

**ARIZONA STATE ACTION PLAN
UPDATED September 2020**

For

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

Table of Contents

Introduction	3
Arizona Game and Fish Department’s Priority Big Game Corridors	7
1) Grand Canyon to Prescott Corridor Complex (mule deer, elk, and pronghorn) 7	
2) Flagstaff to Sedona Corridor (mule deer and elk).....	16
3) Paunsaugunt to Kaibab Plateau Corridor and Winter Range (mule deer)	22
4) Proposed Interstate 11 Corridor of Obstruction and Opportunity (mule deer) 31	
5) Game Management Unit 18A (mule deer, elk, and pronghorn)	36
Current Federal Agency Activities in all Priority Corridors	42
Research Needs	46
1) Spatial and Temporal Distribution of Mule Deer in Game Management Units 1 and 27.....	46
2) Game Management Unit 18A Mule Deer and Pronghorn Linkages.....	49
Literature Cited	50
Appendix A - Secretarial Order 3362	52

INTRODUCTION

Conditions in the broader landscape may influence the function of big game migration corridors and the sustainability of their populations (Middleton et al. 2019; Sawyer et al. 2009). 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), United States Geological Survey (USGS), and Bureau of Land Management (BLM) within the United States Department of the Interior (USDI) 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 USDI 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 USDI, the states, and other natural resource managers across the broader landscape. This collaboration will strive for an all-lands approach to research, mapping, 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. Among these lands, approximately 38% are managed by two Federal Departments: 17 million acres by USDI and 11 million acres by USDA (Figure 1).

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 (Kauffman et al. 2020). This new research has led to some important discoveries, such as a 150-mile mule deer migration corridor in southwest Wyoming, which is the longest recorded for that species. 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.

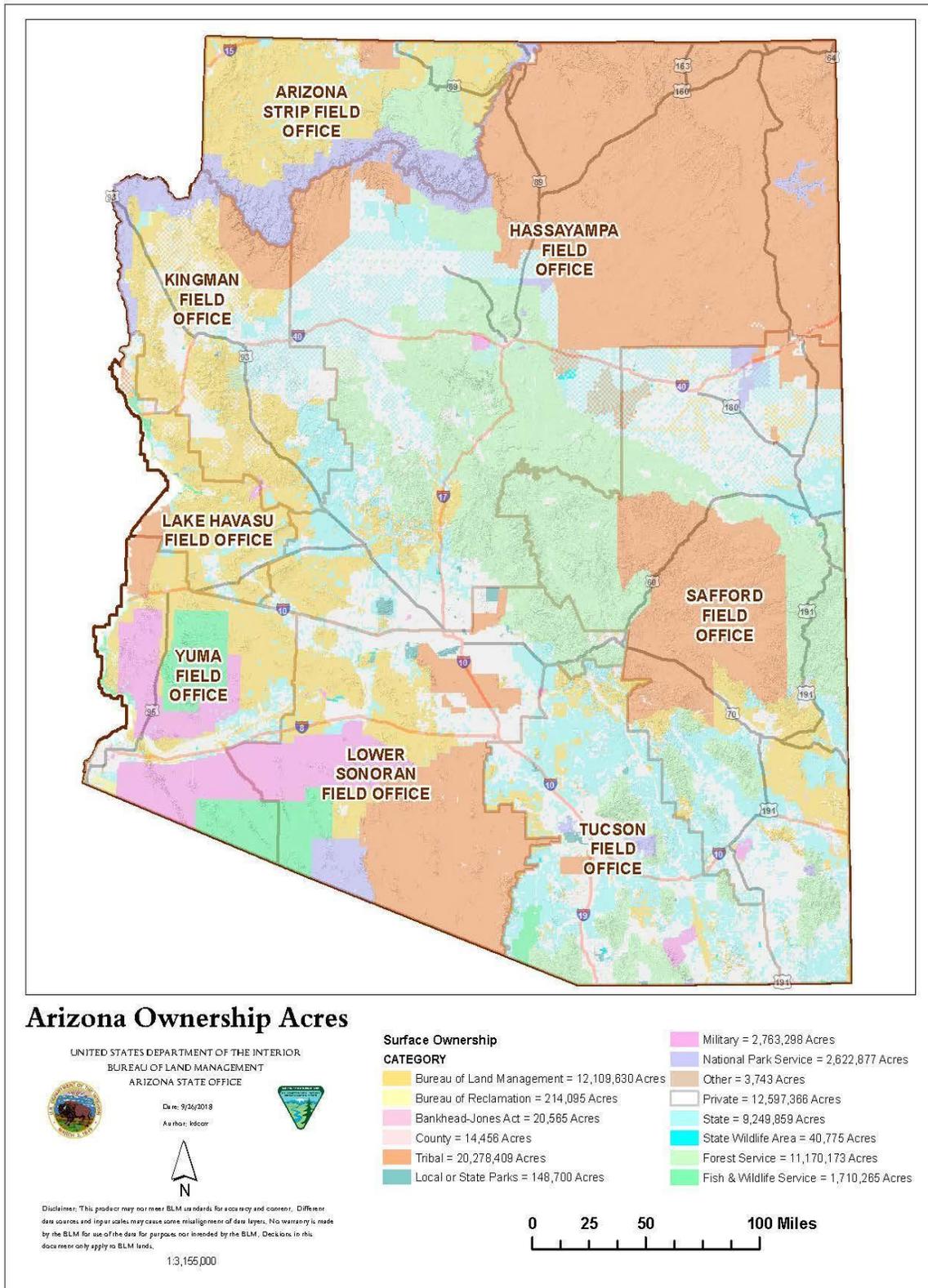
Several lessons important to modern wildlife management are emerging from migration research. New detailed information is showing wildlife managers that the corridors used during seasonal migration are crucial for conservation of big game herds in the West. This recent and ongoing accumulation of large 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. Some 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 USDI, the Arizona Game and Fish Department (AZGFD) implemented its 2018 and 2019 State Action Plans (Stemler 2020). Through SO3362, AZGFD was provided with a total of \$646,000 to support big game movement-specific research which is currently ongoing. Complementary habitat enhancement funds included \$395,000 on private land through USFWS Partners For Wildlife (PFW), and \$309,000 through the National Fish and Wildlife Foundation (NFWF). Funds procured for our highest research priorities in the first two years of implementation allowed us to deploy GPS collars on 131 mule deer and 30 elk to identify migration corridors, with 40 additional mule deer collars awaiting deployment fall of 2020.

Additionally, AZGFD was awarded funding for mapping support and partnered with the USGS and the Mule Deer Foundation (MDF) to fund a partner biologist. This position supports AZGFD's movement research and mapping efforts as well as representing AZGFD on the Corridor Mapping Team.

In April 2020, the USDI sent a letter to 11 state wildlife agency directors asking for updates to the State Action Plans for Year 3 of implementation. Within this document are AZGFD's highest priority movement corridors and winter range areas based on the best available science. Also included are AZGFD's priority research needs for big game movement and migration research. Corridors in this document are listed in priority order. Ongoing analysis of existing and incoming data will help AZGFD to refine the most important areas within those migration corridor and winter range polygons.

Figure 1. Overview of land management in Arizona.



ARIZONA GAME AND FISH DEPARTMENT'S PRIORITY BIG GAME CORRIDORS

1) Grand Canyon to Prescott Corridor Complex (mule deer, elk, and pronghorn)

This corridor complex contains high variation in elevation, ranging from 12,600 feet near Flagstaff, to as low as 3,100 feet in the Verde River Valley. 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.

However, ongoing research has revealed several migration corridors (Figure 2). For example, AZGFD GPS collared 46 mule deer near the San Francisco Peaks (Game Management Units 7&9) in 2019 and 2020 and identified distinct corridors and winter range along the south rim of the Grand Canyon. Some individuals travel distances up to 80 miles to reach winter range. This migratory population must cross 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.

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 documented movement north from their wintering grounds near the Verde River Valley until they encounter the interstate and abruptly turn eastward and parallel I-40 until they reach summer habitat near Garland Prairie (Figure 2). Migration is also occurring among pronghorn north of I-40. Migration strategies both north and south of I-40 suggest that the interstate became a barrier to north-south migrations from the Grand Canyon south to the Prescott area. In addition to the effect of I-40, US 89 is a significant 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).

This corridor 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 lacks funding to construct such features. The USFS and the Four Forest Restoration Initiative

(4FRI) are adjusting forest treatment/thinning efforts 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 mule deer, elk, and pronghorn.

The land ownership/management in this corridor 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.

Category	Area (acres)	%
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

Figure 2. Mule deer and pronghorn migration corridors and seasonal ranges within the Grand Canyon to Prescott Corridor Complex.

