Interface Between Fire and Forests—Tree Management in the National Park Service

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Wildfires, management ignited prescribed fires, and mechanical fuels treatments in national parks have resulted in unintended consequences. Thousands of trees along roadways and power lines have been damaged or killed by fires. Furthermore, in 2007, 11,738 National Park Service (NPS) acres were mechanically treated under the National Fire Plan to protect park resources. Park foresters illustrated some outcomes and raised some questions about tree disposal, tree hazard prevention, and mitigation to include acceptable collateral damage or unacceptable safety hazards, and increased workload for park forestry crews.

It has been noted that the NPS needs clear and coherent policy and direction on how to manage these forest resources, including how to conduct biomass disposal and sales. We recommend that a Director's Order, with an accompanying reference manual and an NPS Biomass Disposal Desk Guide, be developed by fire and resource management professionals for specific policy guidance to allow for the sustainable disposal of woody biomass.

A certain degree of tree damage and mortality is an anticipated result of prescribed burning. When those dead or damaged trees are, or become, hazardous to traffic on adjacent roads or trails or to utilities, this ancillary damage becomes undesirable and requires mitigation. And, while a background level of mortality or damage is expected and largely unavoidable, excessive mortality or damage is, in most cases, both unacceptable and avoidable.

In the past, the undesirable effects of roadside, trailside, or utility corridor burning, namely tree mortality or damage, have been viewed as uncontested consequences of reintroduction of fire as a natural process, and ones for which mitigation funding was not available from traditional prescribed burn funding sources. This has not only increased the workload of already over-burdened park forestry and roads crews, as well as utility company line-clearing crews, but has also increased the NPS's tort liability due to the increased likelihood of roadside accidents from tree failure. At least one utility company has expressed concern over increased line-clearing costs in the aftermath of NPS burning in and adjacent to utility corridors, and has even passed costs back to the agency.

The solution requires a three-pronged approach: (1) recognition and prevention and reduction of fire-related mortality or damage, (2) substitution of mechanical treatment for or utilization of mechanical pre-treatment in conjunction with prescribed burning, and (3) availability of funding for pre-burn mechanical treatments and post-burn tree hazard mitigation.

While not entirely preventable, minimizing roadside tree damage and mortality requires first an awareness of the problem, and second, modification of the burn prescription, or tech-

nique, or both. Season, time-of-day, and fuel availability are all variables which can and should be manipulated to reduce burn severity adjacent to roads, trails, and utility corridors. Burning during cooler spring and fall weather, and burning earlier in morning or later in afternoon or evening are simple but effective means of influencing temperature, relative humidity, and fuel moisture parameters of burn prescription.

In addition, burning technique can be modified to favorably affect fire behavior and energy release components by reducing strip width in strip-head firing, or using backfiring technique instead. This in turn contributes to reduction in scorch height and basal cambium damage, both of which are factors in tree damage and mortality.

Substitution of mechanical treatment for, or use in conjunction with prescribed fire, such as has been conducted in Yosemite National Park, has proven to be an effective means of reducing roadside tree mortality and damage. This can either be done in-house with day labor, or under contract. If there is salvage value in material being removed then there are cost-reduction or cost-elimination options which will be discussed subsequently. The new tree hazard management directives for parks in the Pacific West Region states that management activities in and adjacent to developed areas—such as fire management and tree hazard mitigation—will attempt to minimize injury to living trees which are to be retained on the site. This includes damage to roots as well as the bole (trunk), and limbs of trees. Tree hazard abatement and mitigation may be required when individual trees in natural or wilderness areas that are killed or damaged by fire management, trail construction, ecological restoration, or other management activities, are within striking distance of a target, particularly if the damage leads to colonization by decay fungi, or insect attack.

Burned trees can fail (USFS), even trees with green crowns. Reintroduction of prescribed fire to western forests where fire has been excluded for long periods has been resulting in mortality of the large, old trees we are trying most to protect (Hood et al. 2007). Treatments such as raking can reduce overstory tree mortality (Laudenslayer, Steger, and Arnold 2008). It is imperative that prescribed fire project funding be available to address necessary pre-burn treatment, as well as post-burn mitigation, including administrative costs associated with developing and administering contracts.

Servicewide fire management officials have agreed to several items that will reduce public and worker risk from tree hazards, including encouraging pre-burn thinning and raking in project proposals. Also, *draft* language will be added to the NPS business rules for hazard trees which are created either through a prescribed burn, or an unplanned ignition that was managed according to the park's Fire Management Plan strategies and objectives.

