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CEAP-Wildlife Conservation Insight

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Conifer Removal Benefits Sage-Grouse, Other Sagebrush Birds, and Rangeland Productivity

Summary of Findings

The encroachment of native conifers (pinyon-juniper) into western sage-steppe rangelands has negatively affected ecosystem services provided by sagebrush habitats and threatens sagebrush-dependent wildlife. Where these conifers now dominate, relationships between snow distributions, water budgets, plant community dynamics, and wildlife habitat are disrupted.

Large-scale encroached conifer removal is an increasingly widespread practice that benefits rangeland productivity and restores habitat quality for sage-grouse and other sagebrush-dependent wildlife. Recent studies show that after encroached conifers are removed, sage-grouse occupancy, nest survival, and brood success are greatly improved. Studies also show that sagebrush songbirds recolonize rapidly following encroached conifer removal.

Encroached conifers cause snow to accumulate uniformly on rangelands, resulting in faster snowmelt than on more open landscapes where water is stored longer in drifted snow. Removing the conifers can improve summer water budgets, which benefits ranchers and wildlife.

Through the Sage-Grouse Initiative, the Natural Resource Conservation Service and partners have worked to increase the utilization of mechanical conifer removal to improve and restore sagebrush habitats for wildlife and rangeland sustainability.

Background

Woodland encroachment into grassy biomes is compromising grassland ecosystem function across the globe (Veldman *et al.* 2015; Nackley *et al.* 2017). In the United States, native woody plants have invaded over 800 million acres of historically non-forest lands (Eldridge *et al.* 2011). Encroachment of conifers into sage-steppe rangelands in the western U.S. negatively impacts ecosystem services provided by sagebrush habitats (Kormos *et al.* 2017) and threatens the greater sage-grouse and other sagebrush-dependent wildlife (Donnelly *et al.* 2017; Holmes *et al.* 2017; Sandford *et al.* 2017; Severson *et al.* 2017a,b; Hamilton *et al.* 2018). This Conservation Insight highlights recent studies that show the benefits of encroached conifer removal—an increasingly widespread conservation practice—to sage-grouse and other sagebrush birds, as well as rangeland health and productivity.

Pinyon-juniper conifers have spread into millions of acres of sagebrush habitat since the mid-19th century due primarily to fire suppression, climate change, and land use change. Though conifers are native to the Intermountain Western U.S., their encroachment into native rangelands of the region has altered the dynamics of sagebrush systems, compromising ecosystem resilience and negatively impacting the occupancy and habitat use of sagebrush-dependent wildlife. Although conifer removal in the western U.S. is increasingly common, little was known until recently whether the practice achieves its intended conservation outcomes (Miller *et al.* 2017).

Encroached conifers also impact the quality of sagebrush habitats by altering soil resources and ecohydrology (the dynamics of water in an ecosystem) in ways that limit water availability to native shrubs and understory herbaceous plants. Western juniper—a conifer species common to

Native conifers, seen mostly in the background here, are invading western U.S. rangelands once dominated by sagebrush (foreground), negatively impacting sagebrush-dependent wildlife, such as the sage-grouse, and water supply.

The practice of mechanical removal of encroached conifers is increasing in the West and helps restore sagebrush habitats. The effects of conifer removal on wildlife and rangeland condition are explored in the assessments featured in this Conservation Insight.

pinyon-juniper woodlands—has come to dominate much of the rangeland Intermountain West, affecting critical ecohydrological relationships between snow distributions and water budgets, plant community dynamics, and wildlife habitat (Kormos *et al.* 2017). The effects of juniper encroachment on the ecohydrology of sagebrush ecosystems, however, have not been well documented. Especially understudied is the relationship between water availability and the distribution of snow accumulation among encroached conifers versus open landscapes without trees.

Through the Sage-Grouse Initiative (SGI), the Natural Resources Conservation Service (NRCS) and partners have worked to increase the use of mechanical removal of encroached conifers to improve and restore sagebrush habitats. Knowing the outcomes of conifer removal on wildlife and rangeland condition will improve the science base underlying this conservation practice and provide a means for the USDA and its partners to better serve the land and the wildlife, and the people that depend on both.

Assessment Partnerships

The assessments covered in this Conservation Insight were conducted by the NRCS Conservation Effects Assessment Project (CEAP) and SGI partners, including the Agricultural Research Service, Bureau of Land Management, U.S. Fish and Wildlife Service, Utah Division of Wildlife, Oregon State University, Utah State University, University of Idaho, University of Montana, Intermountain West Joint Venture, Northwest Wildlife Science, and Point Blue Conservation Science. Additional details are available from the sources listed in the reference section, the SGI website (http://www.sagegrouseinitiative.com), and the CEAP website (https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/ceap/).

Assessment Approach

Sage-grouse productivity

Assessments on public and private lands in Oregon (Severson *et al.* 2017a,b) and northwest Utah (Sandford *et al.* 2017) evaluated sage-grouse responses to large-scale encroached conifer removal. In these studies, investigators tracked female sage-grouse following conifer removal treatments.

