U.S. Department of the Interior
Bureau of Land Management
Keystone Peak Prescribed Burn
Environmental Assessment
DOI-BLM-AZ-G020-2015-0009-EA

BLM

NATIONAL SYSTEM OF PUBLIC LANDS

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U.S. Department of the Interior
Bureau of Land Management
Gila District
Tucson Field Office

Environmental Assessment Number
DOI-BLM-G020-2015-0009-EA

Project Name
Keystone Peak Prescribed Burn

Project Location
The project is located in the Sierrita Mountains, approximately 25 miles south southwest of Tucson, Arizona and 10 miles west of Green Valley, Arizona.

Legal Description
Legal- T18S, R11E, S9, 10, 11, 13, 14, 15, 16, 23, 24
Latitude/Longitude- N 31° 51' 55"/ W 111° 11' 42"
County- Pima County
Drainages- Ox Frame Tank and White Iron Canyons

Project Lead
NEPA-Eric Baker, Range Management Specialist, Tucson Field Office
Prescribed Burn-Dan Quintana, Fuels Program Manager, Gila District

Project Description
The prescribed burn is designed to reduce cover and density of shin dagger and shrub species, promote an increase in native perennial grass cover, and re-introduce fire back into the ecology of the landscape. The implementation of a prescribed fire treatment within the Sierrita Mountains is also designed to reduce the fuel loading near Keystone Peak Communications Site.

ACRONYM LIST

After Death – AD
Air Quality -AQ
Altar Valley Conservation Alliance -AVCA
Animal Unit Months -AUMs)
Arizona Department of Environmental Quality –ADEQ
Arizona Game and Fish Department –AZGFD
Arizona State Land Department -ASLD
Arizona State Forestry Division -ASFD
Arizona Statewide Land Use Plan Amendment for Fire, Fuels, and Air Quality Management –LUPA
Best Management Practices –BMPs
Bird Conservation Region -BCR
Bureau of Land Management -BLM
Burned area emergency rehabilitation -BAER
carbon monoxide -CO
Chiricahua Leopard Frog -AM
Clean Air Act -CAA
Code of Federal Regulations -CFR
Cooperator Coordination -CC
Coordinated Resource Management Plan -CRMP
Council on Environmental Quality -CEQ
Concentration - Conc.
Cultural Resources and Native American Religious -CR
Endangered Species Act –ESA
Environmental Assessment - EA
Environmental Impact Statement -EIS
Federal Register –FR
field contact representative –FCR
Finding of No Significant Impact statement -FONSI
Fire Regime Condition Class –FRCC
Flowering Plants -PL
Fuels Treatments –FT
Grazing Management –GM
Historic Climax Plant Community -HCPC
Interdisciplinary Team -IDT
Incident Action Plan -IAP)
Instruction Bulletin -IB
Instruction Memorandum -IM
Jaguar –JA
lead -Pb
Lesser Long-nosed Bat –LB
Major Land Resource Area –MLRA
Memorandum of Understanding -MOU
Micrograms per cubic meter -$\mu g/m^3$
Migratory Bird Treaty Act -MBTA
Minimum Impact Suppression Tactics -MIST
National ambient air quality standards –NAAQS
National Environmental Policy Act –NEPA

National Historic Preservation Act -NHPA
Natural Resource Conservation Service -NRCS
National Wildfire Coordinating Group -NWCG
nitrogen dioxide -NO2
nitrogen oxides -NOx
Not Present –NP
oxides of sulfur -SOx
ozone -O3
particle pollution with aerodynamic diameters less than 2.5 micrometers -PM2.5
particle pollution with aerodynamic diameters less than 10 micrometers - PM10
Present, not Affected –NI
Present with Potential Impact –PI
Parts per billion –ppb
Parts per million –ppm
Noxious and Invasive Weeds -NW
off-road vehicle -ORV
Phoenix District Resource Management Plan -PDRMP
Primary Constituent Elements -PCEs
Public Law –PL
Rehabilitation and Restoration -RR
Right of way
Riparian and Aquatic Habitat -RA
Risk Management –RM
Road Maintenance –RM
Simple Approach to Smoke Emissions Modeling -SESEM
State Wildlife Action Plan -SWAP
Sonoran Desert Conservation Plan -SDCP
Species of Greatest Conservation Need -SGCN
sulfur dioxide -SO2
The Nature Conservancy -TNC
Threatened and Endangered -T&E
Tucson Field Office –TFO
United States Code –USC
U.S. Environmental Protection Agency -USEPA
U.S. Fish and Wildlife Service –USFWS
U.S. Forest Service -USFS
Visual Resource Management –VRM
volatile organic compounds -VOCs
Washington Office -WO
Wildland fire suppression –FS
Wildland Urban Interface -WUI

1 Introduction

This Environmental Assessment (EA) has been prepared to analyze and disclose the environmental consequences of the Keystone Peak Prescribed Burn project as proposed by the Bureau of Land Management (BLM), Tucson Field Office (TFO). The EA is a site-specific analysis of potential impacts that could result with the implementation of a proposed action or alternatives to the proposed action. The EA assists the BLM in project planning and ensuring compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] § 4321, as amended), Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] 1500-1508 [1997]), and BLM NEPA Handbook H-1790-1, and in making a determination as to whether any "significant" impacts could result from the analyzed actions ("significance" is defined by NEPA and is found in regulation 40 CFR 1508.27). An EA provides evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact statement (FONSI). If the decision maker determines that this project has "significant" impacts following the analysis in the EA, then a Notice of Intent for an EIS would be prepared for the project. If there are no significant impacts, a Decision Record may be signed for the EA, approving the selected alternative, whether the proposed action or another alternative. A Decision Record, including a FONSI, documents the reasons why implementation of the selected alternative would not result in "significant" environmental impacts (effects).

1.1 Background

Wildfire occurrence has decreased dramatically during most of the twentieth century. This decline in wildfire occurrence can be attributed to several human influenced factors including fire suppression polices and grazing practices. The influence of human factors, coupled with increased erosion in the uplands, entrenchment of drainage corridors and periodic severe weather events has led to changes in desert grassland structure and composition throughout southern Arizona. In many cases the vegetative changes led to a type conversion of native grasslands to shrublands. Some studies have shown that approximately 3.5 million acres of the shrub-invaded native grasslands have the potential for restoration back to native grass dominated ecosystems utilizing integrated vegetation management techniques (Gori and Enquist 2003).

Fire has played an important role in the Altar Valley's ecology prior to Euro-American settlement. Fires were fairly frequent in southern Arizona grasslands prior to 1882 and much larger in aerial extent within the grasslands. The cessation of major grassland fire preceded the brush invasion of the 1890s. Research further suggests that desert grasslands in this area likely burned once every 8–12 years. Those fire regimes likely played a crucial role in maintaining the area's grasslands by suppressing woody species and encouraging new growth.

Fire is an essential ecological process in many fire dependent ecosystems. In large areas of the country, fire exclusion from these ecosystems has led to unhealthy forest, woodland and rangeland conditions. These areas are at risk of intense, severe wildfires that threaten communities and cause significant damage to key ecological components. As one component of fire management, prescribed fire is used to alter, maintain, or restore vegetative communities; achieve desired resource conditions; and to protect life, property, and values that would be degraded and/or destroyed by wildfire (AVCA 2008).

Without continued efforts to improve, enhance, and maintain the desert grassland ecosystems found in the desert southwest fire exclusion, grazing, urban expansion, and soil erosion will continue to support and promote the shift from perennial grass dominated grasslands to shrub dominated landscapes. This shift to shrublands could be irreversible in many areas throughout the southwest if efforts are not taken to prevent it (AVCA 2008).

In recent years, the steady increase of woody and succulent (shin dagger) species and decrease of herbaceous species in the Altar Valley has resulted in a renewed interest in restoring fire to the ecosystem—both in its natural form (fire for resource benefit) and as a management tool (prescribed fire). The Altar Valley Conservation Alliance (AVCA) was formed in the mid-1990s by ranchers in the Altar Valley as a first step in addressing the restoration and enhancement of native grasslands in the Alter Valley. (AVCA 2008) Today the AVCA is comprised of a consortium of cooperating agencies and organizations cooperatively working together to improve the restorable grassland ecosystems found in southern Arizona. The consortium includes:

- Natural Resource Conservation Service (NRCS);
- U.S. Fish and Wildlife Service (USFWS);
- Buenos Aires National Wildlife Refuge;
- Arizona Game and Fish Department (AZGFD);
- Arizona State Land Department (ASLD);
- Arizona State Forestry Division (ASFD);
- Pima County Natural Resources, Parks and Recreation Division (Pima County);
- The Nature Conservancy (TNC);
- Sierrita Mining and Ranching Company; and
- BLM.

The Sierrita Mining and Ranching Company are the private land owners within the project area; they are also the grazing allotment lessee, a partner in the AVCA, and a co-operator/contributor to the burn implementation process. They will provide equipment and personnel to complete road maintenance, provide an area for base camp during burn operations, and control access to the project area through private land.

The Keystone Peak Prescribed Burn Unit (project area) is located in the Sierrita Mountains, approximately 25 miles south southwest of Tucson, Arizona and 10 miles west of Green Valley, Arizona (Figure 1-1). There are several towers on Keystone Peak, most of which are critical to wireless services in this area. The Arizona Department of Public Safety has a tower where one BLM repeater and one BLM repeater control station is hosted. In addition to law enforcement radios, the Department of Public Safety tower hosts Department of Corrections, AZGFD, Emergency Medical Services, Interagency Radio System stations, military range support equipment, and Arizona Department of Transportation equipment. It also houses a link in the southern loop of the statewide telecommunications microwave network. The U.S. Border Patrol also has a tower there (which hosts National Park Service, Drug Enforcement Administration, and Federal Bureau of Investigation antennae among others). Pima County also has equipment. All of the wireless phone companies operating in this area have equipment there, and all of those towers are critical to local wireless services. The Keystone Peak Communications site is critical infrastructure for Federal, State, and local agencies and provides continuity of operations for health and safety to law enforcement, fire, and resources personnel. In the event of a significant loss at Keystone Peak, critical communications capability would be lost that would affect Southwest Border operations for various Federal, State and local agencies.

1.2 Purpose and Need

The purpose of the Proposed Action is twofold. First it is to implement prescribed fire treatments; in cooperation with Federal, State, County, local, and non-profit agencies and partners, to maintain a mixture of woodlands, shrublands and grasslands while reducing woody plant encroachment and reducing invasive plant species through the reestablishment of fire as a naturally functioning and sustaining component of the ecosystem. The reduction in cover of shin-dagger and shrubs will improve wildlife habitat and increase the cover and density of native perennial grasses. Second, it is to reduce the fuel loading around the Keystone

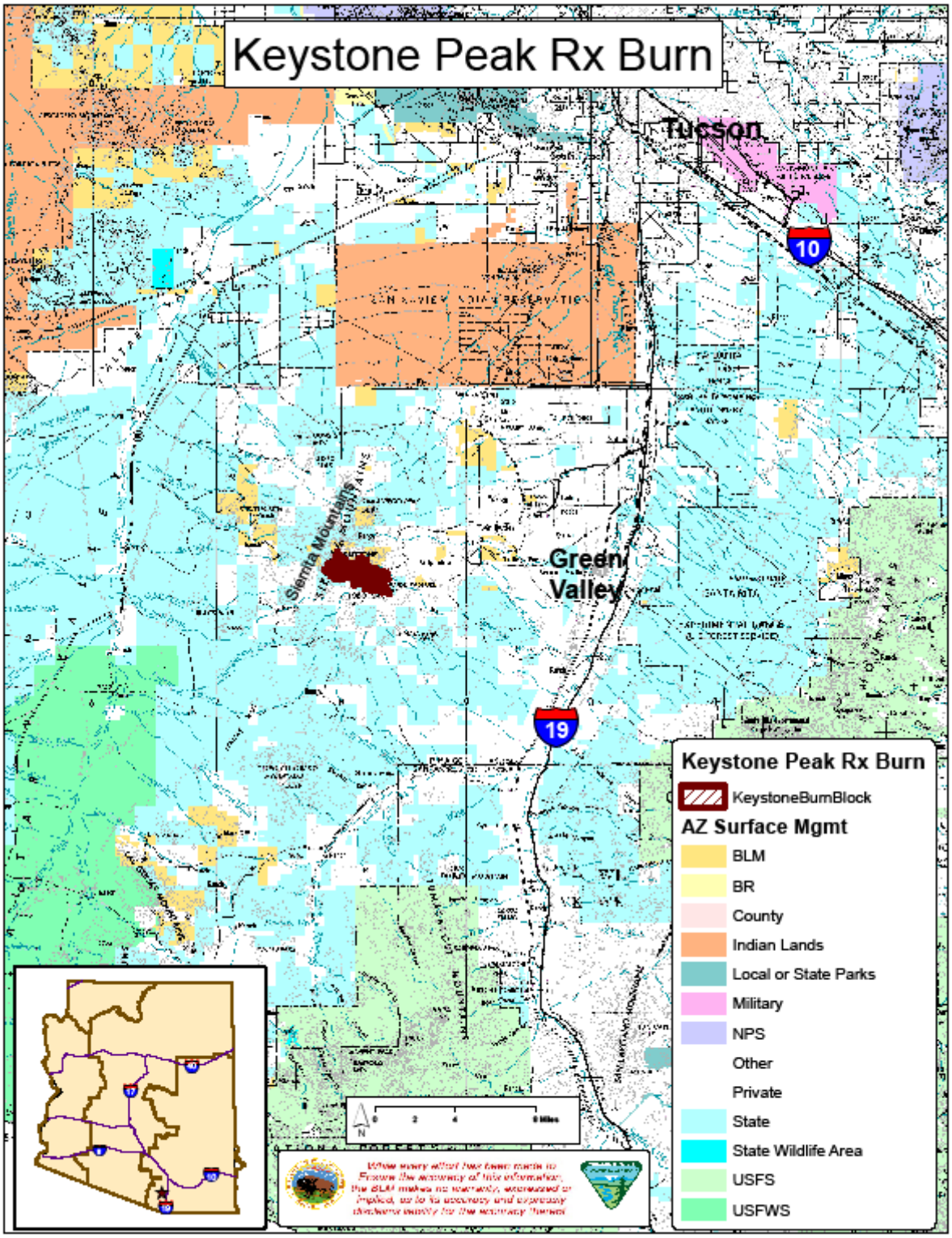

Figure 1 1. Project area Vicinity Map.

Peak Communication Site. The reduction in fuel loading will aid in protection of the communication site during wildfire events.

The need for the proposed action is to meet the objectives outlined in the *National Fire Plan's National Cohesive Wildland Fire Management Strategy*, *Phoenix District Resource Management Plan* (PDRMP), and the *Arizona Statewide Land Use Plan Amendment for Fire, Fuels, and Air Quality Management* (LUPA). These objectives include restoring resilient landscapes within their natural range of variation in plant cover, composition, structure, and function. Currently 63 percent of the vegetation within the project area is not within Fire Regime Condition Class (FRCC) 1. This shows that the vegetation is moderately or highly departed from reference conditions (based of natural fire return intervals).

1.3 Decision to be Made

The BLM would decide whether or not to authorize the implementation of the Keystone Peak Prescribed Fire treatment.

