

**DR. SARA K. McMILLAN, P.E.**  
*Curriculum Vitae*

Department of Agricultural and Biological Engineering  
225 South University Street  
West Lafayette, IN 47907-2093  
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**Research Interests**

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Stream and wetland restoration; biogeochemistry; water resources and climate change; watershed and landscape processes; hyporheic and riparian zone hydrology

**Education**

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- 2007            PhD, University of North Carolina at Chapel Hill, Department of Environmental Sciences and Engineering  
Advisors: Hans Paerl and Michael Piehler.  
*Influence of hydrology and denitrification on nutrient dynamics in coastal headwater streams.*
- 1998            MS, University of Iowa, Department of Civil and Environmental Engineering.  
Advisor: Jerald Schnoor.  
*Phytoremediation of methyl tert-butyl ether (MTBE) by hybrid poplar trees.*
- 1997            BSCE, University of Iowa, Department of Civil and Environmental Engineering.

**Professional Positions**

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- 2014 – present    *Assistant Professor*, Department of Agricultural and Biological Engineering, Purdue University, West Lafayette, IN
- 2013 – 2014        *Assistant Professor*, Department of Civil and Environmental Engineering, University of North Carolina at Charlotte, Charlotte, NC
- 2009 – 2013        *Assistant Professor*, Department of Engineering Technology, University of North Carolina at Charlotte, Charlotte, NC
- 2008 – 2009        *Water Resources Engineer*, Black & Veatch, Charlotte, NC
- 2003 – 2007        *Research Assistant*, Institute of Marine Sciences, University of North Carolina at Chapel Hill, Morehead City, NC
- 2000 – 2002        *Project Engineer*, Limno-Tech, Inc. Ann Arbor, MI
- 1998 – 2000        *Environmental Engineer*, Howard R. Green Company, Cedar Rapids, IA
- 1997 – 1998        *Research Assistant*, Department of Civil and Environmental Engineering, University of Iowa, Iowa City, IA
- 1996-1997         *Teaching Assistant*, Department of Civil and Environmental Engineering, University of Iowa, Iowa City, IA

## Professional Certifications

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Professional Engineer, North Carolina 2008 - present

## Honors and Awards

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- UNC Charlotte College of Engineering Excellence in Undergraduate Teaching Award (2010)
- Board of Governors Fellowship, University of North Carolina, (2002)
- Iowa Water Pollution Control Association Scholarship, University of Iowa (1997)
- Tau Beta Pi National Engineering Honor Society (1996)
- Chi Epsilon National Civil Engineering Honor Society (1995)

## Sponsored Research

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### *Active Research Funding*

- 2012-2015 City of Charlotte Stormwater Services, \$379,500 (co-PI). “Reedy Creek Watershed Restoration Study”. PI: S. Clinton.
- 2012-2015 United States Department of Agriculture, Agriculture and Food Research Initiative, \$485,000 (PI). “Impact of agricultural stream restoration on riparian hydrology and biogeochemistry”, co-PI: P. Vidon.
- 2010-2015 National Science Foundation, CBET Environmental Sustainability, \$391,341 (PI). “Impact of stormwater management on ecological function in urban streams”, co-PIs: S. Clinton, A. Jefferson, C. Tague.

### *Pending Research Funding*

- 2016-2020 United States Department of Energy, \$7,953,176 (co-PI). “Bio3BL-Beioenergy Landscape Design for the Triple Bottom Line” PI: Indrajeet Chaubey, co-PIs: S. Brouder, D. Buckmaster, B. Engel, E. Flaherty, T. Filley, R. Goforth, B. Gramig, K. Gkberitza, C. Martin, N. Mosier, L. Prokopy, J. Sesmero, S. Singh, R. Turco, W. Tyner, J. Volenec, J. Arnold, D. Bosch, T. Strickland, W. Anderson, G. Hawkins, G. Vellidis, M. Toews, R. Srinivasan.
- 2015-2018 National Science Foundation, CBET Environmental Sustainability, \$320,052 (PI). “Collaborative research: Nutrient retention and floodplain connectivity in restored urban streams”, co-PIs: S. Clinton, G. Noe.
- 2016-2018 Illinois-Indiana Sea Grant College Program, \$200,000 (co-PI). “Combining societal acceptance and biophysical drivers of best practices to achieve water quality improvements in multi-use landscapes”. PI: Z. Ma.
- 2016-2018 Illinois-Indiana Sea Grant College Program, \$200,000 (PI). “Quantifying trade-offs of floodplain restoration using the two-stage ditch: improvements in water quality vs. increased greenhouse gas emissions.” co-PI: J. Tank.

