

March 31, 2016

I. PERSONAL DATA

Name: David S. Brookshire

Title: Distinguished Professor (Emeritus), Research Professor, Department of Economics and Director of the Science Impact Laboratory for Policy and Economics (SILPE)

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II. EDUCATION

B.A. Economics, California State University at San Diego, 1970 (with distinction).

Ph.D. Economics, University of New Mexico, 1976 (recognized in 2010 as UNM Economics Department Distinguished Alumni).

III. PROFESSIONAL EXPERIENCE

Research/Administrative Assistant, Southern California First National Bank, San Diego, CA, 1970.

Economist, National Water Commission, Arlington, VA, 1971-1972.

Economist, Environmental Studies Staff, Bureau of Economic Analysis, Department of Commerce, Washington, D.C., 1972-1973.

Economist, Office of the Director, United States Geological Survey, Reston, VA, 1983-1984 (Sabbatical leave).

Professor of Economics, University of Wyoming, Laramie, WY, 1976-1990.

Visiting Professor of Economics, University of New Mexico, Albuquerque, NM, 1989-1990.

Professor of Economics, University of New Mexico, Albuquerque, NM, 1990-2012

Chair, Department of Economics, University of New Mexico, Albuquerque, NM, 1993-2000.

Director of Science Impact Laboratory for Policy and Economics (SILPE), 2004- present.

Distinguished Professor, University of New Mexico, Albuquerque, NM, 2012 to 2014 (Emeritus effective 7/1/2014).

Research Professor, University of New Mexico; 2014 to present

IV. JOURNAL EDITORSHIPS

Associate Editor, *Intermountain Economic Review*, 1975-1976.

Associate Editor, *Water Resources Research*, 1985-1987.

Policy Sciences Editor, *Water Resources Research*, 1988-1993.

Special Section Organizer and Editor, *Water Resources Research*, 1987, 1992, 2004.

V. PARTICIPATION IN PROFESSIONAL ORGANIZATIONS

Member, Board of Directors, Association of Environmental and Resource Economists, 1985-1988.

University Delegate, University of Wyoming, Universities Council on Water Resources, 1988-1990.

Member, Policy Sciences Committee, Hydrology Section, American Geophysical Union, 1988-1993.

Member, Steering Committee, Institute for Water Law and Policy, University of Wyoming, 1989-1990.

Program Reviewer for National Science Foundation, 1996.

Program Reviewer for Environmental Protection Agency, Integrated Assessment of the Positive and Negative Consequences on the United States of Climate Change and Climate Variability, 1999.

University Delegate—Universities Council on Water Resources, 2005- 2008.

VI. RESEARCH APPOINTMENTS IN SCIENTIFIC/COMMUNITY ORGANIZATIONS

Member, Panel on Ground Subsidence, National Research Council, Washington, D.C., 1985-1987 and 2012.

Member, Committee on Ground Failure Hazards, National Research Council, Washington D.C., 1986-1988.

Member, Advisory Committee, The Earthquake Insurance Project, Institute of Behavioral Science, University of Colorado, Boulder, sponsored by the National Science Foundation, 1988-1989.

Member, Project Work Group, National Institute of Building Sciences, Washington D.C., 1992-2005.

Member, S.W. Region Climate Assessment Team, Tucson, Arizona, 1998-2000.

Co-Chair, Economic Analysis Forum, Western Governors Association, 1999-2001.

Executive Committee, NSF Science and Technology Center, University of Arizona, entitled “Sustainability in semi-Arid Hydrology Riparian Areas” (SAHRA), 2000-2010.

Member, Committee on the Economic Benefits of Improved Seismic Monitoring, Committee on Seismology and Geodynamics, Board on Earth Sciences and Resources, Division on Earth and Life Studies, National Research Council, of the National Academy, 2003-2005.

Member of Independent Project Review Team for “Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings from Mitigation Activities, Multihazard Mitigation Council, National Institute of Building Sciences, Wash. D.C., 2005.

Member, Committee on FEMA Flood Maps: Accuracy Assessment and Cost-Effectiveness Improvements, Board on Earth Sciences and Resources, National Research Council, Washington D.C. 2007-2009.

Member, Consumer Advisory Board, Albuquerque Bernalillo County Water Utility Authority, 2012 to present.

VII. BOOKS, MONOGRAPHS AND EDITED VOLUMES

Societal Value of Geologic Maps, U.S. Geological Survey Circular 1111, U.S. Department of Interior, (1983), (with R. Bernknopf, D. Soller, M. McKee, J. Sutter, J. Matti, and R. Campbell).

- Republished - *Societal Value of Geologic Maps: Japanese Translation of USGS Circular 111 and Review of Studies on The Economic Evaluation of Geologic maps in the United States*, by Masatsugu Ogasawara and Kenta Ooi (Editors, March 2006, Geological Survey of Japan, AIST, (with

R. Bernknopf et al.).

Valuing Environmental Goods: An Assessment of the Contingent Valuation Method, Totowa: Rowman & Allanheld, Publishers, (1986), (with R. Cummings and W. Schulze).

Measuring Recreation Benefits: Conceptual and Empirical Issues, eds. D. Brookshire and V. K. Smith, Vol. 23, No. 5 (1987), *Water Resources Research*.

Mitigating Losses From Land Subsidence in the United States, Committee on Ground Failure Hazards Mitigation Research, Panel on Land Subsidence (National Academy Press, Washington D.C.), (1991), (contributing author).

Problems and Issues in the Validity of Benefit Transfer Methodologies, eds. D. Brookshire and H. Neill, Vol. 28, No. 3 (1992), *Water Resources Research*.

Developing Countries Water Issues, eds. D. Brookshire and D. Whittington, Vol. 29, No. 7 (1993), *Water Resources Research*.

Journal of Environment Economics and Management, 25th Silver Anniversary Issue, Special Editor, Vol. 39, (2000).

The Role of Geosciences Information in Reducing Catastrophic Loss Using a Web-based Economics Experiment, U.S. Geological Survey Professional Paper 1683, 2003, (with R.L. Bernknopf, P.T. Ganderton).

Water Markets and Banking: Institutional Evolution and Empirical Perspectives, Vol. 40, No. 9, (2004), *Water Resources Research*, (with Phil Ganderton).

Improved Seismic Monitoring and Improved Decision-Making: Assessing the Value of Reduced Uncertainty, Committee on the Economic Benefits of Improved Seismic Monitoring, Research Council of the National Academies Press, Washington D. C., 2006 (with C. Poland et al., contributing author).

Mapping the Zone: Improving Flood Map Accuracy; Committee on FEMA Flood Maps, Board on Earth Sciences and Resources/Mapping Science Committee, Water Science Technology Board, National Research Council, (2009), contributing author.

Ecosystem Good And Service Co-Effects Of Terrestrial Carbon Sequestration: Implications for the U.S. Geological Survey's Landcarbon Methodology, with J. Boyd, May 2011, SSRN http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1847750, Resources for the Future (RFF DP11-22).

Water Policy in New Mexico: Addressing the Challenges of an Uncertain Future, eds. David. S. Brookshire, Hoshin Gupta, Paul Matthews, Resources for the Future Press, January 2012. Co-authored the following chapters:

- a. Chapter 1 - "Introduction", D. Brookshire, H. Gupta, P. Matthews.
- b. Chapter 2 – "Modeling: A Basis for Linking Policy to Adaptive Management", H. Gupta, D. Brookshire, V. Tidwell, and D. Boyle.
- c. Chapter 9 – "Water Markets in New Mexico", (C. Broadbent, D. Brookshire, D. Coursey, P. Ganderton and V. Tidwell).
- d. Chapter 12 – "Impacts of Endangered Species Protection on Water management, Allocation and Use in New Mexico: Lessons Learned and Uncertainties about the Future", L. Genova, R. Unsworth, and D. Brookshire.
- e. Chapter 14 – "Conclusion: Issues for the Future", D. Brookshire, P. Matthews, and H. Gupta

Societal Benefits: Methods and Examples for Estimating the Value of Remote Sensing Information, in S. Morain, M. Renslow, and A. Budge, ed., *Manual of Remote Sensing* 4th edition, American Society for Photogrammetry and Remote Sensing, Bethesda, Maryland, in press, Chapter 10, (Bernknopf, R, D. Brookshire, M. Macauley, G. Jakeman, Y. Kuwayama, H. Miller, L. Richardson, and A. Smart).

VIII. JOURNAL PUBLICATIONS

Interstate Trade and Regional Income, *Intermountain Economic Review*, Vol. 6, No. 1 (1975): 40-52, (with R. Whitworth).

The Valuation of Aesthetic Preferences, *Journal of Environmental Economics and Management*, Vol. 3, No. 4 (1976): 325-346, (with B. Ives and W. Schulze).

- Re-Published in The Stated Preference Approach to Environmental Valuation, Volume I, Foundations, Initial Development, Statistical Approaches, Editor, Richard Carson

A Macroeconomic Analysis of Regional Environmental Modeling and Planning, *Journal of Environmental Economics and Management*, Vol. 5, No. 3 (1978): 268-282.

Contingent Claims Mechanisms for Revelation of Willingness to Pay for Public Goods, ed. G. Tullock, *Public Choice In New Orleans*, (1980): 75-89, (with L. Eubanks).

An Experiment on the Economic Value of Visibility, *Journal of Environmental Economics and Management*, Vol. 7, No. 1 (1980): 1-19, (with R. d'Arge and R. Rowe).

Adjustment Issues of Impacted Communities or Are Boomtowns Bad? *Natural Resources Journal*, Vol. 20, No. 3 (1980): 523-546, (with R. d'Arge).

Valuing Increments and Decrements in Natural Resource Service Flows, *American Journal of Agricultural Economics*, Vol. 63, No. 3 (1980): 478-488, (with A. Randall and J. Stoll).

The Advantages of Contingent Valuation Methods for Benefit-Cost Analysis, *Public Choice*, Vol. 36, No. 2 (1981): 235-252, (with T. Crocker).

Valuing Environmental Commodities: Some Recent Experiments, *Land Economics*, Vol. 57, No. 2 (1981): 151-172, (with R. d'Arge and W. Schulze).

- Re-Published in The Stated Preference Approach to Environmental Valuation, Volume I, Foundations, Initial Development, Statistical Approaches, Editor, Richard Carson.

Recreation in the Lake Powell Area: Alternatives for Preservation and Development, *Southwestern Review of Management and Economics*, Vol. 1, No. 1 (1981): 1-18, (with S. Ben-David, D. Rosenbaum, and W. Schulze).

The Social Rate of Discount for Nuclear Waste Storage: Economics or Ethics? *Natural Resources Journal*, Vol. 21, No. 4 (1981): 811-832, (with T. Sandler and W. Schulze).

Valuing Public Goods: A Comparison of the Survey and Hedonic Approaches, *American Economic Review*, Vol. 72, No. 1 (1982): 165-177, (with R. d'Arge, W. Schulze, and M. Thayer).

- Re-Published in The Stated Preference Approach to Environmental Valuation, Volume I, Foundations, Initial Development, Statistical Approaches, Editor, Richard Carson

Carbon Dioxide and Intergenerational Choice, *American Economic Association Papers and Proceedings*, Vol. 72, No. 2 (1982): 251-256, (with R. d'Arge and W. Schulze).

The Economic Benefits of Preserving Visibility in the National Parklands of the Southwest, *Natural Resources Journal*, Vol. 23, No. 1 (1983): 149-173, (with W. Schulze, et al.).

Estimating Option Prices and Existence Values for Wildlife Resources, *Land Economics*, Vol. 59, No. 1 (1983): 1-15, (with L. Eubanks and A. Randall).

Contingent Valuation Surveys for Evaluation of Environmental Assets, *Natural Resources Journal*, Vol. 23, No. 3 (1983): 635-648, (with J. Hoehn and A. Randall).

Economics and the Determination of Indian Reserved Water Rights, *Natural Resources Journal*, Vol. 23, No. 4 (1983): 749-765, (with J. Merrill and G. Watts).

