United States Department of Agriculture

Natural Resources Conservation Service

Outcomes in Conservation

Sage Grouse Initiative

An NRCS Progress Report

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Executive Summary

In 2010, the U. S. Fish and Wildlife Service (FWS) designated the greater sage-grouse a Candidate species for protection under the Endangered Species Act (ESA). In 2015, FWS will decide whether to list the species under the ESA. This report provides FWS with the first-ever comprehensive evaluation of the Sage Grouse Initiative (SGI) and its contributions to threat reduction for sage-grouse and enhanced ecosystem function on private lands. The report's findings seek to answer two fundamental questions: *What has changed since 2010 when sage-grouse was designated as a Candidate for listing*, and *with what certainty will conservation efforts continue beyond 2015*.

In 2010, the Natural Resources Conservation Service (NRCS) launched SGI to voluntarily reduce threats facing sage-grouse on private lands. Over the past 5 years, SGI has matured into a primary catalyst for sagebrush conservation across the West. SGI focuses on the shared vision of wildlife conservation through sustainable ranching, providing win-win solutions for producers, sage-grouse and 350 other obligate species. With 1,129 participating ranches in 11 western states, SGI and its partners have already invested $424.5 million and conserved 4.4 million acres, an area that is twice the size of Yellowstone National Park.

This report evaluates NRCS practices that address the non-regulatory threats established in the SGI Conference Report and prioritized in FWS's Conservation Objectives Team Report. This report describes the conservation benefits over the past five years by quantifying the threat reduction SGI achieved through the targeting of resources on priority landscapes, which optimized the acreage of new conservation.

SGI has proved efficient in its threat reduction practices. Since 2010, SGI has focused its attention on large populations by successfully targeting 75 percent of investments inside of Priority Areas for Conservation (PACs). The remaining investments bolster populations and maintain connectivity within occupied sage-grouse range.

Conservation easement acreage has increased eighteen-fold under SGI, which has reduced subdivision and agricultural conversion threats. Of the more than 450,000 acres of easement, more than 80 percent occur inside occupied habitats, and 94 percent provide permanent protection. Outcome-based science shows that the Wyoming Governor's core area policy and easements results in a two-thirds reduction in sage-grouse losses that would have otherwise occurred in PACs. In Montana, easements help maintain the longest-known sage-grouse migration by reducing by a third the threat of agricultural conversion. In the Great Basin, where new satellite mapping shows that more than 80 percent of brood rearing areas are privately owned, easements maintain requisite habitats on working ranches. Critically, these practices provide benefits to other species, such as in Wyoming's Daniel Core, where protective measures put in place for sage-grouse also are conserving 75 percent of migratory mule-deer habitat.

The new 'Sodsaver' provision in the 2014 Farm Bill reduces the federal crop insurance subsidies on cropland recently converted from native sagebrush habitats, which is particularly important within Sage Grouse Management Zone I (MZI). This reduction eliminates some benefits producers receive as part of their risk management strategy making conversion of marginal lands less economically viable. This has in turn cut in half the risk to the 13 percent of sage-grouse at risk of conversion in MZI, where 70 percent of the land is privately owned and wheat production is the top-ranked industry.

Conifer removal maintains existing sage-grouse populations by removing early encroaching trees. Cuts have reclaimed 405,241 acres of otherwise suitable habitat. Nearly half of reclaimed acres are in Oregon, where conifer removal during SGI has increased by 1,411 percent and alleviated 68% of their threat on private lands inside PACs. Studies by The Nature Conservancy show the effectiveness of rapid restoration of early conifer-invaded sage-steppe in maintaining existing sage-grouse populations. Similar research by the U.S. Geological Survey confirms that the conifer treatments employed by SGI also benefit sagebrush songbirds, which will reoccupy cut sites during the spring following treatment. This practice also significantly decreases fuel load, increasing the sagebrush ecosystem's resistance to catastrophic wildfire.

SGI has also enhanced rangeland health inside PACs by applying grazing systems, re-vegetating former rangeland with sagebrush and perennial grasses, and controlling invasive weeds. SGI-sponsored science demonstrates the effectiveness of fence-marking by quantifying its benefit and targeting its application. Conservative estimates show that SGI fence-marking prevents 2,600 fence collisions annually, which is more than twice the number of male sage-grouse counted annually on leks in Washington, North and South Dakota, and Canada combined. Partners are now scaling up fence-marking to reduce collisions.

Since 2010, SGI has boosted sage-grouse conservation on private lands, and a new infusion of $198 million from NRCS starting in 2015 provides partners with unprecedented certainty that conservation will continue well into the future. This additional commitment, combined with partner contributions, will bring the total SGI investment to an estimated $751 million. Already underway in 2015, additional resources are enabling SGI to nearly redouble past achievements, resulting in an estimated 8 million acres conserved by 2018. It is an exciting time for sage-grouse conservation and NRCS is proud to provide increased certainty for additional conservation through the life of the 2014 Farm Bill.

Background and Purpose

In March 2010, the U. S. Fish and Wildlife Service (FWS) designated greater sage-grouse (*Centrocercus urophasianus*; hereafter sage-grouse) as a Candidate species for possible listing under the federal Endangered Species Act (ESA). September 30, 2015, is the court-mandated deadline for FWS to decide whether to withdraw their warranted finding or list the species under ESA.

On the heels of the candidate designation in 2010, the Natural Resources Conservation Service (NRCS) launched the Sage Grouse Initiative (SGI) as a highly-targeted and science-based landscape approach to proactively conserve sage-grouse and sustain the working rangelands that support western ranching economies. Conservation practices are designed to be win-win solutions addressing threats facing both sage-grouse and rangelands. Rather than funding 'random acts of environmental kindness', SGI highly targets implementation to apply the right conservation practices in the right places, thus maximizing biological return-on-investment. Farm Bill programs provide the mechanism for accelerating on-the-ground conservation across private lands representing 40 percent of the species' range.

NRCS and FWS used the 'conferencing' provisions under section 7 of the ESA to assess the potential benefits and adverse effects of specific NRCS conservation practices to be implemented and maintained by landowners under SGI. The FWS's Conference Report (CR) conditioned 40 NRCS conservation practices to ensure their benefits to sage-grouse (FWS 2010). NRCS requires that all SGI participants adhere to conservation measures as conditioned in the CR. If the species is listed under ESA, participating ranchers know they can continue implementing their SGI conservation plans without increased restrictions or regulations.

NRCS used a variety of programs authorized by the 2008 Farm Bill in its sage-grouse conservation efforts. Restoration and enhancement activities were carried out under the Environmental Quality Incentives Program (EQIP) and the Wildlife Habitat Incentive Program (WHIP). Conservation easements were acquired through the Farm and Ranch Lands Protection Program (FRPP), Grassland Reserve Program (GRP), and the Wetlands Reserve Program (WRP). The 2014 Farm Bill consolidated NRCS easement authority under the Agricultural Conservation Easement Program (ACEP) and folded WHIP activities under EQIP.

State experts and FWS representatives developed the Conservation Objectives Team (COT) Report (FWS 2013) as a goal post defining the extent to which threats must be reduced for the species to be conserved. The overarching directive in the report is two-fold: modify policy to alleviate anthropogenic threats and actively manage habitats to restore ecosystem function

(Boyd et al. 2014). To accomplish this, the COT Report spatially identified threats and prioritized threat reduction inside Management Zones (MZs), populations and bird abundant habitats known as Priority Areas for Conservation (PACs; Appendix A [FWS 2013]).

Conservation partners are each doing their share to reduce threats identified in the COT Report (FWS 2013). As State and Federal policy makers finalize regulatory changes to reduce anthropogenic threats, they now embark on a public lands campaign to restore ecosystem function. Since 2010, NRCS has been working in earnest through SGI to accelerate threat reduction on private lands that comprise the other 40 percent of the species range. In the midst of their 2015 listing determination, FWS is asking all these partners to help them answer two central questions:

1. *What has changed since 2010, when sage-grouse was designated as a Candidate species?*

2. *What are projected conservation efforts beyond September 2015?*

The purpose of this report is to provide FWS with the first-ever comprehensive evaluation of SGI contributions to sage-grouse conservation. Evaluated practices address the non-regulatory threats agreed to in the CR (FWS 2010) and prioritized by the COT Report (FWS 2013). Change since 2010 is quantified by level of new investment, acreage of additional conservation and the extent of targeting within priority landscapes. Outcome-based assessments evaluate effectiveness of resulting conservation actions. Future conservation efforts are projected based on NRCS commitments made through 2018, the life of the current Farm Bill.

Section I: SGI Impacts on Sage-Grouse Conservation

Outcome #1: NRCS Created SGI to Accelerate Private Lands Conservation

SGI launched in 2010, and 5 years later is a primary catalyst for sage-steppe conservation, conserving 4.4 million acres across 11 western states.

Absent a major role in sage-grouse conservation, NRCS answered the call in 2010 by launching the Sage Grouse Initiative (SGI), a highly-targeted and science-based approach for implementing wildlife conservation through sustainable ranching. Five years later, SGI has matured into a primary catalyst for sage-steppe conservation, providing win-win solutions to non-regulatory threats facing ranching, sage-grouse and 350 other species. SGI has enacted beneficial conservation in each of the 11 western states (Figure 1)

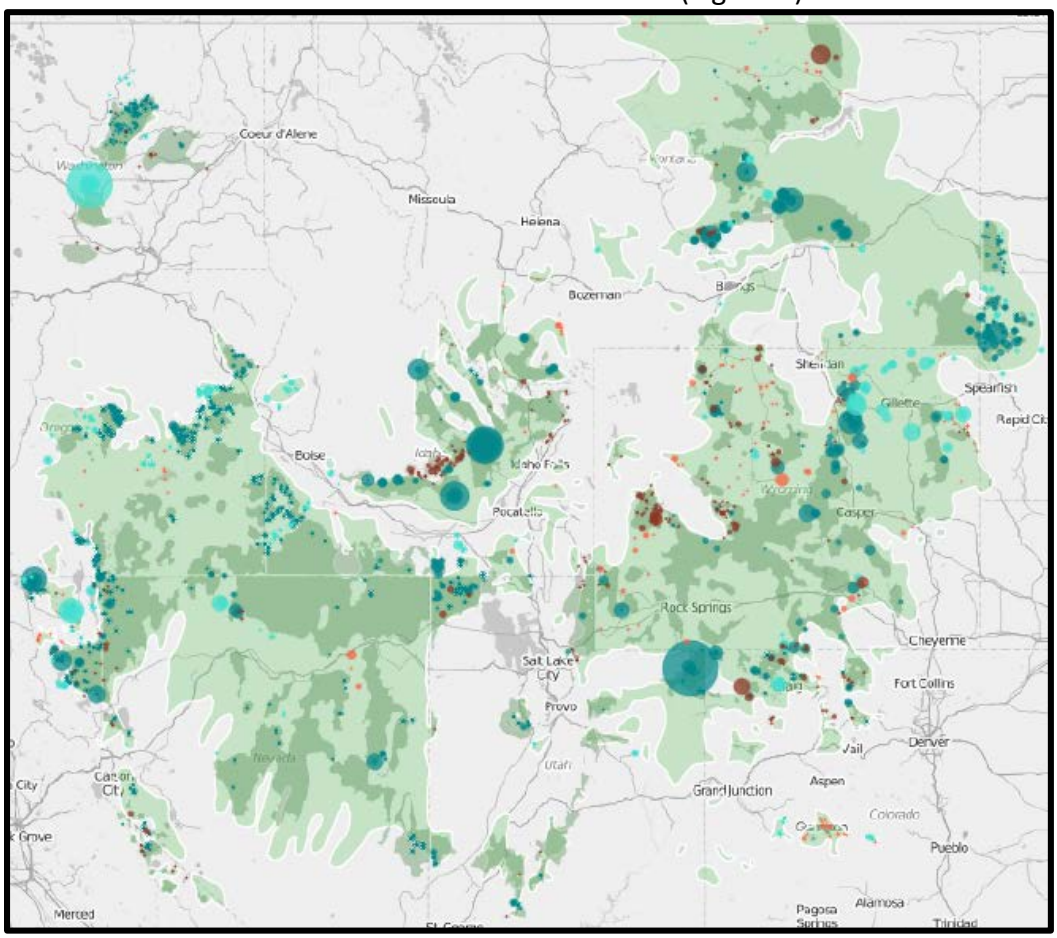

Figure 1. SGI (EQIP and WHIP; 2010-2014) contract locations are shown in blue. NRCS easements (WRP, GRP and FRPP; 1992-2013) are shown in brown. Light colors signify locations outside of PAC boundaries, and dark colors are located within PAC boundaries.

SGI has exponentially expanded the diversity of partners participating in conservation by focusing on the shared vision of achieving wildlife conservation through sustainable ranching. SGI participation is voluntary, but legally binding contracts underpin most implementation. To date, 1,129 ranches participate in SGI, conserving 4.4 million acres across 11 western states – an area equivalent to two Yellowstone National Parks. To accelerate conservation, NRCS has invested $296.5 million, and partners and landowners have provided an additional $128 million, bringing the total SGI investment to $424.5 million[1] (Table 1).

Table 1. Past (FY 2010 - FY 2014) SGI funding and acreage conserved (in millions).

Past Accomplishments	NRCS	Partner Match	Total ($)	Total (Ac)
Restoration and enhancement	102.4	34.1	136.5	4.0
Conservation easements	164.7	85.7	250.4	0.4
Human capacity	29.4	8.2	37.6	
Subtotal	296.5	128.0	424.5	4.4

SGI targets conservation activities based on the critical threats outlined in the COT report (FWS 2013). This report summarizes resulting acreage for each activity within States, Management Zones, Populations and PACs (Appendices B and C). Overall NRCS has acquired 451,884 acres of conservation easements[2], implemented 2,437,645 acres in grazing systems, and removed invasive conifer from 405,241 acres. Additional benefits include re-vegetating 48,120 acres[3] of former rangeland, marking or moving of 350 miles of high-risk fence to reduce collisions, 15,509 acres of weed management and 179 acres of wet meadow restoration.

[1] Restoration and enhancements represent NRCS cost-share programs (i.e., EQIP and WHIP) with partner match estimated at 25 percent. Partner match for conservation easements calculated at 50 percent for FRPP and ACEP easements programs. Additional NRCS easement funds exclude partner match (i.e., WRP and GRP). Human capacity to deliver conservation includes NRCS technical assistance estimated at 7 percent of financial assistance. Additional human capacity under NRCS and partner match includes contributions from the Conservation Effects Assessment Project (CEAP) and SWAT.

[2] NRCS easements acquired before and during SGI are included because all reduce the same fragmenting threats regardless of timing or purpose of acquisition.

[3] Half of new acres are native seeding (23,253 acres); remaining acres were primarily former cropland restored back to tame pastures.

Outcome #2: NRCS Strategically Targeted SGI Conservation Practices

Through SGI, NRCS maximizes conservation benefits by targeting Farm Bill resources to sage-grouse-abundant centers or 'core areas' (Doherty et al. 2010, 2011). More than 75 percent of all SGI acres are located inside PACs, regardless of conservation activity (Appendices B and C). The remaining quarter is in surrounding occupied habitat, expanding habitat opportunities and increasing connectivity.

> *SGI overwhelmingly benefited large populations by targeting 75 percent of investments inside Priority Areas for Conservation or 'PACs'.*

SGI targets conservation activities in each population based on the critical threats outlined in the COT report (FWS 2013) and clusters implementation to achieve landscape benefits (Figure 1; Appendices 2 and 3). NRCS has acquired 451,884 acres of conservation easements, of which 72% are targeted to four populations at risk from urbanization[4] or agricultural conversion[5]. NRCS easements acquired before and during SGI are included because all reduce the same fragmenting threats regardless of timing or purpose of acquisition. Of the 2,437,645 acres in grazing systems, 76% are clustered within five populations[6]. SGI has cut invasive conifer from 405,241 acres, of which 84% of removal is focused in four Great Basin populations[7]. Newly seeded acres[8] total 48,120 with 74% concentrated in five populations[9]. Additional benefits include 350 miles of high-risk fence marked or removed to reduce collisions, 15,509 acres of weed management and 179 acres of wet meadow restoration. Conservation actions planned but not funded through Farm Bill programs are not recorded by NRCS and are therefore not included in this report.

SGI further targeted its conservation effort to match areas of bird abundance range-wide. For example, 86 percent of SGI effort is invested in three of seven MZs (I, II, IV; Appendix C) that together contain 83 percent of birds (Doherty et al. 2010). Similarly, 61 percent of conserved acres are clustered inside three of 11 western states (Idaho, Montana, and Wyoming), that together comprise 69 percent of grouse range-wide (Appendix B).

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[4] Wyoming Basin, Snake-Salmon-Beaverhead, Northwest Colorado.
[5] Northern Montana.
[6] Powder River Basin, Yellowstone Watershed, Dakotas, Wyoming Basin and Snake-Salmon-Beaverhead.
[7] Northern Great Basin, Box Elder, Central Oregon, Western Great Basin.
[8] Half of new acres are native seeding (23,253 acres); remaining acres were primarily former cropland restored back to tame pastures.
[9] Dakotas, Yellowstone Watershed, Northwest Colorado, Northern Great Basin, Box Elder.

Outcome #3: NRCS Accelerated Conservation Easements in Sage-Grouse Range

Threats reduced from COT Report – Ex-Urban Development, Agricultural Conversion

Conservation easements are an effective mechanism for keeping sage-grouse habitats intact by removing ex-urban development and agricultural conversion threats (FWS 2013). For nearly 25 years, NRCS and partners have used easements to conserve continentally-important wetland habitats and waterfowl populations. The concentration of easements in the Prairie Pothole Region and the Central Valley of California demonstrate the agency's ability to focus Farm Bill resources to landscapes prioritized for conservation (Figure 2; gold). SGI seized on this past success and has replicated the approach for sage grouse (Figure 2; pink and red). Most easements for sage grouse (79 percent) are located inside PACs (Appendices B and C), with 72 percent of those concentrated within four large and at-risk populations in southwest Wyoming, central Idaho, northwest Colorado and northern Montana[10] (Figure 2, Appendix C).

