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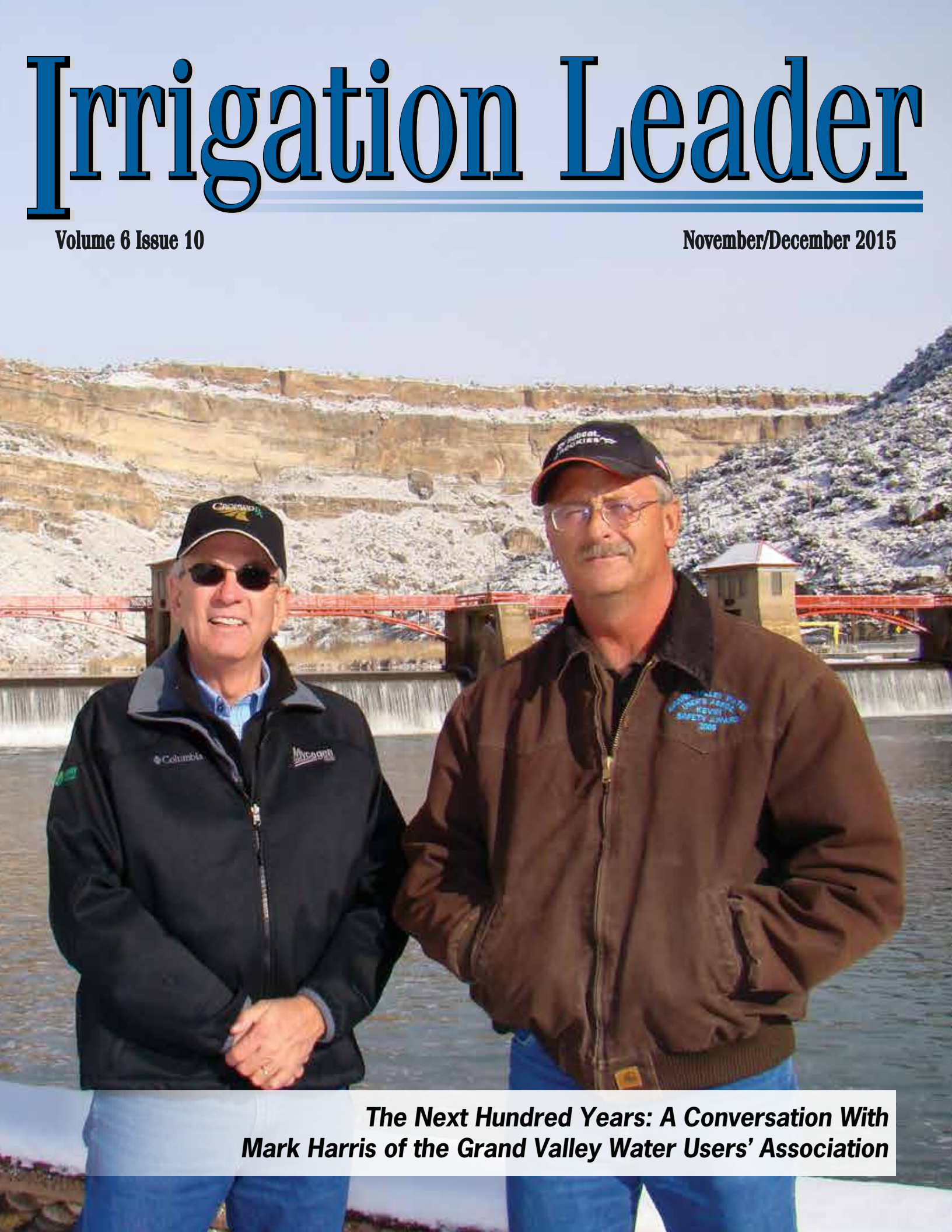

The Next Hundred Years: A Conversation With Mark Harris of the Grand Valley Water Users' Association

Australia Irrigation Education Tour: Learning Internationally

By Kris Polly

We created the *Irrigation Leader* magazine over five years ago with the primary objective of focusing on the innovative solutions and ideas developed by irrigation district general managers and sharing those solutions and ideas with other general managers and irrigation districts. We found that irrigation district general managers and board members are very interested in the successes and experiences of their peers. As a result, we began hosting annual Operations and Management Workshops four years ago. Irrigation district general managers and board members suggest the workshop discussion topics. The workshops are designed to be informal and to encourage speaker-audience interaction with multiple opportunities for attendees to have side conversations. Many of our past workshop participants have told me the workshop is their favorite and the most helpful meeting they attend.

This year we have continued the educational purpose of *Irrigation Leader* magazine by partnering with Rubicon Water on their Australia Irrigation Education Tour scheduled for February 20-28, 2016. At the upcoming Operations and Management Workshop at the end of January 2016, *Irrigation Leader* magazine will provide door prizes for one manager and one board member to participate in the tour. The door prizes will cover $2,500.00 in airline tickets and travel expenses per individual. To win a door prize, participants must be present for the drawing at the workshop reception scheduled for the evening of January 28, 2016.

This tour will provide participants with an in-depth understanding of the solutions adopted by Australian irrigation districts to protect the bottom line of their farmers in circumstances of water scarcity. The tour will include visits to key irrigation districts including Goulburn-Murray Water, Murray Irrigation, and Coleambally Irrigation. The tour will also meet with Australian farmers to discuss on--farm innovations and how these have increased yields.

For more information on the workshop agenda and door prize rules, please see the inside back cover of this issue or go to www.WaterStrategies.com. We hope to see you in Phoenix and Australia!

DRAFT Australia Irrigation Education Tour Itinerary
(Subject to Change)

Sunday, February 21: Guests land in Melbourne
- Rubicon provides accommodation for two nights in Melbourne

Monday, February 22: Drive to Shepparton and visit Rubicon factory and Goulburn-Murray Water (G-MW)
- Rubicon provides transport, meals, and accommodation in hotels in regional Victoria and New South Wales

Tuesday, February 23: Goulburn-Murray Water
- Tour of G-MW's Total Canal Control system and low energy pipeline

Wednesday, February 24: Travel to Coleambally

Thursday, February 25: Tour of Coleambally Irrigation
- Evening flight from Griffith to Sydney
- Guests pay for their own flights and accommodation in Sydney

Friday, February 26: Guests make their own way home.

Kris Polly is editor-in-chief of Irrigation Leader *magazine and president of Water Strategies LLC, a government relations firm he began in February 2009 for the purpose of representing and guiding water, power, and agricultural entities in their dealings with Congress, the Bureau of Reclamation, and other federal government agencies. He may be contacted at Kris.Polly@waterstrategies.com.*

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COVER PHOTO: Mark Harris (left), General Manager, and Kevin Conrad (right), Operations Manager, of the Grand Valley Water Users Association.

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The Next Hundred Years:

A Conversation With Mark Harris of the Grand Valley Water Users' Association

The Grand Valley Water Users' Association (GVWUA) is a nonprofit corporation formed in 1905 to operate and maintain the Bureau of Reclamation's Grand Valley Project in western Colorado. The GVWUA operates the 55-mile-long Government Highline Canal; 150 miles of laterals, 95 percent of which are in pressurized pipe; 130 miles of drain ditches; and the Grand River Roller Dam, providing irrigation water to approximately 23,340 acres of irrigated land for row crops, parks, and backyards.

This year marked the 100th anniversary of the Grand Valley Diversion Dam. The "Roller Dam" has a unique design, employing seven large steel cylinders to maintain constant water levels behind the dam, and is listed on the National Register of Historic Places. The 14-foot-high, 546-foot-long diversion dam diverts water into the Government Highline Canal and, ultimately, to three other canals, providing water to 15,000 acres across the Orchard Mesa Irrigation District (OMID), the Mesa County Irrigation District, and the Palisade Irrigation District and provides water to the Grand Valley Powerplant in Palisade, Colorado.

There are two key figures running GVWUA today: Kevin Conrad is the operations manager and has been with GVWUA for 30 years, and Mark Harris, a relative newcomer to water management, who has served as GVWUA's general manager for the past two years. Irrigation Leader*'s editor-in-chief, Kris Polly, spoke with Mr. Harris about the history of the Roller Dam, collaboration on the Colorado, and bringing the lessons of small business to the management of water for the future.*

Kris Polly: Please describe the water users' association for our readers.

Mark Harris: The easiest way to talk about GVWUA is to start at the top at the Roller Dam. Anyone who travels through the valley here along I-70 sees it. Although the association started in 1905, it began to deliver water in 1915. That was the year the Roller Dam was dedicated officially.

GVWUA is the contracting entity for a portion of Reclamation's Grand Valley Project. We manage the dam, divert water for GVWUA, and deliver it via the Government Highline Canal. We also divert water at the dam for the Orchard Mesa, Palisade, and Mesa County Irrigation Districts.

The Grand Valley Diversion Dam, the "Roller Dam," on the Colorado River near Grand Junction, Colorado. Completed in 1916, it served as the template for roller gate dams in the West and is currently the largest roller gate dam in the United States.

GVWUA also delivers water year-round to the 3,500-kilowatt Grand Valley Powerplant, which it operates in conjunction with OMID. The facility was originally built in 1933. In 2010, Xcel Energy chose not to continue operating the plant, and since that time, OMID and GVWUA have operated it under a lease of power privilege with Reclamation. While the two districts are partners in the facility, Max Schmidt and his crew at OMID operate the facility on a day-to-day basis.

Here in the Grand Valley, we have a dual water system. People, in most cases, do not have to use domestic water to irrigate urban or suburban properties. We deliver water to thousands of urban and suburban customers. We have 1,800 accounts that represent several thousand users. Some of those accounts represent several hundred people through homeowners' associations. With respect to those homeowners' associations, we deliver a specific amount of water under one bill. The particulars of what happens beyond that point are not GVWUA's business.

The three irrigation districts in the east end of valley deliver the water for the fruits, vegetables, and wine grapes

that many people now associate with the Grand Valley. Those areas have seen a large increase in micro sprinkler and drip irrigation. GVWUA deliveries sustain the small grains, winter wheat, alfalfa, forage crops, corn, dry beans, and livestock that continue to be the largest contributors to farm revenue in the area. The majority of our on-farm irrigation is furrow irrigation, with some sprinkler.

Kris Polly: What is in store for the planned rehabilitation of the powerplant?

Mark Harris: OMID and GVWUA are in the process of conducting total rehabilitation of the powerplant. We'll use the existing geometry but add new turbines, runners, and switch gears and recoat penstocks. We are working through the details of how to make that happen.

