

SCHOOL of FORESTRY

Monthly Newsletter

OCTOBER TO DECEMBER 2021



NAU FORESTRY PROGRAM

The NAU forestry program is a vibrant, diverse and active place of learning and research and a feeling of community. Here are just some of the activities this month of our internationally distinguished faculty and researchers.

UPCOMING EVENTS

Dec 10 – Fall Graduation!

Dec 13- Jan 7 – Winter term

Dec 24-27, Dec 31 – NAU closed

Jan 10 – First day of Spring Semester

NAU SCHOOL OF FORESTRY

The School of Forestry is a gateway to a fulfilling forestry career; it's also an invitation to create sustainable solutions for the natural world and outdoor enjoyment for years to come.



PUBLICATIONS THIS MONTH (PAGES 2-3)



AWARDS & GRANTS (PAGES 3-4)



PRESENTATIONS & OUTREACH (PAGES 4-5)



STUDENT HIGHLIGHTS (PAGE 5)



ALUMNI HIGHLIGHTS (PAGE 6)

For more information visit
nau.edu/forestry





PUBLICATIONS: [NAU Authors in Bold, * Undergraduate Student]

- Caster, J.J., Sankey, T., Sankey JB, Bowker, M.A.,** Buscombe, D., Duniway, M.C., Barger N., Faist, A., **Joyal, T.** 2021. Soil surface roughness as a measure of biological soil crust disturbance and recovery within cool and hot deserts. *Geoderma* 403:115369.
- De La Torre A.R.,** Sekhwal M.K.*, Neale D.B.. 2021. Selective sweeps and polygenic adaptation drive local adaptation along moisture and temperature gradients in natural populations of coast redwood and giant sequoia. Invited contribution to Special Issue in *Genes*, 12(11):1826.
- De La Torre A.R.,** Sekhwal M.K.*, Puiu D., Salzberg S.L., Scott A.D., Allen B., Neale D.B., Chin A.R.O., Buckley T.N. 2021. Genome-wide association identifies candidate genes for drought tolerance in coast redwood and giant sequoia. *The Plant Journal*, doi:10.1111/tpj.15592
- Donager, J.J., **Sánchez Meador, A.J. & Huffman, D.W.** (2021) Southwestern ponderosa pine forest patterns following wildland fires managed for resource benefit differ from reference landscapes. *Landscape Ecol.* <https://doi.org/10.1007/s10980-021-01352-1>
- Dixit, A.*, **T. Kolb**, O. Burney, K. Mock, and **K. Grady.** 2021. Provenance variation in early survival, growth, and carbon isotope discrimination of southwestern ponderosa pine growing in three common gardens across an elevational gradient. *Forests* 12, 1561. <https://doi.org/10.3390/fl2111561>
- Erbilgin, N., L. Zanganeh, J.G. Klutsch, S. Chen, S. Zhao, G. Ishangulyyeva, **S.J. Burr**, M. Gaylord, **R. Hofstetter**, K. Keefover-Ring, K.F. Raffa, and **T. Kolb.** 2021. Combined drought and bark beetle attacks deplete non-structural carbohydrates and promote death of mature pine trees. *Plant, Cell and Environment* 44:3635-3651. <http://doi:10.1111/pce.14197>
- Fule, P., C. Edgeley, and C. Chambers** are co authors of a book chapter titled "Fire ecology and management of Southwestern Forests." Other co-authors include NAU alumni Serra Hoagland and Blanca Céspedes <https://link.springer.com/book/10.1007/978-3-030-73267-7?sap-outbound-id=01C8E901645519F2A5AADD5BB3A3A64A96193E91>
- Gandhi, J.K. and **R.W. Hofstetter** (editors). 2022. *Bark Beetle Management, Ecology and Climate Change*. Academic Press, Elsevier Publishing. 480 pages. ISBN 978-0-12-822145-7 <https://www.sciencedirect.com/book/9780128221457/bark-beetle-management-ecology-and-climate-change> This is the first book to address the effects of global warming on bark beetles, which have a tremendous effect on forests across the country. It offers insights for land managers and policymakers as they grapple with this growing threat.
- Gandhi, K.J.K and **R.W. Hofstetter.** 2022. Introduction. Pages xix-xxvi.
 - **Hofstetter, R.W.,** C. Villari, and K.D. Klepzig. 2022. Chapter 10: Effects of Climate on Ectosymbiotic Communities Associated with Bark and Ambrosia Beetles. Pages 303-341.
 - **Hofstetter, R.W.** and K.J.K. Gandhi. 2022. Chapter 12: Interactions Among Climate, Disturbance, and Bark Beetles Affect Forest Landscapes of the Future. Pages 395-404.

