

***Dividing the Waters:***  
A Dialog for Judges, Masters, and Referees

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*A project for Judges, Masters, and Referees involved in western general stream adjudications  
and other complex water litigation made possible with grants from  
the Hewlett Foundation and the General Service Foundation.*

**Science for Judges Workshop**  
**April 27-29, 2003**  
**Snowbird Resort, Utah**

A G E N D A

**Ground/Surface Water Interaction Workshop**  
*(Meeting rooms to be announced)*

**Sunday, April 27, 2003**

6:00 p.m.      Opening Reception – Informal, food and cash bar  
Welcome to Utah by *Chief Justice Christine Durham*

**Monday, April 28, 2003**

7:00-8:00      Breakfast Buffet (provided)

8:00            Introduction: *Justice Greg Hobbs, Colorado Supreme Court*

8:15-9:15      Overview of Ground/Surface Water Interaction: Discussion between hydrologist and judge/attorney. The first 30 minutes of the discussion is an exchange between the hydrologist and judge and at this point the audience would be encouraged to join  
*Tom Maddock, Professor of Hydrology and Water Resources, University of Arizona*  
*Senior Judge Dan Hurlbutt, Idaho*

9:15-10:15    The Hydrology of Ground/Surface Water Interaction: Technical presentation that follows the above discussion  
*Tom Maddock*

10:15-10:30    Break

10:30-11:30    An Example of Interaction: Effects of ground-water pumping on aquifer inflow/outflow components  
*Stan Leake, U.S. Geological Survey*

**Monday, April 28, 2003 (continued)**

- 11:30-12:30 Case Study Problem on Ground/Surface Water Interaction: This problem (long term effect of ground-water pumping) could be “solved” in one large group or several smaller groups working with the experts  
*Dave Prudic, U.S. Geological Survey*  
*Bill Woessner, University of Montana*  
*Others to be announced*
- 12:30-1:45 Lunch (provided)  
“Science and Water Management in the Context of Global Change,”  
*Kathy Jacobs, Special Assistant for Policy and Planning, Arizona*  
*Department of Water Resources*
- 1:45-2:30 Measurement and Data Issues in the Context of Ground/Surface Water Interaction: Discussion of technical problems of data gathering (measurement), quality of data, time dependent issues, and relative quality of ground/surface water data  
*Jim Constantz, U.S. Geological Survey*
- 2:30-3:45 The Role of Data in Modeling  
*Bill Woessner*
- 3:45-4:00 Break
- 4:00-5:00 Case Studies that Illustrate Overall Principles of Interaction and Measurement/Data Issues (Maddock, Leake, and others lead small group discussions):
- Kansas/Colorado on the Arkansas
  - San Pedro
  - Templeton/Pecos Valley
  - Carson River
  - Yellowstone
- 5:00-5:15 Brief Summary of Data Quality Act (implications for Ground/Surface water data issues)  
*Carolyn Brickey*
- 5:00-5:30 First Day Wrap-up and General Discussion of Cases
- 6:30 Dinner (provided)  
“Water Follies: The Impact of Groundwater Pumping on the Environment”  
*Robert Glennon, Professor of Law, University of Arizona*

**Tuesday, April 29, 2003**

7:00-8:00 Breakfast Buffet (provided)

8:00-8:45 Ground/Surface Water Modeling: The Structure and Data Requirements of MODFLOW: Discussion of how the model is constructed, the major assumptions and the limitations it has  
*Bill Woessner, Stan Leake*

8:45-9:30 Relationship between Data Quality and Model Results  
*Tom Maddock, Jim Constantz*

9:30-9:45 Break

9:45-11:30 Case Study: Use of the modeling in forecasting the effects of ground-water pumping on the Carson River  
*Dave Prudic*

11:30-12:30 General Wrap-Up of Workshop: the points to remember

Lunch on your own

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## **Science for Judges Workshop** **April 27-29, 2003** **Snowbird Resort, Utah**

### **BIOGRAPHICAL SKETCHES**

**CAROLYN BRICKEY** is Project Administrator of *Dividing the Waters*, a foundation-funded (Hewlett Foundation and General Service Foundation) project designed to further the resolution of general stream adjudications in the western United States. She has served in that role since the project's inception in 1993.