All of this sits at the head the 15-Mile Reach, which is critical habitat for four endangered fish species. We do a lot for those species, including providing fish passages and screens. We work with the U.S. Fish and Wildlife Service to keep water in that environmentally sensitive section of the river. The facilities that we jointly operate here in the valley are critical to the overall management of the Colorado River and ensuring Endangered Species Act compliance.

The feasibility study on the powerplant rehabilitation is done, and we are exploring funding opportunities. We are upside down in all the NEPA [National Environmental Policy Act] issues at this point. This whole complex, of which the Roller Dam, the canyon canal, and power canal are fundamentally important components, enables delivery of water downriver to the 15-Mile Reach and beyond. There are multiple beneficiaries of the operations we manage, and we are exploring opportunities with all those folks.

Kris Polly: What has been the effect of fish recovery efforts on the Colorado and infrastructure projects in your service area?

Mark Harris: GVWUA has benefitted from fish recovery money. That money has funded continued system improvements, which in turn have generated a significant amount of forgone diversion at the dam. Included in those improvements are the fish passage, fish screens, 16 automated checks, and a SCADA system.

One of the most important projects that has come out of recovery efforts is the Palisade Bypass and Highline Lake Pump Station. The bypass is at the upper end of

Fish screen in the Government Highline Canal. The screen is instrumental in furthering the goals of the Upper Colorado River Endangered Fish Recovery Program.

the Government Highline Canal, right where we separate out water for the Palisade and Mesa County Irrigation Districts, and the pump station sits 30 miles downstream on the canal. Together, they form an offline regulating reservoir system, using Highline Lake, which sits on the other end of the Grand Valley. GVWUA has an agreement to hold water there and pump when required. If the canal level begins to drop below an acceptable point in that section of the canal, the pumps will kick on, pump water back out of the lake, and replenish the canal.

Sending water down to the Palisade Bypass cuts in half the time it takes to get water from the diversion dam in the river to the extreme west end of the canal system. So we can send some water to the bypass to anticipate needs at certain times of the year, and because it can be returned to river above the 15-Mile Reach, the use of the Palisade Bypass is treated like a reservoir release for purposes of the management of the river for endangered species. We use it pretty aggressively. We run the pumps when we need to, which helps to facilitate the creation of 15 percent of those forgone diversions, which are delivered via the Palisade Pipeline.

Kris Polly: What are some of the biggest challenges GVWUA is facing right now?

Mark Harris: First, and it is something that everyone in the water business is addressing, is the future of water. How do we manage an increasingly scarce resource in the Colorado River? We are working with a number of parties to investigate that question with the goals of protecting ourselves and finding value in partnerships.

The second major challenge is what to do with these 100-year-old facilities. The economic assumptions made when they were first built were quite generous. There is no way a reasonable assessment that shareholders could pay would rebuild and rehab the Roller Dam at untold millions of dollars. Our challenge is to continue to sustain and use these 100-year-old facilities. Undoubtedly, it is something we work on almost every day.

Third, what does the future look like for the association given the urbanization and suburbanization in the valley? We have two jobs—delivering water for commercial agriculture and delivering water to urban and suburban water users. People's expectations are dramatically different now compared to what they used to be. A lot of work is required to be productive, responsive, and transparent to get things done.

All of this leads to the fourth challenge, which is how to fund all of these things. We have to find a way to generate ongoing sources of revenue to help keep this facility going in the future. GVWUA has some "canals of concern," under Reclamation's assessment, which run through urbanized areas. Our concern is not that they would fail, but that Reclamation will slowly work its concern up to required actions. Paying for those upgrades will be a challenge.

Kris Polly: What role does the development of partnerships play in meeting those challenges?

Mark Harris: A lot of things that we focus on are the result of the fact that there is just less water and less money to go around and more work to do, so partnerships are key to our mutual success in the future. To the extent that our time and budget allows, we are trying to establish partnerships that allow us to pursue such collaboration.

We are updating our water management plan for the Grand Valley portion of the system with the support of Reclamation and the State of Colorado. We are also conducting a Roller Dam and Related Facilities Master Plan in collaboration with the Mesa County, Palisade, and Orchard Mesa Irrigation Districts; the Colorado River Conservation District; the Nature Conservancy; Reclamation; and the Colorado Basin Round Table, which is in part funded by the Colorado Water Conservation Board and will give us direction on some of these questions. In addition, as I mentioned, we are cooperatively developing plans for the rehabilitation of the Grand Valley Powerplant. We are trying to establish some baselines and plans so we have a blueprint to guide us operationally, administratively, and financially for a prioritized set of objectives over the short and long terms.

Lateral repairs.

But, it will be different in dealing with our combined constituencies in the future. Their expectation for information, transparency, and cost efficiency will be more demanding than in the past. We have to do a really good job of explaining why we need these improvements, who the beneficiaries are, and how we will pay for them.

I guess I am guilty of mercenary and selfish thinking, but to be a good mercenary in today's world, to look after your own interests effectively, you have to think about what value are you are going to deliver to all your partners. We have to think about our individual members; our irrigation associates; our responsibilities to the operation of the river, the State of Colorado, Reclamation and other federal agencies; and our obligations to inter- and intrastate agreements.

There are a lot of potential partners out there. In the West, environmental groups and water users and commodity organizations have traditionally been enemies. We are all wary of putting our foot on the potentially slippery slope of new thinking about the environmental, recreational, and urban benefits that accrue from sustained uses of agricultural water. But put it there we must. That doesn't mean you have to roll over and capitulate on everything, but you have to explore new alternatives to avoid risk and identify benefits for our irrigation and agricultural interests.

GVWUA is working with environmental, wildlife, recreational, and domestic water interests to identify those areas where we have common interests despite having different agendas and constituencies. The process can be scary, and at times those concerns are very real, but we want to be in control of our own destiny. We need to be productively involved in the discussion, and we are.

Kris Polly: This year marked the 100th anniversary of the completion of the Roller Dam. What makes it unique?

Mark Harris: The construction marked the second opening of the West. The Reclamation Act of 1902 was all about populating the western states. The Roller Dam

is an iconic structure in that it represents, for western irrigation and Reclamation, how deeply involved water management is in the life and economics of the West. Generally, our infrastructure is not taken for granted by people directly related to it; the Roller Dam is unique in that respect because it is really visible. It represents all the activity required to build, maintain, and operate it and the canal systems in the valley.

The dam represents the growing importance of collaborative attempts to address these very real issues that overlap users in economic and resource communities. The presence of the dam affects irrigation, wildlife, and the environment. None of them can be addressed separately—they have to be addressed holistically. You have to be thinking collaboratively.

Another reason the dam is unique is because it is on the Colorado River. The management of the river from the headwaters on down is wrapped up inextricably with the Roller Dam, its associated facilities, and the people and entities that own the water. The water coming downstream is important to everybody.

The Roller Dam means water in the West.

Kris Polly: You have been on the job for a couple of years. What did you do before that?

Mark Harris: The prior 17 years, my business partner and I owned a company called Grand Valley Hybrids. We developed and sold hybrid seed corn across the western United States. And prior to that, I spent 17 years in the farm building and construction business. Throughout that time, and to this day, we have farmed.

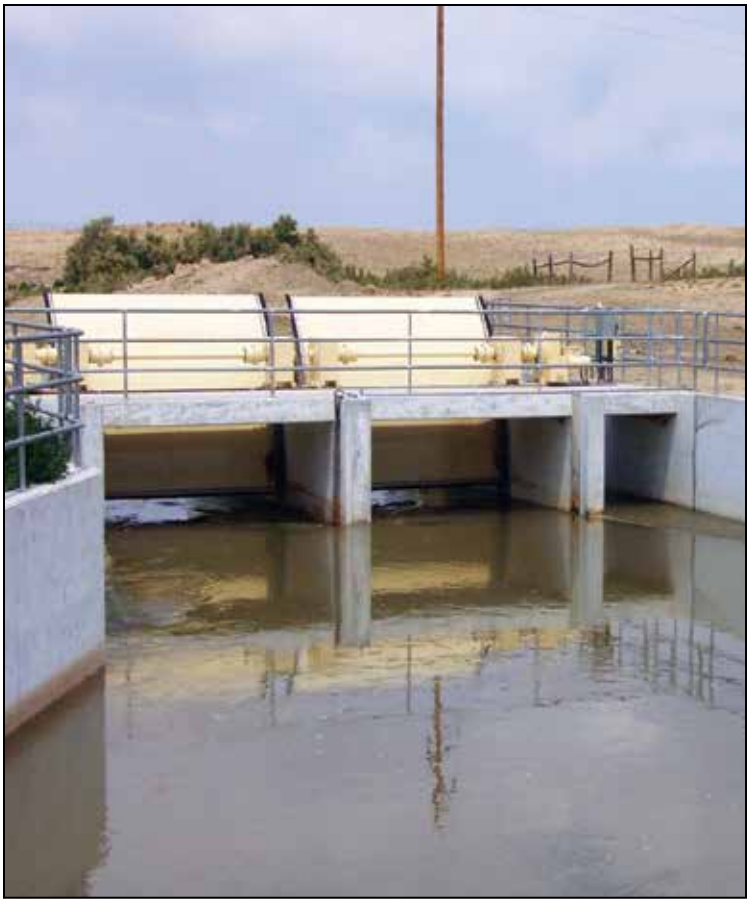
We sold the commercial part of Grand Valley Hybrids to Dow Agrosciences in 2010. Dow retained me to help integrate our activities with their western operations. In the meantime, I went back to school at Texas A&M and earned a master's degree in agricultural development.

When you have been a small businessman, you may have a skill set that may or may not be of value to other organizations. So when people ask what you can do, you must ask, "What is it that you need?" GVWUA advertised for this general manager position about the time my obligations with Dow were completed, and I was lucky enough to be selected. The timing really worked out well for me. I love the job and am glad to be here.

Kris Polly: What is the most important lesson you have learned on the job thus far?

Mark Harris: This is a great job due to having a great operations manager in Kevin Conrad; it didn't take long to learn that. He runs the canal and makes it possible to pursue these other activities.

So the first lesson is that you have to empower everyone in the organization and build on all the skill and talent that is there already. If you can't do that, you are going to fail.



