BI-STATE SAGE-GROUSE ACCOMPLISHMENT REPORT

2012-2018

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EXECUTIVE SUMMARY

Photo: Bob Wick

INTRODUCTION

The objective of the 2012 Bi-State Sage-Grouse Conservation Action Plan (Action Plan) was to develop a comprehensive set of strategies, objectives and actions to be implemented over a 10-year span to attain long-term conservation of the Bi-State sage-grouse Distinct Population Segment (Bi-State DPS) and their habitats. In 2014, a team of agency biologists reviewed the Action Plan and developed 76 projects that were considered the highest priority Action Plan projects to complete.

The Action Plan is implemented through the Bi-State Local Area Working Group (Bi-State LAWG), a collaborative conservation network of federal, state and local government agencies, Native American tribal members and representatives, nonprofits organizations and private landowners (Figure 2). Utilizing a science-based adaptive management approach, this diverse group of stakeholders cooperates to carry out strategies and actions identified in the Action Plan.

ACCOMPLISHMENTS

Much has been accomplished since the implementation of the Action Plan in 2012. Bi-State partnerships remain strong and active and the Action Plan, while flexible, remains the guiding framework for Bi-State LAWG efforts. Through this framework, agencies and project partners have carried out population and vegetation monitoring plans and initiated conservation projects on more than 100,000 acres of land in the Bi-State (Figure 1).

Population monitoring provides information on habitat selection and utilization and helps biologists understand factors influencing sage-grouse population trends. Vegetation Monitoring plots completed by the Nevada Partners for Conservation and Development aim to evaluate the effectiveness of Bi-State

restoration and conifer treatment projects. Conservation projects implemented across the Bi-State are designed to address and alleviate threats including wildfire, urbanization, conifer encroachment, infrastructure and loss of sagebrush and meadows, among others (Table 4).

The implementation of these monitoring and conservation efforts have expanded our knowledge of population demographics, measured ecosystem health, increased habitat availability and suitability and provided ecological benefits to Bi-State sage-grouse populations and their habitats.

PURPOSE

This report summarizes population and vegetation monitoring efforts and provides a synopsis of conservation projects, initiated since 2012, in an attempt to understand what percent of the Action Plan has been implemented. This understanding will help to prioritize Bi-State DPS conservation efforts moving forward.

ACCOMPLISHMENT HIGHLIGHTS

- A "SAGE-GROUSE SERVICE TEAM" APPROACH WAS IMPLEMENTED
- INTER-AGENCY AGREEMENTS AND FUNDING PROVIDED FOR USGS SCIENCE ADVISOR
- $45M MULTI-JURISDICTIONAL FUNDING SUPPORT TO CONSERVE BI-STATE DPS AND ITS HABITATS
- DEVELOPMENT OF A SPATIALLY EXPLICIT CONSERVATION PLANNING TOOL
- COMPLETION AND UTILIZATION OF AN INTEGRATED POPULATION MODEL
- 24 EXECUTIVE OVERSIGHT MEETINGS SINCE 2015
- 11 TECHNICAL ADVISORY COMMITTEE MEETINGS SINCE 2015
- 28 STAKEHOLDER MEETINGS
- FORMATION OF THE TRIBAL NATURAL RESOURCE COMMITTEE
- CREATION OF THE BI-STATE WEBSITE
- 73 VOLUNTEER, EDUCATION AND OUTREACH EVENTS
- ADHERED TO A POPULATION MONITORING PLAN
- COMPLETED 2 YEARS OF PARKER MEADOW TRANSLOCATIONS
- INITIATED 89% OF ALL ACTIONS IN THE ACTION PLAN
- INITIATED OR EVALUATED 85% OF THE 76 HIGH PRIORITY PROJECTS

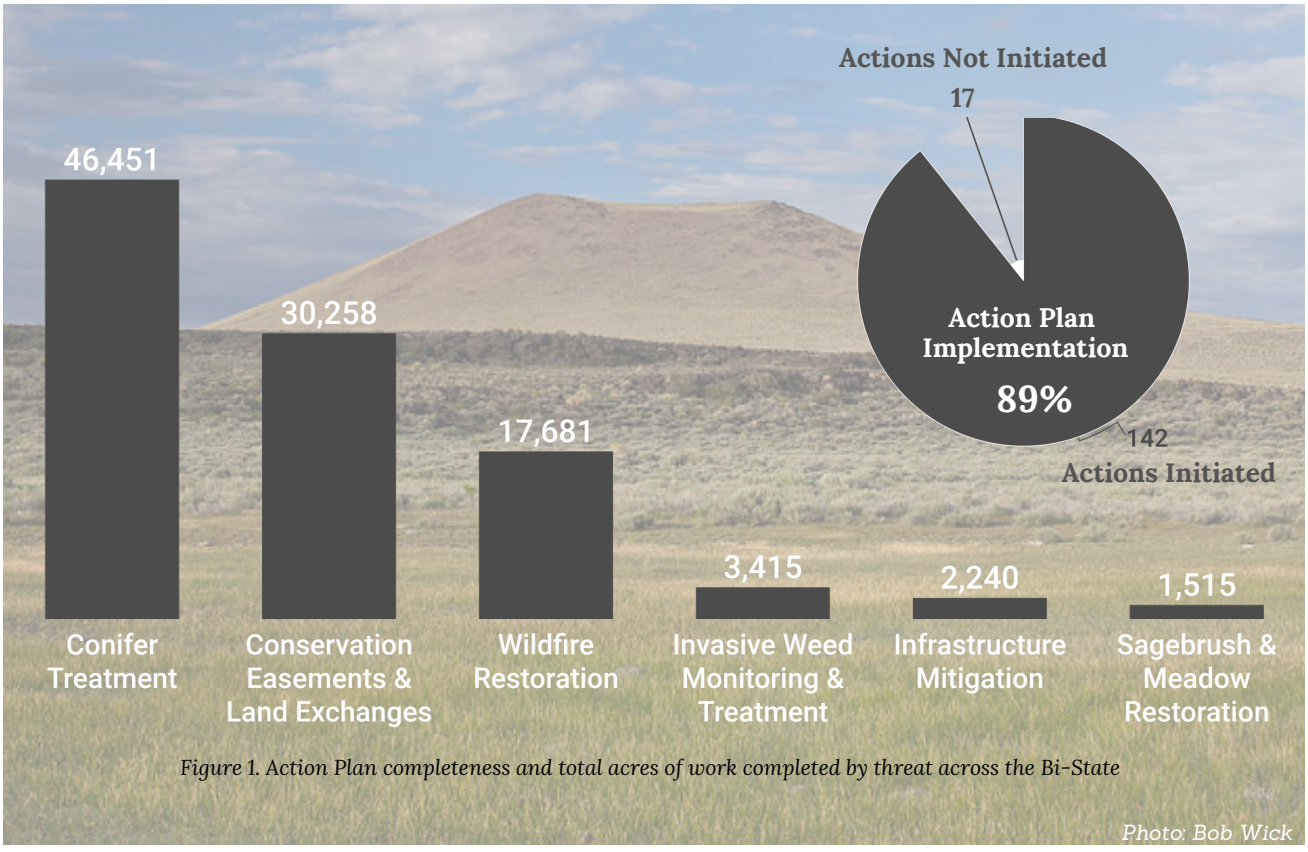


Figure 1. Action Plan completeness and total acres of work completed by threat across the Bi-State

Photo: Bob Wick


Photo: Bob Wick

INTRODUCTION

The Bi-State Local Area Working Group (Bi-State LAWG) was formed in 2002 with the goal of establishing a landscape level approach to conservation and management of the Bi-State greater sage-grouse distinct population segment (Bi-State DPS). Working collaboratively, they developed the first Bi-State sage-grouse conservation plan in 2004.

In 2012, the Bi-State LAWG organized a planning and strategy approach to build and improve upon the multi-pronged effort to affect conservation of the Bi-State DPS. While an important milestone, it was not the beginning of the Bi-State LAWG's effort but a continuation of efforts that began a decade before (Figure 3).

Encouraged by a potential listing of the species under the Endangered Species Act, the Bi-State LAWG set out to re-evaluate threats to Bi-State sage-grouse and identify tangible on-the-ground actions to alleviate these concerns. This effort culminated in the 2012 Bi-State Conservation Action Plan (Action Plan), which provides a 10-year adaptable scope of work, grounded in the best available science and supported by funding commitments provided by local, state and federal partners.

The Action Plan summarized relevant threats and prior conservation efforts and outlined a comprehensive set of strategies, objectives and actions designed to achieve conservation of sustainable populations and habitats for the Bi-State DPS (Table 4). After seven years of implementation, much has been accomplished. Partnerships remain strong and active and the Action Plan, while flexible, remains the guiding road-map for Bi-State LAWG conservation efforts.

The purpose of this report is to summarize the implementation of the strategies and actions outlined in the Bi-State Action Plan, which includes population monitoring, vegetation monitoring and the implementation of a wide variety of habitat improvement and conservation projects.

Executive Oversight Committee	Technical Advisory Committee	Local Area Working Group	Tribal Natural Resource Committee
The EOC is comprised of resource agency directors from the USFWS, BLM, USFS, NRCS, USGS, NDOW and CDFW.	Resource agency biologists who provide technical expertise and guidance make up the TAC.	The LAWG is formed by federal, state, and local governments, Native American tribes, non-profit organizations, ranchers and private landowners.	The TNRC is made up of Tribal representatives, individual Tribal members, and land and wildlife management agency liaisons.

Figure 2. The Bi-State collaborative

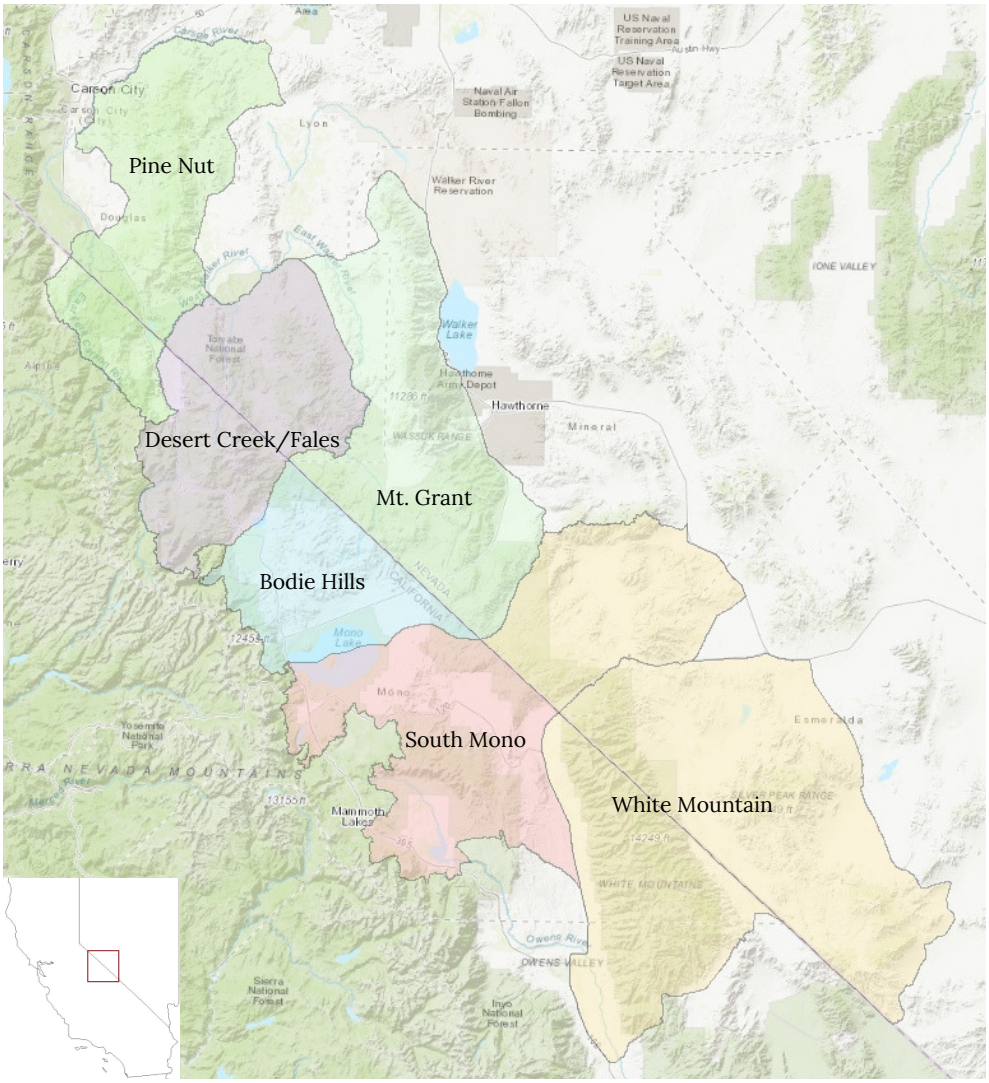


Figure 3. Bi-State Population Management Units (PMUs)

CONSERVATION HISTORY

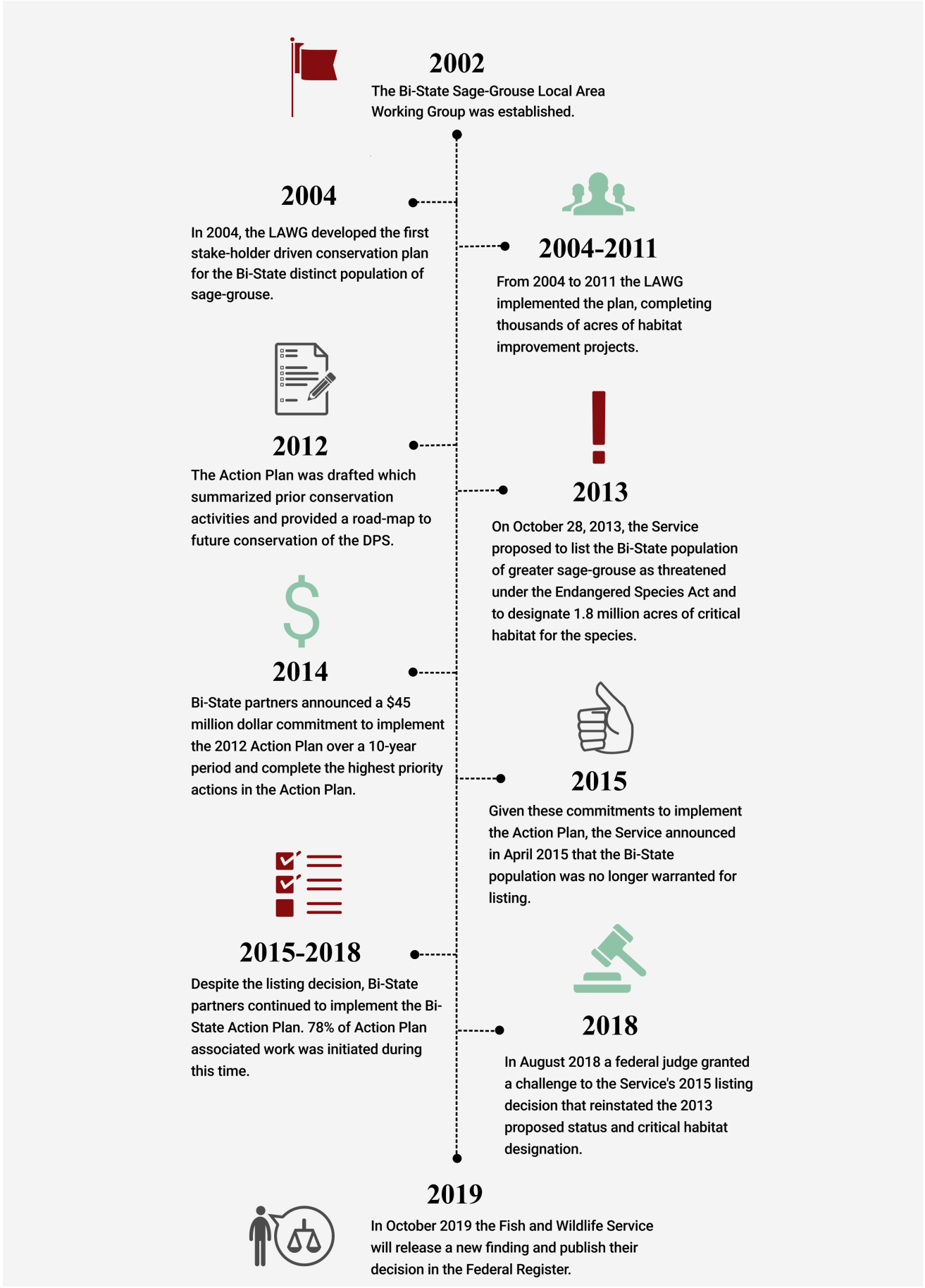


Figure 4. A timeline of Bi-State sage-grouse conservation efforts and listing decisions

POPULATION MONITORING

There are six Population Management Units (PMUs) within the Bi-State, including the Bodie Hills, Desert Creek/Fales, Mount Grant, Pine Nut, South Mono and White Mountains (Figure 3).

