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Quarterly Newsletter

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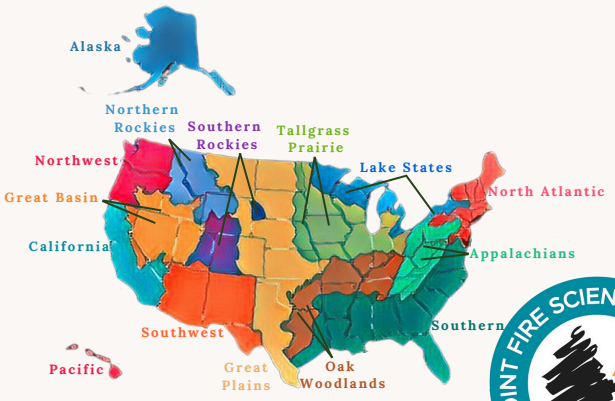
CONSORTIUM OF APPALACHIAN FIRE MANAGERS AND SCIENTISTS

Newsletter Highlights



Research Brief

Predicting The Future of Fire in the Southern Appalachian Region

Throughout the Appalachian region, a century of fire exclusion has altered the landscape. Historically, the fire regime was determined by topography, fuel moisture, and patterns of Native American burning. Today, it is highly influenced by fire management and urban expansion. There could be shifts in the wildfire regime as climate change is predicted to increase the frequency and severity of droughts, and as the Wildland Urban Interface (WUI) expands in some areas. A new paper in the journal Fire Ecology authored by Zachary Robbins et al., "Fire regimes of the Southern Appalachians may radically shift under climate change", models potential changes in wildfire and forest composition from today to 2100.

The authors tested 3 hypotheses for four different climate predictions:

1) Increasing drought over time will increase the total area burned through greater fuel drying.

2) More variation in drought within decades will increase the total area burned, as more extended droughts (such as in 2016) may occur.

3) If the models predict increases in the area burned, fire-adapted oaks may benefit but the well-established mesic species (e.g. red maple, yellow-poplar) will persist.

Methods and Study Area

- The study area was located in the Blue Ridge Ecoregion of Tennessee, Georgia, North Carolina, and South Carolina, consisting of oak forest types predominant on the landscape.
- To test their hypotheses, the authors used the LANDIS-II model, which can forecast changes in forest composition, disturbances, and their interactions across the landscape while also incorporating climate change.
- The authors used climate and area burned by wildfire from 1972 – 2018 (historic) data to predict future area burned by decade (2020-2100) under four different climate projections (minimal to maximum change).
- They also modeled forest composition change in response to predicted wildfire trends, and incorporated the effects (ignitions and suppression) of predicted WUI expansion on wildfire trends.

Key Findings

Predicted area burned by wildfire from minimal to maximal change

- **Low T/Low V**: minimal drought trend increase with low variation within decades.
  Approximately 5.5°F average temperature increase by 2100.
  The total area burned by wildfire, 2020-2100, was predicted to be similar to burning at the current (1972-2018) rate.
  The average fire return interval (FRI) for the landscape was 314 years.
- **Low T/High V**: minimal drought trend increase with high variation within decades.
  Approximately 9°F average temperature increase by 2100.
  The total area burned was predicted to be 42% higher.
  The average FRI was 200 years.
- **High T/Low V**: maximal drought trend increase with low variation within decades.
  Approximately 11°F average temperature increase by 2100.
  The total area burned was predicted to be 104% higher.
  The average FRI was 139 years.
- **High T/High V**: maximal drought trend increase with high variation within decades.
  Approximately 13°F average temperature increase by 2100.
  The total area burned was predicted to be 485% higher.
  The average FRI was 48 years.

Vegetation

- ·Oak-dominance in the overstory will continue under all climate and wildfire scenarios as mature oaks are long-lived and fire-resistant.
- ·Under the maximal wildfire prediction, white and chestnut oak biomass are predicted to increase moderately, with black and scarlet oak exhibiting little change; red maple biomass is predicted to decline by 50% but other mesic hardwoods, including yellow-poplar, are predicted to change less. Yellow pines are predicted to decline.

Take Home Points

- All three hypotheses were supported by the model predictions: droughts increase in intensity and become more variable (more extended droughts), the area burned by wildfire is predicted to increase due to greater fuel drying.
- Oak-dominance is predicted to continue but the increasing area burned by wildfire will not be enough to greatly reduce the mesophytic species that are currently well-established in the landscape. Tree regeneration, including that of oaks, could be reduced due to increased drought.
- While a previous study had predicted little change in wildfire for the Southern Appalachians due to climate change, the authors of that paper were unable to include the 2016 wildfire season in the analysis of drought effects on area burned. This new paper highlights the potential for more extended droughts like the 2016 event in the future which could lead to large increases in acres burned by wildfire in the decades to come.

