

# FY15 NM WRRI Research Progress Report Form

Report Due Date: December 1, 2014

**1. Project Title:** Ground water level and storage changes – Regions of New Mexico

**2. Investigators:**

PI: Stacy Timmons, New Mexico Bureau of Geology and Mineral Resources, New Mexico Institute of Mining and Technology. Collaborators: Mike Johnson, Hydrology Bureau, New Mexico Office of the State Engineer, Nathan Myers, U.S. Geological Survey, Matt Ely, U.S. Geological Survey, Kenneth C. Carroll, New Mexico State University

**3. Brief description of project, research objectives, and impacts on New Mexico.**

Changes in water levels can reflect very relevant water issues in the arid southwest, such as variations in nearby surface water, fluctuations in recharge, and changes in the ground water storage. For this study, we will compile water level data, in an effort to begin development of a statewide water level change contour map. We will develop maps showing contours of changes in water levels within several select basins. Additionally, we will also attempt to quantify the change in ground water storage.

The proposed work will highlight changes in water levels on a regional scale, while in some regions it will highlight data gaps where future work is needed. In many regions of New Mexico, we know that water levels are declining, but the data have not been compiled to address the amount of decline in specific areas. Project deliverables will show changes in ground water systems, which will give the results visual impact useful for illustrating the potential impact of conservation efforts and other water management options. With up-to-date regional maps showing contoured changes in water levels (time interval depending on the available data), the state of New Mexico will have a useful tool to aid in planning for future water management needs.

**4. Brief description of methodology.**

For this project we are developing a statewide water level database. Data will be compiled from multiple agencies, reviewed and filtered toward the goals of this study. We will incorporate all data into one simplified water level database that can be used by other research groups or interested public entities. This will be completed by December 31, 2014.

From this database, starting in January 2015, regional contour maps of water level changes will be developed for selected basins. We are using a regional analysis approach because water level measurements have been collected over portions of the state, often clustered in areas with greater populations. Additionally, water level measurements have been collected at various time intervals, such as annual or 5-year intervals of measurement.

The water level measurements will be processed to calculate changes in ground water levels over the intervals relevant within a region, and then contoured using ArcGIS. Changes in aquifer water levels relate to changes in aquifer storage. Storage changes can be estimated using the *changed* volume of an aquifer (based on water level changes) and the storage property (specific yield) of the aquifer. With regional maps of water level change, using ArcGIS, these surfaces can be paired with an average specific storage value applied to the region to estimate changes in groundwater storage (McGuire, 2013). From these results, the state of New Mexico will have a useful tool to aid in planning for future water management needs.

**5. Brief description of results to date and work remaining.**

At this time, we have prepared a comprehensive database in MS Access that is based on site locations. The bulk of the data is from the USGS, NMOSE, and NMBGMR, which now includes

about 5400 well locations and over 130,000 water level measurements. These measurements include sites that have been measured periodically since the 1940s. We have provided these data to the Statewide Spatiotemporal Water Level project to insure common data are being used between the two water level projects. As water level measurements continue in the state, we will continue to incorporate data into this database, from which we can provide data to other research groups or interested public entities.

Remaining work includes providing a simplified database of well locations and water levels, with queries built for analysis of water level changes over available date ranges for deliverable by December 31, 2014. Also in December 2014, we are meeting to discuss selection of regions to address. By June 2015, we will complete contouring of water level changes for selected regions and attempt calculations of changes in ground water storage.

**6. Student participation - List all students participating in the project, their classification level (undergraduate, master's, Ph.D., post doc) and their field of study (degree major)**  
None.

**7. Provide special recognition awards or notable achievements as a result of the research. Include publications in progress (all published work supported wholly or in part of NM WRRI must bear an acknowledgment of support)**

At the 59<sup>th</sup> Annual WRRI Water Conference, Stacy Timmons gave a 15-minute presentation to describe this work and the challenges of addressing groundwater issues in New Mexico. Also at the conference, Stacy presented a poster on the same topic. The presentation is currently online at: <http://2014.wrri.nmsu.edu/power-point-presentations>

**8. Include references as needed (limit to one additional page)**

McGuire, V.L., 2013, Water-level and storage changes in the High Plains aquifer, predevelopment to 2011 and 2009–11: U.S. Geological Survey Scientific Investigations Report 2012–5291, 15 p. (Also available at <http://pubs.usgs.gov/sir/2012/5291/>.)

**9. Provide a few sentences on progress toward uploading data to a common/standardized platform, if applicable.**

We have spoken with and provided example data to WRRI's data manager to begin to form a common data platform for sharing this water level change component of the Statewide Water Assessment. In September 2014, we participated in an additional follow up meeting with WRRI staff, including the data management team, and the group working on similar water level analyses. We provided overview of our current database, discussed processes for data analysis and sharing. Action items included discussion with Produced Water database P.I. to establish potential links between databases, which are both based on well point locations. As of November, 2014, we have provided all water level data available to the Statewide Spatiotemporal Water Level project to insure common data are being used between the two water level projects.

**10. Provide two PP slides that provide summary information on your project appropriate for viewing by state legislators.**

Attached.