GASTON E. SMALL

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Updated 4/22/2022

Education

University of Georgia, Athens, GA
Ph.D. Ecology, 2010
Dissertation: "Phosphorus Dynamics in Neotropical Stream Food Webs: Effects of Stream Phosphorus Loading on Consumer Physiology, and the Role of Consumers in Recycling Nutrients"

University of North Carolina, Chapel Hill, NC
M.A. in Teaching (Science Education), 2002

North Carolina State University, Raleigh, NC
B.S. Environmental Science (Suma Cum Laude), 2001.
B.A. English (Suma Cum Laude), 2001.
Minor, Outdoor Leadership

Professional Experience

University of St. Thomas, Saint Paul, MN 2021-2022
Acting Chair
Department of Earth, Environment, and Society

University of St. Thomas, Saint Paul, MN 2020-present
Environmental Science Program Director
Department of Earth, Environment, and Society

University of St. Thomas, Saint Paul, MN 2020-present
Associate Professor
Department of Earth, Environment, and Society

University of Minnesota Institute on the Environment, Saint Paul, MN 2019-present
Fellow

University of St. Thomas, Saint Paul, MN 2018-present
Associate Professor
Biology Department

University of St. Thomas, Saint Paul, MN 2012-2018
Assistant Professor
Biology Department

University of Minnesota 2010-2012
Department of Ecology, Evolution, and Behavior
Saint Paul, MN
Postdoctoral Research Associate
Biogeochemistry of Great Lakes

University of Georgia, Odum School of Ecology, Athens, GA 2004-2010
Research Assistant, Project Manager
Tropical Stream Ecology and Biogeochemistry

North Carolina State University 2002-2003
Department of Zoology
Raleigh, NC
Research Assistant
Effects of predator chemical cues on mosquito oviposition

Research Overview

My research is broadly focused on understanding biological and physical controls on nutrient cycling within ecosystems, and understanding how humans are altering these processes through factors such as external nutrient loading, changes in community composition, and climate change.

Membership in Professional Societies

American Society of Limnology and Oceanography
Ecological Society of America
International Association of Great Lakes Research
Society for Freshwater Science

Grants and Fellowships

2022: University of St. Thomas Research-In-Action grant. Analysis of soil and water contamination at Wakán Tipi. ($20,000). GES is PI.

2021: National Science Foundation, LTER. The changing nature of cities: Ecological and social dynamics in the Minneapolis-St. Paul Urban Ecosystem. ($7.1 million) GES is Senior Personnel

2021: National Science Foundation. STEM Teaching for all: Recruiting diverse science and mathematics teachers for the Twin Cities. ($75,000) GES is co-PI.

2021: National Science Foundation, DEB-Ecosystems. Research Experience for High School Students Supplement. ($5,000) GES is PI.

2020: Formas (Swedish Granting Agency). Sustainable urban nutrient management under climate change: Can urban agriculture help build food, energy, & water resilient cities? ($27,925 sub-award to UST) GES is co-PI.

2020: National Science Foundation, DEB-Ecosystems. Research Experience for High School Students Supplement. ($5,000) GES is PI.

2019: National Science Foundation, DEB-Ecosystems. Research Experience for Teachers Supplement. Developing middle school biology curricula around urban agriculture ($14,914) GES is PI.

2018-2019: Environmental Protection Agency National Student Design Competition for Sustainability Focusing on People, Prosperity, and the Planet (P3). Soil amendments for enhanced phosphorus retention: Implications for green infrastructure design. ($14,977). GES is PI.

2018-2019: National Science Foundation, Division of Undergraduate Biology Education. RCN-UBE Incubator: Urban agriculture supports accessible and impactful biology education. ($73,904). GES is co-PI.

2018: NCR-SARE Youth Educator Grant. Sustainable agriculture internship including study of compost nutrient cycling in urban agriculture. ($2,000). GES is collaborator.

2017-2020: NCR-SARE. Collaborative evaluation of ecosystem services provided by urban agricultural best management practices in the Twin Cities Metropolitan Area. ($198,529). GES is co-PI.

2018: National Science Foundation, DEB-Ecosystems. Research Experience for Teachers Supplement. Using urban agriculture research as a basis for K-12 science curricula for English Language Learners ($14,850) GES is PI.

2017-2022: National Science Foundation, DEB-Ecosystems. CAREER: Effects of urban agriculture expansion and climate change on nutrient cycling and loss in urban ecosystems. ($658,338). GES is PI.

2017-2022: National Science Foundation, DEB-Ecosystems. LTREB: Climate-driven acidification in lowland neotropical streams: Building on 25 years of groundwater-surface water interactions. ($300,000) PI: A. Ramírez (NC State University). GES is co-PI.

2015-2018: Minnesota Legislative-Citizen Commission on Minnesota Resources (LCCMR). Assessing wetland restorations for improved water quality. PI: Jacques Finlay (University of Minnesota). GES listed as project partner.

2014-2015: U.S. Environmental Protection Agency P-3 (People, Prosperity, and the Planet) Design Competition for Sustainability. Phase 1 Award. Adaptation of hydroponics to remove excess phosphorus from urban lakes. ($15,000) GES is PI.

2013: National Science Foundation, DEB-Ecosystems. REU Supplement. Emergent landscape patterns in stream ecosystem processes resulting from groundwater/surface water

interactions. ($7,245) PI: C.M. Pringle (University of Georgia). GES had primary role in writing the grant and mentored a student from the University of St. Thomas on this project.

2011-2016: National Science Foundation, DEB-Ecosystems. Emergent landscape patterns in stream ecosystem processes resulting from groundwater/surface water interactions. ($449,491) PI: C.M. Pringle (University of Georgia). GES co-wrote the grant and was a collaborator on this project.

