

**ARIZONA STATE ACTION PLAN  
UPDATED October 2019**

**For  
Implementation of Department of the Interior Secretarial Order 3362: “Improving Habitat  
Quality in Western Big Game Winter Range and Migration Corridors”**

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## INTRODUCTION

Conditions in the broader landscape may influence the function of big game migration corridors and the sustainability of their populations (Sawyer et al., 2013). The landscapes necessary to maintain ungulate winter range and migration routes are becoming increasingly fragmented across the western United States due to human encroachment from agriculture (Donald & Evans, 2006), development and urban sprawl (Radeloff et al., 2005), roadway and railway expansion (Johnson, 2001; Michalak & Lerner, 2007), natural resource extraction (Drohan et al., 2012; Hennings & Soll, 2010) and fencing (Gates et al., 2012).

In response to changing landscape conditions, Secretarial Order 3362 (SO3362; Appendix A) directs appropriate agencies including the US Fish and Wildlife Service (USFWS), National Park Service (NPS), and Bureau of Land Management (BLM) within the Department of the Interior (DOI) to work in close partnership with the State of Arizona to enhance and improve the quality of big game winter range and migration corridor habitat on Federal lands under the management jurisdiction of the DOI in a way that recognizes state authority to conserve and manage big game species and respects private property rights. Through scientific endeavors and land management actions, wildlife such as Rocky Mountain Elk (*Cervus canadensis*), Mule Deer (*Odocoileus hemionus*), Pronghorn (*Antilocapra americana*), and a host of other species will benefit.

The United States Department of Agriculture (USDA), through the USDA Forest Service (USFS) and USDA Natural Resource Conservation Service (NRCS), will collaborate with DOI, the states, and other natural resource managers across the broader landscape. This collaboration will strive for an all-lands approach to research, planning, and management for ecological resources, to include migration corridors in a manner that promotes the welfare and populations of elk, deer, and pronghorn, as well as the ecological integrity of terrestrial ecosystems in the plan area. There are nearly 73 million acres of land in Arizona (Figure 1). Among these lands, approximately 38% are managed by two Federal Departments: DOI (17 million acres) and USDA (11 million acres).

Big game species have significant economic and social value. A survey of wildlife-related recreation conducted by the USFWS indicated that 2.9 million people hunted big game in the 19 western states and spent \$8.7 billion on hunting-related expenses (U.S. Fish and Wildlife Service & U.S. Census Bureau, 2016). Considering this value, it is critical that wildlife habitat

requirements are fully considered and appropriately addressed in landscape planning decisions. In addition to the monetary value of big game species, protecting these species will contribute to a healthy ecosystem and enjoyment by all wildlife enthusiasts.

Recent advances in Global Positioning Systems (GPS) radio collar technology are now allowing researchers to identify and map important ungulate migration corridors, winter range, and stopover sites at high resolutions. This new research has led to some amazing discoveries, such as a 150-mile mule deer migration corridor in southwest Wyoming, which is the longest recorded for that species to date. Similar research has documented the migration corridors of nine separate elk herds that winter on habitats managed by three different states (Montana, Wyoming, and Idaho), but all migrate to shared summer range within Yellowstone National Park.

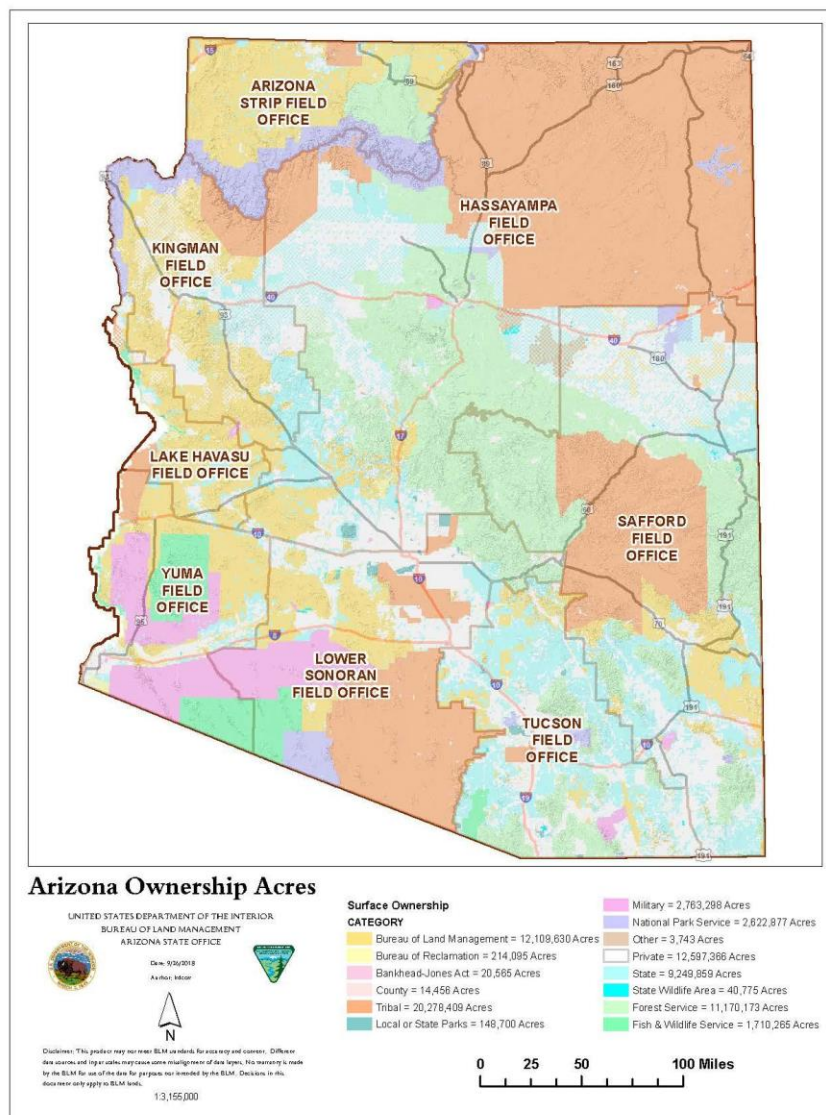
Several lessons important to modern wildlife management are emerging from migration research. New detailed information is showing wildlife managers that the corridors used during seasonal migration are crucial for conservation of big game herds in the West. This recent and ongoing accumulation of large amounts of reliable movement data provides an excellent opportunity to use science to identify best practices in various kinds of development scenarios to minimize conflicts and maximize the availability of habitat. Often, the migration corridors that are identified from fine scale movement data are quite narrow (1-2 miles in width) and thus allow managers to prioritize migration and movement habitat. Science-based prioritization of these linear strips of habitat and winter range areas, which represent a small area of habitat but a large benefit to wildlife, will help plan for long-term landscape conservation.

Together with the DOI, Arizona Game and Fish Department (AZGFD) implemented its 2018 State Action Plan and was provided with \$347,000 to support big game movement specific research and \$200,000 for complementary habitat enhancement work on private land through the USFWS partners program. AZGFD implemented the top three research priorities including GPS collaring 81 mule deer for the purposes of identifying important migration corridors.

Additionally, AZGFD partnered with the US Geological Survey (USGS) and the Mule Deer Foundation (MDF) to fund a partner biologist who began in June 2019. This individual is leading AZGFD's movement research and collaborating with the USGS Wyoming Cooperative Research Unit as a member of the Corridor Mapping Team.

In April 2019, the DOI sent a letter to 11 state wildlife agency directors asking for updates to the 2018 State Action Plans under SO3362, requesting refinement of priority corridors and an updated list of state wildlife agency research priorities. Below are AZGFD's highest priority movement corridors and winter range areas based on best available science. Also included are AZGFD's highest priority research needs which were submitted in a proposal in August 2019. The research needs reflect areas where we currently lack data necessary to delineate big game movement corridors or winter range. Corridors and research in this document are listed in priority order. Ongoing analysis of existing and incoming data will help AZGFD to refine migration corridor and winter range priorities within current corridor polygons.

**Figure 1.** Overview of Arizona land ownership/management.



## **ARIZONA GAME AND FISH DEPARTMENT'S PRIORITY BIG GAME CORRIDORS**

### **1) Grand Canyon to Prescott Corridor Complex (pronghorn, mule deer, & elk)**

This corridor complex contains some of the highest altitude landscapes in Arizona, reaching elevations up to 12,633 feet. Inhospitable winter conditions in the high country induce migration for mule deer, elk, and pronghorn to lower elevations. The full extent of seasonal migrations across this complex of migration routes and winter range is not thoroughly understood. AZGFD is continuing to refine the many suspected corridors and winter range habitats within this area with historical data and ongoing analysis (Figure 2).

Research collar data has helped AZGFD identify deer and elk populations that seasonally migrate to winter range along the south rim of the Grand Canyon. Some of these individuals were documented traveling distances up to 50 miles and traversing highways such as State Route (SR) 180, US Highway (US) 89, and SR 64. In fact, a number of Flagstaff area municipalities have reported seasonal vehicle-wildlife collision hotspots north and west of Flagstaff. AZGFD has prioritized research on this migration and collared 20 mule deer in June 2019. This research will allow AZGFD to identify specific movement corridors in relation to transportation structures and development.

Pronghorn data within this corridor complex suggests strong human influences directing seasonal movement and habitat selection. GPS locations of pronghorn on the south side of I-40 show clear movement north from their wintering grounds near Paulden, AZ until they encounter the interstate and abruptly turn eastward and parallel I-40 until they reach acceptable summer habitat. A similar phenomenon is also occurring among GPS collared pronghorn north of I-40. There is evidence that prior to the development of I-40, this area once served as a north-south corridor complex from the Grand Canyon south to the Prescott area. In addition to the effect of I-40, US 89 is a barrier to pronghorn north of Flagstaff. Northern Arizona University and AZGFD documented genetic differences between pronghorn populations separated by US 89 and SR 64 indicating movement has been substantially restricted by these highways (Theimer et al., 2012).

As mentioned above, this area contains several high volume transportation routes in Arizona, including US 89, I-17, and I-40 where traffic volumes may exceed 20,000 vehicles/day. The Arizona Department of Transportation (ADOT) is aware of the need for wildlife crossings in this corridor but currently lack funding to construct such features. The USFS and the Four Forest

Restoration Initiative (4FRI) are adjusting forest treatment/thinning efforts within prescription parameters to provide better connectivity associated with locations for future targeted crossing structures, particularly in an area west of Parks, AZ where a recommended overpass would simultaneously serve as a safe crossing for pronghorn, elk, and mule deer.

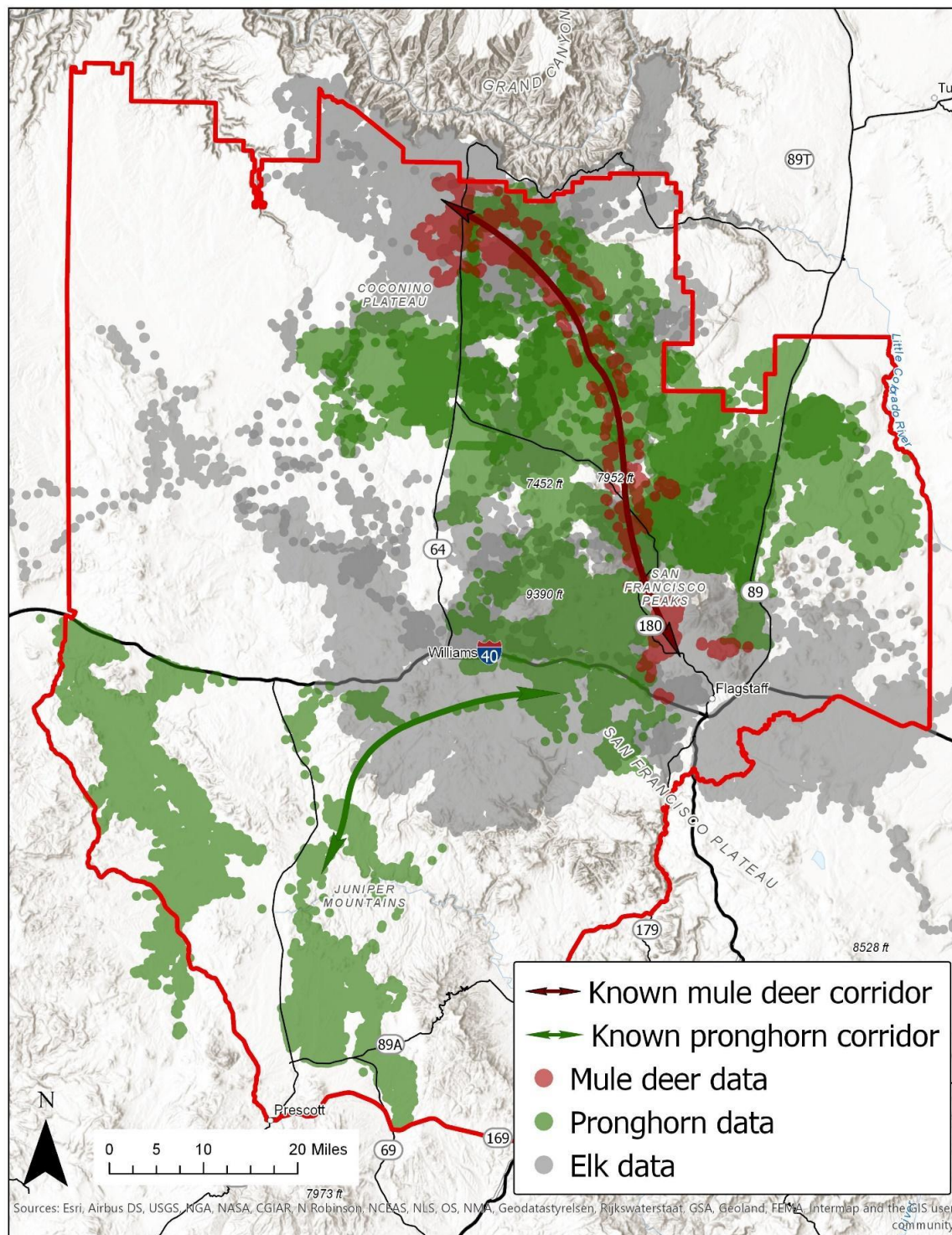
The land ownership/management ranges from NPS at the Grand Canyon on the north end through USFS, BLM, and state-owned and private land (Figure 3, Table 1). Current threats are vehicle traffic collisions, future exurban and suburban development, pinyon-juniper (PJ) encroachment, shifts in vegetation and available resources, and livestock fencing.

