PINYON/JUNIPER REMOVAL FOR PROACTIVE HABITAT RESTORATION

Overview: *The state of Utah has, and continues to invest millions of dollars into enhancing and restoring habitat for Sage-grouse through targeted removal of conifers. Recent peer-reviewed scientific research demonstrates that conifer removal is an important conservation practice for Sage-grouse. The study found that even a small percentage of encroachment by pinyon and juniper trees can lead Greater Sage-grouse to abandon an area that has provided suitable habitat. Since 2006, Utah has completed conservation projects on over 560,000 acres of Sage-grouse habitat through Utah's Watershed Restoration Initiative and its partners. This program leads the country in addressing habitat loss from conifer encroachment.*

Restoring Sage-Grouse Habitat Matters

Conifer encroachment, primarily of pinyon and juniper species, is an area of emphasis in conservation planning within the state of Utah and other Western states. There is a good reason why this is so important. Pinyon and juniper trees have expanded into hundreds of thousands of acres of Utah Sage-grouse habitat in the last 150 years. This is estimated to be an increase of 600% from pre-settlement landscapes [Need a Source].

Currently, there is sufficient habitat to support healthy Sage-grouse populations. However, the U.S. Fish and Wildlife Service has determined that one of the primary threats which support a listing under the Endangered Species Act is habitat fragmentation, in large part due to conifer encroachment into suitable habitat. To ameliorate the threats posed by encroachment of conifers, the state of Utah has developed a comprehensive science-based strategy to remove conifers that are beginning to encroach into existing habitat. Utah's plans also have a more ambitious goal: to increase the amount of suitable habitat and the quality of those habitats within each of the state's Sage Grouse Management Areas (SGMAs).

Figure 1 - Biologists work with landowners to implement conifer removal on private property. This program not only helps Sage-grouse populations, it can improve desirability of habitat for grazing.

How Conifer Woodlands Impact Greater Sage-Grouse

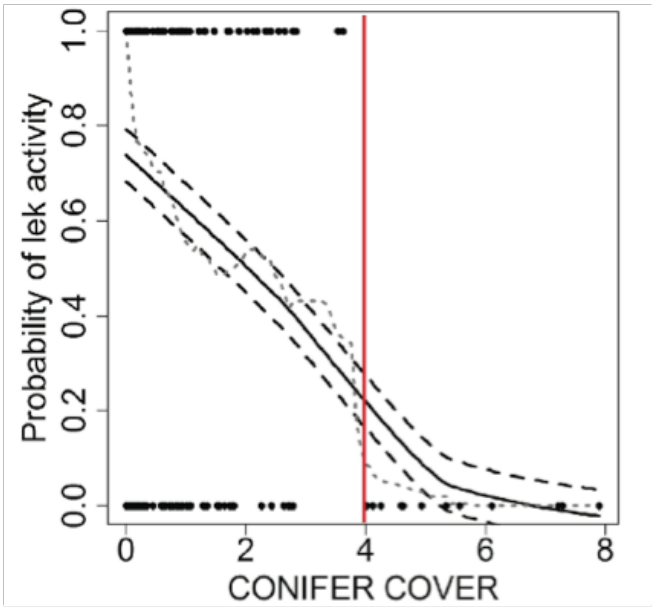
To develop comprehensive strategies and implement conifer removal projects in ways that ensure maximum benefit for Greater Sage-grouse, it is important to understand how conifers impact Sage-grouse populations. Pinyon/juniper encroachment hurts Sage-grouse and Sage-grouse habitats in four fundamental ways:

1. Creating an inhospitable environment for Sage-grouse populations;
2. Crowding out of sagebrush, grasses and forbs;
3. Increasing the frequency and severity of wildfires; and
4. Altering landscapes in other ways that diminish the value of habitat for Sage-grouse.

A recent study conducted by The Nature Conservancy, University of Idaho and Natural Resources Conservation Service (NRCS) Sage-Grouse Initiative demonstrates that Sage-grouse may avoid areas of even low-density conifer encroachment.

The study found that Sage-grouse leks were not active in areas where conifers covered more than 4% of the land area (Figure 2). The study also demonstrated that even small trees widely scattered across a landscape resulted in avoidance by Sage-grouse. While these early encroachment stands are less impactful on the understory vegetation than higher density conifer stands, these areas still did not contain active Sage-grouse leks.

