delinquent in the payment of any District tolls or charges, or any installments thereof, water delivery to such applicant or land shall be refused or discontinued until such tolls or charges or installments thereof, plus interest and penalties as provided for in these Rules and Regulations, are paid. If water service has commenced for the irrigation season, but is to be discontinued under the terms of this Rule, the landowner, and tenant, if any, who signed the application for water for the year, will first be afforded the right to a hearing before the District Manager or Board of Directors, as set forth in a written notice to be given to the landowner and tenant. Addition of delinquent water toll or tolls to the assessment against the lands using such water shall not be considered as payment thereof. The District's option to discontinue water service is in addition to all other rights of enforcing payment of District tolls and charges, and shall not be construed as limiting the rights of the District to otherwise enforce collection of its tolls and charges.

If at any time during an irrigation season, a landowner or water user has been more than thirty days delinquent in the payment of district tolls or charges, the District will require that one hundred percent of the following irrigation season's estimated water tolls and charges for the land on which the prior year's tolls or charges were delinquent be deposited at the time an application for water service is filed for that subsequent irrigation season.

Rule 8. District Owned Property

The lands owned or controlled by the District may be leased or rented under such terms and conditions as may be prescribed and ordered by the Board of Directors from time to time;

provided however, that unless different rules, regulations and rates are fixed, then these rules, regulations and rates shall apply to water service to be delivered to such District-owned land.

Rule 9. Acreage Surveys

If the District finds it necessary to survey land for the purpose of determining the acreage planted and for which water was delivered, it will include all lands within the exterior boundaries of the area on which water has been allowed to stand, or use such other standards for measurement as are commonly used in the area in which the land is situated.

Rule 10. Abandoned Use of Water

Whenever the use of water is abandoned on any lands, such lands shall be required to pay the full installments of water tolls and charges due and payable at the time the District receives notice of such abandonment.

Rule 11. Condition of Ditches

Upon the application of a landowner or water user for the delivery of water, it shall be the duty of the District Manager to certify whether or not the applicant's ditches are in proper condition to receive water.

As provided in California Water Code Section 22257, all ditches must be kept free from weeds and other obstructions and shall be of sufficient capacity and properly constructed and maintained so as to carry water without danger of serious breaks or waste, and if not so unobstructed, constructed and maintained the District Manager may shut off delivery of water thereto. The District Manager will examine all ditches and may order them to be cleaned, repaired or reconstructed if necessary, before water is turned in. Refusal to comply with this rule will be sufficient cause for refusal to turn in water. Nothing herein shall be construed as an assumption of liability on the part of the District, its Directors, officers or employees for any damages occasioned through the improper construction, maintenance or use of any ditch or ditches or by reason of permitting the flow of water or turning water therein.

Rule 12. Waste of Water

Any landowner or water user wasting water either wilfully, carelessly, or on account of defective ditches will be refused the use of water until such conditions are remedied. Without limiting the foregoing, the District and its Board of Directors reserve the right to refuse or to limit delivery of water to any lands when it appears to the satisfaction of the Board of Directors that its proposed use, or method of use, will require such excessive quantities of water as will constitute waste or will damage adjacent land by seepage.

When it appears to the satisfaction of the Board of Directors that service of water to certain lands will probably result in seepage damage to adjacent lands the Board may require as a

condition precedent to the delivery of water a written guarantee on the part of the landowner desiring service that he will protect the District and hold it free and harmless from liability for any such damage.

Rule 13. Shortage of Water

When, through lack of water, lack of ditch capacity, or for any other reason, it is not possible to deliver throughout the District or any portion thereof the full supply of water required by the water users, such supply as can be delivered will be equitably pro-rated until such time as delivery of a full supply can be given. A pro-rata delivery means a simultaneous flow available at a point nearest the District system for the use of each and every landowner or water user in as nearly an exact proportion as can be determined of the total amount available or that can be delivered, based on the individual's right to receive water as fixed by acreage, crop to be irrigated, ditch capacity, or otherwise. The method may be applied to all, or a part of the system.

Rule14. Use of Laterals and Distribution Ditches

No District owned or operated lateral shall be used as a distribution ditch to directly irrigate alfalfa, clover, corn or similar strip check grown crop.

Rule 15. Complaints

All complaints as to service, lack of water, or other unsatisfactory conditions should be made immediately, in writing, addressed to the District office.

Rule 16. Access to Land and Ditches

The District and its agents shall have free access at all times to all lands irrigated from the canal system and to all canals, laterals and ditches for the purpose of inspection, examination, measurements, surveys or other necessary purposes of the District, with the right of installation, maintenance, control and regulation of all meters or other measuring devices, gates, turnouts, or other structures necessary or proper for the measurement and distribution of water.

The District assumes no liability for damages to persons or property occasioned through defective ditches, laterals, meters or measuring devices.

Rule 17. Use of District Right-of-Way

No trees or crops shall be planted on any District right-of-way, and all such trees or crops growing therein shall belong absolutely to the District. The District Manager may, upon such terms and conditions as he deems appropriate, grant permission in writing for annual crops to be planted in a District right-of-way. Such plantings shall be entirely at the risk of the landowner or tenant planting such crops.

Rule 18. Obstructions on Right-of-Way

No fences or other obstructions shall be placed across, upon or along any canal bank or District right-of-way without the written permission of the Board of Directors, subject to such conditions as the Board deems appropriate. Any obstructions placed without permission as herein required shall be removed by the District and the expense of such removal shall be assessed against the landowner.

Rule 19. Drains

Before allowing water to drain or waste into the drains constructed by the District, all landowners and water users must construct, install and maintain all necessary structures so as to protect such drains from erosion and damage. Such work must be done to the satisfaction of the District Manager.

Each landowner shall construct and maintain adequate drainage facilities to prevent damage to adjacent land.

Rule 20. Gates, Structures and Main Canal

No opening shall be made or structures placed in or on any District right-of-way, nor shall anyone alter District facilities without the written permission of the District Manager. All such structures or alterations must be constructed according to requirements of the District, at the expense of the landowner or water user, must be maintained in a condition satisfactory to the District Manager and must not be changed without the written permission of the District Manager.

If a landowner or water user desires to have work done at his expense by the District, the District will prepare an estimate in advance if the landowner or water user requests it. The total cost of all work shall be paid within 30 days of completion of the project.

Rule 21. Damage to Laterals

Any person causing damage to or permitting livestock to cause damage to any District right of way or facilities shall be required to reimburse this District for all expense incurred in repairing the same.

Rule 22. Enforcement of Rules

Refusal to comply with the requirements, any violations of any of these Rules and Regulations, or any interference with the proper discharge of the duties of any person employed by the District, shall be considered sufficient cause for shutting off the water, and water will not again be furnished until in the opinion of the District Manager full compliance has been made with all requirements herein set forth.

Rule 23. Non-Liability of District

The District will not be liable for any damage of any kind or nature resulting directly or indirectly to any private ditch or the water flowing therein or by reason of lack of capacity therein, or for negligent, wasteful or other use or handling of water by the users thereof. The District's responsibility shall absolutely cease when the water leaves the District's facilities, and the District will not be liable for shortage of water, either temporary or permanent, failure to deliver such water, or for the quality thereof.

Rule 24. Presumption of Knowledge by Landowners

All landowners in the District shall be conclusively presumed to have knowledge of these Rules and Regulations, of the provisions of the California Irrigation District Law, and of all proceedings had, and all orders and decisions made and entered in the District's records, including those already appearing therein and those that may hereafter be entered therein; and all such landowners are bound by them.

Rule 25. Borrowing Equipment

Tools or equipment will not be loaned unless the borrower first secures a properly signed order for same at the District office.

Rule 26. Rebates

Refunds or rebates for water applied for but not used will only be considered in the discretion of the Board of Directors and none will be granted unless application therefore is made within the current year during which payment was made.

The foregoing Rules and Regulations were adopted July 10, 2002, superceding all former Rules and Regulations.

Reclamation District 108

Reclamation District No. 108

Measurement and Volumetric Billing Compliance (Plan)

State Regulation

In 2009, the State Legislature passed legislation titled SBX7 which included the requirement for water purveyors over 25,000 acres to measure the volume of water delivered to customers with sufficient accuracy to: (1) report aggregated farm-gate delivery data to the State and (2) adopt a pricing structure based at least in part on the volume of water delivered to each field. The regulation is very specific as to the accuracy of each measurement device requiring that all measurement devices are either lab certified or field verified by an engineer to meet volumetric accuracies of +/- 5% for lab certified, +/- 10% for new devices that are field verified or +/- 12% for existing devices that are field verified. Outlined below is the District's plan to become compliant with the State's new regulation for water measurement within the next three years as required.

Background

The District has invested time and money to perform two significant pilot projects to determine how measurement compliance could be achieved in the District. The results of the studies were clear. The use of a velocity measurement device provided consistently accurate measurements that would meet the State regulation. This tool reduced the impacts from challenging low head and extreme high flow conditions.

Compliance Strategy

The District proposes to modify all 600 field turnouts and pump discharges to provide turnout measurement that meet the accuracy standards required by the State regulation. This would include the addition of a concrete weir box on all field turnouts and either a weir box, or if not possible, installation of 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 watermen to take point measurements whenever the flow through the field turnout is changed. This information will be recorded and used to calculate the volume of water delivered over time. 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 as the regulation requires.

February 15, 2013

Certification

The acoustic doppler was lab tested and certified at the California State University Chico Agricultural Teaching and Research Center (CSUC ATRC) in July of 2012. Laboratory results showed that the remote tracker can meet the accuracy requirements of the regulation. The enclosed Appendix A Remote Tracker Accuracy Certification further describes the results from the laboratory testing that support compliance with California Code of Regulations.

Construction Program

The most significant portion of the District's effort to comply with the State regulation will be the installation of the concrete weir box on the downstream end of each turnout. The diagram below shows the weir box with temporarily installed measurement device in the oval.

FIGURE 1.

