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EDUCATION

Ph.D. Yale School of Forestry and Environmental Studies, 1990.
M.Phil. Yale University, 1987. M.S. Yale University, 1985.
Cornell University Graduate School. Exchange Scholar, fall semester 1984.
Yale School of Forestry and Environmental Studies, 1983 to 1984.
B.A. magna cum laude, Phi Beta Kappa, with Distinction in the Major of Geology and Geophysics, Yale University, 1981.

HONORS, AWARDS, AND FELLOWSHIPS

Barrington Moore Memorial Award, Society of American Foresters, 2020.
Champion Superveteran Woman, Upstate New York Cross Country Series, 2018.
Japanese Society for the Promotion of Science (JSPS) Fellowship, 2011.
SUNY Chancellor's Award for Excellence in Scholarship and Creative Activity, 2011.
Editors' Citation for Excellence in Manuscript Review, Soil Science Society of America, 2011.
Best Paper, Division S-7 Session, Soil Science Society of America Meeting, 2005, 2007, 2009.
Sabbatical Fellow, Ecosystems Center, Marine Biological Laboratory, Woods Hole, MA, 2008.
Award for Research and Scholarship, Research Foundation, State University of New York, 2005.
Champion Masters Woman, Upstate New York Cross Country Series, 2001, 2002.
National Masters Indoor Track and Field Champion, 800 Meter Run, Women 40-49, 2002.
USATF National Masters 5K XC Team Championship, Women 40-49, 1999.
Editors' Citation for Excellence in Manuscript Review, Soil Science Society of America, 1992.
Fulbright Fellowship, Institute of Terrestrial Ecology, University of Edinburgh, UK, 1987-1988.
Yale Graduate School Fellowship, 1986-1987.
National Science Foundation Graduate Fellowship, 1983-1986.
Yale Geology Fellowship to support field studies in the Pyrenees, 1981.
Pat Wilde Prize for Senior Thesis in Geology and Geophysics, 1981.
National Merit Scholarship, 1977-1981.
Math Association of America Award, 1975.
Rensselaer Polytechnic Institute Medal, 1975.
Society of Women Engineers Award, 1975.

RESEARCH INTERESTS

Uncertainty in ecosystem budgets and in country-level carbon accounting for climate mitigation; element cycling in forested ecosystems, nutrient limitation, and nutrient co-limitation; soil chemistry and plant nutrient uptake; models for simulating plant-soil interactions, the response of plants to environmental change, and optimal growth strategies; forest regeneration and successional development.

PROFESSIONAL EXPERIENCE

- 2022 - present Distinguished Professor, SUNY College of Environmental Science and Forestry. (December 13, 2022).
- 2007 - 2022 Professor, SUNY College of Environmental Science and Forestry. (August 23, 2007 - December 13, 2022).
- 2016 Visiting Academic, School of Forestry at the University of Canterbury, New Zealand.
- 2011 - 2015 Director, Graduate Program in Environmental Science, SUNY College of Environmental Science and Forestry.
- 2012 – 2013 Visiting Professor, University of Tokyo, Graduate School of Agricultural and Life Sciences (5 months).
- 2008 Sabbatical Fellow, Ecosystems Center, Marine Biological Laboratory, Woods Hole, MA.
- 1999 - 2007 Associate Professor, SUNY College of Environmental Science and Forestry.
- 2007 Instructor, Forestry and Forest Products Research Institute, Tsukuba, Japan (1 month).
- 2006 Visiting Professor, University of Tokyo, Graduate School of Agricultural and Life Sciences (4 months).
- 1994 – 1999 Assistant Professor, SUNY College of Environmental Science and Forestry. (August 24, 1994).
- 1994 Senior Research Associate, Boyce Thompson Institute for Plant Research.
- 1993 Visiting Assistant Professor, SUNY College of Environmental Science and Forestry.
- 1992 -1993 Research Associate, Boyce Thompson Institute for Plant Research.
- 1991 Postdoctoral Associate, Boyce Thompson Institute for Plant Research.
- 1989-1990 Research Support Specialist, Center for Environmental Research, Cornell University.
- 1987-1988 Fulbright Fellow, Edinburgh University and Institute of Terrestrial Ecology, UK.
- 1982-1983 Secondary School Teacher, The Putney School, Putney Vermont.
- 1981-1982 Research Assistant, Department of Geology and Geophysics, Yale University.

PUBLICATIONS

My publications can be downloaded from my web site: <http://www.esf.edu/for/yanai/pubs.htm>
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Journal Articles

- Pu, G., J.L. Campbell, M.B. Green, J.L. Merriam, D. Zietlow, and R.D. Yanai. 2023. Uncertainty in stream water fluxes of solutes at the Hubbard Brook Experimental Forest, New Hampshire, USA. *Hydrological Processes*, 37(8), e14961 doi.org/10.1002/hyp.14961
- Li, S., M.C. Fisk, R.D. Yanai, and T.J. Fahey. 2023. Co-limitation of root growth by nitrogen and phosphorus in early successional northern hardwood forests. *Ecosystems*, DOI: 10.1007/s10021-023-00869-7
- Young, A.R., R. Minocha, S. Long, J. E. Drake, and R.D. Yanai. 2023. Responses of physical, chemical, and metabolic leaf characteristics to depth within mature sugar maple crowns and to nitrogen and phosphorus addition. *Tree Physiology*, tpad043, DOI:10.1093/treephys/tpad043
- Lin, J., J.G.P. Gamarra, J.E. Drake, A. Cuchietti, and R.D. Yanai. 2023. Scaling up uncertainties in allometric models: How to see the forest, not the trees. *Forest Ecology Management*, 537: 12094, DOI: 10.1016/j.foreco.2023.120943
- Yanai, R.D., A.R. Young, J.L. Campbell, J.A. Westfall, C.J. Barnett, G.A. Dillon, M.B. Green, and C.W. Woodall. Measurement error in a national forest inventory: results from the Northern Region of the USA. *Canadian Journal of Forest Research*, 53(3): 163-177, DOI: 10.1139/cjfr-2022-0062
- Gonzales, K.E., R.D. Yanai, T.J. Fahey, and M.C. Fisk. 2023. Evidence for P limitation in eight northern hardwood stands: Foliar concentrations and resorption by three tree species in a factorial N by P

- addition experiment. *Forest Ecology Management*, 529: 120696, DOI: 10.1016/j.foreco.2022.120696
- Rice, A.M., Johnston, M.T., Libenson, A.J., and Yanai, R.D. 2022. Tree variability limits the detection of nutrient treatment effects on sap flux density in a northern hardwood forest. *PeerJ*, 10:e14410, DOI:10.7717/peerj.14410
- Rastetter, E., B. Kwiatkowski, D. Kicklighter, A. Barker Plotkin, H. Genet, J. Nippert, K. O’Keefe, S. Perakis, S. Porder, S. Roley, R. Ruess, J. Thompson, W. Wieder, K. Wilcox, and R. Yanai. 2022. N and P constrain C in ecosystems under climate change: role of nutrient redistribution, accumulation, and stoichiometry. *Ecological Application* e2684, DOI: 10.1002/eap.2684
- Hong D.S., K.E. Gonzales, T.J. Fahey, and R.D. Yanai. 2022. Foliar nutrient concentrations of six northern hardwood species responded to nitrogen and phosphorus fertilization but did not predict tree growth. *PeerJ* 10:e13193, DOI: 10.7717/peerj.13193
- Shan, S., H. Devens, T.J. Fahey, R.D. Yanai, and M.C. Fisk. 2022. Fine root growth increases in response to nitrogen addition in phosphorus-limited northern hardwood forests. *Ecosystems* 25, 1589–1600, DOI: 10.1007/s10021-021-00735-4
- Nash, J.M., F.M. Diggs, and R.D. Yanai. 2022. Length and colonization rates of roots associated with AM and EM fungi decline differentially with depth in two northern hardwood forests. *Mycorrhiza*, 32:213–219. DOI:10.1007/s00572-022-01071-8
- Yanai, R.D. T.A. Mann, D. Hong, G. Pu, and J.M. Zuskewitz. 2021. The current state of uncertainty reporting in ecosystem studies: a systematic evaluation of peer-reviewed literature. *Ecosphere*, 12(6):e03535. DOI:10.1002/ecs2.3535
- Sahu, S.K., K.S. Bakar, J. Zhan, J.L. Campbell, and R.D. Yanai. 2020. Spatio-temporal Bayesian modeling of precipitation using rain gauge data from the Hubbard Brook Experimental Forest, New Hampshire, USA. *Joint Statistical Meetings Proceedings, Statistical Computing Section*. Alexandria, VA: American Statistical Association. pp.77–92.
- Yanai, R.D., C. Wayson, D. Lee, A.B. Espejo, J.L. Campbell, M.B. Green, J.M. Zuskewitz, S.B. Yoffe, J.E. Aukema, A.J. Lister, and J.W. Kirchner, and J.G.P. Gamarra. 2020. Improving uncertainty in forest carbon accounting for REDD+ mitigation efforts. *Environmental Research Letters*, 15:24002. DOI:10.1088/1748-9326/abb96f
- See, C.R., M.B. Green, R.D. Yanai, A.S. Bailey, J.L. Campbell, and J. Hayward. 2020. Quantifying uncertainty in annual runoff due to missing data. *PeerJ*, 8:e9531. DOI:10.7717/peerj.9531
- Yanai, R.D., Y. Yang, A.D. Wild, K.T. Smith, and C.T. Driscoll. 2020. New approaches to understand mercury in trees: radial and longitudinal patterns of mercury in tree rings and genetic control of mercury in maple sap. *Water, Air, & Soil Pollution*, 231(5): 248. DOI: 10.1007/s11270-020-04601-2
- Kattge, J., et.al. 2020. Twelve years of TRY – towards a third generation of plant trait data assimilation and sharing. *Global Change Biology*, 26(1):119–188. DOI:10.1111/gcb.14904
- Yang, Y., R.D. Yanai, N. Schoch, V.L. Buxton, K.E. Gonzales, D.C. Evers, and G.G. Lampman. 2019. Determining optimal sampling strategies for monitoring mercury and reproductive success in common loons in the Adirondacks of New York. *Ecotoxicology*, DOI: 10.1007/s10646-019-02122-1
- Schoch, N., Y. Yang, R.D. Yanai, V.L. Buxton, D.C. Evers, and C.T. Driscoll. 2019. Spatial patterns and temporal trends in mercury concentrations in common loons (*Gavia immer*) from 1998 to 2016 in New York’s Adirondack Park: Has this top predator benefitted from mercury emission controls? *Ecotoxicology*, DOI: 10.1007/s10646-019-02119-w
- Yang, Y., L. Meng, R.D. Yanai, M. Montesdeoca, P.H. Templer, H. Asbjornsen, L.E. Rustad, and C.T. Driscoll. 2019. Climate change may alter mercury fluxes in northern hardwood forests. *Biogeochemistry*, 146:1. DOI: 10.1007/s10533-019-00605-1