Figure 2 - Recent research underscores the importance of using science-based solutions and proven methodologies in planning and implementing conifer treatment programs.



Avoidance is not the only way that conifers affect Sage-grouse. Jeremy Maestas from the NRCS Sage-Grouse Initiative Technical Team explains how conifers directly impact Sage-grouse habitats, "They act like millions of tiny little straws sucking up what little moisture we get…it eventually dries up the springs and streams that are so critical to this desert environment." Conifers can also affect soil acidity, compete with understory grasses, forbs and other plants that Sage-grouse rely on for food. Additionally, larger trees can serve as roosts for hawks, ravens, crows and other birds that prey on Sage-grouse eggs and nestlings. Just as important, conifer woodlands increase fuel loads that can, in turn, dramatically increase the risk of catastrophic wildfire. These wildfires can alter the suitability of Sage-grouse habitat for years.

Not only do conifers increase the risk of wildfire, but the density of conifer stands can increase with the passage of time. Twenty years from now, phase I and phase II conifer stands (low density) may progress to higher density phase III conifer stands (Figure 3). This is one major concern because rehabilitation of phase III conifer stands and areas burned by catastrophic wildfires is more expensive and takes much longer than restoration

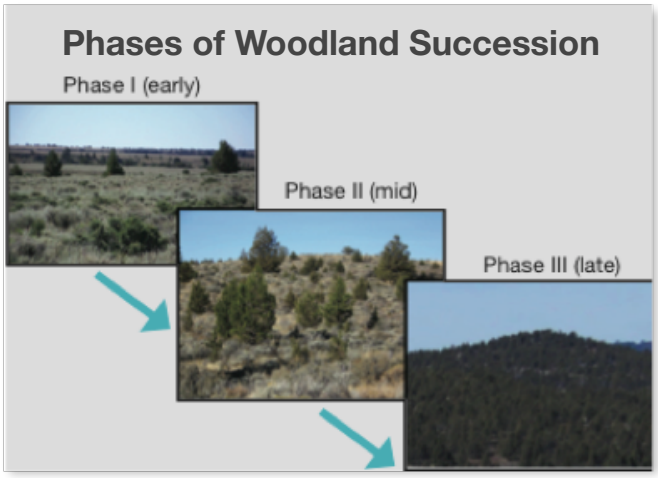


Figure 3 – Progression of conifer stands is an important focus of researchers and land managers.

projects on phase I and phase II stands. Utah's Conservation Plan for Greater Sage-grouse (the "Conservation Plan") directs the investment in solutions to address those challenges. In fact, the state anticipates budgeting millions of dollars to complete up to 75,000 acres of habitat work annually. [For example, in FY 2014, $YY million was directed toward these activities.]

Proven Strategies for Conifer Removal and Grouse

Scientists and other experts utilize specific criteria to prioritize treatments of the tens of thousands of acres of pinyon/juniper encroachment. These

Figure 4 - Lop and scatter provides cost effective long-term treatment for phase-I conifer encroachment.

criteria not only ensure proper implementation of removal projects, but also help improve utilization by Sage-grouse of treatment areas after projects are completed. Criteria for prioritization include, but are not limited to (1) wildfire frequency and intensity, (2) cheat grass dominance, (3) Sage-grouse carrying capacity in the SGMA, (4) habitat restoration capacity, (5) proximity of Sage-grouse populations, (6) seasonal importance of habitat to Sage-grouse, (7) proximity to mesic areas, (8) land ownership, (9) availability of funding for projects, and (10) regulatory obstacles to conservation projects.

State and federal agencies have identified several practical guidelines which dramatically improve the likely success of these treatments:

1. Targeting stands in early stages of encroachment with still intact sagebrush or areas which are important transition corridors;

Figure 5 - Higher density encroachment areas can be managed using brush hog treatment methodology.

2. Removing all conifer trees to reduce conifer cover to <4%; and
3. Using treatment methods that maintain sagebrush and understory cover.

