Water Resources Research Institute
Annual Technical Report
FY 2004

Introduction

This program report provides the required information for projects funded with the 2004 base grant and mandatory non-federal matching funds. Please note that there may be some overlap in information with our 2003 report because data collection is based on a July-June fiscal year rather than the March-February USGS Grant Award period.

The New Mexico Water Resources Research Institute (NMWRRI) was established in 1963 by the New Mexico State University Board of Regents, becoming one of the first of the 54 state institutes approved nationwide under the authorization of the 1964 Water Resources Research Act. It is considered to be the statewide nucleus for coordinating water resources research. Using the expertise of researchers in a variety of disciplines at state-supported universities, the institute is able to respond to the critical water needs of New Mexico and the region. It operates under the general advice of a Program Development and Review Board, whose membership includes faculty representatives as well as state and federal agency personnel.

The mission of the NMWRRI is to develop and disseminate knowledge that will assist the state, region, and nation in solving water resources problems. Specifically, the institute encourages university faculty statewide to pursue critical areas of water resources research while providing training opportunities for students who will become our future water resources scientists, technicians, and managers. It provides an outlet for transferring research findings and other related information to keep water managers and the general public informed about new technology and research advances. In addition, the institute maintains a unique infrastructure that links it with many federal, state, regional, and local entities to provide expertise and specialized assistance.

The institute maintains a vigorous program to transfer technical information from the producer to the user and the public. Technical publications, newsletters, conferences, press announcements, and presentations keep practitioners aware of new technology and research advances. The NMWRRI homepage (wrri.nmsu.edu) provides on-line information about the institute, newsletters, technical report series, requests for proposals, upcoming conferences and symposia, links to related entities, and the research reference library.

One of the driest states in the nation, New Mexico averages no more than 20 inches of precipitation a year, varying from about 6.5 inches in the Four Corners area to more than 30 inches in the high mountains. The relative humidity is low, resulting in a high rate of evaporation. Summer rain accounts for almost half of the annual precipitation other than in the high mountains. Such widely varied precipitation is as much a water allocation problem as water scarcity itself. New Mexico, like much of the West, has suffered drought conditions throughout the latter half of the 1990s as well as the past four years. Speculation is that the region might be headed into a long-term dry spell that could last decades. Although New Mexico received above average precipitation during the winter of 2004-2005, drought remains a real concern for the state. The biggest problem remains low reservoir levels. On the Rio Grande, reservoirs are holding only about 30 percent of their normal storage at the time of this report. Good mountain snowpack has led

forecasters to predict higher than normal flows in rivers around the state and to caution about possible flooding. Water conservation measures continue to expand in municipalities throughout New Mexico to help ensure adequate public water supplies for residential and industrial use. Drought ordinances are in place in cities across the state, and county and municipal governments are working together to limit water use and reduce demand. The Drought Task Force, established in April 2002 by New Mexico's governor after declaring a state of emergency because of the drought, continues to monitor the situation. Officials say this is the most significant drought since the mid-1950s.

Water problems in New Mexico, like in other western states, continue to revolve around three key issues: quality, quantity, and management. Because water resources are so limited, water quality and water resources management have taken on increasing importance. These concerns are interrelated and sufficiently complex so that the highest quality research is essential to solving them.

Research Program

The primary objective of the New Mexico Water Resources Research Institute is to maintain a balanced program of research that addresses water issues and problems critical to New Mexico, the region, and the nation. In administering this program, the institute relies on financial support from state appropriations, federal and state agencies, and the USGS Water Resources Research Institute Annual Base Program. The 2004 Annual Base Program supported the Geographic Information Systems for Water Resources Research Planning, a project that focused on conservation, management, and planning.

During the reporting period, the NMWRRI administered a total of 42 projects dealing primarily with water quality and conservation issues. The total value of these projects was nearly $1.2 million, including required cost sharing. Awards were made by various federal and state agencies, a private foundation, and from the institute's annual state appropriations. Dollar amounts per project award ranged from $2,000 to just over $94,000. During the reporting period, projects were conducted at New Mexico State University, New Mexico Tech, University of New Mexico, New Mexico Highlands University, and Eastern New Mexico University. Faculty members were principal investigators on 26 projects and NMWRRI staff managed 15 projects. The institute maintained frequent contact with its researchers through periodic progress updates, site visits, and expenditure tracking.