### *Completed Funded Research*

- 2012-2013 North Carolina Water Resources Research Institute, \$49,991 (PI) “Nutrient retention and floodplain connectivity in restored Piedmont streams”, co-PI: Gregory Noe.
- 2009-2010 City of Winston-Salem, NC, \$53,520 (PI). “Hydrologic and heat response at the catchment scale in highly urbanized watersheds”.
- 2010-2011 North Carolina Water Resources Research Institute, \$49,500 (PI) “Nitrogen retention in urban streams: Implications for ecologically based stream restoration”, co-PI: Gregory Jennings.
- 2010-2011 UNC Charlotte, ADVANCE Program, \$5300 (PI) “Ecosystem restoration through integration of ecological modeling with experimental research”.
- 2010-2011 UNC Charlotte, Faculty Research Grant, \$6000 (PI) “Nitrogen uptake dynamics in urban streams”.

### **Publications** (\*invited contribution, underline indicates advised student co-author)

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#### *Journal articles and book chapters*

1. Tuttle, A. K., **S.K. McMillan**, A. Gardner and G. D. Jennings (2014). “Channel complexity and nitrate concentrations drive denitrification rates in urban restored and unrestored streams”. *Ecological Engineering*, 73:770-777; DOI: 10.1016/j.ecoleng.2014.09.066.
2. \***McMillan, S. K.** and P. G. Vidon (2014). “Taking the pulse of stream restoration practices: moving towards healthier streams”. *Hydrological Processes* 28:398-400. DOI: 10.1002/hyp.10092.
3. \***McMillan, S. K.**, A. K. Tuttle, G. D. Jennings, and A. Gardner (2013). “Influence of Restoration Age and Riparian Vegetation on Reach-Scale Nutrient Retention in Restored Urban Streams”. *Journal of the American Water Resources Association*, *In Press*.
4. \*O’Driscoll M., S. Clinton, A. Jefferson, A. Manda and **S. McMillan** (2010). “Review: Urbanization effects on watershed hydrology and in-stream processes in the southern United States” *Water*, 2:605-648; doi:10.3390/w2030605.
5. **McMillan, S.K.**, M.F. Piehler, S.P. Thompson and H. W. Paerl (2010) “Denitrification of nitrogen released from senescing algal biomass in coastal agricultural headwater streams.” *Journal of Environmental Quality*, 39(1):274-281.
6. Ensign, S.H., **S.K. McMillan**, S.P. Thompson, M.F. Piehler (2006). “Nitrogen and phosphorus attenuation within the stream network of a coastal, agricultural watershed.” *Journal of Environmental Quality*, 35(4):1237–1247.
7. **Winnike-McMillan, S.K.**, Q. Zhang, L. C. Davis, L. E. Erickson and J. L. Schnoor (2003). “Phytoremediation of Methyl Tertiary-Butyl Ether.” *Phytoremediation: Transformation and Control of Contaminants*. Editors: J. L. Schnoor and S. C. McCutcheon, Wiley-Interscience.
8. Hong, M. S., W. F. Farmayan, I. J. Dortch, C. Y. Chiang, **S. K. McMillan** and J. L. Schnoor (2001). “Phytoremediation of MTBE from a Groundwater Plume.” *Environmental Science and Technology* 35(6): 1231-1239.

*Other peer-reviewed publications*

1. **McMillan, S.K.**, G.D. Jennings, A. Gardner, A. Tuttle (2012) “Nitrogen Retention in Urban Streams: Implications for Ecologically Based Stream Restoration”. Final Report for North Carolina Water Resources Research Institute, Project #70256.

*Manuscripts in review/preparation*

1. Jefferson, A., C. Bell, S. Clinton and **S. McMillan**. “Application of isotope hydrograph separation to understand urban stormwater dynamics”. Hydrological Processes. *In Review*.
2. Bell, C., **S. McMillan**, S. Clinton and A. Jefferson. “Hydrological response in urban watersheds with stormwater control measures”. Water Resources Research. *In Review*
3. Vidon, P., S. Marchese, M. Welsh, **S. McMillan**. “Impact of sampling design on greenhouse gas flux estimates at the soil-atmosphere interface in two agricultural riparian zones” In preparation for submission to Environmental Monitoring and Assessment.
4. Vidon, P., S. Marchese, M. Welsh, **S. McMillan**. Impact of landscape position on greenhouse gas response to storms in a forested riparian zone (in preparation for submission to Environmental Science: Processes and Impacts).