Link to paper: Robbins, Z.J., Loudermilk, E.L., Mozelewski, T.G. et al. Fire regimes of the Southern Appalachians may radically shift under climate change. fire ecol 20, 2 (2024). https://doi.org/10.1186/s42408-023-00231-1

Author Information: Zachary Robbins is a scientist at the Los Alamos National Lab in New Mexico. His research focuses on forest modeling, landscape scale interactions, and insect disturbance. For additional information on the study, see this article from North Carolina State University's website.

2023 Appalachian Fire Science Publications

The following papers published in 2023 focus on fire science conducted within, or included, the Appalachian Region.

- Arthur, M.A., Blankenship, B., Leuenberger, W., Winkenbach, J., Black, D. E. **Mastication Fuels Did Not Alter Fire Severity or Stand Structure in an Upland Oak Woodland.** *Forest Science, Volume 69, Issue 1, February 2023, Pages 37–49.*

- Baldwin, M.E., Stober, J.M., Edelman, A.J. **Prescribed fire and thinning influence snag density and size in the southern Appalachian Mountains.** *Forest Ecology and Management* 533, 120864 (2023).

- Blankenship, B. A., Poynter, Z. W., Arthur, M. A. **Fire exclusion vs. a fire-free interval following repeated prescribed fire: Consequences for forest stand structure and species composition in an upland oak forest.** *Forest Ecology and Management* 546, 121367 (2023).

- Colenbaugh, C., Hagan, D.L. **After the Fire: Potential Impacts of Fire Exclusion Policies on Historical Cherokee Culture in the Southern Appalachian Mountains, USA.** *Hum Ecol* 51, 291–301 (2023).

- Craycroft, J., Schweitzer, C. **Profiling overstory survival trends following varying thinning and burning disturbance regimes in a mixed pine-hardwood forest in the US South.** *Forest Ecology and Management* 531, 120796 (2023).

- Cuprewich, S.A., Saunders, M.R. **Evaluating the impact of prescribed surface fire on seedlings in the Central Hardwood Region, USA.** *Forestry: An International Journal of Forest Research, Volume 97, Issue 1, January 2024, Pages 94–106*

- Feely, M.E., and Aborn, D. **Changes in Avian Diversity Post-Wildfire in a Southeastern Deciduous Forest: Flipper Bend Woods, Signal Mountain, Tennessee.** *Southeastern Naturalist* 22(3), 445-458, (4 October 2023).

- Fillingim, H., Knapp, B.O., Kabrick, J.M. et al. **Direct and indirect effects of fire on germination of shortleaf pine seeds.** *Fire Ecol* 19, 53 (2023)

- Goode, D., Hart, J. L., Dey, D. C., LaFevor, M. C., Torreano, S. J. **Restoration of low-intensity fire in Quercus-Pinus mixedwoods following a prolonged period of fire exclusion.** *Canadian Journal of Forest Research.* 54(1): 97-109.

- Greenberg, C., Moorman, C., Elliott, K., Martin, K., Hopey., Caldwell, P. **Breeding bird abundance and species diversity greatest in high-severity wildfire patches in central hardwood forests.** *Forest Ecology and Management* 529 (2023) 120715

- Hubert, M., Schweitzer, J., Giam, X., Papes, M. **Contrasting effects of urbanization and fire on understory plant communities in the natural and wildland–urban interface.** *Ecosphere* 14(5): e4520

- Huebner, C. D., Thomas-Van Gundy, M., Underwood, Chris A. **Comparison of seed bank composition over a gradient of pyrophilic vegetation.** *The Journal of the Torrey Botanical Society* 150(3), 409-436, (9 May 2023)

- Kreye, J.K., Kane, J.M. & Varner, J.M. **Multivariate roles of litter traits on moisture and flammability of temperate northeastern North American tree species.** *Fire Ecol* 19, 21 (2023).

- Larsen, C. P.S., Tulowiecki, S. J., Robertson, D., Bream, G. J. **Environmental drivers and species traits of mesophication and xerophication in forests of western New York State.** *Forest Ecology and Management* 548, 12143 (2023).

- Regmi, A., Kreye, M. M., Kreye, J. K. **Forest landowner demand for prescribed fire as an ecological management tool in Pennsylvania, USA.** *Forest Policy and Economics* 148, 102902 (2023).

