

Damon R. Vaughan

Education

Northern Arizona University – School of Forestry

Ph.D. in Forestry, specialty: Wood Science and Forest Products

Faculty advisor: Dr. David Auty

Dissertation title: “Wood properties of southwestern *Pinus ponderosa* and relationships with silviculture, climate, and wood products”

4.0/4.0 GPA

Flagstaff, AZ

Aug 2016 – May 2020

Colorado State University – Warner College of Natural Resources

M.S. in Forestry, specialty: Forest Products

Faculty advisor: Dr. Kurt Mackes

Thesis title: “Time-since-death and its effects on wood from beetle-killed Engelmann spruce in southwest Colorado”

4.0/4.0 GPA

Fort Collins, CO

Jan 2015 – Aug 2016

Colorado State University – Warner College of Natural Resources

B.S. in Forestry, concentration: Management

4.0/4.0 GPA

Mathematics minor

Fort Collins, CO

Jan 2011 – Dec 2013

Research Experience

Post-doctoral researcher, Forest ecophysiology lab

Mar 2022 - Present

University of Kentucky, Lexington, Kentucky and Monteverde, Costa Rica

Responsible for managing field work, data collection, data analysis and synthesis for a Costa Rica-based tree canopy research project. Based full-time in Costa Rica from April 2022 to April 2024.

- Constructed, installed, maintained, and collected data from canopy sensors including sap flow, microclimate, soil moisture, point dendrometers, and more.
- Conducted intensive physiology measurement campaigns including pre-dawn and mid-day water potential, PV curves, stable isotopes, and leaf morphological traits.
- Wrote scripts in R to automate the compiling and organizing of continuously collected data and built Shiny applications to facilitate data viewing and sharing with collaborators.
- Collaborated on an NSF grant proposal focusing on forest structure and composition in topographically complex regions.

Research Associate, Forest Operations and Biomass Utilization

Ecological Restoration Institute, NAU, Flagstaff, Arizona

May 2020 – Feb 2022

Responsible for research and outreach aimed at increasing the pace and scale of forest restoration in the Southwest US.

- Coordinated multi-state wood utilization team funded through a \$400,000 grant from the US Forest Service.
- Conducted comprehensive survey and analysis of forestry contractors in the Southwest.
- Produced management-focused scientific summaries and white papers, in addition to peer-reviewed papers.
- Performed spatial data analysis of railroad transportation networks and forest restoration projects in the southwest to assess the feasibility of shipping wood products by rail.

PhD Candidate

Damon R. Vaughan

Northern Arizona University School of Forestry, Flagstaff, Arizona

Aug 2016 – May 2020

PhD research project: Wood properties of southwestern *Pinus ponderosa* and relationships with silviculture, climate, and wood products

- Conducted extensive forest sampling work across sites in northern Arizona, including forest inventory measurements and wood sample collections.
- Processed and tested samples using X-ray densitometry and static bending tests
- Modelled variations in wood properties both within trees and across the landscape.
- Led field crews and provided mentorship to undergraduate field and lab workers.

MS student researcher

Colorado State Forest Service, Fort Collins, Colorado

Jan 2014 – Aug 2016

Projects included:

- Characteristics of Colorado forestry contractors and their role in current forest health issues.
- Utilizing Russian olive at the Colorado State Forest Service Nursery: A case study.
- Mechanical properties of *Juniperus scopulorum* and their implications on utilization.

Peer-Reviewed Publications

Vaughan D., C.B. Williams, N. Nadkarni, T.E. Dawson, D. Draguljic, R. Naesborg, S. Gotsch. 2024. Drought response strategies of vascular epiphytes in isolated pasture trees in a Costa Rican tropical montane landscape. *American Journal of Botany*

Nicholls D., **D. Vaughan**, D. Mitchell, H.-S. Han, M. Smidt, J. Sessions. 2022. Forest bio-hubs to enhance forest health while supporting the emerging bioeconomy- A comparison between three U.S. regions. *Energies*. 15:931.

Vaughan D., C. Edgeley, H.-S. Han. 2021. Forest contracting businesses in the US Southwest: Current profile and workforce training needs. *Journal of Forestry*.

Vaughan D., D. Auty, T.E. Kolb, J. Dahlen, A.J. Sanchez Meador, K.H. Mackes. 2021. Wood density variation in naturally regenerating stands of *Pinus ponderosa* in northern Arizona, USA. *Canadian Journal of Forest Research*. 51:4.

Vaughan D., D. Auty, J. Dahlen, A.J. Sanchez Meador, K.H. Mackes. 2021. Modelling variation in wood stiffness of *Pinus ponderosa* using static bending and acoustic measurements. *Forestry: An international Journal of Forest Research*. 94:232 – 243.

