



DIVINING ROD

NEW MEXICO WATER RESOURCES RESEARCH INSTITUTE

Vol. XXIII, No. 1

April 2000

WRRI rated among top four in the nation

The New Mexico Water Resources Research Institute (WRRI) has been judged one of the top four institutes in the nation by a U.S. Geological Survey (USGS) evaluation team. The New Mexico WRRI is one of 54 institutes authorized by the federal Water Resources Research Act of 1964. Each state and several territories have a water institute that administers research funding provided by a USGS grant, and in New Mexico's case, state funding as well.

Under the authorizing legislation, all state water research institutes must undergo an evaluation every five years to determine their eligibility to continue receiving federal funding. In the most recent review, which covered the period from 1993-1997, USGS evaluators recognized four state institutes for programs of particular excellence. The New Mexico WRRI has one of those programs.

According to evaluators, New Mexico WRRI's former Director, Tom Bahr, "should be commended for creating and maintaining an exemplary water resources institute

program, which has been of great value to the State, the region, and the Nation." The evaluators went on to indicate that "the panel was highly impressed with the quality and breadth of the program. The Director has a well-earned national reputation as one of the most experienced and successful water institute directors."

The report indicated, "The institute's research, information transfer, and educational programs are all excellent. The research program is relevant and balanced and all indicators show that the resulting research is of the highest quality. The information transfer program is of great value to the State and region and is excellent in all regards."

The evaluation panel noted the role the New Mexico WRRI played in writing and publishing the early editions of the *Water Science Reporter*, a publication of the National Institutes for Water Resources, and in hosting the website for the National Institutes for Water Resources. The panel commended the Director for accepting special responsibilities in supporting the national information transfer program.

The New Mexico WRRI was praised for its support of students and acknowledged for having several students involved in research who had won state, regional and national awards.

A statewide program, the WRRI is guided by a 10-member Program Development and Review Board comprising research faculty and administrators from New Mexico State University, New Mexico Tech, and the University of New Mexico, and representation from the Office of the State Engineer, Environment Department, and U.S. Geological Survey. Faculty at all state supported New Mexico colleges and universities are eligible to receive funding to conduct research into water resources problems and issues affecting New Mexico, the region, and the nation.

During the evaluation period, the New Mexico WRRI was led by Director Tom Bahr and Assistant Director, Bobby J. Creel. Other professional staff during the evaluation period were Darlene Reeves, Catherine Ortega Klett, and Leslie Blair.

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WRRI Research Awards

Water quality projects and flood prediction model to receive funding

Four research projects will be funded this year through the 2000 New Mexico WRRI Seed Money Research Program. This program is designed to support seed money projects that target new investigators or propose new and novel approaches to solving water resources problems. After initial funding by the WRRI, it is anticipated that the projects will attract more substantial outside funding. The research categories that were given priority in the selection process include: water conservation, planning and management; atmospheric-surface-groundwater relationships; water quality; and utilization of saline and other impaired waters.

Three of the projects slated for funding fall into the water quality category. *Arsenic and Arsenic Species in the Rio Grande - The Effects on Irrigated Lands* will be conducted by New Mexico Tech Professor David I. Norman, of the Department of Earth and Environmental Science. Dr. Norman and doctoral student Gregory Miller will monitor arsenic concentrations and arsenic speciation at three places along the Rio Grande weekly. They also will measure diurnal variations in arsenic species and concentrations at the monitoring sites during each season. The data will allow the researchers to determine if Middle Rio Grande Valley irrigation affects Rio Grande river arsenic concentrations.

To date, there is little information on Rio Grande arsenic concentrations and how arsenic

varies throughout the year. There are no New Mexico studies on what happens to arsenic concentrations and speciation due to irrigation. These are important issues considering that the EPA may impose more stringent limits on arsenic in drinking water, new information on health hazards associated with low levels of arsenic ingestion, and the increased use of Rio Grande waters.

According to the investigators, results from this project will be used by municipalities in planning water treatment facilities. Results also will warn farmers if present irrigation practices are poisoning their soil with arsenic. Most importantly, new information will alert all users of Rio Grande water if there is a possibility that arsenic concentrations could contaminate water supplies for weeks or months.

A second funded water quality project is entitled, *Genetic Techniques for the Verification and Monitoring of Dihaloethane Biodegradation in New Mexico Aquifers*, and is under the direction of Rebecca Reiss, of New Mexico Tech's Department of Biology. Dr. Reiss will study dihaloethanes, carcinogens known to form adducts with glutathione, which can bind to

DNA and cause cancer. Dihaloethanes also have been linked to a variety of acute health effects, including damage to the liver, stomach, and adrenal cortex along with significant reproductive system toxicity, particularly to the testes.

