

## JEFFREY DANIEL MUEHLBAUER

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### EXPERTISE

*Stream Ecology.* Stream and riparian community ecology, large river ecosystems, aquatic macroinvertebrates, food webs, multivariate statistics and ordination, stable isotope analysis, aquatic biogeochemistry, leaf decomposition.

*Hydrology & Geomorphology.* Geomorphic surveys, in-stream hydraulics, sediment transport (incipient motion analysis), modeling (HEC-RAS).

*Restoration & Urbanization.* Stream and wetland compensatory mitigation, dam removal, ecological monitoring, effects of urbanization and restoration on aquatic ecosystems.

*Research Logistics.* Design and implementation of multi-year, international and domestic research in both remote and densely-populated regions, small and large-group mentoring and leadership of undergraduates, oversight of simultaneous projects, lab management.

*Large River Fieldwork.* Initiated, organized, led multi-year studies in large river ecosystems:

- Colorado River Basin: Colorado, Green, San Juan, Little Colorado, & Gunnison Rivers, western US (5<sup>th</sup>–8<sup>th</sup> Order, heavily regulated, endangered species), 2013–Pres.
- Danube River Basin: Danube, Sava, & Drava Rivers, central Europe (7<sup>th</sup>–10<sup>th</sup> Order, ship traffic, groin fields, industrial forestry & fisheries, confluences), 2010–2011
- Tagliamento River, Italy (1<sup>st</sup>–7<sup>th</sup> Order, braided, alpine, un-dammed), 2010–2011
- Elbe River, Germany (8<sup>th</sup> Order, groin fields, cruise ship traffic), 2011
- Coweeta LTER & Little Tennessee River, NC (1<sup>st</sup>–6<sup>th</sup> Order, natural), 2009–2010
- Hudson & Indian Rivers, NY (5<sup>th</sup> Order, dam flood pulses), 2007
- Timberlake stream/wetland, NC (drought, restoration monitoring), 2007–2012
- Meeting of the Waters & New Hope Creeks, NC (3<sup>rd</sup> Order, urbanizing), 2008
- Fossil Creek, AZ (karst spring, dam removal), 2003–2007

### EDUCATION

*Ph.D. Ecology.* University of North Carolina at Chapel Hill, 2013

- Thesis: “Stream signatures” and aquatic-terrestrial interactions in arthropod food webs

*M.S. Ecology.* University of North Carolina at Chapel Hill, 2010

- Thesis: Ecological heterogeneity in streams: geomorphic and hydrologic influences on macroinvertebrate community structure

*B.S. Biology & Chemistry.* Northern Arizona University, 2007

Ecology Emphasis, with Honors, *Summa cum laude*. 4.0 GPA.

- Thesis: Short-term effects of dam decommissioning and flow restoration

### RESEARCH & EMPLOYMENT

*US Geological Survey Grand Canyon Monitoring and Research Center.* Flagstaff, AZ.

Supervisors: Dr. Theodore A. Kennedy and Dr. Charles B. Yackulic

- Postdoctoral Fellow, Research Ecologist, 2013–Pres.

*University of North Carolina.* Chapel Hill, NC. Advisor: Dr. Martin W. Doyle

- University Fellow, 2007–2012; Geography/Ecology TA/RA, 2008–2012.

*Leibniz Institute of Freshwater Ecology & Inland Fisheries (IGB).* Berlin, Germany.