2012-2014: Minnesota/Wisconsin Sea Grant. Landscape regulators of biogeochemical pattern and process in the Saint Louis River Estuary. ($189,877) PIs: J.C. Finlay (UMN), R.W. Sterner (UMN), E. Stanley (University of Wisconsin, Madison) GES had primary role in writing the grant and is a collaborator on this project.

2012: Cooperative Institute for Limnology and Ecosystems Research Postdoctoral Fellowship. Developing a coupled hydrodynamic/biogeochemical model for the St. Louis River Estuary.

2007-2009: U.S. Environmental Protection Agency Science to Achieve Results (STAR) Graduate Fellowship. Measuring the effects of insect emergence as a nitrogen removal pathway in streams.

2004-2010: Presidential Fellowship, University of Georgia Graduate School.

Peer-Reviewed Publications

Google Scholar Profile: https://scholar.google.com/citations?user=qotdVyEAAAAJ&hl=en
Citations: 1218
h-index: 17
i10 index: 27

41. Kay, A.D., E.J. Chapman, J.D. Cheruiyot, S. Lowery, S.R. Singer, **G.E. Small**, A.M. Stone, R. Warthen, W. Westbroek. 2022. Potential for urban agriculture to support accessible and impactful undergraduate biology education. *Ecology and Evolution* 12: e8721.
40. Chapman, E.J., G.E. Small, P. Shrestha. 2022. Investigating potential hydrological ecosystem services in urban gardens through soil amendment experiments and hydrologic models. *Urban Ecosystems*. https://doi.org/10.1007/s11252-021-01191-7
39. Tao, T., L. Liu, G.E. Small, J. Chen, Y. Wang, X. Sun. 2021. The effects of land management patters on soil carbon sequestration and C:N:P stoichiometry in sloping croplands in southern China. *Agriculture, Ecosystems & Environment* 320: 107584.
38. **Small, G.E.**, I. Jimenez, M. Salzl, P. Shrestha. 2020. Urban heat island mitigation due to enhanced evapotranspiration in an urban garden in Saint Paul, Minnesota, USA. *WIT Transactions on Ecology and the Environment* 243: 39-45.
37. Nicklay, J.A., K.V. Cadieux, M.A. Rogers, N.A. Jelinski, K. LaBine, **G.E. Small**. 2020. Facilitating Spaces of urban agroecology: A learning framework for community-university partnerships. *Frontiers in Sustainable Food Systems* 4: 143.
36. Shrestha, P., **G.E. Small**, A. Kay. 2020. Quantifying nutrient recovery efficiency and loss from compost-based urban agriculture. *PloS one* 15: e0230996
35. **Small, G.E.**, R. McDougall, G.S. Metson. 2019. Would a sustainable city be self-sufficient in food production? *International Journal of Design & Nature and Ecodynamics* 14: 178-194.
34. **Small, G.E.**, P. Shrestha, G.S. Metson, K. Polsky, I. Jimenez, A. Kay. 2019. Excess

phosphorus from compost applications in urban gardens creates potential pollution hotspots. *Environmental Research Communications* 1 (9): 091007.

33. Shrestha, P., M.T. Salzl, I. Jimenez, N. Pradhan, M. Hay, H.R. Wallace, J.N. Abrahamson, **G.E. Small**. Efficacy of spent lime as a soil amendment for nutrient retention in bioretention green stormwater infrastructure. *Water* 11:1575.
32. **Small, G.E.**, M. Simeon, P. Shrestha, M. Dahmus, E. L. Amel. 2019. Assessing the potential of urban ecology research to inform municipal sustainability practices. *Cities and the Environment* 12.
31. Rozmarynowycz, M.J., B.F.N. Beall, G.S. Bullerjahn, **G.E. Small**, R.W. Sterner, S.S. Brovold, N.A. D'souza, S.B. Watson, R.M.L. McKay. 2019. Transitions in microbial communities along a 1600 km freshwater trophic gradient. *Journal of Great Lakes Research*. DOI:10.1016/j.jglr.2019.01.004
30. **Small, G.E.**, P. Shrestha, A. Kay. 2018. The fate of compost-derived phosphorus in urban gardens. *International Journal of Design & Nature and Ecodynamics*. 13: 415-422. DOI: 10.2495/DNE-V13-N4-415-422
29. **Small, G.E.**, E.Q. Niederluecke, P. Shrestha, B.D. Janke, J.C. Finlay. 2019. The effects of infiltration-based stormwater best management practices on the hydrology and phosphorus budget of a eutrophic urban lake. *Lake and Reservoir Management*. DOI:10.1080/10402381.2018.1514549
28. Cooney, E.M., P. McKinney, R. Sterner, **G.E. Small**, and E. C. Minor. 2018. Tale of two storms: Impact of extreme rain events on the biogeochemistry of Lake Superior. *Journal of Geophysical Research: Biogeosciences*. DOI:10.1029/2017JG004216
27. Ginger, L.J., K.D. Zimmer, B.R. Herwig, M.A. Hanson, W.O. Hobbs, **G.E. Small**, and J.B. Cotner. 2017. Watershed versus within-lake drivers of nitrogen:phosphorus dynamics in shallow lakes. *Ecological Applications* 27: 2155-2169.
26. **Small, G.E.**, B. Sisombath, L. Reuss, R. Henry, and A. Kay. 2017. Assessing how the ratio of food waste to wood chips in compost affects rates of microbial processing and subsequent vegetable yield. *Compost Science & Utilization* 25: 272-281.
25. Vanni, M.J., P.B. McIntyre, … **G.E. Small,** … and K.D. Zimmer. 2017. A global database of nitrogen and phosphorus excretion rates of aquatic animals. *Ecology*. DOI:10.1002/ecy.1792
24. Halvorson, H.M., and **G.E. Small**. 2016. Observational field studies are not appropriate tests of consumer stoichiometric homeostasis. *Freshwater Science* 35: 1103-1116.
23. **Small, G.E.,** J.C. Finlay, R.M.L. McKay, M.J. Rozmarynowycz, S. Brovold, G.S. Bullerjahn, K. Spokas, and R.W. Sterner. 2016. Large differences in potential denitrification and sediment microbial communities across the Laurentian great lakes. *Biogeochemistry*. 128: 353-368.
22. Loken, L.C., **G.E. Small**, J. C. Finlay, R. W. Sterner, and E.H. Stanley. 2016. Nitrogen cycling in a freshwater estuary. *Biogeochemistry* 127: 199-216.
21. **Small, G.E.**, M. Ardón, J.H. Duff, A.P. Jackman, C.M. Pringle, A. Ramírez, and F.J. Triska. 2016. Phosphorus retention in a lowland neotropical stream following an eight-year phosphorus enrichment experiment. *Freshwater Science* 35: 1-11.
20. Ganong, C., **G.E. Small**, M. Ardón, W.H. McDowell, D. Genereux, J.H. Duff, and C.M. Pringle. 2015. Interbasin flow of geothermally modified ground water stabilizes stream exports of biologically important solutes against variation in precipitation. *Freshwater Science* 34: 276-282.
19. Sun, X., **G.E. Small**, X. Zhou, H. Li, and C. Liu. 2015. Variation in C:N:S stoichiometry and nutrient storage related to body size in a holometabolous insect (*Curculio davidi*) (Coleoptera: Curculionidae) larva. *Journal of Insect Science* 15. doi: 10.1093/jisesa/iev004.

