



Divining Rod

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Climate panel opens window on New Mexico's drought

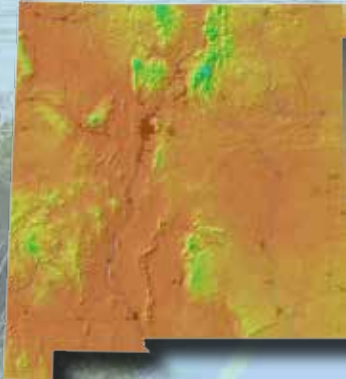
By Erin Ward

New Mexico, entering its fifth straight year of severe drought, can take some solace in the fact that, no, the current drought is not worse than the legendary drought of the 1950s.

David Gutzler, professor with UNM's Department of Earth and Planetary Sciences, assured participants attending New Mexico's 59th Annual WRRRI Water Conference that historical records show the state suffered from a lengthier and possibly worse drought beginning in 1950. During the 1950s, he said, New Mexico recorded eight straight years of below average annual precipitation. In contrast, below average precipitation was recorded for six of the past seven years, with a break in 2010.

"One thing that is different between now and the 1950s," Gutzler noted, "is that it's a lot warmer now." On average, annual temperatures are higher by an astonishing 1.5 degree Fahrenheit, he said. The higher temperatures have, in turn, exacerbated the

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Page 10 Seventeen student water research grants awarded

NM Universities Working Group on Climate Variability panelists listen to a question from the audience. From left: Peggy Johnson, Lee Reynis, Janie Chermak, David Gutzler, and moderator J. Phillip King.



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Director's current topics

Drought and water scarcity have inspired, great conversations, great ideas, great meetings, and great collaborations

The NM WRRRI was established in response to the drought of the 1950s, and was a model for other water institutes established throughout the country. New Mexico is facing drought again, and NM WRRRI is responding with help from the state legislature and the governor. For fiscal year 2015 from July 1, 2014 to June 30, 2015, the New Mexico legislature appropriated \$1M for a water initiative that includes a state-wide water assessment. The cutting edge statewide water assessment is designed to meet the following characteristics:

- Comprehensive - detailed information on water resources beyond the administrative supply. Currently, the State Engineer administers water rights for about 4M acre-feet of withdrawals. The administrative supply is the water supply tied to water rights. Much more water than the administrative supply moves in and out of New Mexico. Precipitation in the entire state ranges from 55-110 million acre-feet per year, though most of that is lost by evapotranspiration. Return flows along river valleys may exceed 0.5 million acre-feet. Groundwater, including brackish water, may exceed 20,000 million acre-feet.
- Accessible - web delivery at user-defined temporal and spatial resolutions. The data to calculate inflows and outflows from the state or regions or counties are available publicly but difficult to condense into meaningful data. The assessment webpage will provide easy to access data and user-friendly synthesis of the data. The NM WRRRI webpage will also provide links to the core researchers and raw data from statewide databases.
- Collaborative - statewide involvement of scientists, researchers, and students. The NM WRRRI approach is to tap into the brain trust of New Mexico, its researchers, and students at universities throughout
- Dynamic - up-to-date quantitative assessment of continuously variable water resources. Precipitation and



surface flow in New Mexico varies dramatically from year to year. Groundwater levels are changing rapidly in some places. The prehistoric record shows periods of megadrought extending for over 100 years in the last 2000 years. This component of the project will use the latest remote sensing techniques to characterize changing supplies.

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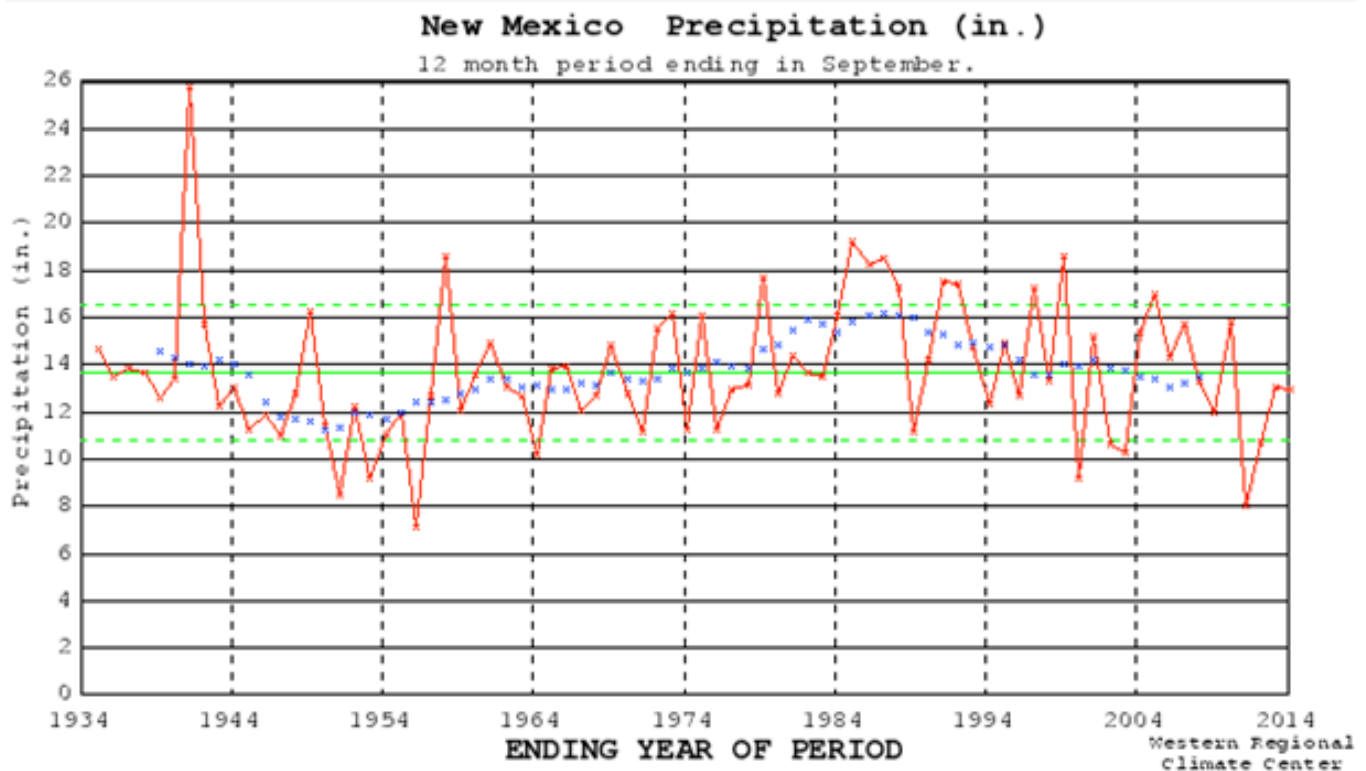
impacts of the current drought and placed added stress on regional water supplies.