A Test of the Expected Utility Model: Evidence from Earthquake Risks, *Journal of Political Economy*, Vol. 93, No. 2 (1985): 369-389, (with W. Schulze, M. Thayer, and J. Tschirhart).

- Re-published in *Environmental Valuation*, pp. 81-101, ed. K. G. Willis, K. Button, P. Nijkamp (no. 3 in EAEP series), Edward Elgar Publishing Limited, (1999).

- Re-published in The International Library of Critical Writings in Economics: *The Economics of Natural Hazards*, Eds. H. Kunreuther and A. Rose Edward Elgar Publishing Ltd, Vol. 1, Elgar Reference Collection, pp. 120-140, (2004).
- Republished in *Classics in Risk Management*, Eds. W. K. Viscusi and T. Gayer, Edward Elgar Publishing Ltd, (2004).

Current Issues in the Quantification of Federal Reserved Water Rights, *Water Resources Research*, Vol. 21, No. 11 (1985): 1777-1784, (with J. Merrill and G. Watts).

Measuring the Elasticity of Substitution of Wages for Municipal Infrastructure: A Comparison of the Survey and Wage Hedonic Approaches, *Journal of Environmental Economics and Management*, Vol. 13, No. 3 (1986): 269-276, (with R. Cummings, S. Gerking, and W. Schulze).

Existence Values and Normative Economics: Implications for Valuing Water Resources, *Water Resources Research*, Vol. 22, No. 11 (1986): 1509-1518, (with L. Eubanks and C. Sorg).

The External Validity of Experimental Economics Techniques: Analysis of Demand Behavior, *Economic Inquiry*, Vol. 25, No. 2 (1987): 239-250, (with D. Coursey and W. Schulze).

Benefits and Costs of Earthquake Resistant Buildings, *Southern Economic Journal*, Vol. 53, No. 4 (1987): 934-951, (with R. Hageman, W. Schulze, and J. Tschirhart).

Measuring Recreation Benefits: Conceptual and Empirical Issues, *Water Resources Research*, Vol. 23, No. 5 (1987): 931-935, (with V. Smith).

Measuring the Value of a Public Good: An Empirical Comparison of Elicitation Procedures, *American Economic Review*, Vol. 77, No. 4 (1987): 554-566, (with D. Coursey),

- Republished in Ashgate Publishing Limited in the International Library of Environmental Economics and Policy (series Editors Tom Tietenbeg and Kathy Segerson), ed., Jason F. Shogren, *Experiments in Environmental Economics*, Volumes I and II, December 2003.

A Probabilistic Approach to Landslide Hazard Mapping in Cincinnati, Ohio, with Applications for Economic Evaluation, *Bulletin of the Association of Engineering Geologists*, Vol. 25, No. 1 (1988): 39-56, (with R. Bernknopf, R. Campbell, and C. Shapiro).

An Economic and Geographic Appraisal of a Spatial Natural Hazard Risk: A Study of Landslide Mitigation Rules, *Environment and Planning A*, Vol. 20 (1988): 621-631, (with R. Bernknopf, R. Campbell, and C. Shapiro).

Earthquake and Volcano Hazard Notices: An Economic Evaluation of Changes in Risk Perceptions, *Journal of Environmental Economics and Management*, Vol. 18 (1990): 35-

49, (with R. Bernknopf and M. Thayer).

- Republished in The International Library of Critical Writings in Economics: *The Economics of Natural Hazards*, Vol 1. Eds. H. Kunreuther and A. Rose, Elgar Reference Collection, pp. 141-158, (2004)

Should We Try to Predict the Next Great U.S. Earthquake?, *Journal of Environmental Economics and Management*, Vol. 18, No. 3 (1990): 247-262, (with S. Ben-David, R. Hageman, and W. Schulze).

Benefit Transfers: Conceptual and Empirical Issues, *Water Resources Research*, Vol. 28, No. 3 (1992): 651-655, (with H. Neill).

Water Resources Issues in the Developing Countries, *Water Resources Research*, Vol. 29, No. 7 (1993): 1883-1888, (with D. Whittington).

Is the Glass Half Empty, Is the Glass Half Full: Compensable Damages and the Contingent Valuation Method, *Natural Resources Journal*, Vol. 34, No. 1 (1994): 51-72, (with M. McKee).

Evolving Entitlements: Intervening to Prevent Collective Harm, *Journal of Agricultural and Resource Economics*, Vol. 21, No. 1 (1996): 160-173, (with P. Ganderton and M. McKee).

Estimating the Social Value of Geologic Map Information: A Regulatory Application, *Journal of Environmental Economics and Management*, Vol. 32, No. 2 (1997): 204-218, (with R. Bernknopf, M. McKee, and D. Soller).

Direct and Indirect Economic Losses from Earthquake Damage, *Earthquake Spectra*, Vol. 13, No. 4 (1997): 683-702, (with S. Chang, H. Cochrane, R. Olson, A. Rose, and J. Steenson).

Implementing the Safe Minimum Standard Approach: Two Case Studies from the U.S. Endangered Species Act, *Land Economics*, Vol. 74, No. 2 (1998): 147-161, (with R. Berrens, M. McKee, and C. Schmidt).

- Re-published in *Economics and Biodiversity Conservation*, ed. Stephen Polasky, The International Library of Environmental Economics and Policy, 2002.

A Joint Investigation of Public Support and Public Values: Case of Instream Flows in New Mexico, *Ecological Economics*, Vol. 27, No 2 (1998): 189-203, (with R. Berrens, A. Bohara, H. Jenkins-Smith, C. Silva, and P. Ganderton).

- Exploring Non-market Values for the Social Impacts of Environmental Policy Change, *Resource and Energy Economics*, Vol. 20, No. 2 (1998): 117-137, (with R. Berrens, P. Ganderton and M. McKee).
- The Effects of Total Cost and Group-Size Information on Stated WTP: Open Ended vs. Dichotomous Choice, *Journal of Environmental Economics and Management*, Vol. 35, No. 2 (1998): 142-163, (with A. Bohara, R. Berrens, M. McKee, H. Jenkins-Smith, C. Silva).
- Heterogeneity, Irreversible Production Choices, and Efficiency in Emission Permits Markets, *Journal of Environmental Economics and Management*, Vol. 38, (1999): 176-194, (with S. Ben-David, S. Burness, M. McKee, and C. Schmidt).
- Why Economics Matters for Endangered Species Protection and the ESA, *Conservation Biology*, Vol. 13, No. 6 (1999): 1257-1261, (with J. Shogren, J. Tschirhart, T. Anderson, A. Ando, S. Beissinger, G. Brown, D. Coursey, R. Innes, S. Meyer, S. Polasky).
- Parallelism in the Laboratory and the Field: Testing the Robustness of the MCS Mechanism, *Pacific Economic Review*, Vol. 5, No. 3 (2000): 429-446, (with S. Stewart, M. McKee, R. Berrens and A. Bohara).
- Attitudes Toward Risk And Compliance in Emission Permit Markets, *Land Economics*, Vol. 76, No. 4, (2000): 590-560, (with S. Ben-David, S. Burness, M. McKee, and C. Schmidt).
- Reflections Upon 25 Years of the Journal of Environmental Economics and Management, *Journal of Environmental Economics and Management*, Vol. 39, (2000): 249-263, (with D. Scroggin).
- Contingent Valuation of In-stream Flows in New Mexico: With Tests of Scope, Group-Size Reminder and Temporal Reliability, *Journal of Environmental Management*, Vol. 58, No.1 (2000): 73-91, (with R. Berrens, A. Bohara, C. Silva, M. McKee).
- Buying Insurance for Disaster-Type Risks: Experimental Evidence, *Journal of Risk and Uncertainty*, Vol. 20, No. 3, (2000): 271-289, (with P. Ganderton, M. McKee, S. Stewart, H. Thurston).
- Marketing Western Water: Can a Process Based Geographical Information System Improve Reallocation Decisions?, *Natural Resources Journal*, Vol. 41, No. 2, (2001), (with P. Matthews, L. Scuderi, K. Gregory, S. Snell, K. Krause, J. Chermak, B. Cullen, M. Campana).
- The Informational Role of the EPA SO₂ Permit Auction: Was It Necessary, Did it work?, *Journal of Regulatory Economics*, Vol. 20, No. 1 (2001): 43-60, (with S. Burness).
- Western Urban Water Demand, *Natural Resources Journal*, Vol. 42, No. 4 (2002), (with S.

Burness, J. Chermak, K. Krause).

The Demand for Water: Consumer Response to Scarcity, *Journal of Regulatory Economics*, 23:2, 167-191, (2003), (with J. Chermak, K. Krause).

Water Management in a Mountain Front Recharge Aquifer, *Water Resources Research*, Vol 40, (2004), (with S. Burness, J. Chermak).

Market Prices for Water in the Semi Arid West”, *Water Resources Research*, Vol. 40, No. 9, July 2004, (with B. Colby, M. Ewers, P. Ganderton).

Economics and Transboundary Aquifers, *Journal of Groundwater*, Vol. 43, No. 5, September-October, 2005, (with J. Chermak and R. Patrick).

“Water Leasing: Evaluating Temporary Water Rights Transfers in New Mexico through Experimental Methods”, *Natural Resources Journal*, 2010, (with C. Broadbent, D. Coursey, V. Tidwell).

“Ecosystem Services and Reallocation Choices: A Framework for Preserving Semi-Arid Regions in the Southwest”, *Journal of Contemporary Water Research & Education*, 2010, (with D. Goodrich, M. D. Dixon, L. A. Brand, K. Benedict, K. Lansey, J. Thacher, C. D. Broadbent, S. Stewart, M. McIntosh, D. Kang).

“Creating Real Time Water Leasing Market Institutions: An Integrated Economic and Hydrological Methodology”, *Journal of Contemporary Water Research & Education*, Issue 144, March 2010, (with C. Broadbent, D. Coursey, V. Tidwell).

“Projecting Avian Response to Linked Changes in Groundwater And Riparian Floodplain Vegetation Along a Dryland River: A Scenario Analysis”, *Ecohydrology*, (with L. A. Brand, J. Stromberg, D. Goodrich, M. Dixon, K. Lansey, D. Kang, D. Cerasale), Volume 4, Issue 1, January 2011, Pages: 130–142.

“Projecting Avian Guild Responses to Landscape Management along the Middle Rio Grande, New Mexico.” *The Southwestern Naturalist* 58 (2): 150-162, 2013, (with Brand, L.A., M.D. Dixon, T. Fetz, J.C. Stromberg, S. Stewart, G. Garber, D.C. Goodrich, D.S. Brookshire, C.D. Broadbent and K. Benedict) .

“Moving forward by Looking Back: Comparing Laboratory Results with Ex Ante Market Data”, *Economic Inquiry*, 2011, (with J. Chermak, K. Krause and S. Burness).

“An Experimental Analysis of Water Leasing markets focusing on the Agricultural Sector”, *Agricultural Water Management*, Vol. 141, pp. 88-98, 2014, (with C. Broadbent, D. Coursey and V. Tidwell)

"Valuing Preservation and Restoration Alternatives for Ecosystem Services in the Southwestern

U.S.", forthcoming, *Ecohydrology*. (with C. Broadbent, D. Brookshire, D. Goodrich, M. Dixon, L. A. Brand, J. Thacher, S. Stewart,

IX. CHAPTERS/CONFERENCE PROCEEDINGS

Some Results and Problem Areas in the Application of Bidding Games, in *Proceedings of a Workshop on the Measure of Intangible Environmental Impacts*, Conference on the Measurement of Intangible Environmental Impacts, Asilomar, CA, (1976); Electric Power Research Institute, (1977).

The Impact of Coal Development on Wildlife: An Economic Estimate, in *Proceedings of the Fifth National Conference on Energy and the Environment*, Cincinnati, OH, (1977), (with L. Eubanks and R. Rowe).

Valuing Wildlife Resources: An Experiment, in *Transactions of the 43rd National Wildlife and Natural Resources Conference*, by Wildlife Management Institute, Washington, D.C., (1978), (with L. Eubanks and A. Randall).

