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Education:

B.A. Environmental Science, University of Virginia, 1980.

Ph.D Ecology, University of Georgia, 1984.

Professional Positions:

- 2015 – current Professor CUNY Advanced Science Research Center and Brooklyn College Department of Earth and Environmental Sciences
- 2015 – current Senior Research Fellow, Cary Institute of Ecosystem Studies
- 2005 – 2015 Senior Scientist, Cary Institute of Ecosystem Studies
- 1999 – 2004 Scientist, Institute of Ecosystem Studies.
- 1993 – 1998 Associate Scientist, Institute of Ecosystem Studies.
- 1992 Assistant Scientist, Institute of Ecosystem Studies.
- 1987 – 1991 Assistant Professor, Department of Natural Resources Science, University of Rhode Island.
- 1984 – 1987 Postdoctoral Research Associate, Departments of Crop and Soil Science and Microbiology and Public Health, Michigan State University.
- 1980 – 1984 Graduate Research Assistant and Graduate Teaching Assistant, Institute of Ecology, University of Georgia.

Research Interests and Activities:

Terrestrial microbial ecology, dynamics of microbial processes at the landscape level, nutrient cycling and transformation of environmental pollutants in wetlands, forests, agro-ecosystems and groundwater.

U.S. National Climate Assessment, Convening Lead Author, Ecosystems, Biodiversity and Ecosystem Services Chapter. 2011 – 2014.

Chair, U.S. Long Term Ecological Research Network Science Council, 2014 – 2019.

U.S. Climate Change Science Program, Synthesis and Assessment Product Committee on “Thresholds of Change in Ecosystems.” 2007 – 2008.

U.S. National Committee for Soil Science. Board on International Scientific Organization, Policy and Global Affairs Division, National Academy of Sciences. 2007 – 2013.

Intergovernmental Program on Climate Change (IPCC); lead author, chapter on North America (2000) in 3rd Assessment Report, lead author, Wetlands (1995) in 2nd Assessment Report.

Selected Publications:

- Almaraz, M., P. M. Groffman, W. L. Silver, S. J. Hall, L. Yang, C. O'Connell, and S. Porder. 2023. Dinitrogen emissions dominate nitrogen gas emissions from soils with low oxygen availability in a moist tropical forest. *Journal of Geophysical Research-Biogeosciences* 128:e2022JG007210.
- Ontman, R., P. M. Groffman, C. T. Driscoll, and Z. Cheng. 2023. Surprising relationships between soil pH and microbial biomass and activity in a northern hardwood forest. *Biogeochemistry* 165:265-277.
- Mason, R. E., J. M. Craine, N. K. Lany, M. Jonard, S. V. Ollinger, P. M. Groffman, R. W. Fulweiler, J. Angerer, Q. D. Read, P. B. Reich, P. H. Templer, and A. J. Elmore. 2022. Evidence, causes, and consequences of declining nitrogen availability in terrestrial ecosystems. *Science* 376:eabh3767.
- Mejia, G. A., P. M. Groffman, A. E. Downey, E. M. Cook, S. Sritrairat, R. Karty, M. I. Palmer, and T. McPhearson. 2022. Nitrogen cycling and afforestation success in New York City. *Ecological Applications* 32:e2535.
- Suchy, A. K., P. M. Groffman, L. E. Band, J. M. Duncan, A. J. Gold, J. M. Grove, D. H. Locke, and L. Templeton. 2021. A landscape approach to nitrogen cycling in urban lawns reveals the interaction between topography and human behaviors. *Biogeochemistry* DOI: 10.1007/s10533-020-00738-8.
- Zarnetske, P., J. Gurevitch, J. Franklin, P. M. Groffman, C. Harrison, J. J. Hellmann, F. M. Hoffman, S. Kothari, A. Robock, S. Tilmes, D. Vioni, J. Wu, L. Xia, and C.-E. Yang. 2021. Potential ecological impacts of climate intervention by reflecting sunlight to cool Earth. *Proceedings of the National Academies of Science* 118:e1921854118.
- Gaiser, E. E., D. M. Bell, M. C. N. Castorani, D. L. Childers, P. M. Groffman, C. R. Jackson, J. S. Kominoski, D. P. C. Peters, S. T. A. Pickett, J. Ripplinger, and J. C. Zinnert. 2020. Long-term ecological research and evolving frameworks of disturbance ecology. *BioScience* <https://doi.org/10.1093/biosci/biz162>

