NEW MEXICO TECH
SCIENCE • ENGINEERING • RESEARCH UNIVERSITY

Application for Determination of Sole Source Procurement

This form, *with one or more categories completed*, must accompany a purchase requisition for equipment, supplies or services exceeding $20,000. Select the category or categories appropriate for this procurement. Attach all documentation necessary to support the application. Procurements of $20,000 and greater shall be posted to the NM Tech Purchasing website for the mandatory thirty (30) day period per NMSA 13-1-126.1

Requesting Department:	Bur of Geo	End User's Name:	Stacy Timmons
Proposed Contractor:	Dr. Phil King	Estimated Cost:	$59,950.00
Product Description:	Groundwater expertise	Date:	03/08/2024

I am requesting a sole source procurement based on the following reasons:

- [ ] Compatibility of existing equipment or supplies; provide details in *Explanation*. Include manufacturer, model number and NMT PCN of existing equipment.
- [ ] Item specifically required for use in conjunction with grant or contract. Attach applicable grant or contract page and provide justification of why it is required for grant / contract and why other substitutes are not acceptable.
- [ ] Requirement is of a proprietary / copyright / licensing nature which is explained below.
- [ ] The requested product has unique design / performance specifications or quality requirements which are essential to my work, research protocol or teaching needs, and are not available in comparable products. Please discuss this uniqueness / performance below.
- [ ] NMT Staff has specialized training and / or extensive experience. Retraining would incur substantial cost in money / time as explained below.
- [ ] I have contacted other suppliers or service providers identified below and have considered their product, however, their products / services are not acceptable because they are lacking one or more technical capabilities as discussed below.
- [ ] The requested product is essential in maintaining / continuing experiments. Other investigators have used this product in similar research and for comparability of results, I require it.
- [x] Contractor is the sole manufacturer and sole distributor and has unique features / characteristics not available from other sources (provide explanation and attach applicable documents).
- [ ] Product is a prototype; contractor offers a trade-in allowance; availability of service, parts or maintenance as discussed below.

Explanation: See attached.

By signing below, requestor certifies that the information provided is accurate to the best of their knowledge.

Stacy Timmons Digitally signed by Stacy Timmons Date: 2024.03.08 16:43:00 -07'00'	Stacy Timmons	03/11/2024
End User Signature (actual signature required)	Printed Name	Date
Chief Procurement Officer (signature required)	Date	

For use by Purchasing:

Date application received in purchasing: 3/13/24 NMT Web Posting date: 3/13/24 Expiration date: 4/11/24

Sole Source Justification

March 11, 2024

The New Mexico Bureau of Geology and Mineral Resources, a research division of New Mexico Tech, seeks to hire Dr. Phil King as a contractor for a period of approximately 6 months to support technical groundwater, collaborative work with several partner organizations. This work provides technical expertise on groundwater in New Mexico, with availability to lead and direct aspects of a newly forming NM Groundwater Alliance working group. This group endeavors to develop stakeholder-driven reform of water policy and water management concepts for implementation. Dr. Phil King, with his 40 years of experience in water research and engineering, and his extensive professional network, offers a unique technical and leadership skill set for addressing the state's groundwater challenges. The Groundwater Alliance and other collaborative efforts require careful coordination and continuity with agency leadership within the NM Bureau of Geology and Mineral Resources, the Office of the State Engineer, the Interstate Stream Commission, Thornburg Foundation, and the NM Groundwater Alliance, a new state-sponsored public-private consortium. This work is guided in part by the recommendations of the Governor's Water Policy and Infrastructure Task Force of 2022, as well as the Governor's 50 Year Water Action Plan.

While there are numerous experienced water resource engineers in the region, Dr. Phil King is uniquely qualified for this contract position due to his years of direct experience working on New Mexico's water problems. Dr. King has conducted or overseen countless research projects as a principal investigator or academic advisor, collaborated with water users across the state (and internationally) to identify and solve engineering challenges, and consulted with water management organizations such as the Elephant Butte Irrigation District in southern New Mexico. Dr. King has been a technical lead and expert witness in major water-related litigation and mediation, giving him a nuanced understanding of the nature and technical requirements for water dispute resolution in New Mexico. He has engaged in public service at local, state, regional, and international levels, including serving as as member of the New Mexico Water Policy and Infrastructure Task Force; supervisor of the Doña Ana Soil and Water Conservation District; co-author of the State's nationally-recognized "Leap Ahead" report on climate change impacts to water resources; and board member of the Leasburg Mutual Domestic Water Consumers Association.

The selection of this sole source vendor is also required to provide continuity with existing work already underway at the NM Office of the State Engineer and Interstate Stream Commission. In this capacity, Dr. King is supporting technical water data and research needs of the Water Security Planning Act (NMSA § 72-14A), leading the formation of the Groundwater Alliance and organizing initial planning meetings, as well as providing technical review, research, report writing, meeting coordination and strategic development for groundwater planning, management, and administration needs. It is essential to maintain this collaboration and project continuity with the same contractor for this period of time, rather than requiring a new vendor to get up to speed and acquainted all of the complex water issues and people involved at the collaborating agencies. Alternate vendors would cause inefficiencies in project expenses and timeline, which is set according to the legislative session in 2025.

James Phillip King, P.E., Ph.D., MBA

Current Employment:

12/23 – Present: **Senior Advisor**, New Mexico Office of the State Engineer/Interstate Stream Commission. Technical advisor to primary water administration agencies in New Mexico, focusing on regional water planning, groundwater management and governance, water conservation, and climate change adaptation.

9/95 – Present: **Principal Engineer,** King Engineering & Associates, Inc., Albuquerque, New Mexico. Water Resources and Agricultural Engineering specialist. Clients include irrigation districts, Indigenous tribes, state and federal agencies, environmental organizations, and private individuals and companies. Services include a broad range of civil, agricultural, water resources, hydraulic and hydrological engineering. Extensive experience with expert services in support of legislation, litigation (including expert reports and testimony), negotiation and dispute resolution.

Education:

Ph.D., Agricultural Engineering, 1990, Colorado State University. Concentration: Soil and Water Engineering. Dissertation: *Knowledge based expert systems methods for irrigated barley crop management*. Funded by the Colorado Institute for Artificial Intelligence.