- Haagsma M., Page G., Johnson J., Still C., **Waring K.M.**, Snieszko R., and J. Selker. 2021. Model selection and timing of acquisition date impacts classification accuracy: a case study using hyperspectral imaging to detect white pine blister rust over time. *Computer and Electronics in Agriculture*. 191:106555. <https://doi.org/10.1016/j.compag.2021.106555>
- Liu J.J., Schoettle A.W., Snieszko R.A., **Waring K.M.**, Williams H., Zamany A., Johnson J.S., and A. Kegley. 2021. Comparative association mapping reveals conservation of major gene resistance to white pine blister rust in southwestern white pine (*Pinus strobiformis*) and limber pine (*P. flexilis*). *Phytopathology*. <https://doi.org/10.1094/phyto-09-21-0382-r>
- Neale D.B., Zimin A.V., Zaman S., Scott A.D., Shrestha B., Workman R.E., Puiu D., Allen B.J., Sekhwal M.K.*, **De La Torre AR**, McGuire P.E., Burns E., Timp W., Wegrzyn J.L., and S.L. Salzberg. 2021. Assembled and annotated 26.5 Gbp coast redwood genome: a resource for estimating evolutionary adaptive potential and investigating hexaploidy origin. **G3: Genes Genomes Genetics**, doi:10.1093/g3journal/jkab380.
- Mahmud, K., R.L. Scott, J.A. Biederman, M. Litvak, **T. Kolb**, T.P. Meyers, P. Krishnan, V. Bastrikov, N. MacBean. 2021. Optimizing carbon cycle parameters drastically improves terrestrial biosphere model underestimates of dryland mean net CO₂ flux and its inter-annual variability. *Journal of Geophysical Research Biogeosciences*: <https://doi.org/10.1029/2021JG006400>
- Pirtel, N.L., R.M. Hubbard, J.B. Bradford, **T.E. Kolb**, M.E. Litvak, S.R. Abella, S.M. Porter, M.D. Petrie. 2021. The aboveground and belowground growth characteristics of juvenile conifers in the southwestern United States. *Ecosphere* 12(11):e03839. 10.1002/ecs2.3839 <https://doi.org/10.1002/ecs2.3839>
- Vaughan, D., Edgeley, C., and Han, H.S.** 2021. Forest Contracting Businesses in the US Southwest: Current Profile and Workforce Training Needs. *Journal of Forestry*, in press. <https://doi.org/10.1093/jofore/fvab060>
- Robinne, F.N., Mimbreno, M.R. and **Kim, Y.S.**, 2021. Fire \$, or the economics of wildfires: State of play and new contributions. *Forest Policy and Economics*, 133, p.102610
- Ribeiro, N.S., Armstrong, A.H., Fischer, R., **Kim, Y.S.**, Shugart, H.H., Ribeiro-Barros, A.I., Chauque, A., Tear, T., Washington-Allen, R. and Bandeira, R.R., 2021. Prediction of forest parameters and carbon accounting under different fire regimes in Miombo woodlands, Niassa Special Reserve, Northern Mozambique. *Forest Policy and Economics*, 133, p.102625



NEW AWARDS:

James Allen is receiving the SAF Forest Manager Award. Dr. Allen, the former Executive Director of the School of Forestry, has been a member of SAF since 1988, was named a Fellow of SAF in 2012, and was selected as “Alumnus of the Year” from Louisiana State University in 2009.

