

divining rod

Vol. XVIII, No. 1 New Mexico Water Resources Research Institute February 1995

39th Annual Water Conference focuses on Middle Rio Grande basin

"In my opinion, there isn't an issue more important to New Mexico's future than water, and one of the most important basins is the Middle Rio Grande basin," asserted keynote speaker Senator Pete Domenici at the 39th Annual New Mexico Water Conference held in Albuquerque last November.

The Senator went on to call for a cooperative effort to quantify the extent of the underlying aquifer, the amount of water in storage and the water's quality, location and avail-

ability. The initiative would include quantifying the amount of surface water available and how the surface and groundwater are interconnected. Such a study will help determine "the fate of New Mexico's economic future," according to the Senator.

It's obvious why the basin is so important—nearly forty percent of New Mexico's population lives on top of the basin, the region's population is growing quickly and the associated demands of economic development must be addressed.

And the problems facing the Middle Rio Grande are problems facing other basins around the state.

This year's conference theme, *The Water Future of Albuquerque and Middle Rio Grande Basin* proved to be timely. Sponsored by the New Mexico Water Resources Research Institute and co-sponsored this

year by the American Water Resources Association, New Mexico Section, the conference attracted nearly 400 participants who attended plenary and concurrent sessions over a two-day period.

The first morning of the conference was devoted to providing an overview of the history of water development in the basin and background on the area's hydrogeology. Well publicized recent studies that call into question the amount of easily obtainable water once thought available in the Middle Rio Grande region and solutions to the water availability problem were discussed by a panel. The panel consisted of experts with many years collective experience who are well versed in the area's geology.

Panelist Bob Grant, an Albuquerque consulting geologist, emphasized that political solutions to the availability problem would be as important as technical solutions, and that whatever the solutions, they are going to be very expensive. Grant, on a positive note, said, "The good news is that this city does have the most fantastic, incredibly bountiful, world class aquifer beneath it, the porosities, the specific yield, storage capacities and so on that range from an average of 15-35%—that's about 2 to 3 times more than what an average, good groundwater aquifer would be."



Geologist John Hawley describes the Albuquerque aquifer system at the 39th Annual New Mexico Water Conference.

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Kelly Summers, also a local consultant on New Mexico's water resources, focused on the need to manage water resources regionally. Solutions to the region's water problems should be paid for by those in the region—not with state funds, not with federal funds, according to Summers.

American Ground Water Consultant, Bill Turner, focused on the need to change, modify and rebuild New Mexico's water resources institutions in a manner that enables us to quantify our water resources in a non-political atmosphere. Turner called for greatly expanding the role of the Bureau of Mines and Mineral Resources in this area.

John Hawley, New Mexico Tech geologist, who earlier provided the background on the hydrogeology of the area, discussed the need to preserve and enhance the quality of existing institutions, and individuals who can "hit the

ground running" in resolving water resources problems. The brain drain from New Mexico agencies must be stopped if we are to maintain viable programs within our agencies, claims Hawley.

The panel moderator, Norm Gaume, manager of the City of Albuquerque's Public Works Department's Water Resources Program, reminded the audience that public support is crucial to making any solution work. Gaume noted that although water-rate increases will be necessary in the future, the public

should be aware that Albuquerque's citizens would still likely pay less than most other New Mexicans. Gaume stated that one of the best solutions to Albuquerque's water resources situation is water conservation. The City staff has proposed