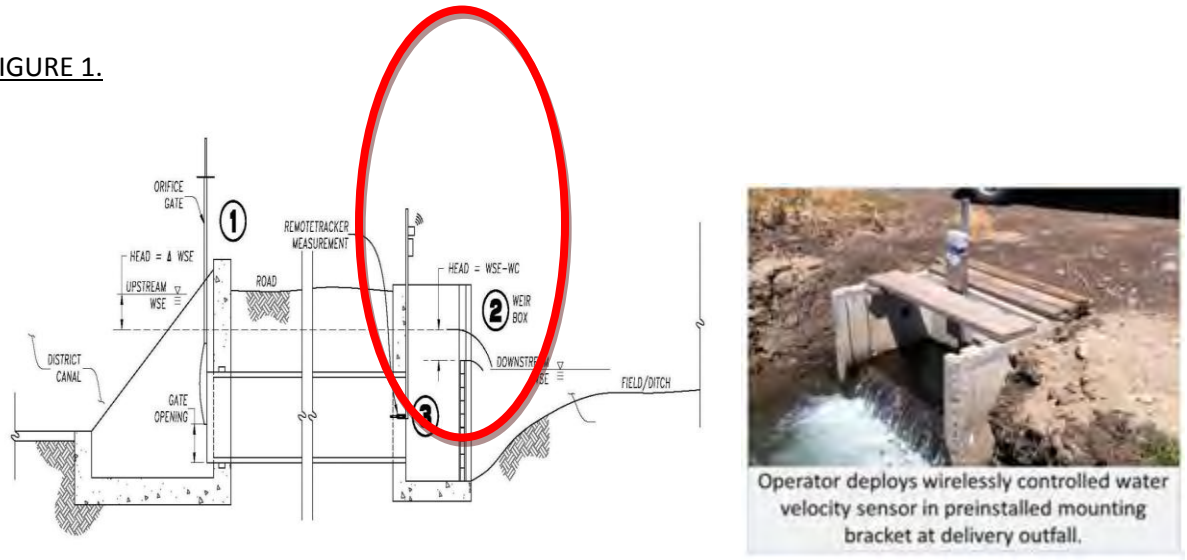

Figure 1: Typical field turnout with addition of concrete weir box shown in the oval. Photo to the right shows the portable Doppler meter installed in the proposed concrete weir box.

The construction program will be challenging to accomplish in the three years provided by the State regulation due to the number of turnouts (approx. 600 or approx. 1 per working day for 3 years) and the limited work windows available due to ongoing irrigation services. The following table shows some of the major challenges and opportunities during a typical year.

Month(s)	Challenges	Opportunities
January – March	Wet weather limits access	Empty Irrigation System
April – Mid-Sept	Irrigation systems full	Row crops between irrigations
Mid-Sept. - October	Most of the Irrigation system full	Rice water off, dry weather
November - December	Most of the Irrigation system full	Somewhat dry weather

In order to accomplish this, the District proposes hiring two additional staff to help assemble a 3 person installation crew. The general box installation includes removing any existing end of turnout structure, excavating the location for the new box to be placed, cutting the end of pipe as necessary, remove sediment from pipe, place base rock foundation for the new box, grouting the box to the end of pipe, placing boards in box up to field elevation and backfilling around the box. The box is then equipped with a properly located bracket to position the portable measurement device.

There are two situations in which a field turnout will need to be entirely removed (including entire gate and pipe) and reinstalled. This will be done if the pipe is found to have less than 1/3 of the remaining life, or the installation elevation would require a box taller than 6 feet. A box taller than this would require the portable measurement device to be longer, making it difficult for a waterman to manage both the length and weight. The District believes that re-installation for elevation will apply to approx. 5 – 10 percent of the installations. For planning purposes, the District is estimating that we will have to re-install approximately 40 percent of all field turnouts (33% for old pipe and 5 – 10% for elevation).

The District installation crew will utilize one pickup, one excavator, one flat bed dump truck, survey equipment along with two cell phones. The District excavator currently has 9,500 hours and was scheduled for replacement in 2013. The Plan includes purchasing a new excavator, but not selling the old unit until the box installation program is complete. In 2012, the District purchased a small dump truck and it is believed that this frees up the use of one of the two existing flat bed dump trucks to be dedicated to this three year effort. The District's 2013 Capital Budget includes the addition of one excavator, one pickup, survey equipment and two cell phones for this crew.

District staff will focus installation during the winter months on complete re-installations since this is the only period where the irrigation system is not charged with water. Wet weather will slow productivity during this period. Throughout the irrigation season, the District will focus installation in the row crop areas between irrigations. Once rice fields begin shutting off, the crew will again focus on rice field installations paying particular attention to fields that typically run rice decomposition water. Once rice decomposition begins, the crew will focus on those rice fields not running decomposition water. The plan is to install 160 boxes in 2013, 180 boxes in 2014 and 2015, and 80 boxes in the first three months of 2016 prior to the irrigation season. The first year will be very revealing in regard to the District's progress as there are substantial unknowns related to existing facilities; i.e. how many field turnouts have downstream structures, how many of the delivery pipes are steel vs. concrete, how many field turnouts will require elevation adjustments, etc.

Operations

District staff spent the last year performing measurement on 17 turnouts as part of a pilot study. The general sense is that the employees find the measurement device useful. Current and historical operations have always required waterman to measure water in order to deliver the amount of water ordered as well as manage water through their delivery systems. The use of the portable Doppler meter simply provides a more accurate measurement as required by the new State regulation. The system uses cell phone data communication to automatically share recorded information with a server in the office as well as with the other waterman. This allows the office as well as the other watermen to all have the current status of all field turnouts.

A typical field adjustment will require the following steps: 1) placement of the portable Doppler meter on the bracket in the concrete weir box, 2) record the current flow reading, if already running water, 3) adjust the flow rate to the desired flow, 4) record the new flow rate and 5) return the portable device to the vehicle. The data is automatically shared as described above.

During the Pilot Project, the District didn't have any reliability issues; however, with full implementation, the District will have a spare device and spare parts to ensure program reliability.

Data Management and Billing

The District will have to perform quality control of the data. This will be an ongoing activity that is very limited with the existing per acre/crop billing system. The District will work to automate this process as much as possible to reduce labor costs to create a new billing program based in part on volume of water delivered.

The District has a relatively small sample size to estimate the additional costs associated with implementing the measurement program. During the Pilot Project, there were very little additional operational time/costs associated with measurement using the portable device. Clearly with full implementation, the District anticipates additional workload for the waterman. It is anticipated that in System A, the largest system at approx. 18,000 acres, it may be necessary to add another waterman during rice flood and re-flood periods.

The District does not anticipate initiating any measurement and data collection until the 2014 irrigation season since there will only be a sporadic number of boxes in the field. The District will utilize the pilot project meter to test each site. In 2014 and 2015 the District will then measure all installed boxes and start developing quality control procedures, invoicing software and billing software.

The District will need to work with landowners and water users to develop a new rate structure that could be tested in 2015 and potentially be ready for implementation in 2016.

TABLE 1

RD108 Initial Cost Estimate for Measurement Program

	2013 qty	2013 $$$	2014 qty	2014 $$$	2015 qty	2015 $$$	2016 qty	2016 $$$	Total Expenses per category	Cost per Box
Item/Cost per box										
weir box $600	160.0	$ 96,000	180	$ 108,000	180	$ 108,000	80	$ 48,000	$ 360,000	$ 600
Box Ext. $100 on 25%	40.0	$ 4,000	45	$ 4,500	45	$ 4,500	20	$ 2,000	$ 15,000	$ 25
grout $65	120.0	$ 7,800		$ 8,775		$ 8,775		$ 3,900	$ 29,250	$ 49
1 1/2 tons crush rock $125	1000.0	$ 20,000		$ 22,500		$ 22,500		$ 10,000	$ 75,000	$ 125
meter plate $50	160.0	$ 8,000		$ 9,000		$ 9,000		$ 4,000	$ 30,000	$ 50
1/4" anchor bolts $1.50 x 4	800.0	$ 1,200		$ 1,350		$ 1,350		$ 600	$ 4,500	$ 8
pipe replacement $1,000	52.8	$ 52,800		$ 59,400		$ 59,400		$ 26,400	$ 198,000	$ 330
gate replacement $1,500	26.7	$ 40,000		$ 45,000		$ 45,000		$ 20,000	$ 150,000	$ 250
excavator	1.0	$ 35,000		$ 35,000		$ 35,000		$ 11,667	$ 116,667	$ 194
flat bed dump truck	1.0	$ 10,000		$ 10,000		$ 10,000		$ 3,333	$ 33,333	$ 56
labor 1 $50,00	1.0	$ 50,000		$ 52,500		$ 55,125		$ 17,500	$ 175,125	$ 292
labor 2 $50,000	1.0	$ 50,000		$ 52,500		$ 55,125		$ 17,500	$ 175,125	$ 292
labor 3 $60,000	1.0	$ 60,000		$ 63,000		$ 66,150		$ 21,000	$ 210,150	$ 350
fuel		$ 40,000		$ 40,800		$ 41,616		$ 13,600	$ 136,016	$ 227
pickup and misc. tools		$ 27,000		$ 2,000		$ 2,000		$ 667	$ 31,667	$ 53
Construction Annual Total		**$ 501,800**		**$ 514,325**		**$ 523,541**		**$ 200,167**	**$ 1,739,833**	**$ 2,900**
Portable Measurement Device $30,000			2	$ 60,000	2	$ 60,000	1	$ 30,000	$ 150,000	$ 250
Data Quality Control	Initial	$ 40,000	Refine	$ 20,000	Refine	$ 10,000			$ 70,000	$ 117
Invoicing			Initial	$ 50,000	Refine	$ 10,000			$ 60,000	$ 100
Accounting			Initial	$ 30,000	Refine	$ 30,000	Refine	$ 10,000	$ 70,000	$ 117
Data/Metering Subtotal		**$ 40,000**		**$ 160,000**		**$ 110,000**		**$ 40,000**	**$ 350,000**	**$ 583**
Program Annual Total		**$ 541,800**		**$ 674,325**		**$ 633,541**		**$ 240,167**		
Total Program Costs									**$ 2,089,833**	**$ 3,483**

Budget and Schedule

The implementation schedule and budget is subject to passing a Proposition 218 election. California law requires voter approval for special districts and public agencies to increase revenue collection. The Board decided to hold a Prop 218 election in March 2013 to collect revenue to fund installation of the weir boxes on each turnout to enable measurement. There will need to be another Proposition 218 election in 2015 to authorize a new water rate structure that is based in part on volume of water delivered.

Budget

The Board decided at its November 2012 meeting that the additional capital costs for the measurement program should be borne by the landowner as improvements to the land and as a condition of service to receive water from the District. Table 1 shows the full capital cost to convert the District's delivery system to enable billing its customers in part on the volume of water delivered.

The cost of installing the infrastructure required for measurement is $2,900 per weir box. Each landowner will pay the $2,900 installation costs for each turnout that delivers water to his field.

The software and data management costs total $350,000 also shown in Table 1. This cost will be divided among the landowners and invoiced on a per acre basis because it is a shared program expense independent of the number of weir boxes installed. The per acre charge is $7.

Revenue Collection

The Board chose to collect the entire program capital cost of approximately $2,100,000 over the three-year installation period beginning in Fall 2013. Landowners will be invoiced 1/3 of his estimated project cost in Fall 2013, Fall 2014 and the actual remaining costs in 2015.

