Kevin R. Hultine, Ph.D. Desert Botanical Garden 1201 N. Galvin Parkway Phoenix, AZ 85008 Ph: 480.481.8195, fax 480.481.8124 Email: khultine@dbg.org

Education

Ph.D. School of Renewable Natural Resources, with a Ph.D. minor in Hydrology, University of Arizona, Tucson, AZ, 2004 Dissertation title: Water uptake by *Prosopis velutina*: the role of soil hydraulic limits and root function

M.S. School of Renewable Natural Resources, University of Arizona, Tucson, AZ, 2001 Thesis title: Reverse flow in tap- and main lateral roots of semi-arid riparian tree species: evidence for hydraulic redistribution

B.S. School of Forestry, University of Idaho, Moscow, ID, 1997 Thesis title: A comparison of three methods for determining the stomatal density of pine needles

Academic experience

Research Ecologist/Plant Physiologist, Desert Botanical Garden, Phoenix, July 2011 - Present

Adjunct Professor, Northern Arizona University, School of Earth Sciences and Environmental Sustainability, June 2011 - Present

Visiting Faculty, Northern Arizona University, School of Earth Sciences and Environmental Sustainability, August 2010 to May 2011

Staff Scientist, University of Utah, Entrada Field Station, October 2008 to June 2010

Assistant Research Professor. University of Utah, Department of Biology Stable Isotope Ratio Facility for Environmental Research, January 2007 to August 2010

Research Associate. University of Utah, Department of Biology Stable Isotope Ratio Facility for Environmental Research, March 2004 to January 2007

Graduate advisor: David G. Williams (University of Arizona)

Postdoctoral advisor: James R. Ehleringer (University of Utah)

Publications in review:

4. Doody T, Glenn E, Nagler P, Moore GW, Morino K, Hultine KR, Benyon R. Potential for water salvage by removal of non-native species from dryland river systems. *Hydrological Processes*

3. Hultine KR. Herbivory-induced mortality increases with radial growth in a dominant riparian phreatophyte. *Biological Invasions*

2. Glenn EP, Morino K, Nagler PL, Murray RS, Pearlstein S, Hultine KR Role of saltcedar and capillary rise in salinizing a non-flooding terrace on a flow-regulated desert river. *Ecohydrology*

1. Nagler PL, Brown T, Hultine KR, van Riper III C, Bean DW, Murray RS, Pearlstein S, and Glenn EP Regional-scale impacts of the *Tamarix* leaf beetle (*Diorhabda carinulata*) on the leaf phenology and water use of *Tamarix* spp. *Remote Sensing of Environment*

Publications

28. Hultine KR, and Bush SE. (2011) Ecohydrological consequences of non-native riparian vegetation in the southwestern U.S.: a review from an ecophysiological perspective. *Water Resources Research* DOI:10.1029/2010WR010317

27. Bateman HL, Dudley TL, Bean DW, Ostoja SM, Hultine KR, and Kuehn MJ. (2010) A river system to watch: documenting the effects of saltcedar (Tamarix spp.) biocontrol in the Virgin River Valley. *Ecological Restoration* **28**: 405-410

26. Hultine KR, Nagler PL, Morino K. Bush SE, Burtch, KG, Dennison PE, Glenn EP, and Ehleringer JR. (2010) Sap flux-scaled transpiration by tamarisk (*Tamarix* spp.) before, during and after episodic defoliation by the saltcedar leaf beetle (*Diorhabda carinulata*). *Agricultural and Forest Meteorology* **150**: 1467-1475

25. Bush SE, Hultine KR, Sperry JS, Ehleringer JR, and Phillips N. (2010) Calibration of heat dissipation sap-flux probes on ring- and diffuse-porous trees. *Tree Physiology* **30**: 1545-1554

24. Hultine KR, Belnap J, Dennison PE, Ehleringer JR, Lee ME, Nagler PL, Snyder KA, Uselman SM, van Riper III C, and West JB. (2010). Tamarisk biocontrol in the western United States: ecological and societal implications. *Frontiers in Ecology and the Environment* **8**: 467-474

23. Hultine, KR, Bush, SE, and Ehleringer JR. (2010). Ecophysiology of riparian cottonwood and willow before, during and after two years of groundwater removal. *Ecological Applications* **20**: 347-361