Two dihaloethane compounds will be studied: 1,2-dibromoethane (EDB) and 1,2-dichloroethane (EDC), which are threatening fresh water supplies worldwide. These compounds are used for industrial, petrochemical, food-industry and agricultural applications. In New Mexico, approximately 175 locations have or have had EDB and



Professor Rebecca Reiss (right) describes how her new DNA analyzer works to her New Mexico Tech colleague, Subhasish Mazumdar. Photo by George Zamora, New Mexico Tech.

EDC contaminated soil and groundwater. In New Mexico, the primary source of EDB and EDC contamination is associated with petroleum refining industries and fuel dispensing systems.

Microorganisms are responsible for the degradation of EDB and EDC in groundwater. The biodegradation of EDB and EDC

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occurs through a series of enzymatic reactions initiated by the hydrolytic enzyme, haloalkane dehalogenase (*dhla*). Reiss's preliminary results demonstrate that microorganisms with the *dhla* gene are present in several EDB and EDC contaminated aquifers in New Mexico. She employed the polymerase chain reaction (PCR) method to amplify and thus detect the *dhla* gene in crude DNA extracted from groundwater samples. Verification, optimization and refinement of this technique will provide a reliable method for detecting and tracking the *dhla* gene in aquifer systems.

A third water quality project to be funded this year is under the direction of Kevin H. Oshima, Department of Biology, New Mexico State University. Dr. Oshima will continue research for a third year for his project, *Ultrafiltration Based Detection of Viruses and Cryptosporidium Oocysts from Environmental Water Samples*. Professor Oshima has been testing the effectiveness of extremely fine filters designed to remove viruses from fluids. He hopes to use the results from small-scale experiments obtained during initial funding and apply those results as the bases for scaling-up to field size ultrafiltration systems. The project is designed to improve the sensitivity and consistency of waterborne virus recovery and *Cryptosporidium* oocysts from surface, ground and drinking water. Dr. Oshima also is attempting to simplify the process of concentrating samples compared to the existing methods, which tend

to be technically cumbersome.

High intensity, short duration rainfall in New Mexico often results in loss of life, property damage, and expensive emergency response. Given current forecasting methods, it is not possible to issue flash flood warnings with sufficient lead time to avoid tragic and costly outcomes. Professor Kirk Gregory, of the University of New Mexico's Department of Geography, has proposed a modeling system designed to provide viable flash flood warnings. His project, *A Flash Flood Prediction Model for Rural and Urban Basins in New Mexico*, is the fourth project that will be funded through the WRRRI Seed Money Research Program.

The most important reasons that current forecasting methods fail to provide timely warnings are twofold. First, it is difficult to generate spatially explicit quantitative precipitation forecasts for flood events. Second, the hydrologic models that have historically been

used to predict flash floods are not spatially distributed models and thus generate biased estimates of surface runoff. Without a distributed framework to route surface runoff, much of the dynamic nature of the storm water runoff is lost and predicting vulnerable areas is not possible.

Dr. Gregory's modeling system is designed to alleviate both of these problems. By using advances in computing resources and nonlinear modeling, high intensity rainfall events can be measured quantitatively and their associated surface runoff can be modeled. The project's modeling system will be built and validated over a limited extent of the city of Albuquerque and over a rural basin. After refining the model, the modeling system will be extended to a wider area. The model should prove to be very useful by the National Weather Service, which issues flood warnings, and should prove a valuable tool for identifying flood prone areas.

45th Annual New Mexico Water Conference

Water, Growth and Sustainability: Planning for the 21st Century

Mark your calendars!