The largest population of sage-grouse occurs in the Bodie Hills PMU and the smallest population resides in the Pine Nut PMU. There is evidence of movement between all PMUs except for the White Mountains where there is little available data from radio-marked birds. Information is currently being collected from birds captured during the summers of 2016 and 2018 that were outfitted with Global Positioning System (GPS) satellite transmitters. These data will inform future management and conservation actions in the White Mountain PMU.

Research and monitoring projects detailed in the Action Plan include telemetry, habitat and vital rate data collection and the coordination of annual lek counts to better understand population demographics and improve predictive models and adaptive management capabilities.

Monitoring efforts were in place in 2012 when the Action Plan was written but a cooperative plan to intensively monitor sage-grouse populations was “kicked off” during the fall of 2015. This monitoring plan facilitates a before-after-control-impact study, designed to monitor sage-grouse response to management actions (Table 1).

Through this established monitoring plan birds from scheduled PMUs are captured each year in the spring and fall seasons and fitted with Very High Frequency (VHF) collars or GPS satellite transmitters (Table 2, Figure 5). Body measurement data is collected during capture and sage-grouse movement and survival is tracked in the consecutive years. Intensive monitoring is conducted during nesting and brood-rearing periods to track reproduction and recruitment (Mathews et al., 2018). These vital rates provide data for the Integrated Population Model (IPM) which has the ability to characterize population growth rate and isolate factors affecting that rate for individual sub-populations and the Bi-State DPS as a whole.

Table 1. Proposed monitoring schedule (2012-2023)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Pine Nut				●	●	●			●	●	●	
Desert Creek		●			●	●	●				●	●
Mt. Grant	●		●	●	●	●	●				●	●
Bodie Hills				●	●	●	●	●	●	●		
Sagehen *				●	●						●	●
Long Valley *	●		●		●	●	●	●	●			
Parker Meadows *				●	●	●	●	●	●	●		
White Mountain		●			●	●	●	●	●			

* *South Mono PMU*

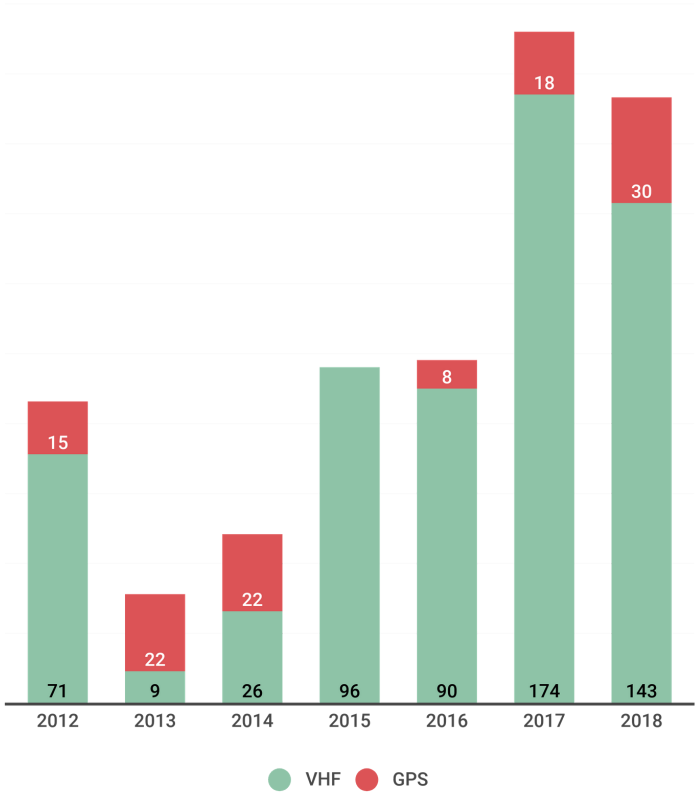


Figure 5. Sage-grouse collared annually and collar type (2012-2018)

Table 2. Sage-grouse captured annually by PMU (2012-2018)

	2012	2013	2014	2015	2016	2017	2018	Total
Pine Nut	53	18	10	3	-	-	-	84
Desert Creek	6	-	-	11	31	20	10	78
Mount Grant	22	11	1	14	32	27	18	125
Bodie Hills	-	-	24	29	14	77	58	202
Sagehen *	5	-	13	7	-	-	-	25
Long Valley *	-	-	-	32	13	33	26	104
Parker Meadows *+	-	-	-	-	-	12	11	23
White Mountain	-	2	-	-	8	23	50	83
Total	86	31	48	96	98	192	173	724

* *South Mono PMU* + *Birds were captured in Bodie and translocated to Parker Meadows*

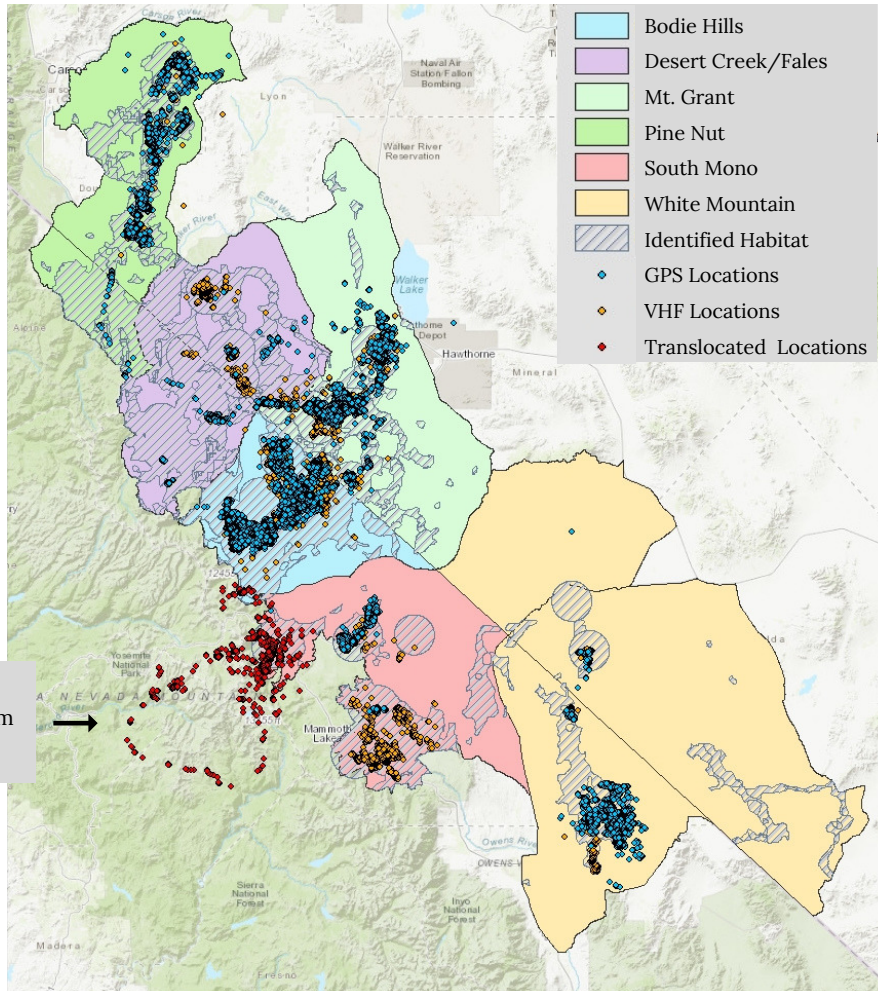


Figure 6. Key habitat identified by utilization distribution and resource selection function models and locations of all captured birds 2012-2018

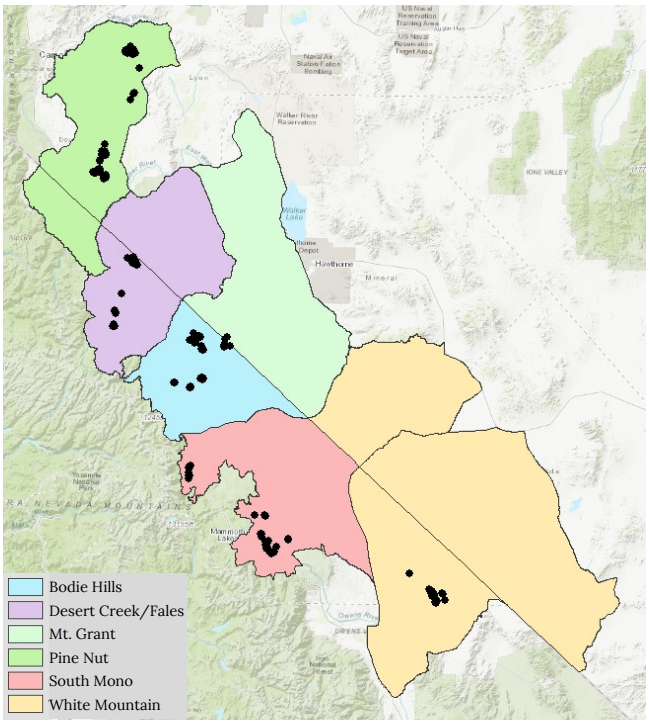


Figure 7. Capture locations 2012-2018

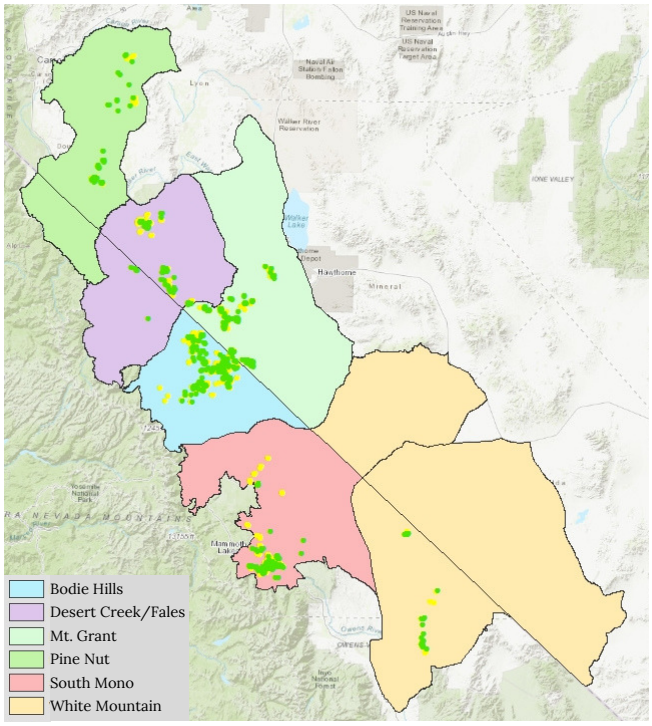


Figure 8. Nest (yellow) and brood (green) locations 2012-2018

Photos: Bob Wick

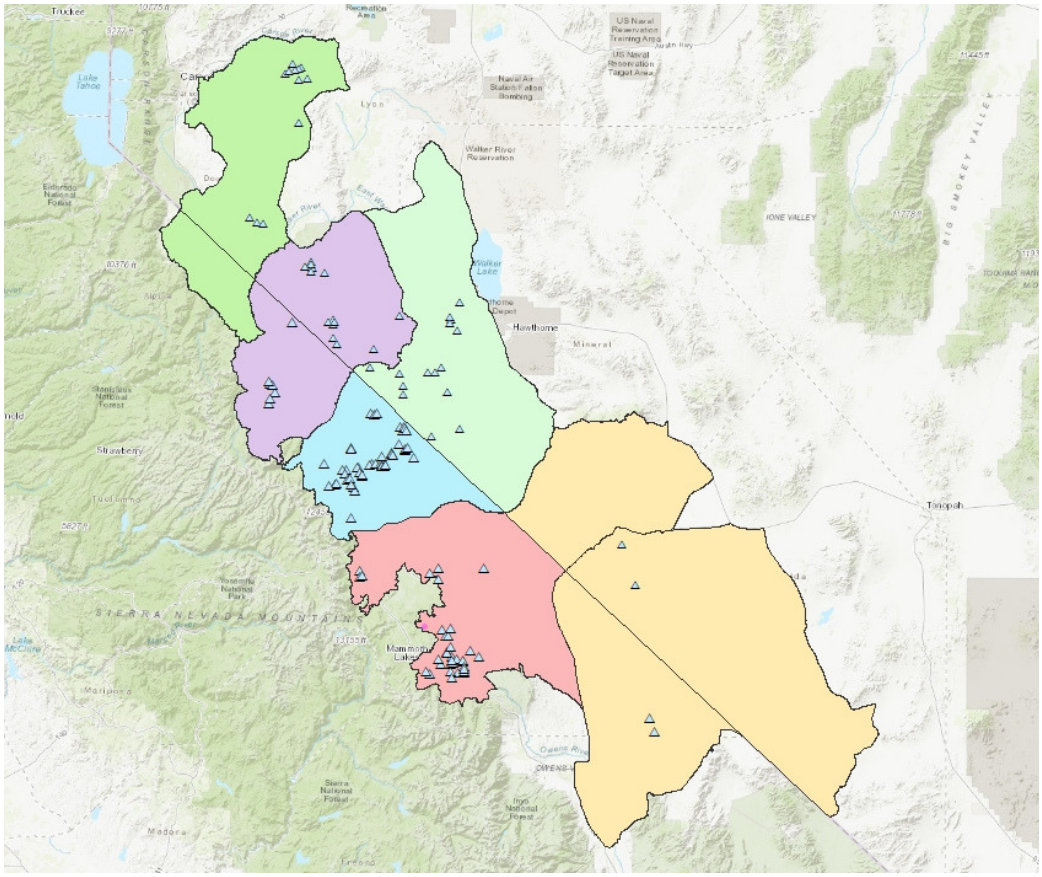


Figure 9. Current knowledge of Bi-State sage-grouse lek locations

LEK MONITORING

Each spring several Bi-State partners collaborate to monitor known leks in an attempt to count male sage-grouse when they congregate and visibly display on lekking grounds. These counts generate annual population estimates which help Bi-State partners understand population trends over time. These population trends are cyclical in nature and count results fluctuate year to year (Figure 10, 11). To determine long-term trends, annual lek count data is incorporated into the IPM which accounts for low counts or leks not counted and generates modeled population estimates.

Within the Bi-State area, there are a total of 101 documented lek locations between California and Nevada, of which 49 are considered currently active. The active lek status is defined by two or more males present for at least two of five recored years (Connelly et al., 2003). The total number of documented leks may be somewhat misleading due to the presence of “satellite leks” within many of the PMUs. Satellite leks are small leks that often occur near larger active leks during years of relatively high abundance. The "active" definition is sometimes difficult to apply to satellite leks that are utilized sporadically and do not persist each year. State agencies including NDOW and CDFW are currently working on delineating satellite leks as autonomous or connected, thereby removing some uncertainty surrounding lek counts as an index of population change.

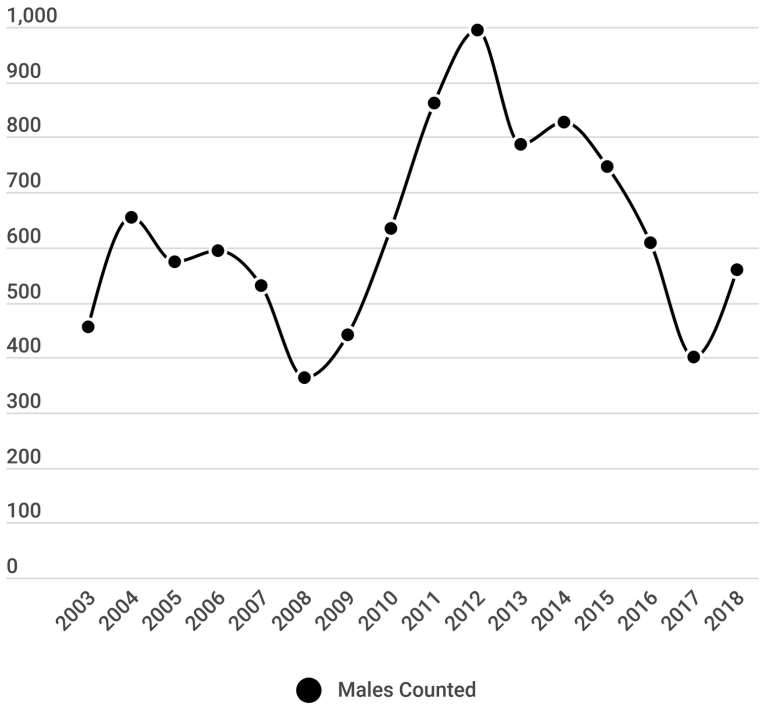


Figure 10. CA male sage-grouse lek attendance

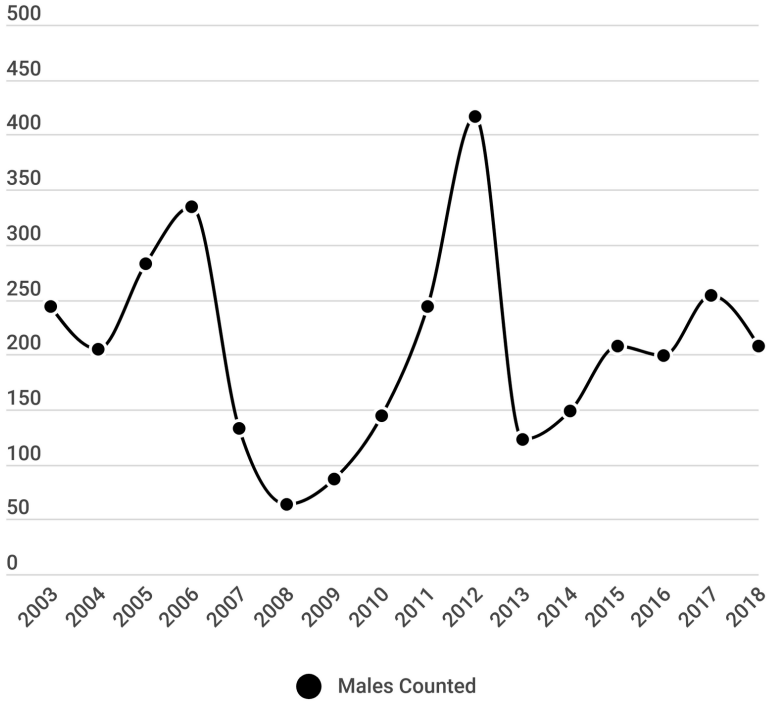


Figure 11. NV male sage-grouse lek attendance

PARKER MEADOW TRANSLOCATION

One management action specifically listed in the Action Plan was the addition of birds, through translocation, from other PMUs to critically small and isolated sub-populations of sage-grouse. Translocations are designed to: 1) bolster population size to reduce the eminent likelihood of local extinction that would negatively impact the overall stability and persistence of the DPS; and 2) infuse genetic variation to 'rescue' this population from the harmful effects of low genetic diversity and inbreeding depression.