Collaborators: Drs. Klement Tockner, Michael T. Monaghan, Martin T. Pusch

- Visiting Fellow, 2011; Tagliamento River research station, 2010–2011

*Northern Arizona University.* Flagstaff, AZ. Advisor: Dr. Jane C. Marks

- Research Associate, Department of Biology, 2003–2007

## RESEARCH & EMPLOYMENT (CONTINUED)

*Ecological Restoration Institute*. Flagstaff, AZ. Director: Dr. Peter Z. Fulé

- Assistant Crew Leader, 2006; Research Assistant, 2004–2007

*Duke University*. Durham, NC. Director: Dr. Christopher B. Newgard

- Chemist/Geneticist Intern, 2005

## SCIENTIFIC PUBLICATIONS

*Asterisks (\*) indicate mentored student or technician lead author*

- 19) Muehlbauer, J.D., Kennedy, T.A., Copp, A.J. & Sabol, T.A. (In Press) Deleterious effects of net clogging on the quantification of stream drift. *Canadian Journal of Fisheries and Aquatic Sciences* DOI: 10.1139/cjfas-2016-0365
- 18) Baxter, C.V., Kennedy, T.A., Miller, S.W., Muehlbauer, J.D. & Smock, L.A. (In Press) Macroinvertebrate drift, adult insect emergence and oviposition. Chapter 21 in: *Methods in Stream Ecology* (Eds F.R. Hauer & G.A. Lamberti), 3<sup>rd</sup> edition.
- 17) Dzul, M.C., Yackulic, C.B., Korman, J., Yard, M.D. & Muehlbauer, J.D. (In Press) Incorporating temporal heterogeneity in environmental conditions into a somatic growth model. *Canadian Journal of Fisheries and Aquatic Sciences* DOI: 10.1139/cjfas-2016-0056
- 16) \*Metcalf, A.N., Kennedy, T.A. & Muehlbauer, J.D. (2016) Phenology of the adult angel lichen moth (*Cisthene angelus*) in Grand Canyon, USA. *The Southwestern Naturalist* 61: 233–240. DOI: 10.1894/0038-4909-61.3.233
- 15) \*Smith, J.T., Muehlbauer, J.D. & Kennedy, T.A. (2016) Evaluating potential sources of variation in Chironomidae catch rates on sticky traps. *Marine and Freshwater Research*. 67: 1987–1990. DOI: 10.1071/MF15189
- 14) Kennedy, T.A., Muehlbauer, J.D., Yackulic, C.B., Lytle, D.A., Miller, S.W., Dibble, K.L., Kortenhoeven, E.W., Metcalfe, A.N. & Baxter, C.V. (2016) Flow management for hydropower extirpates aquatic insects, undermining river food webs. *BioScience* 77: 561–575. DOI: 10.1093/biosci/biw059 **BioScience Editor's Choice and featured in Press Releases by USGS, Oregon State U., Conservation Magazine, and others.**
- 13) Larsen, S., Muehlbauer, J.D. & Martí, E. (2016) Resource subsidies between stream and terrestrial ecosystems under global change. *Global Change Biology* 22: 2489–2504. DOI: 10.1111/gcb.13182
- 12) \*Clay, P.A., Muehlbauer, J.D. & Doyle, M.W. (2015) Effect of tributary and braided confluences on aquatic macroinvertebrate communities and geomorphology in an alpine river watershed. *Freshwater Science* 34: 845–856. DOI: 10.1086/682329
- 11) \*Smith, J.T., Kennedy, T.A. & Muehlbauer, J.D. (2014) Building a better sticky trap: description of an easy to use trap and pole mount for quantifying the abundance of adult aquatic insects. *Freshwater Science* 33: 972–977. DOI: 10.1086/676998
- 10) \*Copp, A., Kennedy, T.A. & Muehlbauer, J.D. (2014) Barcodes are a useful tool for labeling and tracking ecological samples. *Bulletin of the Ecological Society of America* 95: 293–300. DOI: 10.1890/0012-9623-95.3.293
- 9) Muehlbauer, J.D., Collins, S.F., Doyle, M.W. & Tockner, K. (2014) How wide is a stream? The spatial extent of the potential “stream signature” in terrestrial food webs using meta-analysis. *Ecology* 95: 44–55. DOI: 10.1890/12-1628.1 **Article recommended by Faculty of 1000Prime, and featured on SFS podcast “Making Waves.”**
- 8) Wang, H., Zhang, Z., Muehlbauer, J.D., He, Q. & Jiang, D. (2014) Linking stoichiometric homeostasis of microorganisms with soil phosphorous dynamics in wetlands subjected to microcosm warming. *PLoS ONE* 9: e85575. DOI: 10.1371/journal.pone.0085575

