

The Role of Fire in Research Natural Areas in the Northern Rockies and Pacific Northwest

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Forest Service Research Natural Areas are established to preserve examples of all significant natural ecosystems for comparison with those influenced and/or managed by humans, to provide educational and research areas for ecological and environmental studies, and to preserve gene pools for typical and rare and endangered species. The Research Natural Area program in the Northern Rockies and Pacific Northwest regions attempts to protect a wide spectrum of terrestrial and aquatic communities in their "natural" state. At least 79 of the 246 established and proposed Research Natural Areas in these regions represent forest and grassland types that have been adapted to frequent fires over the last several hundred to thousands of years.

Results of Fire Suppression

Due to the increase and intensity of human development and use of the landscape and the suppression of fire over the last 100 years, most of the 79 Research Natural Areas in frequent fire types have shown or are beginning to show one or more of the following: loss of dominant seral species, historically unusual changes in structural patterns, and loss of some early seral community types.

The loss of dominant seral species is obvious in many different types of communities in Research Natural Areas. Exclusion of fire in grassland Research Natural Areas in central and western Montana and in Washington state has led to the encroachment of and increased shading by shrubs and conifers, resulting in a decrease in abundance of species like Idaho fescue (*Festuca idahoensis*), rough fescue (*Festuca scabrella*), bluebunch wheatgrass (*Agropyron spicatum*), prairie Junegrass (*Koeleria cristata*), and needlegrasses (*Stipa* sp.). Oregon white oak (*Quercus garryana*) in the margins of and within the Willamette Valley of Oregon is being supplanted by conifers, especially grand fir (*Abies grandis*) and Douglas-fir (*Pseudotsuga menziesii*). Research Natural Areas with historically park-like stands of ponderosa pine (*Pinus ponderosa*) are being invaded by true firs and Douglas-fir, resulting in poor regeneration of pine. Fire suppression in stands of western larch (*Larix occidentalis*) favors Douglas-fir and grand fir regeneration over that of larch.

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Fire exclusion and the resultant loss of dominant seral species lead to changes in the structural patterns of Research Natural Areas. In the sagebrush steppe and western juniper zones, Research Natural Areas dominated by grass, herbs, and scattered shrubs are changing to systems dominated by increased shrub cover and tree cover. In many cases those with open, park-like stands of seral tree species are becoming dominated by thickets of saplings and pole-size trees. Unusually large amounts of dead and/or dying regeneration occur in stands of high elevation lodgepole pine (*Pinus contorta*) and subalpine fir (*Abies lasiocarpa*).

The exclusion of fire in Research Natural Areas is leading to loss of seral successional processes. In the more xeric lodgepole pine types in central Oregon, large fuel build-ups have increased the chances of unusually severe fires that could result in soil damage, potentially disrupting the usual succession following fire. In several eastern Oregon Research Natural Areas, fire exclusion has decreased seral understory species diversity by as much as 50 percent, and the abundance of seral species may have declined dramatically. It is unclear what effects this may have on invertebrate and vertebrate species populations.

Ecological and Operational Challenges to Reintroduction of Fire

Reintroduction of fire through prescribed burning and prescribed natural fires poses ecological and operational challenges. To date, only 5 of the 79 Research Natural Areas needing some level of prescribed fire have been burned.

Often seen as "museum pieces," many Research Natural Areas have poorly articulated management goals. It is not unusual for managers to think that no disturbances (including natural ones) should be allowed.

To reintroduce fire, it often seems necessary to reconstruct the previous fire history; this is time-consuming and expensive. It is questionable whether reintroducing fire from lightning ignitions into small Research Natural Areas makes ecological sense in areas where much larger fires (spreading from other areas) were the norm. It could be that these areas are really just too small to reintroduce lightning fire processes, leading to false conclusions about burning responses. There is also the question of whether the climatic regime today is different from the one under which the stands originally developed.

In some Research Natural Areas, reintroducing fire could adversely provide opportunities for the introduction or increased spread of exotic species. On the other hand, continued exclusion of fire that leads to an unusually severe

wildfire may encourage exotics even more. We know little about soil invertebrates and their relation to fire regimes. More often than not, management requirements and regulations dictate that prescribed burning occur in seasons other than when fire naturally occurs.

The operational challenges are many. Prescribed burning in Research Natural Areas requires a long-term commitment of personnel and money. It is often difficult to garner the interest and commitment that is required for pre-work and planning, especially when burning is not a high priority. The reintroduction of fire into most Research Natural Areas is generally an open-ended commitment; 5 years is barely a beginning. Money for management of natural fuels has recently been available for burning, but ever-tightening budgets will necessarily make this pool much smaller. On the other hand, the U.S. Department of Agriculture has doubled funding for prescribed burning in its proposed 1996 budget, and Secretary of the Interior Babbitt has urged support for increased funding.

The prescribed burning situation can be complicated when there are private surrounding lands or adjacent lands that are managed with goals that conflict with Research Natural Area goals, for example, timber or other commodity production. Public acceptance and legal restrictions, especially smoke management regulations, complicate matters as well. Difficult access, the need for mop-up, and concern for adjacent lands all make the burning costs relatively high.

The reintroduction of fire into Research Natural Areas should include scientifically defensible monitoring, which is also time consuming and expensive, requiring a long-term commitment on the part of both the scientific community

and the management community. Often only one is willing to participate.

Conclusions

Attempts to exclude fire from wildland ecosystems in the Intermountain and Pacific Northwest Regions have had serious ecological impacts on at least 79 of the established and proposed Research Natural Areas. Numerous ecological and operational challenges face scientists and managers who are committed to restoring the role of fire to these natural areas.

The number of Research Natural Areas needing fire is much greater than the money and personnel available. Those needing prescribed fire should be prioritized into categories that include such things as immediate threats (for example, exotic species), likelihood of being burned by natural causes (for example, high elevation types on ridges), complications from adjacent land management, rarity of the community type protected, and availability of scientists to help set up monitoring. In regard to the last issue, there will may be trade-offs between the ability to monitor and an extreme necessity to burn.

Managers and stewards should look for opportunities to combine prescribed fire in Research Natural Areas with other prescribed fires in adjacent areas, leveraging other fuels management dollars as much as possible. If fire is not somehow reintroduced into Research Natural Areas, they will lose the characteristics for which they were established, either by severe wildfires or by advanced succession.