Vaughan D., D. Auty, T.E. Kolb, A.J. Sanchez Meador, K.H. Mackes, J. Dahlen, W.K. Moser. 2019. Climate has a larger effect than stand basal area on wood density in *Pinus ponderosa* var. *scopulorum* in the Southwestern USA. *Annals of Forest Science*. 76:85.

Vaughan D., K.H. Mackes, J.B. Webb. 2018. Time-since-death and its effects on wood from beetle-killed Engelmann spruce in southwest Colorado. *Forest Science*. 64(3), pp. 316-323.

Vaughan D., K. Mackes, M. Eckhoff. 2017. Bond requirements on state-owned forest land in the western United States. *Journal of Testing and Evaluation*. 45(4), pp. 1442-1450.

Vaughan D. and K.H. Mackes. 2017. Shrinkage and static bending properties of *Juniperus scopulorum* from the Rocky Mountains. *Forest Products Journal*. 67(1-2), pp. 39-43.

Damon R. Vaughan

Mackes K.H., T. Costanzo, R. Coleman, M. Eckhoff, **D. Vaughan**. A protocol for heat treating black walnut wood infested with walnut twig beetle. *Forest Products Journal*: 66(5-6), pp. 274-279.

Vaughan D. and K.H. Mackes. 2016. Utilizing Russian olive at the Colorado State Forest Service: A case study. *Forest Products Journal*: 66(3-4), pp. 241-249.

Vaughan D. and K.H. Mackes. 2015. Characteristics of Colorado Forestry Contractors and their Role in Current Forest Health Issues. *Forest Products Journal*: 65(5-6), pp. 217-225.

White Papers

Vaughan D., C. Edgeley, H.-S. Han. 2022. Workforce training needs of forestry contractors in the US Southwest: Results of an industry survey. ERI White Paper – Issues in forest restoration. Ecological Restoration Institute, Northern Arizona University. 16 pp.

Vaughan D., C. Edgeley, H.-S. Han. 2022. Workforce training needs of forestry contractors in the US Southwest. ERI Fact Sheet. Ecological Restoration Institute, Northern Arizona University. 2 pp.

Vaughan D., D. Auty, K. Mackes. 2020. Wood properties of southwestern ponderosa pine: Implications for utilization of forest restoration byproducts. ERI Fact Sheet. Ecological Restoration Institute, Northern Arizona University. 2 pp.

Vaughan D. and R. Lockwood. 2015. Potential for Russian-olive Removal and Utilization at the Colorado State Forest Service Nursery. *Colorado Water* Vol. 32, Issue 2, pp. 24-26

Licata C., K. Mackes, T. Reader, **D. Vaughan**. Regional assessment of the timber economy in southwest Colorado, 2015. Colorado Wood Utilization and Marketing Program. 31 pp.

Presentations

- **Society of American Foresters Ecophysiology Community of Interest**. Webinar delivered via Zoom, November 7, 2024. “Do epiphytes help or hinder host trees in the tropics?”
- **Society of American Foresters National Convention 2024**. Loveland, CO, September 18, 2024. “Microclimate variability within cloud forest tree canopies: exploring effects of land management and epiphyte removal.” Vaughan D., N. Nadkarni, L. Lowman, T. Dawson, E. Cubero, P. Gutierrez, S. Gotsch.
- *In Spanish*: **Monteverde climbing festival 2024**. Monteverde, Costa Rica, February 3, 2024. “Investigación canopy en los trópicos: Historias de un proyecto basado en Monteverde.”
- **Ecological Society of America Convention 2023**. Portland, OR, August 8, 2023. “Epiphyte removal alters host tree microclimate and physiological processes in a Costa Rican tropical montane cloud forest.” Vaughan D.R., N. Nadkarni, L. Lowman, T. Dawson, R. Dudrick, H. Connuck, ..., S. Gotsch.
- **Bajo Del Tigre science talks**. Monteverde, Costa Rica, July 19, 2023. “Simulación del cambio climático a través de la eliminación de epífitas: Efectos sobre la salud de los árboles, el microclima y el ciclo del agua”
- **Fire Adapted Communities Learning Network meeting**. Delivered via Zoom, September 21, 2021. “Forest contracting business in the US Southwest: Current profile and workforce training needs.”
- **Forest Products Society International Convention 2021**. Delivered via Zoom, June 2021. “Identification and evaluation of railroad networks in the US Southwest to strategically transport small logs and biomass.” Vaughan D.R., H.-S. Han, P. Seligman, N. Anderson.