Ms. Brickey is an attorney and consultant, principally about environmental policy. Ms. Brickey is Executive Director of the Protected Harvest. Protected Harvest promotes the development and use of eco-labeling for sustainably grown food and certifies Healthy Grown potatoes for the Wisconsin Potato & Vegetable Growers Association.

Ms. Brickey is Executive Director of the Institute for Environment and Agriculture which is focused on sustainable agriculture and environmental protection. For seven years Ms. Brickey directed The National Campaign for Pesticide Policy Reform which helped to spearhead the enactment of the "Food Quality Protection Act of 1996," a new law designed to protect children from exposure to harmful pesticides.

Of special expertise and experience are governmental policy-making in water, environmental toxins, food safety, drug law, and the regulatory process. Ms. Brickey is currently serving on the EPA Pesticide Policy Dialogue Committee, the EPA Committee to Advise on Risk Assessment and Transition, and, until recently, the USDA Advisory Committee on Agricultural Biotechnology. She serves on the Dow Agro-Sciences Global Stewardship Council.

Previously, Ms. Brickey chaired the National Organic Standards Board, an advisory board that assists the Secretary of Agriculture in the implementation of the national organic program. Clients have included the World Wildlife Fund, the Arizona-Sonora Desert Museum, the Centers for Disease Control and Prevention, the Natural Resources Defense Council, Environmental Defense, and the Gerber Food Company.

Ms. Brickey served as Senior Counsel to the Chairman of the U.S. Senate Agriculture, Nutrition, and Forestry Committee until May 1992. In that capacity she specialized in environmental issues and managed legal and policy strategy for Chairman Patrick Leahy. She helped draft the 1990 Farm Bill, and was the lead drafter of the pioneering Federal Insecticide, Fungicide and Rodenticide Act of 1988. She obtained her law degree from Georgetown University Law Center in 1979.

**JAMES CONSTANTZ**, National Research Program, Water Resource Discipline, U.S. Geological Survey. I came to the USGS in 1980 after completing a Ph.D. at the University of California, Berkeley. I am the chief of the research project, “Environmental Tracers for examining surface-water/ground-water interactions.” I’m first author on 30+ scientific articles, and I’m the leading authority on the use of heat as a tracer of stream changes with ground water.

**BARBARA COSENS** is an Assistant Professor in the Environmental Studies Program at San Francisco State University. She is also currently mediating efforts to settle water distribution disputes on the Walker River in California and Nevada. Barbara is a member of the Montana, Colorado and California bars. She received her LL.M. from Northwestern School of Law at Lewis and Clark College in 2003, and her J.D. from the University of California, Hastings College of the Law in 1990, where she graduated *magna cum laude*. As a law student, Barbara worked for the California Attorney General’s Office in Environmental Law. She also worked for the Natural Heritage Institute researching the legal/policy aspects of proposed technical solutions to the agricultural drainage problem in the San Joaquin Valley, as part of the San Joaquin Valley Drainage Project. Her research focused on solutions requiring integrated management of surface and groundwater. Following law school, she clerked for Justice Lohr of the Colorado Supreme Court. Barbara joined the staff of the Montana Reserved Water Rights Compact Commission in 1991. She served as chief legal counsel for water right negotiations between the Commission and the National Park Service, which resulted in protection of the hydrothermal system within Yellowstone National Park. She also served as chief legal counsel to Montana on negotiations with the U.S. Fish and Wildlife Service, the Chippewa Cree Tribe of the Rocky Boy’s Reservation, the Gros Ventre and Assiniboine Tribes of the Fort Belknap Reservation and the Blackfeet Tribe. Law is her second career. Barbara received her M.S. in Geology from the University of Washington in 1982, and her B.S. in Geology from the University of California at Davis in 1977. As a geologist, she did applied research in the exploration and development of geothermal energy in California, Japan, and the Philippines, focusing in particular on the effect of geothermal development on surface hydrothermal systems.

**KATHY DOLGE** is assistant to Special Master George A Schade, Jr., in Phoenix. Kathy joined the office of the Special Master in December 1990, just six months after John Thorson was appointed by the Arizona Supreme Court to be the first Special Master. Kathy’s initial duties included establishing systems and procedures for the newly created office and purchasing furniture, equipment, and supplies. As the sole support staff in the office, her ongoing duties have included making all arrangements for hearings and meetings, calendaring, tracking documents, preparing budgets and monitoring expenditures, overseeing contracted staff, and document preparation, among many others.