Ongoing research conducted by the USGS highlighted the potential for population declines within the Parker Meadow sub-population in the South Mono PMU to critically low levels. It was determined that intervening management efforts were necessary to maintain and increase the Parker Meadow subpopulation.

After three years of planning, the first of a multi-year translocation effort began in March 2017. During this first year, 28 sage-grouse (20 females, 8 males) captured at Bodie Hills were translocated and released at Parker Meadows. All captured birds were fitted with VHF or GPS (male only) transmitters. As part of an experimental design, a subset of females was artificially inseminated prior to release to help increase the probability of nest initiation that spring. Additionally, three post-hatch broods, females with newly hatched chicks, were translocated. These were the first greater sage-grouse brood translocations attempted range-wide. The expectation is that these reproductive conditions would help "anchor" the female to the release area, and their surviving chicks would add new recruits to the population at Parker Meadows (Figure 12).

LESSONS LEARNED

Data from 2017 efforts suggested that brood translocations may increase translocation success through bypassing the effects of low nest initiation and success associated with the translocation of pre-nesting females. In 2018, 20 more sage-grouse (13 female, 7 male) were translocated from Bodie Hills to Parker Meadows, five of which were pre-nesting hens and eight were females with broods (Figure 13).

Given what has been learned during the initial years of translocation efforts, measures have been identified to minimize morality and dispersal rates. Design changes to transport boxes and increasing the emphasis on brood translocations, promise to reduce the number of individuals required to be handled and improve success of the translocation overall.

FUTURE OBJECTIVES

Further evaluation of translocation results and continued consultation with CDFW and the Technical Advisory Committee will inform all future translocation efforts at Parker Meadows. Additional augmentation and continued monitoring of the Parker Meadows population is scheduled to occur for the next three years. In 2019, the USGS plans to translocate:

- seven males,
- five pre-nesting females,
- 10-12 females with broods.

Population monitoring and the collection of vital rate and demographic data will determine if translocation efforts have successfully increased the overall population size and genetic diversity within the Parker Meadows sub-population to levels that will persist into the future.

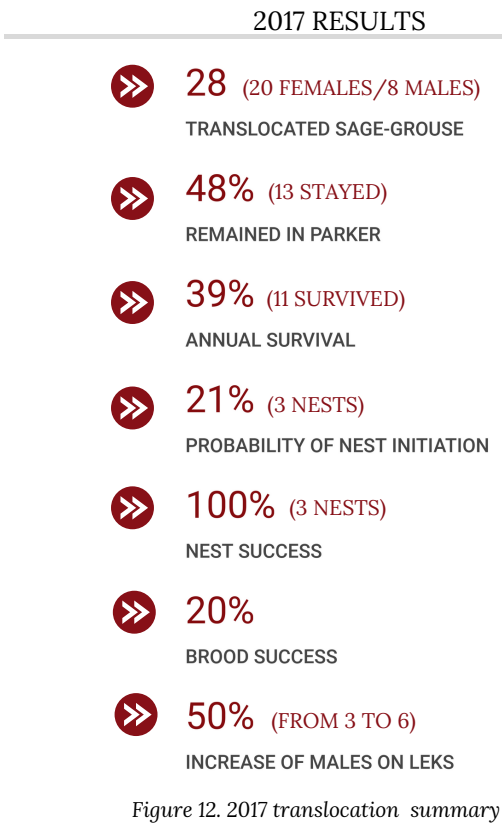


Figure 12. 2017 translocation summary

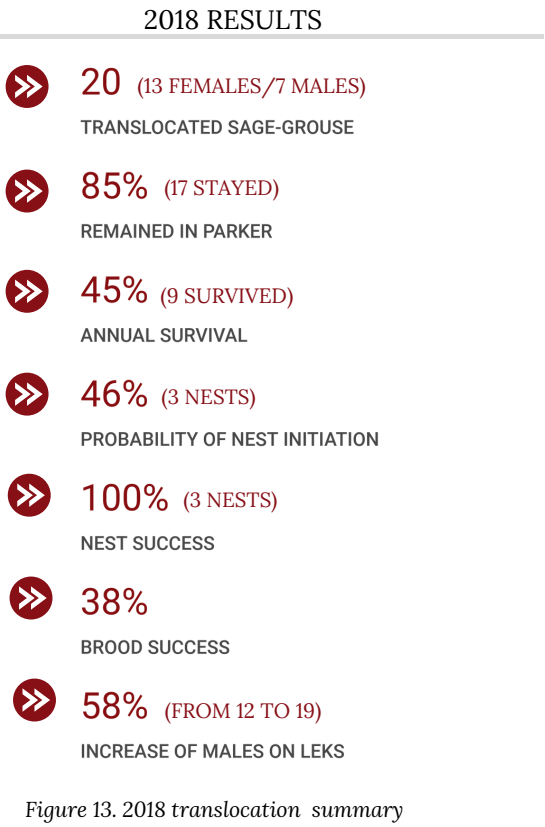
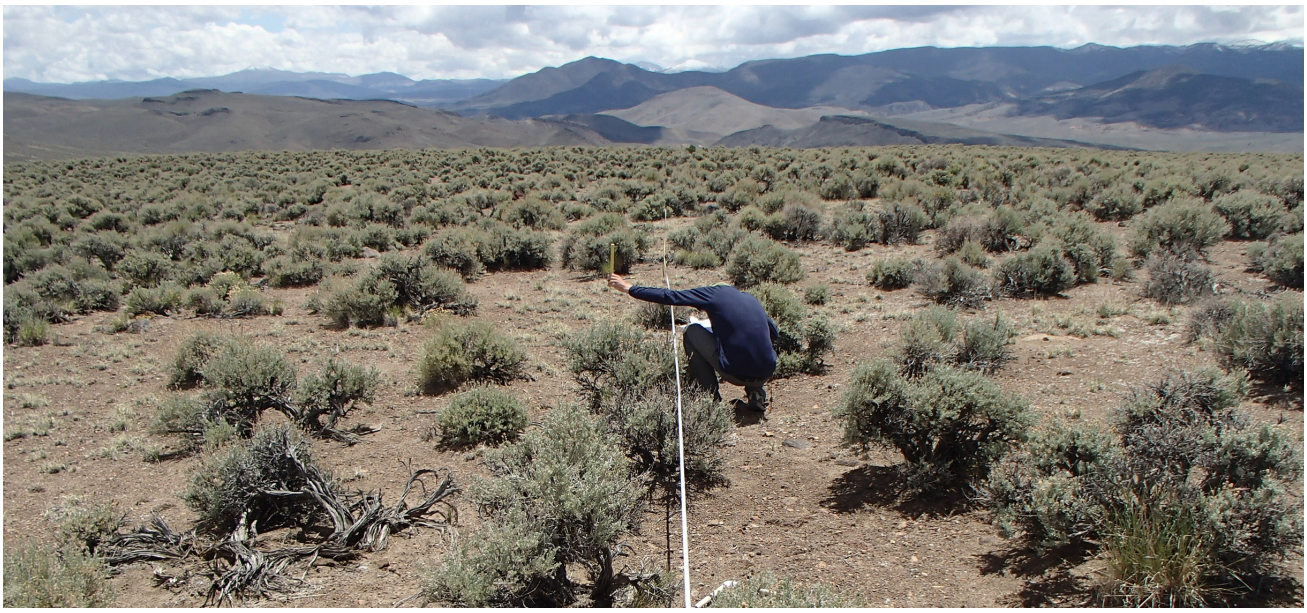


Figure 13. 2018 translocation summary



VEGETATION MONITORING

The Nevada Partners for Conservation and Development (NPCD), housed within the Nevada Department of Wildlife (NDOW), has been collecting vegetation data across numerous sites within the Bi-State sage-grouse Population Management Units since 2011.

In areas identified for conifer removal and at sites that have experienced episodes of wildfire, the NPCD establishes monitoring plots both within and outside of treatment and wildfire boundaries (Figure 14). Sampling is conducted prior to treatment to establish baseline conditions and sites are revisited post treatment to determine treatment and fire restoration effectiveness. Plots outside of treatment and wildfire boundaries serve as controls against which the restoration projects' effectiveness can be compared.

The methods NPCD employs are consistent with the BLM's Assessment, Inventory and Monitoring protocols (AIM; Taylor et al. 2014) and are designed to be easily replicated, requiring little or no expensive equipment.

Since the Action Plan was implemented, 466 vegetation plots have been monitored across the Bi-State (Table 3, Figure 15). Monitoring measures vegetation response to treatment including changes in sagebrush cover, perennial grass cover, species richness and presence of non-native and invasive species.

Vegetation response to treatment is often slow and continued analyses are needed; however, preliminary results from selected sites suggest that species richness, sagebrush, perennial grass and forb cover are elevated in treatment plots while non-native cheatgrass cover and abundance has been variable where conifer removal or wildfire has occurred.

The NPCD will continue to monitor plots to collect data in all areas that have been identified for treatment or restoration. Upcoming analyses are expected to provide strong evidence that sagebrush restoration techniques, such as conifer treatment and wildfire rehabilitation, provide ecological benefits to sage-grouse.

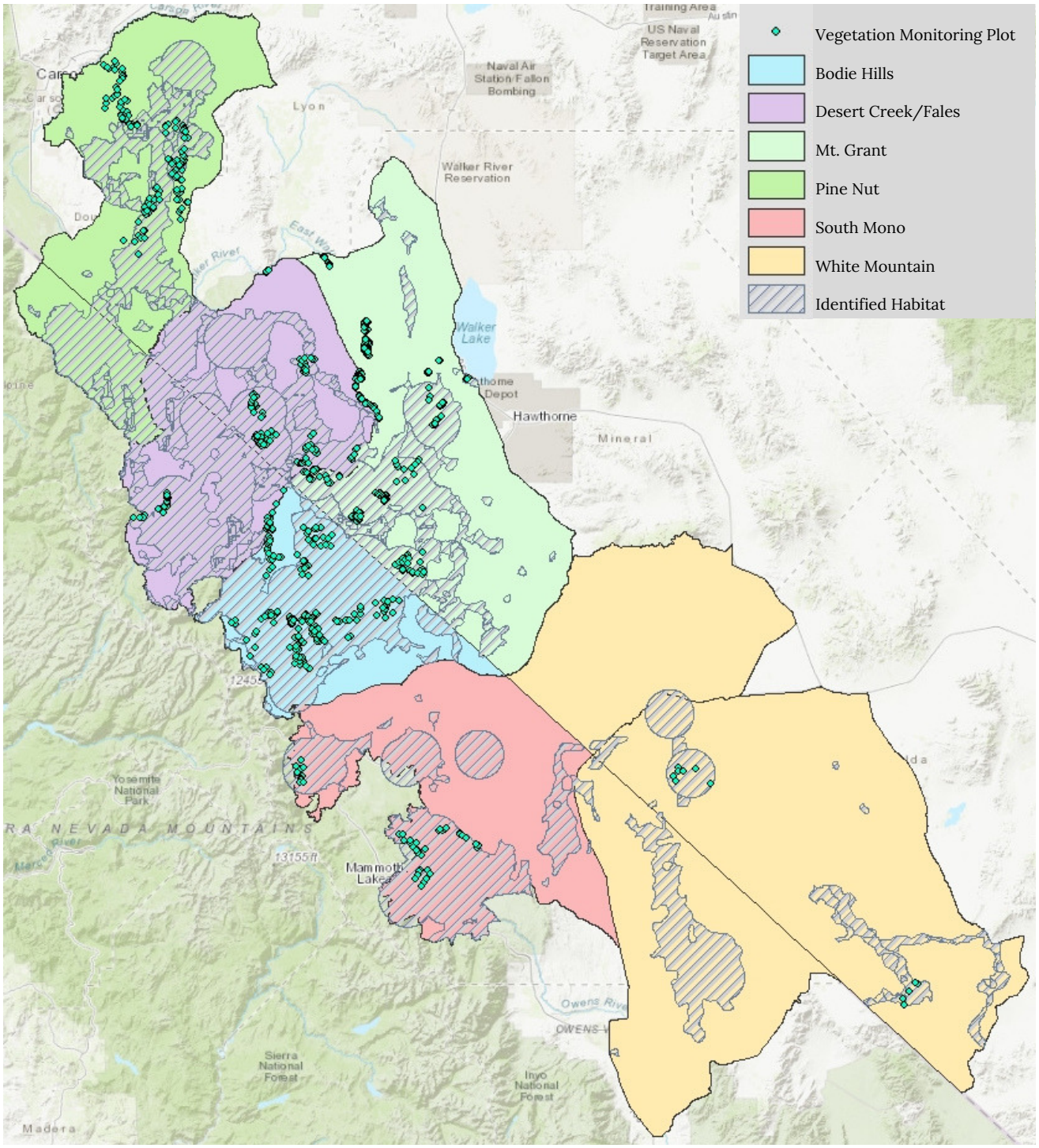


Figure 14. Completed Bi-State vegetation monitoring plots

Table 3. Vegetation plot type completed by PMU

	Control	Post-Treatment	Pre-Treatment	Fire	Total
Pine Nut	10	19	0	45	74
Bodie/Mt.Grant	127	44	57	28	256
Desert Creek/Fales	51	12	18	0	81
South Mono	14	18	9	2	43
White Mountain	12	0	0	0	12
Total	214	93	84	75	466

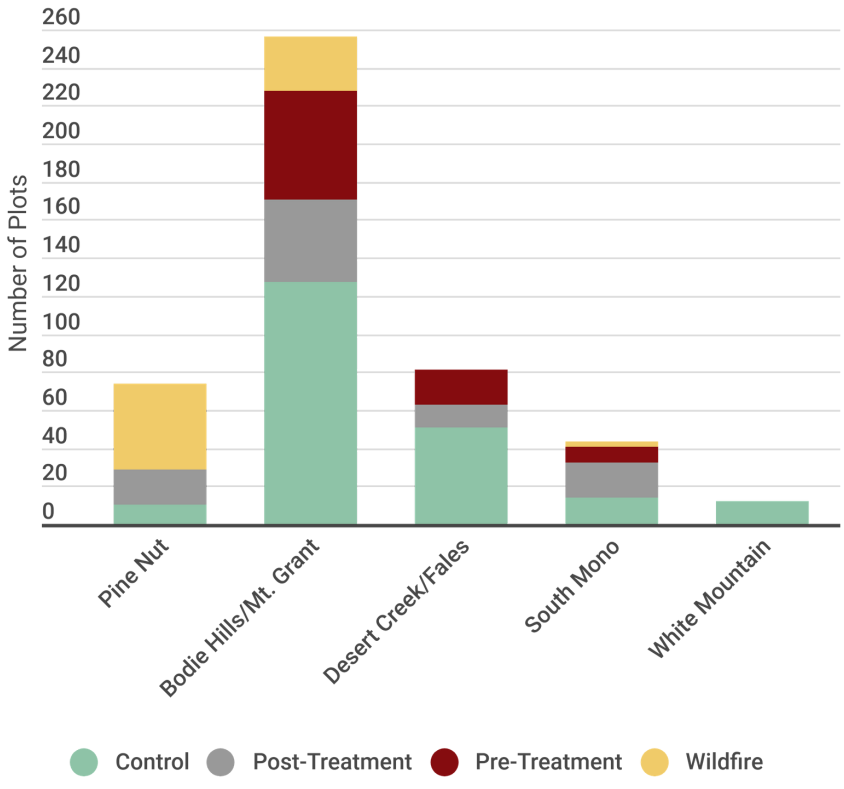


Figure 15. Vegetation plot type completed by PMU


Photo: Bob Wick

CONSERVATION IMPLEMENTATION

The Action Plan was written in 2012 to provide a road-map to conservation for the Bi-State DPS. It called out priority actions deemed necessary to protect both sage-grouse populations and their habitats. In each Population Management Unit, threats were identified and ranked (Table 4).

