


**Bradley Hunt Udall**  
**Senior Water and Climate Research Scientist/Scholar**  
**Colorado Water Institute, Colorado State University**  
**Fort Collins, CO 80523**



**EDUCATION**

1993 Masters in Business Administration, Colorado State University.  
1981 B.S. in Environmental Engineering, Stanford University.

**PROFESSIONAL WORK EXPERIENCE**

2014-2019 Senior Water and Climate Research Scientist/Scholar, Colorado Water Institute, Colorado State University.  
2017-2019 Member, Colorado River Research Group.  
2014-2019 Colorado State University Liaison to USDA North Central Climate Hub.  
2014-2019 Senior Fellow, Getches-Wilkinson Center for Natural Resources, Energy and the Environment, Colorado Law.  
2010-2019 Co-Principal Investigator, Department of Interior Southwest Climate Science Center.  
2013 Director, Getches-Wilkinson Center for Natural Resources, Energy and the Environment, Colorado Law.  
2011 Visiting Scholar, Department for Water, Government of South Australia, Adelaide, SA.  
2003-2012 Director and Principal Investigator, CU-NOAA Western Water Assessment RISA. Boulder, CO.  
concurrently, member University of Colorado Research Faculty.  
2001-2003 Donnell Kay Foundation. Denver, CO.  
1997-2001 Executive Director, Eagle Valley Land Trust. Vail, CO.  
1995-1997 Bradley H. Udall Consulting.  
1985-1995 Principal, Hydrosphere Resource Consultants. Boulder, CO.

**SELECTED SERVICE**

2017-2018 Member writing team for 4th U.S. National Climate Assessment, Southwest Chapter.  
2014-2017. John Berggern Ph.D. Committee Member, University of Colorado.  
2008-2017. Anonymous Reviewer for papers submitted to the Geophysical Research Letters, Proceedings of the National Academy of Sciences and American Meteorological Society journals.  
2003-2017. At least 200 invited talks around the United States and Australia on water issues to policy makers, scientists, legislators, students. Examples include U.S. Conference of Mayors, Colorado River Water Users Association Annual Meeting, Urban Water Institute, Water Education Foundation Colorado River Retreat, National Academy Panels, American Meteorological Society Congressional Briefings, DOI Assistant Secretary Briefings, Colorado Water Congress Annual Meetings, Society of Environmental Journalists, and Continuing Legal Education International Conferences on the Law of the Colorado River and Law of Rio Grande. Also, numerous invited talks at scientific meetings such as the AGU Annual Meeting. Wyoming, Utah and Nevada NSF EPSCOR programs, Geological Society of America and USDA ARS scientific meetings.  
2016. Invited Presenter, Characterizing Risk in Climate Change Assessments National Academies of Science, Engineering and Medicine Workshop.  
2013-2014. Member DOI Federal Advisory Committee on Climate Change and Natural Resource Science.  
2011-2014. Colorado Water Institute Advisory Board.  
2012. USDA Agricultural Research Service External Review Team, Water Availability and Watershed Management.  
2009-2012. Julie Vano Ph.D. Committee Member, University of Washington.  
2010-2011. National Center for Atmospheric Research Applications Laboratory Advisory Board.  
2010-2011. Union of Concerned Scientists Energy and Water in a Warming Climate Advisory Board.  
2010. House Testimony on Relationship of RISAs to Proposed DOI Climate Activities via Budget Oversight Hearing.  
2010. National Science Foundation Nevada Experimental Program to Stimulate Competitive Research AAAS Review Panel.  
2008-2011. Water Research Foundation (American Water Works Association Research Foundation) Expert Panel on Climate Change.  
2007-2010. U.S. CLIVAR Climate Prediction Applications Postdoctoral Program Selection Committee.  
2002-2014. George W. Bush Presidential Appointment with Senate confirmation to the Morris K. Udall Foundation Board of Trustees.