The decade-long study in Oregon evaluated sage-grouse habitat use, nest site selection, and survival in the Warner Valley within the northern Great Basin. The investigators set up a 84,000-acre treatment study area in south-central Oregon and a 99,000-acre untreated control area on the Oregon-Nevada border. Encroached conifer removal was applied over several years in the treatment area from late fall to early spring by hand-cutting conifers to maximize retention of native shrubs. From 2010 to 2014, the investigators tracked female sage-grouse to evaluate the impacts of encroached conifer removal on nest site selection. Investigators also monitored survival before and after conifer removal within the study areas. Then, they used statistical models of population growth to examine how the treatment impacts on survival translated to changes in population growth.

In northwest Utah, researchers evaluated differences in nest and brood success in response to encroached conifer removal. The study area consisted of about 322,700 acres in the Box Elder Sage-Grouse Management Area, which harbors one of the largest and most stable sage-grouse populations in Utah. The area is a mix of public and private land having mostly a sagebrush-steppe habitat invaded by native and non-native conifers and primarily used for domestic livestock and alfalfa hay production. From 2012 to 2015, investigators tracked female sage-grouse and monitored nest success (success = at least one egg hatched). When a female successfully hatched a clutch, they continued tracking for 50 days to determine brood success. The investigators then used a baseline disturbance map (Manier *et al.* 2014) and a conifer cover map (Falkowski *et al.* 2014, corrected with 2012-2015 treatment updates using study data) to analyze the impacts of conifer encroachment and disturbances (roads, power lines, urban development, nonurban development, agricultural activity) on nest site selection, nest success, and brood success.

Passerine bird responses

Sage-grouse conservation efforts have assumed broader ecosystem and multiple-species benefits (NRCS 2015a,b, USFWS 2015), and those assumptions have recently begun to be assessed through empirical studies. Assessments conducted across the western U.S. (Donnelly *et al.* 2017) and in

Oregon (Holmes *et al.* 2017) used bird survey count data at different scales to examine benefits of large-scale sage-grouse conservation to other sagebrush bird species.

A study across western sagebrush rangeland in the U.S. used a modeling approach to identify patterns of passerine songbird abundance in relation to sage-grouse distributions, and to evaluate broader benefits of targeted sage-grouse conservation (i.e., encroached conifer removal). The study area encompassed about 96% of the sagebrush landcover in the western U.S., including seven Western Association of Fish and Wildlife Agencies Sage-Grouse Management Zones, which represent geographical sage-grouse population segments that are delineated by common ecological characteristics (Stiver *et al.* 2006; Figure 1). The investigators used North American Breeding Bird Survey count data to assess influences on the distribution and abundance of three sagebrush songbird species: Brewer's sparrow, sagebrush sparrow, and sage thrasher. They modeled songbird abundance across the study area and then evaluated co-occurrence within known sage-grouse distributions. The results were then summarized within Management Zones to evaluate patterns of songbird abundance that coincide with sage-grouse habitat restoration via conifer removal as well as with landscape protections strategies (Wyoming's sage-grouse core areas, and the Fire and Invasive Assessment Tool (FIAT)). The BLM and USFS identify priority habitat areas and management strategies through FIAT assessments to reduce threats to sage-grouse and songbirds from invasive annual grasses, wildfire, and conifer expansion (BLM 2014), whereas the state of Wyoming primarily focuses on human-induced habitat fragmentation such as development of rural areas for subdivisions and energy production (State of Wyoming Executive Department 2015; Donnelly *et al.* 2017).

