

Science to Solutions

Conifer Removal Boosts Sage Grouse Success



In Brief: In recent years the Sage Grouse Initiative, led by the USDA's Natural Resources Conservation Service, has worked with many partners to accelerate the mechanical removal of invading conifer trees, primarily junipers, to restore sagebrush habitats in and around sage grouse strongholds across the West. Replicated studies from public and private land in southern Oregon and northwest Utah are the first to document sage grouse response to this type of landscape-level habitat restoration effort. Despite conventional wisdom that female sage grouse use the same nesting areas every year, space-starved hens in Oregon were quick to use restored habitats made available by conifer removal: within four years, 29% of the tracked sage grouse were nesting within and near restored habitats. In Utah, 86% of hens avoided conifer invaded habitats, and those using restored habitats were more likely to raise a brood. Taken together, studies show that landscape-level conifer removal can effectively increase habitat availability and boost success for nesting and brooding sage grouse.



Removing invading conifers in otherwise high-quality sagebrush habitat is a boon to nesting sage grouse, as in this landscape in the Warner Valley, southern Oregon, before (left) and after (right) restoration. Photos courtesy of Todd Forbes, Bureau of Land Management.

Invaders in the Sage

The encroachment of conifers (mostly juniper species and pinyon pine) into sagebrush habitats is one of several major causes of sage grouse declines. Although native, these trees have spread into millions of acres of sagebrush habitats due to a combination of 100 years of fire suppression, historic overgrazing, and a changing climate. As trees spread into sagebrush, predation may increase because the trees provide new nest sites and

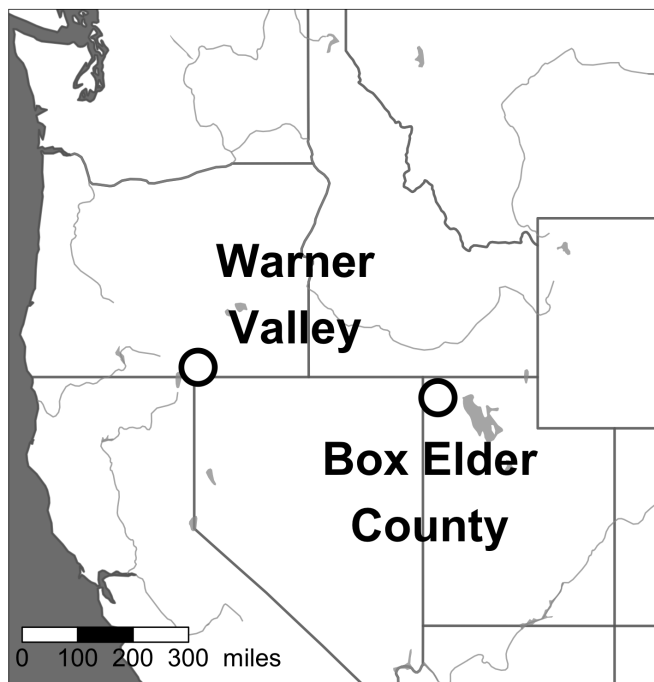
perches to raptors, ravens, and other birds that prey on sage grouse, eggs, and chicks. Conifers also alter sagebrush habitats by robbing native shrubs and understory plants of water and nutrients and drying up streams, springs, and seeps. The result is a widespread degradation of healthy sagebrush habitats.

Even just a few trees scattered across the landscape in the earliest stage of conifer encroachment (called Phase I) can impact grouse. An Oregon study found that where conifers

cover only 4% of the landscape, grouse abandon their courtship leks (Baruch-Mordo et al. 2013; and see [Sage Grouse Initiative Science to Solutions No. 2](#)). Although sage grouse still use Phase I landscapes, their survival may be lower when compared to sagebrush-dominated habitats because of the increased abundance of predators. In essence, sagebrush habitats with even a few conifers serve as death traps for grouse—areas biologists call “population sinks” because they cannot sustain the species (Prochazka et al. in press; Coates et al. in press).