M.S., Agricultural Engineering, 1988, Colorado State University. Concentration: Soil and Water Engineering. Thesis: *Water induced soil erosion processes and modeling*. Funded by the National Science Foundation.

B.S., Civil Engineering, 1982, University of California at Berkeley. Concentration: Construction Engineering.

MBA, 2003, New Mexico State University. Special project on modeling effects of leadership styles on organizational learning and performance.

Previous Work History:

1/1990 – 6/2021: **Assistant/Associate/Full Professor,** Department of Civil Engineering. **Professor** and **Associate Department Head,** specializing in Civil (water resources) and Agricultural Engineering. **Teaching** included graduate and undergraduate courses in computing, water resources engineering, irrigation and drainage, hydraulics, hydrology, geohydrology, hydraulic structures, construction, professional ethics, and engineering project management and economics. **Research** included applied and basic projects on water use optimization, consumptive use, conservation, drought effects, climate change adaptation, surface water-groundwater interaction, streamflow forecasting and river modeling, water resource planning and management, international development, and transboundary water issues. Director of New Mexico Alliance for Minority Participation (NMAMP), an NSF regional alliance for supporting Under-Represented Minorities in STEM fields, 2015-2021. Principal Investigator for Reaching the Pinnacle, an NSF regional alliance aimed at recruiting and retaining students with disabilities in STEM fields, 2010-2013. **Service** included university and professional society committee work, technical review of local water resources issues, curriculum development and administration, and advising graduate and undergraduate students. Retired to pursue professional practice.

9/09-8/10: **Science & technology Policy Fellow,** American Association for the Advancement of Science (AAAS), Washington, D.C. Fellow in the Energy, Environment, Agriculture, and Natural Resources division in the Science and Technology Policy program. Posted while on sabbatical from NMSU with the National Science Foundation's Engineering Directorate (ENG), Civil, Mechanical, and Manufacturing Innovation Division (CMMI), Arlington, Virginia. Left upon completion of service and sabbatical.

- Represented NSF CMMI in Integrative Graduate Education and Research Traineeship (IGERT), Water, Sustainability and Climate (WSC), Interdisciplinary Research (IRD), and Graduate Research Supplement (GRS) grant programs
- Organized and conducted four core program review panels in NSF Civil Infrastructure Systems (CIS)
- Served on ENG Assessment and Evaluation Work Group, developing and implementing evaluation of federal investment in research by ENG and NSF; Focused on logic model formulation, indicators, metrics, and organizational infrastructure for ongoing performance assessment
- Served on ENG diversity work group focusing on improving innovation in STEM workforce
- Session organizer for AAAS seminar on Federal Investments in Research Evaluation, April 2010
- Participated in AAAS Water Affinity Group, presented Critical Water Issues in Arid Regions, May 2010

1/86-12/89: Graduate/Teaching **Research Assistant,** Department of Agricultural and Chemical Engineering, Colorado State University. Left position upon completion of Ph.D. to take faculty position at NMSU.

- Secured $58,000 of external funding for doctoral research
- Received Armand Blanc Award for doctoral dissertation work
- Received Mined Land Reclamation Group Award for Masters Thesis work
- Taught one graduate course in Hydraulic Structures

5/83-10/85: Peace **Corps Volunteer/Irrigation Engineer,** Ngabu Agricultural Development Division, Malawi, Africa. Left position upon completion of service to attend graduate school.

- Rehabilitated three small holder irrigation schemes totaling 790 hectares
- Designed and built irrigation systems for two research stations
- Chosen as Peace Corps Volunteer of the Year, Malawi, 1984

Service Activities:

- Member, Good Neighbor Environmental Board, US Environmental Protection Agency, 2021-2023.
- Water Ambassador, New Mexico Interstate Stream Commission's Water Policy and Infrastructure Task Force, 2022-present.
- Expert Panelist, New Mexico Interstate Stream Commission "Leap Ahead" Water and Climate Advisory Team in support of State 50-year Pater Plan, 2021-2022.
- Chair, ASCE Subcommittee on Levee and Dam Assessment, New Mexico Infrastructure Report Card, 2011.
- Governor's Designee, New Mexico Soil and Water Conservation Commission, 2007-2012.
- Supervisor, Doña Ana Soil and Water Conservation District, New Mexico, 2006-2009; Chair 2008-2009.
- Board Member, Leasburg Mutual Domestic Water Consumers Association, New Mexico, 2003-2010; President 2009-2010.

Awards and Honors:

- John C. Frye Memorial Award in Environmental Geology as co-author of *Climate Change in New Mexico Over the Next 50 Years: Impacts on Water Resources,* NM Bureau of Geology and Mineral resources Bulletin 164, 2023.
- Meritorious Service Award, New Mexico State University, 2021.
- Professor of the Year, 2021, Department of Civil Engineering, New Mexico State University, selected by Departmental students.
- John Clark Family Endowed Professor for Excellence in Civil Engineering, 2013 – 2016.
- Bill Daniels Fellowship for Ethics, 2011.
- American Association for the Advancement of Science & Technology Policy Fellowship, 2009-2010.
- First and second places in the Sixth Scientific Papers Competition in Xinjiang Water Resources Research, Xinjiang Water Conservancy Society, China, for co-authored papers, 2011.
- Daniel C. Roush Award for Excellence in Teaching, New Mexico State University, 2008.
- American Society of Engineering Educators, Southwest Regional Meeting, 2nd Outstanding Conference Paper Award, Austin, Texas, 1993.
- Armand Blanc Prize for Outstanding Young Researcher for Dissertation, 11th Congress on International Agricultural Engineering, Dublin, Ireland, 1989.
- 1988 Mine Land Reclamation Group Award for Masters thesis.
- Peace Corps Volunteer of the Year, Malawi, 1984.

Teaching:

- Computing for Engineers, 1990 -2012, undergraduate.
- Engineering Economics, 1998, undergraduate.
- Artist Books on the Rio Grande, 2009, undergraduate.
- Construction/Engineering Project Management, 1999-2021, graduate and undergraduate.
- Irrigation and Drainage Engineering Design, 1990 - 2020, graduate and undergraduate.
- Hydraulic Structures, 1992 - 2021, graduate and undergraduate.
- Hydraulic Systems Engineering, 2002, 2018, undergraduate
- Statistical Hydrology, 2000-2021, graduate.
- Geohydrology, 2005-2011, undergraduate.
- Water Resources Development, 2000, graduate.
- Open Channel Hydraulics, 1999-2020, graduate.
- Water Resources Technician Training, 1993 -2010, short courses funded by the Bureau of Indian Affairs.
- Surface Water Hydrology, 1994 -1996, graduate and undergraduate.
- Groundwater Hydrology and Modeling, 1990 -1999, graduate.
- GIS/GPS Foundations and Applications, 1993, graduate and undergraduate.