Issues in Valuing Visibility: An Overview, in *Proceedings of the Workshop on Visibility Values*, Ft. Collins, CO, (1979), USDA General Technical Report WO-18.

Environmental Preferences and Effluent Charges, Chap. 4 in *Progress in Resource Management and Environmental Planning*, eds. T. O'Riordan and R. K. Turner, Vol. 2 (New York: John Wiley and Sons, Ltd., 1980): 89-107, (with R. d'Arge and R. Rowe).

The Economics of Pricing Hunting Licenses, in *Wyoming Issues*, Vol. 3, No. 1 (1980) (with L. Eubanks).

An Economic Analysis of the Benefits and Costs of Seismic Building Codes, in *Earthquakes and Earthquake Engineering Eastern United States*, Vol. 2 (1981) (with R. Hageman, W. Schulze, J. Tschirhart).

Experiments in Valuing Public Goods, *Advances in Applied Microeconomic Theory*, ed. V. K. Smith, Vol.1 (Greenwich: JAI Press, Inc., 1981): 123-172, (with R. d'Arge, W. Schulze, M. Thayer).

An Economic Overview of the Issues and Problems of Microzonation, in *Third International Earthquake Microzonation Conference Proceedings*, 1 (1982) (with R. Hageman, et al.).

An Evaluation of the Validity of Survey Methods in Economics, Chap. 7 in *Environmental Policy: Air Quality*, eds. G. Tolley, P. Graves and A. Cohen, Vol. 2 (Cambridge: Ballinger Publishing Co., 1982): 171-193, (with R. d'Arge, W. Schulze, M. Thayer).

Intergenerational Ethics and the Depletion of Fossil Fuels, Chap. 10 in *Coal Models and Their Use in Government Planning*, eds. J. Quirk, K. Terasawa, and D. Whipple (New York:

- Praeger Publishers, 1982): 159-178, (with W. Schulze).
- The Benefits and Costs of Seismic Building Codes, in *Social and Economic Aspect of Earthquakes*, eds. B. G. Jones and M. Tomazevic, Institute of Earthquake Engineering and Engineering Seismology, University of Kiril and Metodij, Skopje, Yugoslavia (1982): 187-204, (with R. Hageman, W. Schulze, J. Tschirhart).
- Economic Valuation of the Risks and Impacts of Energy Development, Chap. 6 in *Health Risks of Energy Technologies*, eds. C. C. Travis and E. L. Etnier, American Association for the Advancement of Science Selected Symposium (Boulder: Westview Press), (1983): 229-278, (with R. d'Arge W. Schulze).
- Economic Issues in the Legacy Problem, Chap. 9 in *Equity Issues in Radioactive Waste Management*, ed. R. E. Kasperson (Cambridge: Oelgeschlager, Gunn & Hain, Publishers, Inc.), (1983): 203-226, (with A. Kneese, et al.).
- The Economics of Landslide Mitigation Strategies in Cincinnati, Ohio: A Methodology for Benefit-Cost Analysis, Chapter D in *Feasibility of a Nationwide Program for the Identification and Delineation of Hazards from Mud Flows and Other Landslides*, ed. R. H. Campbell, Open-File Report 85-276, U.S. Geological Survey, Reston, VA (1985) (with R. Bernknopf, R. Campbell, C. Shapiro, R. Fleming); Summary in *Ground Failure*, Vol. 2, (1985): 1, 6-9.
- Existence Values and Normative Economics, in *Toward the Measurement of Total Value*, eds. G. Peterson and C. Sorg, General Technical Report RM-148, Rocky Mountain Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture (November 1987): 14-26, (with L. Eubanks and C. Sorg).
- Management of Risk as It Relates to Hazardous Waste, in *Proceedings of the Waste Management for the Energy Industries Conference*, Waste Management for the Energy Industries Conference, Grand Forks, ND (1987) (with W. Schulze, G. Watts).
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- Experiments in the Solicitation of Private and Public Values: An Overview, in *Advances in Behavioral Economics*, eds. L. Green and J. Kagel, Vol. 2 (Norwood, NJ: Ablex Publishing Corporation), (1990): 173-190, (with D. Coursey, W. Schulze).

- Compensation Schemes for Negative Externalities: A Field Experiment, in *Research in Experimental Economics*, ed. V. Smith, 4 (JAI Press, Inc.), (1991): 81-106, (with D. Coursey, H. Kunreuther).
- Carbon Dioxide and Intergenerational Choice, in *The Economics of Global Warming*, ed. T. Tietenberg, the International Library of Critical Writing in Economics, (1995), Edward Elgar Publishing Limited, (with R. d'Arge, W. Schulze), (this paper originally appeared in the *American Economic Review Proceedings*).
- Endangered Species in Riparian Systems of the American West, in *Desired Condition of Southwestern Riparian Ecosystems: Bringing Interests and Concerns Together*, U.S. Forest Service (1995) (with M. McKee, C. Schmidt).
- The Endangered Species Act and Critical Habitat Designation: An Integrated Biological and Economic Approach, in *Endangered Species Protection in the United States: Biological Needs, Political Realities, Economic Consequences*, eds, J. Shogren and J. Tschirhart, Cambridge University Press, (2001): 177-199, (with G. Watts, W. Noonan, H. Maddux).
- Integrated Modeling: Data Transfers from the Physical And Social Sciences, *First International Symposium on Transboundary Water Management*, eds. Alvaro. Aldama, Javier Aparico Mijares, Rafael Equihua, AMH-IMTA, 2002, (with Janie Chermak).
- Borders Crossing Borders: Efficiency and Equity Considerations of Groundwater Markets in the Ciudad Juárez/El Paso Region Along the Mexico/United States Border, eds. A. Zichichi and R. Ragaini, *International Seminar On Nuclear War and Planetary Emergencies, The 26th Session*, World Scientific Publishers, 2002, (with J. Chermak, M. Ewers).
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- The Economic Value of Water: Results of a Workshop in Caracas, Venezuela, presented at IV Inter-American Dialogue on Water Management, Foz do Iguacu, Brazil September 2001, published by Nature Conservancy, The Conservation Finance Guide, in CD ROM format, August 2003.
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X. BOOK REVIEWS

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- Designing a Water Leasing Market for the Mimbres River, New Mexico, Final Report to the Bureau of Reclamation and the Office of State Engineer, (with Charles Jackson et al.) April 2013.*
- A Conceptual Framework for a Multidisciplinary Resource Assessment: The Net Resources Assessment Tool (NetRA), Richard Bernknopf, Brandon Bridge, Craig D. Broadbent, Richard L. Bernknopf, Stephen Faulkner, Submitted to the USGS Science and Decision Center through cooperative agreements: “A Collaborative Agreement between USGS & SILPE: A Focus on Ecosystems & Institutional Frameworks,” Sponsor #: G10AC00303: “A Focus on Natural Resource Economics & Value of Information,” Sponsor # G13AC00076, (June 2014).*
- The Value of Information from a GRACE-Enhanced Drought Severity Index, Richard Bernknopf, David S. Brookshire, Yusuke Kunayama, Molly McCauley, Sara Pesko, Submitted to NASA, NASA Award Number: NNX13AQ58G, (July 2014).*
- A Conceptual Framework and Market for Nitrate Loading in the Tensas River Basin in the Lower Mississippi Valley, Brandon Bridge, David S. Brookshire, Craig D. Broadbent, Richard L. Bernknopf, Sara Pesko, Submitted to USGS Science and Decision Center, Reston VA, and Aquatic Ecology Laboratory, Leetown Science Center, through a cooperative agreement: “A Collaborative Agreement between USGS & SILPE: A Focus on Ecosystems & Institutional Frameworks,” Sponsor #: G10AC00303, (December 2014).*
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- Net Resource Assessment (NetRA): A Collaborative Effort between USGS Science and Decisions Center, the Science Impact Laboratory for Policy and Economics (University of New Mexico and Sandia National Laboratories, 8/15/2015, Progress Report, (Brookshire, D., R. Bernknopf, C. Broadbent, V. Tidwell, D. Adhikari, and C. Babis).*
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- Climate and Population Change and Thresholds of Peak Ecological Water: Integrated Synthesis for Dryland Rivers: An Economics Perspective, NSF Final Report, 12/31/2015)*

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XIII. SELECTED PRESENTATIONS AND WORKSHOPS

Environmental Preferences and Effluent Charges, Session on the Impact of Regulatory Environment on Innovative Decisions, American Association for the Advancement of Science, Houston, TX, January 1979.

Benefit Cost Assessments for Air Pollution Control in the South Coast Air Basin: An Outlook, Testimony before the National Commission on Air Quality, Los Angeles, CA, February 1979.

Issues in the Prevention of Significant Deterioration of Air Quality, National Academy of Sciences, Committee on Prevention of Significant Deterioration of Air Quality, Washington, D.C., September 1979.

Valuing Public Goods: A Comparison of the Survey and Hedonic Approaches, American Economic Association Meetings, Denver, CO, September 1980 (with R. d'Arge, W. Schulze, and M. Thayer).

Household Production and Non-Market Valuations, Recent Advances in Environmental Economics, American Economic Association Meetings, Denver, CO, September 1980 (with L. Eubanks).

Carbon Dioxide and Intergenerational Choice, American Economic Association Meetings, Washington, D.C., December 1981 (with R. d'Arge and W. Schulze).

Methods for Valuing Non-Market Resources: Theoretical and Empirical Comparisons, American Economic Association Meetings, Washington, D.C., December 1981 (with L. Eubanks).

Contingent Valuation Surveys for Evaluating Environmental Assets, joint session of the Association of Environmental and Resource Economists and the American Economic Association Meetings, New York, NY, 1982 (with J. Hoehn and A. Randall).

Discussant, Session on Theoretical Issues in Environmental Economics, American Economic Association Meetings, Dallas, TX, December 1984.

Economic Issues and Earthquake Hazards, Governor's Workshop on Earthquake Hazards in Wyoming, Rock Springs, WY, June 1985.

Contingent Valuation of Non-Market Goods: Lessons from the Laboratory, joint session of the American Economic Association and the Association of Environmental and Resource Economists Meetings, New York City, NY, December 1985 (with D. Coursey).

Market Methods and the Assessment of Benefits: Some Further Results, Workshop on Integrating Economic and Psychological Knowledge in Valuations of Public Amenity Resources, Estes Park, CO, May 1986 (with D. Coursey and K. Radosevich).

Interaction with State and Local Governments: Implications for the Commission on Engineering and Technical Systems Activities, panel discussant, National Research Council, Washington, D.C., June 1986.

Effects of Federal Land Use Restrictions on U.S. Coal Markets, Eastern Economic Association meetings, Washington, DC, March 1987 (with R. Bernknopf and W. D. Watson).

Management of Risk as it Relates to Hazardous Waste, Waste Management for the Energy Industries Conference, Grand Forks, ND, April/May 1987 (with W. Schulze and G. Watts).

Special Interests and the Voluntary Provision of Public Goods, Economic Science Association, Fall meetings, Tucson, AZ, October 1988 (with D. Coursey and D. Redington).

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Equity and the Incentive Compatible Provision of Public Goods, Southern Economic Association Meetings, 1989 (with D. Coursey and D. Redington).

Economic Effects of Western Federal Land Use Restrictions on U.S. Coal Markets, 12th International Conference of the International Association for Energy Economics, New Delhi, India, January 1990 (with R. Bernknopf and W. Watson [presenter]).

Other Indirect Costs and Losses from Earthquakes: Issues and Estimation, 16th Annual Hazards Research and Application Workshop, Boulder Co. and at Federal Emergency Management Agency Workshop which was mandated by Public Law 101-614, 1991 (with M. McKee).

Potential vs. Actual Interventions: Free Riding and Public Goods Provision, Public Choice Meeting, New Orleans, LA, March 1992 and Economic Science Meeting, Tucson, AR, October 1992 (with P. Ganderton and M. McKee).

Experimental Investigation of Voluntary Resolution of the Commons Dilemma: An Application of the Contribution Game, 3rd Common Property Conference, International Association for the Study of Common Property, Washington DC, September 1992 (with M. Bagnoli and M. McKee).