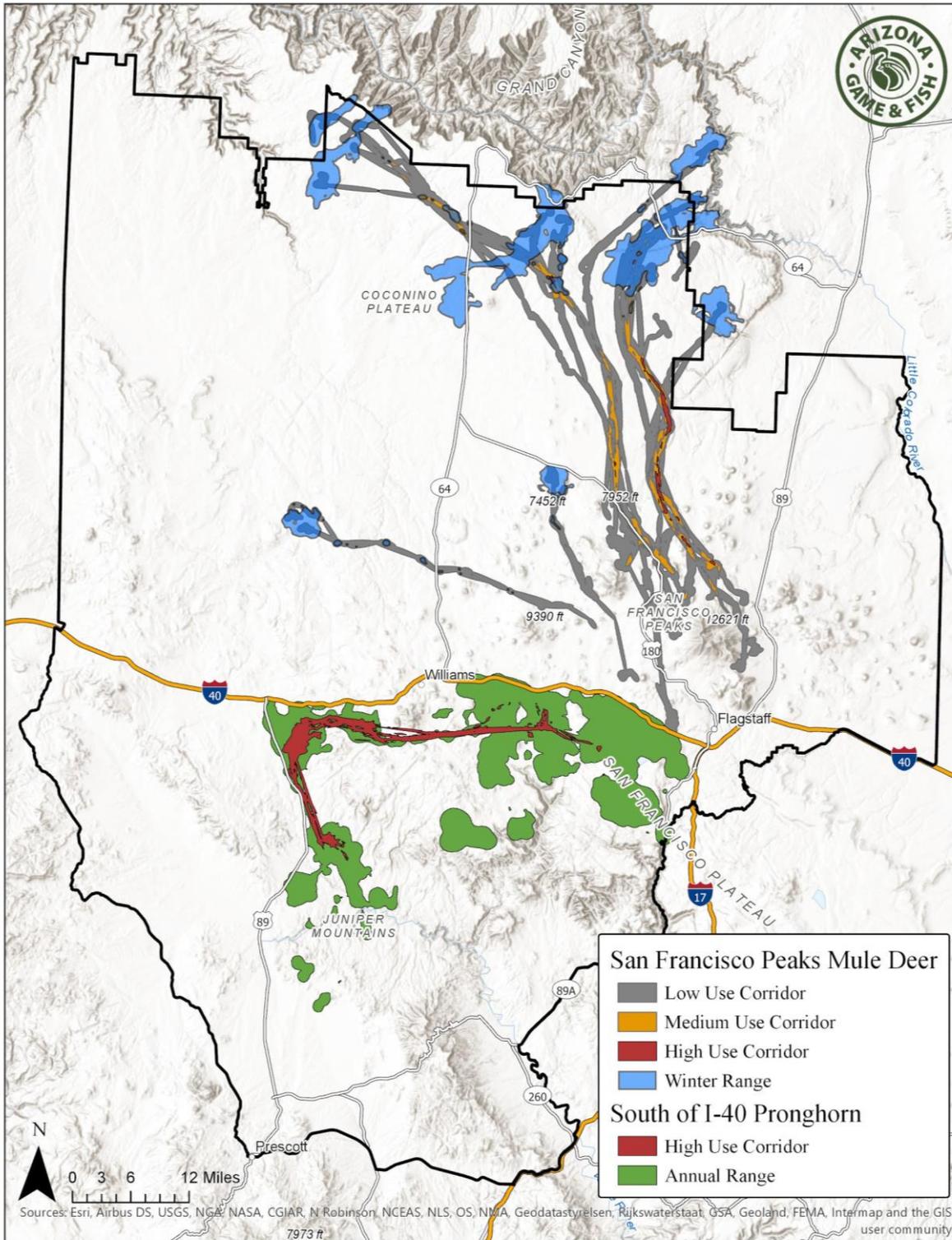
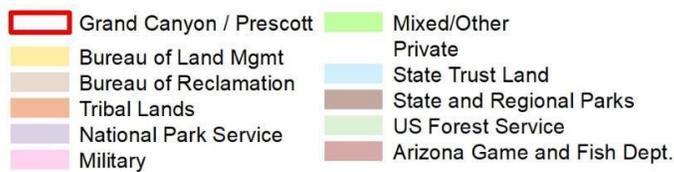
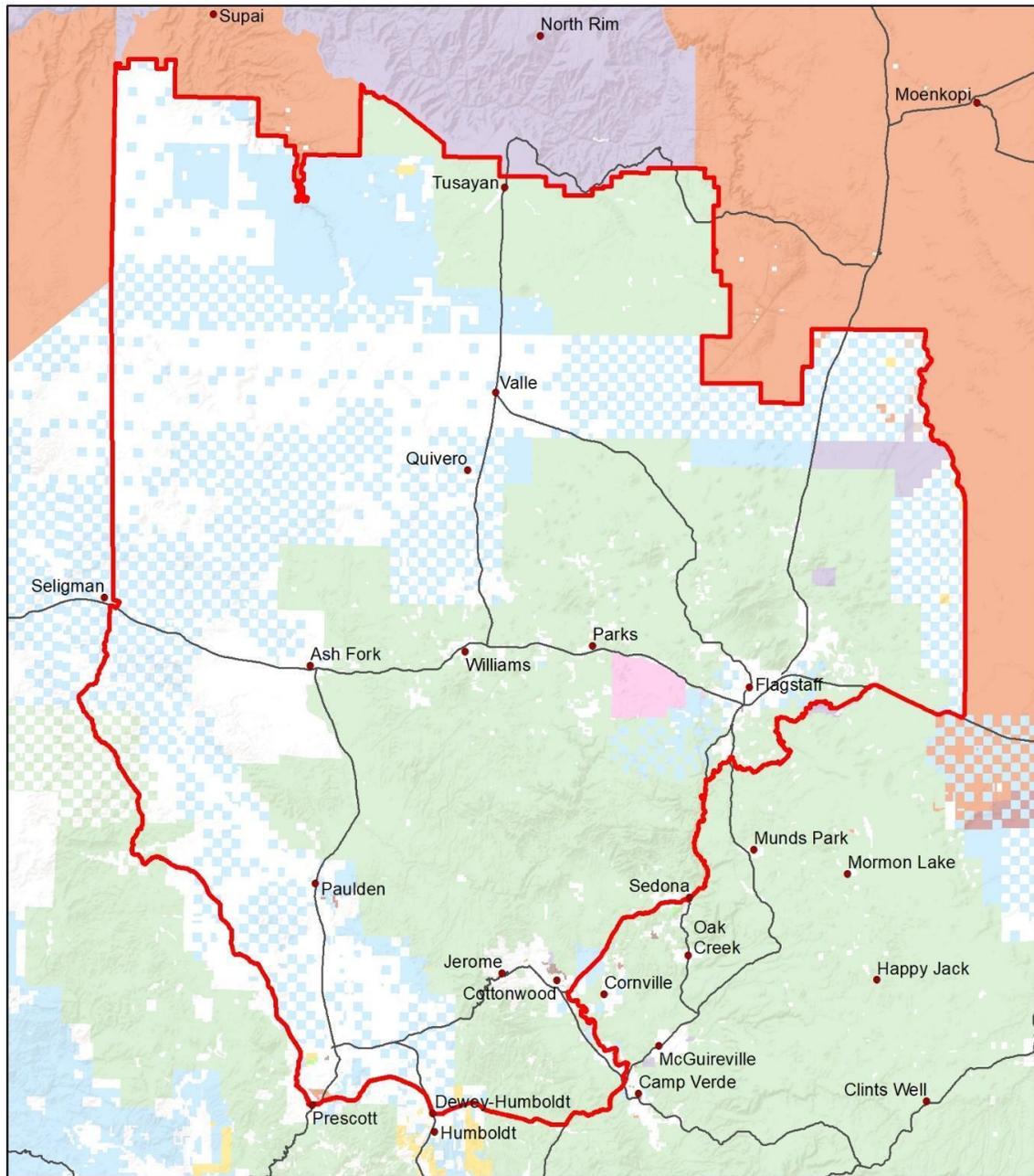


Figure 3. Land ownership/management within the Grand Canyon to Prescott Corridor Complex.



Grand Canyon to Prescott Corridor with Land Ownership



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 AZGFD, along with private and public partners, restored 2,000 acres of grassland for pronghorn and mule deer within the corridor. The Piedra Project was completed in 2019 and was 876 acres of savanna restoration for pronghorn. In 2020 the Boyd Knoll project completed 540 acres of grassland restoration completed in pronghorn migration habitat. In 2019, 1,373 acres of grassland restoration were completed on the CO Bar ranch (PR-WHEI funds through Coop Stewardship Agreement for Habitat Improvement signed 12/13/18). In 2020, approximately 900 acres of grassland and savanna restoration on the Slate Mountain allotment in phase 1 of the Slate Mountain grassland restoration project was completed. Another 1,284 acres of grassland restoration will be completed on the CO Bar ranch by the end of 2020 through a grant provided by the Rocky Mountain Elk Foundation (RMEF). In fiscal year 2021 another 400 plus acres of grassland and savanna restoration are planned for treatment on the Slate Mountain allotment utilizing PR-WHEI funds. An additional 2,010 acres of grassland restoration is planned on the CO Bar ranch in fiscal year 2021 utilizing fiscal year 2020 SO 3362 funds provided through NFWF and PFW. A total of 3,924 acres of grassland restoration are slated for completion on the Perrin Ranch in 2020 funded with PFW and AZGFD Habitat Partnership Committee (HPC) funds. An additional 919 acres of grassland restoration funded through a grant from RMEF will be performed on the Perrin Ranch as well. 984 acres of grassland restoration funded by USDA NRCS through the EQIP program will be completed in 2020 as well. The 10X project on the Kaibab National Forest was funded \$46,800 through HPC for 2020 to finish the 432 acres from the original project.

Barrier/Fragmentation Mitigation Efforts

Highway-related elk, deer, and pronghorn movement studies – AZGFD performed ADOT-funded wildlife movement studies along I-40, I-17, US 89, and SR 64 and identified wildlife crossing locations for future implementation during road improvement efforts (Figure 4).

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 collared 35 additional 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 Foundation 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 ungulates.

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 of significant land use changes that would have an impact on the long-term viability of the corridor for wildlife movement. AZGFD will work with partners to 1) identify, and 2) support partners in securing funding for key parcels that could be protected via conservation easements, land transfers, and land purchases for long-term conservation and 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.

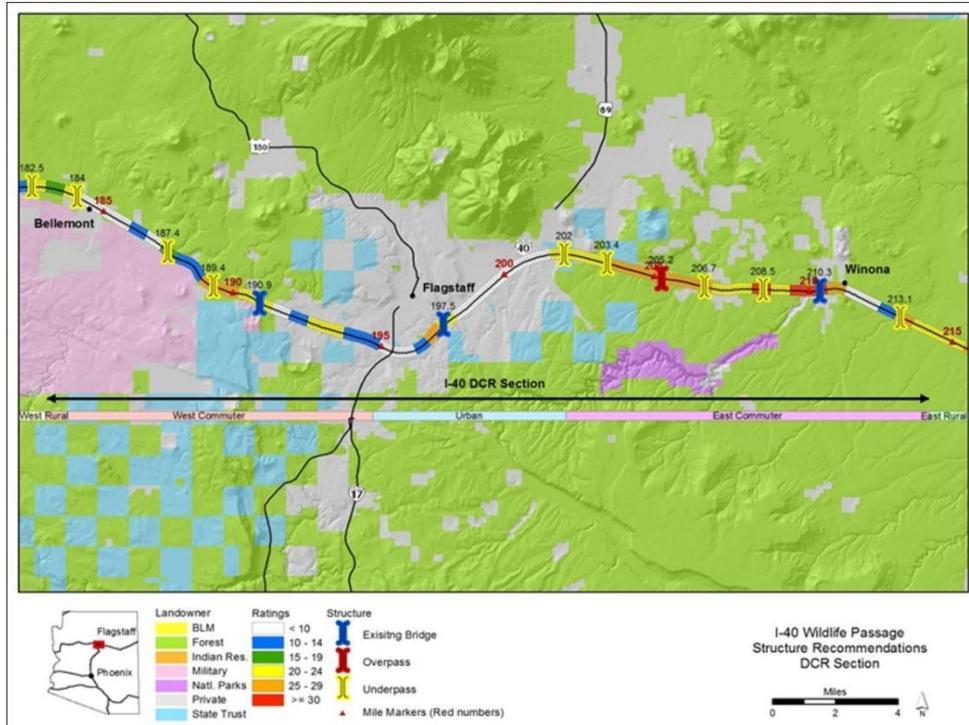
An Environmental Assessment (EA), Design Concept Report (DCR), and Wildlife Accident Reduction Plan were all created for this section of I-40 that includes all of the recommended wildlife crossing locations and fencing.

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 redeveloped to provide the necessary water to support big game corridor movements during drought periods. Water redevelopments restore functionality on an existing water development that no longer provides year round water. Typically this involves the replacement of the old system with a newer, higher capacity system

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.



