

An Introduction to the Colorado River Research Group:

Purpose, Membership and Contact Information

The Colorado River Research Group (CRRG) is a self-directed team of veteran Colorado River scholars assembled to provide a non-partisan, academic voice on matters pertaining to science, law and policy on the Colorado River, helping all those with a stake in the river identify, justify and implement actions consistent with long-term sustainable management. The CRRG provides an independent and knowledgeable voice that is insulated from political constraints, sectoral alliances, and other pressures that might impede the full consideration of relevant ideas and viewpoints.

Membership in the CRRG is limited to members of the academic community with a long and well-established involvement in Colorado River scholarship. Members in the CRRG do not represent their universities or other affiliations; participants serve as individuals. Participation in the CRRG is at the discretion of the initial cohort of Executive Committee members, namely:

- Robert Adler, University of Utah (Professor of Law and Dean)
- Bonnie Colby, University of Arizona (Professor of Agricultural and Resource Economics)
- Karl Flessa, University of Arizona (Professor of Geosciences)
- Doug Kenney, University of Colorado (Director, Western Water Policy Program)
- Dennis Lettenmaier, University of California, Los Angeles (Professor of Geography)
- Larry MacDonnell, University of Colorado (Adjunct Professor of Law)
- Jonathan Overpeck, University of Arizona (Professor of Geosciences)
- Jack Schmidt, Utah State University (Professor of Stream Geomorphology)
- Brad Udall, Colorado State University (Senior Water and Climate Research Scientist)
- Reagan Waskom, Colorado State University (Director, Colorado Water Institute)

Biographies of CRRG members are provided in the following pages. Over time, the Executive Body will recruit additional members from the academic community as Affiliates. The CRRG is currently chaired by Doug Kenney (University of Colorado) (with assistance from Karl Flessa (University of Arizona)). The CRRG Chair assumes primary responsibility for the production of CRRG products, the scheduling and management of CRRG meetings, and is the point of initial contact with outside constituents. The CRRG is self-governing by unanimous consent, and will modify participation and activities as desired in order to best achieve the organization's purposes. Inquiries regarding the purpose, membership or structure of the CRRG should be directed to the Chair: Doug Kenney: 303-492-1296; douglas.kenney@colorado.edu.

Robert Adler (University of Utah)

James I. Farr Presidential Chair and Dean, College of Law

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Research Interests & Background:

As a scholar, Professor Adler urges a broader, more holistic approach to the restoration and protection of aquatic and other ecosystems than is used in traditional environmental laws alone, which focus on discrete kinds of environmental harm. He also explores the many ways in which environmental law and water law will have to respond to a rapidly changing climate. After completing a B.A. from Johns Hopkins University and a J.D. from Georgetown University Law Center, Professor Adler practiced environmental law for 15 years.

Selected Colorado River Publications

Adler, Robert W. 2010. Changing the law-science paradigm for Colorado River restoration, in *Proceedings of the Colorado River Basin Science and Resource Management Symposium* (edited by Melis, T.S., J.F. Hamill, L.G. Coggins Jr., P.E. Grams, T.A. Kennedy, D.M. Kubly, and B.E. Ralston, November 18–20, 2008, Scottsdale, Arizona: U.S. Geological Survey Scientific Investigations Report 2010–5135). <http://pubs.usgs.gov/sir/2010/5135/>

Adler, Robert W. 2008. Revisiting the Colorado River Compact: Time for a Change? *Journal of Land Resources and Environmental Law* 28:19. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1089507

Adler, Robert W. 2008. An Ecosystem Perspective on Collaboration for the Colorado River. *Nevada Law Journal* 8:1031. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1241483

Adler, Robert W. 2007. *Restoring Colorado River Ecosystems: A Troubled Sense of Immensity*. Washington: Island Press. https://books.google.com/books?id=22e6JGExJdYC&dq=Restoring+Colorado+River+Ecosystems:+A+Troubled+Sense+of+Immensity&printsec=frontcover&source=bn&hl=en&ei=GAeZTMCSJNPdngfEONS1Dw&sa=X&oi=book_result&ct=result#v=onepage&q&f=false

Adler, Robert W. 2007. Restoring the Environment and Restoring Democracy: Lessons from the Colorado River. *Virginia Environmental Law Journal* 25:55. <http://www.velj.org/restoring-the-environment-and-restoring-democracy.html>

Selected Colorado River Presentations

“Who Should be at the Table and What Should They Be Talking About?” University of Colorado Law School, Navigating the Future of the Colorado River Basin, 6/10/2011.