## SCIENTIFIC PUBLICATIONS (CONTINUED)

- 7) Riggsbee, J.A., Doyle, M.W., Julian, J.P., Manners, R., Muehlbauer, J.D., Sholtes, J. & Small, M.J. (2013) Influence of aquatic and semi-aquatic organisms on channel forms and processes. Pages 189-202 in: *Treatise on Geomorphology* (Ed J.F. Schroder), Vol. 9, *Fluvial Geomorphology* (Ed E. Wohl), pp 189-202. Academic Press, San Diego, CA. DOI: 10.1016/B978-0-12-374739-6.00237-2
- 6) Muehlbauer, J.D. & Doyle, M.W. (2012) Knickpoint effects on macroinvertebrates, sediment, and discharge in urban and forested streams: Urbanization outweighs micro-scale heterogeneity. *Freshwater Science* 31: 282-295. DOI: 10.1899/11-010.1
- 5) Muehlbauer, J.D., Duncan, J. M. & Doyle, M.W. (2012) Benign use of salt slugs on aquatic macroinvertebrates: Measuring discharge with salt during an aquatic ecology study. *River Research & Applications* 28: 1858-1863. DOI: 10.1002/rra.1546
- 4) Muehlbauer, J.D., Doyle, M.W. & Bernhardt, E.S. (2011) Macroinvertebrate community responses to a dewatering disturbance gradient in a restored stream. *Hydrology and Earth System Sciences* 15: 1771-1783. DOI: 10.5194/hess-15-1771-2011
- 3) Fuller, R.L., Griego, C., Muehlbauer, J.D., Dennison, J. & Doyle M.W. (2010) Response of stream macroinvertebrates in flow refugia and high-scour areas to a series of floods: A reciprocal replacement study. *Journal of the North American Benthological Society (now Freshwater Science)* 29: 750–760. DOI: 10.1899/09-107.1
- 2) Muehlbauer J.D., LeRoy C.J., Lovett J.M., Flaccus K.K., Vlieg J.K. & Marks J.C. (2009) Short-term responses of decomposers to flow restoration in Fossil Creek, Arizona, USA. *Hydrobiologia* 618: 35–45. DOI: 10.1007/s10750-008-9545-3
- 1) Joseph, J.W., Odegaard, M.L., Ronnebaum, S.M., Burgess, S.C., Muehlbauer, J., Sherry, A.D. & Newgard, C.B. (2007) Normal flux through ATP-citrate lyase or fatty acid synthase is not required for glucose-stimulated insulin secretion. *Journal of Biological Chemistry* 282: 31592–31600. DOI: 10.1074/jbc.M706080200

## MANUSCRIPTS IN REVIEW

- 20) Muehlbauer, J.D., \*Clay, P.A., Doyle, M.W. & Tockner, K. (In Revision) Landscape controls on stream signatures: the forest edge as the stream boundary for terrestrial food webs. *For Ecological Monographs*

## MANUSCRIPTS IN PREP

- 21) Muehlbauer, J.D. & Doyle, M.W. (In Prep) Flooding decouples a major aquatic-terrestrial subsidy: insights from the combination of multiple ecological theories. *For Oikos* (~95%, revising draft)
- 22) Muehlbauer, J.D. (In Prep) A critical examination of the variables affecting stream subsidy dynamics. *For Aquatic Sciences*. (~90%, revising draft)
- 23) Muehlbauer, J.D. & Doyle, M.W. (In Prep) Does monitoring length affect restoration success? A 5-year stream/wetland study. *For Restoration Ecology*. (~80%, writing)
- 24) Muehlbauer, J.D., Yackulic, C.B., Kennedy, T.A. & Wright, S.A. (In Prep) Lagrangian sampling reveals strong linkage between invertebrate drift and shear stress in a large river dam tailwater. *For Freshwater Biology*. (~50%, analyzing data)
- 25-26) Muehlbauer, J.D. & Kennedy, T.A. (In Prep) Local and regional geomorphic controls on insect emergence throughout the Colorado River watershed in Grand Canyon. (~20%, processing data. 2+ publications)
- 27-28) Muehlbauer, J.D., Kennedy, T.A. & Yackulic, C.B. (In Prep) Food web ecology of the Little Colorado River and implications for spawning populations of endangered humpback chub (~10%, work ongoing. 2+ publications)

## OUTREACH PUBLICATIONS

- 3) \*Kortenhoeven, E.W., Muehlbauer, J.D. & Kennedy, T.A. (2016) Hydropower waves, insect eggs and citizen science: what's up with the aquatic food base in Grand Canyon? *Boatman's Quarterly Review*, Fall 2016: 5 pp.
- 2) Muehlbauer, J.D. (2007) Getting all wet at the ERI: a study of how riparian restoration influenced the aquatic ecosystem in Fossil Creek, Arizona. *Ecological Restoration Institute Newsletter*, Spring 2007: 3 pp.
- 1) Muehlbauer, J.D. (2004) Bridges, beer cans, and bulldozers: in search of answers along Abbey's Road. *A Celebration of Ideas*, NAU Honors Publication Fall 2004: 14 pp.