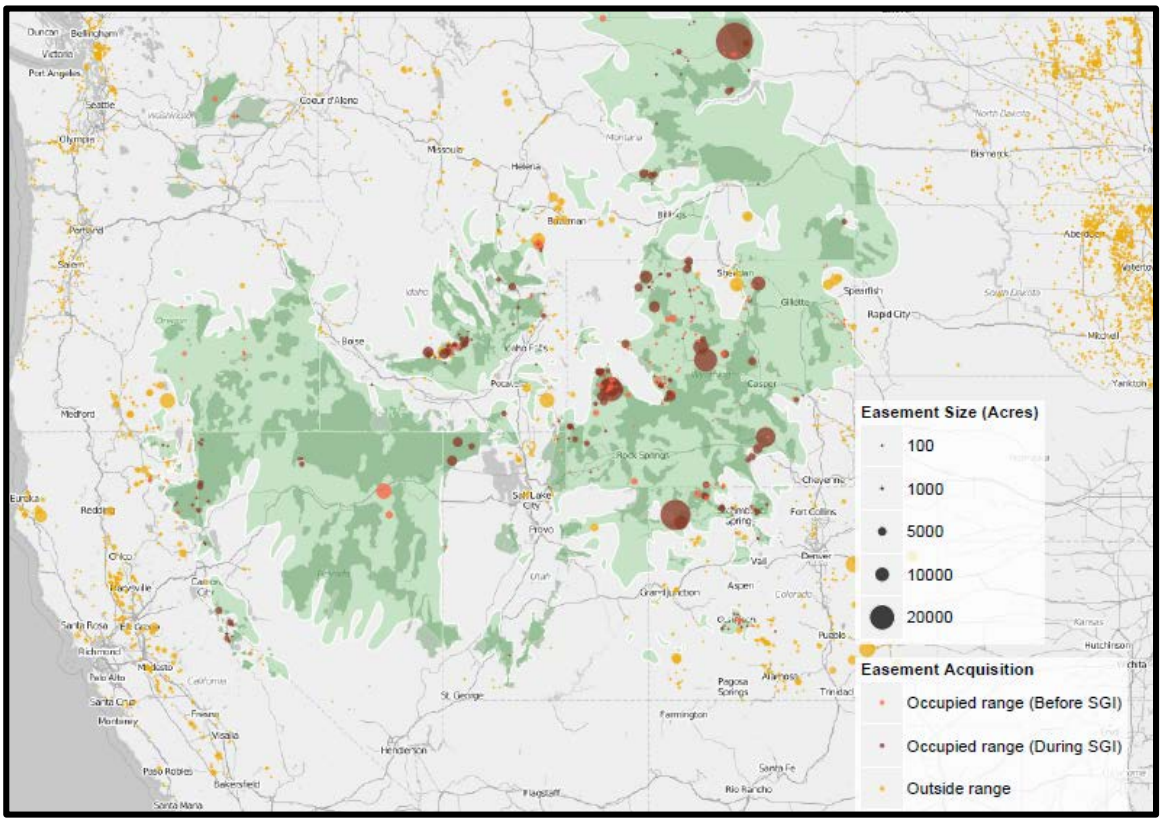

Figure 2. NRCS conservation easements (WRP, FRPP, GRP; 1992-2013) outside occupied sage-grouse range (gold), inside occupied range acquired 1992-2009 (pink), inside occupied range acquired from 2010-2013 (brown).

[10] Wyoming Basin, Snake-Salmon-Beaverhead, Northwest Colorado, Northern Montana.

The pace and extent of easement acquisition has accelerated in occupied sage-grouse habitat since SGI became a national priority for NRCS. Easement acquisition during SGI has increased 1,809 percent, totaling 361,984 in just 4 years[11] (Figure 3). SGI easements are bigger and more likely to be permanent inside than outside the occupied range, providing vast tracts of working lands that anchor sage-grouse conservation in perpetuity. On average, easements through SGI are more than four times larger inside than outside of the occupied range[12], with nearly all acquisitions (94 percent) providing permanent protection[13].

Easement acquisition increased 1,809% during SGI. Totaling 451,884 acres through fiscal year 2013, easements are more than four times larger inside occupied habitat; 94 percent provide permanent protection.

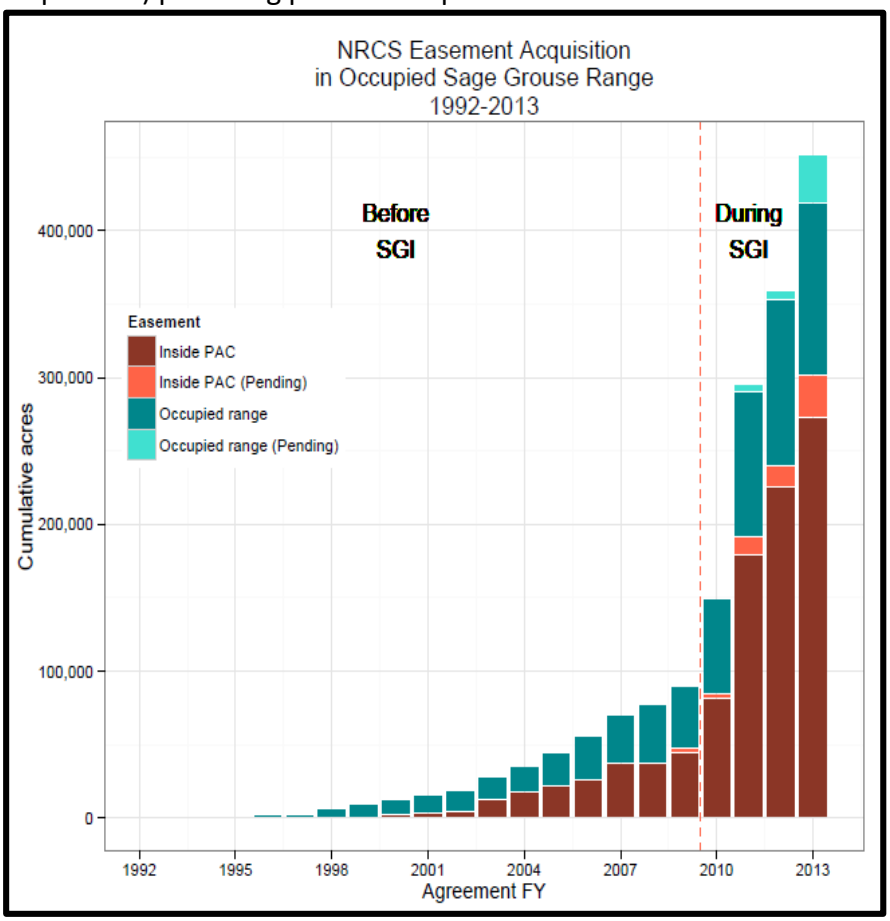

Figure 3. Acres of conservation easements acquired before (1992-2009) and during SGI (2010-2013). Colors denote acquisitions within occupied range or inside of PACs.

[11] Easement acres before SGI (89,990; 1992-2009) versus during SGI (361,984; 2010-2013).
[12] 934 acres inside versus 205 acres outside occupied sage-grouse range; estimates based on easements located within the 11 western sage-grouse states.
[13] Proportion of perpetual easements inside (94 percent) versus outside (73 percent) of occupied range in 11 western sage-grouse states.

SGI outcome-based science has quantified the effectiveness of easements for sage-grouse in Wyoming and Montana. SGI science also has created spatial tools to target future acquisitions in Oregon, Nevada and California.

Case Study: Wyoming

Wyoming's approach is a marriage between policy and voluntary conservation, with each partner doing its share to reduce the mix of threats facing populations. The Wyoming Governor's Executive Order (EO) is reducing energy threats inside PACs to 1 well/mi^2 and ≤5 percent surface disturbance to maintain populations (Wyoming EO 2011-5). Bureau of Land Management (BLM) policy manages drilling of the federal mineral estate in accordance with objectives set forth in the EO (BLM Instructional Memorandum Wyoming 2012-2019). With these policies in place to reduce habitat fragmentation from energy development, NRCS and partners have placed conservation easements to remove the residual fragmenting threat of urbanization.

> *Core area policy and easements in Wyoming reduce by two-thirds the bird losses that would have occurred in PACs, and these same protective measures also conserved 75 percent of habitats for migratory mule deer.*

An outcome-based assessment by scientists from The Nature Conservancy has quantified the biological benefits of resulting policy and easement investments (Copeland et al. 2013). A conservation strategy with policy and $250 million in targeted easements is predicted to halt declines to 9-15 percent, cutting anticipated losses by roughly half statewide and nearly two-thirds within PACs (Appendix D: Panel A versus B). Easement acquisitions during SGI have prevented urbanization in some of the most bird abundant and at-risk landscapes in Wyoming (Figure 4). SGI's $250 million easement campaign in Wyoming is 59 percent complete[14], and NRCS and partners remain committed to continuing this partnership.

[14] Wyoming campaign is 59 percent complete based on $147 million currently invested and a $250 million target. Acquired acres (181,418 acres; Table 2) multiplied by $814/acre = $147,674,252. Current investment is estimated at $814/acre according to 2011-2013 Wyoming-specific Farm and Ranch Lands Protection Program (FRPP) easement data; estimate is doubled to reflect full value (FRPP pays half).

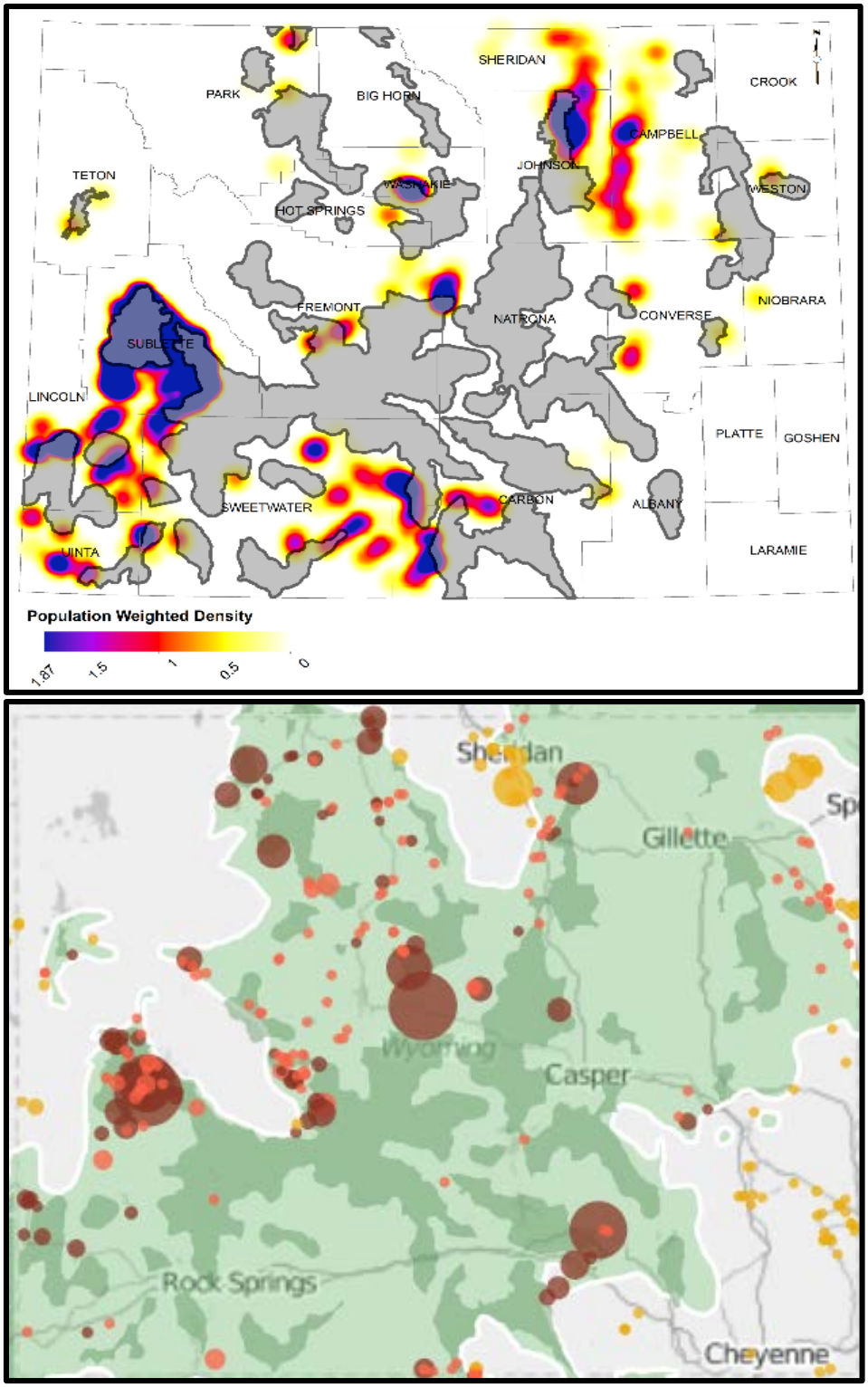

Figure 4. Top shows priority areas in need of conservation easements to reduce ex-urban development (blue is highest need; modified from Copeland et al. 2013).

Bottom shows NRCS-sponsored easement acquisitions in Wyoming during SGI (brown) and before SGI began (pink).

Targeting conservation to sage-grouse habitat also has benefited other sagebrush-dependent fauna. A second outcome-based evaluation by The Nature Conservancy found that measures taken for sage-grouse have also conserved 75 percent of priority habitats for two world-class populations of migratory mule deer (Copeland et al. 2014). Multiplicative benefits are the result of protective measures made possible through the Governor's sage-grouse EO, U.S. Forest Service purchases or withdrawals of oil and gas leases and conservation easements (Appendix E). Future SGI investments will further benefit deer because 77 percent of remaining high-priority, at-risk private lands important for mule deer migration are also PAC-based sage-grouse priorities (Appendix F).

Case Study: Montana

Located within the species' northernmost PAC, SGI's largest easement (32,249 acres; Figure 2) helps maintain in perpetuity the longest-known sage-grouse migration: a 150-mile journey between Saskatchewan (Canada) and the Missouri River in northeast Montana (Tack et al. 2012). This easement, together with others acquired by the Montana Chapter of The Nature Conservancy, has reduced the threat of agricultural conversion on private lands by 34 percent within this PAC. Sage-grouse nest and raise their young in silver sagebrush habitats north of the Milk River, before migrating up to 100 miles south to winter in big sagebrush habitats in Montana (Appendix G; Tack et al. 2012). A recent connectivity study reinforces the effectiveness of SGI easements, showing that Canada's Saskatchewan population remains genetically connected to northeast Montana (Bush et al. 2011). If funded in 2015, Governor Steve Bullock's budget request for $10 million from the Montana legislature would provide match for SGI and partners to acquire additional easements in this corridor and throughout the state.

Easements in northern Montana help maintain the longest-known sage-grouse migration by reducing the threat of agricultural conversion by 34 percent.

Case Study: Science-Based Tools for Targeting Easements in the Great Basin

Life follows water in the arid West, and easements are an effective tool for maintaining the scarce summer resources that moist (i.e., mesic) habitats provide in the Great Basin. The newest SGI acquisition in Nevada is Smoke Creek, located inside the Western Great Basin PAC. Each year, successful nesting females from surrounding public uplands make the short trek to Smoke Creek to raise their young on this private working ranch (Figure 5).

Easements in the Great Basin maintain requisite habitats on working ranches where new satellite mapping shows that more than 80 percent of brood rearing areas are privately owned.