New Mexico State University Administrative and Committee Service:

Associate Department Head, Civil Engineering, NMSU, 2005-2021.
Chair and member, Promotion and Tenure Committee, College of Engineering, 2018-2020.
Member, Scholarship Committee, College of Engineering, 2015-2017.
Chair and member, Undergraduate Curriculum Committee, Department of Civil Engineering, NMSU 2010-2014.
Founding member, Executive Committee member, Interdisciplinary Water Science and Management Program, NMSU, 2009-2022.
Member of Search Committees for Dean of Engineering, 2015-2016, 2009-2010.
Associate Director for Water Resources, Institute for Energy and the Environment, NMSU, 2008-2009.
Director of Agricultural Engineering Program, NMSU, 1992-2000.
Member of NMSU Water Resources Research Cluster, 2005-2021.
Chairman of the International Programs Coordinating Committee (IPCC), NMSU, 1992-1994.
Chairman of IPCC Faculty Implementation Subcommittee, NMSU, 1992-1994.
Member of Search Committees for Surveying Engineering Dept. Head, 1990, 2001.
Member of Search Committee for Director of New Mexico Water Resources Research Institute, 1999.
Member of Curriculum and Accreditation Committee, Department of CAGE, 1992-1996.
Member of President's Internal Review Committee for Center for International Programs, 1993-1994.

Professional Activities:

National/New Mexico Society of Professional Engineers Member, 1990-1996, 2015-2016; Southwest New Mexico Chapter President, 1994-1995; Vice President, 1993-1994; Secretary/Treasurer, 1992-1993; Scholarship Committee Chair, 1993-1995. Education Committee, 2015-2017.
American Association for the Advancement of Science, Science & Technology Policy Fellow, 2009-2010.
American Association for the Advancement of Science Member, 2009-present.
American Evaluation Association Member, 2009-2013.
American Society of Civil Engineers Member, 1990-present; Reviewer for Journal of Irrigation and Drainage Engineering, 1990-present. Chair, Subcommittee on New Mexico's Infrastructure Report Card, Flood Control, 2011. Ethics, HEC RAS Sediment and GeoHMS Seminar organizer and presenter, Regional Meeting, 2010.
American Society of Agricultural and Biosystems Engineers Member, 1988-1995; President of New Mexico Chapter, 1992; Vice President, 1991; Treasurer, 1990. Faculty Advisor to NMSU Student Chapter, 1990-93; Journal Reviewer, 1992-2000.
Member of **Chi Epsilon** and **Alpha Epsilon** honor societies; President of AE Nu Chapter, 1989.
Soil and Water Conservation Society member, 1993-1995.

Publications:

Dunbar, N.W., D.S. Gutzler, K. S. Pearthree, F. M. Phillips, P.W. Bauer, eds. C. D. Allen, D, DuBois, M.D. Harvey, J.P. King, L.D. McFadden, B.M. Thomson, A. C. Tillery, 2022. **Climate Change in New Mexico Over the Next 50 Years: Impacts on Water Resources**. NM Bureau of Geology and Mineral resources Bulletin 164.

Fuchs, E. H., King, J. P., & Carroll, K. C., 2019. **Quantifying disconnection of groundwater from managed-ephemeral surface water during drought and conjunctive agricultural use**. Water Resources Research, 55. https://doi.org/10.1029/2019WR024941

Fuchs, E.H., K.C. Carroll & J.P. King (2018). **Quantifying Groundwater Resilience through Conjunctive Use in a Constrained Aquifer System for Irrigated Agriculture.** Journal of Hydrology 565, 747-759.

Zamani Sabzi, H., King, J. P., and Abudu, S., 2017. **Developing an Intelligent Expert System for Streamflow Prediction, integrated in a Dynamic Decision Support System for Managing Multiple Reservoirs: A Case Study.** Journal of Expert Systems with Applications, 83, pp 145-163.

Zamani Sabzi, H., King, J. P., Gard, C. C., and Abudu, S., 2016. **Statistical and Analytical Comparison of Fuzzy Multi-Criteria Decision-Making Techniques**. Journal of Operations Research Perspectives, 3, pp 92-117.

Zamani Sabzi, H., Humberson, D., Abudu, S., & King, J. P. (2016). **Optimization of Adaptive Fuzzy Logic Controller Using Novel Combined Evolutionary Algorithms, and its application in Diez Lagos Flood Controlling System, Southern New Mexico.** *Expert Systems with Applications*. Vol 43, January.

Abudu, S., C.L. Cui, M. Saydi, and J. P. King, 2012. **Application of snowmelt runoff model (SRM) in mountainous watersheds: A review.** Water Science and Engineering, Hohai University, Nanjing, P.R. China, Vol. 5, No. 2, June.

Abudu, S., King, J. P. and Sheng, Z., 2012. **Comparison of the Performance of Statistical Models in Forecasting Monthly Total Dissolved Solids in the Rio Grande,** Journal of the American Water Resources Association, vol. 48, no. 1, February.

Sheng, Z., Li, J, King, J.P. and Miller, W. 2011. **Development of Groundwater Resources**, in Aral M.M. and Taylor S.W. eds. Groundwater Management Manual, ASCE: pp. 203-294.

Abudu, S., Cevik, S. Y., Bawazir, A., King, J. P. and Cui C., 2011. **Vitality of Ancient Karez Systems in Arid Lands: A Case Study in Turpan Region of China,** accepted to Journal of Water History.

Kambhammettu, BVN. P., Chandramouli, S., and King, J.P. 2011. **An improved DEM aggregation technique for models with non-uniform resolution.** International Journal of Geomatics and Geosciences, Vol. 1, No. 4, 962-970.

Kambhammettu, BVN. P., King, J.P., and Allena, P. 2011. **Evaluation of mountain front recharge estimates for Southern New Mexico Basins.** International Journal of Water Resources and Environmental Engineering, Vol. 3(3), pp. 66-72, March.

