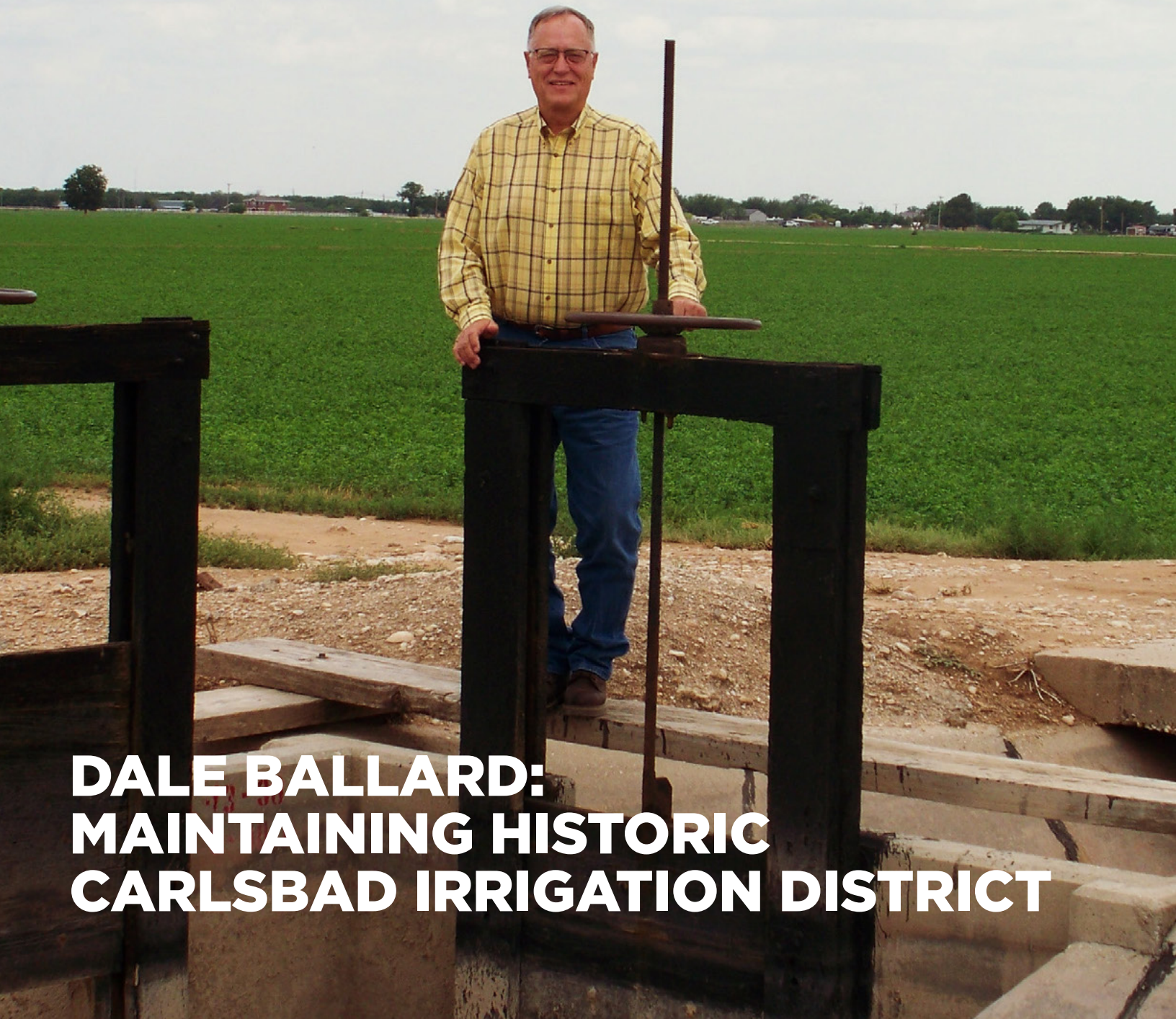


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VOLUME 10 ISSUE 8

SEPTEMBER 2019



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# Irrigation Leader

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#### COVER PHOTO:

Dale Ballard, Manager of Carlsbad Irrigation District.  
Photo courtesy of CID.

#### Coming soon in *Irrigation Leader*:

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Do you have a story idea for an upcoming issue? Contact our editor-in-chief, Kris Polly, at [kris.polly@waterstrategies.com](mailto:kris.polly@waterstrategies.com).

# Irrigation in the Land of Enchantment

By Kris Polly

New Mexico has some of the nation's oldest Reclamation infrastructure. Today, it has some of the nation's most sophisticated groundwater monitoring activity. Its arid landscape is also an ideal location to grow pecans, cotton, and alfalfa. This month's *Irrigation Leader* looks at the state's irrigated agriculture from a number of perspectives.

In our cover story, Dale Ballard tells us about historic Carlsbad Irrigation District (CID), of which he is manager. CID was founded in the first years of the 20th century by early New Mexico pioneers. Today, much of its infrastructure is over a century old. CID is fighting to maintain its infrastructure, supply its farmers, and meet interstate water delivery requirements.


We also speak with two hydrology experts from Elephant Butte Irrigation District (EBID). Patrick Lopez, EBID's SCADA Systems director, describes the remote telemetry units and gravity meter that the district is using to precisely monitor and measure its surface and groundwater. And Dr. Erek Fuchs tells us about the sophisticated analysis the data provided by this monitoring allow him to do.

Phil Ball of Situational Awareness Institute has a new online training course that allows irrigation districts and

other agencies to prepare their staff for security threats and conflictual situations.

In our Irrigated Crop section, we feature Greg Daviet, whose New Mexico family farm produces a sought-after crop well suited to New Mexico's climate: pecans.

Finally, it is with sadness that we publish an obituary of Warren R. Morgan of Quincy, Washington. Warren will be missed by all who knew him.

This month's issue of *Irrigation Leader* demonstrates that exciting things are happening in the great state of New Mexico. New Mexico irrigation has a proud history, a technologically sophisticated present, and a bright future. I hope you enjoy learning more about it. 

*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](mailto:kris.polly@waterstrategies.com).*

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# Maintaining Historic Carlsbad Irrigation District



The headgate of McMillan Dam, pictured in 1906.

**C**arlsbad Irrigation District (CID) was one of the earliest U.S. Reclamation Service projects and dates back to the turn of the 20th century. The town of Carlsbad, New Mexico, grew up around the project and the agriculture it enabled. The project has been updated several times over the years—notably with the Brantley Dam and Reservoir in the late 1980s—but much of its infrastructure is a century old.

*In this interview, CID Manager Dale Ballard speaks with Irrigation Leader Editor-in-Chief Kris Polly about the challenges of updating and maintaining this historic system in the desert landscape of New Mexico.*

**Kris Polly:** Please tell us about your background.

**Dale Ballard:** I was born and raised in Eddy County, where CID lies. My family has been in the agriculture business there for four generations. I completed a career in education: I spent 23 years in the classroom as a teacher and 10 years as a building principal. I retired in 2014 and accepted this position with the district. I did not have any experience in water management; the transferable skills were creating and balancing budgets and working with the State of New Mexico through the Department of Finance. Of course, I was familiar with the district, because even though I did not go into the farming business, my family was involved in it and I grew up working on farms in the area. I've been at the irrigation district for 5 years now, and I'm actually set to retire at the end of this water season, on October 31, 2019.

**Kris Polly:** Please tell us about CID and its history.

**Dale Ballard:** CID was one of the first projects of the U.S. Reclamation Service, later the Bureau of Reclamation, and was built at the turn of the 20th century, when Teddy Roosevelt was president. It started as a land speculation company and was founded by pioneers including Charles W. Greene, Robert Weems Tansill, and James John Hagerman. They thought they would be able to make a lot of money by developing farmland. However, the Pecos River system is flashy, and they weren't prepared for the flooding that occurred in the late 1800s and early 1900s. After it wiped them out two or three times, they went to Reclamation, which took over the project after the flood of 1904. Reclamation rebuilt Avalon Reservoir and then did some work on McMillan Reservoir. In 1935, another reservoir was built upstream around Fort Sumner to help it hold water for Carlsbad and to create a better supply for the Fort Sumner Irrigation District. In the 1980s, McMillan Dam was beginning to silt in, so Reclamation built Brantley Dam in the to replace it. Brantley came online in the late 1980s and McMillan Dam was breached. Those are the primary components of the system we have today. There is another dam, Santa Rosa Dam, which was built by the U.S. Army Corps of Engineers. It is not a Reclamation dam—it's just for flood control on the upper Pecos—but it does store water for us.