In 2014 the Bi-State Technical Advisory Committee (TAC) evaluated projects in the Action Plan and created a list of 76 projects that were considered the highest priorities to complete.

Projects in the Action Plan sought to implement a coordinated interagency approach, incorporate science-based adaptive management, increase regulatory mechanisms, minimize and eliminate risk, improve and restore habitat, monitor populations and maintain stakeholder involvement. At every step, it was assumed that projects would be altered or added as 1) priorities change based on new information; and 2) new priorities occur that were unknown at the time the Action Plan and 76 projects were originally formulated.

The following pages identify the threats to Bi-State sage-grouse and their habitats and detail actions taken to address those threats. Accomplishments reported are associated with the Action Plan, 76 projects and additional priorities identified post Action Plan. Work completed represents the highest priority actions in the Bi-State informed by research, a conservation planning tool developed by USGS, input from the Bi-State Local Area Working Group and common-sense realities of implementing projects.

ACCOMPLISHMENT SUMMARY

101,560 ACRES OF WORK COMPLETED ACROSS THE BI-STATE TO BENEFIT SAGE-GROUSE POPULATIONS AND SAGEBRUSH ECOSYSTEMS

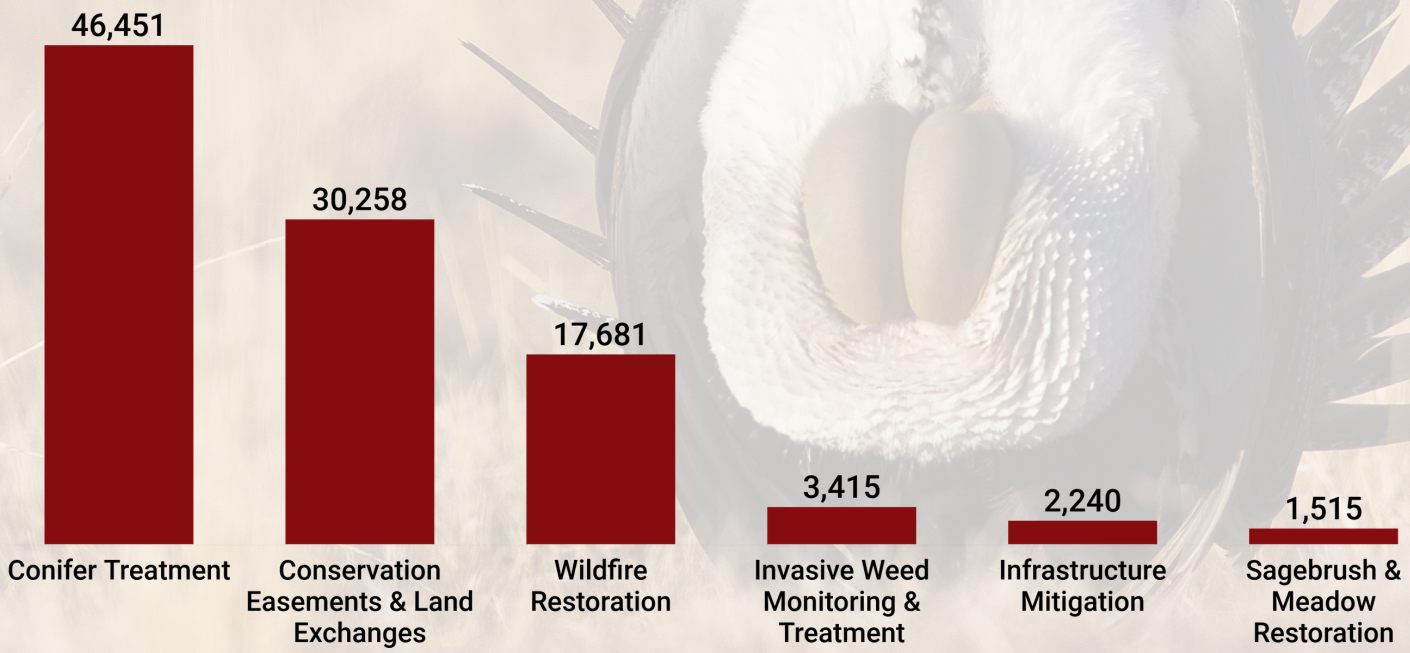


Figure 16. Acres of work completed to address identified threats to Bi-State sage-grouse

Photo: Bob Wick

Table 4. Identified threats in each Population Management Unit

RISK CATEGORY	Pine Nut	Desert Creek/Fales	Bodie Hills	Mt. Grant	South Mono	White Mtn.
Wildfire	High	High	High	High	High	Medium
Conifer Encroachment	High	High	High	High	Medium	High
Invasive Species	High	Low	Low	Medium	Low	Low
Sagebrush Habitat Conditions		Medium				
Urbanization	High	High	Medium		High	Medium
Human Disturbance & Recreation	High	Medium	Low	Low	High	Low
Infrastructure	High	High	Medium	High	Medium	Low
Landfill					High	
Surface Water Management					Medium	
Licensed Hunting					Low	
Poaching						
Grazing-Wild Horses	Medium		Low	Medium	Low	Medium
Grazing-Permitted Livestock	Low	Low	Low	Low	Low	Low
Predation	Medium	Medium	Low	Low	Low	Low
Disease		Medium		Low	Low	Low
Energy Development	High				Low	Low
Wind Energy Testing	Low					
Geothermal Leasing & Development			Low	High	Low	

High Medium Low

COMPLETED BI-STATE ACTIONS

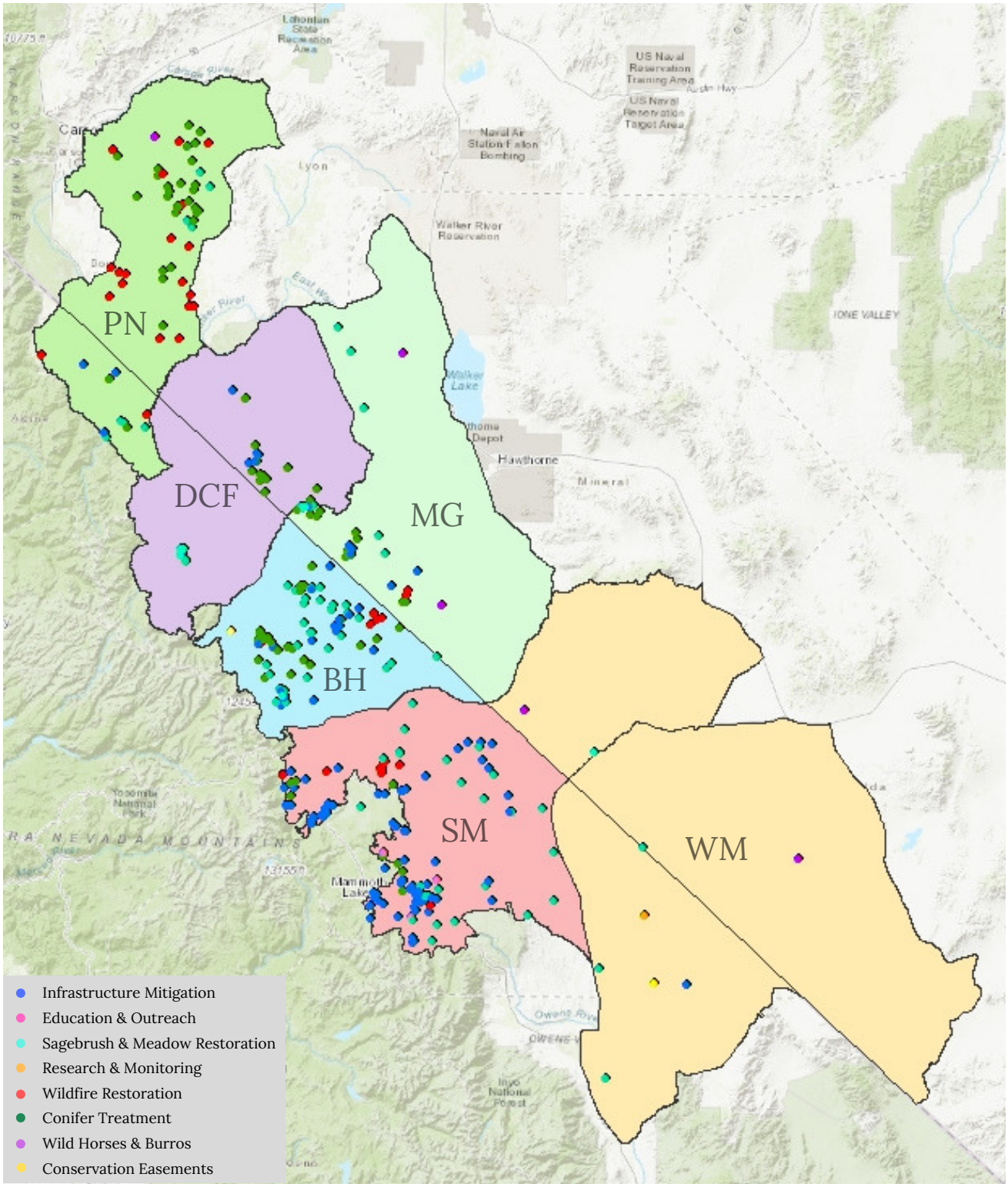
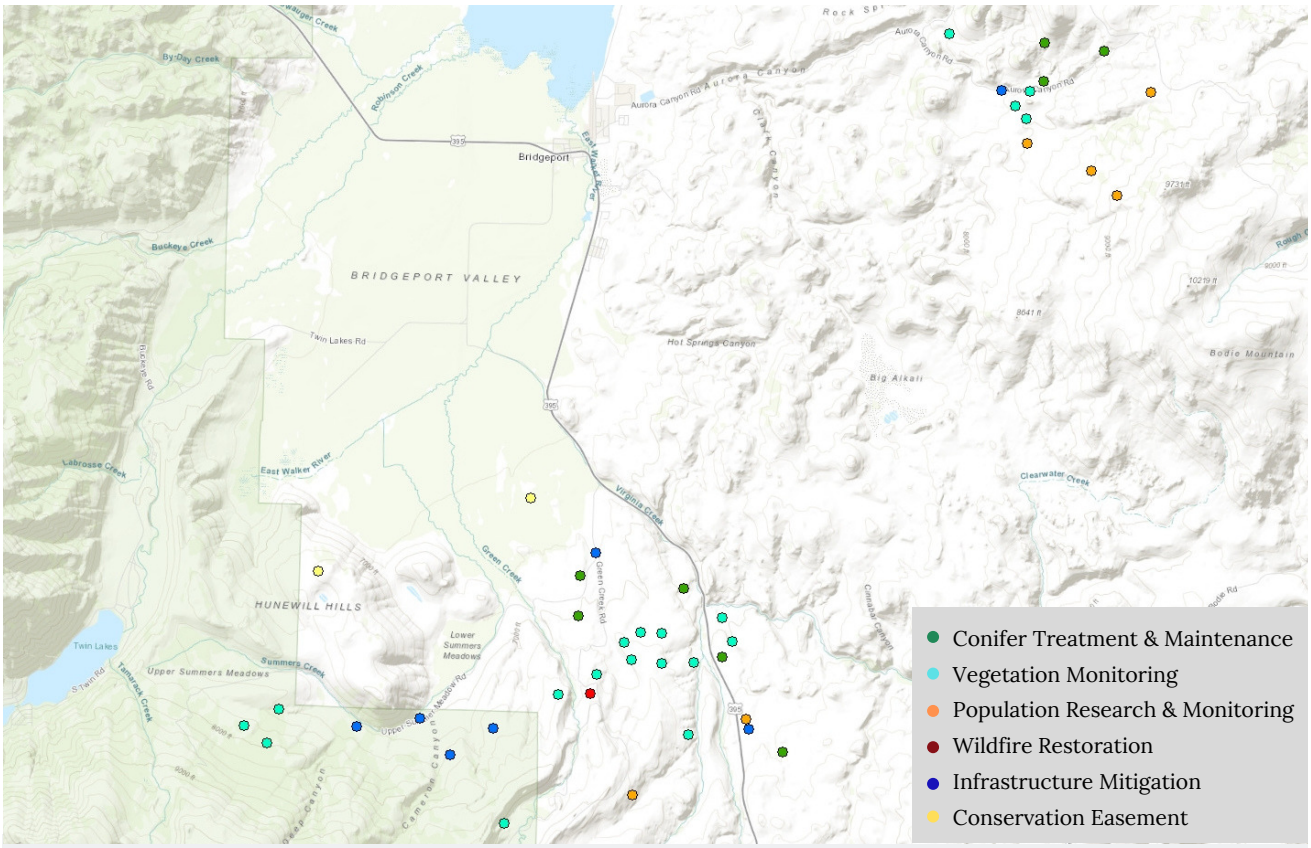


Figure 17. Completed Bi-State projects containing spatial data (2012-2018)

ACTION IN THE SPOTLIGHT



Action HIR1-1-B: Complete pinyon-juniper removal projects in the Lower Summers, Green Creek, Stringer Meadows and Upper Aurora Canyon vicinity in the Bodie PMU

- Action HIR1-1-B identified 8,984 acres for sagebrush restoration through conifer treatment to increase sage-grouse habitat availability, suitability and connectivity.
- Since 2012, 16 conifer treatment projects have been completed in association with this action. The implementation of these projects resulted in 3,753 acres of conifer treatment, representing approximately 42% of all acres originally identified to be completed through this action.
- 1,607 acres have received subsequent maintenance treatment.
- These projects were completed through the collaboration of the Bishop BLM, Eastern Sierra Land Trust, NRCS, private landowners and the Boy Scouts of America.
- Ongoing evaluation is planned. Remaining acres associated with this action will be evaluated and prioritized for future treatment and restoration.

ADDITIONAL PROJECTS IN THE AREA

- CONSERVATION EASEMENTS & LAND EXCHANGES
- MEADOW RESTORATION
- POST-FIRE REHABILITATION
- VEGETATION MONITORING
- GRAZING MANAGEMENT
- FENCE EVALUATION, REMOVAL & MARKING
- ROAD CLOSURES
- DISTURBED SITE RESTORATION
- POPULATION MONITORING
- RAVEN & RAPTOR SURVEYS

WILDFIRE

COMBATING HABITAT LOSS AND ECOSYSTEM TYPE CONVERSION

Large, intense wildfires are an increasing issue across the West and the Bi-State is not immune to this threat. To date 181,508 acres of land have burned within the Bi-State PMUs (Figure 19). Addressing wildfire is identified as a high priority in the Pine Nut, Desert Creek-Fales, Mt. Grant, Bodie and South Mono PMUs.

Changing climate, periods of drought, encroaching conifer and the proliferation of non-native weeds, such as cheatgrass, alter sagebrush ecosystems and increase the likelihood of ignition and fuel load available for wildfire that can quickly devastate large expanses of important sage-grouse habitat.

A disturbed ecosystem post-fire is more susceptible to further invasion of non-native plant species and conversion of sagebrush to annual grass monocultures, which in turn increases potential for fire. This cycle alters fire regimes, causing more frequent and intense fires that perpetuate loss of habitat and threats to sage-grouse. Actions employed to address the threat of wildfire include, strategic fire suppression, fuel breaks, conifer removal, fuel reduction and post-fire rehabilitation (Figure 20). The removal of encroaching conifer reduces fuel availability for wildfires in sagebrush ecosystems and can act as a fuel break to halt or slow the progress of a spreading wildfire. Fuel reduction entails thinning thick stands of conifer, mosaic mowing and prescribed burns to limit the spread and decrease the intensity of wildfires while promoting native plant species production. Post-fire rehabilitation helps avoid ecosystem type conversion and promotes the return of suitable sage-grouse habitat though erosion control and seeding of native shrubs and grasses.

FIRE MANAGEMENT STRATEGIES

- CONIFER REMOVAL, FUEL BREAKS & FUELS REDUCTION
- TARGETED FIRE FIGHTING METHODS & SUPRESSION
- POST-FIRE REHABILITATION

WILDFIRE ACCOMPLISHMENTS

To address the threat of wildfire, Bi-State LAWG partners communicate across jurisdictional boundaries to implement coordinated fire-management strategies that minimize the loss of suitable sage-grouse habitat.

A concerted effort is made to ensure that fire personnel are informed and responding to wildfire in similar ways across management boundaries to limit the effects of wildfire on the landscape in sage-grouse habitat. This requires the ability to: 1) identify locations that provide current or potential habitat for sage-grouse and 2) prioritize fire suppression and management actions in these areas to minimize habitat loss.