22. Nagler PL, Morino K, Didan, K, Erker J, Osterberg J, Hultine K, Glenn EP (2009). Wide area estimates of saltcedar (Tamarisk spp.) evapotranspiration on the lower Colorado River measured by heat balance and remote sensing methods. *Ecohydrology* 2: 18-33

21. Dennison PE, Nagler PL, Hultine KR, Glenn EP, and Ehleringer JR. (2009). Remote monitoring of tamarisk defoliation and evapotranspiration following saltcedar leaf beetle attack. *Remote Sensing of Environment* 113: 1462-1472

20. Hultine KR, Jackson TL, Burtch KG, Schaeffer SM, and Ehleringer JR (2008). Elevated stream inorganic nitrogen impacts on a dominant riparian tree species: results from an experimental riparian stream system. *JGR Biogeosciences* 113, G04025, DOI:10.1029/2008JG000809

19. Glenn EP, Morino K, Didan K, Jordan F, Carrol K, Nagler P, Hultine K, Waugh J (2008). Vegetation density and evapotranspiration in a heavily grazed phreatophytic shrub community in a nitrate-contaminated desert watershed: implications for local water balance. *Ecohydrology* 1: 316-329

18. Hultine KR, Bush SE, West AG, Burtch KG, Pataki DE and Ehleringer JR (2008). Gender specific patterns in above ground allocation, water use and carbon uptake in a dominant riparian tree species: box elder (*Acer negundo*). *Tree Physiology* 28, 1383-1394

17. West AG, Hultine KR, Sperry JS, Bush SE and Ehleringer JR. (2008). Interannual and seasonal variation in transpiration in a piñon-juniper woodland. *Ecological Applications* 18, 911-927

16. Bush SE, Pataki DE, Hultine KR, West AG, Sperry JS and Ehleringer JR (2007) Wood anatomy constrains stomatal responses to atmospheric vapor pressure deficit in irrigated, urban trees. *Oecologia* **156**, 13-20

15. Scott RL, Cable WL, Hultine KR (2007) Ecohydrologic significance of hydraulic redistribution in a semiarid savanna. *Water Resources Research* 44, W02440, DOI 10.1029/2007WR006149

14. Hultine KR, Bush SE, West AG and Ehleringer JR (2007) Population structure, physiology and ecohydrological impacts of dioecious riparian tree species of western North America. *Oecologia* **154**, 85-93

13. West AG, Hultine KR, Jackson TL and Ehleringer JR (2007) Contrasting hydraulic strategies explain differential summer moisture use of *Pinus edulis* and *Juniperus osteosperma*. *Tree Physiology* **27**, 1711-1720)

12. West AG, Hultine KR, Burtch KG, and Ehleringer JR (2007) Seasonal variation in moisture use in a pinon-juniper woodland. *Oecologia* 153, 787-798

11. Hultine KR, Bush SE, West AG and Ehleringer JR (2007) The effect of gender on sap flux-scaled transpiration in a dominant riparian tree species: box elder (*Acer negundo*). *JGR Biogeosciences* **112**, G03S06, DOI 10.1029/2006JG000232

10. Hultine KR, Koepke DF, Pockman WT, Fravolini A, Sperry JS, and Williams DG (2006) Influence of soil texture on hydraulic properties and water relations of a dominant warm-desert phreatophyte. *Tree Physiology* **26**, 313-323

9. Fravolini A, Hultine KR, Brugnoli E, Gazal R, English N, and Williams DG (2005) Precipitation pulse use by an invasive woody legume: the role of soil texture and pulse size. *Oecologia* **144**, 618-627

8. Huxman TE, Wilcox BP, Scott RL, Snyder KA, Breshears D, Small EE, Hultine KR, Pockman WT and Jackson RB (2005) Woody plant encroachment and the water cycle: an ecohydrological framework. *Ecology* **86**, 308-319

7. Williams DG, Cable W, Hultine K, Hoedjes JCB, Yepez EA, Simonneaux V, Er-Raki S, Boulet G, de Bruin HAR, Chebouni A and Timoul F (2004) Components of evapotranspiration in an olive orchard determined by eddy covariance, sap flow, and stable isotope techniques. *Agricultural and Forest Meterology* **125**, 241-258

