Managed Aquifer Recharge and Water Supply Resilience in Albuquerque, New Mexico

By AMY EWING, P.G., and CHRISTOPHER WOLF, P.G., Daniel B. Stephens & Associates, Inc. and KATHERINE YUHAS, Albuquerque Bernalillo County Water Utility Authority

Background
The Albuquerque Bernalillo County Water Utility Authority (Water Authority) has developed a water resource management strategy titled Water 2120: Securing Our Water Future to plan for meeting water needs for the next century. The plan emphasizes water conservation and the use of surface water for water supply, and includes implementing managed aquifer recharge projects as a supply alternative. Before 2008, the Water Authority was entirely reliant on groundwater resources as the source of water supply, causing significant water level declines in the basin. The Water Authority began diverting surface water from the Rio Grande after completing construction of their Drinking Water Project in 2008. The diverted surface water is imported San Juan-Chama (SJC) Project water, which is part of New Mexico’s allotment of Colorado River water apportioned by the Upper Colorado River Basin Compact.

The Water Authority is implementing managed aquifer recharge projects, using imported surface water, to address the possibility of increased variability and uncertainty of the water supply in the future.

Project Permitting and Design
The New Mexico Office of the State Engineer (OSE) requires that each underground storage and recovery (USR) project be tested.

Full-scale operations are set to begin in October 2020.

Congratulations, 2020 Scholarship Recipients!

By ADELINE FOX, TGWA

Even though this year has been unprecedented, one spark of hope remains in this year’s scholarship recipients. The TGWA Scholarship Foundation awarded 30 scholarships. Based on the board’s ranking system for new applicants, Sterling Morrison, Christiana Perez, and Thomas Mullen earned the highest scores for their applications and received $2,500, $2,000, and $1,500 annual scholarship, respectively. All other recipients received $600 annual scholarships.

Scholarship funds could not exist without the generous contributions of TGWA members, which come mostly through the gun raffle and live auction that take place each year during the Association’s Annual Convention. Due to the uncertainty related to convention dates, we cannot yet sell raffle tickets, but hope to have an update soon.

In this issue, TGWA is recognizing the top three ranking students for 2020 and returning recipients from 2019. See all scholarship winners here.
From the top of the rig
Perspectives of Division Presidents

Moving Forward With Hope

Greetings everyone! As I sit to write this quarter’s letter, I was in hope that we would be a little farther through this pandemic. But such is life, and we are still in the middle of this global crisis. As I stated in my last letter, I hope each of you and your families are safe and well. This is still our number one priority. Each of you is in my prayers.

We have had lengthy discussions during our board meetings and there is still so much we just do not know. We have not had an in-person board meeting since our convention in January. We are in hopes that we will in October, but that is not a sure thing. We have been discussing the plans for our 2021 Annual Convention, but we are still unsure if delays will occur. Our plans are to keep it on track for January, but we will have to see as we get closer to that date as hotel venues are also waiting to see what happens. Be assured our staff is doing everything possible to move forward but their hands are tied in so many areas. I promise that all decisions made will be in the best interest of our members and our association.

Our online C.E. classes have been a huge success and a big help to the TGWA finances. Our goal

Financial Impacts of COVID-19

I would like to start by thanking an amazing staff that continue to keep this organization running. Stacey, Becky, Adeline, Lisa and Sarah continue to help everyone in the organization put one foot in front of the other in order for TGWA to succeed. We live in a different world today than we did just seven months ago. In these times, that is the most important thing in life and business and my philosophy, “one step at a time leads to one day at a time.” What a crazy year this has been. I miss everyone and wish we could simply meet up with everyone for drinks and laughs. Sometimes the simplest things in life are the hardest to achieve. We are not promised tomorrow!

As we continue to look for new and innovative ways to get out there without personally getting out there to connect with everyone and stay connected, it has made me realize that everyone calling me has a purpose. So I have made it my purpose to talk to them as long as they will speak to me because I am not sure of the next time I will get to hear from them or interact with them. The only thing certain today continues to be uncertainty.

TGWA continues to take large

Changing Times

At this time of uncertainty regarding meetings, conventions and classes I hope you will allow me to praise the leadership of the TGWA once again. First, General Manager Stacey Steinbach and the staff are doing an excellent job staying on top of this ever changing COVID situation. They are communicating the TGWA’s options in a highly effective manner regarding the situation with the convention, continuing education classes and with developments coming from the State of Texas that affect our industry. The staff is constantly looking ahead and evaluating these issues to come up with potential contingency plans for TGWA.