- See, C.R., R.D. Yanai, and T.J. Fahey. 2019. Shifting N and P concentrations and stoichiometry during autumn litterfall: Implications for ecosystem monitoring. *Ecological Indicators*, 103:488-492. DOI:10.1016/j.ecolind.2019.04.017
- Mobley, M.L., Y. Yang, R.D. Yanai, K.A. Nelson, A.R. Bacon, and D.D. Richter. 2019. How to estimate statistically detectable trends in a time series: a study of soil carbon and nutrient concentrations at the Calhoun Long-Term Soil-Ecosystem Experiment. *Soil Science Society of America Journal*, 83(Suppl1):S133-S140. DOI:10.2136/sssaj2018.09.0335
- Gonzales, K.E. and R.D. Yanai. 2019. Nitrogen-phosphorus interactions in young northern hardwoods indicate P limitation: foliar concentrations and resorption in a factorial N by P addition experiment. *Oecologia*, 189(3):829-840. DOI:10.1007/s00442-019-04350-y
- Campbell, J.L., M.B. Green, R.D. Yanai, C. Woodall, S. Fraver, M. Harmon, M. Hatfield, C. Barnett, C. R. See, and G. Domke. 2018. Estimating uncertainty in the volume and carbon storage of downed coarse woody debris. *Ecological Applications*, 29(2):e01844. DOI:10.1002/eap.1844
- Yanai, R.D., C.R. See, J. L. Campbell. 2018. Current practices in uncertainty analysis in ecosystem ecology. *Ecosystems*, 21(5), 971-981. DOI: 10.1007/s10021-017-0197-x
- Green, M.B., J.L. Campbell, R.D. Yanai, S.W. Bailey, A.S. Bailey, N. Grant, I. Halm, E.P. Kelsey, and L. E. Rustad. 2018. Downsizing a long-term precipitation network: using a quantitative approach to inform difficult decisions. *PLOS One*, 13(5): e0195966. DOI: 10.1371/journal.pone.0195966
- Yang, Y., R.D. Yanai, C.T. Driscoll, M. Montesdeoca and K. Smith. 2018. Concentrations and content of mercury in bark, wood, and leaves in hardwoods and conifers in four forested sites in the northeastern USA. *PLOS One*, 13(4):e0196293. DOI: 10.1371/journal.pone.0196293
- Goswami S., M.C. Fisk, M.A. Vadeboncoeur, M. Johnston, R.D. Yanai, and T.J. Fahey. 2018. Phosphorus limitation of aboveground production in northern hardwood forests. *Ecology*, 99(2):438-449. DOI: 10.1002/ecy.2100
- Yanai, R.D., G.E. Walsh, Y. Yang, C.A. Blodgett, K. Bae, and B.B. Park. 2018. Nutrient concentrations of roots vary with diameter, depth, and site in New Hampshire northern hardwoods. *Can. J. For. Res.*, 48:32-41. DOI: 10.1139/cjfr-2017-0223
- Yang, Y., C.R. See, R.D. Yanai and M.A. Arthur. 2017. Sampling effort and uncertainty in litterfall mass and nutrient flux in northern hardwoods. *Ecosphere*, 8(11):e01999. DOI: 10.1002/ecs2.1999
- Yang, Y., R.D. Yanai, M. Montedeoca, and C.T. Driscoll. 2017. Measuring mercury in wood: Important but challenging. *Int. J. Environ. Anal. Chem.*, 456-67. DOI: 10.1080/03067319.2017.1324852
- Fahey, T.J., R.D. Yanai, K.E. Gonzales, and J.A. Lombardi. 2017. Sampling and processing roots from rocky forest soils. *Ecosphere*, 8(6). DOI: 10.1002/ecs2.1863
- Campbell, J.L., R.D. Yanai, M.B. Green, G.E. Likens, C.R. See, A.S. Bailey, D.C. Buso, and D. Yang. 2016. Uncertainty in the net hydrologic flux of calcium in a paired-watershed harvesting study. *Ecosphere* 7(6). DOI:10.1002/ecs2.1299
- Aulenbach, B.T., D.A. Burns, J.B. Shanley, R.D. Yanai, K. Bae, A.D. Wild, Y. Yang, and D. Li. 2016. Approaches to stream solute load estimation for solutes with varying dynamics from five diverse small watersheds. *Ecosphere* 7(6). DOI: 10.1002/ecs2.1298
- Paré, D., G.Z. Gertner, P.Y. Bernier, P.Y. and R.D. Yanai. 2016. Quantifying uncertainty in forest measurements and models: approaches and applications. *Can. J. For. Res.* 46(3): v. DOI:10.1139/cjfr-2016-0029
- Yang, Y., R.D. Yanai, F.R. Fatemi, C.R. Levine, P.J. Lilly, and R.D. Briggs. 2016. Sources of variability in tissue chemistry in northern hardwood species. *Can. J. For. Res.* 46(3): 285–296. DOI: 10.1139/cjfr-2015-0302
- Kang, H., T.J. Fahey, K. Bae, M.C. Fisk, R.E. Sherman, R.D. Yanai, and C.R. See. 2016. Response of forest soil respiration to nutrient addition depends on site fertility. *Biogeochemistry* 127:113–124. DOI: 10.1007/s10533-015-0172-6

- Bae, K., T.J. Fahey, R.D. Yanai, and M.C. Fisk. 2015. Soil nitrogen availability affects belowground carbon allocation and soil respiration in northern hardwood forests of New Hampshire. *Ecosystems* 18(7):1179–1191. DOI: 10.1007/s10021-015-9892-7
- See, C.R., R.D. Yanai, M.C. Fisk, M.A. Vadeboncoeur, B.A. Quintero, and T.J. Fahey. 2015. Soil nitrogen affects phosphorus recycling: foliar resorption and plant–soil feedbacks in a northern hardwood forest. *Ecology* 96:2488–2498. DOI: 10.1890/15-0188.1
- Falster, D.S., R.A. Duursma, M. Ishihara, D.R. Barneche, R.G. FitzJohn, A. Vårhammar, M. Aiba, M. Ando, N. Anten, J.L. Baltzer, C. Baraloto, J.J. Battles, B. Bond-Lamberty, M. van Breugel, Y. Claveau, L. Coll, M. Dannoura, S. Delagrange, J.-C. Domec, F.R. Fatemi, W. Feng, V. Gargaglione, A. Hagihara, J.S. Hall, S. Hamilton, D. Harja, T. Hiura, R. Holdaway, L. Hutley, T. Ichie, M.I. Ishihara, E.J. Jokela, A. Kantola, J.W.G. Kelly, T. Kenzo, D. King, B.D. Kloeppel, T. Kohyama, A. Komiyama, J.-P. Laclau, C.H. Lusk, D. Maguire, G. le Maire, A. Mäkelä, L. Markesteijn, J. Marshall, K. McCulloh, I. Miyata, K. Mokany, S. Mori, R.W. Myster, M. Nagano, S. Naidu, Y. Nouvellon, A.P. O’Grady, K.L. O’Hara, T. Ohtsuka, N. Osada, O.O. Osunkoya, P.L. Peri, A.M. Petritan, L. Poorter, A. Portsmouth, C. Potvin, J. Ransijn, D. Reid, S.C. Ribeiro, S.D. Roberts, I. S.-R. Rodríguez, R. Rodríguez, A. Saldaña-Acosta, K. Sasa, N.G. Selaya, S.C. Sillett, F. Sterck, K. Takagi, T. Tange, H. Tanouchi, D. Tissue, T. Umehara, H. Utsugi, M.A. Vadeboncoeur, F. Valladares, P. Vanninen, J.R. Wang, E. Wenk, D. Williams, F. de Aquino Ximenes, A. Yamaba, T. Yamada, T. Yamakura, R.D. Yanai, and R.A. York. 2015. BAAD: a Biomass And Allometry Database for woody plants. *Ecology* 96(5): 1445. DOI: 10.1890/14-1889.1
- Wild, A.D. and R.D. Yanai. 2015. Soil nutrients affect sweetness of sugar maple sap. *For. Ecol. Manag.* 341: 30–36. DOI: 10.1016/j.foreco.2014.12.022
- Germain, R.H., R.D. Yanai, A.K. Mishler, Y. Yang and B.B. Park. 2015. Landscape and individual tree predictors of dark heart size in sugar maple. *J. For.* 113(1): 20–29. DOI: 10.5849/jof.14-004
- Yanai, R.D., N. Tokuchi, J.L. Campbell, M.B. Green, E. Matsuzaki, S.N. Laseter, C.L. Brown, A.S. Bailey, P. Lyons, C.R. Levine, D.C. Buso, G.E. Likens, J. Knoepp, and K. Fukushima. 2015. Sources of uncertainty in estimating stream solute export from headwater catchments at three sites. *Hydrol. Processes* 29: 1793–1805. DOI: 10.1002/hyp.10265
- Pitel, N.E. and R.D. Yanai. 2014. Abiotic and biotic factors influencing sugar maple health: soils, topography, climate and defoliation. *Soil Sci. Soc. Am. J.* 78: 2061–2070. DOI: 10.2136/sssaj2014.06.0240
- Fisk, M.C., T.J. Ratliff, S. Goswami, and R.D. Yanai. 2014. Synergistic soil response to nitrogen plus phosphorus fertilization in hardwood forests. *Biogeochemistry* 118(1–3): 195–204. DOI 10.1007/s10533-013-9918-1
- Vadeboncoeur, M.A., S.P. Hamburg, R.D. Yanai, and J.D. Blum. 2014. Rates of sustainable forest harvest depend on rotation length and weathering of soil minerals. *For. Ecol. Manag.* 318: 194–205. DOI:10.1016/j.foreco.2014.01.012
- Levine, C.R., R.D. Yanai, G.G. Lampman, D.A. Burns, C.T. Driscoll, G.B. Lawrence, J.A. Lynch, and N. Schoch. 2014. Evaluating the efficiency of environmental monitoring programs. *Ecol. Indic.* 39: 94–101. DOI: 10.1016/j.ecolind.2013.12.010
- Yanai, R.D., M.A. Vadeboncoeur, S.P. Hamburg, M.A. Arthur, M.A. Fuss, P.M. Groffman, T.G. Siccama, and C.T. Driscoll. 2013. From missing source to missing sink: long-term changes in a forest nitrogen budget. *Environ. Sci. Technol.* 47(20):11440–11448. DOI: abs/10.1021/es4025723
- Rastetter, E.B., R.D. Yanai, R.Q. Thomas, M.A. Vadeboncoeur, T.J. Fahey, M.C. Fisk, B.L. Kwiattkowski, and S.P. Hamburg. 2013. Recovery from disturbance requires resynchronization of ecosystem nutrient cycles. *Ecol. Appl.* 23: 621–642. DOI: 10.1890/12-0751.1

- Vadeboncoeur M.A., S.P. Hamburg, J.D. Blum, M.J. Pennino, R.D. Yanai, and C.E. Johnson. 2012. The quantitative soil pit method for measuring belowground carbon and nitrogen stocks. *Soil Sci. Soc. Am. J.* 76(6):2241–2255. DOI:10.2136/sssaj2012.0111
- Yanai, R.D., C.R. Levine, M.B. Green, and J.L. Campbell. 2012. Quantifying uncertainty in forest nutrient budgets. *J. For.* 110(8): 448–456. DOI: 10.5849/jof.11-087
- Levine, C.R., R.D. Yanai, M.A. Vadeboncoeur, S.P. Hamburg, A.M. Melvin, C.L. Goodale, B.M. Rau, and D.W. Johnson. 2012. Assessing the suitability of using rotary corers for sampling cations in rocky soils. *Soil Sci. Soc. Am. J.* 76 (5): 1707–1718. DOI: 10.2136/sssaj2011.0425
- Yanai, R.D., M.A. Arthur, M. Acker, C.R. Levine, and B.B. Park. 2012. Variation in mass and nutrient concentration of leaf litter across years and sites in New Hampshire northern hardwoods. *Can. J. For. Res.* 42(8): 1597–1610. DOI:10.1139/x2012-084
- Blum, J.D., S.P. Hamburg, R.D. Yanai, and M.A. Arthur. 2012. Determination of foliar Ca/Sr discrimination factors for six tree species in northern hardwood forests, New Hampshire, USA. *Plant Soil.* 356(1): 303–314. DOI: 10.1007/s11104-011-1122-2
- Lucash, M.S., R.D. Yanai, Joel D. Blum, and B.B. Park. 2012. Foliar nutrient concentrations related to soil sources across a range of sites in the northeastern United States. *Soil Sci. Soc. Am. J.* 76(2): 674–683. DOI: 10.2136/sssaj2011.0160
- Park, B.B., M.S. Cho, R.D. Yanai, and D.K. Lee. 2012. Minimizing nutrient leaching and improving nutrient use efficiency of *Liriodendron tulipifera* and *Larix leptolepis* in a container nursery system. *New Forests* 43: 57–68. DOI 10.1007/s11056-011-9266-8
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- Fatemi, F.R., R.D. Yanai, S.P. Hamburg, M.A. Vadeboncoeur, M.A. Arthur, R.D. Briggs and C.R. Levine. 2011. Allometric equations for young northern hardwoods: the importance of age-specific equations for estimating aboveground biomass. *Can. J. For. Res.* 41(4): 881–891. DOI: 10.1139/x10-248
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- Fisk, M.C., R.D. Yanai, and N. Fierer. 2010. A molecular approach to quantify root community composition in a northern hardwood forest: testing effects of root diameter and species. *Can. J. For. Res.* 40(4): 836–841
- Yanai, R.D., J.J. Battles, A.D. Richardson, E.B. Rasetter, D.M. Wood and C. Blodgett 2010. Estimating uncertainty in ecosystem budget calculations. *Ecosystems* 13(2): 239–248
- Wood, D.M., R.D. Yanai, D. Parry, and N.E. Pitel. 2010. Forest fragmentation and duration of forest tent caterpillar (*Malacosoma disstria* Hübner) outbreaks in northern hardwood forests. *For. Ecol. Manag.* 260(7): 1193–1197
- Yanai, R.D., K.J. McFarlane, M.S. Lucash, J.D. Joslin, and S.E. Kulpa. 2009. Nutrient uptake by Engelmann spruce and subalpine fir at two Colorado subalpine forests. *For. Ecol. Manag.* 258(10): 2233–2241
- Park, B.B. and R.D. Yanai. 2009. Nutrient concentrations in roots, leaves and wood of seedling and mature sugar maple and American beech at two contrasting sites *For. Ecol. Manag.* 258 (7): 1153–1160