**PROFESSIONAL MEMBERSHIPS**

American Geophysical Union  
American Association for the Advancement of Science  
American Meteorology Society

**GRANTS RECEIVED**

2016. Walton Family Foundation, Agricultural Water Conservation in the Colorado River Basin: Alternatives to Permanent Fallowing Research Synthesis and Outreach Workshops, \$170k.

2014. NOAA Climate Program Office Navajo Indian Climate Change Vulnerability Study. \$40k.

2003-2014. NOAA Climate Program Office Western Water Assessment, approximately \$800k/year with some years at \$1m/year. Coordinated a team of 30 cross-disciplinary researchers including economists, social scientists, meteorologists, geographers, and climatologists to devise and execute projects to inform decision making. Also worked with NGOs (e.g., The Nature Conservancy, Water Research Foundation) and consultants (e.g., Stratus, AMEC) to jointly produce knowledge.

2008-2011. NOAA Climate Program Office. Reconciling Colorado River Flows. Analyzed differences in climate model projections for Colorado River. Researchers at NOAA, CU, UW, UA and Scripps. \$200k/year.

2011. State of Colorado. Climate Vulnerability and Adaptation Analysis resulting in the Colorado Climate Preparedness Report. \$100k.

2011. State of South Australia. Support for my time as visiting scholar. \$25k.

2011. Department of Interior Southwest Climate Science Center.

2010. Renewable and Sustainable Energy Institute. Paper on impacts of climate change on South Platte. \$50k.

2009. CPAPP Postdoctoral Fellow, \$200k (joint with Reclamation).

2008. State of Colorado. Colorado Climate Report detailing climate change science and physical impacts of climate change to state. \$50k.

2008. CPAPP Postdoctoral Fellow, \$200k (joint with Reclamation).

**SELECTED WESTERN RIVER BASIN KNOWLEDGE**

**Colorado River.** Member of 1995 Severe and Sustained Drought team which investigated consequences of long term drought in Colorado River. Co-author of Reclamation appendix on climate change for 2007 EIS on Colorado River shortages. Co-author of many papers on impacts of climate change on the basin. Member of impacts of dust on snow team. Many invited talks to major water providers, scientists, and news media on the challenges of the river. My personal connection to river includes my great-great grandfather, the John D. Lee of Lee's Ferry, to father and uncle who played critical roles in Glen Canyon Dam and Central Arizona Project legislation, to my own time as a Grand Canyon River guide and climate/hydrology scholar. I have been featured in the New York Times, books, and other media on problems of the river.

**South Platte.** Member of team that analyzed South Platte flows for proposed Two Forks Dam on behalf of environmental community, with funds from Denver Water. Member of team that produced City of Boulder Raw Water Master Plan. Built water rights allocation model of entire South Platte River.

**North Platte.** Member of consulting team working on behalf of State of Wyoming in support of Supreme Court litigation under Nebraska v. Wyoming pertaining to operations of Reclamation's North Platte project.

**Rio Grande.** As consultant, lead engineer on effort to improve operations in Conejos River, the major tributary to the Rio Grande. Modeling of Conejos and Rio Grande under the Rio Grande Compact including groundwater issues. Invited talks on climate change impacts in the basin in 2014, 2015, 2016.

**Columbia/Snake.** Member of a consulting team on endangered species issues on the Snake for NOAA National Marine Fisheries Service. Investigated coordinated reservoir operations to enhance salmon smolt survival. Modeled entire Snake River including groundwater.

**Klamath/SSJ Bay Delta.** I have a substantial research interest in the problems and solutions in the Klamath River and Sacramento-San Joaquin Bay Delta. Both systems are at the forefront of Western water issues and the problems and solutions from these basins may have relevance to the state of Colorado and elsewhere. I have visited both basins multiple times.

**AWARDS AND HONORABLE MENTIONS**

2009. Department of Interior Partners in Conservation Award for Colorado River climate change publication and work on 2007 Shortage Sharing EIS.