Gutzler provided a recent forecast from NOAA that highlights a weak, but apparent El Niño activity over the Pacific Ocean. A strengthening El Niño, he said, typically results in higher than average precipitation for New Mexico. Gutzler contrasted the mildly positive forecast with low stream flows on the Rio Grande and severely reduced water levels in most of the state's reservoirs.

Gutzler said the oppositional indicators provide a "fascinating scientific problem" for his research team.

He said he plans to work closely with forecasting officials to better understand the impacts of climate on the current drought.

Gutzler's talk was part of a panel discussion on drought and climate variability presented at the NM WRI annual water conference, held this year in Santa Fe. Other speakers were Janie Chermak, professor and chair of UNM's Department of Economics; Peggy Johnson, principal hydrologist with the NM Bureau of Geology and Mineral Resources at NM Tech; and Lee Reynis, retired director, of the Bureau of Business & Economic Research at UNM. Phil King, associate head of NMSU's Department of Civil Engineering, served as moderator. ♦



Data from the Western Regional Climate Center identify the years of above- and below-average precipitation for the state of New Mexico, dating back to 1934.

The 59th Annual New Mexico Water Conference was held at Santa Fe's La Fonda on November 18-19, 2014. *New Mexico's Water Future: Connecting Stakeholder Needs to Water Information* focused on the NM WRI's new initiative, a Statewide Water Assessment. Nearly 350 participants attended the day-and-a-half conference, which included a poster session where 55 posters were presented, many by university students from around the state. Speaker presentation slides and poster abstracts are available from the conference website at: <http://2014.wri.nmsu.edu/>. A complete conference proceedings will be ready in late spring 2015.

Statewide Water Assessment under development

By Jesslyn Ratliff

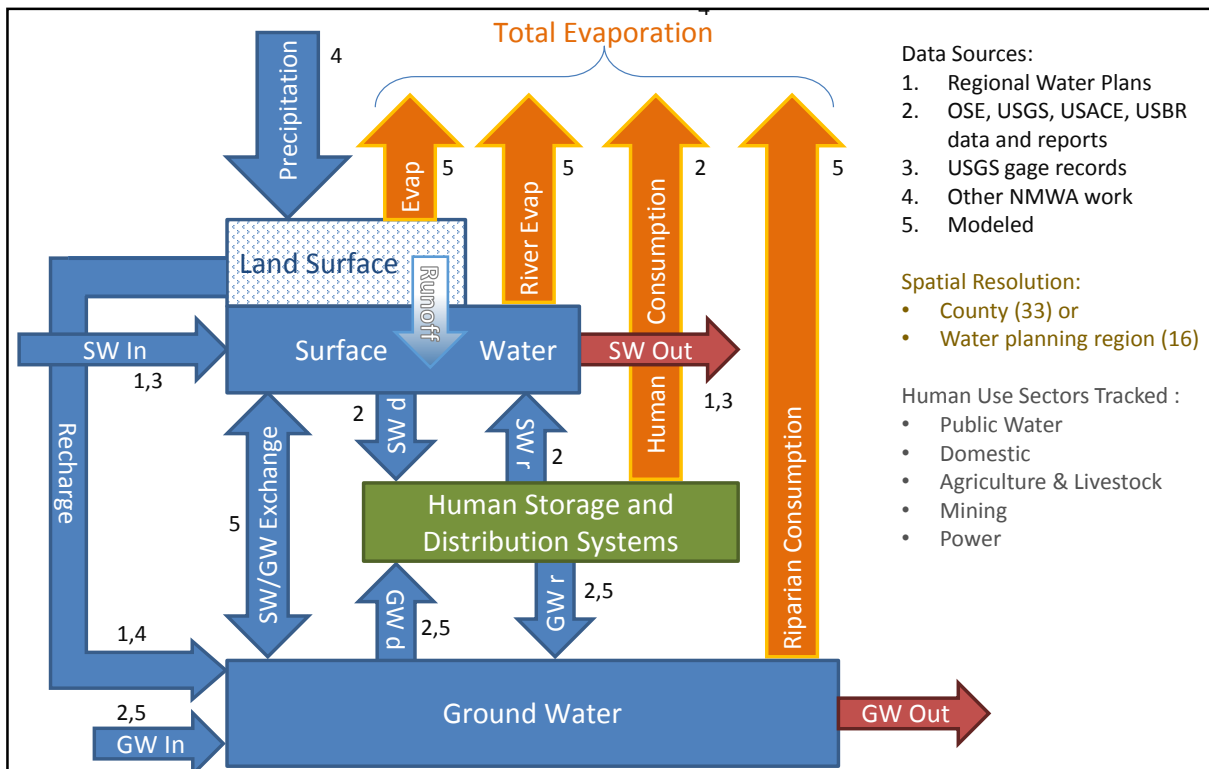
The New Mexico legislature provided funds to NM WRI for FY15 that will support a NM Legislative initiative that includes a statewide water assessment. The statewide water assessment is an effort that will complement existing state agency water resource assessments. It will provide new, dynamic (updated frequently), spatially representative assessments of water budgets for the entire state of New Mexico. Projects were sought that can involve new technologies in statewide water budget assessment or that can expand existing studies to be applicable statewide. Of particular interest are water budget components for which state agencies require improved information, such as evapotranspiration (ET), crop consumptive use, groundwater recharge, and brackish water.