Schedule

Timeline for Implementation of SB X7-7 Measurement and Volumetric Pricing

WINTER 2013	Prop 218 election to approve additional revenue for measurement infrastructure and software.
YEAR 2013	Begin installation of weir boxes on field delivery turnouts. Install 160 boxes.
YEAR 2014	Installation of weir boxes on field delivery turnouts. Install 180 boxes.
YEAR 2014	Initiate a landowner committee to develop and provide recommendations on a new water rate structure that includes billing in part on the volume of water delivered.
WINTER 2014	Develop a measurement database and billing software including data quality control procedures.
SPRING/SUMMER 2014	Start collecting measurement data on the fields with boxes.
YEAR 2015	Installation of weir boxes on field delivery turnouts. Install 180 boxes.
YEAR 2015	Continue to develop measurement database and billing software including data quality control procedures.
WINTER 2015	Prop 218 election to adopt a new water rate structure based in part on volume of water delivered.
SPRING/SUMMER 2015	Continue to collect measurement data on the fields with boxes.
WINTER 2016	Finish installation of remaining 80 weir boxes on field delivery turnouts.
SPRING/SUMMER 2016	***FULL IMPLEMENTATION*** of measurement program and billing structure in accordance with the State Regulation.

Reclamation District 1004

Reclamation District 1004
Proposed Water Measurement Program

Purpose

This document describes measurement, pricing, and billing practices within Reclamation District 1004 (RD 1004 or District) in accordance with the Bureau of Reclamation's (Reclamation's) *Regional Criteria for Evaluating Water Management Plans for The Sacramento River Contractors*.

Background

As identified in the *Sacramento River Basinwide Water Management Plan* (California Department of Water Resources, 2003), water measurement is considered to be a fully implemented water conservation measure within RD 1004. The District's diversions from the Sacramento River and Butte Creek are measured. Flows in canals and laterals are also measured at intermediate points, such as road culverts. Meters have been installed on most of the lift pumps that make up the District's recirculation system. In addition, flow meters were installed on all of RD 1004's customer turnouts, and volumetric pricing has been in place since 1994.

Current Measurement Practices

Table 1 summarizes the District's measurement devices.

TABLE 1
Summary of Measurement Devices

Measurement Type	Number	Estimated Accuracy[a]	Reading Frequency	Maintenance Frequency
Sacramento River Diversions				
Propeller Meters	5	±4%	Biweekly by District Monthly by Reclamation	Annually or as needed
Sontek Flow Meters	4	±4%		Annually or as needed
Butte Creek Diversions				
Mace Flow Meters	4	±3%	Biweekly	Annually or as needed
Canal/Laterals				
Mace Flow Meters	4	±3%	Biweekly	Annually or as needed
Recirculation Pumps				
Mace Flow Meters	4	±3%	Biweekly	Annually or as needed
Customer Delivery/Turnouts				
Propeller Meters	127	±4%	Approximately every 2 days	Annually or as needed

[a] Estimated accuracy is based on information stated by the manufacturer for devices properly installed and maintained.

River Diversions

The District's diversions from the Sacramento River are measured using flow meters installed and maintained by Reclamation staff. These meters provide both instantaneous flow rate and volumetric data. The meters are read and data recorded at least monthly by Reclamation staff. Maintenance and calibration of these meters are performed by Reclamation in accordance with their standard operating procedures.

Diversions from Butte Creek are measured using flow meters installed and maintained by the District. The meters are read and data recorded at least monthly by District staff. Maintenance and calibration of these meters are performed by the District in accordance with the manufactures' specifications and recommendations.

Lateral Measurement

Flows in canals and laterals are measured at intermediate points, such as road culverts, with flow meters equipped with totalizers. Meters have also been installed on most of the lift pumps that make up the District's recirculation system. The meters are read and data recorded at least monthly by District staff. Maintenance and calibration of these meters are performed by the District in accordance with the manufactures' specifications and recommendations.

Turnout or Field-level Measurement

Flow meters have been installed on all of RD 1004's customer turnouts since 1994. These meters are read and cleaned, and data are recorded approximately every 2 days while deliveries are being made. District staff compile the data and bill customers for the quantity of water delivered. District staff maintain and calibrate meters in accordance with the manufactures' specifications and recommendations.

Pricing and Billing

The District's customers are subject to two charges each year: a standby charge and a water charge. The standby charge is a per-acre charge and applicable to all lands within the District's boundaries. Those who order water are also charged for the volume of water delivered. Water users or customers apply for water in March prior to the beginning of the irrigation season. Water orders identify the field acreage and crop to be irrigated. Copies of the 2013 water order, a sample bill, and the District's Rules and Regulations are attached.

References

Bureau of Reclamation (Reclamation). 2004. *Regional Criteria for Evaluating Water Management Plans for The Sacramento River Contractors*.

California Department of Water Resources. 2003. *Sacramento River Basinwide Water Management Plan*. January.

RD 1004 Attachment

The Undersigned Landowner and Tenant hereby apply to **Reclamation District 1004** (the District) for water on lands hereinafter described, subject to, under and pursuant to, the latest rules and regulations adopted by the Trustees of the District. In consideration of the water and other rights provided by the District, the undersigned Tenant agrees to pay the charges so fixed by the Trustees in accordance with the rules and regulations prescribed for the District. In the event the undersigned Tenant fails or is unable to pay to the District the prescribed charges due for whatever reason including the commencement of a case under Title 11 of the United States code, the landowner absolutely and unconditionally guarantees and promises to pay to the District those charges plus all penalties, interest and collection costs (including attorney fees and costs, if any) then owing. The Landowner's liability for payment of the water charges shall be open and continuous for so long as water is provided to the lands described hereinafter. The Landowner's liability for payment shall arise immediately upon the Tenant's failure or inability to pay the charges owing to the District when those charges are due; the Landowner's liability is not contingent upon receiving notice from the District or any other act of the District. Any and all person (s) responsible for causing the District not to have enough Non-Excess, and Eligible Land shall be jointly and severally responsible for the additional costs of the "Full Cost Water" plus any penalties, interest and related costs. The obligation to pay for "Full Cost Water", penalties, interest and related costs shall be that of the landowner, even if caused by a tenant, unless the tenant has satisfied this obligation in full. In the event there are multiple landowners "properties" with Excess, Non-Eligible Land, the obligation to pay shall be prorated among them on the basis of the number of acre feet of water delivered to the Excess, Non-Eligible Land by the District during the year (s) involved. This obligation shall attach to the property and in inure to the detriment of any subsequent landowner. It is enforceable as a lien against the property.

Field No.	Crop	Acres	Unit Duty	Price/unit	Deposit	Amount Due
	Rice		6.0	11.25	67.50	
	Rice		6.0	11.25	67.50	
	Rice		6.0	11.25	67.50	
	Duck/Habitat		2.5	11.25	28.13	
	Other		3.5	11.25	39.38	

The Board of Trustees reserves the right to increase these fees, when necessary.

It is understood that in the event any water charges that shall become payable to the District by reason of the supply of water to the above-described land, as provided in the rules and regulations of the District, are not paid at the time the charges become due, then the District may refuse the delivery of water to the land until the charges are paid in full by either the landowner or the tenant.

Delivery of water cannot be made until after this agreement, all RRA forms and the required deposits are returned to **Reclamation District 1004 office at 317 4th Street, Colusa, CA 95932**, and until payment is made for all water previously delivered, including penalties and interest and the District's costs of collection (which shall include attorney's fees and costs). **Phone # 530-458-7459**

The Tenant and Landowner agree to pay, upon demand, all of the District's costs and expenses, including attorney's fees and legal expenses, incurred in connection with the enforcement of the obligations set forth in this agreement.

In the event Federal and/or State law requires the District to shut down its pumping facilities during any part of the irrigation season, the District will be held harmless for any loss to landowner or tenant resulting from adherence to Federal and/or State law as required.

Water Bill Sent To: Date:_____

_____ _____
Name (print) Landowner (print)

_____ _____
Address Signature of Landowner

_____ _____
City, State ZIP Signature of Tenant

_____
Telephone Number DEP_____ RRA_____

08/05/2013

Reclamation District No. 1004
317 4th Street
Colusa, CA 95932

Water Use Statement

Barale Ranch
P. O. Box 935
Alamo, Ca
94507

Meter Reading Date: ***07/31/2013***

Field #	*Beginning Meter Reading*	*Current Meter Reading*	*Y-T-D Adjustments*	*Total Acre Feet Used*	*Water Charges*	*Water Deposits*	*Deposit Balance or (Amount Owed)*
160	0	198	0	198	$2,227.50	$1,032.37	($1,195.13)
161	0	0	0	0	$0.00	$565.41	$565.41
162	0	0	0	0	$0.00	$880.47	$880.47
			Total Balance:	198	$2,227.50	$2,478.25	$250.75

RULE 27 – DISTRICT CANALS AND FACILITIES ARE NOT FOR RECREATION OR OTHER UNAUTHORIZED USES

The District's canals/laterals and facilities shall be used solely for the purposes of conveying water for use on land, and for conveying drainage water away from the land. The use of District canals/laterals for recreation or other unauthorized purposes is prohibited.

Landowners and water users are urged to prevent the use of District canals/ laterals and their banks, as well as any pumping structures and bridges, for recreation, swimming, play or other unauthorized purposes. These areas present hazards, as the water may be cold, swift and deep. Turbulence in and around culverts and pumping facilities also present Eminent danger.

RULE 28 – COMPLAINTS

All complaints regarding service, lack of water or other unsatisfactory conditions shall be communicated by the landowner or water user directly to the District Manager. It will be the responsibility of the Manager to bring the matter before the Board of Trustees at the next regular board meeting. Decisions may be appealed to the district board at a regular meeting after appropriate opportunity has been provided the Manager to respond.

RULE 29 – AMENDMENT AND OTHER CHANGES

These Rules and Regulations are subject to amendment, modification, repeal or other variation at any time or from time to time at the discretion of the Board of Trustees.

29A. Amendment: In accordance with District rules #4 and #6, customers may not commence taking water until their paperwork is complete, the deposits have been paid and the District has received proper notification and confirmation. These requirements will insure water orders can be filled, diversions match supply and there is no disruption with existing deliveries. Water users north of the California Levee are required to notify the district manager a minimum of twenty-four hours and water users south of the California Levee are required to notify district manager a minimum of forty-eight hours in advance of water demands and curtailments.Water users commencing service prior to the completion of the required paperwork, payment of the water deposit and authorization from the district manager will be subject to the turnout (s) being chained and a $300.00 fine per occurrence.

RULES AND REGULATIONS

GOVERNING THE USE
AND
DISTRIBUTION OF WATER
IN
RECLAMATION DISTRICT NO. 1004
AND FIXING CHARGES PURSUANT TO
SECTION 50911 OF THE CALIFORNIA WATER CODE

Preamble

These Rules and Regulations have been adopted by the Board of Trustees under the authority of the California Water Code, and are part of the law governing this District, and itís landowners and water users. These Rules and Regulations have been adopted to ensure the orderly, efficient, and equitable distribution, use, and conservation of the District's water resources.