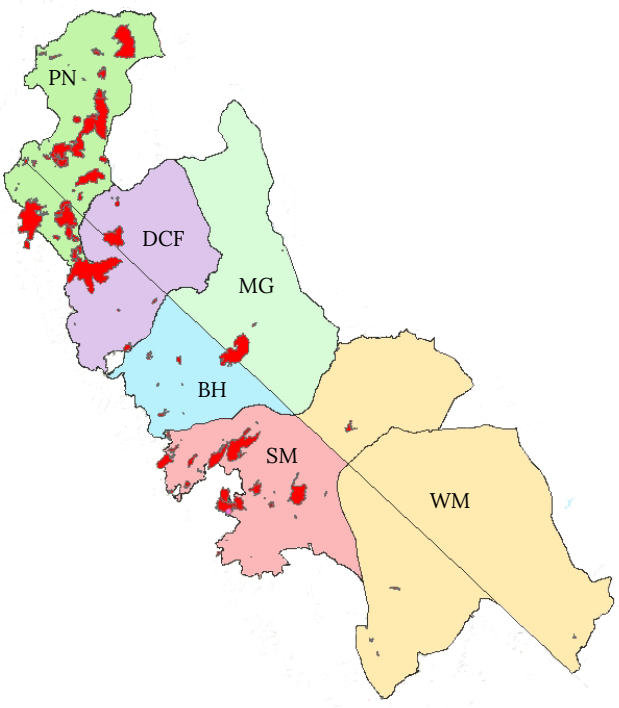


Figure 19. Historical wildfire locations in the Bi-State

181,508 ACRES OF WILDFIRE IN THE BI-STATE

- PINE NUT-92,061 ac.
- DESERT CREEK/FALES-34,181 ac.
- MT. GRANT-9,801 ac.
- BODIE HILLS-6,807 ac.
- SOUTH MONO-36,452 ac.
- WHITE MTN.-2,206 ac.

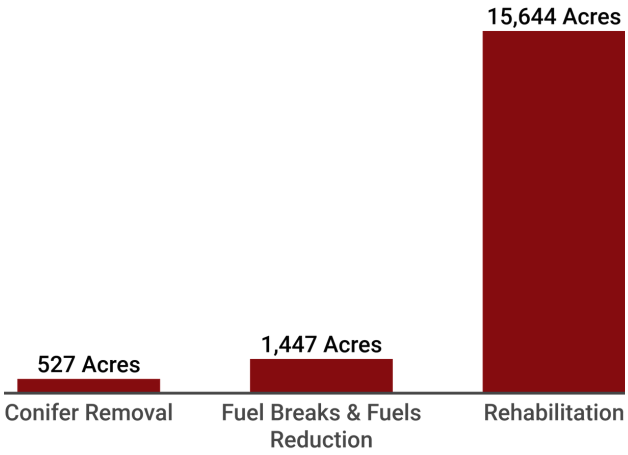


Figure 20. Acres of work completed to address wildfire

- Inter-agency fire management and suppression agreements were established between the BLM and USFS. Existing fire management plans were updated to include conservation measures identified by the National Sage-Grouse Technical Team to reduce long-term loss of sagebrush.
- Since 2012, a total of 17,618 acres of work, including conifer removal, fuel breaks, fuels reduction and post-fire rehabilitation has occurred in the Pine Nut, Desert Creek-Fales, Mount Grant, Bodie and South Mono PMUs.
- Resource advisor kits are updated annually to provide the most recent information on sage-grouse populations and all fire personnel receive training on fire protocols specific to sage-grouse habitat.
- Wildfire prevention activities include patrols to locate fire starts, document campfires and educate the public on fire regulations.
- LADWP prohibits camping on their lands and has adopted a no campfire policy to reduce the potential for human caused fire.

URBANIZATION

CONSERVATION THROUGH EASEMENTS AND LAND EXCHANGES

Fragmentation of sagebrush habitats can have a particularly acute impact on wildlife because food, cover and water resources are distributed unequally across the landscape in the arid west. This characteristic of sagebrush means many obligate species have evolved to require very large areas of intact habitat to meet their seasonal and annual resource needs. Therefore, disturbance of a relatively small number of fragmented sagebrush acres can have a disproportionate impact on the species that need that particular habitat to survive (Crist, 2015).

Maintaining high quality, intact habitat conditions into the future and addressing the risks associated with urbanization is a high priority in the Desert Creek-Fales, Pine Nut and South Mono PMUs.

Conservation easements are implemented to limit urban development that may fragment habitat (Figure 21). These are voluntary legal agreements between a landowner and a qualified organization, like a land trust, which places some conservation restrictions on the use of a property in order to protect its natural values. These agreements provide benefits to both landowners and wildlife. They protect large quantities of suitable habitat from further development and allow landowners to pursue available funding to implement conservation projects on their land.

In addition to conservation easements on private lands, land purchases or exchanges have occurred that resulted in public, state or federal ownership of occupied sage-grouse habitat. These acquisitions ensure that land remains intact for generations and managed in a way that will maintain quality habitat and provide conservation value to Bi-State sage-grouse.

Photo: ESLT

LAND CONSERVATION ACCOMPLISHMENTS

The Action Plan identifies 12 conservation easement projects to address the threat of urbanization in the Desert-Creek Fales, Bodie Hills and White Mountain PMUs. Of those, six easements totaling 8,968 acres were put in place in Desert Creek-Fales and Bodie Hills PMUs. An additional 2,076 acres in the Bodie Hills were acquired by the California Department of Fish and Wildlife through a land exchange. Together, this amounts to 11,044 acres of conserved land and represents 67.1% of all land identified in the Action Plan for protection from development and urbanization.

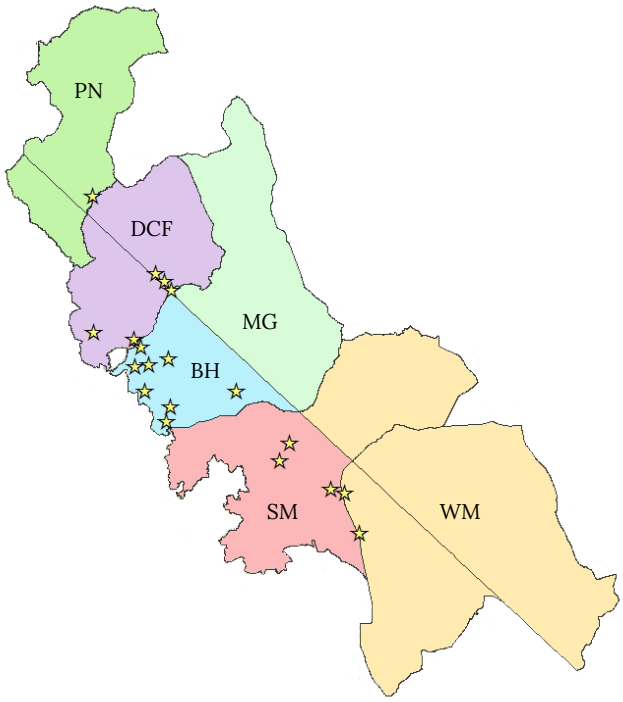


Figure 21. Conservation easements in the Bi-State

Four additional projects, not specifically identified in the Action Plan, have been completed. Projects include 4,574 acres conserved through easements in Mt. Grant and Bodie Hills, 1,780 acres of land acquired by CDFW through a land exchange in the South Mono PMU and the the State of Nevada's acquisition of three historic private ranch parcels, totaling 12,856 acres that has been designated as the Walker River State Recreation Area in the Mt. Grant PMU.

In total, 30,258 acres have been entered into conservation easements or acquired through land purchase or exchange since 2012. These completed projects insure that connected, high-quality habitat is available for sage-grouse and other wildlife species well into the future.

In addition to conservation easements and land exchanges, partners have implemented new policies, plans and programs to promote land conservation and to reduce development and human disturbance impacts:

- In 2014 the NRCS designated the Bi-State region as "Grasslands of Special Environmental Significance." This designation raised the amount of funds NRCS contributes to the acquisition of easements from 50-75 percent.
- In 2017, the Eastern Sierra Land Trust secured 8.1 million dollars in funding through the USDA's Regional Conservation Partnership Program (RCPP) which allows ranchers and landowners to apply for conservation funding for projects on their lands that benefit both working lands and wildlife.
- Mono County implemented new policies in their County Plan to reduce the impact of development in sage-grouse habitat.

TOTAL ACRES OF LAND CONSERVED

- CONSERVATION EASEMENTS.....13,542 ACRES
- LAND EXCHANGES.....16,716 ACRES
- TOTAL.....**30,258 ACRES**


Photo: Bishop BLM

CONIFER ENCROACHMENT

ADDRESSING CONIFER EXPANSION AND INFILL

The loss and fragmentation of high-quality, intact sage-grouse habitat to encroaching conifer is a high priority threat in the Pine Nut, Desert Creek-Fales, Mt. Grant, Bodie and White Mountain PMUs.

Pinyon pine, juniper and Jeffery pine are native species in the Bi-State but expansion beyond historical limits due to fire suppression, historic overgrazing by domestic livestock and favorable climate conditions has become problematic (Brockway et al. 2002). Across the Bi-State area, it is estimated that approximately 40 percent of the historically available sagebrush habitat has been usurped by woodland succession over the past 150 years (USGS, 2012).

Conifer encroachment into sagebrush systems is problematic as it may increase fire severity and size, deplete soil water and nutrients, reduce native understory, provide perches for avian predators and alter sage-grouse habitat selection. All of which can affect behavioral decisions, distribution, and population dynamics of sage-grouse. Previous studies have shown that sage-grouse experience population-level impacts at low levels of encroachment and that leks are less likely to be active near small dispersed trees (Baruch-Murdo et al. 2013). In 2017, the USGS published a study, conducted in the Bi-State, that demonstrated changes in sage-grouse habitat selection and negative effects to vital rates directly associated with encroaching conifer (Coates et al. 2017).

To address the threat of conifer encroachment, the USGS and TAC developed a spatially explicit Conservation Planning Tool (CPT). The CPT is a model that ranks the relative benefit of individual conifer removal projects. Bi-State partners are able to utilize this tool to select and prioritize conifer removal projects that will provide the most conservation value to sage-grouse and maximize benefit from dollars spent.

Addressing conifer encroachment and infill provides a myriad of benefits to sage-grouse that include; increasing habitat connectivity; maintaining native understory; eliminating perches for predators; conserving soil water and nutrients; and increasing ecosystem resilience to fire and resistance to cheatgrass invasion.

CONIFER TREATMENT ACCOMPLISHMENTS

Conifer projects within the Bi-State are ranked using the CPT and the TAC's expertise regarding areas of occupied sage-grouse habitat being impacted by conifer encroachment. Conifer removal projects aim to improve habitat, increase connectivity and reduce risk to sage-grouse. Phase I conifer cover is targeted to provide the most benefit at the lowest cost. Post-treatment maintenance is often required in the years following initial treatment to ensure that small seedlings and saplings were not missed in the original treatment.

The Action Plan contains 20 actions that call for the evaluation and implementation of conifer removal projects as a method to restore and maintain intact sagebrush ecosystems that provide sage-grouse habitat. From these actions 46 potential project locations, totaling 150,000 acres, were selected and identified in the 76 high priority projects.

- 18 of the 20 conifer treatment actions in the Action Plan have been initiated and are in various stages of completion.
- 8 of the 46 high priority projects have been completed, 17 are in progress, nine have not been initiated and 12 were evaluated and removed because they were determined to lie outside of occupied sage-grouse habitat. Acres of completed conifer treatment associated with the 76 high priority projects total nearly 30,000 acres.
- An additional 42,000 acres were prioritized for conifer treatment after the implementation of the Action Plan, of those, 17,524 acres have been completed.
- In total 46,451 acres of conifer treatment and 7,455 acres of conifer treatment maintenance have been completed (Figure 24).
- 24% of all proposed conifer treatment associated with the Action Plan has been completed (Table 6).

Pre-treatment


Post-treatment

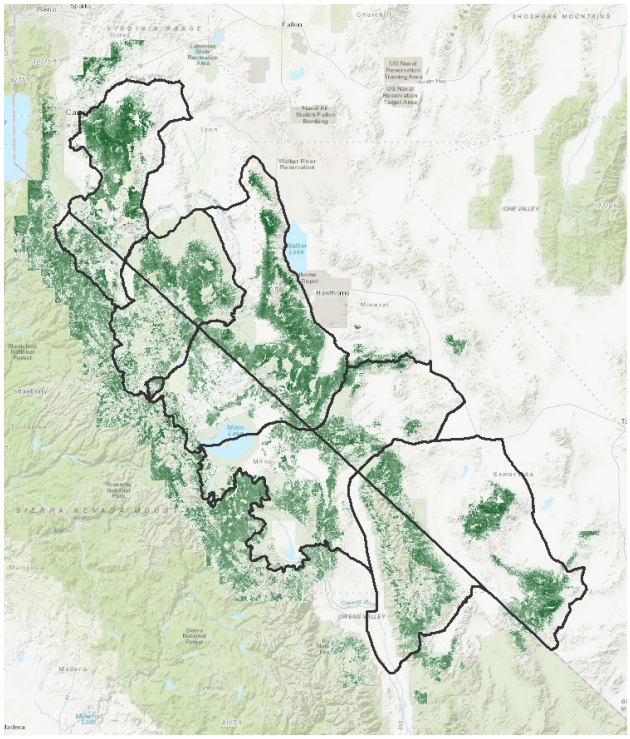


Figure 22. Bi-State conifer coverage modeled by the USGS (Coates et al., 2017)

Although there is a focus on conifer treatments to improve sage-grouse habitat across the Bi-State, the fraction of total existing conifer potentially affected is relatively small. Existing and potential treatment areas are located in sagebrush ecosystems in the early phases of conifer expansion outside of the extensive pinyon-juniper woodlands that exist throughout the region.

The USGS analyzed conifer cover using remote sensing methods to produce a model of conifer coverage across the Bi-State. Most of the conifer cover that appears in the map above is pinyon-juniper but the model detects all species of conifer including Jeffrey pine and other pine species that occur in the Bi-State. The TAC utilized this conifer model and the potential treatment areas developed for analysis in the CPT to calculate the proportion of conifer throughout the Bi-State that would be affected by treatments identified in the Action Plan.

A total of 4.9 percent of the conifer across the Bi-State could potentially be treated in habitat improvement projects (Table 5). The potential treatment areas also include areas with no detectable conifer either because the trees are so small that they are not visible in imagery or because there are openings with no trees included in the potential treatment areas. There are also areas within the potential treatment areas that will be excluded when detailed treatment plans are developed because they have older trees that represent a persistent woodland rather than expansion into sagebrush habitats.

*Table 5. Proportion of conifer within potential treatment areas **

		Acres in Potential Treatment Areas	Percent in Potential Treatment Areas
Total Acres In The Bi-State	4,516,769	217,126	4.8%
Acres With No Detectable Conifer	**2,786,065**	**132,003**	**4.7%**
Acres With Detectable Conifer	1,730,704	85,123	4.9%

* Actual percentages for proposed treatment may be slightly lower than reported because this table has not been updated to reflect the 12 projects (12,695.5 acres) that were analyzed and removed from the list of priorities.

* Acres in potential treatment areas with no detectable conifer represent both areas where there are no trees present within the treatment polygon and areas where trees are so small that they do not protrude above the sagebrush.