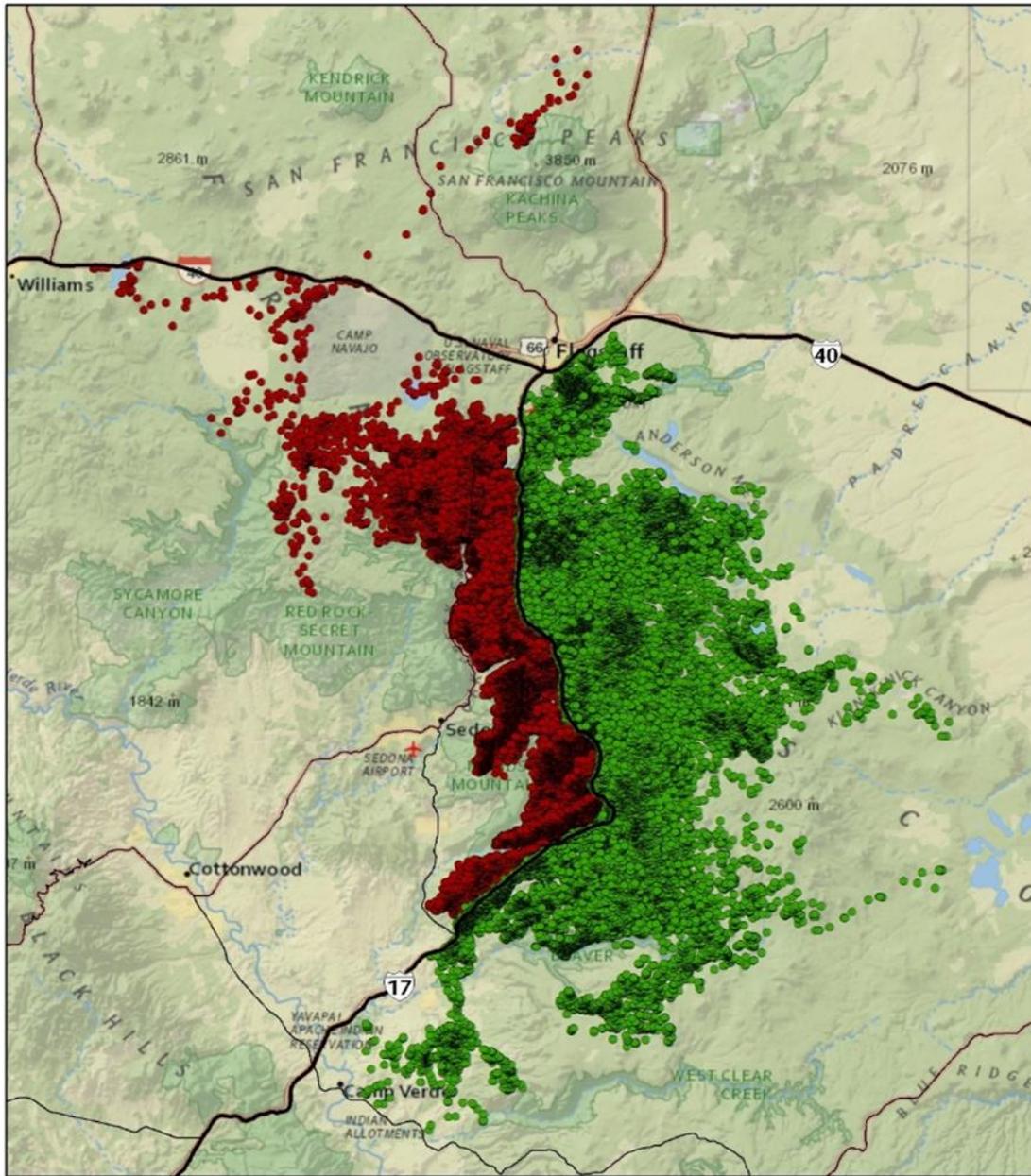
2) Flagstaff to Sedona Corridor (mule deer and elk)

This corridor contains 50 miles of 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. 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 GPS collared population (represented here) were never located on the opposite side of I-17 from where they were collared.



Elk Captured that Did Not Cross Interstate 17

- Elk Captured East of Interstate
 - Elk Captured West of Interstate
- n = 50, locations taken every 2 hours

Elk Locations along I-17
in Arizona



Figure 6. Flagstaff to Sedona elk migration corridor, stopover, and winter range model from the 2019 USGS Migration Report (Kauffman et al. 2020). The model is based on GPS collar data collected from 47 elk from 2006-2014 (Gagnon et al. 2015). Low use, medium use, and high use corridors are based on the relative number of individuals using the same migration corridor.

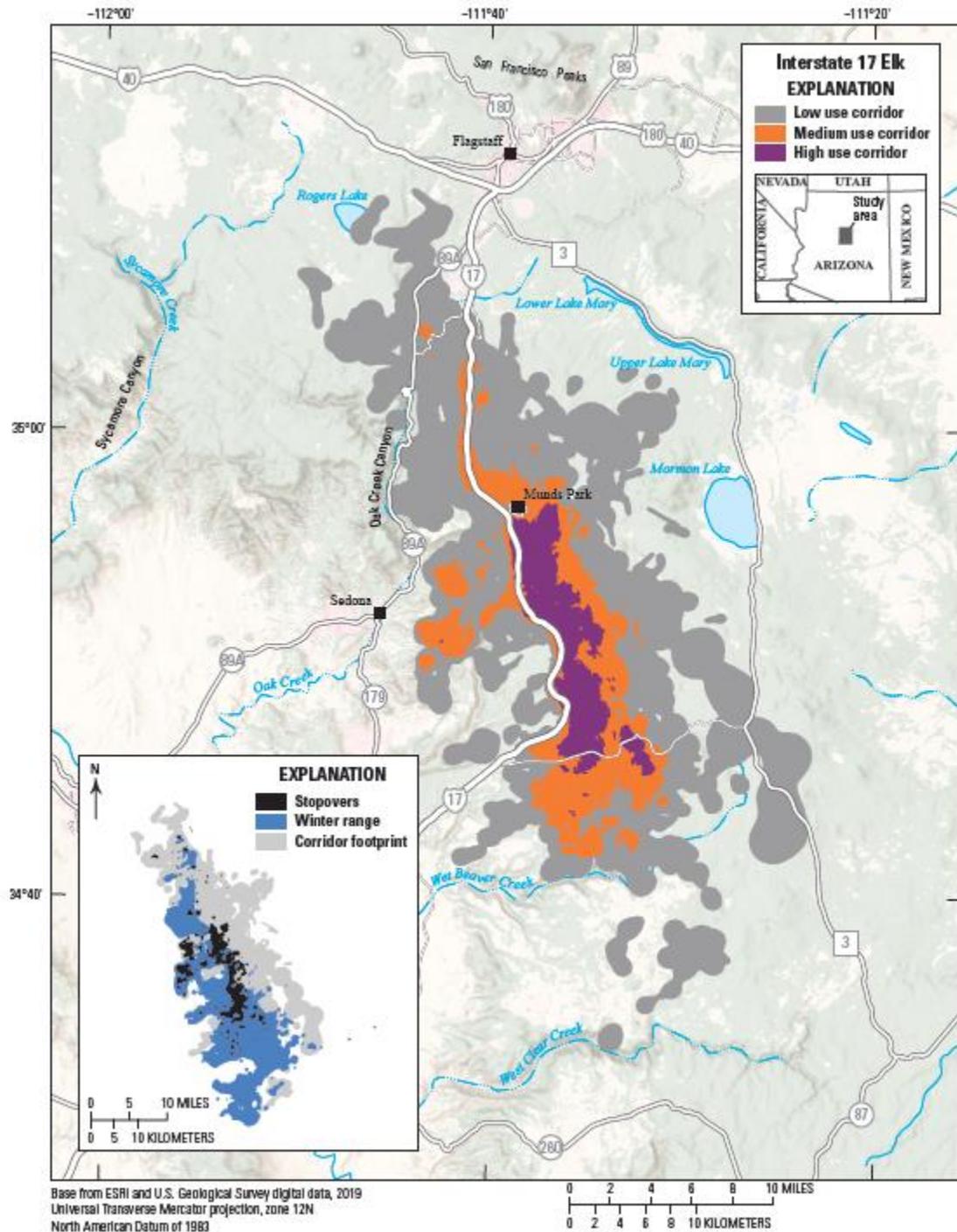


Figure 7. Land ownership/management within the Flagstaff to Sedona Corridor.



- | | | | |
|---|-----------------------|---|-----------------------------|
|  | I - 17 |  | Private |
|  | Bureau of Land Mgmt |  | State Trust Land |
|  | Tribal Lands |  | State and Regional Parks |
|  | National Park Service |  | US Forest Service |
|  | Mixed/Other |  | Arizona Game and Fish Dept. |

I - 17 Corridor
with Land Ownership



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 have 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 (Gagnon et al. 2013). That package includes an EA, DCR, an Accident Reduction Plan, and 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 elk exclusionary 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.

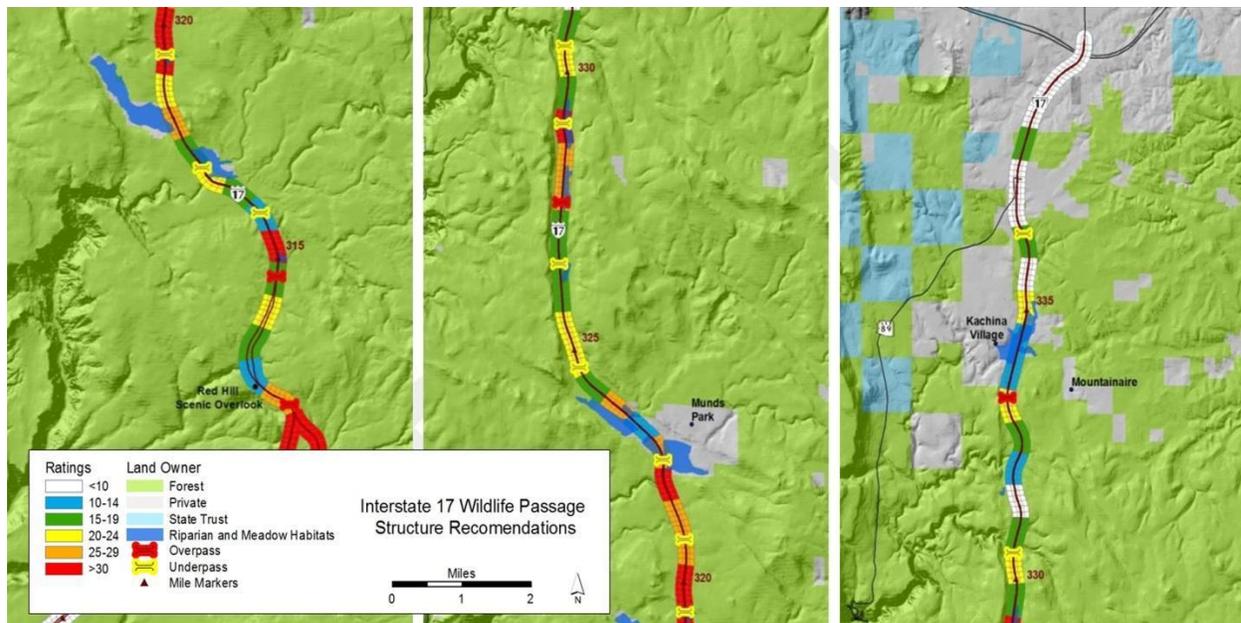
Habitat Projects Identified

Barrier/Fragmentation Mitigation Project Identified

Wildlife Crossings along I-17 – I-17 represents the biggest impediment to migration in this corridor. Gagnon et al. (2013) 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 exclusionary fencing to make these crossing structures effective. ADOT and USFS have coordinated closely with AZGFD to plan for crossings, likely two overpasses, in key areas defined as wildlife crossing locations through the I-17 Elk Movement Studies (see far right panel of Figure 8 and Gagnon et al. 2015) until a complete rebuild is funded. The largest hurdle for this project is funding. Currently ADOT is conducting a statewide wildlife-vehicle collision analysis to determine priority areas for mitigation projects. If I-17 is selected, this will likely provide additional funding opportunities. ADOT, AZGFD, and USFS will continue to work with partners and stakeholders to seek and obtain available funding to complete the project.