2007. Senate Testimony on Impacts of Climate on Water Resources. Testimony ultimately fed into 2009 SECURE Water Act.

2007. California Department of Water Resources Climate Science Service Award for working with water providers and the State.

**SELECTED PUBLICATIONS**

- Gonzalez, P., G.M. Garfin, D.D. Breshears, K.M. Brooks, H.E. Brown, E.H. Elias, A. Gunasekara, N. Huntly, J.K. Maldonado, N.J. Mantua, H.G. Margolis, S. McAfee, B.R. Middleton, and **B.H. Udall**, 2018: Southwest. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 1101–1184. doi: 10.7930/NCA4.2018.CH25
- Xiao, Mu, **Bradley Udall**, and Dennis P. Lettenmaier. “On the Causes of Declining Colorado River Streamflows.” *Water Resources Research* 54, no. 9 (2018): 6739–6756.
- Grafton, R. Q., J. Williams, C. J. Perry, F. Molle, C. Ringler, P. Steduto, **B. Udall**, et al. “The Paradox of Irrigation Efficiency.” *Science* 361, no. 6404 (August 24, 2018): 748–50. <https://doi.org/10.1126/science.aat9314>.
- Udall, B.** and J. Overpeck, 2017. Climate change is shrinking the Colorado River, The Conversation, June 13, <https://theconversation.com/climate-change-is-shrinking-the-colorado-river-76280>.
- Udall, B.**, J. Overpeck, 2017. The Twenty-First Century Hot Drought and Implications for the Future, *Water Resources Research*, 53, doi:10.1002/2016WR019638.
- Udall, B.** and G. Peterson, 2017. Agricultural Water Conservation in the Colorado River Basin: Alternatives to Permanent Fallowing Research Synthesis, Colorado Water Institute, Colorado State University.
- Castle, A., M. Smith, J. Stulp, **B. Udall**, and R. Waskom, 2017. Where Now with Alternative Transfer Methods – ATMs – in Colorado, CWI Special Report #31, Colorado Water Institute, Colorado State University.
- Udall, B.**, 2016. Global and Local Climate Change: What We Know and Expect, Colorado Water, Climate Smart Agriculture Issue, March – April 2016, 33(1), pp 2-7.
- Udall, B.**, 2016. Greenhouse Gases and Agriculture, Colorado Water, Climate Smart Agriculture Issue, March – April 2016, 33(1), pp 14-16.
- Udall, B.**, 2016. Solving the Climate Change Riddle: Reasons for Optimism, Colorado Water, Climate Smart Agriculture Issue, March – April 2016, 33(1), pp 32-35.
- MacDonnell, L., R. Benson, B. Colby, R. Glennon, **B. Udall**, and C. Wilkinson, 2015. Navigating a Pathway Toward Colorado’s Water Future: A Review and Recommendations Colorado’s Draft Water Plan, Report of the Getches-Wilkinson Center Colorado Water Working Group.
- Dettinger, M., **B. Udall**, and A. Georgakakos, 2015. Western Water and Climate Change, *Ecological Applications*, 25(8), 2069–2093.
- Romero-Lankao, P., Smith, J.B., D. Davidson, N. Diffenbaugh, P. Kinney, P. Kirshen, P. Kovacs, and L. Villers Ruiz, 2014. Climate Change 2014: North America. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V. Barros, K. Mach, M. Mastrandrea (Eds.)], Cambridge University Press, Cambridge, UK, and New York, NY, USA. (Contributing Author).
- Vano, J., **B. Udall**, D. Cayan, J. Overpeck, L. Brekke, T. Das, H. Hartmann, H. Hidalgo, M. Hoerling, G. McCabe, K. Morino, R. Webb, K. Werner, and D. Lettenmaier, 2014. Understanding Uncertainties in Future Colorado River Streamflow. *Bulletin of American Meteorological Society*, January.
- Deems, J. S., T. H. Painter, 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 and hydrology, *Hydrol. Earth Syst. Sci. Discuss.*, 10, 6237-6275, doi:10.5194/hessd-10-6237-2013, 2013.
- Udall, B.**, 2013. Water: Impacts, Risks and Adaptation in Garfin, G., A. Jardine, R. Merideth, M. Black, and S. LeRoy, eds. 2013. *Assessment of Climate Change in the Southwest United States: A Report Prepared for the National Climate Assessment*. A report by the Southwest Climate Alliance. Washington, DC: Island Press.
- Grafton, R. Q, J. Pittock, R. Davis, J. Williams, G. Fu, <sup>[1]</sup> M. Warburton, **B. Udall**, R. McKenzie, X. Yu, N. Che, D. Connell, Q. Giang, T. Kompas, A. Lynch, R. Norris, H. Possingham and J. Quiggin, 2012. Global insights into water resources, climate change and governance. *Nature Climate Change*.
- Western Water Assessment, 2011. Colorado Climate Preparedness Project Final Report. Available at: <http://www.coloadaptationprofile.org/> (Lead Author Water Sector Chapter).
- Brickey, C., K. Engel, K. Jacobs, J. Matter, D.F. Luecke, M.L. Miller, J. Overpeck, and **B. Udall**, 2010. How to Take Climate Change Into Account: A Guidance Document for Judges Adjudicating Water Disputes, *Environmental Law Reporter*, 40 (12): 11215-11228.
- Overpeck, J. and **B. Udall**, 2010. Dry Times Ahead. *Science*, 328. 1642-1643, doi: 10.1126/science.1186591.
- Udall, B.**, 2010. Written Testimony of Bradley Udall, *Oversight Hearing on the Proposed Fiscal Year 2011 Budget Requests for the Bureau of Reclamation and the Water Resources Division of the United States Geological Survey*, before the Subcommittee on Water and Power, Committee on Natural Resources, U.S. House of Representatives, March 11, 2010.

