Governance Focus of Albuquerque Meeting

Irrigation district managers are facing an increasing number and scope of societal and environmental challenges, in order to fulfill their fundamental responsibility of delivering diverted water to users.

The Theme of the USCID Fall Conference, Emerging Issues in Water Management Governance, is sure to engage managers and practitioners in stimulating discussions regarding irrigation and water management.

A unique program is being developed by Conference General Chair Gerald A. Gibbens, Co-Chairs David J. Gensler and Blair L. Stringam, and the Planning Committee.

New USCID Officers, Board Members

During its annual meeting in April, the USCID Board elected Brian T. Wahlin, WEST Consultants, Inc., as President. Steven C. Macaulay, Macaulay Water Resources, was named Secretary. Wahlin, who previously served as Secretary, succeeds Bryan P. Thoreson. The Board also appointed Randy Hopkins to complete the term of Rhonda Skaggs, who resigned.

In recent balloting, Eduardo Bautista, David E. Bradshaw and Brian T. Wahlin were elected to three-year terms on the USCID Board of Directors. Bautista was elected to his first term; Bradshaw and Wahlin to their second. A Tellers Committee of William A. Price,

Governance Challenges for Comprehensive Groundwater Management

by Steve Macaulay, P.E., Macaulay Water Resources, Davis, California, steve@macaulaywater.com

Editor’s note: An oral summary of this paper was presented during the USCID Conference in Reno, Nevada, during June. The author has added observations from the Conference.

Introduction

The concept of state groundwater legislation in California has been discussed for many years. As background, direct control by state government of surface waters came about through the adoption of the Water Commission Act of 1914. This set in place the current surface water appropriative water system — water users are issued a water right permit for the beneficial use of such water supplies. The legislative deliberations leading to the adoption of the 1914 Act considered whether the state would have permitting and management authority over groundwater extractions, but ultimately was limited to surface water rights.

President’s Message

Earlier this year, I had the honor of being elected President of USCID. While I am still not quite sure how I got elected, be assured that I will take this position very seriously and will do my best to follow in the footsteps of our outgoing President, Bryan Thoreson. I am glad that I was able to spend my first few years on the USCID board with Bryan, as I learned quite a bit from him during his tenure as president. Bryan was always organized and ran quick board meetings (always a plus). In addition, he had excellent and thoughtful ideas, as well as a strong vision for the future of USCID. Bryan implemented member meetings during conferences to facilitate getting feedback from our members.

Recognizing the need to collaborate with other organizations, Bryan Thoreson and Steve Macaulay organized a joint conference with the Groundwater Resources Association of California. Most importantly, he had a strong passion for USCID, and irrigation and drainage in general. I want to thank him for his service. He has set the bar high, and I hope that I can live up to the high standard he set.

Since this is my first President’s Message, I thought it would be good to

(continued on page 23)
Mission Statement

The Mission of USCID is to promote progressive and sustainable irrigation, drainage and flood control practices in support of food and fiber production and public safety, recognizing that sustainability embodies economic, social and environmental goals.

USCID Newsletter and Membership

The USCID Newsletter is published in Winter, Spring and Fall for USCID Members. News items and technical articles of interest to the irrigation community are invited. Membership information is available on the USCID website.

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Membership Directory

The most recent Membership Directory is online in the Members Only section of the USCID website — www.uscid.org. In addition to contact information for each Member, the Directory includes member listings by state and organization, as well as information about USCID and ICID work body memberships.
ICID News and Activities

2015 ICID Meeting Set for Montpellier
The ICID family will gather in Montpellier, France, for the 66th IEC Meeting and 26th European Regional Conference, October 11-16, 2015.

Centered around the theme Innovate to Improve Irrigation Performance, the Conference will include technical sessions, workshops and roundtables, thematic meetings of ICID working groups, an exhibition, technical tours and a networking program.

The European Regional Conference will focus on three topics:
- Drip Irrigation for Water Savings
- Potential for Wastewater Use in Agriculture
- Governance for Groundwater and Surface Water Use in Agriculture

USCID Members are encouraged to attend ICID 2015. It is an excellent opportunity to share technical expertise and meet colleagues from around the world. Early registration closes August 31. For more information, visit http://icid2015.sciencesconf.org/

African Regional Conference
The 4th African Regional Conference on Irrigation and Drainage will take place April 26-28, 2016, in Cairo, Egypt. The theme will be Agricultural Land and Water Management for Sustainability under Climate Variability. The Conference will feature technical sessions, an exhibition and book fair, and a one-day study tour following the Conference.

For more information, go to www.encid.org.eg/arcid/index.htm.

Thailand to Host 2nd World Irrigation Forum
The 2nd World Irrigation Forum will be held November 6-12, 2016, in Chiang Mai, Thailand, in conjunction with the 67th IEC Meeting. ICID organizes the World Water Forum every three years, bringing together all stakeholders involved in irrigation, including policy makers, experts, research institutions, NGOs, private sector companies and farmers.

The Theme for the 2nd World Irrigation Forum is Water Management in a Changing World: Role of Irrigation for Sustainable Food Production.

For more information, go to www.worldirrigationforum.net.

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Governance (continued)
As outlined in a separate paper by Macaulay and Joseph, California’s 2014 Sustainable Groundwater Management Act sets forth a number of requirements and timelines for establishing Groundwater Sustainability Agencies and for eventual development of Groundwater Sustainability Plans. SGMA requirements include: (1) designation of basin priorities (only medium and high priority basins are required to form GSAs and develop GSPs); (2) consideration of groundwater basin boundary adjustments to boundaries that were developed by DWR over the past 30-40 years; and (3) consideration of the necessary components of a GSP (regulations to be developed by DWR). There are many more requirements, but these are critical for local agencies to form GSAs.

SGMA Elements Related to Formation of Groundwater Sustainability Agencies
In the best of all worlds, these three SGMA requirements would be established in DWR regulations long before GSAs are formed. However, the law takes a concurrent rather than linear approach, making it more difficult to form GSAs by the legal timeline while the other requirements are in play. Table 1 below shows the deadline for each requirement in chronological order.

While this appears linear with the establishing of GSAs at the end, the formation of GSAs is expected to be a long and difficult process and will in many cases depend on what will eventually end up in the various DWR regulations. It is largely acknowledged that discussions regarding GSA formation need to get underway immediately. In fact, as of April 2015, dialogue at many levels had been actively underway on this topic. Recognizing the importance of this dialogue, DWR has offered limited no-cost facilitation services to help promote such discussions.

Basin Priorities
GSAs and resulting GSPs are required of all groundwater basins that are of medium or high priority. An early SGMA requirement was to adopt basin priorities. In 2009, a new law went into effect that required DWR to develop the California Statewide Groundwater Elevation Monitoring program. CASGEM was developed to track seasonal and long-term trends in groundwater elevations in California’s groundwater basins. Fortunately, the CASGEM program had developed groundwater basin priorities as of June 2014, and DWR adopted those priorities in January 2015 as the initial SGMA priorities. Figure 1 shows statewide basin priorities.

The 2009 law required that the CASGEM program prioritize each of the groundwater basins using the following factors:
1. Overlying population
2. Projected growth of overlying population
3. Public supply wells
4. Total wells
5. Overlying irrigated acreage
6. Reliance on groundwater as the primary source of water
7. Impacts on the groundwater; including overdraft, subsidence, saline intrusion and other water quality degradation
8. Any other information determined to be relevant by DWR

While SGMA added “including adverse impacts on local habitat and local streamflows” to factor 8 above, this did not change initial basin priorities although it may change such priorities in the future as more information and data is developed on this matter.