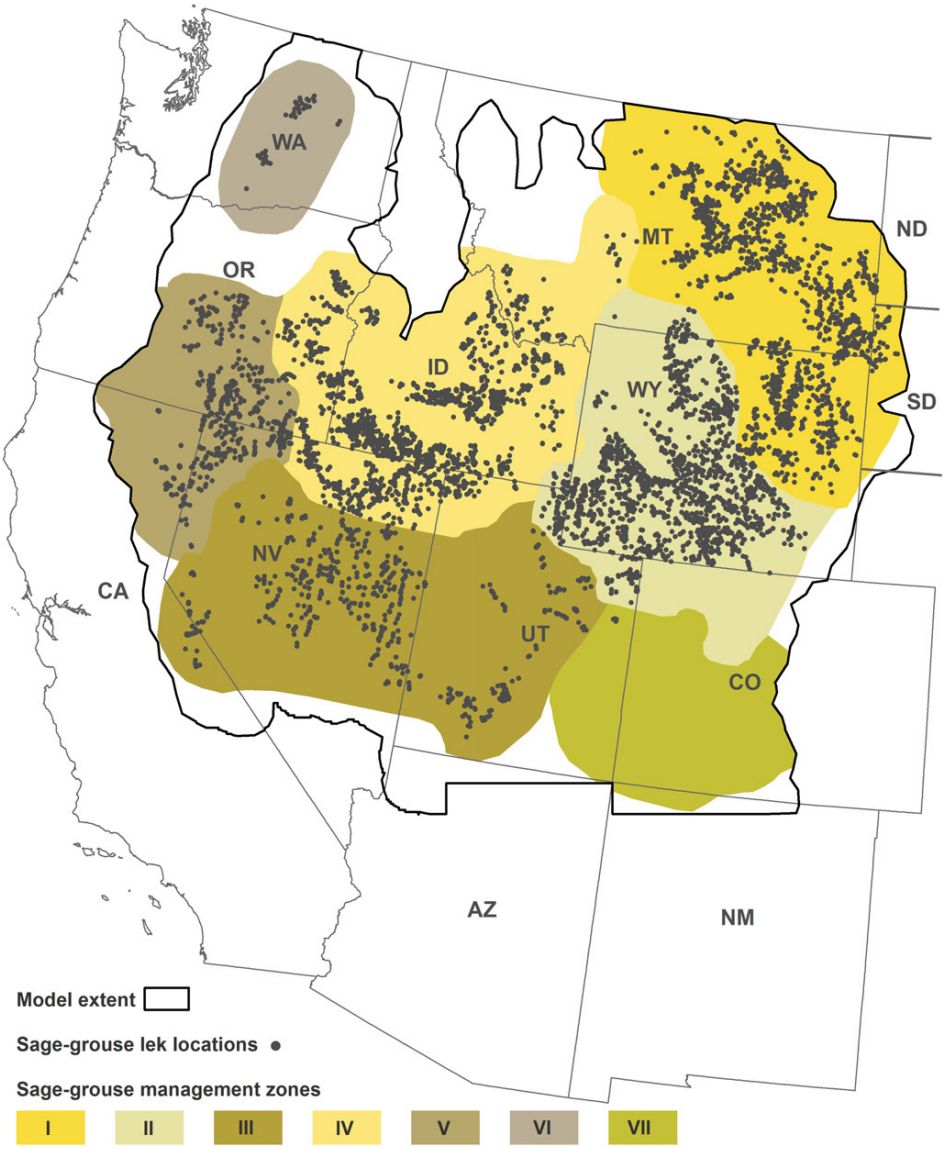

Figure 1. Study area encompassing >96% of sagebrush land-cover in western North America (>1.7 million km^2). Lek locations are representative of greater sage-grouse distributions in 10 of 11 western states that have sage-grouse populations (California, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming). Western Association of Fish and Wildlife Agencies Sage-Grouse Management Zones (I-VII) are representative of geographical population segments containing common ecological setting and stressors. Small portions of sagebrush lands in northern Arizona and New Mexico were omitted, as there was no potential for overlap within the range of sage-grouse. Figure from Donnelly et al. (2017).

The Oregon study used a field sampling approach to evaluate changes in passerine songbird abundances in response to juniper removal. The study area, the South Warner juniper removal project area, was a 68,880-acre high-elevation plateau that is 78% publicly owned land administered by the U.S. Bureau of Land Management and 22% privately owned ranchlands. The BLM developed encroached conifer removal treatments beginning in 2012 with the goal of maintaining sagebrush cover that is required by sagebrush-dependent birds, and similar management actions were carried out on private lands. To assess the impacts of encroached conifer removal on songbird populations, investigators estimated songbird abundances at sagebrush sites where juniper had not yet been removed and at sites 1, 2, and 3 years post-removal. This was done using a space-for-time substitution, where sites with different times since treatment were all sampled in the same breeding season across space, instead of sampling sites across multiple breeding seasons through time.

Rangeland water availability

A study in Idaho integrated environmental measurements with an advanced modeling approach to assess the impacts of encroached conifer removal on rangeland water avail-

Sage-grouse in flight.

ability (Kormos *et al.* 2017). The study sites consisted of four catchments in snow-dominated rangeland watersheds within the Owyhee Mountains east of the Idaho-Oregon border. Investigators modeled watershed topography and meteorological variables—temperature, precipitation, wind, solar and thermal radiation, and vapor pressure—to estimate snow accumulation and melt, then they combined that with snow distribution, soil water availability, and streamflow data for six water years (WY) (a WY is from October 1 to September 30) from WY2008 to WY2013. The model produced estimates of snow water equivalent (the amount of water contained within a snowpack), snow melt, and surface water input (the combined water drainage leaving the bottom of the snow pack and rain on the ground surface) throughout the study area. Sagebrush was the dominant shrub at all sites, but each catchment was primarily juniper-dominated. So, the model initially used measurements from the late-succession juniper conditions, and then sagebrush-dominated scenarios (conditions with a mosaic of sagebrush vegetation) were modeled and compared to the juniper-dominated scenarios.

Findings

Sage-grouse productivity

Results from the Oregon and Utah studies demonstrated that encroached conifer removal improved sage-grouse productivity. In Oregon, conifer removal expanded sage-grouse habitat about 23,730 acres (about 7,910 ± 1,186 acres annually), which increased the total area available for nesting within the treatment landscape by 28%. Consequently, the probability of nesting increased 22% annually in sites that were restored by conifer removal treatments (Figure 2a), and female sage-grouse were 43% more likely to nest within 1,000 m of treatments (Figure 2b). Over the course of the study, about 29% of the tracked sage-grouse (9.5 ± 1.2% annually) shifted nesting activities into previously unused mountain big sagebrush areas that were cleared of encroaching conifers. Additionally, annual female survival was 6.6% higher and nest survival was 18.8% higher in the conifer removal area than in the untreated control area. The differences in survival rates led to projections of improved population growth in the treatment area, indicating significant benefits of encroached conifer removal on sage-grouse productivity. Preliminary results of integrated population modeling in the Warner Mountains study area imply a 12% higher sage-grouse population growth rate in rangelands restored by conifer removal than in nearby control areas invaded by trees (Andrew Olsen, unpublished data).

