

**Michael D. Madritch**

Department of Biology, Appalachian State University  
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**Education**

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Ph.D. Ecology. Institute of Ecology, University of Georgia, Athens, GA. 2002.

North Carolina State University, Raleigh, NC. 1998.

B.S. Biochemistry

B.S. Biological Sciences

B.A. Chemistry

Minor, Genetics

**Academic Positions**

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2014-present Associate Professor. Dept of Biology, Appalachian State University, Boone, NC.

2009-2014 Assistant Professor. Dept of Biology, Appalachian State University, Boone, NC.

2007-2008 Assistant Scientist. Dept of Entomology, Univ of Wisconsin, Madison, WI.

2003-2006 Postdoctoral Research Associate. Dept of Entomology, Univ of Wisconsin, Madison, WI.

**Funding**

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2014-2019 NSF-NASA Dimensions of Diversity: Linking remotely sensed optical diversity to genetic, phylogenetic and functional diversity to predict ecosystem processes. PI: J.M. Cavender-Bares, Co-PIs: S.E. Hobbie, R.A. Montgomery, M.D. Madritch, P.A. Townsend, J.J. Couture, R.L. Lindroth, A.I. Zyguelbaum, J. Gamon. \$1,999,944

2013-2014 ASU URC Grant: Development of hyperspectral UAV platform for forest canopy research. \$5,000.

2009-2014 NASA Biodiversity: Remote sensing of forest genetic diversity and assessment of belowground microbial communities in *Populus tremuloides* forests. PI: M.D. Madritch, Co-PIs: P.A. Townsend, K.E. Mock, R.L. Lindroth. \$613,929

2011-2013 NPS Southern Appalachian Cooperative Ecosystems Studies Unit: Develop a GIS model to predict information critical for development of Big South Fork National River and Recreation Area's climbing management plan. PI: G.L. Walker Co-PI: M.D. Madritch. \$95,000

2010-2012 Oak Ridge Associated Universities Powe Junior Faculty Enhancement Award: Ecosystem consequences of genetic diversity in nitrogen fixing mutualisms. \$10,000.

2011-2012 NPS Southern Appalachian Cooperative Ecosystems Studies Unit: Vegetation survey of cliff systems in Cumberland Gap NHP. PI: G.L. Walker, Co-PI: M.D. Madritch. \$25,000

2011-2012 NC Space Grant: Interdisciplinary Course Proposal: Land cover change science. PI: C. Badurek, Co-PI: M.D. Madritch, S. Van de Gevel, M. Denslow. \$14,500

- 2009-2010 ASU URC Grant: Ecosystem consequences of genetic variation in pioneer tree species along an elevational gradient. \$5,000.
- 2004-2009 NSF Ecosystem / Ecology Panels: Genetic variation and herbivory in aspen: consequences for ecosystem processes. PI: R.L. Lindroth, Co-PI: M.D. Madritch. \$800,000.  
-NSF Ecosystems REU Supplements: \$25,000.
- 2001-2003 NSF-Dissertation Improvement Grant: Decomposition and nutrient cycling in a changing environment: Is genetic diversity redundant to ecosystem function? M.D. Madritch and M.D. Hunter. \$7,055.
- 2001-2002 University-Wide Doctoral Fellowship. University of Georgia Graduate School. \$13,000, plus tuition.