DWR’s extensive website on groundwater resources (www.water.ca.gov/groundwater/) includes this description of California’s extensive groundwater basins:

There are 515 alluvial groundwater basins and subbasins in California as defined in DWR’s Bulletin 118. These basins contribute close to 40 percent of the California’s annual water supply in an average year and as much as 45 percent in dry years. During extensive dry or drought years, groundwater can provide close to 60 percent of the water supply. Statewide, approximately 30 million people, or 80 percent of

<table>
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<th>SGMA Requirement</th>
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<tr>
<td>DWR: adopt basin boundary revision regulations (after which applications for boundary adjustments can be submitted)</td>
<td>Jan. 31, 2016</td>
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<tr>
<td>DWR: adopt regulations specifying GSP components</td>
<td>June 1, 2016</td>
</tr>
<tr>
<td>Local agencies: establish GSAs for medium and high priority basins</td>
<td>July 1, 2017</td>
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Table 1. Timelines for Various SGMA Requirements.
Californians live in areas overlying alluvial groundwater basins. Some communities are 100 percent reliant on groundwater.

**Basin Boundary Adjustments**

Current statewide basin boundaries are published in DWR’s Bulletin 118-2003. While the boundaries are established largely based on hydrogeologic factors, they also consider political boundaries. SGMA provides for the possibility of existing boundaries being modified for the purpose of implementation of the law, and DWR is required to adopt regulations for basin boundary revisions by January 31, 2016.

As of July 2015, DWR staff had participated in more than 100 meetings with many specific water interests and groups to hear what they had to say regarding the need to adjust boundaries in their regions in addition to other SGMA issues. Public “listening sessions” were held to get input on basin boundary adjustments, and a Practitioners Advisory Panel had been formed to provide technical and institutional input. A number of concerns have been raised, including the need to reflect boundaries of agencies that make water resource management decisions within their boundaries that do not necessarily match groundwater basin boundaries. It was made clear in many of these meetings that the local agencies managing surface water resources are likely to play important roles in achieving sustainable groundwater management, and that success in meeting sustainable groundwater objectives will require overall sustainable water management.

Another concern raised by local agencies is the interplay among water district boundaries, county boundaries and groundwater basin boundaries. In some cases local agencies have indicated that county boundaries might work best. In other cases, especially where groundwater basin boundaries crossed over county boundaries, there were mixed recommendations depending on various circumstances in different regions. A common concern appeared to be how to handle groundwater use areas that are not within water districts.

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### 10733.2. DEPARTMENT TO ADOPT EMERGENCY REGULATIONS CONCERNING PLAN REVIEW AND IMPLEMENTATION

(a) (1) By June 1, 2016, the department shall adopt regulations for evaluating groundwater sustainability plans, the implementation of groundwater sustainability plans, and coordination agreements pursuant to this chapter.

(2) The regulations shall identify the necessary plan components specified in Sections 10727.2, 10727.4, and 10727.6 and other information that will assist local agencies in developing and implementing groundwater sustainability plans and coordination agreements.

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**Groundwater Sustainability Plan Components**

The specific requirement in SGMA from the California Water Code is reproduced above.

These regulations are intended to identify necessary GSP components and describe how DWR will determine whether the sustainable groundwater management objectives and actions developed by GSAs meet the intent of the law.

**Land Use Control**

It is important to recognize that not all irrigated lands in California are within a water or irrigation district, and that achieving long-term groundwater sustainability may require reduction in groundwater extractions in some basins over time. Decisions on land use in California are made at the local level, with decisions by cities made within municipal boundaries and decisions by county government made for unincorporated areas. SGMA establishes the counties as a default GSA or partner in a GSA, presumably to ensure that land use authority is one of the tools for GSPs.

**Case Studies: Challenges and Initial Efforts in Selected Regions of California**

For almost 20 years, California state government has allowed and encouraged the development of groundwater management plans, and in recent years such plans have included measurable basin management objectives. This has been a voluntary program, with grant funding available to those organizations that wished to develop a plan. In addition, for more than a decade state government has also promoted the development of integrated regional water management, including the development of integrated regional water management plans (IRWMPs).

As described earlier, CASGEM was developed to track seasonal and long-term trends in groundwater elevations in California’s groundwater basins. The law requires collaboration between local monitoring entities and DWR to collect groundwater elevation data.

All of these programs — all largely voluntary for local agencies and water users — have formed important building blocks for statewide sustainable water

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Figure 2. General Location of Case Studies.
management. While voluntary, each program has had major success — in part due to the availability of supporting bond funds, and in part due to the need to develop groundwater management plans, IRWMPs and implement CASGEM in order to get future state funding for water management support.

The four case studies that follow (general locations shown in Figure 2) describe the historic development of groundwater management in each of the subregions, as well as the challenges each face as they seek to develop groundwater sustainability agencies to comply with SGMA.

Sacramento Valley
The floor of the Sacramento Valley is essentially a large alluvial region, with two primary groundwater basins (Tuscan and Tehama formations) divided into a large number of subbasins shown in Figure 3. The figure shows county boundaries in the background. While water district boundaries are not shown, they are a complex mix throughout the Valley.

In meetings with a number of Sacramento Valley representatives, DWR received many comments about the complex institutional relationships that exist throughout the Valley. The least complex is Yuba County on the east side of the Valley, which has political boundaries formed by three rivers. Water leadership is essentially the same as between the Yuba County Water Agency and the Yuba County Board of Supervisors, and water resources are effectively managed within the County boundaries. Several districts elsewhere in the Sacramento Valley (e.g., Glenn-Colusa Irrigation District, Reclamation District 108 and the Tehama Colusa Canal Authority) overlap two or more counties. Such water districts effectively manage their surface water resources — and to some extent groundwater extractions — only within their boundaries and have no authority over adjacent areas that pump groundwater. Some districts also overlap different groundwater subbasins.

Effective management required by SGMA may warrant modification to the groundwater subbasins shown in Figure 1. The Northern California Water Association (a regional water user organization) has suggested that there would be merit in dividing much of the Sacramento Valley along county lines for a variety of reasons including the jurisdiction of the counties for the unmanaged areas.

Kern County
The Central Valley portion of Kern County is extensively irrigated, with water supplies managed by a large number of water and irrigation districts. A map of these districts is shown in Figure 4. The collective boundaries of these districts essentially overly the large groundwater subbasin in this region.

The entire Kern groundwater subbasin is classified as high priority under SGMA, and has a long history of both overdraft and extensive water management. The region has a number of surface water sources including water imported from other regions. Surface water distribution facilities are located throughout the subbasin, each controlled by a different entity with varying and different sources of surface water. The subbasin is highly dependent on groundwater in dry years, when surface water supplies are low.

Most of the districts in Figure 4 have recently formed the Kern Groundwater Authority (KGA) to respond to the challenges brought about by SGMA. The KGA is currently engaging in an open dialogue of how water interests in Kern County should appropriately address the requirements of SGMA.
They recognize that SGMA allows several options for developing SGP within a basin, and the ongoing dialogue is exploring the concept of forming multiple GSAs and either multiple or a single GSP with a number of chapters addressing the implementation plan for each of the KGA member agency areas.

Water agencies in Kern County are historically very engaged in water management, and frequently work together on common issues. They are raising a number of issues related to SGMA compliance, mostly associated with the interplay between GSAs and GSPs and how that relates to current institutional boundaries. The SGMA issues in this region are primarily institutional, but are important to successful attainment of sustainable groundwater management.

**Monterey County**

Figure 5 shows a map of groundwater basins in both Monterey County and Santa Cruz County, along the California coast.