18. Snyder, M.N., **G.E. Small**, and C.M. Pringle. 2014. Diet-switching by omnivorous freshwater shrimp diminishes differences in nutrient recycling rates and body stoichiometry across a food quality gradient. *Freshwater Biology* 60. doi 10.1111/fwb.12481.
17. **Small, G.E.**, R.W. Sterner, and J.C. Finlay. 2014. An ecological network analysis of nitrogen cycling in the Laurentian Great Lakes. *Ecological Modelling*. DOI: 10.1016/j.ecolmodel.2014.02.001
16. Sun, X., A.D. Kay, H. Kang, **G.E. Small**, G. Liu, X. Zhou, S. Yin, and C. Liu. 2013. Correlated biogeographic variation of magnesium across trophic levels in a terrestrial food chain. *PloS one* 8, e78444.
15. Finlay, J.C., **G.E. Small**, and R.W. Sterner. 2013. Human influences on nitrogen removal in lakes. *Science* 342: 247-250.
14. **Small, G.E.,** J.H. Duff, P.J. Torres, and C.M. Pringle. 2013. Insect emergence as a nitrogen flux in Neotropical streams: Comparisons with microbial denitrification across a stream phosphorus gradient. *Journal of Freshwater Science* 32: 1178-1187.
13. Ardón, M., J.H. Duff, A. Ramirez, **G.E. Small**, A.P. Jackman, F.J. Triska, and C.M. Pringle. 2013. Experimental acidification of two biogeochemically-distinct neotropical streams: Buffering mechanisms and macroinvertebrate drift. *Science of the Total Environment* 443: 267-277.
12. **Small, G.E.**, J.B. Cotner, J.C. Finlay, R.A. Stark, and R.W. Sterner. 2013. Nitrogen transformations at the sediment-water interface across redox gradients in the Laurentian Great Lakes. *Hydrobiologia* 731: 95-108. DOI 10.1007/s10750-013-1569-7
11. **Small, G.E.**, G.S. Bullerjahn, R.W. Sterner, B.F.N. Beall, S. Brovold, J.C. Finlay, R.M.L. McKay, M. Mukherjee. 2013. Rates and controls of nitrification in a large oligotrophic lake. *Limnology & Oceanography* 58: 276-286.
10. **Small, G.E.**, P.J. Torres, L.M. Schweizer, J.H. Duff, and C.M. Pringle. 2013. Importance of terrestrial arthropod subsidies in lowland neotropical rain forest stream ecosystems. *Biotropica* 45: 80-87.
    **received 2014 Biotropica Outstanding Paper Award*
9. Sun, X., X. Zhou, **G.E. Small**, R. Sterner, H.Z. Kang, and C. Liu. 2013. Energy storage and C:N:P variation in a holometabolous insect (Curculio davidi Fairmaire) larva across a climate gradient. *Journal of Insect Physiology* 59: 408-415.
8. **Small, G.E.**, M. Ardon, A.P. Jackman, J.H. Duff, F.J. Triska, A. Ramirez, M. Snyder, and C.M. Pringle. 2012. Rainfall-driven amplification of seasonal acidification in poorly buffered tropical streams. *Ecosystems* 15: 974-985.
7. Davis, J., A.D. Rosemond, and **G.E. Small**. 2011. Increasing donor ecosystem productivity decreases terrestrial consumer reliance on a stream resource subsidy. *Oecologia* DOI: 10.1007/s00442-011-2026-9.
6. **Small, G.E.**, R. Bixby, C. Kazanci, and C.M. Pringle. 2011. Partitioning stoichiometric components of epilithic biofilm using mixing models. *Limnology & Oceanography: Methods* 9: 185-193.
5. **Small, G. E.**, M. Pyron, J.H. Duff, and C.M. Pringle. 2011. Emergent role of the fish, *Astyanax aeneus* (Characidae), as a Keystone Nutrient Recycler in low-nutrient Neotropical streams, Costa Rica. *Ecology* 92: 386-397.
4. **Small, G.E.**, J.P. Wares, and C.M. Pringle. 2011. Phosphorus limitation by a fast-growing detritivore across natural- and experimental P-gradients: evidence for adaptation to local conditions. *Limnology & Oceanography* 56: 268-278.
3. **Small, G.E.** and C.M. Pringle. 2010. Deviation from strict homeostasis across multiple trophic levels in an invertebrate consumer assemblage exposed to high chronic phosphorus enrichment in a Neotropical stream. *Oecologia* 162: 581-590.
2. **Small, G.E.**, A.M. Helton, and C. Kazanci. 2009. Can consumer stoichiometric regulation

control nutrient spiraling in streams? *Journal of the North American Benthological Society* 28: 747-764.