With FY15 funds that were provided by the NM Legislature, NM WRI is coordinating different components of the Statewide Water Assessment effort with work being done by researchers from NMSU, NM Tech, USGS, New Mexico Bureau of Geology and Mineral Resources, Petroleum Recovery Research Center, and Tetra Tech Inc. The funded research components include the following.

A Dynamic Statewide Water Budget (DSWB) for New Mexico's Major River Basins

(Jesse Roach, Tetra Tech Inc.; Vincent Tidwell, Sandia Labs; Bruce Thomson, UNM; Ken Peterson, WRI)

The goal of this project is to create a dynamic, statewide water budget using regional water plans. The budget will have three main benefits. First, it will pull information from a variety of sources into a single structure with a consistent framework. Second, the DSWB will facilitate data visualization by serving as a platform that allows a user to view the key pieces of data throughout the state that inform our understanding of regional water budgets. Finally, the DSWB will be dynamic in terms of providing the user the ability to explore the implication of underlying assumptions used to develop regional mass balances during the historic period, and alter scenario assumptions used to push the mass balance into the future. In the short term, results will focus on an integration of regional water budgets for historic conditions, while in the longer term, the dynamic nature of the effort will allow for future scenario analyses.



Data Sources:

1. Regional Water Plans
2. OSE, USGS, USACE, USBR data and reports
3. USGS gage records
4. Other NMWA work
5. Modeled

Spatial Resolution:

- County (33) or
- Water planning region (16)

Human Use Sectors Tracked :

- Public Water
- Domestic
- Agriculture & Livestock
- Mining
- Power

NM Dynamic Statewide Water Budget (DSWB): Conceptual Model

Groundwater Level and Storage Changes Statewide

(Stacy Timmons, NM Bureau of Geology and Mineral Resources; Mike Johnson, OSE; Matt Ely, USGS; KC Carroll, NMSU)

The proposed work for this project 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 all of the data has not been compiled to address the amount of decline in specific areas. The first objective is to compile available groundwater level data for New Mexico through collaboration with USGS, OSE, NMSU, and other entities collecting water level measurements. The second objective is to develop regional maps for selected basins that show changes in water levels over 5-year intervals, reflecting the frequency of measurements performed in a particular region. From these results, the state of New Mexico will have a useful tool to aid in planning for future water management needs.

Surface-water Inflow, Outflow, Gains, and Losses in New Mexico

(Nathan Myers and Matt Ely, USGS)

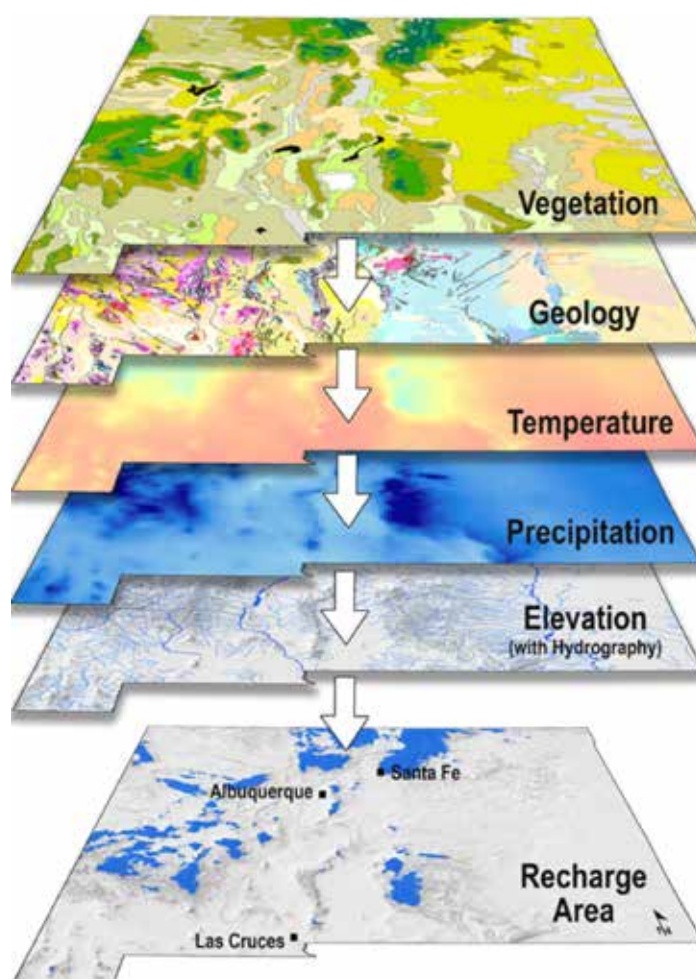
The proposed work will quantify the volume of streamflow entering New Mexico at stream gages at or near the state's borders, and at Compact gages and streamflow gains and losses between gages within New Mexico and adjoining states where water flows into New Mexico. The data will be provided as a series of ARCGIS files, suitable for integration into a Statewide Water Assessment (SWA) database. Within a SWA database, streamflow data and derived statistics could be used by water managers to plan for the best patterns of storage and use of surface water within the State while still meeting Compact obligations.