- Garcia, M.O., P.H. Templer, P.O. Sorensen, R. Sanders-DeMott, P.M. Groffman and J.M. Bhatnagar. 2020. Soil microbes trade-off biogeochemical cycling for stress tolerance traits in response to year-round climate change. *Frontiers in Microbiology* 11:616.
- Almaraz, M., P. M. Groffman, and S. Porder. 2019. Effects of changes in nitrogen availability on nitrogen gas emissions in a tropical forest during a drought. *Journal of Geophysical Research: Biogeosciences* 124:2917-2926.
- Frelich, L., B. Blossey, E. Cameron, A. Davalos, N. Eisenhauer, T. Fahey, O. Ferlian, P. Groffman, E. Larson, S. Loss, J. Maerz, V. Nuzzo, K. Yoo, P. Reich. 2019. Side-swiped: Ecological cascades emanating from earthworm invasion. *Frontiers in Ecology and the Environment* doi:10.1002/fee.2099.
- Groffman, P.M., C.T. Driscoll, J. Durán, J.L. Campbell, L.M. Christenson, T.J. Fahey, M.C. Fisk, C. Fuss, G.E. Likens, G. Lovett, L. Rustad and P.H. Templer. 2018. Nitrogen oligotrophication in northern hardwood forests. *Biogeochemistry*: <https://doi.org/10.1007/s10533-018-0445-y>
- Reisinger, A. J., E. Woytowicz, E. Majcher, E. J. Rosi, K. T. Belt, J. M. Duncan, S. S. Kaushal, and P. M. Groffman. 2018. Changes in long-term water quality of Baltimore streams are associated with both gray and green-infrastructure. *Limnology and Oceanography* 17:1-
- Groffman, P. M., M. Avolio, J. Cavender-Bares, N. D. Bettez, J. M. Grove, S. Hall, S. E. Hobbie, K. L. Larson, S. B. Lerman, D. H. Locke, J. B. Heffernan, J. L. Morse, C. Neill, K. C. Nelson, J. O'Neil-Dunne, D. E. Pataki, C. Polsky, R. V. Pouyat, R. Roy Chowdhury, M. Steele, and T. L. E. Trammel. 2017. Ecological homogenization of residential macrosystems. *Nature Ecology and Evolution* 1:article 0191, DOI:10.1038/s41559-017-0191.
- Groffman, P. M., M. L. Cadenasso, J. Cavender-Bares, D. L. Childers, N. B. Grimm, J. M. Grove, S. E. Hobbie, L. R. Hutrya, D. G. Jenerette, T. McPhearson, D. E. Pataki, S. T. A. Pickett, R. V. Pouyat, E. J. Rosi-Marshall, and B. L. Ruddell. 2017. Moving towards a new Urban Systems Science. *Ecosystems* 20:38-43.
- Grimm, N.B., P.M. Groffman, M. Staudinger and H. Tallis. 2016. Climate change impacts on ecosystems and ecosystem services in the United States: Process and prospects for sustained assessment. *Climatic Change* 135:97-106.
- Groffman, P. M., J. M. Grove, C. Polsky, N. D. Bettez, J. L. Morse, J. Cavender-Bares, S. J. Hall, J. B. Heffernan, S. E. Hobbie, K. L. Larson, C. Neill, K. Nelson, L. A. Ogden, J. O'Neil-Dunne, D. E. Pataki, R. Roy Chowdhury, and D. H. Locke. 2016. Satisfaction, water and fertilizer use in the American residential macrosystem. *Environmental Research Letters* 11:034004. doi:10.1088/1748-9326/11/3/034004