- Saunders, M.R., Mann, D.P., Stanis, S., Wiedenbeck, J.K., Dey, D.C., Schuler, T.M. **Prescribed Fire Causes Wounding and Minor Tree Quality Degradation in Oak Forests.** *Forests* 2023, 14, 227

- Siegert, C., Llek, A., Wade, A., Schweitzer, C. **Changes in bark properties and hydrology following prescribed fire in Pinus taeda and Quercus montana.** *Hydrological Processes.* 2023;37:e14799.

- Tulowiecki, S.J., Hanberry, B.B. & Abrams, M.D. **Native American geography shaped historical fire frequency in forests of eighteenth-century Pennsylvania, USA.** *Sci Rep* 13, 18598 (2023).

- Waters, C. G., Weand, M. P. **Successional Change and Fire History in Montane Longleaf Pine-Dominated Ecosystems of Northwestern Georgia, USA.** *Southeastern Naturalist* 21(4), 316-334, (6 January 2023).

2023 Appalachian Fire Science Papers

Amphibians & Reptiles		Bats
Chemistry/ Nutrients		Chestnut
Controlled Burns		Editorial/ Public Outreach
Fire and Fire Surrogate Study		Fire History
Fuels	Insects/ Arachnids	Law & Policy

Find all of our publications on our website

Upcoming Events

SBR FLN Annual Meeting

May 21st - 23rd
Johnson City, TN.

This landscape includes the high ridges that extend along the Tennessee-North Carolina state line where fire dependent Pine-Oak forests are abundant. Partners strive to be innovative and proactive in applying the latest science to management. An active stakeholder collaborative group representing a cross-section of interests provides recommendations based on an ecological departure analysis study. For more information: SBR FLN

14th North American Forest Ecology Workshop

June 24 - 27, 2024
Asheville, NC.

The 14th North American Forest Ecology Workshop offers opportunities for land managers and forest ecologists to meet and discuss new findings and trends in basic applied ecology. The workshop includes field trips, workshops, plenary talks, and more. North, Carolina State University is hosting the workshop, which will be held in Asheville, NC. Southern Research Station scientist Tara Keyser is one of the key organizers. For more information: 14th North American Forest Ecology Workshop.

Northeast - Midwest Prescribed Fire Science and Management Workshop

August 19-22, 2024
Albany, NY

A workshop for all wildland fire management partners across the 20 state NE-MW region to share region-wide, science-based, fire ecology information oriented toward expanding and maintaining the use of prescribed fire across all landscapes, jurisdictions, and fire-dependent ecosystems. For more information: Northeast - Midwest Prescribed Fire Science and Management Workshop

International Oak Synposium

October 7-10, 2024
Knoxville, Tennessee, USA

The University of Tennessee's School of Natural Resources is proud to host an International Oak Symposium in 2024 to provide a platform to exchange information and build collaborations around the best available science and technology on oak ecology and management for a global audience. For more information: Internationl Oak Symposium

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North Georgia Prescribed Fire Meeting

June, 13, 2024

Chattahoochee Technical College, Jasper, GA

Throughout the day hear topics on Woodland Restoration, Transmission Damage Prevention, Air Quality Standards, Smoke Savvy, Fire effects on soil and forest health, and other great topics related to Prescribed Fires. Continuing Forestry Education and Master Timber Harvester Credits have
been applied for and will be available at the end of the meeting. Sponsorship form available. For more information: GA Prescribed Fire Council

Webinars

- April, 23, 2024 California Fire Science Consortium: Traditional and long-time use of prescribed fire
- April 24, 2024 Talking Fire: Learning from the Media: A Conversation with Journalists
- April 25, 2024 North Atlantic Fire Science Exchange: Developing Computational Methods for the Utilization of Terrestrial LiDAR Scanning in Forestry Applications
- Virtual Lunchbox Talk: Fire and Longleaf Pine: A Dynamic Duo for Biodiversity Conservation with The Nature Conservancy North Carolina
- May 1, 2024 Fire and Game Species
- May 13-16, 2024 Intertribal Timber Council: 47th Annual National Indian Timber Symposium
- May 30, 2024 Talking Fire: Working with the Media: How to Know Your Messages and Communicate Them
- June 26, 2024 Talking Fire: Crisis Communication: What Do We Say When Things Go Wrong?

Jobs

- The Nature Conservancy is hiring a Virginia Pinelands Burn Boss & Land Steward
- South Carolina Forestry Commission is hiring multiple positions
- Georgia Forestry Commission is hiring multiple positions
- Tall Timbers 2 Open Positions: Smoke Scientist and Wildland Fire Training Specialist

Article on Prescribed Burning

Helen Mohr, Director of CAFMS,"Busier Season for Prescribed Burns Should Mean Less-Busy Wildfire Seasons"

CAFMS Blog Post

Board member, Melissa Thomas-Van Gundy is a Research Forester at the USFS Timber and Watershed Laboratory. Read her blog about fire effects on chestnut oak and northern red oak in the Monongahela National Forest: One Fire, Two Trees, and a Lesson in Fire Ecology.

