

## Justin M. Mathias

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### Professional Appointments

- 2021-pres. Postdoctoral Fellow,  
Department of Forest, Rangeland, and Fire Sciences,  
University of Idaho,  
Moscow, Idaho
- 2020-2021 Postdoctoral Scholar,  
Department of Geography,  
University of California, Santa Barbara,  
Santa Barbara, California

### Education

- 2020 Ph.D., Biology,  
West Virginia University,  
Morgantown, WV
- 2013 Bachelors of Science in Biology,  
West Virginia University,  
Morgantown, WV

### Publications

#### *Accepted*

- 2021 **Mathias, J.M.** and R.B. Thomas. Global tree intrinsic water use efficiency is enhanced by increased atmospheric CO<sub>2</sub> and modulated by climate and plant functional types. *Proceedings of the National Academy of Sciences*. DOI: 10.1073/pnas.2014286118.
- 2018 **Mathias, J.M.** and R.B. Thomas. Disentangling the effects of acidic air pollution, atmospheric CO<sub>2</sub>, and climate change on recent growth of red spruce trees in the Central Appalachian Mountains. *Global Change Biology*. DOI: 10.1111/gcb.14273.
- 2016 Smith, K.R., **J.M. Mathias**, B.E. McNeil, W.T. Peterjohn, and R.B. Thomas. Site level importance of broadleaf deciduous trees outweighs the legacy of high nitrogen (N) deposition on ecosystem N status of Central Appalachian red spruce forests. *Plant and Soil*. DOI: 10.1007/s11104-016-2940-z.

*In revision*

- 2021        **Mathias, J.M.** and A.T. Trugman. Climate change impacts plant carbon balance, increasing mean future carbon use efficiency but decreasing forest extent at dry range edges.

**Research Grants**

- 2017        Smithsonian Center for Tropical Forest Science – ForestGEO Grants Program. Using dendroisotopes to disentangle processes of forest recovery from decades of acid deposition. (\$13,140.14).

**Software Development**

- 2021        isocalcR: Isotope calculations in R. R package version 0.0.2. <https://CRAN.R-project.org/package=isocalcR>.

**Awards and Fellowships**

*Graduate – Internationally competitive*

- 2019        W.D. and S.M. Billings Award (for Contrasting trends in growth and intrinsic water use efficiency of four eastern U.S. tree species), Ecological Society of America, Physiological Ecology Section.
- 2019        European Geosciences Union Roland Schlich Early Career Scientist’s Travel Support to attend the 2019 European Geosciences Union annual meeting in Vienna, Austria. (\$265).
- 2019        *Plants* journal travel award to attend the 2019 European Geosciences Union annual meeting in Vienna, Austria. (\$400).
- 2018        Elizabeth Sulzman Outstanding Publication Award (for Disentangling the effects of acidic air pollution, atmospheric CO<sub>2</sub>, and climate change on recent growth of red spruce trees in the Central Appalachian Mountains), Ecological Society of America, Biogeosciences Section.

*Graduate – University wide*

- 2019        Eberly College of Arts and Sciences Doctoral Travel Award (\$1000).
- 2019        West Virginia University Professor Charles H. Baer Graduate Scholarship (\$2,250).
- 2019        West Virginia University BGSA Productivity Award (\$1,000).
- 2018        David Blaydes Biology Dissertation Scholarship (\$1,133).
- 2018        Eberly College of Arts and Sciences Doctoral Travel Award (\$800).
- 2018        West Virginia University Earl L. Core Memorial Scholarship (\$2,000).

- 2018 West Virginia University BGSA Productivity Award (\$1,000).
- 2017 Eberly College of Arts and Sciences Doctoral Travel Award (\$900).
- 2015 Eberly College of Arts and Sciences Doctoral Travel Award (\$700).
- 2014 Eberly College of Arts and Sciences Doctoral Research Award (\$700).
- 2013-2016 Ruby Distinguished Doctoral Fellowship (\$96,000 across 3 years).

*Undergraduate*

- 2012 Henry W. Hurlbutt Memorial Award (\$1,000).
- 2009-2013 Presidential Scholarship (\$12,000 across 4 years).
- 2009-2013 Promise Scholarship (\$24,000 across 4 years).