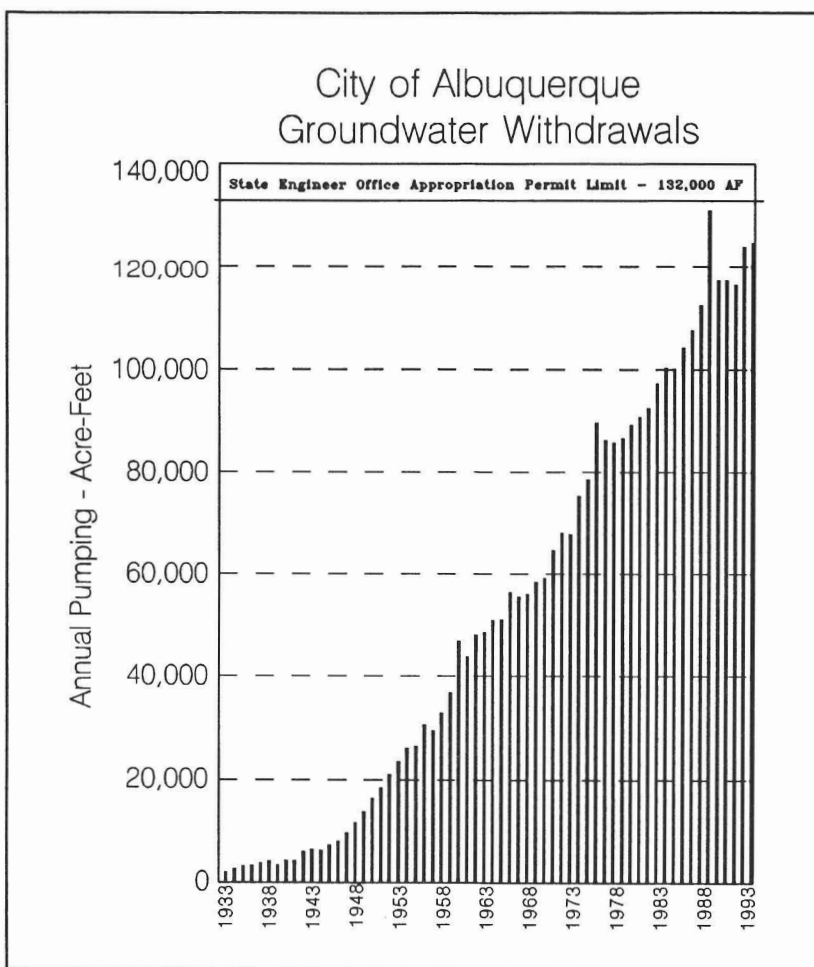
been articulated fairly well technically, claimed Tysseling, "...but the water issue is not just a technical problem. Our social choices are much more complex than that." It is the public's choice as to how they will use their water, according to Tysseling, and a concern of his is whether the leaders of the City of Albuquerque are "just fulfilling their obligation to a process of choosing or whether it is their responsibility that they're fulfilling in allowing the public to choose."

Over 70 speakers presented talks on a wide variety of topics relevant to the Middle Rio Grande basin. Technical sessions were presented on the USGS Albuquerque Basin Groundwater Model, surface and groundwater interaction, studies on flooding, wastewater reclamation, transmissivity of the Albuquerque aquifer, sediment studies on the Rio Grande and many others. Wa-

ter rights, water quality standards, Indian pueblo issues, pertinent state and federal regulations, and water conservation efforts also were discussed.

"We should take a serious look at interbasin transfers; politically the timing has never been better in this state."

Bob Grant



a long-term conservation strategy to achieve a 30% savings of water. The program's cost to City government would be approximately \$40 million and if that estimate turns out to be true, the water that would be saved through conservation would be the cheapest water by far that Albuquerque has ever obtained.

The morning plenary session drew to a close with comments by John Tysseling of Energy, Economic and Environmental Consultants. The water resources problems of the Middle Rio Grande have

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Fourteen new USGS reports available

The U.S. Geological Survey recently has published the following New Mexico-related publications. Copies are available for inspection at the USGS District Office in Albuquerque (4501 Indian School Road NE, Suite 200). 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 (303) 236-7476 for price information.

◆ **Geohydrology of the San Agustin Basin, Alamosa Creek Basin upstream from Monticello Box, and upper Gila Basin in parts of Catron, Socorro, and Sierra Counties, New Mexico** by R.G. Myers, J.T. Everheart, and C.A. Wilson (WRIR 94-4125) - This report, prepared in cooperation with the New Mexico State Engineer Office, provides results from a study that used sixty-three vertical electrical-resistivity soundings to estimate bedrock depth and the interface between freshwater and saline water. The dissolved-solids concentration of water samples ranged from 74 to 23,500 milligrams per liter. Dominant cations varied; the dominant anion of freshwater generally was bicarbonate.