Revision Date

~~June 21st~~, 2013

RECLAMATION DISTRICT NO. 1004

BOARD OF TRUSTEES

Jack Baber	Chairman
Edwin Hulbert	Vice Chairman
Jeff Moresco	Trustee
Roger Borrell	Trustee
Frank Rogers	Trustee

DISTRICT EMPLOYEES

Cameron Kelly Boyd	General Manager
Barbara J. Sachs	Office Manager/Sec. to Board of Trustee's
Wayne Montz	Meter Specialist
Steve Crawshaw	Operations Assistant

AFTER HOUR EMERGENCIES

General Manager	(530) 682–0050

DISTRICT OFFICE	DISTRICT SHOP
317 4th Street	7625 Gridley–Colusa Hwy
Colusa, CA 95932	Colusa, CA 95932
Phone: (530) 458–7459	Phone/Fax: (530) 458–4220
Fax: (530) 458–4276	

or charge, when due, or interference with the performance of the duties of any official or employee of the District shall be sufficient cause for shutting off the water from any such offender. Except in cases of emergencies, the Manager will attempt to notify the irrigator in person, by telephone, or in writing prior to shutting off the water supply together with advice as to the violation requiring that termination. Water will not again be furnished until, in the opinion of the Manager, full compliance has been made with all of the requirements hereof.

RULE 26 – NON LIABILITY OF DISTRICT

a. Private laterals. The District will not be liable for any damage of any kind or nature resulting directly or indirectly from any private lateral, or the water flowing therein, or by reason of lack of capacity therein, or for negligent, wasteful or other use or handling of water by the water user therefrom.

b. Deliver of water. Most of the water furnished by the District is pumped, flows, through miles of open ditches, and is subject to pollution, shortages, fluctuation in flow, and interruption in service. District employees shall not and are not authorized to make any agreements binding the District to serve an uninterrupted, constant supply of water, or guaranteeing a certain quality of water. All water furnished by the District will be on the basis of irrigation deliveries; water users putting District water to other uses do so at their own risk and assume all liability for, and agree to hold the District and its Trustees, officers, agents and employees free and harmless from, liability and damages that may occur as a result of defective water quality, water shortages, fluctuation in flow and interruptions in service. The District sells water as a commodity only and not as a guaranteed service. The District will not be liable for defective quality of water, shortage of water, either temporary or permanent, or failure to deliver water.

c. Pumping. Pumping by water users of District water, when permitted by the District Manager, is done at the userís risk, and the District assumes no liability for damages to pumping equipment or other damages resulting from turbulent water, shortage or excess of water, or other causes, including fluctuations in the amount or level of water. It shall be the duty of the landowner or the water user to provide appropriate devices to protect pumps from damage.

users or their agents will not be permitted from the District easement or rights–of–way areas without prior approval of the District Manager.

Plantings and natural growth of vegetation in District easement and rights–of–way, including conveyance and drainage ditches and ditch banks must be maintained. Prior consideration should be given to the future growth of this vegetation, planted or natural, to insure safe unobstructed passage of vehicles and equipment. Encroachment of any plantings and/or natural vegetation within this area may be subject to damage from the cleaning and/or maintenance. Reasonable allowance for vegetative growth in these areas will minimize potential damage or loss of wanted cover from maintenance. It is the responsibility of the landowners or their agents to maintain clear unobstructed passage.

RULE 23 – ABATEMENT OF NUISANCE

No tree or vine trimmings, brush, weeds, grass, tulles, rubbish, swill, garbage, manure, refuse, dead animals, or animal matter from any barnyard, stable, dairy or hog pen, or other materials or substances that will become offensive to the senses or injurious to health or obstruct the flow of water, or result in the scattering of seeds of noxious weeds, plants, or grasses shall be placed or dumped in any canal or drain belonging to the District, or be placed or left so as to roll, slide, flow or be washed or blown into any such canal or drain. Any violation of this rule will subject the offender to prosecution. Also, the offender will be responsible for all costs incurred by the District to rectify the violation. All employees of the District shall promptly report any violation of this rule and the water users of the District are urged to cooperate in its enforcement.

RULE 24 – WATER DELIVERED IN MAIN CANAL

The District will operate the pumping plant or plants of the District and will deliver the water there from to the main canal of the District known as Drumheller Slough and all existing District laterals, from whence it will be required to be diverted or pumped by each irrigator at his own expense; and it is understood that the District shall be required to deliver water for irrigation into said main canal and all existing laterals only, and the charges paid by the respective irrigators for water is for the service of the District in delivering said water into said main canal.

RULE 25 – ENFORCEMENT OF RULES

Failure or refusal of any landowner or water user or their servants or employees to comply with the requirements of any of these Rules and Regulations or violation of any of the provisions hereof or failure to pay any water toll

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ery. District personnel will make every reasonable effort to advise landowners of any observed deficiencies in sufficient time to make necessary repairs. Landowners and or tenants should take note during the season and make repairs of all needed field hardware also including drain pipes and weir boxes in addition to continuous seasonal surveying and repair to perimeter roads that boarder delivery and drainage laterals reducing unnecessary water losses. Refusal to comply therewith will be sufficient cause for refusal to turn water on or continue to provide water deliveries.

RULE 19 – BUILDING DIVERTING GATES AND WEIRS

No openings shall be made or structures placed in any district conveyance or drainage canal until an application in writing has been made to the Board, and permission granted therefore, and without the special permission of the District Manager. All structures in must be maintained in a condition satisfactory to the Manager, and must not be removed or altered without the permission of the Manager.

RULE 20 – RESPONSIBILITY OF THE DISTRICT

The District will not be liable for any damage resulting, directly or indirectly, from the water flowing in or from any private ditch nor for any damage resulting from the flooding of land or other property, by water from fields that are being irrigated. District responsibility will cease absolutely when the water is delivered from the canals or laterals of the District.

RULE 21 – LIABILITY OF IRRIGATORS

Every Water User and landowner shall be jointly and severally responsible to the District for all damage to District works by his neglect, carelessness, or malicious acts, and upon his failure to repair such damage after notification by the Manager or duly authorized assistant thereof, such repairs will be made at his expense by the District.

RULE 22 – ENCROACHMENTS

No encroachments shall be permitted upon District lands, easements or rights–of–way, including conveyance, drain ditches and ditch banks, by installation of any structure or alteration of the District lands, easements or rights–of–way (excluding, in the case of District owned lands, alterations made pursuant to a lease) except upon application to the District for a permit authorizing such installation or other alteration. No construction, permanent or temporary of any nature on District easements or rights–of–way, including conveyance and drainage ditches and ditch banks will be permitted without prior approval of the District Manager and written authorization from the Board of Trustees. Material needed for coffer dams or other projects by the water

RULE 15 – ACCESS TO LAND

The Manager, his assistants and all other servants, agents and employees of the District shall have free access at all times to all canals, ditches, laterals, pipes and meters and, to the extent needed to properly manage District operations or enforce these regulations, to the lands irrigated from same for the purpose of inspection, examination, measurements, surveys, control of water or other necessary purposes of the District, with the right of installation, maintenance, control and regulation of all meters or other measuring devices, gates and turnouts necessary for the proper measurement and distribution of water.

RULE 16 – CONTROL OF REGULATING STRUCTURES

Except in cases of actual emergency or to prevent imminent danger of damage to property or when specifically authorized by the Manager, no person other than the Manager or his assistants shall be authorized or permitted to turn water on or off or to change or interfere with the Districtís head gates or delivery gates or the irrigation systems or with any measuring devices of the irrigation systems. All violations are subject to prosecution under Section 592 of the Penal Code of California.

RULE 17 – CONDITION OF PRIVATE DITCHES

Upon application of a landowner for the delivery of water, it shall be the duty of the District Manager to certify whether or not the applicantsí ditches are in proper condition to receive water. All private ditches shall be properly constructed and maintained so as to carry water without danger of serious breaks or undue seepage. The Manager is required to examine all such ditches and may order them to be cleaned, repaired or reconstructed, as he deems necessary, before water will be turned into them. Refusal to comply therewith will be sufficient cause for refusal to turn on water. Nothing herein shall be construed as an assumption of liability on the part of the District, its Trustees, officers, or employees for any damage occasioned by improper construction, maintenance or use of any private ditch or ditches or other facilities or by reason of permitting the flow of water or the turning of water therein.

RULE 18 – DELIVERY GATES OR TURNOUTS

All delivery gates, turnouts and weirs are under the control of the District. The Districtís employees alone are allowed to open the Districtís delivery gates, and they alone have full authority to close the same as soon as the requisite amount of water for each irrigator has been discharged. Said gates and turnouts may be supplied with locks, the keys to be under control of the Manager. All landowner delivery hardware, including but not limited to, screw gates, weirs and piping are to be in satisfactory condition prior to water deliv-

RULE 1 – CONTROL OF SYSTEM

The operation of the distribution system and irrigation works owned or operated by Reclamation District No. 1004 shall be under the exclusive management and control of the Manager of the District. No other person shall have control of the distribution system and works, except for duly appointed assistants of the Manager or when specifically authorized by resolution of the Board of Trustees of the District.

RULE 2 – EMPLOYEES

Subject to the approval of the Board of Trustees, the Manager shall employee such assistants as may be necessary for the proper operation and maintenance of the District. Employees shall be guided by these Rules and Regulations and by such technical and other instructions and advice as may be given by the District's professional staff for the purpose of carrying out the policies of the Board of Trustees and providing efficient and economical service.

It is the specific duty of each employee to maintain cordial relations with all landowners and water users in the District. Every water user is entitled to equitable, courteous and prompt service. Every employee is charged with the duty and responsibility of cooperating with the water users and the Board in a sincere effort to render as satisfactory service as can be reasonably attained. Every water user has a right to such service, and every employee of the District is enjoined to maintain and execute this policy.

RULE 3 – DISTRIBUTION OF WATER

The District will deliver water into the various irrigation canals, laterals and drains as shown on the map of district facilities approved by the Board of Trustees at such levels as are feasible and practical with the facilities existing at the time these Rules and Regulations are made effective and such other facilities as may thereafter be added by resolution of the Board of Trustees. Except as hereinafter provided in case of a shortage of water or in case of noncompliance with these Rules and Regulations, water will be delivered into the irrigation canals and laterals in sufficient quantity to meet the reasonable needs of all qualified irrigators. The District does not and cannot guarantee water quality, nor the time or quantity of delivery. THIS WATER IS NOT POTABLE AND MUST BE PURIFIED FOR DOMESTIC USE. The District recommends that the water not be used for domestic purposes.

