



Every Wildfire is an Opportunity to Treat a Landscape

There has been a quiet but dramatic shift in fire management over the past few years – more indirect tactics, using natural features for control line, low impact suppression. These tools have been part of the fire manager’s toolkit for decades but concerns with safety, firefighting expense, and the ecological impact of suppression have made them more important. Describing the 2014 Slide Fire, this article discusses the changing approach to wildfire management and suppression.

On the afternoon of May 21, the Slide Fire was reported towards the south end of Oak Creek Canyon between Flagstaff and Sedona, Arizona. The first evening and night after ignition, firefighters raced to protect more than 300 homes and cabins that sat nestled between Oak Creek and the walls of the steep, narrow canyon that bears its name. Amazingly, no homes or other structures were lost in the critical first 24 hours, or even later when the fire pushed up the canyon and began to threaten neighborhoods on the outskirts of Flagstaff.

Much of the terrain is steep and rugged—not the type of country that firefighters prefer for taking on a fire directly. So, after the initial threat to the homes passed, fire managers decided to take an indirect approach, using a confine-and-contain strategy.

Over the course of several days, crews along the north and northwest flanks of

the fire staged burnout operations, igniting low intensity fires using drip torches along roads and trails to halt the advance of the main head of the fire. In areas that were difficult and dangerous to access, helicopters dropped PSDs (perforated spherical devices)—think ping-pong balls filled with combustible chemicals—to light fires on the canyon rim and on the tops of slopes and ridges. These firing operations robbed the main fire front of the fuel it needed to make runs up the canyon. Although this strategy increased the total acreage burned, it lessened negative impacts to the forest, the watershed, and threatened and endangered species such as the Mexican spotted owl. Most importantly, this approach provided for the safety of the more than 1,200 firefighters working on the fire.

The response to the Slide Fire evokes the question at the core of current approaches to fire management: can we suppress fires in ways that protect lives



Smoke lingering in Oak Creek Canyon. Photo: Ted Grussing

and property, are cost-effective, and pay attention to the signature we are leaving on the ground? In the past, the overriding fire suppression imperative meant that the ends (putting the fire out) justified all means, no matter the impact on the land and resources. However, that mindset has been rapidly changing and now many fire management teams work to have a lighter impact on the land while still accomplishing their suppression objectives.

Suppression Impacts

Many suppression techniques can have impacts on ecosystem properties, particularly those that disturb the upper soil layers, impact streams and creeks, or promote the spread of noxious or invasive plants. Fireline, built using both handcrews or heavy equipment such as bulldozers or plows, removes vegetation and can also create potential erosion problems (if not rehabilitated after the

fire). These effects can result in downstream water quality issues from siltation and sedimentation.

Suppression firing techniques, such as burnouts and backfiring, are used to consume surface fuels near the fireline to strengthen and secure it. These types of actions are taken to increase firefighter safety on the fireline and also to speed up the time in which the fire can be declared “under control.” However, depending on the size of the wildfire perimeter, firing operations can add up to a lot of acres burned. And, if the firing operations are done under extreme weather conditions, they can lead to severe fire effects, possibly more severe than those created by the actual wildfire.

The 2002 Biscuit Fire on the Siskiyou National Forest in Oregon was one of the largest wildfires in U.S. history at almost 500,000 acres. However, large-scale burnouts accounted for a large

amount of the total acreage burned by the fire, much of which experienced high-severity fire effects (Ingalsbee 2014).

The use of fire retardant dropped from low-flying air tankers can also have negative effects on streams and creeks if dropped in or nearby. Fire retardants are basically a mix of fertilizer, water, and other minor ingredients used to thicken, color, and stabilize the mixture. The chief environmental concern is retardant's effects on aquatic life and water quality. When the chemical mixture hits a stream or lake, the ammonia in the retardant can be lethal to fish and other organisms. Forest Service guidelines adopted in 2000 bar retardant drops within 300 feet of a body of water. But there are several

exceptions: Pilots can release a load over a stream or lake zone if it is necessary to protect life, property or because of terrain limitations (Forest Service 2000).

There are also indirect effects from suppression actions. Firefighters and their equipment can inadvertently become vectors for transporting noxious and invasive weeds. In addition, soil disturbance related to suppression actions can create opportunities for invasive species that can displace native species, changing the composition of ecosystems and consequently the fire regime. Another indirect effect of suppression is increased access to roadless areas by off-highway vehicles (OHVs) that follow roads and firelines built during a wildfire. Unauthorized use

Resource Advisors (READs)

Many land management units now advocate for active participation by resource advisors at all levels of fire management planning and actions, under the rationale that in fire-adapted ecosystems, if you are not considering the potential effects of fire and fire management actions, you are not managing the resource.