Kambhammettu, BVN. P., Schmid, W., King, J.P., and Creel, B.J. 2011. **Effect of elevation resolution on evapotranspiration simulations using MODFLOW**. Ground Water Journal. doi: 10.1111/j.1745-6584.2011.00852.x.

Kambhammettu, BVN. P., Allena P., and King, J.P. (2011). **Application and evaluation of universal kriging for optimal contouring of groundwater levels**. Journal of Earth System Science (In print, to appear in April 2011 issue).

Abudu, S., Cui, C., King, J. P, Moreno, J., and Bawazir, A., 2011. **Modeling of Daily Pan Evaporation Using Partial Least Squares Regression**, Science in China. Series E, Technological sciences, 54, 163-174.

Abudu, S., King, J., and Bawazir, A., 2011. **Forecasting Monthly Streamflow of Spring-Summer Runoff Season in Rio Grande Headwaters Basin Using Stochastic Hybrid Modeling Approach.** J. Hydrol. Eng., 10.1061/(ASCE)HE.1943-5584.0000322, 384-390.

Abudu, S., Cui, C., King J. P. and Abudukadeer, K., 2010. **Comparison of the Performance of Statistical Models in Forecasting Monthly Streamflow in the Kizil River, China,** Water Science and Engineering, 2010, 3(3), 269-281.

Moreno, J., Abudu, S., Bawazir, A., and King, J. P., 2010. **Comment on 'Kisi O. Daily pan evaporation modeling using multi-layer perceptrons and radial basis neural networks. Hydrological Processes 23, 213–223,** Published online on 28 JUN 2010 in Wiley InterScience (www.interscience.wiley.com) DOI: 10.1002/hyp.7713

Abudu, S., King, J. P., and Pagano, T., 2010. **Application of Partial Least Squares Regression in Seasonal Streamflow Forecasting**, Journal of Hydrologic Engineering, 15(8), 612-623.

Abudu, S., Bawazir, A. and King, J. P., 2010. **Infilling Missing Daily Evapotranspiration Data Using Neural Networks**, Journal of Irrigation and Drainage Engineering, 136(5), 317-325.

Kambhammettu, B.V.N.P., Allena, Praveena, and King, J.P., 2010. **Simulation of groundwater flow in the southern Jornada del Muerto Basin, Doña Ana County, New Mexico**. Prepared in cooperation with the Lower Rio Grande Water Users Association (LRGWUO): N. M. Water Resources Research Institute, New Mexico State University, Technical Completion Report 352, 63 p.

Fernald, A.G., S.Y. Cevik, C.G. Ochoa, V.C. Tidwell, J.P. King, S.J. Guldan, 2010. **River Hydrograph Retransmission Functions of Irrigated Valley Surface-Groundwater Interactions.** Journal of Irrigation and Drainage Engineering, ASCE, vol. 136, issue 12, pages 823-835. December.

Schmid, W., King, J.P. and Maddock, T. III, 2009. **Conjunctive surface-water/groundwater model in the southern Rincon Valley using MODFLOW-2005 with the Farm Process**. Prepared for the Elephant Butte Irrigation district: N. M. Water Resources Research Institute, New Mexico State University, Technical Completion Report 350, 53 p.

King, J.P., Hawley, J.W., Hernandez, J.W., Kennedy, J.F., and Martinez, E.L., 2006. **Study of potential water salvage on the Tucumcari Project, Arch Hurley Conservancy District: Phase I. A pre-appraisal-level study of the potential amount of water that may be saved, and the costs of alternative methods of reducing carriage losses from district canals**. NM Water Resources Research Institute, New Mexico State University, in cooperation with the Department of Civil and Geological Engineering, Technical Completion Report 335, 105 p.

Tillery , S., Z. Sheng, J.P. King, R. Creel, C. Brown, A. Michelson, A. Granados, 2006. **The Development of a Coordinated Database for Water Resources and Flow Model in the Paso del Norte Watershed.** NM WRRI Technical Completion Report No. 337. Texas WRI TR 297.

King, J. P., 2005. **Active Water Resource Management in the Lower Rio Grande: Adapting to Basin-specific Requirements.** Proceedings of the 50th Annual New Mexico Water Conference, NM Water Resources Research Institute, October.

King, J.P., 2005. **An Introduction to the Law of the Rio Grande: The New Mexico and Colorado Perspectives.** Proceedings of Continuing Legal Education Conference on the Law of the Rio Grande, Albuquerque, NM, February.

Black, J.A., J.P. King, and R.L. Oliver, 2005. **Simulation of the Emergence of the Organizational Competence: Context for Learning.** In: Competence Perspectives on Resources, Stakeholders, and Renewal, Advances in Applied Business Strategy, Vol. 9. Ron Sanchez, Aimé Heene, editors, Elsevier pub.

Black, J.A., J.P. King, and R.L. Oliver, 2005. **Leadership Style Matters: The Deployment of Leadership Skills in Developing and Organizational Context-for-Learning Capability.** In: Competence Perspectives on Learning and Dynamic Capabilities, Advances in Applied Business Strategy, Vol. 10. Aimé Heene, , Rudy Martens, Ron Sanchez editors, Elsevier pub.

Black, J. A., J. P. King, J. Howell, and R. L. Oliver, 2005. **A Dynamic System Simulation of Leader and Group Effect on Context for Learning**. Journal of the Academy of Management.

Oad, R., and J. P. King, 2005. **Irrigation Forbearance Feasibility Study in the Middle Rio Grande Conservancy District.** Peer-reviewed technical report for MRGCD and the ESA Water Acquisition and Management Committee. October.

Black, J. A., R. Oliver, J. P. King, 2004. **Effects on Development of Context-for-Learning of Position Power: Member, Participative, Balanced and Autocratic Leadership Influences.** Proceedings of the 2004 Western Academy of Management in Alyeska, Alaska.

Lower Rio Grande Water Users Organization, 2004. **Lower Rio Grande Regional Water Plan**. Prepared for the New Mexico Interstate Stream Commission.

Witcher, J., J. P. King, J. Hawley, J. Kennedy, J. H. Williams, 2004. **Sources of Salinity in the Rio Grande and Mesilla Basin Groundwater.** New Mexico Water Resources Research Institute, Las Cruces, NM.