**Invited Presentations**

- 2021 **Mathias, J.M.** and R.B. Thomas. Tree intrinsic water use efficiency during the twentieth century: from global trends to local drivers. Dendrochronology Intensive Summer Course, University of Arizona.
- 2021 **Mathias, J.M.** and R.B. Thomas. Tree growth and water use efficiency during the twentieth century: from global trends to local drivers. University of Maryland Center for Environmental Science, Appalachian Laboratory.
- 2018 **Mathias, J.M.** and R.B. Thomas. Using a multi-proxy tree ring approach to examine the effects of environmental change on eastern U.S. forests. United States Forest Service Forest Air Resource Management team.
- 2018 **Mathias, J.M.** and R.B. Thomas. Red spruce recovery in the Central Appalachian Mountains. At: Central Appalachian Spruce Restoration Initiative's Partnerships for Connectivity Conference. Canaan Valley Resort and Conference Center, Canaan, WV.
- 2018 **Mathias, J.M.** and R.B. Thomas. Using a multi-proxy approach to explore recent growth increases in red spruce trees in the Central Appalachian Mountains. At: Dynamics of Forest Growth and Resource Use Symposium. University of Virginia, Charlottesville, Virginia.
- 2015 **Mathias, J.M.** and R.B. Thomas. Widespread forest recovery across the central Appalachian Mountains (U.S.) following reductions in pollutant emissions. Chinese Academy of Forestry, Beijing, China.

## Contributed Presentations

- 2021      **Mathias, J.M.** and A.T. Trugman. Climate change impacts plant carbon balance, increasing mean future carbon use efficiency but decreasing total forest extent at dry range edges. Ecological Society of America Annual Meeting. Long Beach, CA.
- 2020      **Mathias, J.M.** and R.B. Thomas. A global meta-analysis of historical changes in intrinsic water use efficiency of trees using the dual isotope method. Ecological Society of America Annual Meeting. Salt Lake City, UT.
- 2019      **Mathias, J.M.** K.R. Smith, and R.B. Thomas. Contrasting trends in growth and intrinsic water use efficiency of four eastern U.S. tree species. Ecological Society of America Annual Meeting. Louisville, KY.
- 2019      **Mathias, J.M.** and R.B. Thomas. Using a multiproxy tree ring approach to examine the effects of environmental change on eastern U.S. forests. European Geosciences Union Annual Meeting. Vienna, Austria.
- 2018      **Mathias, J.M.** and R.B. Thomas. Using a multiproxy tree ring approach to examine the effects of environmental change on eastern U.S. forests. American Geophysical Union Annual Meeting. Washington D.C.
- 2018      **Mathias, J.M.** and R.B. Thomas. Using multiple proxies of ecosystem function to assess long-term growth and physiology of two deciduous tree species in the Fernow Experimental Forest, WV. Ecological Society of America Annual Meeting. New Orleans, LA.
- 2018      Thomas, R.B. and **J.M. Mathias**. Tracing historical stomatal conductance using stable isotopes. At: Dynamics of Forest Growth and Resource Use Symposium. Charlottesville, VA.
- 2017      **Mathias, J.M.** and R.B. Thomas. Stable nitrogen isotopes in tree rings are an integrator of historical changes in nitrogen cycling dynamics in red spruce (*Picea rubens* Sarg.) forests in West Virginia. Ecological Society of America Annual Meeting. Portland, OR.
- 2017      Thomas, R.B. and **J.M. Mathias**. Disentangling the complexity behind red spruce forest ecosystem recovery from acid deposition. At: High Elevation Forest Restoration Workshop and CASRI/SASRI Meeting. Gatlinburg, TN.
- 2017      Lantz, K.E., **J.M. Mathias**, and R.B. Thomas. Exploring tree growth during the Anthropocene: the Fernow Experimental Forest as a case study. WVU 1<sup>st</sup> Annual Undergraduate Spring Symposium.