Of variables examined in the Utah study, conifer canopy cover and proximity to encroached conifer removal were the strongest drivers of female sage-grouse habitat use. Overall, sage-grouse tended to select nest and brooding sites closer to treatment areas that had lower conifer canopy cover. The probability of success at nest sites and brood locations declined significantly for females that selected sites with increasing conifer canopy cover (Figure 3a, Figure 4a). Similarly, the probability of success declined further from conifer removal treatments (Figure 3b, Figure 4b). Additionally, sage-grouse females with broods tended to select areas further from disturbances such as roads and agriculture (alfalfa production, fallow fields, pasture).

Passerine bird responses

In both passerine songbird studies, results indicated that spatially-targeted encroached conifer removal that is implemented for sage-grouse conservation can provide benefits to other sagebrush-dependent birds, including several species of conservation concern. Results from the western U.S. study show that songbird abundance was positively associated with sagebrush land-cover, sage-grouse distributions, and sage-grouse conservation practices (Figure 5). The individual songbird models revealed an apparent 40% threshold in sagebrush land-cover, beyond which songbird abundances increased dramatically (Figure 6). Landscapes with a high abundance of sage-grouse leks supported 13-19% higher songbird densities compared to range-wide mean densities. Over 85% of the conifer removal areas conducted through the SGI had high to moderate Brewer's sparrow abundance, and about 30% had high to moderate sagebrush sparrow and sage thrasher abundances. Wyoming's core area strategy for sage-grouse encompasses half of the high-to-moderate sagebrush sparrow and sage thrasher populations. Similarly, in the Great Basin, half of the high-to-moderate populations of these species were in areas with sage-grouse FIAT priorities.

In the Oregon study, investigators detected 58 different species of birds. Six

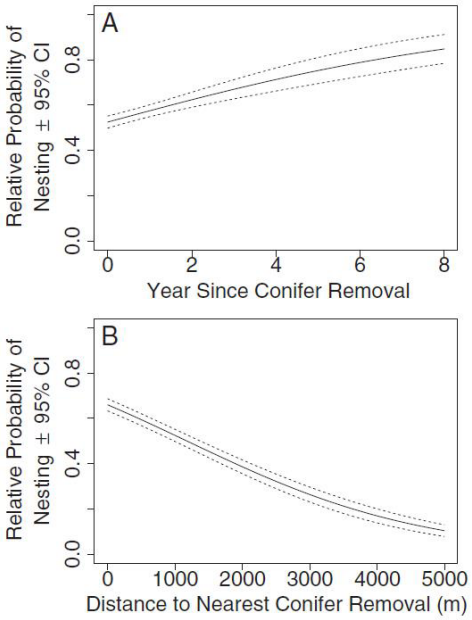

Figure 2. Response plots for relative probability of greater sage-grouse nesting in relation to conifer removal areas in Lake County, Oregon, 2010-2014. Relative probability of nesting (A) in a treated area as a function of time since cut and (B) near a treated area as a function of distance to nearest removal area. Figure from Severson et al. (2017a).

of these species comprised 68% of the detections, among which the Brewer's sparrow, green-tailed towhee, and vesper sparrow exhibited increased densities (inferred by the number of territorial males) in response to juniper removal (Figure 7). Brewer's sparrow density at treated sites 3 years post-removal was 23.6 ± 4.2 territories per km^2 higher than at untreated sites, which equates to 1,212-1,737 additional nesting pairs within the study area. Green-tailed towhee increased in density by 4.6 ± 1.5 territories per km^2, adding an estimated 194-381 nesting pairs to the study area. And the vesper sparrow density increased by 6.5 ± 1.9 territories per km^2, increasing nesting pairs in the study area by 460-559. Based on observations during bird surveys, the lark sparrow, spotted towhee, and sage thrasher also appeared to increase in abundance and occur more widely post-treatment, though the investigators lacked sufficient count data to perform statistically sound analyses for these species.

Rangeland water availability

In the Idaho study, juniper-dominated catchments had less consistent snow water equivalent, earlier snow melt, and lower streamflow relative to sagebrush-dominated catchments. The late-season (April 1) distributions of snow water equivalent shown in the modeling scenarios demonstrated how juniper cover influences the distribution of snow cover and thus the ecohydrology of a landscape. The juniper-dominated scenario showed catchments having a uniform snow distribution (Figure 8a), whereas the sagebrush-dominated scenario had a more heterogenous snow distribution (Figure 8b), which enables more snow water equivalent stored in drifts. Due to increased water storage in snow drifts, water delivery was delayed by 9 days in the sagebrush-dominated scenario compared to the juniper dominated scenario. The differences in snow dynamics translated to higher mean annual streamflow (212 mm) and higher mean runoff ratio (0.38) in the sagebrush-dominated scenario than in the juniper-dominated scenario (streamflow: 115 mm, ratio: 0.16). These results demonstrate that juniper encroachment can significantly alter local water balances by affecting snow distribution, timing and magnitude of melt, and delivery of water to the soil, which has wide-ranging implications for available surface and soil water and for vegetation dynamics associated with sage-grouse and other sagebrush-dependent wildlife.

