

Department of Ecology, Evolution & Behavior
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PROFESSIONAL INTERESTS

Terrestrial biogeochemistry, ecosystem processes, microbial ecology, and landscape ecology

PROFESSIONAL EXPERIENCE

Fall, 2006-present. Assistant Professor, Depts. of Ecology, Evolution & Behavior (75%, tenure home) and Plant Biology (25%), University of Minnesota.

March 2004-2006. NSF ADVANCE Postdoctoral Research Associate & Adjunct Professor, Department of Soil, Water and Climate, University of Minnesota.

August 2002-2004. Adjunct Professor, Escuela de Biología, Universidad de Costa Rica.

December 2001-February 2004. Postdoctoral Research Associate. Department of Ecology and Evolution, State University of New York, Stony Brook, NY.

EDUCATION

Ph.D. 2001. Department of Biology, Duke University, Durham, NC

M.S. 1995. Department of Forest Science, Oregon State University, Corvallis, OR

B.A. 1991. Department of Biology, Reed College, Portland, OR

HONORS AND AWARDS

Institute on the Environment Resident Fellow (2009-2012)

McKnight Land Grant Professor, University of Minnesota (2009-2011)

Department of Forest Science Faculty Award for Graduate Student Achievement, OSU (1994)

Outstanding Senior Woman at Reed College from the American Association of University Women (1991)

Commendation for Academic Excellence from Reed College (1990)

ADDITIONAL TRAINING

Microbial Diversity, Marine Biological Laboratory (Summer, 2004). A 6-week intensive course.

Comparative Neotropical Ecology (Fall, 2001), Organization for Tropical Studies. A 10-week long field course that visited field stations in Costa Rica, Panama, Peru, and Brazil.

Summer Institute Fellow (1999) at the Center for the Study of Institutions, Population, and Environmental Change (CIPEC). Indiana University, Bloomington.

Geographic Information Systems Laboratory Intern, La Selva Biological Station, Costa Rica. (February 1995 - August 1995).

Tropical Diversity and Conservation, Organization for Tropical Studies (Summer, 1994). A 3-week long field course in Costa Rica.

TEACHING TRAINING

- August, 2007. PowerPoint Reconsidered, Center for Teaching and Learning Services
- August, 2007. Active Lectures, CTLS.
- March 2007. "Getting Beyond Covering Content" - Larry Michaelsen.
- August 2005. "Strategies for Large Classes" CTLS.
- August 2005. "The First Day & Beyond" CTLS.
- August 2005. "Discussions that Work" CTLS.

INVITED WORKSHOPS

- Long-term Soil Ecosystem Experiments Workshop on Global Soil Change, Durham, NN, June 8-11, 2009 (sponsored by NSF, USDA, and Duke University).
- Microscale Approaches to Macroscale Issues in Ecology, April 16-18, 2007 (sponsor NSF).
- LTER Ecophylogenetic workshop May 31-June 3, 2007 (sponsor LTER).

TEACHING EXPERIENCE

- Fall, 2008. Ecology 3001, Ecology and Society (33 students).
- Fall, 2007. General Biology 1001 (130 students), University of Minnesota.
- Fall, 2007. Seminar on Plant Functional Traits (co-taught with Helene Muller-Landau, Peter Reich, Jeannine Cavender-Bares, and Rebecca Montgomery) (11 students).
- Fall, 2007. Seminar on Biogeochemistry (co-taught with Sarah Hobbie and Jennifer King) (4 students).
- Fall 2006. General Biology 1001 (132 students), University of Minnesota.
- Spring 2005. Graduate Seminar in Microbial Diversity (4 students), University of Minnesota.
- Spring 1998. Teaching Assistant, Biogeochemistry, Duke University.
- 1995-2004. Resource person for five OTS courses including the Undergraduate Semester Abroad, Agroecología, and Fundamentals of Tropical Ecology (graduate level).
1995. Taught workshops on Geographic Information Systems and Spatial Statistics to researchers at the La Selva Biological Station, Costa Rica.