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 over 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 46 mule deer on the North Kaibab has allowed AZGFD to identify migration corridors and winter range on the west and north sides of the plateau (Figure 9), which is consistent 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 (*Bromus tectorum*).

The higher elevation areas are NPS and USFS lands with oaks (*Quercus gambelii*), ponderosa pine and mixed conifer, and the surrounding lowlands are dominated by sagebrush (*Artemisia tridentata*) and cliffrose (*Purshia stansburiana*) 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.

Category	Area (acres)	% in Utah	% in Arizona	% of Total
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=46) and Paunsaugunt Plateau (n=54) mule deer herds based on GPS locations collected from two research studies. Low, medium and high use represent the relative number of individuals using the same migration corridor.

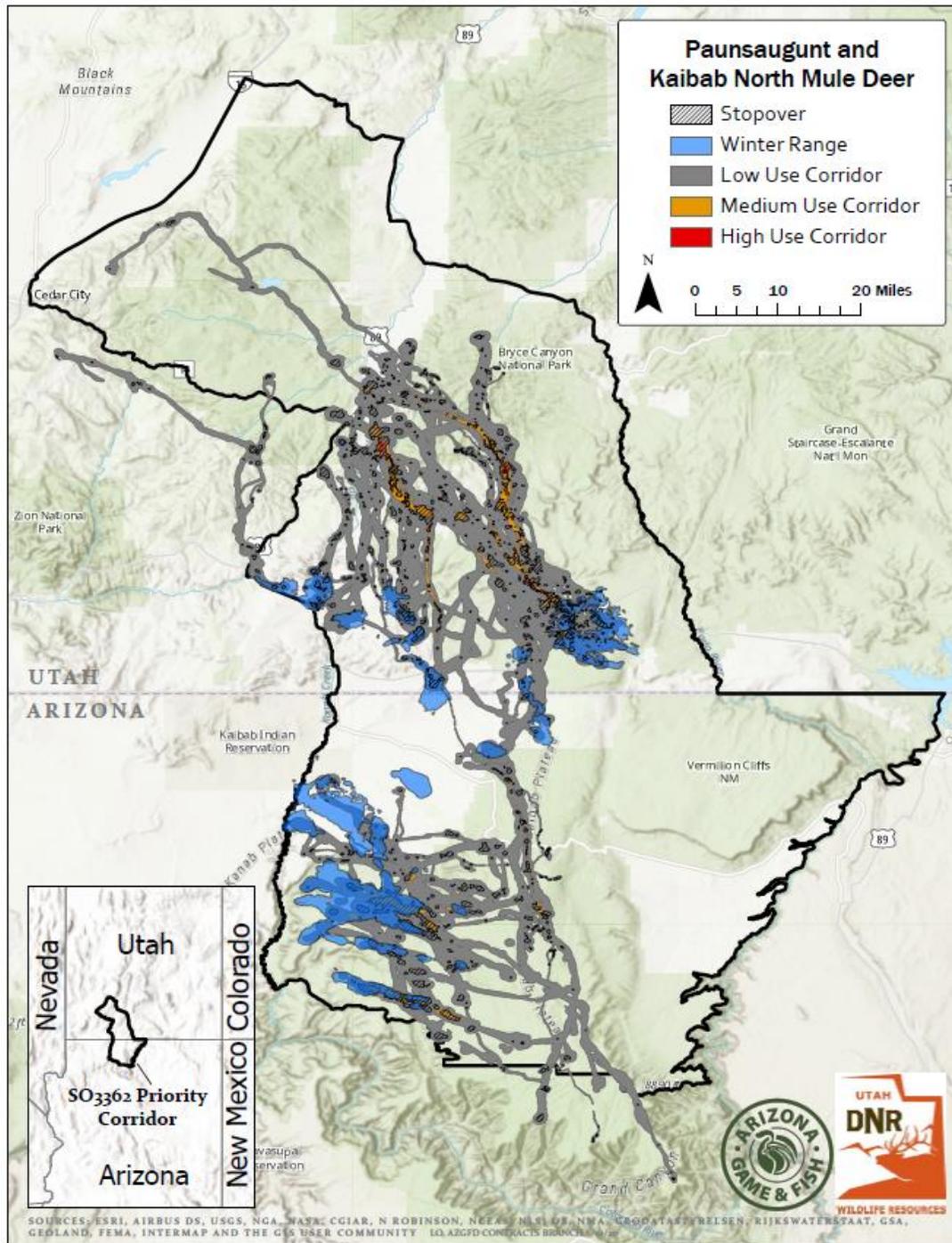
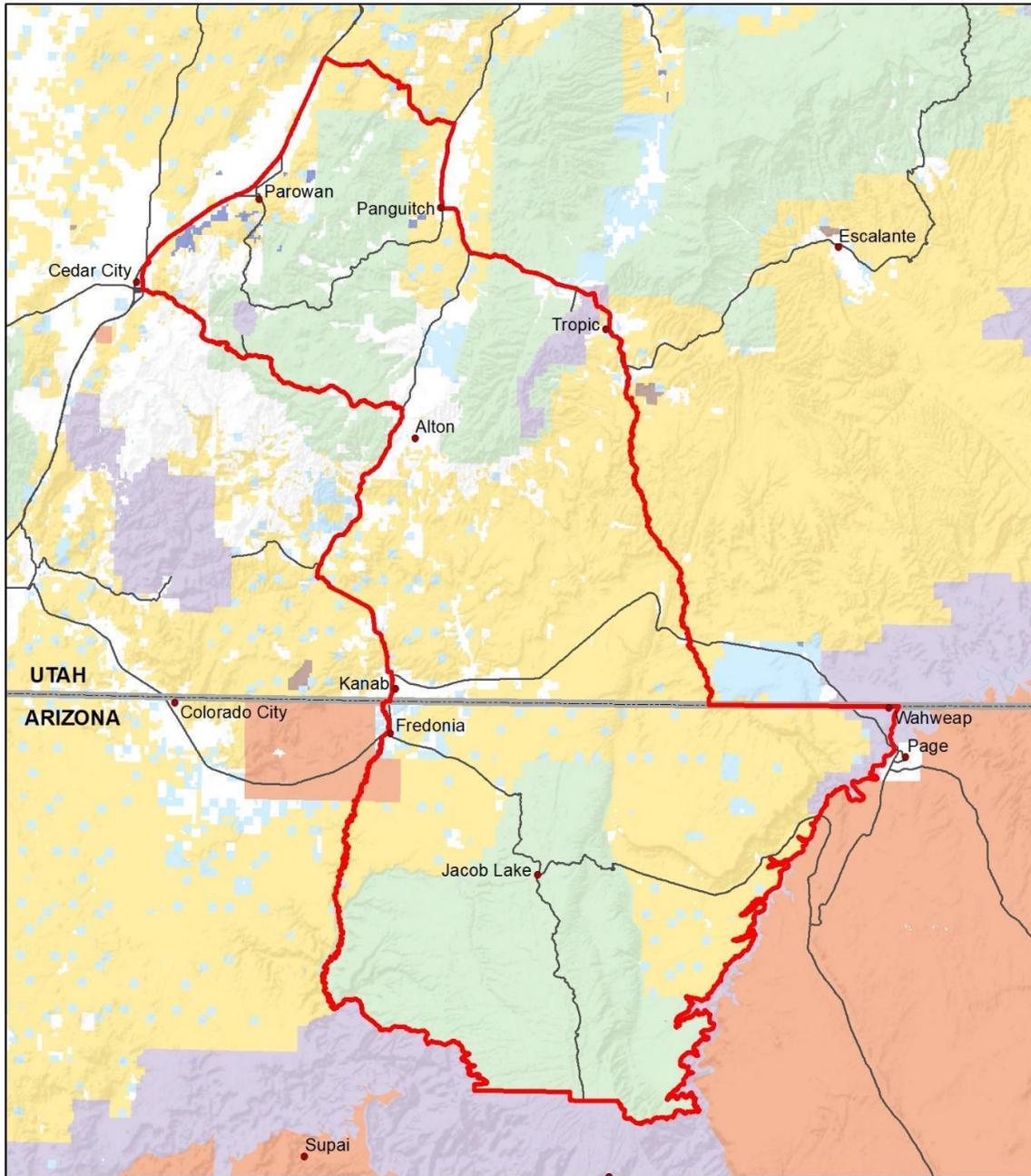


Figure 10. Land ownership/management within the Paunsaugunt to Kaibab Plateau Corridor.



	Kaibab / Paunsaugunt		Private
	Bureau of Land Mgmt		State Trust Land
	Tribal Lands		State and Regional Parks
	National Park Service		US Forest Service
	Mixed/Other		Utah Department of Natural Resources
			Utah Department of Wildlife Resources

**Kaibab / Paunsaugunt
Corridor with Land Ownership**



 Miles
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SB, SSI/T 7/2019

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. In early July 2020, the Kaibab National Forest issued their decision for the project and began a 45-day protest period. This clearance process will cover a substantial portion of the Paunsaugunt to 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 28,090 acres of vegetation management within the North Kaibab National Forest. In May 2020, the Kaibab National Forest had an open public comment period on the EA. The Kaibab National Forest is currently responding to comments on the EA. 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.

