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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



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IS THERE ROOM FOR EVERYBODY AND EVERYTHING?

A contributed essay by
Jeremy Kolaks
Fuels Technician, Hoosier National Forest

I can still remember the excitement of my first prescribed burn. The first burns of my career were all about dragging a torch and keeping the fire inside the line. If I remember correctly the burn plan was about 5-10 pages long. Fast forward 15 years and many things have changed, including my role and perspective, which likely had a direct effect on the declining amount and color of my hair. The list of what I, and others, are responsible for seems to have grown exponentially to include authoring burn plans, developing objectives, implementing the burn, considering competition for fire resources, and smoke management to name a few. Concurrently, the burn plan has also grown at the same rate with the last one topping out at 87 pages.

However, before any of the aforementioned can take place many things have to be sorted out in the planning process. During this process many paradoxical relationships can develop between competing resource needs that are, ironically, inextricably linked. In the end, these relationships must be addressed before implementation can take place. Examples vary by location and are many: foraging habitat and the Indiana bat, oak regeneration and wood quality, prey base and wild turkey nests, the list goes on and on. In all of these cases you might not be able to sustain one without the other. These relationships can also be political in nature or economically driven. In other cases, the proximal cause for paradoxical relationships can result from statutes such as the Endangered Species Act (ESA).

Speaking of statute, I had never realized there was another definition of the word “take” until I melded prescribed fire with the ESA. And...just for the record...I am in no way discounting the importance of the ESA nor am I professing to be an ESA authority. However, when using prescribed fire as a management tool we are basically choosing winners and losers, those who will prosper and those who might suffer. Sometimes the suffering is unintentional and in the case of the ESA this is referred to as take. “Take” means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct and is prohibited by the ESA under most circumstances. The end result usually manifests itself in date restrictions for burning that may look like this: “do not burn between April 15 and September 15, if within 5 miles of known Indiana bat hibernacula, do not burn between April 1 and May 15 and September 1 to November 1.”

So, for the paradoxical part, Indiana bats are known to prefer an open mid-story and increased insect abundance and diversity that can result from prescribed burning. However, depending on the climatic attributes of any given year, some of the best burn days to meet objectives and decrease smoke concerns occur very soon after April 15th along the Ohio River Valley. If a burn unit is within five miles of a known Indiana bat hibernacula, then move that date back another 15 days to April 1, resulting in another two weeks of the most valuable prescribed burning period being eliminated. Each hibernacula fire exclusion zone accounts for about 25,000 acres. Two or three well-distributed hibernacula can affect a lot of acres. So, in short, in areas where prescribed fire implementation could have the most benefit at improving Indiana bat habitat, it is the most limited. Other species are also affected this way.

Other paradoxical relationships involving wildlife exist as well, but not necessarily with endangered



Photo by Teena Ligmans

Employees of the U.S. Forest Service implement a prescribed burn to restore a barren/woodland community and improve wildlife habitat at the Hoosier National Forest (March 23, 2014).

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Moving fire forward...



RESEARCH HIGHLIGHT:

Relationships between bat occupancy and habitat and landscape structure along a savanna, woodland, forest gradient in the Missouri Ozarks

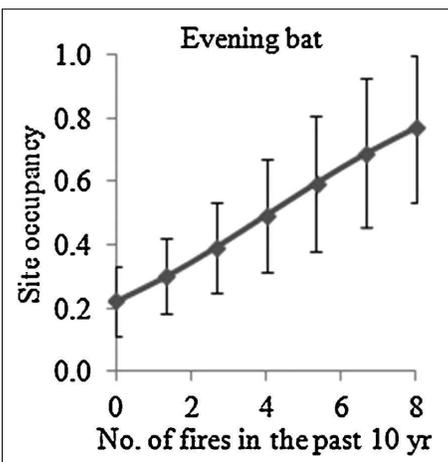
Clarissa A. Starbuck, Sybill K. Amelon, and Frank R. Thompson III. 2014. *Wildlife Society Bulletin*. doi: 10.1002/wsb.512

Habitat degradation, urbanization, deforestation, and, especially, white-nose syndrome are all contributing factors to declining bat populations in eastern oak forests. Because bats often forage and roost in forests, management activities, like prescribed burning and mechanical thinning for savanna and woodland restoration, may influence these behaviors. As land managers develop restoration projects, it is important to consider bats and other wildlife when establishing management objectives.