December 5-6, 2000
Hyatt Regency Albuquerque



Upcoming Conferences in 2000

- April 11-13 American Association for the Advancement of Science, *Science and Technology at the Millennium: Retrospect and Prospect* - Washington, D.C.
- April 12-14 National Water Resources Association, *2000 Federal Water Seminar* - Washington, D.C.
- April 15 Bureau of Reclamation, New Mexico Acequia Commission, and Office of the State Engineer, *Water Management Workshop for Acequia Irrigators* - Alcalde, New Mexico
- April 17-19 U.S. Environmental Protection Agency, *National Watershed Outreach Conference* - San Diego
- April 25-27 National Water Quality Monitoring Council, *Monitoring for the Millennium* - Austin
- April 27-28 Continuing Legal Education International, *Western Water Law - Water Rights, Quality and Policy* - Denver
- May 1-3 American Water Resources Association, *Water Resources in Extreme Environments* - Anchorage
- May 1-2 Arizona Water Resources Research Center, *Arizona's Groundwater Management Act* - Tucson
- May 4-5 Continuing Legal Education International, *Texas Water Law* - Houston
- May 4-5 Continuing Legal Education International, *The Law of the Colorado River - Balancing Interests on the River: Water Rights, Use and Storage* - Tucson
- May 9-11 National Arbor Day Foundation, *Buffers: Commonsense Conservation for Urbanizing Landscapes* - Nebraska City
- May 10-12 National Weather Service, *Flash Flood: It's Not a Drive-Thru* - Atlanta
- May 15-19 Center for Risk Management of Engineering Systems, University of Virginia, *Short Course: Hierarchical-Multiobjective Approach in Water Resources Planning and Management* - Charlottesville, Virginia
- May 16-19 University of Arizona's Udall Center for Studies in Public Policy, *Alternative Dispute Resolution and Natural Resources* - Tucson
- May 17-18 National Ground Water Association, *Southwest Focus Conference* - Austin
- June 11-15 American Water Works Association, *Step Up to the Future - Innovation for the New Millennium* - Denver
- June 15-18 National Environmental Health Association, *Onsite Wastewater Systems Conference* - Denver
- June 22-23 Continuing Legal Education International, *Land Use Law* - Albuquerque
- August 9-11 National Water Resources Association, *Western Water Seminar* - Sun Valley, Idaho
- August 27-31 American Water Resources Association, *Riparian Ecology and Management in Multi-Land Use Watersheds* - Portland
- October 23-25 New Mexico Environmental Health Conference and WERC Conference on the Environment, *Sustainable Partnerships for Healthy Communities* - Albuquerque
- Nov. 28-Dec. 1 National Water Resources Association, *Annual Conference* - San Diego
- December 4-5 New Mexico Water Resources Research Institute, 45th Annual Water Conference** - Albuquerque



44th Annual New Mexico Water Conference Keynote Address

The 1905 Rio Grande Project's Impact on the 1938 Rio Grande Compact

The following is condensed from Douglas R. Littlefield's keynote address at the 44th Annual New Mexico Water Conference. Dr. Littlefield's complete text will be contained in the conference proceedings, available on WRRRI's home page later this spring.

For three decades before the approval of the 1938 Rio Grande Compact, the struggles for the river's water supplies were already contentious. And even with the signing of the Compact, controversies over the river's water supplies have not ceased. One reason for this is a lack of knowledge of the compact's history as well as the history of the Rio Grande Project.

A lack of understanding has precipitated one of the enduring mysteries of the compact—the question of why the compact's negotiators provided for deliveries of the river's water by Colorado at the Colorado/New Mexico state line, and yet failed to provide a similar delivery point at the New Mexico/Texas border. Instead, New Mexico's delivery obligation is made at San Marcial, New Mexico, just above Elephant Butte Reservoir, over a hundred miles upstream from Texas. Why wasn't a delivery point specified closer to the New Mexico/Texas border?

The history of the Rio Grande Project, which allocated Rio Grande waters at the New Mexico/Texas border, provides the answer. The apportionment was legislated by Congress in 1905 when federal lawmakers authorized the construction of the Rio Grande Project. The allocation was based on surveys of irrigable lands in New Mexico and Texas. It was

established that Rio Grande waters within the Rio Grande Project would be sufficient for 88,000 acres in southern New Mexico, and 67,000 acres in western Texas.

How that apportionment was intended to be incorporated into the broader allocation under the 1938 Rio Grande Compact is the focus of these remarks.

The need to resolve how to allocate Rio Grande waters in southern New Mexico and around El Paso and Juarez had become an important issue around the turn of the century. During



Dr. Douglas R. Littlefield presented the keynote address at the 44th Annual New Mexico Water Conference

this period, water supplies had dwindled in the Mesilla and El Paso valleys as settlements had grown in the upper part of the basin in Colorado's San Luis Valley. Increased population in the San Luis Valley resulted in a dramatic decline of the non-flood

flows of the Rio Grande that previously had reached the Mesilla and El Paso valleys.

Mesilla Valley residents backed a solution to their lack of water by supporting a proposal by Nathan Boyd's Rio Grande Dam and Irrigation Company to build a reservoir at Elephant Butte. The company planned to store spring flood waters and then supply irrigation to several New Mexico valleys including the Mesilla Valley.

Simultaneously, residents in El Paso and Juarez endorsed a plan for an international dam just above those two towns. This dam also would capture spring snowmelt flows for later use. The international reservoir idea was developed by a prominent El Paso resident, Colonel Anson Mills.

Understandably, both groups felt threatened by each other, feeling there was insufficient water for both plans. Then in 1904, at the National Irrigation Congress, the two-year old U.S. Reclamation Service announced its studies of the river had resulted in a plan to end the water struggles.

The Reclamation Service proposal involved construction of a Governmental reservoir at Elephant Butte instead of the private structure proposed by Boyd. Waters stored in the structure were to serve lands in New Mexico and Texas through a distribution system, the Rio Grande Project. The amount of acreage in New Mexico and Texas to receive project supplies would be determined by Reclamation Service surveys. Like the dam itself, the Project distribution system would be built and operated by the Service and the farmers who received Project water were to repay the Government the cost of building the irrigation system. *(continued on page 6)*



The proposal also called for Elephant Butte Reservoir to provide 60,000 acre-feet of water annually to Mexico. That figure was determined by an earlier international commission to be the amount of water that had been denied Mexico due to increasing American diversions.