In June-July 2020, approximately 84,000 acres of mule deer habitat experienced wildfire within the corridor. Of those, approximately 80,000 acres were within Arizona. The Mangum Fire (~71,400 acres), Pine Hollow Fire (~11,400 acres), and Wire Pass Fire (~1,500 acres) burned across summer, transition, and core winter range habitats, at varying degrees of intensity. The fires were essentially contiguous from Arizona to Utah impacting approximately 34 miles north

to south within the central portion of the corridor. Many of the areas of the fire burned on steep slopes with high intensity, leaving areas completely void of vegetation and habitat at risk for substantial soil loss following monsoon rain events. Concerns of non-native cheatgrass establishment, and degradation of migration corridor habitat were immediately identified. In addition, in Arizona, 11 wildlife and cooperative wildlife/livestock water catchment facilities were damaged or destroyed during these fires. AZGFD has been closely involved with the USFS, BLM, NRCS, and the livestock ranching community in identifying immediate needs for native plant reestablishment through seeding, soil stabilization and erosion control, and replacement/maintenance of infrastructure damaged in the fires.

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 wire with smooth wire and raising it to 18-20” also reduced fencing barrier effects for juvenile deer movements.

North of the Arizona/Utah 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 (Cramer & Hamlin 2019). There are ongoing efforts to monitor movements in this corridor with GPS collars led by the 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 (24) water developments have been identified for redevelopment, or new construction including: 14 redevelopments of under capacity water developments within winter range transition habitat; 4 redevelopments of cooperative water developments in mule deer winter range habitat; 6 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 Arizona/Utah 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. 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. Additionally, AZGFD and BLM have secured funding for the redevelopment of two wildlife water developments in the Buckskin Mountains. All environmental review is completed (USDI-BLM-AZ-A010-2016-0004-EA).

Habitat Projects Identified

Vegetation Management Projects Identified

Vegetation management of the Shuttleworth-Suicide Wildlife Habitat (BLM 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 will enhance production of browse species for wintering mule deer in this priority area. This project will treat approximately 14,267 acres of PJ with a mix of mastication, lop and scatter methods, and seeding. The estimated overall project cost is estimated to be \$2 million dollars. NFWF funding through SO3362 provided \$200,000 towards vegetation treatments on this project. That work is expected to begin in October of 2020.

Vegetation management for West Side Habitat Improvement (Kaibab National Forest USFS) – Archeological clearances are required prior to implementation of PJ overstory 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 – 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. The project began a 45-day protest period in early July, 2020.

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. The Kaibab National Forest is currently working through public comments on the EA. These projects will enhance undergrowth species for wintering and migrating mule deer within the corridor.

East Kanab Creek/Buckskin Mountain Strategic Focus Area – This project is within the larger Kanab Creek Healthy Lands Project Area which comprises 265,000 total acres; 213,900 on BLM lands, as well as 12,400 on private lands. Part of this project is to prioritize where management efforts are needed to improve ecosystem function for the Paunsaugunt and North Kaibab mule deer herds. The BLM is in the data gathering stage and the NEPA has not yet been completed.

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 subdivisions along the Arizona/Utah 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.

- 12 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 12 waters has been completed in addition to an internal AZGFD Environmental Assessment Checklist (EAC). Cost for redevelopment of these wildlife waters would be approximately \$1.2 million dollars.
- NEPA associated with an emergency response to the Mangum Fire has been completed for 6 wildlife waters, 7 wildlife water fence projects, 7 cooperative livestock water projects, and up to 17,000 acres of aerial seeding.
- A NEPA document, the Eastside Wildlife Waters Development (and redevelopment) Project Categorical Exclusion (2015), has been completed. Overall 9 wildlife waters were identified for development and 3 wildlife waters remain for completion of this project.
- 3 cooperative wildlife and livestock water developments have been completed with one more cooperative wildlife and livestock water identified for redevelopment in mule deer winter range habitats within the corridor. NEPA compliance is complete for this project.
- 3 cooperative wildlife and livestock waters have been identified for new development in mule deer winter range within the corridor. No NEPA has been completed for these projects.

Redevelopment of 2 wildlife waters on USDI lands in the Buckskin Mountains – Two water developments were recently completed, directly benefiting migrating mule deer within winter range identified in the corridor. Buckskin 2 was completed in July 2019, and Buckskin 1 was completed March 2020.

Development of new wildlife water developments on USDI lands in GMU 12B – On USDI 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.

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

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 disturbance which may lead to changes in wildlife behavior and habitat use (Sawyer et al. 2020).

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.” Public review of the Draft Tier 1 EIS has closed, and ADOT is currently responding to comments. ADOT has targeted a late 2020 release of the final Tier 1 EIS. The subsequent Record of Decision (ROD) regarding the “Selected Alternative” identified in that final EIS will likely occur in 2021. 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. 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. For example, understanding mule deer movement pathways that would be impacted by I-11 if it is constructed. 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 USDI as part of SO3362 implementation, AZGFD collared 61 mule deer in 3 priority study areas to begin accumulating movement data along a portion of the I-11 Proposed Corridor Alternative (Figure 11) There are an additional 40 mule deer collars, funded by Year 2 of SO3362 implementation that will be deployed during the fall of 2020. Preliminary information shows several connections between mountain ranges, such as within the Rainbow Valley between the North Maricopa and Sierra Estrella mountains (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 (*Carnegiea gigantean*), palo verde (*Parkinsonia florida*), mesquite (*Prosopis glandulosa*), ocotillo (*Fouquieria splendens*), and various other cacti. Land ownership and management is primarily BLM, Private, and State Trust Land (Figure 13, Table 4).

Barrier/Fragmentation Mitigation Projects Identified

Fence inventories within important movement areas - GPS collar data along the I-11 proposed corridor alternative has allowed AZGFD to gain an understanding of several movement corridors, where it is not uncommon for mule deer to travel distances over 10 miles between and within habitat patches (Figure 12). Within these areas AZGFD intends to seek funding for fence

inventories that would aid in understanding the existing barriers to movement, and to strategize for possible mitigation measures that would support mule deer movement.

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

Category	Area (acres)	%
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 11. The Tier 1 draft EIS recommended I-11 Corridor Alternative with the February 2019 study area and 2020 study areas for continued research.

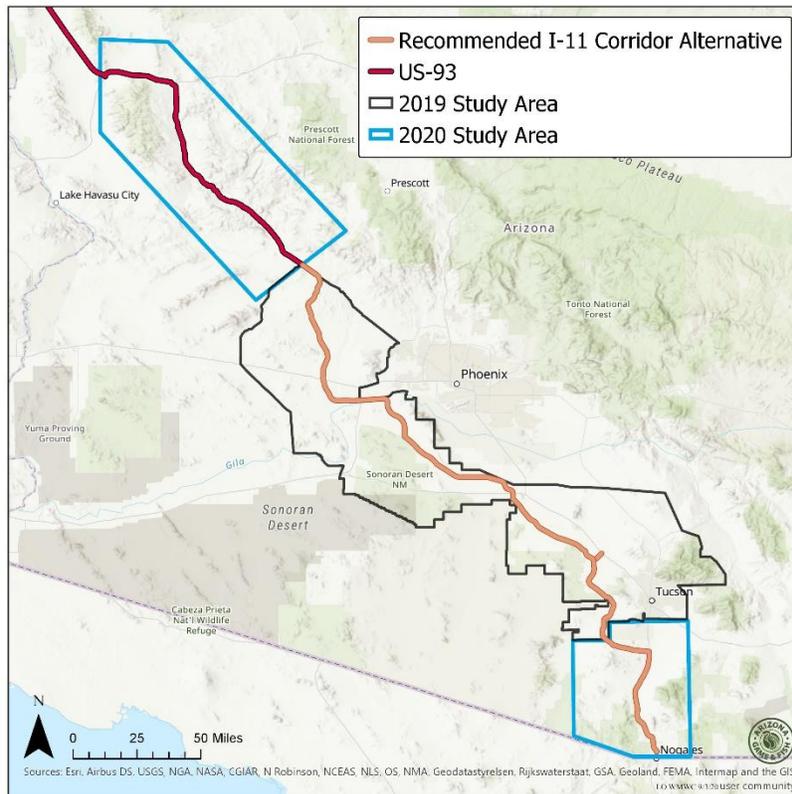


Figure 12. Rainbow Valley Mule Deer movements and the Recommended I-11 Corridor Alternative within the I-11 Corridor of Obstruction and Opportunity.