Water agencies in Monterey County have raised several concerns. First, various State agencies involved in water supply and water quality do not provide consistent and often conflicting guidance when implementing State Agency programs. In particular they were concerned about coordination with the State’s salinity and nutrient management regulatory program as it may affect SGMA implementation.

Second, Monterey County has not yet complied with provisions of the CASGEM program, limiting their access to future State bond funds. Recognizing this limitation, they have begun working to provide all necessary information to DWR in order to reach compliance in all of the remaining unmonitored groundwater basins in their area.

A third issue is how to address SGMA requirements for the Carmel River watershed, due to the very complex nature of water rights and groundwater extractions in this small but important watershed. A key issue in that watershed is adverse impacts of pumping on surface water flows.

A fourth issue is a need for a basin boundary modification in the southern portion of the County due to the presence of a physical groundwater divide that is not reflected in current basin boundaries.

A final issue relates to longstanding seawater intrusion, and how that is impacted by groundwater diversions in a nearby adjudicated groundwater basins (adjudicated basins are not subject to SGMA). The concern is that pumping in both the adjudicated and non-adjudicated basins has the potential to further aggravate seawater intrusion, and direct participation by the adjudicated basin in a GSA and subsequent GSP might be desirable.

**Santa Cruz County**

The City of Santa Cruz, County of Santa Cruz, Soquel Creek Water District, Scotts Valley Water District, Pajaro Valley Water Management Agency and others have been working actively for several years on more active engagement in sustainable groundwater management. They have begun active discussions on forming appropriate GSAs, taking into consideration a number of factors including potential groundwater basin boundary adjustments and the interaction between groundwater extractions and surface water resources.

A number of technical concerns have been raised concerning SGMA implementation in Santa Cruz County. There is a concern that there is little scientific basis for three of the basins in the County, and it may make sense to combine them. Due to the dipping of geologic groundwater-bearing formations, a significant amount of pumping in formations east of the Pacific coast is causing impacts to down gradient groundwater basins. In addition, the County of Santa Cruz has documented groundwater basin boundaries as part of their current groundwater management plans, and they do not correspond to current DWR-developed boundaries.

The current low-priority Scotts Valley basin is completely reliant on groundwater, and it may make sense to increase the basin priority in order to allow the basin to develop a GSP. In addition, there is a concern that groundwater pumping in this small, confined basin is impacting flows in the nearby San Lorenzo River. The interaction between groundwater extractions and surface water resources is one of the elements added by SGMA for establishing groundwater basin priorities.

Finally, the agricultural Pajaro Valley overlaps both Santa Cruz and Monterey counties. Basin boundaries, GSAs and
GSPs need to account for this physical fact, particularly since Pajaro Valley Water Management Agency is one of the few organizations that is defined as an exclusive GSA in SGMA.

**More Information from the Conference**

The June 2015 USCID Conference, at which this paper was presented, included a panel discussion of water management institutions in the western states with a focus on groundwater issues. Each state has different legal requirements, and even so there are challenges in water management. For example, the surface water supplies for the downstream senior water rights of the Pershing County Water Conservation District on the Humboldt River in Nevada have been greatly diminished by upstream junior water right holders who pump groundwater. The legal and institutional framework is in place, but it has proven difficult to manage and enforce.

In contrast, the Pima-Maricopa Irrigation Project in Arizona has been very successful in managing its complex water resources, in large part due to relatively new facilities, high-priority water rights, proactive leadership, and the ability to take advantage of water management experience throughout the western states.

The Tulare Irrigation District is one of the water districts in the overdrafted San Joaquin Valley of California that is confronting SGMA implementation challenges. The region began irrigation in the late 1800s and turned to groundwater in the 1920s to supplement surface water supplies. Depth to groundwater has declined steadily since the 1920s, aggravated by declining reliability of surface water supplies in recent decades. They are facing very significant institutional, land use and other challenges in order to achieve sustainable overall water use by the SGMA deadline of 2040.

**Conclusions**

SGMA implementation will require major changes over the long-term in how water agencies and local government in California manage or oversee water supplies. The case studies in this paper, in addition to other presentations and dialogue at the June 2015 conference, showcase a number of complex technical and institutional challenges that will need to be addressed, and reinforce the importance of tailoring water management solutions to complex local needs.

While not specifically addressed in the case studies, a common concern is promoting effective outreach and communication as SGMA implementation goes forward. Efforts at broad local dialogue have begun throughout California, against the backdrop of a fourth consecutive year of drought. By June 2016, the California Department of Water Resources will have adopted a number of regulations required for SGMA implementation, after which local agencies will need to form groundwater sustainability agencies and eventual groundwater sustainability plans.

This paper was written as a companion to other papers on the general topic of California’s 2014 Sustainable Groundwater Management Act that were also addressed as part of the June 2015 USCID Conference in Reno. Contact USCID to receive a copy of the Proceedings.

**Science and Policy Conference to Focus on Groundwater**

The Second International Conference Linking Science and Policy will address the theme, *Toward Sustainable Groundwater in Agriculture*. The Conference will be held June 28-30, 2016, in San Francisco, California. It is sponsored by the Robert M. Hagan Endowed Chair, University of California, Davis.

The three-day international conference will bring together scientists, policy analysts, policy and decision makers, and agricultural and environmental stakeholder groups.

Abstracts will be accepted between September and November 2015. Visit http://ag-groundwater.org for more information.

**USCID 2015 Awards and Scholarship**

Nominations are being accepted for the 2015 USCID Merriam Improved Irrigation Award and the USCID Service to the Profession Award. Nominations are due September 9, 2015.

The USCID Merriam Improved Irrigation Award, endowed by the late John L. Merriam, is given to a Member of USCID who has made meritorious contributions to the advancement, understanding or attainment of the goals and objectives of USCID, ICID and/or furthering the value of flexible irrigation water supply and distribution systems.

The USCID Service to the Profession Award recognizes service to the irrigation, drainage, flood control or water resources management profession by an individual, organization or agency. Nominees need not be USCID Members.

Visit www.uscid.org/awards.html for a list of previous recipients of USSD Awards.

**Scholarship**

Applications for the USCID/Summers Engineering Scholarship are also being accepted. Only USCID Student Members are eligible to apply for the Scholarship, which will be awarded during the USCID Water Management Conference in Albuquerque, November 17-20, 2015. The scholarship recipient will be expected to make a poster presentation during the Conference, and the registration fee and travel expenses to attend the Conference will be paid by USCID.

Applicants should send a 750-word summary of their academic program, a copy of their transcript and a letter of endorsement from their advisor or department head. Applications should be sent by e-mail, no later than October 2, 2015. For more information, visit www.uscid.org/scholar.html.

The Scholarship winner will be notified by October 16, in time to make plans to attend the Albuquerque Conference.
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Reducing Energy Requirements for On-Farm Irrigation Systems — The California Energy Commission’s WET Program

By Charles Burt and Stuart Styles, Irrigation Training and Research Center, California Polytechnic State University, San Luis Obispo, California

Historically, electrical utilities in California have offered financial incentives for the purchase of various irrigation system pieces. However, these financial incentives have not considered how the pieces function together as a package.

For example, an inefficient farm well pump may be replaced by a more efficient one. The practical result has been that the more efficient pump extracts more groundwater but ultimately uses the same annual kW-Hr as before. That is not the case with irrigation district lift pumps, which have a limit on the volume pumped per year.

As another example, a favorite rebate item has been “low-pressure nozzles” for sprinklers. The rebates, however, do not consider that changing sprinkler nozzles has secondary impacts on pump operating points, and unless the pump is also modified there may actually be an increase in annual kW-Hr consumption.