Because of the endorsement of the Reclamation Service's plan by the 1904 National Irrigation Congress, the U.S. Congress enacted legislation in 1905 extending the 1902 Reclamation Act to the El Paso Valley in Texas. The 1905 law became the first Congressionally-directed allocation of an interstate river. It wasn't until 23 years later that the Boulder Canyon Act of 1928 apportioned the Colorado River.

In 1906, Congress ratified a treaty with Mexico for delivery of 60,000 acre-feet of Rio Grande water.

The important point is that this interstate and international division of the Rio Grande waters was accomplished long before compact negotiations began on a broader allocation of the river's waters among Colorado, New Mexico and Texas. How the Rio Grande Project's allocation made its way into the 1938 Compact in intent can be seen through the history of the Compact.

Following the interstate apportionment within the Rio Grande Project, several events took place that ultimately made an interstate compact among Colorado, New Mexico and Texas necessary. First, Elephant Butte Dam was completed in 1916. Subsequently, the Reclamation Service finished studies of soils, drainage, and other factors, and determined that the final Rio Grande Project would serve 88,000 acres in New Mexico and 67,000 in Texas. These allotments, twice endorsed by water users in both states, fulfilled the Congressional

directive under the 1905 law extending the Reclamation Act to Texas that the Reclamation service would apportion the river's waters based on the agency's studies.

Meanwhile, two districts were formed to work with the Government in operating the Project and to coordinate payments for construction and operation and maintenance—the Elephant Butte Irrigation District in New Mexico and the El Paso County Water Improvement District No. 1 in Texas. Both districts signed contracts with the U.S. Government

to pay expenses in the same 88/67 ratio as their respective acreage allocations.

Concurrently, concern that the expansion of irrigation in the Middle Rio Grande Valley above Elephant Butte and in Colorado's San Luis Valley might undermine apportionment within the Project by diminishing water supplies, prompted the beginning of compact discussions.

The direct cause for beginning compact talks centered on what was known as the Rio Grande "embargo." The embargo was a limitation on developing the river's water supplies anywhere on the public domain in New Mexico or Colorado that had been imposed in the late 19th century, at the same time the debate raged over whether the private Elephant Butte Dam or the international dam would be built. First instituted in 1896, the embargo had been left in place even after the 1904 National Irrigation Congress had endorsed the Reclamation Service's solution to the Rio Grande's problems to protect water supplies that eventually were to be stored at Elephant Butte Reservoir.

The direct cause for beginning compact talks centered on what was known as the Rio Grande "embargo."

Residents of the Middle Rio Grande Valley near Albuquerque and in Colorado's San Luis Valley tried in vain for years to have the embargo lifted. It was suggested that a negotiated compact, similar to that of the Colorado River, would apportion waters among Texas, New Mexico and Colorado, and the hated Rio Grande embargo could be lifted permanently.

In 1922, New Mexico and Colorado named commissioners to negotiate a compact on the Rio Grande. Talks broke down over a variety of issues including whether Texas

should take part. Not until December 19, 1928 did compact deliberations get underway in earnest.

New Mexico Compact Commissioner, Francis C. Wilson, argued that since neither New Mexico nor Texas was asking for any new Rio Grande water from Colorado but both sought to prevent further Colorado diversions, then delivery should entail a specific amount of water at the Colorado/New Mexico state line. Wilson thought Colorado could continue to develop in the San Luis Valley by draining the water-logged part of the valley that was commonly known as the "dead" or "sump" area, formally termed the Closed Basin. Wilson believed this water could be used elsewhere in Colorado with no detrimental effect below the state line. However, without such drainage any new dams in the Colorado part of the Rio Grande Basin would be a direct threat to Rio Grande Project water rights because those new structures in Colorado would impound existing flows coming out of the San Luis Valley.

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Texas attorney Richard Burges told those attending that Texas relied upon its rights as established by the Rio Grande Project. Burges also asserted that Texas held senior water rights for 20,000 acres above Fort Quitman, Texas, but below the end of the Rio Grande Project.

Colorado's Lt. Governor George Corlett spoke for San Luis Valley irrigators and described how the Rio Grande embargo had been a grave injustice to Colorado water users. Corlett offered two reasons why additional storage of Rio Grande waters in Colorado would not hurt water supplies

downriver: return flows from San Luis Valley irrigation would offset any supplemental Colorado diversions, and Rio Grande water flowing into New Mexico was wasted by evaporation in the desert long before it could reach Elephant Butte Reservoir. Corlett said that new reservoirs in Colorado might even benefit farmers in northern New Mexico and in the Middle Rio Grande Valley by acting as storage. Corlett said he was willing to work with New Mexico and Texas representatives to secure federal aid for drainage of the San Luis Valley Closed Basin and to provide related storage works on the upper Rio Grande and on the Conejos River, a tributary of the Rio Grande.

