

FY15 NM WRI Research Progress Report Form

Report Due Date: Sept. 8, 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 depletion of the aquifer, 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 maps. 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. Results of this work will have visual impact to show changes in ground water systems, which may help to implement change toward conservation. With up-to-date regional maps showing contoured 5-year changes in water levels (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.

We will develop a statewide water level database, with regional contour maps of changes in water levels for selected basins. Water level measurements have been collected in parts of the state, clustered in areas with greater populations, therefore, we are using a regional analysis approach. Additionally, water level measurements have been collected over various time intervals, such as annual or 5-year intervals of measurement. Data will be reviewed within this project and filtered toward the goals of this study. We will incorporate all data into one water level database. 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.

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

At this time, we have prepared a comprehensive database in MS Access that will incorporate well locations and time series water level data from multiple agencies. We are establishing data standards for which fields will be required to complete this project, including locations in UTM's NAD83, well depth, measuring point descriptions, water level measurements, dates, and preferably with geologic information also.

The bulk of the data will come from the USGS and NMOSE to build the statewide dataset. These data are in preparation and review by the USGS. It is expected that more than 30,000 well points will be incorporated into the database in the next few months. It will also include shorter term, regional data from the New Mexico Bureau of Geology and Mineral Resources and Bernalillo County. Remaining work includes compiling and filtering data for deliverable in December 2014. By June 2015, we will complete calculations 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)

None yet.

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

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

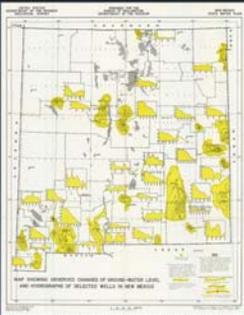
We have spoken with and provided example data to WRRI's data manager to begin to form a common data platform for sharing this water level change component of the Statewide Water Assessment.

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

Groundwater level and storage changes for regions of New Mexico
with USGS, NMOSE, NMBGMR

Water level change may indicate depletion of the aquifer, variations in nearby surface water, fluctuations in recharge amounts, and changes in the total water remaining in storage for future use.

- Step 1: Compile water level data
- Step 2: Select basins/regions
- Step 3: Contour changes in groundwater levels over regionally-appropriate time interval (i.e. 5-10 years)
- Step 4: Calculate changes in water storage over relevant time intervals (where possible)

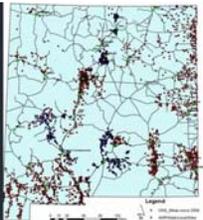


Map compiled in 1974 with a similar idea

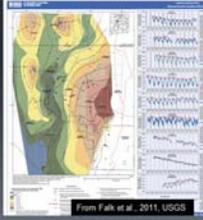
Datasets and Products

- Datasets: USGS/OSE networks, NMBGMR studies, and others
 - Data coverage is NOT evenly distributed statewide
 - Intervals of measurement are variable (most are every 5 years)
 - Identification of data gaps
- Products:
 - Compiled water level database (ArcGIS friendly)
 - Mapped region of water level changes (ArcGIS)
 - Estimate of change in groundwater storage
 - Technical report describing methodology*
 - * This can be used on other regions of the state, pending future funding.

Data coverage



Example product



From Falk et al., 2011, USGS