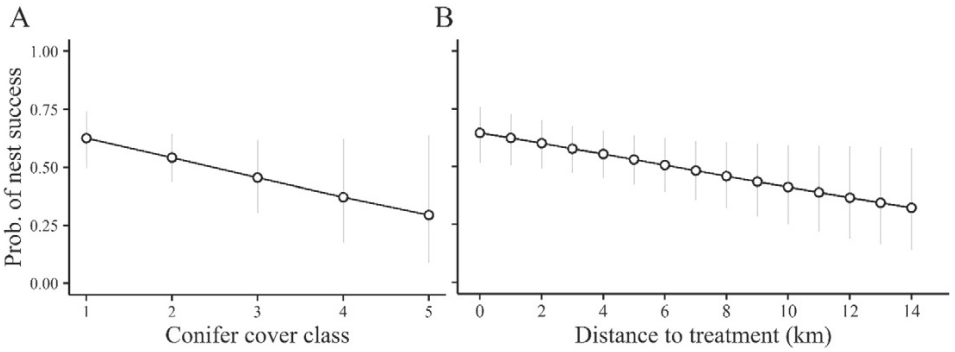

Figure 3. Probability of female sage-grouse nest success as a function of (A) conifer canopy cover class and (B) distance to conifer removal area in Park Valley, Utah, from 2012 to 2015. Probability of nest success deceased by 30% for each unit increase in conifer canopy cover (95% CI = −0.78, 0.08) and decreased by 9.1% (95% CI = −0.096, −0.001) for every 1 km a nest was located away from a conifer removal area. Note: Conifer canopy cover percent was divided into five classes: 1) 0−4%, 2) 4−10%, 3) 10−20%, 4) 20−50%, 5) 50+% per acre. Figure from Sandford et al. (2017).

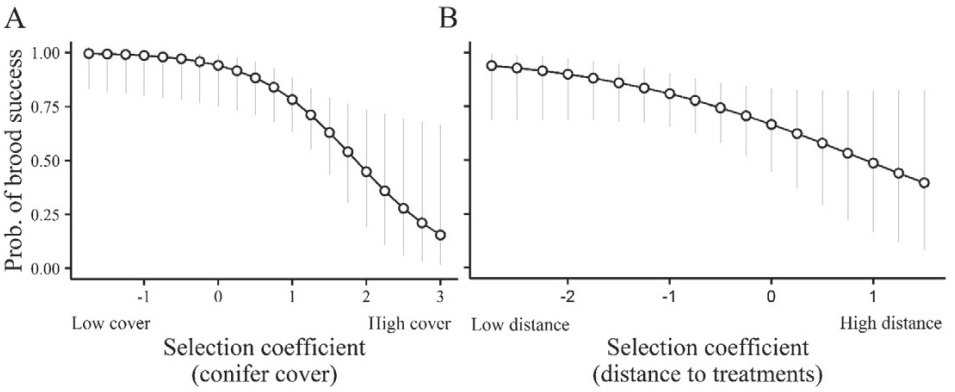

Figure 4. Probability of greater sage-grouse brood success plotted against selection coefficient estimates of (A) the average female of conifer canopy cover and (B) distance to conifer removal area in Park Valley, Utah, from 2012 to 2015. Probability of brood success decreased by 77.2% for each unit increase in canopy cover (95% CI = −2.74, −0.22) and decreased by 52.6% for each unit increase in distance from conifer removal area (95% CI= −1.60, 0.11). Figure from Sandford et al. (2017).

Putting Findings into Practice

The assessments described here illustrate the value of encroached conifer removal for landscape-scale sagebrush habitat restoration. Woodland encroachment into grassy biomes is a global problem (Veldman *et al.* 2015; Nackley *et al.* 2017), for which invasion of sagebrush systems by conifers in the Intermountain Western U.S. serves as a major example (Maestas *et al.* 2019). In coordination with many partners, the SGI and the NRCS have carried out encroached conifer removal on over half a million acres, leading the way for others to act similarly. Considering the rapid expansion of this conservation practice, assessments are needed to evaluate how well the practice achieves conservation outcomes. The findings outlined here represent some of the first data documenting the positive impacts of large-scale encroached conifer removal on sagebrush-dependent wildlife and rangeland productivity.

Observations and anecdotes from field technicians, farmers, ranchers, and land managers have espoused the benefits of combatting conifer encroachment through removal