**Table 1.** Land ownership/management for the Grand Canyon to Prescott Corridor Complex.

<b>Category</b>	<b>Area (acres)</b>	<b>%</b>
US Forest Service	1,953,023	43.48
Private	1,551,696	34.55
State Trust Land	903,000	20.10
National Park Service	38,934	0.87
Department of Defense	28,873	0.64
Bureau of Land Management	5,646	0.13
Tribal Lands	4,552	0.10
Bureau of Reclamation	4,064	0.09
State and Regional Parks	1,173	0.03
Arizona Game and Fish Dept.	404	0.01
Mixed/Other	289	0.01

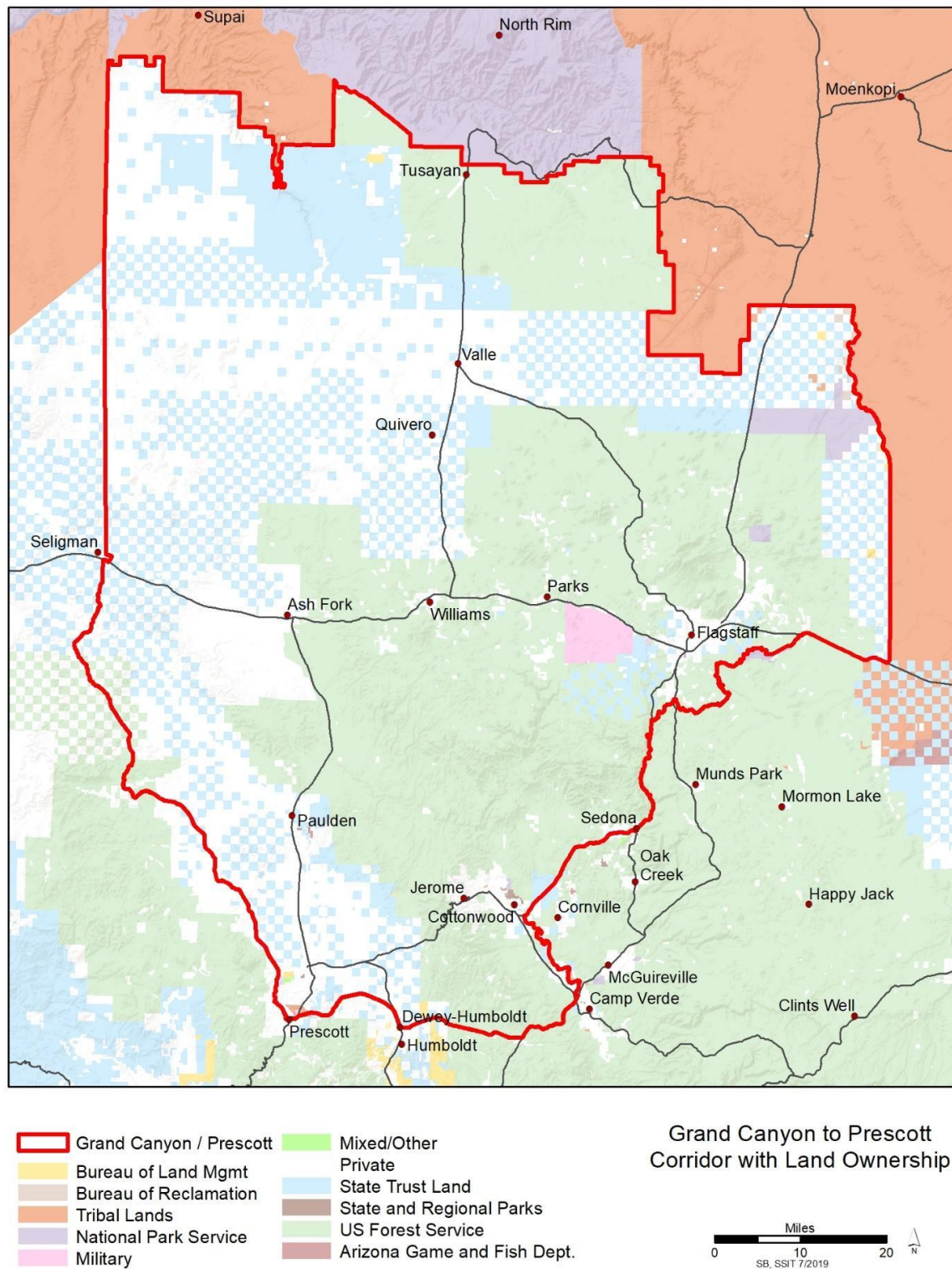


**Figure 2.** Pronghorn, elk, and mule deer GPS location data within the Grand Canyon to Prescott Corridor Complex and known movement corridors.





**Figure 3.** Land ownership/management within the Grand Canyon to Prescott Corridor Complex.



## **Current State Agency Activities**

### **Vegetation Management Treatments**

*Vegetation management treatment of public and private lands* – Juniper encroachment into savannas and grasslands over the last 100 years has been a major cause of habitat deterioration within the Grand Canyon to Prescott Corridor Complex. Mastication, thinning and prescribed fire efforts are ongoing on both private and public land to restore historic migration patterns and habitat, especially for pronghorn. Multiple state and federal initiatives are currently underway to restore these ecosystems. In 2018 and 2019 the AZGFD, along with private and public partners, restored 2,000 acres of grassland for pronghorn and mule deer within the corridor.

### **Barrier/Fragmentation Mitigation Efforts**

*Highway-related elk, deer, and pronghorn movement studies* – AZGFD performed ADOT-funded wildlife movement studies along I-40, US 89, and SR 64 and identified wildlife crossing locations for future implementation during road improvement efforts. Figure 2 depicts pronghorn, elk, and deer movement data from several highway projects.

*Landscape level pronghorn movement studies* – AZGFD has deployed 60 GPS collars on pronghorn south of I-40 to identify how individuals are accessing seasonally important ranges across the landscape. AZGFD plans to collar up to 35 more pronghorn in 2019 in the southern part of this corridor near Prescott Valley.

*Wildlife-Friendly Fence Modifications* – Over the past 10 years, AZGFD has worked with the NPS, USFS, ADOT, sportsman's groups, and local ranchers to inventory and modify or remove barrier fences. In 2018 and 2019, the Arizona Antelope Federation and volunteers from across the state modified five miles of fences in critical locations to allow pronghorn movement within the corridor. In total about 55 miles of fence were removed or modified both north and south of I-40.

### **Wildlife Water Resources**

*Wetland/Riparian Restoration* – Wetland and riparian habitats are rare in northern Arizona and provide key habitat within big game migration corridors and winter range. Many of these riparian areas are impacted by livestock and/or have been hydrologically altered and are in need of restoration. In 2018 and 2019, AZGFD protected 245 acres of wetland and riparian habitat

across two lakes, one river, and one spring by excluding harmful livestock grazing from these areas with wildlife-friendly fencing.

## **Habitat Projects Identified**

### Vegetation Management Treatments

*Vegetation management treatment of public and private lands* – 10,000 acres of private and State Trust land and 20,000 acres of Kaibab and Prescott National Forest land are in need of treatment within the Grand Canyon to Prescott Corridor. AZGFD will work with partners to focus efforts within and adjacent to the Corridor in order to allow for a landscape-level improvement for big game.

### Barrier/Fragmentation Mitigation Projects Identified

*Habitat conservation through land acquisition and easements* – Specific tracts of land within the Grand Canyon to Prescott Corridor are at risk for development. In these cases, development would have a significant impact on the long-term viability of the corridor for wildlife movement. AZGFD is currently working with partners to identify these key parcels and secure funding for their long-term conservation. Tools such as conservation easements, land transfers, and land purchases would ensure long-term habitat connectivity.

*Wildlife Crossings along I-40* – I-40 represents the biggest impediment to migration within the Grand Canyon to Prescott Corridor Complex. A study of elk movements and wildlife-vehicle collisions identified the best locations for wildlife crossings and fencing for future I-40 upgrades. Although wildlife underpasses will facilitate elk and deer, wildlife overpasses are the only crossing design proven to accommodate pronghorn, so a network of I-40 crossings that includes overpasses as well as underpasses are needed to connect all three species from the Grand Canyon to Prescott. These wildlife crossings would improve migrations for multiple big game species across/under I-40 in the area between Flagstaff and Ash Fork (Figure 4).

*Wildlife Crossings of US 89, SR 64, and US 180* – Additional wildlife crossings, including at least some overpasses on US 89, SR 64, and US 180 would also serve to connect these fragmented populations leading to more robust population growth and resilience to stressors such as climate change and development.

*Wildlife-Friendly Fence Modifications South of I-40* – Cooperative efforts between AZGFD, NPS, USFS, ADOT, sportsman’s groups, nonprofit conservation organizations, and local ranchers to inventory and modify or remove barrier fences are targeted for expansion south of I-40. Approximately 75 miles of fence modifications are needed in order to facilitate migratory pronghorn movement south of I-40.

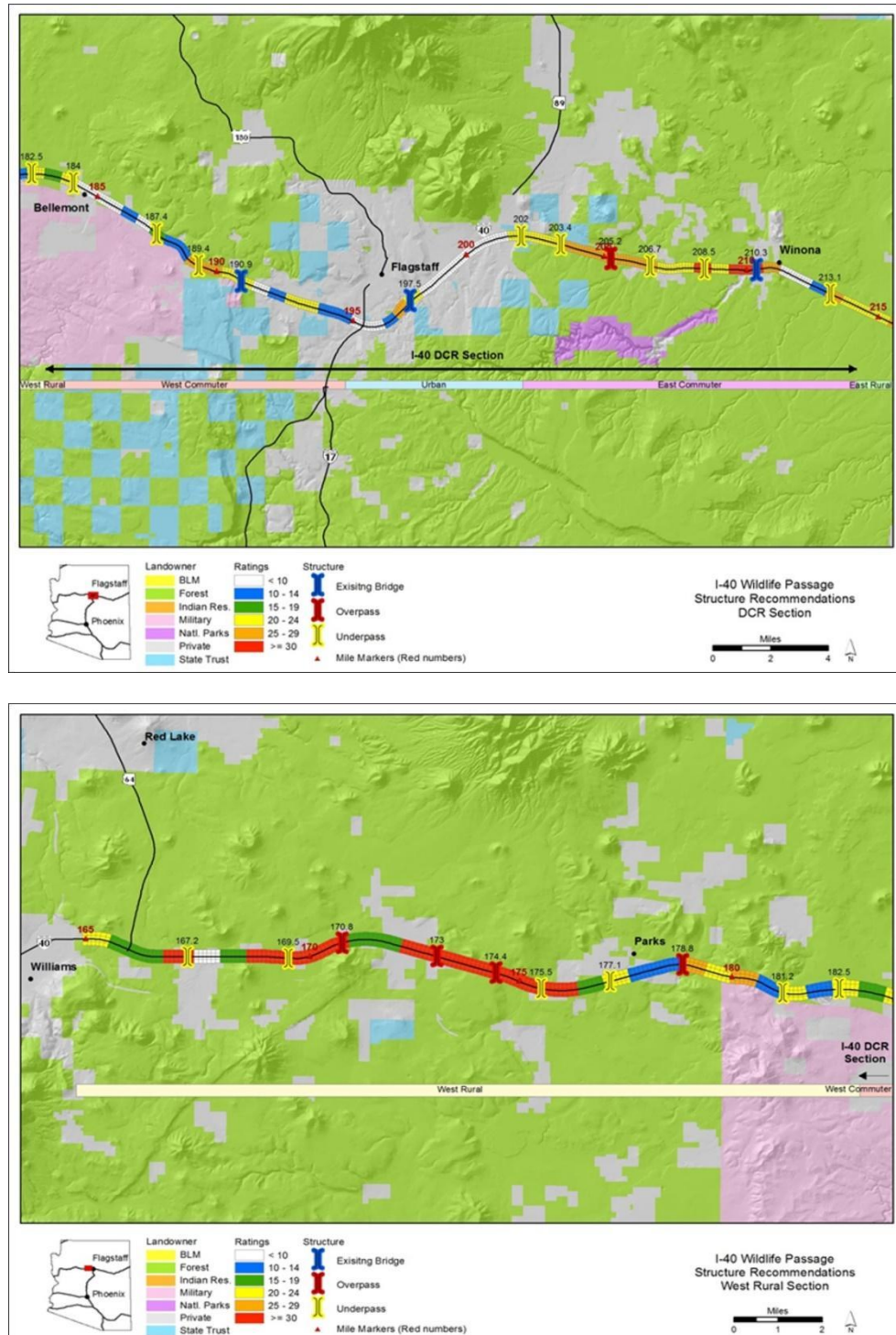
An Environmental Assessment (EA), Design Concept Report (DCR), and Wildlife Accident Reduction Plan were all created for this section of I-40 that includes all of the recommended wildlife crossing locations and fencing.

#### Wildlife Water Resources

*Wetland/Riparian Restoration* – Corridor wetlands and riparian habitats outside the scope of current AZGFD and Kaibab National Forest work are in need of restoration efforts.

*New wildlife water developments and redevelopments in the corridor* – AZGFD has identified four additional wildlife water developments to be built or rehabilitated to provide the necessary water to support big game corridor movements during drought periods.

**Figure 4.** Recommendations for highway crossings in the Grand Canyon to Prescott Corridor Complex. Ratings are based on elk highway crossings, weighted elk approaches, elk-vehicle collisions, deer-vehicle collisions, human activity, terrain, land status, and railroad proximity.