**Presentations** (\*invited presentation; underlined advised student co-author)

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\***McMillan, S. K.** (2014). “Assessing ecosystem function of headwater streams: Influence of restoration on nutrient retention.” Purdue University, National Soil Erosion Research Lab. December 10, 2014.

Turner, E., S.M. Clinton, **S.K. McMillan** (2014). “Stream restoration influences floodplain connectivity: Effects of restoration on soil characteristics in restored urban floodplains in the Piedmont of North Carolina. Ecostream: Stream Ecology and Restoration Conference, Charlotte, NC

Welsh, M., **S. McMillan**, P. Vidon (2014). “Quantification of in-stream and riparian denitrification potential and environmental drivers of denitrification following agricultural stream restoration in the Piedmont Region of North Carolina.” Ecostream: Stream Ecology and Restoration Conference, Charlotte, NC

**McMillan, S.**, P. Vidon, M. Welsh, S. Marchese (2014). “Impact of agricultural stream restoration in the Southeastern USA”. USDA-NIFA Project Director’s Meeting, Arlington, VA

\***McMillan, S.**, A. Jefferson (2014). “Evaluating success of urban stream restoration in an ecosystem services context”. British Hydrological Society National Symposium. Birmingham, UK

Bell, C.D., **S.K. McMillan**, S.M. Clinton, A.J. Jefferson (2014). “Identifying controls on stormflow, nutrient and carbon export from urban watersheds in the Southeastern U.S. with Sustainable Drainage Systems (SUDS).” British Hydrological Society National Symposium. Birmingham, UK

- Clinton, S., S. McMillan, G. Noe, E. Turner (2014). “Nutrient processing and floodplain connectivity following restoration in urban streams.” British Hydrological Society National Symposium. Birmingham, UK
- Looper, E.N, S.K. McMillan (2014). “Influence of stormwater management structures on denitrification activity in urban streams in Charlotte, North Carolina, USA. British Hydrological Society National Symposium 2014. Birmingham, UK
- Welsh, M., S. McMillan, P. Vidon (2014). “Impact of floodplain restoration on riparian soil and stream sediment denitrification potential in the Piedmont region of North Carolina”. Joint Aquatic Sciences Meeting, Portland, OR
- Bell, C.D., S.K. McMillan, S.M. Clinton, A.J. Jefferson (2014). “Controls on stormflow, nutrient and carbon export from urban watersheds with stormwater control measures.” American Ecological Engineering Society Annual Meeting, Charleston, SC
- Welsh, M., S. McMillan, P. Vidon (2014). “Impact of stream restoration on riparian soil and stream sediment denitrification potential in North Carolina”. American Ecological Engineering Society Annual Meeting, Charleston, SC
- Dulin, S., S. McMillan, S. Clinton, M. Welsh, P. Vidon (2014). “Downwelling and longer retention times increase nitrogen uptake in streams”. Charlotte Research Scholars Undergraduate Conference, Charlotte, NC
- McMillan, S.K.**, G. Noe, A.K. Tuttle (2014). “Nutrient processing and floodplain connectivity following restoration in urban streams”. North Carolina Water Resources Research Institute Annual Meeting, Raleigh, NC
- Looper, E.N, S.K. McMillan (2014). “Sediment denitrifying community response to flow disturbances in an urban stream receiving discharge from a stormwater control measure”. North Carolina Water Resources Research Institute Annual Meeting, Raleigh, NC. 1<sup>st</sup> Place in student poster competition
- Welsh, M., S. McMillan, P. Vidon (2014). “Impact of stream restoration on riparian soil and stream sediment denitrification potential in the Piedmont region of North Carolina”. Water Resources Research Institute Annual Meeting, Raleigh, NC. 2<sup>nd</sup> place in student poster competition
- Bell, C.D., S.K. McMillan, S.M. Clinton, A.J. Jefferson, C.L. Tague (2013). “Water and nitrogen export patterns of urban watershed with stormwater control measures.” American Geophysical Union Fall Meeting, San Francisco, CA
- \*McMillan, S. K.**, G. B. Noe, A. K. Tuttle, G. Jennings (2013). “Influence of restoration age on nutrient processing in urban streams and floodplains following restoration.” American Geophysical Union Annual Meeting. San Francisco, CA