In a range-wide effort, land managers have collaborated to restore the quality of the habitat on working sagebrush landscapes by removing invasive conifers across public and private lands. These projects focus on removing invading conifers in and around sage grouse strongholds. Biologists initially reasoned that bird response to habitat restoration would be a slow process because sage grouse show strong fidelity to nest sites (hens using the same nesting areas year after year).

Yet two parallel studies in the Great Basin show a different story—apparently grouse know good habitat when they see it. These two studies examined sage grouse response to conifer removal in watershed-scale restoration projects, and confirmed that grouse benefit almost immediately when the trees come down.

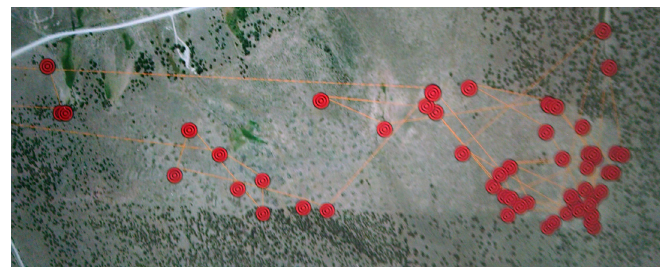


Two recent, independent studies near the Warner Valley in Oregon and in Box Elder County, Utah confirm that sage grouse directly benefit from large-scale mechanical removal of invasive conifers. Map by SGI.

Moving into the New Neighborhood

How quickly will sage grouse nest in restored habitats where invading conifers have been removed? To answer this question, John Severson of the University of Idaho and his colleagues set up a treatment and control field study near the Warner Valley on the Oregon/ Nevada border (Severson et al. in press). The study compared two large landscapes of mountain big sagebrush and western juniper. An untreated control area (>98,800 acres) scattered with invading juniper was compared to a treatment area (>84,000 acres) where large patches of juniper, totaling 20% of the landscape, were removed to restore the entire watershed to sagebrush habitat suitable for nesting grouse. Because the impact of invading conifers extends beyond the trees themselves, removing encroaching trees helps restore the habitat quality of a much larger area of the sagebrush landscape than just the stands that are cut.

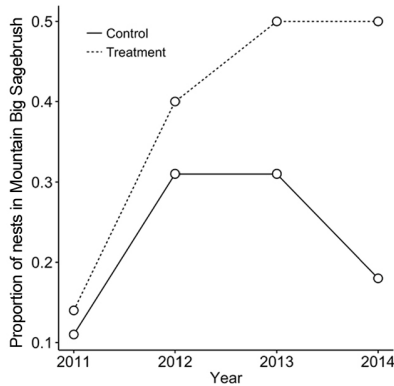
From 2009 to 2014, the researchers then radio-collared and tracked 153 hens in the treatment study area and 117 hens in the control area, which allowed them to locate more than 260 nests and determine where hens were choosing to nest.



GPS locations recorded for this single female grouse in the Warner Valley show how the bird prefers a newly restored sagebrush habitat recently cleared of invading conifers. Image courtesy of Andrew Olsen, graduate student under Professor Christian Hagen at Oregon State University, who is continuing long-term monitoring of sage grouse response at these sites.

“The speed at which these space-starved birds colonize our sagebrush restorations is remarkable, and their increased performance is the ultimate outcome in science-based conservation.”

~ Charles Sandford, former Graduate Student, Utah State University, and current SGI Partner Biologist, Tremonton, Utah.



In the large landscape that was treated with conifer removal, 29% of radio-tagged female sage grouse nested in newly restored habitat. Hens did not increase nesting in the untreated control landscape, where conifers remained. Chart courtesy Severson et al.