## 2) Flagstaff to Sedona Corridor (elk & mule deer)

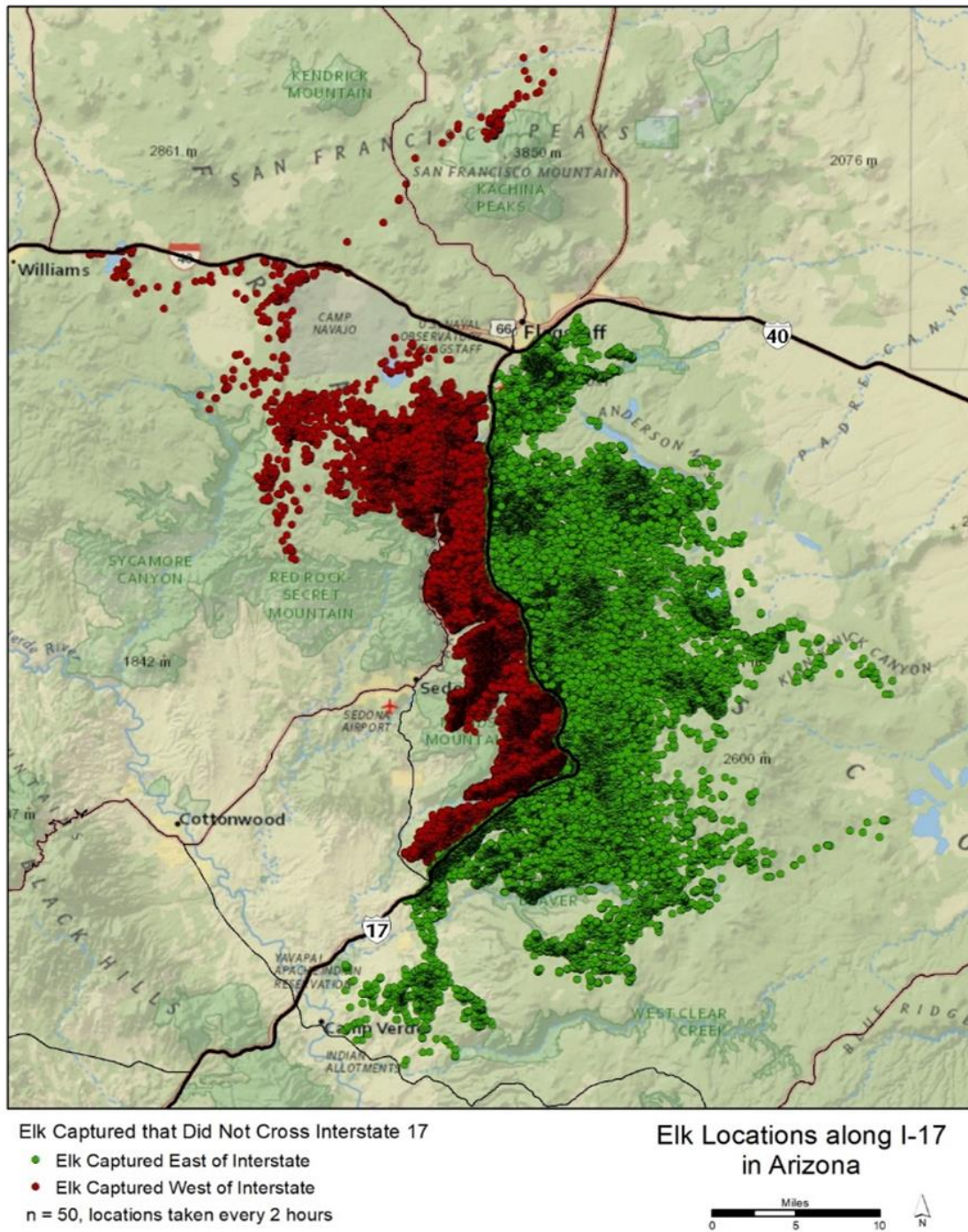
This corridor contains 50 miles of Interstate 17 (I-17) which is a four lane divided highway that connects Phoenix and Flagstaff. I-17 is travelled by millions of people each year (>17,500 vehicles/day in 2018) travelling to numerous Arizona public lands. The northernmost 31-mile section connecting the Verde Valley and Flagstaff changes quickly in elevation and passes through both summer and winter range for elk and mule deer. Therefore, AZGFD recognizes this area as a priority to focus efforts on mitigation to enhance connectivity of critical migration patterns. Numerous wet meadow-riparian habitats found adjacent to or near the highway corridor and a local golf course provide preferred food and water sources influencing elk distribution and movements (Gagnon et al., 2015). Along this segment of I-17, elk account for 75% of all wildlife–vehicle collisions with >85 elk mortalities per year (Gagnon et al., 2013). Despite high incidence of elk-vehicle collisions along I-17, the highway’s high traffic volumes generally prevent crossing attempts (Figure 5). Gagnon et al. (2015) found a mean passage rate across I-17 (crossings/approach) of <0.07 for 64 GPS collared elk, illustrating the interstate’s effectiveness as a movement barrier. Current analysis of GPS collar data show elk migration and winter range availability is highly influenced by I-17 (Figure 6). When winter conditions push elk out of summer range, they face the choice of crossing I-17, or following the interstate south to lower elevation winter range. The land management in this corridor is primarily USFS, with small private parcels (Figure 7, Table 2). Vegetation is primarily Petran Montane Coniferous Forest biotic community dominated by Ponderosa pine (*Pinus ponderosa*).

**Table 2.** Land ownership/management for the Flagstaff to Sedona Corridor.

Category	Area (acres)	%
US Forest Service	686,040	93.62
Private	39,470	5.39
State Trust Land	4,821	0.66
National Park Service	995	0.14
Tribal Lands	630	0.09
State and Regional Parks	296	0.04
Mixed/Other	238	0.03
Arizona Game and Fish Dept.	199	0.03

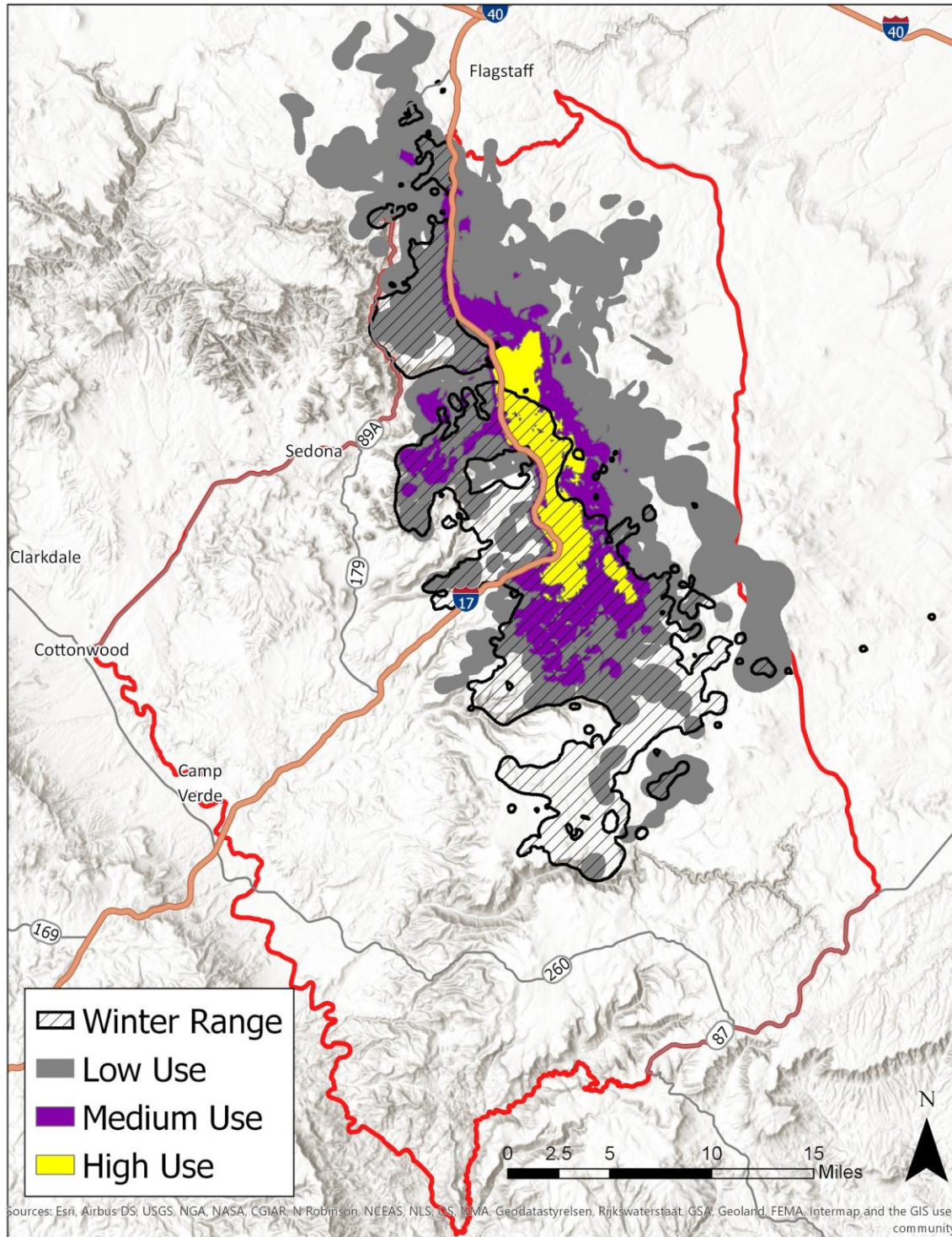


**Figure 5.** Elk locations associated with I-17 highway crossing study illustrating that 70% of the population (represented here) were never located on the opposite side of I-17 from where they were collared.





**Figure 6.** Preliminary Flagstaff to Sedona corridor and winter range model based on GPS collar data collected from 2006-2014. Low use, medium use, and high use corridors are based on the relative number of individuals (n=45) using the same migration route.



**Figure 7.** Land ownership/management within the Flagstaff to Sedona Corridor.



## **Current State Agency Activities**

### **Barrier/Fragmentation Mitigation Efforts**

*I-17 study on wildlife movements and fencing/crossing needs* – In 2007, ADOT commissioned AZGFD to conduct a study on wildlife movements and determine needs for wildlife crossings and fencing. AZGFD recommended 19 locations where new or modified crossing structures should be incorporated with future highway upgrades to improve wildlife movement across I-17 (Figure 8). These suggested crossing structures have already been prioritized based on elk movement and roadkill data and discussions with ADOT has garnered their support and commitment, in concept, to contribute funds to a collaborative project to implement these improvements. The report from this project was included in ADOT's package of planning materials for the future upgrade of the northern section of I-17. That package includes an EA, DCR, an Accident Reduction Plan, and the AZGFD report to ADOT's Research Center.

*I-17 Woods Canyon to Munds Canyon fencing retrofit* – To address concerns with the high wildlife-vehicle collision rate in a shorter timeline than future roadway upgrades would allow, AZGFD worked with ADOT to retrofit a 6-mile section of highway from Woods Canyon to Munds Park with fencing. This guides animals to existing drainage structures where they can safely cross under I-17. Collisions with elk were reduced by 97% and use of the drainage structures increased by >100%. GPS movement data showed no significant change in the ability of elk to cross I-17 with the retrofitted fences guiding animals to existing crossings. Although these structures reduced collisions while allowing some animals to cross, the low success of crossing attempts indicated by the GPS data (prior to and after the retro-fit) underscores the need to transition to properly designed wildlife crossing structures and standard woven-wire, ungulate-proof fencing on a comprehensive scale.

## **Habitat Projects Identified**

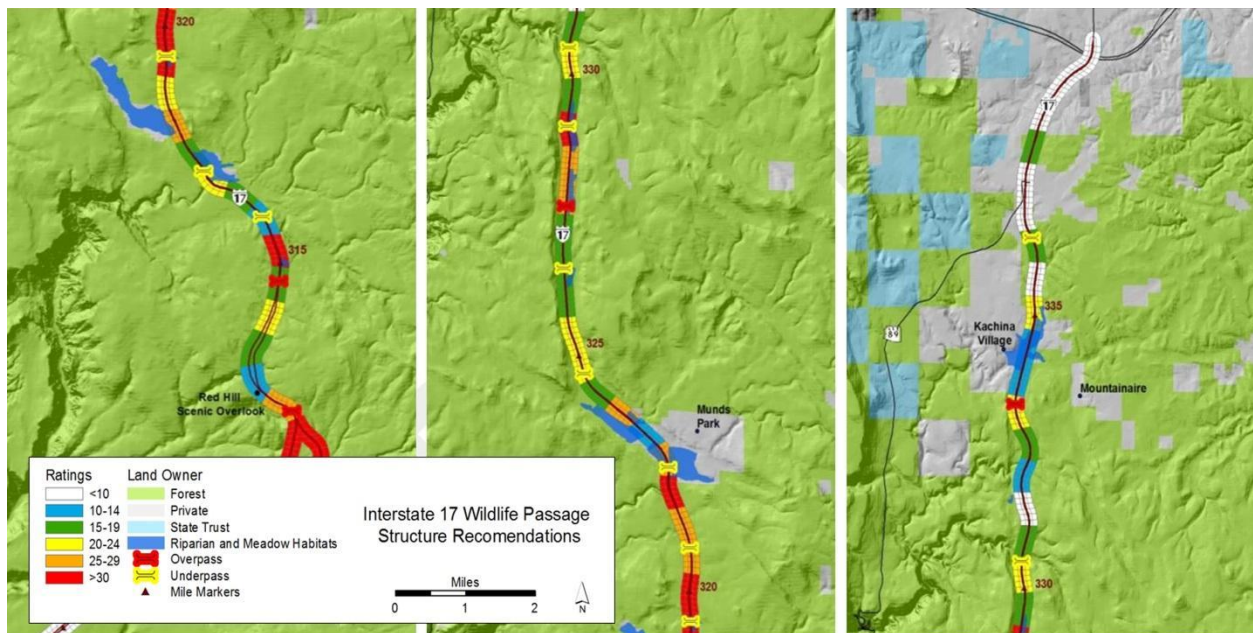
### **Barrier/Fragmentation Mitigation Project Identified**

*Wildlife Crossings along I-17* – I-17 represents the biggest impediment to migration in this identified corridor. The study described above investigated elk movements and wildlife-vehicle collisions to identify the best locations for wildlife crossings and fencing for future I-17 upgrades (Figure 8). These wildlife crossings would improve migrations for multiple big game species. A



priority for this linkage is the design and construction of several wildlife crossing structures across/under I-17 in the area between Flagstaff and Sedona, along with wildlife ROW fencing to make these crossing structures effective.