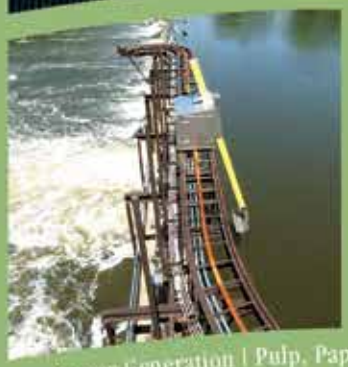
One of the check structures funded in part by fish recovery money.

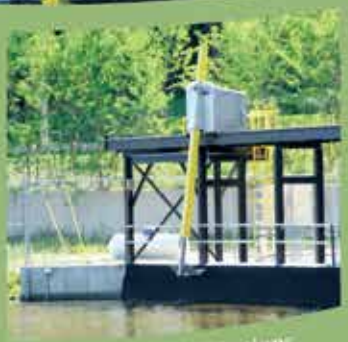
Second, you have to engage with others inside and outside your organization by taking a little risk and being a good partner with no expectations of returns. You can't expect to receive real value and have lasting relationships—for you personally or for your organization—if you are not willing to take a chance and bring something to the table first.

Third, you have to be visionary, but with an attention to detail. To create, articulate, and sustain a vision requires performing well on the nuts and bolts of everyday management and recognizing the obligations, concerns, and aspirations of those you deal with every day, in your organization and beyond.

But the most important lesson I have learned is to find good teachers, mentors, and partners. Remember, I'm just a newbie. The only success that I've had—and the success that the association is having —is solely based upon the assistance of others: Kevin Conrad; a good crew and office staff; other irrigation managers; the GVWUA board; the local Reclamation office; Mark Hermundstad, our legal counsel; the Colorado River Conservation District; the Colorado River Basin Round Table; and the Colorado Water Conservation Board, among others too numerous to mention. GVWUA and I are indebted to them all.

Easy isn't a benefit, **IT'S A REQUIREMENT.**





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Developing Water Storage to Meet Colorado's Future Needs

By Senator Cory Gardner

Painted on the walls of the Colorado State Capitol, there is a saying by Thomas Hornsby Ferrill that reads, "Here is a land where life is written in water. . . ." The saying rings more true today than ever as the fight over water has defined the West throughout much of its history. The winners in the fight have seen new opportunities in growing cities, new tourism and recreation, and robust agriculture production. The losers have experienced dried up land and struggling rural communities.

Over time, most of the fight over water has been between states or between different water basins and ultimately has been settled in the courts. But today, Colorado sees a different fight, one that pits local water districts and utilities trying to increase water storage capacity against the federal government and the frequently burdensome and bureaucratic regulatory process that comes with it. This is a fight that Colorado has been losing as it struggles to meet the water demands of the fourth-fastest-growing state, according to U.S. Census Bureau.

According to the draft Colorado Water Plan, construction of new storage capacity in the state is the lowest it has been since the 1930s. This is not for lack of effort or proposals for new water projects. The Northern Integrated Supply Project, which would provide 40,000 acre-feet of reliable water annually, began the federal regulatory process in 2004. Eleven years later, that project is still several years away from a final decision. The Gross Reservoir Expansion Project in Boulder County, Colorado, which would expand an existing reservoir for additional water storage, began its regulatory process in 2003. Twelve years later, no final decision has been made on the project at the federal level.

While these projects languish in the permitting process, the demands on Colorado's water grow by the day. According to a 2010 Colorado Water Conservation Board study, the state's population is expected to nearly double to 10 million people by 2050. The same study makes the argument that if we do not invest in water infrastructure and reduce water consumption, 500,000 to 700,000 acres of irrigated agricultural land could be dried up throughout the state. These irrigated acres are vital to Colorado's rural communities, where agriculture remains a way of life.

In addition to water storage, many will say the focus should be on conservation, and I agree with them. It must be a broad part of the equation. According to the Colorado Water Conservation Board, Denver Water used the same amount of water in 2014 that it did in 1973, despite having an additional 350,000 users. Colorado is doing its part to conserve, but we simply cannot just conserve as the only solution. We must have a collaborative approach to meet the water needs of a growing state.

It is up to Congress and the federal government to ease the regulatory labyrinth facing states and local water districts and utilities. Fortunately, we already have a proven framework to do it. In 2014, we passed the Water Resources Reform and Development Act to expedite studies, environmental reviews, and permits, including compliance with National Environmental Policy Act. It is my hope that this effort can be replicated and applied for western water storage projects. We cannot afford continued delay.

Senator Cory Gardner represents Colorado in the United States Senate.

Banking on Water Security for the Upper Basin

Rising demands for water on the upper basin of the Colorado River, coupled with diminishing supplies, are pushing water users and stewards to find creative solutions to ensure water security for future generations. The Colorado River Water Conservation District (River District) is spearheading an effort to bank water to create flexibility in meeting increasing demands on the upper basin.

Two reports—the Bureau of Reclamation's *Colorado River Basin Supply and Demand Study* and the Colorado River Water Conservation Board's *Colorado River Water Availability Study—Phase I*—framed the challenge for the River District and its partners. The *Colorado River Basin Supply and Demand Study* showed that water supply and demand imbalances have the potential to increase to 3.2 million acre-feet by 2060, while the *Colorado River Water Availability Study—Phase I* indicated that water supply development from the Colorado River is reaching capacity in Colorado. This push and pull of supply and demand prompted the River District to investigate how to fully develop Colorado's Colorado River supplies while at the same time decreasing the risk of shortage for the purposes of the Colorado River Compact.

The idea is to develop a voluntary and compensatory water bank to save water in order to stave off shortages or enable use by junior users in times of compact administration. The focus would be to enter into interruptible supply contracts with willing owners of senior water rights.

Feasibility Studies

In 2011, the River District, the Southwestern Water Conservation District, The Nature Conservancy, the Colorado River Water Conservation Board, the Front Range Water Council, and a group of Front Range water providers (hereafter referred to as the partners) began a series of feasibility studies to investigate the potential for a water bank or a water banking–type approach in the upper basin and determine the effects its implementation may have on producers.

According to Dan Birch, deputy general manager at the River District and water bank project co-facilitator, the initial feasibility study shed some light on critical water uses in western Colorado. The partners learned that there are more than 1 million acre-feet of precompact consumptive use in Colorado, of which a majority—900,000 acre-feet—is associated with hay crops.

Mr. Birch said, "We talked to individual producers and cow-calf operators. They told us that you couldn't fallow hay. Cow-calf operators have their system optimized for their herd. Reducing water by 25 percent, thereby reducing hay production by a similar margin, would cause a reduction in herd size. They spend generations just getting the genetics of the herd just the way they want it."

For Mr. Birch and the project partners, "the priority is figuring out how this would work for the producers. How will this work on a particular ditch system?" So, the second phase involved a pilot study involving four irrigation systems with precompact rights.

The third phase, which is being performed in conjunction with Colorado State University, will focus on the effect of fallowing or deficit irrigation on a field. The partners are

The Colorado River near Glenwood Springs. ***Photo credit: Bill Park.***

now studying deficit-irrigated fields over the course of five years. Taylor Hawes, The Nature Conservancy's Colorado River program director and water bank project co-facilitator, noted, "In order to make this program work, we have to be able to assure farmers what is going to happen to their fields. If they do not have as good of a yield for a couple of years after [deficit irrigation], you will likely have to build it into the price [of compensation to the producer]."

The Palo Verde Model

The project partners have looked at the fallowing program at Palo Verde Irrigation District on the lower basin as a potential model. The partners sent a group down this past spring. For Mr. Birch, "the big takeaway was that the program was a net benefit. Fundamentally, we are not talking about water supply, but water augmentation. People buy augmentation supply every day."

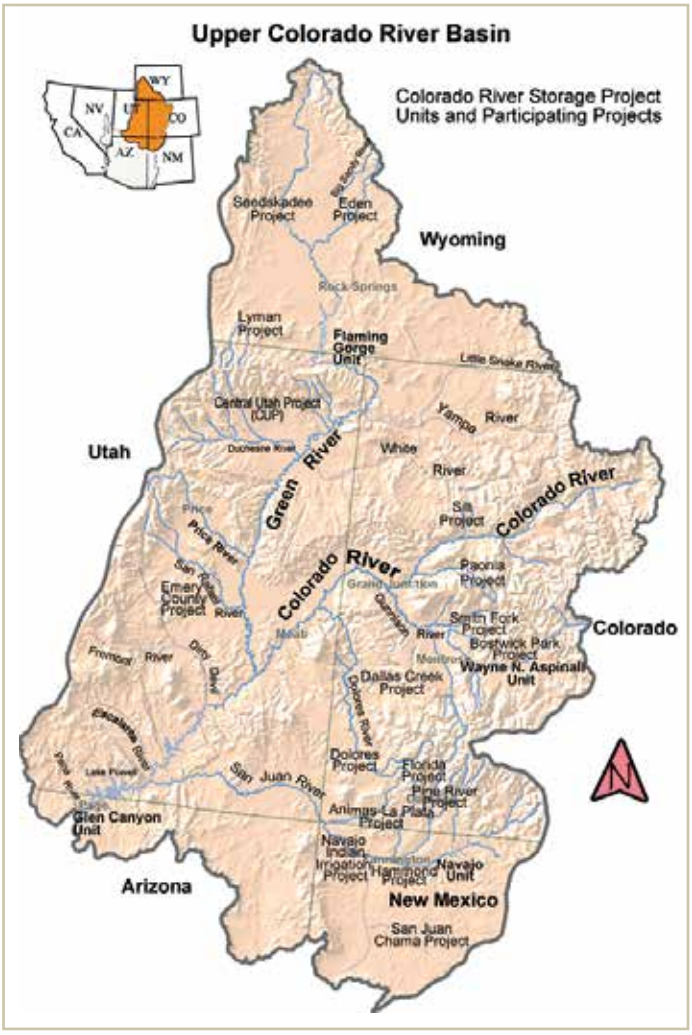
Creating a Program With Agriculture at the Forefront

Building understanding and support with the agricultural community has been an essential component of the project partners' work. Mr. Birch stated, "Agricultural producers face a lot of problems, especially in western Colorado where there are not as many economies of scale. There is concern that this is going to be another threat to the viability of agriculture and agricultural communities in our region. People have real and valid concerns about the primary impact of such a program."

That kind of relationship building has revealed a certain amount of healthy skepticism. According to Mr. Birch, "One misperception is that this is about sending more west slope water to the Front Range." Another salient issue for west slope water users is identifying who shoulders the burden. Ms. Hawes noted, "Irrigation districts want to make sure that they are not causing more problems for their constituents or nearby third parties. We want to spread the enrollment out so it is not concentrated in one district or one valley."