**Kris Polly:** Please tell us about the district's services today.

**Dale Ballard:** We've got about 650 users who range from a quarter of an acre to thousands of acres. We service a little



Upstream of Avalon Dam.

over 25,000 acres of water rights attached to land. On any given year, there are probably 16,000–17,000 acres being farmed in the district.

During the 1990s, the New Mexico Interstate Stream Commission (ISC) was leasing water in order to meet the state line delivery requirements to Texas under the 1947 Pecos River Compact. ISC later purchased about a little over 4,600 acres of land within CID. The water that would have been diverted for farm delivery to the land ISC purchased is instead diverted directly into the Pecos River for state line delivery. However, ISC does not require CID to divert water to the Pecos River in extremely dry years when the amount of water available for delivery to CID farms is less than 50,000 acre-feet. ISC also does not take delivery of its water in years in which the river master determines that state line delivery has met a certain threshold. In the years ISC does not take delivery of its water, that water is available for use by CID farmers.

**Kris Polly:** What are the main crops in your area?

**Dale Ballard:** Alfalfa and cotton are the main ones. Pecan orchards have started to pop up in the district over the last 20 years. There are also grains, corns, and other specialty crops grown for particular markets, but alfalfa and cotton continue to be the main crops.

**Kris Polly:** Is your water all surface water?

**Dale Ballard:** Yes. However, up until the early 1970s,

the farmers were able to apply to the state engineer for permission to drill supplemental wells for years when there was not a full allotment. Not every farm has supplemental wells, however. On the southern end of our district, there are also about 1,000 acres that are supplemented with water from the Black River, which is a tributary of the Pecos. Other than that, it's all Pecos River water.

**Kris Polly:** What is your total diversion?

**Dale Ballard:** The total number of acres that we have rights to is 25,055. Depending on what's in the reservoirs each year, we can allot up to 3.697 acre-feet per acre.

**Kris Polly:** How many employees does the district have?

**Dale Ballard:** We have operations and maintenance (O&M) agreements with Reclamation for Avalon, Sumner, and Brantley Dams and Reservoirs. We have 6 employees for those sites. We have about 25 more employees if we've got full crew. Over the last couple of years, with the oil and gas boom down here, we have been struggling to compete with the oil and gas industries on wages, so we haven't had a full crew for several years. We have about 30 employees if we are fully staffed.

**Kris Polly:** What are your district's top issues and priorities today?

**Dale Ballard:** One of the dams that we have an O&M contract for, Avalon Dam, is about 115 years old. Sumner Dam was completed in 1935, so it's approaching 100 years of age. The newest Reclamation dam that we have an O&M agreement for is Brantley, which came online in the late 1980s, I think in 1988. The aging infrastructure is a huge issue. When it comes to repairs, most of our money comes from assessments that we charge the farmers. If we raise our assessment by \$1 per acre, we raise \$25,000. That just doesn't go very far when you're talking about major projects like replacing cylinder or radial gates that are over 100 years old. The radial gates for flood control at Sumner are close to 100 years old. It is a big challenge to try to keep those up and running and up to Reclamation's expectations.

**Kris Polly:** What kind of funding strategies have you looked into?

**Dale Ballard:** We've looked into WaterSMART grants from Reclamation. We've also just completed a couple of projects using a product called Aqualastic to repair sections of our main canal. Every winter, we try to address the needs of the system that we've identified during the water season. We're partnering with Reclamation to work on the cylinder gates at Avalon, since their flood control function was made obsolete when Brantley was built upstream. We plan to reengineer



The main canal at CID's lateral 12.

and remove those gates and do something different with the structure. Each year, we try to chip away at Reclamation's O&M recommendations as we are able. We try to keep those needs to a minimum and to keep everything in operating shape. It's always a challenge to work on a structure that's 100 years old. It's like working on the plumbing in an old house: You want to repair a faucet and end up having to replace it, then you have to replace the drywall, and then there's flooding inside the wall. You just can't get replacement parts for some of these old structures.


**Kris Polly:** Have you been affected by drought in recent years?

**Dale Ballard:** The three years prior to my arrival—2011, 2012, and 2013—were all really dry. We had two big rain events in 2014, some of the water from which was caught by the reservoirs. We have actually had full allotment for the last 5 years, even though the drought has affected us. Actually, a big part of the reason that we've been able to have our full allotment is because of ISC, which I spoke about earlier. ISC bought land so that the water could be used for state line delivery, but when those two rain events occurred in 2013 and 2014, a lot of water went across the state line, creating an overage, or credit, you might say, with Texas. As a result, ISC has not taken delivery of its water for the last 3 years. That extra water has allowed us to supplement our supply, so we have been able to meet our allotment.

With the ISC purchase of 4,600 acres of land in the district and the fact that some farmers are letting land fallow,

there are 5,000–10,000 acres each year that are not being cultivated. With this much land not being farmed, sometimes there are not enough orders to maintain a continuous flow in our main canal. When orders drop below 50–70 cubic feet per second, carriage losses go up to 40–50 percent, which is very inefficient. This forces a shutdown of delivery until enough orders are placed to reduce the carriage losses back under a threshold of 25–35 percent. When this happens, farmers do not always get water as quickly as they would like. Crops suffer during these periods.

**Kris Polly:** What is your vision for the future?

**Dale Ballard:** My hope is that within the next 30–60 days, the district is able to find a young, ambitious person who is willing to accept these challenges and to continue to try to rebuild this infrastructure and make it a viable system. The town of Carlsbad was built over 100 years ago around this irrigation system and the farming that surrounds it. There's a lot of history there. I hope that it's able to continue long into the future. 



*Dale Ballard is the manager of the Carlsbad Irrigation District. He can be contacted at [dale.ballard@cidistrict.com](mailto:dale.ballard@cidistrict.com) or at (575) 236-6390.*

