

Introduction to Case Studies

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The use of managed aquifer recharge (MAR) systems has expanded greatly across the U.S. during the past few decades, especially aquifer storage and recovery (ASR) wells and closely related Aquifer Storage and aquifer storage, transfer and recovery (ASTR) systems. Adoption of ASR and ASTR systems has been especially intensive in several southwest states that are characterized by arid climate conditions and in Florida, where ASR wells are used to store water in aquifers during wet seasons and then subsequently withdraw water during dry seasons.

The case studies here describe ASR or ASTR well fields for three cities in the southwest U.S., ASR systems that have been implemented by two municipal water systems in the Upper Midwest and investigations of injection well systems at two other Upper Midwest sites that were ultimately abandoned due to differing reasons. The southwest U.S. case studies feature descriptions of ASTR systems that have been operational for over three decades in El Paso, Texas and nearly two decades in Tucson, Arizona, and a multi-ASR well system that is being developed in Roseville, California. The Upper Midwest case studies include an overview of five ASR wells that are managed by the Des Moines Water Works (DMWW) or the City of Ankeny Water Utility, which support DMWW water distribution to the Des Moines metropolitan area, and a single ASR well installed by Joint Powers Water Board (JPWB) of Albertville, Hanover, and St. Michael, Minnesota that has been operating since 2012 to meet increasing water demand from customers served by the utility.

The two other case studies describe an ASR well exploration by the City of Green Bay, Wisconsin and an injection well pilot study commissioned by the Shakopee Mdewakanton Sioux Community (SMSC), located in Scott County, Minnesota. The attempt to establish a functioning ASR well by the City of Green Bay failed due to elevated arsenic concentrations that proved insurmountable per the goal of implementing a successful ASR well within the city water distribution system. The SMSC is a small tribe consisting of 325 people that operates a water system serving roughly 15,000 people, who pursued the pilot study in order to determine if treated wastewater could be used to recharge declining aquifer levels by using multiple injection wells. The pilot study showed that the approach was feasible but the SMSC abandoned further assessment of the injection wells due to concerns expressed by neighboring communities related to potential undesirable effects on groundwater movement because of the presence of a valley in the buried bedrock surface.

These seven case studies provide a composite overview of key MAR systems being adopted by a range of U.S. municipalities that represent disparate environmental conditions, available water sources and variations in MAR technology. The case studies also reveal that significant problems can be encountered that can undermine development and implementation of ASR wells and other MAR approaches.