By mid-February 1929, the Commissioners realized that no final agreement could be reached, and so they signed a temporary compact that in essence established the status quo as a basis for apportioning the river's waters among Colorado, New Mexico and Texas.

The temporary 1929 Rio Grande Compact requested that the United States construct a drain for the San Luis Valley's Closed Basin and a reservoir in Colorado near the state line to impound the increased river flow from the drainage works. Once the Closed Basin drain and the State Line Reservoir were completed, the three states were to meet again to work out a permanent agreement.

By December 1937, with the fruit of the Rio Grande Joint Investigation in hand, the Rio Grande Compact Commission's engineering advisers developed a proposed schedule of deliveries to form the basis of a permanent compact.

Nine months after the accord was signed, the stock market crashed, making Congress and President Herbert Hoover reluctant to approve major expenditure bills. Projects like the Closed Basin Drain and the State Line Reservoir were temporarily shelved. The Depression also delayed resumption of the Rio Grande Compact talks until December 1934.

When negotiations resumed, George Corlett demanded that Colorado be placed upon a "parity with New Mexico and Texas insofar as our present requirements are concerned." This meant having the right to build new storage reservoirs in Colorado's part of the Rio Grande Basin regardless of whether the Closed Basin Drain and the State Line Reservoir were constructed.

Texas legal advisor Richard Burges insisted that Texas was unwilling to allow Colorado to have more storage until the extent of flows from the Closed Basin Drain was known. New Mexico supported Burges's position. Realizing that none of the negotiators would retreat from their positions, it was decided that the session would adjourn for the time being.

With negotiations at an impasse, in October 1935 Texas filed a lawsuit in the U.S. Supreme Court against New Mexico and the Middle Rio Grande Conservancy District to protect Rio Grande Project water supplies. Another purpose of the lawsuit was to keep talks moving forward. Almost simultaneously, President Franklin D. Roosevelt directed the National Resources Committee to act as a clearinghouse on all Rio Grande water proposals and to help settle the dispute. The result was the creation of the Rio Grande Joint Investigation, a series of studies by state and federal authorities on water supplies, needs, and other information on which a compact could be based. Meanwhile, *Texas v. New Mexico and the Middle Rio Grande Conservancy District* was postponed.

By December 1937, with the fruit of the Rio Grande Joint Investigation in hand, the Rio Grande Compact Commission's engineering advisers developed a proposed schedule of deliveries to form the basis of a permanent compact. Deliveries were to be made by Colorado at the Colorado/New Mexico state line and by New Mexico at San Marcial, near the head of Elephant Butte Reservoir. No delivery schedule was called for at the Texas/New Mexico state line. The following March, the Rio Grande Compact Commission unanimously adopted schedules of delivery at those locations when they signed the Rio Grande Compact.

The 1938 Compact's principal provisions were:

- 1) The creation of a permanent compact commission to oversee the operations of the compact.
- 2) The establishment of gaging stations along the river to ensure deliveries by Colorado at the Colorado/New Mexico state line and

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deliveries by New Mexico to Elephant Butte Reservoir.

3) The creation of a system of debits and credits to accommodate variations from agreed-upon schedules.

After signing the Rio Grande Compact, the Commissioners returned to their home states to lobby for quick ratification by their respective state legislatures. Little could the Commissioners have imagined that ratification would become an almost insurmountable obstacle in Texas because of a major dispute about how the Compact affected that state.

The Compact's lack of mention of specific deliveries at the New Mexico/Texas state line triggered the ratification problem in Texas. The Rio Grande Compact Commissioners' reasons for rejecting a schedule of deliveries at the New Mexico state line had never been made clear to Texans on the lower Rio Grande between Fort Quitman and the Gulf of Mexico. Many of these water users thought that because the Compact only provided for water deliveries at Elephant Butte Reservoir and not the New Mexico/Texas state line, Texas had no solid guarantee of **any** Rio Grande water.

To these water users, the supposed lack of an apportionment at the New Mexico/Texas state line appeared to be a sellout of the majority of Texas's interests in favor of a handful of Rio Grande Project farmers in the El Paso Valley. Even more galling, the abandonment of their needs had taken place during the severe drought of the 1930s.

Acting on these beliefs, water users in Texas below Fort Quitman demanded 200,000 acre-feet per year of Rio Grande waters. Threatening to go to the Texas legislature to fight ratification of the Compact, these lower river water users also retained a law firm, Smith and Hall, to intervene in the pending *Texas v. New Mexico*

and *Middle Rio Grande Conservancy District*.