Interventions and Markets, American Geophysical Union meetings, San Francisco, CA, December 1992.

Free Riding Behavior with Heterogeneous Agents, Economics Science Association Meeting, Tucson, AZ, October 1993 (with P. Ganderton and M. McKee).

Panelist for Earthquake Loss and Estimation Methodology Workshop: Economic Loss Estimation, National Science Foundation, Arlington, VA, October 1994.

Non-Use and Use Values for Environmental Programs: Experimental Evidence, Economic Science Association, Tucson, AZ, November 1994.

Economic Impacts of Designating Critical Habitat for the Virgin River Fishes, SUPAC, St. George, UT, December 1994.

Emission Trading and Production Choices, The Public Choice and the Economic Science Meetings, Los Angeles, CA, March 1995 (with S. Ben-David, S. Burness, C. Schmidt, and M. McKee).

Balancing a Healthy Economy with a Healthy Environment, Albuquerque Health Department Symposium, May 1995, Albuquerque, NM

The Contingent Valuation Method: Past, Present and Future, University Lecture, Royal Agricultural University, Copenhagen, Denmark, June 1995 (with B. Berrens).

Investigating Cultural Heritage Values for Preserving Traditional Grazing on Federal Public Lands: The Case of New Mexico, Workshop on Non-market Valuation of Amenities, Sjjoldenaesholm, Denmark, June 1995 (with B. Berrens, P. Ganderton, and M. McKee).

Valuing Cultural Heritage: Grazing and New Mexico, Joint European-American Conference on Non-Market Valuation, Oslo, Norway, June 1995 (with B. Berrens, P. Ganderton, and M. McKee).

Examining Benefit Threshold for Environmental Goods Provision: Experimental Evidence, Joint European-American Conference on Non-Market Valuation, Oslo, Norway, June 1995 (with B. Berrens, P. Ganderton, and M. McKee).

Valuing Cultural Heritage: Case of Live Stock Grazing on Federal Lands in New Mexico, Conference on Valuing Non-Market Goods, The University of Chicago, Chicago, IL, July 1995 (with B. Berrens, P. Ganderton, and M. McKee).

Endangered Species in Riparian Systems of the American West, Future Conditions for Southwestern Riparian Ecosystems: Bringing Interests and Concerns Together conference, presenter and discussant on the panel People and Riparian Ecosystems: Past, Present and Future, Albuquerque, NM, September 1995.

Economic Impacts of Critical Habitat Designation in the Colorado River Basin, Endangered

- Species Management: Planning Our Future, The 6th Annual South Platte Basin Forum, Greeley, CO, October 1995.
- The Contingent Valuation Method: Past, Present and Future, University Lecture, Royal Agricultural University, (with B. Berrens), 1995, Copenhagen, Denmark.
- Investigating Cultural Heritage Values for Preserving Traditional Grazing on Federal Public Lands: The Case of New Mexico, Workshop on Non-market Valuation of Amenities, 1995, (with B. Berrens, M. McKee, P. Ganderton), Sjjoldenaesholm, Denmark.
- Valuing Cultural Heritage: Grazing and New Mexico, Joint European-American Conference on Non-Market Valuation, with B. Berrens, M. McKee, P. Ganderton, 1995, Oslo, Norway
- Examining Benefit Threshold for Environmental Goods Provision: Experimental Evidence, Joint European-American Conference on Non-Market Valuation, (with M. McKee, P. Ganderton, 1995), Oslo, Norway.
- Panel Member: Endangered Species -- Water Resources Interdisciplinary Program, University of New Mexico, The Essential River Restoration and Development Issues Class, 1995.
- Invited Lecture: Valuing Non-priced Goods: Contingent Valuation Water Resources Interdisciplinary Program, University of New Mexico, The Essential River Restoration and Development Issues Class, 1995.
- Balancing a Healthy Economy with a Healthy Environment, Albuquerque Health Department Symposium, May 1995, Albuquerque, NM.
- Evaluation of Non-Market Goods: A Perspective, in American Studies, College of Arts and Sciences, University of New Mexico, Economics of War Seminar, July 1995.
- Growth and the Environment: Evidence to Date, New Mexico Environmental Health Association, Albuquerque, NM, December 1995.
- Heterogeneity, Irreversibility Production Choices and Efficiency in Emission Permit markets: An Experimental Investigation, The European Association of Environmental and Resource Economists, Lisbon, Portugal, June 1996, (with S. Ben-David, S. Burness, M. McKee, and C. Schmidt).
- Value Uncertainty and Outcome Uncertainty as Explanations of the WTA-WTP Disparity, Economic Science Association, October 1996 (with R. Berrens, A. Bohara, P. Ganderton, H. Jenkins-Smith, H. Kaplan, M. McKee, C. Silva, and S. Stewart).
- Special Provisions and the Voluntary Provision of Public Goods, presented at the European Environmental and Resource Economics meetings, June 1997, Tilburg, Holland, (with D. Coursey and D. Redington).

Seismic Rehabilitation of Buildings: Strategic Plan 2005 -- The Second Decade, Participant, sponsored by Earthquake Engineering Research Institute and Federal Emergency Management Agency, August 1997, Reno, NV.

Southwest Regional Climate Change Symposium and Workshop, Participant and Steering Committee member, sponsored by the U.S. Department of the Interior and the U.S. Global Climate Change Research Program, September 1997, Tucson, AZ.

The Consequences of Global Change for the Nation, Participant, sponsored by the U.S. Department of Commerce, November 1997, Washington D. C.

Co-Organized and Chaired the session entitled - *Economics and Biodiversity*, Venice, Italy, European Association of Environmental and Resource Economists. Presented a general talk addressing the Endangered Species Act, and Biodiversity, June 1998.

Invited speaker at the Lewis and Clark College Symposium on Environmental Affairs, Session entitled *Economics, the Market and the Environment*, October 1998

The Endangered Species Act and Critical Habitat Designation: An Integrated Biological and Economic Approach, presented at the Social Order and the Endangered Species Act Conference at the University of Wyoming, April 1997, presented at Center for Earth Science Research Information, Stanford University, May 1998, (with G. Watts, W. R. Noonan, and H. Maddux).

Invited panelist to the NSF workshop, *Alternatives to Traditional Contingent Valuation Techniques*, October 1998, served on the panel entitled, “*Ultimate Problems of the Credibility of Damage and Benefit Estimates*”, presented talk entitled, “Laboratory and Field Research: Complements and/or Substitutes”, Vanderbilt University Institute of Public Policy Studies.

Reallocation of Water in the Western United States, *Water Week in Panama*, Roundtable Session – Theme: Social and Environmental and Economic Valuation, March 1999.

Energy and the Environment, Agricultural University of Norway, Aas, Norway and Cambridge University (Land Economy College), England, October 1999.

The U.S. Experience and Research in the SO₂ Emissions Permit Market, Agricultural University of Norway, Aas, Norway, October 1999.

Uncertainty, Benefit Transfers, and Physical Models: A Middle Rio Grande Valley Focus, European DRG 12 Conference on the Environment, Lillehammer, Norway, October 1999, also opened the conference with an overview entitled “Benefit Transfers to Date” and served as panel member on the “Transferability of Benefit Transfers from the U.S. to Europe”.

Value of Water in the Americas, Co-organized and hosted a workshop in Caracas, Venezuela with Michael Campana and Paul Matthews, November 2000. Workshop funded by Office of Sustainable Development NOAA and sponsored by Inter-American Water Resources Network.

Non-Market Valuation as Applied to Nature Conservancy Sites in Latin America, Co-organized and conducted a workshop for The Nature Conservancy in Caracas, Venezuela with Paul Matthews, November 2000, funded by The Nature Conservancy.

Integrated Resource Management Modeling: Applications to the San Pedro River, Workshop for Thrust area 5, NSF STC: SAHRA, University of Arizona, Tucson, AZ. October 2000, (with J. Chermak and S. Burness).

Borders Crossing Borders: Efficiency and Equity Considerations of Groundwater Markets in the Ciudad Juárez/El Paso Region Along the Mexico/United States Border, *The 46th International Seminar On Nuclear War and Planetary Emergencies*, forthcoming, (with J. Chermak).

Water Scarcity, Market Based Incentives and Consumer Response, American Water Resources Association Annual Conference, Albuquerque, NM, November 2001, (with J. Chermak and K. Krause).

The Demand for Water: Consumer Response to Scarcity," presented at the *Southern Economic Association Annual Meetings*, Tampa, FL, October 2001, (with J. Chermak and K. Krause).

The Demand for Water: Consumer Response to Scarcity, presented at the *Annual American Water Resources Association* meetings, Albuquerque, NM, November 2001, (with J. Chermak, and K. Krause).

Water Consumption: Comparing Consumer Response In and Out of the Lab," 1) The Second World Congress of Environmental and Resource Economists. Monterey, California, June 2002. (Abstract Published in *The Second World Congress of Environmental and Resource Economists Book of Abstracts*, 2) presented at the AEA/AERE session in Atlanta, GA, January 2002, (with K. Krause, Janie Chermak, and H. Stuart Burness).

Endangered Species and Integrated Modeling, Department of Hydrology, New Mexico Tech., Socorro, NM, (presentation of multiple papers and reports), March 2002.

Assessing Tradeoffs in Water Policy Using Integrated Modeling, Blue Ribbon Task Force on Water in New Mexico, May 2002, Albuquerque, NM, (presentation overview of multiple papers), (with J. Chermak).

Western Water Markets, The Second World Congress of Environmental and Resource

- Economists. Monterey, California, June 2002, (Abstract Published in The Second World Congress of Environmental and Resource Economists Book of Abstracts), (with M.Ewers, J. Little and P. Ganderton).
- A Web Based Risk Experiment: Design and Implementation, The Second World Congress of Environmental and Resource Economists. Monterey, California. June 2002. (Abstract Published in The Second World Congress of Environmental and Resource Economists Book of Abstracts), (with R. Bernknopf and P. Ganderton).
- Lab and Field Studies of Experience and Subject Pool Effects in Contingent Valuation, The Second World Congress of Environmental and Resource Economists. Monterey, California. June 2002. (Abstract Published in The Second World Congress of Environmental and Resource Economists Book of Abstracts), (with S. Stewart, A. Bohara, and P. Ganderton).
- The Demand for Water: Consumer Response to Scarcity, The Second World Congress of Environmental and Resource Economists. Monterey, California. June 2002. (Abstract Published in The Second World Congress of Environmental and Resource Economists Book of Abstracts), (with J. Chermak and K. Krause).
- Integrated Modeling: Data Transfers from the Physical And Social Sciences, First International Symposium on Transboundary Water Management, November 2002, Monterrey Mexico, (with J. Chermak).
- Restoration, Replacement, or Acquisition of Damaged Groundwater Resources Workshop, NM Office of Natural Resources Trustee, September 2002.
- Consumer Demand Response, Data Gaps, and Demand Management of Water in the Southwestern U.S., American Association for the Advancement of Science, Denver Colorado, February 2003, (with J. Chermak, K. Krause, S. Burness).
- Assessing Tradeoffs in Water Policy Using Integrated Modeling, New Mexico Geographical Information Council, Los Alamos, NM, April 2003 (with J. Chermak, K. Krause (presenter) and S. Burness).
- Water Demand Management, Los Alamos sponsored 60th anniversary forum entitled Water, Drought and New Mexico, Santa Fe, NM, April 2003, (with J. Chermak and K. Krause).
- Consumer Response to Scarcity, Hydrological Sciences Session, EGS-AG-EUG joint assembly, Nice, France, April 2003 (with J. Chermak, K. Krause).
- Disaggregating Residential Water Demand for Improved Forecasts and Decision Making, Hydrological Sciences Session, EGS-AG-EUG joint assembly, Nice, France, April 2003 (with M. Black, J. Chermak, K. Krause, J. Roach, S. Stewart, V. Tidwell, M. Weber and G. Woodward).

Experimental Investigations in the Consumer Demand for Water, Latin American and Caribbean Congress of Environmental and Resource Economics, Cartagena, Columbia, July 2003, (with J.Chermak, K. Krause and S. Burness).