Recharge Data Compilation and Recharge Area Identification for the State of New Mexico

(Talon Newton, NM Bureau of Geology and Mineral Resources; Fred Phillips, NM Tech)

The objectives of the initial stage of this study are to extensively review recharge estimates in different parts of the state from previous studies and to identify recharge areas in the state. While completing the second task, a geographic information system (GIS) model will be used to determine potential recharge locations within New Mexico. This analysis will locate areas where groundwater recharge

is likely, on a statewide scale. The researchers will incorporate digital elevation models representing topography, monthly average PRISM (Parameter-elevation Relationships on Independent Slopes Model) precipitation estimates, potential ET, geology, significant drainages, and vegetation. These analyses will be presented as a map that shows regions in the state that are likely recharge areas. Results of the tasks listed above will not only provide a framework upon which recharge will be quantified in the future, but also will serve as a stand-alone product that will be of great value to decision makers and researchers. This recharge map will have a visual impact and be of direct use for legislators, land-use managers, fire-management planners, and educators about the location of the state's primary recharge areas.



Characterization of Produced Water in New Mexico

(Martha Cather, Petroleum Recovery Research Center, NM Tech)

Results of this project will include a comprehensive online geodatabase of existing data on the composition of produced water in New Mexico. The proposed project will improve the availability of information on the chemical composition and volumes of produced water. The information gained from the project could be used to identify and characterize produced water as an alternate source of future water supply.

Making this data available and increasing the scope and quality of the database will provide stakeholders with data for decision-making in water management. This information will also be accessible to the public.

Assessment of Spatiotemporal Groundwater Level Changes Throughout New Mexico

(KC Carroll, NMSU; Stacy Timmons, NM Bureau of Geology and Mineral Resources, Mike Johnson, OSE, Nathan Myers, USGS)

This project will develop a map of groundwater level changes over time. A groundwater map supports the spatial examination of groundwater as a resource throughout the State, and a map of the change in groundwater levels over time provides a quantification of the impact of groundwater withdrawals over time on the sustainability of the groundwater system as a water supply resource. This type of spatiotemporal groundwater level assessment will be valuable for evaluating the impact of increased groundwater extraction and utilization of the groundwater supply as a resource.

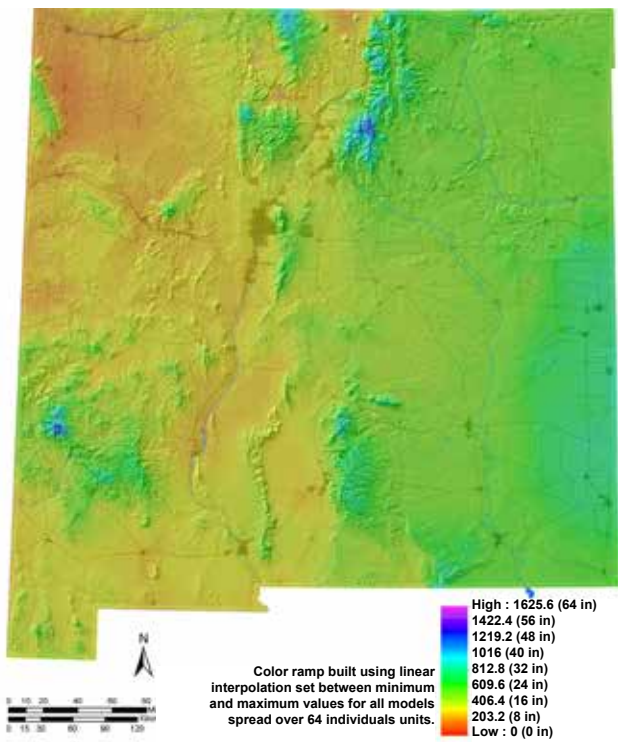
Comparison of Operational Precipitation and Evapotranspiration Products

(Jan M.H. Hendrickx, NM Tech; Thomas Schmugge, WRI; Dan Cadol, NM Tech; Steve Walker, NMSU; Ken Peterson, WRI; Ian Hewitt, NMSU)

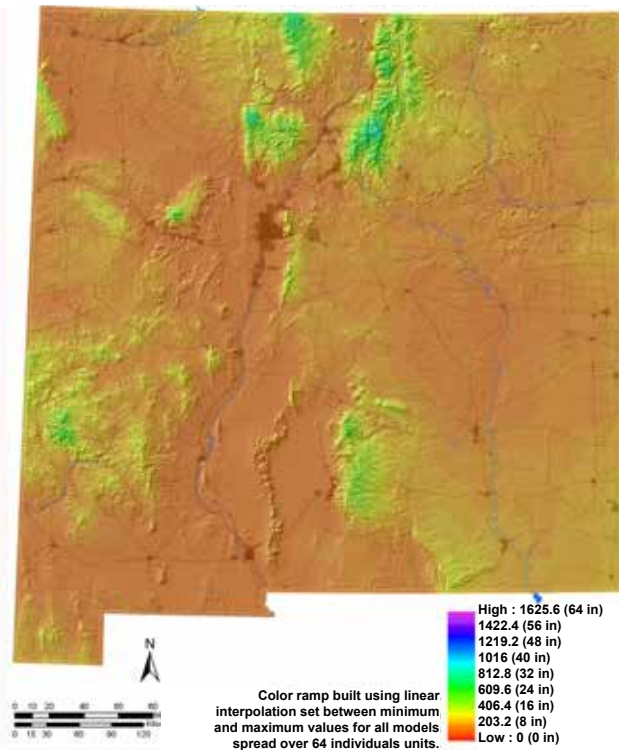
The overall study goal is to develop a procedure for cost-effective assessment of existing precipitation and evapotranspiration products at spatial and temporal scales