Research projects administered by the NMWRRI utilized at least 47 students during the year including undergraduates, masters, and Ph.D. candidates in the disciplines of agronomy, civil engineering, geography, range science, earth and environmental science, biology, anthropology, and fish and wildlife science. A water resources summer training program provided a broad understanding of water resources to approximately 30 Native American high school students from across the nation.

Projects administered by the NM Water Resources Research Institute during the reporting period that were funded from sources other than the 2004 USGS Annual Base Program are listed below. Note that total award value is shown and includes both agency and cost sharing when appropriate.

Digitizing Geologic Maps. New Mexico Bureau of Geology and Mineral Resources $2,000

Well Metering Inventory and Evaluation for Elephant Butte Irrigation District. Elephant Butte Irrigation District $4,000

Mapping Services - Regional Water Plan Task Orders. Professional Services Agreement with the NM Interstate Stream Commission (two projects) $4,380

Identification of Membrane Foulants in Natural Waters. WRRI Student Research Grant $4,500 (Khalid Mehboob, University of New Mexico)

Water Quality Assessment along Surface Water and Groundwater Pathways at the Las Vegas National Wildlife Refuge, New Mexico. WRRI Student Research Grant $4,805 (Thomas Evans, New Mexico Highlands University)

Escherichia coli Source Tracking by DNA Fingerprinting in Diverse Watersheds of Northern New Mexico. WRRI Student Research Grant $4,819 (Greg Huey, New Mexico Highlands University)

Prehistoric Water Management in the American Southwest. WRRI Student Research Grant $4,920 (Stacy K. Galassini, Eastern New Mexico University)

Using Natural Tracers to Improve Estimates of Groundwater Recharge Resulting from Snowmelt. WRRI Student Research Grant $4,991 (Sam Earman, New Mexico Tech)

Effects of Gender and Predation Risk on Depth Choice in the Mosquitofish, Gambisia affinis. WRRI Student Research Grant $4,995 (Tony Spitzack, Eastern New Mexico University)

Effects of Burning and Thinning on Forest Hydrology. WRRI Student Research Grant $4,998 (Anthony Madrid, New Mexico State University)

The Fate of Pharmaceutically Active Drugs in the Rio Grande and Groundwater. WRRI Student Research Grant $5,000 (Maceo Carillo Martinet, University of New Mexico)

Geochemistry of Rio Grande Rift Travertine Depositing Springs: Implications for Rio Grande Valley Water Quality. WRRI Student Research Grant $5,000 (Dennis L. Newell, University of New Mexico)

Can Non Potable Saline Groundwater be used for Turfgrass Irrigation? WRRI Student Research Grant $5,000 (Casey Johnson, New Mexico State University)

Mapping Lake Evaporation Using Satellite Imagery. WRRI Student Research Grant $5,000 (Alex Herting and Jordan Evans, New Mexico State University)

Climate, Land Use Change, and Hydrologic Response Modeling the Rio Puerco River Basin. WRRI Student Research Grant $5,000 (Robert Wyckoff, New Mexico Tech)

Technical Support of Phase II Coordinated Water Resources Database Project. Texas A&M, Agricultural Research and Experiment Center at El Paso $5,750

Mapping and GIS Activities Associated with the Enhancement of the Data Portal Capabilities of the Paso del Norte Coordinated Database. Texas A&M, Agricultural Research and Experiment Center at El Paso $8,074

An Inventory of Water Conservation Hydrology, Culture and Institutions in New Mexico. Bureau of Reclamation $9,700

International Boundary and Water Commission Flood Control Benefit Assessment. Texas A&M, Agricultural Research and Experiment Center at El Paso $11,000

Purchase and Installation of Tower and Instrumentation in Support of Treated Salt Cedar Site. Bureau of Reclamation $11,234

Irrigation and Brackish Water Utilization Research. Sandia National Laboratories $15,000

Enhancement of the Data Portal Capabilities of the Paso del Norte Coordinated Database Project. Texas A&M, Agricultural Research and Experiment Center at El Paso $18,975