The authors of this study examined the relationships between big brown (*Eptesicus fuscus*), northern long-eared (*Myotis septentrionalis*), eastern red (*Lasiurus borealis*), evening (*Nycticeius humeralis*), and tri-colored (*Perimyotis subflavus*) bat site occupancy and characteristics of habitat, landscape, and land management across savannas, woodlands, and forests. They hypothesized that site occupancy would vary among bat species due to differences in their physical and echolocation characteristics. For instance, all bats except the northern long-eared are relatively large with a high body mass to wing area ratio (also known as wing loading) and longer, narrower wings (higher aspect ratio), and are frequently found in open habitats than closed forests (see [Loeb and O’Keefe 2006](#), [Loeb and Waldrop 2008](#), and [Armitage and Ober 2012](#)). The authors also expected site occupancy to be affected by proximity to water and roads, urban and forested land cover, tree density, and vegetation composition (coniferous vs. deciduous).

Bat site occupancy was assessed at 369 points across 26 sites in the Missouri Ozark Highlands that had a history of management with prescribed burning and mechanical thinning. To determine occurrences of bat species, echolocation calls were recorded, identified, and analyzed at each site in the summers of 2010, 2011, and 2012. Site characteristic variables including the number of small stems, saplings, poletimber, and sawtimber per hectare; recent fire frequency (10 years prior); land cover classification (forest, open, or urban) within 2 km and 16 km; distance to water and roads; and climatic data were used to develop site occupancy models describing relationships between habitat variables and site occupancy.

Overall, site occupancy was high at >60% and species generally occurred across the entire range of savanna, woodland, and forest habitats. Evening bats preferred stands with low densities of poletimber and sawtimber, greater small-stem densities, and greater fire frequency; which are characteristics of managed savanna and woodlands. This corroborates other studies that have found increasing bat activity in pine forests with higher frequency of prescribed fire (see [Loeb and Waldrop 2008](#) and [Armitage and Ober 2012](#) for more information). Site occupancy of big brown, eastern red, and tri-colored bats had no relationship with frequency of fire. Similarly, these bats were not associated, positively or negatively, with savannas or woodlands, although other studies have reported a correlation between these bats and open habitats (see [Ford et al. 2006](#) and [Loeb and O’Keefe 2006](#) for more information). Eastern red bat site occupancy decreased with increasing distance to roads, further indicating the importance of open habitat to this species. Northern long-eared bats had a slightly positive relationship with poletimber density and negative relationship with sawtimber density, but occupancy remained 60–80% across the range of these tree densities in savanna, woodlands, and forests.



Probability of occupancy across the range of number of fires in the past 10 years for the evening bat in the Missouri Ozark Highlands, USA, 2010-2012.

Cover type (forest, open, and urban) at the landscape scale (16km radius from acoustic detection points) was a significant predictor variable of site occupancy for all five focal bat species. It is common for bats to roost and forage across large areas and distances utilizing a variety of roosts and food resources. For instance, it is not unusual for big brown bats to travel up to 11 km to forage. Urban areas may lack vegetative structure and insect abundance and thus bat activity is lower in these sites. Site occupancy was significantly reduced for northern long-eared, evening, and tri-colored bats with increasingly urban areas within a 16 km radius of acoustic detection points. Big brown bats, however, responded positively to increasing urban areas likely because urban areas provide roost refuges in an agricultural matrix.

Increasing forest cover at a 16 km radius positively affected big brown, eastern red, and northern long-eared bat occupancy, but negatively affected evening and tri-colored bats. Big brown and eastern red bats have been found in open and urban habitats more often than other species, though they are known to roost in tree canopies during the breeding season and the leaf litter in the winter. Northern long-eared bats, in particular, roost and forage in mature forests and less frequently found in fragmented landscapes. Site occupancy of evening bats increased as stem density decreased perhaps as a result of transitional areas from open land (e.g. glades, prairies) to savannas and woodlands, for which these bats are best suited. Although stem density was not a significant predictor for tri-colored bat site occupancy, these bats are commonly found in open habitats, which may explain the decline in site occupancy in forested and urban landscapes. This is parallel to a similar study by [Ethier and Fahrig \(2011\)](#) who also noted lower relative abundance of tri-colored bats with increasing forest cover.

Management Implications

- It is important to consider the needs of each individual species in land management because bat species have differing morphological characteristics and habitat requirements
- Evening bats were most positively associated with habitat features characteristic of savannas and woodlands but, in general, all species had high occupancy rates across savanna, woodland, and forest habitat types
- While it is essential to meet local habitat requirements when managing for bats, landscape-scale conditions also influence bat site occupancy

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Moving fire forward...

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 asked these questions of Russell Stevens of the Noble Foundation in Ardmore, OK.