- Weathers, K.C., P.M. Groffman, E. Van Dolah, E.S. Bernhardt, N.B. Grimm, K. McMahon, J. Schimel, M. Paolisso, R. Maranger, S. Baer, K. Brauman and E.L. Hinckley. 2016. Frontiers in ecosystem ecology from a community perspective: The future is boundless and bright. *Ecosystems* DOI: 10.1007/s10021-016-9967-0.
- Groffman, P.M., T.J. Fahey, M.C. Fisk, J.B. Yavitt, R.E. Sherman, P.J. Bohlen and J.C. Maerz. 2015. Earthworms, microbial biomass and nitrogen retention in northern hardwood forest soils. *Soil Biology and Biochemistry* 87:51-58.
- Morse, J. L., J. Durán, and P. M. Groffman. 2015. Denitrification and greenhouse gas fluxes in a northern hardwood forest: the importance of snowmelt and implications for ecosystem N budgets. *Ecosystems* 18:520-532.
- Groffman, P.M., J. Cavender-Bares, N.D. Bettez, J.M. Grove, S.J. Hall, J.B. Heffernan, S.E. Hobbie, K.L. Larson , J.L. Morse, C. Neill, K. Nelson, J. O’Neil-Dunne, L. Ogden, D. Pataki, C. Polsky, R.R. Chowdhury and M.K. Steele. 2014. Ecological homogenization of urban USA. *Frontiers in Ecology and Environment* 12:74-81.
- Polisky, C., J.M. Grove, C. Knudson, P.M. Groffman, N.D. Bettez, J. Cavender-Bares, S.J. Hall, J.B. Heffernan, S.E. Hobbie, K. Larson, J.L. Morse, C. Neill, K.C. Nelson, L.A. Ogden, J. O’Neil-Dunne, D.E. Pataki, R. Roy Chowdhury and M. Steele. 2014. Assessing the homogenization of urban land management with an application to US residential lawncare. *Proceedings of the National Academy of Sciences* 111:4432-4437.
- Burgin, A.J., J. Lazar, P.M. Groffman, A.J. Gold and D.Q. Kellogg. 2013. Balancing nitrogen retention ecosystem services and greenhouse gas disservices at the landscape scale. *Ecological Engineering* 56:26-35.
- Groffman, P. M., P. Kareiva, S. L. Carter, N. B. Grimm, J. J. Lawler, M. C. Mack, V. Matzek, and H. Tallis. 2013. Ch. 8: Ecosystems, Biodiversity, and Ecosystem Services. *In* J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, editors. *Climate Change Impacts in the United States: The Third National Climate Assessment*. U.S. Global Change Research Program, <http://nca2014.globalchange.gov/report/sectors/ecosystems>.
- Burgin, A.J. and P.M. Groffman. 2012. Soil O₂ controls denitrification rates and N₂O yield in a riparian wetland. *Journal of Geophysical Research Biogeosciences* Biogeosciences 117: G01010. doi:10.1029/ 2011JG001799.
- Groffman, P.M. 2012. Terrestrial denitrification: Challenges and opportunities. *Ecological Processes*: doi:10.1186/2192-1709-1-11.
- Groffman, P.M., L.E. Rustad, P.H. Templer, J.L. Campbell, L.M. Christenson, N.K. Lany, A.M. Socci, M.A. Vadeboncoeur, P.G. Schaberg, G.F. Wilson, C.T. Driscoll, T.J. Fahey, M.C. Fisk, C.L. Goodale, M.B. Green, S.P. Hamburg, C.E. Johnson, M.J. Mitchell, J.L. Morse, L.H. Pardo and N.L. Rodenhouse. 2012. Climate change