1. **Small, G.E.**, C. M. Pringle, F.J. Triska, J.H. Duff, A.P. Jackman, M. Hidalgo, A. Ramírez, and M. Ardón. 2008. The dynamics of phosphorus retention during an eight-year P-addition in a Neotropical headwater stream. *Verhandlungen Internationale Vereinigung für theoretische und angewandte Limnologie* 30:551-554.

Other Publications

Reuss, L., **G.E. Small**. 2020. Earthworm Distribution in the Schoolyard Ecosystem. *Science Scope* 43(8).

Small, G.E. 2017. Water quality in the Great Lakes. In: Biodiversity, Conservation, and Environmental Management in the Great Lakes Basin. Eds. E. Freedman, M. Neuzil. Routledge.

Pringle, C. M., E.P. Anderson, M. Ardon, R. Bixby, S. Connelly, J.H. Duff, A.P. Jackman, P. Paaby, A. Ramirez, **G.E. Small**, M. Snyder, and F.J. Triska. 2015. The Riverine Ecosystems. *In:* M. Kappelle and L. Diego Gomez (eds.) *Ecosystems of Costa Rica*. University of Chicago Press, Chicago, Illinois.

Small, G.E., H. Baulch, H. Bechtold, K. Holzer, S. Newell, and R. Vaquer. Headwaters to estuaries: Complex responses to cultural eutrophication at the watershed scale. 2014. Eco-DAS IX Symposium Proceedings. Waco, TX: Association for the Sciences of Limnology and Oceanography. DOI: 10.4319/ecodas.2014.978-0-984559.

Kavanaugh, M.T., G.W. Holtgrieve, H. Baulch, J.R. Brum, M.L. Cuvelier, C.T. Filstrup, K.J. Nickols, and **G.E. Small**. 2013. A Salty Divide Within ASLO? *Limnology & Oceanography: Bulletin* 22: 34-37.

Riskin, S. H., **G.E. Small**, R. Mikkelsen, A. Bateman, J. Cooper, O. S. Hanserud, P. Haygarth, C. Lapoumadares, M. McCrackin, G. Metson, and S. Remington. 2012. Managing phosphorus in urban and agricultural landscapes. *In:* K. Wyant, J. Corman, and J. Elser (eds.) Phosphorus, Food, and Our Future. Oxford University Press.

Small, G.E. 2012. The Postdoc Dilemma. *Nature* 483: 235.

Small, G.E. 2011. Time to Tweet. *Nature* 479: 141.

Sterner, R.W., **G.E. Small**, and J. Hood. 2011. The conservation of mass. *Nature Education Knowledge* 2:11.

Presentations at National and International Meetings *(#Co-author presented; *Undergraduate advisee presented; **Undergraduate advisee co-author)*

2022: Recycling nutrients through urban agriculture: Challenges and opportunities. The Nature of Cities Festival (online).

2021: Nutrient recycling and loss from compost applied to urban gardens. Conference on the Environment. Air & Waste Management Association: Upper Midwest Section (online).

2021: Interaction between compost amendments, soil chemistry, and microbial activity in garden soil. Ecological Society of America (online).

2020: **Urban garden evapotranspiration and potential for urban heat island mitigation. Ecological Society of America (online).

2020: **Urban heat island mitigation due to enhanced evapotranspiration in an urban garden in Saint Paul, Minnesota, USA. WIT Urban Agriculture 2020 (online).

2019: #Initial trends in ecosystem service metrics of urban agriculture in Minneapolis/St. Paul, MN. ASA, CCSA, and SSSA International Annual Meetings. San Diego, CA.

2019: #**The influence of plant species richness and top-down pest control on insect herbivory, disease, and plant productivity in urban gardens. Ecological Society of America,