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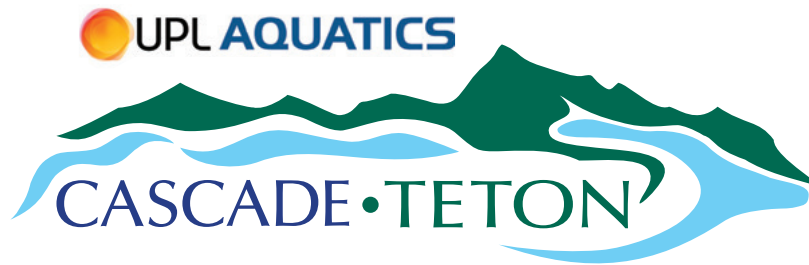
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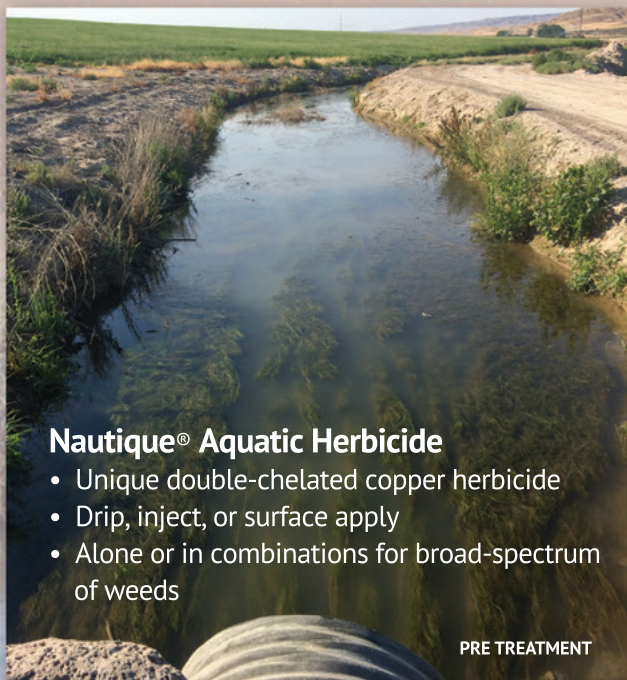
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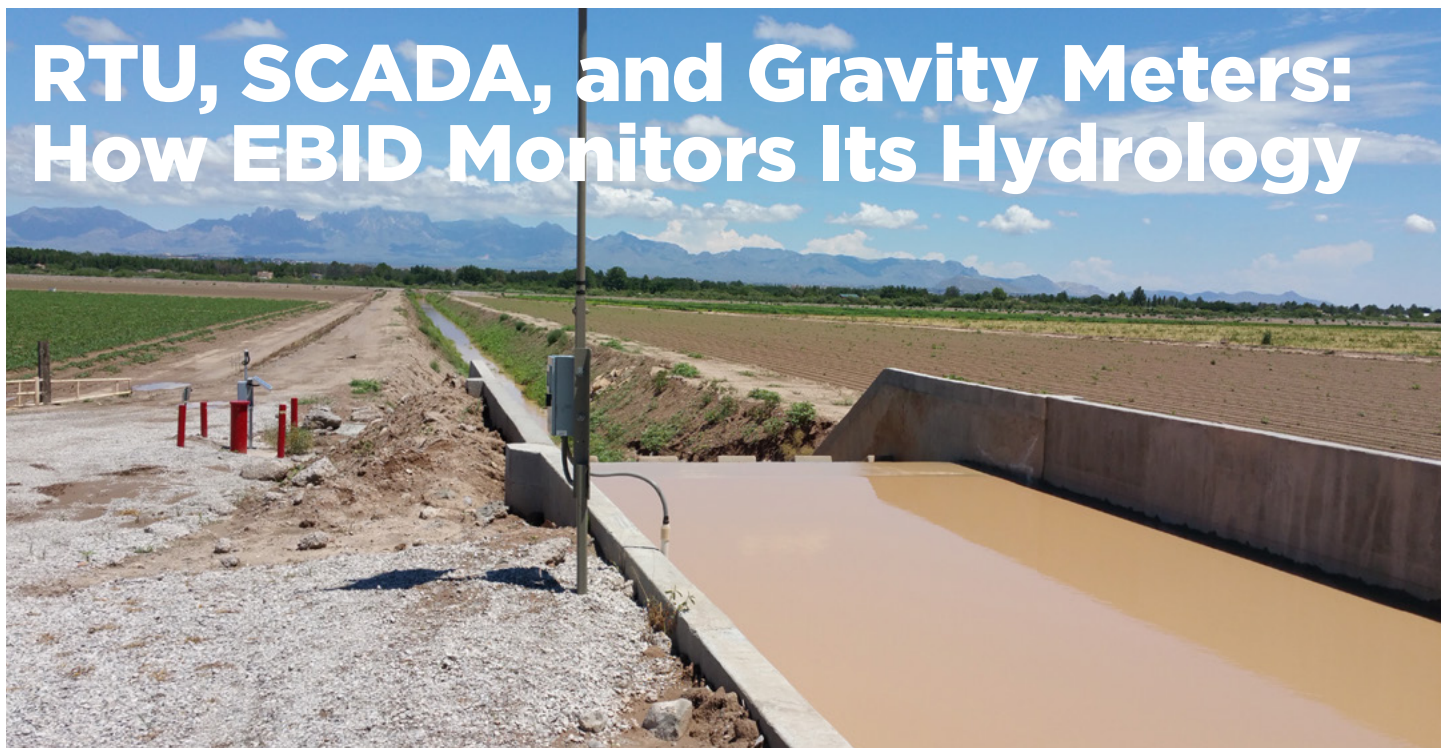
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# RTU, SCADA, and Gravity Meters: How EBID Monitors Its Hydrology



Monitoring equipment on the Picacho Arroyo.

**N**ew Mexico's Elephant Butte Irrigation District (EBID) benefits not only from the scientific expertise of its staff, but also from a sophisticated network of remote telemetry units (RTU) and supervisory control and data acquisition (SCADA)-equipped meters. The information from these devices helps EBID capture stormwater and manage groundwater pumping, supplementing its drought-affected surface water supplies.

In this interview, Patrick Lopez, EBID's SCADA Systems director, speaks with Irrigation Leader Managing Editor Joshua Dill about the district's hydrology and how new technology is helping EBID manage its water resources.

**Joshua Dill:** Please tell us about your background and how you came to be in your current position.

**Patrick Lopez:** I have worked at EBID for 17 years, all of which I have spent in the SCADA Systems Department. I am a graduate of New Mexico State University and started off as EBID's first RTU technician back in 2002. In 2005, I was promoted to SCADA supervisor and spent 9 years in that position before becoming the hydrology director and IT director for 5 years. Last year, we changed the department structure and my department was renamed SCADA Systems.

**Joshua Dill:** For those who might not know a lot about the district, would you give a basic overview of EBID?

**Patrick Lopez:** Our district boundaries run from Caballo

Dam, which is situated between Caballo and Arrey, New Mexico, all the way down to the El Paso, Texas, area, spanning a distance of 90 miles. We serve approximately 90,000 acres, which are split into three distinct diversion areas located in Arrey; Leasburg, New Mexico; and Mesilla, New Mexico. We are part of the Rio Grande Project, a Bureau of Reclamation project, along with El Paso County Water Improvement District No. 1 and Mexico.

**Joshua Dill:** What is distinctive about the hydrology of your area?

**Patrick Lopez:** Our surface water originates from snowpack in southern Colorado and northern New Mexico. We are dependent on good snowpack in order to deliver our full surface water allotment to our farmers. When snowpack levels are below average, we've had to deliver a significantly reduced water allotment to farmers, although their ability to pump groundwater helps offset these shortages. For the last several years, we haven't been getting the snow we're used to, so our surface water allotment has been dwindling. RTU monitoring has become crucial for maximizing the amount of water we do have, ensuring we are highly efficient with our water. Prolonged drought conditions have also led people to find new alternative water sources for irrigation purposes and to preserve aquifer health.

Stormwater has become an important alternative to compensate for shortages. Storm inflows to the Rio Grande can in no way compensate for the reduced surface water allotment, but they are a free water source. Over the last



Patrick Lopez and RTU Technician Adam Carrejo operating the gravity meter.



Close-up view of a remote telemetry unit.

4 years, we've done a good job of capturing stormwater by first monitoring potential inflow with a network of RTU-monitored watershed weather stations, rain gauges, and arroyo channels. We divert this water into our canal system and use it for irrigation, we use our drain system to allow it to seep back into the ground.

We're currently working on a WaterSMART grant with the Bureau of Reclamation that will allow us to expand our storm monitoring by installing 16 additional rain gauges, improving arroyo channel monitoring, automating stormwater capture turnout sites, and constructing a new Rio Grande metering cable site. We will also be working with the New Mexico Water Resources Research Institute to develop modeling and management tools to assist with drought mitigation.

**Joshua Dill:** What kind of data are you collecting with your SCADA systems, and how is it used?

**Patrick Lopez:** Our department monitors the initial release from Caballo Dam and several Rio Grande gauging stations. We also monitor our diversion points, canal headings, lateral headings, lateral spillways, and drain system. As I mentioned previously, we also track storm activity and stormwater inflow through weather stations, rain gauges, and arroyo channel sites.

In addition to our surface water monitoring, we also monitor groundwater wells and farmer irrigation wells. When I began working at EBID, we had approximately 50 RTU sites; that number has now

grown to just under 500. In addition to our SCADA system, our department also conducts regular water quality field sampling and also tests for E. coli levels.

The data we collect is not only used by our personnel; it is also used by outside agencies including Bureau of Reclamation, the U.S. Geological Survey, the Interstate Stream Commission, and the New Mexico Office of the State Engineer. The data is primarily used by our management team and employees to maintain and operate our system. We also use our data for groundwater modeling and use several years of data to identify and predict trends in our system.

**Joshua Dill:** How has that information changed EBID's operations over the past few years?

**Patrick Lopez:** It has improved our efficiency by allowing our personnel to view near-real-time data. Prior to RTU monitoring, periodic meter notes and paper water level charts were used, which basically gave us snapshot views of what was occurring. Any issue that arose with the chart could not be caught and addressed until the next field visit. RTU monitoring has allowed us to see trends or variations in the water, enabling personnel to adjust or react immediately. It provides a window into what's occurring in the field that you can check at any time.

**Joshua Dill:** Please tell us about EBID's gravity meter device and what it is used for.

**Patrick Lopez:** We purchased a Burris Gravity Meter, made by the ZLS Corporation, earlier this year. We are currently training with the meter and learning the calibration procedures. I anticipate that we will conduct our first full-scale site visit in mid-August. We will be visiting a total of 66 sites that span the entirety of our district.


It is difficult to quantify the volume of water in our aquifer, but this device will allow us to closely calculate the additional volume of water created once our surface water release is in our river and canal system. We will also look into calculating the volume displaced in the aquifer once our irrigation season has finished.