An Appraisal-level Study of Alternative Methods of Reducing Carriage Losses from Conchas Canal for the Arch Hurley Conservancy District: Open-canal construction materials and costs. Bureau of Reclamation $27,830

New Mexico Pesticide Management Plan. Memorandum of Agreement with the New Mexico Department of Agriculture. US Environmental Protection Agency $30,000

Phase II Development of a Coordinated Water Resources Database for the Paso del Norte Watershed Council. Texas A&M, Agricultural Research and Experiment Center at El Paso $33,948

Development of a Conceptual Model of the Rio Grande Flow Between Elephant Butte Dam and American Dam. Texas A&M, Agricultural Research and Experiment Center at El Paso $34,618

Salinity Sources of the Hueco Bolson. Subcontract with California State University - Los Angeles $36,002

Rincon Valley Mapping Project. Lower Rio Grande Water Users Organization/City of Las Cruces $45,455

Analysis of Raw and Treated Sewage to Determine the Effectiveness of Sewage Treatment and Levels of Enteric Disease along the Paso del Norte Region. SCERP and Water Resources Research Institute state appropriations $46,951

Development of a Coordinated Water Resources Database: Data Acquisition and Recording Systems. Texas A&M, Agricultural Research and Experiment Center at El Paso $48,183

An Appraisal-level Study of Alternative Methods of Reducing Carriage Losses from Conchas Canal for the Arch Hurley Conservancy District: Geological Site Studies $49,175

Coordination for the Tularosa Basin National Desalination Research Center. Sandia National Laboratories $50,000

U.S.-Latin American Relations Program. Hewlett Foundation $52,650

An Appraisal-level Study of Alternative Methods of Reducing Carriage Losses from Conchas Canal for the Arch Hurley Conservancy District: Quality Control of Design. Bureau of Reclamation $53,750

Joint Investigation of Evapotrarnspiration Depletion of Treated and Non-Treated Saltcedar at the Elephant Butte Delta, New Mexico. Bureau of Reclamation $61,507

Grand Unified Groundwater Model Development for the Lower Rio Grande. Lower Rio Grande Water Users Association $63,576

Early Life History Studies of Rio Grande Silvery Minnow (Hybognathus amarus) Related to Downstream Fish Passage. U.S. Bureau of Reclamation $70,442

Preparation of a Strategic Plan and Bylaws for the Paso del Norte Water Task Force. The William and Flora Hewlett Foundation $74,545

U.S.-Latin American Relationship Program: Mapping Project. The William and Flora Hewlett Foundation $75,000

On-Farm Efficiency Investigations in the Middle Rio Grande. URS Group, Inc. from Bureau of Reclamation $87,838

Water Resources Training Program for Native American Students. US Bureau of Indian Affairs $94,231

Geographic Information System for Water Resources Research Planning

Basic Information

Title:	Geographic Information System for Water Resources Research Planning
Project Number:	2002NM1B
Start Date:	3/1/2002
End Date:	2/28/2006
Funding Source:	104B
Congressional District:	Second
Research Category:	Not Applicable
Focus Category:	Management and Planning, Conservation, Water Quality
Descriptors:	
Principal Investigators:	Bobby J. Creel, John F. Kennedy

