

FY15 NM WRI Research Progress Report Form

Report Due Date: October 1, 2014

1. **Project Title:** A Dynamic Statewide Water Budget for New Mexico by Major River Basin
2. **Investigators:** *Principal:* Jesse Roach Ph.D., Tetra Tech Inc. *Unfunded Collaborators:* Vince Tidwell Ph.D., Sandia National Laboratories, Bruce Thompson Ph.D., University of New Mexico. *Other researcher:* Kenneth Peterson M.S., New Mexico State University
3. **Description:** The dynamic, statewide water budget (DSWB) will synthesize water supply and demand information from across the state into a single, easily accessible location, and in such a way that users can view information at a variety of spatial scales. The overall objective of the project is a holistic view of water resources in the state to help support local and regional education and planning to improve stewardship of New Mexico's limited and critically important water resources.
4. **Methodology:** The DSWB is being built by pulling existing information from a variety of sources, predominately the New Mexico Office of the State Engineer / Interstate Stream Commission's Regional Water Plans (NM-OSE-ISC, 1999-2008), the New Mexico Office of the State Engineer's Water Use reports (Longworth, Valdez, Magnuson, & Richard, 2013) and USGS stream gage information.
5. **Results to Date and Work Remaining:** The new results and new work remaining items are in black. Items that appeared in a previous progress report are in grey.
 - a. We have gathered several different estimates of agricultural area by county into our database including annual USDA based estimates starting in the 1970s, every 5 year reported values from OSE starting in 1975, every 5 year reported values from USDA census information starting in 1997, and variable temporal resolution information from remotely sensed, spatially distributed land cover estimates.
 - b. In order to estimate agricultural and riparian area by either county or water planning region, we have used the spatially distributed land cover information to develop time varying transformation matrices that allow agricultural or riparian area by county to be converted to area by water planning region.
 - c. We have begun incorporation of a Blaney Criddle crop consumption algorithm in the model as this method is used in the OSE consumption reports.
 - d. We have incorporated a Hargreaves-Samani based Reference ET calculator into the modeling which uses monthly mean temperature for a county or water planning region to calculate Reference ET for that area.
 - e. We have split human population into two segments: people served by public water supplies, and people not served by public water supply. This distinction is made by county or by water planning region.
 - f. We have also continued to build the numerical model which will serve as the framework for the DSWB. At the previous progress report, the model was able to estimate human population by County or Water Planning Region for any month from 1950 through 2010 in historic mode, and from 2010 forward in scenario mode. The model can now estimate water use by sector, and per capita use by sector for any month from 1980 forward.

- g. We have summarized data availability in the Regional Water Plans, including creation of a matrix summarizing the temporal and spatial resolution and extents covered by the reports and presence or lack thereof of quantitative water budgets in the reports. The temporal resolution of data in 15 of 16 reports is annual, and 11 of 16 reports include a quantitative water budget.
- h. We have summarized data availability in the New Mexico Water Use Reports from 1975 through 2010 including creation of a matrix summarizing water use categories tracked through time. Based on these reports have settled on five water use categories that will be tracked in the DSWB. These categories are slight aggregations of eight of the categories tracked in the New Mexico Water Use Reports since 1990, and are:
 - Commercial, Public Water, Industrial
 - Domestic
 - Agriculture and Livestock
 - Mining
 - Power
- i. We have settled on a working conceptual model for the DSWB with eight external (to or from outside each mass balance unit) fluxes, seven internal fluxes (exchange between stocks within each mass balance unit), and five stocks: available surface water, practically unavailable surface water, available groundwater, practically unavailable groundwater, and human storage and distribution systems.
- j. Remaining work: documentation of work we have already completed, or come close to completing including methods for calculating population, human water use by sector, and agricultural consumption.
- k. Remaining work: Incorporation of estimates of agricultural area and consumption from the regional water plans.
- l. Remaining work: We are starting to get a pretty good handle on the demand and consumption side of things, and need to start on the supply side of things. Conversations should occur with Nathan Myers at USGS and Talon at NMBG about the status of their work and if and how we will be able to incorporate it into our modeling efforts.

6. **Student participation:** None

7. **Special recognition awards or notable achievements:** None

8. **References:**

Longworth, J. W., Valdez, J. M., Magnuson, M. L., & Richard, K. (2013). *New Mexico Water Use by Categories 2010*. Santa Fe: New Mexico Office of the State Engineer.
NM-OSE-ISC. (1999-2008). *New Mexico Regional Water Plans*. Santa Fe: New Mexico Office of the State Engineer / Interstate Stream Commission.

9. **Progress toward uploading data to a common/standardized platform:** We have spoken with Fereshteh Soltani at NMSU about the type of data we expect to produce. Generally, the output from the DSWB will be available in Microsoft EXCEL file format.

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