- 2015 **Mathias, J.M.**, L.A. Scholtz, B.T. Russell, and R.B. Thomas. Using tree rings of red spruce in the Central Appalachian Mountains to explore growth trends before and after the Clean Air Act. Ecological Society of America Annual Meeting. Baltimore, MD.
- 2015 Smith, K.R., **J.M. Mathias**, and R.B. Thomas. Hardwood abundance outweighs the impact of N deposition on soil N status in red spruce forests in Central Appalachia. Society of American Foresters National Convention. Baton Rouge, LA.
- 2015 Thomas, R.B. and **J.M. Mathias**. Widespread forest recovery across the central Appalachian Mountains (U.S.) following reductions in pollutant emissions. International Acid Rain Conference, October 19-23, 2015 in Rochester, NY.
- 2015 Thomas, R.B. and **J.M. Mathias**. A new story from old trees: possible causes of a recent anomaly in tree growth in the Central Appalachian Mountains (USA). Forest Ecosystem Services for Biodiversity and the Bioeconomy. September 14-20, 2015 in Beijing, China.
- 2014 Smith, K.R., **J.M. Mathias**, B. Hedin, W.T. Peterjohn, and R.B. Thomas. Interannual variability of soil respiration is linked to soil N availability in high-elevation red spruce (*Picea rubens*) forests in Central Appalachia. Ecological Society of America Annual Meeting. Sacramento, CA.
- 2013 Walton, D.R., P.M. Crim, L.A. Scholtz, **J.M. Mathias**, K.R. Smith and R.B. Thomas. Historical trends in stomatal function using herbarium specimens. Summer Undergraduate Research Symposium 2013. Morgantown, WV.
- 2013 **Mathias, J.M.**, K.R. Smith, B. McNeil, W.T. Peterjohn, and R.B. Thomas. Do increased N inputs influence rates of soil N cycling in high-elevation red spruce (*Picea rubens* Sarg.) forests along a gradient of atmospheric deposition? Ecological Society of America Annual Meeting. Minneapolis, MN.
- 2013 Smith, K.R., **J.M. Mathias**, B. McNeil, W.T. Peterjohn, and R.B. Thomas. Who is behind the wheel? The drivers of soil N availability in high-elevation red spruce (*Picea rubens* Sarg.) forests along a gradient of atmospheric N deposition. Ecological Society of America Annual Meeting. Minneapolis, MN.

## Teaching

### *Instructor of record*

- 2016 BIOL 105, Environmental Biology, WVU.

*Guest lectures and teaching coursework*

- 2020 BIOL 327, WVU, Professional Development: How to ensure success as a graduate student.
- 2018 BIOL 191, WVU, First-Year Seminar: Identifying a path towards graduate school.
- 2018 BIOL 493A, WVU, Plant-Microbial Interactions: Red spruce forest responses to environmental change.
- 2017 BIOL 327, Professional Development, WVU: How to ensure success as a graduate student.
- 2017 BIOL 493B, Ecosystem Modeling, WVU: Scaling photosynthesis from the leaf to the globe.
- 2015 BIOL 593N, Advanced Plant Physiology, WVU: Nutrients and plants: sources and sinks.
- 2014 BIOL 693I, Methods in Environmental Physiology, WVU: Sap flux methods for estimating transpiration.

*Teaching assistant*

- 2019 BIOL 106, Environmental Biology Laboratory, WVU.
- 2019 BIOL 298C, Honors Introductory Biology, WVU.
- 2018 BIOL 298E, Honors Introductory Biology, WVU.
- 2017 BIOL 298D, Honors Introductory Biology, WVU.
- 2017 BIOL 106, Environmental Biology Laboratory, WVU.
- 2016 BIOL 298D, Honors Introductory Biology, WVU.
- 2015 BIOL 298D, Honors Introductory Biology, WVU.

**Activities and Service**

*Service to the Profession*

- 2021 Invited panelist providing expertise in climate science and literacy for Exploring Innovation in Appalachia: an undergraduate research symposium. West Virginia University, Morgantown, West Virginia.
- 2019 Co-convended “B118 – Examining Transpiration and Photosynthesis from Ecosystem to Global Scales: Observations, Linkages, and Drivers” at the American Geophysical Union annual meeting, San Francisco, California.

- 2019 Judge for the Gene E. Likens award, Biogeosciences section of Ecological Society of America.
- 2017-pres. Reviewed manuscripts for *Agricultural and Forest Meteorology*, *Botany*, *Biogeochemistry*, *Ecology and Evolution*, *Environmental Pollution*, *Global Change Biology*, *JGR-Biogeosciences*, and *PLoS*.