Besides modifying fuel loading and arrangement, mechanical fuel reduction treatments result in more dependable species selection, improved taper of leave trees, and more controllable spacing of young trees. It can be a challenge for fuel managers to effectively communicate specifications to outside work crews, and mechanical thinning can result in damage to residual trees (pruning wounds, etc.).

When trees are to be removed from NPS areas, 16 USC sec. 3 allows for the secretary of the interior to, "upon terms and conditions to be fixed by him, sell or dispose of timber in those cases where in his judgment the cutting of such timber is required in order to control the attacks of insects or diseases or otherwise conserve the scenery or the natural or historic

objects in any such park.... He may also provide in his discretion for the destruction of such animals and of such plant life as may be detrimental to the use of any of said parks...." 16 USC sec. 54 further states "the Secretary of the Interior may sell and permit the removal of such matured or dead or down timber as he may deem necessary or advisable for the protection or improvement of the park, and the proceeds derived therefrom shall be deposited and covered into the Treasury as miscellaneous receipts."

Additional agency guidance exists. NPS 2006 *Management Policies* advise that "Landscapes disturbed by natural phenomena, such as landslides, earthquakes, floods, hurricanes, tornadoes, and fires, will be allowed to recover naturally unless manipulation is necessary to protect other park resources, developments, or employee and public safety.... Efforts may include, for example ... restoration of areas disturbed by NPS administrative, management, or development activities (such as hazard tree removal, construction, or sand and gravel extraction) or by public use" (NPS 2006, 39).

How much biomass may be removed should be the difference between the amount of biomass to be retained on the site (desired future condition) and existing site conditions. Guides to estimate existing biomass and visualize treated condition are available for many forest types (e.g., Scott and Reinhardt 2005).

NPS Special Directive 82-6 states that wood and wood products are permitted to be removed when they result from approved development, construction, or resource management activities, or where removal is necessary due to a hazard or obstruction, or in historic, recreational, or development zones for: (a) maintenance of historic scenes, (b) maintenance of recreational environments, (c) rights-of-way, (d) vista clearing, or other approved reason. In such instances, the wood shall be disposed of as follows:

1. Quantities associated with work or activities incidental to, or the result of a contract, should be removed by the contractor. The reasonable net value of the wood should be calculated in the contract cost.
2. Wood and wood residue remaining from normal park operations may be allocated for park uses, such as heating public buildings, offices, and remote back country stations, and for park interpretive campfires. Surplus wood and wood products, however, shall not be supplied to concessioners for facilities or activities, nor to residents, nor to employees for residential heating inside or outside the park, nor for use in government quarters. Wood may be obtained, however, under paragraph three for such purposes.
3. Wood and wood products available in quantities or under circumstances beyond those needed for the park operations functions described in paragraph two shall be sold at fair market value, pursuant to 16 USC sec. 3.

Special Directive 82-6 was integrated into the NPS 2006 Management Policies. The gathering of firewood will be allowed only where subsistence use is authorized by federal law, or in specific areas designated by a superintendent in which dead and down wood may be collected for campfires or in small quantities for other uses within the park. Natural resource products that accumulate as a result of site clearing for development, hazard tree removal, vista clearing, or other management actions, will be recycled through the ecosystem when

practicable. When recycling is not practicable, the products may be disposed of by other means. Disposal may be accomplished by contract, if the result of the work done under contract and the value are calculated in the contract cost, or by sale at fair market value in accordance with applicable laws and regulations. Wood that accumulates as a result of the management actions described above may also be used for park purposes, such as heating public buildings or offices, or for interpretive campfire programs.

The paper trail for disposing of woody biomass from NPS areas begins with Standard Form 120, Report of Excess Personal Property. Once the disposal document is executed, biomass with market value can be sold locally, or through the General Services Administration as a sale of government property. Biomass may also be disposed of locally through agreements (such as 122 Stat. 768 Public Law 110-229—May 8, 2008, Subtitle A—Cooperative Agreements sec. 301, Cooperative agreements for national park natural resource protection).

The Department of the Interior will allow service contractors to remove woody biomass generated as a result of land management service contracts wherever ecologically appropriate and in accordance with applicable law (48 CFR parts 1437 and 1452).

Values of forest products vary widely by geographic location, access to markets, local to international market conditions, manufacturer capacity, species, sizes, quantities, and sustainable availability. White pine might be premium in the west, but not in the east; black cherry may be in high demand throughout its range; lodgepole might be sought after in one district of a park and you can't give it away in another during a beetle outbreak.

A biomass desk guide is available from the U.S. Forest Service (www.forestsandrangelands.gov/Woody_Biomass/documents/biomass_deskguide.pdf); the NPS desk guide is in development.

References

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