This methodology is explained by the Natural Resource Conservation Service's Sage-Grouse Initiative:

"Managers can get the most bang for their buck by focusing conifer removal treatments on early encroachment stands in and around landscapes that are already pretty good for grouse. Prioritizing Phase I stands (those with young scattered trees, <10% conifer canopy cover and intact sagebrush and understory vegetation) for complete removal of conifers will likely prove the most effective for restoring and sustaining habitat. Treating early Phase II stands can also prevent conversion to conifer woodlands and help functionally restore sagebrush habitat for several decades. (Baruch-Mordo et al. 2013)."

Utah's Investment in Sage-Grouse Habitats

The state of Utah has a track record not only of investing in conifer removal, but also in recording the subsequent use of the treatment area by Sage-grouse. Since the year 2006, the Utah Watershed Restoration Initiative state of Utah has done projects on at least 560,000 acres of Sage-grouse habitat (Figure 6). A large percentage of these projects involve conifer removal. Utilizing the information gleaned from these efforts (best available science), experts in the state of Utah are able to better assess areas where conifer removal will provide the greatest conservation lift.

This ongoing comprehensive planning effort continues. The state of Utah has systematically identified areas in each of its SGMAs where conifer woodlands are encroaching into Sage-grouse habitat. In the summer of 2014, the state

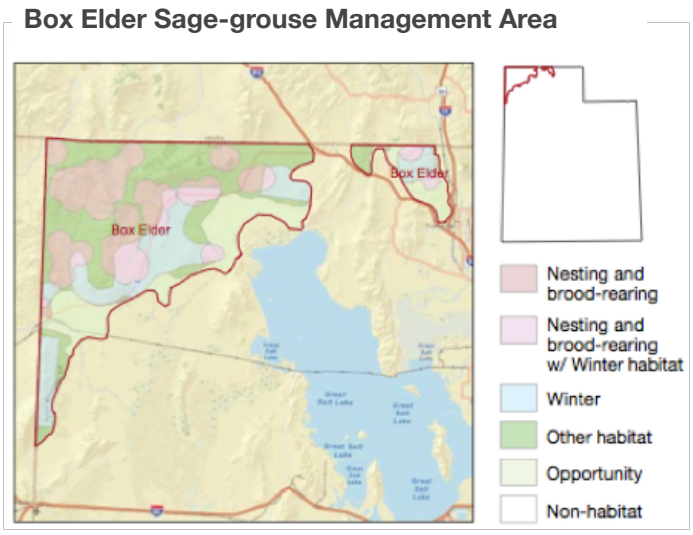


Figure 6 - Understanding Sage-grouse utilization of habitat is a fundamental part of habitat treatment projects within Sage-grouse Management Areas.

of Utah completed an extensive project that created fine-scale mapping (Figure 7) of pinyon pine and juniper coverage for all eleven SGMAs. This data is employed by the Sage-grouse biologists and ecologists who have a working knowledge of the habitats and Sage-grouse utilization patterns within Utah's SGMAs. Using this information, these experts have developed a comprehensive conifer removal strategy covering the next 2-15 years. Coordinating with local working groups, the state has completed detailed plans for implementing conifer removal projects for each SGMA.

Utilizing scientifically established benchmarks for successful implementation, ecologists and Sage-grouse experts are targeting removal in areas that will immediately benefit Sage-grouse. These programs identify areas of treatment according to the following criteria:

1. Encroachment Areas: stands of early phase encroachment in habitats currently utilized by Sage-grouse.
2. Tier I Opportunity Areas: phase I and phase II conifer stands with healthy understory but minimal or no utilization by Sage-grouse. Nearby bird populations are likely to use post-treatment.
3. Tier II Opportunity Areas: conifer stands with healthy understory and adjacent to encroachment areas. Less important to short-term strategies but providing longer-term opportunities for habitat restoration and enhancement.

Figure 7 - Implementation of the Conservation Plan proactively protects existing habitat and restores habitats in T1 and T2 opportunity areas not adequately utilized by birds due to conifer canopy thresholds.