1.4 Conformance with Land Use Plan

This proposed action has been reviewed to determine if it conforms to applicable land use plan terms and conditions as required by 43 CFR 1610.5, BLM MS 1617.3.

The proposed action is in conformance with the PDRMP and Final EIS, approved in 1988, as amended by the LUPA.

The LUPA and Record of Decision were approved in 2004.

The proposed action is consistent with the LUPA Land Use Allocation 1-Wildland Fire Use: Areas suitable for wildland fire use for resource management benefit:

- Areas where wildland fire is desired, and there are few or no constraints for its use. Where conditions are suitable, unplanned and planned wildfire may be used to achieve desired objectives, such as improve vegetation, wildlife habitat or watershed conditions, maintain non-hazardous levels of fuels, reduce the hazardous effects of unplanned wildland fires and meet resource objectives. Where fuel loading is high but conditions are not initially suitable for wildland fire, fuel loads are reduced by mechanical, chemical or biological means to reduce hazardous fuels levels and meet resource objectives (includes Wildland Urban Interface [WUI] areas), (BLM 2004a).

The proposed action is consistent with the LUPA Desired Future Conditions:

- Each vegetation community is maintained within its natural range of variation in plant composition, structure, and function, and fuels loads are maintained below levels that are considered to be hazardous, (BLM 2004A)
- Plains and Great Basin Grasslands-The Desired Future Conditions are for a predominance of perennial grass cover, reduced cover of annual grasses, and for fire to naturally inhibit the invasion of woody shrubs such as rabbitbrush, snakeweed, and big sage brush, (BLM 2004a).

The proposed action is consistent with the LUPA Management Actions:

- In areas suitable for fire where fuel loading is high, BLM will utilize biological, mechanical or chemical treatments, and some prescribed fire to maintain non-hazardous levels of fuels and meet resource objectives, (BLM 2004a).
- For all fire management activities (wildfire suppression, appropriately managed wildfire use, prescribed fire, and mechanical, chemical, and biological vegetation treatments), Conservation Measures will be implemented as part of the Proposed Action to provide statewide consistency in reducing the effects of fire management actions on federally threatened, endangered, proposed, and candidate ("Federally protected") species, (BLM 2004a)

1.5 Scoping and Issues

1.5.1 Internal Scoping

The BLM convened an Interdisciplinary Team (IDT) and conducted internal scoping within the BLM TFO to define issues, alternatives, and data needs. As part of internal scoping the IDT helped to formulate the purpose and need, identify connected and cumulative actions associated with the project, and decide on the appropriate level of NEPA documentation.

1.5.2 External Scoping

BLM Fire Managers met with the AVCA several times during the spring and summer of 2009 to discuss the potential to coordinate resources to implement a prescribed fire treatment in the Keystone Peak Area. BLM and AVCA worked together to identify the burn unit and the objectives for the burn treatment. AVCA applied for grant funding to contract pre-treatment monitoring and draft burn plan preparation, these were completed in 2010.

1.5.3 Issues Identified

The following issues were identified during the scoping process and will be analyzed in further detail in Chapters 3, 4, and 5.

Air Quality

- What would be the effect of the prescribed burn on Air Quality?

Cultural Resources

- What would be the effects of the prescribed burn and handline construction on cultural resource values such as the historic ranch house?

Native American Religious Concerns

- What would be the effects of the prescribed burn to Native American religious sites?

Wildlife and Fisheries

- What would be the effects of the prescribed burn to wildlife habitat cover?
- What would be the effects of the prescribed burn on Migratory Birds?
- What would be the effects of the prescribed burn to BLM Sensitive species?

Threatened, endangered, and Candidate Species

- What would be the effects of the prescribed burn to the jaguar?
- What would be the effects of the prescribed burn to the ocelot?
- What would be the effects of the prescribed burn to the Lesser long-nosed bat?
- What would be the effects of the prescribed burn to the Chiricahua leopard frog annd its critical habitat?
- What would be the effects of the prescribed burn to the Pima pineapple cactus?
- What would be the effects of the prescribed burn to the Sonoran desert tortoise?

Rangeland Health

- What would be the effects of the prescribed burn on rangeland health?

Grazing Management

- What would be the effects of the prescribed burn on grazing management?

Soils

- What would be the effects of the prescribed burn on soil erosion potential?

2 Description of Alternatives

2.1 Proposed Action

In response to a fire plan brought forward by AVCA, BLM proposes to implement a 2,670-acre prescribed fire treatment within the Sierrita Mountains in cooperation with Federal, State, County, local, and non-profit agencies and partners, that is designed to maintain a mixture of woodlands, shrublands and grasslands while reducing woody plant encroachment and reducing invasive plant species through the reestablishment of fire as a naturally functioning and sustaining component of the ecosystem. The prescribed fire treatment will be a broadcast burn implemented with ground/hand ignition tools and techniques. A glossary of terms related to prescribed fire is found in Appendix A.

The project area is located in Pima County in the Sierrita Mountains approximately 25 miles south southwest of Tucson and 10 miles west of Green Valley, Arizona (see Figure 2-1). Table 2-1 shows acreage by land ownership in the project area.

Table 2-1. Acreage by Land Ownership.

Land Ownership	Acreage	Percent of Burn Unit
State	851	32%
Private	942	35%
BLM	877	33%
Total	**2,670**	**100%**

Private land is owned by the Sierrita Mining and Ranching Company. The Sierrita Mining and Ranching Company is the grazing permittee and is a part of the AVCA.

2.1.1 Resource Management Objectives

The Proposed Action resource management goals and objectives include:

- Within shrub-invaded native grasslands, kill 30 percent to 70 percent of the half shrubs, and maintain native-grass dominance with mesquite densities at less than 10 percent;
- Within shrub-invaded non-native grasslands, top kill 30 percent to 70 percent of mesquites less than 4 inches in diameter, stimulate native grass production, and maintain mesquite densities at less than 10 percent;
- Within mesquite woodlands, top kill 20 percent to 50 percent of mesquites less than 6 inches diameter, and maintain total shrub and mesquite canopy cover at 10-25 percent;
- Within oak, juniper, and/or piñon-oak canyons; reduce the 1-hour fuels by 30 to 80 percent, the 10-hour fuels by 10 to 40 percent, the 100-hour fuels by 1 to 10 percent, and 1,000-hour fuels by 1 to 20 percent; and
- Reduce shin dagger cover, but limit reduction of shin dagger cover to less than 50 percent.

2.1.2 Pre-burn Preparation Work

Prior to implementing the prescribed burn, pre-burn preparation work will take place. Prep work consists of:

- Road maintenance to ensure safe and passable roads conditions for fire equipment and personnel;

- Brushing of roads to reduce fire behavior along control lines;

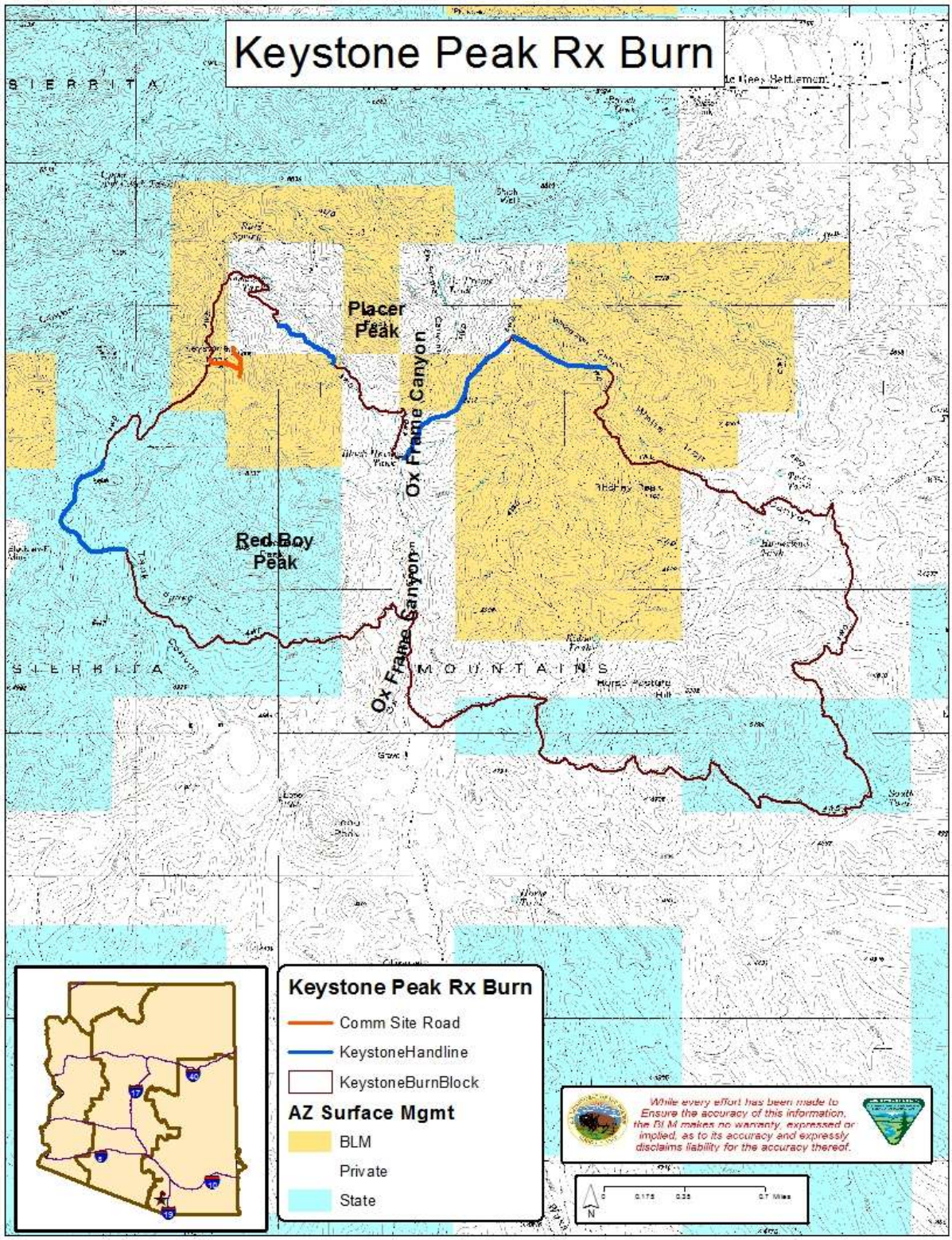

Figure 2-1: Project Area Land Status.

- Cultural survey of handline portions of the project area boundary; and
- Construction of handline along the portions of the project area boundary that are not on roads.

Pre-burn prep work will take approximately 2 to 10 days and will be completed by BLM equipment and personnel or by co-operators in coordination with the BLM.

2.1.3 Ignition Techniques

After a successful test burn is completed, ignition would start around the communication site. After the communication site is secured, burning would continue along the northern and southern perimeters.

Strip and backing fires would be the preferred ignition method to achieve an adequate buffer along unit boundaries (blackline). Strip head fires (short/moderate runs and duration), may be used to help promote fire in areas of sparse fuel and/or to promote a mosaic burn pattern. The ignition phase of the burns would not last longer than 10-14 hours each day of ignition. Two firing teams of 1-4 lighters would be used to complete the ignition phase of the burn, additional lighters would be obtained from holding forces as needed to complete ignition operations. Drip torches would be the primary ignition devices used to ignite the fuels. Alternative ignition devices (flare gun, hand toss flares, fuses) would be utilized as needed. No aerial ignitions would be utilized. The use of these ignition devices would be determined by the Burn Boss and Ignition Specialist(s) after careful consideration of fuels, weather, and fire behavior. Ignition would cease when the fire is not meeting management objectives.

2.1.3.1 Ignition Sequences

Burning around the communications site and power line would be done during higher humidity and lower temperatures (low fire intensity end of the prescription). Burning the lines (blackline) around the boundary of the fire would also be done under these conditions. After communications sites and power line are secured, burning would continue to the south and east until the southernmost portion of the area is reached. After that section is secured, burning would commence from the communication sites on the west side of the fire to the south to tie in with the burning completed on the east side. After the perimeter is secured, a burn crew would start at the south end of the burn and fire both sides of Ox Frame Canyon as they move to the north perimeter, if needed to assure proper burn coverage. If the Burn Boss determines that it is feasible, in the preliminary stages, after the communication sites and power line are protected, burn crews can start burning on each side of the burn working toward final tie-in on the south boundary.

The Burn Boss, Firing Boss, and Holding Boss would coordinate black line and interior firing sequences. Changes in wind direction caused by topography may cause the burn sequence to be changed. This decision would be made by the Burn Boss on-site at the time.

2.1.3.2 Ignition Patterns

Ignition patterns would be determined on site by the Burn Boss and Firing Boss. On-site wind direction, topography, and fire behavior would play a large role in determining firing pattern. Firing patterns may be adjusted as needed to achieve desired mosaic burn pattern.

2.1.3.3 Ignition Staffing

The Burn Boss will coordinate with the Firing Boss to identify ignition staff when preparing the Incident Action Plan (IAP). The IAP is the briefing document that contains maps, objectives, resources, assignments, communications plan, medical plan, etc. for a prescribed burn or wildfire operational shift. Ignition staff size would depend on the type of ignition devices and patterns being utilized during firing operations.

2.1.4 Minimum Organization or Capabilities Needed

The minimum organization is outlined in the Burn Plan (Table 2-2). This outline of equipment and staffing represents the minimum needs for implementation of the Proposed Action. The Burn Boss and Firing Boss are not identified as collateral duty positions, all other positions can be collateral duty. If positions are assigned as collateral duty they would be identified in the safety briefing prior to ignition.

Table2-2. Organization and Equipment.

PERSONNEL		**AMOUNT SUPPLIED BY**	
POSITION	**TOTAL AMOUNT**	**BLM**	**OTHER**
Burn Boss (RXB2)*	1	1	
Firing Boss (FIRB)*	2	2	
Holding Specialist (Engine Boss or Crew Boss)**	2	2	
Water Tender	1	0	
Heavy Engine Crew (3 person crew)	1 (3)	1 (3)	
Light Engine Crew (2 person crew)	5 (10)	2 (4)	
Hand/Ground firing	8	8	
Holding	12	12	
Resource Advisor	1	1	
Logistics Coordinator	1	1	
Total Personnel	**41**	**34**	
EQUIPMENT			
Ignition Equipment			
Drip Torch	10		
Hand held firing devices	2		

*Indicates positions that may not be filled as collateral duty.

**Indicates positions that may fill collateral duties. This is the minimum amount needed for the operation; additional resources can be utilized as needed.

2.1.5 Holding Plan

2.1.5.1 General Procedures for Holding

Holding forces would spread out along the control lines following the ignition team as directed by the Burn Boss and Firing Boss. The holding forces would continue to patrol the control lines until fire activity has significantly decreased and/or relative humidity has recovered and the temperatures have fallen. Holding forces are not expected to be subjected to long durations in smoke filled environment. If smoke becomes a factor, crews would be rotated in and out of the area.

The Water Tender would be parked at the crossroads on the main road leading into the burn area on the northeast side of the burn. At least one engine would be stationed at the historic ranch house in Section 9

until that section of line is secure. The historic ranch house is on the main road to communication site and is easily seen from the road.

