

## FY15 NM WRI Research Progress Report Form

- 1. Project Title:** New Mexico statewide water assessment: Recharge data compilation and recharge area identification for the state of New Mexico.
- 2. Investigators (names, university/agency):** Talon Newton, New Mexico Bureau of Geology and Mineral Resources and Fred Phillips, Department of Earth and Environmental Science, New Mexico Tech. **Other Researchers:** Geoffrey Rawlings, New Mexico Bureau of Geology and Mineral Resources, New Mexico Tech.
- 3. Brief description of project, research objectives, and impacts on New Mexico (provide performance measures and outcomes):** Quantification of groundwater recharge by precipitation is the most important gap in current understanding of the New Mexico water budget. Other important components of the water budget (e.g., precipitation, surface water flows) have been systematically studied for over 100 years, yet no such systematic effort has been attempted for recharge. The objectives of this project are to compile previous estimates of recharge and to construct a map based on Geographic Information System (GIS) layers that identifies areas where recharge is likely to occur. The recharge area map will integrate existing GIS layers, including monthly and annual precipitation, potential evapotranspiration (ET), geology, major streams and drainages, and vegetation. This recharge area map will be a valuable resource in and of itself and is a necessary step towards calculating accurate recharge rates throughout the entire state.
- 4. Brief description of methodology:** Each research objective will be completed per phase:

Phase I: We will obtain and compile all existing recharge estimates and data. Display data in a format that includes the study citation, location (individual basins, counties, and water planning regions), recharge estimate, methodology, and other important information. We will also construct an interactive GIS-based map that shows locations of recharge estimate research and water resource planning studies.

Phase II: We will construct a New Mexico recharge area map within a GIS framework by combining several individual layers containing spatial data that can help to determine where groundwater recharge likely takes place. These spatial data sets include a digital elevation model (DEM), precipitation rates, potential ET rates, regional geology, vegetation cover, and stream locations. These layers will be evaluated and integrated to quantitatively rate different areas in terms of propensity for groundwater recharge. The difference between precipitation data and potential ET values will be used to evaluate the potential magnitude of recharge. Vegetation and geologic data will be categorized in a way that highlights areas where there is greater potential for recharge. Major rivers and streams in the state also likely contribute to groundwater recharge. The final report will describe quantitative methods and algorithms used to integrate these different data sets.

- 5. Brief description of results to date and work remaining:** We are currently nearing the completion of Phase I. Results of Phase I to date are tabulated data from many academic and government studies of groundwater recharge from around the state, with small notable data gaps remaining. The region of the most thoroughly collected and analyzed data has shown to be the populous central region of New Mexico, and previous data gaps have been filled. A working GIS-based map has been developed, showing compiled data associated with points based at the center of each of New Mexico's 16 Water Resource Planning regions and points for each specific study site at the basin scale. Early analysis of GIS data including precipitation models from PRISM and potential evapotranspiration data from MODIS (MOD16) is being completed. An initial map of likely recharge based on these parameters at a large temporal scale has been created. Data pertaining to geology, vegetation, and surface hydrology is being acquired.
  
- 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):**  
David Ketchum, Master of Science in Hydrology.
  
- 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 WRRRI must bear an acknowledgment of support):**
  
- 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 are working to maintain common geographic data formats. These include the use of ArcGIS software georeferenced to the North American Datum (1983) in the highest (where applicable) possible raster resolution.
  
- 10. Provide two PP slides that provide summary information on your project appropriate for viewing by state legislators:**