Ignis **Newsletter of the Oak Woodlands and Forests Fire Consortium** Volume 11, Issue 3 July, 2022

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Our Mission:

To provide fire science to resource managers, land-owners, and the public about the use, application and effects of fire within the region

- Visit oakfirescience.com
- Find us on Facebook
- Follow us on Twitter
- Watch us on *Vimeo*

GETTING BACK INTO THE WOODS

As the heat of summer begins to dissipate, it is natural that fire-minded people start to head back to the woods across the Oak Woodlands region. Changes in the angle and duration of sunlight, temperatures, and humidity all indicate that fuels are curing and will be increasingly receptive to carrying fire. Similarly, here in the fire-science world, we are also feeling the pull to get into the woods and ignite non-virtual, 'in real life,' learning opportunities.

Recently, the Oak Woodlands & Forests Fire Consortium co-hosted a field tour at Marais des Cygnes Wildlife Area in eastern Kansas with partners from the Kansas Department of Wildlife and Parks and US Forest Service Northern Research Station. Attendees visited stands to see examples and results from different woodland restoration treatments (forest thinning and prescribed fire). State, federal, NGO, and private land managers discussed differences and similarities in vegetation responses, and what these portend in terms of reaching desired conditions. Opinions and responses about the treatments among the attendees varied, but a sentiment shared by all was that it was important, perhaps essential, to be meeting and learning in the woods again.

We continue to be enthused by the science and learning landscape that is unfolding as the world adjusts to newly found perspectives and capacities for communication and sharing. As we look toward our next year of fire-science outreach and beyond, you can expect a mixture of in-person and virtual fire-science events, and hopefully new and novel approaches. Read on to learn about new virtual and in-person fire science opportunities and we'll see you back in the woods soon!

Regional fire practitioners, land managers, and researchers discuss vegetation responses to varied woodland restoration management at Marais des Cygnes Wildlife Area in eastern Kansas.

Moving fire forward...

Ignis Newsletter of the Oak Woodlands and Forests Fire Consortium Volume 11, Issue 3 July, 2022

RESEARCH HIGHLIGHT:

Management and climate variability effects on understory productivity of forest and savanna ecosystems in Oklahoma, USA

Arjun Adhikari, Ronald E. Masters, Kumar P. Mainali, Chris B. Zou, Omkar Joshi, Rodney E. Will. Ecosphere. 27 June 2021

In this study, authors assessed the relative influence of management treatments (tree harvest, prescribed fire) and climate variability on understory aboveground net primary productivity (ANPP) in grassland, savanna, and mature forest ecosystems in southeastern Oklahoma, USA.

The study took place within the Pushmataha Wildlife Management Area, located in the Kiamichi Mountains, owned and managed by the Oklahoma Department of Wildlife Conservation. Prior to management treatments, the closed-canopy forest overstories within the study area were dominated by post oak (*Quercus stellata*), shortleaf pine (*Pinus echinata*), blackjack oak (*Q. marilandica*), and hickory (*Carya spp.*). Forest understories were dominated by woody vegetation including sparkleberry (*Vaccinium arboretum*), winged sumac (*Rhus copallinum*), poison ivy (*Toxicodendron radicans*), greenbriers (*Smilax* spp.), and seedlings of the overstory tree species. The forest ground cover primarily consisted of leaf litter with little herbaceous growth.

During 1983-84, a randomized experimental design was implemented with a total of 28 management units (approximately 2-4 acres in size) established. Treatments consisted of commercial harvesting of the overstory pine component, thinning of hardwoods (except for one treatment), followed by prescribed fire at varied return intervals (1-4 years; treatment codes: HT1, HT2, HT3, HT4). For one treatment (code: HNT1), the hardwood component was not thinned, pine was harvested, and the fire interval was one year. No thinning or burning occurred in the control treatment. Prescribed fires were implemented during the dormant season (January-April) and the established fire return intervals were maintained throughout the experiment, resulting in a 31-year period between initial treatment and sampling for this study.

Permanent plots were established in 1987. Aboveground net primary productivity (ANPP) was quantified by clipping, drying, and weighing

Management Implications

- Fire maintains highly productive understories through limiting tree basal area and litter accumulations.
- Fire return intervals greater than three years result in forest redevelopment and loss of savanna or woodland structure.
- Timing of precipitation (particularly mid-growing season) is more important than total precipitation for herbaceous aboveground net primary productivity.