Louisville, KY.
2019: #Urban agriculture as a facilitator of accessible and impactful biology education. Ecological Society of America, Louisville, KY.
2019: **Phosphorus buildup and loss from garden soils constrains the ability of urban agriculture to recycle nutrients. Ecological Society of America, Louisville, KY.
2019: Metrics of sustainability in urban agriculture. The Nature of Cities Summit. Paris.
2018: Quantifying nutrient recycling, recovery and loss from urban agricultural practices. Wessex Institute Urban Agriculture 2018. New Forest, UK.
2018: *Is coffee chaff an effective mulch for urban agriculture? Ecological Society of America, New Orleans, LA.
2018: #Quantifying nitrogen and phosphorus recycling, recovery and loss from urban agricultural practices. Ecological Society of America, New Orleans, LA.
2018: Quantifying nutrient recycling, recovery and loss from urban agricultural practices. 2018 Urban Food Systems Symposium, Minneapolis, MN.
2018: *Effect of water treatment residual (WTR) on phosphorus sorbtion for rain garden application. 2018 Urban Food Systems Symposium, Minneapolis, MN.
2018: *Evaluating leachate nutrient flux losses from various compost treatments in urban agriculture. 2018 Urban Food Systems Symposium, Minneapolis, MN.
2018: #Real LIFE science: Culturally-relevant curriculum for urban students. 2018 Urban Food Systems Symposium, Minneapolis, MN.
2017: Are urban gardens a source of P pollution? SETAC North America. Minneapolis, MN.
2017: *Measuring the fate of P lost through leachate from urban gardens. SETAC North America. Minneapolis, MN.
2017: *Assessing the nutrient imbalance from compost application in urban agriculture. Ecological Society of America. Portland, OR.
2017: *Assessment of the current state of the field of urban ecology and its alignment with the information needs of municipal sustainability workers. Ecological Society of America. Portland, OR.
2017: **Quantifying nutrient recycling and loss in urban agriculture. Ecological Society of America. Portland, OR.
2016: Nutrient recycling and loss from urban agriculture. Twin Cities Urban Agriculture Research Workshop. Minneapolis, MN.
2015: Stewardship Science: Connecting undergraduate-led sustainability research with community service. The Association for the Advancement of Sustainability in Higher Education, Minneapolis, Minnesota.
2015: **Hydroponic gardens as a mitigation strategy for nutrient pollution in urban lakes. Ecological Society of America, Baltimore, Maryland.
2015: #Insights from the 25+ year dataset in lowland Costa Rica: Effects of hydrologic connectivity from the mountains to the sea on stream ecosystems of an inland protected area. Ecological Society of America, Baltimore, Maryland.
2015: * Yield benefits and environmental costs of different compost sources on urban garden plots. Ecological Society of America, Baltimore, Maryland.
2015: *Assessing how the ratio of wood chips to food waste in compost affects rates of microbial processing. Ecological Society of America, Baltimore, Maryland.
2014: #Climate-driven changes in riverine inputs affecting the stoichiometry of Earth's largest lake. American Geophysical Union, San Francisco, Callifornia.
2014: Quantifying nutrient processing rates in a freshwater estuary using a hydrologic mixing model. Joint Aquatic Science Meeting, Portland, Oregon.
2014: # Sediment properties control denitrification rates in a Lake Superior freshwater estuary. Joint Aquatic Science Meeting, Portland, Oregon.

2013: #Slow changes in a large lake: Trends in carbon and nutrient pools in Lake Superior. American Geophysical Union, San Francisco, Callifornia.
2013: *Community gardens as neighborhood compost sites: a cost-benefit analysis. Ecological Society of America, Minneapolis, Minnesota.
2013: *Turning food waste into food: Measuring carbon, nitrogen, and phosphorus efficiency in coupled vermicomposting-aquaponics systems. Ecological Society of America, Minneapolis, Minnesota.
2013: Climate-driven acidification in lowland Neotropical streams: Insights from a 25-year dataset on groundwater-surface water interactions. Ecological Society of America, Minneapolis, Minnesota.
2013: *Response of phytoplankton to nutrient loading in an urban, freshwater estuary. ESA 2013. Ecological Society of America, Minneapolis, Minnesota.
2013: #Denitrification patterns of the Saint Louis River Estuary. Ecological Society of America, Minneapolis, Minnesota.
2012: Denitrification along a biogeochemical gradient in the Laurentian Great Lakes. Association for the Sciences of Limnology and Oceanography, Lake Biwa, Japan.
2011: Effects of anthropogenic stressors on carbon transport and processing in tropical rivers: Current understanding and knowledge gaps. American Society of Limnology and Oceanography, San Juan, Puerto Rico.
2011: #Controls over denitrification in sedimentary environments of Lake Superior. International Association of Great Lakes Research, Duluth, Minnesota.
2011: High Areal nitrification rates in Lake Superior. International Association of Great Lakes Research, Duluth, Minnesota.
2010: Amplification of seasonal acidification in poorly-buffered neotropical streams following an historically large ENSO Event. Ecological Society of America, Pittsburgh, Pennsylvania.
2010: Phosphorus retention in a lowland Neotropical stream following an eight-year phosphorus enrichment experiment. American Society of Limnology and Oceanography and the North American Benthological Society, Santa Fe, New Mexico.
2010: Adaptive response of stream detritivores to nutrient heterogeneity of food resources. Gordon Research Conference on Metabolic Basis of Ecology, Biddeford, Maine.
2009: Are terrestrial insects an important nutrient subsidy in Neotropical headwater streams? Ecological Society of America, Albuquerque, New Mexico.
2009: Diet strategy and body stoichiometry create keystone nutrient recyclers in low-nutrient streams. North American Benthological Society, Grand Rapids, Michigan.
2008: What are the effects of chronic phosphorus loading over millennia on food web stoichiometry? North American Benthological Society, Salt Lake City, Utah.
2008: Exploring the other side of the spiral: Stoichiometric control of nutrient cycling in stream ecosystems. Gordon Research Conference on Metabolic Basis of Ecology, Biddeford, Maine.
2007: Effects of food quality on nutrient storage and retention in a freshwater invertebrate consumer. American Society for Limnology and Oceanography, Santa Fe, New Mexico.
2007: Phosphorus dynamics during an eight-year P-addition in a Neotropical headwater stream. Congress of the International Society of Limnology, Montreal, Canada.
2006: Estimating the P-content in epilithon components across a natural phosphorus gradient using mixing models. North American Benthological Society, Columbia, South Carolina.
2006: Using descriptive ecosystem models to compare the importance of Consumer Nutrient Recycling in high- and low-phosphorus Neotropical streams. North American Benthological Society, Anchorage, Alaska.