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- Yanai, R.D., J.L. Campbell, M.B. Green, and J.L. Merriam. No limits: A call for reporting values below detection along with their uncertainty. Ecological Society of America, Portland, OR, August 10, 2023.
- Zukswert, J.M., T.J. Fahey, M.A. Vadeboncoeur, and R.D. Yanai (presented by Ruth). Foliar Chemistry and Resorption Following 10 Years of Experimental Nitrogen and Phosphorus Addition in New Hampshire Forests. Ecological Society of America, Portland, OR, August 9, 2023.
- Yanai, R.D., T.J. Fahey, M.C. Fisk, M.A. Vadeboncoeur. Nitrogen and Phosphorus Co-Limitation in Northern Hardwood Ecosystems. NAFSC, Eugene, OR. July 17, 2023
- Yanai, R.D., Soil Carbon and Global Change Oral: Linking across Scales, Measurements, and Disciplines. ASA, CSSA, SSSA International Annual Meeting, Baltimore, MD. November 8, 2022. (Moderator)
- Yanai, R.D., J.L. Campbell and M. B. Green. Better Monitoring through Uncertainty Analysis: Costs and Benefits of Sampling Intensively. ASA, CSSA, SSSA International Annual Meeting, Baltimore,

- MD. November 8, 2022.
- Gilhooly, K.A, R.D. Yanai, E.A. Cornell, F. Gonzalez, A.V. Medina, S. Rijal, and Oswaldo I. Carillo. Quantifying Uncertainty in Reducing Emissions From Deforestation and Forest Degradation: Common Mistake Countries Make. Rochester Academy of Sciences Poster Session. Rochester, NY. October 29, 2022.
- See, C., R.D. Yanai, and E. Vaughn. Effect of slowly cycling P on ecosystem C and N accumulation. 2022 LTER All Scientists' Meeting. Asilomar, CA. September 20, 2022.
- Yanai, R.D, T.J. Fahey, and M.C. Fisk. Multiple Element Limitation in Northern Hardwood Ecosystems (MELNHE): Updates from the World's Longest-Running NxP Nutrient Addition Experiment in a Temperate Forest. Ecological Society of America/Canadian Society for Ecology & Evolution Annual Meeting, Montreal, Canada. August 16, 2022.
- Dai, S. and R.D. Yanai. Long-term NxP fertilization effects on herbaceous layer communities in ten northern hardwood forest stands. Ecological Society of America/Canadian Society for Ecology & Evolution Annual Meeting, Montreal, Canada, August 15, 2022.
- Yanai, R.D. Less than obvious: How should we treat concentrations below detection limits. Hubbard Brook Annual Cooperators' Meeting. Plymouth State University, NH, July 13, 2022.
- Cornell, E.A., A. Wild, and R.D. Yanai. Beech Bark Disease is Still Getting Worse! Repeated Measures of a Chronosequence in New Hampshire. SUNY Undergraduate Research Conference, SUNY Buffalo State College, April 23, 2022.
- Yanai, R.D., M.C. Fisk, T.J. Fahey, T.A. Mann, and S. Shan. Phosphorus Limitation Aboveground and Nitrogen Limitation Belowground in Northern Hardwood Ecosystems. ASA, CSSA, SSSA International Annual Meeting, Salt Lake City, UT, Nov 8, 2021.
- Pu, G., J.L. Campbell, M.B. Green, and R.D. Yanai. Uncertainty in streamwater fluxes of solutes at the Hubbard Brook Experimental Forest, New Hampshire. 2021 Winter Cyberseminar Series: Research and Observatory Catchments: the Legacy and the Future (Consortium of Universities for the Advancement of Hydrologic Science, Inc.), March 3, 2021.
- Yanai, R.D. Estimates of the available N pool size: plant. Hubbard Brook Quarterly Project Meeting, January 7, 2021.
- Yanai, R.D. Quantifying Uncertainty in Ecosystem Studies (QUEST) and ecosystem P budgets with uncertainty. Hubbard Brook Quarterly Project Meeting, January 7, 2021.
- Yanai, R.D. P Limitation in MELNHE. Hubbard Brook Committee of Scientists Meeting, October 16, 2020.
- Gonzales, K.E., D.S. Hong, and R.D. Yanai. Foliar N and P concentrations of six northern hardwood species in three age classes in a factorial N and P addition experiment in the White Mountains of New Hampshire. Ecological Society of America Virtual Meeting, August 3-6, 2020.
- Hong, D.S. and R.D. Yanai. Soil nutrient availability affects growth and recruitment of saplings of six northern hardwood species Ecological Society of America Virtual Meeting, August 3-6, 2020.
- Mann, T.A., S. Goswami, R.D. Yanai, and K. Bazany. Nitrogen and phosphorus affect the density of sugar maple and American beech germinants. Ecological Society of America Virtual Meeting, August 3-6, 2020.
- Yanai, R.D., K.E. Gonzales, D.S. Hong, M.C. Fisk, and T.J. Fahey. Does foliar N:P predict nutrient limitation in six northern hardwood species? Ecological Society of America Virtual Meeting, August 3-6, 2020.
- Young, A.R., A.K. Schweiger, M.C. Fisk, and R.D. Yanai. Detecting foliar nutrient status of northern hardwoods from the sky. Ecological Society of America Virtual Meeting, August 3-6, 2020.
- Wayson, C., R.D. Yanai, J.W. Kirchner, A. Lister, J.L. Campbell, M.B. Green, and J.E. Drake. Correcting Errors in Error Propagation for REDD+ Carbon Accounting. American Geophysical Union Fall Meeting, San Francisco, CA, December 13, 2019.

- Olguin-Alvarez, M.I., C. Wayson, R.D. Yanai, and O.I. Carrillo. Quantifying Uncertainty in Allometric Models: Fake Forests for the Real World. American Geophysical Union Fall Meeting, San Francisco, CA, December 13, 2019.
- Young, A.R., R.D. Yanai, R. Eblacker and D. Nowak. Uncertainty in rates of urban forest carbon storage for Baltimore, MD and Syracuse, NY. American Geophysical Union Fall Meeting, San Francisco, CA, December 13, 2019.
- Gonzalez, K.E. and R.D. Yanai. Nitrogen-Phosphorus Interactions in Northern Hardwoods Stands Indicate P Limitation: Foliar Concentrations and Resorption in a Factorial N by P Addition Experiment. American Geophysical Union Fall Meeting, San Francisco, CA, December 9, 2019.
- Yanai, R.D., J.L. Campbell, G.A. Dillon, A.R. Young, M.B. Green, C.J. Barnett, G.M. Domke, and C.W. Woodall. Uncertainty in Measurements of Trees in the US Forest Service Forest Inventory and Analysis (FIA) Program. American Geophysical Union Fall Meeting, San Francisco, CA, December 13, 2019.
- Yanai, R.D. Quantifying Uncertainty in Ecosystem Studies. 2019 American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America International Annual Meeting, San Antonio, TX, November 13, 2019.
- Rice, A.M., M. Vadeboncoeur, and R.D. Yanai. Using Soil Nutrient Pools to Explain Ecosystem Processes. American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America International Annual Meeting, San Antonio, TX, November 12, 2019.
- Yanai, R.D., M. Fisk, and T.J. Fahey. The first long-term soil N x P manipulation experiment in a temperate forest system. International Long Term Ecological Research Network 2nd Open Science Meeting (ILTER), Leipzig, Germany, September 3, 2019.
- Gonzales, K.E., R.D. Yanai, T.J. Fahey, M.A. Johnston, and D. Parry. Nitrogen-phosphorous interactions in northern hardwoods stands indicate P limitation: Foliar concentrations and resorption in a factorial N by P addition experiment. Ecological Society of America Annual Meeting, Louisville, KY, August 16, 2019.
- Hong, D.S. and R.D. Yanai. Fall litter variation in nutrient resorption of six northern hardwood species. Ecological Society of America Annual Meeting, Louisville, KY, August 14, 2019.
- Pu, G., J.L. Campbell, J. E. Drake, M.B. Green and R.D. Yanai. How to avoid errors in error propagation: Monte Carlo estimation of uncertainty in forest biomass and stream loads at the Hubbard Brook Experimental Forest. Ecological Society of America Annual Meeting, Louisville, KY, August 14, 2019.
- Young, A.R., A. Schweiger and R.D. Detecting foliar nutrient status of northern hardwoods from the sky. Ecological Society of America Annual Meeting, Louisville, KY, August 14, 2019.
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- Yanai, R.D. Can We Predict the Biogeochemistry of Catchments? Gordon Research Conference, Andover, NH. June 25, 2019. Invited keynote speaker.
- Yang, Y., M.A. Rice, and R.D. Yanai. Never say “There was no difference”--Report the magnitude of difference you could detect. Gordon Research Conference, Andover, NH, June 23-28, 2019.
- Hong, D.S., K.E. Gonzales, and R.D. Yanai. Foliar analysis of six northern hardwood species indicates nutrient limitation. LTER Midterm Review, Hubbard Brook, NH, June 3-5, 2019.
- Yanai, R.D., M.C. Fisk, T.J. Fahey, K.A. Gonzales, S. Goswami, and S. Li. Early Results from the First Long-Term Soil N x P Manipulation in a Temperate Forest. Soil Science Society of America International Soils Meeting, San Diego, CA, January 8, 2019.

- Yang, Y., L. Meng, R.D. Yanai, C.T. Driscoll, M. Montesdeoca, P.H. Templer, L. Rustad, and H. Asbjornsen. Climate change may worsen mercury pollution in northern hardwood forests. American Geophysical Union Fall Meeting, Washington, DC, December 14, 2018.
- Yanai, R.D., Multiple Element Limitation and Allocation of Effort to Acquire Nutrients, Light, CO₂, and Water. Hubbard Brook Committee of Scientists Meeting, Cary Institute of Ecosystems Studies, Millbrook, NY, October 10, 2018.
- Yanai, R.D. Quantifying Uncertainty in Ecosystem Studies. Long Term Ecological Research Network All-Scientists Meeting, Pacific Grove, CA, October 2, 2018
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- Mobley, M.L., K.A. Nelson, D. D. Richter, and R.D. Yanai. Detecting forest soil response to reforestation and ecological succession at the Calhoun Critical Zone Observatory, USA. Ecological Society of America, New Orleans, LA, August 10, 2018.
- Gonzales, K.E. and R. D. Yanai. Evidence for P limitation in a young northern hardwood forest. . Ecological Society of America, New Orleans, LA, August 9, 2018.
- Yanai, R.D., G.A. Dillon, J.E. Drake, T.R. McConnell, A.R. Young, J.L. Campbell, M.B. Green, B. S. Case, H.L. Buckley, and R.C. Woollons. Measurement error in forest inventory (FIA) and error propagation in biomass models. Ecological Society of America, New Orleans, LA, August 9, 2018.
- Horton, T.R., J. Lamit, P. Kennedy, R.D. Yanai. Using MiSeq on DNA extracted from in-growth bags to observe ectomycorrhizal fungi with N, P and N+P additions in mixed hardwood forests at Bartlett Experimental Forest, New Hampshire. International Mycological Association 11, San Juan, Puerto Rico, July 16-21, 2018.
- Morley, M.S., G.E. Walsh, and R.D. Yanai. Overachieve and retain the leaves: Nutrients affect fall leaf retention in northern hardwood species. Spotlight on Student Research, SUNY ESF, April 24, 2018.
- Dillon, G.A., A.R. Young, J.L. Campbell, M.B. Green, and R.D. Yanai. Tree measurement error in the Forest Inventory and Analysis (FIA) plots in the northern region. Spotlight on Student Research, SUNY ESF, April 24, 2018.
- Hong, D.S., K.E. Gonzales, and R.D. Yanai. Foliar analysis of five northern hardwood species indicates nutrient limitation. Spotlight on Student Research, SUNY ESF, April 24, 2018.
- Barkley, M., S. Kirkpatrick, R.D. Yanai, W. Miller, and A.R. Young. Tardigrade response to nitrogen and phosphorus addition. Spotlight on Student Research, SUNY ESF, April 24, 2018.
- Morley, M., G.E. Walsh, and R.D. Yanai. Nutrients affect fall leaf retention in northern hardwood forests. 2017 Forest Ecosystem Monitoring Cooperative Conference, University of Vermont, December 15, 2017.
- Young, A.R., R.D. Yanai, R. Minocha, and S. Long. Sugar maple canopy response to fertilizer. 2017 Forest Ecosystem Monitoring Cooperative Conference, University of Vermont, December 15, 2017.