A water user may have temporary circumstances needing a very limited quantity of water not effectively being taken through the current metered points of delivery. The District manager will evaluate this special need

of water on a case–by–case basis with water only being available during the irrigation season, as it is available, and to be used within the District boundaries. The approved quantity of water will be charged a flat fee determined by the District manager. No pump with larger than a three inch intake is to be used. A separate fee will be levied for each District numbered property receiving this water for a period of time not to exceed the current irrigation season. All required paperwork and the full amount of the fee will be submitted to the District office for approval prior to the take of water. The water user is to call the District Manager arranging the time water will begin being taken and similarly, when the take will end. At any time during the irrigation season the District Manager may curtail the taking of water with no refund. Any expense for the movement of the needed water from the point of origin to the point of use is at the sole cost of the party requesting the water. The District purveys water from many sources and may contain varying amounts of foreign matter such as chemicals, insecticides, herbicides and fertilizers. Therefore, the District is not to be used as a potable source of water and should be tested if used on any sensitive vegetation.

RULE 4 – APPLICATIONS FOR WATER

Prior to delivery of water from the irrigation works of the District to anyTract of land each season, an application for water shall be filed with the District Office Manager or authorized assistant on a form provided by the District. All applications shall be signed by and shall show the name(s) and address(es) of the party(ies) (applicant) to be billed for irrigation service, and the landowner, if not he applicant, and such other information as the Manager may require from time to time. Fields with multiple water applicants utilizing a common meter shall submit a lead contact name and phone number when applications are submitted. The lead contact shall provide the District office with information requested during the water season as needed. A field containing multiple water applicants utilizing a common meter or multiple fields with different water applicants utilizing a common meter are to agree on water splits at the time applications are submitted. The agreed splits shall be submitted to the District in writing with the application and signed by all participating parties.

In all instances, the landowner shall be responsible for all charges for water used upon his or her land. When the application for water is made by a tenant, the applicant, and all other tenants making such use of water, shall be jointly and severally liable with the landowner for all water charges.

RULE 13 – MEASUREMENT OF WATER

Except as hereinafter provided for Temporary and Special Purpose deliveries of water, all deliveries will be made only through District approved or District owned and operated meters or outlets. The District Manager will provide meter specifications and installation measures. Meters must be installed to the Districtís specifications at the landownerís expense. Meters will become the property of the District so that they may be properly maintained. Any alteration, modification or removal of said meters shall be done only with the supervision of or by District personnel. No one is to remove or tamper with any metering device at any time. This uniformity will promote reliability of service. If a meter is damaged or becomes inoperable as a result of District operations or District personnel the meter will be replaced by the District at District expense. A meter shall be replaced or repaired at the landownerís expense when the meter is damaged or proven inaccurate as a result of landowner or tenant operations. In the event a landownerís meter is damaged due to the actions of another landowner or landownerís tenant, the District will charge all repairs to that landowner who was responsible for said damage.

Meters will be routinely tested. The scheduling and method will be at the discretion of the District. Should a water user suspect the inaccuracy of a District meter between scheduled testing intervals, the water user may request testing. If the test indicates that the meter is within 5% of accuracy, the water user will pay for the testing. Should the test show that metering is not within 5% of accuracy, the District will pay the cost of testing and make the proper adjustments.

When a meter is discovered as not working as a result of mechanical problems or an obstruction, the amount of water is calculated using the rate of flow in C.F.S. (cubic feet per second) observed the last time the meter was read and working properly. The rate of flow is multiplied by the number of hours it was not working and divided by 12.1, to arrive at the total acre feet used.

RULE 14 – DETERMINATION OF ACREAGE IRRIGATED

The District will periodically survey each tract of land by means of aerial photography or other means provided by the appropriate County Farm Service Agency for the purpose of determining the acreage to be used in calculating all District charges. The acreage will include all irrigable land. If any such survey shows a change in the acreage, the effect thereof will be included in all subsequent bills.

the distribution of the available water supply during the period of the shortage. In the event of temporary local or similar shortages the District Manager is authorized to place in effect such variations in service, as, in his judgment the occasion requires.

RULE 11– INTERRUPTION OF WATER SERVICE

The District may temporarily discontinue or reduce the amount of water to be furnished to the Water User for the purpose of investigation, inspection, maintenance, repair or replacement of any District facilities. The District may also temporarily discontinue or reduce water deliveries for vegetation abatement measurements or to the extent required by any environmental regulation that may be imposed upon the District for protection of fish or other environmental concerns. So far as feasible, the District shall give the water user due notice, in advance, of such temporary discontinuance or reduction, except in case of emergency an effort shall be made to notify the water user as soon as possible. In no event shall any liability accrue against the District or any of its officers, agents, or employees, for any damage, direct or indirect, arising from such temporary discontinuance or reduction of water deliveries.

RULE 12 – WASTE OF WATER

Any water user who deliberately, carelessly or otherwise wastes water or who uses an unreasonable amount of water to irrigate properly, will be refused the use of water until such conditions are remedied or will have his use curtailed by the amount of waste, as the District Manager may determine.

The District reserves the right to refuse delivery of water to any lands when it appears to the satisfaction of the District Manager that its proposed use or method of use would require such excessive quantities of water as would constitute waste.

The District spill policy is as follows:
36” Riser not to exceed 1” spill
30” Riser not to exceed 1 ¼” spill
24” Riser not to exceed 1 ½” spill
18” Riser not to exceed 1 ¾” spill

All return flow from use of district water shall be the property of the District when it reaches a drain or a canal maintained by the District. No drain water shall flow from one entity field into another entity field without first passing through a District approved metering structure. In water short years the District Manager may preapprove water conservation techniques on a case by case basis requiring all parties submit a written plan with an agreement signed by all participating parties.

RULE 5 – SALE OR TRANSFER OF TITLE TO LANDS

When land affected by a Water User application is sold or title otherwise transferred to another party, the District shall be under no obligation to deliver water to such lands until the Water User Application is assigned to and assumed by the new landowner. Such assignments and assumption agreements shall be on forms provided by the District, executed and completed in a manner satisfactory to the District.

RULE 6 – CONTROL OF WATER

All water diverted by the District and delivered within the boundaries of the District, by means of District canals, laterals, drains, including private drains, is and remains the property of the District and is subject to control, diversion, rediversion, reclamation, reuse, relift, sale and resale, by the District as it sees fit. No landowner or water user within the boundaries of the District acquires any proprietary right to water delivered to him by the District by reason of such use nor does such landowner or consumer acquire any right to resell and/or relift water provided by the District for purposes of irrigating additional land for which no application has been made and District fees and charges paid. If water is used on lands either within or without the District, which water has heretofore been diverted and/or delivered by the District for use on lands within the District, whether or not that person utilizes water by routing it first through a conduit, flowing it across other lands within the District, recapturing it from drains, or otherwise, said use of water will be subject to the rules and regulations of the District, including measurement of all applicable charges of the District for the use of such water. All drainage from District lands remain the property of the District and shall not be restricted, diverted or pumped without the written permission of the District Manager. Any delivery or drainage water restricted, diverted or pumped to non–district properties shall subject the tenant/property owner to a minimum fine of $750 per occurrence. Immediate curtailment of water deliveries will occur to the field (s) of origin until the Manager is satisfied that the conditions are paid to the District Office. Additional associated charges may include and are not limited to the annual costs per acre imposed on similar District properties for operation and maintenance fees and assessments and the cost of Bureau of Reclamation project water and related component inputs or the current cost of water from the Sacramento River Contractors Association, whichever is higher. Per acre charges will be calculated for and encompass the entire property the diversion was made to utilizing Farm Service Agency acreage measurements. Estimates of water usage will be made by District personnel, consistent with the determination of water usage within the District, for purposes of determining acre feet of water delivered. Any commingled water, regardless of origin, with District water will be considered

entirely as District water. The Board of Trustees reserves the right to determine whether any additionalcharges will be imposed.

RULE 7 – CHARGES FOR WATER

The Board shall annually adopt a schedule of rates to be charged by the District for water service prior to the water application date. The total charges for water furnished shall be based on the total estimated cost of operation and maintenance of the pumping plants and delivery system of the District during each season including, but not limited to, the cost of electric power, operating charges, repairs, maintenance, upkeep of pumping plants, incidental expenses of operation and District overhead.

RULE 8 – TIME OF PAYMENT

Payment of the seasonal water charge for the irrigation of each tract of land applied for shall be made prior to delivery of water to the tract, or prior to April 30 whichever is first, or as scheduled by the Board of Trustees, in the form of a deposit based on the acre foot price and unit duty for the particular crop. The acre foot price and unit duty shall be annually adopted by the Board of Trustees.

For special cases, payment of the seasonal charge for water shall be made in such amounts and at such times as the Manager may determine to be necessary in each case so as to insure that all water so delivered is paid for in advance. No water shall be delivered in advance of said deposit. No water shall be served to a parcel of land until all Operation/Administration, custom work charges, fines, delinquent charges including interest, or any other outstanding District obligations have been paid in full. No water shall be delivered until any Federal, State or County documents, required by the District, are accurately completed and submitted to the District office.

Any Federal, State or County documents submitted to the District office deemed to be in error will be correctly resubmitted within sixty (60) days of initial notification. Noncompliance of these terms will subject applicant to fines of $300.00 per document per incident in addition to future water delivery delays. Fine amounts and time demands for documents may be subject to change depending on constraints levied by auditing or enforcing agency.

An additional deposit will be required when the initial deposit has been depleted. The amount of the additional deposit or partial deposit shall be determined by the District Manager. For any additional deposit or any balance due on the account payment (s) must be paid within 10 days of the date notice is mailed to the water user. In the event, the required payment is not made within the 10 day period, water service will be terminated until such time as the deposit and payment(s).

Any and all person (s) responsible for causing the District not to have enough Non–Excess, Eligible Land shall be jointly and severally responsible for the additional costs of the Full Cost Water plus any penalties, interest and related costs.

The obligation to pay for Full Cost Water, penalties, interest and related cost shall be that of the landowner, even if caused by a tenant, unless the tenant has satisfied this obligation in full.

In the event there are multiple landowner with Excess, Non–Eligible Land, the obligation to pay shall be prorated among them on the basis of the number of acre feet of water the District delivered to the Excess, Non–Eligible Land during the year (s) involved. This obligation shall attach to the property and in inure to the detriment of any subsequent landowner. It is enforceable as a lien against the property and will result in a curtailment of water delivery until paid in full.