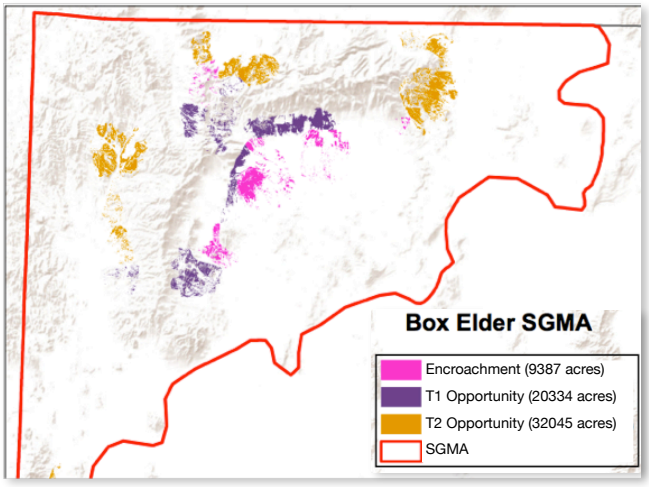


Figure 8 - Removal of encroaching pinyon/juniper ensures the health of watersheds in sage grouse habitats. This mesic area is an important source of food and moisture during summer brood rearing.

By implementing proven conservation practices in these treatment areas, Utah is not only reducing the threat of fragmentation of Sage-grouse habitat, the state is eliminating existing fragmentation and expanding and enhancing habitats in areas where sage grouse can thrive. These projects also increase the productivity of habitat for Greater Sage-grouse by improving stream flows, wet-meadows and the quality and quantity of food sources. Research in the state of Utah demonstrates that pinyon/juniper removal improves utilization rates by Greater Sage-grouse. Conifer removal also helps improve the quality of habitats by improving watersheds, enhancing the value of habitat for other game and non-game species, addressing the threat of wildfires and invasive plant species, and limiting the future encroachment of conifers.

Detailed Conservation Strategy for Long-Term Success

The Conservation Plan, as part of the identified goals and objectives, calls for the enhancement and improvement of habitat. To accomplish these goals, the state is in the final stages of implementing detailed plans to target pinyon/juniper removal. These finalized implementation plans clarify the general habitat definitions and expectations contained within the Conservation

Figure 9 - Projects that restore active corridors can help improve hatchlings survival success. These programs also provide valuable firebreaks and contribute to healthy watersheds.

Plan. Habitat areas mapped for the Conservation Plan have been found to contain areas of conifer encroachment which are prime targets for treatment. Additional acreage has been identified for subsequent treatment, labeled Tier I and Tier II Opportunity Areas.

Over the course of the next two years, the state will treat Encroachment Areas totaling 60,139 acres. Tier I Opportunity Areas totaling 100,320 acres will be treated during the next 5 years. Tier II Opportunity Areas totaling 184,811 will be treated during the next 15 years. Cumulatively, these projects will treat almost 350,000 acres of conifer. Not only will these projects ameliorate the threats posed by pinyon/juniper encroachment, it will actually significantly reduce habitat fragmentation by expanding the overall acreage of contiguous suitable Sage-grouse habitat within the Utah's SGMAs.

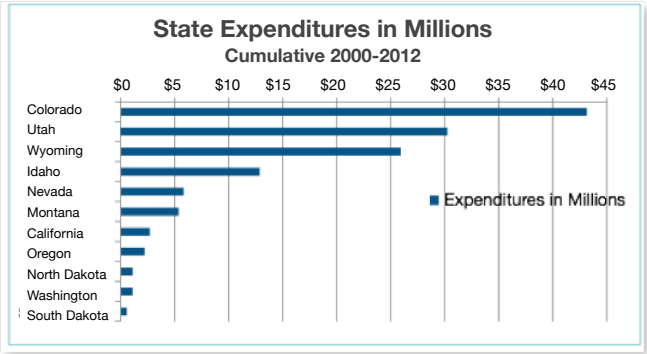


Figure 10 - Utah invests tens of millions of dollars on Sage-grouse conservation efforts.

The key to these projects is consistency. "Pinyon and Juniper encroachment happens at a very slow rate over a period of decades. Steady implementation of targeted conifer removal in Sage-grouse habitat is the best mechanism to stop the loss of nesting and breeding areas and restore habitat where sagebrush remains but conifers have displaced the Sage-grouse," explains Alan Clark, who oversees key aspects of Utah's Watershed Restoration Initiative. "As a result, we are now removing more acres of conifers in our SGMAs than the encroachment that is occurring, resulting in a net gain in contiguous Greater Sage-grouse habitat." While pinyon/juniper encroachment is not considered a threat in all of the state's SGMAs, some amount of work is planned in each SGMA. The scale of this statewide program is impressive.