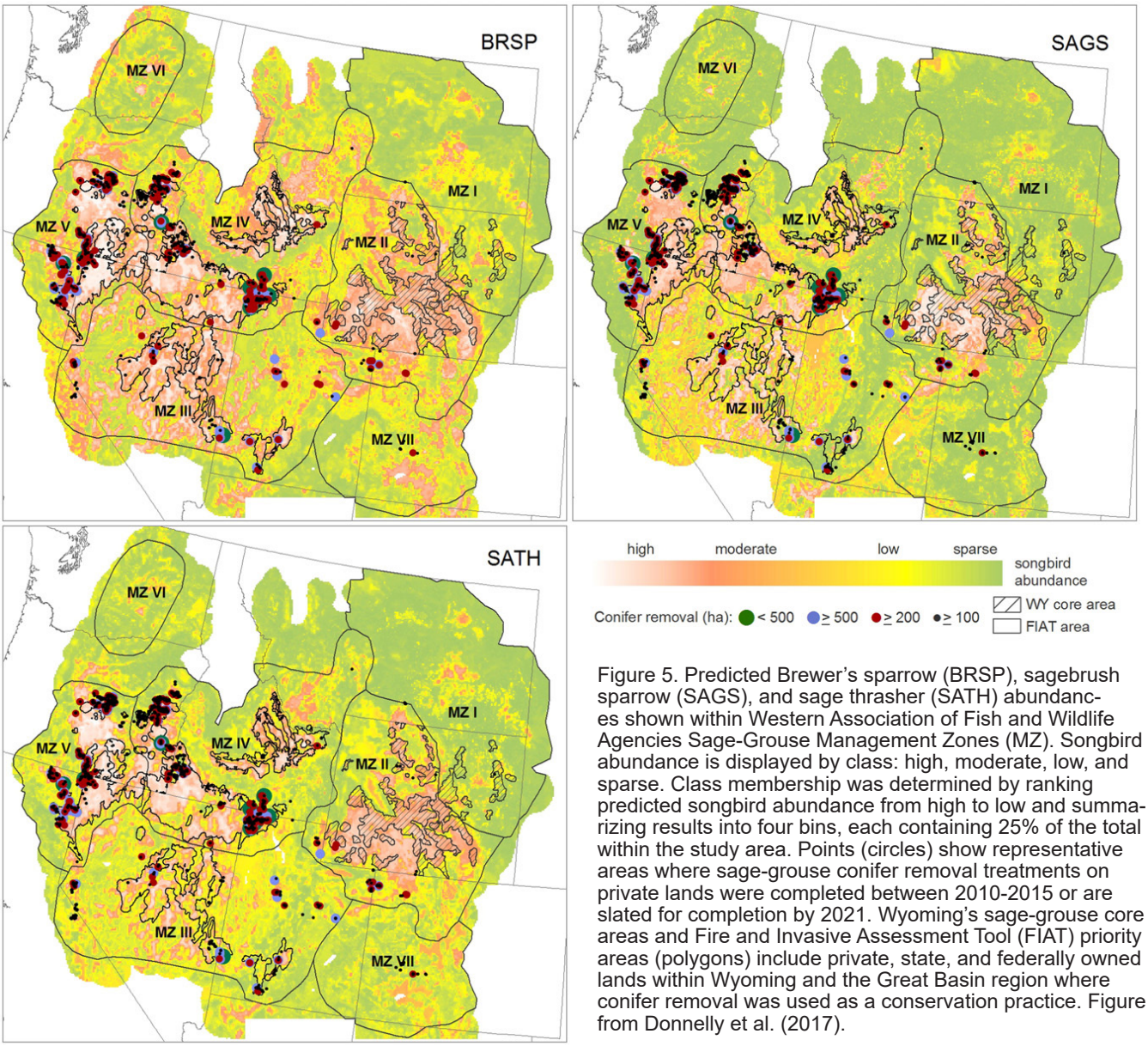

Figure 5. Predicted Brewer's sparrow (BRSP), sagebrush sparrow (SAGS), and sage thrasher (SATH) abundances shown within Western Association of Fish and Wildlife Agencies Sage-Grouse Management Zones (MZ). Songbird abundance is displayed by class: high, moderate, low, and sparse. Class membership was determined by ranking predicted songbird abundance from high to low and summarizing results into four bins, each containing 25% of the total within the study area. Points (circles) show representative areas where sage-grouse conifer removal treatments on private lands were completed between 2010-2015 or are slated for completion by 2021. Wyoming's sage-grouse core areas and Fire and Invasive Assessment Tool (FIAT) priority areas (polygons) include private, state, and federally owned lands within Wyoming and the Great Basin region where conifer removal was used as a conservation practice. Figure from Donnelly et al. (2017).

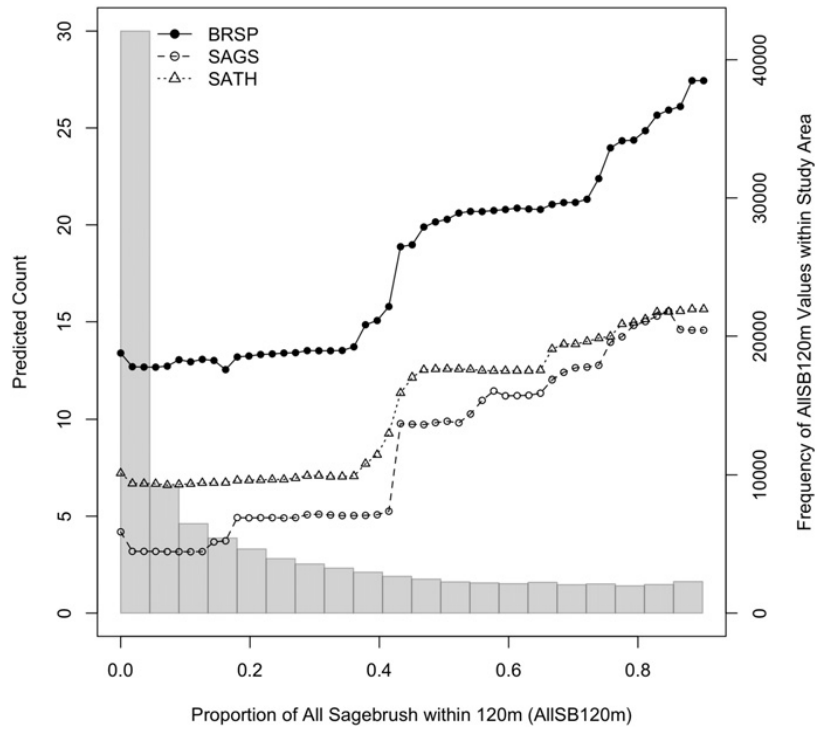

Figure 6. Partial dependence plot displays the predicted relationships between the proportion of all sagebrush classes within 120 m and predicted counts of Brewer's sparrow (BRSP), sagebrush sparrow (SAGS), and sage thrasher (SATH). The background histogram represents the frequency of values for all sagebrush landscape cover contained within the study area. Figure from Donnelly et al. (2017).

