Where Trees ARE the Problem

Greg M. Peters, Western Working Lands for Wildlife

As coordinator of the Bruneau-Owyhee Sage-grouse Habitat (BOSH) Project, Connor White is no stranger to cutting juniper trees from sagebrush rangeland.

The BOSH landscape, like so much of sagebrush country, lies in the Great Basin, a vast sweep of western range that's seen a 600% increase in tree cover since the 1860s. White's job is to coordinate the removal of these intruders and he's got a lot of work to do. "Just through BOSH, we're treating 617,000 acres," he shares. "We're highly targeted, first focusing and timing our efforts to remove trees near leks without disrupting the birds. Then we expand out."

"There are a lot of reasons to cut invading trees from sagebrush habitats," explains Jeremy Maestas, an ecologist with the USDA-Natural Resources Conservation Service. "Benefitting imperiled sage-grouse populations is just one. Maintaining a functioning sagebrush ecosystem that supports over 350 species of conservation concern is another."

Maestas is part of the NRCS' Working Lands for Wildlife (WLFW) efforts, and over the last 15 years, he's become a proponent of strategic tree removal.

"I'm from Las Vegas. I love shade," he jokes. "But trees don't belong everywhere. These landscapes have way more trees than they had a couple hundred years ago. Over that same timeframe, shrubland and grassland birds have declined significantly. Expanding trees are among the primary drivers of those declines."

Fire: Friend, Foe, Friend

Fire was once a frequent visitor in the Great Plains and an infrequent, but regular feature of the sagebrush sea. Commonly set by indigenous tribes, fires helped limit trees, like juniper and pinyon-pine in sagebrush country and eastern redcedar in the Plains, to ridgetops, mountainsides, creek bottoms, and coulees. Fires also maintained grassland health, provided higher quality food for bison and big game, increased native medicinal plants,

and reduced the risk of nomadic settlements to more serious wildfires. As Euro-Americans moved west, natural fire regimes were largely eliminated, allowing trees to expand into productive shrub and grasslands.

"When we removed fire from the landscape and then planted millions of eastern redcedars as windbreaks, we set the stage for what we're seeing now," says Dirac Twidwell, a professor of rangeland ecology at the University of Nebraska and a Western WLFW science advisor. "Expanding redcedars are consuming as much prairie each year as crop expansion. They're pushing Great Plains grasslands towards collapse."

In the Great Plains, where 95% of the land is privately owned, conducting large-scale prescribed burns is challenging. But as trees continue their march into grasslands, landowners are partnering up and creating burn associations to share resources and burn more acres.

Twidwell notes that there are now more than 60 prescribed burn associations across the Great Plains. These efforts are restoring a "fire culture" that's been absent since the displacement of indigenous tribes in the region, but the Great Plains are a vast landscape. "We still need way more fire in way more places if we're going to reclaim our grasslands at scale."

Fast Facts:

- **North America's grassland birds have experienced a 53% population decline since the 1970s, the largest decline in any single terrestrial biome.**
- **90% of tree expansion in the Intermountain West has occurred at the expense of sagebrush range.**
- **Working rangelands better support wildlife than crops or other development, but tree expansion has reduced forage production in sagebrush and Great Plains rangelands by $4.1-$5.6 billion from 1990-2019.**

Resources and Tools:

- **Through WLFW, the NRCS produced two Frameworks for Conservation Action, one for the Sagebrush Biome and one for the Great Plains Grasslands Biome outline threats and guide investments from 2021-2025. Tree expansion is a major threat addressed in both biomes.**
- **Landscape Explorer a new online mapping tool developed by WLFW that uses historical and modern aerial imagery to highlight changes, like tree expansion, in the western U.S. since the 1950s.**
- **The new "Reducing Woody Encroachment in Grasslands: A Pocket Guide for Planning and Design" provides new guidance and resources for planners in grasslands. It was co-produced by WLFW and the Great Plains Grasslands Extension Partnership.**

Photo by Jeremy Roberts, Conservation Media

From a grassland ecology standpoint, well-managed prescribed fire at the right time of year, is often the best way to remove encroaching trees because it consumes seed sources that other methods leave behind. It also improves grassland productivity, recycles nutrients, and reduces the risk of future fires.

Mastication is one method of removing encroaching trees. Heavy machinery, equipped with special masticators, grinds up encroaching trees where they grow.

White agrees that using fire as part of the restoration process is critical. "I've realized that prescribed fire is really important, even in sagebrush country, and especially at higher elevations," he acknowledges. "It really helps kills more trees and eliminates seed sources."

Spreading the Word

Better communication is also helping folks recognize the extent of the problem and the solutions needed to tackle it. Twidwell developed the Eastern Redcedar Science Literacy Project and Maestas helped with the Pinyon-Juniper Encroachment Education Project, both of which provide science-backed education and resources about tree expansion. More than 20,000 copies of Twidwell's Vulnerability Guide, aimed at reducing grassland risk to woody encroachment, have been distributed since it came out in 2022. And in July 2023, partners, including WLFW, released a field-ready pocket guide for addressing woody plant expansion.

To reach an even broader audience, WLFW recently unveiled Landscape Explorer, a website that allows users to seamlessly swipe between historical and modern aerial imagery to see how trees (and other land-use changes) have altered landscapes from the Great Plains to the Pacific coast.

For the Birds

For ground-dwelling birds like sage-grouse and lesser and greater prairie-chickens, trees are a major threat. Predators like raptors and ravens perch in trees. At higher densities, trees crowd out forbs and grasses that the birds, other wildlife, and livestock rely on for food and habitat; they suck moisture from the soil, further impacting native vegetation; and they fuel more destructive wildfires.

It is well documented that these grouse species avoid areas with trees. A 2010 study by WLFW-affiliated scientists showed that sage-grouse abandon otherwise suitable habitat when trees cover just 4% of the landscape – that's only a few trees per acre! A similar study for lesser prairie-chickens showed the same.

Fortunately, the converse is also true. A long-term WLFW-supported study from Oregon showed that sage-grouse quickly return to areas where trees have been removed. Even better, the birds had a 12% higher population growth rate as compared to the control site where no trees were cut.

Defend the Core

It's taken a decade or so for scientists like Twidwell and agency officials like Maestas to figure out the best way to tackle woody species' relentless encroachment.

"For years we chased the problem, treating the most infested areas first," says Maestas. "But it was expensive and time-consuming, and we realized it didn't really have much of an impact. Trees kept sprouting up and degrading even more habitat."

Over the last several years, aided by advances in remote sensing technology that show where trees are expanding at scales from an individual pasture to an entire biome, Twidwell and Maestas have developed, and spread, a new strategy for managing trees: Defend the Core.

This approach identifies large and intact, "core" shrublands and grasslands and focuses management actions on defending them from early encroachment. Then managers and landowners work outwards, expanding the core. In areas where trees have completely taken over, managers help communities mitigate effects and adapt to new realities. The approach works at nearly any spatial scale, whether a single ranch or an entire biome, and it's the approach White and partners use at BOSH.

"Despite the extent of this problem, two of the largest intact grass and shrublands in the world are here in the U.S. - the Sandhills in Nebraska and the central Wyoming Basin," says Twidwell. "We're starting to see groups really come together to defend these last grasslands from trees and other threats. It's an exciting time to be working in grassland conservation."