**Figure 8.** Recommended highway crossings for I-17 for the Flagstaff to Sedona Corridor. Ratings are based on elk highway crossings, weighted elk approaches, elk-vehicle collisions, deer-vehicle collisions, human activity, and topography.



### **3) Paunsaugunt to Kaibab Plateau Corridor and Winter Range (mule deer)**

The mule deer herds of the North Kaibab Plateau (Arizona) and Paunsaugunt Plateau (Utah) are among the most treasured big game in North America. Some of the earliest research on deer population dynamics occurred on the North Kaibab herd (Russo, 1964). The North Kaibab herd represents the densest mule deer herd in Arizona, enjoyed by hunters and tourists alike. In recent years, auction tags in this area have exceeded \$200,000. Utah has auctioned mule deer tags in the Paunsaugunt area for similar amounts. Money garnered from these auction hunts is invested back into habitat projects across the state which benefit mule deer and many other species.

Mule deer of the North Kaibab and Paunsaugunt are representative migrants, traveling documented distances up to 65 miles between summer and winter range. Three mule deer research studies on movement around the Kaibab Plateau, Paunsaugunt Plateau, and surrounding lowlands have shown high amounts of movement between the AZ-UT border. GPS data collected from 41 mule deer on the North Kaibab has allowed AZGFD to identify migration corridors and winter range on the west side of the plateau (Figure 9), which agrees with historical records (Russo, 1964). Beginning in 2017, the Utah Division of Wildlife Resources deployed GPS collars on 200 mule deer from both the Paunsaugunt and North Kaibab herd. The general patterns of mule deer locations have indicated that the lowland area between the Kaibab Plateau and the Paunsaugunt Plateau is critical wintering range for herds migrating from summer range in both states (Figure 9). Maintaining and enhancing migration corridors and winter range is vital to the health and persistence of this population.

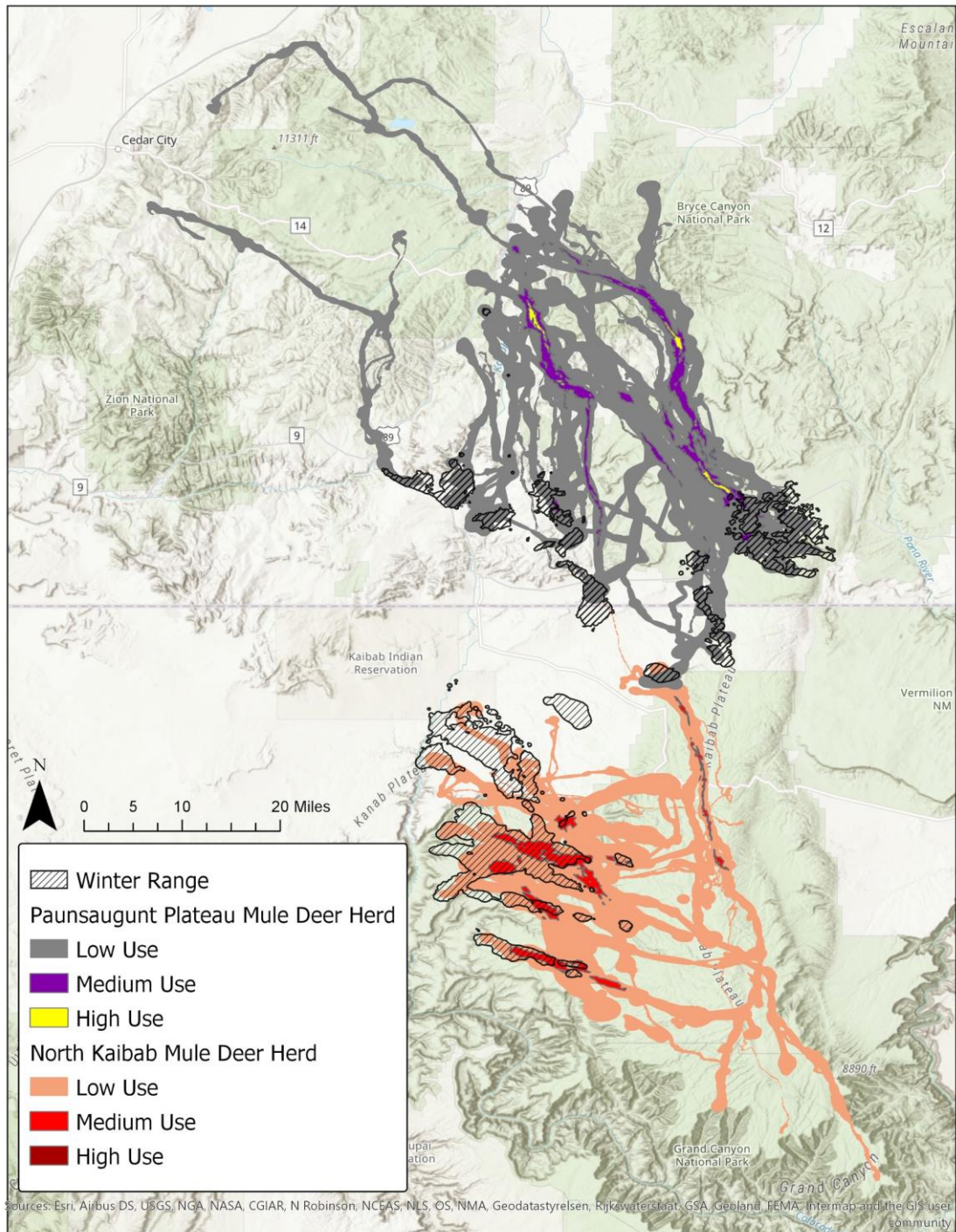
Water availability is a limiting factor for mule deer populations across the corridor. On the North Kaibab for example, large tracts of mule deer winter range contain limited water sources as a result of the complete lack of natural water, prolonged drought, and unreliable existing dirt tanks within the corridor. As in much of Arizona's mid-elevation mule deer winter range, an increase in the representation of PJ as a result of fire suppression, grazing practices, and climatic changes has led to large expanses of monotypic high density PJ stands on migration corridors and winter range. The effect of PJ encroachment has resulted in a decrease in browse quality and quantity resulting in a corresponding decrease in carrying capacity for wintering mule deer. Mastication of existing PJ stands has been shown to be effective at increasing browse production for wintering mule deer. The winter range of the Kaibab Plateau, and BLM lands currently faces threats of increased fire cycles and aggressive invasion of cheatgrass.

The higher elevation areas are NPS and USFS lands with oaks, ponderosa pine and mixed conifer, and the surrounding lowlands are dominated by sagebrush and cliffrose on BLM, National Monument (Vermillion Cliffs), and some tribal lands (Figure 10, Table 3).

**Table 3.** Land ownership/management for the Paunsaugunt to Kaibab Plateau Corridor.

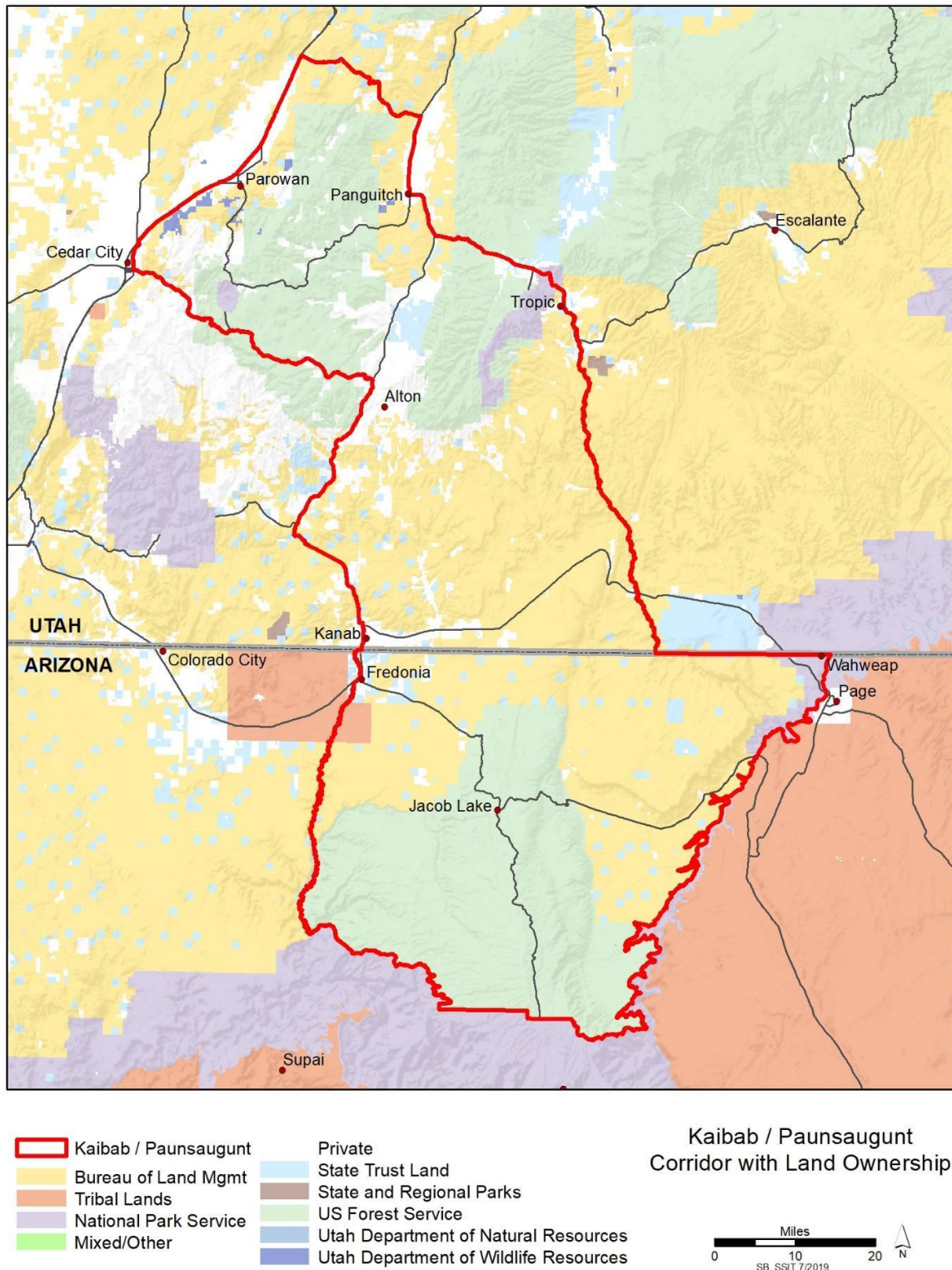
<b>Category</b>	<b>Area (acres)</b>	<b>% in Utah</b>	<b>% in Arizona</b>	<b>% of Total</b>
Bureau of Land Management	735,271	25.57	20.98	46.55
US Forest Service	423,957	14.74	22.61	37.35
Private	285,369	9.38	0.54	9.92
State Trust Land	48,112	1.50	1.67	3.17
National Park Service	28,148	1.35	0.98	2.32
Tribal Lands	13,370	0.00	0.46	0.46

**Figure 9.** Migration corridors and winter range for the Kaibab Plateau (n=41) and Paunsaugunt Plateau (n=54) mule deer herds based on GPS locations collected from two studies. Low, medium and high use represent the relative number of individuals using the same migration route.





**Figure 10.** Land ownership/management within the Paunsaugunt to Kaibab Plateau Corridor.



## **Current State Agency Activities**

### **Vegetation Management Treatments**

Habitat restoration work to enhance the corridor and wintering range has been ongoing with numerous habitat treatments and wildlife friendly fence modifications. Most efforts have been cooperative projects between the BLM, AZGFD, and livestock permittees.

In 2018-19, along the north-eastern boundary of BLM and USFS lands, nearly 900 acres of pinyon juniper mule deer winter range habitat was masticated to improve browse production for wintering mule deer. This project specifically addressed habitat improvement for mule deer within the corridor.

A diverse set of habitat enhancement tools are being assessed by the Kaibab Plateau Ecological Restoration Project (KPEP) to treat up to 518,000 acres within the North Kaibab Forest, including approximately 30,000 acres of mule deer winter range within the corridor. This project entered the public scoping phase in late 2018, with a targeted National Environmental Policy Act (NEPA) planning completion date in 2020. This clearance process will cover a substantial portion of the Paunsaugunt/Kaibab Corridor and would facilitate future enhancement projects within the corridor.

AZGFD has been actively involved in the completion of the Burnt Corral Environmental Assessment. This assessment will cover 28,060 acres of vegetation management within the North Kaibab Forest, and completion is anticipated by the end of 2019. This project will facilitate habitat enhancement opportunities within the corridor.

AZGFD has provided financial support of ongoing research on controlling cheatgrass invasion on the winter range.

### **Barrier/Fragmentation Mitigation Treatments**

From 2016 through 2019, approximately six miles of fence was modified in House Rock Valley to improve pronghorn connectivity. Replacing bottom barbed wires with smooth wire and raising it to 18-20" also reduced fencing barrier effects for juvenile deer movements.

North of the AZ/UT border, Utah has added eight foot tall fencing to exclude deer from accessing US 89 and funnel them to a network of seven existing drainage structures and new wildlife crossings on the east-west stretch of US 89, east of Kanab, Utah. These measures have

reduced deer-vehicle-collisions substantially and cameras placed at the crossings have recorded >78,000 deer crossings during fall and spring migrations. There are ongoing efforts to monitor movements in this corridor with GPS collars lead by Utah Division of Wildlife Resources in collaboration with AZGFD.