## DATA PUBLICATIONS

- 3) Metcalfe, A.N., Kennedy, T.A. & Muehlbauer, J.D. (2016) Angel lichen moth abundance and morphology data, Grand Canyon, AZ, 2012. *US Geological Survey Data Release*. DOI: 10.5066/F7154F5S
- 2) Kennedy, T.A. & Muehlbauer, J.D. (2016) Flow management for hydropower extirpates aquatic insects, undermining river food webs—Data. *US Geological Survey Data Release*. DOI: 10.5066/F7WM1BH4
- 1) Muehlbauer, J.D. (2014) How wide is a stream? Spatial extent of the potential "stream signature" in terrestrial food webs using meta-analysis—Data. *Ecological Archives* E095-006.

## MAJOR CONFERENCE PRESENTATIONS (AS LEAD AUTHOR ONLY)

- 18) Muehlbauer, J.D. (2017) Brown trout in Glen Canyon: insights from an expert elicitation survey. Glen Canyon Dam Adaptive Management Program Annual Reporting Meeting.
- 17) Muehlbauer, J.D. (2017) Fluvial aquatic ecology of the Colorado River. Glen Canyon Dam Adaptive Management Program Annual Reporting Meeting.
- 16) Muehlbauer, J.D. & Kennedy, T.A. (2016) Dammed and adrift: patterns of invertebrate drift throughout Colorado River Basin tailwaters. SFS.
- 15) Muehlbauer, J.D., Kennedy, T.A. & Kortenhoeven, E.W. (2016) Food availability in the Little Colorado River over space and time. Glen Canyon Dam Adaptive Management Program Annual Reporting Meeting.
- 14) Muehlbauer, J.D., Kennedy, T.A., Kortenhoeven, E.W. & Smith, J.T. (2015) Longitudinal and temporal patterns of food availability for endangered humpback chub, *Gila cypha*, in the Little Colorado River, Arizona. Desert Fishes Council.
- 13) Muehlbauer, J.D., Kennedy, T.A., Kortenhoeven, E.W. & Smith, J.T. (2015) There's more than one way to shade a river: contrasting influence of canyon orientation and water clarity on aquatic invertebrate densities. ESA.
- 12) Muehlbauer, J.D., Kennedy, T.A., Kortenhoeven, E.W. & Smith, J.T. (2015) Aquatic insect densities throughout the LCR: preliminary results (Poster). Glen Canyon Dam Adaptive Management Program Annual Reporting Meeting.
- 11) Muehlbauer, J.D., Kennedy, T.A., Smith, J.T., Sankey, J.B. & Kortenhoeven, E.W. (2014) Advances in emergent insect sampling: new sticky trap designs and automated sample processing. Joint Aquatic Sciences Meeting.
- 10) Muehlbauer, J.D., Kennedy, T.A. & Yackulic, C.B. (2013) Shear stress drives local variation in invertebrate drift in a large river. AGU.
- 9) Muehlbauer, J.D. (2013) How long is "long enough" in ecological restoration monitoring? UNC Curriculum for the Environment & Ecology Student Research Symposium.
- 8) Muehlbauer, J.D., Clay, P. & Doyle, M.W. (2012) Temporal succession and island biogeography in a braided river ecosystem following flash flooding: a bank-side community perspective. SFS.

## MAJOR CONFERENCE PRESENTATIONS (CONTINUED)

- 7) Muehlbauer, J.D., Doyle, M.W & Tockner, K. (2011) Effects of river geomorphology on the spatial importance of aquatic energy flows into terrestrial food webs. AGU.
- 6) Muehlbauer, J.D., Tockner, K. & Doyle, M.W. (2011) "Stream signatures:" aquatic subsidy importance to terrestrial food webs with distance from the stream. NABS.
- 5) Muehlbauer, J.D. & Doyle, M.W. (2010) Does urbanization overcome micro-scale heterogeneity? Knickpoint effects on macroinvertebrates, sediment, and discharge in urban and forested streams. ASLO/NABS.
- 4) Muehlbauer, J.D., Bernhardt, E.S. & Doyle, M.W. (2009) Macroinvertebrate community responses to an experimental drought gradient on the outer coastal plain of North Carolina. NABS.
- 3) Muehlbauer, J.D. & Doyle, M.W. (2008) Knickpoint effects on habitat and the macroinvertebrate community. Stream Restoration in the Southeast Conference.
- 2) Muehlbauer, J.D., *et al.* (2007) Short-term effects of dam decommissioning and flow restoration in Fossil Creek. ESA/SER.
- 1) Muehlbauer, J.D., *et al.* (2005) Diversion dam reduces decomposition, fungal biomass and macroinvertebrate abundance and diversity (Poster). AGU/NABS.