Another area we are interested in applying gravity meter readings to is stormwater capture and aquifer replenishment. With our current RTU monitoring, we can quantify the amount of stormwater captured through our structures and see its immediate and prolonged effects on nearby groundwater levels. These readings may also allow EBID to measure the total volume change in the immediate area where capture has occurred and also measure the total area impacted. We will conduct site readings when we are alerted about incoming stormwater and then do a follow-up reading after capture has occurred. My hope is that, working with my colleague Dr. Erek Fuchs, EBID's groundwater resources manager, we can establish a correlation between, say, the number of acre-feet of water we capture at a site and the rise in the groundwater at the aquifer level over a specific area.

**Joshua Dill:** What is the device like? Is it hand held?

**Patrick Lopez:** It's about 1 foot wide, 1 foot tall, and 8 inches deep. It is a hand-held device. It uses a spring or coil inside that is able to measure gravity. The device is delicate—any type of jolt can damage or severely compromise the internal components.

**Joshua Dill:** What trends do you see in the hydrology of your region?

**Patrick Lopez:** Drought is obviously the biggest trend. Below-average snowpack and a general lack of precipitation have led to shortages in surface water allotment. Groundwater pumping has increased over this time to help compensate. I see the need to fallow certain fields. Finally, many farmers have moved to pecan crops. 



*Patrick Lopez is the SCADA Systems director at Elephant Butte Irrigation District. He can be contacted at [patlopez@ebid-nm.org](mailto:patlopez@ebid-nm.org).*

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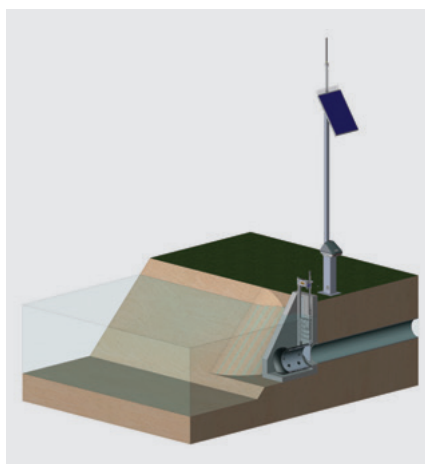
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# Understanding River Hydrology and Aquifer Relationships in the Arid Southwest

A reach of the Rio Grande within EBID.

**I**t is well known that surface water and groundwater supplies are often interconnected, but it is difficult to accurately measure how they affect each other on a scale that is informative for purposes of management. Dr. Ereik H. Fuchs, the groundwater resources director at New Mexico's Elephant Butte Irrigation District (EBID), is addressing this issue through his empirical studies of river and shallow alluvium aquifer hydrology in the desert Southwest and the development of metrics like the groundwater/surface water ratio of application (GSRA). These studies are crucial for understanding the aquifer recharge process and connectivity physics on a basin scale and for intelligent water use in drought-affected regions.

*In this interview, Dr. Fuchs speaks with Irrigation Leader Managing Editor Joshua Dill about his insights into the hydrology of southwestern water.*

**Joshua Dill:** Please tell us about your background and your work at EBID.

**Ereik Fuchs:** I am currently the groundwater resources director at EBID. I hold a PhD in quantitative

hydrology with a focus on groundwater resources, and I'm particularly interested in conjunctive-use environments where irrigated agriculture is prevalent. I've been with EBID for almost 8 years. Prior to that, from 1999 to 2011, I was with the New Mexico Office of the State Engineer, based right here in Las Cruces, as the Lower Rio Grande basin supervisor.

I'm a native New Mexican. I grew up on a little ranch in south-central New Mexico near the small town of Capitan and went to college at New Mexico State University (NMSU) in Las Cruces. All my degrees are from NMSU. I also attended Kansas State University for about a year and a half right after I completed my MS degree in 1997, working on watershed, range hydrology, and water quality issues. Otherwise, I've been in Las Cruces for quite a few years.

I'm delighted to be with EBID. My work here is far more applied and satisfying than the regulation work I was doing in years past. This position has afforded me the opportunity to directly engage with farmers and producers and to learn from them, which I really enjoy, to carry out

applied science, and to develop research ideas. I also have a hand in developing water policy in this part of the world. EBID is a conjunctive-use system, which is to say that surface water and groundwater, particularly the shallow alluvium groundwater, are highly interrelated. Ultimately, groundwater at depths well below the shallow alluvium is interrelated also. It is critical to understand those connection dynamics.

In our system on the Lower Rio Grande, groundwater has been administered by the Office of the State Engineer since 1980. The administrative functions that the Bureau of Reclamation carried out with regard to surface water within EBID and the Rio Grande Project were largely taken over by EBID back in 1979, when our farmers finished repaying the federal government for the Rio Grande Project, while the State Engineer has remained focused on groundwater as a matter of law. These separate administrative functions in an otherwise interrelated system can get complicated.

EBID had the foresight to install its own groundwater-monitoring program years ago. It came online in

mid-2009. Before that, EBID was largely dependent on Reclamation, the U.S. Geological Survey, and other governmental entities for data and information concerning our groundwater resources.

Presently, we have 52 monitoring wells in the Mesilla Valley, which is the larger, deeper and more extensively used aquifer in our system. The Mesilla Valley is consistently recognized as one of the top producers of high-quality pecan nuts in the country. Further north in the Rincon Valley, which is a much shallower and narrower aquifer system, EBID has 13 wells. The 65 monitoring wells are instrumented to serve as piezometers. They're all on remote telemetry units and provide us with real-time data. That's important because, as my board of directors has said, if we can't measure it, we can't manage it. Numeric modeling is only as good as the data we use to calibrate and run models.

Another important aspect of our system and farming practices is that there's basically a one-to-one relationship between surface water availability and groundwater pumping during the irrigation season. Drought conditions result in increased dependence on groundwater for irrigation. EBID's system includes Elephant Butte Reservoir, which is our primary storage for surface water, and Caballo Reservoir just downstream, which is mostly a regulating feature for surface water releases during the irrigation season. Although we get some local precipitation with our summer monsoonal rainstorms, it is a pretty inconsequential part of the overall irrigation water budget. We're far more concerned about snowpack in southern Colorado and northern New Mexico because the spring snowmelt and runoff feeds the Rio Grande and its tributaries and is delivered, under the terms of the Rio Grande Compact, into Elephant Butte Reservoir. That is basically the usable surface water we have to irrigate with

from year to year, but we also have an aggressive stormwater capture program to make efficient use of every drop of surface water we can pick up locally.

In recent years, we've suffered significant surface water shortfalls due to regional drought, and in turn, there's been more groundwater pumping to make up the difference to meet crop requirements. This has led me to develop a metric of groundwater resilience, which I would describe as the capacity of our aquifer system to absorb stress. My concept, which I have written about in the *Journal of Hydrology*, is the groundwater/surface water ratio of application (GSRA). The GSRA is simply the total volume of groundwater extracted and applied through irrigation per unit of time, divided by the total volume of surface water diverted and applied for irrigation per unit of time within a common river basin and interrelated aquifer system such as ours. Over time, especially when combined with other empirical hydrologic considerations specific to the system under study, the GSRA can inform work on aquifer recharge, safe yield, and water resource sustainability. It is a useful metric because it necessarily captures several important measures of the interrelationship between surface water and groundwater.

That brings up another focus of my work, which is connectivity physics and the different flow regimes between the surface water in the river and the underlying aquifer. An ideal circumstance is a connected and gaining system, but what is more common is a connected but losing system. When the river is losing water, it is effectively recharging the aquifer, which is by no means a bad thing. There is a balance between river efficiency and seepage, or infiltration flux from the riverbed into the aquifer. There is also a transitional flow regime, in which the water table below the riverbed is receding or starting to disconnect from the riverbed itself. Disconnection is a circumstance in

which, in an otherwise hydraulically interrelated river and aquifer system, there is an unsaturated zone between the top of the capillary zone overlying the groundwater table and the base of the riverbed. That most often reflects an abnormally perched river and is an indicator of groundwater stress. That's something that we're working to better understand, especially because once disconnection occurs, the infiltration flux or infiltration rate through the river and riverbed to the aquifer is at a maximum, at least relative to the river stage. In other words, it is a situation of maximum seepage or loss of surface water that we would otherwise deliver to our farmers for irrigation. That water can be, and oftentimes is, recovered through groundwater pumping, but groundwater pumping further stresses the aquifer system, to say nothing of the fact that it's expensive.