Different vegetation structures and levels of understory productivity resulted from 31 years of prescribed fire applied at varied return intervals (A= no fire, B= 4-yr, C= 3-yr, D= 1-yr). Pushmataha Wildlife Management Area, southeast Oklahoma, USA.

...Cont'd on Page 3

Research brief, continued

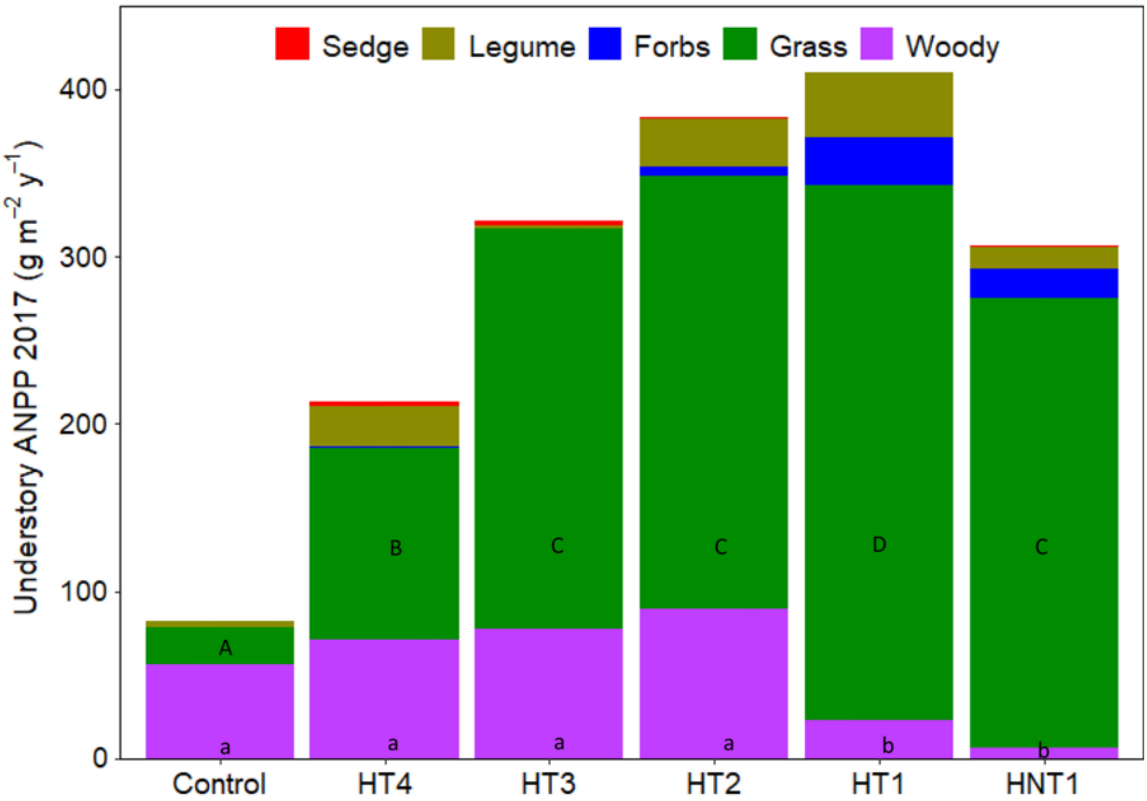
aboveground vegetation. ANPP was calculated separately for different functional groups (understory woody, grass, forb (non-legume), sedge, and legume). At each plot, overstory tree dominance and density was characterized (basal area and canopy cover) and litter accumulation was measured (including all plant material, bark, leaves, and small branches). Statistical models were developed between understory ANPP (herbaceous ANPP + understory woody ANPP) and tree basal area, litter accumulation, fire return intervals, and weather variables.

Study results showed that fire, through its negative influence on tree basal area and litter accumulation (both inversely related to understory ANPP), was critical to maintaining highly productive understories. Total understory ANPP was highest (by a factor of 7) in the thinned (pine and hardwood) + annual fire treatment (HT1) and lowest in the control. Understory ANPP was dominated by grasses, ranging from 27 grams per m^2 per year ($g \cdot m^{-2} \cdot yr^{-1}$) in mature forests (control) to 374 $g \cdot m^{-2} \cdot yr^{-1}$ for annually burned treatments. Grass ANPP (mean) in the control was significantly lower than in all treatments, lowest in the 4-yr fire interval among all burn treatments, and greatest in the thin and annual burning treatment. Herbaceous ANPP was positively associated with June precipitation, and negatively related to early and late growing season temperature maximums, overstory tree basal area, and litter accumulation. Understory woody ANPP was significantly lower in the annual burn treatment, positively associated with tree basal area and precipitation, and was negatively influenced by summer soil moisture deficits.