Table 6. Acres of proposed and completed conifer work

	Priority	Acres Proposed	Acres Treated	Complete
	High	56,519.1	22,599.7	40%
	Moderate	51,555.1	6,363.0	12.3%
	Low	54,431.0	0	0%
	Prioritized Post-Action Plan	41,925.1	17,523.6	41.8%
	Evaluated-Removed	-12,695.5		
	Total	191,734.8	46,450.50	24.2%

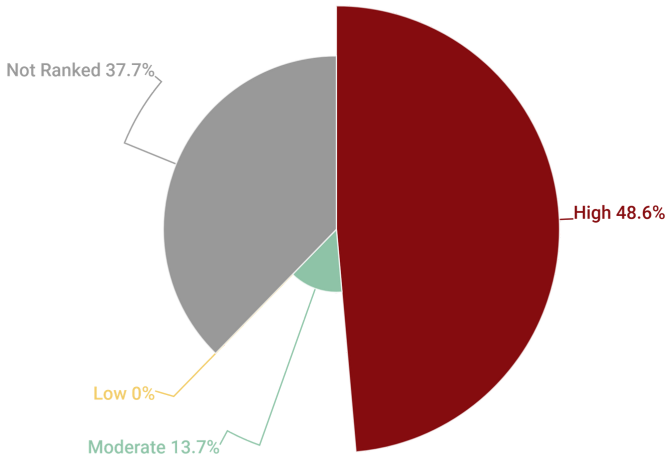


Figure 23. Priority of completed work

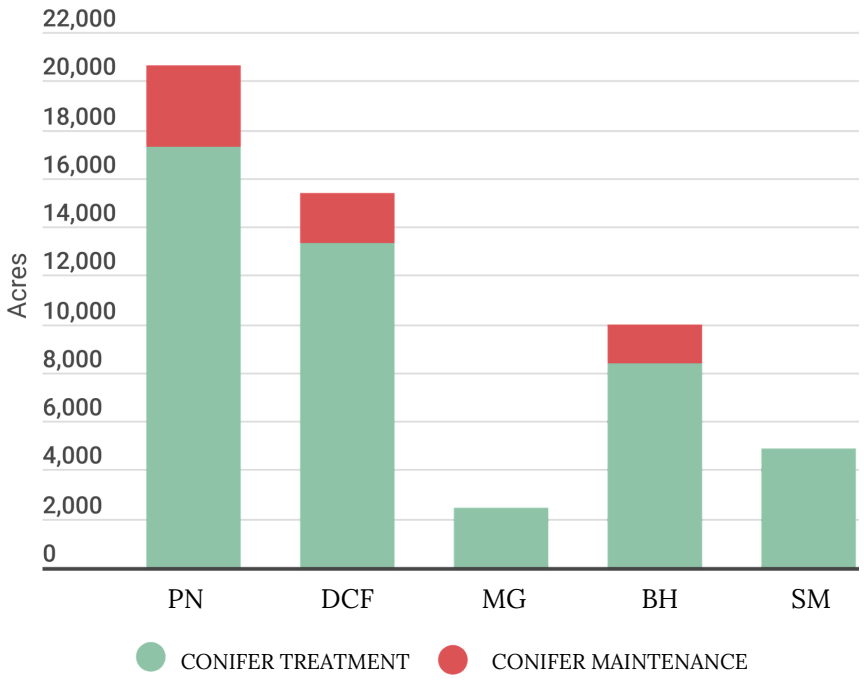


Figure 24. Completed conifer treatment and maintenance

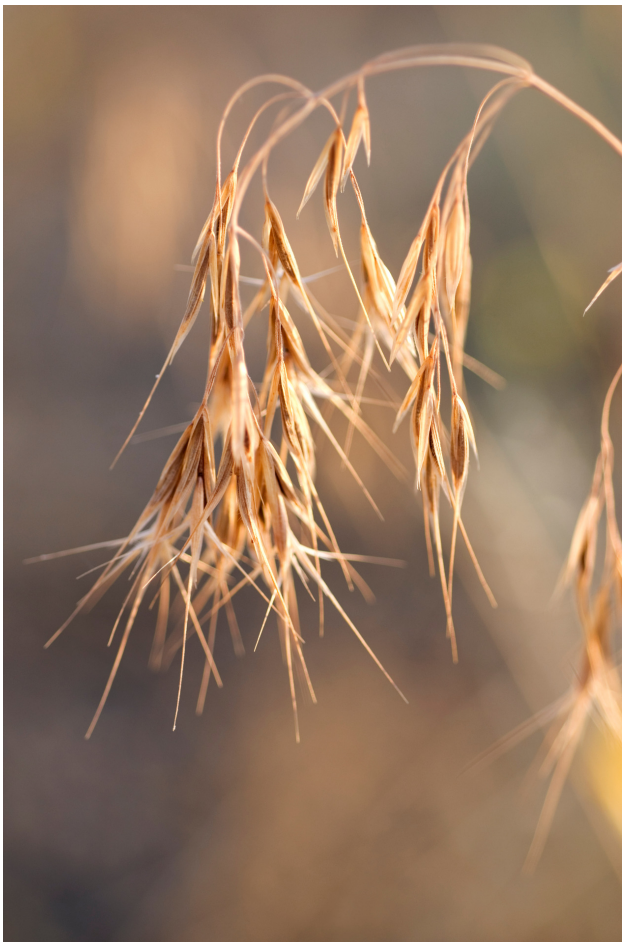
INVASIVE AND NOXIOUS SPECIES

MINIMIZING INVASION OF NON-NATIVE PLANTS

Non-native plants are not overly abundant in the Bi-State area, with the exception of cheatgrass, which occurs in all PMUs throughout the range. It is most prevalent in the Pine Nut PMU, where it is identified as a high priority threat and in the Mt. Grant PMU where it is listed as a moderate threat.

The infiltration of cheatgrass into sagebrush systems can increase fire potential, size and severity, out-compete native understory species after fires and perpetuate a devastating disturbance cycle.

To counter the threat of habitat loss, Bi-State land management agencies and their partners have implemented numerous conservation actions and strategies. These include; strategic fire suppression to avoid ecosystem-type conversion; utilization of native plant species to rehabilitate burned areas; and mechanical and chemical weed treatments.



ACCOMPLISHMENTS

- Since 2012, the Smith Valley Conservation District has completed weed monitoring on 2,121 acres across multiple PMUs in the Bi-State.
- Chemical and mechanical treatment of non-native plant species have occurred on nearly 1,300 acres in the Pine Nut, Desert Creek-Fales and Bodie PMUs and 12,175 acres have been seeded post-fire.
- Restoration and conifer treatment sites are assessed prior to treatment to select appropriate methods to minimize site disturbance that could result in the establishment of non-native plant species.

STRATEGIES TO MINIMIZE INVASION

- PROTECT NATIVE PERENNIAL GRASSES AND SHRUBS
- STRATEGIC FIRE SUPPRESSION
- CHEMICAL AND MECHANICAL WEED TREATMENT
- UTILIZE PROPER RESTORATION TECHNIQUES
- SEED WITH NATIVE PLANTS TO REHABILITATE BURNED OR DISTURBED SITES

LOSS OF SAGEBRUSH AND MEADOWS

MAINTAINING INTACT HABITAT

Photo: Bishop BLM

Healthy sagebrush and meadow conditions are necessary components of sage-grouse habitat, crucial to supporting sage-grouse throughout their life cycle. Land managers make every effort to implement best management practices to avoid the degradation of intact sage-grouse habitat through adopted regulatory mechanisms. When sagebrush and meadow conditions are compromised, improvements are made through restoring native hydrology, installing check dams to stabilize stream head-cuts, fencing areas to allow recovery from livestock grazing, prescribed fire and irrigation.

RESTORATION ACCOMPLISHMENTS

- Through the completion of 38 projects in the Desert Creek-Fales, Mt. Grant, Bodie and South Mono PMUs, 11 sites and 1,515 acres of meadow and sagebrush were restored or enhanced through meadow improvement and vegetation restoration.
- Meadow habitat improvement efforts on public and private lands in upper Aurora Canyon in the Bodie Hills PMU have been implemented. The Bishop BLM installed check dams to stabilize stream area headcuts in 2010, since then additional check dams have been installed in subsequent years and maintenance of these structures occurs annually.
- Hydrologic function was returned to Wheeler Creek through restoration efforts to increase plant cover and diversity on adjacent brood meadows.
- The Eastern Sierra Land Trust cleaned up two dump sites and cleared out irrigation ditches in sage-grouse habitat located on privately owned property.
- In 2018, the Nevada State Parks conducted proper functioning condition surveys to evaluate and assess stream health within the newly designated Walker River State Recreation Area. The objective of these projects is to gather information on creeks and their associated meadows to develop restoration projects designed to reconnect fragmented habitat and restore summer brooding habitat in the Mt. Grant PMU.
- Assessment, inventory and monitoring (AIM) vegetation plots are completed throughout the Bi-State annually to evaluate ecosystem health.
- Through the Seeds of Success program native seeds were collected at multiple sites to provide a local seed source for restoration projects.
- Between 2015 and 2017, partners met five times to complete assessments for future wet meadow and stream restoration sites in multiple PMUs.

INFRASTRUCTURE & DISTURBANCE

EVALUATING AND ELIMINATING RISK

When the Action Plan was written, infrastructure was identified as a high priority threat in the Pine Nut, Desert Creek-Fales and Mount Grant PMUs. The threat of human disturbance is high in the Pine Nut and South Mono PMUs and moderate in Desert Creek-Fales.

Infrastructure features impacting sage-grouse in the Bi-State region include linear features such as roads, power lines and fences and location specific features like landfills, communication towers and windmills.

Impacts from linear features include fragmentation of habitat (Braun 1998), direct mortality through collisions and increased available perches for predators (Connelly et al. 2000). Roads not only fragment habitat but also increase potential for human access and disturbance. Site specific infrastructure, such as landfills, attract and increase predator populations. Gibson et al. 2018, found that transmission lines in central Nevada affected multiple demographic rates of sage-grouse and influenced raven abundance and use of habitat, which had cascading effects to associated sage-grouse populations.

To address threats posed by infrastructure, fences in occupied sage-grouse habitat are evaluated for strike hazards and removed, modified or marked as deemed necessary. Permanent and seasonal road closures serve to extend connected habitat and limit human access into sensitive habitat. Location specific infrastructure threats are evaluated,

and steps are taken to remove structures that increase risk to sage-grouse.

Threats associated with human disturbance include illegal hunting and recreational use impacts to sage-grouse habitat. These threats have been addressed through increased law enforcement, public education and the adoption of land management policies that restrict access to key habitat through road closures, regulation of new road development and seasonally enforced regulations.

INFRASTRUCTURE ACCOMPLISHMENTS


Photo: Bishop BLM

The Action Plan identifies 12 actions to decrease infrastructure threats to Bi-State sage-grouse. Since 2012, 10 of these 12 actions have been addressed and include, fence evaluation, the removal of the site specific hazards and the following actions:

- 13 miles of fence have been removed in the Bodie, Pine Nut and South Mono PMUs, an additional 0.4 miles in the South Mono was converted to “let down”.
- 62.9 miles of fence across the Bi-State were marked with flight diverters.
- LADWP imposes seasonal closures of their land near Crowley Lake during the peak lekking period to reduce the potential for human disturbance.
- 2,420 acres of land near leks and nesting habitat benefit from seasonal road closures annually.
- Four windmills in Adobe Valley located within the South Mono PMU were removed and converted to solar in 2014.
- Over six miles of the Fletcher power line located in the Bodie Hills PMU was decommissioned and removed. This project was completed in 2014.
- Progress toward the closure and relocation of the Mono County landfill has been made through planning and funding acquisition. Closure is on track to be completed in 2023.
- With the new designation of the Walker River State Recreation Area in the Mt. Grant PMU, law enforcement patrols to deter poaching and manage recreational use have increased.
- Partners worked together to develop public lek viewing guidelines and produced outreach material to disseminate information to the general public.
- The BLM adopted a land use amendment that regulates the development of new roads or OHV trails in Bi-State sage-grouse habitat.


Photo: Bob Wick

GRAZING: WILD HORSES

Grazing of wild horses and burros are listed as a low or moderate threat in the Pine Nut, Bodie Hills and Mt. Grant PMUs. Each year the USGS documents the presence of wild horses and burros through the completion of raptor, raven, horse and livestock (RRHL) surveys. Land management agencies make efforts to monitor Bi-State wild horse and burro populations to establish and maintain Appropriate Management Levels (AML) in order to protect their health as well as that of the habitat they and other species rely upon.

- **POPULATION SURVEYS**
  WILD HORSE AND BURRO SURVEYS OCCURRED ACROSS THE BI-STATE REGION IN 2015
- **RRHL SURVEYS**
  USGS RAPTOR, RAVEN, HORSE AND LIVESTOCK SURVEYS
- **ENVIRONMENTAL ASSESSMENT**
  A WILD HORSE HERD MANAGEMENT ASSESSMENT WAS COMPLETED FOR THE PINE NUT PMU
- **MONITORING**
  WILD HORSE AND BURRO MONITORING OCCURRED IN THE BODIE HILLS, MT. GRANT, SOUTH MONO AND WHITE MOUNTAIN PMUS
- **HORSE GATHERS**
  A WASSUK MOUNTAIN HORSE GATHER WAS COMPLETED TO MAINTAIN AML OF WILD HORSES

GRAZING: PERMITTED LIVESTOCK

- **$8 MILLION**
  FUNDING AVAILABLE THROUGH THE REGIONAL CONSERVATION PARTNERSHIP PROGRAM FOR IMPLEMENTING BENEFICIAL PROJECTS ON PRIVATE LANDS
- **ALL GRAZING PERMITS**
  MONITORED FOR COMPLIANCE WITH PERMIT TERMS AND CONDITIONS
- **RRHL**
  USGS RAPTOR, RAVEN, HORSE AND LIVESTOCK SURVEYS
- **576 ACRES**
  HABITAT PROTECTED THROUGH LIVESTOCK EXCLOSURES
- **6 ESCAPE RAMPS**
  INSTALLED IN LIVESTOCK WATER TROUGHS

The grazing of permitted livestock is listed as a low priority threat in all PMUs across the Bi-State. To address the threat of habitat degradation caused by grazing and to implement beneficial livestock management strategies, the NRCS offers $8 million in funding for habitat improvement and enhancement projects on private lands. The USGS completes raptor, raven, horse and livestock surveys. Land management agencies monitor active grazing allotments on their land for compliance with permit terms and conditions.

COLLABORATIVE CONSERVATION

AN INTERAGENCY APPROACH TO SCIENCE-BASED ADAPTIVE MANAGEMENT

INTERAGENCY APPROACH

The Action Plan identifies three actions designed to implement a coordinated interagency approach to sage-grouse conservation, all of which have been initiated.

These actions include the enactment of a "Sage-Grouse Service Team" approach to support the conservation and management of sage-grouse populations in the Bi-State. This requires that partners work collaboratively and provide multi-jurisdictional funding to facilitate the conservation of Bi-State sage-grouse and its habitats.

Each year, Bi-State partners work together to leverage expertise and develop conservation strategies to develop a proposed program of work based on priority, staff availability and funding. Agencies work across jurisdictional boundaries to monitor population demographics, complete vegetation monitoring plots and carry out Action Plan projects.

In 2014, Bi-State partners announced a $45 million-dollar commitment to implement the 2012 Action Plan over a 10-year period and complete the highest priority 76 projects (Figure 25, Table 7). Under the direction of the Executive Oversight Committee, each partnering agency drafted a commitment letter to the Service, stating their acknowledgment of responsibility and dedication to implement a coordinated interagency approach to conservation.

Table 7. Partner funding commitment and conservation role

NEVADA DEPARTMENT OF WILDLIFE	$3.6M	Vegetation monitoring; population monitoring
CALIFORNIA DEPARTMENT OF FISH & GAME	$1M	Translocation; population monitoring; predator monitoring; habitat acquisition
FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE	$13.9M	NEPA planning for projects; planting and irrigation plans; grazing management; meadow restoration; telemetry monitoring
USDA Natural Resources Conservation Service	$12M	Landowner outreach on easement and habitat restoration opportunities; conservation easements; matching funds for partners; utilize program funding to implement projects
NATIONAL SYSTEM OF PUBLIC LANDS	$6.5M	NEPA planning for projects; conifer removal; meadow enhancement; infrastructure evaluation; wild horse assessment; population monitoring
USGS	$2.5M	Develop and apply modeling and science to inform adaptive management; CPT; IPM; population monitoring
MONO COUNTY	$5.9M	Coordinate on easement development and seek matching funds; purchase/relocate landfill; education and outreach to landowners; general plan update for sage-grouse conservation
U.S. FISH & WILDLIFE SERVICE	$1M	Science and capacity support; landowner engagement and outreach; implementation of private lands restoration opportunities

Since 2014, approximately 57% of that funding has been spent with a total of $26 million agency dollars allocated to sage-grouse conservation efforts (Figure 26). Agency partners have recently updated their letters to extend an additional five years, demonstrating their ongoing commitment to Bi-State sage-grouse conservation.