### Wildlife Water Developments

On USFS lands over the past five years, eight new wildlife water developments have been constructed in mule deer winter range within the corridor. Twenty-four water developments have been identified for redevelopment, or new construction including: 14 redevelopments of under capacity water developments within winter range transition habitat; four redevelopments of cooperative water developments in mule deer winter range habitat; six new water developments in mule deer winter range habitat. These projects will help ensure water availability for mule deer on over 100 square miles of migratory, transition, and winter range habitats within the corridor.

On BLM lands, 14 miles of water pipeline have been installed along the AZ/UT border within the corridor and identified winter range habitat for mule deer. In addition, over the past two years seven cooperative water projects have been completed by AZGFD, BLM, and livestock permittees within GMU 12B. AZGFD has provided funding for materials, BLM provided the NEPA clearance and documentation, and livestock permittees provided the labor. All of these projects occurred within mule deer winter range identified within the corridor. Actions included replacement of worn water collection aprons, installation of additional storage tanks to extend the duration of water availability, and the addition of tank lids to prevent entrapment of wildlife and limit evaporation. AZGFD and BLM are working on the redevelopment of two wildlife water developments in the Buckskin Mountains. All environmental review is completed (DOI-BLM-AZ-A010-2016-0004-EA).

### Habitat Projects Identified

#### Vegetation Management Projects Identified

*Vegetation management of the Shuttleworth-Suicide Wildlife Habitat (BLM DOI Lands)* – In April 2019, BLM signed a Decision Record for this project, and this project has been identified as a priority for the local interdisciplinary habitat working group. The treatments of Shuttleworth-Suicide Wildlife Habitat Project would enhance production of browse species for

wintering mule deer in this priority area (Figure 11). This project will treat approximately 14,267 acres of PJ with a mix of mastication, lop and scatter methods, and seeding. Archeological surveys are expected to be completed in September, 2019, with implementation proceeding in the spring of 2020. The estimated overall project cost is estimated to be \$2 million dollars.

*Vegetation management for West Side Habitat Improvement (North Kaibab Forest USFS)* – Archeological clearances are required prior to implementation of PJ over-story removal on 7,000 – 10,000 acres of mule deer winter range that is otherwise authorized under the Environmental Assessment for West Side Habitat Improvement. As clearances and funding for treatments are secured, grinding equipment will be used for strategic mastication of PJ over-story in order to increase forage production for mule deer.

*Vegetation management in Game Management Unit 12B* – PJ thinning and removal in the Buckskin Mountains and on the west side of the Kaibab Plateau along the Buck Pasture and the Old AZ Catchment area would open up heavily encroached areas. Seeding these areas would allow for improved understory growth. This area is heavily used during fall and spring migrations and all winter months.

*Vegetation management on the North Kaibab Forest (KPEP)* – Upon the completion of the compliance process for the KPEP, AZGFD has identified 19 polygons, totaling approximately 30,000 of mule deer winter range habitat within the corridor, for mechanical treatment of pinyon juniper habitats to enhance browse and undergrowth species within the corridor.

*Vegetation management on the North Kaibab Forest (Burnt Corral)* – A combination of mechanical treatment in pinyon juniper habitats, and application of prescribed fire to ponderosa pine habitats has been identified within the 28,060 acres included in the North Kaibab Forest Burnt Corral Environmental Assessment. These projects will enhance undergrowth species for wintering and migrating mule deer within the corridor.

#### Barrier/Fragmentation Mitigation Projects Identified

*Habitat conservation through land acquisition and easements* – The area east and south of Kanab, Utah continues to grow and be developed with sub-divisions along the AZ/UT border and Johnson Wash. Mule deer from Utah use this area for migration. Within this area, a new water pipeline from Lake Powell is set to be constructed in the mid-2020s. Long term projects to

protect this corridor from unmitigated development include: close coordination with the Utah Division of Wildlife Resources concerning mitigation strategies on developments that leave the integrity of this corridor intact, and potential land acquisitions/conservation easements of identified critical core usage zones within the corridor. Fence modifications in this corridor east of Fredonia would also make them more permeable for the pronghorn population in that area.

#### Wildlife Water Developments Identified

*Development of wildlife waters in Game Management Unit (GMU) 12A* – Several efforts are currently ongoing in GMU 12A regarding wildlife water developments.

- 14 wildlife waters on migratory transition range habitat within the corridor have been identified for redevelopment. NEPA, in the form of a Categorical Exclusion, for the 14 waters had been initiated. Cost for redevelopment of these wildlife waters would be approximately \$1.3 million dollars.
- A NEPA document, the Eastside Wildlife Waters Development (and Redevelopment) Project Categorical Exclusion (2015), has been completed. Overall 9 wildlife waters were identified for developed and 3 wildlife waters remain for completion of this project.
- 4 cooperative wildlife and livestock water developments have been identified for redevelopment in mule deer winter range habitats within the corridor. NEPA compliance is complete for these projects.
- 3 cooperative wildlife water have been identified for new development in mule deer winter range within the corridor.

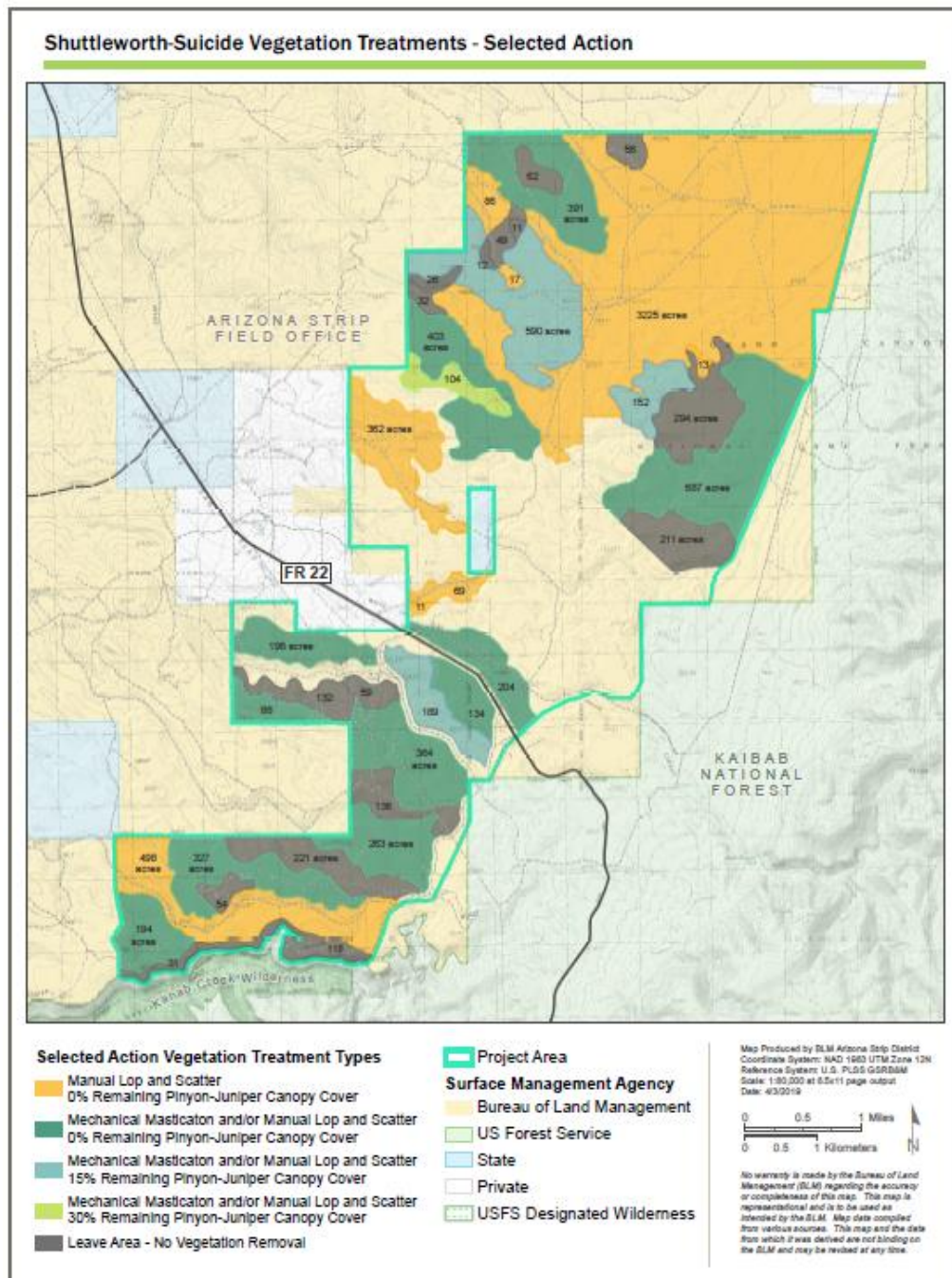
*Redevelopment of 2 wildlife waters on DOI lands in the Buckskin Mountains* – (Buckskin #1 and #2) The redevelopment of these two wildlife waters would directly benefit migrating mule deer within winter range identified in the corridor. All NEPA documentation is complete for these wildlife waters, and implementation can proceed as funding is secured. Implementation costs are expected to be approximately \$50,000.

*Development of New wildlife water developments on DOI lands in GMU 12B* – On DOI lands within GMU 12B, and within winter range habitats identified within the corridor, 14 new wildlife water developments have been identified. These wildlife water developments will enhance water availability and distribution for all wildlife species within the corridor.



*Fence modifications at cooperative-wildlife waters* – Fencing around the wildlife-only water troughs of cooperative wildlife waters receives heavy use by wintering mule deer and requires regular maintenance from AZGFD and the permittee. Replacement of these barbed-wire fences with pipe-rail fence would eliminate or substantially reduce the maintenance requirements and improve long-term functionality and deer access to the waters.

**Figure 11.** Shuttleworth-Suicide project footprint from DOI-BLM-AZ-A010-2018-0013-EA.



#### **4) Proposed Interstate 11 Corridor of Obstruction and Opportunity (mule deer)**

##### Defining an Obstruction and Opportunities Corridor

AZGFD recognizes that the intent of the Action Plans associated with SO3362 is to identify the state's highest priority migration corridors and winter range in order to facilitate the allocation of limited resources toward the most critical areas for the greatest return on investment. However, this priority associated with Interstate 11 (I-11) is not a single movement pathway for mule deer or even a larger network of overlapping migration corridors. Rather it is the identification of a novel transportation feature that has the potential to disrupt mule deer movements across the length of Arizona. There is currently little empirical data on the seasonal and even daily inter-mountain movements of mule deer that are traversed by the band that I-11 would cut through the state.

The top research priority in AZGFD's 2018 SO3362 Action Plan was a suite of three study areas where the potential seems greatest for I-11 to isolate a mountain range from surrounding networks of habitat. AZGFD has begun collecting movement data in those locations and already has preliminary information on connections between mountain ranges. However with just six months of data, there is not enough to define new priority corridors. More importantly, there are additional areas of interest where AZGFD feels that I-11 could pose a substantial obstruction to mule deer movements. Two of those areas are identified below as new research priorities for 2019. It is likely that still more important mule deer movement pathways would be impacted by I-11 if it is constructed. With the scale of this project and the potential for hundreds of miles of new interstate, it would assuredly have meta-population effects, including a decline in Arizona's mule deer population unless sufficient mitigation was incorporated.

Instead of speculating in this document on the various movement corridors that would be interrupted by I-11 and the associated meta-population implications, AZGFD determined the best course of action to be dedicating the proposed I-11 as an obstruction and opportunities corridor. Any movement pathways interrupted by this potential novel interstate rank in the highest priority for AZGFD.

##### Interstate-11 Obstruction and Opportunities Corridor Description



As human populations and economies expand in the West, the demand for high volume transportation corridors, such as interstate highways, has increased. Unfortunately, high volume transportation corridors often serve as impermeable barriers to migrating ungulates (Gagnon et al., 2013) and may constrain their set of possible routes and seasonal ranges, ultimately leading to loss of productive habitats (Sawyer et al., 2013). In addition to the barrier effect of high volume traffic, these transportation corridors are typically associated with increased human development which may lead to changes in wildlife behavior and habitat use.

In the recent transportation authorization bill, Congress recognized and designated I-11 as a critical piece of new infrastructure that would support and connect the economies of Arizona and Nevada under the Moving Ahead for Progress in the 21st Century Act (MAP-21). In 2014, Arizona and Nevada Departments of Transportation completed the I-11 & Intermountain West Corridor Study. The study report identified co-location with US 93 as the only “Recommended Corridor Alternative” to be carried forward for a potential I-11 from Wickenburg, AZ to the Nevada border. Subsequently, ADOT began to work on a multi-tiered Environmental Impact Statement (EIS) process for the portion of the potential I-11 from Nogales, AZ to Wickenburg, AZ. The Tier 1 EIS considers a 2,000 foot wide transportation corridor where road construction may be located (Arizona Department of Transportation, 2019). The Tier 1 EIS considers multiple “Build Corridor Alternative” routes compared to a “No Build” option. A draft EIS, released for public comment in July 2019 identified a “Recommended Alternative”. ADOT has targeted a 2020 release for both the final Tier 1 EIS and the subsequent Record of Decision (ROD) regarding the “Selected Alternative” identified in that final EIS. If a “Build Corridor Alternative” is selected, the process would then require a Tier 2 EIS (for each component project falling under the Tier 1 EIS) to determine the specific I-11 transportation corridor alignment (ultimately to be 400 feet within the 2,000 foot transportation corridor). The Tier 2 EIS would consider traffic interchange locations, specific project-level issues, such as individual property impacts, and specific mitigation measures.

AZGFD recognizes the potential for future research and conservation opportunities within the I-11 study area (Figure 13). AZGFD is a Cooperating Agency for ADOT’s tiered impact study for I-11 and has been working with ADOT to understand the potential impacts that the proposed I-11 highway would have on wildlife, if constructed. This gives AZGFD the opportunity to bring research to the table throughout the NEPA process, and provide input on routing and design

considerations that would conserve important ungulate movement corridors. A Tier 2 EIS process could be initiated immediately following the ROD.