Riverbed sediment accumulation further impedes river efficiency. It likely increases the frequency and duration of disconnection, especially during drought conditions, which further reduces river efficiency and impedes our ability to deliver surface water to farmers to irrigate. This leads them to pump more groundwater, which creates a positive feedback loop with costly effects. Riverbed sediment accumulation can also reduce a system's capacity to handle flooding.

The excavation of excess riverbed sediment becomes particularly expensive and difficult when it accumulates over time. The trick is to maintain a regular maintenance program, excavating and removing excess sediment periodically before it turns into a major problem. Something similar can be said for upland watershed management. The heavy equipment and time needed to excavate sediment can be expensive, so how are we supposed to pay for it? I think there is a good argument for it to be covered in part by Reclamation infrastructure improvement-type activities. Effective river channel maintenance would increase river

efficiencies while also improving our capacity to handle flood flows when they occur. An understanding of connectivity and related physics might also allow us to take advantage of flood flows to facilitate aquifer recharge.

**Joshua Dill:** What about your research is least understood by the industry at large?

**Erek Fuchs:** Probably the biggest challenge is connecting with the urban, nonproducing members of our community and helping them understand the importance of irrigated agriculture in our area. People are quick to criticize irrigated agriculture in the desert Southwest as nonsensical, but we are not irrigating the desert. We are irrigating fertile farmland in the riparian corridor of the lower Rio Grande and growing crops that the world demands, which a great many scientists, engineers, and Reclamation folks long ago figured out was a good idea. That's why the Rio Grande Project was conceived.

When it comes to my research, connecting with the producers on the ground remains a bit of a challenge, even though they clearly have a huge stake in the topic. Some are interested in it from a technical point of view; they ask questions, do follow up, and do some of their own reading. Others are just too busy trying to grow their crops and make a living, which is getting harder and more expensive with the more frequent droughts. We're trying to develop educational materials and are wondering if there's an opportunity to partner with Reclamation or the NMSU cooperative extension service to come up with better materials. When it comes to my published journal articles, it is mostly only other scientists that get much out of that. We need to be able to effectively communicate our research to the folks who would most benefit from it. That has major implications, because the greatest opportunities for better water management are at the local, rather than the regional, level.

**Joshua Dill:** Would you give some concrete examples of how your research has potential for improving water management at irrigation districts?

**Erek Fuchs:** The problem right now is that there's so much litigation in play on an interstate level, which creates tremendous uncertainty and makes implementing our ideas difficult. I think we're going to have to get to a point where some of the interstate disputes are closer to settled. I've got data and I'm reaching hydrologic conclusions, but in terms of actual implementation, most of what we have seen so far has been individual farming operations adapting to drought conditions on the fly.


That said, we are also see something of the opposite. Just the other day, newspapers around here were touting the fact that New Mexico is the number 1 pecan producer in the country, which can be attributed primarily to a

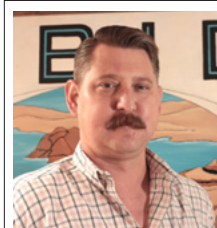
number of the larger Mesilla Valley pecan operations within EBID. Here at EBID, we continue to see more land going into orchards, which reduces the flexibility of adaptive management because pecan orchards are something you can't fallow. If pecans are essentially the only crop that makes sense from a market perspective, it is no wonder that more growers are trending that direction. However, we need to find creative, hydrologically sound ways to balance water demands so that the resilience of our aquifer system isn't compromised in the long run.

**Joshua Dill:** What is your vision for the future?

**Erek Fuchs:** I think that it's inevitable that most of this litigation is going to play out, probably sooner rather than later. The hydrology of this system does not care about transboundary issues, politics, legal rulings, lawyer posturing, or any of that stuff. My vision for the future is that we undertake necessary adaptations to these drought cycles and explore economic incentives to make them happen.

The whole business of surface and groundwater interrelationships and connectivity is going to be more and more important. Given the likelihood that these drought cycles are going to persist, I see groundwater becoming more and more important as a resource to buffer drought. To that end, the notion of groundwater resilience and the capacity of the system to absorb stress is going to receive a lot more attention.

There will be changes. Many farming operations are adapting on their own accord, but more will be compelled by market conditions. My vision for the future is optimistic, but I do think there will be tough choices along the way. The physical and hydrologic limitations of the system will ultimately be the controlling variables. I think that there will also be more of a focus on brackish groundwater and other alternative sources. There's a lot of opportunity, but I don't think it's going to be cheap. I think the days of cheap water in the Southwest, and perhaps beyond, are pretty much over. 



*Dr. Erek H. Fuchs is the groundwater resources director of the Elephant Butte Irrigation District. He can be contacted at [efuchs@ebid-nm.org](mailto:efuchs@ebid-nm.org).*

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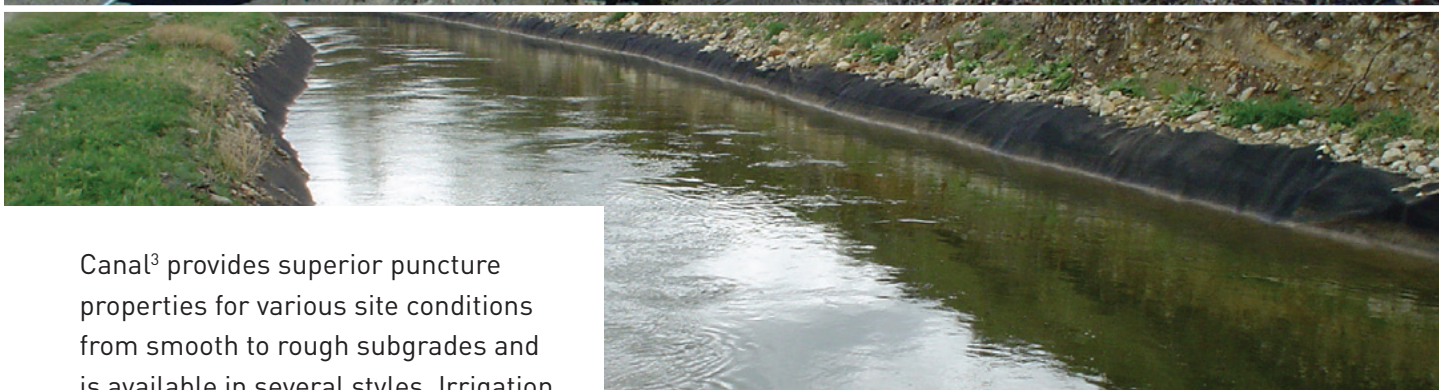
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SAI's website.

## An Online Security Training Course for Irrigation Districts

**P**hilip Ball's Situational Awareness Institute (SAI) provides training for private companies and public agencies about security, active killer prevention and response, and crisis communications. Now, SAI is releasing a new online course that presents the best of its information and education in brief modules that include text, pictures, and video.

*In this interview, Philip Ball speaks with Irrigation Leader Managing Editor Joshua Dill about how water districts can keep both employees and customers safe in an ever-threatening world.*

**Joshua Dill:** Please tell us about yourself and your organization.

**Philip Ball:** I started as a badge-carrying police officer in 1993. Prior to that, I was the governor-appointed emergency management coordinator for the State of Pennsylvania. I worked with the heads of safety and of the police and fire departments in emergency situations to coordinate efforts to save lives. Our goals were safety, incident stabilization, and property conservation. That laid the groundwork for my law enforcement career. I worked as a police officer in Pennsylvania, Maryland, and Georgia, then went down to Florida and worked for about 5 years as a police training specialist in the Broward County area. I then came back to Georgia, which is where I am based now. Working with so many different departments has given me access to tremendous training and certification opportunities in fields such as active killer countermeasures, crisis intervention, and firearms.

Because I had private parties and corporations ask me to teach them the same things I was teaching government

agents and police officers, I came to see that there was a need for a private company to fill this niche, and my wife and I created SAI. We train people to be situationally aware of threats, including active killers, cyberattacks, and physical violence, and to respond to and prevent these threats. If, despite all their precautionary measures, they find themselves in such a situation, our training helps them reduce the opportunity for harm and increase their chances of survival. Both personal survivability and your company's liability are important.