Herbaceous ANPP increased with shorter fire return intervals, due to reduced basal area, tree canopy cover, and leaf litter, and was most sensitive to June precipitation. Mean understory ANPP was consistently low in the control treatments, and herbaceous plant contribution to total understory ANPP increased along with fire frequency, e.g., 54% in control, 70% in 4-yr fire interval, and 92% and 93% in annual fire treatments. Herbaceous ANPP was highly variable over time in all treatments, and showed a decreasing trend in the 4-yr fire return interval treatment as the uneven-aged woodland developed over time.

Precipitation timing (especially mid-growing season) was more important than total annual precipitation for herbaceous ANPP. Higher temperatures which occurred during this experiment did not have a significant negative effect on understory woody ANPP, suggesting that expected changes to climate may have variable effects on different functional groups.

Burning every 1-3 years post-thinning resulted in smaller increases in canopy cover over time, which was mostly due to residual tree canopy expansion, and resulted in maintained grassland, savanna, or woodland structures. Burning every four years (HT4) for 31 years, however, resulted in an uneven-aged woodland in which residual tree canopies expanded and periodic recruitment of new trees occurred. In this treatment, canopy cover increased from 7.3% (one year after thinning and initial fire treatments) to 52.4%. Consequently, a fire return interval threshold of three years was identified, beyond which forest redevelopment and loss of woodland or savanna characteristics is expected to occur.



Average aboveground net primary productivity (ANPP) of different plant functional groups in different treatments measured in 2017. Different uppercase letters (Grass ANPP) and lowercase letters (Woody ANPP) represent significantly different mean ANPP values.

Download a printable version of this research brief HERE

Moving fire forward...

HEADS UP!

2022 Fall-Winter Fire Science Webinar Series

November 29, 2022: Arjum Adhikari, Oklahoma State University

Management and climate variability effects on the understory vegetation productivity along forest-savanna continuum. Details HERE

January 17, 2023: Virginia McDaniel, US Forest Service, Southern Research Station

Diversity Explodes with Another Boring Burn. Details HERE

February 7, 2023: Brice Hanberry, US Forest Service, Rocky Mountain Research Station

How is fire ecology different from classical ecology? Details HERE

Date TBA: Scott Abella, University of Nevada

Topic: Delayed prescribed fire red maple mortality Details TBA

Registration required for all webinars.

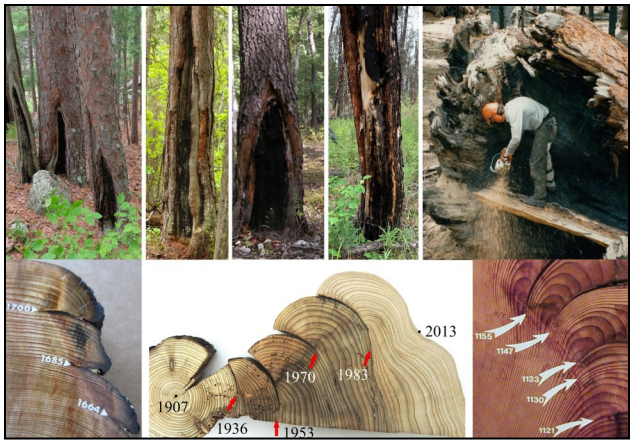
More details and registration information available soon.

Webinars qualify for credits from: ***The Wildlife Society & Society of American Foresters***

June 8, 2022, webinar now online!