Damon R. Vaughan

- **Fire Adapted Communities Learning Network meeting.** Delivered via Zoom, September 24, 2020. “Wood properties of Southwestern *Pinus ponderosa*.”
- **Society of American Foresters northern AZ chapter meeting.** Delivered via Zoom, April 14, 2020. “Wood properties of Southwestern *Pinus ponderosa*.”
- **Society of American Foresters National Convention 2019.** Louisville, KY, November 1, 2019. “Variations in wood density of ponderosa pine across three national forests in Arizona.” Vaughan D.R., D. Auty, A. Sanchez Meador, T.E. Kolb, K.H. Mackes.
- **21st International Nondestructive Testing and Evaluation of Wood Symposium.** Katholische Academy, Freiburg, Germany, September 25, 2019. “Effects of basal area and climate on wood density of southwestern US ponderosa pine in a replicated stand density experiment.” Vaughan D.R., D. Auty, T.E. Kolb, A. Sanchez Meador, K.H. Mackes, J. Dahlen, K. Moser.
- **New Frontiers in Forecasting Forests,** IUFRO Division 5.01.04. Stellenbosch University, Western Cape, South Africa, September 28, 2018. “Effect of stand density and climate on the wood properties of ponderosa pine.” Vaughan D.R., D. Auty, J. Dahlen, A. Sanchez Meador, K.H. Mackes, T.E. Kolb.
- **Western Mensurationists Annual Meeting 2018,** Western Mensurationists. High Country Conference Center, Flagstaff, AZ, June 19, 2018. “Effects of stand basal area on ponderosa pine wood quality.” Vaughan D.R., D. Auty, A. Sanchez Meador, K. Mackes, T. Kolb.
- **Forest Products Society 70th International Convention,** Forest Products Society. Portland, OR, June 27-29, 2016. “Time-since-death and its effects on wood from beetle-killed Engelmann spruce in southwest Colorado.”
- **2015 Plant Health Care Conference,** International Society of Arboriculture and Colorado Tree Coalition. Hilton Hotel, Fort Collins, CO, June 18. “Utilizing Russian olive: A case study”
- **Forest Products Society 69th International Convention,** Forest Products Society, Georgia Tech Center, Atlanta, GA, June 10-12, 2015. “Characteristics of Colorado’s Forestry Contractors.”
- **2015 Joint Annual Meeting,** CO/WY Society of American Foresters, Colorado Timber Industry Association, and Colorado Tree Farmers, Hotel Colorado, Glenwood Springs, CO, May 7-9. “Characteristics of Colorado’s Forestry Contractors.”
- **Colorado State Forest Service Partners Conference,** Colorado State Forest Service, CO/WY Society of American Foresters, Antlers Hotel, Colorado Springs, CO, April 2015. “Utilizing Russian olive at the CSFS Nursery: A Case Study.”

Poster Presentations

- **15th Biennial Conference of Science and Management on the Colorado Plateau and Southwest Region.** High Country Conference Center, Flagstaff, AZ, September 10, 2019. “Modeling ponderosa pine mechanical properties to aid restoration efforts in northern Arizona” Vaughan D.R., D. Auty.
- **ARCS Foundation Phoenix Scholar Awards Dinner.** Camby Hotel, Phoenix, AZ, April 26, 2019. “Wood density variation in southwestern USA ponderosa pine” Vaughan D.R., D. Auty, T.E. Kolb, A. Sanchez Meador, K.H. Mackes, J. Dahlen, K. Moser.
- **NAU Graduate Student Government Poster Symposium.** High Country Conference Center, Flagstaff, AZ, March 26, 2019. “Wood density variation in southwestern USA ponderosa pine.” Vaughan D.R., D. Auty, T.E. Kolb, A. Sanchez Meador, K.H. Mackes, J. Dahlen, K. Moser.
- **Society of American Foresters National Convention 2017,** Albuquerque Convention Center. Albuquerque, NM, November 15-19, 2017. “Wood property models for ponderosa pine in the US southwest.”

Teaching Experience

Guest lectures

Damon R. Vaughan

- *Iterations with Purr* (11/2/21 & 3/31/20). Introduction to R for the natural sciences (Northern Arizona University FOR599)
- *Welcome to the Tidyverse* (9/28/21 & 2/18/20). Introduction R for the natural sciences (NAU FOR599)
- *Silvicultural effects on wood quality* (11/13/20). Silviculture 1 – Semester A (NAU)
- *Introduction to wood science and forest products: part 1* (4/4/18). Introduction to Forestry (NAU FOR101)
- *Introduction to wood science and forest products: part 2* (4/17/18). Introduction to Forestry (NAU FOR101)
- *Wood density and specific gravity* (2/28/19). Wood Science and Technology (NAU FOR442/542)
- *Variations in wood specific gravity* (3/5/19). Wood Science and Technology (NAU FOR442/542)

Teaching Practicum

NAU School of Forestry

Spring semester 2018

Semester-long course in which PhD students are taught how to effectively teach a college-level course

- Delivered two guest lectures
- Developed a course syllabus

Teaching Assistant

Forestry Field Practices, Red Feather Lakes, Colorado

Jan - May 2013, 2015, 2016

Students worked in groups to write and implement thinning prescriptions in a ponderosa pine forest. As TA, I taught safe use and maintenance of chainsaws, four-wheelers, and arch skidders.

