MAR
water banking

# Managed Aquifer Recharge

for

West Texas and Eastern New Mexico Water Banking

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Daniel B. Stephens & Associates, Inc.
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**Western regions of Texas and eastern New Mexico must contend with prolonged, repeated drought. Much of this area provides energy and sustenance not only for their respective states, but also for other parts of the USA, which places further demand on the region's resources. Much, if not all of the region's water resources come from groundwater. Conscientious of the limitations of this resource, many municipalities have implemented plans and projects to extend the use of their water resources, not only because it's good policy, but because it is a necessity. Just this year, City of Amarillo was recognized by the Water Conservation Advisory Council for their efforts in water conservation and received the Save Texas Water Blue Legacy Award.**

**Managed aquifer recharge (MAR) is an important tool that attendees of this workshop may consider implementing to sustainably manage this resource we call "WATER".**

### 8:00 – 9:00 Registration and Networking

- Parkhill, Smith & Cooper, Inc., Daniel B. Stephens Associates, Inc., and, Hydro Resources will have booths in the breakout room with workshop information
- Hydro Resources will be displaying some of the equipment used in the construction of injection wells, a common method of managed aquifer recharge

### 9:00 – 9:30 Introduction *(Honeyfield)*

- Brief introduction of presenters. • Exclusiveness to the regions of west Texas and eastern New Mexico. • History of the area. What is Managed Aquifer Recharge and how it may be applicable to the region.
- Western regions of Texas and eastern New Mexico must contend with prolonged, repeated drought. Much of this area provides energy and sustenance for local markets and the broader USA placing further demand on our water resources. Much, if not all of the water resource of this region, comes from groundwater. Conscientious of the limitations of this resource many municipalities have implemented and exercise methods to extend the use and, reuse of this precious resource. Not because it's good policy but, because we must. Parts of this area, we call home, may have pioneered the concept of regionalized planning. Managed aquifer recharge (MAR) is but another tool that attendees of this workshop may reconsider implementing to further manage this limited resource we call "WATER".

MAR is a water resources management tool that allows for the efficient, conjunctive management of surface-water, groundwater, and reclaimed water sources to help ensure a sustainable water supply. MAR provides some important benefits for water management agencies:

- Maximizing storage capacity
- Buffering peaks in supply and demand
- Reducing evaporative losses that result from above-ground storage
- Minimizing drawdown and reducing or avoiding subsidence
- Improving water quality through dilution and/or soil aquifer treatment (SAT)

The following workshop sessions will discuss these benefits and cover the most important things you need to know to know to implement MAR in your community.

- This workshop will provide professionals certification for Continuing Education Units (CEUs).

### 9:30 – 10:00 State of Recharge in Texas and the USA *(Moore)*

- Giving context to the idea of MAR, a brief overview of projects in Texas and other states will be reviewed. Discussion will include how this method of managing our aquifers is perceived by regulatory agencies and users of the available technologies.

**10:00 – 11:30** Geoscience *(Blandford, Moore, Wolf)*

- A critical part of planning a successful MAR project is developing an understanding of aquifer characteristics — how water "moves" through the aquifer — which can help to determine MAR feasibility, appropriate technology, and potential impacts to other water users in the region.
- Groundwater models can be used to reliably predict the flow of water in an aquifer, whether water can be effectively stored and retrieved, and potential impacts to neighboring pumpers. Modeling can also demonstrate what is happening during recharge to the operator and regulators, and serve as a tool in the management and design of a system.
- It is also important to understand groundwater chemistry, include potential effects of mixing water from different sources, and quality of water pumped after storage in the aquifer.
- Various methods of MAR can be implemented. Given the characteristics of your area, some may work better than others. This discussion should help determine what method(s) may be more applicable for consideration in your region.

**11:30 – 12:00** Panel Discussion (all presenters)

- A moderated panel of the morning's session will convene to receive questions and summarize what has been presented.