King, J. P. and J. Maitland, 2003. **Water for River Restoration: Potential for Collaboration between Agricultural and Environmental Water Users in the Rio Grande Project Area**. World Wildlife Fund, Chihuahuan Desert Program, July.

King, J. P., A. Bawazir, 2003. **Technical Advances in Water Use Efficiency**. In: Water Resources of Lower Pecos Region, New Mexico - Science, Policy, and a Look to the Future, P. Johnson, L. Land, L. G. Price, F. Titus, eds. Decision-Makers Field Conference 2003

A. Bawazir, J. P. King, 2003. **Riparian Evapotranspiration and Vegetation Management**. In: Water Resources of Lower Pecos Region, New Mexico - Science, Policy, and a Look to the Future, P. Johnson, L. Land, L. G. Price, F. Titus, eds. Decision-Makers Field Conference 2003

Black, J. A. & King, J. P. (2001) **Leader Effects on Work Teams: The Dynamics of Charisma, Position and Expertise Power on the Context-for-Learning**, presented at Bernard Bass Festshrift. Binghamton, NY.

Black, J. A. & King, J. P. (2000) **Simulation of the Emergence of Capacity to Change: Organizational Example**, presented at the Competence 2000, Helsinki, Finland.

Ward, F. A., King, J. P., 1999. **Reducing Institutional Barriers to Water Conservation.** Water Policy 1(411-420). Elsevier, pub.

Eastman, C., King, J. P., Meadows, N., 1997. **Acequias, Small Farms, and the Good Life**. In: *Culture and Agriculture,* Vol. 19, No. 1, p. 14-23.

King, J. P., Fahmy, H. S., Wentzel, M. W., 1997. **A Genetic Algorithm Approach for River Management.** In: *Evolutionary Algorithms in Engineering Applications*, D. Dasgupta and Z. Michalewics, eds., Springer pub.

King, J. P., Ward, F. A., Fahmy, H. S., Wentzel, M. W., 1995. **Economic Optimization of River Management using Genetic Algorithms.** New Mexico Water Resources Research Institute Technical Completion Report No. 295.

King, J. P., Jones, T. L., Fahmy, H. S., Seton, J. A., 1995. **A Richards Equation Approach to the Design of ET Beds.** Transactions of ASAE, Vol. 38(4): 1025-1030.

Durnford, D. S., King, J. P. 1993. **An Experimental Study of the Processes and Particle Size Distributions of Eroded Soil.** Journal of Irrigation and Drainage, American Society of Civil Engineers, March-April.

Seton, J., J. P. King. 1993. **Developing Engineering Skills through Expressive Writing**. Presented at American Society for Engineering Education Gulf-Southwest Section, April 2, at Austin, Texas.

King, J. P., I. Broner, R. L. Croissant, C. W. Basham. 1991. **Malting Barley Water and Nutrient Management Knowledge-Based System.** Transaction of the ASAE, 4(6).

King, J. P., I. Israeli-Broner. 1990. **Inductive rule extraction for an irrigation management expert system.** Computer Applications in Agriculture, 5(2), Fall.

Oad, R., J. P. King. 1990. **Irrigation system design and management in mountainous areas**. Irrigation and Drainage Systems Journal. Kulwar Publishers, the Netherlands.

King, J. P., Israeli I., Croissant R. L., 1989. **Knowledge Extraction for a Barley Crop Management Expert System.** In: V. A. Dodd, P. M. Grace, (eds.), Refereed Proceedings of the 11th International Congress on Agricultural Engineering, 4-8 September 1989 at Dublin, Ireland. 4: 2755-2760.

King, J. P., R. Oad. 1989. **The North Poudre Irrigation Company: farmer managed irrigation in Northeastern Colorado, USA**. Journal of the International Irrigation Management Institute, December.

University Service Projects:

New Mexico Alliance for Minority Participation (NM AMP) (2015 – 2021). Director of statewide program involving 14 partner institutions to recruit and retain under-represented minorities into STEM fields. Funded by the National Science Foundation.

Reaching the Pinnacle (RTP) (2010-2011). PI on an NSF Regional Alliance for recruiting and retaining students with disabilities in Science, Technology, Mathematics, and Engineering fields. Funded by the National Science Foundation.

Nile River Basin under Extreme Conditions (2008). PI on a workshop in Addis Ababa, Ethiopia bringing scientists from the Nile Basin countries to present the state of knowledge in their countries and developing coordinated research and policy development efforts for the future. Funded by the National Science Foundation.

Bureau of Indian Affairs Water Resources Technician Training Program (1993-2010). Conducted four and six week training programs in water resources science and management to Native American Tribal hydrology technicians. Sponsored by BIA.

Cochran Program (1999-2002). Hosted professional water resources specialists from the Central Asian countries of Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan. Sponsored by the Cochran Foundation through the US Department of Agriculture Foreign Agriculture Service.

Presentations and Proceedings:

King, J.P., 2014. **Art and Architecture: Water, Drought, and Climate Change.** Presented at the Athenaeum Music and Art Library, January 30, La Jolla, CA.

King, J. P, 2013. **Overcoming obstacles for students with disabilities in STEM careers.** US News & World Report STEM Solutions 2013 convention, June 19, Austin, TX.

King, J. P. 2010. **Climate Change in the Southwestern United States.** Presented to the Paso del Norte Watershed Task Force, February 26, El Paso, Texas.

King, J. P. and R. Skaggs, 2009. **Rethinking Water Conservation.** Presented to the New Mexico State Legislature Interim Committee on Water and Natural Resources, December 2, Santa Fe, New Mexico.

King, J. P. 2009. **Flood Management in Elephant Butte Irrigation District.** Presented to the Hispanic Farm and Ranch Association, August 6, 2009.

King, J.P., 2009. **Development and Implementation of the Rio Grande Project Settlement.** Presented at *Law of the Rio Grande*, Continuing Legal Education, Santa Fe, NM, February 19.

Esslinger, G., and J. P. King, 2008. **Irrigation District Initiatives and Proposals in Response to Climate Change.** Continuing Legal Education, Albuquerque, NM, October 18.

King, J.P., 2008. **The Rio Grande Project Settlement of 2008.** Presented to the Regents of New Mexico State University, Las Cruces, New Mexico, April 10.