**Joshua Dill:** Who are SAI's employees?

**Philip Ball:** Several gentlemen throughout the nation work with SAI, including police officers and retired military officers. I also have consultants who are allowed to deliver my material. When a safety event happens, we discuss its causes and how we can protect our clients from similar events. We offer a wide range of services to corporations and private entities based on what we have learned from years of studying events across the nation.

I have an army psychologist who is a retired colonel on staff. He is an expert in active killers and workplace violence. He and I have consulted for agencies and city governments on high-risk employee situations. If an agency has an employee displaying worrisome behaviors, it can contact us, and we will provide an analysis of the possible risk and the measures it can take to reduce the possibility of the situation escalating into a violent confrontation.

My wife, Tasha, is now working with SAI full time to help with content writing and research. If you have been enjoying our recent blog posts, those have been written by her.

**Joshua Dill:** How did you begin running training courses?

**Philip Ball:** At the time of the Columbine High School shooting in 1999, I was a school resource officer, a D.A.R.E. officer, an FBI firearms instructor, and a SWAT officer. It was a unique skill set. That event made me question why kids would come into a school to take the lives of innocent people. My father had owned a rifle as a child, but he never thought about hurting anybody with it. What cultural trends had caused this shift?

I put a lot of study into the question, and I was asked to teach the chiefs of police in Georgia about it. I developed an 8-hour course to teach them about the historic events that led to this situation, preattack indicators, the measures police departments can take to protect their communities, and how officers should respond to and neutralize threats. From that point on, I pursued any professional or private opportunity that arose to help me better understand why shooting events like this occur.

A couple of years ago, my wife and I wrote a book, *Active Shooter Survival Manual*, that covered the basics of the course. We priced it inexpensively so that we could get the word out and save lives. The book sold around the world; we got compliments from as far away as Israel. I started getting requests to do training sessions. That's when we started our tour. We went to 34 different states over about 2 years. During the tour, I went to actual crime scenes and interviewed survivors. I was given access to the crime scene in Las Vegas. I went to the church in Sutherland Springs, Texas, where there had been a shooting. I gleaned information from those experiences that I did not see anywhere else. I learned about distinctions that can save lives. I would ask people, "Why did you survive? What did you do? What was your mindset? What did you observe? Why did others not survive?" This information has allowed me to develop my program. I have taught police officers, schoolteachers, federal agents, and the employees of private corporations, resorts, and hotels.

**Joshua Dill:** Please tell us about your new online course.

**Philip Ball:** In this new online program, we put the best information that we have gathered into a 3-hour program, which is broken down into little 5–7-minute modules that include videos and pictures. There are quiz questions for each module. It covers the history of active killer events and explains preattack indicators. If people are trained in identifying these indicators, attacks can be prevented. The person displaying these indicators can be helped, or law enforcement can take that person into custody and prevent anybody from being hurt. We also cover the five phases of an active shooter event, which apply to every episode of workplace violence, school shooting, and terror attack. The perpetrators in all those cases go through the same five phases of behavior prior to the attack. We train people

to observe them. We talk about what things lead up to workplace violence and train employees to prevent it. If all this training fails to prevent an incident, our acronym "Go Barricade Fight" describes, in chronological order, the steps that you should take if you hear a gunshot. We even have a reference card that is easily displayed in order to remind you of these steps. We instruct people on what to do when law enforcement arrives to avoid confusion. We educate about emergency action plans. Companies need to have such plans in place so that, should an emergency happen, everybody knows what to do. All those topics are covered in the online program.

The first section of our training to be rolled out is Active Killer Prevention, Survival, and Countermeasures. We will be adding additional courses as they become available. We are looking to include a course on crisis communications, as well as cybersecurity and physical security practices. Crisis communications is a verbal deescalation class I teach. It incorporates police hostage-negotiator techniques and verbal judo. It uses verbal persuasion to calm people in crisis. While this course is already developed, we are working on converting it into an online format.

Our website will also have a regular blog featuring tactical tips and the analysis of current events. We will also be writing articles that reflect American Society for Industrial Security standards. We are constantly updating our procedures to incorporate industry best practices, and I look forward to sharing those with my clients.

**Joshua Dill:** What kinds of organizations should consider this course?

**Philip Ball:** There is a chance of interpersonal violence at any organization with more than one person, but active killers are drawn to large groups of people. Anywhere with a large group or flow of people is a potential target for an active killer. We do see two themes in these events. Violence that breaks out among employees is usually caused by internal conflicts over issues like promotion, termination, or even romantic relationships. Violence that breaks out with customers often concerns disagreements over money or occurs when a person sees an agency or company as a bully or thinks it is abusing its power. The customer starts to feel that the organization's authority is illegitimate and feels justified in resorting to violence.

**Joshua Dill:** Please tell us about the research that informs this training course.

**Philip Ball:** It started when I was a D.A.R.E. officer and a school resource officer. I observed the sociological changes among the students related to factors like violent video games, medications, parenting issues, and core values. Then, as an intelligence officer, I studied ideologically motivated terror. My work as an FBI firearms instructor and my police

work in four different states, answering thousands of calls, helped me see other facets. Then, during my time in Broward County, Florida, I was a police training specialist and helped develop training courses for my officers. We were charged with going into 242 schools in Broward County and teaching the teachers preattack indicators and countermeasures to protect kids. The visits and interviews I carried out on my tour were another kind of research. I've participated in workshops with Homeland Security and the U.S. Marshals Service. I've also done security assessments and training sessions for water districts, resorts, and other entities, and I've been made aware of the unique challenges the water departments and irrigation districts across the country have with customer security and employee issues.

**Joshua Dill:** What sort of safety plan should an organization develop?

**Philip Ball:** It depends on the agency. We know that employee injuries can come from many sources, and both for liability reduction and to do the right thing by employees, we should anticipate the risks that our employees are going to encounter in their everyday work environment. First, we identify the risks, which may be different depending on the agency, its location, its customers, and its exposure. Then we provide training and systems that are going to support a culture of safety. Support from leadership is also important. Whether the leader shows up for that training or not determines the attitude of the whole agency. The fourth step would be to reevaluate safety practices on a regular basis. The person at the front desk who greets people when they come to the door should be the best communicator you have, somebody trained in crisis communications. All these steps will lower an organization's liability and strengthen its work environment so that its employees feel safe and are more productive. One dangerous trend that we have noticed is that some businesses only send part of their staff or only management to security training. All employees should attend, from the groundskeeper to the board of directors. An active killer exhibits 4–6 indicators prior to an attack. If everyone is aware of what those indicators are, the odds of stopping an attack before it occurs are better.

**Joshua Dill:** What specific advice do you have for irrigation districts?

**Philip Ball:** I've noticed two major things about irrigation districts and water districts. First, interactions with the public, whether related to the everyday business of bills or in regular meetings with the public, can be emotional. Communication and security are key there. Second, for the individuals out in the field, lone worker safety is a big issue. Workers who are out in a vehicle by themselves in the middle of nowhere don't have security or support. They may not be able to call for help. Those individual workers need to


be trained in crisis communications for times when they are approached by angry or upset customers. They are the most visible and accessible representatives of the agency. Those workers should also know physical preattack indicators. We go over those in our physical self-defense class. We also teach basic defensive tactics.

The common thread that I've seen running through crisis situations is that a person feels that they have not been treated with dignity and respect, and as a result, they lose all respect for the person, agency, or authority they feel is bullying them. In extreme cases, they feel that they are justified in taking the lives of the people who they feel are persecuting them. I recommend that every supervisor in an irrigation district or water district treat their employees with dignity and respect and be fair minded.

**Joshua Dill:** What else are you working on at SAI?

**Philip Ball:** We are also developing a phone app with tactical tips, information, and our Go Barricade Fight steps. It also has a feature called escort mode. If you hear a gunshot, you can put your finger on the icon for the app. If you determine that there's a real threat in your building, you let your finger off the icon and the app dials 911 for you. It starts telling you what to do to save your life. There will be other features coming out as well.

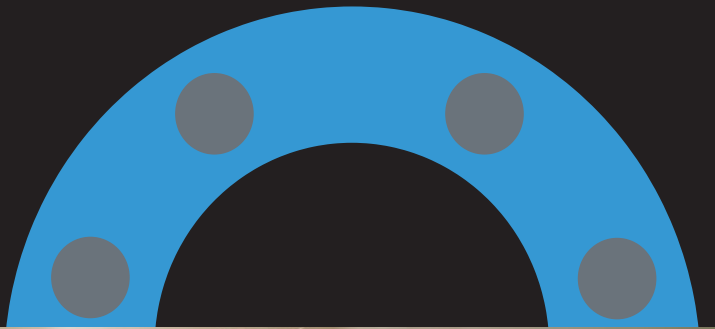
**Joshua Dill:** If an irrigation district is interested in providing access to this online training for its employees, what should it do?