2.1.5.2 Critical Holding Points and Actions

Potential holding problems would not be expected due to pre-burn preparation work (clearing around power poles, communication site, road maintenance, pre-burn notifications) and the use of backing fires along downwind control lines (blacklining). Pre-burn preparation work, adequate holding forces, pre-burn safety briefing, and proper ignition techniques would decrease the risk of holding problems.

2.1.5.3 Counter Measures for Slopover

In the event of a slopover, all ignitions would stop, unless further ignitions are needed to prevent more slopover, and the holding forces would flank the slopover until forward rates of spread have been stopped. The Holding Boss would coordinate the slopover containment efforts. In the event that the slopover escapes initial attack or if it appears the slopover cannot be contained by forces on hand, the burn would be declared a wildfire. After slopover is contained, the Burn Boss would make the determination whether or not to proceed with the burn. A Maximum Manageable Area has not been delineated.

2.1.6 Scheduling

The best time to ignite this burn would be during the months of late April, May or Early June, with the month of May preferred. The BLM proposes this time of year because it is as close to when fires would occur naturally without monsoonal weather causing fire behavior beyond BLM's control (erratic winds, downdrafts), yet still close enough to the time of year when fires would be ignited naturally (onset of monsoon season, lightning strike) and the natural moisture cycle that follows, to have a positive effect on the environment.

Burnout of boundary lines would take place when rising humidity and lowering temperatures would moderate burning conditions. After lines have been burned out, the interior would be allowed to burn during the higher end of the prescription to produce a hot fire to kill the most brush and target species. Burning during this season would mimic historic natural ignitions. There are adequate holding features to burn out the communication sites and along the power line before burning the lines on the downwind portions of the perimeter. The topography is broken by deep canyons which will allow time to blackline for two shifts.

Preparation work would take approximately 2 to 3 days, clearing around the power line and communication sites and building the handline. Burning would take approximately two days and monitoring and mop up would take approximately one day.

2.1.7 Monitoring

Vegetation monitoring will be done at three locations on the proposed Keystone Burn on the McGee Ranch, Sierrita Mining and Ranching, Inc. The monitoring protocol was developed by Dr. Ron Tiller for use on the Las Cienegas National Conservation Area (BLM). It was designed to sample the effects of land treatments like prescribed fire and mechanical mesquite removal upon target shrub species and herbaceous plant communities. Monitoring will take place pre- treatment, one year post-treatment and three years post-treatment to evaluate the effects of the prescribed burn.

The protocol employs a 109-yard baseline permanently marked by steel T-posts at both ends. On steep slopes where 109 yards is not possible on one slope and aspect the baseline will be broken into two 54.5-yard legs each marked by a T-post at both ends. All transects will be located within 218 yards of a road providing ready access.

Herbaceous vegetation (point cover) is recorded at half yard intervals (200 hits) along the 109-yard tape. Measurements include; foliar and basal cover by plant species, ground cover (litter, gravel, rock, cryptogams and bare soil) and standing litter (dead more than a year) cover. Shin-dagger will be included in the herbaceous measurements as it grows in dense stands intermingled with perennial grasses. Photographs are taken at each end of the transect line in the four cardinal directions each year and immediately before and after the planned fire. A placard showing the title (Keystone Burn), date, transect number, photographer and location will appear in each photograph.

Trees, shrubs and succulents are recorded in belt transects along the 109-yard baseline. A 2.2-yard belt on either side of the baseline is used to record the size and canopy dimensions of all woody and succulent (shin dagger, agave, prickly pear, etc.) plants, by species, rooted in the belt. The belt will be marked by an observer with a 2.2-yard PVC pole moving along the baseline. Shrub hits are recorded at the meter reading along the baseline tape. Size (height) and canopy (live) width are recorded by species. Dead canopy can be recorded as well if necessary.

Line intercept by species and size class of all woody and succulent plants will be recorded along the 109-yard baseline.

Other data recorded at each transect include GPS location, azimuth of the baseline, elevation, precipitation and notes applicable to the current season. At the time of actual burning fire behavior and fire climate measurements should be taken at each transect area as it burns. This information includes temperature, relative humidity, wind direction and speed, rate of spread, estimated flame lengths and time of day.

Transect field data forms and excel spreadsheets developed by TNC for use by the BLM at Las Cienegas National Conservation Area will be used to record and store field information.

Rain gauges will be made out of 30 inch lengths of 2 inch PVC pipe and tied to a transect T-post. They will be charged with a 50/50 mixture of antifreeze and auto transmission fluid (1-2 inches) and read at least once a year (preferably twice; in the spring and fall).

Transects will be located in two different vegetative / fuel types on the project area.

Two monitoring locations will be in the desert grassland area on steep south slopes in communities dominated by perennial grasses and shin-dagger. Most of these areas have not burned in the last 100 years (Photos 1 and 2).

Photo 1. Shin-dagger. **Photo 2. Native perennial grasses.**

Photos 1 and 2 show dense stands of shin-dagger (*Agave schottii*) and native perennial grasses on the lower slopes south of Red Boy Peak (left) and Placer peak (right). Other shrubs and succulents include palo dulce (*Eysenhardtia polystachya*), prickly pear (*Opuntia chlorotica*), mimosa species (*Mimosa biuncifera* and *Mimosa dysocarp*a), mesquite (*Prosopsis velutina*), sotol (*Dasyliron wheeleri*), prickly pear (*Opuntia engelmanii*) and ocotillo (*Fouqueria splendens*).

A third location (Photo 3) will be in the higher elevation grassland where perennial grasses dominate the understory vegetation oak species dominate the over-story. Most of these areas have burned in the recent past and have light loads of woody fuels.

Photo 3. Mexican live-oak savannah below Keystone Peak.

Mexican live-oak savannah below Keystone Peak has an understory of bear grass, native perennial grasses and forbs. Dominant tree species include Arizona white oak (*Quercus arizonica*), Mexican blue oak (*Quercus oblongifolia*), and Emory oak (*Quercus emoryi*). Other species include manzanita (*Arctostaphylos pungens*), bear grass (*Nolina microcarpa*), mescal (*Agave parryi*), and juniper (*Juniperus depeanna and Juniperus monosperma*).

The baseline key areas have already been established in July of 2010 and have since been reread in 2014. The summarized data is location in Section 3.3.1.

2.2 Proposed Action Project Design Features

The project design features consist of specific means, measures, or practices that are designed to reduce or eliminate adverse effects due to implementation of the Proposed Action. The following best management practices (BMPs) and conservation measures are identified as Project Design Features for the proposed action. Each conservation measure has been given an alphanumerical designation for organizational purposes (e.g., FS-1).

2.2.1 Best Management Practices

BMPs are defined by BLM Handbook H-1601-1 as a suite of techniques that guide or may be applied to management actions for achieving desired outcomes. BMPs are measures considered highly applicable to management actions related to integrated vegetation management that can be applied on a site-specific basis to reduce or avoid adverse environmental or social impacts.

2.2.1.1 Air Quality (AQ)

- **AQ-01** All prescribed fire treatments will be registered with ADEQ on an annual basis.
- **AQ-02** Arizona Department of Environmental Quality (ADEQ) Burn Plan, Simple Approach to Smoke Emissions Modeling (SESEM) smoke modeling for particle pollution with aerodynamic diameters less than 2.5 micrometers and 10 micrometers (PM 2.5 and PM 10) particulates, day and night estimated smoke dispersal maps, and a vicinity map will be submitted to the ADEQ for each prescribed fire treatment (piles).
- **AQ-03** ADEQ burn permit will be requested and obtained prior to any prescribed fire treatments.
- **AQ-04** Use of road signs with "Smoke Ahead" and "Prescribed Fire In Progress" in areas where smoke may impact road corridors.
- **AQ-05** Use appropriate dust abatement techniques when needed.
- **AQ-06** Public notification of prescribed fires planned will take place prior to burn implementation.
- **AQ-07** Public notifications will be coordinated with the Public Affairs Specialist and generally includes newspaper, radio, and posted notices.

2.2.1.2 Cooperator Coordination (CC)

- **CC-01** Access to private land will need to be granted by the land owner prior to treatment implementation.
- **CC-02** Communication sites may require coordination with the communication site user group two to three weeks prior to treatment implementation.
- **CC-03** State Land Treatment Application- Sierrita Mining and Ranching Company would submit the application for the land treatment. BLM will check with ASLD Lessee, Sierrita Mining and Ranching 90 days prior to expected ignition to assure the ASLD required permit for a range improvement (prescribed burn) has been granted.
- **CC-04** BLM partners may assist in the preparation of control lines on BLM land once approval is obtained. Coordination with the Burn Boss will be required.
- **CC-06** BLM will coordinate with Federal, State, County, and private land cooperators during implementation of proposed treatments.
- **CC-07** Coordination with TRICO Electric Company two to three weeks prior to ignition operations to ensure that the powerline is de-energized during burning operations.
- **CC-08** Coordination with Communication Site User Group to ensure safety of personnel at site and to ensure adequate notification to user group.
- **CC-09** Sierrita Mining and Ranching should be contacted at least one month prior to ignition to allow them to improve roads and move barriers on blocked roads.
- **CC-10** The Border Patrol would scout the burn unit for undocumented aliens prior to ignition.
- **CC-11** Burn implementation- The BLM would be the lead agency and supply overhead positions, TNC will supply equipment and personnel, other cooperators would supply personnel and equipment as they, subject to National Wildfire Coordinating Group (NWCG) qualification standards.
- **CC-12** Monitoring-The BLM, TNC, and AVCA will complete pre and post burn monitoring. The NRCS will provide technical support.

2.2.1.3 Cultural Resources and Native American Religious (CR)

The following Cultural Resource Best Management Practices will occur during implementation of the proposed action.

- **CR-01** All ground disturbing activities will follow Section 106 guidelines of the National Historic Preservation Act (NHPA) which state that, all ground disturbing activities will be surveyed at Class III levels prior to treatment implementation (handline construction). All cultural resource sites located on the survey will be avoided as well as avoidance of all previously recorded sites. These sites will be flagged and identified as no entry buffer areas by the BLM TFO archaeologist prior to treatment implementation.

- **CR-02** All non-ground disturbing activities will be coordinated with the BLM TFO Archeologist prior to treatment implementation.
- **CR-03** A Class I record search will be completed for all treatments prior to project implementation.

The following Cultural Resource Mitigation Stipulations will apply in case new sites are unearthed during project implementation (handline construction).

- **CR-04** Any archaeological or historical artifacts or remains, or vertebrate fossils discovered during operations shall be left intact and undisturbed; all work in the area shall stop immediately; and the BLM TFO Archaeologist shall be notified. Commencement of operations shall be allowed upon clearance by the Assistant Field Manager.
- **CR-05** An additional cultural and paleontological resource survey may be required in the event the project location is changed or additional surface disturbing operations are added to the project after the initial survey. Any such survey would have to be completed prior to commencement of operations.
- **CR-06** If in connection with operations under this authorization, any human remains, funerary objects, sacred objects or objects of cultural patrimony as defined in the Native American Graves Protection and Repatriation Act (Public Law [PL]. 101-601; Statute 3048; 25 USC. 3001) are discovered, the Burn Boss, Project Manager, or Crew Supervisor shall stop operations in the immediate area of the discovery, protect the remains and objects, and immediately notify the BLM TFO Archaeologist and the Field Office Manager (or authorized officer) of the discovery. The Burn Boss or Crew Supervisor shall continue to protect the immediate area of the discovery until notified by the BLM TFO Archaeologist and the Field Office Manager (or authorized officer) that operations may resume.
- **CR-07** Section 106 of the NHPA requires government agencies to take into account the effect of an undertaking on all federal lands. Since the proposed project involves an undertaking that may require ground disturbing activities, for example; handline construction, mechanical grubbing, off-road vehicle and equipment use, the project area will be surveyed (Class I & Class III) for cultural resources prior to implementation of the fireline and infrastructure preparation work.
- **CR-08** Upon completion of the Class III cultural resource survey, the BLM TFO Archaeologist will supervise the implementation phase (handline construction), which includes protection and preservation of the cultural resource sites discovered on the survey. This task will be accomplished by the installation of flagged buffer areas that will serve as avoidance areas during all phases of project implementation. The Fuels Program Manager shall review the prescribed cultural resource protection treatments with the BLM TFO archaeologist and ensure that a copy of the cultural resource report summary is placed in the project folder.
- **CR-09** All identified cultural sites will be avoided during ground disturbing activities such as line construction, clearance around infrastructure, and certain types of off road vehicle travel. The BLM TFO archaeologist will be consulted during control line scouting and placement and will have the opportunity to visit proposed control lines with Fuels Program Manager/Project lead prior to construction.

2.2.1.4 Minimum Impact Suppression Tactics (MT)

Minimum Impact Suppression Tactics (MIST) principles will be utilized to the extent possible during implementation of the proposed action.

- **MT-01** Minimize cutting of snags to those that pose safety concerns or poses a threat to the integrity of the proposed fire breaks. Snags that are identified for removal will be surveyed and cleared for occupancy by wildlife by a biologist prior to removal.
- **MT-02** Minimize off road travel during vegetation treatments to the extent possible.
- **MT-03** Avoid treatment unit boundaries that run in a straight line to the extent possible.
- **MT-04** Avoid ground disturbing activities within identified cultural sites.
- **MT-05** Flush cut stumps to avoid creating stabs (stumps that end in a point).
- **MT-06** Flush cut limbs flush with the trunk or branch of trees (to avoid branches or limbs cut mid-way and leaving partial branches)

- **MT-07** Mow grasses and small shrubs within the foot print of the treatment units, leaving stubble height of 2”-6”; no fireline will be constructed down to mineral soil to mineral soil to reduce erosion potential.
- **MT-08** Agaves and cacti will not be removed during implementation of the proposed action.
- **MT-09** Handline (control line down to mineral soil) will utilize existing trails and natural features (areas of sparse or no vegetation) to the extent possible to minimize ground disturbance.
- **MT-10** Water tenders would be used onsite for use by engines. No drafting or pumping from tanks within the project area would be allowed.

2.2.1.5 Noxious and Invasive Weeds (NW)

The following noxious weed best management practices will be utilized during implementation of the proposed action.

- **NW-01** All equipment utilized from out of the local area will be pressure washed prior to arriving on site for treatment implementation
- **NW-02** All BLM equipment will be cleaned prior to being moved from one area to the next.
- **NW-03** BLM will supply onsite equipment and vehicles with an area to pressure wash equipment and vehicles upon completion of treatments and prior to demobilization from treatment area.

2.2.1.6 Risk Management (RM)

The following Risk Management BMPs will be utilized to due reduce risk to personnel during implementation of the proposed action.

- **RM-01** A Risk Management Worksheet (Department of the Interior Form 1112-5) will be completed for all identifiable potential safety concerns that may be encountered during implementation of the proposed action. The risk management worksheet also identifies mitigations measures to reduce the risk potential. The risk management worksheet will be reviewed and signed by the appropriate level of management depending on the level of residual risk. Risk management worksheets are a required part of a burn plan.
- **RM-02** An IAP will be developed and utilized during implementation of the proposed action. IAPs identify resources, assignments, objectives, safety concerns, weather, medical plans, communications, contingency plans, holding plans, and ignition plans. These are used during pre-burn briefings.
- **RM-03** Safety briefing will be held prior to implementation of the proposed actions, all resource assigned to the prescribed burn are required to attend.