Invited Lectures

2020	Selim Center, University of St. Thomas, St. Paul, MN
2019	University of Minnesota Institute on the Environment
2019	City of Shoreview MN Environmental Speaker Series
2019	Finn Legacy Society, University of St. Thomas, St. Paul, MN
2017	University of Minnesota, Department of Ecology, Evolution and Behavior. St. Paul, MN
2016	Hamline University, Biology Department, St. Paul, MN
2015	Ramsey County Master Gardeners
2012	University of St. Thomas, Saint Paul, MN
	University of Florida, Gainesville, FL
	Kent State University, Kent, OH
	Colby College, Waterville, ME
2011	Keene State College, Keene, NH
2010	Lake Superior Winter Gala, St. Paul, MN
	Diversity, Evolution, and Genetics Seminar Series, UGA
2008	Gordon Research Seminar, Metabolic Basis of Ecology
2006, 2007	La Selva Biological Station, Costa Rica

Other Awards

- 2021 Faculty Undergraduate Research Award, University of St. Thomas
- 2014 *Biotropica* Outstanding Paper Award
- 2011 Excellence in Research Award by Graduate Students in Life Sciences, UGA
- Best Student Paper, 2010 UGA Ecology Graduate Research Symposium
- Best Oral Presentation in Basic Research (Runner-up), 2009 North American Benthological Society Meeting
- Best Student Paper (Runner-up), 2008 UGA Ecology Graduate Research Symposium
- ASLO Early Career Travel Award, 2010
- Odum School of Ecology Travel Award, 2009, University of Georgia
- Emerging Leaders Program, 2007, University of Georgia Graduate School
- Post-Course Research Award, Organization for Tropical Studies
- North American Benthological Society Endowment Award 2007

Teaching Experience

University of St. Thomas, Saint Paul, MN 2012-present

- Aquatic Biology
- Astrobiology
- Biology of Sustainability
- Darwin and *The Origin of Species*
- Environmental Problem Solving
- Environmental Science Senior Capstone
- Field Methods in Biology (Costa Rica)
- Foundations of College Success
- Introduction to Environmental Science
- Urban Ecosystem Ecology

Macalester College, Saint Paul, MN Fall 2011
Visiting Assistant Professor
- Lakes, Rivers, and Streams

University of Minnesota, Saint Paul, MN Fall 2010
Guest Lecturer
- Science, Protection, and Management of Aquatic Environments

University of Georgia, Athens, GA 2005-2009
Co-instructor
- Ecosystem ecology

Teaching assistant
- Limnology
- Foundations of Ecology

La Selva Biological Station, Costa Rica 2006, 2007
Mentor
- Research Experience for Undergraduates Program

North Carolina Museum of Natural Sciences, Raleigh, NC Summer 2004
Instructor
- Piedmont Field Ecology

Broughton High School, Raleigh, NC 2002-2004
Instructor
- A.P. Environmental Science
- Chemistry
- Earth Science

Southern High School, Durham, NC 2001-2002
Intern
- Chemistry
- Earth Science
- Geology

Duke University TIP Program
Teaching Assistant
- Ecology and Geology of the Northern Rockies Summer 2000
- Appalachian Field Ecology and Geology Summer 2002

University of North Carolina, Chapel Hill, NC Fall 2001
Teaching Assistant
- Introductory Biology Lab

North Carolina State University, Raleigh, NC 2000-2001
Teaching Assistant
- Evolution, Behavior, and Ecology Lab

The Green River Preserve, Cedar Mountain, NC 1998-99, 2001
- Environmental educator and expedition leader

Teaching related grants and awards

2022: Project EDDIE (Environmental Data-Driven Inquiry & Exploration) workshop and module development
2021: STEM Inclusive Advising Training
2016: Engaged Scholar, UST Office of Sustainability Initiatives. ($5,300)
2015: Faculty Learning Community facilitator: Creating Self-Regulated Learners
2014: Campus Sustainability Fund Grant. *Growing science: An interdisciplinary project to develop urban agriculture research, education, campus nutrition, and urban renewal.* ($21,450)
2013: College of Arts and Sciences Environmental Stewardship Curriculum Grant. *Integrating Systems Thinking Activities into "The Biology of Sustainability".* ($1,000)
2012: Campus Sustainability Fund Grant. *Using Service Learning to Increase Visibility of Sustainability at UST*. G. Small, A. Kay, M. Dahmus, and D. Martinović-Weigelt ($5,600)
2012: Campus Sustainability Fund Grant. *Developing the UST Stewardship Garden to Enhance Undergraduate-Led Research in Sustainability Science*. A. Kay, D. Martinović-Weigelt, and G. Small ($4,125)
2011: Education Scholar, Ecological Society of America

Mentoring

Postdocs:
Paliza Shrestha (2018-2019)

Graduate students:
Co-advisor for Paulien van de Vlasakker, Linköping University, Sweden (2020-)
Dissertation committee member for Jennifer Nicklay, University of Minnesota (2019-)
Dissertation committee member for Carissa Ganong, University of Georgia (Ph.D. 2015)

Undergraduate Research Students:

- Luis Osorio (2022): *Identifying and correcting structural racism in managing environmental risks and sharing environmental benefits in the Twin Cities Metro.*
- Ethan Lynch, Maria Kisch (2022) UST Sustainability Scholar Grant ($4,000): *Effects of garden soil amendments on the soil microbial community. Co-advised by Dr. Carolyn Zeiner.*
- Ryan Hemenway, Frank Marchio, Megan Goodsell, Mae Macfarlane, Mary Holst (2021): *Quantifying nutrient recycling efficiency in urban gardens.*
- Katie McGinnis (2021), UST Sustainability Scholar Grant ($4,000): *Measuring nitrogen retention in urban lakes.*
- BJ Huls (2020), UST Sustainability Scholar Grant ($4,000): *Assessing potential water savings from campus irrigation. Co-advised by Dr. Tom Hickson.*
- Marisa Smedsrud and Ivan Jimenez (2020), UST Center For Applied Mathematics Fellowship: *Modeling urban garden nutrient dynamics*.
- Griffin Swenson (2019), UST Sustainability Scholar Grant ($4,000): *Effects of garden soil amendments on the soil microbial community. Co-advised by Dr. Carolyn Zeiner.*