**12:00 – 12:30** Lunch, networking and displays available for viewing in the breakout area. *(Lunch will be provided)*

**12:30 – 1:30** Engineering *(Honeyfield, Albus)*

- Your system on MAR. Understanding how various methods of MAR can be devised to function in your system requires an understanding of the fluid dynamics involved.
- Water treatment may be necessary to implement various MAR options available to this region. Discussion, relative to known treatment processes in the region, and any necessary tertiary treatment to meet regulatory requirements for MAR applications will be presented. The subject of direct reuse will also be discussed, conveying regulatory requirements and treatment requirements when contemplating this level of reuse.

**1:30 – 1:45** Regulations *(Moore)*

- Promising not to be boring, this short presentation will summarize some of the regulations that apply to MAR, what you should be aware of when considering the use of these technologies, and how to overcome regulatory hurdle to make your project a success.

**1:45 – 2:00** Funding *(Laverty)*

- So, you have identified a MAR project. How these projects are categorized by state funding institutions may be surprising.

**2:00 – 2:45** Construction (Glotfelty)

- A paradigm shift in the operation of a MAR system could dictate the construction materials used. Implementing Aquifer Storage and Recovery (ASR) into your system will require design and construction of wells that operate in both directions — water in and water out. These wells become a permanent component to your infrastructure, analogous to a pump station, for example. Considerations in the construction of efficient, long-lasting ASR wells will be discussed in some detail for this presentation.

**2:45 – 3:45** Panel Discussion *(All Presenters)*

- A moderated panel of the entire Workshop will convene to receive questions and, summarize what has been presented throughout the day.

**3:45** Q&A

- Presenters will remain to address specific questions you may have about your system(s). You are welcome to visit the booths available in the breakout room which have materials and literature relevant to this Workshop.

# Presenters

**Scott Honeyfield, PE**, is a Principal and Tsenior technical advisor for for PSC. Since joining PSC in 1982, Scott has been involved in the conception, design, study, and management of numerous major civil engineering projects. Potable water infrastructure projects are his specialty. In the last 15 years, Scott has been a major part of the conception, development, and design of some of the largest water works projects in the area. His duties have included authoring Technical Memorandum, which have set the ground work for highly technical water works projects followed by the development of construction documents for these multi-million dollar projects many of which are of historical significant. Two were recognized by ACEC-Texas for Engineering Excellence and won gold medals. Always attentive to the needs of the client, Scott fully engages the client in developing a project from conception through commission and continues this interaction throughout the warranty period. This yields better designs, better understanding, and better relationships.

**Stephanie Moore, PG**, is a Senior Hydrologist and licensed Professional Geoscientist with 20 years of experience, including 8 years with the U.S. Geological Survey (USGS). She holds an M.S. degree in Earth and Planetary Sciences from the University of New Mexico, and a B.S. in Environmental Sciences from Texas Christian University. Ms. Moore has spent most of her career working on technical and policy matters involving groundwater/surface water interaction, vadose zone hydrology, and stormwater. Ms. Moore has extensive experience with recharge, having designed and led the Albuquerque Bernalillo County Water Utility Authority's recharge demonstration projects for six years, and having participated in recharge studies in Arizona, California, Nebraska, New Mexico, and Utah. She has worked with clients to design and implement long-term monitoring programs, and uses geochemical and isotopic analyses to better understand water quality impacts.

**Neil Blandford, PG**, is a Senior Vice President and Principal Hydrologist with over 30 years of experience in quantitative hydrogeology. He is a licensed Professional Geoscientist in Texas and holds and M.S. in Hydrology from New Mexico Institute of Mining & Technology and a B.S. in Environmental Science from the University of Virginia. Mr. Blandford has extensive experience performing water supply investigations, aquifer recharge evaluations, groundwater planning studies, and developing numerical models of groundwater flow and solute transport.

Mr. Blandford has worked extensively across the High Plains region of west Texas and eastern New Mexico conducting groundwater supply studies for municipal and private entities.  in addition, Mr. Blandford conducted groundwater modeling for permitting the first ASR project in New Mexico; he conducted hydrogeologic evaluation and feasibility modeling of indirect potable reuse (IPR) project in California that included simulation of IPR water injection and extraction, interaction of surface water and groundwater, and computation of residence time to meet state regulations and identification of critical flaws for the Padre Dam Municipal Water District; and he has supported the City of Rio Rancho with their aquifer replenishment projects.