2.2.1.7 Road Maintenance (RM)

- **RM-01** Standard road maintenance guidelines established in the BLM Roads Manual 9113 and the BLM Primitive Roads Design Handbook 9115.
- **RM-02** All road maintenance will be in conformance with existing Land Use Plans.
- **RM-03** All road maintenance activities will fall within the foot print of existing roads.
- **RM-04** All road maintenance activities will be implemented according to the road classification and maintenance standards outlined in the in area transportation plans.
- **RM-05** Coordination with BLM Gila District Office supervisory facility operations specialist.
- **RM-06** Road maintenance may be completed before and after treatments to reduce the impacts to the road surface due to extra traffic by heavy equipment and support vehicles.
- **RM-07** Road maintenance may be completed before and after treatment implementation to maintain safe driving conditions for equipment and personnel.
- **RM-08** Road maintenance will be implemented with rubber tired or tracked equipment such as dozer, road grader, or tractor with gannon box attachment and supported by water tenders or vehicles pulling a water buffalo to provide adequate moisture for proper road surface repair.
- **RM-09** Road maintenance includes cleaning of bar ditches and repair of existing water bars.

2.2.1.8 Grazing Management (GM)

The following grazing management best management practices may be utilized by BLM range management specialists prior to, during, or following implementation of the proposed action. These best management practices are designed to; reduce the impacts of the proposed action of grazing operations, reduce impacts of grazing operations on post-treatment vegetation recovery, ensure BLM coordination withlessee, and allow for appropriate management of grazing operations:

- **GM-01** Dormant season livestock grazing (October through June) will be done through approval of the grazing management portion of the Coordinated Resource Management Plan (CRMP) on a yearly basis dependent on precipitation and forage production.
- **GM-02** The proposed action does not include an increase in the available Animal Unit Months (AUMs) in individual grazing allotments post treatment.
- **GM-03** Coordination with the affected livestock lessee within the allotment being treated would be conducted prior to any treatment occurring.
- **GM-04** Any livestock grazing closure for the purpose of the vegetation treatment would be done through the grazing decision or agreement process and would occur prior to the treatment.
- **GM-05** Livestock grazing would not be authorized within the treatment areas during implementation of the selected alternative.
- **GM-06** After the deferment period, a deferred rotational grazing system will be implemented on the remainder of the pastures to allow herbaceous cover to re-grow, regain vigor, produce seed, and establish new plants when climatic conditions are favorable.
- **GM-07** Monitoring data will be collected within key areas and will be used to guide the grazing management of the allotment.

2.2.2 Fire/Fuels Conservation Measures

Wildland fire suppression (FS) measures may not be required unless the fire escapes the project area. Other conservation measures below (fuels treatment, rehabilitation and restoration, riparian and aquatic habitat, and species-specific measures) are mandatory as outlined in the LUPA and are also mandatory design features to limit negative impacts on listed species. Necessary modifications of the conservation measures or impacts to federally protected species and habitat during fire suppression operations will be documented by the resource advisor, and coordinated with the USFWS.

2.2.2.1 Wildland Fire Suppression (FS)

- **FS-01** Protect known locations of habitat occupied by federally listed species. BMPs and MIST will be followed in all areas with known Federally protected species or habitat (Appendix U, *Interagency Standards for Fire and Aviation Operations 2003*, or updates)
- **FS-02** Resource advisors will be designated to coordinate natural resource concerns, including federally protected species. They will also serve as a field contact representative (FCR) responsible for coordination with the USFWS. Duties will include identifying protective measures endorsed by the Field Office Manager, and delivering these measures to the Incident Commander; surveying prospective campsites, aircraft landing and fueling sites; and performing other duties necessary to ensure adverse effects to federally protected species and their habitats are minimized. On-the-ground monitors will be designated and used when fire suppression activities occur within identified occupied or suitable habitat for federally protected species.
- **FS-03** All personnel on the fire (firefighters and support personnel) will be briefed and educated by resource advisors or designated supervisors about listed species and the importance of minimizing impacts to individuals and their habitats. All personnel will be informed of the conservation measures designed to minimize or eliminate take of the species present. This information is best identified in the incident objectives.
- **FS-04** Permanent road construction will not be permitted during fire suppression activities in habitat occupied by federally protected species. Construction of temporary roads is approved only if necessary for safety or the protection of property or resources, including federally protected species

habitat. Temporary road construction should be coordinated with the USFWS, through the resource advisor.

- **FS-05** Crew camps, equipment staging areas, and aircraft landing and fueling areas should be located outside of listed species habitats, and preferably in locations that are disturbed. If camps must be located in listed species habitat, the resource advisor will be consulted to ensure habitat damage and other effects to listed species are minimized and documented. The resource advisor should also consider the potential for indirect effects to listed species or their habitat from the siting of camps and staging areas (e.g., if an area is within the water flow pattern, there may be indirect effects to aquatic habitat or species located off-site).
- **FS-06** All fire management protocols to protect federally protected species will be coordinated with local fire suppression agencies that conduct fire suppression on BLM-administered lands to ensure that the agency knows how to minimize impacts to federally protected species in the area.
- **FS-07** The effectiveness of fire suppression activities and conservation measures for federally protected species should be evaluated after a fire, when practical, and the results shared with the USFWS and AZGFD. Revise future fire suppression plans and tactical applications as needed and as practical.

2.2.2.2 Fuels Treatments (FT)

The following conservation measures are mandatory when implementing wildland fire use, prescribed fires and the proposed vegetation treatments (mechanical, chemical, biological).

- **FT-01** Biologists will be involved in the development of prescribed burn plans and vegetation treatment plans to minimize effects to federally protected species and their habitats within, adjacent to and downstream from proposed project sites. Biologists will consider the protection of seasonal and spatial needs of Federally protected species (*e.g.*, avoiding or protecting important use areas or structures and maintaining adequate patches of key habitat components) during project planning and implementation.
- **FT-02** MIST will be followed in all areas with known federally protected species or habitats.
- **FT-03** Pre-project surveys and clearances (biological evaluations/assessments) for federally protected species will be required for each project site before implementation. All applicable conservation measures will be applied to areas with unsurveyed suitable habitat for federally protected species, until a survey has been conducted by qualified personnel to clear the area for the treatment activity.
- **FT-04** Use of motorized vehicles during prescribed burns or other fuels treatment activities in suitable or occupied habitat will be restricted, to the extent feasible, to existing roads, trails, washes, and temporary fuelbreaks or site-access routes. If off-road travel is deemed necessary, any cross-country travel paths will be surveyed prior to use and will be closed and rehabilitated after the prescribed burn or fuels treatment project is completed.
- **FT-05** As part of the mandatory fire briefing held prior to prescribed burning, all personnel (firefighters and support personnel) will be briefed and educated by resource advisors or designated supervisors about listed species and the importance of minimizing impacts to individuals and their habitats. All personnel will be informed of the conservation measures designed to minimize or eliminate take of the species present.

2.2.2.3 Rehabilitation and Restoration (RR)

- **RR-01** When rehabilitating important areas for federally listed species that have been damaged by fire or other fuels treatments, the resource specialists will give careful consideration to minimizing short-term and long-term impacts. Someone who is familiar with fire impacts and the needs of the affected species will contribute to rehabilitation plan development. Appropriate timing of rehabilitation and spatial needs of federally listed species will be addressed in rehabilitation plans.
- **RR-02** Seed from regionally native or sterile non-native species of grasses and herbaceous vegetation will be used in areas where reseeding is necessary following ground disturbance to stabilize soils and prevent erosion by both wind and water.
- **RR-03** Sediment traps or other erosion control methods will be used to reduce or eliminate influx of ash and sediment into aquatic systems.

- **RR-04** Use of motorized vehicles during rehabilitation or restoration activities in suitable or occupied habitat will be restricted, to the extent feasible, to existing roads, trails, or washes, and to temporary access roads or fuelbreaks created to enable the fire suppression, prescribed burn, or fuels treatment activities to occur. If off-road travel is deemed necessary, any cross-country travel paths will be surveyed prior to use and will be closed and rehabilitated after rehabilitation or restoration activities are completed.
- **RR-05** All temporary roads, vehicle tracks, skid trails, and off-road vehicle (ORV) trails resulting from fire suppression and the proposed fire management activities will be rehabilitated (water bars, etc.), and will be closed or made impassible for future use.
- **RR-06** Burned area emergency rehabilitation (BAER) activities and long-term restoration activities should be monitored, and the results provided to the USFWS and AZGFD. Section 7 consultations for BAER activities will be conducted independently, if necessary.

2.2.2.4 Wildland Fire Suppression & Rehabilitation - Riparian and Aquatic Habitat (RA)

The following conservation measures will be implemented during fire suppression operations in riparian, wetland, or aquatic habitats, unless firefighter or public safety, or the protection of property, improvements, or natural resources, render them infeasible during a particular operation. Necessary modifications of the conservation measures or impacts to Federally protected species and habitat during fire suppression operations will be documented by the resource advisor, and coordinated with the USFWS.

Wildland Fire Suppression (including adaptively managed wildfires) and Rehabilitation

- **RA-01** During wildfire suppression, apply MIST within riparian habitats occupied by Federally protected species or designated areas that drain into Federally protected fish habitat. Fire suppression actions in riparian habitats should be prioritized to minimize damage to stands of native vegetation from wildfire or suppression operations. To the extent possible, retain large, downed woody materials and snags that are not a hazard to firefighters.
- **RA-02** Fire suppression and rehabilitation in riparian corridors with federally protected fish or wildlife species will be coordinated with the resource advisor or qualified biologist approved by BLM.
- **RA-03** Site-specific Fire Management Plans that include project areas with federally protected aquatic or riparian-obligate species will specify fire management objectives and wildland fire suppression guidance, taking into account the special concerns related to these species.
- **RA-04** In riparian areas use natural barriers or openings in riparian vegetation as the easiest, safest method to manage a riparian wildfire. Where possible and practical, use wet firebreaks in developing or sandy overflow channels rather than constructing firelines by hand or with heavy equipment.
- **RA-05** Construction or development of a crossing for motorized vehicles across a perennial stream will not be permitted, unless an established road already exists or where dry, intermittent sections occur.
- **RA-06** Avoid the use of fire retardants or chemical foams in riparian habitats or within 300 feet of aquatic habitats, particularly sites occupied by federally protected species. Apply operational guidelines as stated in the *Interagency Standards for Fire and Fire Aviation Operations 2003 (or updates),* "Environmental Guidelines for Delivery of Retardant or Foam Near Waterways," Chapter 8 (pp. 8-13 through 8-15).
- **RA-07** Priority for placement of fire camps, fire staging areas, and aircraft landing or refueling sites will be outside riparian habitats or river/stream corridors.
- **RA-08** When using water from sources supporting federally protected species, care must be taken to ensure adverse impacts to these species are minimized or prevented. Unused water from fire abatement activities will not be dumped in sites occupied by federally protected aquatic species to avoid introducing non-native species, diseases, or parasites.
- **RA-09** Stock tanks will not be refilled with water from another tank, lakes, or other water sources that may support non-native fishes, bullfrogs, crayfish, or salamanders.
- **RA-10** Use of containment systems for portable pumps to avoid fuel spills in riparian or aquatic systems will be required.

- **RA-11** All conservation measures for wildland fire suppression (**RA-1** to **RA-10**) also apply to fuels treatment activities (prescribed fire; mechanical, chemical, and biological treatments) in riparian, wetland, and aquatic habitats.
- **RA-12** Fire management treatments within or adjacent to riparian and aquatic habitats will be designed to provide long-term benefits to aquatic and riparian resources by reducing threats associated with dewatering and surface disturbance, or by improving the condition of the watershed and enhancing watershed function.
- **RA-13** For priority fire/fuels management areas (*e.g.*, WUIs) with Federally protected species or designated critical habitat downstream, BLM biologists and other resource specialists, as appropriate, in coordination with USFWS and AZGFD, will determine:
    - The number of acres and the number of projects or phases of projects to occur within one watershed per year.
    - An appropriately-sized buffer adjacent to perennial streams in order to minimize soil and ash from entering the stream.
    - Where livestock grazing occurs in areas that have been burned, specialists will determine when grazing can be resumed. Such deferments from grazing will only occur when necessary to protect streams from increased ash or sediment flow into streams. (see footnote 1 in the LUPA).
    - If agreement cannot be reached or treatment will not meet fuel reduction objectives, BLM will reinitiate consultation.

[1] The Interagency Burned Area Emergency Stabilization and Rehabilitation Handbook, Exhibit 4-2, BLM supplemental guidance, page 5 or 9 (http://fire.r9.fws.gov/ifcc/ESR/handbood/4PolicyGuidance.htm) establishes the following policy for livestock exclusion following burns: Exclusion of livestock is critical for the recovery of burned vegetation or establishment and maintenance of new seedings and use of these areas should not be permitted until the vegetation recovers or is established. Both revegetatated, and burned but not revegetated areas, will be closed to livestock grazing for at least two growing seasons following the season in which the wildfire occurred to promote recovery of burned perennial plants and/or facilitate the establishment of seeded species. Livestock permittees must be informed of the closure early during the plan preparation process, and livestock closures will be made a condition or term on the grazing license or permit through the issuance of grazing decision (see 43 CFR 4160). Livestock closures for less than two growing seasons may be justified on a case-by-case basis based on sound resource data and experience. Livestock management following seedling establishment and/or burned area recovery should maintain both non-native and/or native species to meet land use (including Standards for Rangeland Health and Guidelines for Grazing Management) or activity plan objectives. BLM's authority to make these types of changes is in the regulations at 43 CFR 4110.3-3(b).

Species Specific Conservation Measures

In addition to the general conservation measures listed (above), the following species-specific conservation measures shall be required during fuels treatment activities (prescribed fire; vegetation treatments). Necessary modifications of the conservation measures or impacts to federally protected species and habitat during fire suppression operations will be documented by the resource advisor, and coordinated with the USFWS.

2.2.3 Amphibians

2.2.3.1 Chiricahua Leopard Frog (AM)

- **AM-1** Implement the conservation measures for fire management activities in riparian and aquatic habitats.
- **AM-2** For fire management sites with habitat for the Chiricahua leopard frog, un-surveyed sites will be considered occupied unless surveyed prior to project implementation.
- **AM-3** Install sediment traps, as determined by a resource advisor or qualified biologist approved by BLM, upstream of tanks and ponds occupied by Chiricahua leopard frogs to minimize the amount of ash and sediment entering the water. Consultation with a qualified biologist during the planning phase will aid in determining sediment trap installation requirements (see conservation measures FT-1 and FT-3).

- **AM-4** All personnel performing fire management activities at any creek crossing will be informed of the potential presence of Chiricahua leopard frogs, their status, and the need to perform their duties to avoid impacts to the frog and its habitat.
- **AM-5** Except as needed in emergency situations to abate the immediate fire threat or loss of life or property, no water would be drafted for fire suppression from bodies of water known to be occupied by the Chiricahua leopard frog.