Publication

1. Hawley, J.W. and J.F. Kennedy, 2004, Creation of a Digital Hydrogeologic Framework Model of the Mesilla Basin and Southern Jornada del Muerto Basin. New Mexico, Water Resources Research Institute, Technical Completion Report No. 332, New Mexico State University, Las Cruces, New Mexico. 105 p., with 7 plates and appendix on CD ROM.
2. Van Schoik, R., C. Brown, E. Lelea, and A. Conner, 2004, Barriers and Bridges: Managing Water in the U.S.-Mexican Border Region, Environment, 46:1.
3. Connell, S.D., J.W. Hawley, and D.W. Love, 2005, Late Cenozoic drainage development in the southeastern Basin and Range of New Mexico, southeasternmost Arizona, and western Texas, in S.G. Lucas, G. Morgan, K.E. Zeigler, eds., 2005, New Mexicos Ice Ages: New Mexico Museum of Natural History & Science Bulletin No. 28, p. 125-150.
4. Hawley, J.W., 2005, Five million years of landscape evolution in New Mexico: An overview based on two centuries of geomorphic conceptual-model development, in S.G. Lucas, G. Morgan, and K.E. Zeigler, K.E. eds, 2005, New Mexicos Ice Ages: New Mexico Museum of Natural History & Science Bulletin No. 28, p. 9-93.
5. Pazzaglia, F.J. and J.W. Hawley, 2004, Neogene (rift flank) and Quaternary geology and geomorphology, in G.H. Mack, G.H., and K.J. Giles, eds., The Geology of New Mexico: A geologic history: New Mexico Geological Society, Special Publication 11, p. 407-438.
6. Seager, W.R., F.E. Kottlowski, and J.W. Hawley, 2004, Geology of Robledo Mountains and vicinity, Doña Ana County, New Mexico: New Mexico Bureau of Mines and Mineral Resources, Geologic Map 75, CD-ROM only.

7. Brown, C., Z. Sheng, and M. Bourdon, 2005, Final Project Report for the Paso del Norte Watershed Council (PdNWC) Coordinated Water Resources Database, Phase II. Technical completion report produced on behalf of the PDNWC for the El Paso Water Utilities.
8. Kennedy, J.F., 2004, Application of GIS and Remote Sensing Methods to the Paleohydrogeography of the Paso del Norte Region, Ph.D. Dissertation, Department of Geological Studies, University of Texas at El Paso, El Paso, TX, variously paged.

Problem and Research Objectives
The New Mexico Water Resources Research Institute has become the focal point for geographic information system (GIS) data and information concerning water resources in New Mexico. It combines database management with digital mapping into spatial-tabular data models. These models are powerful tools for representing and manipulating earth-science information.

As use of Geographic Information Systems has grown and presented new opportunities, it also has raised a number of new issues and problems. Of increasing concern is the management of a growing collection of spatial data sets and applications programs. These data sets and programs are very expensive to produce but relatively easy to share, so there is a great incentive to avoid duplicating production efforts. The trend clearly is toward managing these elements in distributed spatial libraries.

The primary objective of the project is to increase availability and accessibility of water resource information to support water resource planning and management in the state. The first task provides spatial data library accessibility**.** This task maintains arrangements and establishes those necessary to provide access to spatial data maintained by other agencies and organizations. The second task, spatial data development, evaluates needs, establishes priorities, and undertakes development of spatial data that is otherwise unavailable. These efforts will be coordinated with cooperating agencies and organizations to assure no duplication of effort and establish guidelines for coverages and priorities. The principal investigators maintain, update as necessary, and make the data available to cooperating agencies and organizations through both formal and informal arrangements to facilitate water resource planning activities.

Methodology
A number of cooperative data sharing agreements have been entered into with state, federal, and local agencies and organizations to facilitate access and to develop spatial data. Others will be pursued as necessary. Research funded by the NMWRRI in many cases results in the development of data that can be represented in a spatial form and thus can contribute to the state data pool. Projects that have such a potential are adjusted as necessary to meet this secondary purpose.

The NMWRRI maintains a GIS laboratory consisting of computer workstations; data storage devices; input/output devices (color plotter, digitizer, etc.); software for mapping and analysis (ARC/Info); database development and visualization; and network systems. The laboratory is connected via fiber to the New Mexico State University computer network, and thereby to the Internet. The NMWRRI also maintains an Internet web server site through which both spatial and tabular water resource data can be provided.

Principal Findings and Significance
Various research activities are supported by the system for water resources planning in the state. The New Mexico Interstate Stream Commission provides grants to regional groups to support water resources planning. NMWRRI continues to be utilized by the NM Interstate Stream Commission to provide GIS mapping products for use in their plans and in public outreach. NMWRRI has helped many regional groups with GIS mapping products for use in their plans and in public outreach efforts.

Additionally, support has been given to the New Mexico/Texas Water Commission and various public entities of southern New Mexico for their planning activities. GIS mapping support is also provided to the Lower Rio Grande Water Users Organization. Presentations utilizing the products of the database management system were given at the annual meeting of the Geological Society of America in October 2004, 2nd International Symposium on Transboundary Waters Management in November 2004, and the New Mexico Geographic Information Council's fall 2004 meeting.