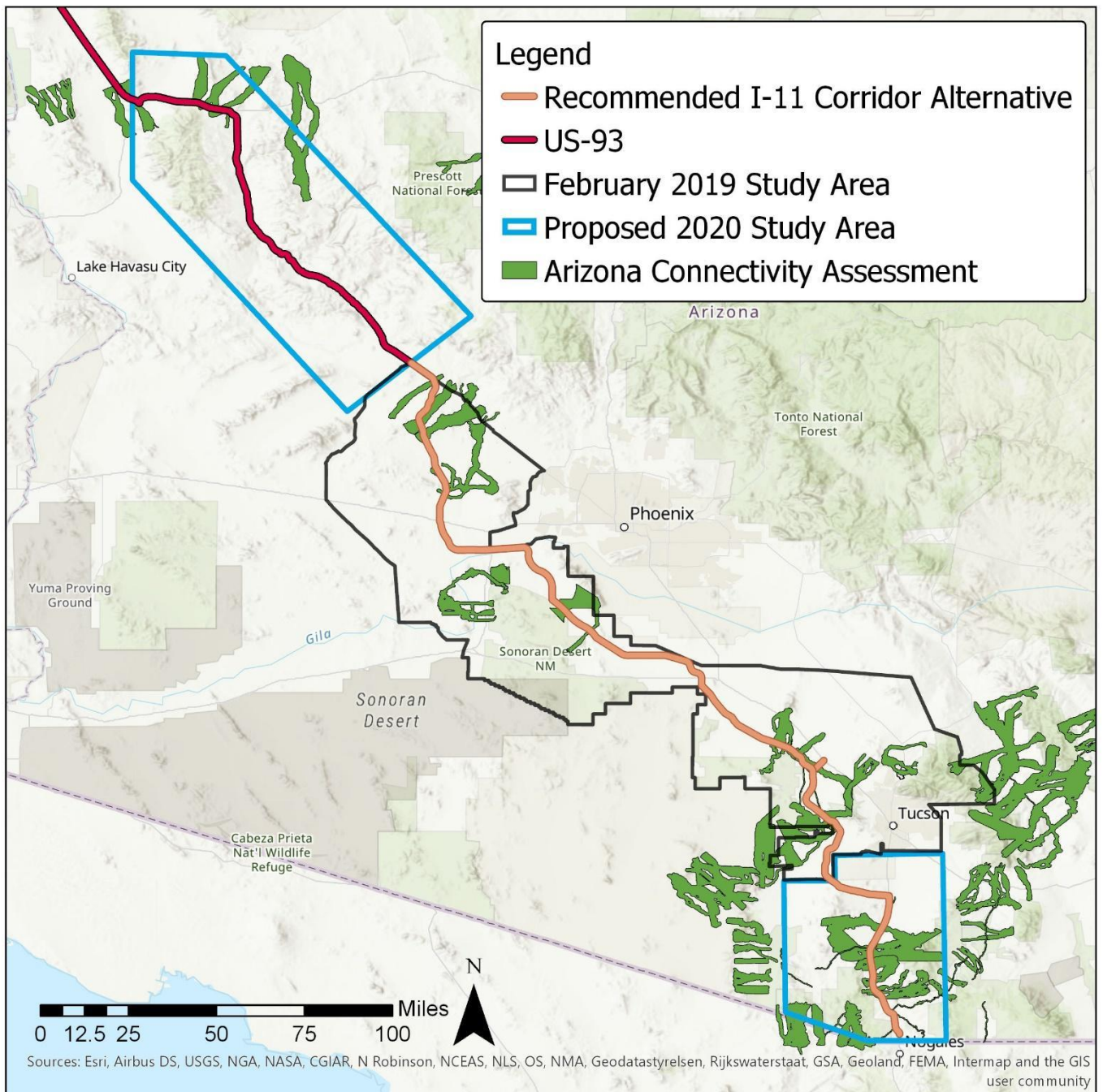
In February of 2019, with funding from the DOI as part of SO3362 implementation, AZGFD collared 61 mule deer to begin accumulating movement data along a portion of the I-11 proposed corridor alternative (Figure 12). The timelines associated with ongoing movement studies and road design will allow AZGFD to analyze current data, and provide ADOT with robust input on migration and corridor routes to aid in the design of specific mitigation measures and improvements for wildlife connectivity.

The ecosystem in this corridor is Sonoran Desert, with vegetation types dominated by saguaro cactus, palo verde, mesquite, ocotillo, and various other cacti. Land ownership and management is primarily BLM, Private, and State Trust Land (Figure 13, Table 4).

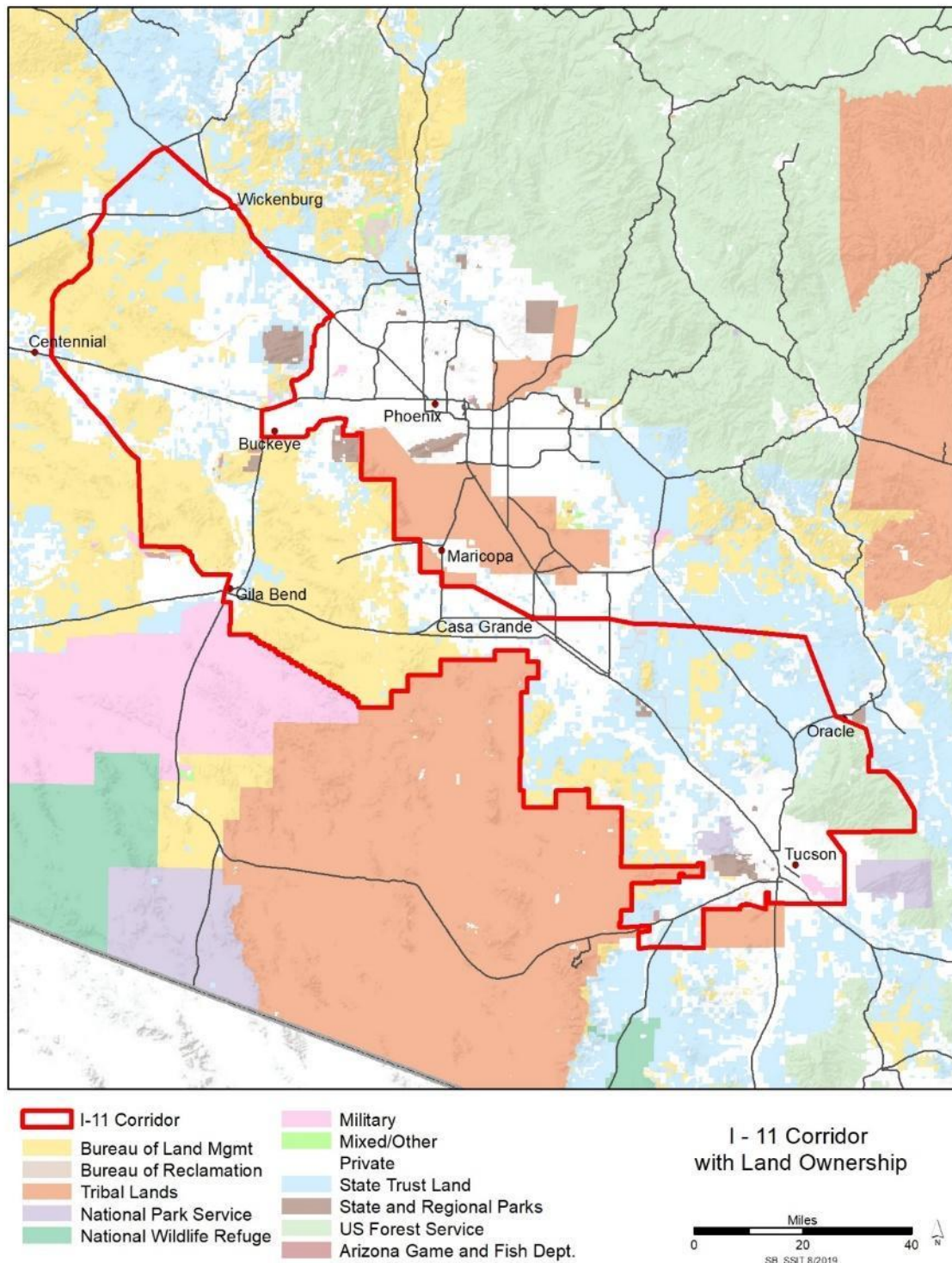
**Table 4.** Land ownership/management for the Proposed Interstate 11 Corridor of Obstruction and Opportunity 2019 study area.

<b>Category</b>	<b>Area (acres)</b>	<b>%</b>
Bureau of Land Management	1,490,903	34.96
Private	1,405,478	32.96
State Trust Land	1,061,015	24.88
US Forest Service	175,288	4.11
State and Regional Parks	75,574	1.77
National Park Service	21,736	0.51
Department of Defense	14,355	0.34
Bureau of Reclamation	12,835	0.30
Arizona Game and Fish Dept.	4,973	0.12
Tribal Lands	1,273	0.03

**Figure 12.** The Tier 1 draft EIS recommended I-11 Corridor Alternative with the February 2019 study area and proposed study areas for continued research. The green areas are predicted wildlife movement corridors from previous AZGFD connectivity assessments which will be used to guide research efforts.



**Figure 13.** Proposed I-11 Corridor of Obstruction and Opportunity study area from 2019 deer movement study and land ownership/management.



## **Current Federal Agency Activities in all Priority Corridors**

### BLM Activities

- BLM issued a signed decision record for Shuttleworth-Suicide Wildlife Habitat Environmental Assessment project in April 2019 for the Paunsaugunt to Kaibab Plateau Corridor. This project will clear treatments for lop and scatter and mechanical (mastication) work in PJ habitats to enhance undergrowth species for wintering mule deer across 14,267 acres (Figure 11).

### US Forest Service Activities

#### *Kaibab National Forest - North Kaibab Ranger District*

- Mastication project along the north eastern boundary of USFS and BLM lands, targeting winter range habitat for the Paunsaugunt to Kaibab Plateau Corridor (PJ thinning - 900 acres).
- AZGFD, as part of the KPEP project and in collaboration with the USFS, have identified approximately 30,000 acres of mule deer winter range habitat improvement in the Paunsaugunt to Kaibab Plateau Corridor.
- Working with AZGFD to install trick tanks/guzzlers: As noted above, 24 wildlife developments are currently identified. All are within mule deer winter range.

#### *Coconino National Forest - Flagstaff Ranger District*

- Significant efforts have been made in the last decade to support healthy pronghorn populations in the Grand Canyon to Prescott Pronghorn Corridor Complex by wildlife biologists, land managers, local volunteers, NGOs, and partners on the Coconino National Forest Peaks Ranger District. Monitoring of GPS-collared animals indicates that without intervention, pronghorn movements continue to be restricted by meadow encroachment, fences and highways.
- Upgrading 55 miles of fences to meet wildlife standards, removing unnecessary fencing. This included replacing the bottom barbed wire with smooth wire, raising the bottom wire to a height of at least 18", in some cases removing or replacing sheep fence with a more wildlife friendly fence.
- Integrated management of right-of-way fences is critical to the success of promoting permeability. Two projects informed by the 2011 AZGFD Assessment of Pronghorn



Movements and Strategies to Promote Highway Permeability. We relocated three sections of right-of-way fence along US 180 and along US 89 North to allow for movement of pronghorn. We used two new approaches to fence design. First we increased the distance between the highway and fence lines in locations where sight distance for both motorists and wildlife is sufficient to insure that animals (pronghorn in particular) could cross more safely. We also used an undulating fence design to promote pronghorn use of the right-of-way. Both designs will work as a test pilot for its effectiveness.

- We have implemented 3,006 acres of grassland restoration in pronghorn habitat.
- We are currently working with AZGFD to develop an archeological survey strategy for 57,600 acres of grassland restoration treatments within this corridor.
- We are in the process of contracting archeological surveys for about 4,000 acres of grassland restoration treatments in high priority areas identified by AZGFD.
- We have identified about 57,600 acres area within this corridor for NEPA analysis that would provide for grassland and pinyon-juniper treatments that would improve pronghorn movements and winter and reproductive habitats. This project currently lacks funding.
- Tailoring forest treatments to promote connectivity – Through the 4FRI first EIS planning, USFS and the *Four Forest Restoration Initiative (4FRI)* are adjusting forest treatment/thinning efforts within prescription parameters to provide better connectivity associated with locations for future targeted crossing structures, particularly in an area west of Parks, AZ where a recommended overpass would simultaneously serve as a safe crossing for pronghorn, elk, and mule deer. This will move us toward desired habitat conditions.
- The Flagstaff and Mogollon Rim RDs fire programs have been doing grassland restoration work on Anderson Mesa (removal of juniper by hand and with equipment as well as some prescribed fire). Mainly Habitat Partnership Committee (HPC) funds have been used to conduct the work, in-house or via contract. The Forest (fire, range, and wildlife) has worked in conjunction with AZGFD on prioritizing areas for treatment based on known movement corridors for pronghorn and other ungulates and work that has been completed on adjacent state, private, and tribal lands by AZGFD.

### *Prescott National Forest*

- The Prescott National Forest has several landscape scale projects that include project design features to improve habitat and connectivity for mule deer, elk, and/or pronghorn. In priority area 2 (Flagstaff to Sedona Corridor) are the Black Hills Vegetation Management Project (decision 2011) and the Agua Fria Grasslands Project (decision 2015). In priority area 1 (Grand Canyon to Prescott Corridor Complex) the Chino Landscape Restoration Project (decision anticipated Dec. 2019) will cover over half a million acres of wildlife habitat including key migration corridors for pronghorn and year-round habitat for mule deer and elk. The Hassayampa Landscape Restoration Project (decision anticipated Sept 2019) lies outside of these two priority areas yet will treat about a quarter of a million acres, most of which provide mule deer habitat year round.
- The Black Hills project is in priority area 2 north and west of the I-17 corridor and stretches from just west of Clarkdale in the north going south to where I-17 bisects the Prescott National Forest, and west to the Prescott National Forest. The main purpose of this project is to improve vegetation conditions in the project area which would improve habitat and forage for both mule deer and elk. Treatments include mechanical thinning, hand thinning, and prescribed fire. Work on this project is ongoing.
- The Agua Fria Grasslands project is also in priority area 2 and is south of where I-17 bisects the Prescott National Forest to the boundary with the Tonto National Forest to the south (map attached). This project focuses primarily on pronghorn habitat, although there are also mule deer in the area. The project is to thin juniper and reduce thickets of catclaw and mesquite to improve grassland habitat and forage and to improve habitat connectivity for pronghorn. This area is also part of the Central Arizona Grasslands Strategy project area. This is a project by AZGFD, working with partners to improve pronghorn habitat and connectivity. Work on this project is ongoing.
- The Chino Landscape Restoration project is in priority area 1 and encompasses most of the Chino Valley Ranger District which is the northern portion of the Prescott National Forest on both the east and west zones. The vegetation in this area is primarily juniper woodland and juniper grassland with some pine stringers scattered about. The project will focus on watershed restoration which will include juniper thinning. In many places, reduction in juniper will increase and improve grasslands and therefore pronghorn and



mule deer habitat and forage. A portion of this project area is also within the Central Arizona Grasslands Strategy project area. Work on this project should commence next year.