Teaching Assistant

Timber Harvesting and the Environment, Fort Collins, Colorado

Spring Semester 2015, 2016

I was responsible for grading homework and giving feedback to students.

Teaching Assistant

Integrated Ecosystem Management, Fort Collins, Colorado

Fall Semester 2015

Delivered lectures, facilitated discussions, and graded homework for the capstone course in the Natural Resources Management degree

Lead Instructor

Colorado Outward Bound School, Leadville, Colorado

Contract based, 2013-2015

Instructor on backpacking and mountaineering courses in the Colorado backcountry with students aged 12 – 22 and on trips of 8 – 22 days

- Taught daily lessons on topics such as backpacking techniques, knot tying, wilderness safety concerns, basic first aid, and more.
- Facilitated discussions on topics such as conflict resolution, student goals, and environmental responsibility.
- Kept students safe by actively identifying and managing risks in dangerous mountain environments such as loose rocks, snow, and rivers.

Organized workshops and conferences

- Innovations in Forest Operations and Biomass Utilization in the Southwest, November 17 – 18, 2020, Albuquerque, New Mexico. Organized a day-and-a-half in-person conference. Responsible for putting together the agenda, arranging contracts with the venue, handling registration, and overseeing the event.

Damon R. Vaughan

- Expanding the forest industry in the Southwest: virtual conference held March 2 – 3, 2020. I organized a free day-and-a-half virtual conference with over twenty speakers and over 200 unique attendees. Managed a collaboration with partners in two neighboring states to create the agenda, market the event, and host the webinar.
- Introduction to lumber dry kiln operations. Hosted a virtual 4-part series in November 2020
- Financial assistance for the forest industry. Hosted a webinar in November 2020

Skills

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| • R: Spatial and tabular data analysis | • Field campaign logistics | • Project management |
| • ArcGIS: Spatial data analysis and map-making | • Field and lab measurements | • Supervising and mentoring technicians |
| • Nonlinear mixed effects modeling | • Forest sampling techniques | • Conference planning and hosting |
| • Data visualization | • Automated sensor array management | • Spanish language working proficiency |
| • Shiny apps | • Dendrochronology techniques | • Scientific writing |

Grant and funding experience

- Collaborated on large NSF grant proposal investigating forest structure in eastern Kentucky (to be submitted January 2025)
- Coordinated a multi-state wood utilization team funded by a \$400,000 US Forest Service grant to the Ecological Restoration Institute
- ARCS (Achievement Rewards for College Scientists) Scholar 2019 (\$8,000 received)
- Wally Covington Travel Award, Northern Arizona University, 2017

Service

Committee member Nov 2024 – Present

Society of Postdoctoral Scholars

- Plan professional development and community building events for UK post-docs
- Welcome new post-docs at post-doc orientation sessions

Committee member, Conservation and Stewardship Committee July 2024 – Present

Red River Gorge Climber's Coalition (RRGCC)

- Provide input on conservation and stewardship decisions for the 1100 acres of land owned by the RRGCC

President

NAU Forestry Graduate Student Association, Flagstaff, Arizona Jan 2017 – Dec 2017

- Chaired weekly meetings
- Organized and held fundraisers

Journal Reviews

- Tree Ring Research (January 2024)
- Forestry: An international journal (December 2021)

Damon R. Vaughan

- Forests (August 2021)
- Forests (December 2020)
- Annals of Forest Science (September 2020)

Professional society memberships

- Society of American Foresters (2012 – 2022; 2024 – Present)
- Ecological Society of America (2023)
- Forest Products Society (2015 – 2016; 2020 – 2022)

Conferences attended

- Society of American Foresters National Convention: 2012, 2017, 2019, 2024
- Ecological Society of America National Convention: 2023
- North American Forest Ecology Workshop (NAFEW): 2024
- New Frontiers in Forecasting Forests (Stellenbosch, South Africa): 2018
- International Non-destructive Testing and Evaluation of Wood Symposium: 2017, 2019 (Freiburg, Germany)
- Forest Products Society International Convention: 2015, 2016