RULE 9 – CHARGE FOR UNAUTHORIZED USE OF WATER

Water Users who take water without prior application, deposit, notification, or authority from the District will incur a minimum charge of $300.00, per occurrence, reimbursing the District for extraordinary expenses caused by such action. Unauthorized water service will be discontinued until compliance with these requirements is met. Water users will provide reasonable notification of the need for additional water as well as reasonable notification when turning water down or off. In all cases, non–notification will result in a charge of $300.00 per occurrence no matter how much water the adjustment may involve. Any violations may be cause for an immediate lockdown whereby future water modifications will be by appointment. Similar charges will apply in lift pump applications where time clocks are utilized. Any adjustments of running time in clock applications, adjustments to boards in weirs, adjustments to screw gates or any other District approved conveying apparatus shall be conveyed to the District Manager in advance or the water user will be subject to a $300.00 charge. Fines will be immediately deducted from any water deposit the offender has with the District.

RULE 10 – SHORTAGE OF WATER

Whenever a general shortage of water appears imminent, the Board of Trustees shall so find by resolution duly passed and recorded in its minutes. The resolution shall incorporate special rules and regulations to cover

Meridian Farms Water Company

Meridian Farms Water Company
Proposed Water Measurement Program

Purpose

This document describes measurement, pricing, and billing practices within Meridian Farms Water Company (MFWC or Company), and describes its plan to comply with the provisions of its Settlement Contract and the measurement requirements of the Central Valley Project Improvement Act and the Bureau of Reclamation's (Reclamation's) *Regional Criteria for Evaluating Water Management Plans to The Sacramento River Contractors* (Regional Criteria).

Background

The Company diverts water at three locations along the left bank of the Sacramento River near Meridian, at River Mile (RM) 71.1L, RM 74.8L, and RM 80.0L. The main pump plant is at RM 80.L. The Company also has state-issued water rights to collect and divert water from drains and sloughs within the Company's boundary. The Company uses a system of canals, ditches, and drains to convey water diverted from the Sacramento River as well as other inflow and recirculated tailwater to its customers.

The Company provides water for irrigation purposes to 108 customers at 191 individual field turnouts or farm-gates by gravity. In addition to the gravity turnouts, water for some fields is pumped by the Company using portable diesel pumps; and in a small number of instances, water is pumped by customers using private pumps. The Company's manager also serves as manager for Reclamation District 70, Reclamation District 1660, and the Butte Slough Irrigation District. The Company shares a secretary with Reclamation District 70 and employs one full-time ditch tender and a maintenance man. The ditch tender is responsible for maintaining water levels throughout the Company, as well as starting and stopping deliveries to customers. Deliveries throughout the Company are made on demand with 48-hour notice to the ditch tender when changes in deliveries are required.

Water users or customers are required to apply for water in March prior to the beginning of the irrigation season. Water orders identify the field, crop, type of irrigation (such as, flood, sprinkler, or drip), and number of acres to be irrigated for the upcoming season. The Company charges for water annually on the basis of the crop to be irrigated and number of acres to be planted. Water charges are payable in three installments due April 1, June 1, and October 1. Attached are copies of the Water Toll Payments adopted by the Company for 2013 and Application for Water.

Current Measurement Practices

River Diversions

Diversions from the Sacramento River are measured using meters. The meters at two of the three diversion locations, RM 74.8L and RM 80.0L, are installed and maintained by Reclamation. The meter at the pumping plant at RM 71.1L is owned and maintained by the Company. All of the meters provide both instantaneous flow rate and volumetric data. The meters are read and data recorded at least monthly by Reclamation staff. Maintenance and calibration of these meters are performed by Reclamation in accordance with their standard operating procedures. Company staff has noted that sometimes the culvert or pipe where the meter for the pumping plant at RM 80.0L is installed does not remain full. This condition affects the accuracy of the measured flow at this location.

Lateral Measurement

The Company's ditch tender operates canals and laterals to maintain water levels to assure sufficient head for gravity deliveries. Water levels are monitored at canal head gates as well as at check structures at key locations along the canals. Water levels throughout the system are maintained in accordance with the ditch tenders' experience and knowledge of the system, and the water requirements of crops.

Turnout or Field-level Measurement

All deliveries to individual fields are made by gravity through 191 screw-gates. Delivery rates are set on the basis of water orders, the ditch tenders' experience and knowledge of the system and its demands, and communication with individual customers. In some cases, deliveries are made to fields or a group of fields by Company-owned portable pumps and to a small number of fields by landowner- or operator-owned pumps. Currently, the Company does not measure or record information regarding deliveries to fields. Table 1 identifies the number and type of turnout measurement devices along with an estimated level of volumetric accuracy for each device.

TABLE 1
Summary of Turnout Structures

Measurement Type	Number[a]	Estimated Accuracy	Reading Frequency	Maintenance Frequency
Screw-gates	191	N/A	Daily or when changes are made	Annually or as needed
Company-owned Pumps	4	N/A		Annually or as needed
Private Pumps	14	N/A		
Total	209	N/A		

[a] The number of each type of device will be verified during the inspection and certification process.

Note:
N/A = not applicable

Turnout Measurement Program

To address the measurement requirements of the Regional Criteria and to comply with the provisions of its Settlement Contract, the Company intends to implement a turnout measurement program. The measurement program will include the following:

1. Evaluation of typical operational canal water-level fluctuations
2. Development and implementation of a system and methodology for monitoring changes in canal levels related to turnouts
3. Verification of number, type, and size of gates
4. Acquisition or development of ratings for screw-gates
5. Field verification of accuracy of screw-gate ratings and modification of ratings as appropriate
6. Evaluation of options for measurement of portable pump deliveries. Options include but are not limited to:
    a. Flow meters
    b. Pump capacity and time of use
    c. Pump capacity and energy usage
7. Development of a system for field recording delivery data

8. Development of a database for recording deliveries
9. Development of operation and maintenance (O&M) procedures to assure accurate measurement of deliveries

The Company anticipates it will need to rely on outside consultants, hire additional personnel, and purchase an additional vehicle in order to develop and implement of the measurement program. The initial estimate of the cost to develop and implement the measurement program is approximately $320,000 over the next 5 years. It is estimated that the ongoing annual costs to maintain the program will be approximately $50,000 per year once the program is fully implemented.

The Company proposes to implement the measurement program in phases. The first phase will be to conduct steps 1 through 7 from the list above within one of the systems within the Company. This phased approach will allow evaluation of measurement options and challenges on a limited scale before expanding the program throughout the Company. It is hoped the phased approach will help minimize the overall cost of the program. The program approach and associated costs will be reviewed and revised as the program is developed. Revisions and updates will be included in the annual updates to the Sacramento Valley Regional Water Management Plan.

Pricing and Billing

The Company has two charges: an annual assessment applicable to all lands within the Company and a water charge or toll applicable to lands that request water service. The charge for water service is based on the crop to be planted and the number of acres for which water is requested. The price per acre for each crop is based on an assumed water need for each crop; that is, the water toll for high-water-use crops such as rice is much higher than low-water-use crops such as wheat or safflower. Water orders are due by mid-March, and payments for water charges are due in three installments by April 1, June 1, and August 1.

Any changes to the current pricing structure will require action by the Company's Board of Directors. Once the program has been developed and implemented, the Company will consider changes in its current pricing policy that will incorporate some level of volumetric pricing.

Finance Plan

As identified above, the costs to develop and implement the turnout program are estimated to be approximately $320,000. The Company proposes to develop and implement the program over a 5-year period. Table 2 identifies a schedule of tasks and the estimated annual program costs. To offset the impact of these added costs on the Company and its customers, the Company intends to seek funding through any grants that may be available from either the California Department of Water Resources or Reclamation. Funding availability may affect the timing of the implementation of the program.

TABLE 2
Proposed Schedule of Verification Tasks

Major Tasks	2014	2015	2016	2017	2018
Evaluate canal water level fluctuation	X	X			
Develop and implement system and methodology for monitoring changes in canal levels related to turnouts	X	X	X		
Obtain or develop ratings for screw-gate deliveries	X	X			
Conduct field verification or accuracy of screw-gate ratings and modify ratings as appropriate	X	X	X	X	X
Evaluate options for measurement of portable pump deliveries	X	X	X		

TABLE 2
Proposed Schedule of Verification Tasks

Major Tasks	2014	2015	2016	2017	2018
Conduct measurements to check and verify ratings at approximately 10 to 20 percent of Company turnouts each year	X	X	X	X	X
Develop system and methodology for field recording delivery data	X	X			
Develop O&M procedures to assure continued accuracy of turnout measurement devices		X	X		
Purchase and develop database to incorporate volumetric pricing			X	X	X
Develop and implement volumetric pricing policy				X	X
Hire new staff		X			
Purchase pick-up truck		X			
Initial Estimate of Annual Costs	$35,000	$95,000	$55,000	$85,000	$50,000

As identified above, the Company currently employs three people: a general manger who also manages three other entities, one full-time ditch tender, and a secretary who is also shared with other entities. The estimated costs identified in Table 2 for the development and initial implementation of the proposed measurement program are based on the assumption that a significant amount of the work will be conducted by a third party such as an outside engineer or consultant. However, the implementation of the measurement program will result in additional duties for the Company's existing staff. Reading and recording of deliveries will require additional time and effort by the ditch tender and general manager. Entering delivery data and producing bills for water deliveries will result in additional work for office staff and the manager. These new tasks will likely require the Company to hire at least one additional employee. The ongoing expense to maintain the measurement program, including the cost of an additional employee and vehicle, is estimated to be approximately $50,000 per year.

Additional Water Use Efficiency Improvements

The above has been prepared to address specific requirements of the Central Valley Project Improvement Act and the Regional Criteria. Company staff has identified additional improvements that they believe would provide equal or greater benefits to overall water use efficiency within the Company. These include the following:

- Update its existing outdated SCADA system
- Expand the SCADA to include water-level monitoring at key locations

These SCADA system improvements would allow Company staff to better operate its delivery system by monitoring and coordinating river diversions and canal operations. Because of the costs associated with developing and implementing the turnout measurement program described above and the Company's limited resources, any improvements to the SCADA system will be dependent on outside funding sources.

Reference

Bureau of Reclamation (Reclamation). 2004. *Regional Criteria for Evaluating Water Management Plans for The Sacramento River Contractors*.

MFWC Attachment

WATER TOLL PAYMENTS

Adopted by the Board of Directors April 9, 2013

Crop	Price per Acre
Services below are payable in three installments by April 1, June 1 and August 1.	
Walnut	$60.00
Rice	$120.00
Sunflower and Strawberries	$60.00
Tomato	$60.00
Onion	$70.00
Milo	$64.00
Cotton	$82.00
Corn	$80.00
Alfalfa, Grass Hay & Pasture	$90.00
Beans	$40.00
Wheat, Safflower, Winter beans, Oats, Vetch & Peas	$20.00
Prunes, Persimmons, Chestnuts & Orchards	$60.00
Vineseed, Millet & Truck Crop	$70.00
Vegetable Seed	$38.00
Non-irrigated: Wheat, Sunflower, Safflower, Winter Beans, Oats, Vetch and Peas	$14.00
Services below are payable at time of service	
Maintenance Flood (measured)	$20.00/AC-FT
Pre and/or Post Irrigation Flood	$20.00

Meridian Farms Water Company rules require a mandatory <u>48-hour notice</u> be given to your ditch-tender, Gary Hall, before water is needed. Please call (530) 682-2998.
Thank you!