- The Hassayampa Landscape Restoration project encompasses most of the Bradshaw Ranger District from a bit south and west of Prescott to the forest boundary in the south, excluding Sonoran desert areas around Cleator and the wildland-urban interface immediately surrounding Prescott. This project is designed to restore a natural fire regime, where possible, reduce tree densities where they are overly dense, and reduce hazardous fuels. The primary vegetation types include mixed conifer, Ponderosa pine, and chaparral. The treatments will include thinning by hand thinning, mechanical, and prescribed fire. This will result in increased forage for mule deer and an overall healthier forest for many species. Work on this project should commence next year.

## **RESEARCH NEEDS**

### **1) South of Interstate 40 mule deer and elk movements**

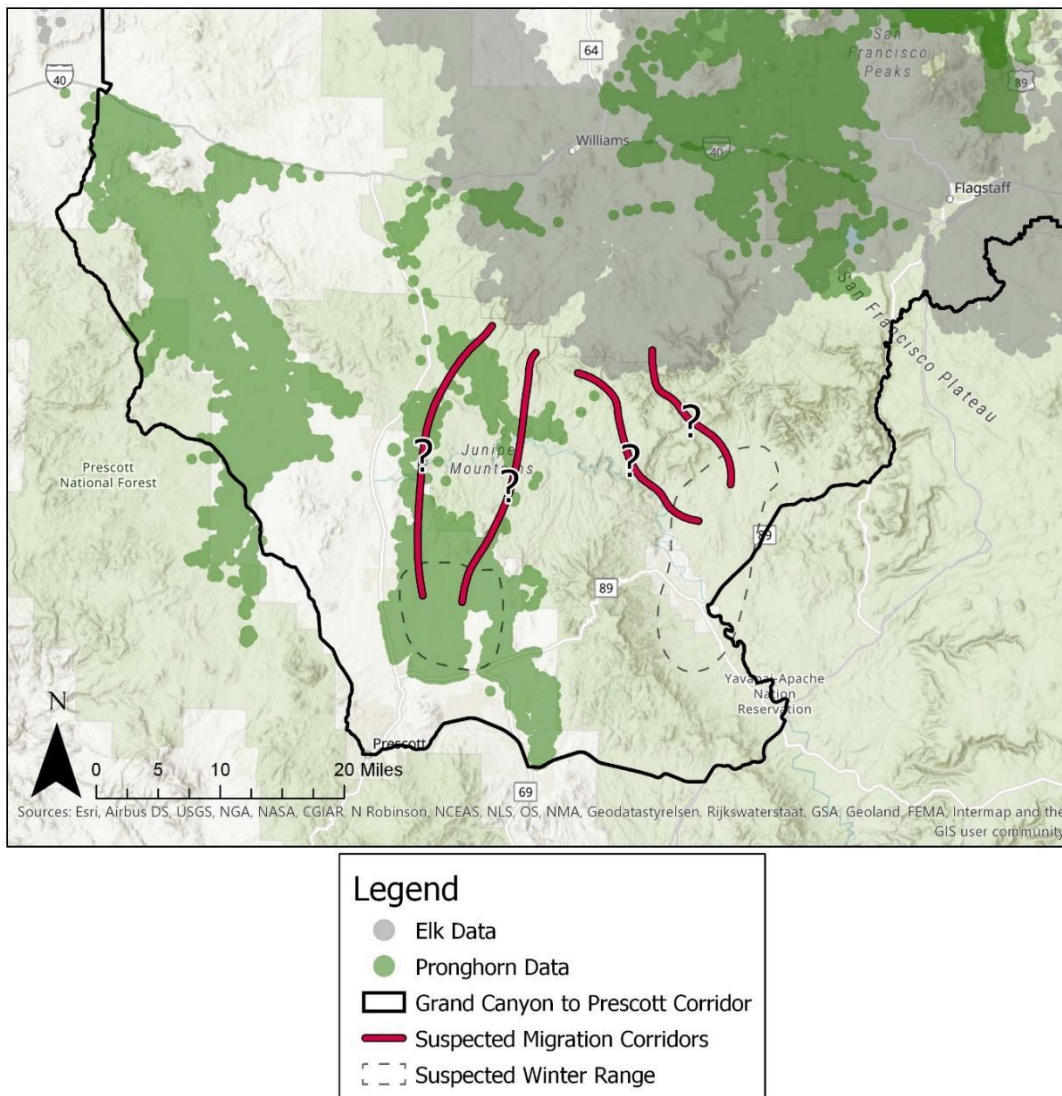
AZGFD has recognized the Grand Canyon-Prescott Corridor Complex as its top priority for seasonal movements for pronghorn, elk, and mule deer. In efforts to narrow the focus of priority corridors for habitat project implementation, AZGFD needs to collect more detailed animal movement data in this priority corridor. High resolution movement data in this area will allow AZGFD to direct land management efforts to maintain and improve priority winter range and migration corridors.

Currently, the majority of the movement data available within the Grand Canyon-Prescott Corridor is from GPS-collared pronghorn and elk (Figure 14). Studies of pronghorn and elk within this corridor were focused on understanding highway permeability and not long-distance movements, so the full extent of seasonal movements in this corridor away from highways is largely unknown. Limited knowledge of elk and deer migration corridors combined with the known impacts of the high volume roads in this area (Gagnon et al., 2013, 2015) further stresses the need to understand seasonal movements for these species.

AZGFD proposes to deploy GPS collars on 30 elk and 30 mule deer south of I-40, where preliminary data and anecdotal reports from hunters show evidence of seasonal movement from summer range west of Sycamore Canyon and above the Mogollon Rim, to winter range in

southern Valleys near Cottonwood, Sedona, and Prescott, Arizona (Figure 14). Delineating these migration routes will allow AZGFD to work with partnering agencies to conserve important winter range and migration corridors, and direct land management activities within them.

**Figure 14.** Grand Canyon to Prescott Corridor Complex with suspected elk and mule deer winter range and migration corridors.



***Project Budget:***

<b>Item/Activity</b>	<b># of Individuals</b>	<b>Cost per Individual</b>	<b>Total</b>
Mule Deer Capture	30	\$1,200	\$36,000
Elk Capture	30	\$1,100	\$33,000
Collars and Airtime	60	\$1,450	\$87,000
Personnel			\$20,000
		Project Total:	\$176,000

## 2) Interstate 11 traffic corridor and linkage validation

AZGFD has been mapping wildlife connectivity corridors for several decades to provide wildlife managers and landscape planners with information on terrestrial connectivity and important connectivity zones, landscape integrity, and large intact blocks; and to identify areas where more detailed analyses and studies of wildlife movement should be performed. The data to create these assessments was generally limited to remote-sensed measures of land cover and landscape fragmentation, combined with stakeholder input and expert opinion. Validation of these models with detailed wildlife movement data within proposed transportation corridors gives AZGFD the opportunity to use a multi-level approach to understand movement corridors, and provide real conservation value for the broader I-11 route.

Providing data and research to understand the potential I-11 development impacts is of utmost importance for conserving seasonal migration corridors in Arizona. AZGFD proposes to deploy 40 mule deer GPS collars north (n=20) and south (n=20) of the February 2019 study area along the I-11 transportation corridor (Figure 12). It is noted that the area north of the February 2019 study area is outside of the ADOT tiered EIS study area, however, it still falls within the I-11 & Intermountain West Corridor Study. Collecting additional movement data will 1) allow AZGFD to have a more complete picture of mule deer movements along a gradient of habitats prior to I-11 construction, and 2) give AZGFD the opportunity to validate previously existing Arizona connectivity assessments through “ground-truthed” movement data. Ultimately, the goal of AZGFD is to be as prepared as possible for future I-11 NEPA review (i.e. the Tier 2 EIS process), giving the opportunity to provide data-driven recommendations for cost effective mitigation options to include in any designs that move forward (Gagnon et al., 2015).

### ***Project Budget:***

<b>Item/Activity</b>	<b># of Individuals</b>	<b>Cost per Individual</b>	<b>Total</b>
Mule Deer Capture	40	\$1,000	\$40,000
Collars and Airtime	40	\$1,450	\$58,000
Personnel			\$25,000
		Project Total:	\$123,000

### **3) Spatial and temporal distribution of mule deer in Game Management Units 1 and 27**

In recent years, managers of Arizona GMUs 1 and 27 have noticed apparent deer density fluctuations on a seasonal basis. The annual variation in detection of mule deer during the December-January survey period suggests immigration and/or emigration is affecting the variance in numbers of animals seen rather than demographic processes such as recruitment and mortality. Also, the hunter success rate in the fall general hunt seems to be correlated with the timing of that hunt each year, because deer seem much more abundant if the hunt is earlier in this area. This all further supports the idea that a segment of the mule deer population is migrating to some other location. Despite the importance of this herd, AZGFD lacks any information on seasonal movements to identify important winter range and migration corridors for mule deer in this area (GMUs 1 and 27).

GMUs 1 and 27 are located in eastern Arizona (Figure 15). They are flanked by New Mexico (NM GMUs 15 and 23) on the east and by the Fort Apache and San Carlos Apache Reservations on the west. Primary land ownership/management in this area is the US Forest Service and State Trust Land. AZGFD's current understanding suggests that a portion of the GMUs 1 and 27 mule deer population may be migrating into New Mexico, adjacent Tribal lands, and/or neighboring Arizona GMUs (2B, 2C, 3B, and 28). The goal of AZGFD is to improve the understanding of this seasonal movement with fine-scale GPS collar data. This will allow AZGFD to identify important winter range and migration corridors, and provide direction regarding land management actions to improve habitat quality for mule deer.

There are numerous state and federal highways traversing and adjacent to GMUs 1 and 27: US Highways 60, 180, and 191 and Arizona State Routes 260, 261, 273, and 373. These roads currently all have an Average Annual Daily Traffic (AADT) <3,000 vehicles/day. These traffic volumes are unlikely to impose substantial restrictions on deer movements except in areas where their associated fences have problematic designs. However, potential growth and development in surrounding areas would bring increases to traffic volumes that could inhibit important deer movements. If critical pathways from movement data are identified now, then as the local highways are upgraded to accommodate the increasing vehicle traffic, targeted deer permeability mitigations can be incorporated to ensure persistence of the population across the landscape. Without robust movement data it can be difficult to justify the expense of transportation infrastructure that accommodates wildlife permeability.



Understanding movement patterns is essential to deriving effective management strategies. Regular deer movements across these boundaries could have serious implications on the effectiveness of the management strategies for this socially important deer population. Knowledge of movement patterns for a migratory portion of the population are critical to developing a survey approach that reflects the dynamics and trends of the overall population. Without such considerations, harvest recommendations based on incomplete knowledge of population movements could result in unpredictable hunter success rates and undesirable impacts on population dynamics.

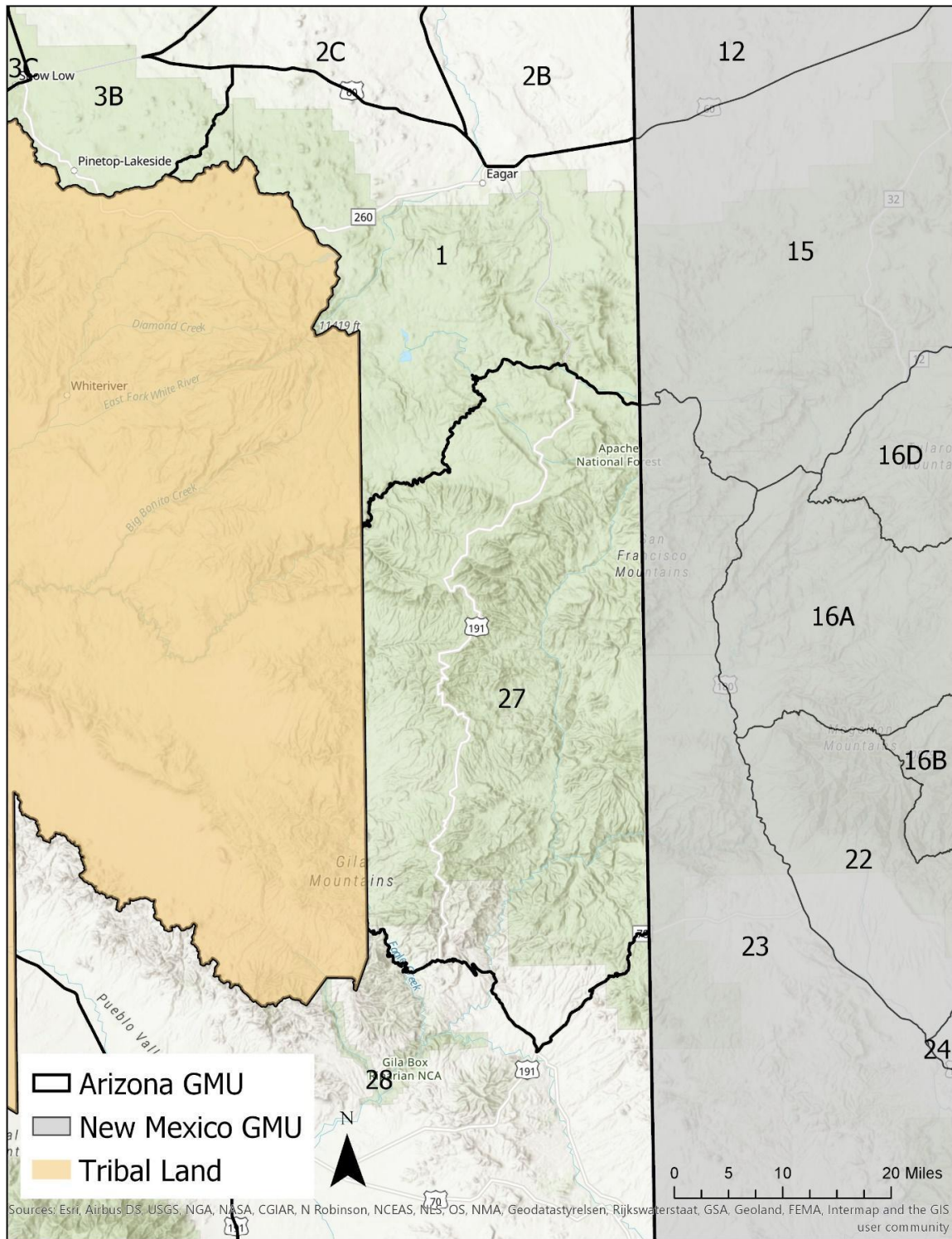
In addition to the nuanced influence of migration on population dynamics, there is also an important disease risk we must manage in this area. To date, Chronic Wasting Disease (CWD) has not been detected in Arizona. However 19 deer in New Mexico have tested positive for CWD. Although the closest detection is over 100 miles east of the Arizona/New Mexico border, at least one radio-collared deer from NM has crossed over into Arizona (approximately 70 miles from point of origin). This is an obvious concern for AZGFD and knowing more about interstate deer movements in this area will help inform disease management.