This sophisticated mapping and geo-spatial database management system, originally designed to support WRRI-funded research activities, is now being used for external research grants (e.g., Creation of a Digital Hydrogeologic Framework Model of the Mesilla Basin and Southern Jornada del Muerto Basin; creation of maps for the purpose of water planning funded by the New Mexico Interstate Stream Commission; and pesticide management planning in the state funded by the New Mexico Department of Agriculture) by water resources management and planning agencies in the state. A research grant resulted in the creation of a regional geographic information system to support water planning in the Paso del Norte borderland area of the southwestern United States.

This is an ongoing project with new data continually being added to the database and assistance being given to produce specific GIS products upon request. Continued funding is anticipated from annual state appropriations, as well as pending agency awards.

Information Transfer Program

The New Mexico Water Resources Research Institute maintains a vigorous program to transfer technical information from the producer to the user and the public. Technical publications, newsletters, conferences, press announcements, and presentations keep practitioners aware of new technology and research advances. The WRRI homepage (wrri.nmsu.edu) provides on-line information about the institute's newsletters, technical report series, requests for proposals, upcoming conferences and symposia, and the research reference library. Starting with the 44th Annual New Mexico Water Conference Proceedings, all papers have full-text viewing via the institute's homepage. Other federal and state servers, such as the U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, USGS, and National Weather Service are linked to the WRRI homepage.

Information Transfer Program

Basic Information

Title:	Information Transfer Program
Project Number:	2002NM3B
Start Date:	3/1/2002
End Date:	2/28/2006
Funding Source:	104B
Congressional District:	Second
Research Category:	Not Applicable
Focus Category:	Education, None, None
Descriptors:	
Principal Investigators:	Bobby J. Creel, Cathy T. Ortega Klett

Publication

1. Smith, G.B. and K.H. Oshima, 2004, Development of a Laser-Based Detection System for Water-Borne Pathogens. New Mexico Water Resources Research Institute, Technical Completion Report No. 331, New Mexico State University, Las Cruces, New Mexico, 10 pp.
2. Hawley, J.W. and J.F. Kennedy, 2004, Creation of a Digital Hydrogeologic Framework Model of the Mesilla Basin and Southern Jornada del Muerto Basin. New Mexico Water Resources Research Institute, Technical Completion Report No. 332, New Mexico State University, Las Cruces, New Mexico, 105 pp.
3. Boren, J., T. Baker, D. Cowley, G. Mason, S. Eaton, and B. Hurd, 2005, Terrestrial Vegetation Inventory of Water Delivery Systems Between San Acacia Diversion and the Bosque del Apache National Wildlife Refuge. New Mexico Water Resources Research Institute, Technical Completion Report No. 333, New Mexico State University, Las Cruces, New Mexico, 6 pp.
4. Ortega Klett, C.T., 2004, Proceedings of the 48th Annual New Mexico Water Conference, New Mexico Water Planning 2003. New Mexico Water Resources Research Institute, Technical Completion Report No. 329, New Mexico State University, Las Cruces, New Mexico, 149 pp.

Statement of Critical Water Problem:
The New Mexico Water Resources Research Institute's Information Transfer Program is designed to bring the results of its research projects to the public and to educate New Mexicans on the critical water issues of the state, region, and nation. Different sectors of the public are targeted for each of its activities.

Statement of Results and Benefits:
The program goal is to provide people with water information appropriate to their level of training and interest. Information transfer activities are funded primarily from non-federal sources. Responsibilities for different segments of the program have been assigned to various professional and support staff at the institute.

Nature, Scope and Objectives:
The primary methods for information transfer are conferences, publications, audio/visual presentations, and available information on the institute's website. For the past 49 years, the NMWRRI has sponsored the Annual New Mexico Water Conference focusing on a topic of importance to the New Mexico water community. The annual conference is held in different locations around the state, usually in the fall. Most of the conference participants are water resources practitioners working for state, federal, or local agencies, although some members of the general public and of academia also attend. Average attendance ranges between 200 and 350, depending on the location and topic of the conference.