“Colorado River Restoration in a Changing Climate.” Moab River Rendezvous, Moab Utah, 11/11/2010.

“Arizona v. California: The Past, Present and Future of the Colorado River Compact.” University of Utah S.J. Quinney College of Law, Snell & Wilmer, and the Constitutional Law Section of the Utah Bar, Salt Lake City, UT, 10/2007.

“An Ecosystem Perspective on Collaboration.” University of Nevada, Boyd School of Law and Saltman Center for Conflict Resolution, Collaboration and the Colorado River, Las Vegas, NV, 10/2007.

Bonnie Colby (University of Arizona)

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<https://ag.arizona.edu/arec/sites/cals.arizona.edu/arec/files/cv/bonniecolby7-2016.pdf>

Research Interests & Background

Dr. Colby's research, teaching, and outreach focus on economic tradeoffs in water and energy management, climate change adaptation, and incentive-based agreements to improve water supply reliability for agricultural, environmental, and urban needs. Colby has provided invited testimony in her areas of expertise to state legislatures, state and federal courts, and the U.S. Congress, and has taught at Harvard University's Kennedy School of Government Executive Training Programs. She works with western states, federal agencies, private firms, water districts, and NGOs to develop and implement new strategies to improve water supply reliability and resolve conflicts over water. Dr. Colby has authored over one hundred journal articles and eight books, including *Risk And Resilience: The Economics of Climate, Water, and Energy in the Arid Southwest*; *Water Markets in Theory and Practice*; and *Braving the Currents: Resolving Conflicts Over the Water of the American West*. She recently was awarded the Warren Hall Medal by the Universities Council on Water Resources for distinguished contributions on water research and public service.

Selected Colorado River Publications

Colby, Bonnie. 2016. "Water Trading Innovations: Reducing Agricultural Consumptive Use to Improve Adaptation to Scarcity." In: *Competition for Water Resources: Experiences and Management Approaches in the US and Europe*, Jadwiga Ziolkowska and Jeffrey Peterson (editors).

Duval, Dari, and Bonnie Colby. 2016. "The influence of Colorado River flows on the upper Gulf of California fisheries economy." *Ecological Engineering*.

Colby, Bonnie. 2016. "Developing System Conservation Programs: A Guide For The Bureau Of Reclamation And Partner Organizations." Report to U.S. Bureau of Reclamation

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Colby, Bonnie, George Frisvold and Matthew Mealy. 2015. "Reallocating Climate Risks Through Water Trading." In: *Handbook of Water Economics*, James Roumasset (editor). Springer-Verlag.

Colby, B. and Frisvold, G. 2011. *Adaptation and Resilience: The Economics of Climate, Water and Energy Challenges in the American Southwest*. Washington: Resources for the Future Press.

Colby, B. and R. Bark. 2009. Inter-sectoral Water Trading as a Climate Change Adaptation Strategy, in *Water Resources Planning and Management*, chapter 41 (edited by Q. Grafton and K. Hussey). Cambridge University Press.

Colby, B., and K.L. Jacobs (editors). 2006. *Arizona Water Policy: Management Innovations in an Urbanizing, Arid Region*. Washington: Resources for the Future Press.

<http://www.tandfebooks.com/isbn/9781936331390>

Colby, B.G., J. Thorson, and S. Britton. 2005. *Negotiating Tribal Water Rights: Fulfilling Promises in the Arid West*. University of Arizona Press.