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Parameter-elevation Regression in Independent Slopes Model [PRISM] Yearly New Mexico Precipitation for 2004 (wet year)



Parameter-elevation Regression in Independent Slopes Model [PRISM] Yearly New Mexico Precipitation for 2012 (dry year)



FY15 Faculty Water Research Grants awarded

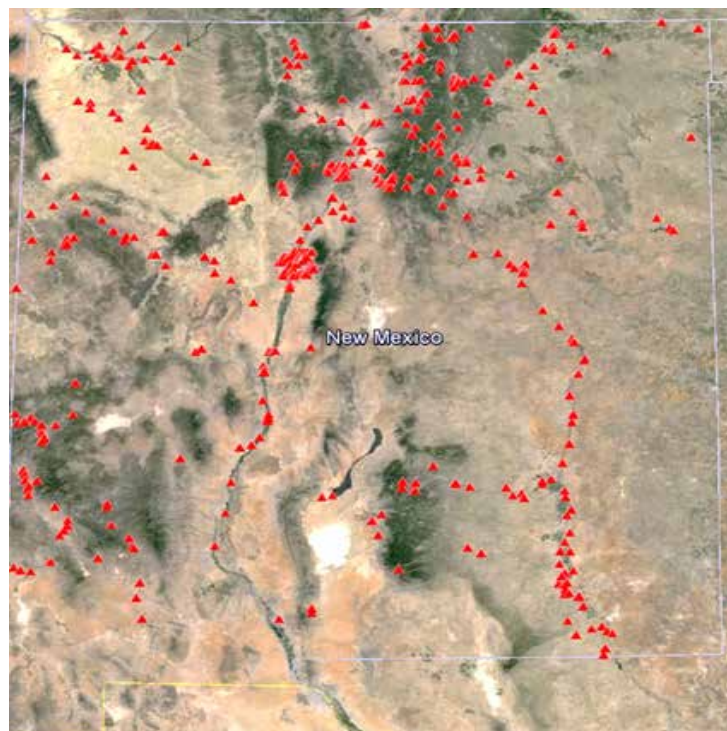
Articles by Erin Ward

The NM WRI is pleased to announce that five water research grants were awarded to New Mexico faculty in response to the Request for Proposals issued in April 2014. Funding for the grants was made available through the New Mexico State Legislature. Awards support targeted research to improve management of the waters of New Mexico.

Each of the projects will receive about \$30,000 in funding for one-year projects that start on July 1, 2014. In announcing the FY15 faculty grant recipients, NM WRI Director Sam Fernald said, “New Mexico has preeminently qualified faculty researchers who are ready to assist the state of New Mexico in dealing with water management issues and are prepared to lead the water research effort to ensure a sustainable water future for the state. These projects are part of a larger legislatively funded NM WRI statewide initiative that includes researchers from NMSU, UNM, and NM Tech plus the state and federal agencies. We will release additional project details as they become available. Today we send our congratulations to the recipients of the water research grants.”

Researchers go into reverse to estimate a statewide water budget

Doing Hydrology Backwards is the title and underlying theme of a grant awarded to UNM’s Ricardo González-Pinzón under NM WRI’s Faculty Water Research Grants program. Dr. González-Pinzón, an assistant professor in the Department of Civil Engineering, and Ph.D. student Cameron Herrington propose to set aside the traditional method of hydrologic modeling (hence, the idea of doing things backwards) and test the use of an algorithm that incorporates USGS streamflow data to calculate watershed averages for precipitation and evapotranspiration. So far, the researchers have tested a prototype algorithm that uses data collected at the Hidden Valley gage in the Valles Caldera National Preserve. Once their algorithm is validated, the simple method could become a useful tool for determining water budgets within New Mexico’s major river basins. The researchers presented a poster on their project at the recently held NM WRI Annual New Mexico Water Conference in Santa Fe. They will also present their project during the Fall Meeting of the American Geophysical Union, scheduled Dec. 15-19 in San Francisco. 💧



Red triangles identify USGS streamflow gage locations



The Embudo Station stream gage was established in 1888.

UNM's Utton Center examines options for water management during drought



The Utton Center is studying law and policy responses to water shortages from around the West and the world to inspire and inform New Mexico decision-makers.