### **Publications**

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- Madritch, M.D., and R.L. Lindroth. 2015. Condensed tannins increase nitrogen recovery by trees following insect defoliation. *New Phytologist*. DOI: 10.1111/nph.13444
- Madritch, M.D., Kingdon, C.C., Singh, A., Mock, K.E., Lindroth, R.L., and P.A. Townsend. 2014. Imaging spectroscopy links aspen genotype with belowground processes at landscape scales. *Philosophical Transactions of the Royal Society B*. 20130194.
- Callahan, C.M., Rowe, C.A., Ryel, R.J., Shaw, J.D., Madritch, M.D., and K.E. Mock. 2013. Continental-scale assessment of genetic diversity and population structure in quaking aspen (*Populus tremuloides*). *Journal of Biogeography*. 40: 1780-1791.
- Whitby, T.G., and M.D. Madritch. 2013. Native temperature regime influences soil response to simulated warming. *Soil Biology and Biochemistry* 60: 202-209.
- Mock, K.E., Callahan, C.M., Islam-Faridi, M.N., Shaw, J.D., Rai, H.S., Sanderson, S.C., Rowe, C.A., Ryel, R.J., Madritch, M.D., Gardner, R.S., Wolf, P.G. 2012. Widespread triploidy in western North American aspen (*Populus tremuloides*). *PLOS One* 7:e48406.
- Schweitzer, J.A., Madritch, M.D., Felker-Quinn, E., Bailey, J.K. 2012. From Genes to Ecosystems: Plant Genetics as a Link between Above- and Belowground Processes. In *Soil Ecology & Ecosystem Services*. Edited by Diana Wall.
- Madritch, M.D., and R.L. Lindroth. 2011. Soil microbial communities adapt to genetic variation in leaf litter inputs. *Oikos* 120: 1696-1704.
- Bailey, J.K., Schweitzer, J.A., Ubeda, F., Koricheva, J., LeRoy, C.J., Madritch, M.D., Rehill, B.J., Bangert, R.K., Fischer, D.G., Allan, G.J., Whitham, T.G. 2009. From genes to ecosystems: A synthesis of the effects of plant genetic factors across levels of organization. *Philosophical Transactions of the Royal Society B* 364:1607-1616.
- Madritch, M.D., Greene, S.L., and R.L. Lindroth. 2009. Genetic mosaics of ecosystem functioning across aspen-dominated landscapes. *Oecologia* 160:119-127.
- Madritch, M.D., and R.L. Lindroth. 2009. Removal of invasive shrubs reduces exotic earthworm populations. *Biological Invasions* 11: 663-671.

- Griffiths, R.P., Madritch, M.D., and A.K. Swanson. 2009. The effects of topography on forest soil characteristics in the Oregon Cascade Mountains (USA): Implications for the effects of climate change on soil properties. *Forest Ecology and Management* 257:1-7.
- Schweitzer, J.A., Madritch, M.D., Bailey, J.K., LeRoy, C.J., Fischer, D.G., Rehill, B.J., Lindroth, R.L., Wooley, S.C., Hart, S.C., Whitham, T.G. 2008. From genes to ecosystems: The genetic basis of condensed tannins and their role in nutrient regulation in a *Populus* model system. *Ecosystems* 11: 1005-1020.
- Madritch, M.D., L.M. Jordan, and R.L. Lindroth. 2007. Interactive effects of condensed tannin and cellulose additions on soil respiration. *Canadian Journal of Forest Research* 37: 2063-2067.
- Madritch, M.D., and B.J. Cardinale. 2007. Impacts of tree species diversity on litter decomposition in northern temperate forests of Wisconsin: A multi-site experiment along a latitudinal gradient. *Plant and Soil* 292: 147-159.
- Madritch, M.D., J.R. Donaldson, and R.L. Lindroth. 2007. Canopy herbivory mediates the influence of plant genotype on soil processes through frass deposition. *Soil Biology and Biochemistry* 39: 1192–1201.
- Madritch, M.D., J.R. Donaldson, and R.L. Lindroth. 2006. Genetic identity of *Populus tremuloides* litter influences decomposition and nutrient release in a mixed forest stand. *Ecosystems* 9: 528-537.
- Griffiths, R.P., M.D. Madritch, and A. Swanson. 2005. Conifer invasion of forest meadows transforms soil characteristics in the Pacific Northwest. *Forest Ecology and Management* 208: 347-358.
- Madritch, M.D. and M.D. Hunter. 2005. Phenotypic variation in oak litter influences short- and long-term nutrient cycling through litter chemistry. *Soil Biology and Biochemistry* 37: 319-327.
- Madritch, M.D. and M.D. Hunter. 2004. Phenotypic diversity and litter chemistry affect nutrient dynamics during litter decomposition in a two species mix. *Oikos* 105: 125-131.
- Cooper, S.R., S.K. McGlothlin, M.D. Madritch, and D.L. Jones. 2004. Water quality history of the Neuse and Pamlico estuaries of North Carolina using paleoecological methods. *Estuaries* 27: 619-635.
- Madritch, M.D. and M.D. Hunter. 2003. Intraspecific litter diversity and nitrogen deposition affect nutrient dynamics and soil respiration. *Oecologia* 136: 124-128.
- Madritch, M.D. and M.D. Hunter. 2002. Phenotypic diversity influences ecosystem functioning in an oak sandhills community. *Ecology* 83: 2084-2090.
- Ristaino, J.B., M. Madritch, C.L. Trout, and G. Parra. 1998. PCR amplification of ribosomal DNA for species identification in the plant pathogen genus *Phytophthora*. *Applied and Environmental Microbiology* 64: 948-954.
- Trout, C.L., J.R. Ristaino, M. Madritch, and T. Wangsomboondee. 1997. Rapid detection of *Phytophthora infestans* in late blight infected potato and tomato using PCR. *Plant Disease* 81: 1042-1048.
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## Teaching Experience