Knowledge of seasonal movement patterns for the GMUs 1 and 27 mule deer population would: 1) serve as a foundation for directing efforts to maintain and improve priority winter range and migration corridors, 2) allow AZGFD to provide recommendations for transportation infrastructure to improve wildlife permeability, 3) allow wildlife managers to prescribe season dates and permit levels that are appropriate for the portion of the population in those units during the fall hunts, and 4) give AZGFD an understanding of interstate deer movement patterns to better manage risks associated with CWD.

***Project Budget:***

<b>Item/Activity</b>	<b># of Individuals</b>	<b>Cost per Individual</b>	<b>Total</b>
Mule Deer Capture	25	\$1,375	\$34,375
Collars and Airtime	25	\$1,450	\$36,250
Personnel			\$30,000
		Project Total:	\$100,625

**Figure 15.** Priority research area including GMUs 1 and 27.



*Summary budget for all research priorities*

<b>Priority</b>	
<b>1 – South of Interstate 40 mule deer and elk movements</b>	<b>\$176,000</b>
<b>2 – Interstate 11 traffic corridor and linkage validation</b>	<b>\$123,000</b>
<b>3 – Spatial and temporal distribution of mule deer in GMUs 1 and 27</b>	<b>\$100,625</b>
<b>Total</b>	<b>\$399,625</b>

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## APPENDIX A - SECRETARIAL ORDER 3362

Subject: Improving Habitat Quality in Western Big-Game Winter Range and Migration Corridors

Sec. 1 **Purpose.** This Order directs appropriate bureaus within the Department of the Interior (Department) to work in close partnership with the states of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming to enhance and improve the quality of big-game winter range and migration corridor habitat on Federal lands under the management jurisdiction of this Department in a way that recognizes state authority to conserve and manage big-game species and respects private property rights.

Through scientific endeavors and land management actions, wildlife such as Rocky Mountain Elk (elk), Mule Deer (deer), Pronghorn Antelope (pronghorn), and a host of other species will benefit. Additionally, this Order seeks to expand opportunities for big-game hunting by improving priority habitats to assist states in their efforts to increase and maintain sustainable big game populations across western states.

Sec. 2 **Authorities.** This Order is issued under the authority of section 2 of Reorganization Plan No. 3 of 1950 (64 Stat. 1262), as amended, as well as the Department's land and resource management authorities, including the following:

- a. Federal Land Policy and Management Act of 1976, as amended, 43 U.S.C. 1701, *et seq.*;
- b. U.S. Geological Survey Organic Act, as amended, 43 U.S.C. 31, *et seq.*;
- c. National Wildlife Refuge System Improvement Act of 1997, as amended, 16 U.S.C. 668dd *et seq.*; and
- d. National Park Service Organic Act of 1916, as amended, 54 U.S.C. 100101, *et seq.*

Sec. 3 **Background.** The West was officially “settled” long ago, but land use changes continue to occur throughout the western landscape today. Human populations grow at increasing rates with population movements from east and west coast states into the interior West. In many areas, development to accommodate the expanding population has occurred in important winter habitat and migration corridors for elk, deer, and pronghorn. Additionally, changes have occurred across large swaths of land not impacted by residential development. The habitat quality and value of these areas crucial to western big-game populations are often degraded or declining.

The Bureau of Land Management (BLM) is the largest land manager in the United States (U.S.) with more than 245 million acres of public land under its purview, much of which is found in Western States. The U.S. Fish and Wildlife Service (FWS) and National Park



Service (NPS) also manage a considerable amount of public land on behalf of the American people in the West. Beyond land management responsibilities, the Department has strong scientific capabilities in the U.S. Geological Survey (USGS) that can be deployed to assist State wildlife agencies and Federal land managers. Collectively, the appropriate bureaus within the Department have an opportunity to serve in a leadership role and take the initiative to work closely with Western States on their priorities and objectives as they relate to big-game winter range and migration corridors on lands managed by the Department.

Consistent with the American conservation ethic, ultimately it is crucial that the Department take action to harmonize State fish and game management and Federal land management of big-game winter range and corridors. On lands within these important areas, if landowners are interested and willing, conservation may occur through voluntary agreements.

Robust and sustainable elk, deer, and pronghorn populations contribute greatly to the economy and well-being of communities across the West. In fact, hunters and tourists travel to Western States from across our Nation and beyond to pursue and enjoy this wildlife. In doing so, they spend billions of dollars at large and small businesses that are crucial to State and local economies. We have a responsibility as a Department with large landholdings to be a collaborative neighbor and steward of the resources held in trust.

Accordingly, the Department will work with our State partners and others to conserve and/or improve priority western big-game winter range and migration corridors in sagebrush ecosystems and in other ecotypes as necessary. This Order focuses on the Western States of: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. These States generally have expansive public lands with established sagebrush landscapes along with robust big-game herds that are highly valued by hunters and tourists throughout the Nation.

The Department has broad responsibilities to manage Federal lands, waters, and resources for public benefit, including managing habitat to support fish, wildlife, and other resources.

Secretary's Order 3356, "Hunting, Fishing, Recreational Shooting, and Wildlife Conservation Opportunities and Coordination with States, Tribes, and Territories," (SO 3356) was issued on September 15, 2017. SO 3356 primarily focused on physical access to lands for recreational activities, particularly hunting and fishing. This Order is focused on providing access to big game animals by providing direction regarding land management actions to improve habitat quality for big-game populations that could help ensure robust big-game populations continue to exist. Further, SO 3356 includes a number of directives related to working with States and using the best available science to inform development of guidelines, including directing relevant bureaus to:

- a. Collaborate with State, tribal, and territorial fish and wildlife agencies to attain or sustain State, tribal, and territorial wildlife population goals during the Department's land management planning and implementation, including prioritizing active habitat management projects and funding that contributes to achieving wildlife population

objectives, particularly for wildlife that is hunted or fished, and identifying additional ways to include or delegate to States habitat management work on Federal lands;

b. Work cooperatively with State, tribal, and territorial wildlife agencies to enhance State, tribe, and territorial access to the Department's lands for wildlife management actions;

c. Within 180 days, develop a proposed categorical exclusion for proposed projects that utilize common practices solely intended to enhance or restore habitat for species such as sage grouse and/or mule deer; and

d. Review and use the best available science to inform development of specific guidelines for the Department's lands and waters related to planning and developing energy, transmission, or other relevant projects to avoid or minimize potential negative impacts on wildlife.

This Order follows the intent and purpose of SO 3356 and expands and enhances the specific directives therein.

**Sec. 4 Implementation.** Consistent with governing laws, regulations, and principles of responsible public stewardship, I direct the following actions:

a. With respect to activities at the national level, I hereby direct the BLM, FWS, and NPS to:

(1) Within 30 days, identify an individual to serve as the "Coordinator" for the Department. The Coordinator will work closely with appropriate States, Federal agencies, nongovernmental organizations, and/or associations to identify active programs focused on big- game winter range and/or migration corridors. The programs are to be organized and cataloged by region and other geographic features (such as watersheds and principles of wildlife management) as determined by the Deputy Secretary, including those principles identified in the Department's reorganization plan.

(2) Within 45 days, provide the Coordinator information regarding:

(i) Past and current bureau conservation/restoration efforts on winter range and migration corridors;

(ii) Whether consideration of winter range and corridors is included in appropriate bureau land (or site) management plans;

(iii) Bureau management actions used to accomplish habitat objectives in these areas;

(iv) The location of areas that have been identified as a

priority for conservation and habitat treatments; and

(v) Funding sources previously used and/or currently available to the bureau for winter range and migration corridor conservation/restoration efforts.

(3) Within 60 days, if sufficient land use plans are already established that are consistent with this Order, work with the Coordinator and each regional Liaison (see section 4b) to discuss implementation of the plans. If land use plans are not already established, work with the Coordinator and each regional Liaison to develop an Action Plan that summarizes information collected in section 4 (a) (1) and (2), establishes a clear direction forward with each State, and includes:

(i) Habitat management goals and associated actions as they are associated with big game winter range and migration corridors;

(ii) Measurable outcomes; and

(iii) Budgets necessary to complete respective action(s).

b. With respect to activities at the State level, I hereby direct the BLM, FWS, and NPS to:

(1) Within 60 days, identify one person in each appropriate unified region (see section 4a) to serve as the Liaison for the Department for that unified region. The Liaison will coordinate at the State level with each State in their region, as well as with the Liaison for any other regions within the State. The Liaison will schedule a meeting with the respective State fish and wildlife agency to assess where and how the Department can work in close partnership with the State on priority winter range and migration corridor conservation.

(2) Within 60 days, if this focus is not already included in respective land management plans, evaluate how land under each bureau's management responsibility can contribute to State or other efforts to improve the quality and condition of priority big-game winter and migration corridor habitat.

(3) Provide a report on October 1, 2018, and at the end of each fiscal year thereafter, that details how respective bureau field offices, refuges, or parks cooperated and collaborated with the appropriate State wildlife agencies to further winter range and migration corridor habitat conservation.

(4) Assess State wildlife agency data regarding wildlife migrations early in the planning process for land use plans and significant project-level actions that bureaus develop; and

(5) Evaluate and appropriately apply site-specific management activities, as identified in State land use plans, site-specific plans, or the Action Plan (described

above), that conserve or restore habitat necessary to sustain local and regional big-game populations through measures that may include one or more of the following:

- (i) restoring degraded winter range and migration corridors by removing encroaching trees from sagebrush ecosystems, rehabilitating areas damaged by fire, or treating exotic/invasive vegetation to improve the quality and value of these areas to big game and other wildlife;
- (ii) revising wild horse and burro-appropriate management levels (AML) or removing horses and burros exceeding established AML from winter range or migration corridors if habitat is degraded as a result of their presence;
- (iii) working cooperatively with private landowners and State highway departments to achieve permissive fencing measures, including potentially modifying (via smooth wire), removing (if no longer necessary), or seasonally adapting (seasonal lay down) fencing if proven to impede movement of big game through migration corridors;
- (iv) avoiding development in the most crucial winter range or migration corridors during sensitive seasons;
- (v) minimizing development that would fragment winter range and primary migration corridors;
- (vi) limiting disturbance of big game on winter range; and
- (vii) utilizing other proven actions necessary to conserve and/or restore the vital big-game winter range and migration corridors across the West.

c. With respect to science, I hereby direct the USGS to:

- (1) Proceed in close cooperation with the States, in particular the Western Association of Fish and Wildlife Agencies and its program manager for the Crucial Habitat Assessment Tool, prior to developing maps or mapping tools related to elk, deer, or pronghorn movement or land use; and
- (2) Prioritize evaluations of the effectiveness of habitat treatments in sagebrush communities, as requested by States or land management bureaus, and identified needs related to developing a greater understanding of locations used as winter range or migration corridors.

d. I further hereby direct the responsible bureaus and offices within the Department to:

- (1) Within 180 days, to update all existing regulations, orders, guidance documents, policies, instructions, manuals, directives, notices, implementing actions, and any other similar actions to be consistent with the requirements in this Order;

(2) Within 30 days, provide direction at the state or other appropriate level to revise existing Federal-State memorandums of agreement to incorporate consultation with State agencies on the location and conservation needs of winter range and migration routes; and

(3) Consult with State wildlife agencies and bureaus to ensure land use plans are consistent and complementary to one another along the entire wildlife corridor in common instances where winter range or migration corridors span jurisdictional boundaries.

e. Heads of relevant bureaus will ensure that appropriate members of the Senior Executive Service under their purview include a performance standard in their respective current or future performance plan that specifically implements the applicable actions identified in this Order.

**Sec. 5 Management.** I hereby direct the Deputy Secretary to take is responsible for taking all reasonably necessary steps to implement this Order.

**Sec. 6 Effect of Order.** This Order is intended to improve the internal management of the Department. This Order and any resulting reports or recommendations are not intended to, and do not create any right or benefit, substantive or procedural, enforceable at law or equity by a party against the United States, its departments, agencies, instrumentalities or entities, its officers or employees, or any other person. To the extent there is any inconsistency between the provision of this Order and any Federal laws or regulations, the laws or regulations will control.

**Sec. 7 Expiration Date.** This Order is effective immediately. It will remain in effect until its provisions are implemented and completed, or until it is amended, superseded, or revoked.