**Christopher Wolf, PG**, has over 24 years of experience specializing in geochemistry and geology. He holds M.S. and B.S. degrees in Geochemistry and Geology, respectively. His experience includes compiling and evaluating water quality data for surface water and groundwater, preparing and implementing sampling and analysis plans for water quality investigations, and performing geochemical modeling of water quality using models, such as PHREEQC and Geochemists Workbench. He has performed geochemical and hydrogeological characterizations for water supply projects throughout the West, including providing expert testimony.

Mr. Wolf recently completed the design and oversight of the construction and testing of the first ASR well for the Albuquerque Bernalillo County Water Utility Authority.  The 20-inch well, completed to 1,200 feet, has a pumping capacity of 4,000 gpm and an infiltration capacity of over 2,500 gpm.  This project also included design and contraction of a vadose zone injection well with a capacity up to 600 gpm.  Additional recent experience includes evaluation of the potential groundwater and surface water sites for recharge for a U.S. Bureau of Reclamation feasibility investigation; evaluation of water quality data and hydrogeology of a City of Rio Rancho ASR project, including groundwater geochemistry, lithology, geologic structure, and borehole geophysics; and analyzing and recommending locations for four new injection wells for the City of Rio Rancho's Master Plan.

**Daniel Albus, PE**, is an Associate and a Team Leader in PSC's Treatment Sector. He is an expert in water and wastewater treatment for industries and municipalities. Since joining PSC in 2010, Daniel has worked with many clients throughout West Texas and Dallas/Ft. Worth to improve water quality both at water and wastewater treatment plants. His experience includes the design of several reverse osmosis plants, arsenic treatment plants, facultative lagoons, and activated sludge systems. He is a subject matter expert on inorganic constituent removal in groundwater for potable water supply. His work on the Wheeler RO plant was awarded ACEC Gold status for engineering excellence in 2017. Daniel was selected as a Top Young Professional in 2018 by ENR Magazine and Young Engineer of the Year by the South Plains Chapter of TSPE. Daniel considers treatment design to be a balance of effectiveness and efficiency that should always be mindful of the owners operational structure. He completed landmark work with the City of Big Spring WWTP in preparation for their potable reuse work with CRMWD. He designed activated sludge and effluent filter improvements to stabilize the effluent treatment quality. Afterwards, Daniel completed design of a new lift station and headworks facility to further improve the plant's ability to deliver consistent reuse quality effluent.

**Kristi Laverty, PE**, is an Associate and a member of PSC's Water Resources Sector. After joining PSC in 2008, Kristi began her tenure working on a multitude of solid waste projects and site development and park improvement projects. Her expertise is focused on irrigation and potable well and pump design; sewer and water line design; and water tank storage design and rehabilitation. Kristi is involved in the Texas Society of Professional Engineers South Plains Chapter where she is currently serving on the board. Kristi exhibits her passion for engineering by speaking to students to promote the engineering profession and encourage women to take leadership positions. She also volunteers to judge engineering competitions and science fairs.

**Marvin Glotfelty, RG**, is a Principal Hydrogeologist with more than 35 years of experience. He has M.S. and B.S. in Geology from Northern Arizona University, is a Registered Geologist in Arizona and California, and is a Licensed Well Driller in Arizona. Over his career, he has been involved with almost every aspect of hydrogeology, water supply studies, aquifer testing, well design, well rehabilitation, water rights issues, and water quality assessment, including the design, installation, rehabilitation, and abandonment of over 900 water wells in the U.S. His ASR experience includes the design and construction management of over two dozen ASR wells in the Phoenix municipal area. He has been the first to incorporate leading-edge technologies in the U.S, such as the reverse-syphon injection method and use of manufactured glass beads for the well's filter pack, which resulted in the City of Phoenix being awarded the 2013 National Ground Water Association's Outstanding Groundwater Project Award. Mr. Glotfelty has given over 100 presentations on hydrogeologic and water well topics and he has authored over 20 publications, and he was selected as the National Ground Water Association's Distinguished McEllhiney Lecturer for 2012.