- \*McMillan, S. K., G. B. Noe, A. K. Tuttle** (2013). “Nutrient processing and floodplain connectivity following restoration in urban streams”. Society of Wetland Sciences Annual Meeting. Duluth, MN
- McMillan, S., P. Vidon, J. Gross, S. Marchese, M. Welsh** (2013). “Impact of agricultural stream restoration on riparian hydrology and biogeochemistry in the US Southeast”. National Cooperative Soil Survey Conference and USDA-NIFA Project Director’s Meeting, Annapolis, MD
- Bell, C.D., S.K. McMillan, S.M. Clinton, A.J. Jefferson (2013). “Urban stream nutrient and carbon quality responses to stormwater control measures.” North Carolina Water Resources Research Institute Annual Meeting, Raleigh, NC. 1<sup>st</sup> Place in student poster competition
- Bell, C.D., S.K. McMillan, S.M. Clinton, A.J. Jefferson, C.L. Tague (2012). “Using watershed modeling to optimize management of urban stormwater to control nitrogen.” American Ecological Engineering Society Meeting, Syracuse, NY
- \*McMillan, S. K., A. K. Tuttle, G. Jennings** (2012). “Coupled biogeochemical cycles in restored urban streams: Influence of riparian vegetation and channel complexity”. Geological Society of American Annual Meeting. Charlotte, NC
- Bell, C.D., S.K. McMillan, C.L. Tague, S.M. Clinton, A.J. Jefferson (2012). “Using modeling to assess hydraulic parameter transferability from an undeveloped to and urban watershed with stormwater infrastructure.” Geological Society of America Fall Meeting, Charlotte, NC
- \*McMillan, S. K.** (2012). “Influence of riparian vegetation and channel complexity on coupled biogeochemical cycles in restored urban streams”. American Water Resources Association, Riparian Ecosystems Specialty Conference. Invited plenary presentation. Denver, CO
- \*McMillan, S. K.** (2012). “Nutrient retention in restored streams: Influence of channel complexity and floodplain connectivity.” Stream Restoration in the Southeast: Innovations for Ecology. Invited plenary presentation. Wilmington, NC
- \*McMillan, S. K.** (2011). “Assessing ecosystem function of urban streams: Influence of restoration on nutrient retention.” Virginia Tech, Department of Civil and Environmental Engineering Seminar Series. October 28, 2011
- McMillan, S. K., S. M. Clinton and A. J. Apple** (2011). “Influence of stormwater wetlands on instream nitrogen dynamics in urban watersheds.” Gordon Research Conference: Catchment Science: Interaction of Hydrology, Biology and Geochemistry, Sentinels of Global Change. Lewiston, ME
- Tuttle, A. K. and S. K. McMillan (2011). “Stream sediment denitrification rates in restored and degraded streams with urbanized watersheds”. Gordon Research Conference: Catchment

Science: Interaction of Hydrology, Biology and Geochemistry, Sentinels of Global Change. Lewiston, ME

**McMillan, S. K.**, G. Jennings, A. K. Tuttle, and A. Gardner (2011). "Linking geomorphic and biological controls on nutrient retention in restored urban streams." 11th Annual American Ecological Engineering Society Conference, Asheville, NC

Blue, B., and **S. K. McMillan** (2011). "Urban stream water temperature response dynamics within the Northern Piedmont of North Carolina." Water Resources Research Institute Annual Conference, Raleigh, NC

Tuttle, A. K. and **S. K. McMillan** (2011). "Stream Sediment Denitrification Rates in Restored and Degraded Streams with Urbanized Watersheds" Water Resources Research Institute Annual Conference, Raleigh, NC

**McMillan, S. K.** and A. J. Apple (2011). "Influence of stormwater wetlands on instream nitrogen transformation in urban streams". Wetlands, Water Resources and People: South Atlantic/Mid-Atlantic Society of Wetland Scientist Joint Chapter Meeting. Reston, VA

Piehler, M. F. and **S. K. McMillan** (2011). "Assessing the function of a wetland constructed to treat agricultural runoff". Wetlands, Water Resources and People: South Atlantic/Mid-Atlantic Society of Wetland Scientist Joint Chapter Meeting. Reston, VA

**McMillan, S. K.**, A. J. Apple and S. M. Clinton (2010). "Is stream restoration enough? Linking restoration with watershed-based stormwater management in urban streams" Stream Restoration in the Southeast: Connecting Communities with Ecosystems. Raleigh, NC