The biggest concern, however, is the potential for diminishing water rights. According to Ms. Hawes, producers "are concerned that if they participate in a program, it might diminish their water rights in the long run." To address that concern, the project partners have worked with the State of Colorado and water conservancy districts to get the word out about state-level programs in which producers can enroll their water rights to protect them from diminishment.

Mr. Birch stated unequivocally, "A 'buy-and-dry' approach would devastate the west slope agricultural economy. We don't want this program to be a break even or neutral thing. We are looking for this to be something positive for agricultural communities and economies."



Map credit: Bureau of Reclamation.

Being Part of the Solution

While the economic viability of a water bank is not certain, the project partners are compelled to find a workable solution. Ms. Hawes stated, "It will be more difficult to figure out [the economics] here than in the lower basin. We have thousands of water users in the upper basin, and it is not clear how we will scale up. Our perspective is that we have to try. The alternative is to wait for the crisis to happen. And while we may not figure it out in time, our hope is to have a solid foundation of data and information prior to that point so that we can design a program that works for all sectors."

For Mr. Birch, "The reason we are doing this goes back to being part of the solution. If we don't do something, we get to a crisis. Then we'll have a variety of interests coming to the west slope that are not concerned in maintaining the regional agricultural economy. That was the motivation for starting this in the first place."

For more information about the potential for water banking in the upper basin, please contact Dan Birch at dbirch@crwcd.org or Taylor Hawes at thawes@tnc.org.

Lake Powell. *Photo credit: Bureau of Reclamation.*

Testing the Water for Market-Induced Savings

By Jerd Smith

Colorado River water users, faced with a growing water supply imbalance, have launched an $11 million, multistate, multijurisdictional pilot project to experiment with irrigation projects, aggressive conservation efforts, and temporary water transfers that stretch available water.

Since 2000, year after year, with some exceptions, levels in Lake Powell and Lake Mead have dropped. These massive storage ponds, once able to hold four years' worth of water for 40 million people, are now less than half full, and the downward trend shows no signs of easing.

The specter of disaster is real enough and close enough that four powerful water users and the federal government were able to reach an agreement in record time in mid-2014. Their innovative effort, called the Colorado River System Conservation Program, seeks to develop voluntary, market-based measures based on modeling developed by the U.S. Bureau of Reclamation. "The modeling shows it can be done," says Jim Lochhead, general manager of Denver Water, the largest utility in Colorado and a funder of the program.

The working group, which includes Denver Water, the Upper Colorado River Commission, the Southern Nevada Water Authority, the Central Arizona Water Conservation District, the Metropolitan Water District of Southern California, and the U.S. Bureau of Reclamation, is evaluating options to dramatically reduce water use. They need to persuade farmers, city utilities, and large industrial users to voluntarily cut back in exchange for cash. The saved water would be used to help refill Powell and Mead.

But much of the work lies in developing precise and credible ways to measure how much water can be freed up through projects like deficit irrigation, and how conserved water can be moved through the system without being inadvertently diverted by other users. In some cases, legislatures will have to amend existing laws or write new laws to allow water to be managed differently.

Despite the challenges, each party has agreed to contribute cash to pay the growers, for instance, who conserve or give up their water so that it remains in the system. Nonfederal entities will contribute up to $2 million each, while Reclamation will contribute $3 million.

Pilot programs in the lower basin are managed by Reclamation, and pilot programs in the upper basin are managed by the Upper Colorado River Commission. Applications for individual projects have been approved based on cost effectiveness per acre-foot of water saved, ease of verification, and geographic diversity. Each state and agency will continue to select the conservation measures most appropriate for its region and water users.

At least $2.75 million of the funding will be used for pilot projects in the upper basin states of Colorado, New Mexico, Utah, and Wyoming. The first effort, in Colorado's Yampa River Basin, began in July 2015. It entails splitting the hay irrigation season so that two hay cuttings instead of three are harvested. The experiment, on the historic Carpenter Ranch, means growers will get paid for the loss of crops and the water will be kept in the system.

Mr. Lochhead and others believe this innovative approach will be an important proving ground for even more aggressive efforts to keep water in the river and its reservoirs. "It's not agriculture. It's not urban. It's not environmental. It's all the sectors in the basin working together."

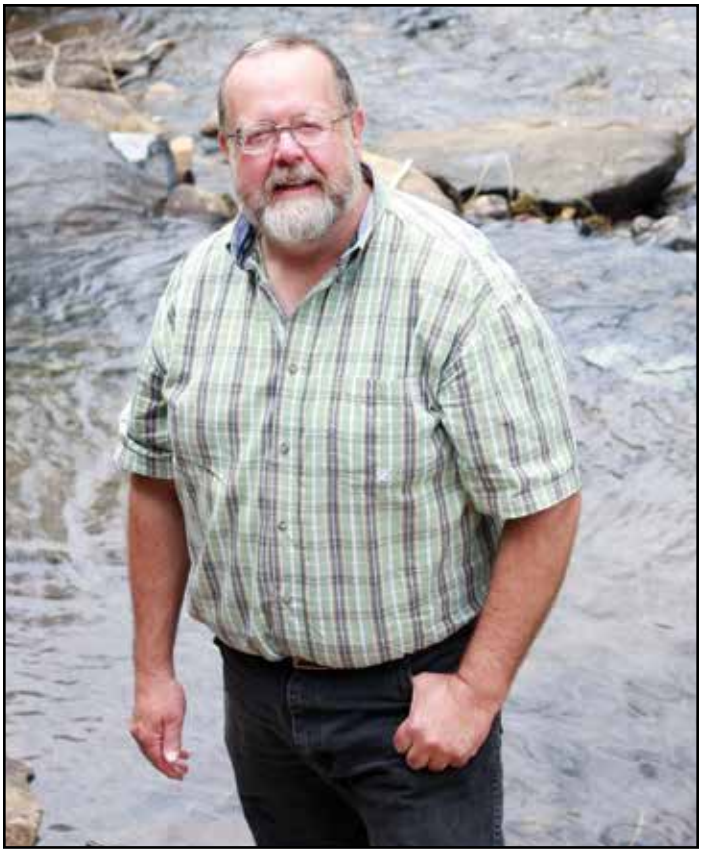
This article first appeared in the fall 2015 issue of Headwaters *magazine and was reprinted with permission from the Colorado Foundation for Water Education, yourwatercolorado.org.*

Jerd Smith is a writer and editor based in Boulder, Colorado, with a special interest in water and other conservation issues. She has covered the Colorado River Basin since 2002. You can reach Ms. Smith at jerd.e.smith@gmail.com.

Bruce Whitehead, Southwestern Water Conservation District

The Southwestern Water Conservation District (SWCD) advocates for southwestern Colorado's water interests at the local, state, regional, and national level. As an umbrella water agency, SWCD funds a variety of programs addressing water quality, water supply, endangered species, and Colorado River Compact compliance. Water education is another key component of SWCD's mission and a vital part of its operations.

SWCD's general manager, Bruce Whitehead, has spent his career working in water. As an engineer, a manager, a legislator, and policy advocate, he has tackled water issues from a variety of perspectives. Irrigation Leader*'s senior writer, John Crotty, spoke with Mr. Whitehead about the unique role of the district, key policy challenges, and dedicating his career to the support of water resources.*



John Crotty: Please describe SWCD.

Bruce Whitehead: SWCD was actually formed with boundaries prescribed by the Colorado Assembly in 1941. So, we will be celebrating our 75th anniversary in 2016. Basically, it covers the San Juan and Dolores River basins, including all of six counties and parts of three. We have a board member from each of the nine counties that are appointed by their respective county commissioner.

Colorado's four water conservation districts serve as overall umbrella entities for water issues, and generally, the districts cover fairly large geographic areas. We differ somewhat from [Colorado's] water conservancy districts, which were also formed under provisions in state statutes and are usually formed to manage or operate specific projects.

John Crotty: What role does the district play as an overarching water agency?

Bruce Whitehead: Our role was, and is, defined by legislation: To protect and conserve the use and development of water resources within the southwestern part of the state. While our emphasis has been on irrigation and municipal projects, the development of irrigation water rights, and planning for future water needs, our mission has broadened significantly to include funding for water quality studies, weather modification (cloud seeding), education, and water gauging stations.

We work and coordinate with water conservancy districts and irrigation projects. A lot of resources have been put into some of the major projects within the district, and SWCD still holds water rights associated with some of the major federal projects that were constructed in our district. In fact, the district assisted in the formation of a number of water conservancy districts, including the Dolores Water Conservancy District (DWCD). SWCD filed on the water rights associated with the Dolores Project, and then when the project was built, those water rights were transferred over to the DWCD. More recently, we were involved in the long process of developing the Animas–La Plata Project.

We deal with policy issues at the state and national levels. We are active in the Colorado Water Congress, with representation on both the State and Federal Affairs Committees. Many of our constituents look to us on broad policy issues as well as for assistance in getting programs off the ground through grants and education. We started a water education and information program (WIP) almost 20 years ago in coordination with local entities to meet their needs.

John Crotty: How is the grant program funded?

Bruce Whitehead: Most of the funding for the district is through a mill levy assessment on property taxes. As a part of our budget development, a significant part of those grants are generated from those taxes. We have three grant funding meetings a year to review various proposals for projects or studies. Sometimes we provide funds to leverage other funds from state or federal programs. SWCD becomes part of the local match.

In the last few years, we have had some funding available for educational grants. SWCD has coordinated those through the WIP. In its 21st year, the WIP has evolved over time as well to include workshops that address the concerns and water education needs of community leaders, attorneys, and real estate professionals in our basins. SWCD matches other entities' contribution dollars for the WIP. The WIP has a separate steering committee that directs its education funding, and we ask that steering committee to look at grant requests and make recommendations to the SWCD board.

Education is an important component of what we do. SWCD oversees a children's water festival geared toward 5th and 6th graders. That event is held annually in the Durango area at Fort Lewis College. We have done it for more than 20 years now, and we have hosted as many as 900 participants. It has been very well received within our basin.

SWCD recognizes the need for professionals to get together to discuss water issues. We hold a water seminar every year. This year will be our 34th year. We generally have 125 to 175 participants from across the state.

John Crotty: What are some of the top challenges the district is facing?