PROPOSALS IN REVIEW

2009. Powers, J.S. Climate change in Mexican tropical dry forests: the intersection of ecological, economic and social systems. North American Research Linkages Program (Canadian Government). Requested \$20,000 Canadian Dollars.

FUNDED GRANTS AND FELLOWSHIPS

2008. **Powers, J.S.**, J. Cavender-Bares, S. Hobbie, R. Montgomery, P. Reich, I. Schmitt, P. Tiffin and G. Weiblen. Ecology, evolution and ecosystem implications of plant traits: a collaborative framework for improving graduate student recruitment and training. Proposal to College of Biological Sciences to improve the quality of EEB and PBS Graduate Programs, **\$20,000**.
2007. **Powers, J.S.**, S.E. Hobbie, J. Finlay, J. Cotner, J.Y. King, and D. Larson, Grant-in-Aid of Research, University of Minnesota Graduate School. "Equipment for identification of microbial biomarkers in phospholipid fatty acids", **\$23,573**.
2007. Grant-in-Aid of Research, University of Minnesota Graduate School. Effects of Climatic Change on Soil Carbon Cycling in a Minnesota Prairie, **\$29, 410**.
- 10/1/2006 – 9/30/2012. PIs: Tilman, D., P. Reich, S. Hobbie, S. Polasky, J. Cavender-Bares, J. King, L.

- Kinkel, J. Knops, R. Montgomery, H. Muller-Landau, and J. Powers. NSF LTER Program. Biodiversity, environmental change and ecosystem function at the prairie-forest border (\$4,920,000; **\$20,000** per year to **J.S. Powers**).
- 2006-2007. May, G. and **J.S. Powers**, UMN IREE Internal Funding, Discovering microbial diversity for biofuel production, **\$49,680**.
- 2006-2009. Sole Investigator: National Aeronautics and Space Agency New Investigator Program. A regional-scale analysis of regenerating tropical dry forests in Costa Rica: measurements and models of the linkages among biodiversity, ecosystem function and carbon storage, **\$267,204**.
2006. McLaughlin, D.J., and **J.S. Powers**. Minnesota Agricultural Experiment Station. Acquisition of a MJ Research DNA thermocycler, **\$7,395**.
2005. National Science Foundation Research Experience for Undergraduates Supplement to NSF #0338143, **\$6,000**.
2004. Office of Naval Research Fellowship to attend Microbial Diversity at MBL, **\$540**.
2004. American Association of University Women American Fellowship (declined), **\$30,000**.
- 2004-2008. Sole Investigator: A mechanistic understanding of the response of soil carbon pools in tropical forests to increasing global temperatures. National Science Foundation ADVANCE Fellowship Program, **\$333,052**.
- 2004-2005. Powers and J.B. Yavitt. Effects of nutrient augmentation on soil microorganisms and soil carbon and nitrogen storage in a lowland moist forest in Panama. Smithsonian Tropical Research Institute, **\$6,440**.
2003. Center for Tropical Forest Science, **\$1,500**.
2002. Powers and R.A. Montgomery, OTS/STRI Comparative Fellowship. The joint influences of climate, litter quality and soil fauna in regulating the decomposition of leaf and root litter: a pan-tropical study, **\$6,000**.
2001. Sigma Delta Epsilon Fellowship, National Chapter of the Graduate Women in Science, **\$3,000**.
- 1999-2001. Dissertation Improvement Grant, National Science Foundation, **\$9,900**.
1999. Andrew W. Mellon Foundation Fellowship for Ecosystem Studies awarded through the Organization for Tropical Studies, **\$3,000**.
- 1998-2001. NASA Graduate Student Researcher Program Fellowship **\$62,500**.
1998. National Security Education Program Boren Fellowship, **\$6,080**.
1998. Sigma Xi, the Scientific Research Society, Grant-in-Aid-of-Research, **\$600**.
- GRANTS (UNIVERSITY COMPETITIONS)**
2000. Lawrence J. Giles Award for Phytotron Research, Duke University, **\$500**.
2000. Catherine Keever Award, Duke University, **\$700**.
1999. Center for International Studies, Duke University, **\$1,000**.
1998. Center for International Studies, Duke University, **\$1,500**.
1998. Tinker Field Research Grants Program for Latin American Studies, Duke University, **\$780**.
1997. Tinker Field Research Grants Program for Latin American Studies, Duke University, **\$2,200**.