practices. Now, these assessments provide empirical support to the assertions that encroached conifer removal increases habitat quality and availability, promotes sage-grouse reproductive success, and improves the ecosystem services provided by sagebrush rangelands. In Oregon and Utah, encroached conifer removal expanded sage-grouse habitat, improved nest and brood success, and led to increased annual survival and projected population growth rate (Sandford *et al.* 2017; Severson *et al.* 2017a,b). It is likely that reduced conifer canopy cover increased reproductive success by removing perch sites for predators, increasing abundances of forbs and grasses, and reestablishing mesic areas that are critical to brood success. Additionally, habitat connectivity was improved, increasing the availability of quality sagebrush habitat to sage-grouse.

By illustrating the benefits of encroached conifer removal, these assessments contradict Knick *et al.* (2014), which suggested that mechanical conifer removal was insufficient for habitat improvement in the short term. These studies described here demonstrate that the practice can provide immediate benefits by increasing habitat availability, decreasing habitat fragmentation, and promoting reproductive success. Encroached conifer removal is an effective and sustainable management treatment when carried out at larger, landscape scales and particularly when applied near occupied sage-grouse habitat. These findings highlight the importance of identifying priority habitats for implementation of conservation practices, which are having positive impacts through voluntary conservation programs on the restoration of sage-steppe ecosystems for sage-grouse and other sagebrush-dependent wildlife.

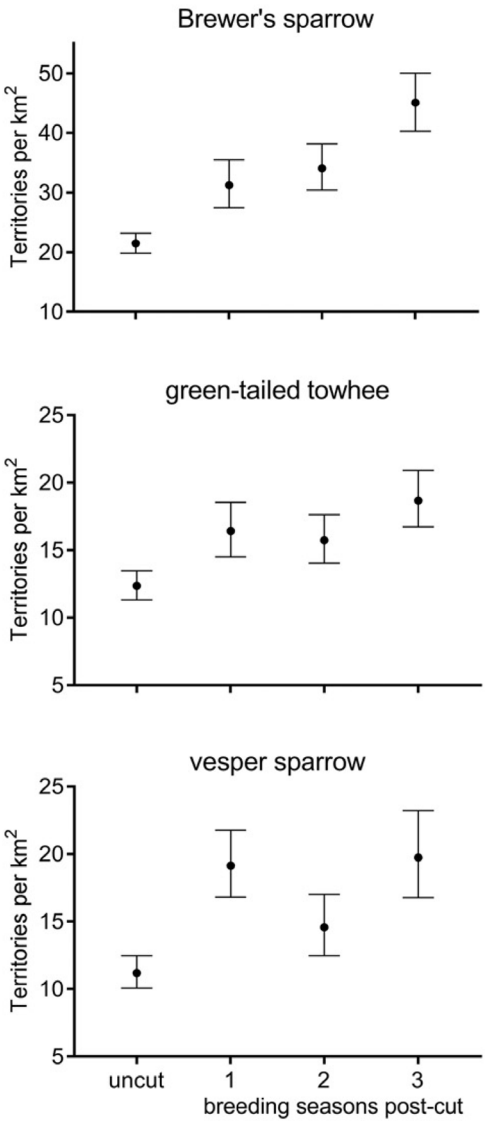

Figure 7. Bird density estimates for portions of the project area that had not yet been cut and those surveyed during the first, second, or third breeding season following tree removal. Bird densities were represented by recorded numbers of territories held by singing males. Error bars indicate 95% confidence intervals. Figure modified from Holmes et al. (2017).

Spatially targeted conifer removal for sage-grouse conservation benefits other sagebrush birds. Holmes *et al.* (2017) provide empirical evidence of broader, multiple species benefits by demonstrating positive population responses to encroached juniper removal in a large sage-grouse conservation area. As illustrated by Donnelly *et al.* (2017), sage-grouse conservation practices overlap high-abundance centers for sagebrush passerine birds, suggesting an "umbrella species" effect that would support assumptions of broader ecosystem benefits. In addition to sagebrush birds, recent studies have demonstrated benefits of encroached conifer removal to other sagebrush-associated wildlife (Maestas *et al.* 2019). In an 11-year study in Nevada, Hamilton *et al.* (2018) showed that mechanical conifer removal for sagebrush restoration maintains small mammal densities in the face of conifer encroachment. And a spatial analysis of mule deer migration

