



MWR Fire Ecology

Volume 2, number 1
December 2010

Playing With Fire in Missouri

Working with students is a great way to instill an appreciation for the role fire plays in prairies and forests of the Midwest. When presented with the opportunity to develop a fire ecology workshop for students attending the Green Leadership Academy for Diverse Ecosystems (GLADE) at Missouri State University's Bull Shoals Field Station, Sherry Leis, a Fire Ecologist for the Heartland Inventory and Monitoring Network, jumped at the chance.

Project GLADE is a week-long camp for high school students interested in ecology. Fire is a pretty alluring subject to teach about, but not one in which instructors usually incorporate hands-on activities. Sherry includes charismatic pictures of fire to liven things up in her lectures to college students, but she was challenged to think about teaching fire ecology in a hands-on way. Having discovered the Fire-Works curriculum, developed by the United States Forest Service, Sherry adapted several of the lessons for the GLADE workshop. The curriculum and the accompanying trunk includes



Students at project GLADE try burning dry fuels they collected at the field station. One student times the burning while others observe.

activities to use with students in grades 1 through 10, in laboratories or outdoors. The curriculum is well written, ties to state academic standards, and requires few inputs. Although Western ecosystems like lodgepole pine forests dominate the curriculum, it was eas-

ily adapted to include some lessons to fit Midwestern ecosystems. Students gathered their own fuels and made predictions about their ability to burn. They also experimented with match-stick forests and learned how slope,

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Indiana Dunes Fire Staff Assist on Research Project

During the 2009 and 2010 spring and fall fire seasons Indiana Dunes National Lakeshore (INDU) Fire Management was instrumental in helping USGS scientists burn research plots as part of a Joint Fire Science Program funded project. The project, "To Burn or Not to

Burn Oriental Bittersweet: A Fire Manager's Conundrum," is a research project to help determine how the highly invasive vine, Oriental bittersweet reacts to fire. Scientists Noel Pavlovic and Stacey Leicht-Young determined there was a need to understand and document the

interaction between fire and post-fire resprouting of Oriental bittersweet, as well as to investigate the how fire may interact with light, soil moisture, litter and other environmental factors to either increase or decrease abundance of the species. Additionally, their research

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Reducing Fuel Loads At Mount Rushmore

An ambitious fuel reduction project began with a planning meeting at Mount Rushmore in February 2010. Prompted by an ongoing mountain pine beetle outbreak in the central Black Hills, staff at Mount Rushmore requested assistance from the Midwest Regional Office to help prepare a plan to mitigate the

impacts of a potential mountain pine beetle infestation. A plan was completed by a small group of specialists with input from memorial staff, the Black Hills National Forest, and other local stakeholders. One component of the plan included mechanically thinning more than 525 acres of the memorial, most of which

had not received any type of fuels treatment (mechanical or fire) since the establishment of the memorial. Two methods were used to complete the project. The first included crews with chainsaws removing trees less than 10 inches in diameter. These trees were then fed through a tracked chipper and



A chipper with tracks, rather than wheels, causes less disturbance on the soils.

the chips were broadcast on the site. In more rugged parts of the project area, crews using chainsaws cut trees less than 6 inches in diameter and stacked them into piles that will be burned when weather conditions allow.

memorial, which will be the next step in restoring the old-growth ponderosa pine forest. Ultimately, it is the hope that these treatments will make the forest more resilient and resistant to infestation of mountain pine beetle.

Mount Rushmore preserves one of the largest contiguous stands of old-growth ponderosa pine remaining in the Black

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aspect, and wind affect fire. After the experiments, participants discussed how the small-scale fires they made related to real landscapes. An added treat was when Sherry did a little show and tell of her firefighting gear bag and equipment for the students. The students loved being able to experiment with fire and gained some insight and appreciation that could not be taught in a lecture format.

Have something to share? Please send stories to Cody Wienk, MWR Fire Ecologist.

Stories will be accepted on a revolving basis and will appear in the next issue as space allows.

Voyageurs National Park Works to Restore Mixed Pine Forests

Turn of the century logging and recent fire suppression reduced the coverage of red and white pine forests across much of Minnesota. These activities brought about the conversion of this forest type to hardwood forests, mainly dominated by aspen. Less than 2% of the original pine forests now remain. The fire program at Voyageurs National Park is working to restore and perpetuate the remaining pine stands using multiple mid-summer prescribed fires. Typically, prescribed fires are conducted

in the spring in northern Minnesota, which successfully results in mortality of balsam fir and top-kill of red maple and various tall shrubs. Unfortunately, subsequent shrub and maple re-sprouts are vigorous, often leading to thickets more dense than pre-burn. Additionally, heat penetrating the soil and consumption of the duff layer is minimal making pine regeneration and germination of the seedbank difficult. The park decided to experiment with growing season burns to attain better results. Grow-

ing season burns tend to have better success by top-killing trees and shrubs while they are actively growing, making re-sprouting less vigorous or killing the plants outright. Soil heat penetration and duff consumption are greater since duff moisture tends to be relatively low.

During July, 2007, the park conducted its first mid-summer burns on several islands and one mainland unit. The fires burned slowly at first on some of the brushier sites, due to the leaf-on conditions that create a humid understory environment. However, over the following weeks as conditions became drier, the fires slowly made their way across the sites. These fires were greatly successful at consuming and reducing dense stands of brush and preparing seedbeds. As of 2010, several of the stands were regenerating in the open conditions, while others were maintained in their present state by suspending succession. Several stands experienced a flush of new understory species as the seedbank awakened.