King, J. P., 2007. **Inland Water Desalination in the Southwestern United States.** Presented at the *Water Technology and Policy International Forum* sponsored by the PR China National Development and Reform Commission and General Electric, October 24.

King, J. P., 2007. **Water Management and Research in New Mexico's Lower Rio Grande.** Presented to the Xinjiang Water Resources and Hydropower Institute, Urumqi, Xinjiang AR, China, October 17.

King, J. P., 2007. **Water Allocation in the Lower Rio Grande.** Presented at the New Mexico chapter meeting of the American Society of Biological and Agricultural Engineers, Las Cruces, NM, April 20.

King, J.P., 2007. **Water Issues on the Rio Grande: Mi casa es su casa, pero MI AGUA ES MI AGUA!** Presented to multiple interdisciplinary classes from NMSU and University of New Mexico, Las Cruces, NM, February 23.

Magallanez, H. J.P. King, 2006. **Irrigation District Management in Elephant Butte Irrigation District.** Presented to the Xinjiang Water Resources and Hydropower Institute and Xinjiang University, Urumqi, Xinjiang AR, PR China, August 24.

King, J.P., H Magallanez, 2006. **Water Management in the Rio Grande Basin.** Presented to the Xinjiang Water Resources and Hydropower Institute and Xinjiang University, Urumqi, Xinjiang AR, PR China, August 24.

King, J.P., 2005. **Active Water Resource Management in the Lower Rio Grande: Adapting to Basin-Specific Requirements.** Presented at the 50th Annual Water Conference, New Mexico Water Resources Research Institute, Las Cruces, NM, October.

King, J.P., 2005. **The Developing Law of the Rio Grande – Colorado, New Mexico, No Man's Land, and Texas.** Presented at *Law of the Rio Grande*, Continuing Legal Education, Albuquerque, NM, January 31.

King, J. P., N. Shafike, 2003. **Groundwater and Surface Water Modeling for Water Planning.** Presented at the 2003 State Water Meeting, NM Water Resources Research Institute, November 6, Santa Ana Pueblo.

King, J.P., 2004. **The Lower Rio Grande Regional Water Plan.** Presented to the New Mexico Interstate Stream Commission on behalf of the Lower Rio Grande Water Users Organization, Las Cruces, NM, July 21.

Esslinger, G., J.P. King, S.L Hernandez, 2004. **The Water Workings of New Mexico's Lower Rio Grande Basin.** Presented to the New Mexico Blue Ribbon Task Force on Water Issues, Santa FE, NM, April 28.

King, J. P., 2003. **Drought conditions and water supply in Elephant Butte Irrigation District.** Presented to the Chile Task Force, March 12, NMSU.

King, J. P., 2003. **Drought conditions and water supply in Elephant Butte Irrigation District.** Presented at the ASAE State Meeting, March 14, Elephant Butte Dam.

King, J. P., 2003. **Sistemas de Riego y Uso Eficiente del Agua en el programa de Conservacion de EBID.** Presented to the Border Environmental Cooperation Consortium, Cuidad Juarez, Mexico, September 29.

King, J. P., 2003. **EPSCOR Needs in Hydrology Infrastructure.** Presented to the New Mexico Interim Legislative Committee on Water and Natural Resources, Elephant Butte, NM, September 19.

King, J. P., 2003. **Lower Rio Grande Regional Water Plan**. Presented to the Interstate Stream Commission, Santa Fe, November 28.

King, J.P. 2002: **Current Technology related to Drought and Irrigation**, invited presentation at the New Mexico Water Resources Research Institute's Annual Water Meeting, Ruidoso, NM, October 10.

King, J.P., 2002. **Agricultural Drainage**, invited presentation at the Effects of Soil and Water Salinity in Crop Production Workshop, Texas A&M Agricultural Experiment Station, El Paso, Texas September 4..

King, J.P., 2002. **Agricultural – Municipal Water Transfers in Elephant Butte Irrigation District**, presented to the American Water Works Association, Tri-State Chapter, Anthony, New Mexico, July 11.

King, J.P., 2002. **Agricultural Drainage**, invited presentation at the 2002 Improving Irrigation Efficiency in Agriculture Conference, Las Cruces, New Mexico, March 21.

King, J.P., 2001: **Water and Information Management in Elephant Butte Irrigation District**, presented to the Texas-New Mexico Water Commission Management Advisory Committee, Las Cruces, New Mexico, November 11.

King, J.P., 2001: **Agricultural Water Conservation**, invited presentation at Water Conservation and Planning: Dollars and Sense Public Forum, League of Women Voters, Las Cruces, New Mexico, September 19.

5 Mar 2001: **EBID Water Conservation Plan**, presented at the American Society of Agricultural Engineers State Meeting, Las Cruces, New Mexico.

19 Oct 1999: **Water Issues in the Elephant Butte Irrigation District Area**, presented to the Water and Natural Resources Committee of the New Mexico Legislature, Albuquerque, New Mexico.

26 Mar 1996: **Pump/Well Efficiency Measurement**, presented at the Clovis Growers Day, New Mexico Cooperative Extension Service.

15 May 1995: **Appropriate Irrigation Technology in the American Southwest,** presented at the United Nation's Symposium on Arid Land and Water Management, Jerusalem, Israel.

8 Jan 1995: **Irrigation Potential and Planning in Panamá's Middle Provinces,** presented at Primer Encuentro Nacional de Riego, Los Santos, Panamá.

22 Jun 1994: **Unsaturated Flow Through a Textural Interface,** Presented at the 1994 International Summer Meeting of the ASAE, Kansas City, Missouri.

20 Jun 1994: **Pipe Network Pumping Strategy Optimization by Genetic Algorithm,** Presented at the 1994 International Summer Meeting of the ASAE, Kansas City, Missouri (with Mark Wentzel).

20 Jun 1994: **Economic Optimization of River Management Using Genetic Algorithms,** Presented at the 1994 International Summer Meeting of the ASAE, Kansas City, Missouri (with Hazem Fahmy).

12 Mar 1993: **GPS Applications in Agricultural Engineering**, Presented at the State Meeting of the ASAE, Las Cruces, NM. Also served as chair for the conference.

2 Apr 1993: **Developing Engineering Skills through Expressive Writing**. Presented at American Society for Engineering Education Gulf-Southwest Section, at Austin, Texas. 2nd conference paper award.