◆ **Chemical, geologic, and hydrologic data from the Little Colorado River basin, Arizona and New Mexico, 1988-91** by G.G. Fisk, S.A. Ferguson, D.R. Rankin, and L. Wirt (OFR 94-356) - This study collected and compiled hydrologic data on the effects of uranium mining and the effects of the largest spill of uranium tailings

and liquid in US history on the Little Colorado River basin and the alluvial aquifer in the Navajo New Lands area near Sanders, Arizona. The report presents water levels and chemical-analysis data for 69 groundwater wells sampled in the New Lands area. Data for stream-flow discharge, sediment discharge, sediment concentration, and water quality are presented for 14 surface-water sites which range from upstream of Gallup, NM, near the uranium mines, to the Little Colorado River, near Cameron.

◆ **Geohydrology of the High Energy Laser System Test Facility site, White Sands Missile Range, Tularosa Basin, south-central New Mexico** by G.T. Basabivazo, R.G. Myers, and E.L. Nickerson (WRIR 93-4192) - Three test wells were constructed at the High Energy Laser System Test Facility, White Sands Missile Range. This report summarizes the geohydrology in the vicinity using data that were derived from these new test wells, two older test wells, and a 1990 aquifer test. Borehole-geophysical logs, lithologic logs and water-quality data are included.

◆ **Analysis of meteorological data and water chemistry of Latir Lakes, Taos County, New Mexico** by S.K. Anderholm and others (WRIR 93-4113) - Data collected from 1985 to 1988 on the chemistry of precipitation and water from the Latir Lakes are presented in this report. According to this study, the pH of water in the Latir Lakes was generally larger than 7.0 and was as large as 9.9 during the summer in several of the

lakes. The pH of wet precipitation generally ranged from 4.6 to 5.5. The concentration of dissolved oxygen in the deeper parts of several of the lakes approached zero during the summer, and thus, large volumes of water in several of the lakes probably are not suitable for habitation during summer months.

◆ **Computer simulation of storm runoff for three watersheds in Albuquerque, New Mexico** by R.L. Knutilla and J.E. Veenhuis (WRIR 94-4143) - The USGS Distributed Routing Rainfall-Runoff Model was calibrated and verified for three urban watersheds in the Albuquerque metropolitan area. Model-generated storm hydrographs and peak discharge can be compared to actual storm hydrographs and associated peak discharges and used to predict flow in watersheds under future development.

◆ **Ground-water recharge near Santa Fe, north-central New Mexico** by S.K. Anderholm (WRIR 94-4078) - Chloride mass-balance methods were used to estimate direct and mountain-front recharge to the Tesuque aquifer system. Estimates of natural recharge using this method are 2,320 acre-feet per year in the Santa Fe drainage, 690 acre-feet per year in the Rio Tesuque drainage, and 830 acre-feet per year in the Arroyo Hondo drainage.

◆ **Hydrologic data for the Puerco River Basin, western New Mexico, 10/1/91 - 9/30/92** by R.L. Gold and D.R. Rankin (OFR 94-377) - In an effort to determine the suitability of the water resources in the Puerco River Basin and the effects of uranium mining and a 1979 tailings pond spill, in combi-

nation with naturally occurring and potentially hazardous trace elements, this study collected data on surface water, groundwater, water quality, and sediment chemistry and particle size.

◆ **Traveltime and reaeration characteristics for a reach of the Rio Grande, Albuquerque, New Mexico, October 1991** by S.D. Waltemeyer (WRIR 94-4071) - Determining the river's reaeration capability—that is, its ability to renew its supply of oxygen—is one method of measuring the Rio Grande's wastewater assimilation capability. Reaeration coefficients were calculated by two methods: the peak method produced a result of 7.0 per day with a range from 4.6 to 8.3 per day, and the area method gave a mean value of 7.7 per day with a range from 5.5 to 10.4 per day. The reaeration coefficient for this reach of the Rio Grande was relatively small, as expected for a low-gradient stream, according to the author.