The Utton Transboundary Resources Center at the UNM School of Law recently completed a survey of legal and policy options developed in the U.S. and around the world as a response to drought. Results were presented in October in Albuquerque to a group of 42 water policy experts for their help in identifying successful water management practices that could be implemented in New Mexico, soon entering its fifth year of drought. The discussion focused on the concept of water resilience, defined as the ability of the state's legal and policy institutions to adapt to drought. A progress report was presented at the NM WRI's Annual New Mexico Water Conference held Nov. 18-19 in Santa Fe. Once final, the report will be presented to the New Mexico Legislature during its upcoming 60-day session. The project is funded by the WRI Faculty Water Research Grant Program and the McCune Charitable Foundation. 💧

NMSU researchers collect well data to identify the influence of the Rio Grande on groundwater

Two NMSU researchers are collecting soil and well water data for a better understanding of surface-groundwater interactions in the southern Rio Grande basin. Faculty members Blair Stringam and Manoj Shukla with the NMSU Plant and Environmental Science Department are measuring changes in the water table and sampling water quality at more than 50 observation wells from Garfield, NM to Fabens, Texas, to track the influence of the river and its irrigation canals on the aquifer. Soil samples are planned at ten pecan orchards to test for salinity and sodicity (concentration of sodium). An important objective of the project, funded in part through WRI's Faculty Grant Program, is a better understanding of the time required for water to travel from the river to the groundwater system. Information on the project was presented during the poster session at the NM WRI Annual New Mexico Water Conference. 💧



NMSU graduate student Benjamin Nana Kuffour collects a water sample as part of a project funded in part through the NM WRI Faculty Water Research Grant Program.

Drought tests New Mexico's vulnerability to invasive and weedy plants

If you've noticed a change in desert vegetation during the recent drought, you are not alone. NMSU researchers Geno Picchioni and Brian J. Schutte are testing a hypothesis based on anecdotal observations that long-term drought has changed the soil water supply and increased the risk of altering New Mexico's desert flora. According to the researchers, the Southwest's prolonged drought may have raised the salinity of the water contained in both native and cultivated soils, allowing certain salt-tolerant weeds to thrive at the expense of native and cultivated plants. Funded through the WRRF Faculty Water Research Grants Program, the project is intended to provide new information in the use of soil water quality as a predictive tool for assessing the risks to semiarid lands. The project may also highlight the need for effective land management in the use of brackish irrigation water. Dr. Picchioni, a professor in the Department of Plant and Environmental Sciences, and Dr. Schutte, assistant professor of Entomology, Plant Pathology and Weed Sciences, are conducting the project with the help of NMSU students Triston Hooks, Hae-Na Chung, and Sharon Martinez. Preliminary results were presented at the poster session of the NM WRRF Annual Water Conference in Santa Fe. 💧

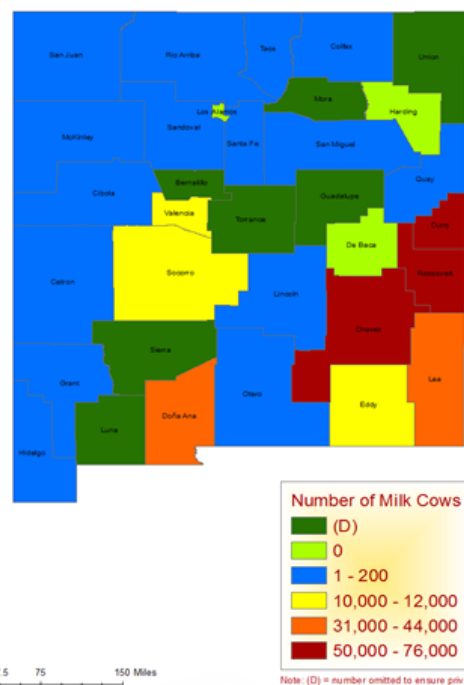


Researchers exam a species of *Lepidum* to identify the plant's response to high levels of sodium in soil water.

UNM economists model a dairy farm to find the best approach for managing waste

A project funded through the WRRF Faculty Water Research Grants Program hopes to examine options for controlling groundwater pollution from dairy farms, including the novel approach of using cattle waste for bio-energy production. Jingjing Wang, assistant professor in UNM's Department of Economics, and researcher Janak Raj Joshi are developing a computer model to simulate options for managing the disposal of cow manure on a representative New Mexico dairy farm. The model takes into account a number of variables that impact farm income, including compliance with environmental regulations to control nitrate pollution in groundwater. Model subcomponents are included for farm animals, crops, and hydrology. The researchers plan to couple their results with GIS software to map the regional impacts of policy options and regulatory requirements on the state's dairy industry. This project was presented on a poster at the 59th Annual New Mexico WRRF Water Conference in Santa Fe. 💧

Total Number of Milk Cows in New Mexico (2012)



FY15 NM WRI Student Water Research Grants Awarded

The 2014 New Mexico State Legislature made funds available for the FY15 New Mexico Water Resources Research Grant Program. Awards support the training of New Mexico's future water experts through grants to university students throughout the state for their water-related research projects.

These one-year grants of up to \$6,000 help students defray expenses related to their research including student salaries, supplies, sample analysis costs, field equipment, travel to field sites, and travel to present results at professional meetings.

In response to the August 2014 Request for Proposals, NM WRI received 35 proposals and 17 grants were awarded. Student recipients, working under the guidance of a faculty advisor, are from Eastern New Mexico University, New Mexico Highlands University, New Mexico State University, New Mexico Tech, and University of New Mexico.

Most of the student grant recipients presented posters at the 59th Annual New Mexico Water Conference on November 19 at La Fonda in Santa Fe.

Congratulations to the FY 15 NM WRI Student Water Research Grant recipients and their advisors.