Publications include technical completion reports resulting from NMWRRI sponsored projects, special in-house publications, and conference proceedings. The institute has published more than 360 technical and miscellaneous reports. The peer reviewed technical completion reports are directed toward water professionals working in disciplines related to the research projects. Since about 2000, technical reports are available via the NMWRRI web site in full text. Those interested in a particular report are able to print off the Internet instead of ordering a hard copy of the report.

A quarterly newsletter, *The Divining Rod,* focuses on research and current water issues. It is distributed to approximately 2,300 readers and is available on the WRRI homepage.

The institute averages 125 requests for general information and 20 requests for specific publications each month. A reference room, housed at the institute, contains over 10,000 documents and is used frequently by faculty, students, and others. A complete catalog of holdings can be searched through the NMWRRI home page on the Internet, along with an extensive water resources and information system database and other information about the institute. Several hundred inquires per month are recorded on the web page.

The institute director and associate director are invited frequently to speak at local, regional, and national conferences and workshops in addition to serving on a number of committees that focus on water resources. The institute director is currently the president of the national organization, Universities Council of Water Resources, and is an active member of the National Institute of Water Resources. The NMWRRI staff also regularly provide expertise for solving specific problems and general concerns. They play a central role in planning for the water future of the region by cooperating with a host of water resources entities throughout the state and region, particularly in the Paso del Norte area.

Accomplishments:
The 49th Annual New Mexico Water Conference was held in September at the Ruidoso Convention Center, in Ruidoso, New Mexico. The conference theme, "Water Desalination and Reuse Strategies for New Mexico" drew over 200 participants. New Mexico Senator Pete Domenici gave the keynote address. The senator foresees "that much of the development, testing, and manufacture of the next generation's water technology will occur in New Mexico…" A full proceedings of the conference was produced, and participants received a copy on CD.

The NMWRRI coordinated the 2004 Water Research Symposium held on the campus of New Mexico Tech, in Socorro, New Mexico. The one-day "2004 New Mexico Water Research Symposium" was co-sponsored by Sandia National Laboratories, Los Alamos National Laboratory, New Mexico's three state universities, Office of the State Engineer, New Mexico Interstate Stream Commission, and the AWRA-New Mexico

section. Sixteen presentations were given and 28 posters displayed. Over 100 participants from throughout New Mexico, Arizona, and west Texas attended.

The institute maintains a vigorous program to transfer technical information from the producer to the user and the public. Technical publications, newsletters, conferences, press announcements, and presentations keep practitioners aware of new technology and research advances. The NMWRRI's homepage (wrri.nmsu.edu) provides on-line information about the institute's newsletters, technical report series, student grants, requests for proposals, upcoming conferences, and the research reference library. Starting with the 44th Annual New Mexico Water Conference Proceedings, all conference papers have full-text viewing on the institute's homepage.

The institute's publications for the period included three technical reports and the 48th Annual New Mexico Water Conference proceedings. NMWRRI technical completion reports are available at no charge while supplies last. A copy charge is assessed if the report is out of print or has been reprinted. Water conference proceedings and miscellaneous reports can be purchased for a small charge. All technical report abstracts can be viewed via the NMWRRI homepage and publications may be ordered at wrri.nmsu.edu.

The institute's quarterly newsletter, *The Divining Rod*, is an eight- to sixteen-page newsletter that focuses on research projects administered by the NMWRRI and on current water issues in New Mexico. It provides information on upcoming conferences, seminars, and workshops; describes new grants and newly released publications; and provides general information on new developments in water resources research and management. Each issue is available on the NMWRRI's homepage.

The Information Transfer Program is an ongoing program with no particular timelines.

Student Support

Student Support					
Category	**Section 104 Base Grant**	**Section 104 RCGP Award**	**NIWR-USGS Internship**	**Supplemental Awards**	**Total**
Undergraduate	1	0	0	0	1
Masters	2	0	0	0	2
Ph.D.	0	0	0	0	0
Post-Doc.	0	0	0	0	0
Total	3	0	0	0	3

Notable Awards and Achievements

Jose Solis (Alliance for Minority Studies) won first place for a research presentation at the Spring, 2003 URA Symposium, New Mexico State University for a presentation entitled, Automatic Class A Evaporation Pan Using Load Cell Sensors.

