# 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 (5th–8th Order, heavily regulated, endangered species), 2013–Pres.
* Danube River Basin: Danube, Sava, & Drava Rivers, central Europe (7th–10th Order, ship traffic, groin fields, industrial forestry & fisheries, confluences), 2010–2011
* Tagliamento River, Italy (1st–7th Order, braided, alpine, un-dammed), 2010–2011
* Elbe River, Germany (8th Order, groin fields, cruise ship traffic), 2011
* Coweeta LTER & Little Tennessee River, NC (1st–6th Order, natural), 2009–2010
* Hudson & Indian Rivers, NY (5th Order, dam flood pulses), 2007
* Timberlake stream/wetland, NC (drought, restoration monitoring), 2007–2012
* Meeting of the Waters & New Hope Creeks, NC (3rd 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

# Research & Employment (Continued)

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

* Research Associate, Department of Biology, 2003–2007

*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*

16) 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*

15) 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. (In Press) Flow management for hydropower extirpates aquatic insects, undermining river food webs. *BioScience*. DOI: [10.1093/biosci/biw059](http://dx.doi.org/10.1093/biosci/biw059)

14) \*Smith, J.T., Muehlbauer, J.D. & Kennedy, T.A. (In Press) Evaluating potential sources of variation in Chironomidae catch rates on sticky traps. *Marine and Freshwater Research*. DOI: [10.1071/MF15189](http://dx.doi.org/10.1071/MF15189)

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](http://dx.doi.org/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](http://dx.doi.org/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](http://dx.doi.org/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](http://dx.doi.org/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](http://dx.doi.org/10.1890/12-1628.1) [***Article recommended by Faculty of 1000Prime***](http://f1000.com/prime/718343875)***, and*** [***featured on SFS podcast “Making Waves.”***](https://www.freshwater-science.org/Education-and-Outreach/Media/Podcast/MW12---Jeffery-Muehlbauer.aspx)

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](http://dx.doi.org/10.1371/journal.pone.0085575)

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](http://dx.doi.org/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](http://dx.doi.org/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](http://dx.doi.org/10.1002/rra.1546)

# Scientific Publications (Continued)

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](http://dx.doi.org/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](http://dx.doi.org/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](http://dx.doi.org/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](http://dx.doi.org/10.1074/jbc.M706080200)

# Manuscripts In Review

17) Metcalfe, A.N., Kennedy, T.A. & Muehlbauer, J.D. (In Review) Phenology and life history plasticity of the angel lichen moth (*Cisthene angelus*) in Grand Canyon, AZ, USA. *For Southwestern Naturalist*

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

19) Baxter, C.V., Kennedy, T.A., Miller, S.W., Muehlbauer, J.D. & Smock, L.A. (In Review) Macroinvertebrate drift, adult insect emergence and oviposition. Chapter 21 in: *Methods in Steam Ecology* (Eds F.R. Hauer & G.A. Lamberti), 3rd edition.

# Manuscripts In Prep

20) Copp, A.C., Muehlbauer, J.D., Kennedy, T.A. & Sabol, T.A. (In Prep) Deleterious effects of net clogging and reduced filtration efficiency on the quantification of stream drift. *For Limnology and Oceanography (~95%, revising draft)*

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

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.

# Major Conference Presentations (As Lead Author Only)

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.

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

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

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 intern, 2014–2016 (*$12,500*)
* 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*)

*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 research ecologist with US Forest Service, Hilo, HI

# Students & Technicians Mentored (Continued)

*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)

* *General ecology:* Ecology, J Applied Ecology, Restoration Ecology, J Biogeography
* *Aquatic ecology:* Freshwater Sci, Canadian J Fisheries & Aquatic Sci, River Research & Applications, Estuaries and Coasts, Aquatic Sci, Hydrobiologia, J Freshwater Ecology
* *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