<http://www.uapress.arizona.edu/Books/bid1602.htm>

Selected Colorado River Presentations

"Managing Drought Risks Through Water Banks: Who Pays and Who Benefits?" New Mexico Water Institute Annual Conference. Silver City, NM; October 6, 2016.

<https://nmwaterconference.nmwri.nmsu.edu/#>

"Trading Water, Money and Risk to Achieve Environmental Benefits." Water Funders Workshop. Boulder, CO; August, 2016.

"Water Linkages Beyond the Farm Gate: Implications for Agriculture." Federal Reserve Bank Conference. Kansas City, MO; July 11, 2016.

<https://www.kansascityfed.org/publications/research/rscp/rscp-2016>

"New Era of Water Banking and Refined Water Accounting." Annual conference of the Getches-Wilkinson Center, University of Colorado. Boulder, CO; June 11, 2015.

<http://scholar.law.colorado.edu/cgi/viewcontent.cgi?article=1012&context=innovations-in-managing-western-water>

"Trading Water and Money to Manage Economic Risk During Shortage." New Mexico Water Resources Research Institute, Workshop on Water Banking in the Lower Rio Grande. Las Cruces, NM; November 12, 2015. http://waterbank.nmsu.edu/wp-content/uploads/Executive_Summary_Final.pdf

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“Innovations in Water Banking to Improve Supply Resilience.” Water Management Strategies for Addressing Long-Term Drought and Climate Uncertainty. Salt Lake City, UT; October 28, 2015. <http://werawater.org/wp-content/uploads/2015/11/wwc15-surfacewater-colby.pdf>

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Research interests and background

Karl Flessa and his students have been conducting research on the Colorado River delta since 1992. They have documented the effects of upstream water diversions on the fauna of the river's estuary and estimated flows necessary for their restoration. Flessa directed the NSF-supported Research Coordination Network: Colorado River Delta, the environmental monitoring program for the Ciénega de Santa Clara during the test run of the Yuma Desalting Plant, and is currently the co-Chief Scientist for the Minute 319 Monitoring Program for the Colorado River Delta. He was recently a Distinguished Visiting Scientist at Australia's CSIRO, where he studied river management in the Murray-Darling Basin. He received his undergraduate degree at Lafayette College and his Ph.D. from Brown University.

Selected Colorado River Publications

Flessa, K.W., E.P. Glenn, O. Hinojosa-Huerta, C.A. de la Parra-Renteria, J. Ramirez-Hernandez, J.C. Schmidt, and F. Zamora-Arroyo. 2013. Flooding the Colorado River Delta: A landscape-scale experiment. *EOS* 94: 485-486.

<http://onlinelibrary.wiley.com/doi/10.1002/2013EO500001/pdf>

Glenn, E.P., K.W. Flessa, and J. Pitt. 2013. Restoration potential of the aquatic ecosystems of the Colorado River Delta, Mexico (Introduction to special issue on "Wetlands of the Colorado River Delta"). *Ecological Engineering* 59:1-6.

<http://www.sciencedirect.com/science/article/pii/S0925857413001754>

Cintra-Buenrostro, C.E., K.W. Flessa, and D.L. Dettman. 2012. Restoration flows for the Colorado River estuary, México: estimates from oxygen isotopes in the bivalve mollusk *Mulinia coloradoensis* (Mactridae: Bivalvia). *Wetlands Ecology and Management* 20: 313-327.

<http://link.springer.com/article/10.1007%2Fs11273-012-9255-5>

López-Hoffman, L., E.D. McGovern, R.G. Varady, and K.W. (editors). 2009. *Conservation of shared environments: Learning from the United States and Mexico*. Tucson: University of Arizona Press. <https://www.amazon.com/Conservation-Shared-Environments-Learning-Environmental/dp/0816528780>

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Selected Colorado River Presentations

Presenter at the Conservation Biology Program, University of Minnesota, Twin Cities: “A brief meeting of the waters: Science and policy of the first environmental flow to the Colorado River Delta.” (February, 2016).