Similarly, drip/micro systems have been subsidized because it is a common perception that these are “low-pressure” systems. Indeed, some people refer to these systems not as drip/micro systems, but as “low-pressure systems.” However, the reality in California is that a typical pump discharge pressure into a drip/micro system — even one using drip tape with 8 psi into the head of the tapes — is about 45 psi.

A More Holistic Approach

The California Energy Commission, in August 2015, will initiate a new program that provides rebates for drip/micro systems that are designed with a more holistic approach. The basic factors that must be included as a package are:

1. The pump discharge pressure must be as low as possible.
2. The irrigation system Distribution Uniformity (measured globally) must be high.
3. The pump must operate at a high efficiency over the expected operational range.
4. A variable frequency drive (VFD) must be incorporated into all systems that will have variable flow or pressure requirements over time. Examples would be wells with variable dynamic pumping levels, irrigation district connections with varying discharge pressures, and irrigation systems with blocks of different sizes.

Rather than simply specifying various pressure regulators, emitters, filters, and other such pieces, the grant program goes right to the bottom line: how all of these components fit together as a system, to require a minimum inlet pressure. Obviously, only certain filter designs and pressure regulation valves will be capable of fitting into a low-pressure design. By specifying a minimum new Distribution Uniformity (DU) as being a global DU, the program does not need to specify details such as allowable pressure losses, specific emitters, and specific pressure regulator performances. The designer will be responsible for providing the documentation of how these fit together for the target DU. Additionally, once in the field, the system will be subject to verification of performance using the Cal Poly ITRC drip/micro evaluation technique. Designers will know exactly how the performance will be verified, and they can, therefore, design accordingly.

The specifications could have included many details regarding pipe pressure rating, pressure relief valves, air vents, riser designs, tubing wall thicknesses, etc. We felt that these specifications were the minimum that would be necessary for verification and for achieving the goals of good energy efficiency.

System Requirements

The preliminary system requirements are provided below:

1. The Distribution Uniformity must be 0.92 or higher (new), calculated using the Cal Poly ITRC design computational procedure that is based upon field (not hose) uniformity. The values used to compute this field (global) uniformity must be provided, and must include:
   a. Flow rate differences of individual emitters due to pressure differences. Even with pressure-compensating (PC) emitters, there is some impact of pressure differences. This must be clearly shown using excellent pressure/discharge graphs, indicating the range in pressures and flows expected across the complete field.
   b. Non-uniformity due to manufacturing variability. The computation must show:
      i. The number of emitters assumed per plant.
      ii. The manufacturer coefficient of variation (cv).
   c. Unequal drainage.
2. Proof of adequate and simple means of flushing tapes/hoses, with necessary hardware, must be provided. Flushing manifolds must be designed to guarantee a minimum tape/hose end flushing velocity of 1.5 ft/sec.
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4. Maximum pressure at outlet of pump (upstream of the filter) must be 30 psi, plus any uphill elevation.
5. The pump must be designed to deliver the low pressure with the required maximum system flow rate, having an impeller/bowl efficiency of better than 80 percent at that point.
6. The pump must have an inverter duty motor, meeting NEMA MG-1 Part 31 Standard. In addition, for motors of 100 HP or greater, the following must be included for vertical
a. An insulated bearing carrier must be installed on the upper bearing (above the thrust bearings).
b. A shaft grounding ring is needed above the bottom guide bearing.

Similar insulated bearing carriers and grounding must be provided for horizontal motors.

7. The pump motor must be supplied by a VFD (variable frequency drive), with the following minimum characteristics. Proof of these specific characteristics must be supplied.
   a. NEMA 3R or equivalent enclosure (in terms of environmental protection).
   b. Electronics exposed to no external air.
   c. True power factor greater than or equal to 0.90.
   d. Cooling guaranteed to protect the VFD in the hottest conditions expected.
   e. The VFD enclosure shaded from the sun, with air circulation between the shading and the enclosure.
   f. Microprocessor-based inverter logic isolated from power circuits.
   g. Buffered Pulse Width Modulated (BPWM) output waveform using 4th generation Insulated Gate Bipolar Transistors (IGBT) technology.
   h. A guaranteed ability to provide continuous output amperage of 15 percent greater than the maximum amperage required by the project for the motor at a specified input voltage.
   i. Resolution of output control frequency (0-70 Hz) of +/- 0.003 Hz.
   j. DC link choke for the DC bus reactor.
   k. Passive filter (line reactor and EMI/RFI filter) on the input side of the controller.
   l. Ability to accept a variation of input voltage of +10 percent to -15 percent (full rated motor voltage and torque must be deliverable with voltage dips down to 10 percent below the nominal AC line voltage).
   m. Ability to support a motor cable length of 100 feet (minimum) or any greater length specified for this application without voltage reflection or other problems.
   n. Temperature rating for 100 percent performance at 50 deg. Celsius ambient.
   o. Must have 3 percent input line reactor on the input between the VFD and motor (if not built-in).
   p. Must be a 6 pulse VFD.
   q. Testing by the manufacturer of the completely assembled package listed above.
   r. Drive efficiency (including all associated filters) of 96.5 percent or better at full speed and full load.
   s. Displacement power factor between 1.0 -.95 lagging at all speeds and loads.
   t. The ability to automatically restart after an overcurrent, overvoltage, undervoltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between reset attempts shall be programmable.
   u. 3-position Hand-Off-Auto (HOA) switch and speed potentiometer. When in “Hand,” the VFD will be manually started, and the speed will be controlled from the speed potentiometer. When in “OFF,” the VFD will be stopped. When in “Auto,” the VFD will start via a signal from an internal PLC, and its speed will be controlled via PLC communications. For units with bypass capability, a 3-position Drive-Off-Bypass switch is required.
   v. The VFD shall have input line fuses standard in the drive enclosure.
   w. The VFD shall be optimized for a 2 kHz carrier (switching) frequency. The carrier frequency shall be adjustable to a maximum of 8 kHz. The carrier frequency shall be adjusted to the maximum frequency that eliminates audible “hums” in the motor and drive.
   x. All EMI and RFI must be contained and controlled to meet IEC 61800-3.
   y. The drive must meet standard IEC 61800-5-1:2007 (2.3 times the line voltage for 1.3 msec) for transient protection.
   z. The VFD shall provide volts per Hertz and “Sensorless Vector” operation. The operating mode shall be “Sensorless Vector” operation.

8. A flow meter with both totalizer and flow rate displays is required, with manufacturer recommended minimum lengths upstream and downstream (existing meter can be used if it has the documented accuracy).

One might notice the extensive details for the VFD. This is required at this point in time because many pump dealers and customers have minimal familiarity with what a good VFD should consist of. As a result, VFDs frequently overheat, are very noisy, are inefficient, are not properly mounted, are undersized, create poor quality power, etc. Excellent VFDs are available, but their proper application in irrigation by pump dealers and irrigation dealers is still in the adolescent stage.
Eighth International Conference, Reno

Tony Sannella, Sage Designs, Inc.

Keith Bellingham, Stevens Water Monitoring Systems; and Steve Knell, Oakdale Irrigation District.

Joe Catanzarite, South San Joaquin Irrigation District.

Daniel Crevier, Axter Colentache Inc.; and Steve Macaulay, Macaulay Water Resources

Rick Roberti, Roberti Ranch; and Jeff Shaw, Stantec Consulting Services, Inc.

David Bradshaw, Imperial Irrigation District, with Roberti Ranch solar panels background.

Sam Schaefer, GEI Consultants, Inc.; and Shaun Minton, Electronic Data Solutions.

Aaron Beutler and Brian Westfall, Keller-Bliesner Engineering; and Alejandro Paolini, Henry Miller Reclamation District.