1997. Center for International Studies, Duke University, \$1,500.

PUBLICATIONS

- Quesada, M., G. Arturo Sanchez-Azofeifa, M., Alvarez-Anorve, K.E. Stoner, L. Avila-Cabadilla, J. Calvo-Alvarado, A. Castillo, M.M. Espiritu-Santo, M. Fagundes, G. W. Fernandes, John Gamon, M. Lopezaraiza-Mikel, D. Lawrence, P. Morellato, **J. Powers**, F. Neves, V. Rosas-Guerrero, R. Sayago and G. Sanchez-Montoya. Succession and Management of Tropical Dry Forests in the Americas: Review and new perspectives. *In press*, Forest Ecology and Management.
- Powers, J.S.**, J.M. Becknell, J. Irving, and D. Perez-Aviles. 2009. Diversity and structure of regenerating tropical dry forests in Costa Rica: environmental drivers and geographic patterns. *In press*. Forest Ecology and Management.
- Powers, J.S.**, R.A. Montgomery, E.C. Adair, F.Q. Brearley, S.J. DeWalt, C.T. Castanho, J. Chave, E. Deinert, J.U. Ganzhorn, M.E. Gilbert, J. Antonio-Gonzalez, S. Bunyavejchewin, H.R. Grau, K.E. Harms, A. Hiremath, S. Iriarte-Vivar, E. Manzano, A.A. de Oliveira, L. Poorter, J.B. Ramanamanjato, C. Salk, A. Varela, G.D. Weiblen and M.T. Lerdau. Decomposition in tropical forests: a pan-tropical study of the effects of litter type, litter placement and mesofaunal exclusion across a precipitation gradient. 2009. *Journal of Ecology* 97: 801-811.
- Sinsabaugh, R.L., C.L. Lauber, M.N. Weintraub, B. Ahmed, S.D. Allison, C. Crenshaw, A.R. Contosta, D. Cusack, S. Frey, M.E. Gallo, T.B. Gartner, S.E. Hobbie, K. Holland, B.L. Keeler, **J.S. Powers**, M. Stursova, C. Vesbach, M. Waldrop, M. Wallenstein, D. Zak, and L. Zeglin. 2008. Stoichiometry of soil enzyme activity at global scale. *Ecology Letters* 11: 1252–1264. DOI 10.1111/j.1461-0248.2008.01245.x
- Sayer, E.J., **J.S. Powers**, and E.V.J. Tanner. 2007. Increased litterfall in tropical forests boosts the transfer of soil CO₂ to the atmosphere. *PloS ONE* 2(12): e1299. doi:10.1371/journal.pone.0001299.
- Powers, J.S.** 2006. Spatial variation of soil carbon concentrations and stable isotopic composition in 1-ha plots of forest and pasture in Costa Rica. *Biology and Fertility of Soils*. 42: 580-584.
- Powers, J.S.**, and E. Veldkamp. 2005. Regional variation in soil carbon and $\delta^{13}\text{C}$ in paired forests and pasture of Northeastern Costa Rica. *Biogeochemistry* 72: 315-336.
- Powers, J.S.**, K.K. Treseder and M.T. Lerdau. 2005. Fine roots, arbuscular mycorrhizal hyphae and soil nutrients in four Neotropical rain forests: patterns across large geographic distances. *New Phytologist* 165: 913-921.
- Powers, J.S.**, M.H. Kalicin, and M.E. Newman. 2004. Tree species do not influence local soil chemistry in a species-rich Costa Rican rain forest. *Journal of Tropical Ecology* 20: 587-90.
- Powers, J.S.** 2004. Soil carbon and nitrogen storage following contrasting land-use transitions in Northeastern Costa Rica. *Ecosystems* 7: 134-146.
- Powers, J.S.**, J.M. Read, J.S. Denslow, and S.M. Guzman. 2004. Estimating soil carbon fluxes following land-cover change: a test of some critical assumptions for a region in Costa Rica. *Global Change Biology* 10: 170-181.
- Harms, K.E., **J.S. Powers**, and R.A. Montgomery. 2004. Small sapling densities relative to resources and understory vegetation in four Neotropical forests. *Biotropica* 36: 40-51.