Bruce Whitehead: We have had some significant policy issues over the years. SWCD has been working on a review of a Joint Land Management Plan with the U.S. Forest Service and the Bureau of Land Management for close to eight years, with the goal of protecting our water interests and preserving the ability of our constituents to exercise their water rights. We spent a fair amount of time engaging in those conversations and providing comments on the draft plan. After the draft plan came out, we continued to have concerns and eventually had to pursue an appeal with the U.S. Department of Agriculture. Our concern is that guidelines and standards in the plans will lead to more restrictive criteria being used in the evaluation of special-use permits by the federal agencies.

We have also been very engaged in the development of the Colorado Water Plan. SWCD board members and staff have participated on the San Juan–Dolores Basin Roundtable and the Interbasin Compact Committee, which were developed to assist in the development and review of the water plan.

John Crotty: What are some of SWCD's key concerns with and recommendations for the plan?

Bruce Whitehead: One of our main concerns was meeting future demands in our basin. The district is experiencing rapid growth, which affects irrigated lands and the economy associated with agriculture. Water rights in Colorado are private property rights, and we want to

Participants at the SWCD Annual Water Seminar.

limit the need for the "buy-up and dry-up" of agriculture.

Ultimately, our comments were geared toward protecting west slope interests, including municipal and agriculture supplies. Our basin feels that a big part of the solution for future water demands in Colorado is through statewide water conservation measures and the full development of water resources within the state's respective river basins. This should occur before additional supplies in the Colorado River system are tapped.

One of the issues we have been closely monitoring for a number of years is the limited supply of the Colorado River system and the increasing demands on west slope water. We have to be cautious to not overdevelop those resources, especially where it might trigger interstate compact requirements.

John Crotty: Back in August, the U.S. Environmental Protection Agency (EPA) accidentally released 3 million gallons of wastewater from the Gold King Mine near Silverton into a tributary of the Animas River. How has the mine spill affected the Animas River basin, and what role did SWCD play in the aftermath?

Bruce Whitehead: The Gold King Mine spill was an unfortunate incident that occurred near the headwaters of the Animas River. In terms of water quality, within 30 hours of the spill passing specific test locations, pH and metal content levels were back to what they were prior to the spill. That does not mean, however, that there aren't sediments and metals that deposited in the river. SWCD attended many public meetings after the spill and expressed concerns about water quality and long-term solutions.

Historically, there has been a lot of mining activity in the headwaters of the Animas. Since this is a highly mineralized area, there are also a lot of natural background metals in the water. Because of that, SWCD has historically provided funding for the Animas River Stakeholders Group. The group has been active on the ground, taking on remediation projects where possible. SWCD has also provided funding for the purchase of a small trans-mountain irrigation diversion that ran across an old mining dump area. The ditch was abandoned to improve water quality and to keep the water resources on this side of the divide between the Uncompahgre and Animas Rivers.

The district supports local input and clean up efforts by various stakeholders groups, including the Animas River Stakeholders Group. SWCD also supports good samaritan legislation so that these types of third parties can continue their effort without fear of litigation for someone else's past actions.

The Gold King Mine spill was an unfortunate accident. EPA has acknowledged that it was responsible. I have to say that EPA was trying to do a good thing by improving water quality in the headwaters with some help from local stakeholder groups. While there are differences of opinion over the level of federal involvement, we will continue to work toward supporting local efforts to improve the water quality of the river basins.

John Crotty: How did you get into the water business, and what led you to the district?

Bruce Whitehead: Sometimes there are unknowns as we start down our career path. I am a fourth-generation Coloradoan who grew up in Fort Collins. After graduating with a degree in civil engineering from Colorado State University, I went to work for the Colorado Department of Natural Resources, Division of Water Resources, in the office of the State Engineer. After 12 years in the Alamosa office, where I worked on Rio Grande issues, I transferred to Durango and eventually took on the duties of division engineer. I ended up working for the State for 25 years in total.

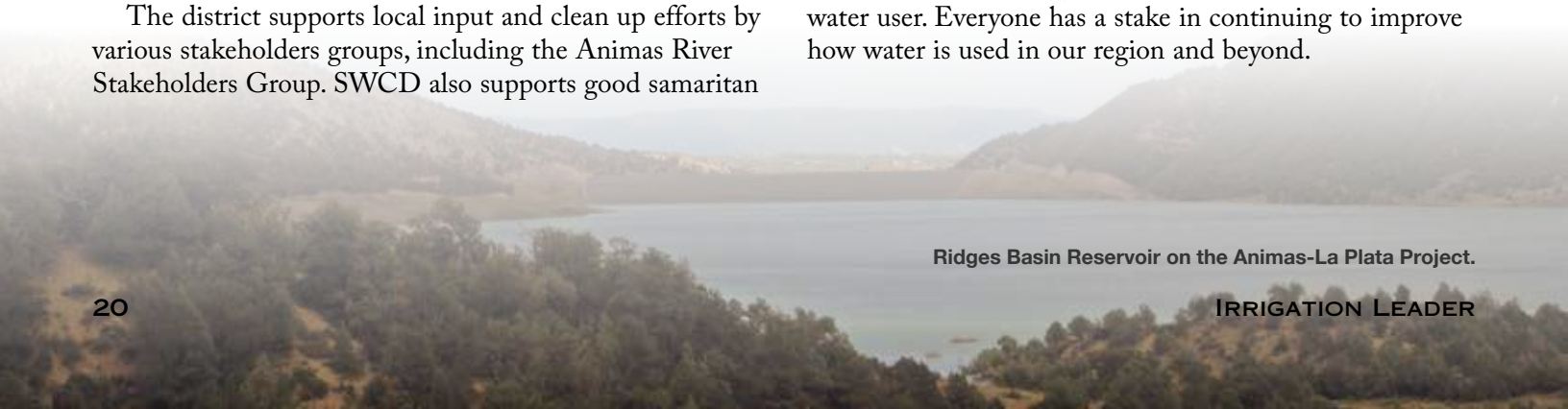
A job opened up with the district at a time when they were restructuring and in need of a new executive director. It was a good time for a change for me, and the job was a good fit. I had a background in policy issues, administrative issues, and water issues.

I also was appointed to the Colorado State Senate in 2009 and served in the General Assembly for a year and a half. I was fortunate that the district was willing to hold my position during the time I served in the Senate.

I have had a multifaceted career, and I am still learning every day.

John Crotty: What kernel of wisdom from your varied career in water would you share with other water managers?

Bruce Whitehead: Water is a limited resource, and you need to use it wisely. That applies to water use, water quality issues, and conservation. While traditionally, the term *water user* has applied to irrigators, everybody is a water user. Everyone has a stake in continuing to improve how water is used in our region and beyond.



Ridges Basin Reservoir on the Animas-La Plata Project.

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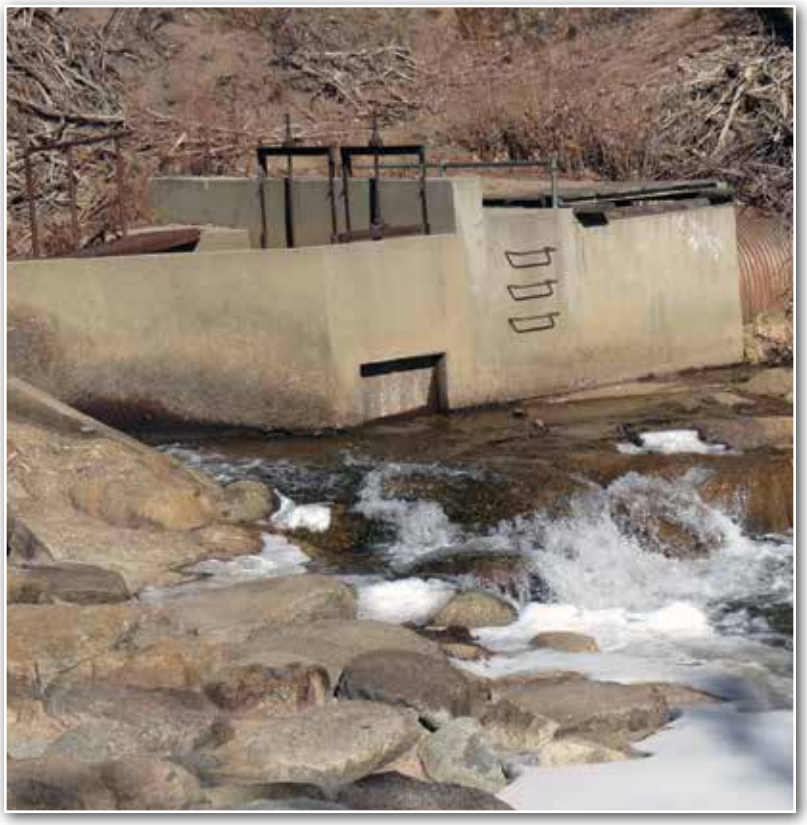
Ditch and Reservoir Company Alliance

By John McKenzie

The Ditch and Reservoir Company Alliance (DARCA) is a nonprofit organization dedicated to serving the needs of ditch and reservoir companies, irrigation districts, lateral companies, private ditch associations, and private ditches. Colorado is a ditch company–oriented state—there are only 14 traditional irrigation districts. Back in 2001, at a time when there was a need for ditch companies to work together and help one another, DARCA was formed to provide a forum for companies on the east and west slope to talk and learn from one another. It is also a vehicle for advocating for the issues most important to its members.

Ditches first and foremost provide water to farmers. Ditch companies, however, have constructed a landscape that did not exist before, creating corridors for plants and wildlife and, ultimately, people. These constructed landscapes are a real value for communities. DARCA promotes what the ditches do for the community. Ditch companies are more than a means to deliver water, but an organization that plans for the shareholders, the service area, and the surrounding communities.



Farmers Ditch Diversion on Boulder Creek.

Addressing the Issues Facing the Modern Ditch Company

Ditch companies are under pressure from urbanization. There is competition for their water and increased costs of delivering water. As rural areas become more populated, ditch shareholders consider selling water out of the system. DARCA works to address urbanization challenges so ditch companies can spend their time running water rather than spending money on the transaction costs of working around Colorado's growing population.