Introducing the North American Tree-Ring Fire-Scar Network

Hosted by the
Fire Science Exchange Network



Presenters: **Dr. Ellis Margolis**, Research Ecologist, USGS Fort Collins Science Center

Dr. Christopher Guiterman, Cooperative Institute for Research in Environmental Sciences (CIRES) University of Colorado at Boulder, and NOAA's National Centers for Environmental Information (NCEI)

To view the webinar
CLICK HERE

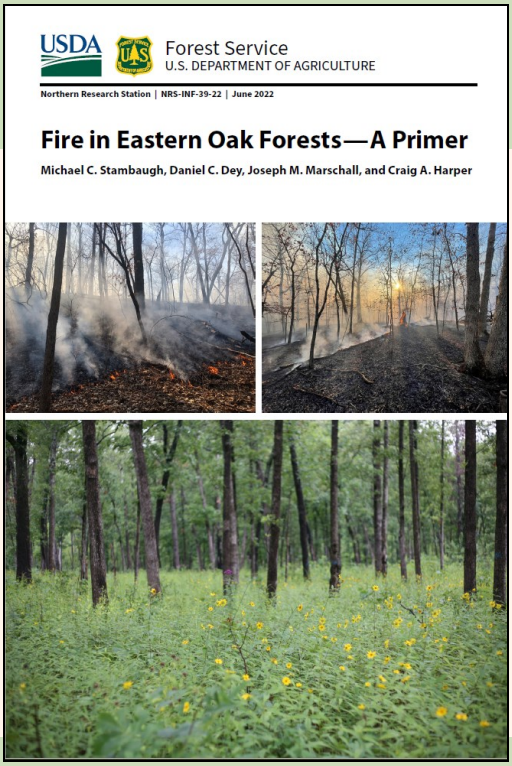
Moving fire forward...

Announcing:

Fire in Eastern Oak Forests—A Primer

A semi-technical booklet, intended for non-fire professionals, that helps to clarify the links between eastern oak forests science and management

- Is burning in forests good or bad?
- Fire's role in oak ecosystems
- History of fire in the eastern US
- Comparing prescribed fire and wildfire
- Why fire in eastern oak forests is essential
- Costs and benefits of burning
- Fire management into the future



FIRESCIENCE.GOV Research Supporting Sound Decisions | OAKFIRESCIENCE.COM | School of Natural Resources University of Missouri | UTEXTENSION INSTITUTE OF AGRICULTURE THE UNIVERSITY OF TENNESSEE

Download the pdf: CLICK HERE

Southern Missouri Prescribed Fire Training Exchange (TREX)
February 27 — March 10, 2023
Vicinity of Springfield, Missouri

Sharpen your prescribed fire and fire science skills!

To attend, participants must have prior training or prior completion of online courses and have completed an arduous pack test.

Complete this **application form** by November 11, 2022

For more information: Ryan Gauger (rgauger@tnc.org or 812-599-2562)

Unfamiliar with TREX?
CLICK HERE for more information.

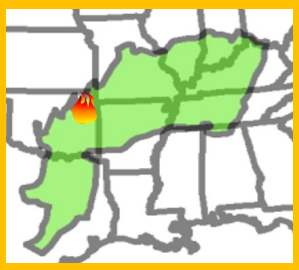
Missouri Prescribed Fire Council | FLN FIRE LEARNING NETWORK

This training conducted through a cooperative agreement between The Nature Conservancy, USDA Forest Service, and agencies of the Department of the Interior.

TREX | The Nature Conservancy Protecting nature. Preserving life.

Moving fire forward...

FIRE SCIENCE
HOT SPOTS



In this feature, we bring into focus fire science on-the-ground

JenksFERST (Fire Ecology Research Station for Teaching)

Jenks Fire Ecology Research Station for Teaching (FERST) is a long-term study site owned and operated by Jenks Public Schools, near Tulsa, Oklahoma. It was established in 2015 by high school science teacher Bryan Yockers (bottom-right and left inset images below) when four acres of a hayfield were converted into 26 study plots (size range:100 - 400 m^2) to provide Jenks Public School students with an opportunity to investigate the impact of fire on plant communities in the Tallgrass Prairie and Cross Timbers ecoregions. Assisted by specialists from Oklahoma State University, prescribed fire is applied to study plots at different frequencies (1-3 year return intervals) and seasons (dormant season: February-March; growing season: August-September). The site was initially dominated by non-native invasive plant species, including Johnsongrass (*Sorghum halepense*), sericea lespedeza (*Lespedeza cuneata*), cheatgrass (*Bromus tectorum*), and Bermudagrass (*Cynodon dactylon*). In an effort to jumpstart the restoration of native plant species at the site, plots were seeded with a native-plant mix in March 2017 following a dormant season burn across all plots, after which the initial experimental design resumed.