- Michael Salzl, Spencer Wihlm, Erin Mahre, Jenna Abrahamson, Madison Dielhe, Ivan Jimenez (2018-2019): *Measuring capacity of water treatment residual to retain phosphorus from raingardens.*
- Megan Hay, Michael Salzl, Erin Mahre, Ryan Avenido, Haley Dare (2019): *Quantifying nutrient recycling efficiency in urban gardens.*
- Spencer Wihlm, Emma Smith, Tove Conway, Sophia Brown, Christian Heisler, Isabella Granse (2019): *Effects of crop diversity on resistance to damage from insects and plant pathogens. Co-advised by Dr. Adam Kay.*
- Megan Hay, Karl Buttel, Sunita Dharod, Michael Salzl, Spencer Wihlm, Alyssa Gilmore, Erin Mahre, Jenna Abrahamson (2018): *Quantifying nutrient recycling efficiency in urban gardens.*
- Courtney Pelissero, Megan Deppa, JP Fisher, Jake Walters, Meagan McFarlin, Sarah Schwabenbauer (2018): *Effects of crop diversity on resistance to damage from insects and plant pathogens. Co-advised by Dr. Adam Kay.*
- Hannah Wallace (2018): *Community education and outreach through urban agriculture.*
- Tyler Schmitt, Megan Hay, Isabelle Tjokrosetio, Katie Dennis, Cari Monroe, Garret Pahl, Alex Guzman, and Will Kreuser (2017): *Quantifying nutrient recycling efficiency in urban gardens. Co-advised by Dr. Adam Kay.*
- Sara Osborne (2017): *Measuring the fate of phosphorus leachate in urban gardens.*
- Katherine Connelly (2017): *A survey of nutrient management practices in urban gardens in the Twin Cities.*
- Anneliese Johnson (2017), UST Sustainability Scholar Grant ($4,000): *Comparison of lysimeter designs. Co-advised by Dr. Adam Kay.*
- Courtney Pelissero (2017), UST Sustainability Scholar Grant ($4,000): *Investigating the use of coffee chaff as a soil amendment in urban gardens. Co-advised by Dr. Adam Kay.*
- Gwen Miller and Rowan Humer (2017): *Measuring compost nutrient loss and retention in an urban park reclamation project. Co-advised by Dr. Adam Kay.*
- Brittany Allen (2016): *Effects of spatial configuration of pollinator gardens on pollinator diversity.*
- Zachary Beckman and Brandon Paulson (2016): *Nutrient loss rates for compost application in community gardens.*
- Casey Clemenson (2016): *Measuring nitrogen loss rates from Minnesota wetlands.*
- Jenny Walz (2015-2016): *Effects of soil organic matter on microbial activity. Co-advised by Dr. Adam Kay.*
- Kristen Bastaug (2015), UST Young Scholars Grant ($4,000): *Evaluating the effects of compost types on vegetable production. Co-advised by Dr. Adam Kay.*
- Jessica Brown (2014), UST Young Scholars Grant ($4,000): *Measuring nutrient limitation in urban lake hydroponic gardens.*
- Quinn Neiderleucke (2014-2016): *Meauring denitrification rates in an urban lake.*
- Tanner Ruprecht (2014): *Quantifying nutrient loss through leachate from urban gardens.*
- Brendan Sisombath (2014-2015): *Assessing how composition of compost affects rates of microbial processing.*
- Isaac Bergstrom (2013): *Optimizing nutrient use efficiency in aquaponics systems.*
- Meaghan Hunt (2013), UST Community Research Award ($4,000): *Optimizing soil fertility for the Youth Farm and Market Project.*
- Lauren Reuss (2013-2015): *Measuring nutrient Limitation in the St. Louis River Estuary.*
- Louis Sand (2013), UST Young Scholars Grant ($4,000): *Using Hydroponics for Bioremediation in Urban Lakes: A Feasibility Study.*

- Alyssa Schroeder (2013), UST Collaborative Inquiry Grant ($1,000): *Measuring the Carbon Footprint of UST Students.*
- Martin Sicam (2013): *Developing FV-COM Model for St. Louis River Estuary*.
- Laura Willson (2013), NSF-REU Supplement ($7,245), UST Collaborative Inquiry Grant ($1,000): *Measuring CO_2 concentrations in Tropical Rainforest Streams.*

High School research students:

- Roxy Neset, Orono High School (2021): *Role of soil amendments on weed diversity in urban gardens.*
- Angela Zbaracki, Benilde-St. Margaret's High School (2021): *Quantifying nutrient recycling efficiency in urban gardens.*
- Wilmar Camposeco, Cristo Rey Jesuit High School (2019-2022): *Quantifying nutrient recycling efficiency in urban gardens.*
- Ayres Warren, Christina Radichel, Breck School (2020): *Testing for potassium limitation in compost-amended urban garden soil.*
- Louise Kim, Darlene Radichel, Breck School (2018): *Effects of urban garden soil amendments on microbial metabolic diversity.*
- Ivan Jimenez, Cristo Rey Jesuit High School (2016-2018): *Quantifying nutrient recycling efficiency in urban gardens.*
- Christiana Wilke, David Ahrens, and Cas Roland, Breck School (2017): *Effects of precipitation intensity and soil amendments on nutrient leachate in urban gardens.*
- Julie Erickson, Courtney Mohs, and Samantha Smalley, Academy of Holy Angels (2017): *Dried food waste as a substitute for compost in urban gardens.*
- Caddisy Yueh and Alex Guzman, Breck School (2015): *Can fish waste be used to power aquaponics systems? Received 3rd place out of 191 entries at regional science fair, 3M Inventor Award, 3M Renewable Energy Award, US Navy/Marine Office of Naval Research Award, presented at 2016 International Word Energy, Engineering, and Environment Project, presented at 2016 International Science and Engineering Fair*