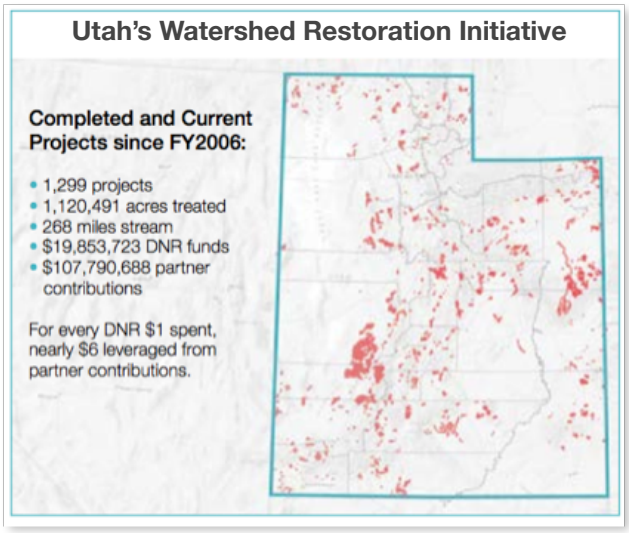


Figure 11 - Utah's Watershed Restoration Initiative is proactively implementing landscape scale habitat improvements for Greater Sage-grouse.

Breakdown of Utah's strategic plan for each SGMA:

1. Box Elder

Past Treatments:	91,185	acres
Encroachment Treatments 0-2 years:	9,387	acres
Tier I Opportunity Treatments 0-5 years:	20,334	acres
Tier II Opportunity Treatments 0-15 years:	32,045	acres
Box Elder Total:	**152,951**	**acres**

2. Parker Mountain

Past Treatments:	30,474	acres
Encroachment Treatments 0-2 years:	10,795	acres
Tier I Opportunity Treatments 0-5 years:	8,923	acres
Tier II Opportunity Treatments 0-15 years:	27,760	acres
Parker Mountain Total:	**77,952**	**acres**

3. Panguitch

Past Treatments:	53,086	acres
Encroachment Treatments 0-2 years:	11,995	acres
Tier I Opportunity Treatments 0-5 years:	10,315	acres
Tier II Opportunity Treatments 0-15 years:	27,356	acres
Panguitch Total:	**102,752**	**acres**

4. Rich/Morgan/Summit

Past Treatments:	29,852	acres
Encroachment Treatments 0-2 years:	3,202	acres
Tier I Opportunity Treatments 0-5 years:	20,334	acres
Tier II Opportunity Treatments 0-15 years:	32,045	acres
Rich/Morgan/Summit Total:	**85,433**	**acres**

5. Hamlin Valley

Past Treatments:	9,839	acres
Encroachment Treatments 0-2 years:	8,720	acres
Tier I Opportunity Treatments 0-5 years:	28,246	acres
Tier II Opportunity Treatments 0-15 years:	36,219	acres
Hamlin Valley Total:	**83,024**	**acres**

6. Sheep Rock Mountains

Past Treatments:	22,515	acres
Encroachment Treatments 0-2 years:	7,981	acres
Tier I Opportunity Treatments 0-5 years:	4,341	acres
Tier II Opportunity Treatments 0-15 years:	18,113	acres
Sheep Rock Mountains Total:	**52,950**	**acres**

7. Carbon

Past Treatments:	661	acres
Encroachment Treatments 0-2 years:	4,091	acres
Tier I Opportunity Treatments 0-5 years:	4,203	acres
Tier II Opportunity Treatments 0-15 years:	221	acres
Carbon Total:	**9,176**	**acres**

8. Bald Hills

Past Treatments:	68,799	acres
Encroachment Treatments 0-2 years:	2,577	acres
Tier I Opportunity Treatments 0-5 years:	1,466	acres
Tier II Opportunity Treatments 0-15 years:	4,841	acres
Bald Hills Total:	**77,683**	**acres**

9. Uintah

Past Treatments:	128,153	acres
Encroachment Treatments 0-2 years:	1,063	acres
Tier I Opportunity Treatments 0-5 years:	1,383	acres
Tier II Opportunity Treatments 0-15 years:	2,718	acres
Uintah Total:	**133,317**	**acres**