Kathy has been responsible for many of the arrangements, logistics, and materials for the *Dividing the Waters* conferences and workshops since the project’s inception.

A native of the West, Kathy was brought to Arizona from California when she was two years old (just after the last horse and buggy left). She earned a bachelor’s degree in history with an emphasis on the Southwest from Arizona State University.

Prior to joining the office of the Special Master, she was the office manager for a sole practitioner for nearly a decade. Her husband, Dave, retired from the U.S. Army as a Lieutenant Colonel. He volunteers at the Heard Museum in Phoenix and gives many hours to Boy Scouts. Son Mike is a Captain in Field Artillery, currently serving in Operation Iraqi Freedom. The Dolges are interested in American history and geography, Native American cultures, and have traveled extensively in the United States and Europe.

**ROBERT GLENNON** is the Morris K. Udall Professor of Law and Public Policy at the University of Arizona's James E. Rogers College of Law. He specializes in American Legal History, Constitutional Law, and Water Law. Prior to joining the faculty at the University of Arizona, he taught at the University of Minnesota, the University of Illinois, and Wayne State University law schools. He has a bachelor's degree in English literature from Boston College, a law degree from Boston College, and an M.A. and a Ph.D. in American history from Brandeis University. His new book *Water Follies: Groundwater Pumping and the Fate of America's Fresh Waters* was published in October 2002 by Island Press.

**KATHARINE L. (KATHY) JACOBS** is currently Special Assistant for Policy and Planning for the Arizona Department of Water Resources (ADWR). She was the Director of the Tucson Active Management Area of the ADWR from 1988 through 2001. In 2001-2002 she worked on a special project at the National Oceanic and Atmospheric Administration focused on the interface between scientific information, policy, and decision-making. Ms. Jacobs earned her M.L.A. in environmental planning from the University of California, Berkeley. Her expertise is in groundwater management and developing practical, appropriate solutions to difficult public policy issues. She has worked in many capacities for ADWR since 1981, verifying groundwater rights, developing mandatory conservation and enforcement programs, writing statewide rules requiring the use of renewable water supplies in new subdivisions, and working within the Tucson community building consensus solutions to serious water policy conflicts. She has facilitated development of groundwater recharge facilities and regional recharge policy. She served on the National Research Council's Committee on Assessing the Future Value of Ground Water, the Synthesis Team for the U.S. National Assessment of the Potential Consequences of Climate Variability and Change, and most recently, on the NRC panel reviewing the U.S. Climate Change Science Program Strategic Plan.

**STAN LEAKE** is a hydrologist with the U.S. Geological Survey, where he has worked for more than 30 years. He has a B.S. degree in mathematics and an M.S. degree in hydrology. His main areas of work include interaction of ground water and surface water, land subsidence, and development of new capabilities for simulating processes related to ground-water flow. Currently, Stan is managing a regional study of ground-water/surface-water interaction in the desert Southwest.

**DANIEL LUECKE** is an environmental scientist and hydrologist who has worked for more than thirty years on water resources, aquatic habitat protection, and other environmental issues. He is a graduate of the University of Notre Dame and he received his Ph.D. in

Environmental Sciences from Harvard University. Before coming to the Rocky Mountains in 1980, he worked as a senior environmental engineer with a Cambridge, Massachusetts, environmental firm and taught at Harvard University' Center for Studies in Education and Development. Mr. Luecke has served on several advisory committees including the following: Colorado Water Resources Research Institute Advisory Committee on Water Policy Research; Denver Metropolitan Water Roundtable; California Department of Water Resources Technical Advisory Committee on Desalination; Advisor to the Food and Agriculture Organization of the United Nations; EPA Integrated Environmental Management Program Advisory Committee; and the Advisory Board of the Wirth Chair at the University of Colorado at Denver. He currently serves as president of the board of the Colorado Conservation Foundation and the advisory board of the University of Colorado Natural Resources Law Center and he is the past president of the board of the High Country News Foundation.

**THOMAS MADDOCK III** is the Co-Director of the University of Arizona's Research Laboratory for Riparian Studies. He is also the Associate Head of the Department of Hydrology and Water Resources at the University of Arizona, Professor of Hydrology and Water Resources, and was a Research Hydrologist for the U.S. Geological Survey.