- Hong, D.S., A.D. Wild, and R.D. Yanai. Battle of the babies: Beech interference with maple regeneration. Rochester Academy of Sciences Fall Scientific Paper Session, St. John Fisher College, November 11, 2017 and 2017 Forest Ecosystem Monitoring Cooperative Conference, University of Vermont, December 15, 2017.
- Lasser, G.A., M.T. Johnston, M.J. Mahoney, V.A. Leimanis, and J.R. Stoodley. An investigation of nutritional effects on causal organisms of beech bark disease in aftermath forests. Rochester Academy of Sciences Fall Scientific Paper Session, St. John Fisher College, November 11, 2017 and 2017 Forest Ecosystem Monitoring Cooperative Conference, University of Vermont, December 15, 2017.
- Morley, M., C. Sosa, R.D. Yanai. Time for tea: Nutrient affect on tea decomposition after three-month incubation in northern hardwood forest soils. Rochester Academy of Sciences Fall Scientific Paper Session, St. John Fisher College, November 11, 2017.
- Rice, A.M., M.T. Johnston, and R.D. Yanai. Do nutrient additions affect sap flow in sugar maple trees? Rochester Academy of Sciences Fall Scientific Paper Session, St. John Fisher College, November 11, 2017 and 2017 Forest Ecosystem Monitoring Cooperative Conference, University of Vermont, December 15, 2017.
- Young, A.R., R.D. Yanai, R. Minocha, and S. Long. Specific leaf area and amino acids respond to nutrient amendments and canopy depth. Rochester Academy of Sciences Fall Scientific Paper Session, St. John Fisher College, November 11, 2017.
- Yanai, R.D., K.E. Gonzales, S. Goswami, S. Li, M.C. Fisk and T.J. Fahey. Nitrogen versus phosphorus limitation: A factorial fertilization experiment in temperate hardwood forests, American Society of Agronomy, Crop Science Society of America, Soil Science Society of America, and the Entomological Society of America Joint Annual Meeting, Tampa, FL, October 23, 2017.
- Yanai, R.D. Soil nitrogen availability affects belowground carbon allocation and soil respiration in hardwood forests of New Hampshire, USA. International Congress of Ecology, Beijing, China, August 23, 2017.
- Yanai, R.D., K.E. Gonzales, S. Goswami, S. Li, M.C. Fisk and T.J. Fahey. The first long-term N x P fertilization experiment in a temperate forest system. ESA Annual Meeting Portland, OR, August 7, 2017.
- Fisk, M.C., S. Goswami, C.R. See, R.D. Yanai and T.J. Fahey. Interactions in efficiency of N and P use for forest litter production. ESA Annual Meeting Portland, OR, August 7, 2017.
- Goswami, S., M.C. Fisk, M.A. Vadeboncoeur and R.D. Yanai. Seedling survival and allocation responses to nutrient additions in northern hardwood temperate forests. ESA Annual Meeting, Portland, OR, August 7, 2017.
- Gonzales, K.E. and R.D. Yanai. Could fertilization with N and P affect biodiversity by altering nutrient cycling via resorption in northern hardwood forests? ESA Annual Meeting Portland, OR, August 11, 2017.
- Yanai, R.D. Propagating uncertainty in allometric models. Global Forest Observations Initiative, Silvacarbon, CONAFOR, Zapopan, Jalisco, Mexico, June 8, 2017.
- Hong, D.S., A.D. Wild and R.D. Yanai. Battle of the babies: Beech interference with maple regeneration. Spotlight on Research, SUNY-ESF, April 25, 2017. Poster.
- Lasser, G.A., D.S. Hong, Y. Yang, K.E. Phelps, G. Pu and R.D. Yanai. Effect of nutrients on foliar characteristics of pin cherry, American beech, yellow birch and white birch. Spotlight on Research, SUNY-ESF, April 25, 2017. Poster.
- Morley, M.S., C.G. Sosa, and R.D. Yanai. Time for tea: Nutrient on teabag decomposition after three-month incubation in hardwood forest soil. Spotlight on Research, SUNY-ESF, April 25, 2017. Poster.

- Yang, Y., R.D. Yanai, F.R. Fatemi, C.R. Levine, P.J. Lilly, and R.D. Briggs. Sources of variability in tissue chemistry in northern hardwood species. AGU Fall Meeting, San Francisco, CA, December 12, 2016. Poster.
- Yanai, R.D., Y. Yang, M. Montesdeoca, and C. Driscoll. The importance of mercury in leaves, bark and wood of eight tree species across four northeastern forests. AGU Fall Meeting, San Francisco, CA, December 12, 2016. Poster.
- Lilly, P., R.D. Yanai, H.L. Buckley, B.D. Case, R.C. Woollons, R.J. Holdaway and J. Johnson. How to avoid errors in error propagation: Prediction intervals and confidence intervals in forest biomass. AGU Fall Meeting, San Francisco, CA, December 12, 2016. Poster.
- Yanai, R.D., B. Case, H.L. Buckley, B.S. Case, and R.C. Woolens. How to avoid errors in your error analyses and gain confidence in your confidence intervals. American Society of Agronomy, Crop Science Society of America, Soil Science Society of America, and the Entomological Society of America joint Annual Meeting, Phoenix, AZ. November 8, 2016. Oral Presentation.
- Yanai, R.D., T.J. Fahey, M.C. Fisk, K. Bae, H. Kang, and C.R. See. Nitrogen and phosphorus co-limitation: a factorial fertilization experiment in temperate hardwood forests. International Long-Term Ecological Research Open Science Meeting, Skukuza, South Africa, October 10, 2016. Oral Presentation.
- Yanai, R.D. QUEST: Quantifying Uncertainty in Ecosystem Studies. International Long-Term Ecological Research Open Science Meeting, Skukuza, South Africa, October 10, 2016. Poster.
- Wayson, C., O. Carrillo., R.D. Yanai, Uncertainty Workshop, Module 3: Monte Carlo Error Propagation, International Long-Term Ecological Research Open Science Meeting, Skukuza, South Africa, October 11, 2016. Workshop.
- Yanai, R.D., T.J. Fahey, B.B. Park, J.B. Shanley, S.W. Bailey, R.A. Hallett, and D.S. Ross. Nutrient cycling efficiency compared across sites, elements, and forest types. Ecological Society of America Annual Meeting, Fort Lauderdale, FL, August 8, 2016. Oral Presentation.
- Yang, Y., R.D. Yanai, M. Montesdeoca, and C.T. Driscoll. Measuring mercury in wood: important but challenging. Ecological Society of America Annual Meeting, Fort Lauderdale, FL, August 10, 2016. Oral Presentation.
- Yanai, R.D., H.L. Buckley, B.S. Case, and R.C. Woollons. Avoiding errors in error analyses: How to propagate uncertainty in regression models. Ecological Society of America Annual Meeting, Fort Lauderdale, FL, August 10, 2016. Poster.
- Shan, S. H., Devens, M.C. Fisk, J.D. Blum, T.J. Fahey, and R.D. Yanai. Nutrient controls of fine root growth and foraging for primary Ca phosphate minerals in northern hardwood forest. Ecological Society of America Annual Meeting, Fort Lauderdale, FL, August 10, 2016. Poster.
- Phelps, K.E., and R.D. Yanai. Nitrogen and phosphorus interactions affect foliar resorption in a northern hardwood forest. Ecological Society of America Annual Meeting, Fort Lauderdale, FL, August 10, 2016. Poster.
- Wild, A.D., Y. Yang, R.D. Yanai, M. Montesdeoca, and T.E. Callahan. Genetic control of sap sweetness and mercury concentration in clonally propagated sugar maples. Ecological Society of America Annual Meeting, Fort Lauderdale, FL, August 9, 2016. Poster.
- Morley, M., A.D. Wild, and R.D. Yanai. Snapchat for Science: Comparing leaf retention on nitrogen and phosphorus-fertilized birch and maple trees. Spotlight on Student Research, SUNY ESF, poster session, April 19, 2016 and Cobleskill SURC, poster session.
- Yang, Y., A.D. Wild, R.D. Yanai, M. Montesdeoca, and C.T. Driscoll. Tapping clonal sugar maple provides an opportunity to test for genetic control of mercury uptake by trees. State University of New York Environmental Science and Forestry. ESF Spotlight, poster session. April 19, 2016.
- Phelps, K.E., R.D. Yanai, and C.R. See. Interconnected cycles of N and P resorption in a northern hardwood forest. Spotlight on Student Research, SUNY ESF, poster session, April 19, 2016.

- Yanai, R.D., J.L. Campbell, J.D. Blum. Comparison of current and long-term Ca weathering rates in the White Mountains of New Hampshire. Minneapolis, MN – American Society of Agronomy, Crop Science Society of America, Soil Science Society of America, and the Entomological Society of America joint Annual Meeting, November 17, 2015. Oral presentation.
- Yanai, R.D., J.L. Campbell, J.D. Blum. Comparison of current and long-term Ca weathering rates in the White Mountains of New Hampshire. Rochester, NY – Acid Rain 2015, October 22, 2015. Oral presentation.
- Yanai, R.D., P.J. Lilly, M.A. Vadeboncoeur, S.P. Hamburg, J.D. Blum, M.A. Arthur, C.R. Levine, K. Bae, F.R. Fatemi, B.B. Park. Uncertainty in nutrient budgets in northern hardwood forests: Natural variation exceeds measurement error. Baltimore, MD – Ecological Society of America Annual Meeting, August 14, 2015. Poster.
- Goswami, S., M.C. Fisk, T.J. Ratliff, R.D. Yanai. Microbial biomass accumulates P but not N in response to N and P fertilization in northern hardwood forests. Baltimore, MD – Ecological Society of America Annual Meeting, August 10, 2015. Poster.
- Yang, Y., R.D. Yanai, C.R. See, M.A. Arthur. Sampling intensity and uncertainty in litterfall mass and nutrient flux in northern hardwoods. Canandaigua, NY – Rochester Academy of Science Fall Paper Session, November 7, 2015. Oral presentation.
- Phelps, K.E., and R.D. Yanai. Evidence of N and P interactions in foliar nutrient resorption. Canandaigua, NY – Rochester Academy of Science Fall Paper Session, November 7, 2015. Poster.
- Yanai, R.D. QUEST and a survey on uncertainty. Woodstock, NH – Hubbard Brook Ecosystem Study 52nd Annual Cooperator's Meeting, July 8, 2015.
- Yanai, P.J. Lilly, M.A. Arthur, K. Bae, S.P. Hamburg, C.R. Levine, M.A. Vadeboncoeur. Uncertainty in accounting for carbon accumulation following forest harvesting. San Francisco, CA – American Geophysical Union Fall Meeting, Dec 18, 2014.
- Yang, Y., R.D. Yanai, C.T. Driscoll, and M. Montesdeoca. The importance of measuring mercury in wood. San Francisco, CA – American Geophysical Union Fall Meeting, Dec 18, 2014.
- Adams, M.B., F.R. Fatemi, and R. D. Yanai. Over a barrel: Nutrient co-limitation and Liebig's Law of the minimum. Long Beach, CA -Soil Science Society of America, Crop Science Society of America, and American Society of Agronomy Annual Meeting. November 5, 2014.
- Yanai, R.D., M.C. Fisk, C.R. See, T.J. Fahey. 2014. Multiple Element Limitation in Northern Hardwood Ecosystems (MELNHE). Long Beach, CA -Soil Science Society of America, Crop Science Society of America, and American Society of Agronomy Annual Meeting. November 5, 2014.
- Dong, Y., R.D. Yanai, M.C. Fisk, R. Briggs, M. Johnston. Parent material, N cycling, and foliar chemistry in northern hardwood forests. Sacramento, CA – Ecological Society of America Annual Meeting, August 12, 2014.
- Yang, Y., R.D. Yanai, and R.D. Briggs. Detecting differences of tissue chemistry in four northern hardwoods tree species. Sacramento, CA – Ecological Society of America Annual Meeting, August 14, 2014.
- Wild, A.D., and R.D. Yanai. Do soil nutrients make maple sap sweeter? Sacramento, CA – Ecological Society of America Annual Meeting, August 12, 2014.
- See, C.R., M.C. Fisk, R.D. Yanai. Nitrogen and phosphorus co-limitation in northern hardwood forests. Sacramento, CA – Ecological Society of America Annual Meeting, August 14, 2014.
- See, C.R., and R.D. Yanai. Soil nitrogen drives community-level phosphorus resorption in a co-limited system: evidence from a northern hardwood forest. San Francisco, CA – American Geophysical Union Fall Meeting, Dec 9-13, 2013. Poster B13D-0546.