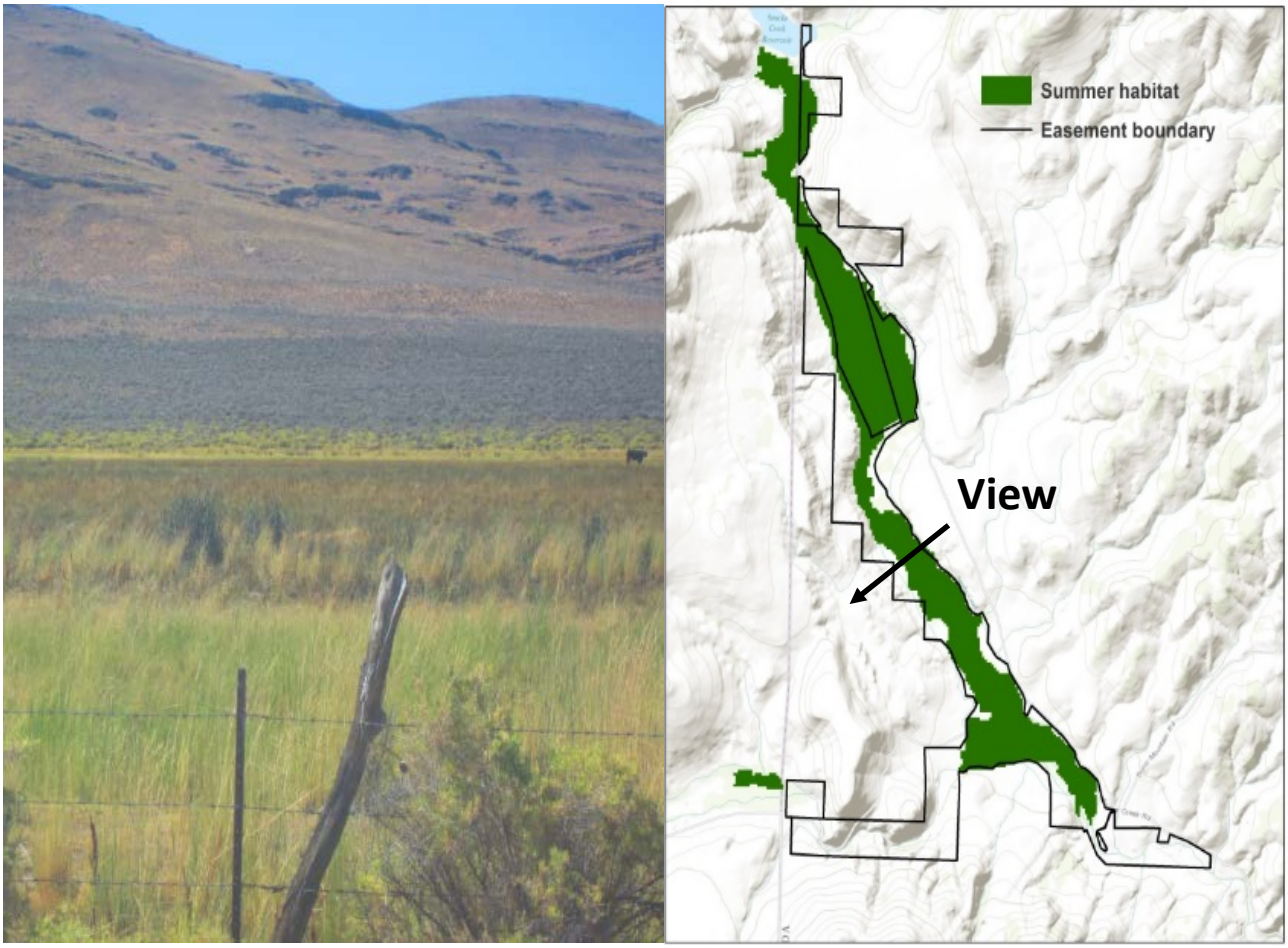

Figure 5. Smoke Creek easement (left) in Nevada's central Washoe County conserves in perpetuity the scarce summer habitats birds need to raise their young. The new SGI tool that maps mesic habitats (Appendices H and I) identified Smoke Creek as a high priority for conservation (green polygons; right).

This same story plays out each summer in much of the Great Basin, where new SGI science shows >80 percent of brood habitats are privately owned (Appendix H; SGI 2014). SGI has incorporated this information into a map-based decision support tool to assist in targeting of future actions that conserve, restore, and enhance mesic habitats (Appendix I).

Outcome #4: New "Sodsaver" Provision in 2014 Farm Bill

Threat reduced from COT Report – Agricultural Conversion

In Management Zone I (Appendix A), where most land is privately owned (70 percent) and wheat production is the top-ranked industry, protection of native sagebrush habitats is synonymous with sage-grouse-compatible uses of working lands. Historically, insurance premiums paid to landowners have increased, in effect subsidizing 2.5 million acres of cropland conversion from 1994 to 1997 in the contiguous 48 states (Lubowski et al. 2006). However, the Agricultural Act of 2014 (i.e., 2014 Farm Bill) includes a policy provision known as 'Sodsaver' that reduces the federal crop insurance subsidy on cropland recently converted from native sagebrush habitats. This reduction eliminates some benefits producers receive as part of their risk management strategy making conversion of marginal lands less economically viable (Smith and Goodwin 2013).

> *New 'Sodsaver' provision in 2014 Farm Bill has reduced by half the 13 percent of the population at risk of agricultural conversion.*

The new Sodsaver policy directly addresses a need identified in the COT report to revise Farm Bill policy and commodity support programs in order to reduce conversion of native sagebrush habitats to marginal cropland (FWS 2013). Conservation benefits of this type of legislation have long been recognized by waterfowl enthusiasts in the Prairie Pothole Region, where a similar 'Swampbuster' provision in the 1985 Food Security Act rendered farmers who drained wetlands to grow crops ineligible for crop insurance subsidies (Gray and Teels 2006, Reynolds et al. 2006). Sodsaver was championed primarily by the same prairie-focused conservation groups that pushed for Swampbuster (i.e., Ducks Unlimited and Pheasants Forever), and its implications for sage-grouse conservation have only recently been recognized.

New SGI sponsored outcome based evaluation from the University of Montana has predicted that new Sodsaver provision in 2014 Farm Bill has reduced by half the 13 percent population at risk of agricultural conversion (unpublished data, Joseph Smith). In the evaluation, leks seldom remained active once cropland exceeded 7-14 percent of a 12.5-mi^2 landscape (Appendix J). Scientists then simulated alternative cropland scenarios by linking bird response (Appendix J) with SGI's new cropland suitability layer (Appendix K). Findings showed that most conversion risk was located outside PACs (Figure 6), and had Sodsaver not been enacted, the worst-case scenario would be a 13 percent population decline.

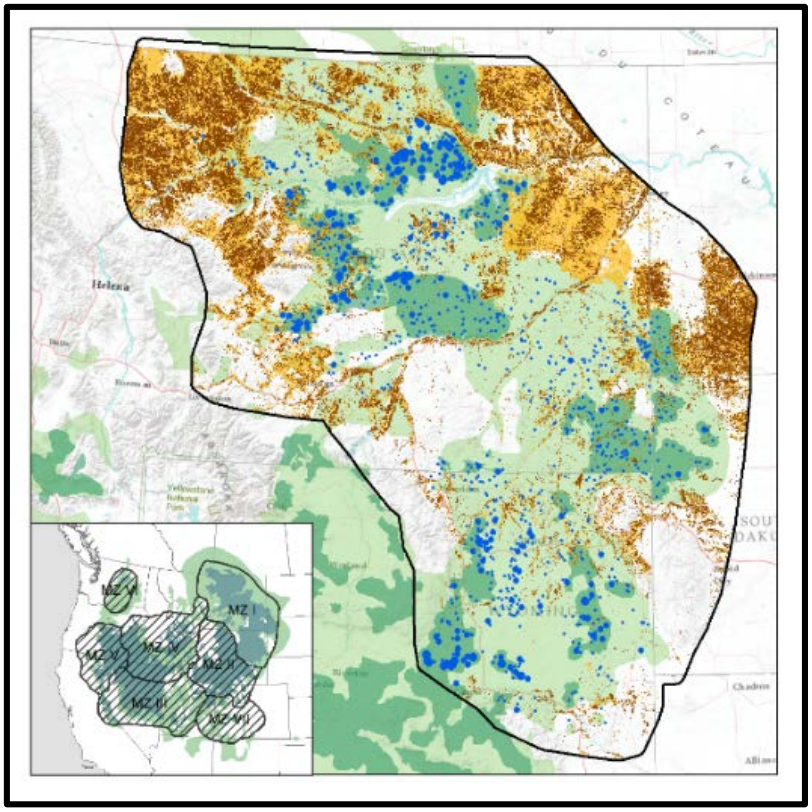

Figure 6. Current cropland (brown) and predicted potential agricultural conversion (tan) in sage-grouse MZI (unpublished data, Joseph Smith, University of Montana). Blue dots and their relative size denote the abundance of males on active sage-grouse leks (2008-2012).

Outcome #5: NRCS Reduced Threat of Conifer Invasion

Threat reduced from COT Report – Conifers

Conifer removal has emerged as a primary SGI conservation practice for maintaining extant sage-grouse populations through rapid restoration of degraded sage-steppe (Baruch-Mordo et al. 2013). Conifer encroachment today is largely an infill issue, as most sites vulnerable to invasion became occupied by trees in the late 1800s and early 1900s (Miller et al. 2005, 2008). Roughly 80 percent of sagebrush sites invaded by conifers are still in the early phases of woodland succession, where native shrubs and bunchgrasses are common (Miller et al. 2008), which means targeting Phase I and II conifer removal (Figure 7) in the near term can reclaim otherwise suitable habitat.

Phase I **Phase II** **Phase III**

Figure 7. Three phases of conifer encroachment in western U.S. rangelands (as modified from Miller et al. 2008).

SGI has greatly accelerated conifer removal, primarily through Phase I and II mechanical removal, reclaiming 405,241 acres of otherwise suitable habitat (Appendices B and C). Overall, 81 percent of cuts are located inside PACs and within populations where conifer encroachment was deemed a widespread threat by the COT report (Appendix L; FWS 2013). SGI's targeted approach helps ensure individual projects achieve cumulative, landscape-level effects with 84 percent of cuts located within four, at-risk populations in the Great Basin[15].

Researchers have long suspected that tree removal would benefit birds (Commons et al. 1999, Freese 2009) and SGI-sponsored science now confirms the reduced capacity of a landscape to support sage-grouse when conifer canopy exceeds 4 percent (Appendix M; Baruch-Mordo et al. 2013). By focusing treatments on early successional sites, SGI

New science shows that rapid restoration of early conifer-invaded sage-steppe maintains sage-grouse populations, and sagebrush songbirds reoccupied conifer cuts the spring following treatments.

[15] Northern Great Basin, Box Elder, Central Oregon, Western Great Basin.

helps prevent lek abandonment and conversion of sagebrush-steppe to conifer woodlands (Appendix N; Baruch-Mordo et al. 2013).

In order to produce more immediate bird benefits, most SGI cuts are completed using mechanical treatments that surgically remove trees while retaining the existing shrub community. New science by the U.S. Geological Survey reinforces mechanical treatments employed by SGI over burning. The study found sagebrush-obligate songbirds returned the following spring after mechanical removal reduced conifer canopy to <0.2 percent on sites with existing sagebrush that were adjacent to large sagebrush expanses; no such response was evident on burned sites where juniper skeletons remained (Knick et al. 2014).

Removing encroaching conifer reduces fuel load by half and can decrease the negative impacts resulting from catastrophic wildfire (Chambers et al. 2008). Private producers also embrace conifer removal because maintaining, rather than shading out, deep-rooted perennials conserves rangeland health, increasing available forage by up to 60 percent (McLain 2012).

Case Study: Oregon

> *Conifer removal in Oregon increased by 1,411 percent during SGI, and threat alleviation is now 68 percent complete on private lands inside PACs.*

Oregon NRCS is a pioneer in conifer threat reduction, and its leadership in SGI has resulted in roughly half of SGI's applied acreage (199,203 acres; Appendix B). SGI in Oregon has targeted conifer removal to PACs most in need of threat reduction (Appendix O), concentrating beneficial cuts near active leks and other occupied seasonal habitats (Hagen et al. 2011). The pace and extent of removal has increased exponentially inside PACs and within occupied habitats since 2010, when sage-grouse was designated as a Candidate species for possible listing under the ESA. Conifer removal during SGI has increased 1,411 percent in 5 years[16] (Figure 8). Certainty of implementation is high because like in Oregon (black bars; Figure 8), 96 percent of previously contracted acres range-wide have been certified as complete.

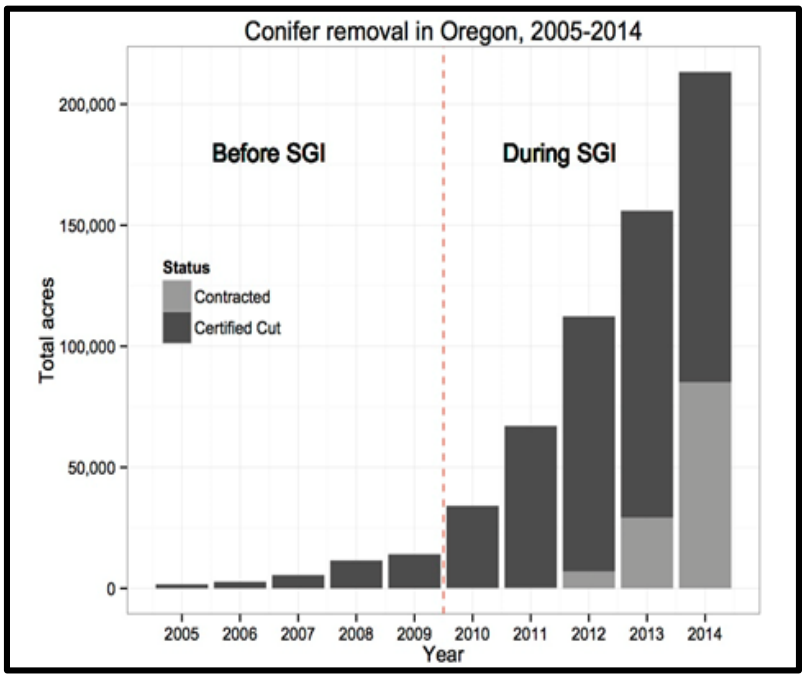

Figure 8. Increase in acres of conifer removal before and during SGI.

Substantial progress within affected PACs and across populations demonstrates SGI's track record for certainty of implementation and illustrates how solving this threat is well within reach of the collective partners in the near term. For the first time, new, high-resolution tree cover mapping capability provides an opportunity to estimate the extent of the conifer threat and quantify threat reduction inside Oregon PACs (Nielsen and Noone 2014). In all four Oregon populations (Appendix O), SGI has helped ranchers reduce the threat of early succession conifer on private lands. In total, SGI has reduced conifer invasion by two-thirds (i.e., 68 percent), and

[16] Acres of conifer removal before (14,114 acres) versus during (199,203 acres) SGI = 1,411 percent increase.

threat alleviation is nearly complete on priority private lands in the Central Oregon population (Table 2).

Table 2. Proportion of conifer threat reduced inside of PACs for four sage-grouse populations in southeast Oregon.

SGI Conifer Removal inside Oregon PACs				
Population	**Ownership**	**Acres Early Successional Conifer[1]**	**Acres Cut Inside PACs[2,3]**	**% Threat Reduced in PACs**
Central Oregon	Private	80,387	67,955	85%
Northern Great Basin	Private	97,367	65,052	67%
Western Great Basin	Private	39,085	20,412	52%
Baker, Oregon	Private	19,005	7,864	41%
TOTAL	**Private**	**235,844**	**161,283**	**68%**

[1] Acres of early-successional conifer is based on the SE Oregon Tree Canopy Cover map developed for The Nature Conservancy by Portland State University. Early-successional classes include 1-4% and 4-10% cover classes (Nielsen and Noone 2014).

[2] Acres cut includes certified cut and contracted acres. Certainty of contract fulfillment is high, as <5% of contracted acres have been cancelled in the five-year history of SGI conifer removal efforts rangewide.

[3] Contracts on ranches within 3.2 miles of a PAC border were counted as recorded contract locations—often ranch centroids or ranch headquarters—may fall outside borders of PACs even when conifer removal took place inside PAC borders.

Crafting a game plan for conservation that tracks threat reduction and anticipates future resource needs is the foundation upon which SGI 2.0 is being built. By the end of 2015, SGI will complete conifer mapping across 102.5 million acres of occupied habitat within MZ III-V and VII (Appendix P), covering seven affected western states. SGI will use new maps to refine targeting tools and develop a business investment plan through 2018 to facilitate and streamline continued success. Partnering with state and federal partners who are aggressively treating conifer and jointly tracking collective threat reduction is an SGI priority.

Outcome #6: NRCS Reduced Impacts from Range Management Infrastructure

Threats reduced from COT Report – Fences, Infrastructure, and Grazing

Private working lands are the glue that maintain sage-grouse habitats across the West, and conservationists desire sustainable ranching over the fragmenting effects of oil and gas, agricultural conversion, and subdivision (FWS 2013). Despite habitat benefits, poorly designed or improperly placed range management infrastructure (e.g., fencing, water tanks, seeps at spring developments, corrals) may threaten grouse with increased mortality risk. Such threats are comparatively simple to address, and in 5 years, SGI has transformed the type and placement of infrastructure installed to facilitate private-lands grazing management. SGI has been placing new infrastructure since 2010 in accordance with CR guidelines (FWS 2010), and NRCS now funds the retrofitting of existing structures (Figure 9).

Figure 9. Drowning risk is reduced by installing new livestock watering tanks equipped with built-in ramps (top left) and by retrofitting old tanks with escape inserts (bottom left). Collision risk is reduced by marking high-risk fence (right). (Photos by Jeremy Roberts)

SGI-sponsored science has catalyzed fence-marking by first quantifying its benefit and then targeting its application (Stevens et al. 2013); now, partners are scaling up execution to reduce sage-grouse collisions. The simple practice of fence-marking reduces grouse collisions by 83 percent (Stevens et al. 2013), without disrupting fences that facilitate sustainable grazing. Most collisions (93 percent) occur within one mile of breeding grounds in flat to rolling terrain. With this information in hand, SGI developed a mapping tool to help land managers prioritize sites across ten of 11 states where grouse are most at risk of colliding with fences (Figure 10). Mapping reveals that only 6-14 percent of the sage-grouse range poses a high risk for collisions that would need markers or other modification if fences are present (Stevens et al. 2013). Using this tool, SGI and partners are focusing limited resources on those fences that are most likely to reduce grouse collisions (Figure 10). Equally significant, the tool helps managers avoid building new fences in problematic high-risk areas, thus precluding many fence strikes from ever happening.