Doug Kenney (University of Colorado)

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Research Interests and Background

Dr. Kenney researches and writes extensively on several water-related issues, including law and policy reform, river basin and watershed-level planning, climate change adaptation, and water resource economics, and is the founder of the Colorado River Governance Initiative. He has served as a consultant to a variety of local, state, multi-state, and federal agencies, including several Interior Department agencies, EPA, the US Forest Service, and special commissions (e.g., the Western Water Policy Review Advisory Commission); and national governments and NGOs in Asia and Africa. Additionally, he has made presentations in 20 states (and the District of Columbia), 7 nations, and 4 continents. He has a B.A. in biology from the University of Colorado, a M.S. in Natural Resources Policy and Administration from the University of Michigan, and a Ph.D. in Renewable Natural Resource Studies from the University of Arizona.

Selected Colorado River Publications

Miller, Kathleen A., Alan F. Hamlet, Douglas S. Kenney, and Kelly T. Redmond (editors). 2016. *Water Policy and Planning in a Variable and Changing Climate*. CRC Press.

Robison, Jason, and Douglas S. Kenney. 2013. Equity and the Colorado River. *Environmental Law*, 42(4):1157-1209. <http://law.lclark.edu/live/files/13155-robison-kenneyfinal-for-webiste.pdf>

Kenney, Douglas S., Sarah Bates, Anne Bensard, and John Berggren. 2011. The Colorado River and the Inevitability of Institutional Change. *Public Land & Resources Law Review*, 32:103-152. <http://www.riversimulator.org/Resources/LawOfTheRiver/ColoradoRiverInevitabilityOfInstitutionalChangeKenney2011.pdf>

Kenney, Doug, Andrea Ray, Ben Harding, Roger Pulwarty, and Brad Udall. 2010. Rethinking Vulnerability on the Colorado River. *Journal of Contemporary Water Research & Education*, 144:5-10, March. <http://onlinelibrary.wiley.com/doi/10.1111/j.1936-704X.2010.00068.x/full>

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Kenney, Douglas S. 2010. *Rethinking the Future of the Colorado River. Interim Report of the Colorado River Governance Initiative*. Boulder: Natural Resources Law Center, Western Water Policy Program. <http://www.rlch.org/archive/wp-content/uploads/2010/12/CRGI-Interim-Report.pdf>

Selected Colorado River Presentations

"Colorado State of Mind" TV (PBS) show, reporting on the functioning of the Interim Guidelines and the Lower Basin structural deficit. (With Reagan Waskom.) January 21, 2016.

<http://video.rmpbs.org/video/2365649839/>.

"Extremes, Averages or Both: Where Do the Risks Lie?" Upper Colorado River Basin Forum. Grand Junction, CO; October 29, 2015.

"Water Scarcity in the Colorado River: Who Gets the Water?" Presentation to the Ridgway-Ouray Community Council. Ridgway, CO; October 15, 2015.

"Challenges for the Colorado River Basin" (webinar). Cooperative Institute for Research in Environmental Sciences, University of Colorado. Boulder, Colorado; October 16, 2013.

"Policy and Legal Implications of Reduced Colorado River Flows." Presentation at the Annual Conference of the Universities Council on Water Resources and the National Institutes of Water Resources (UCOWR/NIWR), Boulder, CO; July 12, 2011.

"Rethinking the Future of the Colorado River." Presentation to the Colorado River Water Users Association, Las Vegas, NV; December 16, 2010. <http://web.stanford.edu/group/ruralwest/cgi-bin/drupal/content/rethinking-colorado-river-provocative-speech>

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Research Interest & Background

Dr. Lettenmaier's research primarily focuses on large-scale hydrology, hydrologic aspects of remote sensing, and hydrology-climate interactions. Professor Lettenmaier recently joined the faculty at UCLA after nearly four decades at the University of Washington's Civil & Environmental Engineering department. Along with his university responsibilities, he has been involved in a variety of other agencies and associations. He was the Program Manager of NASA's Land Surface Hydrology Program and is a member of the American Geophysical Union, the American Water Resources Association, the European Geosciences Union, the American Meteorological Society, the American Society of Civil Engineers, and the American Association for the Advancement of Science. He was a recipient of ASCE's Huber Research Prize in 1990, and the American Geophysical Union's Hydrology Section Award in 2000.