Clinton, S. M. and **S. K. McMillan** (2010). "Linking microbes and ecosystem processes in restored urban streams: An analysis of denitrifier diversity." North American Benthological Society Meeting, Santa Fe, NM

Piehler, M. F., **S. K. McMillan**, A. R. Smyth, S. P. Thompson and C. A. Currin (2007). "Effects of water level and shoreline stabilization on nitrogen cycling in fringing salt marshes." 10<sup>th</sup> International Symposium on Wetland Biogeochemistry

**McMillan, S. K.**, S. T. Thompson, H.W. Paerl and M. F. Piehler (2006). "Denitrification dynamics in coastal headwater streams: Influence of DOC and nitrate." American Society of Limnology and Oceanography Aquatic Sciences Meeting, Victoria, BC

**Winnike, S. K.** and J. L. Schnoor. (2000) "Phytoremediation of methyl *tert*-butyl ether (MTBE) by hybrid poplar trees." American Chemical Society, San Francisco, CA

## **Student research advised**

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PhD	Colin Bell (current)
MS	Erin Looper (2014); Molly Welsh (2014); Alea Tuttle (2012), Alexandra Apple (2012), Brandon Blue (2012), Joshua Moore (2011)
Undergraduate	Nicole Ng (2014), Rachael Herndon (2014), Nikki Trainham (2014), Xueying Wang (2014), Steven Dulin (2014), Trey Riley (2013), Charles Safrit (2012), Brittany Marvel (2011), Katie Aldrich (2011 NSF REU), Melinda Cronenberger (2011 NSF REU), Nicole Garriss (2011), Christopher Lattimore (2011), Leah Haithcock (2010).

## **Courses developed and taught**

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### PhD/MS level

- Ecological Engineering (3 credits)
- Watershed Science, co-taught (3 credits)
- Water Resources Seminar (1 credit)

### Advanced undergraduate level

- Environmental and Water Resources Engineering Design
- Hydraulics and Hydrology (3 credits)
- Sustainability: Principles and Applications (3 credits)
- Water and Wastewater Systems (3 credits)

### Introductory undergraduate level

- Introduction to Environmental Engineering (3 credits)
- Environmental Laboratory (1 credit, 3 contact hours)
- Computer Application for Engineers (3 credits)

## **Professional Service**

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Proposal review	NSF Coupled Human and Natural Systems panel reviewer; NSF-ENG-Environmental Sustainability panel reviewer, NSF-EAR-Hydrologic Sciences ad-hoc reviewer; American Association for the Advancement of Science; Illinois Water Resources Center; Maryland Sea Grant; Wisconsin Water Resources Institute, Indiana Water Resources Center
Manuscript review	Biogeochemistry; Ecological Engineering; Environmental Science & Technology; Hydrologic Processes; Journal of Environmental Quality; Journal of Geophysical Research: Biogeosciences; Journal of Hydrologic Engineering; Journal of the American Water Resources Association; Water Resources Research; Water, Soil and Air Pollution



Session convener	<p>Society of Wetland Scientists, Special Session: “Riparian restoration science: processes, approach and management implications in stream and wetland ecosystems.” June 1-4, 2015, Providence, RI.</p> <p>American Geophysical Union, Special Session Biogeosciences Session B26: “Coupled Biogeochemical Cycles in Terrestrial and Aquatic Ecosystems.” December 5-9, 2011, San Francisco, CA.</p> <p>NC American Water Works Association-Water Environment Association: “Drought Issues: Local to Global Perspectives”, “Endocrine Disrupting Compounds (EDC’s)-What Do They Mean to You?”. November 17-20, 2008, Winston-Salem, NC.</p>
Advisor	UNC Charlotte Student Chapter Society of Women Engineers (2010-2014)
Committees/Centers	Fellow and Advisory Board Member, Infrastructure, Design and Environmental Sustainability Center, UNC Charlotte (2010-2014); Undergraduate Research Conference Organizing Committee, UNC Charlotte (2013-2014); Faculty Competitive Grants Committee, UNC Charlotte (2010-2012)

### **Professional Associations**

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American Society of Agricultural and Biological Engineering  
 American Ecological Engineering Society  
 American Geophysical Union  
 Society of Wetland Scientists  
 Society of Freshwater Science (formerly North American Benthological Society)  
 American Society for Engineering Education