- Powers, J.S.** 2004. New perspectives in comparative ecology of Neotropical rain forests: Reflections on past, present and future. *Biotropica* 36: 2-6.
- Powers, J.S.**, and M. Lerdau. 2002. Las relaciones entre características químicas y físicas de hojas y la decomposición de hojarasca de las especies de un bosque seco en el Parque Nacional Santa Rosa, Costa Rica. In *Ecosistemas forestales de bosque seco tropical: investigaciones y resultados en Mesoamérica*, Universidad Nacional, Heredia, Costa Rica, pp. 119-124.
- Powers, J.S.**, and W.H. Schlesinger. 2002. Relationships between soil carbon distributions and biophysical factors at nested spatial scales in rain forests of Northeastern Costa Rica. *Geoderma* 109: 165-190.
- Powers, J.S.**, and W.H. Schlesinger. 2002. Geographic and vertical patterns of stable carbon isotopes in tropical rainforest soils of Costa Rica. *Geoderma* 109: 141-160.
- Loescher, H.W., **J.S. Powers**, S.F. Oberbauer. 2002. Spatial variation of throughfall in an old growth tropical wet forest, Costa Rica. *Journal of Tropical Ecology* 18: 397-407.
- Powers, J.S.**, P. Sollins, M.E. Harmon, and J.A. Jones. 1999. Plant-pest interactions in time and space: a Douglas-fir bark beetle outbreak as a case study. *Landscape Ecology* 14: 105-120.
- Powers, J.S.**, J.P. Hagggar, and R.F. Fisher. 1997. The effect of overstory composition on understory woody regeneration and species richness in 7-year-old plantations in Costa Rica. *Forest Ecology and Management* 99: 43-54.

MANUSCRIPTS IN REVIEW

- Gotsch, S.G., **J.S. Powers**, and M.T. Lerdau. Leaf traits and water relations of 12 evergreen species in Costa Rican wet and dry forests: patterns of intra-specific variation across forests and seasons. *Plant Ecology*.

MANUSCRIPTS IN PREPARATION (draft available upon request)

- Gotsch, S.G., **J.S. Powers**, and M.T. Lerdau. Effects of light availability, herbivory and water stress on leaf phenology of 12 tree species in a seasonal wet and dry forest in NW Costa Rica.
- Powers, J.S.**, and S. Salute. Contrasting effects of macro- and micronutrients additions on short-term litter decomposition rates of two tropical dry forest tree species. *Soil Biology and Biochemistry*.
- Espeleta, J., **J.S. Powers**, C. Lovelock and S. Wright. Land-cover type and edaphic properties affect the relationships between glomalin and soil carbon in a wet tropical landscape.
- Powers, J.S.**, and R.A. Montgomery. Spatial variation of understory vegetation, fine roots, abiotic resources and seedling abundance in a rain forest in French Guiana.
- Powers, J.S.**, S.G. Gotsch, E.C. Adair, and M.T. Lerdau. Mass loss and nitrogen dynamics in decomposing leaf litter of 26 tropical dry forest species during wet and dry seasons: relative roles of initial litter chemistry versus functional leaf traits.
- Powers, J.S.**, Clark, M., J. Mackensen, D.B. Clark, E. Veldkamp, O.A. Chadwick and D.A. Clark. Assessing multi-scale spatial variation in soil properties and its relation to forest structure: a case study for an old-growth tropical rain forest.