Brian Wahlin, WEST Consultants, Inc. (center); and Sean Lee and Jae Lee, YOOIL Engineering Co., Ltd.
USCID International Conference Held in Reno

by Samuel W. Schaefer, GEI Consultants, Inc., Santa Barbara, California; and Laura A. Schroeder, Schroeder Law Offices, Portland, Oregon

USCID organized the Eighth International Conference on Irrigation and Drainage in Reno, Nevada, June 2-5, 2015. The Conference theme was Sustainable Basin Water Management — Challenges of Supply and Demand Management at the Basin Scale. The Conference brought together water district staff, agricultural producers, irrigation and drainage specialists, consultants and academics to consider governance, policy, management, financing and technical issues related to regional, sustainable, water management. Laura Schroeder and Sam Schaefer were the co-chairs of a planning committee that included 18 USCID Members. The Conference featured presentations on sustainable basin water management for surface and groundwater supplies to meet demands from several regional perspectives, including the states of Arizona, California, Colorado, Idaho, Nevada and Oregon. Representatives from the Bureau of Reclamation, as well as regional organizations shared their experience concerning water management from the agency and Congressional perspective. Conference participants represented 10 states, as well as Canada, Japan and Korea.

The Conference included a half-day field trip visit of the Desert Research Institute that provided an overview of their research program and tours of their plant water use and climate research.

The Plenary session opened with a presentation by Jason King, Nevada State Engineer, highlighting the Nevada approach to water allocations and discussion of the effects of the recent drought. Manucher Alemi, Policy Advisor for State Integrated Water Resources, presented a keynote address that provided an overview of California’s drought impacts, including a briefing of the new groundwater law. Rich Juricich, Principal Water Resources Engineer, DWR, followed with a presentation outlining the implementation of California’s Groundwater Sustainability Act. In the final presentation of the opening day, Kelly Redman, Desert Research Institute, presented a wealth of information on climate measurement and a timely update on the drought conditions in the Western United States. On Wednesday, the Conference featured a panel discussion on Groundwater Management led by Steve Macauley. The panel discussion lived up to expectations as the panel members Aaron Fukuda, Bennie Hodges, Shane Lindstrom and Laura Schroeder provided excellent summaries of state and regional groundwater management issues, and a lively discussion concerning the pros and cons of different state and agency management approaches.

During lunch on Wednesday, Dan Keppin, Family Farm Alliance, provided an excellent overview of issues faced by western farmers and their role to communicate these issues with Congress. Wednesday’s dinner speaker featured the Honorable Richard Wagner, District Court Judge (retired), Lovelock, Nevada. Judge Wagner provided an

Exhibitors
» Aqua Systems 2000 Inc.
» Axter Coletanche Inc.
» Electronic Data Solutions
» HUESKER
» International Water Screens
» Irrigation Training and Research Center
» Keller-Bliesner Engineering, LLC
» Sage Designs, Inc.
» Sierra Controls, LLC
» SonTek
» Stevens Water Monitoring Systems, Inc.
» YOOL Engineering

Sponsors
» Davids Engineering, Inc.
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» Macauley Water Resources
» MBK Engineers
» Provost & Pritchard Consulting Group

Steve Macauley moderates a Panel Discussion on Groundwater Management. Panelists include (from left) Laura Schroeder, Aaron Fukuda, Bennie Hodges and Shane Lindstrom.
insightful perspective of water right issues on the Humboldt River with his decades of experience acting as the sitting judge for the Humboldt River Decree.


The Conference concluded on Friday with a day-long tour led by Martin Roche that focused on the Little Truckee River and water use in the Sierra Valley. A tour highlight was a visit to the Ranch. Ranch operations include cattle and hay. The hay is irrigated using groundwater, supported by a solar farm to help meet the energy needed.

Complementary to the technical content were the Exhibitors and Conference Sponsors. Thank you to Larry Stephens and Tamara Borden for the coordination and planning they provided to make the Conference a success.

Friday field tour participants.

News of Members

Brad J. Arnold has left GEI Consultants, Inc., to pursue his PhD at the University of California, Davis.

Kenneth Gilmore, Gilmore Equipment Company, has relocated from Oxnard to Chico, California.

William R. Johnston now resides in Montecito, California.

Saleh Taghvaeian is an Assistant Professor and Extension Specialist in the Department of Biosystems and Agricultural Engineering, Oklahoma State University. He has research and extension responsibilities focused on agricultural water management and irrigation engineering.

Dick Tzou now resides in Fresno, California. He previously was affiliated with FAO in Bangkok, Thailand.

Friday field tour participants.
Water Transfers Structured to Fund On-Farm Conservation Improvements

Steven R. Knell, P.E., Oakdale Irrigation District, Oakdale, California (sknell@oakdaleirrigation.com)

Background

History of OID

In 1909, OID was organized under the California Irrigation District Act by a majority of landowners within the district in order to legally acquire and construct irrigation facilities and distribute irrigation water from the Stanislaus River (Figure 1). In 1910 OID and the neighboring South San Joaquin Irrigation District (SSJID) purchased Stanislaus River water rights and some existing conveyance facilities from previous water companies. Both districts continued to expand their operations over the ensuing decades.

![Oakdale Irrigation District](image)

Figure 1. Location of Oakdale Irrigation District

Since their creation, OID and SSJID have constructed dams and reservoirs to regulate surface water storage and deliveries. Most dams were constructed in the 1910s and 1920s, including Goodwin Dam (1913), Rodden Dam (1915) and Melones Dam (1926), which provided 112,500 acre-feet of shared capacity. To provide supplemental water storage for OID and the SSJID, the Tri-Dam Project was created in the 1940s. Sites were approved in 1948 for Donnells Dam and Beardsley Dam on the Middle Fork of the Stanislaus River, and for Tulloch Dam above Goodwin on the main stem of the Stanislaus River. The two districts entered a joint agreement to carry out the proposed project and now jointly own and operate the three storage reservoirs for a combined storage capacity of 230,400 acre-feet.

In the early 1970s, the Bureau of Reclamation replaced the Melones Dam with the larger New Melones Dam and Reservoir. The districts have an operations agreement with Reclamation to utilize the federally owned New Melones Reservoir for the delivery of its senior water rights.

These historical capital investment has led to a stable, plentiful water supply for the district. During the last 50 years, the District has focused its financial resources principally on paying off these capital investments; as a result, the District has invested little in replacement, modernization, automation or rehabilitation of its existing system over the years. That focus changed in 2004.

Abstract

The State of California passed legislation in 2009 entitled Senate Bill (SBx) 7-7. That legislation has since been incorporated in the California Water Code as §10608.48. The purpose of the code section is three-fold:

1. To require irrigation districts to accurately measure water to each farm gate,
2. To require irrigation districts to charge volumetrically for each acre foot delivered,
3. To require irrigation districts to implement a wide array of conservation programs and measures that improve on-farm water use efficiency by its water users.

The program developed and implemented by the State is mandatory. The State imposed program provides no funding for compliance despite the fact that compliance costs will be significant. Oakdale Irrigation District (OID or District) anticipates the unfunded costs to approach $3 million dollars a year to its budget. Additionally, the unfunded cost to growers and farmers in the District will be even greater. As with most government regulations, OID and its water users are left with the task of figuring out how to pay this bill.

OID has been successful in using water transfers to willing buyers to fund its infrastructure improvements since 1999. OID’s investment in infrastructure has totaled over $58 million during that period of time, most of it funded with revenues derived from water transfers. With its success in improving its operational efficiency through water transfer revenues OID began to think of ways to drive the benefits derived from water transfer to the farm level in the hopes of paying for costly on-farm improvements. From that thought OID crafted a voluntary On Farm Conservation Funding Program for the 2015 water year.

