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Go Big or Go Home?

Tools and Processes for Scaling Up Collaborative Forest Restoration

Key findings and messages from the Go Big or Go Home? Project

One of the goals of the Go Big or Go Home? Project was to partner with forest managers and stakeholders to explore the effects of different restoration strategies on forest conditions and fire behavior. We focused on the forested landscape of central Oregon and looked out over the next 50 years. We worked with participants to develop several restoration scenarios that used different types of restoration treatments (e.g., tree harvesting and thinning, prescribed fire, managed natural fire) at different magnitudes and in different places on the landscape. We simulated those different scenarios using a computer model of forest growth, forest management, and wildfire built for the central Oregon region. The following are some key conclusions that emerged from those simulations and others in a predecessor project (Forests, People, Fire). Our research was specific to the forests of central Oregon, but many findings likely apply to other landscapes in the U.S. West comprised of fire-dependent, mixed-conifer forests.

Living with fire

Our modeling results support other research findings that forest restoration can modify fire behavior at stand and patch levels and sometimes (cumulatively) at landscape levels. We live in fire-prone landscapes and many values we hold for our forest landscapes are adapted to, or even dependent on, fire. Fire will always be with us, but we may not always like its behavior. The challenge is to understand where and how our actions can influence fire behavior and in what cases we have little influence. Landowners have different perspectives on fire based on their values and objectives. For many, fire on their property or on nearby lands is not desirable. But for others, fire may promote outcomes they desire (e.g., resilience and resistance to future fire and improved wildlife habitat.) The goal of most fuel treatments and restoration activities is not exclusion of fire from the landscape but modification of its behavior.

Scaling up is hard to do

Doubling or tripling the current rate of restoration and fuel treatments on Forest Service land would have only a small effect on the amount of high-severity fire at the landscape level and the exposure of human values to high-severity fire over a 50-year period. It is hard to reach a pace and scale of restoration that can substantially change the forest conditions, fire hazard, and occurrence of high-severity fire over a large landscape in a few decades. This is because: 1) the probability of a wildfire and a fuel treatment being in the same place on a landscape is low; 2) a relatively small part of the landscape has effective fuel treatments at any point in time; and 3) expansive areas of the landscape are not available for restoration treatment because of physical, ecological, or administrative reasons. Our model does show that in years when the greatest number of acres burn, fuel treatments are more likely to help reduce fire size and severity compared to years where fewer acres burn.

Getting ready for fire

Although it is hard to change the number of acres burned each year across a landscape, that doesn't mean forest restoration is ineffectual. Our modeling clearly shows that when all restoration treatments are stopped, the area and severity of fire across the landscape increases significantly. Further, our modeling shows that having more forests in a fire resistant condition can reduce the severity, if not the area, of fire. Forests that are resistant to fire are dominated by large, fire- tolerant trees, and are open and patchy without heavy accumulations of continuous surface and ladder fuels. Thinning, mechanical fuel treatments, and fire can create these conditions. Collectively and cumulatively over time, treatments increase the resistance of the forested landscape to fire. Forests that are resistant to fire are also more resistant to drought and some insects and disease. Our findings suggest that a better measure of effectiveness of forest restoration treatments is the acres of forest in resistant conditions rather than the amount of wildfire on a landscape.

Managing fire with fire and machines

Restoration strategies that include fire (prescribed fire and/or managed natural ignitions) are more effective at reducing wildfire severity at stand and landscape levels than those that use mechanical means alone. This is because fires remove fine surface fuels that are the primary carrier of wildfire. Mechanical treatments, such as thinning, are also important in reducing ladder fuels and canopy closure that can contribute to fires that kill overstory trees. Often, thinning is needed before using prescribed fire. After mechanical treatment, prescribed fire every 10-15 years may be all that is needed to maintain fire resiliency in stands where ladder fuels are not present and canopies are not closed.

Location and pattern matters

Our modeling demonstrates that forest type and spatial pattern of treatments matter. The effectiveness of, and need for, restoration treatments varies with forest environment, topography, vegetation type, and spatial location. Higher-elevation forests of mountain hemlock or lodgepole pine often carry heavy fuel loads but are cool and moist much of the year. This means that historically they burned infrequently, but when they did burn, the fires were often high severity. Restoration treatments are typically not needed in such forests, although fuel treatments, including managed natural ignitions, may help control the spread of wildfire across landscapes if they are done in large patches or wide strips. Drier forests, including many mixed-conifer forests, where fire has been excluded for many decades, are in the most need of restoration. Where treatments are done, clustering fuel treatment along existing barriers to fire (e.g., roads) or high value areas reduces fire severity more effectively than doubling treatment area with no targeted spatial pattern. Our modeling also shows that the probability of high-severity fire in small old-growth areas can be reduced if surrounding landscapes have been the focus of treatments to restore resistance to fire.

Large landscapes can be accommodating

Alternative restoration strategies that yield quite different outcomes at the stand level do not necessarily result in large differences in forest conditions at the landscape level. The fact that large landscapes are difficult to change with fuel treatments also means that they can accommodate many values and disturbances. There are several reasons for this: 1) the aggregate conditions across the thousands or even millions of patches in a landscape change slowly over time; 2) there is a very large number of undisturbed patches on the landscape that continue to grow and offset the losses of vegetation in the lesser number of patches that are disturbed; and 3) our actions typically affect a relatively small area of the landscape. These landscape characteristics, plus the fact that we have difficulty comprehending how truly large landscapes are, mean that we can overestimate the effects of certain management actions and exaggerate the differences in outcomes from alternative strategies, if we don't focus on the entire landscapes and long time frames. However, over a long enough period of time, the cumulative effects of our actions, or inactions, can lead to large changes in landscapes, such as the effects of 100 years of fire suppression. However, it is often difficult to see those changes as they happen because they can be gradual or even hidden if we do not have a whole landscape view.

Tradeoffs

Our modeling studies illustrate some of the tradeoffs in forest conditions that occur with restoration treatments and how those tradeoffs might change over time. All management actions, including no action, result in tradeoffs between values that we have for forests. These tradeoffs may not only be between commodity values and ecological values but also between different ecological values (e.g., dense versus open forests). Additionally, some actions may jointly produce multiple values (e.g., carbon storage and dense older forests, or fire resilience and ungulate browse). The outcomes of tradeoffs can also happen within different timeframes. For instance, there may be a short-term decline in one value (with a subsequent later return) that accompanies a long-term gain in another value. In some cases, tradeoffs at the stand level may not be observable at the landscape scale (see previous paragraph).

More than fire

The results of our simulations show some of the other benefits that can be produced from treatments aimed at improving forest resilience to fire. Restoration has other benefits including promoting resilience to drought, creating habitats for wildlife species (e.g., white-headed woodpecker or elk), potentially enhancing recreational opportunities, and/or promoting increased water yield and quality. It is also important to note that restoration treatments to reduce wildfire severity are not necessarily the same as other forest and watershed restoration activities, which often have specific goals for tree species composition, forest structure, and ecosystem process that go beyond a narrow objective of fuel reduction.

References and Resources

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About Go Big or Go Home?: The goals of this research project were to analyze how public land managers and stakeholders in Oregon's east Cascades can plan and manage at landscape scales using scientific research and participatory simulation modeling (Envision). **To learn more, visit:** gbgh.forestry.oregonstate.edu

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