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- Introductory Biology: Introductory Biology (UW), Concepts of Biology (ASU), Biology in Society II (ASU), Biological Concepts II (ASU)
- Upper-level Undergraduate: Global Change Ecology (ASU)
- Graduate: Communities and Ecosystems (ASU)

## Student Mentoring

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- Graduate students, major advisor: Laura Boggess, Michael Goddard, Jason Harkey, Cameron Houser, Michael Huffman, Angela Langevin, Eric Purdy, Timothy Whitby
- Graduate students, committee member: >20 students
- Undergraduate students: >30 students

## Professional Activities and Service

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- *Oecologia* handling editor
- NASA Biodiversity and Ecological Forecasting Team member
- Manuscript reviewer: *Acta Oecologica*, *Biological Invasions*, *Canadian Journal of Forest Research*, *Ecography*, *Ecology*, *Ecology Letters*, *Ecoscience*, *Functional Ecology*, *Global Change Biology*, *Oikos*, *Oecologia*, *New Phytologist*. *Soil Science Society of America Journal*
- Grant proposal reviewer: National Science Foundation (Ecological Biology and Ecosystem Science clusters), U.S. Department of Energy, National Aeronautics and Space Administration, Binational Agricultural Research and Development Fund, Austrian Science Fund
- Ecological Society of America, Sigma Xi member.

## Invited Seminars

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- Townsend, P.A., Madritch M.D., Kingdon C.L., Singh A., Mock K.E., Lindroth R.L. 2013. Variability in imaging spectroscopy data across aspen stands is due to differences in genotype and foliar biochemistry. NASA Carbon Cycle and Ecosystems/Biodiversity and Ecological Forecasting Team Meeting. Washington, D.C.
- Madritch, M.D. 2013. Using remote sensing to address fine-scale forest biodiversity and belowground processes. Wake Forest University, Winston-Salem, NC
- Madritch, M.D. 2013. Using remote sensing to address fine-scale forest biodiversity and belowground processes. Western Carolina University. Cullowhee, NC.
- Madritch, M.D., Mock K.E., Lindroth R.L., Townsend P.A. 2012. Hyperspectral remote sensing links aspen genotype with belowground processes at landscape scales. Ecological Society of America Meeting. Portland, OR.
- Madritch, M.D., Townsend P.A., Mock K.E., Lindroth R.L. 2011. Remote sensing of forest genetic diversity and assessment of belowground microbial communities in *Populus tremuloides* forests. NASA Carbon Cycle and Ecosystems/Biodiversity and Ecological Forecasting Team Meeting. Alexandria, VA.