It became immediately apparent that sage grouse hens were starved for good sagebrush nesting habitat, and removing the trees creates more usable space. Despite conventional wisdom that female grouse are strongly tied to the same nesting sites every year, sage grouse hens were quick to consider restored habitat nearby, and nested both in and near sagebrush stands cleared of juniper. Within two to four years after juniper cutting, sage grouse moved in to cut areas, and the probability of nesting in and near treated sites increased 22% each year after cutting. After four years, the number of sage grouse nesting in and near the restored areas increased 29% (relative to the control area). Additionally, birds were much more likely to nest in or near restored sites: for every 0.6 miles from a cut area, the probability of nesting decreased 43%. In short, removing junipers dramatically increased the availability of nesting habitat, and hens proved quite willing to take advantage of good habitat as it became available.

A Boost in Nest and Brood Success

Charles Sandford of Utah State University and his colleagues asked how conifer removal in sagebrush habitats might affect the success of sage grouse nests and broods (Sandford et al. in press). Their study area in the Box Elder Sage Grouse Management Area (SGMA) is home to one of the largest and most stable sage grouse populations in Utah.

Covering 256,000 acres, the project area hosts both big and small sagebrush species, and a mix of native bunchgrasses and forbs. Since 2008, managers have mechanically removed invading conifers on more than 20,000 acres to improve sagebrush habitat.

From 2012 to 2015, the biologists tracked 96 radio-tagged sage grouse hens to find and determine the fate of nests. They discovered that the distance between nests and restored

habitat predicted success: nest success declined with every 0.6 miles farther away from restored habitat. (In one documented instance, a marked female nested within a treatment even before mechanical harvesters had completed the cut, and then successfully hatched a brood; Sandford et al. 2015).



Clearing conifers from more than 20,000 acres of the Box Elder Sage Grouse Management Area increased sage grouse nest and brood success. Photo courtesy of Charles Sandford, Utah State University.

The researchers also tracked 56 broods, observing their movements and survival. Most hens (86%) kept broods close to restored habitats and avoided areas with trees, and hens that used areas cleared of conifers were most likely to successfully fledge their broods. This is the ultimate measure of success of habitat restoration: more chicks surviving to boost the next generation of sage grouse.

Clearing the Way for Success

The Sage Grouse Initiative, led by the USDA's Natural Resources Conservation Service, and its many partners have completed conifer restoration projects on more than a half million acres across the West. Utah's Watershed Restoration Initiative has restored another half million acres, and the Bureau of Land Management is now investing heavily in sagebrush habitat restoration across the species' range.

Where conifers invade, grouse appear to be lacking enough quality nesting and brood-rearing habitat. These new studies demonstrate that sage grouse know good nesting habitat when they see it, and collaborative, large-scale sagebrush restoration can benefit sage grouse within a relatively short time.

"Most impressive to me is the foresight and planning across state and federal agencies that resulted in these watershed-scale restorations. BLM is now squarely focused on replicating this partner-based model in priority landscapes throughout the West."

~Steve Small, Division Chief, Fish and Wildlife Conservation, Bureau of Land Management, Washington, D.C.

Use SGI's New Web Tool for Restoration Planning

Interested in planning a sagebrush habitat restoration across your landscape? The Sage Grouse Initiative has a new web tool that maps tree canopy cover in high-resolution across sage grouse range, since removing expanding conifers is a primary focus of SGI's conservation investment strategy. The map tool allows managers and planners to zoom in on a local site or scale up to a county or state. The raster data is free to download to your GIS for planning and conservation. Visit SGI's new web tool at <http://map.sagegrouseinitiative.com/>

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Graduate students John Severson, University of Idaho, and Charles Sandford, Utah State University, documented increases in nesting and brood success after sagebrush habitat was restored by removing encroaching conifers.

Please Cite As

Sage Grouse Initiative. 2017. Conifer Removal Boosts Sage Grouse Success. Science to Solutions Series Number 12. Sage Grouse Initiative, 4pp. <http://www.sagegrouseinitiative.com/>.

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January 2017

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Learn More



The Sage Grouse Initiative, led by the USDA's Natural Resources Conservation Service, is a partnership-based, science-driven effort that uses voluntary incentives to proactively conserve America's western rangelands, wildlife, and rural way of life.

To learn more, visit www.sagegrouseinitiative.com.