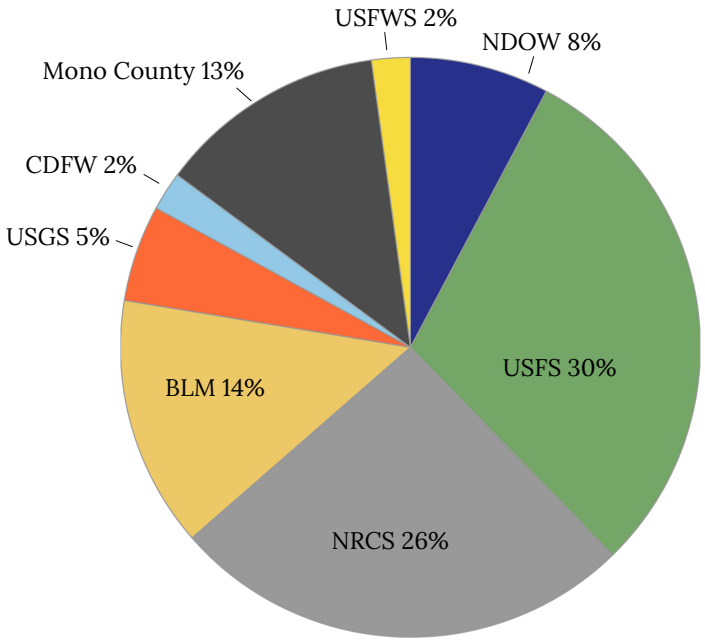


Figure 25. Agency contributions to $45 M commitment

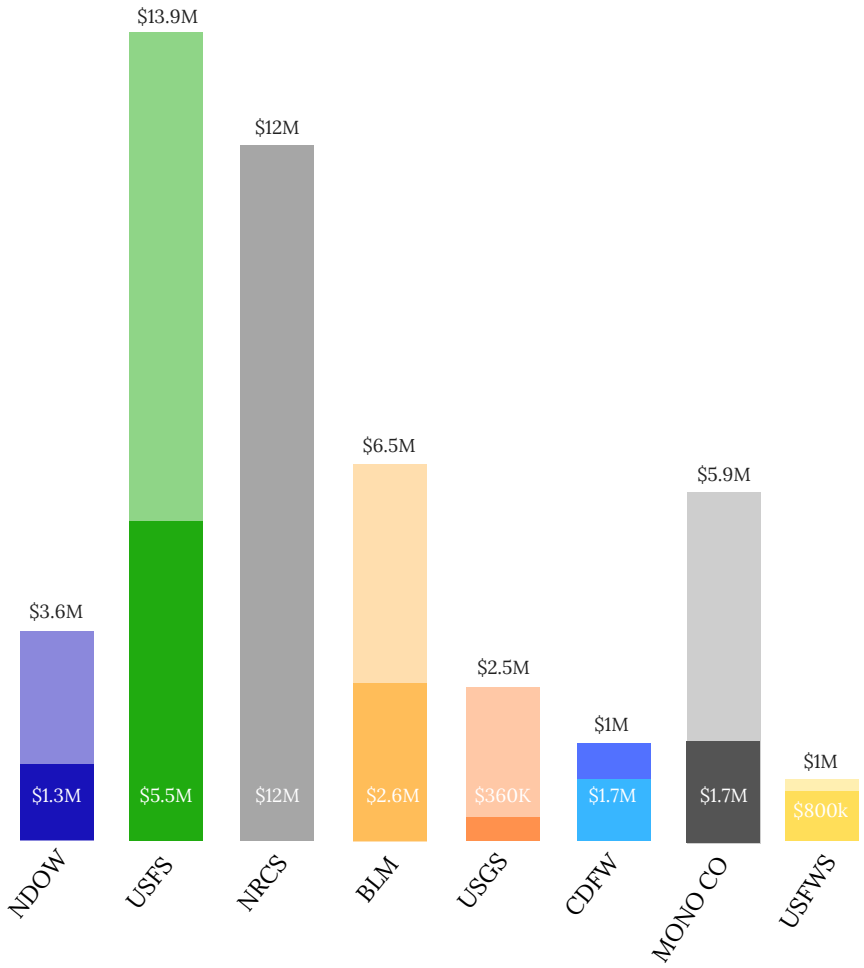


Figure 26. Agency dollars spent, between 2014-2018, toward the 10-year $45 million commitment. Top value represents 10-year commitment. Bottom value represents amount spent since 2014.

Photo: Bob Wick

SCIENCE-BASED ADAPTIVE MANAGEMENT

Bi-State partners utilize a science-based adaptive management approach to generate a strategic process for guiding sage-grouse management. This approach integrates the best available science to inform local and landscape-level management and conservation decisions for Bi-State sage-grouse.

Science-based adaptive management guides management decisions based on data-driven models, implementation of actions, outcome evaluation and modification of management practices based on this iterative learning process (Bi-State Action Plan, 2012). This management strategy provides insight into what management actions should be conducted and which areas should should be targeted, while reducing the chances of carrying out actions in areas where the effects are inconsequential and not meaningful.

The Action Plan identifies seven actions necessary to manage sage-grouse populations and implement projects through adaptive, science-based methods. One priority identified in the Action Plan was the establishment of inter-agency agreements and funding mechanisms to support a USGS Science Adviser. The primary duty of the Science Adviser was the development of the Conservation Planning Tool (CPT) to prioritize conservation projects (Bi-State Action Plan, 2012). Funding for this position was initially acquired in 2012 and has been secured annually.

The six remaining actions detail necessary information to be acquired and incorporated into the CPT to increase its function and management value. These actions include defining habitat, ranking risks, integrating population performance and identifying factors that influence population vital rates. Each of these actions is carried out annually to improve the predictive power of the CPT and inform management decisions to maximize benefit to Bi-State sage-grouse populations.

Selected Research

Supporting Adaptive Management

Habitat Use

Pinyon and Juniper Encroachment into Sagebrush Ecosystems Impacts Distribution and Survival of Greater Sage-Grouse

Peter S.Coates, Brian G.Prochazka, Mark A.Ricca, K. Ben Gustafson, Pilar Ziegler, Michael L.Casazza

Population

An Integrated Population Model for Greater Sage-Grouse in the Bi-State Distinct Population Segment, California and Nevada, 2003–17

Steven R. Mathews, Peter S. Coates, Brian G. Prochazka, Mark A. Ricca, Mary B. Meyerpeter, Shawn P. Espinosa, Sherri Lisius, Scott C. Gardner, and David J. Delehanty

Genetics

Genomic single-nucleotide polymorphisms confirm that Gunnison and Greater sage-grouse are genetically well differentiated and that the Bi-State population is distinct, 2015

Sara J. Oyler-McCance, Robert S. Cornman, Kenneth L. Jones, and Jennifer Fike

Planning

A conservation planning tool for Greater Sage-grouse using indices of species distribution, resilience, and resistance

Mark A. Ricca Peter S. Coates K. Benjamin Gustafson Brianne E. Brussee Jeanne C. Chambers Shawn P. Espinosa Scott C. Gardner Sherri Lisius Pilar Ziegler David J. Delehanty Michael L. Casazza

Figure 27. Selected Bi-State sage-grouse research

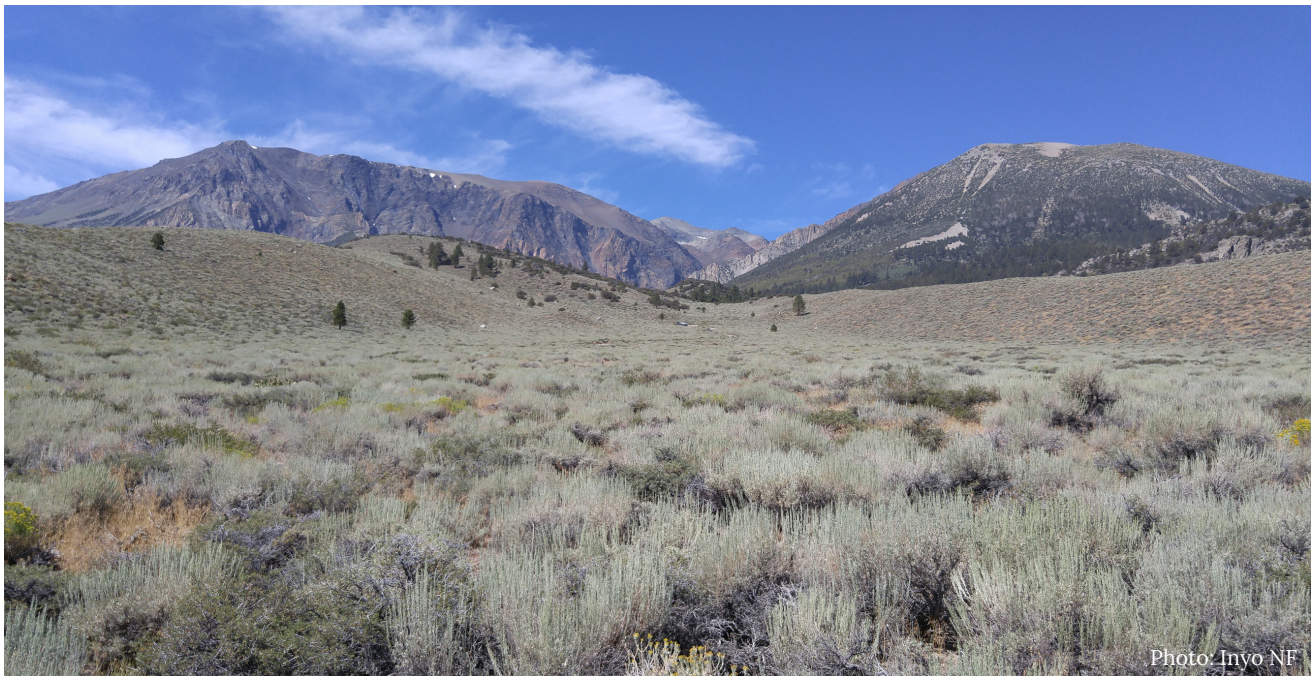


Photo: Inyo NF

IMPROVED REGULATORY MECHANISMS

The Action Plan outlines 13 actions for improved regulatory mechanisms, 12 of which have been completed. These actions provide consistent land management direction across jurisdictional boundaries to conserve Bi-State sage-grouse and their habitats into the future. Considering the majority of sage-grouse habitat in the Bi-State is on federally managed public lands, effective conservation of Bi-State DPS and its habitats requires strong land use management plans.

Bi-State land management agencies agreed to adopt plan amendments to incorporate best management practices, standardize operating procedures, implement conservation measures and mitigate threats to increase regulatory effectiveness and provide direction specific to conservation of the Bi-State DPS. These plan amendments require that agencies consider sage-grouse populations and habitat in land use planning and activity plan analysis to limit potential impacts on sage-grouse or their habitat.

Since the Action Plan was implemented, the Humboldt-Toiyabe National Forest and Carson District and Tonopah Field Office of the BLM have signed amendments to their Land Use Plans to better manage Bi-State habitat. The Inyo National Forest is in the process of updating their Land Management Plan which should be completed by 2020. Additionally, Mono County has updated their General Plan.

Plans are implemented by land management agencies in close coordination with state and federal wildlife agencies to ensure there is seamless regulatory direction for all sage-grouse related issues across management boundaries. These amendments aim to minimize or eliminate threats affecting the status of sage-grouse and to improve habitat conditions. Ongoing plan maintenance occurs to incorporate the most recent information ensuring that public lands containing Bi-State sage-grouse and sage-grouse habitat are adequately protected.

MAINTAINING PARTNER INVOLVEMENT

Relationships built on trust and cooperation among stakeholders are essential to the goal of long-term conservation of sage-grouse and its habitats. Participants involved in this conservation effort include; federal, state, and local governments; Native American tribes; non-profit organizations; ranchers and landowners; among others.

The Action Plan identifies six priorities for maintaining stakeholder involvement, all of which are implemented annually. Actions include conducting Local Area Working Group meetings, holding informational workshops to assist landowners interested in implementing conservation projects on their land and developing outreach materials to facilitate the sharing and distribution of information.

Together, partners conduct Action Plan maintenance, carry out identified actions and track implementation progress to insure the Action Plan is effectively guiding conservation and management efforts.

Since 2012, considerable progress has been made toward maintaining stakeholder involvement. Accomplishments include:

- Formation of the Tribal Natural Resource Committee (TNRC)
- 73 education and outreach events
- 27 published newsletters and articles
- 23 LAWG, individual PMU and TNRC meetings
- Creation of the Bi-State Sage-Grouse website
- Production of LAWG newsletters to provide sage-grouse related updates and notifications to partners as well as the general public

SUCCESSFUL PARTNERSHIP STRATEGIES

- INVOLVE STAKEHOLDERS IN DECISION-MAKING
- PROVIDE TIMELY INFORMATION
- OPEN AND HONEST COMMUNICATION
- LISTEN TO STAKEHOLDER CONCERNS
- RESPECT DIVERSE OPINIONS
- SEEK MUTUALLY BENEFICIAL SOLUTIONS
- LEARN FROM EACH OTHER

Photo: Bishop BLM

PARTNERSHIP IN THE SPOTLIGHT

The Bi-State Tribal Natural Resource Committee and the 2016 Bi-State Traditional Ecological Knowledge Summit

- The Bi-State Tribal Natural Resource Committee (TNRC) is made up of official representatives of the Tribes in the Bi-State area, individual Tribal members, and representatives of the federal and state land and wildlife management agencies.
- The mission of the TNRC is to promote, protect, and preserve good management of lands in the Bi-State through advocacy and education using a holistic approach through education and communication between Tribes and land management agencies.
- In June of 2016, Nevada and California state and federal land and wildlife management agencies met with local Tribal members at the Bi-State Traditional Ecological Knowledge Summit to share stories and perspectives regarding management of Bi-State sage-grouse and their habitats.
- Over 200 participants were present at the summit to discuss and identify how best to incorporate Traditional Ecological Knowledge (TEK) into the adaptive management of sagebrush and pinyon juniper ecosystems in identified Bi-State sage-grouse habitat.
- The summit allowed agencies to share the latest scientific knowledge and practices concerning Bi-State sage grouse conservation and provided an important opportunity for state and federal agencies to listen and learn from Tribal partners regarding the cultural significance of the region and its indigenous people.
- Participants recognized the value of integrating TEK with best science practices to achieve better outcomes for both the land and people. This collaborative work will continue at the next scheduled summit in spring of 2020.

COLLABORATIVE HIGHLIGHTS

COORDINATED INTER-AGENCY APPROACH

- A "Sage-Grouse Service Team" approach was implemented
- Multi-jurisdictional funding and support to conserve Bi-State DPS and its habitats
- 24 Executive Oversight Meetings since 2015
- 11 Technical Advisory Committee Meetings since 2015

SCIENCE-BASED ADAPTIVE MANAGEMENT

- Interagency agreements and funding provided for USGS Science Adviser
- Creation of an Integrated Population Model
- Development of the Conservation Planning Tool

INCREASED REGULATORY MECHANISM

- Humboldt-Toiyabe National Forest created a Forest Plan Amendment
- Inyo National Forest is in the process of completing a new Land Use Management Plan
- Revision of Carson BLM Resource Management Plan
- Mono County incorporated conservation and protection measures into its General Plan

MAINTAINING STAKEHOLDER INVOLVEMENT

- Formation of the Tribal Natural Resource Committee
- Creation of the Bi-State Website
- 73 Volunteer Events/Education & Outreach Opportunities
- 28 Stakeholder Meetings

Figure 28. Collaborative highlights

Photo: Sus Danner

Photo: Bob Wick

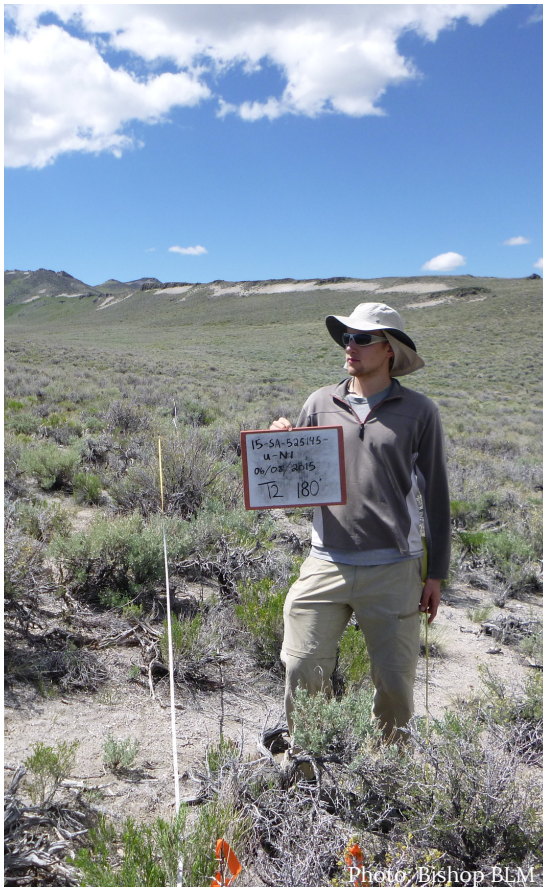


Photo: Bishop BLM

EFFECTIVENESS MONITORING

ACTION PLAN IMPLEMENTATION AND PROJECT STATUS

The 2012 Action Plan was designed to provide a "road-map" to conservation. It contains 159 actions intended to be implemented over a ten-year span. In 2014, the TAC evaluated actions in the Action Plan and selected 76 projects that were considered the highest priority to complete. The implementation of multiple projects are often required to achieve the intended goal of a single action. For example, an action that called for the restoration of Wheeler Creek in the Desert Creek-Fales PMU required the completion of four projects: 1) the construction of a let down fence; 2) marking that fence with flight diverters; 3) NEPA evaluation to develop a restoration plan and 4) completion of that plan through a combination of restoration techniques.

After seven years, great progress has been made toward the implementation of the Action Plan and associated 76 projects. Additional conservation actions prioritized post-Action Plan have also been implemented. These projects represent the highest priority actions deemed necessary to conserve Bi-State sage-grouse populations and their habitats.

Projects are prioritized through a science-based adaptive management process that utilizes on-the-ground evaluation to inform management decisions and prioritize conservation actions. This process incorporates the best available science and key lessons learned from prior efforts to: 1) identify the most critical issues; 2) develop projects that address those issues and 3) assess and adjust project implementation as necessary to improve the probability of benefiting sage-grouse.