There is a growing emphasis on the use of READs to sort through land management plans and translate the subtleties into something immediately relevant and useful during a suppression action. There is also a recognition that the READ is there to help the team achieve, at the very least, reduced impacts, but perhaps even long-term benefits.

READ experience with fire management can be a limiting factor. A resource advisor that is unfamiliar with fire management may not know, snags (wildlife habitat) must be felled within 200 feet from the fire side of the control line.

Communication is the key to effective fire management. If an incident commander or other fire manager has the time and commitment, they can work closely with a READ, providing insights into the implications of suppression actions for resource issues and the READ can communicate the potential impacts and benefits.

For more information consult the NWCG Resource Advisor's Guide for Wildland Fire - http://www.nwcg.gov/pms/pubs/RAGuide_2004.pdf .

of OHVs can lead to further soil disturbance, as well as spreading invasive species and impacting wildlife habitat.

Low Impact Suppression

In general, there are suppression actions that, in the right vegetation type and done under the right conditions, can have ecological benefit (for example, nighttime burnout operations; burning from the top, rather than letting a fire rip up a slope; and using natural features in place of constructed line). However, these are often the less-preferred methods of suppression due to concerns with logistics, safety, and efficiency. But, there are always trade-offs when choosing among courses of action, especially when weighing short-term suppression objectives versus the potential long-term resource benefits of drawing a bigger box and taking the more patient approach. However, the more days that a fire is on the ground, the longer firefighters are placed at risk, and the more expensive the fire becomes.

There is always going to be a great deal of tension between these competing, but not necessarily

contradictory, objectives—risk/cost management versus ecological benefit. Nonetheless, for a variety of reasons, fire managers are increasingly choosing to develop strategies and tactics that accomplish suppression objectives while causing minimal impact on resources. “I think what we are seeing is a trend towards more indirect tactics using natural features or man-made features such as roads,” says Bill VanBruggen, the Director of Fire and Aviation for the USFS Southwest Region. “Burning out from those features often makes for stronger, more secure control line, rather than going, as we have done historically, more direct.”

For example, within the “footprint” of the Slide Fire a variable mosaic burn pattern formed with a few areas scorched by high intensity fire. In these blackened areas, most of the trees were killed and vegetation was consumed. However, larger green areas with lower intensity fire effects surrounded these few black pockets. Here, the fire moved

across the forest floor burning grasses, shrubs, and dead fuel on the ground. Most trees survived with their canopies intact. Most of the burnout operations were conducted at night to take advantage of high humidity and low



Mosaic burn pattern on the Slide Fire. Photo: Coconino National Forest

temperature, which helped keep fire intensities low. The overall impact of the firing operations was very similar to that of a controlled burn, and forest officials believe that the burnouts will have considerable benefits for the forest over the next few years. “Based on the fire effects we are seeing today and comparing those to the potential effects we may have experienced, we feel that we were very successful in our management tactics,” says Wesley Hall, a Fire Management Specialist on the Coconino National Forest. “Overall, this is one of the best outcomes this country [Oak Creek Canyon] could see. We were never going to be able to mechanically treat this area. So having fire introduced into this location, and having it burn under our conditions—favorable conditions—is better than the alternative.”

“Every wildfire is an opportunity to treat a landscape. It depends on what the conditions are—weather, fuels, resource availability, etc. for that specific event,” says Tessa Nicolet, the Regional Fire Ecologist for the USDA Forest Service, Southwest Region. “But if we can start to really use those events as treatment opportunities, I think we will see a lot more positive effects from fire.”

Grand Canyon National Park has certainly embraced that approach, with one of the most progressive fire management programs in the Southwest. “In the Park, we view every ignition as having the potential to have some sort of ecological benefit,” says Windy Bunn, the Fire Ecologist for the Park. “And having wildfires with ecological benefit doesn’t mean you

have to have a 2,000 or 10,000 acre fire. And, it doesn’t mean that the fire has to burn only in low intensity everywhere it burns. We see that fires of different size, different spatial scales, fires that have burned close together, fires that have burned far apart—any of those fires can promote ecological resilience and heterogeneity, which is ultimately what we are looking for in our fire management program.”

There are a number of steps that fire managers can take to reduce the impact of suppression on their landscapes and resources. Also, a critical component of any fire management effort should be the relationship between local resource advisors and the incident management team.

Making it Happen

One of most obvious ways to reduce the negative impact of constructed fireline is to simply construct less of it. Using natural features such as rocky slopes or streams, as well as man-made features such as roads and existing trails can significantly mitigate post-fire problems such as erosion, fuel accumulation in the new firelines, and indirect problems such as the spread of invasive species and increased off-highway vehicle use on the newly opened access points. If done correctly, line placement can facilitate prescribed burning or management of later fires.