- effects are manifest in complex and surprising ways in the northern hardwood forest. *BioScience* 62:1056-1066.
- Groffman, P.M. and M.C. Fisk. 2011. Calcium constrains plant control over forest ecosystem nitrogen cycling. *Ecology* 92:2035–2042.
- Groffman, P.M. and M.C. Fisk. 2011. Phosphate additions have no effect on microbial biomass and activity in a northern hardwood forest. *Soil Biology and Biochemistry* 43:2441-2449.
- Harrison, M.D., P.M. Groffman, P.M. Mayer, S.S. Kaushal and T.A. Newcomer. 2011. Denitrification in alluvial wetlands in an urban landscape. *Journal of Environmental Quality* 40:634–646.
- Groffman, P.M., J.P. Hardy, S. Fashu-Kanu, C.T. Driscoll, N.L. Cleavitt, T.J. Fahey and M.C. Fisk. 2010. Snow depth, soil freezing and nitrogen cycling in a northern hardwood forest landscape. *Biogeochemistry* 102:223-238.
- Groffman, P.M., C. Stylinski, M.C. Nisbet, C.M. Duarte, R. Jordan, A.J. Burgin, M.A. Previtali and J.Coloso. 2010. Restarting the conversation: Challenges at the interface between ecology and society. *Frontiers in Ecology and Environment* 8:284-291.
- Groffman, P.M., J.P. Hardy, M.C. Fisk, T.J. Fahey and C.T. Driscoll. 2009. Climate variation and nitrogen and carbon cycle processes in a northern hardwood forest. *Ecosystems* 12: 927–943. DOI: 10.1007/s10021-009-9268-y.
- Groffman, P.M., K. Butterbach-Bahl, R.W. Fulweiler, A.J. Gold, J.L. Morse, E.K. Stander, C.L. Tague, C. Tonitto and P. Vidon. 2009. Challenges to incorporating spatially and temporally explicit phenomena (hotspots and hot moments) in denitrification models. *Biogeochemistry* 93:49-77. DOI: 10.1007/s10533-008-9277-5
- Groffman, P.M. and R.V. Pouyat. Methane uptake in urban forests and lawns. 2009. *Environmental Science & Technology* DOI: 10.1021/es803720h.
- Kaushal, S.S., P.M. Groffman, L.E. Band, C.A. Shields, R.P. Morgan, M.A. Palmer, K.T. Belt, C.M. Swan, S.E.G. Findlay and G.T. Fisher. 2008. Interaction between climate and land use amplifies watershed nitrogen export. *Environmental Science & Technology*. DOI: 10.1021/es800264f
- Kulkarni, M.V., P.M. Groffman and J.B. Yavitt. 2008. Solving the global nitrogen problem: It's a gas! *Frontiers in Ecology and Environment* 4:199-206.
- Groffman, P.M., M.C. Fisk, C.T. Driscoll, G.E. Likens, T.J. Fahey, C. Eagar and L.H. Pardo. 2006. Calcium additions reduce nitrogen cycling in a northern hardwood forest. *Ecosystems* 9:1289-1305.

- Groffman, P.M., J.P Hardy, C.T. Drisoll and T.J. Fahey. 2006. Snow depth, soil freezing and trace gas fluxes in a northern hardwood forest. *Global Change Biology* 12:1748-1760.
- Groffman P.M., M.A. Altabet, J.K. Böhlke, K. Butterbach-Bahl, M.B. David, M.K.Firestone, A.E. Giblin, T.M. Kana, L.P. Nielsen and M.A. Voytek. 2006. Methods for measuring denitrification: Diverse approaches to a difficult problem. *Ecological Applications* 16:2091-2122.
- Groffman, P.M. J.S. Baron, T. Blett, A.J. Gold, I. Goodman, L.H. Gunderson, B.M. Levinson, M.A. Palmer, H.W. Paerl, G.D. Peterson, N. L. Poff, D.W. Rejeski, J.F. Reynolds, M.G. Turner, K.C. Weathers and J. Wiens. 2006. Ecological thresholds: The key to successful environmental management or an important concept with no practical application? *Ecosystems* 9:1-13.
- Kaushal, S.S. P.M. Groffman, G. E. Likens, K. T. Belt, W. P. Stack, V. R. Kelly, L. E. Band and G. T. Fisher. 2005. Increased salinization of fresh water in the northeastern U.S. *Proceedings of the National Academies of Science of the United States of America* 102:13517-13520.
- Groffman, P.M., N.L. Law, K.T. Belt, L.E. Band and G.T. Fisher. 2004. Nitrogen fluxes and retention in urban watershed ecosystems. *Ecosystems* 7:393-403.
- Groffman, P.M., C.T. Driscoll, G.E. Likens, T.J. Fahey, R.T. Holmes, C. Eagar and J.D. Aber. 2004. Nor gloom of night: A new conceptual model for the Hubbard Brook ecosystem study. *BioScience* 54:139-148.
- Groffman P.M., P.J. Bohlen, M.C. Fisk and T.J. Fahey. 2004. Exotic earthworm invasion and microbial biomass in temperate forest soils. *Ecosystems* 7:45-54.