

## 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

## 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

- 14) Larsen, S., Muehlbauer, J.D. & Martí, E. (Accepted) Resource subsidies between stream and terrestrial ecosystems under global change. *Global Change Biology*. DOI: 10.1111/gcb.13182
- 13) \*Smith, J.T., Muehlbauer, J.D. & Kennedy, T.A. (Accepted) Evaluating potential sources of variation in Chironomidae catch rates on sticky traps. *Marine and Freshwater Research*
- 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: 10.1086/682239
- 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
- 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* (Eds J. Schroder), Vol. 9, *Fluvial Geomorphology* (Ed E. Wohl), pp 189–202. Academic Press, San Diego. 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

## SCIENTIFIC PUBLICATIONS (CONTINUED)

- 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

- 15) Kennedy, T.A., Yackulic, C.B., Muehlbauer, J.D., Lytle, D.A., Miller, S.W., Dibble, K.L., Kortenhoeven, E.W., Metcalfe, A.N. & Baxter, C.V. (In Review) Hydropower production creates a life history bottleneck for aquatic insects in regulated rivers. *For Nature*
- 16) Muehlbauer, J.D. & Doyle, M.W. (In Review) Flooding decouples a major aquatic-terrestrial subsidy: insights from the combination of multiple ecological theories. *For Journal of Animal Ecology*
- 17) Dzul, M.C., Yackulic, C.B., Korman, J., Yard, M.D. & Muehlbauer, J.D. (In Review) Incorporating temporal heterogeneity in environmental conditions into a somatic growth model. *For Canadian Journal of Fisheries and Aquatic Sciences*

## MANUSCRIPTS IN PREP

- 18) Muehlbauer, J.D., \*Clay, P.A., Doyle, M.W. & Tockner, K. (In Prep) Hydrogeomorphic and vegetation controls on stream signatures: the forest edge as the stream boundary for terrestrial food webs. *For Ecological Monographs*. (~95% completed, revising draft)
- 19) 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* (~90%, revising draft)
- 20) Muehlbauer, J.D. (In Prep) A critical examination of the variables affecting stream subsidy dynamics. *For Aquatic Sciences*. (~90%, revising draft)
- 21) 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)
- 22) 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)
- 23-25) 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. 3+ publications)
- 26-28) 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. 2-3 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)

- 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, 2014–2015 (\$10,000)
- 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

*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, 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

**SYNERGISTIC ACTIVITIES (CONTINUED)**

*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