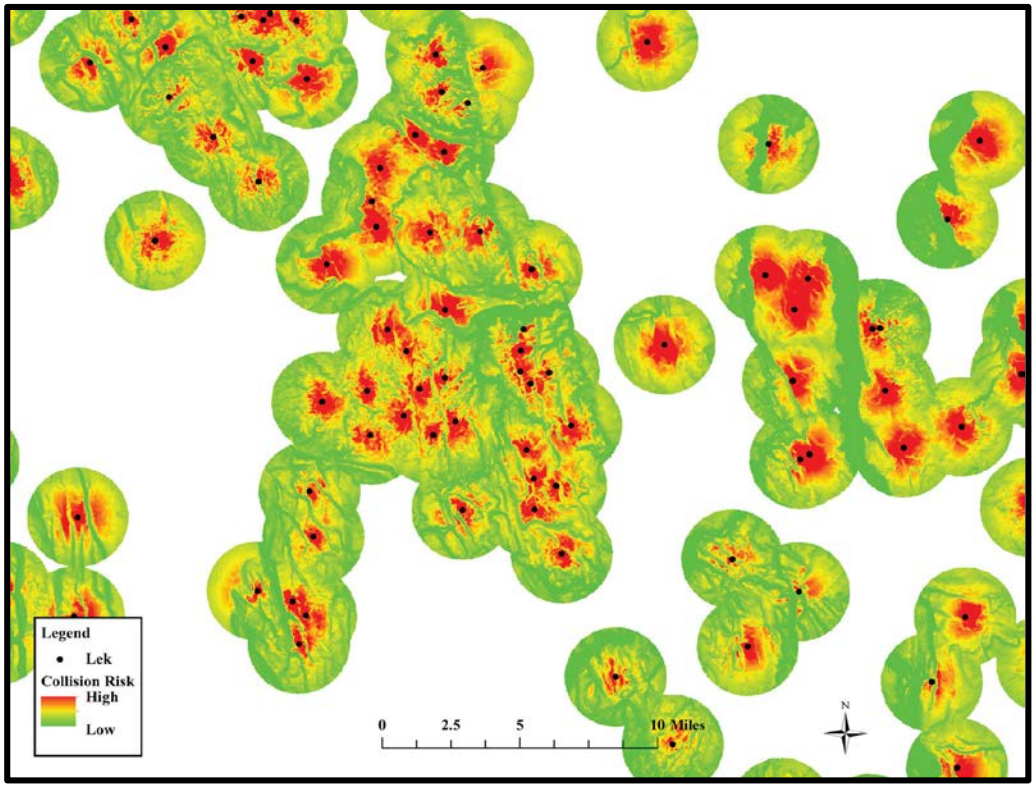

Figure 10. Excerpt from Fence Collision Risk tool resulting from Stevens et al. (2013) that is used to target fence-marking projects. Downloadable from the internet, the tool identifies areas with highest risk of fence collisions (red) within 1.8-mile radius of leks (black dots).

SGI fence-marking conservatively has prevented 2,600 fence collisions, which is more than twice the number of males counted annually on leks in Washington, North and South Dakota, and Canada combined.

Fence-marking is now a widespread practice applied by landowners and volunteers, which makes the tracking of resulting benefits difficult. For example, 41 Wyoming landowners voluntarily marked 82 miles of high-risk fence as a prerequisite to implementation of an SGI grazing contract on their ranch. Using a different approach, landowners in southeast Wyoming voluntarily reduced collision-risk along 57 miles of fence with markers provided by the Medicine Bow Conservation District. Similarly, the Fence Marking Partnership (FMP) in Montana has reduced collision threat by marking 101 miles of fence within six PACs (PACs 2-4, 8, 10, and 13), in addition to those under an SGI contract. The FMP's markers were paid for by American Colloid, manufactured by COR Enterprises in Billings, Montana, and distributed for free to volunteers marking fence inside high-risk areas identified by SGI (Figure 10) or within known grouse winter range. Equally important, but impossible to track range-wide, is the reduced threat of collision provided by NRCS and partner staff who no longer build fences within high-risk areas.

Through direct contracts with landowners, SGI has reduced the threat of collision by marking 350 miles of high-risk fence (Appendix Q). Collectively, 79 percent of these marked fences[17] are located inside of PACs to reduce risk to the greatest number of birds (FWS 2013). Published estimates report a six-fold decline in collisions along marked (0.93 collisions/mile) versus unmarked fences (5.36; Stevens et al. 2010, 2011a, b). Using these rates, the fence-marking efforts presented here (590 miles total) may be preventing 2,600 fence collisions annually[18], which is more than twice the number of males counted annually on leks in Washington, North and South Dakota, and Canada combined[19].

[17] 275 of 350 fence-miles inside of PACs.

[18] 5.36 collisions/mile before marking minus remaining impact of 0.93 collisions after marking = 4.43 reduction in collisions per linear fence mile. 590 miles of fence marked multiplied by 4.43 = 2,614 fewer collisions.

[19] Number of males on leks = 783 males counted in Washington, North and South Dakota, Alberta and Saskatchewan (Canada) (Table 1 in Doherty et al. [2010]). 783 males multiplied by two (1,566 birds) equates to SGI's estimated reduction in fence collisions (1,550).

Outcome #7: NRCS Improved Rangeland Health and Resilience

Threats reduced from COT Report - Grazing, Non-native plants, Invasive plants, Fire

Privately-owned grazing lands that underpin 40 percent of sage-grouse range also constitute some of the most productive habitats available (Appendix H). Despite their importance, poor rangeland management may reduce the value of private ranchlands if plant communities shift to undesirable ecological states, where invasive and other undesirable plants predominate. As outlined in the CR (FWS 2010), SGI enhances rangeland health by enacting a Prescribed Grazing approach, which balances forage availability with livestock demand and maintains ecosystem function by adjusting the timing, frequency, and duration of grazing.

The objective of Prescribed Grazing (NRCS Conservation Practice Standard 528) is to ensure that rangelands are managed sustainably to provide continued ecological function of sagebrush-steppe. The prevalence of deep-rooted perennial grasses is inversely related to that of invasive annual species, such as cheatgrass and medusahead (Appendix R). Therefore, a primary focus of Prescribed Grazing is maintenance of key plant species, such as deep-rooted perennial grasses that have been shown to be essential for ecological resistance to invasive annual grasses. Ecological Site Descriptions and comprehensive rangeland inventories, coupled with Prescribed Grazing, provide the biological basis for sustainable grazing plans.

Since 2010, SGI has enhanced rangeland health through rotational grazing systems, re-vegetating former rangeland with sagebrush and perennial grasses and control of invasive weeds (Figure 11). Collectively, 83 percent of weed management, 76 percent of seeding projects and 75 percent of grazing systems have been implemented inside of PACs[20] (FWS 2013).

[20] Acreage inside of PACs by practice is 1,837,338 of 2,437,645 (75 percent) grazing systems, 36,774 of 48,120 (76 percent) seeding and 12,820 of 15,509 (83 percent) of weed management.

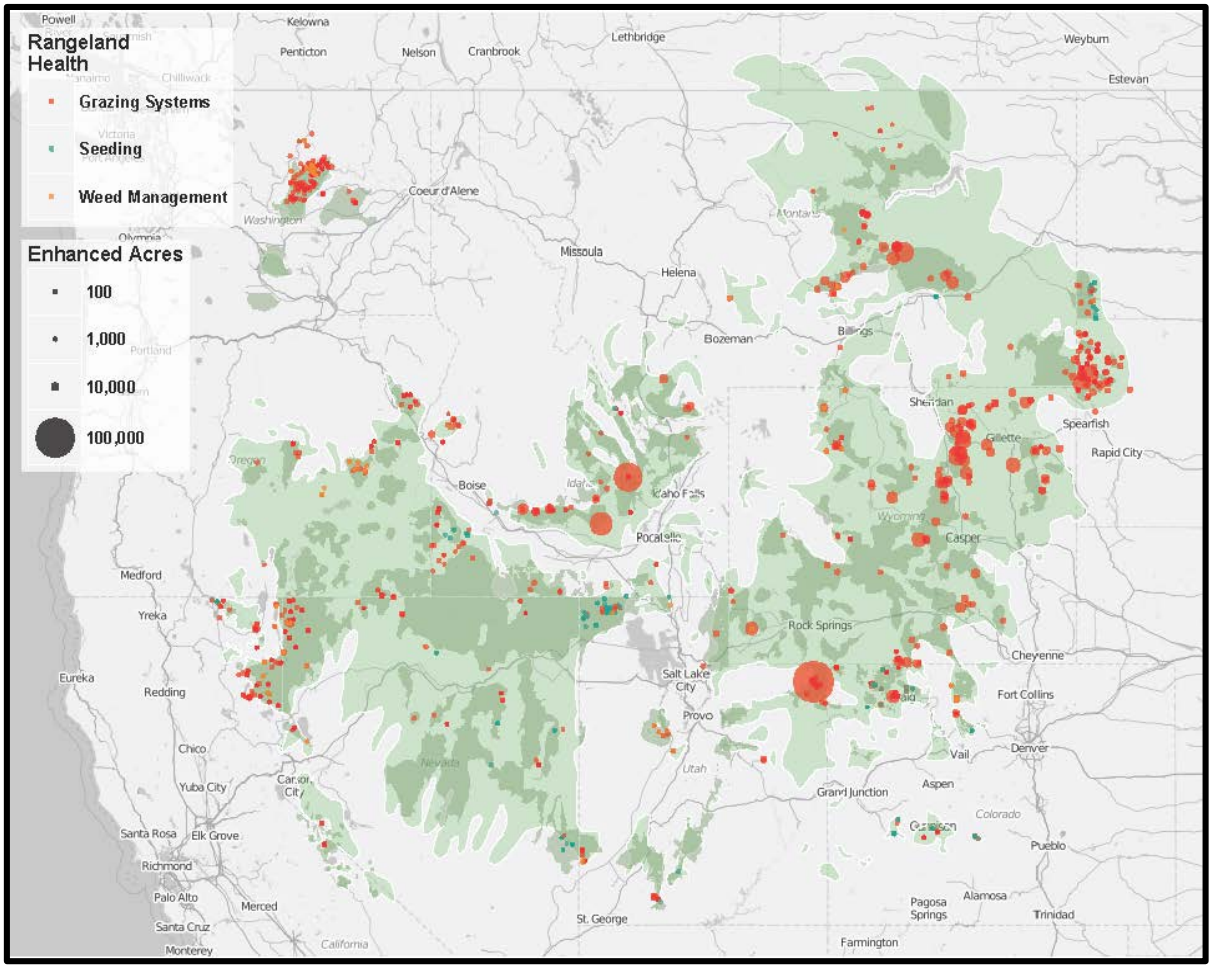

Figure 11. Location and size of SGI grazing systems (red), seeding projects (green), and weed management (orange).

SGI targeted rangeland health practices within PACs to address myriad threats facing sage-grouse (Figure 11). In central Idaho and eastern Montana, grazing systems help maintain existing habitats that support large and intact populations. In the western Dakotas, partners are restoring fringe habitats through native seeding, prescribed grazing and weed management. In Washington, the Columbia DPS reversed its decline following maturation of 1.5 million acres of Conservation Reserve Program (CRP) lands, planted through USDA's Farm Service Agency, to restore cropland to perennial grasses and sagebrush (Schroeder and Vander Haegan 2011). Today, SGI is helping maintain these habitats by turning expiring CRP lands into working lands where sustainable grazing is the predominant land use (Figure 11).

In addition to accelerating proven practices, SGI and partners are crafting solutions to threats posed by wildfire and invasive species (FWS 2013). In 2012, SGI (with BLM and the Western Association of Fish and Wildlife Agencies [WAFWA]) published a synthesis highlighting opportunities to reduce wildfire threats (*Trial by Fire*; Murphy et al. 2013). *Trial by Fire* raised awareness of steps taken to manage wildfire, the already high degree of suppression

effectiveness and the need to forge a strategic approach to reduce threats from remaining fires that damage habitat.

Trial by Fire resulted in WAFWA's launch of the interdisciplinary Wildfire and Invasive Initiative Working Group, in order to develop the desired strategic approach. The outcome is SGI's co-authorship of the groundbreaking *Resistance and Resilience* (*R&R*) publication (Chambers et al. 2014) that combines sage-grouse habitat needs with soils data, in particular temperature and moisture regimes, to spatially depict ecosystem *resilience* to disturbance and *resistance* to annual grass invasion. SGI assembled the soils data collected through the National Cooperative Soil Survey Program into a seamless range-wide data set (Maestas and Campbell 2014). This geospatial data product enables practitioners to incorporate *R&R* concepts into project planning and implementation.

Combining sage-grouse population status with the *R&R* framework provides a powerful decision tool for prioritizing scarce resources to combat wildfire and invasive species (Figure 12). Deep rooted perennial grasses maintained through SGI grazing and weed management practices are reducing fire and invasive threats where bird abundance and wildfire risk is high in northwest Nevada and northeast California (Figure 12).

R&R benefits to sagebrush ecosystems are just now being realized, and SGI is committed to working with partners to fully execute threat reduction measures.

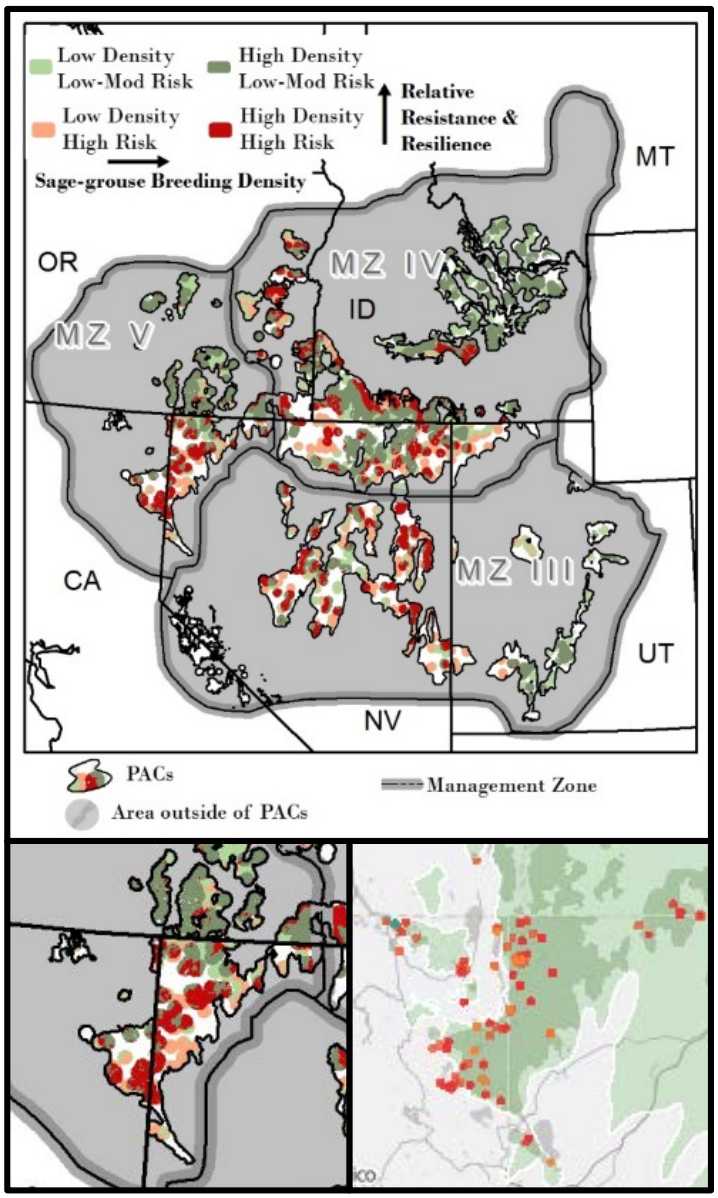

Figure 12. Sage-grouse densities (top) at high (pink and red) and low (light and dark green) risk of wildfire and invasive annual grasses (as modified from Chambers et al. 2014). SGI reduces this threat (bottom left) by targeting grazing systems (red) and weed management (orange) within priority landscapes (bottom right).

Outcome #8: SGI Capacity Has Bolstered Range-wide Certainty of Implementation

> *An additional 11,149 landowner visits by SGI SWAT employees doubled SGI conservation acreage.*

Human capacity needed to initiate conservation and then sustain its implementation is a vital, yet often overlooked, component of successful partnerships (Beever et al. 2014). Anticipating this need, NRCS launched the Strategic Watershed Action Team (SWAT) in 2011, as its primary vehicle for increasing capacity for sage-grouse conservation in priority landscapes. In doing so, it provided the infrastructure requisite to SGI success. Instead of going it alone, NRCS asked that SWAT be managed by the Intermountain West Joint Venture (IWJV), an established and respected public-private partnership governed by a western-based management board.

The underlying strength in SWAT is its simplicity and breadth of partnerships. Diversity of partners investing in SWAT includes state and federal agencies, conservation districts, corporations, and non-governmental conservation organizations. NRCS has invested $9.3 million in SWAT through an Interagency Agreement (IA) with FWS. IWJV in turn leveraged the IA with an additional $5.4 million with more than 40 paying partners.

The primary SWAT outcome is 11,149 field visits[21] with landowners that ultimately resulted in a doubling[22] of SGI conservation. SWAT now manages 27 partner positions that continue to strategically apply SGI practices inside PACs (Figure 13). The three newest positions that further enhance delivery are located in Susanville, California; Gillette, Wyoming; and Dillon, Montana.

SWAT provides SGI with the flexibility to capitalize quickly on emerging opportunities by working locally with partners to solve issues that would otherwise stymie conservation. For example, in Alturas, California (Figure 13), SWAT speeds conifer removal by contracting with a private firm specializing in cultural resource clearances. In Elko County, Nevada (Figure 13), SGI rangeland specialists provide free technical assistance so that ranches that do not qualify for financial assistance can still enact beneficial practices on their own. The SWAT Field Capacity and Delivery Coordinator oversees field staff, catalyzes SGI partner investments, and coordinates training so that members function as a team. Annual trainings in Utah, Wyoming, Oregon, and Idaho enable the team to solve place-based threats within a range-wide

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[21] SWAT staff had 11,149 field visits with 1,119 unique landowners from January 2012 to September 2014. In 2012, staff recorded number of field visits and new landowners. In 2013, SWAT started chronicling in SWAT Quarterly Reports the number of days that each staff person invested in direct landowner assistance. For 2013 and 2014, total contacts were calculated as the number of days invested times two, in order to account for the average number of landowners contacted per day afield.