◆ **Bibliography of Selected Publications Approved by the U.S. Geological Survey on the Water Resources of New Mexico, 1975-93** by O.M. Sandoval (OFR 94-361) - This bibliography of about 500 references has been compiled to assist in the study and development of water resources. Each citation is indexed by geographic location and discipline. Selected citations are indexed by physiographic province and basin, military, Indian, and other reservations, and topics of special hydrologic interest.

◆ **Water use in New Mexico, 1990** by L. Garrabrant (WRIR 93-4199) - The distribution and amount of water used in New Mex-

ico during 1990 are described in a map report, which also provides information on the source, use, and disposition of freshwater by county and river basin in the state. Water withdrawals for all uses in the state during 1990 amounted to 4.2 million acre-feet. Sixty-two percent was depleted and the remainder was returned to surface or groundwater sources. Surface-water withdrawals were 53% of the total withdrawals. San Juan and Doña Ana counties had the largest surface-water withdrawals. The largest groundwater withdrawals were in the eastern counties where irrigation is prominent. Irrigation, the largest water-use category, accounted for about 80% of total withdrawals and about 75% of total depletions. About 984,000 acres of cropland were irrigated in 1990.

◆ **Water-level data for the Albuquerque Basin, New Mexico, 10/1/86 - 9/30/90** by D.R. Rankin (OFR 94-349) - This report summarizes groundwater-level data collected from the 79 wells and piezometers.

◆ **Hydrogeologic framework and preliminary simulation of ground-water flow in the Mimbres Basin, southwestern New Mexico** by R.T. Hanson (WRIR 94-4011) - A preliminary, two-dimensional, computer model was used to evaluate groundwater movement in the bolson-fill aquifer. The flow model was calibrated to the earliest available water-level measurements in each area of the basin and also was calibrated to transient conditions representing pumping periods from 1931 through 1985. The simulated transient water budget indicated that most of the water pumped by 1985 came from storage, and lesser but

substantial amounts came from reductions in evapotranspiration.

◆ **Methods for estimating streamflow at mountain fronts in southern New Mexico** by S.D. Waltemeyer (WRIR 93-4213) - Data from 13 streamflow-gaging stations were used to determine a relation between mean annual streamflow and basin and climatic characteristics. An equation was developed to estimate mean annual streamflow on the basis of drainage area and mean annual precipitation. Another equation was developed to estimate mean annual streamflow using active-channel-width data.

◆ **Hydrogeology and aquifer test of the San Andres-Glorieta aquifer on the southwest part of the Zuni Indian Reservation, Cibola County, New Mexico** by T.M. Crouch (WRIR 94-4033) - A large-yield aquifer test of the aquifer was conducted in 1988. The production well was pumped for more than 10 days at a rate of 2,580 gallons per minute from a cave-fracture system on the southwest part of the reservation. Findings indicate that drawdown was relatively minimal and if pumping were to continue at that rate and aquifer response remained constant, Rainbow Spring would have about 2 feet of drawdown after 30 years.

AWRA Spring Symposium

Water in the 21st
Century: Conservation,
Demand, and Supply

April 23-26, 1995
Salt Lake City, Utah
(703) 904-1225

USEPA recognizes New Mexico researchers

The U.S. Environmental Protection Agency presented two major awards in 1994 to the Rocky Mountain Forest and Range Experiment Station, USDA Forest Service, Albuquerque and those associated with the "Beneficial Use of Biosolids" research activities in the Rio Puerco Watershed. Research activities included a WRRI-sponsored interdisciplinary research project. Project investigators were Dr. Richard Aguilar, formerly of the Rocky Mountain Forest and Range Experiment Station, now with Sandia National Laboratory, Dr. Samuel Loftin, Rocky Mountain Forest and Range Experiment Station, formerly with UNM's Biology Department, Dr. James R. Gosz of UNM's Biology Department, and Dr. Tim J. Ward and Kenny Stevens of NMSU's Civil, Agricultural, and Geological Engi-