- Roberti, J.A., J.R. Taylor, R.D. Yanai, A. Skibbe, X. Zhang, and L. Swift. Spatial variance of precipitation: optimizing sampling efficiency and mitigating uncertainties. San Francisco, CA – American Geophysical Union Fall Meeting, Dec 9-13, 2013. Oral presentation B24B-07.
- Yanai, R.D., K. Bae, C.R. Levine, P. Lilly, M.A. Vadeboncoeur, F.R. Fatemi, J.D. Blum, M.A. Arthur, S. Hamburg. Benchmarking observational uncertainties for hydrology. San Francisco, CA – American Geophysical Union Fall Meeting, Dec 9-13, 2013. Invited Oral Presentation B24B-06 (Invited).
- Aulenbach, B.T., D.A. Burns, J.B. Shanley, R.D. Yanai, K. Bae, A. Wild, Y. Yang, and Y. Dong. Uncertainty of streamwater solute fluxes in five contrasting headwater catchments including model uncertainty and natural variability San Francisco, CA – American Geophysical Union Fall Meeting, Dec 9-13, 2013. (Oral Presentation B24B-03.)
- Campbell, J.L., R.D. Yanai, Mark Green, G.E. Likens, D.C. Buso, C.R. See, and B. Barr. Quantifying uncertainty in the net hydrologic flux of calcium at the Hubbard Brook Experimental Forest, New Hampshire, USA. San Francisco, CA – American Geophysical Union Fall Meeting, Dec 10, 2013.
- Roberti, J.A., J.R. Taylor, R.D. Yanai, A.M. Skibbe, X. Zhang, and L.W. Swift. Spatial variance of precipitation: optimizing sampling efficiency and mitigating uncertainties. San Francisco, CA—American Geophysical Union Fall Meeting, December 10, 2013. B24B-02.
- Yanai, R.D., J.L. Campbell, D.D. Richter, M.L. Mobley. Quantifying Uncertainty in Ecosystem Studies (QUEST): A research coordination network. Tampa, FL—Soil Science Society of America, Crop Science Society of America, and American Society of Agronomy Annual Meeting. Nov 4, 2013. Poster.
- Yanai, R.D., K. Bae, C.R. Levine, C.R. See, M.A. Vadeboncoeur, S.P. Hamburg, J.D. Blum, M.A. Arthur. Sustainable forest harvest requires calcium supply from soil pools: Ecosystem budgets for second-growth northern hardwoods in New Hampshire. Minneapolis, MN—Ecological Society of America Annual Meeting, August 8, 2012. PS 53-22.
- Campbell, J.L., R.D. Yanai, M.B. Green. Quantifying uncertainty in ecology: Examples from small watershed studies. Minneapolis, MN—Ecological Society of America Annual Meeting, August 5, 2012. OOS 5-2.
- Levine, C. R., R. D. Yanai, G. Lampman, D. A. Burns, C. T. Driscoll, G. B. Lawrence, J. A. Lynch, N. Schoch. Optimizing environmental monitoring designs. Minneapolis, MN—Ecological Society of America Annual Meeting, August 5, 2012. OOS 5-5.
- See, Craig R., R. D. Yanai, M.B. Green, and D.I. Moore. Uncertainty due to gap-filling in long-term hydrologic datasets. Minneapolis, MN—Ecological Society of America Annual Meeting, August 5, 2012. OOS 5-6.
- Bae, K., R.D. Yanai, M.C. Fisk, T.J. Fahey. N and P fertilization effects on soil respiration and microbial respiration in northern hardwood forests of New Hampshire. Minneapolis, MN—Ecological Society of America Annual Meeting, August 5, 2012 PS 8-77.
- Goswami, S., M.C. Fisk, T. J. Ratliff, R. D. Yanai. Synergistic soil response to nitrogen plus phosphorus fertilization in hardwood forests. Minneapolis, MN—Ecological Society of America Annual Meeting, August 5, 2012. PS 9-85.
- Diggs, F., R.D. Yanai, T. R. Horton. Mycorrhizal guilds decline similarly with depth in two northern hardwood forests. Minneapolis, MN—Ecological Society of America Annual Meeting, August 8, 2012. COS 89-5.
- Yanai, R.D. Quantifying uncertainty in belowground carbon turnover. Bordeaux, France—COST Action FP0803, Belowground Carbon Turnover in European Forests, May 13-15, 2013. Invited keynote speaker.

- See, C.R., R.D. Yanai, M.C. Fisk. Foliar N:P ratios and resorption efficiencies provide evidence of nutrient co-limitation in a northern hardwood forest. (Poster Presentation) Springfield, MA-Northeastern Natural History Conference, April 14, 2013.
- Yanai, R. Techniques for evaluating the efficiency of programs for monitoring climate change and other environmental variables. Saratoga Springs, NY—Northeastern Ecosystem Research Cooperative, March 19, 2013.
- Diggs, F.D., R.D. Yanai, T.R. Horton. Variance in mycorrhizal colonization in stands of mixed hosts. Rochester, NY—Rochester Academy of Science, November 10, 2012. Poster.
- Bae, K., and R.D. Yanai. Fertilization effects on soil respiration, root respiration, and microbial respiration in northern hardwoods of New Hampshire. Rochester, NY—Rochester Academy of Science, November 10, 2012. Poster.
- Levine, C.R., R.D. Yanai, G. Lampman. Assessment of Long-term Monitoring of Nitrogen, Sulfur, and Mercury Deposition and Environmental Effects in New York State. South Portland, ME -- National Atmospheric Deposition Program Annual Meeting. Oct 2-5, 2012.
- See, C.R., H.A. Tremblay, R.D. Yanai. 2012. The Grass is always greener: nitrogen processes in lawns and adjacent forest land in the White Mountains. Amherst, MA--10th Annual Symposium in Plant Biology. October 6, 2012.
- Yanai, R.D., Carrie R. D., C. R. Levine, M. B. Green, J. L. Campbell, M. A. Vadeboncoeur, S. Hamburg. 2012. Is the missing nitrogen source (or sink) at Hubbard Brook statistically significant? Quantifying Uncertainty in Ecosystem Studies (QUEST). Estes Park, CO-Long Term Ecological Research All Scientists Meeting, September 9-12, 2012.
- Fisk, M.C., T. J. Ratliff, S. Goswami, C. R. See, B. K. Naples, R.D. Yanai, M. A. Vadeboncoeur, T. J. Fahey. 2012. Examining nutrient co-limitation in northern hardwood forests. Estes Park, CO-Long Term Ecological Research All Scientists Meeting, September 9-12, 2012.
- See, C.R., R.D. Yanai, J. L. Campbell, D. I. Moore, G. Likens, E. Matsuzaki. 2012. A proposed cross-site comparison of missing data in long-term hydrologic datasets. Estes Park, CO-Long Term Ecological Research All Scientists Meeting, September 9-12, 2012.
- Goswami, S., C. R. See, M. C. Fisk, M. A. Vadeboncoeur, and R. D. Yanai. 2012. Evidence for species-specific nutrient limitation of growth efficiency in northern hardwoods. Estes Park, CO-Long Term Ecological Research All Scientists Meeting, September 9-12, 2012.
- Bae, K., R. D. Yanai, and T. J. Fahey. 2012. No fertilization effects on soil respiration and root respiration in northern hardwoods of New Hampshire. Estes Park, CO-Long Term Ecological Research All Scientists Meeting, September 9-12, 2012.
- Yanai, R.D., J. Campbell, S. L. LaDeau, K.C. Weathers, C.R. See, and M.B. Green. 2012. Quantifying Uncertainty in Precipitation Estimates. Portland, OR-Ecological Society of America Annual Meeting, August 8, 2012.
- Levine, C.R., R.D. Yanai, G. Lampman. Assessing long-term monitoring programs for sulfur. Portland, OR-Ecological Society of America Annual Meeting, August 7, 2012.
- Bae, K., Yanai, R.D., S.P. Hamburg, J.D. Blum, M.A. Arthur, M.A. Vadeboncoeur, C.R. See, and C.R. Levine. 2012. Sustainable harvest requires calcium supply from soil pools: Ecosystem budgets for second-growth northern hardwoods in New Hampshire. Portland, OR-Ecological Society of America Annual Meeting, August 6, 2012.
- See, C., B.A. Quinero, and Yanai, R.D. 2012. Nitrogen and phosphorus resorption efficiency ratios vary with stand age in northern hardwoods. Portland, OR-Ecological Society of America Annual Meeting, August 8, 2012.
- Yanai, R.D., C.R. Levine, C.R. See, J.L. Campbell, M.B. Green, S.L. LaDeau. 2012. Certain Progress in Uncertainty Analysis. West Thornton, NH—Hubbard Brook Ecosystem Study Annual Cooperators Meeting, July 11, 2012.

- Levine, C.R., R.D. Yanai, J.L. Campbell, M.B. Green. 2012. Quantifying Uncertainty in Ecosystem Studies. Troy, NY—Northeast Soil Monitoring Cooperative Annual Meeting, March 13, 2012.
- Bae, K., R.D. Yanai, T.J. Fahey, and M.C. Fisk. 2012. Fine root biomass and soil respiration reflect belowground carbon allocation in response to nutrient limitation in New Hampshire northern hardwoods. East Syracuse, NY—New York Society of American Foresters Winter Meeting, January 26, 2012. Poster.
- See, C.R., R.D. Yanai, and B.A. Quintero. 2012. Nitrogen and phosphorus resorption efficiency ratios vary with stand age in northern hardwood forests. East Syracuse, NY—New York Society of American Foresters Winter Meeting, January 26, 2012. Poster.
- Diggs, F.M., R.D. Yanai, and T.R. Horton 2011. Mycorrhizae distributions by depth in northern hardwood ecosystems. East Syracuse, NY—New York Society of American Foresters Winter Meeting, January 26, 2012. Poster.
- Yanai, R.D., C.R. Levine, M.B. Green, and J.L. Campbell. 2012. Ecosystem budgets have no error: a progress report on Quantifying Uncertainty in forest Ecosystem Studies (QUEST). East Syracuse, NY—New York Society of American Foresters Winter Meeting, January 26, 2012. Poster.
- Levine, C.R., R.D. Yanai, J.L. Campbell, M.B. Green. 2012. Quantifying Uncertainty in Ecosystem Studies. Millbrook, NY—Hubbard Brook Cooperators Meeting, January 11, 2012.
- Levine, C.R., and R.D. Yanai. 2011. Assessment of long-term monitoring programs in New York State. Albany, NY—New York State Energy Research and Development Authority Environmental Monitoring, Evaluation and Protection meeting, November 15, 2011.
- Yanai, R.D., C.R. Levine, M.B. Green, and J.L. Campbell. 2011. Ecosystem budgets have no error: a progress report on Quantifying Uncertainty in forest Ecosystem Studies (QUEST). Rochester, NY—Rochester Academy of Science Meeting, October 29, 2011.
- See, C.R., R.D. Yanai, and B.A. Quintero. 2011. Nitrogen and phosphorus resorption efficiency ratios vary with stand age in northern hardwood forests. Rochester, NY—Rochester Academy of Science Meeting, October 29, 2011.
- Diggs, F.M., R.D. Yanai, and T. Horton 2011. Mycorrhizae distributions by depth in northern hardwood ecosystems. Rochester, NY—Rochester Academy of Science Meeting, October 29, 2011.
- Levine, C.R., and R.D. Yanai. 2011. Assessing long-term monitoring programs for sulfur, nitrogen, and mercury deposition and impacts in New York State. Providence, RI—National Atmospheric Deposition Program Meeting, October 25, 2011.
- Yanai, R.D., M.A. Vadeboncoeur, S. Hamburg, C.D. Canham, and J.D. Blum. 2011. Will Biomass Harvesting of Northern Hardwood Forests Lead to Nutrient Depletion In the Northeastern US? San Antonio, TX—Symposium--Bioenergy and Soil Sustainability: Forest, Range and Wildlands: I Agronomy Society of America Annual Meeting, October 16-19, 2011.
- Yanai, R.D., C.R. Levine, M.B. Green, and J.L. Campbell. 2011. Ecosystem budgets have no error: a progress report on Quantifying Uncertainty in forest Ecosystem Studies (QUEST). San Antonio, TX—Agronomy Society of America Annual Meeting, October 16-19, 2011.
- Yanai, R.D., E.B. Rastetter, M.C. Fisk, T.J. Fahey, R.Q. Thomas and M.A. Vadeboncoeur. Multi-Element Limitation: Simulation and Measurements Suggest that P is More Limiting than N in Young Northern Hardwood Ecosystems. Austin, TX—Ecological Society of America Annual Meeting, August 7-12, 2011.
- Levine, C.R., J.L. Campbell, R.D. Yanai, M.B. Green, M.B. Adams, D.A. Burns, D.C. Buso, M.E. Harmon, T. Keenan, S.L. LaDeau, G.E. Likens, W.H. McDowell, J.N. Parman, S.D. Sebestyen, J. Vose and M. Williams. 2011. Quantifying Uncertainty in Ecosystem Studies (QUEST): A cross-site comparison of watershed input-output budgets. Austin, TX—Ecological Society of America Annual Meeting, August 7-12, 2011.