The program works as follows: irrigated lands would be idled on March 1 and not receive water again until the following March. The crop’s consumptive use water that would have been applied as part of irrigation would be marketed for sale in a water transfer. The revenues of the marketed water would be returned to the landowner with the following conditions; 20 percent of revenues would be paid as an incentive for participation; 75 percent would be placed on account and available to implement an approved on-farm conservation project; and five percent of the revenue would go to OID for administration and environmental document preparations. The non-consumptive use water that was not marketed would be placed back in upstream reservoirs for uses as needed.

The District Today

Currently, the District maintains over 330 miles of laterals, pipelines, and tunnels, 29 production wells, and 43 reclamation pumps to serve local customers.

In general, the District’s facilities, system operations, political organization, and administration have not changed significantly during the last several decades. Nearly all water supply canals were constructed more than 100 years ago. In recent years, however, the district’s customers, land use, and financial resources have developed in a direction that is influencing the way OID provides services and conducts business.

Oakdale Irrigation District provides pre-1914 water rights to more than 62,000 acres of irrigated farmland located within the northern San Joaquin Valley of California. Initiated in November 2004 and completed in June
2007, OID developed a Water Resources Plan (WRP) as a strategic roadmap for addressing its future infrastructure and modernization needs. Today the District is moving forward with the implementation of a $170 million capital improvement program to meet the multifaceted needs of the District. Those needs as outlined in the WRP include the protection of the District’s water rights; an increase in agricultural water supply reliability during droughts; protection for the local area’s surface and groundwater supplies; along with a roadmap to modernize and rebuild a century old system to meet the needs of its changing customer base. Regional water transfers have been used as the basic funding mechanism to make this all happen.

**Overview of Water Transfers**

**History of Water Transfers at OID**

OID began transferring water in 1999 through two separate contracts; one to Stockton East Water District (SEWD) for their treatment and delivery to the City of Stockton, and one contract to the Bureau of Reclamation. A portion of water under the Bureau contract was for use in a fish study called VAMP (Vernalis Adaptive Management Plan), and the second portion of that contract was for ancillary water to meet dissolved oxygen and salinity objectives at Vernalis as required under the Bureau’s operating permit from the State of California for New Melones Dam and also for miscellaneous fish flow needs.

These two contracts at inception in 1999 had 10 year terms with renewal clauses that effectuated their ending dates in the fall of 2010 for SEWD and in 2011 for the Bureau. In 2009, OID made a water transfer to the San Luis & Delta Mendota Water Authority (SLDMWA) and in 2013 OID made a water transfer to the SLDMWA and the California Department of Water Resources (State Water Contractors).

Over the course of these transfer years, OID moved 575,000 acre-feet of water and generated a revenue stream totaling $49.1 million dollars. On average the aggregate price of water marketed was about $85 per acre foot on these contracts. The cost of water to purchasers ranged from $60 to $250 dollars depending on circumstances, hydrology and need.

**Water Markets Available to OID**

There are three types of water markets OID has been involved with over the years. Each market has a different ability to pay and comes with a different set of politics.

**High End Metropolitan Areas:** These markets come with a high capacity to pay but in-district politics for completing such transactions can be difficult. Water kept locally serving local needs is a common public statement on these types of contracts and is not without merit. However, the benefit in marketing to high-end metropolitan areas is the potential for high returns with the least amount of water being transferred. Despite the desire to keep water local, water agency budgets still have to be met and water transfer revenues are a significant part of the OID’s budget. With that perspective though, balancing the financial needs of the District and the needs of the local community is the driver of discussions at the local level.

**Local/Regional/Municipal Areas:** These markets are only now willing to consider paying the true value of water. For many years, the local and regional areas have relied on a seemingly abundant availability of both surface and groundwater supplies that has now become less than reliable in the San Joaquin Valley. With the implementation of the State’s Groundwater Management Sustainability Act of 2014, Senate Bill x7-7, changes to the arsenic rule, rising nitrate contamination, salt water intrusion and groundwater degradation from years of overdraft, etc., cities in the local and regional markets are only now beginning to see reliability constraints in their future water supplies.

**Agricultural Market Areas:** This local agricultural market’s capacity to pay is simply defined and premised on what makes business sense. This market compares the cost of surface water with the cost of pumping groundwater. In the area east of Oakdale, where agricultural is expanding solely on the reliance of groundwater, that current cost is approximately $80-$100 per acre foot, depending on depth to groundwater. While the market is easy to define, the cost conscientious farmers in the area, despite long term sustainability questions, still have little interest in paying more for surface water if the cost to pump groundwater is less.

Markets on the westside of the San Joaquin Valley, which rely on Central Valley Project water or groundwater if insufficient CVP water available, have a different perspective. Groundwater on the westside can be as deep as 200-400 feet or deeper and is extremely costly to pump compared to CVP water if and when it’s available. This market and the capacity to seek transfer water to reduce groundwater pumping has grown in recent years.

**Environmental Market Areas:** Purchase of water to meet environmental needs was a premise of the original Bureau contract mentioned previously. In two of the latest OID water transactions to the SLDMWA/DWR, water was released on a fish friendly schedule as part of a pulse flow. While not a direct payer for the benefit, the ability be have both water transfers and environmental benefits is a doable option that needs consideration.

**The Water Market End Game**

The end game in water transfers is always to provide the maximum protection to the district’s water rights and to insure reliable, adequate water deliveries to the farming community within the service area of the district before any water is marketed. Meeting that goal may best be met by having equal participation of transferred water in each market area. Politically, this strategy may provide the broadest base of support to a legal challenge to one’s water right in the future.

**Benefit of Water Transfers — Improving Water Use Efficiency**

As outlined in OID’s Water Resources Plan, revenues derived from water transfers were directed at making infrastructure and modernization changes in OID’s water delivery system. Those changes significantly improved OID’s capacity to deliver water more
To clarify the terms used in Figures 2 and 3:

- **Crop CU**: The amount of water consumed solely by the crop.
- **Farm Runoff**: The amount of water that leaves the OID service area in the form of tailwater or runoff.
- **OID Losses**: The amount of operational or carriage water that “spills” out the ends of laterals and canals within the OID conveyance system.
- **Groundwater**: The amount of water that is “net” to the aquifer coming from deep percolation losses on-farm, seepage from OID laterals and drains, etc.

During this 10 year period, OID has been able to reduce its annual water demand by 44,000 acre feet. That reduced demand is quantified as follows:

- The change in Crop CU is attributable to land use changes in the conversion of pastureland to less water intensive crops like almonds and walnuts.
- The change in OID Losses is a direct result of operational improvements through modernization and automation of OID’s main canal delivery system and lateral head-gates and the installation of two regulating reservoirs.
- The change in Farm Runoff is a result of two factors. One being the conversion of pastureland to trees and the installation of drip systems in much of these orchards, reducing or eliminating runoff. The other factor is the enhanced control of water by OID by the modernization of its delivery systems in providing improved farm deliveries at the farm gate. It is difficult to achieve high water use efficiency on-farm if the water deliveries from the irrigation district are inconsistent and lack flexibility in the frequency, rate and delivery of water to the farm. The more efficiently an irrigation district can deliver water to the farm the more efficient the farm can be in the application of that water.
- The change in water going to groundwater is an interesting note. With the addition of automated canal and lateral structures system wide, OID is not having to drain and fill laterals as often between irrigation events. That operational change leaves water ponded in the system more often and hence, we believe, allows more seepage to occur to the aquifer. This is not necessarily a bad thing.