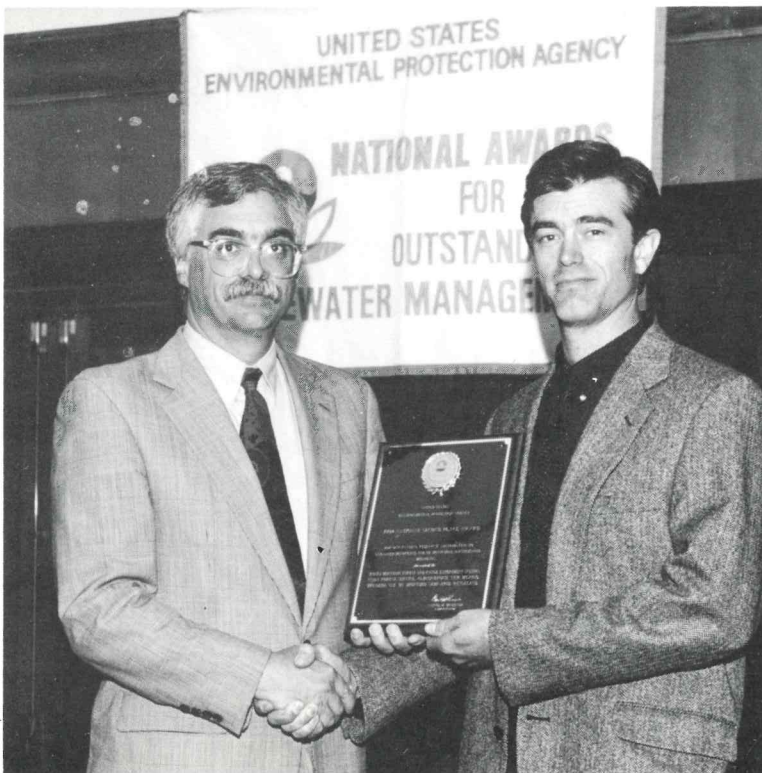
neering Department. The Experiment Station received one of four New Mexico awards presented for the 1994 EPA Region 6 Regional Administrator's Environmental Excellence Awards Program. The Experiment Station also received national recognition by winning the 1994 National Second Place Award for Outstanding Research Contributing to Enhanced Beneficial Use of Municipal Wastewater Sludge.

Research results of the associated WRRI-funded project entitled *Sewage Sludge Application in Semiarid Grasslands: Effects on Vegetation and Water Quality* are published in WRRI technical completion report no. 285. Call WRRI at (505) 646-1813 or write to WRRI, Box 30001/ Dept. 3167, Las Cruces, NM 88003 for free copies of the report.

Universal Resource Locator for the WRRI coming soon

The New Mexico Water Resources Research Institute will soon provide Internet services using the well-known software package, Mosaic. This will allow Internet users to access the WRRI for such information as research project descriptions, funding programs, expertise directory, publications and data developed and maintained by the WRRI. The system will incorporate much of the information previously made available by the institute in printed form.

The next issue of *Divining Rod* will describe how to access the Universal Resource Locator and the information it makes available.



Samuel Loftin (right) accepts a national award on behalf of the Rocky Mountain Forest and Range Experiment Station, USDA Forest Service, Albuquerque. EPA Assistant Administrator for Water, Robert Perciasepe, presented the award last October in Chicago. Dr. Loftin, under the direction of his University of New Mexico advisor, Dr. James Gosz, participated in a WRRI-sponsored project, which resulted in his Ph.D. dissertation entitled, "Sewage Sludge Application to Semiarid Grasslands; Effects on Soil, Vegetation, and Surface Hydrology."