*Service to the University*

- 2018 Peer mentor for the WVU Biology Graduate Student Association's Peer Mentoring Program.
- 2015 Social coordinator for the WVU Biology Graduate Student Association.
- 2014-2015 Biology graduate student representative for the WVU Graduate Student Advisory Committee.
- 2014 Biology graduate student representative for the WVU Board of Governors visit to the Biology Department.

*Service to the Public and Outreach*

- 2020 Foothill Elementary School Geography Awareness Week outreach, University of California, Santa Barbara: a brief introduction to a changing world—climate change from Santa Barbara to the globe
- 2018 Osher Lifelong Learning Institute at WVU guest lecture: forest ecosystems, learning from the past.
- 2018 Eastwood Elementary Citizen Science Day: linking ecosystem processes and highlighting Appalachian forest services.
- 2017 Aided in the distribution of a donation of ~\$12,000 in supplies and used scientific equipment to Richwood High School in Nicholas County, WV, which was severely flooded and closed.
- 2016 Participated in planting of ~10,000 red spruce trees at the Canaan Valley Wildlife Refuge in Davis, WV.
- 2015 Osher Lifelong Learning Institute at WVU guest lecture: learning from the past to predict the future: how air pollution and climate interactively affect forest ecosystems.

**Professional memberships**

- 2018-pres. European Geosciences Union
- 2018-pres. American Geophysical Union
- 2012-pres. Ecological Society of America

## Undergraduates Mentored

- 2019 Whitney Johnson – B.S. candidate at West Virginia University.
- 2019 Dylan Sunzeri – B.S. in Biology, West Virginia University. Employed at Alliance Pharma.
- 2019 Lauren Borho – B.S. candidate at West Virginia University.
- 2018 Keanan Allen – B.S. candidate at West Virginia University. Ph.D. Student at Northern Arizona University.
- 2018 Marvin Wright – B.S. in Biology, West Virginia University. M.S. candidate at West Virginia University.
- 2018 Afsoon Sabet – B.S. in Biology, West Virginia University. Research assistant at Mississippi State University.
- 2017 Kristin Lantz – B.S. in Biology, West Virginia University. Research assistant at Montana State University.
- 2016 Benjamin Russell – B.S. in Biology, West Virginia University. Attending medical school at Joan C. Edwards School of Medicine, Marshall University.
- 2016 Adam Christian – B.S. in Biology, West Virginia University. Attending medical School at Joan C. Edwards School of Medicine, Marshall University.
- 2015 Stacy Simon – B.S. in Biology, West Virginia University. M.S. in Biotechnology, Northeastern University. Employed at AstraZeneca Pharmaceuticals.

## Selected Media Coverage

- 2021 [Study finds trees growing taller due to climate change for Virginia Public Radio.](#) February 26, 2021.
- 2021 [New WVU biology study of trees has implications for future climate change predictions in Charleston Gazette-Mail.](#) February 14, 2021.
- 2021 [WVU biologists uncover forests' unexpected role in climate change in WVU Today.](#) February 8, 2021.
- 2019 [Red spruce sprout atop coal mines that helped kill them in E&E News.](#) April 3, 2019.
- 2018 Red spruce forest research highlighted in the WVU Eberly College of Arts and Sciences Fall 2018 Magazine.
- 2018 [WVU researchers studying forests' past and future in WVNews.](#) June 1, 2018.



- 2018      [WVU biology student links Clean Air Act to red spruce recovery in Appalachia.](#)  
May 22, 2018.
- 2018      [Red spruce forest research highlighted online in WVU Magazine Viewfinder.](#)  
Summer, 2018.
- 2018      [How red spruce trees tell the story of forest recovery.](#) National Science Foundation.  
May 25, 2018.
- 2017      [WVU biology students investigate the impact of climate change on Appalachian forests.](#) Katlin Swisher, Interim Director, Communications and Marketing, WVU, September 20, 2017.
- 2015      [Increase in red spruce growth tied to the Clean Air Act.](#) Jeff, Atkins, PLOS Ecology Field Reports. Jeff Atkins, PLOS Ecology Field Reports, August 11, 2015.

### **Professional References**

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