6. Hultine KR, Scott RL, Cable WL and Williams DG (2004) Hydraulic redistribution by a dominant, warm-desert phreatophyte: seasonal patterns and response to precipitation pulses. *Functional Ecology* **18**, 530-538

5. Hultine KR, Williams DW, Burgess SSO and Keefer TO (2003) Contrasting Patterns of hydraulic redistribution by three desert phreatophytes. *Oecologia* **135**, 167-175

4. Hultine KR, Cable WL, Burgess SSO and Williams DG (2003) Hydraulic redistribution by deep roots of a Chihuahuan Desert phreatophyte. *Tree Physiology* **23**, 353-360

3. Hultine KR and Marshall JD (2001) A comparison of three methods for determining the stomatal density of pine needles. *Journal of Experimental Botany* **52**, 359-363

2. Hultine KR and Marshall JD (2000) Altitude trends in conifer leaf morphology and stable carbon isotope composition. *Oecologia* **123**, 32-40

1. McDowell SCL, McDowell NG, Marshall JD and Hultine KR (2000) Carbon and nitrogen allocation to male and female reproduction in Rocky Mountain Douglas-fir (*Pseudotsuga menziesii* var. *glauca*, Pinaceae). *American Journal of Botany* **87**, 539-546

Book chapters

Goodrich DC, Williams D, Unkrich CL, Scott RL, Hultine KR, Pool D, Coes AL, Hogan JF and Miller S. (2004) Ephemeral channel recharge and evapotranspiration from near-

channel vegetation. In, Groundwater Recharge in a Desert Environment: the Southwestern United States, eds. FM Phillips, JF Hogan and B Scanlon, Water Science and Application series, Washington DC, American Geophysical Union

Manuscripts in Prep

Hultine KR, Burian S, Bush SE, Dudley-Murphy E, Williamson J, Ehleringer JR. Evapotranspiration from an oak/maple woodland relative to stream discharge in a protected Great basin canyon watershed. *Ecohydrology*

Funding

National Science Foundation \$164,241 (pending) "Collaborative research: Scaling local impacts of biotic and abiotic interactions to predict future shifts in riparian vegetation" KR Hultine, C. Gehring co-PI, T. Whitham co-PI, 2 years

National Science Foundation \$56,115 "Collaborative Research: Quantifying nitrogen uptake in bioretention designed for semiarid climates", C. Pomeroy, KR Hultine co-PI, 3 years

University of Utah Seed Grant Program \$27,647, "Water and carbon exchange in bioretention stormwater facilities", C. Pomeroy, KR Hultine co-PI, 1 year

Bureau of Reclamation \$321,087, "Developing a salt and water budget for saltcedar stand replacement vegetation on the lower Colorado River at Cibola National Wildlife Refuge and Dolores River at Entrada Research Station, P. Nagler, E Glenn co-PI, KR Hultine co-PI, K McDonald co-PI, 2 years

USDA, CAPS, \$34,750, "Monitoring tamarisk defoliation by the saltcedar leaf beetle along the middle Colorado River watershed", P. Dennison, KR Hultine co-PI, JR Ehleringer co-PI, 1 year

Bureau of Reclamation, \$150,000, "Episodic defoliation of tamarisk by the saltcedar leaf beetle: implication for regional-level riparian ET on the Colorado Plateau" KR Hultine, PL Nagler, co PI, 3 years

University of Utah Seed Grant Program \$26,000, "Coupled biophysical-hydrological response to climate variability" S. Burian, KR Hultine co-PI, 1 year

Water Resource Research Center, University of Arizona, \$13,724, "Isotope biohydrology of an ephemeral drainage" DG Williams, KR Hultine co-PI, D Goodrich co-PI, 1 year

Conference presentations

Hultine KR, Bush SE, Nagler PL, Morino K, Dennison PE, Burtch KG, Glenn EP, and Ehleringer JR. (2010) From leaf to basin: evaluating the impacts of introduced plant

species on evapotranspiration fluxes from riparian ecosystems in the southwestern U.S. American Geophysical Union's annual meeting (San Francisco, CA)

Hultine KR, Bush SE, Nagler PL. (2010) Effects of biological control on water use by tamarisk and other riparian invasives. 2010 Tamarisk Symposium (Grand Junction, CO)

Hultine KR. (2009). Soil hydraulic properties and plant water relations: controls over plant community structure and function in arid environments. Ecological Society of America's annual meeting (Albuqueque, NM)