Conditions immediately prior to growing season burning in 2007.



Conditions one year after 2007 burn.

“INDU Assist”

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hopes to determine how fire regimes influence the distribution of Oriental bittersweet on the landscape.

INDU fire management was involved from the beginning. No additional fire funding was requested. Time was committed for writing two burn plans, as well as helping to prepare firelines around over 90 research plots of various sizes. Two phases of the research required slightly over two years of burning. The first phase looked at the susceptibility of Oriental bittersweet invasion in which fire was one of three treatments, requiring burning of 60 small scale-plots. The second phase delved into the fire effects of already established populations in the park in two different soil types and divided into previously burned and unburned loca-



Firefighter igniting a research plot.

tions. Thirty seven larger plots were burned over two seasons.

Hopefully this close collaboration between USGS and Fire Management will

provide land managers with sound science to support decisions that lead to successful management of this species in fire dependent and invaded areas.

Prescribed Fire in Old-growth Pine at Hot Springs

Big shortleaf pine love fire, so it was puzzling to some people when fire managers asked the fire crew that was preparing the fireline to rake around as many of the old-growth pines as they could. Indeed, shortleaf pine is well adapted to low- to moderate-intensity fire. For example, the flaky bark of shortleaf pine is an adaptation for taking fire high up the trunk and breaking away in the wind, so that fire can spread across obstacles like streams. So why were fire managers so concerned about how fire was returned to an old-growth pine/oak woodland at Hot Springs National Park?

Tony Collins, NPS prescribed fire specialist, was concerned that old-growth shortleaf pine that had not experienced fire for many decades could be killed by a prescribed fire because unnaturally heavy amounts of fuel had accumulated. The needles and flaky bark that allows shortleaf pine to spread fire had fallen year after year and accumulated at the base of the big pines.

On March 19, 2010, a diverse team of wildland fire professionals successfully completed the first prescribed fire on a portion of the unique old-growth woodland that shelters the hills of the park. The goal was to reduce decades of fuel accumulation and recreate conditions that would allow shortleaf pine seedlings to establish. Above all else, was the desire to maintain the health of the significant number of old-growth shortleaf pine and white oak.

Fire managers were also faced with the challenge that their 188-acre burn unit included 30 acres of private land. Much of the burn unit was also bordered by a busy road and a large powerline. However, the biggest concern was that the Hot Springs city limits started just 100 yards away from the fireline. There was no shortage of places where smoke from the fire would be extremely unwelcome. Consequently, the managers needed weather conditions that were optimal for excellent smoke dispersal while the duff below the leaf litter was

still moist at the base of the big pines. Collins calculated correctly that if the duff layer was just barely beginning to dry out, then the fuel reduction objectives could be accomplished without damaging the old-growth pine. The crew executed this prescribed burn perfectly from the criteria of safety, smoke dispersal, fuel reduction, and ecological restoration.

The burn unit was systemically checked in mid-September and no evidence of fire related damage or stress to the old-growth trees was observed. The fire also met its objectives of reducing the heavy fuel load, and reducing the number of fire-intolerant understory trees like blackgum. There were also an impressive number of shortleaf pine seedlings that sprouted because of the fire. Now the challenge is to continue decades of astute fire management at Hot Springs National Park so that this next generation of shortleaf pine can grow into great majestic trees.



Shortleaf Pines in the Sugerloaf Burn Unit.

Largest Prescribed Fire in Wind Cave's History

The largest prescribed fire in the history of Wind Cave National Park was completed October 20-21, 2010. The 3,450 acre American Elk unit was located primarily within forested communities of the park but also included mixed-grass prairie, prairie dog towns, and ponderosa pine encroached meadows. Over one hundred personnel helped out with the burn including those from four National Park Service units, two Bureau of Indian Affairs units, the Black Hills National Forest, and Custer State Park. The first day of the fire consisted of two ignition teams blacklining approximately 12 miles of unit perimeter. Day two involved blacklining the final half-mile of the unit perimeter and interior helicopter ignition.

The primary objective for the fire was to restore fire back into the project area where fire has been excluded since the Park's creation. Additional resource objectives included reducing overstory, midstory, and seedling densities. We also wanted to reduce both dead and

down fuel loads within the forested communities and encroachment of ponderosa pine regeneration at the forest-prairie ecotone.

The natural fire regime and forest structure at Wind Cave from the mid 1500's to the late 1800's consisted of frequent surface fires and mostly open-canopy ponderosa pine stands with large diameter trees. With land settlement in the area in the late 1800's, the frequent surface fire regime ceased which changed the forest structure to dense, closed canopy stands consisting of unusually high numbers of small diameter trees. As a result, the crown fire potential has dramatically increased and the park's forested areas are now subject to high severity stand-replacing wildfires. Prescribed fires at Wind Cave during the spring and fall months are an integral tool for restoring these forests to their naturally diverse structure.

The large size of this unit allowed the prescribed fire to burn over multiple

burn periods and weather conditions which replicates natural fire activity. The use of a helicopter allowed us to achieve variable fire severities across the landscape due to varied ignition patterns and provided fire fighter safety by eliminating the need for interior hand ignition. We have over seventy-five fire effects monitoring plots located within the unit which we will use to assess our monitoring objectives within the next year.

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These stories can also be found on the NPS Fire & Aviation website at:
http://www.nps.gov/fire/public/pub_firestories.cfm



Surface fire moves upslope from burn perimeter consuming large woody debris and ponderosa pine seedlings.