INVITED TALKS

- 2009 (3) Plenary Seminar for the Tropi-Dry Meeting, Chamela, Mexico. Biology Dept. Reed

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- College, Portland, OR. Applied Economics Dept. Seminar Series on Resource Economics, University of Minnesota.
- 2008 (2) Smithsonian Tropical Research Institute, Panama; Dept. of Environmental Sciences, University of Virginia.
- 2007 (4) Dept. of Civil Engineering, University of Minnesota; Association for Tropical Biology and Conservation Meeting, Dry Forest Symposium; Latin American Soil Science Meetings, Leon, Mexico; University of Wisconsin Milwaukee Biology Colloquium.
- 2006 (2) Biology Dept., New Mexico State University; Biogeochemistry and Environmental Biocomplexity Program, Cornell University, NY.
- 2005 (9) Dept of Environmental Science, Policy, and Management University of California, Berkeley; Dept. of Plant Biology, University of Minnesota; Biological Sciences, Louisiana State University; Environmental Science and Engineering, Colorado School of Mines; CIRES, University of Colorado, Boulder; College of Natural Sciences, University of California, Merced; Dept. of Biology, Notre Dame University; Dept. of Zoology, University of Hawaii, Manoa; School of Public and Environmental Affairs, Indiana University.
- 2004 (6) Dept. of Biological Sciences, University of Arkansas; Keynote Address at the Land Use and Cover Change in the Tropics Workshop, Institute of Geography, University of Copenhagen, Denmark; Biological Sciences, Louisiana State University; Dept. of Forest Resources, University of Minnesota; Dept. of Biology, University of Pennsylvania; Biology Department, Boston University.
- 2003 (1) Institute of Ecology, University of Georgia, GA.
- 2002 (1) School of Integrative Biology, University of Illinois, Champagne-Urbana.
- 2001 (3) American Geophysical Union Meetings, Boston; Department of Atmospheric and Environmental Chemistry, Harvard University; Department of Geography, University of North Carolina, Chapel Hill.
- 1996 (1) IUFRO-World Bank-USDA Forest Service Symposium on Accelerating Native Forest Regeneration on Degraded Tropical Lands. Washington, D.C.
- 1992 (1) Smithsonian Environmental Research Center, Edgewater, MD

GUEST LECTURES

April, 2009. EEB 4068/5068 Plant Physiological Ecology.

March, 2009. CONSBIO 8004.

April, 2007. EEB 4611 Biogeochemical Processes.

SOCIETY MEMBERSHIPS

Ecological Society of America

American Geophysical Union
Association for Tropical Biology and Conservation
Phi Beta Kappa Society
Graduate Women in Science

UNIVERSITY SERVICE (UNIVERSITY OF MINNESOTA)

- 2009. Pedology Search Committee, Soil, Water & Climate Dept., UMN
- 2009. Graduate School Fellowship Committee, UMN
- 2008. College of Biological Sciences TA of the Year Award Committee.
- 2007. Exploratory Hiring Committee for Dr. Brandy Toner (SWC).
- 2007. Block Grant Committee for Summer Graduate Student Support
- 2007. College of Biological Sciences TA of the Year Award Committee.
- 2006-2008. CFANS International Programs Steering Committee.
- 2006-2008. LTER Monthly Seminar Committee.
- 2006-2007. Seminar Committee, Dept. of Ecology, Evolution and Behavior.
- 2006-2008. Plant Biology Graduate Program Steering Committee.
- 2006-2008. General Biology Advisory Committee.

PROFESSIONAL SERVICE AND MENTORING

- 2009. Gave a talk to the public entitled “What’s the Dirt on the Tropics? Digging Holes in 7 Tropical Forests?” at the Bell Museum.
- 2009. Gave 45-minute talks on “Ecosystems” to two classes (75 students each) of 5th graders at Oak Point Intermediate School, Eden Prairie. MN (February).
- 2008. Coordinator (lead author) for NEON (National Ecological Observatory Network) Soil Sampling Protocols.
- 2007. Gave lecture on ecology in Costa Rican to UMN undergraduates visiting Costa Rica through the YMCA (November).
- 2007. Gave interns at Cedar Creek Natural History Area a lecture (August)
- 2007. Taught a module entitled “How big is a hectare? Resource use and human population density” for the Nature of Life Program, CBS’s undergraduate orientation (July)
- 2006. Committee member on the Center for Tropical Forest Science working group on carbon dynamics.
- 2005-2006. Faculty advisor to the UMN student organization CASH, the Campus Atheists and Secular Humanists.
- 2005-2006. Member of the Fellowship Review Committee of the National Chapter of the Graduate Women in Science.
- 2005. Mentor to Adrienne Keller, an undergraduate from Macalester College completing her senior

thesis under my direction.