Dr. Maddock has been a member of several editorial boards and contributes his time to various committees in the field such as the Hydrology Committee for the Lower Rio Grande Adjudication, the Texas-New Mexico Settlement Commission, and the former San Pedro Negotiation Technical Advisory Committee. In addition, he has written extensively about hydrology in various publications such as the *Hydrogeology Journal*, *Groundwater*, *Rivers*, and *Water Resources Research*. Currently, he supervises Ph.D. and Master Students in the field. He has won several honors and awards including: the Joseph Wood Krutch Award for Environmental Service, The Nature Conservancy, and the Udall Fellowship from the Udall Center for Studies in Public Policy.

Dr. Maddock received his B.S. in Mathematics at the University of Houston, his M.S. in Applied Mathematics, and his Ph.D. in Environmental Engineering from Harvard University

**JEROME C. MUYS** is president of Muys & Associates, P.C., in Washington, D.C. He is a graduate of Princeton and Stanford Law School and practices public land, water resources, and environmental law and has lectured and written extensively in those fields. He is past Chairman of the ABA's Section of Energy, Environment and Resources Law and of the Water Law Committee of the International Bar Association's Section of Energy and Resources Law. He has taught federal land and natural resources law at the University of Virginia Law School (1977-1995) and water law at George Washington University Law School (1991-1996).

Mr. Muys' experience in water resources matters includes (1) litigation involving state, federal, Indian, private, and environmental claims respecting western water resources allocation and development, including federal hydropower licensing, (2) Congressional and administrative consideration of federal-state-Indian relations, and (3) negotiations with the Bureau of Reclamation. He served as a California deputy attorney general and later as special counsel to California in *Arizona v. California*, 373 U.S. 546

(1963) (the Colorado River litigation) and subsequently has represented the Metropolitan Water District of Southern California as special counsel in later stages of that case. In 1971 he prepared a study on interstate water compacts for the National Water Commission which was the basis for the Commission's recommendations on interstate compacts in its 1973 report, *Water Policies for the Future*. He served as Special Master in *Oklahoma and Texas v. New Mexico*, 501 U.S. 221 (1991), 510 U.S. 126 (1993), a dispute over the Canadian River Compact. He presently is a consultant to the Texas Attorney General with respect to interstate issues on the Rio Grande.

**DAVE PRUDIC** graduated with a M. S. degree in Geological Engineering from the University of Missouri-Rolla in 1975. His career with the U.S. Geological Survey, Water Resources Division, began in the same year at Albany, New York. His first assignment was to characterize the hydrology and subsurface migration of radionuclides from a low-level radioactive-waste burial site in western New York. David moved to Carson City, Nevada, in 1980 to work on a Regional Aquifer Systems Analysis project of the Great Basin region and subsequently worked on large regional models of the Great Central Valley in California and the Gulf Coast region in southern United States. He has extensive field and numerical modeling experience, and during the past few years has focused his time on developing more sophisticated methods for modeling the interaction of surface water with ground water and in analyzing the effects of mine dewatering on flows along the Humboldt River in north-central Nevada.

**WILLIAM (BILL) W. WOESSNER** has been teaching classes in applied hydrogeology at the University of Montana since 1981 including classes in hydrogeology, advanced hydrogeology, groundwater modeling, applied groundwater modeling, surface water-groundwater interaction and groundwater remediation. He received his B.A. in Geology from the College of Wooster, an M.S. in Geology from the University of Florida, an M.S. in Water Resources Management, and a Ph.D. in Geology (Hydrogeology with a minor in Civil and Environmental Engineering) from the the University of Wisconsin-Madison. Dr. Woessner's research specializes in regional hydrogeology, water supply, surface water-groundwater interactions, and groundwater modeling. Recent research has also examined virus transport in groundwater. He is the co-author with Mary P. Anderson of *Applied Groundwater Modeling*. Professor Woessner has served on committees of the National Academy of Science, taught short courses on groundwater modeling, and acted as a consultant for private companies, the states of Montana and Arizona, and numerous federal agencies. He is currently serving his second term on the board of directors of the National Ground Water Association's 11,000 member Association of Ground Water Scientists and Engineers