- Green, M.B., D.C. Buso, J.L. Campbell, C.R. Levine, G.E. Likens, and R.D. Yanai. 2011. Long-term trends in uncertainty of element fluxes at the Hubbard Brook Experimental Forest. Austin, TX—Ecological Society of America Annual Meeting, August 7-12, 2011.
- Bae, K., R.D. Yanai, T.J. Fahey, and M.C. Fisk. 2011. Fine root biomass and soil respiration reflect belowground carbon allocation in response to nutrient limitation in New Hampshire northern hardwoods. San Austin, TX—Ecological Society of America Annual Meeting, August 7-12, 2011. Poster.
- Levine, C.R., R.D. Yanai, M.B. Green, J. Campbell, G.E. Likens, D. Buso. QUEST: Quantifying uncertainty in Ecosystem Studies. West Thornton, NH—Hubbard Brook Ecosystem Study Annual Cooperators Meeting. July 6, 2011.
- Yanai, R.D., N. Tokuchi, M.B. Green, J. Campbell, C.R. Levine, E. Matsuzaki. Hubbard Brook, Coweeta, and Wakayama (Japan): Sources of Uncertainty in Stream Export of Nutrients. West Thornton, NH—Hubbard Brook Ecosystem Study Annual Cooperators Meeting, July 6, 2011.
- Levine, C.R., R.D. Yanai, J.L. Campbell, M.B. Green. Quantifying Uncertainty in Ecosystem Studies. Millbrook, NY—Hubbard Brook Cooperators Meeting, January 11, 2011.
- Campbell, J.L., R.D. Yanai, M.B. Green, C.R. Levine, M.B. Adams, D.A. Burns, D.C. Buso, M.E. Harmon, T. Keenan, S.L. LaDeau, G.E. Likens, W.H. McDowell, J. Parman, S.D. Sebestyen, J.B. Shanley, J.M. Vose, and M.W. Williams. Quantifying Uncertainty in Ecosystem Studies (QUEST). Roanoke, VA - North American Forest Ecology Workshop, June 20, 2011.
- Yanai, R.D., N. Tokuchi, M.B. Green, J.L. Campbell, C.R. Levine, E. Matsuzaki. Nutrient cycling in forest ecosystems: Uncertainty in nutrient budgets. Tokyo, Japan—University of Tokyo, June 29, 2011.
- Adams, M.B., R.D. Yanai, J.L. Campbell, M.B. Green, D.A. Burns, D.C. Buso, M.E. Harmon, T. Keenan, S.L. LaDeau, G.E. Likens, C.R. Levine, W.H. McDowell, J. Parman, S.D. Sebestyen, J.M. Vose, M.W. Williams. Quantifying Uncertainty in Ecosystem Studies: Using long-term data from small watersheds. Fairbanks, AK—Interagency Conference on Research in the Watersheds, September 26, 2011.
- Yanai, R.D., and B.B. Park. Nutrient Concentrations of Roots Vary More with Site than Soil Depth. Long Beach, CA—Agronomy Society of America Meeting, November 3, 2010.
- Park, B.B., R.D. Yanai, M.S. Cho, J.H. Sung, Y.K. Kim and S.K. Kim. Nutrient leaching and improving nutrient use efficiency of *Liriodendron Tulipifera* and *Larix Leptolepis* in a container nursery system. Long Beach, CA—Agronomy Society of America Meeting, November 3, 2010.
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TEACHING

Teaching materials for my courses and workshops are available on my web site:

<http://www.esf.edu/faculty/yanai/>

3-credit courses

- FOR 796 REDD+ Carbon Accounting, 2021- present (1 to 3 credits)
- FOR 694 Writing for scientific publication, 1997-1999, 2001, 2003-2011, 2013-present.
- FOR 692 Capstone seminar in forest and natural resources management, 2009-present.
- FOR 442/642 Watershed ecology and management, 2013.
- FOR 796 Environmental uncertainty analysis, 2012.
- FOR 496/796 Research experience in forest ecosystem science, 2006-2007.
- FOR 332 Forest ecology, 2002-2005.
- FOR 345/545 Introduction to soils, 1994-1997, 1999.
- FOR 296 Soils and physical geography, 1995.

1-credit seminars.

- FOR 797 Seminars for my laboratory group, of various titles, 2004-present.
- FOR 797 Uncertainty workshop, 2013 - 2015, 2017, 2018
- FOR 797 Energy balance of an urban landscape, 2003.
- FOR 796 Modeling forests and global change, other graduate seminars, 1993-2000.
- FOR 797 Women in scientific and environmental professions, 1999-2000, 2002.
- FOR 132 Freshman orientation seminar, 1999.

1-credit research experience for high school students

- ESF 296 Research Experience/ESF in the High Schools

Workshops

Writing Manuscripts for Publication

- American Society of Agronomy Annual Meeting, Baltimore, MD, Nov 6, 2018; Tampa, FL, Oct 24, 2017; Phoenix, AZ, Nov 7, 2016; Minneapolis, MN, Nov 17, 2015; Long Beach, CA, Nov 4, 2014; Tampa, FL, Nov 5, 2013; San Antonio, TX, Oct 18, 2011; Long Beach, CA, Nov 2, 2010; Pittsburgh, PA Nov 3, 2009; Houston, TX, Oct 7 2008; New Orleans, LA, Nov 6, 2007; Indianapolis, IN, Nov 14, 2006; Salt Lake City, UT, Nov 8, 2005; Seattle, Washington, Nov 2, 2004.
- Women in Science and Engineering Future Professoriate Program, Syracuse University, Syracuse, NY, Jan 26, 2011.

Ecological Society of America Annual Meeting, Montreal, Quebec, Aug 9, 2005; San Jose, CA, Aug 7, 2007; Milwaukee, WI, Aug 5, 2008.
 Marine Biological Laboratory, Woods Hole, MA, Dec 8, 2008.
 Forestry and Forest Products Research Institute, Tsukuba, Japan, July 28, 2006, April-May, 2007.
 Chiba Experimental Forest, Tokyo University, Japan, July 25, 2006.
 Kyoto University, Graduate School of Agriculture, Kyoto, Japan, July 14, 2006.

Uncertainty Analysis

Better Monitoring through Uncertainty Analysis. 2022 Long Term Ecological Research All Scientists' Meeting, September 21, 2022, Pacific Grove, CA.
 Monte Carlo Propagation of Uncertainty. Workshop, Biology Department at West Virginia University, March 29, 2019, Morgantown, WV.
 Better Monitoring through Uncertainty Analysis: Optimize allocation of effort, save time and money. Long Term Ecological Research All Scientists' Meeting, October 3, 2018, Pacific Grove, CA.
 Quantifying Uncertainties and Merging Observations, Experiments, and Models for Improving Estimation, Mapping, and Forecasting of Terrestrial Ecosystem Dynamics. AGU Fall Meeting, December 12, 2016, San Francisco, CA.
 QUEST (Quantifying Uncertainty in Forest Ecosystem Studies). Soil Science Society of America International Annual Meeting, November 8, 2016, Phoenix, AZ.
 Monte Carlo Error Propagation workshop. ILTER Open Science Meeting, October 11, 2016, Skuzuka, South Africa.
 Sources of Uncertainty in Ecosystem Monitoring. LTER All Scientists Meeting, Sept 1, 2015, Estes Park, CO.
 IUFRO International Congress, Side Event: Practical Issues in Implementing Uncertainty Analysis. Oct 9, 2014, Salt Lake City, UT.
 Tools for Estimating Uncertainty in Ecology, Ecological Society of America meeting, Aug. 10, 2014, Sacramento, CA.
 Quantifying Uncertainty in Ecological Studies. LTER All Scientists Meeting, Sept 11, 2012, Estes Park, CO.
 Quantifying Uncertainty in Ecosystem Studies. Soil Sci. Soc. Am. Annual Meeting, August 9, 2011, Austin, TX.
 Estimating uncertainty in ecosystem budgets. Université Laval, Centre de foresterie de Laurentides (CFL) & Le Centre d'Étude de la Forêt (CEF), Québec, QC, Oct 13, 2010
 Uncertainty Workshop, Hubbard Brook Committee of Scientists, Jan 5, 2009.
 Monte Carlo in Excel: build your own uncertainty analysis. Michigan State University - Department of Forestry, East Lansing, MI, Feb 20, 2009; Ecological Society of America meeting, Albuquerque, NM, Aug 2, 2009; Agronomy Society of America Meeting, Pittsburgh, PA, Nov 1, 2009.

SERVICE

Departmental Service

Secretary: 2000-2004 (two-term limit); 2008-2011.
 Graduate Education and Research Committee: 1998-2000, 2008-2010, 2018-2019.
 Promotion and Tenure Committees (5): 1999-2010, 2020-present
 Coordinator of the Critical Thinking Initiative: 1999-2003.
 FNRM Marketing Committee: 1998-1999.
 Search Committee for Chair: 1996-1997.

College and University Service

Vice President of Research search committee: 2020
SUNY Senator, University Faculty Senate: 2020-2021, Alternate: 2021-present
Syracuse University Senator: 2005-2007, 2016-2018.
Executive Committee for College Governance: 1997-1999, 2003-2007, 2008-2011, 2015-2018, 2020-present
Bicycle Safety Committee: 2013 – 2018.
Awards Committee of Faculty Governance: 2012-present.
ESF Honor Program Faculty Panel: 2006-present.
ESF Women's Caucus, Steering Committee: 1995-2016.
Chair, graduate student examinations as assigned (approximately annually): 1994-present.
Awards Committee of Faculty Governance as Past Chair: 2015.
Parliamentarian to Campus Governance: 2015.
Director of the Graduate Program in Environmental Science (GPES): 2011-2015.
Faculty search committees (4): 1997-1999, 2014.
Chair, Awards Committee of Faculty Governance: 2013-14.
Secretary: 1997-1999, 2003-2005, 2008-2011.
Faculty Advisory Committee on the Joint ESF-SU Environmental Initiative: 2006-2007.
Library Committee (Syracuse University): 2005-2007.
Acting Chair of ESF Faculty Governance: 2004.
Learning Action Forum, an extension of the Critical Thinking Initiative: 2001-2003.
Committee on Instruction and Subcommittee on Instructional Quality: 2002-2003.
Multicultural Outreach Committee: 2003.
Organizer of seminars: Women in Scientific and Environmental Professions: 1998-2002.
Employee Assistance Program Committee: 1996-97.
Ad Hoc Task Force to Increase Support of Individual and Institutional Excellence in Teaching: 1996.

Professional Activities

Societies: Ecological Society of America, Soil Science Society of America, American Geophysical Union, Association for Women in Science, Association of Women Soil Scientists, American Geophysical Union, and the Open Gate Program of the Forestry and Forest Research Products Institute, Japan.
City University of New York, Advanced Science Research Center. Member of the external panel charged with reviewing the Environmental Sciences Initiative. 2020.
National Science Foundation. Reviewed proposals for a US-South Africa International Research Coordination Network. 2018
University of New Hampshire. Member of the external panel charged with reviewing the master's program in Natural Resources and the Environment at the University of New Hampshire. 2017.
Hubbard Brook Monitoring Strategic Plan (2012-present) and Core Values (2012-present) Committees.
Recruiting liaison, Semester in Environmental Science Program, Marine Biological Laboratory, Woods Hole, MA (2008-present)
Committee of Scientists, Hubbard Brook Ecosystem Study (1986 – present).
Guest Editor, Ecosphere Special Feature, "Uncertainty Analysis" 2013-2020.
Associate Editor for Division S-7, Soil Science Society of America Journal (1/2013-12/2015)
Chair of the Hubbard Brook Committee of Scientists, (2014-2015).