- 2005-2006. Mentor to Matthew Warner, an UMN undergraduate who completed an NSF Research Experience for Undergraduates with me.
- 2003-present. Member of the Graduate Women in Science Speaker Bureau, Twin Cities Chapter.
2003. Guest editor for *Biotropica*, Volume 36, March 2004.
- 2003, 2005, 2006. Invited speaker for the Undergraduate Biology Colloquium, University of Minnesota.
- 2003, 2005. Outreach with K-12th grade teachers in the Minneapolis-St. Paul area, administered by the Bell Museum and the Jason Project, University of Minnesota (gave talks on tropical rain forest ecology and the global carbon cycle).
2003. Mentor to Gwenaëlle Lashermes, an agronomy student from L'École Nationale Supérieure Agronomique de Rennes, France. Thesis title: Soil nutrients and forest structure in a chronosequence of tropical dry forest stands.
2003. Co-Organizer of a symposium entitled "Element Cycling in Tropical Ecosystems" for the meetings of the Association for Tropical Biology, University of Aberdeen, Scotland.
- 2002 - present. Educational outreach with eighth grade students in Earth Sciences classes at Breck School, Minneapolis, MN. Includes giving annual guest lectures and designing field experiments.
- 2002 - present. Committee Member for Jackeline Vargas, a MS student at the University of Costa Rica. Thesis title: Fungal and bacterial succession on decomposing leaf litter: effects of species and environment.
1999. Mentor to Melissa Kalicin, an undergraduate student at Hartwick College, NY. Thesis title: The effect of tree species on soil chemistry and nutrients in a tropical wet forest of Costa Rica.

JOURNAL AND PROPOSAL REVIEWS

Journals

Agriculture, Ecosystems and Environment (2), Annals of Botany, Biogeochemistry (2), Biological Conservation, Biological Reviews, Biology & Fertility of Soils, *Biotropica* (4), Canadian Journal of Forest Research, Caribbean Journal of Science, Ecological Applications (3), Ecology (4), Ecosystems (5), Forest Ecology & Management (3), Functional Ecology (5), Geoderma (8), Geophysical Research Letters, Global Biogeochemical Cycles, Global Change Biology (5), Journal of Ecology (2), Journal of Geophysical Research-Biogeosciences, Journal of the Torrey Botanical Society (1), Journal of Tropical Ecology (7), Journal of Tropical Forest Science, *Oecologia*, Plant & Soil (7), Science, Soil Biology and Biochemistry (3), Soil Science, Soil Science Society of America Journal (2), Trees, Water Air & Soil Pollution

Proposals

National Geographic Society, National Science Foundation (5), Graduate Women in Science

PhD GRADUATE STUDENT ADVISEES

Heather Whittington (Plant Biology), Justin Becknell (Ecology, Evolution and Behavior), Maria Gei (EEB)

GRADUATE STUDENT COMMITTEES (Current)

Brett Arenz (Plant Pathology), Kerrie Sendall (Plant Biology), Moana McClellan (Plant Biology), Christopher Pinhas (Plant Biology), Brendan Epstein (Plant Biology)

GRADUATE STUDENT COMMITTEES (Past)

Bonnie Keeler (EEB), Dan Hernández (EEB)

UNDERGRADUATE DIRECTED RESEARCH SUPERVISEES

2009. Laura Deede, project title: Spatial Variation in N¹⁵ Isotopic Signature in Legumes: Temperature and Species Effects

2008. Stefani Salute, project title: Micronutrient effects on leaf litter decomposition

2007-2008. Matthew Schneider, project title: Litter decomposition and microbial dynamics during the winter at Cedar Creek Ecosystem Science Reserve

2007. Matthew Warner, project title: Depth-dependent patterns of soil carbon, and microbial activity and composition in three weathered Panamanian forest soils