Selected Colorado River Publications

Vano, J.A. and D.P. Lettenmaier. 2013. A sensitivity-based approach to evaluating future changes in Colorado River Discharge, *Climatic Change*, doi: 10.1007/s10584-013-1023-x. <http://link.springer.com/article/10.1007/s10584-013-1023-x>

Rosenberg, E. A., E. A. Clark, A. C. Steinemann, and D. P. Lettenmaier. 2013. On the contribution of groundwater storage to interannual streamflow anomalies in the Colorado River basin, *Hydrol. Earth Syst. Sci.* 17, 1475-1491, doi:10.5194/hess-17-1475-2013. <http://www.hydrol-earth-syst-sci.net/17/1475/2013/hess-17-1475-2013.html>

Vano, J.A., B. Udall, D.R. Cayan, J.T. Overpeck, L.D. Brekke, T. Das, H.C. Hartmann, H.G. Hidalgo, M. Hoerling, G.J. McCabe, K. Morino, R.S. Webb, K. Werner, and D.P. Lettenmaier. 2013. Understanding Uncertainties in Future Colorado River Streamflow, *Bulletin of the American Meteorological Society* 94, doi: 10.1175/BAMS-D-12-00228.1. <http://journals.ametsoc.org/doi/full/10.1175/BAMS-D-12-00228.1>

Vano, J.A., T. Das, and D.P. Lettenmaier. 2012. Hydrologic sensitivities of Colorado River runoff to changes in precipitation and temperature. *Journal of Hydrometeorology*, doi:10.1175/JHM-

D-11- 069.1. <http://journals.ametsoc.org/doi/abs/10.1175/JHM-D-11-069.1?journalCode=hydr&>

Gao Y., J. Vano, C. Zhu, and D.P. Lettenmaier. 2011. Evaluating climate change over the Colorado River basin using regional climate models. *Journal of Geophysical Research* 116, doi:10.1029/2010JD015278. <http://onlinelibrary.wiley.com/doi/10.1029/2010JD015278/pdf>

Christensen, N. and D.P. Lettenmaier. 2007. A multimodel ensemble approach to assessment of climate change impacts on the hydrology and water resources of the Colorado River basin. *Hydrology and Earth System Sciences* 11, 1417–1434. <http://www.hydrol-earth-syst-sci.net/11/1417/2007/>

Christensen, N.S., A.W. Wood, N. Voisin, D.P. Lettenmaier, and R.N. Palmer. 2004. Effects of Climate Change on the Hydrology and Water Resources of the Colorado River Basin. *Climatic Change* 62, 337-363. <http://link.springer.com/article/10.1023/B:CLIM.0000013684.13621.1f>

Larry MacDonnell (University of Colorado)

Adjunct Professor of Law; Senior Fellow, Getches-Wilkinson Center for Natural Resources, Energy and the Environment

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Research Interests and Background

Professor MacDonnell's research and writing focus on water, natural resources and the environment, with a particularly focus on strategies for making development and use of natural resources more environmentally sustainable. He was the first director of the Natural Resources Law Center at the University of Colorado School of Law (now known as the Getches-Wilkinson Center for Natural Resources, Energy and the Environment), a position he held between 1983 and 1994. Between 1995 and 2009 he worked as an attorney and consultant in Boulder, Colorado. Most recently he was a professor at the University of Wyoming College of Law where he taught water law, public land law, and natural resources law. He has also been instrumental in the organization and establishment of community-based watershed protection and restoration groups including the Colorado Watershed Assembly and the Colorado Water Trust. His publications include numerous books, law review articles, other journal articles, and research reports. He has given over 250 invited presentations.