Jenks High School students develop field sampling techniques and observational skills while collecting information on vegetation to track changes in the plant community and other ecological attributes (such as soil nutrient availability and exchange) as part of their science curriculum (right-inset). Since burning treatments and seeding of native plant species, students have encountered greater numbers of native grasses at the site, include big bluestem (*Andropogon gerardii*), switchgrass (*Panicum virgatum*), and eastern gammagrass (*Tripsacum dactyloides*, center inset), along with other native forbs and legumes. Click on each photo for a full-size downloadable image, or view all HERE. Photo credits: top, center inset, bottom left: Bryan Yockers; left inset: Luke Gray; right inset: John McQuaig; bottom-right: Allison Thompson.

SPOTLIGHT

In an effort to introduce you to new people and information from the region, we interview fire practitioners and researchers about timely topics. In this issue, we ask these questions of Ryan DeSantis with Oklahoma State University.

What are some of the greatest fire research needs for the oak ecosystems in Oklahoma?

RD: Public acceptance - especially from absentee landowners - of fire as a management tool for fuels reduction; potential for using fire in closed canopy forests with more mesic species and more eastern redcedar; fire behavior and fuels modeling, considering the current state of overly dense oak systems with more mesic species and eastern redcedar; interaction of drought and fire on oak survival and recruitment; post-fire differences in regeneration response among post oak, blackjack oak and white oak; and fire use strategies for wildlife habitat improvement in forested systems.

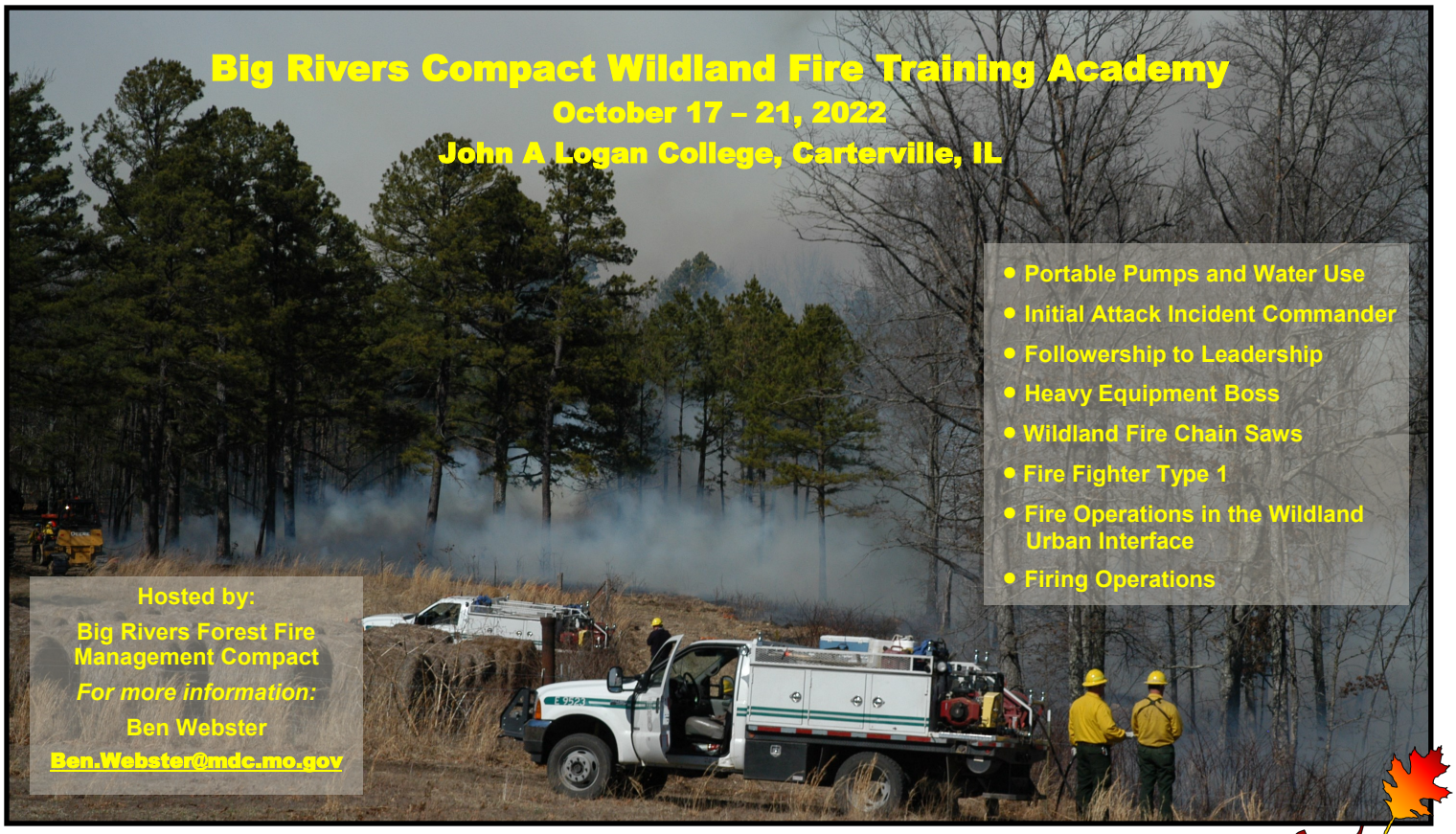
What is your biggest concern regarding the use of fire to manage woodlands and forests?