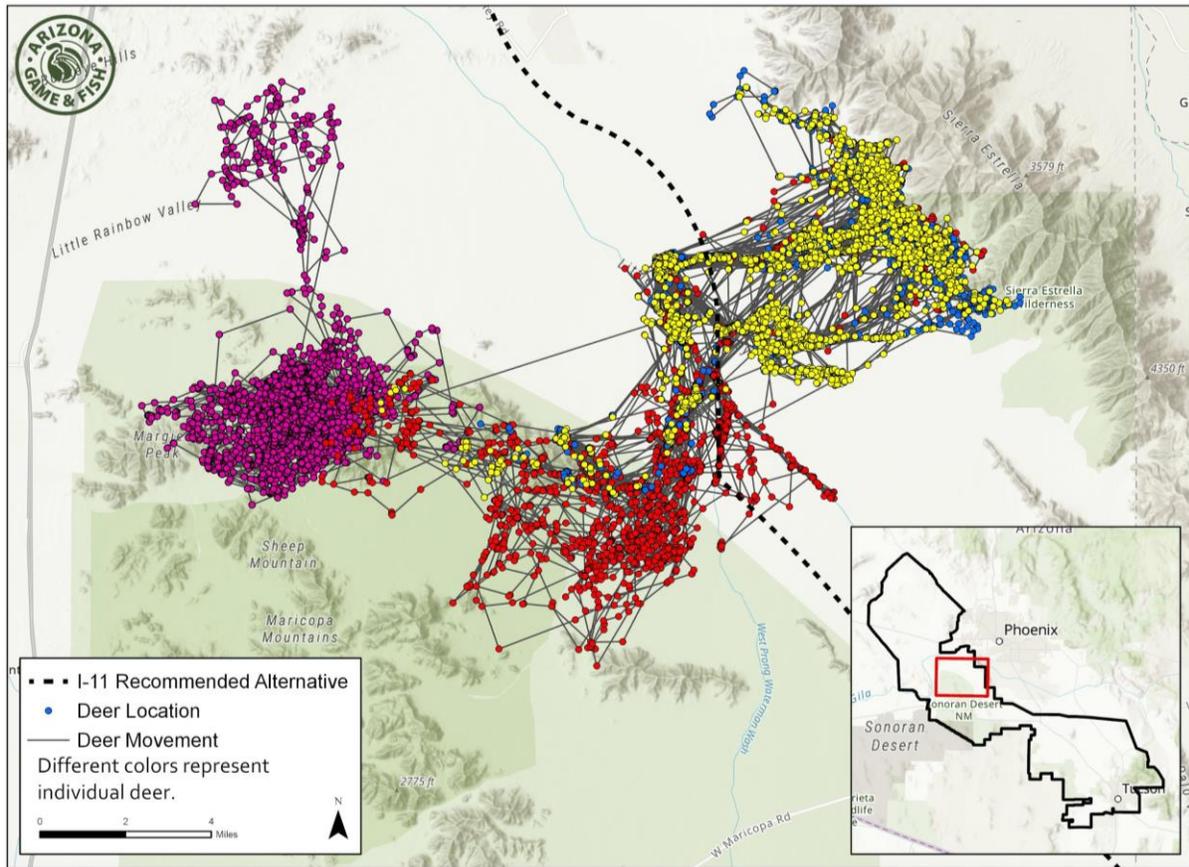
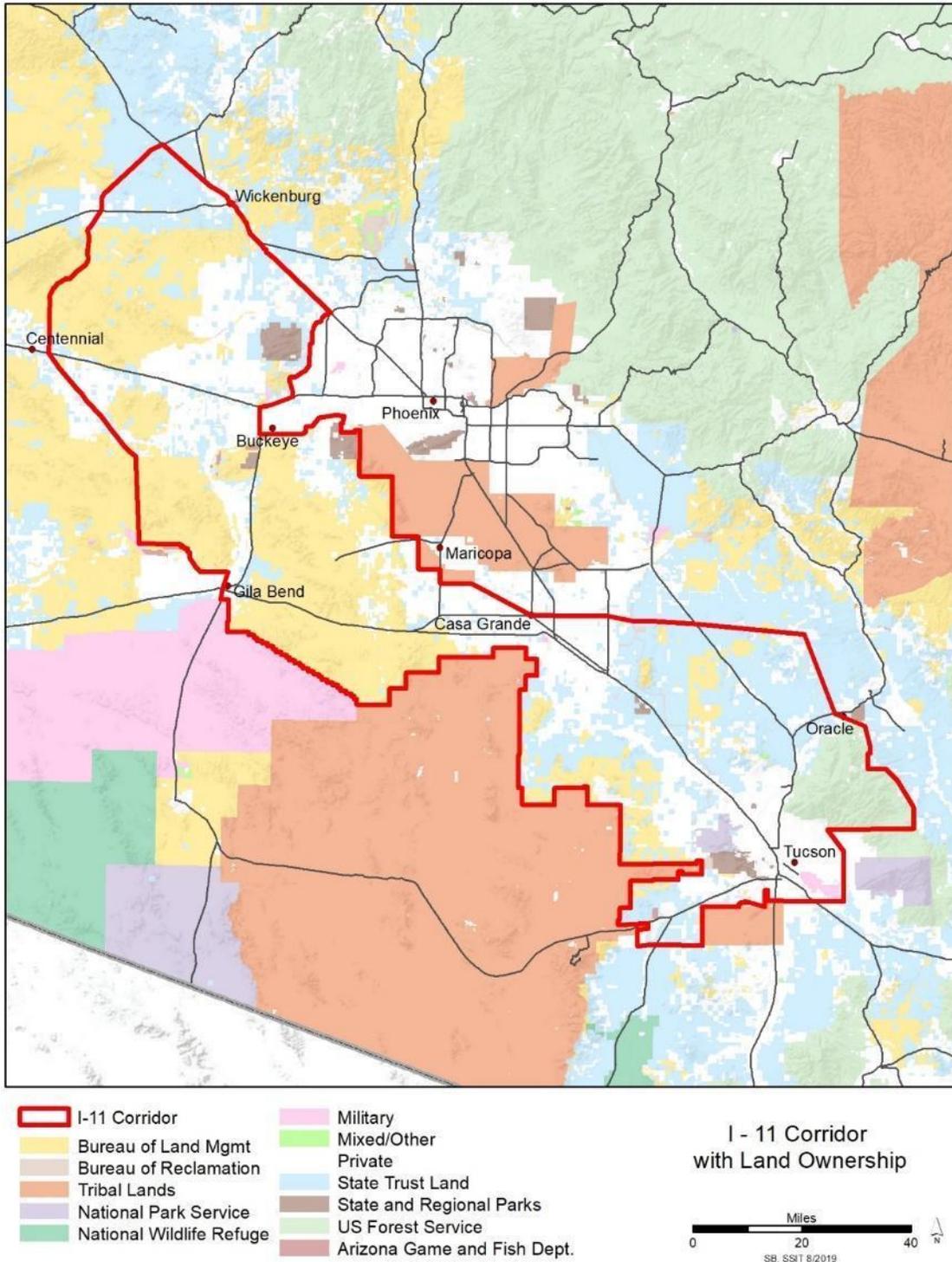


Figure 13. Proposed I-11 Corridor of Obstruction and Opportunity and land ownership/management.



5) Game Management Unit 18A (mule deer, elk, and pronghorn)

GMU 18A has been a focus of AZGFD to increase habitat quality and availability for multiple wildlife species including mule deer, elk, and pronghorn. It is located between Kingman and Seligman, extending both north and south of Interstate 40. Mule deer and pronghorn populations in GMU 18A have declined for decades due to many factors including human disturbance, livestock grazing and fence design and densities, reduction of habitat, and drought. The combination of these factors has led to a reduction in habitat availability and quality, a substantial decline in recruitment rates, and a decrease in total population numbers.

The GMU is composed of a mix of grassland, pinyon/juniper, chaparral, and lower desert habitat types. Elevations range from about 2,380 to 6,742 feet above sea level, but most of the GMU lies between 4,300 and 5,300 feet. Landforms include open plains, rolling hills, plateaus, and mountains. Natural surface water is very scarce throughout the area. Most water is supplied by earthen tanks and well-fed pipelines designed to support livestock grazing operations. Hundreds of miles of pasture fences exist which can inhibit movement of wildlife, such as pronghorn. These fences need to be converted to AZGFD's wildlife friendly standards for enhanced wildlife permeability.

AZGFD has prioritized collection of movement data within GMU 18A to evaluate movement corridors and the effectiveness of current and future habitat treatments. During the fall of 2019, 17 pronghorn were collared within the north-central portions of GMU 18A; the data collected will guide habitat treatment implementation in years 2021-2024 (Figure 15). Several collars were placed on the southern boundary of the study area and data collected will also tell us if current treatments are being used as the projects progress. The restored ability of pronghorn to move throughout its range will provide them an opportunity to adapt and increase its resilience. Additionally, AZGFD will deploy 15 mule deer collars November of 2020.

GMU 18A covers about 1,236 mi² in northwest Arizona. Land ownership is complex and includes checker-boarded lands with 40% Arizona State Land Department (ASLD) lands, 49% private lands, and 11% BLM lands (Table 5, Figure 16). Much of the GMU has existing grazing leases for livestock managed by 10 different ranches.

Current State Activities

Most of year 1 has been spent in coordination meetings with ranches, applying for and obtaining a Regional Conservation Partnership Program (RCPP) in coordination with the NRCS, obtaining permits for treatments from ASLD and additional funding from Arizona Department of Forest and Fire Management, USFWS Partners Program and Rocky Mountain Elk Foundation.

Additional cooperating organizations include the Arizona Antelope Foundation, the Arizona Deer Association, the Arizona Elk Society, the Mule Deer Foundation, and the Arizona Mule Deer Organization.

In the heart of the GMU 18A there were 3,300 acres of browse treatments completed.

- 17 pronghorn collared in the northern portion of the GMU Oct 2019, we've had five mortalities but 3 were placed back out on bucks Feb 2020 along I-40 (2 north, 1 south). Treatment clearances are underway for the northern migration corridor for FY22-24 from the central portion of the GMU up to the north and then across westward to the BLM lands.
- 15 deer collars will be deployed Nov 2020 and will be monitored to watch the change in movement as treatments occur in FY22-24 (current plan is 8 south and 7 north of I-40).

Habitat Projects Identified

8,600 acres of grassland and browse treatments underway already in FY21 and it could be more depending on contractors, rancher permits and matching funds.

Vegetation Management Treatments

Grassland Habitat Treatment - The treatment prescription in grassland habitat is to remove a majority of recent juniper trees while retaining large old growth junipers, with a diameter of 16 inches or greater at 12 inches above the root collar. The treatment will be completed using a drum grinder attached to rubber tired equipment with less than 4 psi ground pressure. The drum grinder will chip up the trunk of the trees, leaving the branches that will retain more soil moisture, creating a microclimate that is conducive to the production of cool season grasses and forbs. In areas that contain deeper soils associated with flat topography the majority of the trees will be removed, with the exception of obvious bedding trees which will result in approximately

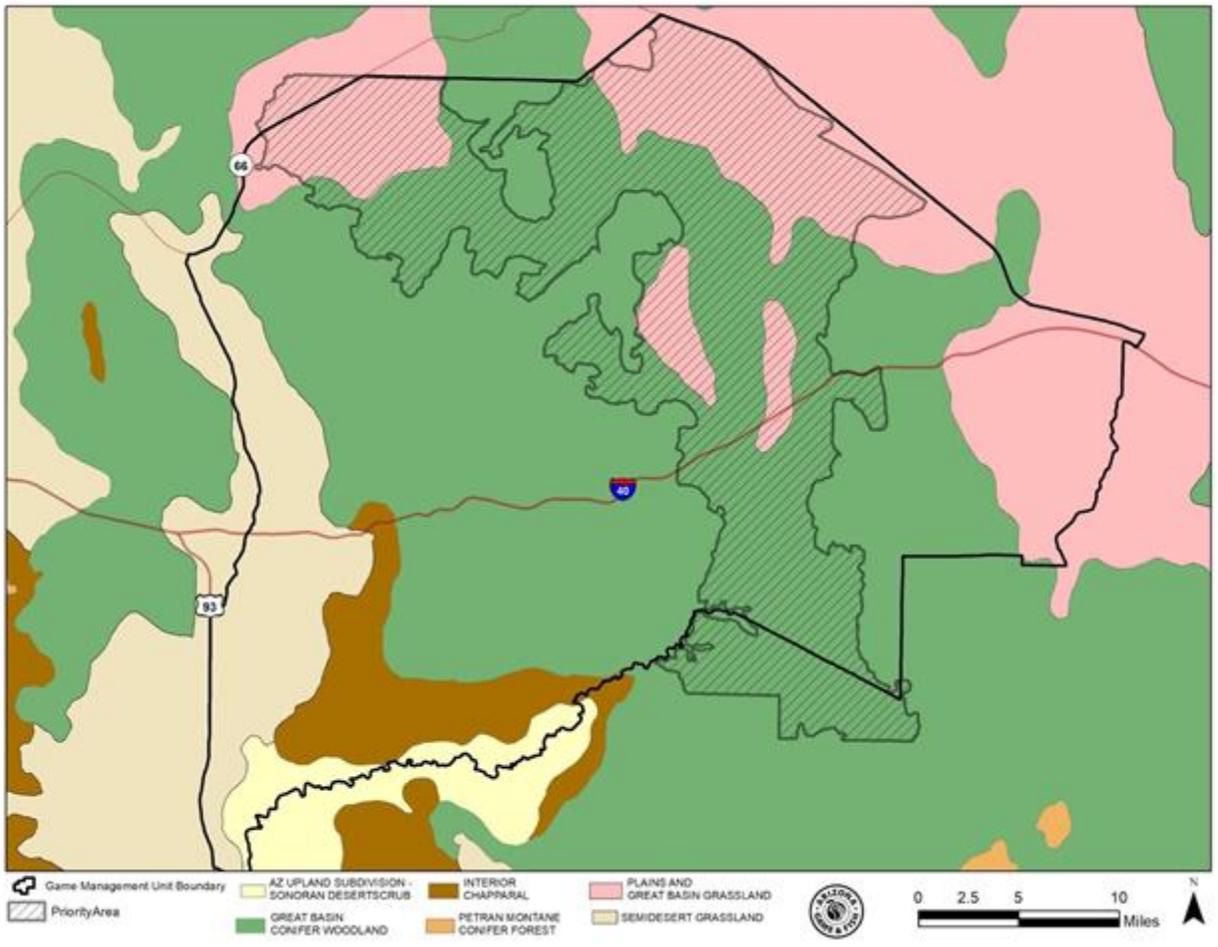
one mature tree left per acre. Work will be performed year round with precaution given to avoiding wet roads and rutting conditions. Number of acres that will be treated is difficult to determine due to unsecured funding and actual treatment costs. Impacts to grassland birds may be monitored.