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

RS: Surveys conducted by Oklahoma State University revealed that the general public in Oklahoma support the use of prescribed fire. Consequently, there is currently a big effort underway to form locally led, landowner-based prescribed fire associations in Oklahoma. This effort, as well as similar efforts in other states, could benefit from human dimension related research on methods to create and then maintain landowner or community-based associations to apply fire. Professional fire managers working with individual landowners are beneficial and obviously this work needs to be continued, but group efforts and programs need to be created in order for prescribed fire to really make a difference in Oklahoma.

What is your biggest concern when deciding to use fire to manage oak woodlands and forests?

RS: Timing, frequency, and intensity are concerns, but my bigger concern is more general: the long-term ability of landowners to use prescribed fire. I see several threats to this, perhaps the biggest of which is smoke management in relation to air quality standards. This issue could seriously affect the ability of Oklahoma landowners to apply fire. Closely related is urban sprawl and the associated network of roads and other infrastructure that create obstacles for neighboring landowners wanting to use prescribed fire. Additionally, there is the ever-present threat of tightening laws and regulations that can further restrict the ability to use prescribed fire. I don't intend for this to come across as negative, just realistic. All of these issues can be addressed with a coordinated and unified approach through this Consortium and other efforts.

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

RS: I think there are several advantages including but not limited to:

- increased plant diversity (and often structure) following most prescribed fires improves habitat for many species of wildlife
- fire is the most efficient method to control the spread of eastern redcedar
- and the application of fire reduces fuel load accumulation that contributes to the frequency and intensity of wildfire

To top it all off, prescribed fire is usually the most cost-effective method to accomplish this all.

Russell Stevens

Wildlife and Range
Consultant, Samuel Roberts Noble
Foundation, and
Interim Executive Director of the
Oklahoma Prescribed Burn Association
Ardmore, OK has been involved
with prescribed fire in the Cross Timbers and Prairies
region of Oklahoma and Texas for over 25 years through
both research and consulting with landowners. For the
past two years, he has worked closely with the Oklahoma
Prescribed Burn Association to create, educate, train, and
equip locally led landowner prescribed burn associations
and reduce obstacles that prevent them from using fire.



Room?, continued:

or threatened species. Despite improving habitat and prey base, burning later into the spring can cause perceived issues with ground nesting animals. I've often heard concerns about burning up wild turkey nests if burning is completed too late into the spring. If fuel conditions allow, burning in the summer can be one of the best ways to reduce fescue and woody stem density or encroachment but, again, present a conflict with ground nesting birds.

Timber quality seems to have been a topic of discussion lately as well and it, too, has a paradoxical relationship with fire, but in a slightly different way. Timber quality in the Midwest focuses on several species groups with which oak is often associated. In areas of the Central Hardwoods with richer and more mesic soils, oak and fire represent a chicken and egg situation. Fire, by far, is the most economical and sustainable management option for procuring and promoting oak regeneration. However, the same fire can, and does, lead to damage in the butt log of trees...the most valuable part. This damage can be minimized by moderating fire behavior but it is always a risk, as is the loss of oak regeneration in the absence of fire.

To complicate things further, all the above interactions can occur on the same acre. So, with all that said, is there room for everybody and everything? Objective evaluations of benefits and trade-offs are often difficult to attain, especially when laws or politics are involved. It can often get emotional. In what little experience I have amassed, I can say with almost 100% confidence that I don't have the answer. However, I can say that taking a seat at the table and a proactive approach will pay dividends in the future when it comes to the implementation of ecologically sound and objectively driven prescribed burning.



Presence of the endangered Indiana Bat can restrict wildlife habitat restoration activities including prescribed fire. Photo by Jerry A. Payne, USDA Agricultural Research Service, Bugwood.org

Bat Occupancy, continued:

The authors recommend that land managers consider individual bat species in their management plans as habitat and landscape preferences differ among species. Because conditions of land cover at a 16 km radius were important to bat occupancy, it is suggested that landscape-scale composition and structure be considered in management decisions, even where species-specific, local habitat conditions are met.