Hultine KR, Belnap J, Dennison PE, Ehleringer JR, Lee ME, Nagler PL, Snyder KA, Uselman SM, van Riper III C, and West JB. (2009) Biocontrol of tamarisk in the western United States: an event underway with significant ecological and societal implications. Tamarisk and Russian olive Research Conference (Reno, NV)

Hultine KR. (2008). Tamarisk (Tamarix) water flux patterns before, during and after episodic defoliation by the salt cedar leaf beetle on the Colorado Plateau, USA. 7th Annual International Workshop on Sap Flux (Seville, Spain)

Hultine KR, Jackson, TL, Burtch KG, Schaffer SM, and Ehleringer JR (2008) Elevated stream inorganic nitrogen impacts on a dominant riparian tree species: results from an experimental riparian stream system. Utah State University's annual Spring Runoff Conference (Logan, UT)

Hultine KR, Bush SE, West AG, Burtch KG and Ehleringer JR (2006) Gender specific patterns of carbon uptake and water loss in a dominant riparian tree species, *Acer negundo*. Ecological Society of America's annual meeting (Memphis TN)

Hultine KR, Bush SE, West AG and Ehleringer JR (2005) Dioecy impacts on plant water fluxes in riparian ecosystems. American Geophysical Union's annual meeting (San Francisco CA)

Hultine KR (2002) Transpiration by mesquite on a desert river floodplain. American Geophysical Union, Chapman Conference on Eco-Hydrology of Semiarid Landscapes: Interactions and Processes (Taos, NM)

Hultine KR, Williams DG, Cable WL and Burgess SSO (2002) Hydraulic redistribution by deep roots of a Chihuahuan Desert phreatophyte. Ecological Society of America's annual meeting (Tucson AZ)

Hultine KR, Williams DG, Cable WL and Burgess SSO (2001) Downward recharge through root systems: has the decline of walnut trees altered the hydrology of semi-arid riparian systems? American Geophysical Union's annual meeting (San Francisco CA)

Hultine KR, Williams DG, and Burgess SSO (2001) Contrasting seasonal patterns of root and stem sap flow in three tree species in a desert arroyo. Ecological Society of

America's annual meeting (Madison WI)

Teaching experience

Instructor, ENV 698, Research Methods, Northern Arizona University, Flagstaff, AZ, 2credit graduate level course, Taught in the Fall of 2010

Instructor, ENV 440/540, Conservation Biology, Northern Arizona University, Flagstaff, AZ, 3-credit lecture course, Taught in the Fall of 2010

Instructor, ENV 440L/540L, Conservation Biology Lab, Northern Arizona University, Flagstaff, AZ, 1-credit field course, Taught in the Fall of 2010

Instructor, ENV 101, Introduction to Environmental Sciences, Northern Arizona University, 3-credit lecture course, Taught in the Fall of 2010

Instructor, Biology 5465, Desert Plant Ecology Lab, University of Utah, Salt Lake City, UT, 2-Credit combined field, lab and lecture course, Taught in the Fall of 2008, and 2009

Instructor, Biology 4950, 4955, Graded independent study, University of Utah, Salt Lake City, UT

Guest lecturer, Biology 5460, Desert Plant Ecology, University of Utah, Salt Lake City, UT

Assistant in the annual Stable Isotope Ecology Laboratory summer course (2004-2007)

Teaching Assistant, Renewable Natural Resources 570, Functional Ecology of Aridland Plants, University of Arizona, Tucson, AZ

Teaching Assistant, Renewable Natural Resources 202, Native Plant Taxonomy, University of Arizona, Tucson, AZ

Memberships

Ecological Society of America, Physiological Section American Geophysical Union, Hydrology Section American Society of Plant Biologists

Other synergistic and professional activities

Serving on editorial board of the Hindawi open access journal *ISRN Ecology* <u>http://www.hindawi.com/isrn/ecology/aims.html</u>, 2010-present Serving on editorial board for the Oxford journal *Tree Physiology* <u>http://heronpublishing.com/tphome.html</u>, 2007-present Participant in NEON Intermountain Region Observatory Network (IRON) http://www.neon-iron.org/. 2006-Participant in *Sustainability of semi-Arid Hydrology and Riparian Areas* (SAHRA), http://www.sahra.arizona.edu/, 2001-2004