Selected Colorado River Publications

Robison, J., and L. MacDonnell. 2014. Arizona v. California and the Colorado River Compact: Fifty Years Ago and Fifty Years Ahead. *Arizona Journal of Environmental Law and Policy* 4:130. <http://www.ajelp.com/wp-content/uploads/Robison-MacDonnell.pdf>

MacDonnell, Lawrence J. 2013. Arizona v. California: Its Meaning and Significance for the Colorado River and Beyond After Fifty Years. *Arizona Journal of Environmental Law and Policy* 4:88. <http://www.ajelp.com/wp-content/uploads/MacDonnell.pdf>

MacDonnell, Lawrence J. 2012. Arizona v. California Revisited. *Natural Resources Journal* 52:363. <http://lawschool.unm.edu/nrj/volumes/52/2/NMN201.pdf>

MacDonnell, Lawrence J. 2010. The Disappearing Colorado River. *Western Economics Forum* , 9(2) (Fall). http://ageconsearch.umn.edu/bitstream/176387/2/WEF-Vol.9-No.2-Fall2010R_MacDonnell.pdf

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MacDonnell, L.J., D. Getches, and W. Hugenberg Jr. 1995. The Law of the Colorado River: Coping with Severe Sustained Drought. *Water Resources Bulletin* 31(5): 825-836.
http://scholar.law.colorado.edu/cgi/viewcontent.cgi?article=1053&context=books_reports_studies

Selected Colorado River Presentations

“Drought Management, Climate Change, and the Colorado River Compact.” Water Management Strategies for Addressing Long-Term Drought and Climate Uncertainty. Salt Lake City, UT; October 28, 2015. <http://werawater.org/wp-content/uploads/2015/11/wwc15-compact-macdonnell.pdf>

Presenter at the Colorado River Symposium of the Water Education Foundation, <http://www.watereducation.org/colorado-river-project>. September 17-18, 2015.

Jonathan Overpeck (University of Arizona)

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Research Interests and Background

Professor Overpeck (“Peck”) is a climate scientist who has written over 200 papers on climate and the environmental sciences, served as a Coordinating Lead Author for the Nobel Prize winning IPCC 4th Assessment (2007), and also as a Lead Author for the IPCC 5th Assessment (2014). Other awards include the US Dept. of Commerce Gold Medal, a Guggenheim Fellowship, the Walter Orr Roberts award of the American Meteorological Society, and the Quivira Coalition’s Radical Center Award for his work with rural ranchers and land managers. Peck has active climate research programs on five continents, loves trying to understand drought and megadrought dynamics (and risk) the world over, and is a lead investigator of CLIMAS and the SW Climate Science Center – two major programs focused on regional climate adaptation. He has appeared and testified before Congress multiple times, is a Fellow of the AAAS and AGU, and tweets about climate-related issues @TucsonPeck.

Selected Colorado River Publications

Ault, T.R., J. E. Cole, J.T. Overpeck, G.T. Pederson, and D.M. Meko. 2014. Assessing the Risk of Persistent Drought Using Climate Model Simulations and Paleoclimate Data. *Journal of Climate* 27:7529-7549, October. DOI: 10.1175/JCLI-D-12-00282.1.

<http://journals.ametsoc.org/doi/abs/10.1175/JCLI-D-12-00282.1>

Vano, J.A., B. Udall, D.R. Cayan, J.T. Overpeck, L.D. Brekke, T. Das, H.C. Hartmann, H. G. Hidalgo, M. Hoerling, G.J. McCabe, K. Morino, R.S. Webb, K. Werner, and D.P. Lettenmaier. 2013. Understanding Uncertainties in Future Colorado River Streamflow. *Bulletin of the American Meteorological Society*, 95, 59-78, 10.1175/BAMS-D-12-0228.1.

<http://journals.ametsoc.org/doi/full/10.1175/BAMS-D-12-00228.1>

Overpeck, J.T. 2013. The challenge of hot drought. *Nature* 503: 350-351.

<http://www.nature.com/nature/journal/v503/n7476/full/503350a.html>

Routson, C.C., C.A. Woodhouse, and J.T. Overpeck. 2011. Second century megadrought in the Rio Grande headwaters, Colorado: How unusual was medieval drought? *Geophysical Research*

Letters 38: L22703, 10.1029/2011GL050015.