23 Apr 1993: **Abandoned Well inventory in Doña Ana County**, Presented at the State Meeting of ASCE, Las Cruces, NM. Invited paper.

3 Nov 1992: **Irrigation on New Mexico's Acequias** , Fifth National Irrigation Symposium, Irrigation Association of America, New Orleans.

25 Jun 1992: **Writing in Engineering at New Mexico State University,** Presented at A Conference on Writing in Engineering Design, Michigan Technological University, Houghton, MI (with Julie Seton).

2 Mar 1992: **Arid Land Agriculture in Northwestern China**, Presented at the State Meeting of the ASAE, Albuquerque, NM. Invited paper.

30 Oct 1990: **Uncertainty in a Malting barley Management Expert System.** Presented at Visions of the Future: Third National Irrigation Symposium, ASAE/Irrigation Association, Phoenix.

University Research Projects:

Transboundary Aquifer Assessment (2008-2011). New Mexico PI on a collaborative project with Texas Water Research Center, US Geological Survey, and Mexican agencies aimed at characterizing the Mesilla Aquifer system shared by the US and Mexico. Funded by USGS.

E. Coli Occurrence, Sources, and Mitigation in the Rio Grande (2007-2012). PI on a project funded by the US Environmental Protection Agency through the New Mexico Department of Agriculture to characterize sources and movement of E. coli in southern New Mexico's the Rio Grande, and to develop best management practices for control of the bacteria.

Conceptual Model Development of the Rio Grande Project (2004-2011). PI on a project aimed at developing a Riverware-based model of the Rio Grande between Caballo Dam and El Paso, Texas. Funded by the Army Corps of Engineers.

Dam Safety Research Center (2008-2011). PI on a project funded by the New Mexico legislature to perform breach analyses, inundation mapping, and development of emergency action plans in the state.

Water Quality Forecasting for the Rio Grande at El Paso (2007-2009). Co-PI on a project to determine the feasibility of membrane treatment of Rio Grande water during winter months for municipal supply in El Paso, Texas. Developed ARIMA, neural network, and transfer noise function model s to forecast total dissolved solids of raw water. Funded by AWWARF through Texas A&M University.

Watershed Restoration Action Strategy for the Lower Rio Grande (2006-2007). PI on a project aimed at developing a plan for mitigating E. coli contamination of the Lower Rio Grande. Funded by the Environmental Protection Agency through the New Mexico Environment Department.

Alcalde Surface Water – Groundwater Interaction Study (2005-2009). Co-PI on a project examining the interaction of surface water and groundwater along the Rio Grande and the effects of irrigation on hydrologic processes in northern New Mexico.

Seepage Analysis in the Arch-Hurley Conservation District (2004-2005). PI on a project to evaluate canal lining as a water conservation measure in the area of Tucumcari, New Mexico. Funded by the Bureau of Reclamation through the New Mexico Water Resources Research Institute.

Canal Seepage Losses in the Rio Grande Project (2002-2005). Co-PI on a project to quantify and model seepage from unlined canals in Elephant Butte Irrigation District, New Mexico, and El Paso County Water Improvement District No. 1, Texas. Funded by the Texas Water Research Institute.

Doña Ana County Evapotranspiration Evaluation (2001-1004). PI on project to determine agricultural depletions in Doña Ana County, New Mexico. Funded by EPA and administered by NM Water Resources Research Institute.

Riparian Evapotranspiration Measurement in Middle Rio Grande Area (1998-Present). PI and Co-PI on projects to measure evapotranspiration from salt cedar, cottonwood, and Russian olive using eddy covariance and other methods. Goal is to develop coefficients for estimating consumptive use using Penman equation. Funded by Bureau of Reclamation and administered by NM Water Resources Research Institute.

Salinity Sources and Movement in the Rio Grande Project (1999-2002). PI on a project to identify sources and destinations of overall salt load and of specific ions in the Rio Grande Project area of New Mexico. Funded by the New Mexico Interstate Stream Commission and the Southwest Center for Environmental Research and Policy (SCERP).

Economic Impact of Severe and Sustained Droughts on the Rio Grande Basin (1996-2000). Investigator on a project to evaluate drought effects on the Rio Grande Basin under current institutional constraints and under various scenarios of water marketing. Specific responsibilities include development of an integrated hydrologic, economic, and institutional model of the basin, and statistical evaluation and modeling of the region's droughts. Multi-state project funded by USGS and administered by NM Water Resources Research Institute.

Groundwater Impacts of NMSU Landfill (1997). Evaluated groundwater quality monitoring and geohydrologic data to assess and defend NMSU's compliance with state environmental regulations at the closed landfill on main campus. Funded by NMSU.

Spaceport EIS Groundwater Study (1996-1998). Assessed impacts of planned Spaceport activities on groundwater resources in Sierra, Otero, Luna, Chaves, and Doña Ana Counties, New Mexico for the project's Environmental Impact Statement. Work included water use assessments, MODFLOW modeling of the northern Jornada aquifer, and evaluation of existing water quality. Subcontractor to Physical Sciences Laboratory.

Optimization of Multi-use Water Resource Systems using Genetic Algorithms (1993-1995). Directed research on optimization of multi-use water system models using genetic algorithms. Funded by the New Mexico Water Resources Research Institute.

Irrigation Development Project, Panamá (1994-1995). Worked with the Ministry of Agriculture in Panamá to develop irrigation capacity and water management infrastructure. Project includes training, design, and construction components. Funded by NMSU and the Panamanian Ministry of Agriculture.

Consumptive Use of Water by Crops in the Middle Rio Grande Project (1994). Developed crop coefficients for calculating evapotranspiration for consumptive use estimates and water rights determination. Funded by the US Bureau of Reclamation.

New Mexico Water Conservation Study (1993-1995). PI on survey of water conservation policies and water price structuring as part of a multi-state effort. Funded by the New Mexico Water Resources Research Institute and the American Water Works Association.

Doña Ana County Water Plan/Wellhead Protection (1992-1994). PI on a project to develop a regional water plan for Doña Ana County, New Mexico, to be included in the State Water Plan. Funded by the New Mexico Interstate Stream Commission.

Water Use on New Mexico's Acequias (1992-1994). Co-PI on a project to study production value as well as socio-cultural value of irrigation water on small traditional irrigation systems in New Mexico. Funded by USDA-Cooperative Research Service.