*Abdullah Alazmi, Dennis Felipe Jr, Malcolm Braughton, Reynold Durden, Paul Candelaria, Seth Davis, NMSU, bachelor's and master's students (Dr. J. Phillip King)
Real time monitoring of flood control dams for emergency action management*



*Maxwell Baymiller, NM Tech, undergraduate student (Dr. Snezna Rogelj)
Cost-efficient detection of endocrine-disrupting compounds in drinking water*



*Onur Beyazoglu and Yasser Almalki, NMSU, master's students (Dr. Owen Burney)
Evaluation of impacts of silvicultural operations such as thinning treatments on water quality and quantity in New Mexico forests*



*Fawn Brooks, UNM, PhD student (Dr. David Gutzler)
Temporal analysis of non-snow fed streams in New Mexico*



*Reid Brown, NM Tech, master's student (Dr. Jan Hendrickx)
Test of the new LAS MkII Scintillometer for validation of statewide New Mexico evapotranspiration maps*



*Laurel Carr, NMHU, master's student (Dr. Ben Nelson)
The detection of antibiotic resistant bacteria (ARB) in the Gallinas River*





Alexander Clark, UNM, undergraduate student (Dr. Rebecca Bixby) *Fire ash influences on aquatic primary producers through changes in water quality*

Lu Lin, NMSU, MS/PhD student (Dr. Pei Xu) *Enhanced photocatalysis for water purification and disinfection using optical fibers coated with nanocomposite thin films*



Angela Gregory, UNM, PhD student (Dr. Mark Stone) *Evaluating the impacts of particulate matter deposition on snow melt processes in the Upper Rio Grande, NM*

Edward McCorkindale, UNM, master's student (Dr. Robert Berrens) *Linking forests to faucets: Investigating alternative approaches for securing long-term funding for watershed restoration in New Mexico*



Rebekah Horn, NMSU, PhD student (Dr. David Cowley) *Development of a bio-indicator to assess water quality in ephemeral ponds*

Sabrina Michael, ENMU, master's student (Dr. Marv Lutnesky) *Effects of turbidity on group cohesion in Sand Shiners and Red Shiners from the Pecos River in New Mexico*



Fawna Lee, NMSU, undergraduate student (Dr. Amy Ganjuli) *Surveying and restoring windmills on northern New Mexico reservations for current and future use*

Virginia Thompson, UNM, PhD student (Dr. Clifford Dahm) *Submerged aquatic macrophytes – Ecosystem engineers in New Mexico mountain streams – Effects of forest fire in the Rio Grande aquifer system*





Elise Trott, UNM, PhD student
(Dr. Erin Debenport)
*Water politics and cultural
difference: Fostering community
relationships to promote
environmental health and
community wellbeing in times of
drought*



Kai Williams, NMSU,
master's student
(Dr. Salim Bawazir)
*Assessment of water quality in
the irrigation drainage canals as
a source of reusable irrigation
water*



Michael Wine, NM Tech,
PhD student
(Dr. Daniel Cadol)
*Application of HydroGeoSphere
to model climate change
effects on three-dimensional
hydrological processes in the
Valles Caldera, New Mexico*

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Report of the Rio Grande Compact Commission 2013 is available at

http://www.ose.state.nm.us/isc_rio_grande_tech_compact_reports.html

EPSCoR program develops modeling tools for evaluating energy development

By Ken Peterson

Energy industries are important to the economy of New Mexico, yet energy development is often constrained by environmental impacts and water resources. To determine the best options for energy development, powerful and integrative modeling tools are needed. These tools are used to evaluate energy development and source viability in light of water, environment, and socioeconomic considerations and concerns. To address these issues, NM WRRI is involved in a multi-year collaborative project with the New Mexico EPSCoR (Experimental Program to Stimulate

Competitive Research) Social and Natural Science Nexus research group. This team comprises researchers, scientists, and students from New Mexico State University, The University of New Mexico,

Sandia National Laboratories, Tetra Tech, New Mexico Tech, The Valles Caldera National Preserve, and the Navajo Nation Environmental Protection Agency.

The Social & Natural Science Nexus team is creating innovative ways of using a system dynamics modeling framework and detailed environment, water, energy and socioeconomic budgets. System dynamics models increase understanding of the behavior of many complex systems over time—complex systems like the interaction of water, the environment, energy and people—and deal with internal feedback loops that can affect the behavior of the entire system. Creating a useful model based on

complex data is no easy task, so the team spent most of the first year laying the basic groundwork for the project, including identifying data sources for human, energy, infrastructure and regulatory data as well as identifying major data gaps. Because New Mexico has long been without a comprehensive water budget, the Social and Natural Science Nexus team is collaborating with the Statewide Water Assessment working group, which is spearheaded by NM WRRI, to develop a dynamic statewide water budget.



Members of the Social & Natural Sciences Nexus group met in May 2014. From left: Janie Chermak, Jennifer Thacher, Sam Fernald, Vince Tidwell, Janak Raj Joshi, Steve Walker, Ken Peterson, Christopher Scott (EPSCoR advisory board member), and Ian Hewitt.

This dynamic statewide water assessment is not only an important piece of the Natural and Social Science Nexus' team's work, it is an essential tool for water resource management

and planning for New Mexico as a whole. The dynamic statewide water assessment is built on a conceptual mass balance structure that is being used to organize water supply and water-use data throughout time, in association with the state's 33 counties and/or the 16 water planning regions as defined by the Office of the State Engineer and Interstate Stream Commission. This conceptual model includes eight external (from outside each mass balance unit, that is, counties and planning regions) fluxes, seven internal fluxes (exchange between stocks within each mass balance unit), and five stocks: available surface water, entire surface water system, available groundwater, entire groundwater system, and human storage and distribution systems. 💧

Introducing new full-time NM WRRRI staff



Carolina Mijares recently joined the staff as the institute's accountant.



Ken Peterson is a program specialist, primarily assisting with the Statewide Water Assessment.



Robert Sabie is a research assistant assisting on GIS programs.

New Student Staff



Fernando Herrera is an undergraduate student providing IT assistance.



DeMeshanique Jefferson is an undergraduate student primarily reorganizing the NM WRRRI library and assisting all staff as needed.



Melody Prather is an undergraduate graphics design student helping with WRRRI's website.