Pinyon/Juniper Habitat Treatments - There are approximately 280,000 acres of treatments that fall within the priority area shown on the proposals map. Based on land ownership the majority of the project will be completed on ASLD land. AZGFD has been working closely with the ASLD’s Range Unit Manager toward the implementation of this project, whenever possible funding will be placed adjacent to areas previously treated. Some additional projects will be completed on private and BLM lands. AZGFD has been working with the Colorado River District BLM Fuels Unit Manager toward completion of the environmental compliance needed for these treatments (Figure 14).

Table 5. Land ownership/management for the Game Management Unit 18A Corridor.

Category	Area (acres)	%
Private	377,542	48.07
State Trust Land	317,542	40.43
Bureau of Land Mgmt.	89,214	11.38

Figure 14. Habitat types and project priority area in GMU 18A, 2019.



Barrier/Fragmentation Mitigation Efforts

Wildlife-Friendly Fence Assessments and Modifications - There are approximately 36 miles of woven wire boundary fence and 6 miles of interior pasture fence on the Cross Mountain Ranch which is the priority focus. The ranch will work with Arizona Antelope Foundation and NRCS to remove and replace the existing fence, with wildlife friendly fencing, starting with the boundary fences and then moving to interior pasture fences that would better facilitate proper livestock management and pronghorn connectivity. AZGFD also intends to seek funding for fence inventories that would aid in understanding the existing barriers to movement, and to strategize for possible mitigation measures that would support ungulate movement. By modifying the fences, we hope to reduce barriers for pronghorn and improve their use of suitable habitat throughout GMU 18A.

Removal of woven wire fencing will be completed using volunteers provided by wildlife conservation organizations. Boundary fencing material provided to lease holders and installation expenses shared between ranches. Cross Mountain Ranch will be applying for NRCS (EQIP) assistance to realign and replace interior pasture fencing to allow for more managed livestock rotation. With the approval of the “Linking the CAGCS and NAGI RCPP,” practices like this will also be allowed under that program.

Wildlife Water Resources

Wildlife water developments - AZGFD Region III has identified the need for as many as 20 new or redeveloped water sources within GMU 18A. These waters are in various stages of development ranging from planning to implementation. The region will focus its efforts on the redevelopment of range improvements, after the wildlife waters currently planned are built.

Figure 15. Pronghorn movements in GMU 18A.

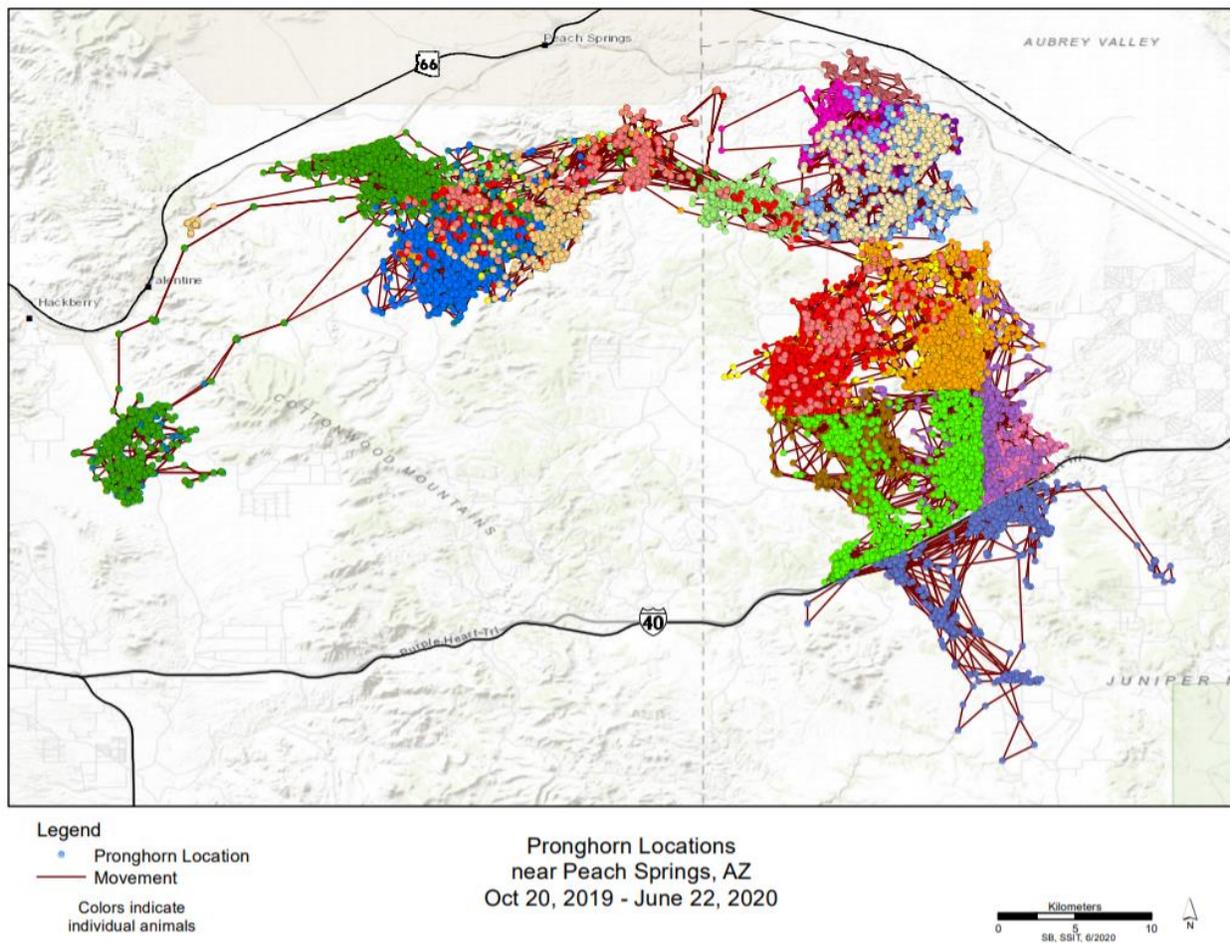
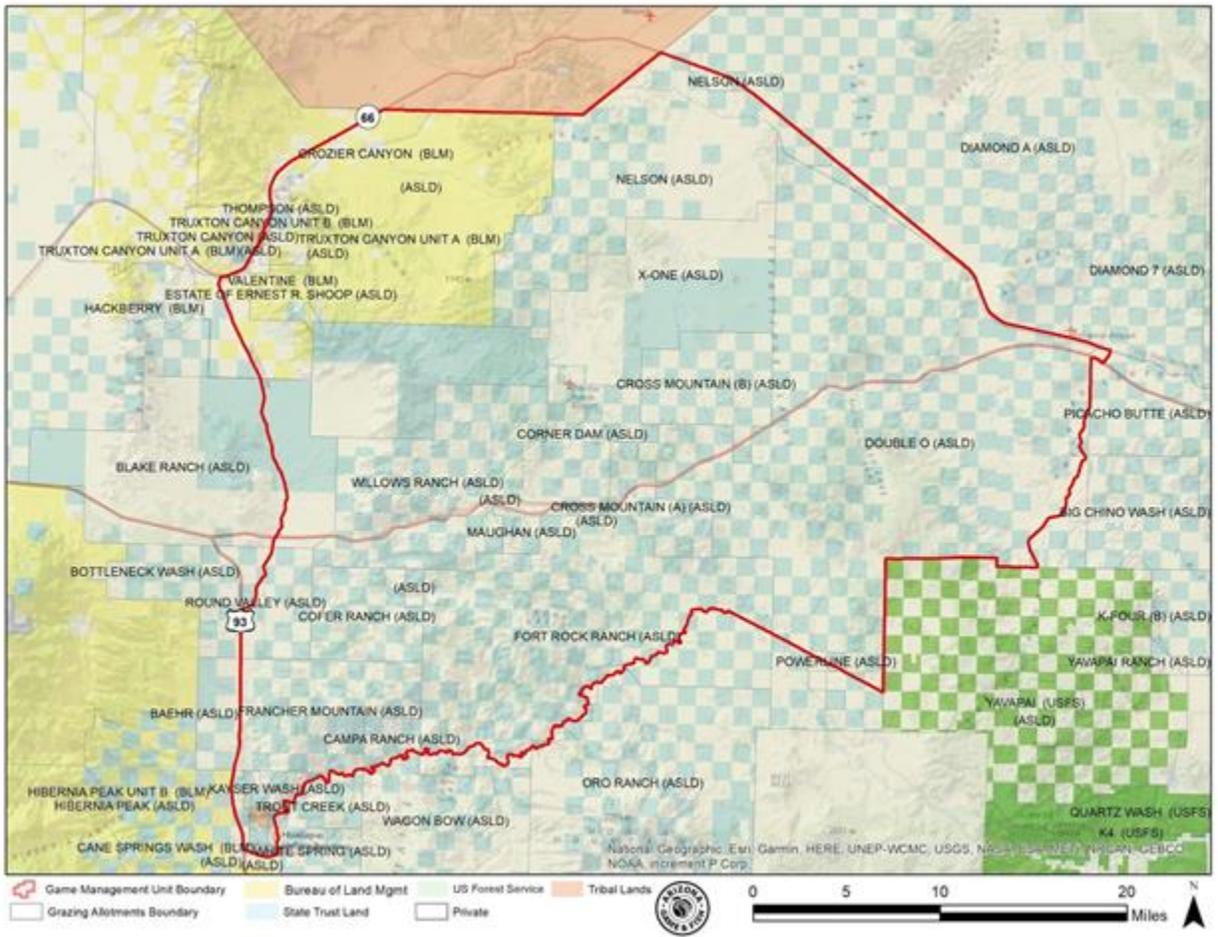


Figure 16. Land ownership/management within the Game Management Unit 18A Corridor.