Painter, T., J. Deems, J. Belnap, A. Hamlet, C. Landry, **B. Udall**, 2010. Response of Colorado River runoff to dust radiative forcing in snow, *Proceedings of the National Academy of Sciences*, 107(40), 17125-17130.

**Udall, B.**, 2009. Water in the Rockies: A Twenty-First Century Zero-sum Game. in *How the West was Warmed*. Fulcrum Publishing.

Karl, T. R., J. M. Melillo, T. C. Peterson & (eds.). 2009. *Global Climate Change Impacts in the United States*. Cambridge University Press. (Lead Author, Water Sector Chapter.)

Rajagopalan, B., K. Nowak, J. Prairie, M. Hoerling, B. Harding, J. Barsugli, A. Ray, and **B. Udall**, 2009. Water supply risk on the Colorado River: Can management mitigate?, *Water Resour. Res.*, 45, W08201, doi:10.1029/2008WR007652.

Ray, A., J. Barsugli, K. Averyt, K. Wolter, M. Hoerling, N. Doesken, **B. Udall**, and R. Webb, 2008. *Climate Change in Colorado: A Synthesis to Support Water Resources Management and Adaptation*. Colorado Water Conservation Board.

Brekke, L., B. Harding, T. Piechota, **B. Udall**, C. Woodhouse and D. Yates, 2007. *Review of Science and Methods for Incorporating Climate Change Information into Reclamation's Colorado River Basin Planning Studies, Colorado Basin Final Environmental Impact Statement*. U.S. Department of Interior, Bureau of Reclamation.

**Udall, B.**, 2007. Written Testimony of Bradley Udall, *Hearing on Impacts of Climate Change on Water Supply and Availability in the United States*, before the Subcommittee on Water and Power, Committee on Energy and Natural Resources, U.S. Senate, June 6, 2007.