## INVITED, NON-CONFERENCE PRESENTATIONS

- 6) "Dammed and adrift in the Colorado River Basin". USGS Southwest Biological Science Center All-Hands Meeting, 2017
- 5) "Beyond the meter tape: defining ecological boundaries using food web metrics." ASU Polytechnic Global Institute of Sustainability Seminar, 2015
- 4) "'Stream signatures' and aquatic-terrestrial interactions in arthropod food webs." USGS Southwest Biological Science Center Brown Bag Seminar, 2013
- 3) "'How big is a river? How far do bugs fly? Hold on, you do what?' And other questions preschoolers (and parents) ask." UNC Royster Society of Fellows Interdisciplinary Seminar, 2012
- 2) "Water, watersheds & people." UNC special course on water issues, 2010
- 1) "Carbon dioxide" (for 200 children). Chapel Hill/Carrboro City Schools, 2009

## GRANTS & RECOGNITIONS

*~\$2,150,000 total in grant and fellowship support*

### *Federal Agencies*

- Bureau of Reclamation Glen Canyon Dam Adaptive Management Program 3-year workplan for aquatic foodbase research in Colorado River, 2015–2017 (\$1,147,700)
- Western Area Power Authority grant for aquatic foodbase research in Colorado River Basin, 2015–2017 (\$395,000)
- USGS Pathways Program support for undergraduate interns, 2014–2016 (\$33,500)
- USGS Southwest Biological Science Center Discretionary Funding, 2013 (\$5,000)

### *University of North Carolina at Chapel Hill*

- Royster Society Fellowship, 2007–2012 (~\$200,000)
- Graduate & Professional Student Federation Travel Award, 2009 (\$400)

### *Northern Arizona University*

- Gold Axe Award (most prestigious undergraduate award given at NAU), 2007
- Biology Senior Scholastic Award (outstanding undergraduate research), 2007 (\$250)
- Bayless Biology Scholarship (highest GPA in Biology Department), 2007 (\$250)
- Chemistry Senior Scholar Award (outstanding departmental contribution), 2007 (\$250)
- Provost's Scholarship, 2003–2007 (~\$50,000)
- Robert C. Byrd Arizona Scholarship, 2003–2007 (\$12,000)

- Raymond Scoutmaster Scholarship, 2006 (\$500)

## GRANTS & RECOGNITIONS (CONTINUED)

### *Societies & Organizations*

- Association for the Sciences of Limnology & Oceanography Travel Award, 2012 (\$500)
- IGB (Berlin) Fellowship in Freshwater Science, 2011 (~\$6,000)
- CUAHSI Hydrology Pathfinder Fellowship, 2010 (\$5,000)
- Sigma Xi Grant in Aid of Research (GiAR), 2010 (\$800)
- Cary IES Ecosystem Ecology Course, 2010
- North American Benthological Society President's Award, 2009 (\$900)
- Binghamton Geomorphology Symposium Student Scholarship, 2009 (\$75)
- Kirk Smith Ecological Restoration Institute Scholarship, 2005 (\$500)
- Exchange Club Chapter and Regional Scholarships for Patriotism, 2003 (\$3,000)
- Canon International Envirothon First Place in Aquatics Section, 2003
- Arizona Envirothon State Champions, 2003
- Eagle Scout (Boy Scouts of America), 2001

## STUDENTS & TECHNICIANS MENTORED

*David Goodenough.* USGS Undergraduate Biology Intern, 2014–Pres.

- Internship through USGS Pathways Youth and Education in Science Program

*Josh Smith.* USGS Research Ecologist, 2013–2014

- Published research on sticky trap designs and midge behaviors (see above)
- Current wildlife refuge specialist with US Fish and Wildlife Service, Sasabe, AZ

*Patrick Clay.* B.S. UNC Environmental Science, 2013. Research Assistant, 2009–2013

- UNC SURF Fellowship for international research on Tagliamento River (\$5,000)
- Published research on confluences and braided river hydro-ecology (see above)
- Current Ph.D. student in aquatic ecology, Rice University

*Ben Bogardus.* B.S. UNC Environmental Science, 2010. Research Assistant, 2007–2010

- Undergraduate research on channel bathymetry of largest stream restoration in NC
- Current masters student in international water development, Villanova University

*Daniel Band.* B.S. UNC Environmental Science, 2010. Research Assistant, 2007–2010

- Completed masters degree, UNC Department of City & Regional Planning

## TEACHING EXPERIENCE

*ENST 201: Environment & Society.* UNC, Chapel Hill, NC 8/2009–12/2009, 8/2012–12/2012.