Fawna Lee is an undergraduate student assistant and recipient of a Student Water Research Grant.



Ian Hewitt is a master's degree student in the Water and Science Management program and assisting with the Statewide Water Assessment.



Celeste Prieto is an undergraduate student working on reorganizing NM WRRRI's library.

Director's current topics continued from page 2

the state, to provide better information on statewide water resources and thereby lay the groundwork for better management of water. This means that New Mexico university researchers are the engines of discovery. Individually these researchers are worldwide experts, and by bringing them together on this initiative, NM WRRRI will be able to present a complete picture of the state's water resources, one that has never been available before.

- Science based - utilizing latest scientific information and technology. Within the broader Statewide Water Assessment, researchers are studying precipitation, evapotranspiration, recharge, groundwater, surface flow, produced water, and water policy.

More details about the statewide water assessment and faculty and student research supported by the State of New Mexico are provided in this issue of the *Divining Rod*. 💧

Statewide Water Assessment continued from page 6

needed by New Mexico's water resources managers. The specific objectives are:

- Compare and contrast the five precipitation and three ET products and quantify biases present over the entire state and over specific ecological climate zone.
- Validate each product against reliable measurements.
- Provide quality control measures through selective adjustments

These objectives contribute to the main goal of producing the first statewide precipitation and ET products for New Mexico with a quality assessment and a plan for improving these products at the proper spatial and temporal scales. 💧

USGS Reports Available

Estimated 2012 groundwater potentiometric surface and drawdown from predevelopment to 2012 in the Santa Fe Group aquifer system in the Albuquerque metropolitan area, central New Mexico by Rachel I. Powell and Sarah E. McKean, <http://pubs.usgs.gov/sim/3301/>

Simulated and Measured Water Levels and Estimated Water-Level Changes in the Albuquerque Area, Central New Mexico, 1950–2012 by Steven Rice, Gretchen Oelsner, and Charles Heywood, <http://pubs.usgs.gov/sim/3305/>

Water Quality, Streamflow Conditions, and Annual Flow-Duration Curves for Streams of the San Juan-Chama Project, Southern Colorado and Northern New Mexico, 1935-2010 by Sarah E. Falk, Scott K. Anderholm, Katya A. Hafich, SIR 2013-5005, <http://pubs.er.usgs.gov/publication/sir20135005>

Water-level data for the Albuquerque Basin and adjacent areas, central New Mexico, period of record through September 30, 2012 by Joseph E. Beman. USGS Data Series: 790, <http://pubs.er.usgs.gov/publication/ds790>

Characterization of the hydrologic resources of San Miguel County, New Mexico, and identification of hydrologic data gaps, 2011 by Anne Marie Matherne, and Anne M. Stewart, SIR 2012-5238 <http://pubs.er.usgs.gov/publication/sir20125238>

Water-level changes and change in water storage in the High Plains aquifer, predevelopment to 2013 and 2011-13, 2014 by Virginia L. McGuire, SIR 2014-5218 <http://pubs.er.usgs.gov/publication/sir20145218>

USGS 104G Water Research Competitive Grants Program RFP, FY 2015

If you are interested in submitting a proposal, please contact NM WRRRI Director Sam Fernald (575-646-4337; afernald@nmsu.edu) or Cathy Ortega Klett (575-646-1195; coklett@nmsu.edu) as soon as possible. Proposal and budget should be reviewed by NM WRRRI no later than **February 10, 2015**.

The U.S. Geological Survey in cooperation with the National Institutes for Water Resources requests proposals for matching grants to support research on the topic of improving and enhancing the nation's water supply and availability, and promoting the exploration of new ideas that address or expand our understanding of water problems. Included are the following specific areas of inquiry (levels of priority are not assigned, and the order of listing does not indicate the level of priority):

- Evaluation of innovative approaches to water treatment, infrastructure design, retrofitting, maintenance, management and replacement.
- Exploration and advancement of our understanding of changes in the quantity and quality of water resources in response to a changing climate, population shifts, and land use changes; including associated economic, environmental, social, and/or infrastructure costs.

- Development of methods for better estimation of water supply, both surface and groundwater, including estimation of the physical supply and of the economic supply of water.
- Development and evaluation of processes and governance mechanisms for integrated surface/groundwater management.
- Evaluation and assessment of the effects of water conservation practices, as well as adoption, penetration and permanence.

This program provides university researchers with up to \$250,000 for projects of 1 to 3 years in duration. It requires a 1:1 non-federal match. The intent of the program is to encourage projects with collaboration between universities and the USGS. Funds have not been appropriated for this program but the USGS is proceeding with the proposal solicitation process in case an appropriation is received. General information on this program is available at <http://water.usgs.gov/wrri/national-competitive-grants.php>. Links are provided to information on past year funding and the 2015 RFP.

Researchers must submit their proposal online at the NIWR.net website. The deadline is February 19, 2015, by 5:00 p.m. Eastern Time.

NM WRRRI receives favorable review

New Mexico State University President Garrey Carruthers received notice that the New Mexico Water Conference Research Institute is eligible for continued support under section 104 of the Water Resources Research Act of 1984, as amended.

The institute was recently evaluated by a panel under the direction of the U.S. Geological Survey, which administers the section 104, State Water Resources Research Institute Program. The Panel evaluated the activities of the 54 institutes or centers authorized by the Act during the period 2008 through 2010.

Among its findings for the NM WRRRI, the Panel indicated that the "State and University support to the Institute are exemplary"; "Information dissemination efforts are solid"; and "The review panel was pleased to see some 104b seed monies were leveraged to obtain additional funds."

