North Central Research Station News

April/May/June 2001

Fire in the Hills:

Landmark Study of Fuel Loading in the Ozarks

In the News.....

Centuries ago, in what we now call the Ozarks, Native Americans used fire as a land management tool. Their blazes raced through the understory every 3 to 7 years, leaving open, parklike forests with few flammable materials on the forest floor.

Today's Ozark forests bear little resemblance to their forebearers. Limbs and tree-tops from 100 years of timber harvesting—have piled up beneath a forest canopy that has grown denser in the last 50 years of fire suppression.

The question is: How much fuel has built up? Does decay balance the addition of new fuels? And how do these fuels affect fire behavior? The problem is, no one knows for sure.

"Unlike the West, where fuel loading is carefully documented, there's not much information about fuels in the oak-hickory forests of the Eastern U.S.," said Edward Loewenstein, an NC research silviculturist in the Central Hardwoods unit in Columbia, Missouri. "This comes at a time when prescribed burning is commonly used to restore native species in our area. In Missouri, 69,000 acres were burned in 1999, yet we don't know how these fires, or other management techniques for that matter, are affecting fuel loads."

Ed Loewenstein

▲ *Knowing how much flammable material is present in a forest is vital for safe, effective prescribed burns.*

Without a fuels inventory, it's difficult to predict how wildfires will behave, or how to use controlled fires to reduce the risk of wild ones. To shrink these information gaps, Loewenstein teamed up with George Hartman, a fire ecologist with the Missouri Department of Conservation, and Keith Grabner, a fire

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Ed Loewenstein

◀ *Horse logging is a "light-on-the-land" way to thin Ozark forests.*

ecologist with the U.S. Geological Survey's Northern Prairie Wildlife Research Center. The three applied for a grant administered by the Joint Fire Sciences Program of the U.S. Departments of Agriculture and the Interior. Their innovative proposal outlined a 3-year study to evaluate the effects of prescribed fire, with and without thinning, on fuel reduction and fire behavior. It won them $264,000.

All Bases Covered

"We're beginning to create baseline data that are long overdue," said Loewenstein. This information will be important in the modeling (computer simulation) work that the Columbia unit is known for. The LANDIS model, for example, predicts cumulative, landscape-scale effects of local management actions, wind, and fire. "If we can improve the model's ability to predict fuels and fire behavior, we can give managers a sense of how their actions might affect fire probabilities on a mosaic landscape, how future fuel loads will change over time, or how to conduct 'restoration burning' in ways that will also reduce fuel loads," he said.

"This study is among the first to evaluate response to a *mixture* of thinning and prescribed fire. We may find that a combination of techniques enables managers to reduce fuel loads AND restore historic vegetative conditions," Loewenstein said.

Spying on Fire Behavior

The study will be conducted on three 45-plus-acre sites owned by the Missouri Department of Conservation. Each site contains three topographic land types—north slope, ridge top, and south slope. These topographic types will be divided into 3-acre plots, each receiving a different fuel reduction treatment: prescribed fire alone, prescribed fire with overstory thinning, thinning alone, and a no burn and no thinning control. The team will study effects on fuel loading, fire behavior, cost effectiveness, and effect on herbaceous and woody species composition and structure. If followup funds become available, they'll monitor the sites to see how fuel buildup changes 5, 10, even 15 years after a treatment.

Some of the techniques for spying on fire behavior are curious. To clock rate of fire spread, for instance, modified watches are buried in the soil and activated when the flaming front passes. Cotton strings are soaked in fire retardant and then suspended throughout the plots. The extent of singe marks shows fire height.

Missouri Department of Conservation's George Hartman thinks managers throughout the State will put the study to good use. "Until now, we've been getting by with best estimates," he said. "This data will help managers decide where to focus their efforts, what's the best match of treatment to landscape, and what the tradeoffs will be."

Who Wants to Know?

What really impressed the grantors was the team's plans to reach these managers through technology transfer. In addition to papers tailored for various management audiences, the team will create a demonstration site at one of the study areas. "We want managers, researchers, students, and rural fire departments to come and see for themselves what kind of legacies these treatments leave: what kinds of vegetation, what kinds of fuels," Loewenstein said.

The team is also issuing an invitation for managers to come and watch the fires as they burn. "Getting managers involved from the very beginning is one way to make sure the results will be useful, and therefore, actually used." With a plan like that, the knowledge should spread like wildfire.

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