Before developing a legal strategy for the intervention, Sawnie Smith of Smith and Hall realized he needed to know whether the Rio Grande Compact Commissioners deliberately had **not** provided for a specific amount of water to go to Texas, and if so, why. Smith wrote to Frank Clayton, the then current Texas Rio Grande Compact Commissioner asking, "why the respective rights of Texas and New Mexico to those waters were not defined and provided for in the Compact in express terms."

In reply, Clayton wrote that the negotiators of the new Rio Grande Compact had recognized an existing apportionment of the river's waters between New Mexico and Texas below Elephant Butte Dam through the allocations made by the Bureau of Reclamation and the operation of the Rio Grande Project. Clayton explained, "the question of the division of the water released from Elephant Butte reservoir is taken care of by contracts between the districts under the Rio Grande Project and the Bureau of Reclamation." Clayton confirmed that the water was allocated according to the respective areas involved in two states—areas defined by the Bureau of Reclamation under the terms of the 1905 federal legislation sanctioning the 1904 apportionment compromise.

Clayton continued, "the total area is 'frozen' at the figure representing the acreage now actually in cultivation: approximately 88,000 acres for Elephant Butte Irrigation District and 67,000 for the El Paso County Water Improvement District No. 1, with a

'cushion' of three per cent for each figure." Adding that he believed "there will never be any difficulty about the allocation of this water"—perhaps an overly optimistic assumption—Clayton told Smith he hoped his answer would satisfy lower Rio Grande water users.

Clayton sent explanatory letters similar to his reply to Smith to all the incoming Texas state legislators. He also went in person to the lower Rio Grande Valley in early October 1938,

The Compact's lack of mention of specific deliveries at the New Mexico/Texas state line triggered the ratification problem in Texas.

armed with copies of the Compact and histories of the Rio Grande controversy to explain the Rio Grande Compact Commissioners' aim. The campaign

to clarify the Compact's intent quickly paid off and Clayton won the support of lower Rio Grande water users for the Compact's ratification.

The legislatures of Colorado, New Mexico and Texas soon approved the Compact. Colorado Governor Ralph Carr, Texas Governor Lee O'Daniel, and New Mexico Governor John E. Miles signed their respective states' ratification bills. President Roosevelt signed Congress's consent on May 31, 1939.

Thus, as this history of the Rio Grande Project and the 1938 Rio Grande Compact illustrates, there actually **is** an interstate apportionment of Rio Grande waters at the New Mexico/Texas border—one that was authorized by Congress in 1905 when federal lawmakers approved the construction of the Rio Grande Project and directed the Reclamation Service to allocate waters within that project. That apportionment was then intended to be incorporated into the 1938 Rio Grande Compact.



Reports, videos and web sites worth checking

USGS reports

The U.S. Geological Survey has published the following six New Mexico related publications and Fact Sheet since the last issue of the *Divining Rod*. Copies are available for inspection at the USGS District Office in Albuquerque (5338 Montgomery Blvd NE, Suite 400). The Water Resources Research Institute library also has the reports on file. They may be ordered from the USGS, Federal Center, Box 25286, MS 517, Denver, CO 80225. You may call 1-888-ASK-USGS for price information.

Ground-water quality and susceptibility of ground water to effects from domestic wastewater disposal in Eastern Bernalillo County, central New Mexico, 1990-91 by Paul J. Blanchard and G.E. Kues (WRIR 99-4096)

Numerical simulation of vertical ground-water flux of the Rio Grande from ground-water temperature profiles, central New Mexico by James R. Bartolino and Richard G. Niswonger (WRIR 99-4212).

External task review of the U.S. Geological Survey Federal-State Cooperative Water Program, August 1999 compiled by Stephen F. Blanchard (Circular 1192)

Geohydrology of the unsaturated zone and simulated time of arrival of landfill leachate at the water table, Municipal Solid Waste Landfill Facility, U.S. Army Air Defense Artillery Center and Fort Bliss, El Paso County, Texas by Peter F. Frenzel and Cynthia G. Abeyta (WRIR 97-4036)

Geologic and hydrologic data for the Municipal Solid Waste Landfill Facility, U.S. Army Air Defense Artillery Center and Fort Bliss, El Paso County, Texas by Cynthia G. Abeyta and Peter F. Frenzel (OFR 99-271)

Model input and output files for the simulation of time of arrival of landfill leachate at the water table, U.S. Army Air Defense Artillery Center and Fort Bliss, El Paso County, Texas by Cynthia G. Abeyta and Peter F. Frenzel (OFR 98-397)

New Mexico Rio Grande Basin Study (USGS Fact Sheet 032-99)

The Middle Rio Grande Basin, the area within the Rio Grande Valley extending from Cochiti Dam downstream to San Acacia, is the focus of a 5-year study by the USGS and other agencies to improve understanding of the area's water resources. The Santa Fe Group aquifer is the main source of municipal water. The New Mexico Office of the State Engineer manages the water resources in the basin and has declared the basin a "critical basin"—a groundwater basin faced with rapid economic and population growth for which technical information about the available water supply is inadequate. The study began in 1995 and is scheduled to be completed in 2000. The Fact Sheet summarizes the work to date. Additional information can be found at <http://rockyweb.cr.usgs.gov/mrgb/>.