<http://onlinelibrary.wiley.com/doi/10.1029/2011GL050015/full>

Selected Colorado River Presentations

“Understanding future hydroclimatic risk in the Southwest.” Plenary talk and Panel, *Arizona Hydrological Society Annual Meeting*, September 16, 2016, Tucson AZ; September 16, 2016.

“Changing Climate in a Changing Future: Impact on Our Water Resources” *Law and the Colorado River: Cooperation in the Face of Shortage*. CLE International. Las Vegas, NV. February 4, 2016.

Presenter at the Colorado River Symposium of the Water Education Foundation, <http://www.watereducation.org/colorado-river-project>. September 17-18, 2015.

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Research Interests and Background

Professor Schmidt has devoted 30 years of research to the Grand Canyon and the Colorado River that flows through it, focused on the relationship of ecosystem health and the dams, reservoirs, and diversions associated with river management. He recently stepped down as chief of the U.S. Geological Survey's Grand Canyon Monitoring and Research Center, a position he had held since 2011. In both his university and government research, Jack has worked to encourage collaboration between federal and state agencies, tribal interests, non-governmental organization and academic institutions. He recently received the National Park Service's Director's Award for Natural Resource Research.

Selected Colorado River Publications

Poff, LeRoy N., and John C. Schmidt. 2016. How dams can go with the flow. *Science*, 453(6304):1099-1100, September 9.

Schmidt, J. C., and Grams, P. E. 2011. Understanding physical processes of the Colorado River, in effects of three high-flow experiments on the Colorado River ecosystem downstream from Glen Canyon Dam, Arizona (edited by T. S. Melis). *U.S. Geological Survey Circular 1366*, p. 17-51, 53-91. <http://pubs.usgs.gov/circ/1366/c1366.pdf>

Schmidt, J.C. 2010. A watershed perspective of changes in streamflow, sediment supply, and geomorphology of the Colorado River, in *Proceedings of the Colorado River Basin Science and Resource Management Symposium* (edited by Melis, T.S., J.F. Hamill, L.G. Coggins Jr., P.E. Grams, T.A. Kennedy, D.M. Kubly, and B.E. Ralston, November 18–20, 2008, Scottsdale, Arizona: U.S. Geological Survey Scientific Investigations Report 2010–5135, p. 51-76). <http://pubs.usgs.gov/sir/2010/5135/>

Grams, P. E., J.C. Schmidt, and M.E. Andersen. 2010. High-flow experiment at Glen Canyon Dam: morphologic response of eddy-deposited sandbars and associated aquatic backwater habitats along the Colorado River in Grand Canyon National Park. *U.S. Geological Survey Open-File Report 2010-1032*, 73 p. <http://pubs.usgs.gov/of/2010/1032/>. <https://pubs.usgs.gov/of/2010/1032/of2010-1032.pdf>

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Hazel, J.E. Jr., P.E. Grams, J.C. Schmidt, and M. Kaplinski. 2010. Sandbar response in Marble and Grand Canyons, Arizona, following the 2008 High-Flow Experiment on the Colorado River. *U.S. Geological Survey Scientific Investigations Report 2010-5015*, 52p., <http://pubs.usgs.gov/sir/2010/5015/>.

Selected Colorado River Presentations

“Riparian restoration in the Colorado River system.” *The Nature Conservancy and Tamarisk Coalition field conference*. Moab, UT. April 21, 2016.

“Conservation challenges for the Colorado River: thinking out loud.” *National Parks Conservation Association Southwest Regional Council meeting*. Salt Lake City, UT. February 12, 2016.

“Restoring the Colorado River, challenges and opportunities.” *Stegner Center, University of Utah*. Salt Lake City. January 19, 2016.
<https://www.youtube.com/watch?v=7zwXVSnMzSo&feature=youtu.be>

“Threats to national parks of the Colorado River watershed.” *Outdoor Retailers Convention (winter)*. Salt Lake City, UT. January 7, 2016.