Avoiding sensitive resources such as archeological and other cultural sites or nest trees is an obvious and immediate opportunity to reduce impacts. And, if done in consultation with a cultural

resource advisor, line placement can allow an archeologist to see into an area that was previously obscured by vegetation. Following the Slide Fire, a number of cultural sites were uncovered and examined for the first time by Forest Service archaeologists.

As experience with prescribed burning has increased, the skill with which fire managers are able to apply to burnout operations has become more sophisticated. Understanding the desired fire effects for long-term management can identify opportunities to overlay short-term holding objectives and long-term vegetation management objectives. On the Slide Fire, many of the low-intensity burnouts functioned to benefit Mexican spotted owl habitat. “In some cases T&E [threatened and endangered] species, or other critical

habitat, may be damaged by suppression activities and may not be damaged by the fire. So, that type of information is important for a fire management team to understand even before they arrive on a fire,” says Tim Sexton, Program Manager for the Wildland Fire Management Research, Development, and Application program.

Cultural resources can also benefit from low-impact suppression. For example, Jun Kinoshita, an archaeologist with Yosemite National Park, says that traditionally gathered medicinal and ceremonial plants can benefit from introducing low or moderate-severity fire. He also suggests that identifying a previous dozer line in an area and re-opening it instead of trying to go direct can reduce further impacts in an area with sensitive archeological resources.



*On the Slide Fire, crews lit burnouts from roads as part of a confine and contain strategy.
Photo: Coconino National Forest*

Outside IMTs and Local Resource Advisors

But what happens when an outside incident management team arrives on a unit to manage a wildfire? How can resource advisors work with the team?

There is always concern when an outside organization comes in that is not familiar with local conditions. Nonetheless, through good communication, resource advisors can supply the right types of information that can lead to reduced impacts or even benefits during suppression actions.

At the start of every fire season, many units prepare maps and packets of information that show all of their threatened and endangered species habitat, identify all of their values-at-risk, and mark their archaeological sites and cultural resources. Those kinds of information are very important for the team to understand as soon as they arrive, and maybe beforehand. According to Nicolet, the outside IMTs need to know more than the location of the important resources, they also need to know what the local unit wants from those sites. “So, for instance, if you are looking at Mexican spotted owl habitat, you might actually want fire in there, but of low-severity,” says Nicolet. “That needs to be clearly articulated to the management team. You don’t want it necessarily protected from fire. Then the management team can say, ‘Well, maybe we’ll backburn it at night and still get fire in that area. While some archaeological sites might have a historical cabin that is definitely a

protection response where they don’t want fire anywhere near it. So, it is not only identifying where you have values, but what those values mean for an incident management team—where we can see fire or where we don’t want fire at all.”

“What is important? Why is it important? And, then how important is it?” says Clay Templin, Incident Commander for the SW Type 1 IMT Team 1. “That is what we want to get to because that is going to help formulate what strategy we want to do and from that strategy we will have a set of tactics. So, for a particular fire we may have an intense, aggressive strategy, but when we get to other parts of that fire, it may not be. We may be taking advantage of the landform, taking advantage of fuel treatments they may have done.”

Tim Ingalsbee, a researcher and Executive Director of the organization Firefighters United for Safety, Ethics, and Ecology (FUSEE), says that resource advisors need to step up and take on a more integrated role in fire management. “Often resource advisors just supply information. I think they need to be right there as a part of the team in the decision-making process,” says Ingalsbee.

Conclusion

The indirect tactics used on the Slide Fire are part of a trend that has been evident across the West – wildfires being managed in ways that can benefit the landscape even while actively suppressing the fire. There is a growing

recognition that many of these forests need fire to thin dense vegetation that chokes regeneration and forest health, and also creates favorable settings for more severe fires that can completely consume the forest. Also, climate change has generated hotter and drier weather patterns in the West, and this has led to larger, more intense fires. Fire managers are simply more reluctant to put firefighters out in front of wildfires burning under these extreme conditions.

"Firefighter safety must always come first in the way we respond to fires," says VanBruggen. "Because of the build-up of fuels on many of our wildlands, it has forced us to be more indirect in our strategies, but really think wisely about successful strategies and weigh those in

terms of different alternatives to responding to fire."

The Slide Fire is just the latest in a series of recent high profile fires that reflect the changing realities of wildfire in the western US. According to Sexton, conditions are forcing a change in how fires are managed. "We need to recognize that the decisions we make today in keeping the footprint of the fire small may come back to haunt us years down the road when fire revisits that site again. And we know that fire will revisit all of our sites at some point, and probably sooner rather than later in many of our landscapes due to the way that the climate is going."

Written by Josh McDaniel, August 2014.

The Southwest Fire Science Consortium is a way for managers, scientists, and policymakers to interact and share science in ways that can effectively move new fire science information to management practices.

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