Economics and the Silvery Minnow”, Governors Symposium: The Rio Grande Silvery Minnow – Science and Policy in the Bosque, Santa Fe, N.M. October 2003.

Invited to participate as a panelist for “On the Edge: Metropolitan Growth and Western Environments”, The Center for the Study of the North American West, Stanford University, April 2004.

Invited to participate as a panelist for “Lasting Effects: Assessing the Future of Economic Impact Analysis” May, 2004, at the Pocantico Conference Center in Tarrytown, N.Y, by the Cultural Policy Center of the University of Chicago.

Multi-Resolution Integrated Modeling for Basin-Scale Water Resources Management and Policy Analysis, (1) International Conference on Hydrology: Science and Practice for the 21st Century, Session on Integrated Catchment Management, London, England, July 2004 and (2) Universities Council on Water Resources entitled *Allocating Water: Economics and the Environment*, Portland, Oregon, July 2004, (with H. V. Gupta, E. Springer, T. Wagener).

A Decision Support System for Demand Management of the Rio Conchos Basin, Mexico”, (1) International Conference on Hydrology: Science and Practice for the 21st Century, July 2004, London, England, and (2) Universities Council on Water Resources entitled *Allocating Water: Economics and the Environment*, Portland, Oregon, July 2004, (with S. Stewart, J. Valdes, J. Gastelum, J. Aparicio, J. Hidalgo, I. Velazco).

Urban Consumer Water Demand: A Field/Experimental Investigation”, International Conference on Hydrology: Science and Practice for the 21st Century, July 2004, London, England, (with J. Chermak, K. Krause).

On the Feasibility of a Water Banking Institution for the Middle Rio Grande Valley, (1), SAHRA Fourth Annual Meeting. Albuquerque, NM, October, NM, (2) Universities Council on Water Resources entitled *Allocating Water: Economics and the Environment*, Portland, Oregon, July 2004 (3) 2nd International Transboundary Conference, Tucson, Arizona, November 2004, (4) American Geophysical Union meeting, San Francisco, CA., December 2004, (with C. Coursey, A. Demint, V. Tidwell, and Jessie Roach).

Issues in the Experimental Determination of Urban Water Demand, Universities Council on Water Resources, Portland, Oregon, July 2004, (D. Brookshire, J. Chermak, K. Krause, S. Stewart).

- The Role of Geo-Science in Natural hazard Risk management: Evidence from Web Based Experiments, Annual conference of the European Association of Environmental and Resource Economists XIII (EAERE), Budapest, Hungary, June, 2004, (with P. Ganderton and R. Bernknopf).
- Integrated Modeling and Ecological Valuation, USEPA workshop on Improving the Valuation of Ecological Benefits, October 2004, Washington D.C. (with J. Stromberg, S. Stewart, J. Thacher, K. Benedict, J. Chermak, D. Goodrich, and A. Brand)
- A Conceptual Framework for Water Banking in the Middle Rio Grande Basin, SAHRA annual meetings, October 2005, Albuquerque, NM (with D. Coursey, A. Demint, V. Tidwell, K. Carpenter)
- Integrated Assessment and Modeling for Water Resources Management in Arid and Semi-arid regions, IAMAS 2005 in Beijing, August 2005, Session C12: Hydrological process and water security related to climate change and human activity (with T. Wagener, H. V. Gupta, Y. Liu, S. Yatheendradas, and E. Springer)
- “Towards a Framework for Temporarily Trading Water Resources within The Middle Rio Grande Basin”, New Mexico Rural Watershed Association Annual Training Conference, Workshop session “Drought Management: Understanding and Coping with Climate Variability and Uncertainty”, March 2005, Albuquerque, NM (with, Don Coursey and others).
- “Water Leasing/Banking: A Framework and Results”, New Mexico Water Dialogue Board of Directors meeting September 2005, Albuquerque, NM (with D. Coursey and others)
- “Urban Water Demand” New Mexico Water Dialogue, Board of Directors, Sept, 2005, Albuquerque, NM (with J. Chermak, K. Krause, and, S. Burness).
- “What Kinds of Water Leasing markets or Water Banks are Feasible?, Plenary Over view of Science Questions, SAHRA Fifth Annual meeting, Tucson AR, October 2005 (with SAHRA researchers).
- “Towards a Water Leasing/banking System with the Middle Rio Grande Basin, SAHRA Fifth Annual meeting, Tucson AR, October 2005 (with D. Coursey)
- “The Potential for Water Banking/Leasing in New Mexico: A Proposal for The Mimbres Basin”, Office of the State Engineer, Santa Fe, NM , January 2006 (with D. Coursey, V. Tidwell, H.Gupta).
- “Towards a Water Leasing/Banking System on the Middle Rio Grande, University Council on Water Resources Meeting on Increasing Freshwater Supplies, Santa Fe, NM, July 2006, (with C. Broadbent, D. Coursey, V. Tidwell).

“An Integrated Model for a Water Leasing System on the Middle Rio Grand, New Mexico”, session entitled “Numerical Modeling in Support of Water Resource Decision Making and Policy Implementation”, American Geophysical Union, San Francisco, 2006, (with D. Coursey, V. Tidwell, C. Broadbent)

Featured Speaker: “Towards a Water Banking/Leasing System on the Middle Rio Grande, New Mexico USA: Progress to Date”, III International Symposium on Transboundary Waters Management, Ciudad Real, Spain July 2006, (with, C. Broadbent, D. Coursey, V. Tidwell).

Invited speaker: “A Stylized Water Banking and Leasing Framework: Integrating Institutional, Economic, Science Models”, Reclamation Research and Development Forum on Institution and Collaborative Approaches to Water Solutions Workshop, Bureau of Reclamation, Denver, CO, February 2006, (with Don Coursey and Vince Tidwell).

“Economic Analysis of New Mexico Water Markets”, New Mexico Water Markets: A Seminar on Buying, Selling and Leasing Water Rights, Albuquerque, NM, hosted by Lee Brown (H2O Economics) and John Shoemaker & Associates, 2006, (with F. Lee Brown).

“Economics of River Restoration”, workshop entitled *Integrating Inquiry & Water Issues*, Explora Science Center, Albuquerque, NM, June 2006.

Issues and Results from Experimental Water Leasing Markets”, Annual UNM Water Forum, October 2006.

Panel member: Round Table: “Water Markets and TWM/El Mercado del Agua como Herramienta de Gestion”, III International Symposium on Transboundary Waters Management, Ciudad Real, Spain, June 2006.

Roundtable on “A National Framework for Natural Hazard Risk Reduction and Management: Developing a Research Agenda”, Cosmos Club, Washington DC November 2006.

“Integrated Modeling”, Sustainability in semi-Arid Hydrology Riparian Areas, Socorro, NM April 2006.

Hosted/Organized EPA “Bird” workshop as part of the project, Albuquerque, NM,, June 2006.

Hosted/Organized/Funded by SILPE, “Facilitated Workshop on Water Leasing with Water Dialogue of New Mexico-Stakeholders Input”, July 2006.

Hosted/Organized/Funded by SILPE, “Facilitated Workshop on Integrated Modeling Beyond SAHRA: Intersection of SILPE, USGS, CADRE (Sandia National Laboratory) and ISCMEM (Interagency Steering Committee on Multimedia Environmental Models), June 2006.

- Benefit Transfers and Alternative Levels of Scientific Information, Middle Rio Grande Conservancy District, Albuquerque, NM, 2007, (with, J. Thacher and project team).
- Featured Speaker -- “Ecosystem Valuation”, Illinois Nature Conservancy Economics Symposium, 50th Anniversary Event, Chicago, Illinois, 2007.
- Issues in Establishing a Water Leasing Market for the Middle Rio Grande, Third Biennial Rio Grande Day, Santa Fe, NM, 2007, (with C. Broadbent, D. Coursey and V. Tidwell).
- “Integrated Modeling and Ecological Valuation:” Applications in the Semi-Arid Southwest, presented at the “Valuations for Environmental Policy: Ecological Benefits” workshop, 2007, Washington DC, (with J. Thacher and research team).
- “Integrated Science, Modeling and Ecological Decision-making in the Upper San Pedro Basin, AZ”, D. Brookshire and D. Goodrich, Environmental Sciences Division of the USEPA, National Exposure Laboratory, Las Vegas NV, 2007.
- “Integrated Science, Modeling, and Ecological Valuation for Decision-making in the Upper San Pedro Basin, AZ and Middle Rio Grande, NM”, USGS conference on Valuing Ecosystem Services for Decision Making: Developing a Research Agenda, Denver Co, 2007, (with, D. Goodrich, J. Calhoun).
- “Water Leasing Institutions Focusing on Agricultural Decisions for the Middle Rio Grande. Presented at the 2007 Annual American Water Resources Association Conference in Albuquerque, NM, (C. Broadbent, D. Coursey, V. Tidwell).
- “Futures Markets for Water Leasing”, Presented at the SAHRA 2007 annual meeting in Tucson AZ, (with D. Coursey, C. Broadbent, V. Tidwell).
- “Water Leasing in the Mimbres Basin, Presented at the SAHRA 2007 annual meeting in Tucson, AZ, (with V. Tidwell, C. Broadbent, D. Coursey).
- “Integrated Modeling and Ecosystem Valuation”, Universidad de Guanajuato, Escuela de Economia, (with J. Thacher, C. Broadbent, and the research team), April 2008.
- “Water Leasing in the Mimbres Basin”, for the Office of the State Engineer, (with V. Tidwell, C. Broadbent, D. Coursey), September 2008.
- “Ecosystem Valuation and Markets”, (with, J. Thacher, C. Broadbent, V. Tidwell, D. Coursey and the rest of the team), ACES Pre-conference #2, Naples, Florida, USGS, July 2008.
- “Overview of Ecosystem Valuation, Decision Support Systems and Water Leasing: Movement Towards a Market Approach”, (with J. Thacher, C. Broadbent, V. Tidwell, D. Coursey and the rest of the team), ACES Pre-conference #3, funded by SILPE and USGS, October 2008.

“Water Leasing in the Mimbres”, SAHRA Annual Meeting, (with V. Tidwell and D. Boyle, D. Coursey, C. Broadbent), October 2008.

“Markets for Ecosystem Services: Water Leasing Applications (with C. Broadbent, D. Coursey, D. Boyle), ACES: A Conference on Ecosystem Services, Naples, FL, December 2008

“Using Markets and Other Institutional Structures to Incorporate Ecosystem Services in Decision making: Opportunities and Challenges”, Plenary Speaker, ACES: A Conference on Ecosystem Services, Naples, FL, December, 2008.

Invited speaker, Presentation to San Pedro Partnership Executive Committee on “B/C, Impact Studies, Financial Analysis and Ecosystems Services for Alternative Water Futures”, , March 2008.

“San Pedro Ecosystem Modeling and Valuation”, ACES: A Conference on Ecosystem Services, Naples, FL, December 2008, Moderated.

Organized and hosted a workshop at UNM, “A Conference on Ecosystem Services (ACES),: Using Science for Decision Making in Dynamic Systems”, Pre-conference Workshop #3: Developing an Institutional Framework to Incorporate Ecosystem Services into Decision Making, funded by USGS and SILPE, October 2008.

“Markets and Ecosystems”, Gila Planning Economic Forum”, sponsored by the Interstate Stream Commission, May 28, 2009, Silver City, NM.

“The Scientific Foundation for Ecosystem Valuation in the San Pedro and the Southwest”, Ecological Society Meetings, Albuquerque, NM Aug 2009 (with K. Benedict, L. A. Brand, C. Broadbent, J. Cavner, M. Dixon, D. Goodrich, K. Lansey, M. McIntosh, H. Richter, S. Stewart, J. Stromberg, J. Thacher).

“Using Survey Methods to Value the Impact of Changes in Water Level: The San Pedro Riparian National conservation Area”, Ecological Society Meetings, Albuquerque, NM, 2009, (with K. Benedict, L. A. Brand, C. Broadbent, M. Dixon, D. Goodrich, K. Lansey, M. McIntosh, H. Richter, S. Stewart, J. Stromberg, J. Thacher).