Editorial Advisory Board: Forest Ecology and Management (11/2009-2/2015).
 Soil Science Society of America, SSSA Conference Committee (2/2012-2/2013).
 Soil Science Society of America, Bouyoucos Conferences Committee (1/2010 – 12/2012).
 Hubbard Brook Research Approval Committee (2004-2011).
 Co-convenor Session C-14: Management impacts on forest hydrology, biogeochemistry and water quality. Congress of the International Union of Forestry Research Organizations, August 25, 2010, Seoul, Korea.
 Roundtable for Sustainable Forests. Provided information on the needs of forest professionals and stakeholders interested in criteria and indicators of sustainable forests. 2007.
 US-Japan joint workshop on biogeochemistry and hydrology in forest watersheds associated with LTER, Sapporo, Japan, March 13-19, 2005.
 Soil Science Society of America, Soil Science Education Award Committee Member, 1/2002-12/2002.
 Roundtable participant, reviewing Criteria and Indicators for the Montreal Protocol, Denver, Colorado, March 12-14, 2000.
 Booz-Allen & Hamilton. Advising on research and management of forests affected by radioactive fallout in Eastern Europe. 1994.
 Co-convenor of the Forest Stress session, Workshop on Comparison of Forest-Soil-Atmosphere Models, Leusden, The Netherlands, May 10-14, 1993.
 USEPA, Environmental Criteria and Assessment Office. Author for Criteria Document, Ozone and other photochemical oxidants. 1993.
 Chemex International P.L.C., Cambridge, England. Researched EPA, state, and private requirements for laboratory certification and assessed opportunities for the analysis of US pollutants. 1988.

INVITED PRESENTATIONS

What Limits Productivity in Northern Hardwoods? Surprising Findings from the First Long-Term N x P Addition Experiment in a Temperate Forest. Ecoinformatics Seminar at Northern Arizona University, November 15, 2021.
 What Limits Productivity in Northern Hardwoods? Surprising Findings from the First Long-Term N x P Addition Experiment in a Temperate Forest. Stockbridge School of Agriculture University of Massachusetts Amherst Seminar Series, Amherst, MA, October 25, 2021.
 The first long-term N x P addition experiment in a temperate forest system. Seminar, University of Montreal, Canada, April 26, 2019.
 Can We Predict the Biogeochemistry of Catchments? Gordon Research Conference, Andover, NH, June 25, 2019.
 Nutrient Cycling and Nutrient Limitation in Forest Ecosystems. SilvaCarbon Seminar Series, National Agrarian University, Lima, Peru, December 14, 2018.
 Quantifying uncertainty in ecosystem studies (QUEST). University of Southampton Statistics Seminar, Southampton, UK, May 25, 2018.
 Quantifying uncertainty in ecosystem studies (QUEST). Forest Research, Forestry Commission, Edinburgh, Scotland. May 21, 2018.
 Quantifying uncertainty in ecosystem studies (QUEST). Penn State seminar series on Energy and Nutrient Movement through Ecological Systems: An Ode to Odum, University Park, PA, November 13, 2017.
 Propagating uncertainty in allometric models. Global Forest Observations Initiative, Silvacarbon, CONAFOR, Zapopan, Jalisco, Mexico, June 8, 2017.
 Soil nitrogen availability affects belowground carbon allocation and soil respiration in hardwood forests of New Hampshire, USA. International Congress of Ecology, Beijing, China. August 23, 2017.

Multiple element limitation in northern hardwood ecosystems. Northeastern Ecosystem Research Cooperative (NERC) Conference. Saratoga Springs, NY, March 28, 2017.

Quantifying uncertainty in ecosystem studies: why it's worth facing our fears. Lockwood Lecture. The Connecticut Agricultural Experiment Station, CT, February 3, 2017.

Comparison of current and long-term weathering rates in the White Mountains of NH at Acid Rain, Session 7c, Role of Forestry and Land Management. Rochester, NY, October 22, 2015.

P-recycling and P-efficiency of ecosystems at the German Research Foundation's (DRG) Priority Research Programme SPP 1685 workshop Ecosystem Nutrition: Forest Strategies for limited phosphorus resources in Freising, Germany hosted by the Soil Ecology Group at the University of Freiburg, September 16-17, 2014.

Methods of uncertainty propagation in estimating forest biomass. Session 4: Uncertainty Combination, Workshop on Error propagation for carbon estimation, December 4-6, 2013, Camino Real Aeropuerto Hotel, Mexico City.

Multi-element limitation in deciduous hardwood forests of the northeastern USA. Lincoln University, Christchurch, NZ, July 24, 2013.

Quantifying uncertainty in ecosystem studies: Approaches and applications. University of Canterbury, NZ, Forestry, hosted by Scion, the Forestry Research Institute, July 23, 2013.

Improving the efficiency of environmental monitoring using uncertainty analysis. Forestry and Forest Products Research Institute, Ibaraki, Japan, December 14, 2012.

Uncertainty Analysis of the Phosphorus Budget at the Hubbard Brook Experimental Forest, New Hampshire. University of Tokyo, Laboratory of Forest Hydrology and Erosion Control Engineering, Oct 5, 2012.

Nutrient co-limitation: a case study in hardwood forests of the northeastern USA. Kyoto University, June 16, 2011.

Nutrient co-limitation in young and old northern hardwood forests: Has nitrogen deposition tipped the balance? Joint program: Centre de foresterie de Laurentides & Le Centre d'Étude de la Forêt, Québec, QC, Canada, Oct 13, 2010.

Is P more limiting than N in young northern hardwood forests? Korea Forest Research Institute, Aug 30, 2010.

Calcium depletion in northern hardwoods: acid rain or aging forests? Manlius-Pebble Hill School, Dewitt, NY, May 26, 2010.

Calcium cycling in northern hardwoods: acid rain and apatite weathering. Hanover Forest Science Seminar Series, Michigan State University - Department of Forestry, East Lansing, MI, February 20, 2009.

What controls calcium depletion in northern hardwood ecosystems? Acid rain or aging forests? Ecosystems Center, Marine Biological Laboratory, Woods Hole, October 14, 2008.

What controls calcium depletion in northern hardwood ecosystems? Acid rain or aging forests? National Science Foundation, Washington, DC, January 14, 2008.

Below-ground processes and nutrient cycling. Forestry and Natural Resources Seminar Series, North Carolina State University, November 12, 2007.

The dynamic forest floor: fact or fiction? Forestry Commission, Northern Research Station, Penicuik, Scotland, June 29, 2007.

The dynamic forest floor: fact or fiction? School of Geosciences, University of Edinburgh, Edinburgh, Scotland, June 20, 2007.

The dynamic forest floor: fact or fiction? EECB Colloquium, University of Nevada, Reno, March 15, 2007.

Cross-site comparison of root turnover and nutrient cycling along a calcium gradient. Northeastern Ecosystem Research Cooperative, Durham, New Hampshire, October 26, 2006.

Studying roots in stony forest soils. University of Tokyo Graduate School of Agriculture and Life Sciences, Tokyo, July 7, 2006.

The dynamic forest floor: fact or fiction? Forestry and Forest Products Research Institute, Tsukuba, Japan, July 5, 2006.

The dynamic forest floor: fact or fiction? University of Tokyo Graduate School of Agriculture and Life Sciences, Tokyo, May 23, 2006.

SUNY College of Environmental Science and Forestry, Alpha Sigma Xi Commencement Address, Syracuse, NY, April 22, 2005.

Keeping the dirt: the value of sample archives to long-term ecological research, Yale School of Forestry and Environmental Studies, New Haven, May 31, 2003.

Nutrient uptake estimated by ecosystem budgets and by root measurements, Ecosystems Center, Marine Biological Laboratory, Woods Hole, April 9, 2002.

Paradigms lost and paradigms regained: soil carbon, acid rain, and biotic control of forest ecosystems, Yale School of Forestry and Environmental Studies, New Haven, February 12, 2001.

Calcium depletion from forest soils: Acid rain or aging forests? Joint Lecture Series with RPI, SUNY Albany, New York, September 13, 2000.

Comparing apples and oranges: efficiency of phosphorus acquisition and predictions of root lifespan, Mini-Symposium on Root-Soil Interactions, BTI, Ithaca, New York, April 12, 2000.

Air pollution and the forest floor, Frontiers of Science Lecture Series, Syracuse University, April 11, 2000.

Air pollution and the forest floor, Natural Resources Department, Cornell University, February 1, 2000.

Organic matter accumulation and cation depletion in the forest floor, Biogeochemistry Seminar Series, Cornell University, March 5 1999.

Global warming and climate change, Keuka College, Keuka Park, New York, October 26, 1998.

Carbon storage in the forest floor of New Hampshire northern hardwoods following clearcutting, North American Forest Soils Conference, Tahoe, California, August 10-14, 1998.

Changes in base cations in the forest floor, International Sugar Maple Symposium, Warren Pennsylvania, June 4, 1998.

Calcium loss from the forest floor: Acid rain or forest succession? USDA Forest Service, Warren Pennsylvania, November 18, 1996.

Acid rain, calcium depletion, and forest growth, Pennsylvania State University, February 1, 1996.

Acid rain, calcium depletion, and forest growth, Ecosystems Center, Marine Biological Laboratory, Woods Hole, February 20, 1995.

Phosphorus cycling in northern hardwoods: focus on the forest floor, Ecosystems Center, Marine Biological Laboratory, Woods Hole, November 1, 1994.

Nutrient cycling in northern hardwoods: focus on the forest floor, Forestry Faculty, SUNY College of Environmental Science and Forestry, April 8, 1994.

Nutrient cycling in New Hampshire northern hardwoods: focus on the forest floor, University of New Hampshire, Department of Natural Resources, January 25, 1994.

Modeling the response of trees and forests to air pollution and climate change, Forestry Department, University of Florida, January 20, 1994.

Modeling root efficiency: nutrient uptake and carbon cost, Soils Department, University of Florida, January 19, 1994.

Changes in forest floor mass and nutrient content over twenty-two years in a northern hardwood forest, Institute of Ecosystem Studies, October 15, 1993.

Modeling the response of trees to climate change and air pollution, University of Georgia, Institute of Ecology, May 24, 1993.

Nutrient uptake by plants, models, and ecosystems, Biogeochemistry Seminar Series, Cornell Center for the Environment, November 13, 1992.

Applications of a nutrient uptake model, University of Washington, College of Forest Resources, October 30, 1992.

The efficiency of nutrient uptake by fine roots and mycorrhizae, University of Wyoming, Botany Department, April 30, 1992.

Modeling the response of trees to climate change and air pollution, Oregon State University, Forest Science Department, April 2, 1992.

Modeling the response of trees to climate change and air pollution, Institute of Terrestrial Ecology, Bush Estate, Scotland, November 26, 1991.

Modeling the response of plant-soil systems to simultaneous acid rain and ozone exposure, V International Congress of Ecology, Yokohama, August 29, 1990.

GRANTS AND CONTRACTS

Yanai is lead investigator except where noted otherwise.

LTER Working Group: Do Actively Cycling C and N Pools Depend Ultimately on Soil P Supply? A Cross-Biome Synthesis. National Science Foundation, Long-Term Ecological Research Network Office. \$19,600. 2023

LTER: Long-Term Ecological Research at the Hubbard Brook Experimental Forest. National Science Foundation award to Cary Institute; overall grant is \$7.65 million the ESF subcontract to R.D. Yanai is \$150,000. 2023-2029.

Quantifying Uncertainty Estimates Required for Carbon Accounting. USDA Forest Service International Programs. \$220,000. 2022-2024.

Soil Nutrient Limitation of Northern Hardwood Forest Productivity. USDA Agriculture and Food Research Initiative. \$500,000. 2019-2023.

LTER: Long-Term Ecological Research at the Hubbard Brook Experimental Forest. National Science Foundation award to Cary Institute; overall grant is \$5.6 million, the ESF subcontract to R.D. Yanai is \$202,000. 2017-2023.

Quantifying Uncertainty Estimates Required for Carbon Accounting. USDA Forest Service International Programs. \$210,000. 2020-2022.

Develop guidelines and support country program in estimating the uncertainty of emission reductions from REDD+ programs using the Monte Carlo approach. World Bank \$65,000. 2020-2021.