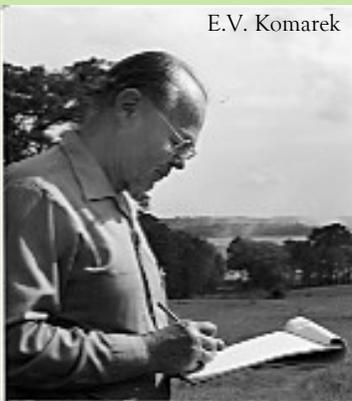
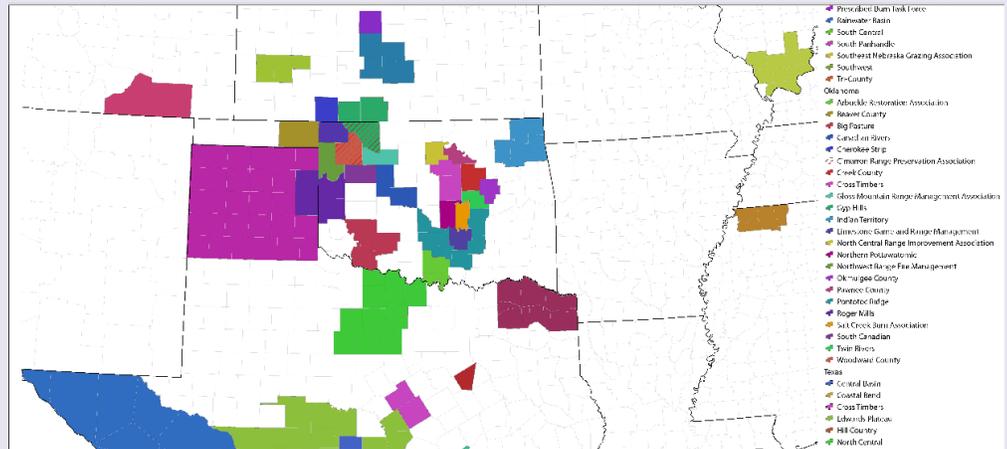
Moving fire forward...

HEADS UP!

Prescribed Burn Associations (PBAs) are on the rise!

Which PBA is nearest you?

Click [HERE](#) to find out!



E.V. Komarek

Access excellent **FIRE SCIENCE** resources and publications on our [website...](#)

including comprehensive bibliographies like

The E.V. Komarek Fire Ecology Database

“The donation of personal research collections from E.V. Komarek and H.L. Stoddard, who were two of the key founders of Tall Timbers, was the original impetus for the Tall Timbers Board of Trustees to mandate creation of a computerized bibliographic database. Since its inception in 1987, the database has been continually expanded under the direction of the Tall Timbers librarian funded in part through the Joint Fire Science Program’s [Southern Fire Exchange](#).”

Need to complete wildland fire training?

Here is a list of academies in our region and their training dates.

Arkansas River Valley Wildland Fire Academy	May 11-22, 2015
Southern Area Engine Academy	May 13-22, 2015
East Texas Interagency Wildfire and Incident Management Academy	May 27-June 5, 2015
Midwest Wildfire Training Academy	June 3-7, 2015



Moving fire forward...

UPCOMING EVENTS

Topics for workshops, special sessions, and presentations

Fire Ecology
 Fire Management
 Fire Research
 Climate Change
 Human Dimensions of Fire
 Global/International Fire
 Case Studies

Submissions and Registration Deadlines

Special Sessions	April 1
Workshop and Training Submission	May 1
Early Bird Registration	June 1
Oral and Poster Abstract	August 1
Attached Meetings	Sept. 15

[CLICK HERE](#) FOR MORE INFORMATION

See our [calendar](#) at [oakfirescience.com](#) for a full schedule of upcoming events

April 20-24, 2015: 13th Intl. Wildland Fire Safety Summit & 4th Human Dimensions of Wildland Fire Conference

Boise, ID, for more information [CLICK HERE](#)

May 11-22, 2015: Arkansas River Valley Wildland Fire Academy

Russellville, AR, for more information [CLICK HERE](#)

May 13-22, 2015: Southern Area Engine Academy

Greenville, KY, for more information [CLICK HERE](#)

May 21, 2015: Shortleaf Pine, Wildlife, and Fire at Caney Mtn. CA Field Tour

Gainesville, MO, for more information [CLICK HERE](#)

May 27-29, 2015: 5th Fire in Eastern Oak Forests Conference

Tuscaloosa, AL, for more information [CLICK HERE](#)

May 27- June 5, 2015: East Texas Interagency Wildfire and Incident Management Academy

Lufkin, TX, for more information [CLICK HERE](#)

June 3-7, 2015: Midwest Wildfire Training Academy

Jefferson City, MO, for more information [CLICK HERE](#)

Aug. 19th, 2015: Fire Science Field Tour at May Prairie

Coffey, Co., TN, for more information [CLICK HERE](#)

Sep. 22-24, 2015: 3rd Biennial Shortleaf Pine Conference

Knoxville, TN, for more information [CLICK HERE](#)

Nov. 3-5, 2015: Natural Areas Conference

Little Rock, AR, for more information [CLICK HERE](#)

Nov. 16-20, 2015: 6th International Fire Ecology and Management Conference

San Antonio, TX, for more information [CLICK HERE](#)

Mar. 28-31, 2016: 20th Central Hardwood Forest Conference

University of Missouri-Columbia, for more information [CLICK HERE](#)

Please contribute your event announcements. Send information to: oakfirescience@gmail.com

Moving fire forward...