WRRRI Reports focus on depleted uranium transport, constructed wetlands, landslides, plant water-use efficiency

The following four technical completion reports have been published by the institute since last June. To receive free copies either write or call WRRRI, Box 30001/ Dept. 3167, Las Cruces, NM 88003; (505) 646-1813.

◆ Report No. 286 - *Modeling Erosion and Transport of Depleted Uranium, Yuma Proving Ground, Arizona* by Tim J. Ward and Kenny A. Stevens

Dr. Tim Ward, of NMSU's Department of Civil, Agricultural and Geological Engineering, was contracted by Los Alamos National Laboratory to investigate water transport of depleted uranium during rainfall-runoff events at the U.S. Army's Yuma Proving Ground. The Proving Ground is used as a test site for firing depleted uranium projectiles. When these test projectiles strike a target and fragment, most fragments are collected but some are too small or too dispersed to be easily found. Posing a potential environmental hazard, the researchers studied what the hazard might be when these fragments are transported during rainfall and runoff.

Study results indicate that infiltration rates in the impact areas were very close to zero. No depleted uranium was found in the suspended sediment samples and this suggests that most transport of depleted uranium is restricted to contact or bed-load movement during overland flow. Because the study experiments were conducted to simulate extreme rainfall-runoff conditions, the probability of significant transport of depleted uranium from land surface appears to be low.

◆ Report No. 287 - *Evaluation of a Subsurface Flow Wetland Processing Sewage from the Sevilleta LTER Field Station* by Eleonora H. Trotter, Bruce Thomson and Ross Coleman

UNM researchers constructed and evaluated a three-cell subsurface flow wetland to study the performance of various species of aquatic plants for treating domestic wastewater. The cells consisted of a multiculture, a reed monoculture, and a bulrush monoculture. Wetland cells were fed by two septic tanks. Biochemical oxygen demand, total and fecal coliform bacteria, total Kjeldahl Nitrogen, NH_3 and NO_3^- were measured.

The wetland cell system was constructed to allow sample collection from septic tank wastewater entering, midway, and at the end of each cell. Water samples also were collected from the septic and wetland drainfields. Water quality from the wetlands was substantially better than in the drainfield receiving water from the septic tank directly. Based on ranked data, the multiculture performed best.

◆ Report No. 288 - *Modeling Delivery of Landslide Materials to Streams* by Tim J. Ward

Landslides can be a significant source of sediment in watersheds as materials enter stream channels and create problems such as blockage or diversion of the stream and significant degradation of the aquatic and riparian habitats. Estimating the amount of material delivered to a stream channel by a landslide is of great value to watershed managers. This study reviewed current methodology and developed new models for estimating the delivery

of landslide materials to a stream channel.

Dr. Ward collaborated with researchers in Great Britain regarding a conceptualization of new approaches.

◆ Report No. 289 - *Somatic Cell Selection to Genetically Improve Plant Water-Use Efficiency and Tolerance to Stresses* by Gregory C. Phillips, Raul Saavedra and Glenn D. Kuehn

Water conservation may depend on developing improved crop plant water-use efficiency and tolerances to drought and heat stresses. This project tested the hypothesis that increased production of uncommon polyamines may confer greater crop water-use efficiency and/or tolerance to drought and heat stresses, using cotton as a model system.

Cotton cell lines were recovered with stable changes in up to three of the key enzymes involved in uncommon polyamine production. The cell lines selected to have increased activities for all three polyamine enzymes, also showed enhanced tolerance to high temperatures. Cotton cell lines also were adapted to growth at high temperatures, and these cell lines showed elevations in the activities of all three polyamine enzymes. Results indicate that there is a direct relationship between polyamine production in cells and the cells' capability to tolerate high temperature stress. The relationship between polyamines and stress tolerance can be exploited at a genetic level for breeding improved crops. Further studies are needed to determine whether polyamines also are involved in water-use efficiency.

Regional water planning update

At the Interstate Stream Commission's December meeting, the commission considered 13 regional water planning proposals requesting total funding of over \$4 million. Fiscal year 1995 funds were allocated to portions of six proposals to begin public participation programs and develop water-use data.