2.2.4 Flowering Plants (PL)

The following conservation measures for all federally protected plant species within the planning area will be implemented during fire suppression to the extent possible, and are mandatory for wildland fire use, prescribed fire and vegetation treatment activities:

- **PL-1** Known locations and potential habitat for plant populations will be mapped to facilitate planning for wildland fire use, prescribed fires, and vegetation treatments, and to ensure protection of these populations during fire suppression.
- **PL-2** BLM will coordinate with FWS to delineate buffer areas around plant populations prior to prescribed fire and vegetation treatment activities. BLM will coordinate with USFWS during any emergency response and wildland fire use activities to ensure protection of plant populations from fire and fire suppression activities.
- **PL-3** During fire suppression, wildland fire use, and prescribed fire in habitat occupied by federally protected plant species, no staging of equipment or personnel will be permitted within 109 yards of identified individuals or populations, nor will off-road vehicles be allowed within the 109-yard buffer area, unless necessary for firefighter or public safety or the protection of property, improvements, or other resources (see FS-7). One of the primary threats to many of these plant species is trampling/crushing from personnel and vehicles.
- **PL-4** No prescribed burning will be implemented within 109 yards of identified locations for federally protected and sensitive plant populations unless specifically designed to maintain or improve the existing population.

2.2.5 Mammals

2.2.5.1 Jaguar (JA)

- **JA-1** Implement the conservation measures for fire management activities in riparian and aquatic habitats to minimize adverse effects to jaguars that may occur in dense riparian habitats on BLM-administered lands.
- **JA-2** Maintain dense, low vegetation in major riparian or xero-riparian corridors on BLM-administered lands in identified locations south of Interstate 10 and Highway 86. Locations will be identified in site-specific fire management plans.

2.2.5.2 Lesser Long-nosed Bat (LB)

- **LB-1** Instruct all crew bosses (wildfire suppression, managed wildfire, prescribed fire, and vegetation treatments) in the identification of agave and columnar cacti and the importance of their protection.
- **LB-2** Prior to implementing any fuels treatment activities (prescribed fire, vegetation treatments), pre-project surveys will be conducted for paniculate agaves and saguaros that may be directly affected by fuels management activities.
- **LB-3** Protect long-nosed bat forage plants -- saguaros and high concentrations of agaves -- from wildfire and fire suppression activities, and from modification by fuels treatment activities (prescribed fire, vegetation treatments), to the greatest extent possible. "Agave concentrations" are contiguous stands or concentrations of more than 20 plants per acre. Avoid driving over plants, piling slash on top of plants, and burning on or near plants. Staging areas for fire crews or helicopters will be located in disturbed sites, if possible.
- **LB-4** No seeding/planting of nonnative plants will occur in any wildfire rehabilitation site or fuels treatment site with paniculate agaves or saguaros.

- **LB-5** A mitigation plan will be developed by the BLM in coordination with the USFWS for prescribed fires or fuels management projects (mechanical, chemical, biological treatments) within 0.5 mile of bat roosts or in areas that support paniculate agaves or saguaros. The mitigation plan will ensure that effects to bat roosts and forage plants are minimized and will include monitoring of effects to forage plants. The plan will be approved by the USFWS.
- **LB-6** (Recommended) BLM personnel would examine concentrations of agaves (including shindagger – *A. schottii*) within each proposed fuels treatment area, and blackline or otherwise protect from treatments any significant concentrations of agaves that appear to be amidst fuel loads that could result in mortality greater than 20 percent (>50 percent for *A. schottii).* BLM personnel would determine which significant agave stands are prone to mortality greater than 20 percent (>50 percent for *A. schottii*) (see conservation measures FT-1 and FT-3).

2.2.6 Additional Design Features

Chiricahua Leopard Frog

The upper portions of Ox Frame and other major canyons with down-gradient springs/seeps shall be burned with backing fire since the ignition operations will start on the uphill side of the burn unit. Blacklining operations will occur during early evening and into nighttime hours to take advantage of lower temperatures and higher humidities. Utilizing these methods should allow for a mosaic burn pattern in the upper portions of the canyon. Patches of unburned vegetation should allow for decreased amounts of water and sediment runoff.

Sediment trap installation within canyons, as a required conservation measure, will be designed by BLM hydrologist and biologists. The sediment traps will be implemented after the prescribed fire, but before the end of June (the beginning of monsoon season). Netting used in waddles shall not be used in order to prevent wildlife entrapment hazard.

Sonoran Desert Tortoise

As a design feature, the Standard Mitigation Measures For Projects in Sonoran Desert Tortoise Habitat (2008) and the Guidelines for Handling Desert Tortoises (2007) would be mandatory measures for this prescribed fire.

Rare plants

As a design feature, the exact route of all handlines shall be surveyed prior to the prescribed fire by a biologist/botanist for Pima Indian mallow and avoidance measures shall be taken to avoid individual plants or avoid erosion around plants, if any plants are found.

Specific locations of the rare agave hybrid (*Agave palmeri x Agave schottii*) shall be identified by qualified BLM biologists/botonists and provided and/or marked for fire staff. Each hybrid agave shall have flammable materials removed from around the agave immediately prior to the prescribed fire.

Bats

As a design feature, fire staging or activity areas shall not occur around abandoned mines or natural outcrops where bat roosts may occur .

Migratory birds

Preferred timing avoidance for prescribed fire at Keystone for priority migratory birds are from March through mid-June, with preferred timing for prescribed fire during February/very early March or late June before monsoon. Late

June timing would coincide with timing of natural fire starts during the time of year when lightning strikes before rain begins in early July.

Wildlife

Burnout of major xeroriparian areas will take place in the evening just before sunset and continuing into the night and morning when rising humidity and lowering temperatures will moderate burning conditions. The upper and lower portions of OxFrame and other major canyons shall be burned with backing fire since the ignition operations will start on the uphill side of the burn unit. Utilizing these methods described should allow for a mosaic burn pattern in the upper portions of the canyon, and still allow for a movement corridor for wildlife. Riparian values to be protected include live vegetation, density, cover, and species richness of vegetation, woody debris, snags, cavities, and loose bark.(Figure X; see also mandatory Conservation Measures for jaguar JA-1 and JA-2).

As a design feature for this prescribed fire, it is required that all livestock troughs or other structures that do not allow wildlife escape are retrofitted with wildlife escape ramps, if not already completed

As a design feature for this prescribed fire to preserve Mearn's quail and band-tailed pigeon habitat, techniques shall be utilized during prescribed fire, such as night burning or black-lining, in order to reduce fire intensity on slopes with mature oaks in order to minimize burning of oaks and removal of oak overstory.

No Action Alternative

Under this alternative, there would not be a prescribed burn at Keystone Peak. The BLM would continue with full suppression as outlined in the *Gila District Fire Management Plan 2013*. BLM would suppress natural or human-caused wildland fires by first addressing the safety concerns of firefighters and the public and then addressing resource concerns. Private lands and structures located near this management area require protection from wildfire. The priority appropriate management action is to prevent wildfires from spreading to private land.

Regarding Threatened and Endangered (T&E) species, the conservation measures as outlined in Appendix B of the LUPA would be complied with.

2.3 Alternatives Considered but Eliminated from Detailed Analysis

Mechanical control of shrubs on these soils would not be possible. Soil surfaces are very rough with high cover of gravel and rock. Rock-outcrop covers 5–10 percent of the area and slopes range from 3–60 percent. Mechanical control that disturbs the soil surface (root-plowing, bulldozing) can lead to increased erosion by disrupting protective cover of gravel and rock, and exposing sub-soils high in clay. Mowing treatments involve the least amount of soil disturbance of mechanical methods, but would only top-kill the shrubs. Acacia species, mesquite, and catclaw mimosa are sprouting species and would quickly re-assume dominance after top removal. Mechanical control using an excavator would not be feasible due to the small stem sizes of the whitethorn, the roughness of the terrain, and the sheer number of plants per acre. Therefore, this alternative was not considered for further analysis.

Fire for Resource Benefit, or the use of naturally ignited wildfire to meet resource objectives, would not be a viable option. The project area consists of multiple land ownerships, including BLM, State, and private land in discontinuous parcels. State land and private land do not allow for the use of wildfires for resource benefit.

2.5 Relationship to Statutes, Regulations, or Other Plans

The proposed action would comply with the following laws and/or agency regulations, and are consistent with applicable federal, state, and local laws, regulations, and plans to the maximum extent possible (Table 2-3).

In addition to the protection afforded by the MBTA and associated policy guidelines, the Bald and Golden Eagle Protection Act, as amended, affords supplementary protection to all bald and golden eagles.

Per the 2010 MOU between the BLM and USFWS, the BLM shall, at the project level, evaluate the effects of the BLM's actions on migratory birds during the NEPA process, focusing first on species of concern, priority habitats, and key risk factors (MOU VII.F).

Table 2-3. Applicable Guidance, Laws, and Regulations.

Regulation	Agency	Permit/Approval	Regulated Activity
NEPA of 1969 (42 U.S.C. § 4321 et seq.)	BLM	FONSI or preparation of an EIS	Federal action
Arizona Water Quality Standards (18 Arizona Administrative Code, Chapter 11, Article 1)	State of Arizona	Conformity Determination	Federal implementation of a proposed action may result in water quality impacts that could exceed levels noted in 18 Arizona Administrative Code, Chapter 11, Article 1.
Endangered Species Act (ESA) of 1973, as amended (7 U.S.C. § 136, 16 USC § 1531 et seq.)	USFWS	Concurrence or Consultation	Potential impacts to threatened and endangered species.
Executive Order 13186: Responsibilities of Federal Agencies to Protect Migratory Birds (Migratory Bird Treaty Act), January 11, 2001	BLM	Compliance	Potential impacts to migratory birds.
Migratory Bird Conservation Act of 1934 (16 USC § 715 et seq.)	USFWS	Compliance	Potential impacts to migratory birds.
MBTA of 1918 (16 USC § 703-712)	USFWS	Compliance	Potential impacts to migratory birds.
Public Rangelands Improvement Act of 1978, Title II (43 USC 1901 et seq.)	BLM	Compliance	Range improvements.
Federal Noxious Weed Act of 1974, 7 USC §§ 2801-2814, January 3, 1975, as amended 1988 and 1994	BLM	Compliance	Range improvements.

Executive Order 13186	BLM and USFWS	Compliance	Conservation of migratory bird populations
Gila District Fire Management Plan 2013	BLM, Gila District	Compliance	Fire and Fuels Management Program Guidance
Pima County Community Wildfire Protection Plan 2013	Federal, State, County, Local Emergency Management	Wildland urban interface, wildfire risk rating and values at risk	Hazardous fuels reduction guidance
Bald and Golden Eagle Protection Act of 1940 (16 USC §§ 668-668d)	USFWS	Compliance	Potential impacts to bald and golden eagles.
Federal Land Policy and Management Act of 1976 (43 USC § 1701-1785)	BLM	Compliance	Grazing allotments.

2.6 Summary of Impacts

The potential environmental impacts associated with implementation of each alternative are presented and compared to each other in Table 2-4. For a detailed description of potential environmental consequences, refer to Chapter 3, Affected Environment, Environmental Consequences, and Mitigation Measures.

Table 2-4. Summary of Impacts.

Resource Area	Proposed Action	No Action Alternative
Air Quality	There would be direct and indirect, short term impacts to air quality, however, the BLM would implement BMPs AQ-1 through AQ-7 to keep these impacts to a minimum. Due to the short nature of the prescribed burn (less than three days) there would be no long term direct or indirect impacts. Since the ADEQ would be granting a permit for this project the project would not result in an exceedance of the air quality standard.	There would be no significant impacts from implementation of the No Action Alternative. Under the No Action Alternative conditions would remain the same; there would be no change. Cultural resources would not be affected.
Cultural Resources	Any cultural resource sites identified as part of the project would be avoided. Thus there would be no adverse impacts to cultural resources.	Under the No Action Alternative conditions would remain the same; there would be no change. Cultural resources would not be affected.
Grazing Management	There would be adverse short term, direct impact to the grazing program since cattle would not be	Under the No Action Alternative, any wildland fire starts would be fully suppressed. Thus, the

	allowed to graze. However, the Proposed Action would result in a more diverse native grassland community within the allotment which would be a beneficial, long term indirect impact to the grazing program.	adverse, short term direct impacts that would occur under the Proposed Action would not occur under the No Action Alternative because the forage would not be lost and grazing would be allowed after the fire. However, the beneficial, long term indirect effects would occur under the Proposed Action would not occur under the No Action Alternative since there would not be an opportunity for native grasses to recolonize the area.
Land Health	Implementation of the Proposed Action would result in an increase in perennial grasses and provide more forage and cover for the allotment. Thus it would be a positive long term benefit for land health.	Under the No Action Alternative, any wildland fire starts would be fully suppressed. Thus, the beneficial, long term indirect effects that would occur under the Proposed Action would not occur under the No Action Alternative since there would not be an opportunity for native grasses to recolonize the area
Native American Religious Concerns	An official project description letter was sent out to the Tribes informing them about the Keystone Peak Prescribed Burn project and asking them for their input. No response was received.	Under the No Action Alternative conditions would remain the same; there would be no change. Native American religious concerns would not be affected.
Soils	Sediment traps and other erosion control methods would minimize erosion in soils with a "Moderate" rating. Sediment traps and other erosion control methods as well as reseeding bare areas would minimize soil erosion in soils with a "Severe" rating.	Under the no action alternative, soils will remain at their current state with no short term adverse effects. No additional erosion control structures or added perennial grass cover will aid the site to lessen shin dagger cover.
Special Status Species	BLM consulted with USFWS on the jaguar, ocelot, lesser long-nosed bat, Chiricahua leopard frog (and associated critical habitat which is in proximity to the project area), and Pima pineapple cactus. USFWS concurred with BLM's may affect, not likely to adversely affect determinations on all of these species.	For any unplanned fire that the BLM initiates suppression on, that may affect listed species, the BLM will initiate an emergency consultation and to the extent possible the BLM will follow the Conservation Measures for fire suppression as well as species-specific Conservation Measures as outlined in the *Biological and Conference Opinion for the BLM Arizona Statewide Land Use Plan Amendment for Fire, Fuels and Air Quality Management* (See Section 2.2.2). Impacts from unplanned wildfire

		are difficult to determine, because the timing, severity, and size of wildfire cannot be predicted. Therefore, impacts from wildfire and fire suppression activities may have impacts to special status species that range from positive or negligible to severe, depending upon fire traits and individual species and preferred habitat.
Migratory Birds	Direct impacts to migratory birds will likely occur through removal of nests by fire, and mortality of eggs, nestlings, and fledglings for those species that nest before monsoon begins. Short term, direct effects from smoke and ash may occur for individuals that are not mobile enough to leave the immediate area. Longer-term effects may include a change in vegetation composition and structure, impacting the species of birds that utilize the habitat. If grassland conditions are restored, then long term, positive impacts may occur for grassland specialists.	Impacts from unplanned wildfire are difficult to determine, because the timing, severity, and size of wildfire cannot be predicted. Therefore, impacts from wildfire and fire suppression activities may have impacts to migratory birds that range from positive or negligible to severe, depending upon fire traits and individual species and preferred habitat. Depending upon the species, fire suppression could be beneficial to some species that prefer dense, low cover, but not provide needed habitat for grassland specialists.
Wildlife	The major effects on wildlife from the Proposed Action would be beneficial, long term, and indirect and pertain to changes in food and cover.	Impacts from unplanned wildfire are difficult to determine, because the timing, severity, and size of wildfire cannot be predicted. Therefore, impacts from wildfire and fire suppression activities may have impacts to wildlife that range from positive or negligible to severe, depending upon fire traits and individual species and preferred habitat. Depending upon the species, fire suppression could be beneficial to some species that prefer dense, low cover, but not provide needed habitat for grassland specialists.