**Philip Ball:** SAI has developed an easy to use online platform. Just go to [activekillerexpert.com](http://activekillerexpert.com), click on online training, and follow the ordering process. Be sure to type in the promo code WATER. This will allow you to access our group rate, which is more than 50 percent off the retail price. If you prefer to pay by check, need an invoice, or want to bundle online and onsite training options, you can always contact us at [sai.tashaball@gmail.com](mailto:sai.tashaball@gmail.com) or (954) 483-0213. 



*Philip Ball is the cofounder and lead instructor of the Situational Awareness Institute. He can be contacted at [saitactical@gmail.com](mailto:saitactical@gmail.com).*

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Irrigation at Dixie Ranch farm.

## Growing Pecans in the Desert Southwest

**T**he climate of the desert Southwest is ideal for growing pecans, and the region produces roughly one-third of all pecans grown in the United States. With global demand for their product rising, New Mexico pecan growers see a bright future. However, there is a hard constraint on pecan production: water. Growing pecans in New Mexico's arid land requires the efficient and intelligent use of limited irrigation water resources.

In this interview, Greg Daviet, the manager of Dixie Ranch farm, speaks with Irrigation Leader Managing Editor Joshua Dill about how pecans are grown and harvested in New Mexico and distributed around the world.

**Joshua Dill:** Please tell us about your background and how you came to be in your current position.

**Greg Daviet:** I am the farm manager for Dixie Ranch. Dixie Ranch was founded in 1905 by my great-grandfather in the Mesilla Valley and has been continuously operated since that time. We've been growing pecans since 1965, and I've been managing the farm since 1994. I am also the elected representative for Precinct 4 of the board of Elephant Butte Irrigation District.

**Joshua Dill:** Please tell us about the farm and its history.

**Greg Daviet:** Our farm is currently about 325 acres. My great-grandfather established the initial 270 acres. We've been able to expand it a little bit over the last decade, and we hope to be able to continue to do so as property around us becomes available. We are right at the interface between

the agricultural environment and the city of Las Cruces. Anytime we are able to preserve agricultural land and continue growing crops on it instead of allowing it to move into development, we attempt to do so.

Prior to planting pecan trees in 1965, our predominant crops were cotton and alfalfa. My great-grandfather originally raised white-faced Herefords on forage crops that he grew on the farm. He was from Louisiana, which is the origin of the Dixie part of our name. Ranch comes from the fact that he was raising cattle. We have retained that name for the last 115 years.

**Joshua Dill:** Are pecans your only crop today?

**Greg Daviet:** Pecans are the only thing that I currently grow. When I began managing the farm in 1994, we still had a little bit of cotton and alfalfa. I frequently say that I was not very good at growing either of those two crops, so we replaced them with pecans. When we acquire additional farmland, we generally continue to lease that land with the crops that are currently in production until we're ready to plant the pecans, at which point we roll the complete management of the pecan trees into our operation.

**Joshua Dill:** How well do pecans grow in the climate of New Mexico?

**Greg Daviet:** Pecans are remarkably well suited to growing in the desert environment. A lot of the disease and fungal pressures pecan trees have in the Southeast are not

problems here because of our dry climate. However, you need a regular and abundant source of water to grow pecans in the desert. The Rio Grande Project supplies the water for pecan production in the Mesilla, Rincon, and El Paso Valleys. There's been a transition over the last 50 years from other cropping patterns to pecans because of how well suited our area is to them. Approximately one-third of the pecans grown in the United States are grown in our region.

**Joshua Dill:** Would you tell us about the process of growing, harvesting, and marketing pecans?

**Greg Daviet:** Immediately after harvest, our growing season begins again. That's usually in January. In our operation, winter work is predominantly pruning the trees, disposing of the pruning, and doing soil maintenance. Our soil maintenance involves mechanically aggregating the soils to improve their drainage and water holding capacity. The pruning is to increase sunlight within the tree canopy. After we finish our winter work, we generally start the irrigation season. We irrigate for the first time in March, replenishing the water that has been depleted from the soil over winter. Soil fertilization, foliage fertilization, and pest management start in April. From April until the end of September, our focus is on irrigation and pest management. From the middle of June until the end of September, pecan trees are irrigated every 7–14 days depending on the soil type. Managing the irrigation of the trees is a constant task. The trees begin to senesce, or transition into dormancy, in early November. In our area, we wait for the first freeze before we begin the harvest process. The freeze will defoliate the trees, at which point the pecans need about a week to finish drying on the tree. Then we begin shaking the trees and harvesting the pecans. That generally lasts from Thanksgiving until Christmas. When that process is finished, we begin all over again.

**Joshua Dill:** What techniques do you use to irrigate your pecan trees?

**Greg Daviet:** At Dixie Ranch, we exclusively use flood irrigation. In the Mesilla Valley, we rely on both groundwater and surface water to irrigate our crop, and they're very different in their quality. Our surface water has a high amount of suspended sediment. Our groundwater has a high number of dissolved solids. Currently, no filtration system has been demonstrated to be able to handle both of those water quality issues in an alternative irrigation system. In the Mesilla Valley, almost everything is flood irrigation. Outside the Mesilla Valley, solid-set sprinklers are common in the pecan and other tree nut industries. Surface drip is also used, although not as extensively as sprinklers.

**Joshua Dill:** Would you tell us more about how you mechanically improve soils for water capacity?

**Greg Daviet:** We use large earthmoving equipment, specifically excavators, to mechanically aggregate the layers of our soil. We are in a flood alluvium basin, so our soil has been deposited in layers by millennia of flood events. Layered soils don't drain particularly well. There are issues with the varying water holding capacities of those layers, which is not particularly good for crops that want a consistent water holding capacity vertically through the soil. We take the excavator and mix the soil in place in a trench line through the orchard. This practice was started in the late 1970s or early 1980s by pioneers in our industry and is now common practice among all highly managed commercial pecan operations. By mechanically aggregating the soil and getting the coarse and fine particles mixed together, we can improve the homogeneity of the soil profile, improve its drainage, and get a more uniform water holding capacity for our trees.

**Joshua Dill:** What other water use efficiency measures does your farm use?

**Greg Daviet:** The predominant one is laser leveling. We laser level our fields with approximately 2½ inches of slope for every 1,000 feet of run. The purpose of that is to flatten our wetting curve. The wetting curve is the description of how much water the head of the field takes compared to the tail. The water comes in at the head, so it's got more time to infiltrate into the soil there as the water flows down toward the tail. We try to give the tail extra depth to compensate for the fact that the head gets extra time. We have also increased our flow rates and installed high-flow turnouts in our distribution system to more rapidly apply the irrigation water and make the distribution of that water as even as possible throughout any given flood basin.

**Joshua Dill:** Would you tell us about the process of storing and marketing the pecans?

**Greg Daviet:** The marketing of our product has changed substantially over the last decade. There has been an increase in foreign demand for our product and a consequent diversification in its marketing channels. Traditionally, all the pecans grown in the United States went to the domestic shelling industry, and the pecan meats were then sold to either end users or ingredient manufacturers. With the diversification of our marketing channels, products are now segregated into different marketing channels. We are still developing our on-farm processes to adapt to those new marketing channels. Traditionally, during the harvest period, you would sell the crop, ship it immediately, and then go straight back to



Dixie Ranch's freezer building under construction.

growing without any concern about what was happening to the product from that point on. Now it is becoming more common for growers to be responsible for storing the crop, bearing the risk of adverse price movements, and financing the holding of that crop until it is needed by either an in-shell foreign user or a domestic shelling user. At Dixie Ranch, we are currently building a freezer so that we can manage that process on the farm, eliminating the economic friction caused by having third-party cold storage handle the product and store it. This also reduces the banking needs of the shelling industry by reducing the financing required between the harvest period and sales to end users.

**Joshua Dill:** Why did the foreign demand for American pecans emerge?


**Greg Daviet:** There were pioneers in our industry who ventured into foreign markets such as China and built demand for pecans. Pecans are a natural, healthy source of plant protein; the oils of pecans are very good for heart health. For health-conscious foreign consumers, pecans are an outstanding product. Now that that demand has been sparked, it has really taken off and grown. As we're able to improve trade agreements with foreign countries, demand for our product has increased.