“ Ecosystems Restoration in the San Pedro, AZ and Middle Rio Grande, NM”, SAHRA Annual Meeting, Tucson, AZ, September 2009 (with J. Thacher, and research team).

“The Scientific Foundation for Ecosystem Valuation in the San Pedro and the Southwest, Ecological Society Meetings, Albuquerque, NM. August 2009 (with K. Benedict, A Brand, J. Cavner, M. Dixon, D. Goodrich , K. Lansey, M. McIntosh, H. Richter, S. Stewart, J. Stromberg, J. Thacher).

Plenary Speaker, “After Restoration: A Framework for Preserving Semi-Arid Regions in the

Southwest”, 3rd National Conference on Ecosystem Restoration, July 21, 2009, Los Angeles, CA.

Invited speaker, “Real Time Natural Resource Markets for Water Leasing and Ecosystem Services”, , University of Nebraska-Lincoln Water Center – Sixth Annual Water Law, Policy, and Science Conference, Lincoln Nebraska, April 29-30, 2009.

Co-Organized (With B. Creel and S. Piper) the “Gila Economic Forum”, Silver City, NM May 28, 2009.

Invited Workshop, “Assessment of Goods and Valuation of Ecosystem Services (AGAVES) project, January 27-30, 2009, Tucson, AZ.

Invited Workshop, USEPA workshop – “Final Indicators of Ecosystem Services for Streams”, , July 13-16, 2009, Denver, CO.

“Land-Carbon Workshop”, Invited Workshops, USGS Reston VA, Dec 1-3, 2009.

“Integrated Modeling and Ecological Valuation: A Framework for the Semi-Arid Southwest”, ACES December 6-9, 2010, Phoenix, AZ (with, D., Goodrich, J. Stomberg, J. Thacher, A. Brand, M. Dixon, K. Benedict, K. Landsey, M. McIntosh, S. Steward, C. Broadbent).

Panel: Session on “Ecosystem Service Endpoints for Decision Making”, ACES December 6-9, 2010, Phoenix, AZ.

Invited workshops - “Defining Issues Related to a Research Program of Ecosystem Services within the U.S.G.S, Reston, VA, March, 2010.

Invited workshops - Indicators of Final Ecosystem Service for Wetland and Estuaries Workshop, Denver CO, sponsored by U.S.E.P.A, June 7-10 2010.

Plenary Speaker – “Ecosystem Modeling: Coupling Science and Endpoints for Benefit Transfer Analysis”, USPA Office of Research and Development, Green Valley, NV October 19-21, 2010.

“Futures Contracts in Water Leasing”, Missouri Valley Economic Association, October 28-30, 2010, St. Louis, MO (with C. Broadbent, D. Coursey, V. Tidwell).

“Integrated Modeling and Benefit Transfers”, W2133 Meeting, Albuquerque, NM, Feb 2011, (with D., Goodrich, J. Stomberg, J. Thacher, A. Brand, M. Dixon, K. Benedict, K. Landsey, M. McIntosh, S. Steward, C. Broadbent).

Public Kickoff workshop NSF grant- “Addressing Peak Water Issues through Nonmarket Valuation”, (with, D. Coursey and C. Broadbent), Tucson, AZ , March, 2011.

Economics at the USGS: A Workshop on Future Directions, USGS National Center, Reston, VA, June 1-3, 2011, Session: “How Can Economics Add to the USGS Research Portfolio”; Session: “Water- How Can Economics Be Incorporated in Integrated Models to Inform Decisions About Water Quantity, Quality And Management?”; Session: “Future Directions – A Synthesis Panel”.

“Integrated Modeling and Ecological Valuation: A Framework for the Semi-Arid Southwest”, AWRA Annual Water Resources Conference, November 7-10, 2011, Albuquerque, New Mexico, (with D., Goodrich, J. Stomberg, J. Thacher, A. Brand, M. Dixon, K. Benedict, K. Landsey, M. McIntosh, S. Steward, C. Broadbent).

“Developing Flexible Water Leasing Institutions in the SW”, AWRA Annual Water Resources Conference, November 7-10, 2011, Albuquerque, New Mexico (with C. Broadbent, D. Coursey, V. Tidwell).

“Residential Water Consumer Behavior Under Increasing Water Prices” AWRA Annual Water Resources Conference, November 7-10, 2011, Albuquerque, New Mexico.

“Coupled Hydrological, Ecological, Decision and Economic Models for Monetary Valuation of Riparian Ecosystems”, American Geophysical Union, 2011 (with Goodrich et al.).

Invited Panel Member, “Reflections on Establishing Water Markets in New Mexico”, 57th Annual New Mexico Water Resources Research Institute Conference, August 28th, 2012.

Three talks at the the ACES Conference December 2012:

- a. “Overview of Natural Resource Markets”;
- b. “Experiments in Testing Real-Time Water Leasing Markets”;
- c. “A Real-Time Leasing Market in the Mimbres Basin” (all with C. Broadbent, D. Coursey and V. Tidwell).

Invited Panelist in the session “Integrating Federal Efforts to Support Environmental Markets”, ACES Conference, December 2012

External USGS SILPE review workshop held at UNM, February 2012.

SESYNC, National Socio-Environmental Synthesis Center, Annapolis, MD, March 2012.

“Valuing Ecosystem Services: An Integrated Modeling Approach”, Plenary: Ecological Thresholds: Fire, Water and Climate, Joint Annual Meeting of the Wildlife Society and American Fisheries Society, January 2013.

“The Value of Information from a GRACE-Enhanced Drought Severity Index”, 2013, American Geophysical Union, San Francisco, CA, (with Kuwayama, Y, R. Bernknopf, B. Zaitchik, M. Macauley, and M. Rodell).

“An Economic Analysis of the Value of Information from a GRACE-Enhanced Drought Severity Index”, 2013, NASA Applied Sciences Program, Water Resources Meeting.

Workshop: NetRA Proof of Concept, participants- Sandia National Laboratory, USGS, UNM, Oct 2014.

Workshop: Workshop and 5th Progress Meeting of the joint EU-USA SWAN Project, University of Arizona, 10– 15 Nov 2014.

Measuring the Value of Earth Observation Information with the Gravity Research and Climate Experiment (GRACE) Satellite, Dec 2014, American Geophysical Union, San Francisco, CA, (Bernknopf, R., Y. Kuwayama, D. Brookshire, M. Macauley, B. Zaitchik, S. Pesko, P. Vail, and A. Thompson).

Invited workshop: Science and Decisions Center, USGS, Multi-Resource Analysis (MRA), Denver, CO, April 7-8, 2015, (D. Brookshire, R. Bernknopf, V. Tidwell, C. Broadbent, C. Babis, and D. Adhikari)

Invited workshop: Integrating Landscape Approaches and Multi-Resource Analysis into Natural Resource Management; National Academies of Sciences, Washington DC, June 2, 2015, Presentation entitled “ NetRA Resource Assessment”, (R. Bernknopf, D. Brookshire, R. Bernknopf, V. Tidwell, C. Broadbent, C. Babis, and D. Adhikari)

“Substitutability of Ecosystem Services: A Choice Experimental Approach Valuing Semi-Arid Ecosystems”, Western Economic Association Meeting, Hawaii, June 30, 2015, (C. Broadbent, D. Brookshire. and R. Bernknopf).

“A Conceptual Market Framework for Nitrate Loading in the Tensas River Basin in the Lower Mississippi Valley”, Western Economic Association Meeting, Hawaii, June 30, 2015, (C. Broadbent, R. Bernknopf, and D. Brookshire)

“The Value of Information from GRACE-Enhanced Drought Severity Index”, American Geophysical Union Dec 8-13, San Francisco, (Bernknopf, R., D. Brookshire, Y. Kuwayama, M. Macauley, M. Rodell, B. Zaitchik, A. Thompson, and P. Vail)

“Net Resource Assessment (NetRA): A Collaborative Effort Between USGS Science and Decisions Center, the Science Impact Laboratory for Policy and Economics (University of New Mexico) and Sandia National Labs”, American Geophysical Union Dec 8-13, 2015, San Francisco, (D. Brookshire, R. Bernknopf, C. Broadbent, V. Tidwell, D. Adhikari, and C. Babis)

“How Much is Your Ecosystem Worth? Trans-Disciplinary Science-Based Ecological Valuation in the Semiarid Southwest”, Poster at the International Conference on Open Knowledge: Bridging Perspectives to Address Water Challenges”, Organized by the Sustainable Water Action Network (SWAN), Feb 16-17, , 2016, Tucson, AZ (Brookshire, D., D.

Goodrich, J. Thacher, C. Broadbent, M. Dixon, A. Brand, K., Benedict, K. Lansey, J. Stromberg, S. Stewart, and M. McIntosh).

“The Value of Information from a GRACE-Enhanced Drought Severity Index”, Data to Decisions: Valuing the Societal Benefit of Geospatial Information, March 10-11, 2016, Paris, France (R. Bernknopf, D. Brookshire, Y. Kuwayama, M. Macauley, M. Rodell, A. Thompson, P. Vail, B. Zaitchk)

XIV. POSTER PRESENTATIONS

User Studies in the Interior West: Investigating Current Uses of Climate Information and User Needs: Case Study II- An Exploratory Assessment of the Potential for Improved Management of Water Resources through Increased Use of Climate Information in Three Western States and Selected Tribes, NOAA Principle Investigators Conference 2002, (with C. Howe, J.D. Weiner, D. McCool, G. Smoak, C. Garcia)

Western Water Market Prices and the Economic Value of Water, 1) SAHRA annual meeting, Tucson AZ, February 25, 2002, 2) AERE World Congress 2002, Monterey CA, June 22, 2002, (with M. Ewers, P. Ganderton, and J. Little)

Modeling Optimal Water Allocation in the Middle Rio Grande: A Powersim Application, New Mexico WRI conference, Socorro NM, August 13, 2002, (with J. Chermak, M.Ewers, and M.Pease).

Are There Any Water Rights Left to Trade in the Middle Rio Grande? 1) New Mexico WRI conference, Socorro NM, August 13, 2002 and 2) AAG conference, Laredo TX, November 2002, (with M. Ewers, O. P. Matthews, and M. Pease).

Exploratory Assessment of the Potential for Improved Water Management by Increased Use of Climate Information in Three Western States, NOAA Future Plans Conference, October 2002, Charleston, SC, (with C. Nunn-Garcia).

Using Experiments to Fill Data Gaps: Improving Estimates of Consumer Response in the Case of Residential Water Market, SAHRA 3rd Annual Meeting, October, 2003, Tucson, Arizona (with J. Chermak, K. Krause).

Water Allocation in the Middle Rio Grande, SAHRA 3rd Annual Meeting, October, 2003, Tucson, Arizona, (with K. Krause, J. Chermak, A. Demint, R. Watson, O. P. Mathews).

An Optimal Crop Model Applied to the San Luis Valley, Colorado, SAHRA 3rd Annual Meeting, October, 2003, Tucson, Arizona, (with M. Ewers, J. Chermak, E. Hepker).

Towards a Market Based System for Water Resources on the Rio Grande Basin, session at the SAHRA Fourth Annual Meeting. Albuquerque, NM, October 2004, NM (with D

Coursey, V. Tidwell, A. Demint, K. Carpenter and J. Roach).

On the Feasibility of a Water Banking Institution for the Middle Rio Grande Valley, 1) SAHRA annual meeting, Albuquerque, NM October, 2004 and 2) 2nd International Transboundary Conference, November 2004, Tucson, Arizona and at the American Geophysical Union meeting, San Francisco, CA December 2004.

“Integrated Modeling and Ecological Valuation”, SAHRA Fifth Annual meeting, Tucson AR, October 2005, (with, J. Stromberg, S.Stewart, A. Brand, D. Goodrich, M. Dixon, T. Maddock III and J. Thacher).