[22] SGI SWAT field capacity helped implement 52 percent of SGI grazing systems (1,273,123 of 2,437,645 acres), 46 percent of conifer cuts (185,581 of 405,241 acres) and 37 percent of fence-marking projects (132 of 350 miles).

perspective. Delivery is further enhanced by monthly teleconferences, annual workshops, training webinars, and the sharing of decision support tools resulting from SGI science.

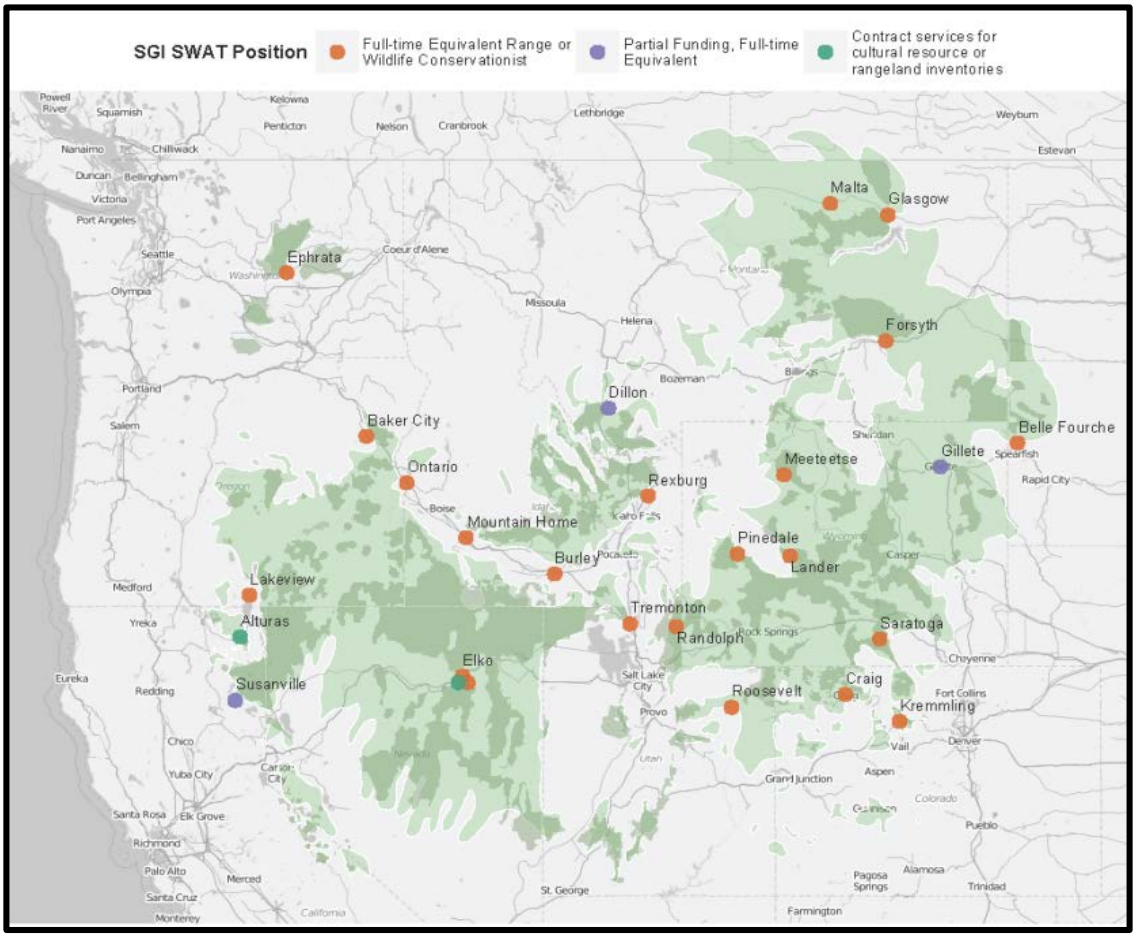

Figure 13. Locations of SGI partner positions in 11 western states.

SWAT sponsors SGI science used to target conservation, assess resulting outcomes, and continually improve program delivery. NRCS retains the services of a science advisor to help prioritize and guide SGI science. Resulting SGI priorities are then contracted by SWAT to independent scientists at state, federal, and private institutions. Science needs are funded primarily through a $3 million SWAT allocation with $1 million in match from the NRCS-based Conservation Effects Assessment Project.

SGI embraces strategic communications to show diverse audiences the benefits of sustainable ranching to wildlife conservation and to increase partner and landowner participation. Communication tools include a dedicated SGI website that is now the go-to source for sage-grouse conservation (Figure 14), SGI Facebook page reaching more than 100,000 since inception in 2012, SGI video library sharing key practices and benefits and a popular *Science to Solutions* series to show readers how SGI uses science to improve program delivery. A full-time

communication specialist integrates SGI communications with those of NRCS Public Affairs to maximize reach and benefits.

Figure 14. Home page for SGI website at www.sagegrouseinitiative.com.

SWAT bolsters IWJV capacity that in turn assists SGI in its daily operations. IWJV staff assists with event planning and logistics, manage grants and agreements, and help track and report accomplishments. A beneficial outgrowth of SWAT is an IWJV partnership with Pheasants Forever, which efficiently administers external contracting with third-party providers. Intangible benefits include an IWJV Coordinator and Management Board that help secure additional SGI support.

Section II: Certainty For Future Sage-Grouse Conservation

In another bold move to help sage-grouse, NRCS will make available $198 million to provide partners with unprecedented certainty that conservation will continue well into the future. Unlike past annual allocations, this new infusion will fuel SGI through 2018, the life of the current Farm Bill.

New NRCS funding provides unprecedented certainty that conservation will continue well into future.

Allocation levels through FY 2018 are comparable to those from previous years. The new commitment, combined with estimated partner match, will bring the total SGI investment to $751 million[23] (Table 3). These resources will allow SGI to nearly double the number of conserved acres from 4.4 million through 2014 to an estimated eight million by 2018 (Table 3).

Table 3. Past (FY 2010-FY 2014) and future (FY 2015-FY 2018) SGI funding, estimated partner match and projected acreage of additional conservation (in millions).

Past Accomplishments	NRCS	Partner Match	Total ($)	Total (Ac)
Restoration and enhancement	102.4	34.1	136.5	4.0
Conservation easements	164.7	85.7	250.4	0.4
Human capacity	29.4	8.2	37.6	
Subtotal	296.5	128.0	424.5	4.4
Outyear Commitments	**NRCS**	**Estimated Partner Match**	**Estimated Total ($)**	**Estimated Total (Ac)**
Restoration and enhancement	80.0	26.7	106.7	3.4
Conservation easements	100.0	100.0	200.0	0.2
Human capacity	17.6	2.5	20.1	
Subtotal	197.6	129.2	326.8	3.6
Total SGI Investment	**494.1**	**257.2**	**751.3**	**8.0**

[23] Restoration and enhancement represents NRCS cost-share programs (i.e., EQIP and WHIP) with partner match estimated at 25%. Partner match for conservation easements calculated at 50% for FRPP and ACEP easement programs. Additional NRCS easement funds exclude partner match (i.e., WRP, GRP). Human capacity to deliver conservation includes NRCS technical assistance, estimated at seven percent of financial assistance. Additional human capacity under NRCS includes contributions from CEAP and SWAT. Partner match for human capacity only includes estimated SWAT contributions. Extrapolated from past accomplishments, out-year forecasts project that the additional $80 million in NRCS investment will restore or enhance an additional 3,404,255 acres ($80 million divided by $25.50) and conserve in perpetuity another 243,986 acres ($100 million divided by $409.86 per acre).

The new $198 million investment includes up to $45 million annually in direct financial assistance to help landowners voluntarily accelerate conservation. Allocations are for conservation easements ($25 million/year) from ACEP as well as for restoration and enhancements of rangelands ($20 million/year) under EQIP. Extrapolated from past SGI accomplishments, out-year forecasts project that this additional investment through 2018 will restore or enhance an additional 3,404,255 acres and conserve in perpetuity another 243,986 acres.

New NRCS infusion will bring total investment to $751 million, enabling SGI to conserve an estimated 8 million acres by 2018.

Importantly, projections do not include additional funding through the new Regional Conservation Partnership Program (RCPP). Authorized by the 2014 Farm Bill, RCPP is a comprehensive and flexible program that uses partnerships to stretch and multiply conservation investments and reach conservation goals on a regional or watershed scale. As RCPP promotes a landscape-scale approach to conservation and leverages NRCS funding through partnerships to achieve greater outcomes, there are many opportunities to further sage-grouse conservation through this new program.

In the first round of selected projects announced in January 2014, NRCS awarded $9 million to a partnership in Oregon for landowners who voluntarily conserve sage-grouse habitat. The RCPP investment is equally matched from partners, providing $18 million total so that the Oregon Association of Conservation Districts can spearhead work in Baker, Crook, Deschutes, Grant, Harney, Lake, Malheur and Union counties. Efforts include removal of 130,000 acres of invasive conifer, which when completed by 2018, will alleviate this threat on priority private lands state-wide. New conservation easements on an additional 12,000 at-risk acres represent the first acquisitions in Oregon since SGI's inception.

NRCS will invest another $5 million into the SGI SWAT to maintain longevity of the human capacity necessary to deliver the newly committed financial resources. SWAT has matured over the years and is now regarded by partners as an effective mechanism for enhancing field capacity, funding outcome-based science, and sharing the SGI story. Originally envisioned as a 3-year effort in 2011, a second infusion by NRCS extended SWAT through 2016. New investments will continue to fuel SWAT through 2018. In January of 2015, a new $1 million contribution to IWJV from ConocoPhillips Company illustrates the commitments of partners to continue the SWAT model into the future, in order to truly achieve long-term conservation of the sagebrush ecosystem.

The last item included in projections are the technical resources that existing NRCS offices have redirected away from other priorities to implement SGI. This trained staff is critical to SGI implementation; without it the financial resources mean little. NRCS currently has more than 300 employees in more than 95 field offices across 11 western states working in tandem to

execute sage-grouse conservation on working landscapes. Their varied responsibilities include conservation planning, contracting, engineering, and training NRCS and partner staff.

In addition, not included in the above projections but offered for the first time as a new pilot under SGI in 2015 are conservation opportunities through the Conservation Stewardship Program (CSP). SGI-CSP is available to ranchers who volunteer to 'raise the bar' further by removing all identified threats facing sage-grouse on their entire operation. Participants earn CSP payments in five-year renewable contracts for conservation performance, the higher the performance the higher the payment. NRCS has specifically designed CSP enhancements to benefit sage-grouse and include conservation measures contained in the FWS-approved Conference Report (FWS 2010). For example, if an SGI participant has already removed invasive conifer, they can now through CSP also implement an SGI grazing system, and receive a financial incentive to maintain the system for 5 years with an opportunity to renew for an additional 5 years.

Finally, NRCS is developing a SGI 2.0 business plan as a spatially-explicit and state-based plan for guiding the investment of newly committed resources. NRCS staff in each of the eleven relevant States are refining sage grouse conservation priorities through 2018 and estimating anticipated level of threat reduction in those priority landscapes. Landscape priorities for NRCS in SGI 2.0 will link closely with State and Federal sage-grouse conservation plans and include quantitative goals. NRCS expects to provide this business plan to FWS in late spring 2015 as a further demonstration of commitment to future implementation. This business plan will be updated periodically, as state and federal plans are finalized and new science becomes available, in order to continue to drive sage-grouse conservation implementation to the areas of highest need and greatest impact across the landscape.

It is an exciting time for sage-grouse conservation and NRCS is proud to provide increased certainty for additional conservation through the life of the 2014 Farm Bill. Expectations are high that past accomplishments and out-year commitments will exceed criteria set forth in the Policy for Evaluation of Conservation Efforts policy for certainty of implementation and effectiveness (i.e., Policy for Evaluation of Conservation Efforts When Making Listing Decisions; Federal Register 2003). NRCS has provided with this Report to FWS a spatially-explicit dataset depicting conservation actions (Appendix S) for incorporation in the Conservation Efforts Database (CED) and to help inform the upcoming ESA listing decision.

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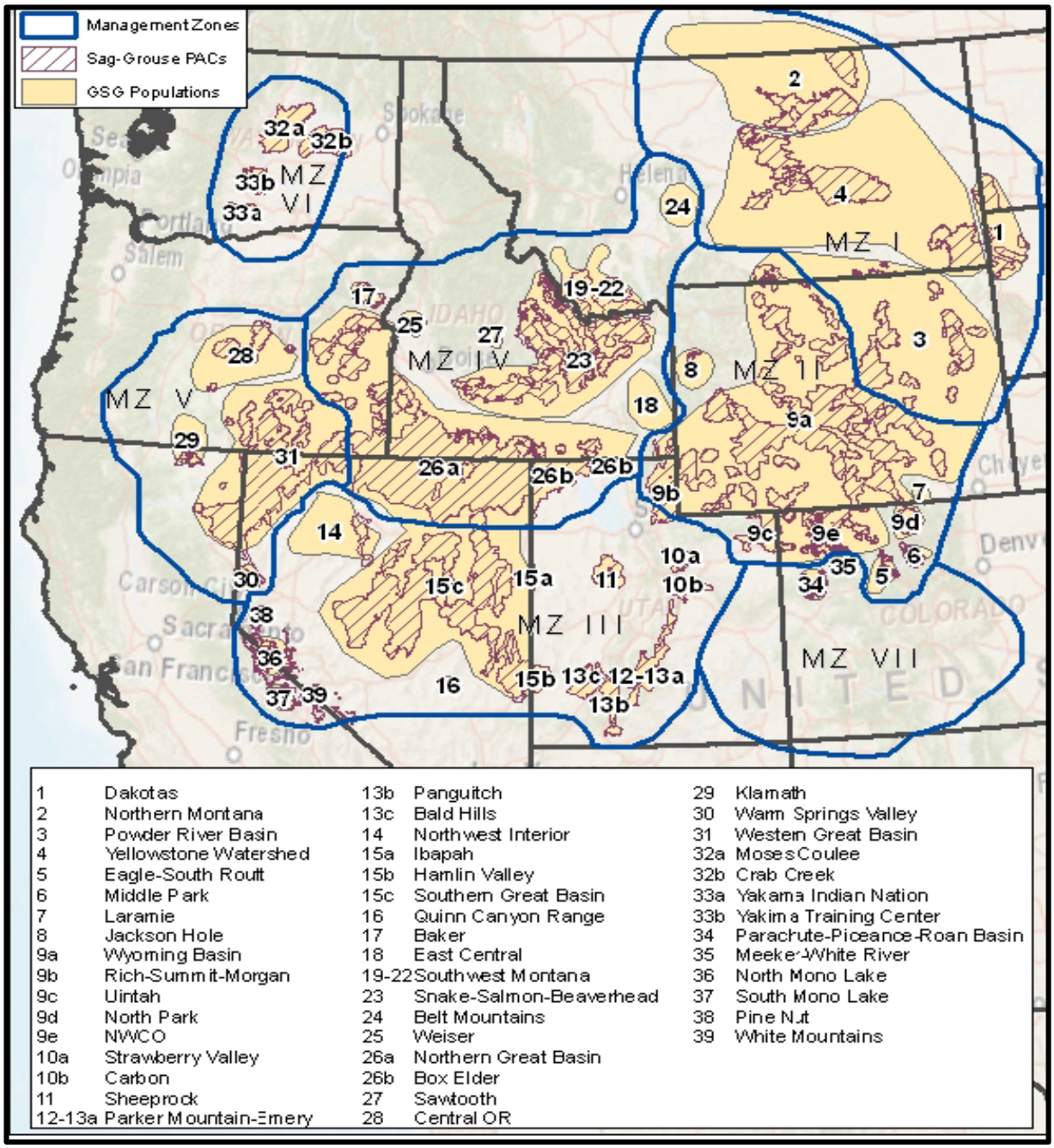
Appendices

Appendix A. Boundaries for sage-grouse management zones, populations, and priority areas for conservation (PACs; as adapted from FWS 2013).



Appendix B. SGI acres certified complete or contracted by state and activity, FY 2010-FY 2014.

Acres certified complete or contracted by state, 2010-2014

State	Grazing Systems		Easements*		Conifer Removal		Seeding		Fences Marked or Removed	
	acres	(% in PACs)	acres	(% in PACs)	acres	(% in PACs)	acres	(% in PACs)	miles	(% in PACs)
California	64,204	(56)	15,187	(71)	63,299	(65)	987	(96)	65	(72)
Colorado	79,077	(56)	68,988	(86)	1,185	(19)	3,483	(72)	11	(85)
Idaho	249,653	(87)	69,609	(94)	47,830	(77)	5,235	(43)	79	(94)
Montana	409,594	(85)	70,111	(75)	168	(0)	5,442	(14)	104	(96)
Nevada	26,173	(90)	18,272	(100)	22,266	(75)	1,855	(62)	21	(66)
North Dakota	20,173	(100)					2,475	(88)	< 1	(100)
Oregon	26,571	(100)	6,701	(1)	199,203	(81)	296	(93)	11	(82)
South Dakota	312,295	(85)							5	(83)
Utah	173,733	(95)	17,229	(100)	70,011	(99)	27,666	(96)	11	(100)
Washington	83,073	(86)	4,369	(100)			677	(41)	29	(10)
Wyoming	993,100	(63)	181,418	(71)	1,280	(80)	4	(100)	14	(36)
Total	2,437,645	(75)	451,884	(79)	405,241	(81)	48,120	(76)	350	(79)

Rangewide totals of 15,509 acres of weed management and 179 acres of wet meadow restoration are not shown.
*Easement numbers include all NRCS easements in occupied range or PACs acquired between FY92 and FY13

Appendix C. SGI acres certified complete or contracted by population, FY 2010-FY 2014.