CURRENT FEDERAL AGENCY ACTIVITIES IN ALL PRIORITY CORRIDORS

BLM Activities

- BLM-Arizona has focused efforts to ensure an Integrated Vegetation Management Program is implemented in cooperation with our partners. The Paunsaugunt to Kaibab Plateau Corridor and Winter Range Priority Area falls within the Kanab Creek Landscape Planning area for the Arizona Strip District. This area covers the existing the Shuttleworth-Suicide Wildlife Habitat Project and Pine Hollow area. In 2020, over 17,800 acres of vegetation treatments, 95 range improvement projects, and five water catchments were completed in the priority corridor. BLM is also planning vegetation projects that will treat 430 acres by mastication, and 2,240 acres by lop and scatter in the Shuttleworth -Suicide Wildlife Habitat Project Area. Vegetation thinning funded through NFWF is expected to begin in October of 2020.
- ES+R activities within the footprint of the Pine Hollow Fire (~11700 acres), are being explored and will likely include a phased seeding application of plant species along with soil stabilization efforts through May 2021.

US Forest Service Activities

In July of 2020, the USDA and State of Arizona signed a Shared Stewardship Memorandum of Understanding to increase coordination and cooperation for work addressing forest health risks and wildfire across the state.

Kaibab National Forest - North Kaibab Ranger District

- 900 acres of PJ mastication was completed along the north eastern boundary of USFS and BLM lands, targeting winter range habitat for the Paunsaugunt to Kaibab Plateau Corridor.
- 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.

- ES+R activities within the footprint of the Mangum Fire (~71,400 acres), are being explored and will likely include: a phased seeding application of plant species along with soil stabilization efforts through May 2021, and redevelopment of damaged wildlife and joint resource wildlife/livestock catchment infrastructure.

Coconino NF - Flagstaff & Red Rock Ranger Districts

- NEPA was completed for the approximately 23,136 acre North Forest Grassland Restoration project on the Flagstaff RD in September 2019. This project is located in the northwest corner of the Forest east of US 180 and is intended to improve movement corridors for pronghorn and other big game through removal of juniper that has encroached into grasslands using mechanical removal and prescribed fire. Phase 1 of the project began in April 2020 with mastication of juniper scheduled to occur on approximately 2,454 acres. Phase 1 was funded through an agreement between AZGFD and the Babbitt Ranch, the grazing allotment permit holder in the project area.
- Additional grassland restoration work is on-going on the Red Rock RD on both the Windmill West and Fossil Creek range allotments. In FY19, approximately 2,924 of juniper removal occurred in these projects efforts with more work planned in FY20.
- The Forest also continues to improve big game habitat in this corridor through prescribed burning and wildfires managed for multiple resource objectives. In FY19, approximately 18,778 acres were treated through planned prescribed fires as well as unplanned lightning-ignited wildfires. These fires helped remove downed logs and woody debris as well as smaller trees that can inhibit big game movement. They also created openings in the canopy through single and group tree torching that will promote shrub, grass, and forb growth in the future.
- Removal of old, dilapidated fence continues across the Forest to reduce potential effects these hazards pose to big game and other wildlife. In FY19, 1.5 miles of fence were removed on the Flagstaff RD near Sunset Crater National Monument.
- The Forest is working on NEPA clearance for improvements of 8 trick tanks to be completed by AZGFD and partners including Arizona Elk Society and Mule Deer Foundation. Most of them are located along US 180 with one located east of US 89. Old vaults will be removed and replaced with a new storage tank and drink to increase water

availability for big game. Clearances are anticipated to be completed in September 2020 with implementation expected to begin shortly thereafter.

Coconino NF - Mogollon Rim District

- The district will work on NEPA clearance in the winter of FY21 for construction of 2 new trick tanks to be completed by AZGFD. Both sites are north of Highway 87 and east of Tremaine Lake.
- Grassland restoration work (funded through an HPC grant) is ongoing at the Bar T Bar allotment, although the district project coordinator expects to have to return FY20 funds due to lack of availability of our equipment operators to implement the work this fall.
- Removal of old, dilapidated barbed-wire fencing continues on the district. In FY20, 1.25 miles of fence were removed within the Buck Springs Allotment.
- The district also continues to improve ungulate habitat through prescribed burning and wildfires managed for multiple resource objectives. In FY19, approximately 27,025 acres were treated through planned prescribed fires as well as unplanned lightning-ignited wildfires. These fires helped remove downed logs and woody debris as well as smaller trees that can inhibit ungulate movement. They also created openings in the canopy through single and group tree torching that will promote grass and forb growth in the future.

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 the Flagstaff to Sedona Corridor is the Black Hills Vegetation Management Project (decision 2011) and the Agua Fria Grasslands Project (decision 2015). In the Grand Canyon to Prescott Corridor Complex is the Chino Landscape Restoration Project. The Chino Landscape Restoration Project was signed in November 2019 covers over half a million acres of wildlife habitat including key migration corridors for pronghorn and year-round habitat for mule deer and elk.
- The Black Hills project is in the Flagstaff to Sedona Corridor, 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 in the Flagstaff to Sedona Corridor and is south of where I-17 bisects the Prescott National Forest to the boundary with the Tonto National Forest to the south. 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 and is contiguous with grasslands projects to the north on the Kaibab National Forest. Work on this project should commence next year. The Chino analysis used AZGFD's pronghorn telemetry data to identify locations for vegetation treatments within corridors to improve and connect areas of pronghorn habitat use and movements.

RESEARCH NEEDS

1) Spatial and Temporal Distribution of Mule Deer in Game Management Units 1 and 27

In recent years, managers of Arizona's 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 currently lacks information on seasonal movements to identify important winter range and migration corridors for mule deer in this area.

GMUs 1 and 27 are located in eastern Arizona (Figure 16). They are flanked by New Mexico (New Mexico 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 USFS and ASLD 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 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, 59 free-ranging elk and 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 New Mexico has crossed over into Arizona (approximately 70 miles from point of origin). This is a concern for AZGFD and knowing more about interstate deer movements in this area will help inform disease management.

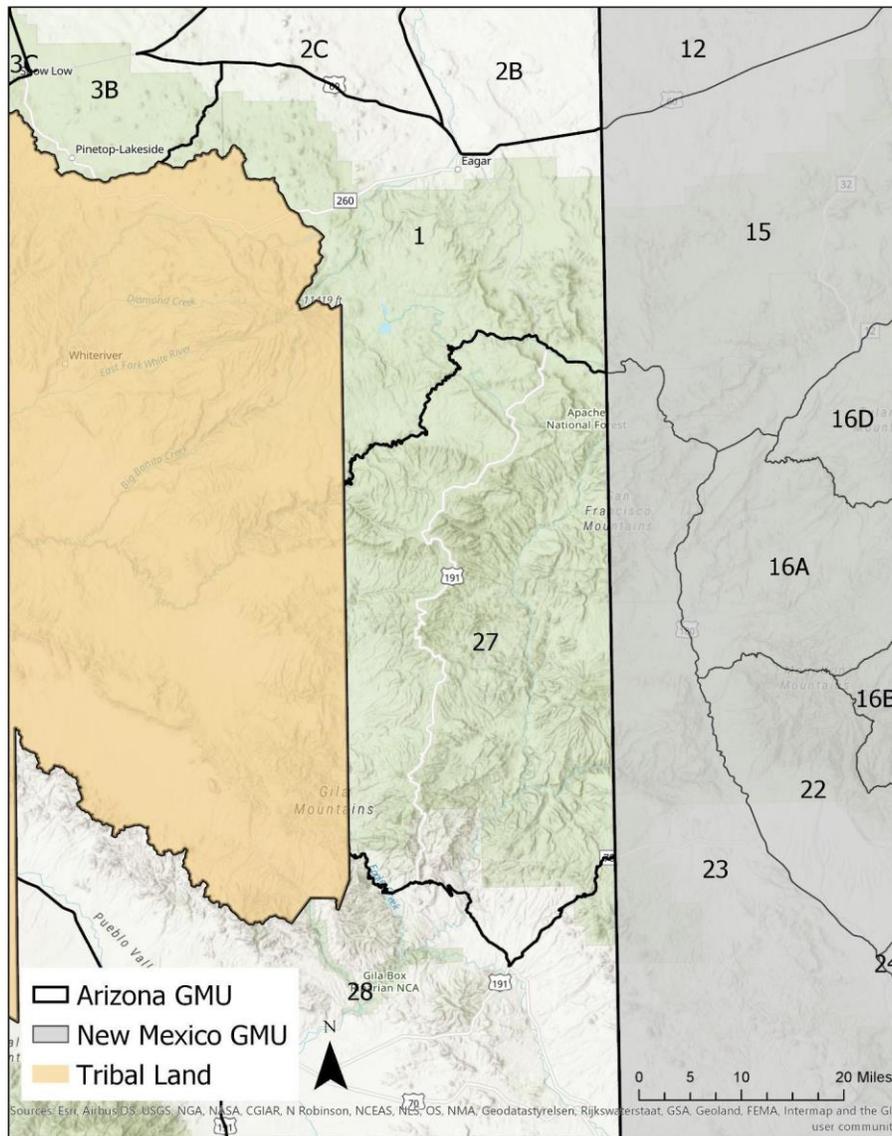
Knowledge of seasonal movement patterns for the GMUs 1 and 27 mule deer population would:

- 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 GMUs during the fall hunts, and
- 4) give AZGFD an understanding of interstate deer movement patterns to better manage risks associated with CWD.

Project Budget:

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

Figure 16. Priority research area in GMUs 1 and 27.



2) Game Management Unit 18A Mule Deer and Pronghorn Linkages

Fences, railroads, and high volume roads are a barrier to big game movement, and a threat to population connectivity within GMU 18A. Current pronghorn collaring efforts have already revealed several impermeable livestock fences as well as long distance movements that are potential migration corridors (Figure 15). However, the full extent of these corridors and movement barriers for pronghorn and mule deer is currently unknown due to limited sample sizes. There are also questions about seasonal mule deer and pronghorn movements between GMU boundaries, such as GMU 15A. Additional pronghorn and mule deer collars are necessary to guide treatments and understand seasonal ranges. Habitat treatments such as fence modifications within the GMU 18A corridor will be more successful when a data-driven approach is used to guide management activities. The restored ability of pronghorn and mule deer to move throughout their range will provide them an opportunity to adapt and increase population resilience.

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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.