A special thank you should also go to Mr. Mike Pyburn for his tireless efforts to assist the staff and the TGWA at large to keep our organization’s financial health strong and growing. Mike is also instrumental in monitoring the financial health of the TGWA Scholarship Foundation. I think we can all agree that the scholarship program is one of the best and most phenomenally successful efforts ever implemented by the TGWA those many years ago.
TGWA Partners with NGWA to Launch New Online CE Class Platform

TGWA has never had its own online continuing education (CE) content or platform. Now, TGWA has partnered with the National Ground Water Association (NGWA) to develop an online CE class portal with pre-recorded classes, attendance verification questions, and an automatic certificate feature. The classes are hosted on the NGWA website, but the link is available on the TGWA Online CE Class page.

With the ongoing pandemic still limiting large in-person gatherings, TGWA is monitoring the latest CDC guidelines to ensure the safety of all CE class attendees remains the priority. By launching this online CE class platform, TGWA hopes to fill the gap left by halted in-person classes. While there are many variables to consider before hosting in-person classes again, TGWA plans on hosting regular classes in 2021 with the online option serving as an added platform.

Currently, TGWA is offering four classes on the new online platform, including the rules and regulations course. Anyone needing their CE hours before a certain expiration deadline can now use this self-scheduled platform to obtain their four hours of credit. TGWA is the CE Provider and staff will still be submitting the credit hours to the Texas Department of Licensing and Regulation.

So if you need CE classes this year, take them online and support our state and national associations. Visit www.tgwa.org/onlinececlasses for instructions on how to access the online CE class portal.

A preview of the NGWA online portal.
Congratulations to all of our scholarship recipients!

Sterling Morrison, Christiana Perez, and Thomas Mullen received the highest rankings among new applicants in 2020.

**Sterling Morrison**
Name of university: University of Texas at Austin  
Class standing: Freshman  
Current major: Undergraduate Studies  
Hobbies: Researching different possible renewable energy sources and ways that we can improve existing ones.

**Christiana Perez**
Name of university: McMurry University  
Class standing: Freshman  
Current major: Biomedical science  
Hobbies: I focus mainly on soccer and since I am in school studying has to be a hobby!

**Thomas Mullen**
Name of university: West Texas A&M University  
Class standing: Freshman  
Current major: Agribusiness  
Hobbies: Hunting, fishing, working, being outdoors, and hanging out with friends.

**How has the TGWA scholarship positively affected you?**
This scholarship has allowed me to more realistically view my college career as one that will require lots of hard work but will also reap many benefits. This aid gives me confidence and encourages me to pursue my degree.

**Where do you see yourself in five years?**
I have to work to pay my own way through school, so this has helped relieve the burden.

In five years, I see myself graduated from West Texas A&M University and applying for the Texas Game Warden Academy.

**Catherine Arnold**
Name of university: Texas A&M University  
Class standing: Sophomore  
Current major: Chemical Engineering  
Hobbies: I enjoy playing the piano and watching movies. On long breaks, I love traveling with family.

**Clay Brunson**
Name of university: South Plains College  
Class standing: Sophomore  
Current major: Wildlife Management  
Hobbies: Roping, hunting, fishing, and drilling water wells.

**How has the TGWA scholarship positively affected you?**
The TGWA scholarship has allowed me to be able to confidently focus on my studies without the heavy burden of future debt, especially during these unprecedented times. With finances mounting, it is a relief to be able to take some weight off of the shoulders of me and my parents. I look forward to being able to pay it forward and contribute to students in need of financial help in the future.

**Lena Deharde**
Name of university: Baylor University  
Class standing: Sophomore  
Current major: Neuroscience  
Hobbies: My favorite activities are performing in a handbell ensemble, wakeboarding and exploring new places.

**How has the TGWA scholarship positively affected you?**
The TGWA scholarship has helped cover my textbook and tuition expenses for college. With the financial help, I am able to obtain great knowledge and enjoy my experience at Baylor. TGWA has also enabled me to make connections between the water well industry and healthcare.

**Where do you see yourself in five years?**
In five years, I will have my first degree and be starting school for a doctorate. I hope to have found great, positive accomplices and to be nourishing strong family bonds!
New Recipients 2020-2021

Mac Aulbach
University of Oklahoma

Andrew Bettle
Sul Ross State University

Mikaela Calami
Sam Houston State University

Riley Calk
Texas A&M University

Myla Childers
Texas A&M University

Cassidy Crowell
University of Texas at Austin

Madison Hill
Blinn College

Ariadne Ortiz
Sam Houston State University

Eryka Pruitt
Texas State University

Emily Schmuck
Concordia University

Zoie Stevens
Trinity Valley Community College

John Jones
Name of university: Texas A&M University
Class standing: Sophomore
Current major: Petroleum Engineering
Hobbies: I enjoy woodworking, working with cattle, playing classical piano, and ballroom & country dancing.