“A perspective on future changes in stream flow, sediment supply, temperature, and aquatic ecosystem of the Colorado River.” *USGS*. November 2, 2015.

Brad Udall (Colorado State University)

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http://cwi.colostate.edu/CSUWaterExperts/default.aspx?WF_ID=2019

Research Interests and Background

Brad Udall has an extensive background in water and climate policy issues, including as Director of the Western Water Assessment (University of Colorado), as the first Director of the Getches-Wilkinson Center for Natural Resources, Energy and the Environment (University of Colorado), and currently as the first senior water and climate research scientist/scholar at the Colorado Water Institute (Colorado State University). He has written extensively on the impacts of climate change on water resources in the American West. He was the lead author of the water sector chapter of the *Global Climate Change Impacts in the United States* (2009), a publication of the United States Global Change Research Program, and was an author of the Western Water Assessment's *Climate Change in Colorado Report*. He was formerly a consulting engineer and the managing partner at Hydrosphere Resource Consultants. The California Department of Water Resources awarded him its Climate Science Service Award for his work in facilitating interactions between water managers and scientists, and the Department of Interior bestowed the Partner in Conservation Award on the Western Water Assessment for his work on the groundbreaking 2007 EIS on Colorado River shortages and coordinated reservoir operations. He has an engineering degree from Stanford and an MBA from Colorado State University.

Selected Colorado River Publications

J.S. Deems, T.H. Painter, J.J. Barsugli, J. Belnap, and B. Udall. 2013. Combined impacts of current and future dust deposition and regional warming on Colorado River Basin snow dynamics hydrology. *Hydrology and Earth System Sciences Discussions* 05/2013; 10(5):6237-6275. <http://www.hydrol-earth-syst-sci.net/17/4401/2013/hess-17-4401-2013.html>

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Selected Colorado River Presentations

“Is a Sustainable Colorado River Possible?” *Law and the Colorado River: Cooperation in the Face of Shortage*. CLE International. Las Vegas, NV. February 5, 2016.

“A Pivotal and Promising Year for Climate Change Solutions.” *Water Management Strategies for Addressing Long-Term Drought and Climate Uncertainty*. Salt Lake City, UT; October 29, 2015. <http://werawater.org/wp-content/uploads/2015/11/wwc15-keynotes-udall.pdf>

Presenter at the Colorado River Symposium of the Water Education Foundation,
<http://www.watereducation.org/colorado-river-project>. September 17-18, 2015.

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Research Interests and Background

Dr. Waskom currently serves as the Director of the Colorado Water Institute and as Director of the Colorado State University Water Center, where his responsibility is to address water research and information needs for the State of Colorado. His current research focus is on agricultural water conservation in the Colorado River basin, surface and groundwater interactions in the S. Platte Basin, and impacts of oil & gas production on water resources in Colorado. Past research activities include phosphorus runoff from irrigated fields, impacts of meadow management on stream water quality, irrigation management practices in Colorado, irrigation runoff, aquifer sensitivity and vulnerability, and producer adoption of BMPs. He is co-chair of the Agricultural Conservation workgroup, formed as a “next step” from the *Colorado River Basin Water Supply and Demand Study*.

Selected Colorado River Publications

Waskom, Reagan M., and MaryLou Smith. 2016. “Use it or Lose It” In Colorado Water Law. *The Water Report*. Issue # 147, May 15.

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Barta, Rachel, Robert Ward, Reagan Waskom, and Dan Smith. 2004. Stretching Urban Water Supplies in Colorado: Strategies for Landscape Water Conservation. *Colorado Water Institute*, Special Report 13. <http://www.cwi.colostate.edu/publications/sr/13.pdf>

Selected Colorado River Presentations

"Colorado State of Mind" TV (PBS) show, reporting on the functioning of the Interim Guidelines and the Lower Basin structural deficit. (With Doug Kenney.) January 21, 2016. <http://video.rmpbs.org/video/2365649839/>.

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