Matthew Bowker and **Anita Antoninka** have a new grant. New funded collaboration between NAU School of Forestry, US Geological Survey, National Park Service, and three Arizona National Monuments.

Anita Antoninka has a new grant. Drs. Propper, Antoninka, Castagno and Brown were awarded an Alfred P. Sloan Foundation with the purpose to create long-term, equity-oriented systemic change through a partnership across institutions (NAU Mountain Campus, NAU Yuma Campus, and Diné College) aimed at reducing racial disparities in STEM graduate pathways.

Bowker, M. and A. Antoninka, A. Determining climate adaptation and restoration options for Casa Grande Ruins National Monument biological soil crusts. US Geological Survey, \$47,940 (Smaller and first of two expected funding streams for this project).

Kristen Waring and Nicholas Wilhelmi (FHP FS Collaborator and Sponsor) have a new grant from the USDA Forest Health Protection Arizona Zone to monitor the health of southwestern white pine. This \$75,817 award will be used to re-measure permanent white pine blister rust monitoring plots. The project duration is from 2022-2024.

Amanda De La Torre has two new grants from the Bureau of Land Management.

- \$50,000 award from BLM-Montana to fund her project on genetic diversity, hybridization and the potential for adaptation to climate change in populations of the endangered species whitebark pine and limber pine. The project duration is from 2022-2023.
- \$45,000 award from BLM-Colorado to fund her project on genetic diversity and the potential for adaptation to climate change in isolated populations of the Corcoran Peak Ponderosa pine stand in western Colorado. The project duration is from 2021-2023.



PRESENTATIONS/OUTREACH:

Catrin Edgeley made media appearances.

- Cat was an invited panelist at a recent Cary Science Conversations webinar titled ""Wildfire in the Western US: Causes, consequences, and adaptation."" The event was hosted by the Cary Institute for Ecosystem Sciences in New York.
<https://www.caryinstitute.org/news-insights/lecture-video/wildfire-western-us-causes-consequences-adaptation>
- Cat was also quoted in a KNAU piece on climate change, mental health and wellbeing in Flagstaff following recent fires and floods
<https://www.knau.org/post/climate-anxiety-takes-toll-flagstaff-residents-brace-fiery-future>

Anita Antoninka's work was featured in a newspaper article from Arizona Center for Investigative Reporting. This article describes what's known about the ecology of Valley Fever and work by **Dr. Bridget Barker, Anita Antoninka, Helen Rowe** and grad student, **Marieke Ramsey** to determine if biocrust restoration can help suppress the causative agent of Valley Fever, *Coccidioides*. <https://azcir.org/news/2021/09/28/valley-fever-ecology-unknown-fungus-expanding-throughout-west/>

Crouch C.D.*, Waring K.M., Wilhelmi N.P., and M.M. Moore. 2021. Aspen decline in northern Arizona: what is limiting successful regeneration and recruitment? Society of American Foresters National Convention. Virtual. November 2021.



Kristen Waring made a public outreach/education effort. In August, working with Forest Service collaborators, contracted an American Conservation Experience crew to plant southwestern white pine trees in eastern Arizona as part of a long-term durability trial for white pine blister rust resistance (pictured on the right).

Waring, K.M., Cushman, S., Eckert, A., Flores-Renteria, L., Snieszko, R., Still, C., Wehenkel, C., Whipple, A., Wing, M., Bagley, J., Bucholz, E., Haagsma, M., Hartsell, J., Garms, C., Johnson, J., Landguth, E., Leal Sáenz, A., Menon, M., Moler, E., Page, G., Shirk, A., and J. Swenson. 2021. Interdisciplinary research in southwestern white pine: results and management implications. Society of American Foresters and Asociación Mexicana de Profesionales Forestales XXVIth Reunión. Virtual. October 21-22, 2021

Kristen Waring authored or co-authored the following presentations in H5II: The Second Conference on the Research and Management of High Elevation Five Needle Pines in Western North America. Virtual. October 5-7, 2021:

- **Waring, K.M.**, Cushman, S., Eckert, A., Flores-Renteria, L., Snieszko, R., Still, C., Wehenkel, C., Whipple, A., Wing, M., Bagley, J., Bucholz, E., Haagsma, M., Hartsell, J., Garms, C., Johnson, J., Landguth, E., Leal Sáenz, A., Menon, M., Moler, E., Page, G., Shirk, A., and J. Swenson. 2021. Interdisciplinary research in southwestern white pine: results and management implications. H5II:
- **Waring, K.M.** and N. Wilhelmi. 2021. Fire, restoration and climate change in southwestern mixed conifer forests: implications for *P. strobiformis*.
- Peach, L.R. (former grad student), **Waring K.M.**, **Fulé P.Z.**, Swenson J.K., Menon M., Eckert A.J., and Bagley J.C. 2021 Does drought response change with parental ancestry across a white pine hybrid zone?
- **Waring K. M.**, Snieszko R., Wilhelmi N., Reynolds G., and J. Johnson. 2021. Maintaining *Pinus strobiformis*, a tree species threatened by climate change and white pine blister rust.
- **Johnson J.** (adjunct faculty), Haagsma, M., Snieszko R., Page G., Still C., Selker J. and **Waring K.M.** 2021. Genetic and remote sensing approaches to identify white pine blister rust infection in southwestern white pine.
- **Johnson J.** (adjunct faculty), Snieszko R., **Waring K.M.**, and C. Wehenkel. 2021. Identifying patterns of blister rust resistance in southwestern white pine.



STUDENT HIGHLIGHTS:

Connor Crouch, PhD student (Major Professor, **Kristen Waring**) co-authored a short essay on the importance of networking at the SAF National Convention. **Crouch, C.** and F Cabbage. 2021. SAF Convention: Passing the Torch. The Forestry Source. 26(9):15.

Jack Burnett, PhD student (Major Professor, **Cat Edgeley**) presented preliminary findings from his dissertation research to Yavapai Firewise. They will use his research to expand their scope and develop strategies for encouraging more geographically diverse communities to adapt to fire within Yavapai County.



ALUMNI HIGHLIGHTS:

We are deeply grateful for all of the financial support we received over the past year from our alumni and friends. Most of the support we receive each year goes directly to students as scholarships or other forms of financial assistance, such as the Mrs. M Fund and the Wally Covington Student Travel Award. Below we acknowledge the donations we received in 2021 that were \$5,000 or more, but please know that all donations are appreciated and needed more than ever.



- With the generous gift over \$100,000 from **Blair Moody (BSF, 1975)**, SOF will benefit from the new “Blair and Carol Moody Scholarship” to be awarded to a Forestry Junior or Senior with minimum 3.0 GPA.
- **John Stephenson (BSF, 1963)** pledged \$12,000 toward establishing a scholarship in the honor of James Allen’s years of services as the Executive Director of School of Forestry, in addition to \$10,000 toward the “John H Stephenson Forestry Scholarship”.
- Other donations include \$25,000 from **Dan Binkley (BSF, 1977)** to “Mrs. M Endowed Fund” to provide support for student having a financial emergency; \$20,000 from **David Schmidt (BSF, 1962)** to the “David Schmidt Forestry Scholarship”; \$5,000 from **Linda Paciorek** to “Paciorek Family Endowment for Forestry” and \$5,000 from **Mike Ryan (MSF, 1978)** to “Wally Covington Student Travel Award”.



The School of Forestry Advisory Council had the first on-campus meeting in two years (Oct 7-8, 2021)! From the upper left to clockwise, Rob Nelson, Blair Moody (BSF, 1975), Jeff Whitney, Ted Schaefer (BSF, 1975; MBA 1984), Deanne Shulman (BSF, 1981), Melvin Hunter, Jr. (BSF 2010) Margaret Hangan Lee Alford (BSF, 1969; MSF 1971) Jose (Pepe) Iniguez (BSF 1996, MSF 2001, PhD 2006), Yeon-Su Kim (SOF, Interim Executive Director), Tom Tuchmann (BSF, 1983) Mike Ryan (MSF, 1978) Leon Ben, Jr. (BSF 1994)