Table 8. Action Plan implementation

Action Type	Actions Identified	Actions Initiated	Total Projects
Coordinated Interagency Approach	3	3	18
Science-Based Adaptive Management	7	7	13
Increased Regulatory Mechanisms	13	12	13
Wildfire	9	9	64
Urbanization	12	6	16
Infrastructure & Human Disturbance	12	11	71
Conifer Encroachment	13	13	60
Disease & Predation	4	4	4
Wild Horses	5	5	7
Small Populations	6	6	7
Habitat Restoration & Improvement	41	34	158
Research & Monitoring	28	26	69
Maintaining Stakeholder Involvement	6	6	87
Total	**159**	**142**	**587**

Table 9. High priority 76 project implementation

76 Project Type	Actions Identified	Actions Initiated	Total Projects
Science-Based Adaptive Management	2	2	12
Wildfire	1	1	3
Urbanization	6	0	0
Infrastructure & Human Disturbance	4	3	69
Conifer Encroachment	46	45	60
Disease & Predation	1	1	8
Wild Horses	1	1	6
Small Populations	1	1	8
Habitat Restoration & Improvment	13	10	41
Maintaining Stakeholder Involvement	1	1	78
Total	**76**	**65**	**285**

Population monitoring provides the basis of understanding for what types of projects should be implemented and where they should be placed. Utilizing monitoring data, the USGS developed a resource selection function that identified key sage-grouse habitat in the Bi-State. The highest priority projects are located in this identified habitat to provide the most ecological benefit to sage-grouse.

Published research regarding habitat selection, population models, genetics and conservation strategies all contribute to effective adaptive management. In 2014, the USGS incorporated completed research into the development of a Conservation Planning Tool (CPT), which measures ecological benefits to sage-grouse for a given management action using resource selection functions and estimates of abundance and space use (Ricca et al., 2017).

The CPT informs and prioritizes habitat improvement project design and is especially valuable for prioritizing conifer treatment and wildfire restoration projects. Boundaries of these projects are initially drawn as a best guess based on bird use, aerial imagery and knowledge of the habitat. The CPT then ranks these projects based on benefit to grouse and cost effectiveness. Each year additional research and monitoring data is incorporated into the CPT and it becomes more valuable as a result.

In 2015 and again in 2017, the TAC used the CPT results as the basis for re-prioritizing Bi-State conifer projects. This planning tool has proven to be incredibly valuable when combined with other information, such as on-the-ground knowledge of an area, logistics of planning and implementing projects and professional expertise. Combined, these tools provide the basis for prioritization of conservation projects.

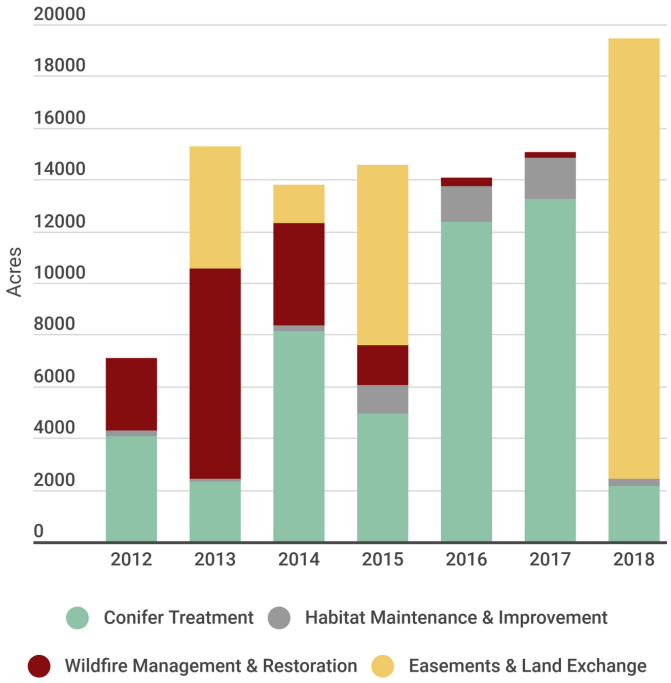


Figure 29. Conservation project acres completed annually

Efforts to implement conservation projects across the Bi-State have increased annually since 2012 (Figure 29). Currently, 142 of 159 identified actions in the Action Plan have been initiated and are in the stages of completion, meaning they are in progress, ongoing or occur annually or have been evaluated as part of the planning process. These actions represent 89% of all identified actions in the Action Plan (Table 8).

Additionally, 53 of the 76 associated high-priority projects have been initiated representing 68% of all projects originally identified (Table 9). Twelve projects (17%) were evaluated and determined to lie outside of occupied sage-grouse habitat and were subsequently removed from the list of priorities (Table 10).

PROJECT PRIORITIZATION TOOLS

- MONITORING
- RESEARCH AND MODELING
- CONSERVATION PLANNING TOOL
- LOCAL KNOWLEDGE

The completion of these projects illustrates the effectiveness of long-held and time-tested partnerships between stakeholders and their ability to increase the overall health of the sagebrush ecosystem and sage-grouse populations. Together, they established and implemented a framework that fostered ongoing problem solving and proactive engagement. This collaborative process effectively integrates multiple perspectives and interests and has proven to be more successful in providing durable solutions to complex issues and challenges.

Moving forward with maintained momentum, Bi-State stakeholders will continue to conduct collaborative conservation efforts at the landscape scale to benefit sage-grouse populations and the sagebrush ecosystem in the Bi-State.

FUTURE OBJECTIVES

- THE 2012 BI-STATE SAGE-GROUSE ACTION PLAN WILL BE EVALUATED AND UPDATED AS DEEMED NECESSARY
- ACTION AND PROJECTS IN PROGRESS WILL BE PRIORITIZED FOR COMPLETION
- ACTIONS AND PROJECTS NOT YET INITIATED WILL BE EVALUATED AND PRIORITIZED FOR FUTURE COMPLETION BASED ON CURRENT RELEVANCE AND ABILITY TO IMPROVE HABITAT CONDITIONS FOR SAGE-GROUSE
- UP-TO-DATE SCIENTIFIC TOOLS WILL BE UTILIZED TO INCORPORATE THE MOST RECENT AND APPLICABLE SCIENCE INTO SAGE-GROUSE CONSERVATION EFFORTS
- CONSERVATION AND MANAGEMENT DECISIONS WILL BE MADE USING A SCIENCE-BASED ADAPTIVE MANAGEMENT APPROACH
- ECOLOGICAL OUTCOMES OF CONSERVATION EFFORTS WILL CONTINUE TO BE MONITORED TO DEMONSTRATE HOW CONSERVATION ACTIONS ARE IMPACTING SAGE-GROUSE POPULATIONS AND THE SAGEBRUSH ECOSYSTEM

Photo: Bob Wick

ACTION PLAN IMPLEMENTATION & STATUS

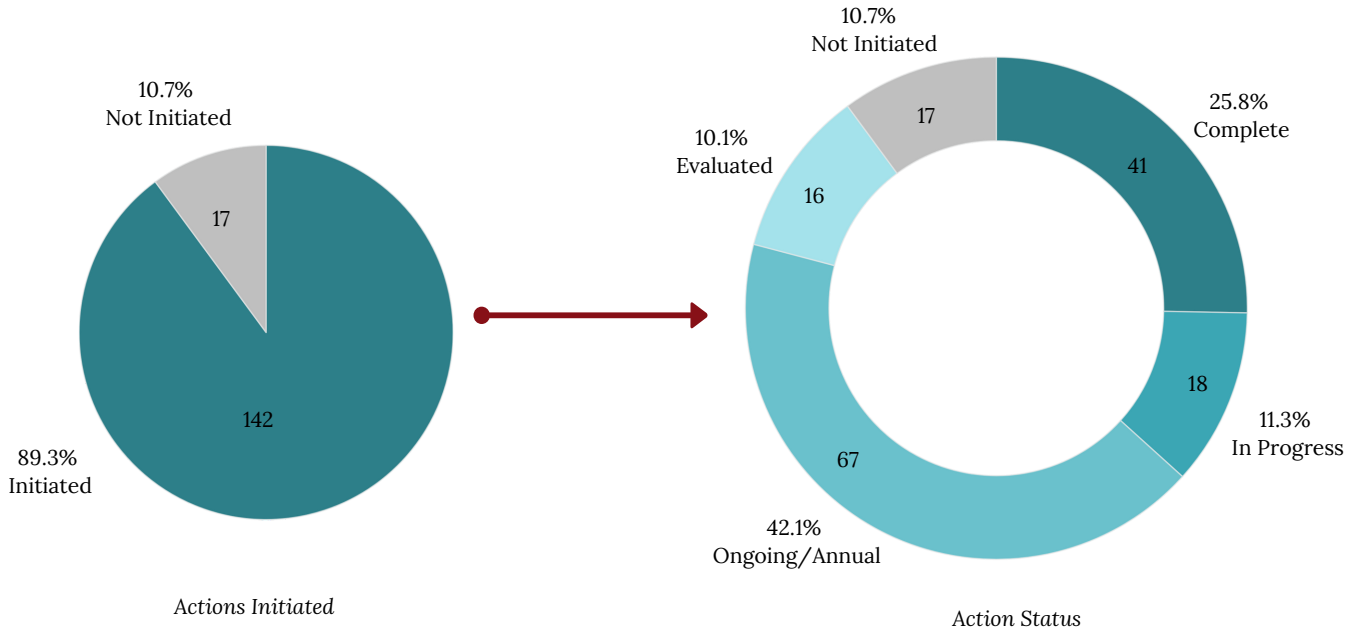


Figure 30. Action Plan implementation

76 PROJECT IMPLEMENTATION & STATUS

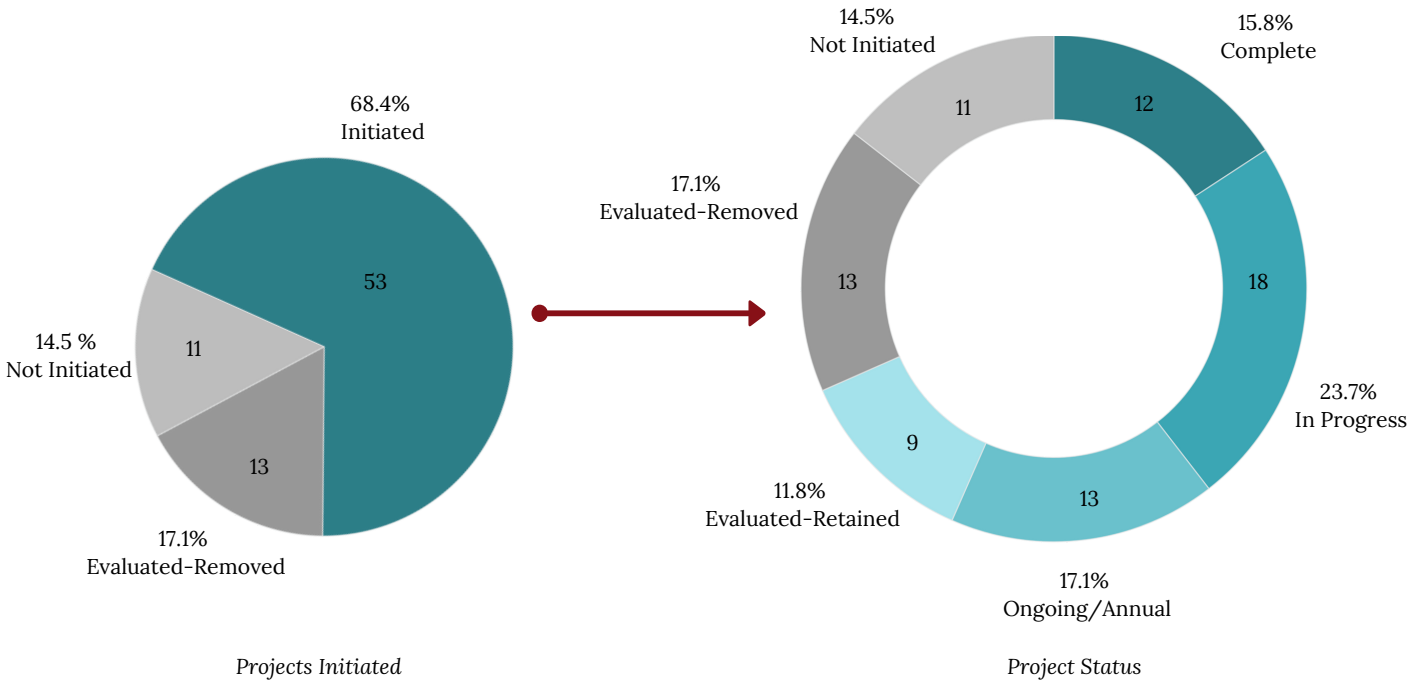


Figure 31. High priority 76 project implementation

Table 10. 76 projects evaluated and removed from list of priorities

PMU	Description	Evaluation
Multiple PMUs	Grouse Crossing Signs	Deemed not necessary
Bodie/Mt. Grant	East Walker Land Health Project #3	Dense conifer-will not treat
Pine Nut	Bull Canyon conifer treatment	Not in occupied sage-grouse habitat
Pine Nut	Sunrise conifer treatment	Not in occupied sage-grouse habitat
Pine Nut	Pine Nut conifer treatment	Not in occupied sage-grouse habitat
Pine Nut	Eldorado Canyon conifer treatment	Not in occupied sage-grouse habitat
Pine Nut	Hackett Canyon conifer treatment	Not in occupied sage-grouse habitat
Pine Nut	Oreana conifer treatment	Not in occupied sage-grouse habitat
Pine Nut	Ruhenstroth conifer treatment	Not in occupied sage-grouse habitat
Pine Nut	Ruhenstroth Well conifer treatment	Not in occupied sage-grouse habitat
Pine Nut	Brunswick conifer treatment	Not in occupied sage-grouse habitat
Pine Nut	Pipeline Canyon conifer treatment	Not in occupied sage-grouse habitat

Tabe 11. Action Plan items not initiated

Action ID	76 Project	PMU	Description
MER2	5	Pine Nut	Pine Nut PMU Conservation Easement
MER4	47	Pine Nut	Sunrise Pass pinyon-juniper removal
HIR1-5-PN	68	Pine Nut	Manage high elevation wet meadows in the southern portion of the Pine Nut PMU
HIR2-1-PN		Pine Nut	Restore previously burned sagebrush habitat within a three mile radius of Mill Canyon Lek
HIR2-2-PN		Pine Nut	Maintain meadows in Mount Siegel and Bald Mountain areas in proper functioning condition
HIR2-3-PN		Pine Nut	Improve sagebrush habitat quality west of Big Meadow
HIR2-4-PN	72	Pine Nut	Control noxious weeds within and surrounding Big Meadow complex
MER2-2	4	Desert Creek/Fales	Secure a conservation easement with Desert Creek Ranch
MER2-8	8,9	Desert Creek/Fales	Secure conservation easements near Burcham Flat, Wheeler Flat and Fales Hot Springs
MER2-11		Desert Creek/Fales	Secure conservation easements near Huntoon Valley, Swauger Creek and Bridgeport Valley
HIR2-7-DCF		Desert Creek/Fales	Improve meadow habitat on private lands near Huntoon Valley, Swauger Creek, Bridgeport Valley
RAM3-6		Desert Creek/Fales	Continue and supplement ongoing telemetry effort in Fales PMU
MER2-6		Mount Grant	Secure conservation easement or agreement for Aurora Meadows complex
HIR2-3-MG	76	Mount Grant	Evaluate meadow habitat conditions in the Aurora and Gregory Flat vacinities
MER3-7	11	Mount Grant	Minimize impacts from traffic near the Aurora Borealis mine
MER2-5	6,7	Bodie Hills	Secure conservation easement or agreement with Mormon Ranch
MER2-12		White Mountain	Secure conservation easements or agreements along the eastside of the White Mountains
IRM2-2		Multiple PMUs	Coordinate with local and county governments in Nevada
RAM1-7		Multiple PMUs	Incorporate Habitat Assessment Framework into lek inventory and monitoring efforts

ABBREVIATIONS & GLOSSARY

BH	Bodie Hills
BLM	Bureau of Land Management
CDFW	California Department of Fish and Wildlife
CPT	Conservation Planning Tool
DC	Desert Creek
DPS	Distinct population segment
ESA	Endangered Species Act
FA	Fales
GPS	Global Positioning System
IPM	Integrated population model
LADWP	Los Angeles Department of Water and Power
LV	Long Valley
MG	Mount Grant
NDOW	Nevada Department of Wildlife
PJ	Pinyon and juniper
PM	Parker Meadows
PMU	Population Management Unit
PN	Pine Nut Mountains
RRHL	Raptor, Raven, Horse and Livestock survey
SH	Sagehen
UD	Utilization distribution
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VHF	Very high frequency
WM	White Mountains

- Adaptive management: a systematic approach for improving resource management by learning from management outcomes
- Brood rearing: invested energy in the growth and development of offspring after they are born
- Conservation Planning Tool: A tool that measures ecological benefits to sage-grouse for a given management action through a composite index comprised of resource selection functions and estimates of abundance and space use.
- Demography: the study of characteristics of a population
- Fire regime: general pattern in which fires naturally occur in a particular ecosystem over an extended period of time
- Inbreeding: breeding of closely related individuals, often with negative genetic consequences
- Monoculture: based on a single variety of a single species
- Mortality: measure of individual deaths in a population
- Population growth rate: the proportional change in population size over time
- Predation: the act of killing another living organism for food
- Recruitment: the number of individuals added to the population in a given time
- Resource selection function: a model used to assess which habitat characteristics are important to a specific population or species of animal, by assessing the probability of that animal using a certain resource proportional to the availability of that resource in the environment
- Sustainable: system able to be maintained itself indefinitely without supplement
- Translocation: capture, transport and release or introduction of species from one location to another
- Vital rates: births, deaths, nesting success and brood success

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