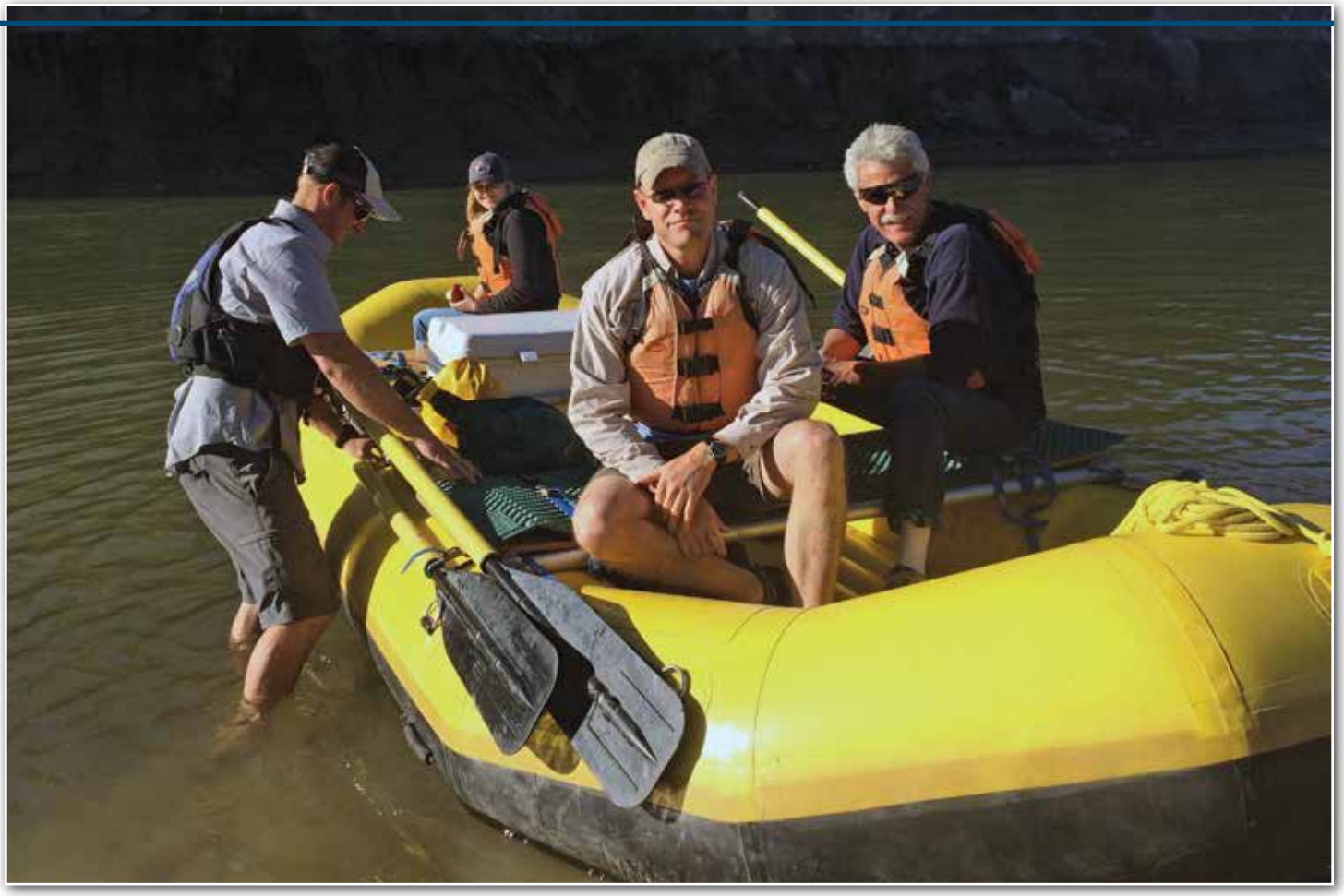
One way we have done this is to focus our advocacy at the local level—cities and counties. We developed DARCA model land use codes for use at the local level. Our codes help ditch companies by describing easements more formally, prohibiting the building of structures within easements, and generally giving the ditch companies a bigger voice in the development process. We are all about solving problems with practical solutions.

Many Colorado ditch companies are rich in assets but cash poor. They struggle with financial viability, lacking the money to make system improvements and to protect their assets. The costs of ditch operation and maintenance continue to rise, while funding sources diminish. While companies can still access improvement funds via the Colorado Water Conservation Board, it is difficult for companies to obtain commercial loans. DARCA is currently investigating the use of social funds to tap into groups that may be interested in environmental and agricultural issues and investing in ditch companies.

Educating Our Members

DARCA holds workshops to educate its members on a variety of topics ranging from GIS to real estate law to financing. In fact, we are holding four workshops on our local land use codes. I get input from my members, call on local experts, and then the experts deliver the content.

This December, we are holding workshops on water transfer methods that serve as an alternative to "buy and dry." While alternative transfer methods are good tools, individual water rights holders may find them too costly or too complex to undertake.



This past September, DARCA members and water experts participated in a two-day summit focused on treatment options for invasive weeds and phreatophytes as well as riparian health, and included a float down the Colorado River.

DARCA is exploring the possibility of helping ditch companies put deals together to undertake alternative transfer methods.

DARCA wants to see healthy ditch companies and healthy agriculture in Colorado. We are not supportive of buy and dry actions or raiding the agriculture sector for its water. However, we are willing to find mutually beneficial solutions.

We just held a workshop on invasive species in Grand Junction with an accompanying float trip down the Colorado River. DARCA's annual convention will be held in Fort Collins in January in conjunction with the Four States Irrigation Council.

DARCA also partners with agencies and research institutions to explore areas of interest to ditch companies. For example, we worked on a project with Colorado State University's Department of Civil and Environmental Engineering to help develop and disseminate ditch company–specific spreadsheets. We also solicit grant funding for our own research projects.

Weighing In on the Colorado State Water Plan

The Colorado State Water Plan involves recommendations for projects and behavior changes to help ensure that we have enough water in 2050. DARCA has been involved with gathering and submitting our members' input into the plan. Last year, we held a series of workshops around the state to talk to farmers about their experiences and concerns. The list of recommendations that resulted from those workshops focuses on sustaining ditch company viability and implementing evidence-based solutions.

John McKenzie is the executive director of the Ditch and Reservoir Company Alliance. He has been involved with agricultural and water issues for most of his career and lives on the 80-acre farm in Boulder County that has been in his family since 1893. You can reach Mr. McKenzie at john.mckenzie@darca.org or (970) 412-1960.

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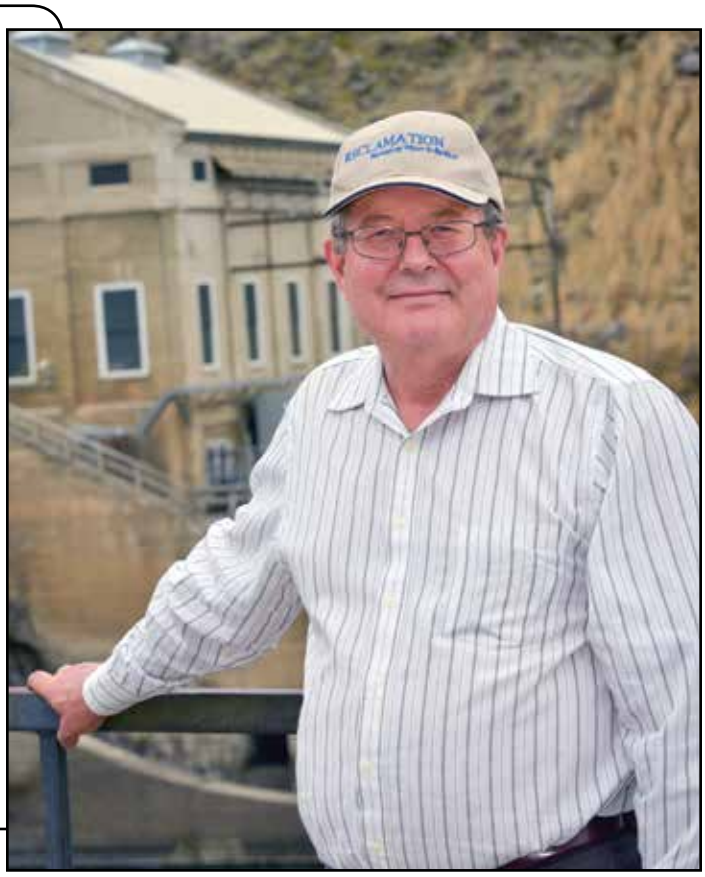
Jerry Gregg, Snake River Area Office

Reclamation's Snake River Area Office (SRAO) oversees Reclamation services in eastern Oregon, Idaho, and western Wyoming. With its headquarters in Boise, Idaho, the SRAO manages 25 dams and reservoirs to deliver water to more than 30,000 farms and 5 powerplants to generate 0.82 gigawatt-hours of power annually. Irrigation in the region has a long history. This year, Reclamation and the irrigation districts of the Treasure Valley celebrated the 100th anniversary of the completion of the 350-foot-tall Arrowrock Dam.

For more than 25 years, the career of SRAO Manager Jerry Gregg has intertwined with Arrowrock Dam and he irrigation projects along the Boise and Snake Rivers. Mr. Gregg grew up in South Dakota and was drafted into the U.S. Army after graduating from college. He made his way up the managerial ranks within Reclamation, eventually landing at the SRAO. October 2015 marked his final official month at the office. Irrigation Leader*'s senior writer, John Crotty, looked back with Mr. Gregg at his career and looked ahead to what water managers will need to do their job in the future.*



John Crotty: How did you get started with Reclamation?

Jerry Gregg: This spring marked 40 years with Reclamation. When I was in college my junior and senior year, some of my professors were on contract with Reclamation. They encouraged me to interview with Reclamation before I went into the U.S. Army. Luckily, when I got out of the Army, Reclamation was hiring again.

I started with Reclamation in June 1975. I started off in Redfield, South Dakota, at a small drainage office that was part of the Oahe Project. I spent three years there, classifying soils and designing underground drains. I wanted to broaden my experience, so I transferred to Bismarck, North Dakota. They were planning the Garrison Project at the time, so, with a few other engineers, I started the Irrigation Management Services Program.

From there, I transferred to Casper, Wyoming, to lead water operations on the North Platte Project. Working with water users in multiple states was a great experience for me. The North Platte River is under a U.S. Supreme Court decree, with waters divided up among Colorado, Nebraska, Wyoming, and the federal government.

Just when I started getting used to the wind, I headed down to Socorro, New Mexico, to head up the Socorro field division, where I supervised about 65 people. The Rio Grande and the Colorado are the two rivers in which Reclamation has the authority to work in the river system. I gained a lot of experience in the operations and maintenance fieldwork Reclamation did due to the flood control dykes and channelization all the way from southern Colorado to the New Mexico–Texas border.