U.S.-Mexican Border Region guide

Border EcoWeb, compiled by Elena Lelea and Paul Ganster, is a

guide to finding environmental information about the U.S.-Mexican Border Region through the Internet. This volume is written in English and Spanish and is a useful tool for those who are new to the Internet and who have limited or no access to the Internet. It contains tutorials in English and Spanish to help people get started on their search for environmental information on the Internet as well as contact information for organizations involved in issues dealing with the U.S.-Mexico border environment. For copies of the report, contact: Institute for Regional Studies of the Californias, San Diego State University, (619) 594-5423 or bew@rohan.sdsu.edu.

Rio Grande Compact report

The New Mexico WRII has received a copy of the *1998 Report of the Rio Grande Compact* to the Governors of Colorado, New Mexico and Texas. Each year the Rio Grande Compact Commission holds a meeting in which it reviews prior and current reports of the Secretary and the Engineer Advisers relative to streamflow at Compact gaging stations and storage in reservoirs during the previous year. For a copy of the 1998 report, issued recently, contact Rolf Schmidt-Petersen at (505) 841-9480. The Rio Grande Compact Commissioners most recently met in El Paso on March 23, 2000 for their annual meeting.

Watershed Management monograph

The American Water Resources Association has published *Human*

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Rio Grande Compact Commissioners hold annual meeting in El Paso

The Rio Grande Compact Commissioners from New Mexico, Colorado, and Texas met in El Paso on March 23, 2000 for the 61st Annual Meeting.

The Commission found that:

- (a) deliveries of water at the Colorado-New Mexico state line by Colorado amounted to 474,400 acre-feet in 1999 and the scheduled delivery for the year was 466,900 acre-feet;
- (b) deliveries of water into Elephant Butte Reservoir by New Mexico, as measured by the Elephant Butte Effective Supply, amounted to 744,900 acre-feet and the scheduled delivery for the year was 710,000 acre-feet;
- (c) the actual release of usable water from Project Storage was 736,300 acre-feet.

The Commission agreed to the accounting of accrued credits for 1999 as follows:

- (a) accrued credit for deliveries by Colorado at the Colorado-New Mexico state line was 17,700 acre-feet on January 1, 2000;
- (b) accrued credit for deliveries by New Mexico at Elephant Butte Dam was 170,700 acre-feet on January 1, 2000;
- (c) accrued departure from normal release from Project Storage as of January 1, 2000 was a credit of 38,300 acre-feet.

44th Annual Water Conference Proceedings to be online late spring

The 44th Annual New Mexico Water Conference was held in Santa Fe in early December and was one of the best attended annual conferences ever. Over 350 participants packed the ballroom at La Fonda to hear a day-and-a-half worth of presentations on this year's theme, *The Rio Grande Compact: It's the Law!*

The conference proceedings is currently being prepared. The full text of each presentation will be available later this spring via the WRRI's home page. Conference participants will receive a hard copy of the proceedings.

The proceedings will include a copy of the Rio Grande Compact, a request made by several conference participants. Also included in the proceedings will be a list of all participants and their addresses.

Douglas R. Littlefield, historian and expert on the Rio Grande Compact, delivered the keynote address at the 1999 conference. Dr. Littlefield discussed how the 1905 apportionment of Rio Grande water supplies for the Rio Grande Project found its way into the 1938 Rio Grande Compact. An abbreviated version of the keynote address is contained in this issue of the *Divining Rod*.

If you missed the conference, you won't want to miss the proceedings, which will contain the following authors and their presentations:

- **Philip Mutz** on post Compact delivery of water by New Mexico
- **Fred Allen** on delivery of San Juan Water to the Otowi Gage
- **Jim Williams** on the administrative criteria for the declaration of the Rio Grande Underground Water Basin
- a panel discussion with **Lower Rio Grande farmers** on how they dealt with the drought of the '50s
- **Blane Sanchez**, pueblo tribal member, with his perspective on the Rio