Project 2001 B-03 NM1421 Geographic Information System for Water Resources Planning: The New Mexico Water Resources Institute continues to be the focal point for geographic information system (GIS) data and information concerning water resources in New Mexico as well as in the El Paso/Juarez border region.

John W. Hawley, WRRI senior hydrogeologist, was awarded the 2005 New Mexico Earth Scientist of the Year Award, sponsored by the New Mexico Bureau of Geology and Mineral Resources and the New Mexico Energy, Minerals and Natural Resources Department. The award honors those often unrecognized champions of Earth science issues vital to the future of New Mexico. The awards presentation was made on January 28, 2005 at the State Capitol building during the state legislative session in conjunction with Earth Science Day.

John F. Kennedy, WRRI GIS coordinator, received the 2004 UTEP Geological Sciences Department Outstanding Dissertation Award, presented November 2004 for his dissertation entitled, Application of GIS and Remote Sensing Methods to the paleohydrogeography of the Paso del Norte Region.

Sue Tillery, a Ph.D. student in civil engineering at New Mexico State University, received a prestigious Sandia National Laboratories fellowship for her doctoral studies. She participates in several projects funded through the WRRI.

Publications from Prior Projects

1. 2000NM7G ("Institutional Adjustments to Coping with Prolonged and Severe Drought in the Rio Grande") - Articles in Refereed Scientific Journals - 2000NM7G Booker, J.F., A.M. Michelsen, and F.A. Ward, 2005, Economic Impact of Alternative Policy Responses to Prolonged and Severe Drought in the Rio Grande Basin, Water Resources Research, 41:2:W02026:1-15.
2. 2000NM7G ("Institutional Adjustments to Coping with Prolonged and Severe Drought in the Rio Grande") - Articles in Refereed Scientific Journals - 2000NM7G Ward, F.A., J.F. Booker, and A.M. Michelsen, 2005, Integrated Economic, Hydrologic and Institutional Analysis of Policy Responses to Mitigate Impacts in the Rio Grande Basin, Journal of Water Resources Planning and Management, in press.
3. 2000NMB03 ("Hyperfiltration-Induced Precipitation of Sodium Chloride") - Articles in Refereed Scientific Journals - 2000NMB03 Odour, P. and T.M. Whitworth, 2004, Transient Modeling of Hyperfiltration Effects, Mathematical Geology, 36:6:743-758.
4. 2000NM4B ("Ultrafiltration Based Detection of Viruses and Cryptosporidium Oocysts from Environmental Water Samples") - Articles in Refereed Scientific Journals - 2000NM4B Montoya, J.R., R.L. Armstrong, and G.B. Smith, 2003, Detection of Salmonella Using Surfaced Enhanced Raman Scattering, 2003, Proceedings of SPIE, Chemical and Biological Sensing IV, P.J. Gardner, Ed. pp. 144-152.
5. 2000NM4B ("Ultrafiltration Based Detection of Viruses and Cryptosporidium Oocysts from Environmental Water Samples") - Articles in Refereed Scientific Journals - 2000NM4B da Silva Nunes-Halldorson, V., R.L. Steiner and G.B. Smith, 2003, Residual toxicity after biodegradation: Interactions among benzene, toluene, and chloroform, Ecotoxicology and Environmental Safety, 57:2:162-167.
6. 2000NM4B ("Ultrafiltration Based Detection of Viruses and Cryptosporidium Oocysts from Environmental Water Samples") - Articles in Refereed Scientific Journals - 2000NM4B (Ultrafiltration Based Detection of Viruses and Cryptosporidium Oocysts from Environmental Water Samples) Articles in Refereed Scientific Journals Morales-Morales, H.A., G. Vidal, J. Olszewski, C.M. Rock, D. Dasgupta, K. H. Oshima, and G.B. Smith, 2003, Optimization of a Reusable Hollow-Fiber Ultrafilter for Simultaneous Concentration of Enteric Bacteria, Protozoa, and Viruses from Water, Applied and Environmental Microbiology, 69:7:4098-4102.