3 Affected Environment

3.1 Ecological Site Description

The project area is located in Major Land Resource Area (MLRA) 041-Southeastern Arizona Basin and Range. The ecological site found in the project area is Granitic Hills (R041XC306AZ) in the 12” – 16” precipitation zone.

Further description of the ecological sites' reference state and reference plant community (Historic Climax Plant Community [HCPC]) follows below. The historical climax represents the natural potential plan communities found on relict or relatively undisturbed sites. The plant communities are naturally variable throughout an ecological site, and composition will vary due to annual conditions, location, aspect, and assumed variability of soils. Figure 3-1 is the state and transition model for the Granitic Hills ecological site, this figure models the change in vegetation conditions due to disturbances or lack of disturbance on the landscape. Disturbances can be lack of fire, drought, grazing, or a combination of these types of disturbances over time.

3.1.1 Monitoring Data

Production data provided in this site description is standardized to air dry weight at the end of the summer growing season. The plant communities described in this site description are based on near normal rainfall years.

NRCS uses a Similarity Index to compare existing plant communities to the plant communities described here. The Similarity Index is determined by comparing the production and composition of a plant community to the production and composition of a plant community described in this site description. To determine the Similarity Index, compare the production (air dry weight) of each species to that shown in the plant community description. For each species, count no more than the maximum amount shown for the species, and for each group, count no more than the maximum amount shown for that group. Divide the resulting total by the total normal year production shown in the plant community description. If the rainfall has been significantly above or below normal, use the total production shown for above or below normal years. If field data is not collected at the end of the summer growing season, then the field data must be corrected to the end of the year production before comparing it to the site description. The growth curve can be used as a guide for estimating production at the end of the summer growing season.

The historic native state includes the native plant communities that occur on the site, including the HCPC. This state includes other plant communities that naturally occupy the site following fire, drought, flooding, herbivores, and other natural disturbances. The HCPC represents the natural climax community that eventually re-occupies the site with proper management.

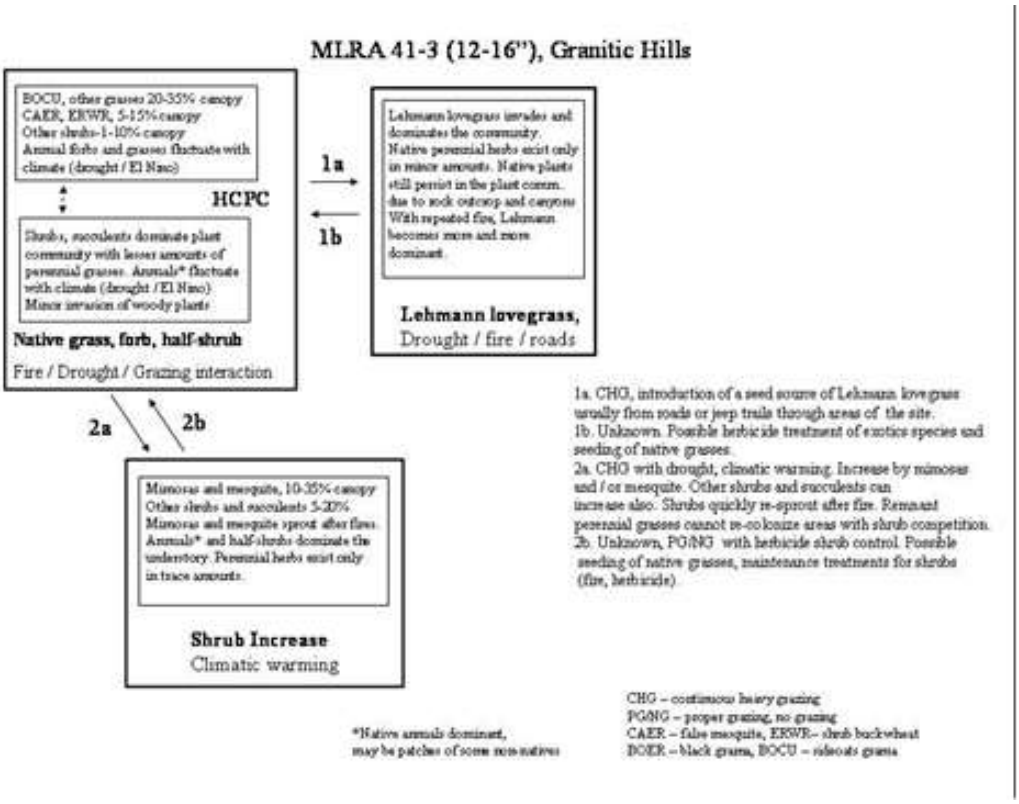

Figure 3-1. State and Transition model for Granitic Hills 12 – 16 inch Precipitation Zone Ecological Site Description.

3.1.2 Reference Conditions

The topography of the Altar Valley can best be described as ranging from primarily steep slopes to more gently sloped hills with various aspects. The plant communities on the lower elevations (< 5,500 feet) are dominated by warm season perennial grasses. The major species are sideoats, black, blue, hairy, spruce-top, and Rothrock gramas; plains lovegrass, cane beardgrass, Arizona cottontop, plains bristlegrass, big sacaton, alkali sacaton, tobosa, vine mesquite, curly mesquite, bush muhly, and mesa, blue, red, poverty, and spidergrass threeawns. Average annual production of these grasslands is about 1,000 pounds per acre (0.5 tons acre). Important shrubs include false mesquite, range ratany, shrubby buckwheat, fourwing saltbush, soaptree yucca, and sacahuista. Mesquite is the dominant tree of the area with other common trees including catclaw acacia, netleaf hackberry, western soapberry, desert willow, Arizona ash, Arizona black walnut, cottonwood, and black willow.

Summer annual grasses are important in the area and include species of grama, panic, sprangletop, and threeawn. Perennial forbs are also important and include species like evolvulous, sida, dyschoriste, wild bean, lotus, matweed, zinnia, hog potato, perezia, cudweeds, and vetch.

The vegetation on the higher elevations (>5,500 feet) is oak-savannah with open canopies (5-10 percent) of Emory, Mexican blue, Arizona white oak, and one-seed juniper, and perennial grasses in the understory. The major grasses include sideoats, blue, hairy, and purple gramas, bullgrass, deergrass, Texas bluestem, plains lovegrass, woolly bunchgrass, crinkleawn, prairie junegrass, squirreltail, piñon ricegrass, and beggartick threeawn. The dominant shrubs include sacahuista, California brickelbush, wait-a-bit mimosa, and yerba de

pasmo. Average annual production of these grasslands is about 1,500 pounds per acre (0.75 tons acre). (BLM 2013)

Desert Grassland Communities

Elevations range from 3,800 to 4,600 feet in the desert grassland communities although they will go higher on steep southern exposures. Annual precipitation averages from 12 to 16 inches. In the desert grassland region the soil temperature regime is thermic and the soil moisture regime is ustic aridic. In the desert grassland communities, the predominant species are native grasses. There is moderate to dense vegetation cover that includes desert grasses and forbs, succulent species, sub-shrubs, and some herbaceous cover of annuals. Fires are common with mean fire return intervals estimated at between 10 and 25 years. Ground cover consists primarily of gravel, cobble and rock. Plant basal area ranges from 5 to 15 percent of the soil surface. Plant litter occupies 5 percent to 45 percent of the soil surface. Litter and plant cover values represent the range from after disturbance (fire, drought) until site equilibrium is reached. There are no signs of compaction or accelerated erosion. The ability of soil to maintain resource values and sustain outputs is high. High quality habitat exists for desert mule deer, Coues whitetail deer, javelina, mourning dove, scaled and Gambel's quail. Traditional food and material plants thrive here, including pigweed, coyote melon, canaigre, agave species, sotol, ocotillo, soaptree and banana yucca, cane cholla, prickly pear, oneseed juniper and mesquite.

Plains Grassland and Savanna Communities

Elevations range from 4,600 to 5,500 feet in the plains grassland and savanna communities although they may go higher on steep southern exposures. Annual precipitation averages from 16 to 20 inches. In the plains grassland region the soil temperature regime is thermic and the soil moisture regime is aridic ustic. In the plains grassland and savanna communities, the predominant species are native perennial grasses. There is moderate to dense vegetation cover that includes mid and short grasses and forbs, succulent species, sub-shrubs, taller shrubs and some trees. Fires are common with mean fire return intervals estimated at between 5 and 20 years. Ground cover consists primarily of gravel, cobble and rock. Plant basal area ranges from 10 to 20 percent of the soil surface. Plant litter occupies 20 percent to 70 percent of the soil surface. Litter and plant cover values represent the range from after disturbance (fire, drought) until site equilibrium is reached. There are no signs of compaction or accelerated erosion. The ability of soil to maintain resource values and sustain outputs is high. High quality habitat exists for Coues whitetail deer, desert mule deer, javelina, mountain lion, winter sparrow species and Mearn's quail. Traditional food and material plants thrive here, including skunkbush, yerba de pasmo, herbaceous sage, sotol, agave, yucca, beargrass, oak, walnut, mesquite and juniper.

Woodland Communities

A small area of woodland (tree canopy greater than 15 percent) occurs around Keystone Peak on top of the Sierrita Mountains. Elevations range from 5,200 feet to over 6,000 feet. Annual precipitation is about 20 inches. Soil temperature regimes are thermic. The soil moisture regime is ustic aridic. The predominant species are native trees. There is moderate to dense vegetation cover that includes mid and short perennial grasses and forbs, sub-shrubs, shrubs and trees. Fires are common with mean fire return intervals estimated for some communities at between 5 and 15 years. Ground cover consists of organic layers (duff) of oak leaves and twigs under tree canopies with gravel, cobble and rock cover of 20 to 40 percent. Bedrock outcrop ranges from 1 to 10 percent of the surface. Plant basal area ranges from 4 to 10 percent of the soil surface. Plant litter occupies 20 percent to 90 percent of the soil surface. Litter and plant cover values represent the range from after disturbance (fire, drought) until site equilibrium is reached. There are no signs of compaction or accelerated erosion. The ability of soil to maintain resource values and sustain outputs is high. High quality habitat exists for Coues whitetail deer, black bear, javelina, coati-mundi,

mountain lion, bandtail pigeon and Mearn's quail. Traditional food and material plants thrive here, including oak, pinyon, juniper, manzanita, skunkbush, agave, yucca, beargrass, terragon and herbaceous sage.

3.1.3 Desired Future Conditions

The potential plant community on this site is dominated by warm season perennial grasses. Several species of low shrubs are well represented on the site, but the aspect is grassland dotted with shrubs and cacti. Larger species of shrubs are concentrated at the edges of rock outcrop areas and in canyon bottoms. Most of the grass and low shrub species are well dispersed throughout the plant community.

In the absence of wildfire and/or with overgrazing, shrubs increase to dominate the plant community. Well-developed gravel and cobble covers protect the soil from erosion and protect forage species from heavy use. Natural fire was an important factor in development of the potential plant community. Natural fire frequencies were about once every ten years. Fires helped maintain a balance between grasses, forbs and shrubs.

With continuous heavy grazing palatable forage species diminish in the plant community and can be replaced by shrubs and succulents. Areas of rock outcrop are little grazed and hold remnant perennial forage species to help reseed the slopes below once grazing is managed. The plant community described for the HCPC is at a midpoint in its fire free interval, 5 to 7 years after fire. The project area is currently in the State 2a-shrub increase (NRSC Site ID R041XC306AZ 2005).

3.2 Current Conditions

Ecological conditions in the Altar Valley have improved dramatically since the 1970s and are overall, relatively good compared to previous decades. These improvements are due, in part, to the use of prescribed fire or wildland fire management in the Altar Valley from the mid 1970's to the mid 1990's. Assessment of present conditions in the watershed confirms that the management practices of the past three decades have generally stabilized or improved range conditions.

Carl D. Jones chaired the development of the *Altar Valley Fire Management Plan/Action Guidelines* (the Plan) in 1998 (Jones 1998). The Plan consisted of a short narrative and two computer generated maps done by the University of Arizona Advanced Resource Technology Group. The first display map contained numbered fire management blocks delineated by roads, trails and natural features along with land ownership and ranch boundaries. This information was also displayed on the 7.5-minute USGS topographic maps for field use. The second display map was a fire occurrence map showing all natural and human caused fires from 1975 on, along with the location of the start and final burned boundary areas. The information was gathered in the field to be used in the future by fire managers for making fire management decisions. AVCA's *Watershed Action Plan and Final Report* (AVCA 2001) shows specific problems where at least two of three rangeland health attributes are rated at-risk in the following areas:

(1) a large area (approximately 5 by 12 miles) of uplands along the west side of the valley floor;

(2) an area of uplands (approximately 5 by 7 miles) on the east-central side of the valley floor;

(3) on the valley floor floodplain and its associated Altar Wash arroyo; and

(4) in many washes on the east side and south end of the watershed.

The remainder of the watershed, and representing the majority of its land area, is rated as stable, intact, or functioning in at least two rangeland health attributes. Trends are generally static with mesquite densities higher than desired and where nonnative grasses replaced native grass species. The vegetative community is

not at its potential with the desired mix of native grassland species. Two factors present serious obstacles to long-term sustainability of the Altar Valley watershed. These include (1) the Altar Wash arroyo, which impairs watershed function by increasing sediment transport, decreasing infiltration, and lowering soil moisture in the valley soils; and (2) mesquite encroachments in the uplands which create higher rates of sheet runoff, evapotranspiration, erosion, and sediment transport. These trends are recognized as irreversible on human time scales without management intervention, including restoration of fire to the ecosystem.

Conditions vary from place to place in the watershed and there are substantial problem areas. These are reflected in three of the four resource issues the AVCA has specifically identified as concerns: (1) invasive nonnative grasses, (2) woody shrub encroachment into grassland habitats, and (3) erosion in the Altar Wash arroyo (AVCA 2001). These issues will be addressed to some degree through the Plan.

3.2.1 Monitoring Data

In 2010 three key areas were established for pre burn comparison data (Figure 3-2).