Unsaturated Flow through Textural Interfaces in Engineered (Capillary) Barriers (1992-1993). PI on research project that developed a finite difference model to evaluate cover designs for hazardous waste isolation systems. Funded by the Department of Energy.

Developing Criteria for Small On-site Sewage Treatment Systems: Two Case Studies (1991-1992). Acted as PI on a project to improve design procedures for small rural sewage treatment works. Evaluated two failed on-site sewage systems to identify causes of failure and improve design criteria to avoid future failures. Funded by the Chino Mines Corporation.

China - USA Arid Land Agriculture Collaborative Research (June-July 1991). Served as Civil/Agricultural Engineer on an interdisciplinary study of arid land agriculture in China's Gansu Province and Xinjiang Autonomous Region. Funded by USDA-OICD.

Optimization of Pumping Strategies for Municipal Supplies (1990). Performed dynamic modeling analysis of pumped water systems to schedule off-peak power usage. Funded by New Mexico Department of Energy, Minerals, and Natural Resources.

Artificial Intelligence Applications in Irrigation Management (1988-1989). Developed an expert system for advising barley growers on irrigation and fertilizer management strategies. Wrote all project reports. Funded by the Colorado Institute for Artificial Intelligence.

Water-induced Erosion Processes and Modeling (1986-1988). Performed rainfall simulator experiments and sediment size analyses to identify and characterize erosion processes, and produced all project reports. Funded by the National Science Foundation.

Consulting Work:

Elephant Butte Irrigation District, New Mexico, 1995-Present: Technical expert in negotiation on water management issues; projects include water rights adjudication, and court-ordered mediation concerning development of an operating agreement among EBID, El Paso County Water Improvement District No. 1, and the U.S. Bureau of Reclamation

Elephant Butte Irrigation District, New Mexico, 1992-Present: Working with Elephant Butte Irrigation District's engineering and hydrology sections to maintain flow measurement stations, install new measurement stations, develop an internal water quality monitoring program, develop operating procedures, build and maintain hydraulic structures, and evaluate contract bids and designs. Produced District's Climate Change Plan, Water Plan and Drought Plan.

Underwood Engineering, Las Cruces, NM, 2006-2023: Performed hydraulic and hydrologic analysis to produce FEMA Letter of Map Revision applications for subdivisions in Las Cruces.

Middle Rio Grande Conservancy District, Albuquerque, New Mexico, 2004-2005: Performed hydrologic analysis to quantify amount of water made available for endangered species management through irrigation forbearance. Produced final report and presentation to MRGCD.

World Wildlife Fund, Las Cruces, New Mexico, 2001-2002: Conducted study to identify sources of water for river restoration efforts in the Rio Grande Project area of New Mexico and Texas. Produced final report to WWF.

Attorney General, New Mexico, 2003-2006. Provide expert services and modeling for issues relating to potential litigation between New Mexico and Texas regarding the Rio Grande Project.

Bureau of Indian Affairs, Office of Trust Responsibilities, Washington, D.C., 2000-2001: Evaluated geohydrology studies of Fence Lake Coal Mine for potential impacts on Zuni Salt Lake; carried out geochemical and data analyses; produced final report of findings to BIA.

L. M. Stoller Corp., New Mexico, 1996, 2001-2002. Provided expert analysis of flooding frequency, magnitude, and stage through the town of Carlsbad, NM, for a successful appeal of the flood zoning in the Flood Insurance Rate Maps developed by FEMA. Analysis included HEC 1 and HEC 2 model implementation.

Jicarilla Apache Nation, New Mexico, 1998-2000. Developed irrigation alternatives for Nation as part of a water planning study by the Jicarilla Apache Nation Natural Resources Department, including evaluation of previous planning and existing sprinkler and surface irrigation facilities, preliminary design, cost estimation, and consumptive use determination, and training of Tribal Council on their Water Code. Funded by the Administration for Native Americans.

Training on Erosion and Sediment Dynamics in New Mexico (1997). Trained personnel from New Mexico's Surface Water Bureau on quantitative methods in assessing erosion and sediment movement, focusing particularly on the Rio Grande and its watersheds. Worked as subcontractor for Tetra Tech, Inc.

Confederated Tribes of the Chehalis River, Washington, 1994-1995: Worked with Tribal Natural Resources Department to implement a groundwater monitoring program aimed at developing a computer model for risk assessment and management of the groundwater supply.

Contel Communications, Inc., Texas, 1993. Performed Global Positioning System (GPS) surveys of three sites for cellular telephone communications towers in the El Paso, Texas area.

Elephant Butte Irrigation District, New Mexico, 1993: Trained ditch riders and hydrology section personnel on basic hydraulics, flow measurement, water accounting, and remedial math.

El Paso County Water Improvement District #1, Texas, 1993: Trained ditch riders and hydrology section personnel on basic hydraulics, flow measurement, water accounting, and remedial math.

Tetra Tech, Inc., Reston, Virginia, 1991-1992: Compiled and reviewed literature relating to sediment delivery estimation methods and nonpoint-source pollution control for inclusion in EPA document *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters,* produced under the Coastal Zone Act of 1990.

Engineering Projects in Peace Corps, Malawi, Africa:

Soil Conservation and Sediment Control, Ngabu (now Shire Valley) Agricultural Development Division, 1983-1985. Designed erosion control structures and sediment control practices for agricultural and range lands in Chikwawa and Nsanje Districts.

Bvumbwe Irrigation Scheme, Tyolo District, 1985: Carried out engineering analysis for installation of a Netafim drip irrigation system for 10 hectares of coffee and macadamia trees on an agricultural research station.

Kasinthula Irrigation Scheme, Chikwawa District, 1984-1985: Installed irrigation systems for research station, including surface and sprinkler systems, and subsurface drainage for upland crops and rice.

Muona Irrigation Scheme, Nsanje District, 1983-1984: Designed and supervised rehabilitation project on a gravity-fed small-holder rice irrigation scheme.

Nkhate Irrigation Scheme, Chikwawa District, 1983-1984: Evaluated gravity rice irrigation scheme built by Taiwanese foreign aid agency prior to handing over to the Government of Malawi. Designed modifications for sediment ejection, hydraulic control and flow measurement, and energy dissipation.