“Voluntary market-Based System for Water Transfers Within the Middle Rio Grande Basin”, SAHRA Fifth Annual meeting, Tucson AR, October 2005, (with A. Demint, C.Broadbent, J. Grandy, F. Miller, D.n Coursey, V. Tidwell, K. Carpenter, J.Roach, R. Vasquez).

“The Development of a Physical Based Hydrologic Model to Assess Water Markets/Banking on the Rio Grande, SAHRA Fifth Annual meeting, Tucson AR, October 2005, (with R. Naranjo, D. Boyle, G.Lamorey, S.Bassett, H. Gupta).

“The Role of Geo-Science in Natural hazard Risk Management: Evidence from Web-Based Experiments”, European Geosciences Union, General Assembly, Vienna Austria, April, 2006, (with P. Ganderton, R. Bernknopf)

“The Development of a Physically Based Hydrologic Model to Assess Water Markets/ Banking on the Middle Rio Grande, NM”, Sustainability in semi-Arid Hydrology and Riparian Areas 6th Annual meeting, Phoenix, AZ, October 2006,(with R. Naranjo, D. Boyle, S. Markstrom, H. Gupta, G. Leavesley)

“Integrated Modeling and Ecological Valuation”, Sustainability in semi-Arid Hydrology and Riparian Areas 6th Annual meeting, Phoenix, AZ, October 2006 , (with A. Brand, J. Thacher, M. Dixon, D. Goodrich, K.I Benedict, J. Stromberg, S. Stewart, M. McIntosh, T. Maddock III).

“A Stylized Model for Water Leasing with a Focus on the Middle Rio Grande, Sustainability in semi-Arid Hydrology and Riparian Areas 6th Annual meeting, Phoenix, AZ, October 2006, with C. Broadbent, D. Coursey, V. Tidwell).

“Issues in the Development of a Water Leasing Model in the Mimbres Basin, NM”, Sustainability in semi-Arid Hydrology and Riparian Areas 6th Annual meeting, Phoenix, AZ, October 2006, (with C. Broadbent, D. Coursey, d V. Tidwell).

A Water Leasing Framework for the Middle Rio Grande with a focus on the Farmers Decision Making Process, Sustainability in semi-Arid Hydrology and Riparian Areas 6th Annual meeting, Phoenix, AZ, October 2006,(with C. Broadbent, D Coursey, V. Tidwell).

Leasing in the Middle Rio Grande using Futures Markets, Sustainability of semi-Arid Hydrology and Riparian Areas annual meeting 2007, given at the Third Biennial Rio Grande Day Water, (with C. Broadbent, D. Coursey, V. Tidwell, R. Vasquez).

Issues in the Development of a Water Leasing Model in the Mimbres Basin, NM; Sustainability of semi-Arid Hydrology and Riparian Areas annual meeting, 2007, (C. Broadbent, D. Brookshire, D. Coursey, V. Tidwell, A. Williams, W. Cain, M. McIntosh).

Integrated Modeling and Ecological Valuation; Sustainability of semi-Arid Hydrology and Riparian Areas annual meeting, 2007, (with D. Goodrich, J. Thacher, K. Benedict, A. Brand, C. Broadbent, M. McIntosh, S. Stewart, T. Maddock, J. Stromberg, M. Dixon).

Establishing Prototype Water Leasing Markets in New Mexico, Sustainability of semi-Arid Hydrology and Riparian Areas annual meeting, October 2008, (with C. Broadbent, D. Coursey, V. Tidwell, R. Vasquez).

Complex Ecosystem Valuation: A Case Study in the San Pedro and Rio Grande”; Sustainability of semi-Arid Hydrology and Riparian Areas annual meeting, October 2008, (with C. Broadbent, J. Thacher, L.A. Brand, M. Dixon, K. Benedict, J. Stromberg, D. Goodrich, K. Lansey, M. McIntosh, S. Stewart).

Futures Contracts in Water Leasing”, University of New Mexico Department of Economics Research Day, April 2008, (with C. Broadbent, D. Coursey, V. Tidwell and Ramon Vasquez).

“Assessment of the Feasibility of Water Leasing in the Middle Rio Grande, NM Using a Hydrologic Model, SAHRA Annual Meeting, Tucson, AZ, Sept 2009 (with C. Garner, D. Boyle, S. Basset, S. Markstrom, D. Brookshire, C. Broadbent, D. Coursey, V. Tidwell, H. Gupta, E. Triana).

“Establishing Proto-Type Water Leasing Markets in New Mexico”, SAHRA Annual Meetings, Sept. 2009, Tucson, AZ, (with C. Broadbent, D. Coursey, V. Tidwell).

“How Much is Your Ecosystem Worth? Science-Based Ecological Valuation in the Semiarid Southwest, American Geophysical Union Chapman Conference, Sun Valley, ID, Oct 2009, (with D. Goodrich, J. Thacher, C. Broadbent, M. Dixon, A. Brand, K. Benedict, K. Lansey, J. Stromberg, S. Stewart and M. McIntosh).

“Earth Observation for Regional Scale Environmental and Natural Resources Management”, 2013, American Geophysical Union, San Francisco, CA, and 2014 GEO-X Ministerial Summit, Geneva, Switzerland (with Bernknopf, R., B. Bridge, C. Broadbent, S. Faulkner, and B. Chivoiu).

“Earth Observation for Regional Scale Environmental and Natural Resources Managemen”t,

GEO-X Ministerial Summit, Geneva, Switzerland, poster (Bernknopf, R., D. Brookshire, B. Bridge, C. Broadbent, S. Faulkner, and B. Chivoiu, invited), 2014.

XV. REVIEWER FOR:

National Oceanographic and Atmospheric Administration; National Science Foundation; National Sea Grant College Program; New Mexico Water Resources Institute; U.S. Environmental Protection Agency; University of California, California Sea Grant Program; Wyoming Water Resources Research Center; American Geophysical Union.

American Economic Review; American Journal of Agricultural Economics; Economic Geography; Economic Inquiry; Environment and Planning A; Journal of American Real Estate and Urban Economic Association; Journal of Economic Behavior and Organization; Journal of Environmental Economics and Management; Natural Resources Journal; Water Resources Research; Western Journal of Agricultural Economics; Land Economics; World Development; Resources for the Future.

XVI. CONSULTANT TO:

Bonneville Power Administration; Development Technologies Inc.; Federal Emergency Management Agency; Los Alamos Scientific Laboratory; Mathematica, Inc.; National Commission on Air Quality; The National Indian Youth Council; The State of Colorado; The State of Wyoming; Township of Ruidoso; U.S. Department of the Interior; U.S. Fish and Wildlife Service; U.S. Environmental Protection Agency; U.S. Forest Service, State of New Mexico, Industrial Economics, Applied Technologies Council, ABS Consulting, Industrial Economics, State of New Mexico.

XVII. RESEARCH CONTRACTS

(PD: Project Director; PI: Principle Investigator; Co-PI: Co-Principle Investigator)

Estimation of Aesthetic Damages of Air Pollution from Coal Burning Power Plants, Electric Power Research Institute, 1976-1977, \$75,545. Co-PI (with R. d'Arge and T. Crocker)

Measurement of the Value of Wildlife through Application of a Bidding Game Survey, U.S. Fish and Wildlife Service, 1976-1978, \$138,349. PD (with R. d'Arge and T. Crocker)

Development and Application of a Household Production Approach to the Valuation of Fish and Wildlife Resources, U.S. Fish and Wildlife Service, 1976-1978, \$56,547. PD (with R. d'Arge and T. Crocker)

Methods Development for Assessing Tradeoffs in Environmental Management, U.S. Environmental Protection Agency, 1976-1980, \$869,713. Co-PI (with R. d'Arge, T. Crocker, and W. Schulze)

Energy and Environment Coal Transport Task Force, National Science Foundation, 1977-1979, \$50,000. Co-PI (with H. Bergman)

Strategic and Long Range Environmental Policies for the State of Wyoming, The Ford Foundation, 1977-1978, \$66,900. Co-PI (with R. d'Arge)

Environmental Aspects of Solar Energy Deployment, Los Alamos Scientific Laboratory, 1978-1979, \$19,856. Co-PI (with W. Schulze)

Methods Development for Assessing Air Pollution Control Benefits, U.S. Environmental Protection Agency, 1979-1980, \$455,000. Co-PI (with R. d'Arge, T. Crocker, and W. Schulze)

Methods Development for Assessing the Value of Hazard Information, U.S. Geological Survey, 1979-1980, \$149,997. PD (with W. Schulze and J. Tschirhart)

The Economics of Big Game Management in the Conifer Forests of the Black Hills and Rocky Mountains, U.S. Forest Service Rocky Mountain Forest and Range Experiment Station, 1980-1982, \$5,000. PI

Methods Development for the Benefit-Cost Analysis of Natural Hazards Information, U.S. Geological Survey, 1981-1982, \$149,961. PD (with W. Schulze and J. Tschirhart)

Methods Development in Measuring Benefits of Environmental Improvements, U.S. Environmental Protection Agency, 1981-1983, \$536,181. Co-PI (with R. d'Arge, T. Crocker, and W. Schulze)

An Economic Analysis of Private Sector Benefits and Potential for Cost of the National Coal Resources Data System, U.S. Geological Survey, 1983, \$30,000. PD (with W. Schulze)

The Economics of Landslide Prediction, U.S. Geological Survey, 1983, \$151,000. Co-PI (with R. Bernknopf and R. Campbell)

Experimental Methods for Assessing Environmental Benefits, U.S. Environmental Protection Agency, 1983-1984, \$441,768. Co-PI (with R. d'Arge, T. Crocker, S. Gerking, and W. Schulze)

Socioeconomic Impacts of Volcano and Earthquake Hazards Warnings in the Mammoth Lakes Region of California, U.S. Geological Survey, 1984, \$45,000. Co-PI (with H. Jenkins-Smith and M. Thayer)

Improving Accuracy and Reducing Costs of Environmental Benefit Assessments, U.S. Environmental Protection Agency, Subcontract from the University of Colorado-Boulder, 1984-1987, \$292,456. Co-PI (with D. Coursey)

Socioeconomic Effects of Volcano and Earthquake Hazards Watches, U.S. Geological Survey, 1985, \$6,250. Co-PI (with R. Bernknopf)

Landslide Prediction and Economic Analysis, U.S. Geological Survey, 1986-1989, \$14,750. Co-PI (with R. Bernknopf)

Laboratory Studies of the Expected Utility Hypothesis, Experimental Program to Stimulate Competitive Research (EPSCoR), National Science Foundation, 1986-1989, \$107,195. PI (with D. Coursey)

Valuing Information: A Case Study of U.S.G.S. Geologic Maps, U.S. Geological Survey, 1987-1989, \$5,000. Co-PI (with M. McKee)

Response of the Insurance Industry to Geotechnical Information, U.S. Geological Survey, 1987-1989, \$5,000. Co-PI (with M. McKee)

An Economic Analysis of Sandstone Dam and Reservoir, Wyoming Water Development Commission, 1988, \$72,000. Co-PI (with G. Watts)

An Analysis of Contemporary and Historical Economics Associated with Water Development Projects in Wyoming, Wyoming Water Research Center, 1989-1990, \$58,620. Co-PI (with R. Cummings and G. Watts)

An Economic Analysis of Platte River Compact, Attorney Generals Office, Wyoming, 1990-1994, \$5,000. Co-PI (with G. Watts)

Indirect Losses from Earthquakes, Development Technologies (for FEMA), 1991, \$15,500. Co-PI (with M. McKee)

An Economic Analysis of Blackfeet Indian Water Rights Claims, Attorney Generals Office, Montana, 1991-1994, \$15,000. Co-PI (with G. Watts)

Identification of the Limited Resource Farmer Through the Utilization of the National Resource Inventory Data and Incentives for the Limited Resource Farmer to Adopt SCS Programs, USDA Soil Conservation Service, 1992-1993, \$35,000.00. Co-PI (with S. Ben-David, R. Cummings, and M. McKee)

Application of a Stochastic Cost-Effectiveness Model to Groundwater Remediation, Los Alamos National Laboratory, 1992-1993, \$69,690. PD (with M. McKee)