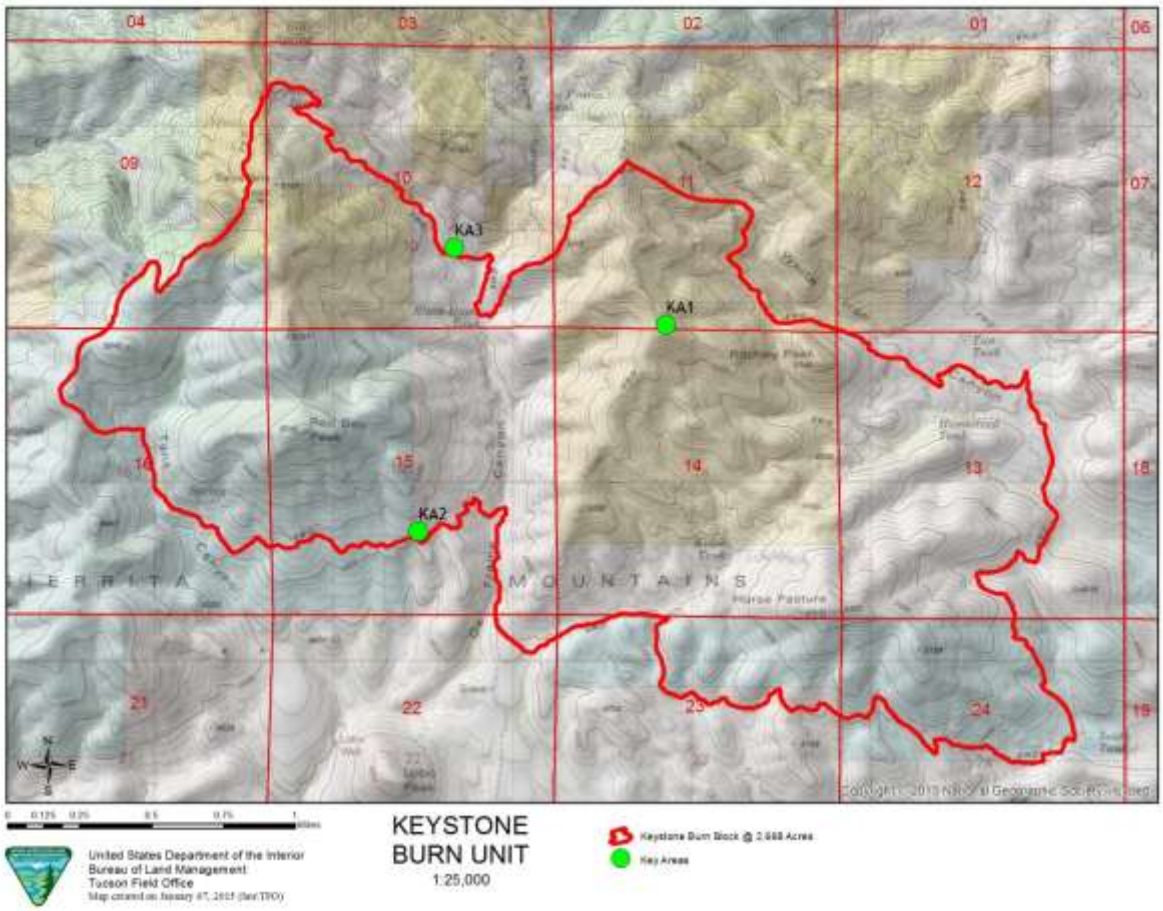

Figure 3-2. Key Area Transects.

Transect 1 has a high amount of litter cover at 28 percent canopy and 58 percent basal hits. Shrub cover follows at 16 percent canopy hits. Perennial forb cover makes up approximately 22 percent canopy counts on this transect, while perennial grass cover makes up approximately 18 percent canopy.

Transect 2 and 3 have high litter amounts as well with 32 percent canopy cover and 48 percent basal hits. Litter is followed by gravel at 13 percent canopy and 22 percent basal hits. Bare ground, rock and herb make up much less percentages, less than 5 percent each, for both transects. Perennial forbs make up 22 percent canopy cover while only 8 percent canopy cover for perennial grasses.

Repeat photography is also being used to track any major changes to vegetation.

3.2.2 Fire Regime Condition Class

A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning. The five natural (historical) fire regimes are classified based on average number of years between fires (fire frequency) combined with the severity (amount of replacement) of the fire on the dominant over-story vegetation.

Fire Regimes Groups and FRCC for the project area are shown below (Figure 3-3). Fire Regime Groups are defined as:

- Fire Regime Group I: 0-35 year fire return interval with low severity fires.
- Fire Regime Group II: 0-35 year fire return interval with high severity fires.
- Fire Regime Group III: 35-200 year fire return interval with mixed to low severity fires, (generally stand replacing fire, can include low severity fire).
- Fire Regime Group IV: 35- 200 year fire return interval with high severity, stand replacement fires.
- Fire Regime Group V: 200 + year fire return interval with high severity, standing replacement fires, (predominately stand replacement fire but any severity type can be included in this frequency range).

The Fire Regime Condition Classification System measures the extent to which vegetation departs from reference conditions (or how the current vegetation differs from a particular reference condition). Departures from reference condition could be the result of changes to key ecosystem components such as vegetation characteristics, fuel composition, fire frequency, fire severity and pattern, as well as other associated disturbances. Associated disturbances can include insects and disease mortality, human activity impacts (grazing, urban expansion, infrastructure corridors), or fire suppression practices. Fire Regimes are organized into three Condition Classes.

FRCC are defined as:

- Condition Class 1: Represents vegetation communities with low departure from reference conditions. Represents ecosystems with low degree of departure and that are still within an estimated historical range of variation as determined by modeling for the ecosystems reference conditions. Fire regimes are within a historical range, and the risk of losing key ecosystem components is low. *Vegetation attributes (species composition and structure) are intact and functioning within a historical range.* Where appropriate, these areas can be maintained within the historical fire regime by treatments such as fire for resource benefit or prescribed fire.
- Condition Class 2: Represents ecosystems with moderate degree of departure from reference conditions. Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals (either increased or decreased). This results in moderate changes to

one or more of the following: fire size, intensity and severity, and landscape patterns. *Vegetation attributes have been moderately altered from their historical range.* Where appropriate, these areas may need moderate levels of restoration treatments, such as prescribed fire, mechanical, chemical, or fire for resource benefit treatments.

- Condition Class 3: Represents ecosystems with high degree of departure from reference conditions. Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals. This results in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. *Vegetation attributes have been significantly altered from their historical range.* Where appropriate, these areas may need high levels of restoration treatments, such as mechanical or chemical treatments, before fire can be used to restore the historical fire regime.

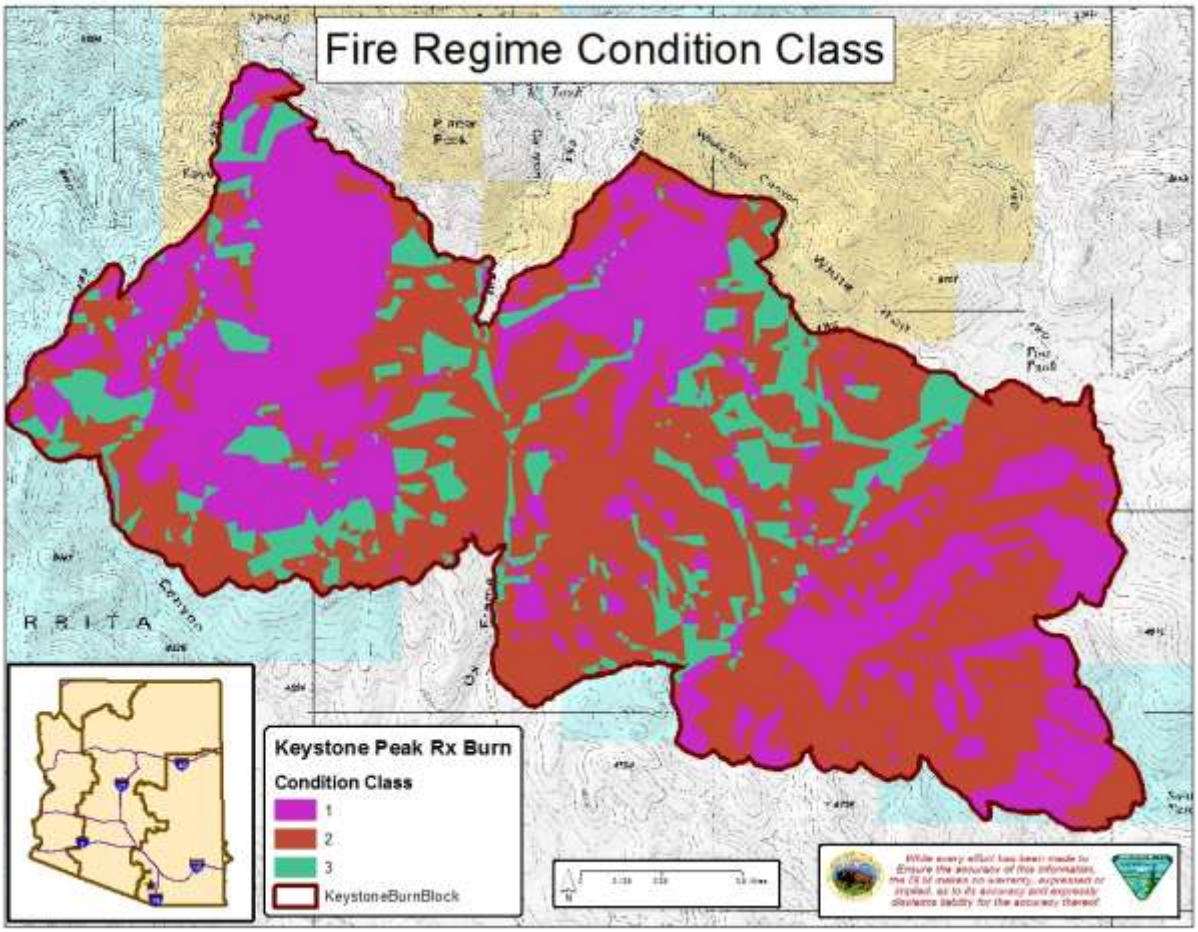

Figure 3-3: Project Area Fire Regime Condition Classes.

Table 3-1 describes the current condition of the project area. 63 percent of the vegetation within the project area is classified as either FRCC 2 or 3 indicating they are currently not within reference conditions.

Table 3-1. Project Area FRCC.

	Condition Class 1	Condition Class 2	Condition Class 3	Total Not Within Reference Conditions
Keystone Peak Burn Unit	37% (980ac)	49% (1317ac)	14% (373ac)	63% (1690ac)
Source: Data obtained from the Landfire dataset in 2012.				

3.3 Elements/Resources of the Human Environment

The BLM is required to consider many authorities when evaluating a Federal action. Those elements of the human environment that are subject to the requirements specified in statutes, regulations, or executive orders, and must be considered in all EAs, have been considered by BLM resource specialists to determine whether they would be potentially affected by the proposed action. These elements are identified in Table 3-2, along with the rationale for the determination on potential effects. If any element was determined to be potentially impacted, it was carried forward for detailed analysis in this EA; if an element is not present or would not be affected, it was not carried forward for analysis. Table 3-2 also contains other resources/concerns that have been considered in this EA. As with the elements of the human environment, if these resources were determined to be potentially affected, they were carried forward for detailed analysis in this document.

Table 3-2. Elements of the Human Environment.

Resource	**Determination ***	**Affected Environment (Rationale for Determination)**
* NP = Not present in the area that will be impacted by the proposed action. NI = Present, but not affected to a degree that would mean detailed analysis is required. PI = Present with potential for impact; analyzed in detail in the EA.		
Areas of Critical Environmental Concern	NP	The proposed action would not affect this element as no ACECs are within or adjacent to the Project area; therefore, there would be no direct, indirect or cumulative impacts to this critical element.
Air Quality	PI	Prescribed fires may contribute to changes in air quality.

Resource	Determination *	Affected Environment (Rationale for Determination)
Cultural Resources	PI	The entire project area would be surveyed to a Class III level before the project is initiated. If any cultural resource features would be affected by the handline it would be rerouted to avoid any impacts.
Environmental Justice	NP	There is no expected discernible or disproportionate direct or indirect impacts on children or minority and low income populations as defined in Executive Order 12898 (Environment Justice) and Executive Order 13045 (Safety Risks to Children).
Farmlands (Prime or Unique)	NP	There are no prime or unique farmlands in the project area; therefore, there would be no direct, indirect, or cumulative impacts to this critical element.
Floodplains	NP	There are no floodplains as defined by the Floodplain Compliance Executive Order 11988 (1977) with the Project area
Invasive and Nonnative Species	PI	There is the potential for the spread of noxious weeds from equipment and support vehicles utilized during the implementation of the proposed action. Project design features NW-01 thru NW-05 would be used to mitigate potential.
Lands and Realty	NP	There are no lands and realty actions associated with the proposed action.
Grazing Management	PI	The Sierrita allotment would have to defer livestock grazing for 1-2 years prior to ignition to build up fine fuels to carry the fire and post ignition to allow grasses to reestablish and develop adequate root systems.
Minerals	NI	The proposed action will not have an effect on mineral rights.
National Energy Policy	NP	The proposed action will not have an impact on National Energy Policy.
Native American Religious Concerns	NI	An official project description letter was be sent out to the Tribes informing them about the Keystone Peak Prescribed Burn project and asking them for their input. A presentation on the project was made at the Four Southern Tribes meeting in December, 2014. No response was received.

Resource	Determination *	Affected Environment (Rationale for Determination)
Rangeland Health	PI	Implementation of the Proposed Action could result in an increase in perennial grasses and provide more forage and cover for the allotment.
Recreation	NI	The area supports dispersed recreation activities such as hunting, hiking, and horseback riding. Access to the area is limited due to surrounding land ownership and limited access points. Public notifications prior to implementation of the proposed action will occur.
Socioeconomic Values	NP	Implementation of the proposed action would not have an effect on socioeconomics in the project area.
Soils	PI	Over 96percent of the project area has moderate to severe erosion potential. However, implementation of erosion control measures would minimize any potential damage to soils through wind or water erosion.

Resource	Determination *	Affected Environment (Rationale for Determination)
Special Status Species	PI	Project activities could result in adverse direct and indirect effects to Chiricahua leopard frog eggs, tadpoles, and invertebrates or their habitats, potentially causing a change in the numbers and reproduction in any potentially occupied habitat. Ox Frame Tank and North and South Twin Tanks are the only tanks designated as Chiricahua leopard frog critical habitat within the vicinity of the proposed action. The proposed action will result in a short-term increase in human activity and effects to the vegetation communities providing some jaguar habitat elements. The proposed action will result in a short-term increase in human activity and effects to the vegetation communities providing some ocelot habitat elements. The potential for negative effects to lesser long-nosed bats from the proposed Keystone Peak prescribed fire would only occur if food sources are damaged or destroyed, or roosts are disturbed. Indirect effects to Pima pineapple cactus and its habitat may include the following effects: 1) soil erosion following prescribed fire, 2) alteration of vegetative structure and/or composition from prescribed fire activities, 3) an increase in invasive species in the habitat which may outcompete Pima pineapple cactus (which could occur when native vegetation is removed by fire), 4) increased recreational or incidental traffic through this species habitat as an indirect result of temporary trails for prescribed fire activities, and 5) decrease or loss of bee pollinators due to prescribed fire actions outside the specific habitat of Pima pineapple cactus. There is potential and occupied habitat for several BLM sensitive species within the project area; habitat and individuals could be directly impacted through prescribed fire or fire activities, changes in amount of bare soil and subsequent erosion, and vegetation composition and structure.