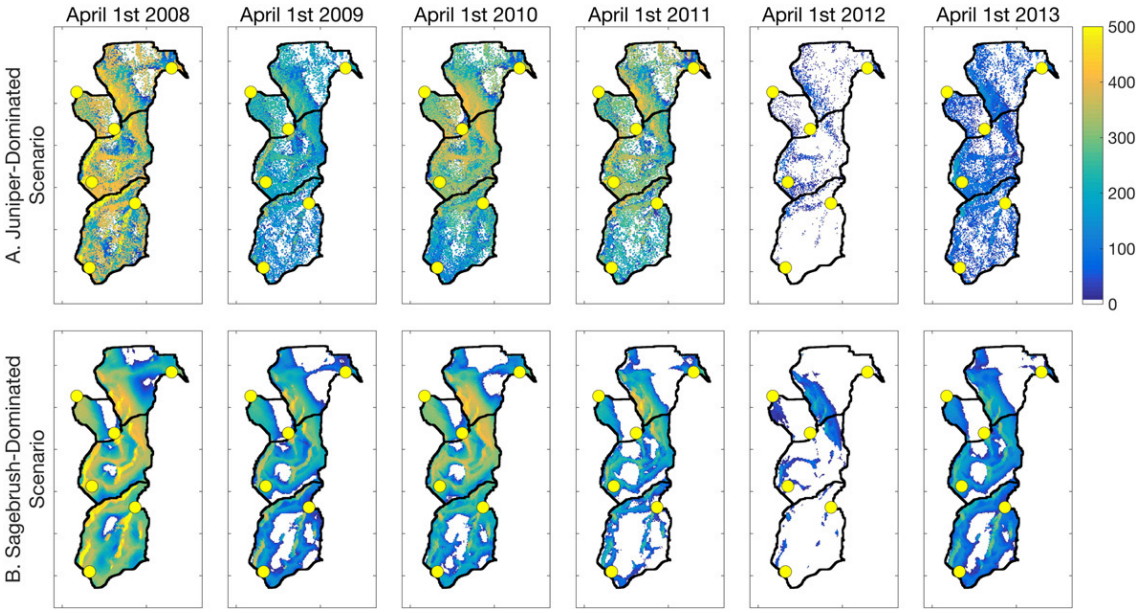

Figure 8. Modeled SWE (mm) distributions on 1 April of each water year for the (A) juniper-dominated scenario and (B) sagebrush-dominated scenario. Late-season differences show that the juniper-dominated scenario results in a more uniform snow distribution, whereas the sagebrush-dominated scenario has a more heterogenous snow distribution, which enables more SWE stored in drifts. Yellow circles indicate the location of weather stations. Figure from Kormos et al. (2017).

A brood of sage-grouse hidden among grasses and forbs, including a few sagebrush plants.

routes in Wyoming indicated that sage-grouse conservation practices help to maintain the connectivity of routes necessary for the success of migratory mule deer (Copeland *et al.* 2014). Thus, as resource managers are increasingly concerned about the implications of juniper encroachment, these studies provide support for conservation practices that can benefit sensitive wildlife species.

Targeted conifer removal promotes landscape productivity by improving the ecosystem services provided by sage-steppe environments. According to the results of Kormos *et al.* (2017), the retention of high-elevation, sagebrush-dominated landscapes may be a crucial aspect of sage-grouse habitat management, especially as juniper encroachment is coupled with transitions from snow- to rain-dominated precipitation regimes in mid- and low-elevation areas. The delayed water input and increased streamflow from restored sagebrush-dominated catchments can increase late-season water availability for shrubs, forbs, and grasses that would otherwise desiccate under lower summer precipitation. Furthermore, it could increase surface water resources such as springs and wet meadows that would improve sage-grouse habitat conditions and grazing resources for livestock.

In the Intermountain West, approximately 80% of wet summer habitats are found on private lands, and 85% of sage-grouse leks are found within 6 miles of those water resources. Juniper encroachment can significantly alter the ecohydrology of grassland and shrub-steppe ecosystems. Therefore, in addition to the wildlife benefits and fire resistance garnered from the practice of encroached conifer removal (e.g., Donnelly *et al.* 2017; Holmes *et al.* 2017; Sandford *et al.* 2017; Severson *et al.* 2017a,b), ranchers and land managers in the West who face harsh, dry conditions can improve rangeland health by removing encroaching junipers to maintain and even improve streamflow.

The assessments described in this Conservation Insight represent some of the first empirical evidence supporting landscape-level encroached conifer removal as a conservation practice for the improvement of sage-grouse and other sagebrush bird habitats. By evaluating the impacts of encroached conifer removal on the productivity of sage-grouse, of sensitive sagebrush-associated wildlife, and of the rangelands where this increasingly widespread practice is applied, the work of NRCS and SGI partners can continue to improve the science base on which recommended practices are founded. These studies should serve as examples to inform conservation practices and to encourage further assessments to better support western rangelands and the wildlife and people that depend on them.

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Conservation Effects Assessment Project: Translating Science into Practice

The Conservation Effects Assessment Project (CEAP) is a multi-agency effort to build the science base for conservation. Project findings help to guide USDA conservation policy and program development and help farmers and ranchers make informed conservation choices.

One of CEAP's objectives is to quantify the environmental benefits of conservation practices for reporting at the national and regional levels. Because wildlife is affected by conservation actions taken on a variety of landscapes, the CEAP-Wildlife National Component complements the CEAP national assessments for cropland, wetlands, and grazing lands. The Wildlife National Assessment works through numerous partnerships to support relevant assessments and focuses on regional scientific priorities.

For more information, visit www.nrcs.usda.gov/technical/NRI/ceap/, or contact Charlie Rewa at charles.rewa@wdc.usda.gov.