Evaluation of the Economic Costs of Designation Critical Habitat in the Colorado River Basin, U.S. Fish and Wildlife Service, 1992-1994, \$240,000. PD (with M. McKee)

Existence Values and Option Prices for Environmental Public Goods, National Science

Foundation, 1992-1993, \$43,237.00. Co-PI (with P. Ganderton and M. McKee)

Evaluation of the Benefits of Increased Reliability: Case Studies of the Direct and Indirect Economic Losses of Lifeline Failures, Los Alamos National Laboratory, 1993, \$49,996. PD (with M. McKee)

Evaluation of Earthquake Loss Estimation Methodology, National Institute of Building Sciences, 1993-1996, \$57,090. Co-PI (with Project Work Group)

Case Study 1: Regional Economic Impact of Earthquake-triggered Hazards in Santa Clara, California; Case Study 2: Regional Economics Impact of a Climate Change in the Rio Grande Basin, New Mexico, United States Geological Survey, 1994, \$40,000. PD (with B. Berrens, P. Ganderton, and M. McKee)

Market Uncertainty and Efficiency in Emission Allowance Trading Institutions: An Experimental Laboratory Investigation, Electric Power Research Institute, 1994, \$100,000. Co-PI (with S. Bemen, S. Ben-David, and M. McKee)

Economic Impacts due to Designation of Critical Habitat for the Woundfin, Virgin River Chub, and Virgin Spinedace, U.S. Fish and Wildlife Service, 1994-1995, \$125,000. Co-PI (with M. McKee)

Economic Impacts of Critical Habitat for Endangered Species on Tribal Lands, U.S. Fish and Wildlife Service, 1995-1996, \$40,000. Co-PI (with M. McKee)

Land-Use Values and Non-Market Values for the Rio Puerco Basin, United States Geological Survey, 1995-1997, \$49,998. PD (with B. Berrens and M. McKee)

Preference Formation and Elicitation in Valuing Non-Market Goods, Environmental Protection Agency, 1996-1997, \$184,997. PD (with B. Berrens, P. Ganderton, H. Jenkins-Smith, H. Kaplan and M. McKee)

“Valuing Earth Science Information,” U. S. Geological Survey, 1998-1999, \$25,000. PD (with P. Ganderton, and M. McKee).

“Sustainable Water Resources Development: Valuation of Water in the Americas,” National Oceanic and Atmospheric Administration, 2000, \$20,000, Co-PI (with O.P. Matthews and M. Campana).

“Cost Benefit Study – The Value of Information,” U.S. Geological Survey, 1999-2002, \$200,00, Co-PI (with P. Ganderton).

“An Exploratory Assessment of the Potential for Improved Water Management by Increased Use of Climate Information in Three Western States,” National Oceanic and Atmospheric Administration, 1999-2001, \$177,000, Co-PI (with C. Howe, and D. McCool).

- “A Quantitative Assessment of the Economic and Institutional Impacts of Climate Change on the Upper Rio Grande Valley Using an Integrated Geographic System,” National Science Foundation, 2000-2003, \$671,000, Co-PI (with L. Scuderi, O.P Matthews, M. Campana, J. Chermak).
- “An Integrated GIS Framework for Water Allocation and Decision-Making in the Upper Rio Grande Valley,” U.S. Environmental Protection Agency, 2000-2003, \$451,000, Co-PI (with L. Scuderi, O.P Matthews, M. Campana, J. Chermak and K. Krause).
- “Fully Integrated System Dynamics toolbox for Water Resources Planning”, Sandia National Laboratory, 2004-2006, \$240,000, Co-PI, (with J. Chermak)
- “ Efficient Management of the Water Resources in a Semi-arid Region”, National Science Foundation – Science and Technology Center at the University of Arizona (Center title-- Sustainability in semi-Arid Hydrologic Riparian Areas, 2000-2009, years 1-7 (approx. \$950,000), UNM -- \$112,000 for year 8 as of January 1, 2007, Director of the Economic studies and serving on the Executive Committee to the Center, Project Director is J. Shuttleworth, University of Arizona, PD, (with J. Chermak)
- “ Integrated Modeling and Ecological Valuation”, U.S. Environmental Agency, start date of May 2004 to 2007, \$386,000, PD, (with S. Stewart, J. Stromberg)
- “Science Impact Laboratory for Policy and Economics”, U.S. Geological Survey, 2002, establishes a center for a period of 5 years, years 1, 2, 3 and 4 \$200,000.
- “Decision Support Modeling to Aid in the Design of Water Banks for New Mexico”, 2006, Sandia National Laboratories, \$101,000.
- “Externalities and the Everglades: A Focus on Surroundings Land Use Options”, USGS, 2006, supplemental funding to Science Impact Laboratory for Policy and Economics, \$15,000
- “Use of USGS Information in Water Leasing Institutions”, USGS, 2006, supplemental funding to Science Impact Laboratory for Policy and Economics, \$15,000
- “Efficient Management of the Water Resources in a Semi-arid Region”, National Science Foundation – Science and Technology Center at the University of Arizona -- Center title-- Sustainability in semi-Arid Hydrology and Riparian Areas, 2000-2009, UNM -- \$113,000 for year 9 (Economics and Biology Depts).
- “Efficient Management of the Water Resources in a Semi-arid Region”, National Science Foundation – Science and Technology Center at the University of Arizona -- Center title-- Sustainability in semi-Arid Hydrology and Riparian Areas, 2000-2010, UNM -- \$145,000 for year 10 (2009) (Economics and Biology Depts.)

“Ecosystem Valuation”, National Science Foundation – Science and Technology Center at the University of Arizona -- Center for Sustainability in semi-Arid Hydrology and Riparian Areas, 2008, \$83,000.

“Science Impact Laboratory for Policy and Economics”, new 5 year MOU with USGS, 2008, \$50,000.

“Establishing a Water Leasing Market for the Mimbres River, New Mexico”, Water 2025 Challenge Grant Submitted in Conjunction with the Office of the State Engineer in New Mexico to the Bureau of Reclamation (\$1 million total, \$650,000 OSE Cost share match and \$250,000 to Sandia National Laboratories, UNM portion \$100,000).

SILPE Center proposal to USGS, “Memorandum of Agreement (MOU) between the University of New Mexico (UNM) and U.S. Geological Survey (USGS): Management Plan and Resource Agreement for Science Impact Laboratory for Policy and Economics (SILPE)”, \$50,000 (first year new 5 year MOU).

Interstate Stream Commission, “Gila Economic Forum”, \$50,000 to NMSU with sub award to UNM, \$17,000.

SILPE Center, Modeling Carbon Sequestration, USGS, \$14,000.

SILPE Center Proposal - “Lower Mississippi Valley Ecosystems Assessment”, USGS, \$50,000.

SILPE Center proposal - , “Memorandum of Agreement (MOU) between the University of New Mexico (UNM) and U.S. Geological Survey (USGS): Management Plan and Resource Agreement for Science Impact Laboratory for Policy and Economics (SILPE)”, \$50,000 (second year of 5 year MOU).

SILPE Center proposal to USGS, “Memorandum of Agreement (MOU) between the University of New Mexico (UNM) and U.S. Geological Survey (USGS): Management Plan and Resource Agreement for Science Impact Laboratory for Policy and Economics (SILPE)”, \$96,000 (3rd MOU of 5 years).

SILPE Center Proposal - “Collaborative Research: WSC-Category 3 - Climate and Population Change and Thresholds of Peak Ecological Water: Integrated Synthesis for Dryland Rivers”, (with T. Miexner (PD), J. Stromberg, F. Dominguez, G. Duan, T. Maddock, D. Plane, National Science Foundation, Total Grant \$1.4 million, UNM \$454,000.

“The Value of Information from a GRACE-Enhanced Drought Severity Index”, NASA, Co PI, (with R. Bernknopf, Y. Kuwayama, M. McCauley, Ben Zaitchik); Total Grant \$347,000, UNM share \$161,000

SILPE Center proposal to USGS, “Memorandum of Agreement (MOU) between the University of New Mexico (UNM) and U.S. Geological Survey (USGS): Management Plan and

Resource Agreement for Science Impact Laboratory for Policy and Economics (SILPE)",
New \$46,000, Total for cooperative agreement \$500,000) (December 2014-5th year).

SILPE Center proposal to USGS: New Memorandum of Agreement (MOU) between the
University of New Mexico (UNM) and U.S. Geological Survey (USGS). Program Title:
"A Focus on Resource, Ecological and Social Economic Analysis", 5/1/2015 to
4/30/2020, year 1 funds -- \$55,385.00.

XVIII. UNIVERSITY SERVICE

UNIVERSITY SERVICE - UNIVERSITY OF WYOMING

Member, Commerce and Industry Planning Committee, 1977-1978;
Chair, Commerce and Industry Planning Committee, 1978-1979;
Solar Energy Advisory Council 1979;
Advisory Board for *Wyoming Issues* 1979;
Member, Committee for Drafting Proposal for the Establishment of a Minerals Institute, 1979;
Member, Commerce and Industry Computer Advisory Committee, 1980-1981;
Computer Policy Committee, College of Commerce and Industry, 1983, 1985;
Advisory Committee, Institute for Policy Research, 1984-1985;
University Equipment Priorities Committee, 1985;
Member, Dean's Selection Committee for the College of Commerce and Industry 1986;
Stroock Professorship Search Committee, 1986;

DEPARTMENTAL SERVICE - UNIVERSITY OF WYOMING

Member, John S. Bugas Committee, Department of Economics, 1982-1983;
Member, Ph.D. Macroeconomic Comprehensive Committee, 1977;
Member, Ph.D. Resource Field Comprehensive Committee, 1978;
Recruited graduate students at California State University, San Diego, 1979;
Member, Ph.D. Microeconomic Comprehensive Committee, 1979;
Member, Ph.D. Dissertation Committee, Robert L. Horst, Jr. 1980;
Chair, M.S. Plan B Committee, Steven Furtney 1980;
Member, Ph.D. Dissertation Committee, Larry Eubanks 1980;
Member, Ph.D. Dissertation Committee, Narongsakdi Thanavibulchai 1982;
Member, M.S. Plan B Committee, John Eastwood 1983; Graduate Admissions Committee,
Department of Economics, 1984-present;
Chair, John S. Bugas Committee, Department of Economics, 1984;
Department Super-User; Departmental Representative on Computer Committee 1985;
Advisor for College of Commerce and Industry Economic Majors 1985;
Member, Ph.D. Dissertation Committee, Mark Dickie, 1986;
Chair, Ph.D. Dissertation Committee, Doug Redington, 1989

UNIVERSITY SERVICE - UNIVERSITY OF NEW MEXICO

Senior Promotion and Tenure Committee, College of Arts and Sciences, Spring 1992;
Provost's Privatization Committee 1998;
Chair, Department of Economics, 1993 to 2000;
Steering Committee-Water Resources Program 1998 to 2002
Faculty Senate 2009 – 2011

DEPARTMENTAL SERVICE- UNIVERSITY OF NEW MEXICO

Department of Economics Recruitment Committee, 1990, 1991;
Ph.D. Resource and Environmental Economics Curriculum Committee;
Visiting Speaker Chair, 1991;
Ph.D. Theory Comprehensive Committee, 1991, 1992;
Ph.D. Resource and Environmental Comprehensive Committee, 1991 to 2002;
Department of Economics Compensation Committee, 1991;
Department of Economics Graduate Director, 1992;
Member, Dissertation Committee, Helen Neil 1992;
Chair, Dissertation Committee Christian Schmidt 1997;
Chair, Dissertation Committee, Steven Stewart 1998;
Co-Chair, Dissertation Committee Hale Thurston 1999;
Member, Dissertation Committee Jim Cash, 1999;
Chair, Professional Project Report, Water Resources Program, Hirotaka Sato, 1999
Co-Chair, Dissertation Committee Mary Ewers 2004
Experimental Lab Coordinator, 2004 - present
Committee on Studies, 2005, Jake Gandy,
Chair, Alyssa Neir, Professional paper, Water Resources Program, 2005
Chair, Craig Broadbent, Dissertation 2009