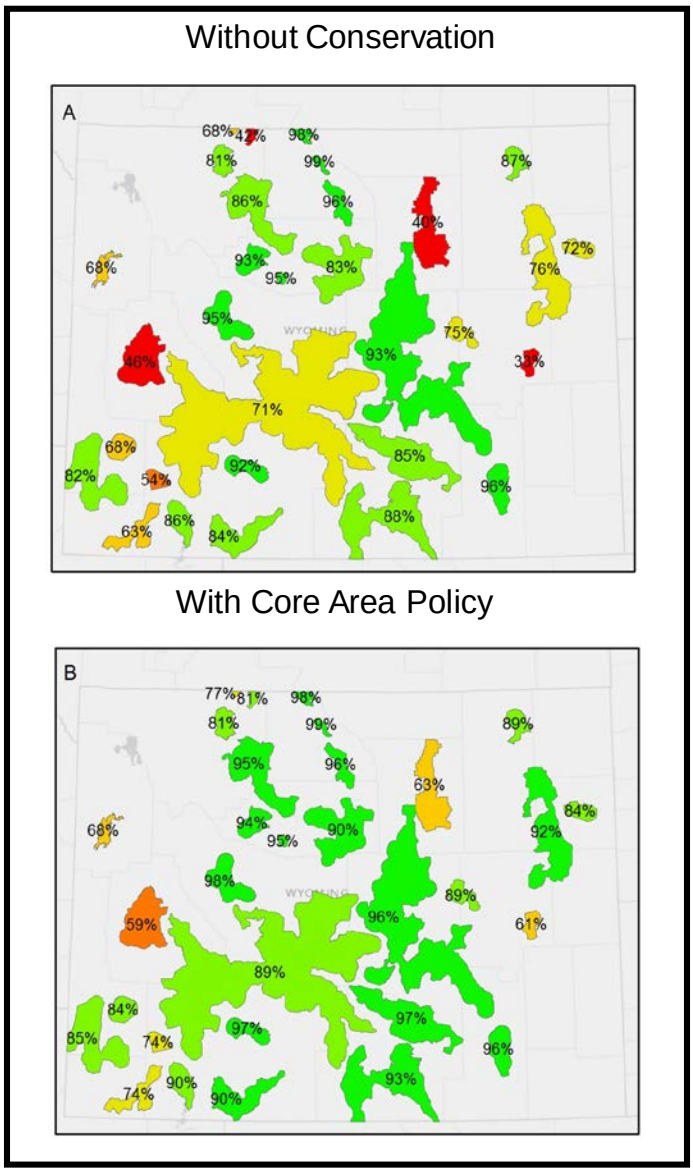
Acres certified complete or contracted by population, 2010-2014

MZ	Population	Grazing Systems		Easements*		Conifer Removal		Seeding		Fence Marked or Removed	
		acres (% in PAC)		acres (% in PAC)		acres (% in PAC)		acres (% in PAC)		miles (% in PAC)	
I	Dakotas	329,055	(89)					2,475	(89)	11	(93)
	Northern Montana	4,411	(73)	40,807	(79)						
	Powder River Basin	671,954	(54)	8,720	(60)	181	(0)			10	(98)
	Yellowstone Watershed	338,849	(83)	16,354	(97)			5,122	(15)	91	(95)
	Other	26,000	(49)							< 1	(100)
II	Middle Park	16	(100)	1,288	(100)			11	(100)		
	Jackson Hole			70	(100)						
	Wyoming Basin	327,652	(83)	166,831	(72)	1,099	(94)	4	(100)	5	(100)
	Rich-Morgan-Summit	8,596	(100)	465	(100)	455	(100)				
	Uintah	126,327	(100)			1,748	(100)			8	(100)
	North Park	12,182	(100)	6,067	(100)					< 1	(100)
	Northwest Colorado	48,677	(47)	52,039	(97)	223	(100)	2,512	(100)	10	(87)
	Other	11,000	(84)	8,450	(88)	26	(0)			< 1	(100)
III	Strawberry					7	(100)				
	Sheeprock Mountains	3,959	(100)			1,204	(100)	720	(100)	1	(100)
	Parker Mountain-Emery			93	(100)	509	(100)	226	(100)	< 1	(100)
	Panguitch	1,297	(100)	18	(100)	358	(100)	66	(100)	< 1	(100)
	Ibapah			422	(100)						
	Hamlin Valley	7,248	(100)			3,181	(100)	1,917	(100)	1	(100)
	Southern Great Basin	1,188	(33)			5,858	(83)	1,072	(100)	7	(100)
	North Mono Lake	13	(100)	6,085	(100)	2,185	(100)			1	(100)
	Pine Nut			0		963	(100)				
	Other	23,852	(63)	4,573	(100)	4,590	(77)	1,533	(19)	< 1	(100)
IV	Baker	10,295	(100)			5,795	(100)				
	East-Central ID			419	(0)						
	SW Montana	31,179	(100)	4,125	(99)					5	(100)
	Snake, Salmon, Beaverhead	198,284	(100)	64,314	(99)	290	(100)	1,730	(100)	62	(100)
	Belt Mountains	4,204				142	(0)	320	(0)	< 1	(0)
	Weiser	11,593						257	(0)		
	Northern Great Basin	38,053	(87)	2,477	(0)	137,501	(74)	2,445	(40)	27	(83)
	Box Elder	2,992	(100)	16,230	(100)	59,990	(100)	22,861	(100)	1	(100)
	Other	18,330	(33)	10,602	(4)	2,381	(100)	2,127	(73)	< 1	(0)
V	Central OR	4,522	(100)	1,690	(0)	69,291	(85)	20		6	(63)
	Klamath	12	(83)	679	(0)	11,229	(77)	535	(96)	18	(100)
	Warm Springs Valley	3	(100)	902	(100)	15					
	Western Great Basin	64,359	(78)	20,253	(81)	75,685	(76)	496	(97)	54	(56)
	Other	19,410	(27)	5,347	(23)	19,375	(72)	34	(100)	2	(78)
VI	Moses Coulee	60,037	(100)	2,127	(100)			280	(100)	3	(100)
	Crab Creek	9,515	(100)	2,242	(100)						
	Other	13,521	(15)					397	(0)	26	(37)
VII	Other	9,061		8,193		962	(0)	960	(0)	< 1	(0)
Total		2,437,645	(75)	451,884	(79)	405,241	(81)	48,120	(76)	350	(79)

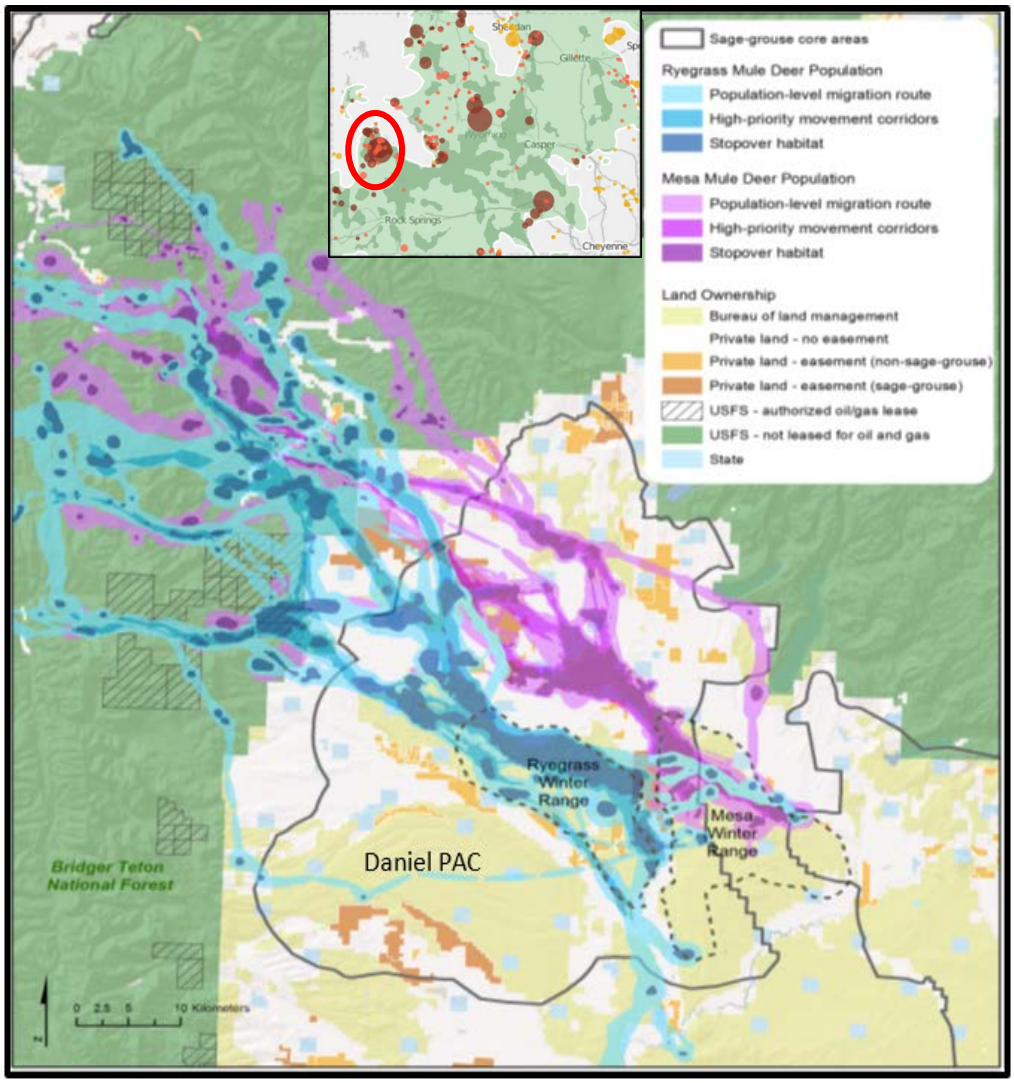
Rangewide totals of 15,509 acres of weed management and 179 acres of wet meadow restoration are not shown.

*Easement numbers include all NRCS easements in occupied range or PACs acquired between FY92 and FY13

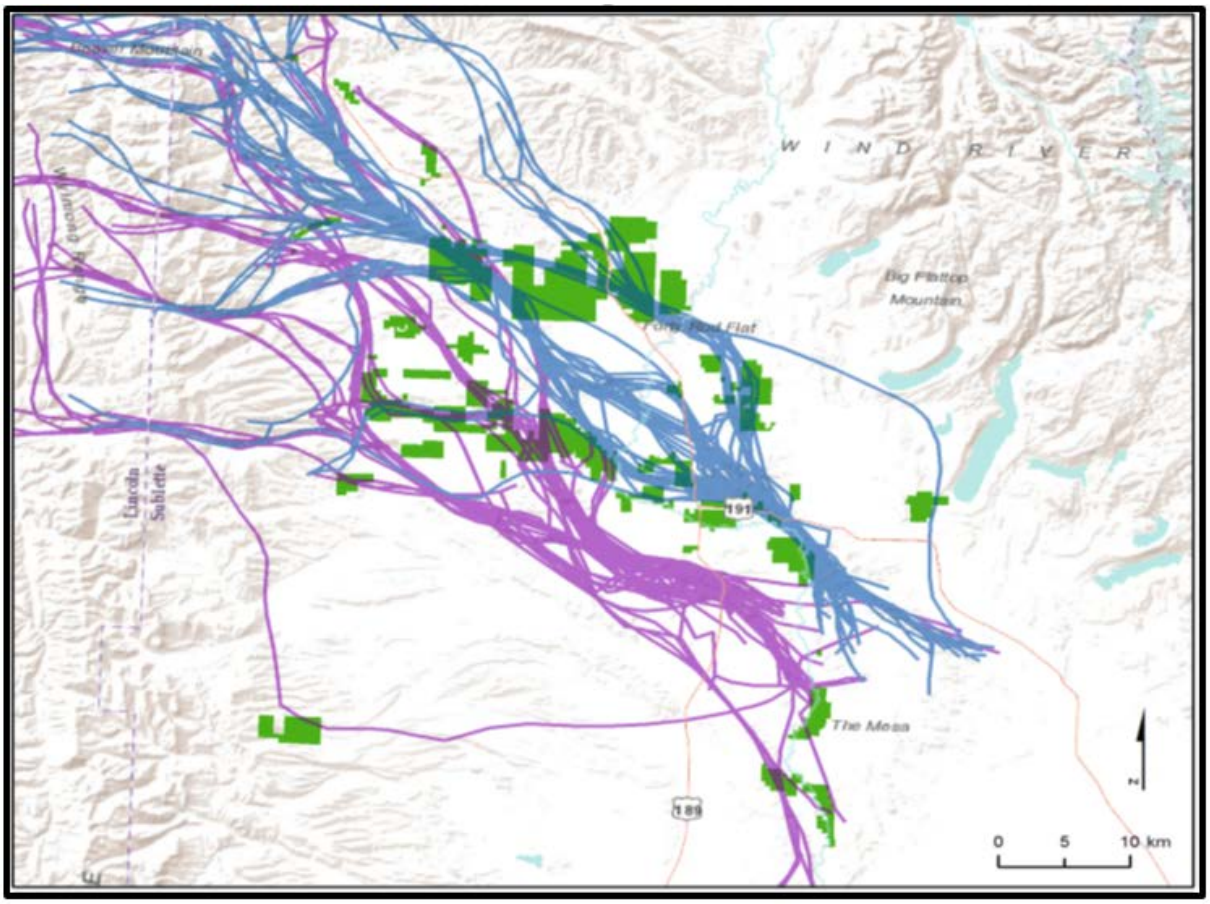
Appendix D. Percent of Wyoming sage-grouse populations remaining with and without conservation. Panel A is population remaining within PACs without policy and easements. Panel B shows percent remaining from current population with policy in place (as modified from Copeland et al. [2013]).



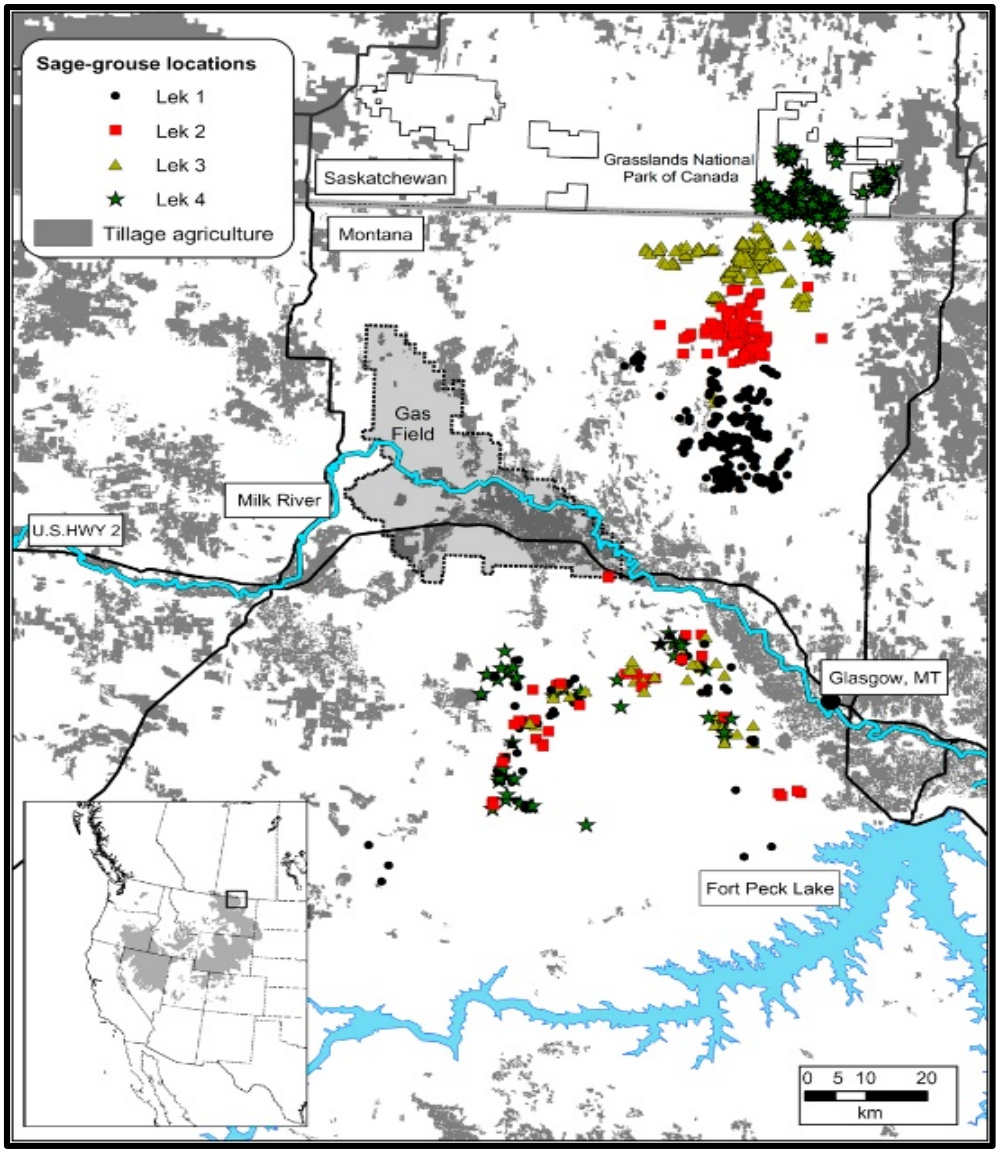
Appendix E. Winter ranges, stopovers, and migration routes for two mule deer herds (Mesa and Ryegrass subpopulations), Upper Green River Basin, Wyoming, relative to land ownership and conservation measures enacted (as modified from Copeland et al. 2014).