How has the TGWA scholarship positively affected you?
Receiving the TGWA scholarship has provided for me the cushion to focus on my professional life during college and pursue my passion academically. Because of this, I had the opportunity to work a summer internship with SM Energy. I recently finished my final presentation of my summer project; and looking back, I realize the whole experience would not have been possible had I been lacking the generous financial assistance of the TGWA and other scholarships during the semester. I am now very excited and grateful to be a returning scholarship recipient.

Where do you see yourself in five years?
In five years, I hope to be commissioned in the United States Airforce and be a pilot.

Samantha Scott
Name of university: West Texas A&M University
Class standing: Junior
Current major: Accounting
Hobbies: I enjoy spending time with my friends and family, watching movies and painting.

How has the TGWA scholarship positively affected you?
Receiving this scholarship will help me be able to afford textbooks for this next semester.

Where do you see yourself in five years?
In five years, I see myself as a college graduate with a Masters in Accounting. I see myself working in a large accounting firm, working towards opening my own firm.

Zachary Pike
Name of university: East Texas Baptist University
Class standing: Sophomore
Current major: Sport Management
Hobbies: I enjoy playing safety for the ETBU Tigers and spending time with family and friends.

How has the TGWA scholarship positively affected you?
Thank you so much for helping me pursue my college education. Your contribution helps relieve some of the financial burden.

Where do you see yourself in five years?
In five years, I see myself working in a field that gives back to my community, and I definitely hope it’s in water conservation.

Caden Wyatt
Name of university: Arizona State University
Class standing: Junior
Current major: Electrical Engineering
Hobbies: Most of my hobbies include being outdoors. I love to hunt, fish, camp and ride dirt bikes.

How has the TGWA scholarship positively affected you?
As a young independent married student, the scholarship helps me to manage the high costs of school and still support my family.

Where do you see yourself in five years?
In five years, I should be graduating from law school as a patent attorney.
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The Groundwater Science Division is currently looking at possible changes to our organizational structure and by-laws. We are looking at the possibility of streamlining and re-organizing some of our GWS division committees with the following in mind: evaluate the existing committees and examine what committees might be eliminated, examine which committees might be effectively combined, and most importantly, look at how to utilize committees to encourage general Groundwater Science Division membership to become more active.

If anyone would like to be involved with the GWS Division and this process, feel free to contact me or any of the other GWS Division Board members. Additionally, you can always contact TGWA staff and let them know you would like to become involved.

Sincerely,

Terry Love

Get the Latest TGWA News On Our “News” Web Page

If you’re not getting our news emails, but would like to, send an email to afox@twca.org.

strides in working with NGWA to develop online courses and maintain regular business. It is an important part of moving forward with new technology and staying connected in the world today. These courses are helping our contractors keep up with necessary CE classes. I have one more quarter on this journey as the M&S president of TGWA, and I want to continue to adapt and assist with anything and everything that will move us forward. We continue to seek new opportunities and ideas in order to keep this organization financially stable and growing. Please reach out to any and all of your board members with ideas and thoughts regarding financial support for the organization. The association has been dealing with unforeseen setbacks of COVID-19 relating to in-person CE classes. Donations to TGWA are not tax deductible but did you ever think about simply giving a contribution to TGWA because you can and are able? If each member gave $20, $50, $100 simply for this year alone in addition to membership dues where would we be next year? Just a thought because I believe in this organization and want to see it push forward.

Special thanks to Jaythan Browning for continuing to market TGWA CE classes on the Facebook page Water Well Guys. Thank you to each member that continues to give valuable input by reaching out to their board members staying connected and involved. We all need each other to get through this crazy time and help everyone to achieve and win.

I want to take a second to remember Betty Jane Pyburn who gave out smiles like money when anyone would enter the M&M Hardware in Manvel, Texas. If you never met this amazing lady, you missed a superstar in my eyes!

“Enlightenment, peace, and joy will not be granted by someone else. The well is within us, and if we dig deeply in the present moment, the water will spring forth.