### Bringing Water Transfer Benefits to the Farm Gate

#### Background on Needs for a Program

The State of California passed legislation in 2009 entitled Senate Bill (SBx) 7-7. That legislation has since been incorporated in the California Water Code as §10608.48. The purpose of the code section is three-fold:

1. To require irrigation districts to accurately measure water to each farm gate,
2. To require irrigation districts to charge volumetrically for each acre foot delivered,
3. To require irrigation districts to implement a wide array of conservation programs and measures that improve on-farm water use efficiency by its water users.

This State imposed program is mandatory and provides no State funding for compliance hence putting the cost burden upon agricultural districts and their constituents. These unfunded costs to OID are estimated to add $3 million dollars to the OID budget per year. Depending on conservation practices installed, the cost to the farm gate could be significantly more.

In an effort to meet the financial challenges brought on by SBx7-7, OID recently approved a water rate increase to cover some of the cost of implementing the law. That rate required a doubling of the past rate and the ire of many agricultural water users.

Many of OID farm parcels are ill-equipped to pay for the financial burden these changes bring to their farming operations. OID is a mix of both high value and low value crops. While some of the high value crops can afford to do more, it leaves few options for those farming low value crops to come up the revenues to make conservation improvements.

With the successes OID experienced using water transfer revenues to fund its system improvements, the idea of bringing that same benefit to the farm to improve on-farm irrigation systems emerged. With that as the goal, OID crafted an On-Farm Conservation Funding Program. The framework of that program follows.
Proposed Program (Draft) — On-Farm Conservation Funding and SBx7-7 Compliance Program

Eligibility Criteria
- Participation is VOLUNTARY.
- Open to all parcel sizes.
- Enrollment acreage limited to 2,500 acres per year.
- Program enrollment period from March 1, 2015, to September 30, 2015.
- Participant lands must have irrigated 3 out of the last 4 years.
- Participant lands will be limited to the following water allocations by crop for funding calculation purposes:
  - 4.0 acre feet/acre for pastureland
  - 3.5 acre feet/acre for rice land
  - 2.5 acre feet/acre for corn/oats
  - Crop allocations not listed shall be determined by the Consumptive Use of the crop between the months of March 1 to October 1.
- Participant lands on private pipelines must have ability for positive shut-off to field.
- Ease of verification.
- Participant lands shall not employ any groundwater, surface water or drain water substitution during enrollment in the program.

Approved Water Conservation Practices
- Pipelines that replace open ditches. Includes all associated parts.
- Pipelines that replace old pipelines. Includes all associated parts.
- Laser land leveling with sub-soiling and reseeding.
- Tail-water Recovery or Pump-back systems. Includes pump and electrical.
- Land conversions from high water use crops to lower water use crops.
- Conversion to higher efficiency irrigation systems.
- Fifty percent of Conservation Practice monies to small parcel may be applied to actual costs of lowering, replacement or deepening of domestic wells.

Terms
- This program is a 1-year program.
- Water made available by participant lands would be marketed at $400 per acre.
- Funding levels for conservation practices will be determined by multiplying the market rate of water per times the crop allocation provided earlier.
- Funding from program will be allowed to spent in the following areas:
  - 20 percent cash incentive to landowner/participant
  - 75 percent installation of approved conservation practices
  - 5 percent OID administration costs
- All participant lands must have a measurable gate or meter at their point of delivery, compliant with SBx7-7 requirements, or that will be one of your conservation projects under the program.
- Contractors/landowners working within OID easements must be pre-approved by OID.
- Participant land must be compliant with OID easement criteria at the end of the project.
- NRCS standards and specifications will apply to all work.
- Participant land must be registered with the Irrigated Lands Coalition.
- Tenants are responsible for obtaining all landowner approvals for program participation.
- Any irrigation water, regardless of source, on the participant property during the Program Year of enrollment will result in lands ineligibility for any payment.
- OID to pay on submitted invoices after field verification that the work has been completed and compliant with NRCS standards.
- OID will make water available the entire month of October to assist in establishment of re-vegetated fields.

Program Interest
OID began receiving Solicitation of Interest Forms for the program at its first meeting in December 2014 and stopped solicitations in mid-January 2015. At the end of that period, OID had 143 parcels covering 3,250 acres of lands that had submitted statements of interest in the program. Of those submitted, 50 parcels were 10 acres or less, 54 parcels were 10-40 acres in size and 20 parcels were more than 40 acres.

On a crop mix basis, 1,760 acres were pasturelands, 690 acres were corn/oat lands and 800 acres were a mixed use of lands.

Program Success
OID believes the response to the program is an overwhelming affirmation that such programs can bring value to the participants. While in the short term, the program affords the landowner sufficient capital to improve its irrigation system, it’s the long term benefits that will provide the most value.

Program Benefits
Modernized irrigation systems provide a level of water control that will reduce wasteful runoff and excessive deep percolation losses. Reduced runoff means less water running off the fields carrying less contaminants. Improved water control enhances uniformity leading to greater production values to the farmer. Less water wasted or lost puts water back in storage for drought resiliency, benefitting all constituents of an irrigation district.

An often omitted value of such a program is the ability to bank all the non-consumptive use water not delivered to the field. For a number of management reasons, this is substantial. Eliminating water losses from delivery inefficiencies for a field that sits idle for a year, and making that water available to meet a broader range of constituent demands is a significant management tool. Whether that purpose is for meeting water demands in a drought or for banking additional supplies for subsequent years, as carryover storage, are all value added benefits of this program.[]
Delivering water for over 100 years.

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“One of the things that we try to do is make sure that people are working on projects that they are excited about.”
— Keith Mortensen, Senior Engineer

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President’s Message (continued)

start out with outlining the hopes and concerns that I see for USCID in the future. First, I will start with the hopes. The drought in California persists and there continue to be serious water issues throughout most of the western United States. These issues are making the front page of newspapers (or online news websites) and highlight the importance of an organization like USCID. In addition, every time I talk to a first time attendee at a USCID conference, I always hear the same thing: what a great conference! I have heard a number of first time conference attendees tell me that they had no idea that USCID provided such useful information and that they enjoy hearing about issues and concerns facing other irrigation districts as well as how they came up with solutions to their issues and concerns. These observations give me hope in the future of USCID, because USCID is providing useful, quality and timely information to irrigation districts at a time of great need. However, I also see several areas of concern with regards to the future of USCID. First, as we discussed during the members meeting at the spring conference in Reno, individual membership in USCID has been steadily dropping over the last 10 years and the number of irrigation district members has remained stagnant. In addition, I have observed that there are very few younger members attending USCID conferences or participating in the organization. With the importance of the services that USCID provides, our membership should be increasing and not decreasing. In addition, we should be trying to enable the younger engineers out there who will soon become the future leaders of USCID.

So one of my visions for USCID during my presidency is to increase membership and attract younger members. Some of the reasons for the decrease in membership may be that we have not done a good job of letting people know the benefits of being a USCID member. Bryan Thoreson began addressing this issue by implementing the members meetings during the conferences. During the first members meeting that I conducted during the Reno conference, I mentioned that USCID is the U.S. representative to ICID (International Commission on Irrigation and Drainage — www.icid.org), and being a member of USCID allows you to participate with ICID on an international level by attending ICID meetings or joining one of several working groups. I was surprised at the number of people who were not aware of this connection. I would also like to thank Michael Davidson for joining the ICID Working Group on Global Climate Change and Agricultural Water Management after the members meeting in Reno! If you are interested in finding out more about the ICID Working Groups, please go to www.icid.org/wbody_icid.html.