- Madritch, M.D. 2010. Genetic mosaics and ecosystem functioning in forests. Department of Biology, West Virginia University, Morgantown, WV.
- Madritch, M.D., Townsend P.A., Mock K.E., Lindroth R.L. 2010. Remote sensing of forest genetic diversity and assessment of belowground microbial communities in *Populus tremuloides* forests. NASA Biodiversity and Ecological Forecasting Team Annual Meeting. Washington, D.C.
- Madritch, M.D. 2009. Genetic mosaics and ecosystem functioning. Plant Biology Departmental Seminar, North Carolina State University, Raleigh, NC.
- Madritch, M.D. 2009. Genetic mosaics and ecosystem functioning in aspen forests. Sigma Xi Seminar, University of North Carolina - Asheville, Asheville, NC.
- Madritch, M.D. 2007. Genetic mosaics and ecosystem functioning: The influence of aspen clones on ecosystem processes across natural landscapes. Ecology and Evolutionary Biology Departmental Seminar, University of Tennessee, Knoxville, TN.
- Madritch, M.D. 2007. Stopping invasion meltdowns by targeting invasive keystones. Science Day (keynote speaker), University of Wisconsin Arboretum, Madison, WI.
- Madritch, M.D. 2007. Genes to ecosystems: A genetic perspective of nutrient cycling in aspen forests. Indiana University, Bloomington, IN.
- Madritch, M.D. 2006. Ecosystem consequences of genetic variation in trembling aspen. Madison Ecology Group, University of Wisconsin, Madison, WI.
- Madritch, M.D. 2005. Diversity effects on decomposition: Intraspecific variation and spatial scale. Oak Ridge National Laboratories Ecosystems Division, Oak Ridge, TN.
- Madritch, M.D. 2004. Community genetics and ecosystem functioning: Consequences of extended phenotypes on soil processes. Evolution Discussion Group, University of Wisconsin, Madison.
- Madritch, M.D., and R.L. Lindroth. 2004. Genes to geography: The influence of genetically-based plant traits on biodiversity and ecosystem processes. International Entomological Congress, Brisbane, Australia.
- Madritch, M.D., and R.L. Lindroth. 2004. A *Populus* parallel universe. Northern Arizona University Cottonwood Symposium, Flagstaff, AZ.
- Madritch, M.D. 2003. Ecosystem level consequences of intraspecific variation in plant secondary metabolites. Entomology Colloquium, University of Wisconsin, Madison, WI.

### **Posters and Presentations**

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- Hoch, R.A., McCormick, M.A., Eads, C.B., Madritch, M.D., M.M. Gangloff. 2013. Beaver and mill dams alter freshwater mussel habitat, growth and survival in North Carolina piedmont streams. Freshwater Mollusk Conservation Society. Guntersville, AL
- Bogess, L, G. Walker, M.D. Madritch. 2013. Ecology on the rocks: Community composition and climbing impact on the Big South Fork. Association of Southeastern Biologists Annual Meeting. Charleston, W.V.
- Teat, A.L., E. Gonzales, M.D. Madritch, H.S. Neufeld. 2012. Influence of biochar on soil properties and physiological responses of corn, *Zea mays*. 15th Annual Celebration of