Appalachian Fire Trail

The Appalachian Fire Trail is collaboration between CAFMS and The Southern Blue Ridge Fire Learning Network. It is an enhanced interpretive trail consisting of on the ground informational signs with corresponding podcast episodes, serving as an in-depth audio tour.

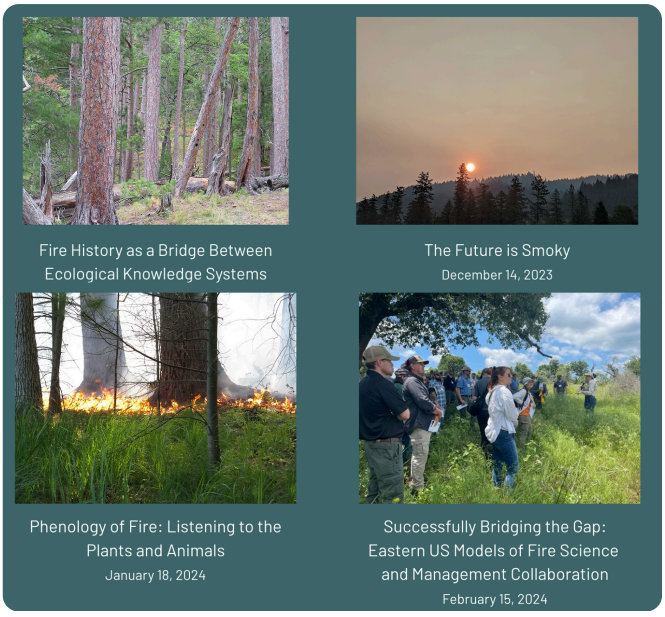
Our newest installment at the [The New River State Park] has been completed in North Carolina!

To view our other Appalachian Fire Trail installments, visit our website:

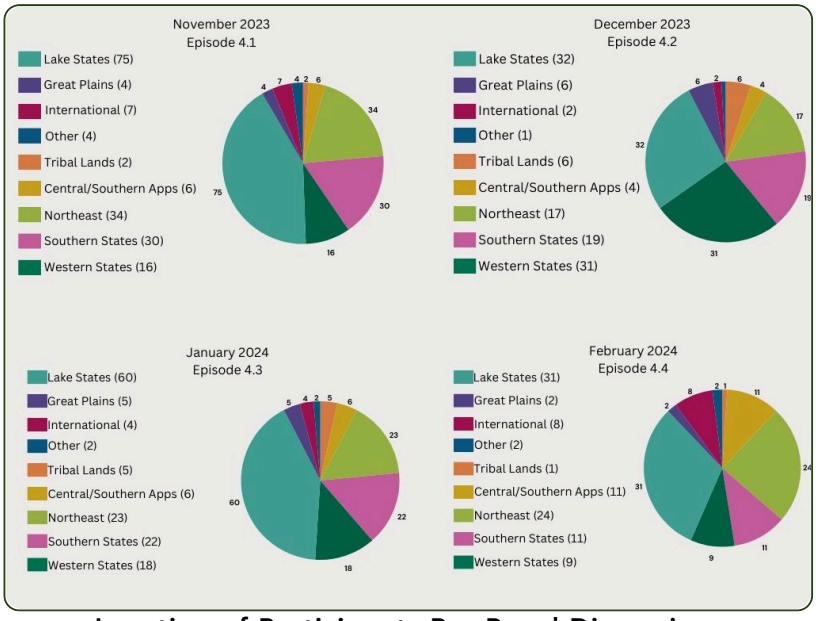
- Linville Gorge, NC
- Table Rock State Park, SC
- Bridgestone Firestone Wildlife Management Area, TN
- Daniel Boone National Forest, KY
- New River State Park, NC

Season 4 Fueling Collaboration Recap

Season 4 of Fueling Collaboration was a huge success! We could not have bridged the gap between fire science and managers without our partners, panelists, moderators, and participants - thank you! You can find all of our Fueling Collaboration videos on our **YouTube Channel.** We are looking forward to Season 5.



Fueling Collaboration Series



Location of Participants Per Panel Discussion

We value your continued support and feedback!

Find us on Facebook:[Consortium of Appalachian Fire Managers and Scientists]
Find us on Twitter: [@APfirescience]
Find us on YouTube: [Appalachian Fire - CAFMS]
Website: [www.appalachianfire.org]

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