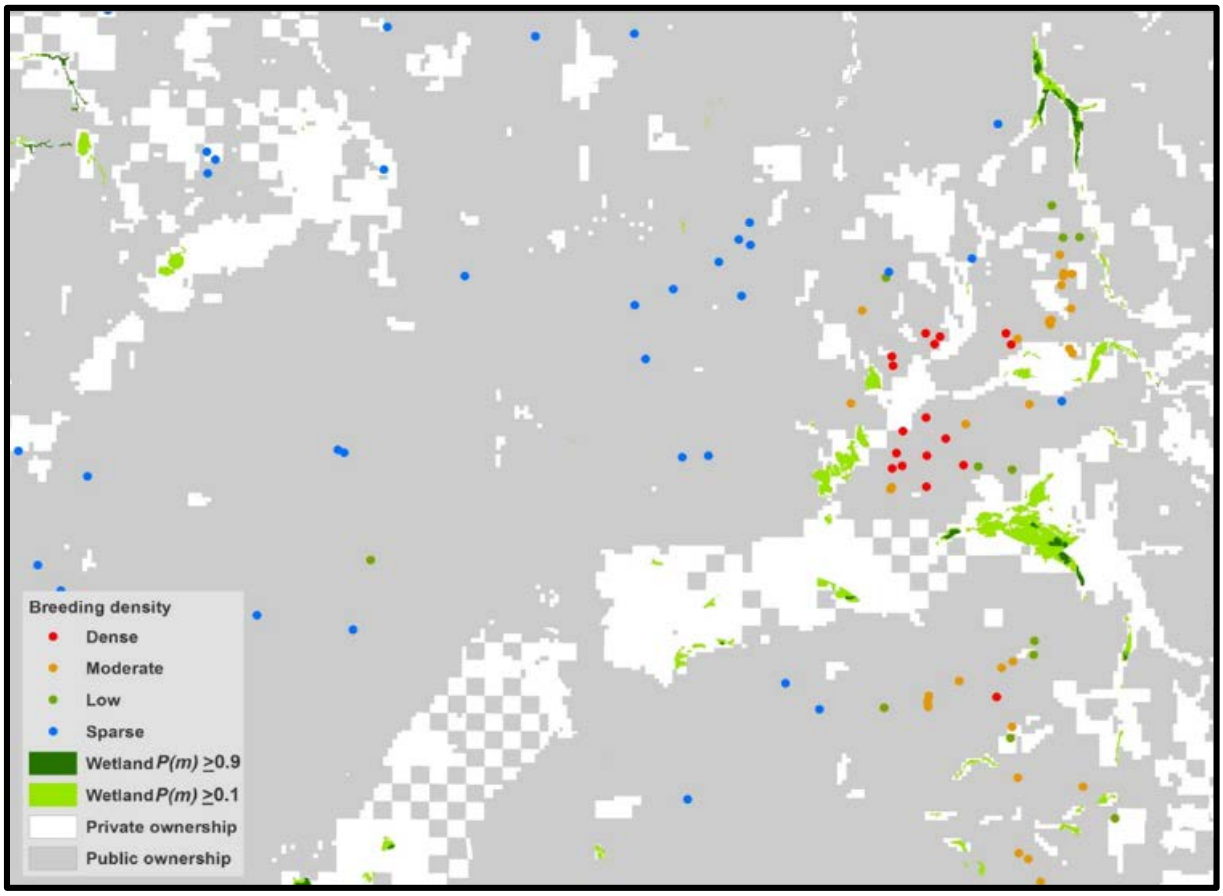
Appendix F. Conservation opportunities on private land (green) with individual migration routes for Mesa (blue) and Ryegrass (purple) mule deer populations (as modified from Copeland et al. 2014).



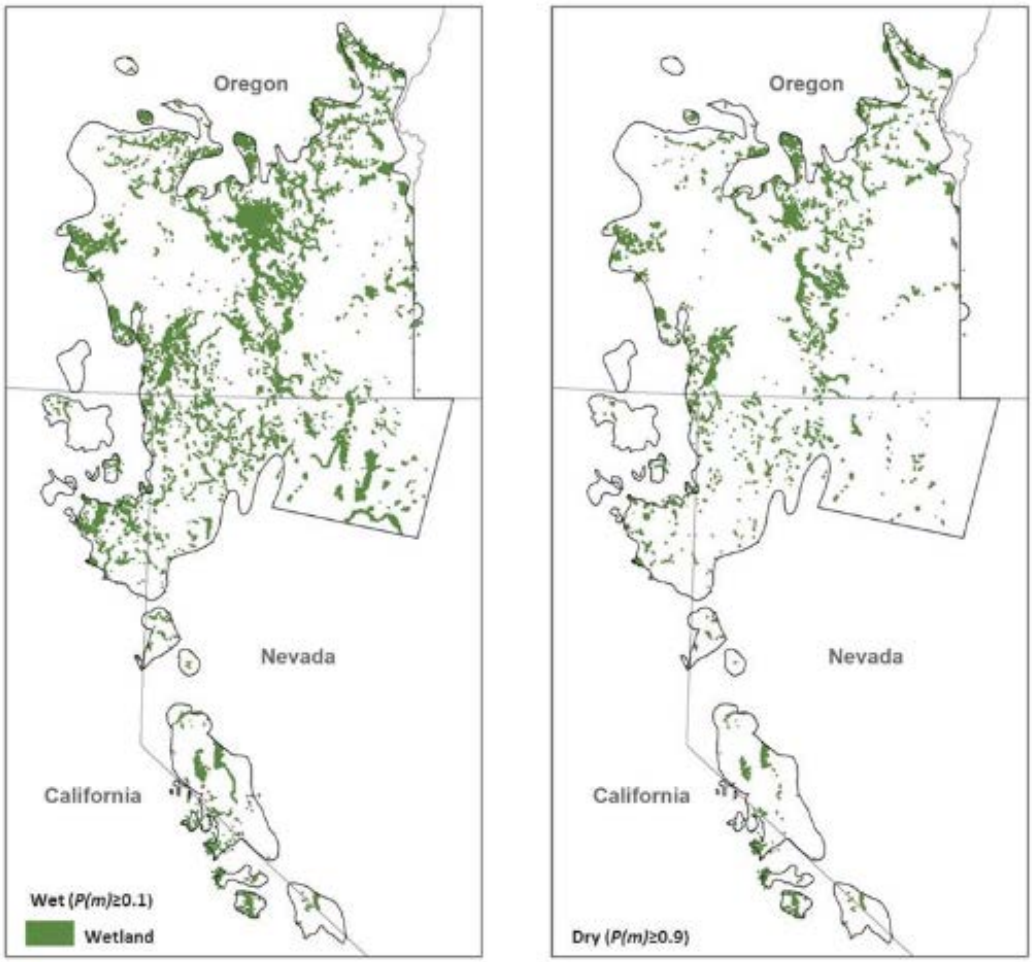
Appendix G. Telemetered sage-grouse locations in spring/summer (north of Milk River) and winter (south of Milk River) in northeast Montana and East Block of Grasslands National Park, Saskatchewan, Canada (modified from Tack et al. 2012).



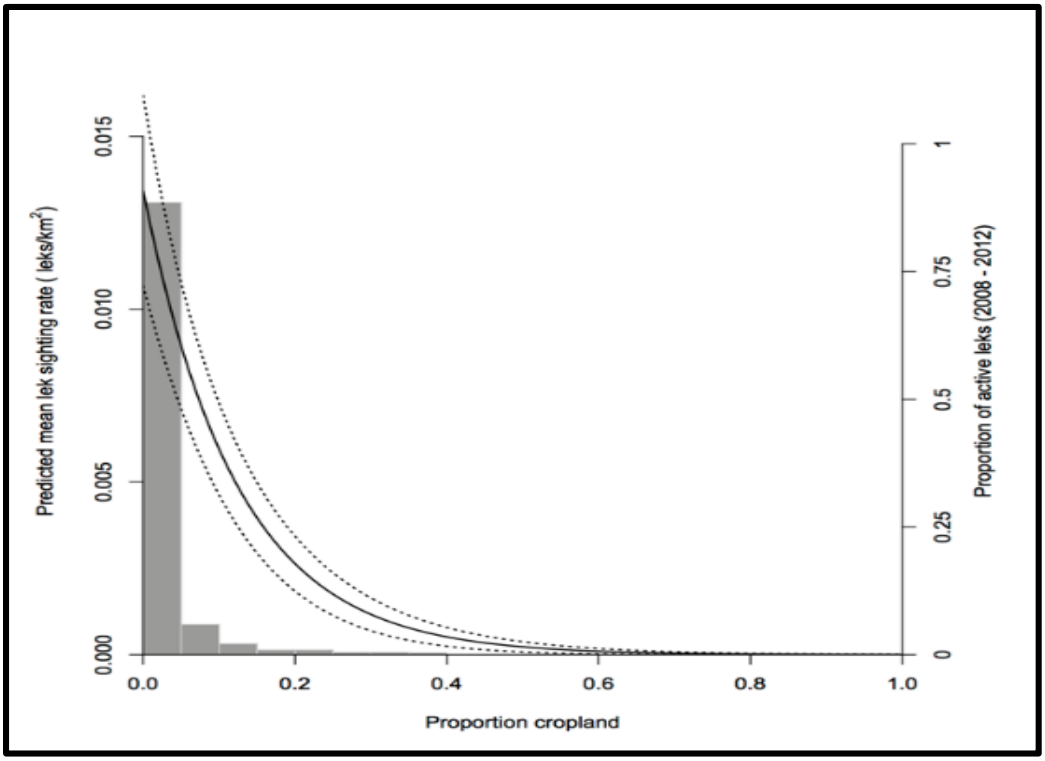
Appendix H. Colored dots represent sage-grouse leks with breeding densities that vary from dense (red) to sparse (blue). Leks are clustered near summer habitats (green). Although more than 80 percent of upland breeding habitat is on public lands (gray), 81 percent of summer habitats are privately owned (white; as modified from SGI 2014).



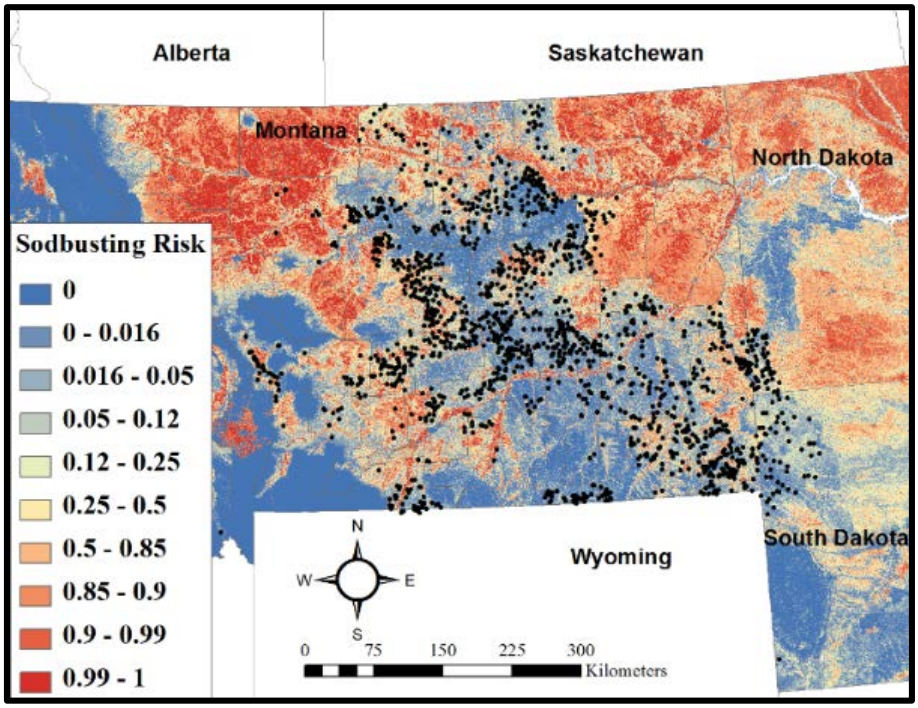
Appendix I. Mesic habitats, as mapped for sage-grouse broods in Oregon, Nevada, and California. Extent of brood habitat nearly doubles in wet (left) compared to dry (right) years.



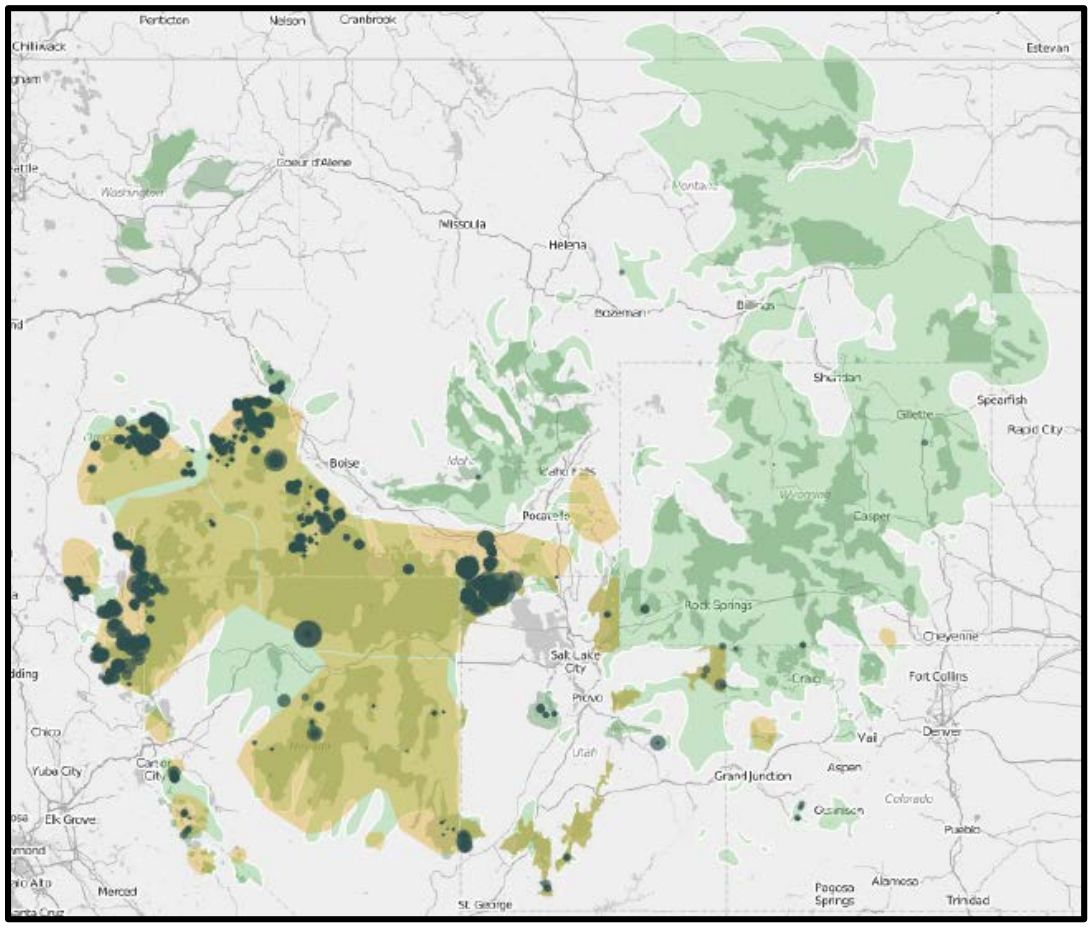
Appendix J. Effect of proportion cropland within 2 miles on lek sighting rate. Lek sighting rate was calculated as a function of increasing cropland simultaneously within 0-0.5 mile and 0.5-2 mile buffers. Histogram indicates proportion cropland within 0-2 miles of active leks (unpublished data, Joseph Smith, University of Montana).



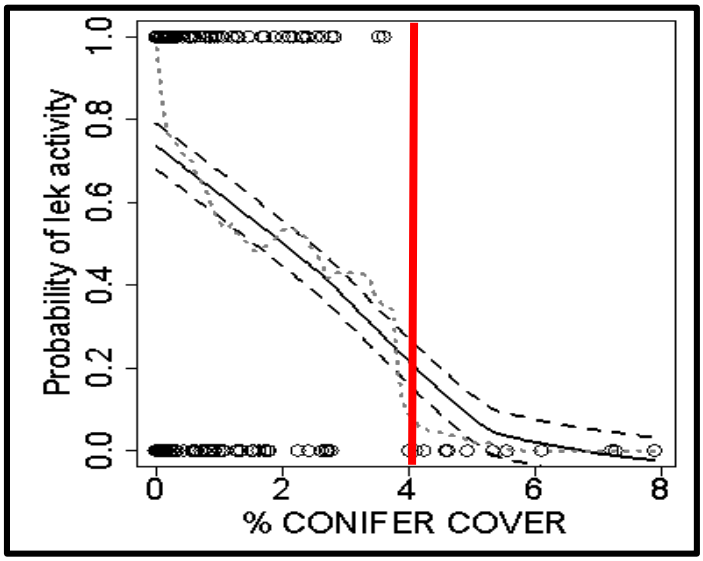
Appendix K. Crop suitability map depicting relative risk of agricultural conversion with blue representing low likelihood of tillage (unpublished data, Jeff Evans, The Nature Conservancy). Black dots denote active sage-grouse leks.