John Crotty: When did you arrive at the SRAO?

Jerry Gregg: In October 1987, I became the project superintendent of the Central Snake Project Office (CSPO). In 1994, the CSPO and the Minidoka Project Office merged to become the SRAO. I held the position of area office manager until October of this year.

I have had a great career with Reclamation. The SRAO has contracts with 90 irrigation districts and 6 power plants that deliver power to 11 irrigation districts. One of the most positive perks of the job has been getting out and working with the water users to help them address the issues in front of them.

More than 70 people attended the Arrowrock Dam Centennial celebration on Friday, October 9, including (left to right): Lee Juan Tyler, vice chairman, Shoshone-Bannock Tribes; Reclamation Regional Director Lorri Lee; Jerry Gregg; Idaho Lieutenant Governor Brad Little; U.S. Army Corps of Engineers Lieutenant Colonel Timothy Vail; Layne Bangerter, representing Senator Mike Crapo; Boise Project Board of Control Chairman Will Patterson; Mike Roach, representing Senator Jim Risch; and Travis Jones, representing Congressman Mike Simpson. Photo credit: Reclamation, David Walsh.

John Crotty: What are some of the biggest changes that you have seen over the years as area manager?

Jerry Gregg: Aging infrastructure—quite a few of our facilities are 60 to 100 years old. A lot of the gates and valves and components are getting to the useful end of their lives. In addition, the SRAO and its partners just celebrated the 100th anniversary of the completion of Arrowrock Dam.

Here in the Treasure Valley, we have had tremendous growth. When my wife and I moved here in 1987, there were 200,000 people in the valley. Now there are 600,000 people. Urbanization has created challenging problems for water managers.

About of one-third of our budget is for endangered species, from salmon issues to bull trout to the western yellow-billed cuckoo and Snake River physsa, a very small snail located on the mid-Snake River. We have had to adapt to dealing with the U.S. Fish and Wildlife Service and NOAA [National Oceanic and Atmospheric Administration] Fisheries for biological opinions so we don't interrupt deliveries to irrigation districts.

I also think changes in weather patterns and climate change have been significant. This last year, we started out with above-average precipitation and snowpack on the Boise and Upper Snake Rivers, but we ended up with a 45 to 50 percent supply. Much of our precipitation is coming in the form of rain, not snow. The Owyhee basin is in its fourth year of drought, and the supply this year was just 25 percent of normal. Our water operations folks have really had to adapt to increased variability in the springtime.

Finally, Reclamation is a much smaller agency. When I first started, there were 8,500 employees; we are now down to 5,100. While I think we are more cost effective, we don't have the depth we used to have. That has put a lot pressure on our employees.

John Crotty: What are you most proud of in your role as area manager?

Jerry Gregg: I grew up on an irrigated farm in South Dakota. My grandfather farmed and my dad farmed. I am most proud of the relationship with the irrigation districts and managers.

It is tough for irrigation district managers: They face complex financing for their projects, more regulation, and changing technology. A lot of farmers are marketing worldwide. Expectations for service are extremely high. So it has been valuable to be able to connect with them and help them solve their issues.

John Crotty: Looking back over your career, which project or projects stand out as most memorable?

Jerry Gregg: One project that stands out is the Minidoka Dam spillway that we recently completed with the Burley and Minidoka Irrigation Districts. The old spillway was 2,700 feet long and had 291 stop-log bays that were used for river regulation. During the construction project, we straightened out the spillway, added 12 radial control gates, and eliminated an aging stop-log water control system that was very labor intensive and expensive to operate and maintain.

Right now, the SRAO has quite a few projects going. One important project involves rehabbing hydroelectric units at Minidoka. As I mentioned, there are 11 irrigation districts that get power at cost for their large pumping plants. Having reliable power at a very reasonable cost is crucial for district operations.

John Crotty: What advice do you have for an up-and-coming Reclamation manager?

Jerry Gregg: I would encourage all Reclamation managers to go out and meet their irrigation district peers and start making those connections. It is very helpful to know how they operate and what their issues are. Make use of the John Keys Partnership Program, through which a number of Reclamation employees partner with irrigation districts each fall to see how they operate and maintain their canals and water delivery systems.

I was very lucky to have some excellent mentors, such as Charlie Calhoun, Roger Patterson, John Keys, and others. When I started out, my boss took me out to get to know our irrigation districts well before I became a manager.

John Crotty: What advice do you have for irrigation districts or water users who want to work with the Reclamation?

Jerry Gregg: Build a strong relationship. Make sure you understand the processes that govern the agency for which you are working. Once you have done that, you are a long way down the road. We have had great successes in our region because the irrigation districts can bring a lot of practical experience to the table. We are an organization of engineers and scientists, and we can bring those skills to the table. Irrigation district managers and board members, however, are much more apt to borrow a good idea from their neighbor than they are from a government agency. Sharing those best practices is how we advance together.

When it was constructed in 1915, Arrowrock Dam was the tallest dam in the world.

Measuring Success in the Upper Big Blue Natural Resources District

Managing groundwater in times of shortage is a challenge for any water district. For Upper Big Blue Natural Resources District in eastern Nebraska, which covers 1.2 million groundwater-irrigated acres, diligent groundwater management practices have helped ensure long-term water supplies and avoid conflicts between water users.

In 1977, after considerable study, Upper Big Blue identified significant groundwater table declines. In early 1979, its board adopted the district's first set of rules and regulations. Those rules have gone through multiple iterations over the decades to accommodate changes in technology and agriculture.

The Upper Big Blue measures 500 observation wells throughout the district each spring. If groundwater levels hit a specific level, water users report water use and certify irrigated acres and the number of active wells. If the groundwater table drops below 1978 levels, allocations are instituted. Upper Big Blue manages and enforces the rules and regulations pertaining to well spacing, permits, and registration.

METERING PROGRAM

All wells have to be permitted, and new well construction requires meters. According to Rod DeBuhr, Upper Big Blue assistant manager, "We encouraged metering for a long time. During the drought of 2012 and 2013, our board determined that we were getting close to our allocation trigger and needed to be ready for it. We required meters for all wells pumping 50 gallons per minute or more by the beginning of 2016."

There are roughly 7,000 meters logged into Upper Big Blue's system now. Mr. DeBuhr recalled that when the district started requiring meters in 2004, implementation was a struggle for the board. "We first heard a lot of reasons why people did not want to meter wells, but that mindset has shifted. Now it is not viewed as just a requirement."

The expense of meters is borne by the farmer. Marie Krausnick, Upper Big Blue water department manager, explained that mechanical meters can run anywhere from $1,000 to $1,200, while electronic meters can cost upward of $1,800. Those prices usually cover installation. While more expensive per meter, some of the electronic meters actually require less straight pipe distance, so the cost of installation is reduced.

A typical meter install and register.

Upper Big Blue has a list of approved meters that farmers can use. According to Ms. Krausnick, "McCrometer has about 80 percent of the market share. It helps that they are built in Aurora, within our district."

In the past, Upper Big Blue ran a voluntary cost-share program for eight years. For the first four years of the program, the district supported it with $900,000 from a Nebraska Environmental Trust grant. Once that money ran out, the district continued with funds at a local rate. When it was apparent that metering would become mandatory, the district phased out the cost-share program.

METER MAINTENANCE

Upper Big Blue also runs a meter maintenance program. It hires a company to check every meter in each of its five quadrants to make sure they are functioning properly. The district notifies landowners if there is a broken meter and shares the cost of repair with them. Every four years, the district replaces batteries in electronic meters. The farmer has to pay for the battery cost but not for the labor and time associated with installation.

ADDRESSING WATER QUALITY

Several years ago, the district implemented a program to address nitrate issues in its groundwater. Overirrigation flushes nitrates out of the root zone into the groundwater. So, in areas where there are high levels of nitrates, the district requires farmers to use soil moisture sensors in at least one of their irrigated fields. Irrigators in Upper Big Blue have installed soil moisture sensors across 100,000 acres to aid farmers with irrigation scheduling. According to Mr. DeBuhr, "It has also helped farmers learn to get by with less water." Over the last two years, Upper Big Blue farmers averaged 7 inches of water for irrigation.

Upper Big Blue has a small lab in the office, and anyone who wants to have water tested for nitrate and bacteria can do so—free of charge. The district's aquifer is complex; in many areas of the district, domestic wells are dug into a shallow aquifer contaminated with high nitrates. However, there is a deeper aquifer, with lower levels of nitrates, out of which irrigation wells pump. That complicates the issue a little bit as far as getting credit for contaminated groundwater.

THE POWER OF DATA

Data collection has been instrumental in Upper Big Blue's groundwater management. As Ms. Krausnick states, "The district has years' worth of water level and water quality data that other districts are just beginning to collect. Having those numbers there for your governing body helps it to make management decisions and helps reinforce that the decisions it is making are the right ones."

Mr. DeBuhr explained that the Upper Big Blue board required mandatory water use reporting 9 years ago, "not only because it thought the farmers needed to know what they were pumping, but because the public needed to know what it was using. We didn't know how much they were pumping, so how could we set an allocation if we did know what the needs were? The data showed what was really happening—while the legislature was referencing 20 inches of water per acre, our producers were only using 4 or 5 inches."

Installing soil moisture sensors.

THE BIG PICTURE

Ms. Krausnick points out, "Agriculture is evolving at a very rapid rate. We are seeing a real push right now with seed genetics, irrigation delivery, and fertilizer delivery. Upper Big Blue is poised to move with agriculture rather than trying to catch up from behind." That is where the power of comprehensive data fits into the picture. Mr. DeBuhr advises districts to "be proactive and don't wait for a problem." That is what Upper Big Blue did 30 years ago.

Manufacturing Solutions for Water Providers: Obermeyer Hydro, Inc.

Headquartered in northern Colorado, Obermeyer Hydro has manufactured hydropower and water-control equipment for more than 25 years. The company provides hydropower and water-control equipment as well as inflatable rubber structures for industrial applications, including pneumatically operated spillway gates, rubber dams, drive-over water control gates, adjustable whitewater features, water turbine equipment, and inflatable seals for tunnel-boring applications.

The company's primary focus has been the manufacture of pneumatically operated water-control gates, products that, prior to Obermeyer's development, did not exist. Back in the late 1980s, company founder Henry Obermeyer identified a need in the market for a more robust rubber dam. At the time, rubber dams had inherent operational limitations in terms of stability and damage resistance. There were no strong options to cross a spillway. The company has focused on that market ever since.