~ Thich Nhat Hanh

Sincerely,
first as a demonstration project. If successful, the applicant may apply for a full-scale permit. The Water Authority contracted with Daniel B. Stephens & Associates, Inc. (DBS&A) to permit, design, and oversee the construction of the DWTP Large-Scale Recharge Demonstration Project at the site of their existing SJC Drinking Water Treatment Plant (DWTP). The project is designed to recharge surface water, specifically SJC Project water, to the Middle Rio Grande (MRG) basin aquifer.

The permitting and design project phase included permitting with state agencies, site characterization, well design, and design of the surface infrastructure including the well house, piping and associated appurtenances to supply recharge source water from the DWTP and to supply recovered water into the transmission system. DBS&A was the prime consultant for the project’s below ground components (wells), and CH2M (now Jacobs Engineering Group) was the prime consultant for the project’s surface infrastructure components. The OSE issued the project’s USR demonstration permit on November 4, 2016. This was the fourth USR demonstration permit issued in the State of New Mexico.

**Project Construction**

The project was constructed in two phases: well installation and well equipping. Two recharge wells were installed at the DWTP in 2017. Well ASR-01 is completed in the Santa Fe Group Aquifer, and well VZ-01 is completed in the vadose zone, or unsaturated sediments above the water table. Yellow Jacket Drilling Services provided well construction and testing services for both wells. The locations for wells ASR-01 and VZ-01 were selected based on legal and regulatory constraints, predicted saturated thickness, and subsurface lithology.

ASR-01 was completed to a total depth of 1,221.85 ft. below ground surface (bgs). VZ-01 was completed to a depth of 130.5 ft. bgs. Depth to water is approximately 135 ft. bgs at the DWTP. ASR-01 recharges or injects water below the water table at a depth of approximately 400 to 1,200 ft. bgs, and below VZ-01, water infiltrates through the vadose zone and recharges the aquifer at the water table.

The well equipping project included tapping into an existing 72-in. finished water pipeline, and construction of the conveyance infrastructure required to operate the wells, well house, instrumentation, and controls. DBS&A provided support for the below ground project components during this project phase. Well equipping project construction was completed in February 2019.

**Demonstration Testing**

The Water Authority operated the DWTP Large-Scale Recharge Project from March 25 through May 17, 2019 and January 6 through March 31, 2020 under the USR-4 demonstration permit from the OSE and discharge permit DP-1887 from the New Mexico Environment Department, Ground Water Quality Bureau, testing the effectiveness of providing artificial recharge to the Middle Rio Grande basin aquifer though direct injection of potable water into ASR-01 and infiltration at VZ-01.

**ASR-01**

During the demonstration testing, ASR-01 was found to have an injection capacity of 1,750 gpm, and it was shown that the well and associated infrastructure are capable of recovering water at a rate of 3,500 gpm. Based on observations collected during injection, the groundwater mounded as high as to 83 ft. bgs in ASR-01 and, once injection ceased, the increase in water levels had dissipated by about 90 percent within 30 minutes, returning to within several feet of the original static water level. Based on the water quality analyses and geochemical evaluation, the process of injection dilutes arsenic in the formation, such that the recovered water meets the arsenic water quality standard.

**VZ-01**

Two injection tests were performed at VZ-01. The first injection step test consisted of six steps beginning at 100 gpm and progressing to 350 gpm, and yielded an estimated average hydraulic conductivity of 13 feet per day (ft /d). During demonstration testing in VZ-01, the injection rate tended to range from about 198 to 202 gpm, with water levels rising to about 86 ft. bgs. The water level did not continue to increase significantly, indicating that the injected water was infiltrating through the well screen, into the formation. The flow rate of 200 gpm is recommended for VZ-01 on a continuous basis during the project operations.

Being a vadose zone well, VZ-01 is completed above the water table, and remains dry except during injection. Because this is a dry well, there is no pump installed and there is no method to extract water or backwash the screen.

**Water Quality**

A geochemical analysis of the recharge water and groundwater was prepared as part of the demonstration project permit application process to predict chemistry during mixing of the two waters, with an emphasis on arsenic concentrations. This
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Groundwater Week 2020 — Focusing on all you Need to Succeed!
By PAT LEVAK, National Ground Water Association

Through the years, NGWA’s annual Groundwater Week has come to be the place where groundwater professionals can fulfill their continuing education requirements for licensing and certification, while learning about the new products and services from suppliers and manufacturers…and 2020 is no different! In fact, during these extraordinarily challenging times, it is perhaps now more important than ever for you to continue to advance your knowledge, learn about the newest in technology and services, and stay connected with your peers to be able to succeed.

With the goal in mind of focusing on your success, Groundwater Week 2020 is proceeding, albeit in a different format.