APPLICATION FOR WATER

All demands for water must be made in writing at the beginning of the water year using this form. When requesting water please contact you Ditch tender Gary Hall 530-682-2998. Please give him at least a 48 hour notice before you need water.

Under no circumstances will water be delivered to water users until the first payment installment is made and the subject application for water is delivered.

Applicant's Name: ____

Business Name: ____

Landowners Name: ____

Billing Address: ____________________________**City:**________________ **Zip:** _____________

Home #: ___________________**Cell:**___________________ **Email:** _______________________

Field No. (MFWC #)	Acres Planted	Crop	Irrigation Method (Circle One)
_____________	_________	________________	Flood/ Furrow/ Sprinkle/ Drip/ Other____
_____________	_________	________________	Flood/ Furrow/ Sprinkle/ Drip/ Other____
_____________	_________	________________	Flood/ Furrow/ Sprinkle/ Drip/ Other____
_____________	_________	________________	Flood/ Furrow/ Sprinkle/ Drip/ Other____
_____________	_________	________________	Flood/ Furrow/ Sprinkle/ Drip/ Other____
_____________	_________	________________	Flood/ Furrow/ Sprinkle/ Drip/ Other____
_____________	_________	________________	Flood/ Furrow/ Sprinkle/ Drip/ Other____
_____________	_________	________________	Flood/ Furrow/ Sprinkle/ Drip/ Other____

Total Acres: _________

Sutter Mutual Water Company

Sutter Mutual Water Company

SBx7-7 Water Measurement Compliance Program

Prepared By:

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February 2013

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Sutter Mutual Water Company

SBx7-7 Water Measurement Compliance Program

PURPOSE

This SBx7-7 Water Measurement Compliance Program (Program) has been developed by the Sutter Mutual Water Company (Company) to comply with, the requirements of Water Code Section 10608.48 (WC §10608.48) and the Agricultural Water Measurement Regulation, CCR §597. The Program will become a component of the Company's Agricultural Water Management Plan. Specifically, the Program outlines how the Company has or intends to address the Efficient Water Management Practices (EWMPs) identified in WC §10608.48.

WC §10608.48(a) states that agricultural water suppliers *"shall implement efficient water management practices pursuant to subdivisions (b) and (c)."* Subdivision (b) identifies the following two *"critical efficient water management practices:*

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

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

Subdivision (c) identifies several "additional" EWMPs that are to be implemented by agricultural water suppliers *"if the measures are locally cost effective and technically feasible."* Both the Critical and Additional EWMPs are discussed below.

CRITICAL EFFICIENT WATER MANAGEMENT PRACTICES

California Code of Regulations (CCR) §597, approved on July 11, 2012, defines how agriculture suppliers comply with WC § 10608.48(b)(1). The Company currently measures its deliveries to all customers and believes it is in compliance with the provisions of Section 10608.48(b)(1) and the measurement accuracy provisions of CCR §597. The Company's water delivery measurements are described in the 2006 Sacramento Valley Regional Water Management Plan (RWMP) and its 2009 and 2010/2011 updates, which have been prepared in accordance with the United States Bureau of Reclamation's (USBR) Regional Criteria. The Company intends to meet the measurement certification requirements of CCR §597 as described below.

A. Water Delivery Measurement

As described in RWMP and 2010/2011 Plan Update, the Company's diversions from the Sacramento River are currently measured using flow meters and pump flow charts. Flows in laterals are measured at the lateral headgates based on headgate position and differential head pressure. Drain lift pump flows are measured using power consumption records and pump capacity information or pump curves. Drainage leaving the District is measured using a formula developed by the California Department of Water Resources (DWR) for the main drainage discharge pump station.

Deliveries to fields within the Company are made through three general types of devices, rated gates, over pour checks, and undershot checks. Currently, the Company measures and records water deliveries to fields at each turnout. For rated gate turnouts, the gate opening and water levels on both the upstream and downstream side of the gate are measured and recorded together with the date and time of the readings. Flow rates are determined from tables developed by the gate manufacturer and are also recorded. Readings at each turnout are typically made twice daily; however, additional readings are made when deliveries are first started and when conditions within the canals are fluctuating or changes in deliveries are made. Similar measurements are made for undershot checks; the opening at the bottom of the check is set or measured, the differential head pressure is determined by measuring the water levels on either side of the check and the flow rates are read from tables developed from suppressed orifice flow equations. Over pour checks are used mainly to maintain water levels in laterals and delivery canals; however, in some cases they are used for turnout deliveries. These devices are limited to locations where there is sufficient fall over the check to allow for accurate measurement. In these locations, deliveries are measured using the ITRC Weir Stick which allows the flow rate to be calculated based on the width of the check structure and the reading on the weir stick. As with the other two devices readings are made and recoded twice per day or more often if warranted. For all turnouts the volume delivered is calculated based on the flow rate data recorded for each site and time of delivery.

Table 1 below identifies the number and type of turnout measurement devices along with an estimated level of volumetric accuracy for each device.

Table 1 – Summary of Turnout Structures

Measurement Type	Number[1]	Estimated Accuracy	Reading Frequency	Maintenance Frequency
Rated Gate	357	±6% to ±12%	Bi-Daily or as needed	Annual / as needed
Over Pour Check	14	±6% to ±12%	Bi-Daily or as needed	Annual / as needed
Undershot Check	95	±6% to ±12%	Bi-Daily or as needed	Annual / as needed
Total	466			

[1] The number of each type of device will be verified during the inspection and certification process.

1. Certification Program

The Company intends to certify that the existing measurement devices meet the accuracy requirements for existing measurement devices using field inspections and analysis as described in CCR §597.4(b)(3). The initial certification process will include determining volumetric accuracy of each type of device under standard conditions, development of protocols to confirm each of the existing devices are installed and maintained to the manufacturer's recommendations, design specifications, or industry recognized standards. All field inspections will be conducted by individuals trained in the use of the field inspection techniques and will be documented in a report approved by an engineer. In addition to the field inspections, current operation and maintenance practices will be reviewed to assure they meet best professional practices. A summary of the operation and maintenance practices, together with any recommendations for changes, will be included in the report approved by the engineer. The initial estimate of the cost to develop and implement the certification program and to prepare the report required pursuant to CCR §597 is $190,000. The cost estimate may be revised as the certification program developed and refined. The Company intends to conduct the certification program over a three year period. Table 2 below provides the anticipated schedule for implementation.

2. Finance Plan

As identified above, the costs to certify the accuracy of the Company's existing turnout measurements and to comply with the requirements of SBx7-7 are estimated to be approximately $190,000. The Company proposes to conduct the Program over a three year period. Table 2 below identifies the estimated annual Program costs. In order to offset the impact of these added costs on the Company and its customers, the Company intends to seek funding though any grants that may be available from either the DWR or the USBR.

Table 2 – Schedule of Certification Tasks

Task	2013	2014	2015
Development of Inspection Protocols, Review of O&M Practices and Procedures	X		
Field Inspections, Testing, and Quality Control	X	X	X
Document Results and Preparation of Report by Engineer			X
Initial Estimate of Annual Costs	$90,000	$40,000	$60,000

3. Corrective Action Plan

As identified above, the Company believes its existing measurement devices meet the accuracy requirements of CCR §597. A plan for corrective action will be developed following completion of the certification program if it is determined that the existing measurement devices or practices do not meet the accuracy requirements of the regulation.

B. Pricing Structure

Prior to 2003, the Company charged customers for the volume of water delivered using the existing devices and methods described above. Beginning in 2003, the Company's Board changed the pricing policy to charge users based on acreage and duties for various crop types. The duties are based on generally recognized quantities of water required for each crop type, e.g. the duty for crops with higher water demands are greater than those with lower demands. Although the pricing policy changed, the Company has continued to measure and record deliveries at each turnout.

Once the certification plan described under Critical EWMP #1 has been completed, the Company's Board will consider and develop an appropriate pricing policy based in part on the measured volume delivered to customers in accordance with Water Code Section 10608.48(b)(2).

The results of the certification program, including the report approved by an engineer as required under CCR §594.4, together with any necessary corrective actions, and a summary the actual costs to implement the Program will be included with the Company's next update to the AWMP. Changes to the Company's pricing structure will also be included in the AWMP update.

ADDITIONAL EFFICIENT WATER MANAGEMENT PRACTICES

In addition to the critical EWMPs discussed above, Water Code § 10608.48(c) identifies additional EWMPs which are to be implemented if the measures are locally cost effective and technically feasible. These additional EWMPs are referred to in DWR's AWMP Guidebook as Conditional EWMPs.

The Company has evaluated many of the Conditional EWMPs as part of the 2007 Sacramento Valley Regional Water Management Plan and its updates through addressing the targeted benefits (TBs) and quantifiable objective (QOs). The Company may further address Conditional EWMPs at a future date.

EXHIBIT 1

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. By reference, the agricultural water suppliers reporting agricultural water deliveries measured under this article shall use the reporting format and criteria developed for Water Code §531.

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: Section10608.48, Water Code. Reference: Sections 531.10, 10608.48 (b), 10608.48 (i), 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 §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 §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 §10608.12(a), the Department is not subject to this article.

i) An agricultural water supplier subject to Central Valley Project Improvement Act (CVPIA) (Public Law 102-575) or the Reclamation Reform Act (RRA) of 1982 shall be deemed in compliance with this article if all irrigation water delivered by that water supplier to each customer is delivered through measurement devices that meet the United States Bureau of Reclamation accuracy standards defined in Reclamation's Conservation and Efficiency Criteria Standards of 2008.

Note: Authority cited: Section10608.48, 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 x (measured value – actual value) / 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: Section10608.48, 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 ±12% by volume.

and,

2) A new or replacement measurement device shall be certified to be accurate to within:

   A) ±5% by volume in the laboratory if using a laboratory certification;

   B) ±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 downstream of the point of measurement needed to install, measure, maintain, operate, and monitor a measurement device.

   Or,

   B) The measurement options in §597.3(a) cannot be met, as approved by an engineer, by installing a commercially available measurement device, that is comparable in cost to other measurement devices commonly in use, at each of the downstream individual customer's delivery points because small differentials in water level or large fluctuations in flow rate or velocity occur during the delivery season at those delivery points. When a water measurement device becomes commercially available, that is comparable in cost to other measurement devices commonly in use, and that can meet the measurement options in §597.3(a)(2) at the individual customer's delivery points, an agricultural water supplier shall include in its Agricultural Water Management Plan a schedule, budget and finance plan to measure water at

the individual customer delivery points 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 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 shall self-certify to the Department that it has sought and been denied access from its customers to measure water at those customer delivery points.