This past October, in celebration of National Manufacturing Month, Agriculture Secretary Tom Vilsack (seen here with Henry Obermeyer) toured Obermeyer Hydro's plant in Wellington, Colorado. *Photo credit: Patti Finke, U.S. Department of Agriculture*.

BUILDING EXPERIENCE

Mr. Obermeyer grew up on a farm in Colorado, where damming and diverting water for irrigation was a daily activity. He studied mechanical engineering as an undergraduate at the Colorado School of Mines and graduated with a master's degree in metallurgical engineering. After graduation, he went to work for a Connecticut manufacturer of gears and aircraft parts with one of its plants located on the Farmington River. This provided an opportunity to rebuild a turn-of-the-century water turbine in his spare time. The horizontal-shaft, cylinder-gate Francis turbine with a leather belt drive got him into the turbine business. For Mr. Obermeyer, "It was fascinating." That experience eventually led him to start Obermeyer Hydro.

MANUFACTURING TURBINES

Mr. Obermeyer licensed out his early hydropower turbine patents in the 1990s because of the then slow pace of new hydropower development in the United States. The last of the early patents expired in 2008, along with the patent license and its noncompete clause.

The company has since focused its hydropower turbine activities on new and improved designs protected by recently issued and pending patents. These turbines are configured like submersible pumps, but with integral shut-off valves on each turbine. They can be stacked side by side and one atop the other to accommodate varying river flows. Variable speed operation allows a few standard designs to cover a head range of roughly 10 to 100 feet. According to Mr. Obermeyer, arrays of such machines require much

less space than conventional hydropower turbines of similar installed capacity and can often be installed into existing outlet structures with minimal modification.

The company is currently installing 24 of its turbines at two U.S. Army Corps of Engineers flood control dams on the West River in Vermont for Eagle Creek Renewable Energy. Mr. Obermeyer is providing turbines for a 2.2-megawatt power plant on the Ball Mountain Dam and a 0.9-megawatt power plant on the Townshend Dam. After years of permitting, the turbine installations will help the State of Vermont achieve its goal of generating 20 percent of electricity from renewable resources by 2017.

Check structures on the Larimer Weld Irrigation Canal in Colorado. The Obermeyer Gate System facilitates controlled water diversion at rivers without fluctuations in diverted flow caused by river flow changes.

INFLATABLE SEALS

Obermeyer Hydro uses its design and manufacturing capacity to help out other industries. Mr. Obermeyer noted, "Our tunnel boring machine seals serve the same purpose as blow-out prevention valves on oil wells. When you are drilling horizontally below the water table, the mud is under pressure and it wants to blow out. Our inflatable seals keep the mud in the tunnel and minimize the risk of damage to structures above or adjacent to the tunnel. We sell most of these to [a company,] Microtunnelling Inc." The seals have been used in the Brightwater Project in Seattle and for the Toronto subway system.

INFLATABLE CHANNEL FLOW CONTROL GATES

Mr. Obermeyer's inflatable gates employ a steel shield in front of an inflatable air bladder. The design and manufacture of the bladders are similar to that of automobile tires. For Mr. Obermeyer, "The bread and butter of our gate manufacturing involves reinforcement with polyester tire cord. The lifetime of those products is 20 to 40 years, and the current generation is made of far better materials." The company has also built some using DuPont Kevlar. Mr. Obermeyer manufactures gate panels with epoxy-coated, galvanized steel plates or stainless steel plates.

Mr. Obermeyer stresses the advantages of inflatable gates. "If you are doing a river diversion, you can construct a row of piers across the river to support slide gates or radial gates, or you can put in a rubber dam or our pneumatic gates. Our gates limit river obstructions and provide more precise regulation and better damage resistance than rubber dams. A rubber dam has an overtopping limit above that it bounces around and requires deflation. Our pneumatic gate can be operated at any position with any amount of overtopping because of its hydraulic characteristics. If you have an open channel and you are trying to control it, we can help."

SOLUTIONS AT HOME AND ABROAD

Obermeyer Hydro focuses much of its marketing internationally, with completed projects in 25 countries. In fact, most of its sales volume is in exports. The company manufactures almost all components for overseas projects in the United States, but it locally sources expensive-to-ship items, such as steel fabrications and iron castings.

The company has been able to build on its success abroad. This past October, U.S. Department of Agriculture Secretary Tom Vilsack toured Obermeyer Hydro's facilities. The department has provided the Obermeyer Hydro with assistance through its Business and Industry Loan Guarantee Program, which guarantees loans for rural businesses. The guarantee has helped Obermeyer Hydro expand its capacity to support a growing volume of projects in the United States and abroad.

For more information about Obermeyer Hydro and its products, visit http://www.obermeyerhydro.com or call (970) 568-9844.

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4th ANNUAL
IRRIGATION LEADER OPERATIONS and MANAGEMENT WORKSHOP

Sponsored by *Irrigation Leader* Magazine

Phoenix, Arizona — January 27-28, 2016

***IRRIGATION LEADER* magazine** is sponsoring the 4TH Annual Operations and Management Workshop with a theme of "Security: Protecting Personnel, Water, and the Bottom Line." The purpose of the workshop is to provide an opportunity for General Managers and Directors of irrigation districts to discuss and exchange information on a variety of district operational and management-related issues, build out-of-state working relationships, and learn from their peers. The issues and topics will be selected by general managers and board directors and will pertain directly to the management and improvement of irrigation districts. Discussions will feature case studies with general managers sharing their experiences alongside product or service vendors who were directly involved.

AGENDA

WEDNESDAY, JANUARY 27

Morning Training Sessions

8:30-10:00 am	Situational Awareness and Basic Defense
10:00 am	Break Sponsored by TruePoint Solutions
10:30-12:00 pm	Managing Crisis with a Media Plan

Afternoon Program

1:00 pm	Basic Security for Irrigation Districts and Water Agencies
2:00 pm	Active Shooter Plans
3:00 pm	Ice Cream Sundae Break Sponsored by Van Ness Feldman
3:30 pm	Managing Stress and Conflict Resolution
4:30 pm	Conjunctive Use: Managing Ground and Surface Water Supplies Together
5:30 pm	Reception Sponsored By Diamond Plastics

THURSDAY, JANUARY 28

8:00 am	Project Title Transfer: Advantages and Process
9:00 am	Prospering With Limited Water: Israel and Australia
10:00 am	Break Sponsored by Watertronics
10:30 am	Public Outreach: Delivering Your Message with Radio and TV
11:30 pm	Public Outreach: Value of Hiring Teachers During Summer Break
12:00 pm	Lunch Sponsored by Roosevelt Water Conservation District
1:30 pm	Financing Hydro Development
3:00 pm	Break Sponsored by Intertape Polymer Group (IPG)
3:30 pm	Preventing Debris While Pumping Out of Rivers and Canals
4:00 pm	Saving Water By Combining Pivot Mobility with Drip Efficiency
4:30 pm	Open Forum Topics Include: • Working with/training bilingual workforce • Acquiring easements/rights-of-way • Retaining workers • Union negotiations
5:30 pm	Reception Sponsored by Wells Fargo Insurance Services & Clear Risk Solutions Australia Irrigation Education Tour (February 20-28, 2016) Door Prizes Sponsored by *Irrigation Leader Magazine* and Rubicon

ONLINE REGISTRATION: Registration for the Operations and Management Workshop is located at www.WaterStrategies.com. Please complete and submit the online form as soon as possible as space will be limited. Should you have a particular topic you would like discussed during the Open Forum at the meeting, please add it to the registration form in the space provided. Should you have other ideas for the workshop, please share those as well. Updates of the agenda will be provided as registrations are received.

HOTEL RESERVATIONS: We have reserved a block of rooms at the Crowne Plaza Phoenix Airport Hotel located at 4300 East Washington Street, Phoenix, Arizona 85034. The hotel has availability at $139.00 per night plus tax. Your reservation includes a complimentary **full "Express" breakfast**, complimentary 24 hour airport shuttle service, complimentary wireless Internet service, and complimentary Valet parking for registered guests with in and out privileges. To make or confirm your reservations at the special Irrigation Leader rate, please call **1-855-586-8475** and identify yourself with the Irrigation Leader group no later than **Sunday, December 27.**

Please tell the agent that you are attending the Irrigation Leader Workshop to obtain this special rate.

QUESTIONS: Please contact Kris Polly by phoning **(703) 517-3962** or by e-mailing **Kris.Polly@WaterStrategies.com**.

Thank you for your time. We hope to see you in Phoenix.Thank you for your time. We hope to see you in Phoenix.

Irrigation Leader

2015/2016 CALENDAR

November 4–6	National Water Resources Association, Annual Conference, Denver, CO
November 17–20	United States Committee on Irrigation and Drainage, Emerging Issues in Water Management Governance, Albuquerque, NM
November 19–20	Idaho Water Users Association, 32nd Annual Water Law Seminar, Boise, ID
November 22–24	Nebraska Water Resources Association and Nebraska State Irrigation Association, Joint Convention, Kearney, NE
December 1–4	Association of California Water Agencies, Fall Conference and Exhibition, Indian Wells, CA
December 1–4	Oregon Water Resources Congress, Annual Conference, Hood River, OR
December 2–4	Washington State Water Resources Association, Annual Conference, Spokane, WA
December 9–11	North Dakota Joint Water Convention and Irrigation Workshop, Bismarck, ND
December 16–18	Colorado River Water Users Association, Annual Conference, Las Vegas, NV
January 12–13, 2016	National Water Resources Association, Leadership Forum, Las Vegas, NV
January 13–15, 2016	Ditch and Reservoir Company Alliance and Four States Irrigation Council, Joint Annual Meeting, Fort Collins, CO
January 20–21, 2016	Idaho Water Users Association, Annual Convention, Boise, ID
January 27–28, 2016	*Irrigation Leader* magazine, Operations and Management Workshop, Phoenix, AZ
February 3–4, 2016	Texas Water Conservation Association, Texas Water Day, Washington, DC
February 18–19, 2016	Family Farm Alliance, Annual Conference, Las Vegas, NV
February 23–25, 2016	Association of California Water Agencies, 2016 DC Conference, Washington, DC

For more information on advertising in *Irrigation Leader* magazine, or if you would like a water event listed here, please phone (703) 517-3962 or e-mail Irrigation.Leader@waterstrategies.com. Submissions are due the first of each month preceding the next issue.

Past issues of* Irrigation Leader *are archived at

www.WaterAndPowerReport.com