After great deliberation, the NGWA Board of Directors voted unanimously to make Groundwater Week 2020 a virtual-only event.

Due to State of Nevada and City of Las Vegas restrictions on gatherings resulting from the COVID-19 pandemic, we would not have been able to provide the experience our attendees and exhibitors have come to expect. NGWA’s decision to move forward with a virtual-only format allows everyone in the industry to stay connected, and enables more people from around the globe to attend.

What won’t be changing, however, is what you’ve come to expect from Groundwater Week. Virtual does not mean boring or

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noninteractive! We are developing innovative and fun ways to bring the education, networking, and camaraderie you expect from Groundwater Week to life in our virtual setting. Groundwater Week 2020 will still offer:

• Opportunities for buyers and sellers to interact in a virtual exhibit hall
• Educational sessions for industry professionals to earn important continuing education points
• Multiple ways in which virtual participants can connect and network with each other.

Other offerings you’ll be sure to want to attend include product demos, the keynote address by Kevin McGinnis, who will be speaking on “Establishing Social Distancing Between Contamination and Drinking Water Systems,” and presentations of this year’s NGWA awards.

You’ll have the chance to hear two McEllhiney lectures. Jeffrey “Jeff” Williams, MGWC, CVCLD, will give the farewell presentation of his 2020 lecture, “Running a Business or Doing a Job: Combining Professional Expertise with Business Savvy.” McGinnis will deliver the kickoff presentation of his 2021 McEllhiney lecture, “The Good, the Bad, and the Ugly: Innovative Treatment Options for Established and Emerging Water Quality Challenges.”

You can also become part of the solution for clean and sustainable groundwater by participating in virtual activities designed to help support the Groundwater Foundation’s mission.

Don’t miss this virtual opportunity to meet with thousands of industry professionals from around the globe…register today at GroundwaterWeek.com.
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Betty Jane Pyburn of Manvel, TX, aged 78, went to be with her Lord and Savior on August 5, 2020 at Memorial Hermann Southwest Hospital in Houston. Betty was born April 27, 1942, in Houston, TX, the daughter of loving parents Virble and Hilda Nerren. Betty is survived by her sister, Joyce and husband Ivy Hoffpauriir of Richmond, TX; son, Mike (Julie) Pyburn of Alvin, TX and daughter, Melanie (Jason) Welsh of Pearland, TX; four grandchildren, Luke and Layne Pyburn, and Taylor and Haley Welsh; two great grandchildren, Noah Ford and Emery Williams; and numerous other relatives and close friends.

Betty will be greatly missed by this association and industry.
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analysis indicated that a mixture of source water and groundwater would have arsenic concentrations below the standard of 0.010 mg/L, when the groundwater is mixed with 10 percent or more of the recharge source water.

Extensive water quality sampling was performed of the recharge source water (treated, dechlorinated SJC Project water diverted from the Rio Grande), and groundwater (ASR-01 and project monitor wells MW-01S and MW-01D) before, during, and after injection began. Before recharge began, arsenic was the only constituent to exceed a water quality standard in groundwater. The arsenic concentration of the recharge source water is below the analytical detection limit of 0.001 mg/L.

During the demonstration project, water quality observed at ASR-01 changed in response to the recharge and recovery activities. The most important change was the dilution of arsenic concentrations in groundwater due to mixing with recharge water. During demonstration testing, recovered water, which is a mixture of groundwater and treated surface water, met all EPA drinking water and New Mexico groundwater quality standards. Project monitor wells MW-01S and MW-01D were also sampled, and the recharge activities did not impact the water quality at these monitor wells.

Future Plans
During the demonstration project, the Water Authority collected and evaluated the operational, hydrologic, and geologic data needed to support an application for a permit for a full-scale project, and determined that the project is hydrologically feasible. The Water Authority applied for a full-scale USR permit from the OSE, and the full-scale permit was issued on April 20, 2020. This was the third full-scale USR permit issued in the State of New Mexico. This permit allows the Water Authority to recharge up to 5,000 acre-feet per year using this project, up to a maximum storage account of 50,000 acre-feet. The Water Authority plans to begin full-scale operations in October 2020.

The project received the National Ground Water Association Outstanding Groundwater Supply Project Award in 2020. The presentation of awards will occur during the virtual 2020 NGWA Groundwater Week taking place December 8-10, 2020.

AMY EWING, P.G. is a Hydrogeologist and licensed Professional Geoscientist with 20 years of experience, specializing in water supply, conservation, and drought planning. She can be reached at aewing@geo-logic.com
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