RCN: Quantifying Uncertainty in Ecosystem Studies. National Science Foundation. \$500,000. 2013-2020.

Collaborative Research: IDBR: Type A: The NANAPHID: A novel aphid-like nanosensor network for real-time measurement of carbohydrates in live plant tissue. National Science Foundation. \$804,000 total; \$59,815 for the ESF component. Other institutions: SUNY Albany (lead), SUNY College of Nanoscale Science and Engineering, Boston University. 2016-2019.

Quantifying Mercury in Forest Biomass. Northeastern States Research Cooperative. \$78,235. 2015-2019.

The Role of Mycorrhizae in Water Use in Northern Hardwoods: Is Transpiration Optimized for Uptake of Limiting Nutrients? McIntire-Stennis. \$55,229. 2015-2018.

Monitoring mercury in loons: How much is enough? New York State Energy Research and Development Authority (NYSERDA). \$65,750. 2017.

The Importance of Measuring Mercury in Wood. ESF Seed Grant Program. \$5700. 2014.

Aphid-like Biosensors for Ecosystem Studies: NANAPHID Proof of Concept. SUNY 4E, award to SUNY Albany, the total grant was \$135,000, the ESF subcontract to R.D. Yanai was \$16,503. 2014.

Sugar Content of Maple Sap after N, P, or Ca Fertilization, USDA Forest Service, Northeastern State Research Cooperative. \$9,758. 2013-2014.

Uncertainty in Precipitation Inputs in Ecosystem Studies. National Science Foundation, Early-concept Grants for Exploratory Research (EAGER). \$30,000. 2012.

LTER Working Group: Quantifying Uncertainty in Wet Atmospheric Deposition. National Science Foundation, Long-Term Ecological Research Network Office. \$24,000. 2012.

LTER: Long-term ecological research at Hubbard Brook Experimental Forest. National Science Foundation award to Cornell University; overall grant was \$5 million, the ESF subcontract to R.D. Yanai was \$330,000. 2011-2019.

Sustainable nutrient supply after forest harvest: Characterizing the fungal link from soils to roots. McIntire-Stennis. \$54,105. 2011-2013.

Fellowship to Assess Long-Term Monitoring Programs for Sulfur, Nitrogen and Mercury Deposition and Impacts in New York State. New York State Energy Research and Development Authority (NYSERDA). \$79,446. 2011-2012.

LTER Working Group: Quantifying Uncertainty in Ecosystem Studies. National Science Foundation, Long-Term Ecological Research Network Office (co-principal investigator). \$27,000. 2011.

Nutrient co-limitation in young and mature northern hardwood forests, National Science Foundation, \$938,591 total, \$401,141 to ESF and the rest in collaborative grants to Marine Biological Laboratory, University of Michigan, Cornell University and Miami University, plus supplements to ESF totaling \$95,624. 2010-2017.

Forest Health GIS Planner, New York Department of Environmental Conservation. \$496,746. 2010-2015.

Non-destructive soil inventory using Inelastic Neutron Scattering: an application to nitrogen controls on soil carbon storage. USDA Forest Service, Northeastern State Research Cooperative. \$90,745. 2009-2011.

Non-destructive measurement of belowground carbon and nutrients, SUNY-ESF Seed Grant. \$6,400. 2009-2010.

Forest Health GIS Planner, New York Department of Environmental Conservation. \$195,128. 2007-2010.

A decision-support system for forest management under forest tent caterpillar defoliation. Northeastern States Research Cooperative. \$58,912. 2007-2009.

LTER: Long-term ecological research at Hubbard Brook Experimental Forest, National Science Foundation award to Cornell University; overall grant was \$5 million, the ESF subcontract to R.D. Yanai was \$331,512. 2006-2010.

Predicting the size of discolored hearts of sugar maple, Wood Education and Resource Center, USDA Forest Service. \$100,523. 2005-2007.

Assessing the sensitivity of New York forests to calcium depletion from acid rain, New York State Energy Research and Development Authority. \$166,043. 2004-2006.

Biotic control of calcium supply: distinguishing sources to regrowing forests. National Science Foundation. \$611,000. 2003-2007.

Sources of calcium in northern hardwood forests: implications for repeated harvest and calcium depletion. USDA Forest Service Agenda 2020 Sustainable Forest Research program. \$134,793. 2002-2005.

Cross-site comparison of nutrient cycling and root dynamics along a calcium supply gradient. Northeastern States Research Cooperative. \$145,000. 2002-2004.

Determining calcium, lead and organic matter changes in forest floors across the northern forest. Northeastern States Research Cooperative (co-principal investigator). \$96,000. 2002-2004.

Testing nutrient uptake models against ecosystem budgets. National Science Foundation. \$324,000. 2000-2003.

New York City Watershed Model Forest Program. USDA Cooperative State Research, Education, and Extension Service (co-principal investigator). \$349,598. 2000-2003.

New measures of spatial variability in uneven-aged stands: distinguishing sustainable from exploitative cutting practices. USDA Cooperative State Research Service. \$72,000. 1999-2003.

Modeling the early establishment of tree seedlings: the importance of water and nutrient uptake. Forestry Commission (United Kingdom). \$7,240. 1999-2000.

Long-term ecological research at the Hubbard Brook Experimental Forest. National Science Foundation. \$125,000. Subcontract to Cornell University (total \$5M). 1998-2004.

Soil restoration in PAH-contaminated sediments: the role of vegetation in reducing bioavailable PAH concentrations. Great Lakes Research Consortium. \$7,000. 1998-1999.

Modeling height growth in young even-aged northern hardwoods. New York Center for Forestry Research and Development. \$24,000. 1998.

Towards a better understanding of root lifespan: root proliferation and root herbivory. USDA National Research Initiative Competitive Grants Program (co-principal investigator). \$365,000. 1997-2000.

Regeneration modules for the Northeast Decision Model. U.S. Forest Service. \$98,080. 1995-1997.

Predicting lifespan of mycorrhizal roots using a cost-benefit analysis. USDA National Research Initiative Competitive Grants Program (co-principal investigator). \$255,000. 1995-1997.

Interactions of terrestrial ecosystems and global change. Environmental Defense Fund, Global Atmosphere Program. \$9,230. 1994.

Recent changes in nutrient concentrations in the northern hardwood forest: are they natural or anthropogenic? USDA National Research Initiative Competitive Grants Program. \$228,273. 1993-1995.

Regeneration modules for the Northeast Decision Model. U.S. Forest Service. \$72,485. 1992-1994.

Controlled exposure of mature trees, seedlings, and forest mesocosms to gaseous pollution. Electric Power Research Institute (co-principal investigator). \$93,709. Subcontract to TVA. 1992-1994.

Forests as sinks for, or sources of, atmospheric CO₂: The role of warming-induced soil nitrogen transformations. DOE Western Regional Center of the National Institute for Global Environmental Change. \$3,500. Subcontract to Oregon State University. 1992-1993.

Global stress modeling library for assessment of plant and forest response. Electric Power Research Institute (co-principal investigator). \$183,389. 1992-1993.

TEACHING ACCOMPLISHMENTS

Postdoctoral scholars

Melissa Lucash	2008 – 2010
Byung Bae Park	2006 – 2007
Swee-May Tang	2004
Tjeerd Bouma	2004
Elizabeth Hane	2003

PhD dissertations completed

Yang, Y. 2018. Concentration, content and dendrochronology of mercury in northeastern forests in USA. PhD. Syracuse, NY: SUNY College of Environmental Science and Forestry.

- Bae, K. 2013. Belowground carbon fluxes respond to nutrient availability in a northern hardwood forest. PhD Dissertation. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- Lucash, Melissa S. 2006. Methods for measuring nutrient uptake rates of intact roots of seedlings and mature trees. PhD. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- Park, Byung B. 2006. Fine root dynamics and tissue chemistry across a calcium gradient in temperate hardwood and softwood forest ecosystems. PhD. Syracuse, NY: SUNY College of Environmental Science and Forestry. (257 pages)
- Bohn, Kimberly. 2005. Residual spatial structure and implications for sawtimber production in uneven-aged northern hardwoods after selection system silviculture or diameter limit cutting. PhD. Syracuse, NY: SUNY College of Environmental Science and Forestry.

MS theses completed

- Nash, Joseph M. 2022. Downed woody debris, forest development, and tree biomass in the White Mountains of New Hampshire. MS. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- Mann, Thomas A. 2021. Independent and interactive effects of nitrogen and phosphorus addition on forest soil respiration. MS. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- Hong, Daniel S. 2020. Effects of nitrogen and phosphorus addition on foliar nutrient concentrations of six northern hardwood species. MS Thesis. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- Dillon, Gretchen A. 2019. Nutritional effect on causal organisms of beech bark disease in an aftermath forest. MS Thesis. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- Rice, Alexandra M. 2019. Tree variability limits the detection of nutrient treatment effects on sap flow in a northern hardwood forest. MS Thesis. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- Young, Alexander R. 2019. Sugar maple leaf characteristics respond to depth within the crown and to nitrogen and phosphorus addition. MS. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- Gonzales, Kara E. 2017. Effects of calcium, nitrogen, and phosphorus fertilization on foliar nutrient dynamics of three northern hardwood tree species. MS Thesis. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- Yang, Yang. 2015. Detecting changes in tree tissue chemistry over time in Northern Hardwood Stands. MS Thesis. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- Diggs, Franklin M. 2014. Contrasting mycorrhizal groups through the soil profile. MS Thesis. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- Dong, Ying. 2014. Effects of rock-derived nutrients on N cycling in northern hardwood forest. MS Thesis. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- Wild, Adam D. 2014. Soil nutrients affect sweetness of sugar maple sap. MS Thesis. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- See, Craig R. 2013. Foliar resorption in a northern hardwood forest. MS Thesis. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- Levine, Carrie R. 2011. Assessing the suitability of rotary corers for sampling exchangeable cations in rocky soils. MS Thesis. Syracuse, NY: SUNY College of Environmental Science and Forestry.

- Pitel, Nicholas, E. 2010. An assessment of sugar maple condition following defoliation by forest tent caterpillar: investigating soil chemistry. MS Thesis. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- Mishler, Andrew K. 2009. Size of dark hearts in sugar maple. MS Thesis. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- Wood, Dustin M. 2008. Evaluating the susceptibility of sugar maple stands to defoliation by forest tent caterpillar (*Malacosoma disstria* Hübner) and their vulnerability to decline. MS Thesis. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- Fatemi, Farrah R. 2007. Aboveground biomass and nutrients in developing northern hardwood stands in New Hampshire, USA. MS Thesis. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- Lilly, Paul J. 2007. Cation exchange chemistry and the long-term effects of liming on acidic forest soils in the northeastern United States. MS Thesis. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- Homyak, Peter M. 2006. Nitrogen immobilization by woodchip application: Protecting water quality in a northern hardwood forest. MS Thesis. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- McFarlane, Karis J. 2003. Measuring nutrient uptake by roots of sugar maple, red pine, and Norway spruce trees *in situ*. MS Thesis. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- Wang, Xing. 2003. Stream water chemistry after a partial cutting in the Neversink River Basin, New York. MS Thesis. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- Phillips, Richard P. 1999. The effects of calcium chloride and aluminum chloride additions on rhizosphere soil and sugar maple (*Acer saccharum* Marsh.) fine root chemistry. MS Thesis. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- Ray, David G. 1997. Patterns of development in three Adirondack northern hardwood stands following herbicide treatment and shelterwood cutting. MS Thesis. Syracuse, NY: SUNY College of Environmental Science and Forestry.

High School Students

High school students contribute to research on Multiple Element Limitation of Northern Hardwood Ecosystems (MELNHE) by enrolling in a class through ESF in the High School, a project of the Open Academy. A total of 153 students have participated in the program since 2013; 26 received funding from NSF through RAHSS supplements and 54 students participated for at least 45 hours and received college credit.

The MELNHE project is well suited to participation by high school students because of the wide variety of tasks required to support the research effort. High school students have been involved in the field with measurements of tree location, soil pH, snail abundance and diversity, and nutrient uptake by tree roots. In the lab, students have processed root samples from various soil depths, evaluated herbivory by insects on leaves from different nutrient treatments, analyzed soils, identified snails, built sap flow sensors, and learned to do data entry and analysis.

The students come from different high schools in the Syracuse area, including inner city, suburban, and independent schools. Students include first-generation immigrants from West Africa, the Middle East, Southeast Asia, Eastern Europe, and the Caribbean, reflecting the rich diversity of the city of Syracuse.