Pecos Valley Water Users Assoc.	\$38,000
Taos County	28,000
San Juan Water Commission	25,000
Rio Arriba County	23,000
Santa Fe Metropolitan Water Board	10,000
Eastern Plains Council of Gov'ts	8,000

Depending on next year's appropriation, additional phases of these proposals and new proposals will be funded. The budget request for the FY96 Regional Water Planning Program is going forward under a special appropriation request for \$750,000 from the State General Fund.

The commission has developed a preliminary multi-year budget to complete all regional water planning within the next five years. This plan will help in formulating annual budget requests for the completion of additional phases of the regional water plans and continuing assessment work.

Final comments and format changes have been incorporated into the Regional Water Planning Handbook. The handbook should be ready for public dissemination in mid-February.

The commission's planning staff is preparing a contract for the UNM Bureau of Business and Economic Research to produce population projections for each planning region or subregion in the state. The first six regions' population projections will be completed in March and the remaining seven regions are scheduled to be completed in September. Additional areas of the state not covered under a current proposal will be addressed when new proposals for these areas are received by the commission.

The commission staff also is developing a seminar that will be made available to grant recipients to help prepare a public participation program. The seminar will provide technical guidance in preparing a regional water plan. Seminars will last two days and are targeted at regional water planning staff, local and county officials, and elected officials involved in the water planning process. Regions will be contacted for ideas and to coordinate the scheduling of seminars.

For more information on the commission's efforts, contact Mike Hamman, Interstate Stream Commission, (505) 827-6160.

39th water conference continued

The final wrap-up session was devoted to finding consensus on the issues discussed during the conference. Dr. John Hernandez from New Mexico State University, and University of New Mexico Law Professor Al Utton moderated audience participation. Both moderators proved optimistic in their views of the region's water resources.

"We are all in this together; it's our problem, and we should pay for it."

Kelly Summers

At the end of the day there seemed to be consensus on the need for conservation, more and better data, and a need for increased cooperation among stakeholders, of which there are many. However, no consensus was reached on such complex issues as defining the public welfare, preferential use of some types of water uses over others, and the role endangered species will play in managing water resources.

The New Mexico Water Resources Research Institute will publish a complete proceedings of the conference this spring. Copies will be sent to all conference partici-

pants and additional copies will be available from the WRI for a small charge. For a copy of the proceedings, write or call WRI, Box 30001/Dept. 3167, Las Cruces, NM 88003; (505) 646-1813.

"We need to develop the best understanding possible of the surface water and groundwater interaction system, how the groundwater gets recharged naturally, and how to enhance that recharge."

John Hawley

AWRA Sponsors Student Competition

The American Water Resources Association, New Mexico Section, sponsored a student paper competition at the 39th Annual New Mexico Water Conference. After a preliminary screening of abstracts, four papers were chosen to be presented at the conference.

A \$500 first place prize went to Tracy Roth, a master's student at New Mexico Tech, who presented "Nutrient Transport to a Tile-Drained Agricultural Field in Las Nutrias, New Mexico."

Dennis Romero, also a master's student at New Mexico Tech, received second place and \$300 for his presentation entitled, "Conceptual Model of the Three-Dimensional Water Quality Distribution in the Albuquerque Basin."

University of New Mexico undergraduate student, Michael McGuckin, received third place and \$150 for his presentation, "Water Management Policy for the Albuquerque Basin: What Can We Learn from Tucson?"

Fourth place and \$75 went to New Mexico Tech master's student, John Sigda, for "Examining the Impacts of Faults on Aquifer Flow Systems: Implications for Regional Ground Water Flow Modeling." Congratulations to all.



Student paper competition award recipients from left to right include John Sigda, Tracy Roth, and Michael McGuckin. Dennis Romero is not pictured.

Tom Bahr, Director, New Mexico Water Resources Research Institute
Catherine T. Ortega Klett, Editor

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