RD: We have known for a very long time that fire is an important forest management tool, and in many ecosystems, fire is essential. Since most mainstream media fire news is negative, forest management and fire are socially unacceptable. Considering current forest conditions and changing climate, implementing fire remains challenging. Even in ecosystems with relatively low catastrophic fire risk, appropriately used prescribed fire often remains socially unacceptable or at least misunderstood.

Ryan DeSantis is an assistant professor of forest ecology and management at Oklahoma State University. His past research documented the effects of reduced fire and drought as drivers of oak forest composition and structure change across Oklahoma. His current applied research, extension, and outreach interests include vegetation change, disturbance ecology, and non-industrial private forest landowner stewardship. In particular, he is interested in management for forest health improvement, fire risk reduction, and non-traditional forest products and ecosystem services.

In your opinion what is the greatest advantage to using prescribed fire when managing woodlands and forests?

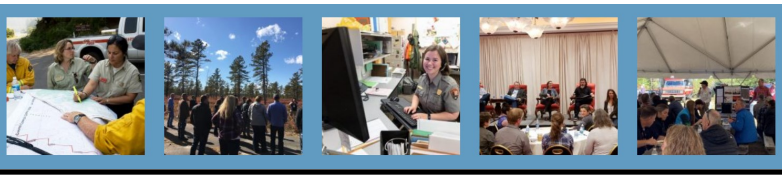
RD: As we continue to learn about the benefits associated with using fire, we gain perspective of ecosystems that have had a long relationship with fire. When fire is used under prescribed conditions for appropriate management, we can achieve amazing results. There are certainly management techniques that emulate many fire effects, but in some cases there is no substitute management technique that can affect ecosystems in all the same ways.



FIFTH NATIONAL COHESIVE WILDLAND FIRE MANAGEMENT STRATEGY WORKSHOP

ASHEVILLE, NC. NOV. 14-18, 2022

Keeping Pace with Reality: Boldly Embracing the Challenges and Undertaking the Hard Work



For more information CLICK HERE

UPCOMING EVENTS

September 19-21, 2022: Southeast Climate Adaptation Science Symposium
Gulf Shores, AL. For more information, CLICK HERE

October 25-29, 2022: 14th Biennial Longleaf Conference: Rekindling Our Connections
Wilmington, NC. For more information, CLICK HERE

October 17-21, 2022: Big Rivers Compact Wildfire Training Academy
Carterville, IL. For more information, CLICK HERE

October 4-7, 2022: Fire Ecology Across Boundaries: Connecting Science and Management
Florence, Italy. For more information, CLICK HERE

November 14-18, 2022: 5th National Cohesive Wildland Fire Management Strategy Workshop
Asheville, NC. For more information, CLICK HERE

November 29, 2022: Webinar: Management and climate variability effects on the understory vegetation productivity along forest-savanna continuum
For more information, CLICK HERE

December 6-8, 2022: 7th Fire in Eastern Oaks Conference (NOTE: This has been postponed)
For more information, CLICK HERE

January 17, 2023: Webinar: Diversity Explodes with Another Boring Burn
For more information, CLICK HERE

February 7, 2023: Webinar: How is fire ecology different from classical ecology?
For more information, CLICK HERE

February 27-March 10, 2023: Southern Missouri Prescribed Fire Training Exchange
Springfield, MO. For more information, CLICK HERE

December 4-8, 2023 10th International Fire Ecology and Management Congress
Monterey, CA. For more information, CLICK HERE

Please contribute your event announcements. Send information to: oakfiresci-

Moving fire forward...