Appendix L. Location and size of SGI-sponsored conifer removal projects. Yellow shading denotes project clustering inside PACs where conifer is a threat (FWS 2013).

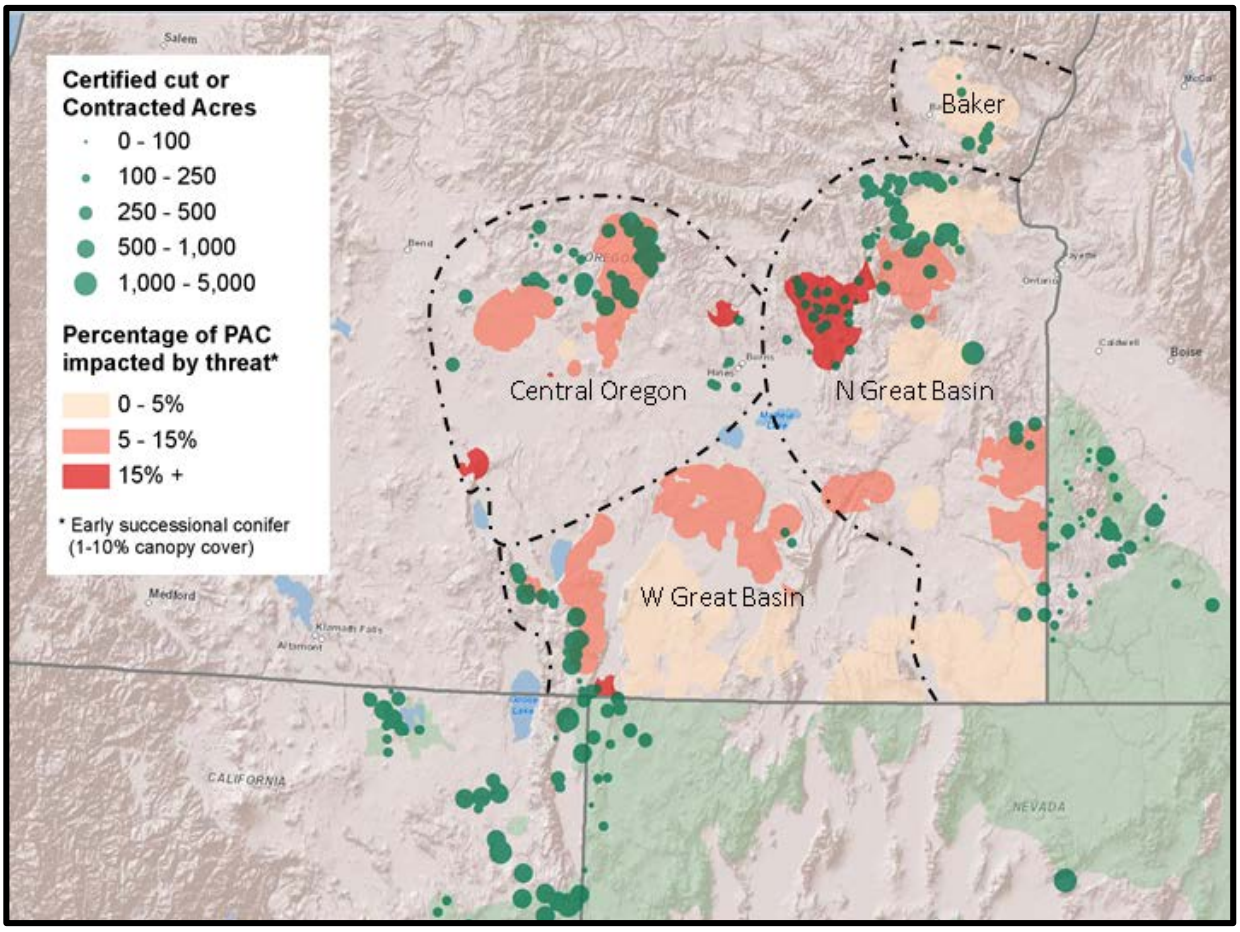


Appendix M. Decreasing sage-grouse lek activity as a function of increasing conifer cover (as modified from Baruch-Mordo et al. 2013). Black circles depict active (1.0) and inactive (0.0) leks. No leks remained active after invasive conifer exceeded 4 percent canopy cover.

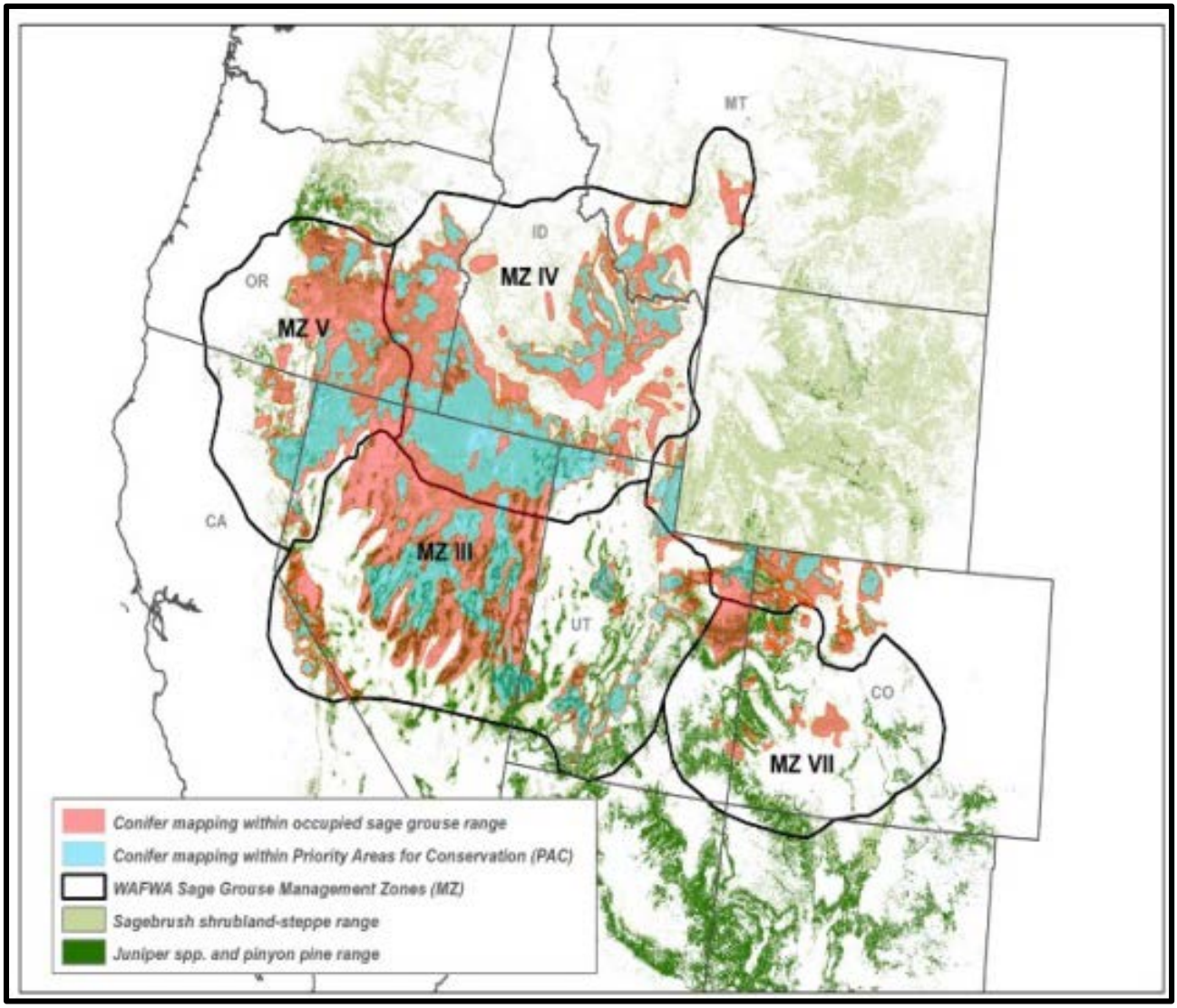


Appendix N. Jim Sage project site near Burley, Idaho, before (top; September 2013) and after (bottom; April 2014) removal of invasive conifer (photos courtesy of Pheasants Forever and Idaho BLM).

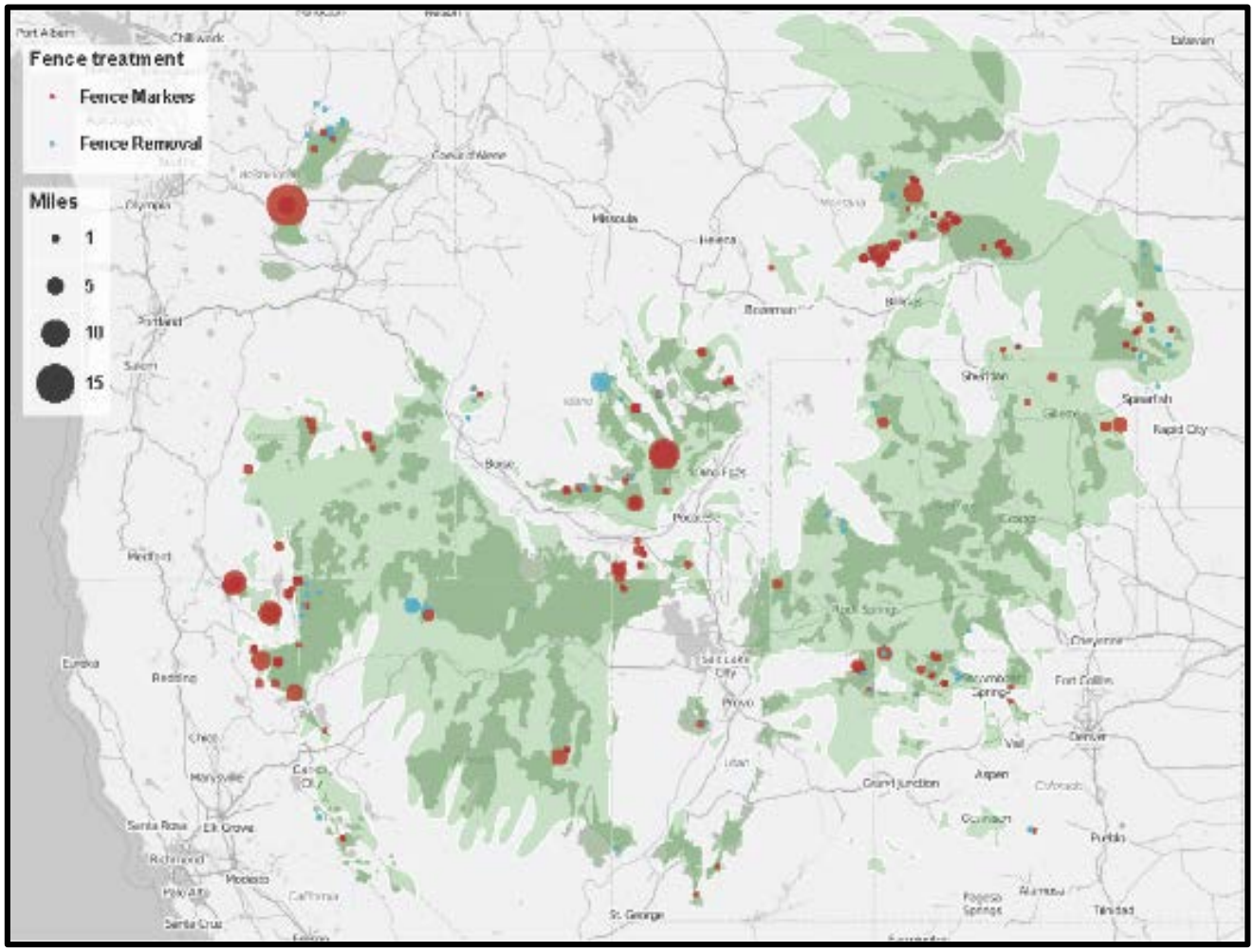
Appendix O. Location and size of conifer cuts in southeast Oregon. Red shading depicts extent of early-successional conifer in each PAC.



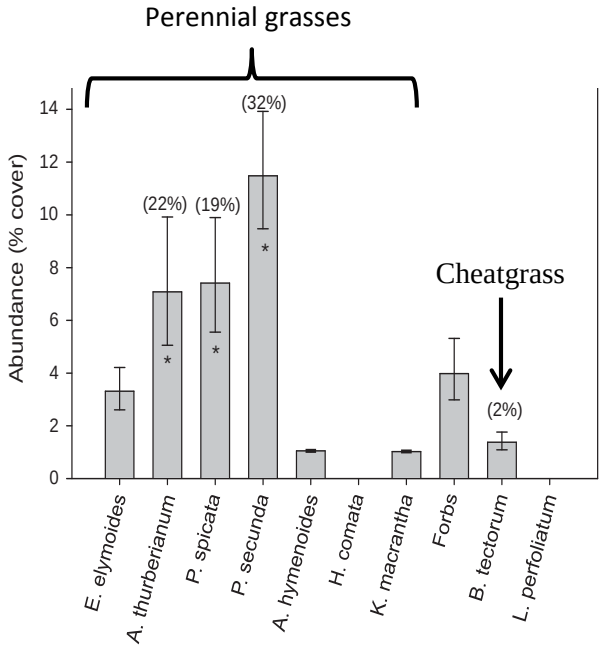
Appendix P. Areas where invasive conifer is being mapped in seven western states, PACs shown in blue and occupied habitat in pink (102.5 million acres total).

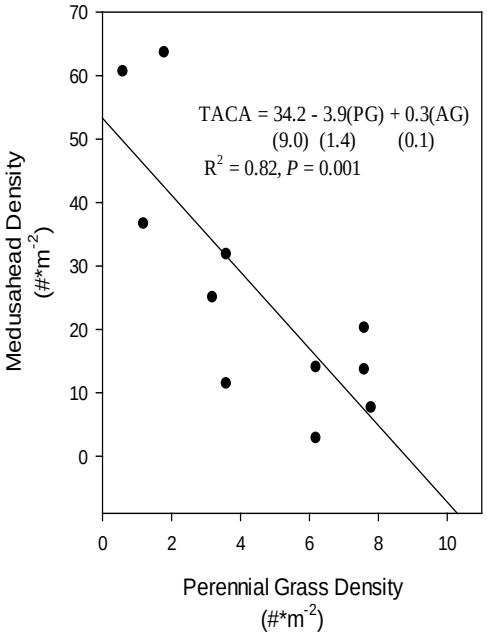


Appendix Q. Location and miles of fences that have been marked (red) or removed (blue) under SGI contract to reduce sage-grouse collisions.



Appendix R. Deep-rooted perennial grasses reduce the prevalence of invasive species, including cheatgrass (left; as modified from Reisner et al. [2013]) and medusahead (right; Davies [2008]).





Appendix S. SGI Digital Data for the FWS (Metadata)

NRCS has assembled a spatially explicit dataset depicting conservation actions described in this report. Data is provided to the FWS for incorporation in the Conservation Efforts Database (CED) and to help inform the upcoming ESA listing decision. Data is aggregated to prevent disclosure of personally identifiable information, as required by Section 1619 of the Food, Conservation, and Energy Act of 2008, and categorized by Type (e.g., easement, conifer removal, grazing system), Status (i.e., contracted but not implemented or certified complete), Priority Location (inside or outside of PACs) and Population to maximize compatibility and utility with the COT Report, CED and FWS. Although 1619 prohibitions prevent NRCS from disclosing easement boundaries for enrolled but unclosed easements, all completed easement boundary shape files are publicly available through the National Conservation Easement Database.

SGI contract locations were determined using point data and often marked at the ranch centroid or headquarters. As a result, conservation actions may fall outside a PAC boundary, even when the area affected lay inside the PAC. Contracts with recorded locations within 3.2 miles (five kilometers) of a PAC boundary were tallied within PAC totals. Similarly, all contracts within 3.2 miles of population boundaries but more than 3.2 miles from a PAC were assigned to the population of interest.

Description: Summary of USDA Natural Resources Conservation Service's Sage Grouse Initiative (SGI) projects at the scale of populations and Priority Areas for Conservation (PACs).

Prepared: January 2015

Data format: ESRI Shapefile

Data Source (conservation easements): 1992-2014 REAP Quarterly Report Query from NEST conducted January 23, 2015.

Data Source (all non-easement): Protracts database query conducted 10/10/2014 for all SGI fund coded EQIP and WHIP contracts FY 2010- FY2014. Also included are six contracts from Nevada and 8 in Oregon that adhere to Conference Report standards, but were simply incorrectly coded under EQIP in 2010.

Field definitions:
population: Population *sensu* Garton et al. (2011).
priority: Inside PAC (<= 3.2 miles) or Outside PAC (> 3.2 miles)
conif_crt: Acres of conifer removal, certified completed.
conif_pln: Acres of conifer removal planned, but not yet certified completed.
graze_crt: Acres of grazing systems, certified completed.
graze_pln: Acres of grazing systems planned, but not yet certified completed.
fence_crt: Feet of fence marking or removal, certified completed.
fence_pln: Feet of fence marking or removal, but not yet certified completed.
seed_crt: Acres of native or tame seeding, certified completed.
seed_pln: Acres of native or tame seeding, but not yet certified completed.
weed_cert: Acres of weed management, certified completed.
weed_pln: Acres of weed management planned, but not yet certified completed.
wetmdw_cert: Acres of wet meadow restoration, certified completed.
wetmdw_pln: Acres of wet meadow restoration planned, but not yet certified completed.
easmt_cmpl: Acres of conservation easements completed/acquired.
easmt_pend: Acres of conservation easements active or pending.

Coordinate system:
Projection: Albers
Geographic coordinate system: GCS North American 1983
Datum: NAD 83