FY16 NM WRRI Research Progress Report Form

Report Due Date: March 31, 2016

- **Project Title:** A Dynamic Statewide Water Budget for New Mexico

- **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

- **Description:** The dynamic, statewide water budget (DSWB) is synthesizing 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.

- **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.

- **Results to Date and Work Remaining:**
  a. Results from 2014-2015 work include development of a monthly timestep mass balance accounting of water stocks and flows in New Mexico by major river basins of the state from 1975 through 2013 are summarized in the Phase I final project report (Peterson, Roach, and Thompson, 2015). Highlights include:
     - River basin scale completed.
     - State level completed.
     - User interface designed to allow changes to input and visualization of outputs.

  b. Results from Q1 and Q2 (July – December 2015) as reported in the October 1st Quarterly Report, December 1st Progress Report, and January 1st 2016 Quarterly Report:
     - WPR spatial scale completed.
     - County spatial scale completed.
     - Consistency attained between WPR and County spatial scales.

c. Results since January 1st 2016

- Outreach: Presentation by Ken Peterson at the January 7th 2016 New Mexico Water Dialogue in Albuquerque. Ken presented methods and preliminary results to a roomful (~100) of attendees including local and regional water managers and the interested public.
- Uncertainty Analysis: The most significant work in 2016 has involved incorporation of uncertainty into the model framework. Analysis of the expected uncertainty associated with model inputs (precipitation, gaged flows, land cover areas) and methods (ET equations) has been added to model runs in a Monte Carlo type stochastic analysis. The range of outputs resulting from allowing input uncertainty has been analyzed. The result is that all fluxes displayed in the model framework whether they are model inputs or outputs now include an estimated confidence range.
- Model Interface Update: In order to display model uncertainty, two main updates were made to the model interface. (1) The number of significant figures being displayed was reduced to two. The significant figures location in the numbers being displayed depends on unit selection, so this involved some programming. (2) The layout of the interface was adjusted to provide room for display of the confidence ranges.

d. Remaining work to be completed by June 30, 2016:

- Water energy nexus information
- Future base case scenario analysis
- Project report

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.

Peterson, K., Roach, J., Thompson, B. (2015). *A Dynamic Statewide Water Budget for New Mexico: Phase I - Major River Basins.* New Mexico Water Resources Research Institute Draft Technical Completion Report Index # 124273. Las Cruces

9. **Progress toward uploading data to a common/standardized platform:** The model and report from 2014-2015 have been made available on the internet via the WRRI website. We have open communication with Fereshteh Soltani and Jon Williams at NMSU about the type of data the model produces. Generally, the output from the DSWB is available in Microsoft EXCEL file format.

10. **Two summary slides for review and use by legislators are included with this delivery.**