- Student Research and Creative Endeavors. Appalachian State University. Boone, NC.
- Harkey, J., G.Walker, M.D. Madritch. 2012. Species area relationship along a cliff face. 73rd Annual Association of Southeastern Biologists. Athens, GA.
- Harkey, J., H.S. Neufeld, M.D. Michael. 2012. Urban forest inventory and ecosystem services provided by trees on the campus of Appalachian State University. 73rd Annual Association of Southeastern Biologists. Athens, GA.
- Purdy, E.R, M.D. Madritch, G.L. Walker. 2012. Nitrogen Availability and Cliff-Face Communities. 73rd Annual Association of Southeastern Biologists. Athens, GA.
- Whitby, T. G, and M.D. Madritch. 2011 Carbon loss from soils along multiple elevation gradients under simulated climate change. Association of Southeastern Biologists. Annual Meeting. Huntsville, AL.
- Madritch, M.D., Greene, S.L., and R.L. Lindroth. 2008. Genetic mosaics and ecosystem functioning: The influence of aspen clones on ecosystem processes across natural landscapes. United States Regional Association of the International Association for Landscape Ecology (US-IALE). Annual Meeting. Madison, WI.
- Madritch, M.D. and R.L. Lindroth. 2007. Aspen genotypes create patches of ecosystem functioning that influence leaf litter decomposition. Ecological Society of America Annual Meeting. San Jose, CA.
- Madritch, M.D. and R.L. Lindroth. 2007. Herbivore-mediated effects of aspen genotype on belowground processes. Gordon Research Conference on Plant-Herbivore Interactions. Ventura, CA.
- Madritch, M.D., Donaldson, J.R., and R.L. Lindroth. 2006. Canopy herbivory mediates the influence of plant genotype on soil processes through frass deposition. Ecological Society of America Annual Meeting. Memphis, TN.
- Mess, T. , L.M. Jordan, M.D. Madritch, R.L. Lindroth. 2006. Interactive effects of tannins and cellulose on soil respiration. Undergraduate Research Symposium. University of Wisconsin, Madison WI.
- Lawson, K. , M.D. Madritch, R.L. Lindroth. 2005. Invasive buckthorn and earthworms unite. Undergraduate Research Symposium. University of Wisconsin, Madison WI.
- Lindroth, R.L., J.R. Donaldson, M.D. Madritch, and T.L. Osier. 2004. Genetics and ecology of chemical defense in aspen (*Populus tremuloides*). Poster Session. 12<sup>th</sup> New Phytologist Symposium: Functional genomics of environmental adaptation in *Populus*. Gatlinburg, TN.
- Madritch, M.D. and M.D. Hunter. 2003. Phenotypic diversity affects nutrient dynamics during decomposition in the presence of another species. Ecological Society of America Annual Meeting. Savannah, GA.
- Madritch, M.D. and M.D. Hunter. 2002. Interactive effects of intraspecific litter diversity and nitrogen deposition on nutrient cycling. Ecological Society of America Annual Meeting. Tuscon, AZ.
- Madritch, M.D. and M.D. Hunter. 2001. Decomposition and nutrient cycling in a changing

environment: Is genetic diversity redundant to ecosystem function? Ecological Society of America Annual Meeting. Madison, WI.

Madritch, M.D. and M.D. Hunter. 2001. Nutrient cycling in a changing environment: Is genetic diversity redundant to ecosystem function during nitrogen deposition? Institute of Ecology Graduate Student Symposium. Athens, GA.

Madritch, M.D. and M.D. Hunter. 2000. Decomposition and nutrient cycling in a changing environment: Is genetic diversity redundant to ecosystem function? Poster Session. Ecological Society of America Annual Meeting. Snowbird, UT.

Griffiths, R. P., M. D. Madritch, B. Mitchell, E. Price, R. Slangen, C. Johnson, S. Acker. 1999. Factors influencing rate of conifer re-establishment in harvested stands and the effects of slow recovery rates on forest soils in the same stands. Poster Session. H.J. Andrews Experimental Forest Annual Symposium, OR.

Griffiths, R. P., M. D. Madritch, B. Mitchell, E. Price, R. Slangen, C. Johnson, T. Hayes. 1999. Influence of forest meadows on soil characteristics in coniferous forests of the central Oregon Cascade Mountains. Poster Session. H.J. Andrews Experimental Forest Annual Symposium, OR.

#### **Committees and Governance Experience at Appalachian State University**

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2013-2014	Camp Broadstone Strategic Planning Committee
2012-2014	Donald W. Sink Outstanding Scholar Award Committee
2012-	Computation and Visualization Lab Steering Committee
2012-	Campus Tree Advisory Committee
2011-	Sustainability Council Natural Resources Subcommittee
2009 -	> 12 Department of Biology committees