Professional Service

Reviewer for journals:

- *Agriculture*
- *Agronomy*
- *American Midland Naturalist*
- *Biogeochemistry*
- *Biogeosciences*
- *Biological Invasions*
- *BioScience*
- *Biotropica*
- *Canadian Journal of Fisheries and Aquatic Sciences*
- *Ecological Applications*
- *Ecological Engineering*
- *Ecological Modelling*
- *Ecology*
- *Ecology Letters*
- *Ecosphere*
- *Ecosystems*
- *Environmental Modelling and Software*
- *Environmental Monitoring and Assessment*
- *Environmental Pollution*
- *Freshwater Biology*
- *Freshwater Science*
- *Geophysical Research Letters*
- *Global Biogeochemical Cycles*
- *Hydrobiologia*
- *Insect Conservation and Diversity*
- *Journal of Environmental Management*
- *Journal of Environmental Sciences*
- *Journal of Hydrology*
- *Lake & Reservoir Management*
- *Limnology & Oceanography*
- *Nature Knowledge*
- *Oecologia*
- *Oikos*
- *PLOS-ONE*
- *Recycling*
- *Renewable Agriculture and Food Systems*
- *Science of the Total Environment*
- *Urban Ecology*
- *Urban Forestry & Urban Greening*
- *Water*
- *Water Resources Research*
- *Water Science and Technology*
- *Wetlands*

Grant reviewer:

National Science Foundation
U.S. Environmental Protection Agency
University of Minnesota Institute on the Environment
University of Minnesota Water Resources Program
Wisconsin Water Resources Institute

Additional activities:

Diversity, Equity, and Inclusion Committee, MSP LTER (2022-)
Environmental Stewardship Institute Mentor, Friends of the Mississippi River (2021)
Aquatic Section Secretary, Ecological Society of America (2019-2021)
Guest associate editor, Frontiers in Sustainable Food Systems Special Issue on Agroecology and Ecosystem Services. (2019-2020)
Member of International Scientific Advisory Committee: Wessex Institute 2nd International Conference on Urban Agriculture and City Sustainability. (2019-2020)
Produced report for The Freshwater Society on urban agriculture as green infrastructure. (2017)

Produced report for Mississippi Watershed Management Organization on stormwater benefits of urban agriculture. (2016)
Produced report for Mississippi Watershed Management Organization assessing gaps in pollinator gardens in Twin Cities. (2016)
Produced report for City of Elk River assessing costs-benefits of implementing a green roof at city's wastewater treatment plant. (2016)
Produced report for City of Saint Paul analyzing feasibility of using community gardens as neighborhood composting sites. (2013)
Collaboration with Healing Haiti to optimize food production efficiency in their aquaponics systems. (2013)
Reviewers for Life Discovery-Doing Science Conference, Ecological Society of America
Careers columnist for *Nature*. (2011).
Co-organizer of special session at ASLO Aquatic Sciences Meeting: "Effects of Global Change on Carbon Transport and Processing in Tropical Freshwater Ecosystems". (2011)
Served on Science Committee for NSF-RCN, "Changes in Tropical Forests", Organization for Tropical Studies. (2011)
Co-organizer of NSF-RCN funded workshop: "Carbon Transport and Processing in Tropical Streams and Rivers". (2010)
Co-organizer of special session at annual meeting of Ecological Society of America: "Alternate Ecology: An Exploration of Ecological Counterfactuals" (2009)
Mentor-student relations committee co-chair, North American Benthological Society. (2008)
Co-chair, Graduate Student Symposium, Odum School of Ecology. (2008)
Organized graduate student workshop at annual meeting of the North American Benthological Society: "Maintaining Ecosystem Services in an Urbanizing Watershed." (2007)
Graduate student representative to Institute of Ecology faculty. Served on search committee for director of Institute of Ecology. (2006-2007)
Volunteer for UGA Center for Undergraduate Research Opportunities (CURO). Led workshops on scientific writing, reviewed abstracts, and convened oral sessions. (2005-2009)
Coordinated undergraduate poster symposium (2005-2006) and program committee (2007) for Institute of Ecology Graduate Research Symposium.
Hosted Science and Math program on local television station. (2001-2003).
Coached Science Olympiad Team at Broughton High School (2001-2003).
Volunteer, N.C. Science Olympiad (2000) and N.C. Ocean Science Bowl. (2001)

Service to the University of St. Thomas

Faculty Affairs Committee (2020-present)
Faculty Leadership Fellows Program (2019-2020)
Faculty Senate (2016-present)
Coordinator, First-Year Experience Environmental Sustainability Theme-Based Learning Community
Environmental Science Program Director (2020-present)
Environmental Science Advisory Board (2014-present)
Biology Department Assessment Committee (2015-present)
Student Life Committee faculty representative (2015-2019)
Teacher Education Partnership Committee (2012-present)
Epidemiologist Hiring Committee (2014)
Computational Biologist Hiring Committee Chair (2016)
Clinical faculty positions Hiring Committee (2016)

College of Arts and Sciences Curriculum Committee (sabbatical replacement, 2015)
University Curriculum Committee (sabbatical replacement, 2014)