But the USCID Board can’t do this alone. We need help from you! If you have any ideas on how to increase the membership of USCID, please feel free to contact me and share your ideas. I would love to hear from you. Feel free to call me at 480-345-2155 or email me at bwahlin@westconsultants.com. In fact, for those of you attending the USCID Conference in Albuquerque, if you pull me aside and share some ideas with me, I will buy you a beer! This will also serve as a test to see how many people actually read the President’s Message. I just checked my wallet and I am afraid that I will have to put a limit on the free beers to the first 10 people who share ideas with me.

Brian Wahlin
President, USCID

Albuquerque (continued)

Committee. The Opening Plenary Session on Tuesday afternoon will feature presentations by “big picture” issues at the state, federal and international levels, and the Navajo Nation. Bureau of Reclamation Commissioner Estevan López has been invited to make the Conference Keynote Address. Completing the Tuesday program will be the Annual Meeting of Members, followed by the Opening Reception and Exhibition.

A Wednesday morning Panel Discussion will address Contemporary Issues on the Colorado River.

On Wednesday afternoon, participants will have the opportunity to engage in discussions during a Technical Session on Environmental Issues and Addressing the Water-Energy Nexus; or attend a Workshop on Water Balances for Irrigation Districts organized by Albert J. Clemmens, WEST Consultants, Inc.

The Thursday morning program features two concurrent technical sessions — Irrigation System Reliability and Technological Advancements. The afternoon program will include a Workshop on Communications for SCADA, organized by Charles M. Burt; and a Technical Session on Irrigation District Management and History.

An exhibition of commercial providers of technology and services will be a highlight of the Conference. Invited speakers will provide interesting perspectives during lunch and dinner presentations.

A field tour on Tuesday morning will visit water resources facilities in the Albuquerque area. A day-long tour on Friday will include visits to Elephant Butte Dam and Caballo Dam.

A final program, online registration, exhibitor and sponsorship reservations and hotel information will be available on the USCID website soon.
Election (continued)

Tony L. Wahl and Larry D. Stephens counted 118 ballots.

Eduardo Bautista is a Research Hydraulic Engineer, Agricultural Research Service, USDA, Maricopa, Arizona. He received his B.Sc. in Agronomy-Plant Science from the Instituto Tecnológico y de Estudios Superiores de Monterrey Campus Querétaro, Mexico, and his M.Sc. and Ph.D. in Agricultural Engineering from the University of California, Davis. He joined USDA-ARS in 1992 and has been working as a Research Hydraulic Engineer at the U.S. Water Conservation Laboratory and later the U.S. Arid Land Agricultural Research Center, Maricopa, Arizona, since 1999. He conducts research on methods for improving water management in irrigated agriculture and assessing its impact on the environment. He leads the ARS development team for WinSRFR, a software package for simulation, evaluation and design of surface irrigation systems. He is a member of the American Society of Agricultural and Biological Engineers and the American Society of Civil Engineers.

Randy Hopkins is Vice President and Principal Engineer, Provost & Pritchard Consulting Group, Clovis, California. He received a B.S. in Agricultural Engineering and M.S. in Water Engineering from California Polytechnic State University, San Luis Obispo, and is a licensed civil engineer in both California and Arizona. In the 13 years since he began with Provost & Pritchard, he has worked primarily with irrigation districts in California’s Central Valley on a wide variety of projects including the planning and design of groundwater recharge and banking facilities, canals, pump stations, pipelines, system modernization and facility rehabilitation. He has been an active member of USCID since 2005, authoring papers and participating in conference planning committees.

Brian T. Wahlin is a Civil Engineer with WEST Consultants, Inc., Tempe, Arizona. He received a Bachelor of Science in Mechanical Engineering from Arizona State University, and M.S. and Ph.D. Degrees in Civil Engineering, also from ASU. He is a Diplomate, Water Resources Engineer through the American Academy of Water Resources. He currently runs the Tempe, Arizona, office of WEST Consultants and has more than 18 years of experience in irrigation, hydrology, hydraulics, sedimentation, geomorphology, flow measurement techniques, and hydraulic laboratory studies as a consultant, manager, researcher, teacher and author. Before coming to WEST, he spent 11 years with the U.S. Water Conservation Laboratory in Phoenix, Arizona. During this time, he was deeply involved in the Laboratory’s pioneering research in the area of automatic control of irrigation water delivery systems. Since joining WEST, he has expanded his expertise into other areas besides irrigation; however, he still has a strong desire and commitment to continue to work in the irrigation arena. He chairs the ASCE/EWRI Task Committee on Recent Advances in Canal Automation.
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USCID Notes
by Larry D. Stephens,
Executive Vice President

Sincere thanks to Bryan Thoreson, Davids Engineering, for his leadership as President of USCID, during the past two years. Bryan was an outstanding President of your Society. And, thanks to Brian Wahlin for "accepting the gavel" to serve as the next President. USCID is certainly fortunate to have capable and dedicated water resources professionals to serve on the Board of Directors and as officers.

We are currently between 2015 USCID Conferences — a most successful return to Reno during June and looking forward to going back to Albuquerque, New Mexico, in November. Please visit the Albuquerque Conference website (www.uscid.org/15nmconf.html) and review the Program. The Conference General Chair, Jerry Gibbens and Co-Chairs David Gensler and Blair Stringam, supported by an excellent Planning Committee, have developed an outstanding program. Estevan López, the Commissioner of the Bureau of Reclamation, has been invited to give the Keynote Address, Colorado State Engineer Dick Wolfe, will be among several water leaders speaking during the Opening Plenary Session. And, with the leadership of Reed Murray, a panel discussion titled Contemporary Issues on the Colorado River will be offered on Wednesday morning. Panel members will come from several organizations involved with the management of the Colorado River.

The Albuquerque Conference will also feature an innovative new approach for add value for Conference participants: two half-day Workshops will provide in-depth reviews of current technical issues. The Workshops will give Conference participants options to concurrent sessions that are more focused on policy and "big picture" issues.

USCID annually presents awards to recognize contributions by individuals and organizations to the irrigation and drainage profession. Nominations for the USCID Service to the Profession Award and for the USCID Merriam Improved Irrigation Award are currently being accepted. Please review these awards and make a nomination to a deserving colleague. Details at www.uscid.org/awardnom.html. The deadline for 2015 award nominations is September 9.

USCID fall conferences also provide opportunities for student involvement. The 2015 USCID/Summers Engineering Scholarship will be awarded to a USCID Student Member during the Albuquerque Conference. The scholarship includes $1,000, plus travel to Albuquerque, hotel room in the Conference Hotel and a full Conference Registration. The Scholarship winner will make a Poster Session presentation featuring their academic program. Application information at www.uscid.org/scholapp.html. The deadline for applications is October 2.

And, six college or university students will receive a free registration and an opportunity to present their work during the Conference. The free registrations, funded by USCID's endowment from the American Water Foundation, includes all Conference activities — an excellent educational and networking opportunity! The first six USCID student members who submit a brief abstract of a Poster Presentation for the Conference Poster Session on Thursday, November 19, will receive the Conference Registrations. To participate, send a 250 word summary of the proposed presentation by e-mail to stephens@uscid.org. The abstract should include the title of the presentation and contact information for the author and co-authors.

I hope to see you in Albuquerque! ☯

USCID Meetings
USCID Fall Conference.
Spring 2016, San Diego, California. USCID Spring Conference.

ICID Meetings
October 11-16, 2015, 66th IEC Meeting and 26th European Regional Conference, Montpellier, France.
November 6-12, 2016, 67th IEC Meeting and 2nd World Water Forum, Chiang Mai, Thailand.
March 2017, 13th International Drainage Workshop, Ahvaz City, Iran.
October 8-14, 2017, 23rd Congress and 68th IEC Meeting, Mexico City, Mexico.