**Joshua Dill:** What is the breakdown of domestic versus foreign sales today?

**Greg Daviet:** With the current uncertainty in the United States' trade posture and its effects on foreign demand, that is hard to say, but immediately prior to the current

uncertainty, 30–40 percent of the pecans grown domestically were being consumed by foreign consumers.

**Joshua Dill:** What trends do you see in the industry, and what is your outlook on the future?

**Greg Daviet:** I have an optimistic outlook on the pecan industry. Currently, the world demands more pecans than we are able to grow. It takes many years for supply to catch up to demand, and with our current efforts to expand demand, I believe it will be many decades before we are able to substantially close the gap between demand and available supply. With that in mind, it is important for producers in the industry to stay focused on maximizing the value for our consumers, both in our own processes and in the processes we facilitate off the farm. In the desert Southwest, the limiting factor for all crops is water. There is a limit to how many pecans can be grown in West Texas, New Mexico, and Arizona. We will probably need producers of pecans outside the desert Southwest to maintain pace with the global demand for our product. I believe that the future of the pecan industry is bright. 



*Greg Daviet is the manager of Dixie Ranch. He can be reached at [greg@dixieranch.com](mailto:greg@dixieranch.com). For more information, follow Greg on Twitter at [@greg.daviet](https://twitter.com/greg.daviet) or on Facebook at [facebook.com/pecangrower](https://facebook.com/pecangrower).*




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# In Memoriam

Warren R. Morgan

**W**arren R. Morgan, 60, passed away unexpectedly in May. He was born April 17, 1959 to Rex and Laurel Morgan in Soap Lake, Washington.

He grew up in Quincy, Washington, and graduated from Quincy High School in 1977 and from Washington State University (WSU) in 1981. He returned to Quincy after graduating from WSU and lived there until his death.

His life as an entrepreneur began while he was still at WSU, where one of his first ventures was renting minifridges to college students. After graduating from WSU with a degree in horticulture, he came back to Quincy and shortly thereafter began working in his parents' orchard. The family orchard had been purchased in 1976 as a retirement investment, but it soon became clear that Warren was going to be a businessman. Instead of being a retirement investment, the orchard eventually became one of a number of orchards that he owned and ran. In 1986, he and his father Rex were instrumental in establishing Double Diamond Fruit, an apple, cherry, and apricot packing facility of which he became president after his father retired from the position.

In 1999, he married Heather Simmons. They had two sons, Chase (now 18) and Connor (now 16).



When the boys were young, Warren and Heather decided to establish the Quincy Valley School, which continues today. After marrying Heather, Warren expanded the business to include raising cattle, growing row crops and hay, and operating a cider plant and a small vineyard.

Warren was energetic, strategic, and analytical in his business decisions. He brought that talent to the several

**Warren Morgan was a consummate board member. His passion for life was a big part of everything he did and was evident in his role as a director on the QCBID board. He came to meetings prepared with his idea of a solution, yet remained open to the other ideas presented. The breadth of his experience and his passion made conversations challenging, insightful, and respectful. We consistently came away from the dialogue with a greater degree of knowledge and the comfort of knowing that a thought-out decision had been reached. His dynamic presence will be greatly missed in our community.**

#### – Quincy–Columbia Basin Irrigation District Board

boards he served on, including those of Tree Top, CMI Orchards, the Quincy–Columbia Basin Irrigation District (QCBID), the Mission Ridge Ski Team, and the Quincy Valley School.

Warren had many hobbies that he was passionate about. His love for waterskiing inspired him to build a waterski lake in George, Washington, which was quite an undertaking. As an avid snow skier, Warren loved skiing the slopes of Mission Ridge with his two boys. He also enjoyed his many fishing trips with friends, where he could relax from his busy schedule, laugh with his buddies, and even catch a couple fish.

In recent years, the family spent memorable time enjoying paddle boarding and hopping on their wave runners and kayaks at their home in

Idaho. A favorite activity was to hike or walk with Heather and their beloved dog, Sadie.

Warren had the gift of a quick wit and a sense of humor that was magnetic. You could not help but be drawn to him. He was, without intent, the life of the party.

He was a mentor to many, sharing his knowledge of his many business interests. He was extremely intelligent and quietly generous. As an organ donor, he continues to give the gift of life to several and hope to many.

He was truly a force, one of a kind. He leaves this world a better place because he lived. Warren impacted so many lives, and he will be missed by all who knew him.

He is survived by his wife Heather; his children Chase and Connor; his sister Camille Morgan and her husband John Stansell; his brother Walter Morgan and his wife Esther; his mother Laurel Morgan; and his nieces Madeleine Morgan, Amanda Panin, and Carolyn Stansell.

A celebration of life service was held at Columbia Grove Covenant Church in May.

Donations in his memory may be made to the Quincy Valley School, 1804 13th Ave. SW, Quincy, WA 98848.



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Diamond Plastics' corporate philosophy is based upon continuous improvement through industry participation. Our staff is involved with continuing education programs for the design community, industry specific committees such as ASTM, AWWA, CSA and HSB. In addition, Diamond Plastics has continuously supported the PVC Pipe Association for over 20 years to further the educational tools of our clients.

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Contact Alan Rollo at [arollo7@msn.com](mailto:arollo7@msn.com).

## Carlsbad Irrigation District: Manager

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**Salary: \$70,000-\$84,000**

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**Salary: Dependent on qualifications**

#### DESCRIPTION:

+ Position provides direction and oversight, and personally performs professional skills in multiple areas including but not limited to water delivery (both in and out of the company), water scheduling, water accounting, financial accounting, and resolution of complex customer concerns and issues. The position will assist and oversee, with environmental clearance documents, annual company shareholder elections and landowner water right/ownership documents.

**FOR MORE INFORMATION:** Visit [SLCC.net](http://SLCC.net) or e-mail [ann@hmrdrd.net](mailto:ann@hmrdrd.net).

## Henry Miller Reclamation District #2131:

### Associate Engineer

**Deadline: Open until filled**

**Salary: \$64,771-\$118,747**

#### DESCRIPTION:

+ Manage individual projects, tasks and/or assignments including subordinate staff, prepare and monitor project budgets, develop and coordinate various activities for the water conservation program, assist with the ongoing management of water quality programs, assist with the district's ongoing modernization program, perform comprehensive hydrography functions and manage data management systems.

**FOR MORE INFORMATION:** Visit [SLCC.net](http://SLCC.net) or e-mail [ann@hmrdrd.net](mailto:ann@hmrdrd.net).

## Office of Columbia River (OCR): Operations Manager (WMS Band 2)

**Location: Union Gap, WA**

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+ This position is directly accountable for direction, management, and performance of OCR staff in consultation with OCR director.

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+ Support two of Wyoming's interstate compacts (Yellowstone and Bear River Basins), provide critical data and information to the ISS administrator and the governor-appointed commissioner.

#### QUALIFICATIONS:

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# Irrigation Leader

## Upcoming Events

- September 1–7** 3rd World Irrigation Forum and 70th IEC Meeting, USCID, Bali, Indonesia
- September 8–11** 34th Annual WaterReuse Symposium, WaterReuse, San Diego, CA
- September 10–12** Husker Harvest Days 2019, Grand Island, NE
- September 8–12** Dam Safety 2019, ASDSO, Orlando, FL
- September 17** Water Rights in Nevada, Nevada Water Resources Association, Reno, NV
- September 23–26** Fall Week of Water, Nevada Water Resources Association, Reno, NV
- September 24** Fall Symposium, Nevada Water Resources Association, Reno, NV
- September 26** Marlette Lake Water System Tour, Nevada Water Resources Association, Carson, NV
- September 26** Operational Value of the Well, Nevada Water Resources Association, Reno, NV
- October 2** Golf Tournament, Oregon Water Resources Association, Sisters, OR
- October 25** H2OPen Golf Tournament, Arizona BWC, Casa Grande, AZ
- November 4–8** USCID's 2019 Conference, Reno, Nevada
- November 6–8** 88th Annual Conference, NWRA, Houston, TX
- December 2** Annual Agribusiness Roundtable, Arizona BWC, Tempe, AZ
- December 4–6** Annual Conference, Washington State Water Resources Association, Spokane, WA
- December 11–13** Annual Conference, CRWUA, Las Vegas, NV
- December 13–14** 2019 Winter Meeting, Western Governors Association, Las Vegas, NV

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