B) When applicable, the agricultural water supplier shall document that the field or flow condition(s) 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: Section10608.48, 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 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

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: Volume = flow rate x 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: Volume = velocity x cross-section flow area x 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 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, the agricultural water supplier shall provide in its plan, a schedule, budget and finance plan for taking corrective action in three years or less.

Note: Authority cited: Section10608.48, Water Code. Reference: Sections 531.10, 10608.48 i (1), and 10826 Water Code.

EXHIBIT 2

NOTICE OF INTENT TO ADOPT
AGRICULTURAL WATER MANAGEMENT PLAN

APPEAL-DEMOCRAT

1530 Ellis Lake Drive, Marysville, CA 95901
(530) 749-4700

This space is for the County Clerk's filing stamp.

Affidavit of Publication

(2015.5 C.C.P)

STATE OF CALIFORNIA,

Counties of Yuba and Sutter

Sutter Mutual Water Company

Notice of Availability

I am not a party to, nor interested in the above entitled matter. I am the principal clerk of the printer and publisher of THE APPEAL-DEMOCRAT, a newspaper of general circulation, printed & published in the City of Marysville, County of Yuba, to which Newspaper has been adjudged a newspaper of general circulation by The Superior Court of the County of Yuba, State of California under the date of November 9, 1951, No. 11481, and County of Sutter to which Newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Sutter, State of California under the date of May 17, 1999, Case No. CV PT99-0819 that the notice of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

January 30, February 4, 2013

I declare under penalty of perjury that the foregoing is true and correct.
Executed at Marysville, California

February 4, 2013

Date: _____

Kellee Smith

(Signature)

PROOF OF PUBLICATION

NOTICE OF AVAILABILITY:
AGRICULTURAL WATER MANAGEMENT PLAN

Notice is hereby given that Sutter Mutual Water Company's (SMWC) proposed Agricultural Water Management Plan (AWMP), prepared pursuant to Water Code ÃõÃõ 10820 et seq., the Water Conservation Act of 2009, is now available for public inspection at the Sutter Mutual Water Company Office, 15094 Cranmore Road, Robbins, CA 95676. Public comments on the proposed plan will be received for consideration by the SMWC Board of Directors until February 11, 2013 at the Sutter Mutual Water Company Office, 15094 Cranmore Road, Robbins, CA 95676. SMWC will receive comments regarding the AWMP, and then the Board of Directors will adopt the AWMP as drafted or modified during its regular Board of Directors meeting scheduled for Wednesday, February 13, 2013 at 9:00 a/m at the SMWC Office address and location noted above.

Jan. 30 & Feb. 4, 2013. Ad #00150131

EXHIBIT 3

BOARD RESOLUTION ADOPTING
AGRICULTURAL WATER MANAGEMENT PLAN

SUTTER MUTUAL WATER COMPANY (SMWC)

RESOLUTION NO. SMWC-2013-1

RESOLUTION TO ADOPT THE AGRICULTURAL WATER MANAGEMENT PLAN

WHEREAS, the Legislature has codified the Agricultural Water Management Planning Act (AWMPA), at Water Code sections 10800-10853, thereby requiring certain agricultural water suppliers to prepare and adopt an Agricultural Water Management Plan (AWMP) to achieve the conservation of water;

WHEREAS, the AWMPA defines an "agricultural water supplier" as a water supplier, either publicly or privately owned, providing water to 10,000 or more irrigated acres, excluding recycled water, and requires an agricultural water supplier serving water to at least 25,000 acres to prepare an AWMP;

WHEREAS, an AWMP must contain information regarding an agricultural water supplier's service area, quantity and quality of water supplies, and specific water use efficiency information;

WHEREAS, an agricultural water supplier that is required to submit a water conservation plan to the U.S. Bureau of Reclamation (USBR) pursuant to the Central Valley Project Improvement Act (CVPIA) or Reclamation Reform Act of 1982 (RRA), or both, may submit those plans in satisfaction of the substantive AWMP requirements contained in the AWMPA;

WHEREAS, in 2007, **Sutter Mutual Water Company** and other Sacramento River Settlement Contractors (SRSCs) developed the SRSCs Regional Water Management Plan (RWMP) for submittal to the USBR pursuant to the applicable CVPIA and RRA requirements for water conservation plans;

WHEREAS, in 2009, **Sutter Mutual Water Company** and the SRSCs prepared an update to the RWMP (2009 Update), and in cooperation with the USBR, they most recently prepared the 2010/2011 update to the RWMP (2010/2011 Update);

WHEREAS, the RWMP, the 2009 Update, and the 2010/2011 Update, collectively, contain the requisite information for **Sutter Mutual Water Company's** water conservation plan submittals to the USBR, **Sutter Mutual Water Company** has submitted them to the USBR in

satisfaction of its water conservation plan obligations, and the USBR has accepted these submittals as adequate;

WHEREAS, Sutter Mutual Water Company has prepared its Water Measurement Compliance Program pursuant to Water Code section 10608.48, including a report regarding efficient water management practices; and

WHEREAS, the RWMP, the 2009 Update, the 2010/2011 Update, and the Water Measurement Compliance Program, collectively, contain the requisite information to satisfy the substantive AWMP requirements required under the AWMPA.

NOW, THEREFORE, BE IT RESOLVED by **Sutter Mutual Water Company** Board of Directors as follows:

1. The foregoing recitals and findings, and each of them, are true and correct.

2. The Board hereby adopts the RWMP, the 2009 Update, the 2010/2011 Update, and the Water Measurement Compliance Program, collectively, as **Sutter Mutual Water Company**'s Agricultural Water Management Plan required under the AWMPA.

PASSED AND ADOPTED by unanimous vote of the Board of Directors on **February 13, 2013**.

I HEREBY CERTIFY that the forgoing is a true and correct copy of the resolution of the Board of Directors of **Sutter Mutual Water Company** as duly passed and adopted by said Board on the **13th day of February, 2013**.

President of the Board of Directors

By: _____

Secretary of the Board of Directors

By: _____

Natomas Central Mutual Water Company

Natomas Central Mutual Water Company Water Measurement Program

Purpose

The Natomas Central Mutual Water Company (NCMWC or Company) water measurement program has been developed to demonstrate measurement, pricing, and billing practices within NCMWC in accordance with the Bureau of Reclamation's (Reclamation's) *Regional Criteria for Evaluating Water Management Plans for The Sacramento River Contractors* (Regional Criteria). With the implementation of the water measurement program, water measurement is considered to be fully implemented.

Water Delivery Measurement

Currently, NCMWC's diversions from the Sacramento River are measured using flow meters consisting of propeller, magnetic, and ultra sonic flow meters. Booster and lift pump flows are measured with Doppler flow meters and estimates using pump capacity information. Flow in laterals is measured at the lateral headgate on the basis of headgate position and differential head pressure. Drainage water is not pumped out of the basin during water delivery season, typically the middle of April to the middle of September. When drainage pumping occurs, volumes of water are estimated using pump capacity information.

Deliveries to fields within the Company are made through two general types of devices: rated headgates and weirs. Since 2012, the Company measures and records water deliveries to fields at each turnout. For rated gate turnouts, the gate opening and water levels on both the upstream and downstream side of the gate are measured and recorded together with the date and time of the readings. Flow rates are determined from tables developed by the gate manufacturer and are also recorded. Weir deliveries are measured using the Irrigation Training and Research Center Weir Stick, which allows the flow rate to be calculated on the basis of the width of the check structure and the reading on the weir stick. For all turnouts, the volume delivered is calculated using the flow rate data recorded for each site and time of delivery. Currently, the Company has two more Sontek in-canal flow meters and four more Mace flow meters scheduled for installation in 2014. Table 1 identifies the number and type of turnout measurement devices along with an estimated level of volumetric accuracy for each device.

TABLE 1
Summary of Measurement Devices

Measurement Location/Type	Number	Estimated Accuracy[a]	Reading Frequency	Maintenance Frequency
Sacramento River Diversions				
Propeller meter	2	±6%	Monthly and Daily	Annually or as needed
Mag Meter	7	±1%	Continuous	Annually or as needed
GE Panametric	3	±1%	Continuous	Annually or as needed
Canals and Laterals				Annually or as needed
Sontek Flow Meter	9	±2%	Continuous	Annually or as needed
Recirculation Pumps				
Mace Flow Meter	9	±2%	Continuous	Annually or as needed
GE Panametric	2	±1%	Continuous	Annually or as needed
Sontek Flow Meter	2	±2%	Continuous	Annually or as needed

TABLE 1
Summary of Measurement Devices

Measurement Location/Type	Number	Estimated Accuracy[a]	Reading Frequency	Maintenance Frequency
Customer Turnouts				
Sontek Flow Meter	1	±2%	Continuous	Annually or as needed
Meter Gates	564	±10%	Periodic	Annually or as needed
Weirs	50	±2%	Periodic	Annually or as needed

[a] The number of each type of device will be verified during the inspection and certification process.

Pricing and Billing

In 2012, the NCMWC Board approved a volumetric rate structure, and the Company's billing was changed to reflect this policy. NCMWC has been measuring and recording water deliveries at each headgate since 2012. These data are collected in a paper format and, until recently, the method of processing this information for billing was inefficient. The Company is in the process of implementing storm water accounting software that will allow efficient processing of the data. Completion is expected in fall 2013. Until the Storm project is completed, the volume of water will be determined by an allocation of water based on acreage and crop type. The Company expects to complete deployment of handheld data loggers to collect the daily headgate flow information and flow meters on a majority of pump stations in 2013. Water is billed at an applied rate set by the NCMWC Board annually and is billed three times per year: June, August, and October. A copy of a sample bill is attached.

Reference

Bureau of Reclamation (Reclamation). 2004. *Regional Criteria for Evaluating Water Management Plans for The Sacramento River Contractors*.

NCMWC Attachment

Natomas Central Mutual Water
2601 West Elkhorn Blvd.
Rio Linda, CA 95673
(916) 419-5936
(916) 419-8691 FAX

INVOICE
080213

DATE
8/2/2013

SHAREHOLDER/OWNER:

Account No.	**TERMS: DELINQUENT CHARGES 18% 30 DAYS AFTER DATE OF INVOICE**

Field	Crop	Description	Acres	Ac/Ft	Rate	Amount
XXX	Corn	Water Delivered to Corn Crop	100	85.8	8.10	694.98
					TOTAL	$694.98

Payments/Credits **$0.00** **Balance Due** **$694.98**