10. Ibapah

Past Treatments:	7,413	acres
Encroachment Treatments 0-2 years:	139	acres
Tier I Opportunity Treatments 0-5 years:	476	acres
Tier II Opportunity Treatments 0-15 years:	3,266	acres
Ibapah Total:	**11,294**	**acres**

11. Strawberry

Past Treatments:	8,473	acres
Encroachment Treatments 0-2 years:	189	acres
Tier I Opportunity Treatments 0-5 years:	299	acres
Tier II Opportunity Treatments 0-15 years:	227	acres
Strawberry Total:	**9,188**	**acres**

Conclusion

Research in the state of Utah is demonstrating that with the removal of trees in encroachment and opportunity areas, Sage-grouse can begin to immediately occupy these newly restored areas. "We are seeing these treatments immediately increase Sage-grouse habitats, both in its suitability and in Sage-grouse utilization. We recognize that there is concern about the loss of habitat to conifer encroachment. Our research demonstrates that the trend is immediately reversible when projects account for the conditions needed for birds to begin utilization of a treatment area," explains [Terry Mesmer, PhD Sage-grouse Range Biologist who has been studying the birds for over 20 years.] "Utah is demonstrating a long-term commitment to ameliorate the threat of conifer encroachment

Figure 12 - Sage-grouse chick in restoration area.

through detailed planning, commitment of resources and implementation of proven science-based solutions. Federal commitments to augment the resources available to do this work and reducing the hurdles to implementation will go a long-way to accelerating this process."

The next 10-15 years will be critical. Approximately 80% of the identified pinyon/juniper occupied areas in the state are categorized as phase I or II, meaning these areas still have a healthy understory. These will eventually evolve into phase III conifer stands without treatment. Utah's fine-scale mapping of pinyon-juniper encroachment into Sage-grouse core areas is informing a state-wide conservation strategy to address conifer encroachment. With 560,000 acres of Sage-grouse treated since 2006 and an additional 340,000 acres planned in the next 10-15 years, the state of Utah is ameliorating the threat posed by conifer encroachment into Greater Sage-grouse habitat. These programs also help restore healthy watersheds, address the threat of wildfire and improve working landscapes for range, productivity and wildlife.

"Our research demonstrates that the trend is immediately reversible when projects account for the conditions needed for birds to begin utilization of a treatment area."

—TERRY MESMER, PHD SAGE-GROUSE RANGE BIOLOGIST

Sources and Additional Reading

Sage Grouse Initiative. 2014. Conifer removal restores sage grouse habitat. Science to Solutions Series Number 2. Sage Grouse Initiative. 4pp. http://www.sagegrouseinitiative.com/wp-content/uploads/2014/09/Conifer-Encroachment-HIGH-RES-FINAL-091614.pdf

Baruch-Mordo, S., J.S. Evans, J.P. Severson, D.E. Naugle, J.D. Maestas, J.M. Kiesecker, M.J. Falkowski, C.A. Hagan, and K.P. Reese. 2013. Saving Sage-grouse from the trees: a proactive solution to reducing a key threat to a candidate species. Biological Conservation 167:233-241.

Knick, S., S.E. Hanser, and M. Leu. In press. Ecological scale of bird community response to pinyon-juniper removal. Rangeland Ecology & Management.

Miller, R.F., J.D. Bates, T.J. Svejcar, F.B. Pierson, and L.E. Eddleman. 2005. Biology, Ecology, and Management of Western Juniper. Oregon State University, Agricultural Experiment Station Technical Bulletin 152.

SGI. 2013. Tackling conifer encroachment. Produced by Conservation Media. Sage Grouse Initiative. Video available at: http://www.sagegrouseinitiative.com/news-media/ photo-video-gallery/.Miller, R. F., J. D. Bates, T. J. Svejcar, F. B. Pierson, L. E. Eddleman. 2007. Western juniper field guide: asking the right questions to select appropriate management actions. U.S. Geological Survey, Circular 1321.

Tausch, R.J., Miller, R.F., Roundy, B.A., and Chambers, J.C., 2009, Piñon and juniper field guide: Asking the right questions to select appropriate management actions: U.S. Geological Survey Circular 1335, 96 p.