- Course on (inter)national environmental issues and policies, ~200 students
- Taught 3 recitation sections of ~20 students each; lectured, graded, led discussions

*ENST 698: Cistern Water Quality Capstone Course.* UNC, Chapel Hill, NC 1/2011–5/2011

- Provided guidance for 9-student undergraduate team in water quality sampling
- Facilitated data collection, analysis, and reporting as Graduate Research Consultant

*GEOG 442: River Processes.* UNC, Chapel Hill, NC 8/2010–12/2010

- Graduate/upper undergraduate 20-student class in fluvial geomorphology
- Lectured occasionally, prepared and graded assignments as Teaching Assistant

*GEOG 110: Environmental Systems.* UNC, Chapel Hill, NC 8/2008–12/2008, 1/2011–5/2011

- First-year environmental sciences lecture class for general college, ~150 students
- Lectured occasionally, graded, and held office hours as Teaching Assistant.

*ECOL 569: Current Issues in Ecology.* UNC, Chapel Hill, NC 1/2009–5/2009

- First-year Ecology graduate core class on researching and publishing a paper
- Led discussions, graded, provided writing assistance as Teaching Assistant

*HON 399: Beyond the Bachelors.* NAU, Flagstaff, AZ 1/2006–5/2007

- Honors class for ~10 students considering graduate school
- Assisted with de novo course creation: Syllabus/scheduling/material development
- Designed, supervised, and maintained online class component as Teaching Assistant

## PROFESSIONAL SERVICE

*Constitutional Revision Committee.* Society for Freshwater Science, 2014–Pres.

*Author English Help Volunteer.* Ecological Society of America, 2006–Pres.

*Graduate Student President.* UNC Curriculum for the Environment & Ecology, 2012–2013

*Undergraduate Awards Committee.* Society for Freshwater Science, 2012–2013

*Seminar Committee.* UNC Curriculum for the Environment & Ecology

- Chair 2011–2012; Member 2008–2009, 2010–2011

*Faculty Search Committee.* UNC Curriculum for the Environment & Ecology, 2011–2012

*Peer-Reviewer.* (≥1 each)

- *Proposals:* NSF Division of Environmental Biology (DEB), Consortium of Universities for the Advancement of Hydrologic Science (CUAHSI) Pathfinder Grant
- *General ecology:* Ecology, J Applied Ecol, Global Change Biol, Ecol & Evol, J Biogeography, Restoration Ecol, PeerJ
- *Aquatic ecology:* Freshwater Sci, Canadian J Fisheries & Aquatic Sci, River Research & Applications, Estuaries and Coasts, Aquatic Sci, Hydrobiologia, J Freshwater Ecol
- *Hydrology & geomorphology:* Water Resources Research, Limnology & Oceanography: Fluids & Environments, J American Water Resources Association

## SYNERGISTIC ACTIVITIES

*Internship Mentor.* Doris Duke Conservation Scholars Program, 2014

*Special Session Organizer and Chair.* “Emergent insects as focal taxa for bridging ecological understanding across ecosystems: a synthesis of current knowledge and novel applications”. Joint Aquatic Sciences Meeting, 2014

*“Science Expert.”* Chapel Hill Schools, NC Museum of Natural Science, NC State Fair, NC Division of Water Quality, NC Museum of Life & Science, Ravenscroft School. 2009–2013

*“Instars” Undergraduate Program Mentor.* Society for Freshwater Science, 2012

*Graduate Research Consultant.* UNC Cistern Water Quality Capstone, 2011

*Envirothon Coach.* Sinagua (AZ) High School Envirothon team, 2006–2007

*Assistant Scoutmaster, Ropes Instructor & Trip Leader.* Boy Scouts of America, 2003–2007

*Conservation Volunteer & Organizer.* The Nature Conservancy, Sierra Club & Sierra Student Coalition, Society of Environmental Communicators, 2002–2007

*Chapter President/VP.* NAU Student Affiliates of the American Chemical Society, 2005–2007

*Active Member.* (Join date)

- Ecological Society of America (ESA), 2005
- American Geophysical Union (AGU), 2007
- Society for Freshwater Science (SFS), 2008
- Association for the Sciences of Limnology and Oceanography (ASLO), 2009
- Sigma Xi, 2010
- Honor Society of Phi Kappa Phi, 2005