Grande Compact

- **Peter Chestnut** on tribal perspectives on the Rio Grande Compact
- **Steve Vandiver** on how Colorado meets its Compact obligations
- **Conrad Keyes** on the key accounting components of the Compact
- **Lee Wilson** on the surface water hydrology of the Rio Grande Basin
- **John Hawley** and **Mike Kernodle** on the Rio Grande Basin's groundwater hydrology
- **Frank Titus** and **Steve Hansen** on the current water budget of the Middle Rio Grande Basin
- **Deborah Hathaway** on integrating water budget studies
- **John D'Antonio** on basin groundwater criteria
- **Neal Ackerly** on the paleohydrology of the Rio Grande
- **Jaci Gould, John Stomp** and **Mike Hamman** on current and projected San Juan/Chama water use
- **Norman Gaume** on New Mexico's obligations and compliance under the Rio Grande Compact
- **Charles DuMars** on the consequences of noncompliance
- **John Hernandez** and **Lee Brown** on water markets
- **David Guzman** on the Upper Rio Grande Basin Water Operations Review and Environmental Impact Statement
- **Chris Gorbach** on the history and significance of the low-flow conveyance channel
- **John Shomaker** on domestic wells depletions
- **Jim Peach** on demographics and projected demands on the system
- **Brian Hanson** and **Steve Harris** on opportunities and constraints for environmental enhancement and recreation along the Rio Grande
- a panel discussion with the **Rio Grande Compact Commissioners**



(continued from page 9)

Dimensions of Watershed Management. The 19 papers in this monograph are primarily drawn from a couple of water symposiums and fall into two broad categories: "social scientific analyses of the local watershed movement as a whole" and "case studies of problem-solving in particular geo-graphic areas." Copies are available for \$25 each plus \$6 postage and handling. Contact the AWRA via email at info@awra.org.

Groundwater videos

The Water Education Foundation has produced two groundwater videos: Groundwater Quality: Managing the Resource and Conjunctive Use: A Comprehensive Approach to Water Planning. Groundwater Quality is a 15-minute video designed to give the layperson an introductory look at how

groundwater quality is maintained. The video gives clear and easy-to-understand explanations of the problems plaguing groundwater such as subsidence and contamination as well as solutions to these problems. The video also outlines groundwater quality management on the federal, state and local levels and defines technical terminology.

The 11-minute Conjunctive Use video provides viewers with an overview of the often-misunderstood concept of conjunctive use, that is, coordinating surface water and groundwater supplies which are often managed as separate resources. Profiled are groundwater banking, extraction rights, groundwater recharge techniques and the potential impacts of conjunctive use on water quality. Copies of the videos are available for \$20 each. Contact the Water Education Foundation at (916)448-7699 or via the Internet at www.water-ed.org.

Streamflow statistics on the web

A web site now offered by the U.S. Geological Survey offers current daily streamflows in real time for all measuring gauges in the nation, information that can be critically valuable to farmers, water managers, and everyone concerned about the amount of water available. One of the most interesting features is the streamflow map of the U.S. accessed from the homepage by clicking on daily or weekly next to the miniature map under the title "National Water Conditions." The address of the site is <http://water.usgs.gov/dwc/national-map.html>.

WRI welcomes Michelle Ford Del Rio

Last fall, Michelle Ford Del Rio joined the WRI staff replacing Cynthia Rex as Records Specialist. Cynthia has moved to Albuquerque and works for the New Mexico Finance Authority. The staff wishes Cynthia and her husband, Kevin, well in their new home and work.

Michelle relocated to New Mexico late last summer from Columbus, Ohio. "New Mexico is the best place on Earth to live and Las Cruces is the nicest community in New Mexico," explained Michelle. As a child, Michelle visited Albuquerque and enjoyed excursions to Farmington, Gallup and Carlsbad. She decided early on that some day she would live in New Mexico.

"Michelle was new to the institute and the area just a few months ago but she has learned a great deal in these

months about the institute and New Mexico's water issues. She has become a terrific asset to the institute. In addition to assisting with the annual water conference in December, Michelle has enthusiastically begun the task of reorganizing the institute's reference room. We are very pleased to have her on board," indicated Bobby Creel, WRI Acting Director.

Michelle lives with her husband, Murphy, and two children, high school senior Renee, and 12-year-old, David, in Mesilla. She enjoys making crafts, needlework, tennis, and is a history buff. Michelle lacks just a few classes to complete her accounting degree and hopes to begin working soon toward a master's degree in accounting.





44th Annual New Mexico Water Conference

The Rio Grande Compact: It's the Law!

December 1999
La Fonda, Santa Fe

Photos by John F. Kennedy, WRI

The New Mexico Riparian Council co-sponsored the water conference and presented annual awards at the evening banquet.



Historian and lecturer, Leon Metz gave the first Albert E. Utton Memorial Water Lecture at the conference's evening banquet.

The annual conference provides opportunities for water colleagues to get together and learn from each other.



The conference included a panel discussion by farmers on the Lower Rio Grande who experienced the drought of the '50s firsthand.

Bobby J. Creel, Acting Director

New Mexico Water Resources Research Institute

Catherine Ortega Klett, Editor

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