Resource	Determination *	Affected Environment (Rationale for Determination)
Visual Resource Management (VRM)	NI	The location of the Proposed Action is in a Class IV VRM Area. The objective of Class IV VRM Areas is to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. Every attempt should be made, however, to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements. This critical element would not be affected by the proposed treatment due to the nature of the treatment prescription. Although the proposed is a modification to the landscape, the treatment is designed to restore the landscape to a more natural condition.
Wastes (hazardous or solid)	NP	No hazardous or solid wastes would be stored or disposed of in the Project area and no direct, indirect, or cumulative impacts on this critical element would occur.
Water Quality (Surface, Ground, Drinking)	PI	There are many livestock tanks and natural springs in the project area. In addition, there are many major washes and tributaries.
Wetlands/Riparian Zones	PI	Pima County considers Ox Frame Canyon an Important Riparian Area.
Wild and Scenic Rivers	NP	There are no wild and scenic rivers within the project area; therefore, no direct, indirect, or cumulative impacts on this critical element would occur.
Wilderness	NP	The project area is not located within designated wilderness; therefore, no direct, indirect, or cumulative impacts on this critical element would occur.
Wilderness Characteristics	NP	The area analyzed within the project area does not meet the size criteria for wilderness characteristics. Due to dis-continuous land parcels, roads, fences, infrastructure and not meeting the size criteria, the project area is determined not to have wilderness characteristics.

Resource	Determination *	Affected Environment (Rationale for Determination)
Wildlife	PI	Wildlife would experience direct impacts through human disturbance and fire activity, and also indirect impacts from changes in vegetation composition and structure after the fire.
Migratory Birds	PI	Migratory birds may be directly impacted through effects to nests, eggs, nestlings, and fledglings, and indirectly through changes in bare ground, vegetation composition, and vegetation structure after the fire.

3.4 Resources Brought Forward for Analysis

The following resources were identified during scoping as needing further analysis due to potential impacts from the proposed action.

3.4.1 Air Quality

In accordance with the Clean Air Act (CAA), the U.S. Environmental Protection Agency (USEPA) has set air quality standards for six common air pollutants. There are two types of standards for these pollutants: primary and secondary. Primary standards are set to protect health, while secondary standards are set to protect welfare. The six pollutants are ozone (O3), particle pollution with aerodynamic diameters less than 2.5 and 10 micrometers (PM2.5, PM10), lead (Pb), nitrogen dioxide (NO2), carbon monoxide (CO), and sulfur dioxide (SO2) (USEPA 2013a). The standards are formally known as the national ambient air quality standards (NAAQS) (Table 3-3). States are required to have air quality standards which are either equal to or are more restrictive than the NAAQS. The State of Arizona has adopted the same standards as the NAAQS.

Geographic areas whose air quality does not exceed the NAAQS are classified as attainment areas, those that exceed the levels are classified as nonattainment areas, and those without sufficient data are unclassified. The USEPA has designated different areas into specific classes that allow for a certain amount of degradation to air quality up to the NAAQS. This degradation must be in accordance with the Prevention of Significant Deterioration regulations. Prevention of Significant Deterioration Class I designated areas allow for minimal air quality deterioration, while Class II and III allow for progressively more. Federal lands that are not Class I areas have been designated as Class II areas (USEPA 2013a).

Table 3-3. National Ambient Air Quality Standards (NAAQS).

Pollutant [final rule cite]	Type of Criteria	Averaging Time	Level	Form
Carbon Monoxide [76 Federal Register (FR) 54294, August 31, 2011]	Primary	8-hour	9 ppm	Not to be exceeded more than once per year
		1-hour	35 ppm	
Lead [73 FR 66964, November 12, 2008]	Primary and Secondary	Rolling 3-month average	0.15 $\mu g/m^3$	Not to be exceeded

Nitrogen Dioxide [75 FR 6474, February 9, 2010] [61 FR 52852, October 8, 1996]		Primary	1-hour	100 ppb	98th percentile, averaged over 3 years
		Primary and Secondary	Annual	53 ppb	Annual mean
Ozone [73 FR 16436, March 27, 2008]		Primary and Secondary	8-hour	0.075 ppm	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution December 14, 2012	**$PM_{2.5}$**	Primary	Annual	12 $\mu g/m^3$	Annual mean, averaged over 3 years
		Secondary	Annual	15 $\mu g/m^3$	Annual mean, averaged over 3 years
		Primary and Secondary	24-hour	35 $\mu g/m^3$	98th percentile, averaged over 3 years
	PM_{10}	Primary and Secondary	24-hour	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide [75 FR 35520, Jun 22, 2010] [38 FR 25678, Sept 14, 1973]		Primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

FR – Federal Register
ppm – parts per million
ppb- parts per billion
$\mu g/m^3$ –micrograms per cubic meter

Source: USEPA 2011.

Atmospheric deposition on the land can occur through precipitation (wet) and the settling of airborne particles (dry). It is a major concern in the Midwest and Eastern United States where measured levels of nitrogen oxides and sulfur oxides are significantly higher. In Arizona and most of the Western United States, lower amounts of industrial pollution along with lower amounts of precipitation account for remarkably less atmospheric deposition. The current monitoring system for atmospheric deposition may be inadequate because of the widespread variations in deposition across a region and the limited amounts, coverage, of monitoring sites, specifically in the West (USEPA 2008).

3.4.1.1 Visibility

Obstruction of a view shed by suspended particulate matter in the atmosphere is often referred to as haze. This is an issue in areas where far-reaching views are important. The measurement of haze and its effects on visibility are important indicators for air quality (USEPA 2012c). The USEPA measures visibility through the IMPROVE network. In order to present visibility data, the USEPA has adopted the haziness, or deciview, index, which is a logarithmic scale that displays human-perceived changes in a linear relationship. A deciview value can be calculated from either visual range (kilometers) or light extinction coefficients from atmospheric components. A value of 0 deciviews represents pristine visibility conditions (IMPROVE 1993). As mentioned previously, Class I areas allow for the least amount of air quality degradation. Areas where visibility is an important characteristic are often categorized as Class I.

Particulate Matter (PM) and Ground Level Ozone (O_3) are significant health and air quality concerns in Pima County. Particulate matter is a generic term used to describe a complex group of air pollutants that vary in

size and composition, depending upon the location and time of its source. The PM mixture of fine airborne solid particles and liquid droplets (aerosols) include components of nitrates, sulfates, elemental carbon, organic carbon compounds, acid aerosols, trace metals, and geological material. Some aerosols are formed in the atmosphere from gaseous combustion by-products such as volatile organic compounds (VOCs), oxides of sulfur (SOx) and nitrogen oxides (NOx). The size of PM can vary from coarse wind-blown dust particles to fine particles directly emitted or formed from chemical reactions occurring in the atmosphere. PM_{10} comprises particles with an aerodynamic diameter less than or equal to a nominal 10 microns. $PM_{2.5}$ comprises particles with an aerodynamic diameter less than or equal to a nominal 2.5 microns (Pima County 2014).

Ground level ozone forms near Earth's surface when the ultraviolet light in sunlight triggers a chemical reaction with "precursor pollutants" emitted by cars, power plants, and industrial sources. These precursor pollutants consist of NOx and VOC. Ozone near ground level is a harmful pollutant. Ozone levels are carefully monitored during the summer months when the weather conditions are perfect for it to form. Sunshine, hot temperatures and high emissions of NOx and VOC pollutants lead to high levels of ozone (Pima County 2014).

3.4.1.2 Current Conditions

The most recent air quality data from 2013 are shown below for the Green Valley Station (Table 3-4).

Table 3-4. Air Quality Data for Green Valley, Arizona.

Carbon Monoxide (ppm)		**Ozone (ppm)**	**PM10 (ug/m3)**	**PM2.5 (ug/m3)**		**Lead (ug/m3)**		**Nitrogen Dioxide (ppm)**	**Sulfur Dioxide (ppm)**
Max Conc. 1 Hour	Max Conc. 8 Hour	4th Highest Conc. 8 Hour	Max Conc. 24 Hour	Max Conc. 24 Hour	Arith Annual Mean	Rolling 3 month average	Arith Annual Mean	Max Conc. 1 Hour	Max Conc. 1 Hour
		.069	434	78.2	4.9				

Source: Pima County 2014.

3.4.2 Cultural Resources

The Keystone Peak area is located within the Sierrita Mountains southwest of Tucson. Local major plant communities are described as mixed paloverde-cacti communities, desert riparian vegetation and desert grasslands.

Cultural Chronology

Occupation of the larger surrounding area appears to have been continuous from the Archaic Period through the Hohokam period, as the earliest Hohokam sites date from AD 200 to 750. Past cultural resource survey inventory was conducted in and around the larger project area; however the immediate project area has not had previous cultural resource surveys. These surveys include Section 106 project clearances for TRICO electric power line project right of way (ROW) and the telecommunications site at the top of Keystone Peak.

The Class III cultural resource surveys that were conducted revealed the peak itself and immediate surrounding areas were dotted with abandoned gold mines. Many of the mines recorded predate the 1930's. These abandoned mines can currently be considered as historic resources. If these areas are located in the project area they will be recorded and avoided during fire handline construction.

Past prehistoric cultural resource surveys around the greater project area have located cultural resource sites. Within the project area cultural resource sites, features etc. have the potential to be located.

3.4.3 Grazing Management

The project area is located within the Sierrita grazing allotment (#6198) (Figure 3-4). The allotment consists of 12,523 acres of mixed land ownership that supports 348 AUMs on the BLM leased lands. The project area

consists of 877 acres of BLM within the Sierrita grazing allotment which has 2,674 acres of BLM within its boundaries. The project area is in a single pasture and after the implementation efforts will be made to remove livestock outside the burned area. This will be done through herding as well as supplemental feeding locations.

The leases are a part of the AVCA in their efforts to work towards the AVCA vision:

Ranchers and other agriculturalists work effectively with our partners to conserve healthy and productive working landscapes, promote a thriving agricultural economy, and sustain a resilient rural community enriched by the culture and history of the Altar Valley.

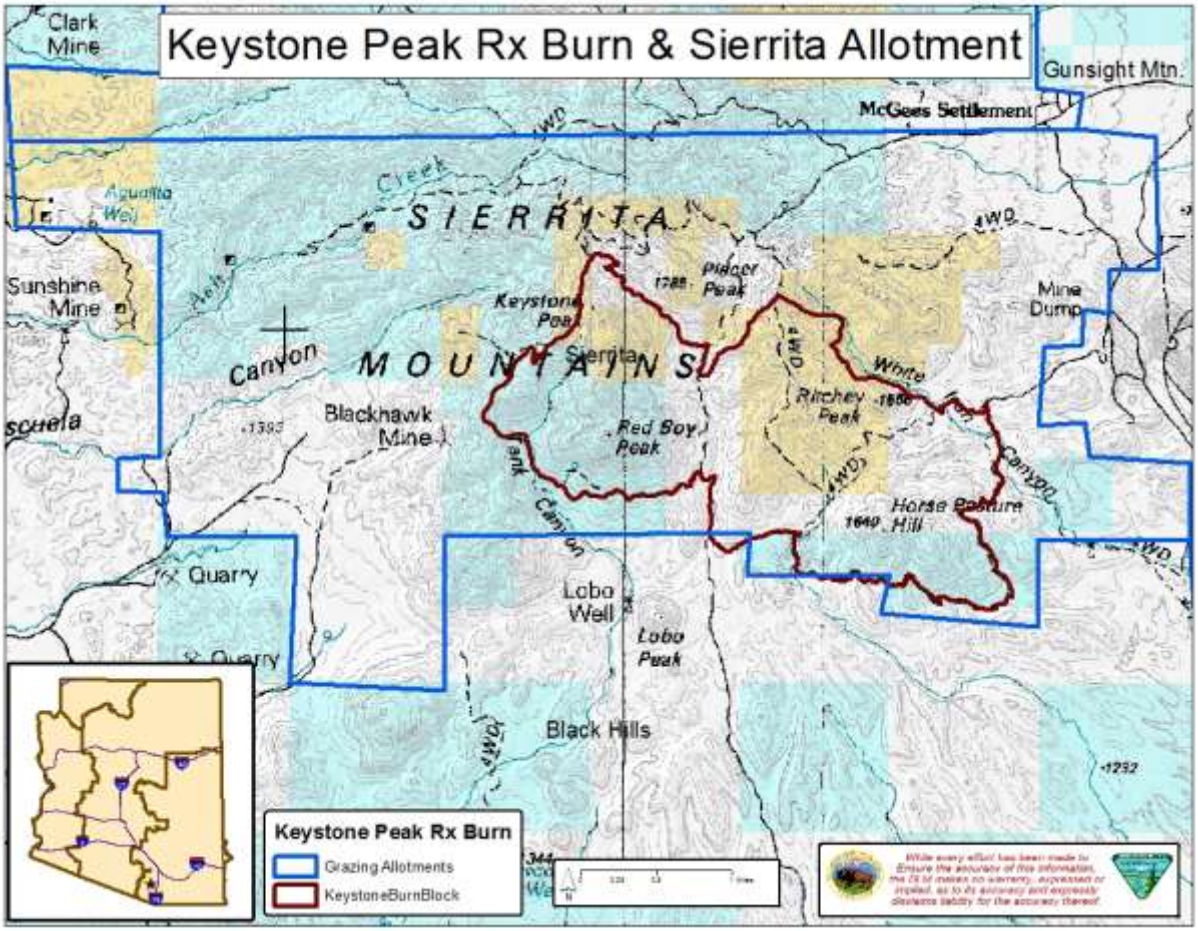

Figure 3-4. Sierrita Grazing Allotment.

3.4.4 Native American Religious Concerns

Based on prior cultural surveys performed near the immediate area, the immediate project area could contain places or areas considered special and important to American Indian Tribes. Tribal consultation efforts will need to be coordinated prior to beginning project operations.

Under provisions listed under the NHPA, Tribes are to be consulted when there are Federal undertakings that could affect areas important to Tribes.

3.4.5 Land Health

The project area is located within three vegetation communities: desert grassland, plains grassland and savanna, and woodland (Figure 3-5).

Land health describes the ecological status of upland areas. The concept of land health has become the preferred alternative to range condition. This concept is currently used by most range professionals as a basis for inventory and assessment.

Qualitative assessments of land health provide land managers and technical assistance specialists with a good communication tool for use with the public. Many of these tools have been used successfully for this purpose over the past 100 years.

This technique, in association with quantitative monitoring and inventory information, can be used to provide early warnings of resource problems on upland rangelands. Rangelands are defined as "land on which the indigenous vegetation (climax or natural potential) is predominantly grasses, grass-like plants, forbs, or shrubs and is managed as a natural ecosystem. If plants are introduced, they are managed similarly. Rangelands include natural grasslands, savannas, shrublands, many deserts, tundra, alpine communities, marshes, and wet meadows" (Society for Range Management 1999). Also included in this definition are oak and pinyon-juniper woodlands.

The protocol described in this technical reference is designed to:

- Be used only by knowledgeable, experienced people;
- Provide a preliminary evaluation of soil/site stability, hydrologic function, and biotic integrity (at the ecological site level);
- Be used to communicate fundamental ecological concepts to a wide variety of audiences;
- Improve communication among interest groups by focusing discussion on critical ecosystem properties and processes;
- Select monitoring sites in the development of monitoring programs; and
  Provide early warnings of potential problems and opportunities by helping land managers identify areas that are potentially at risk of degradation or where resource problems currently exist.

The protocol is not to be used to:

- Identify the cause(s) of resource problems;
- Independently make grazing and other management changes;
- Monitor land or determine trend; and
- Independently generate national or regional assessments of rangeland health.

Interpretation indicators for land health has been developed for use by experienced, knowledgeable land managers or technical assistance specialists. This assessment protocol is not intended for use by individuals who do not have experience or knowledge of the rangeland ecological sites they are evaluating. This protocol requires a good understanding of ecological processes, vegetation, and soils for each site to which it is applied.

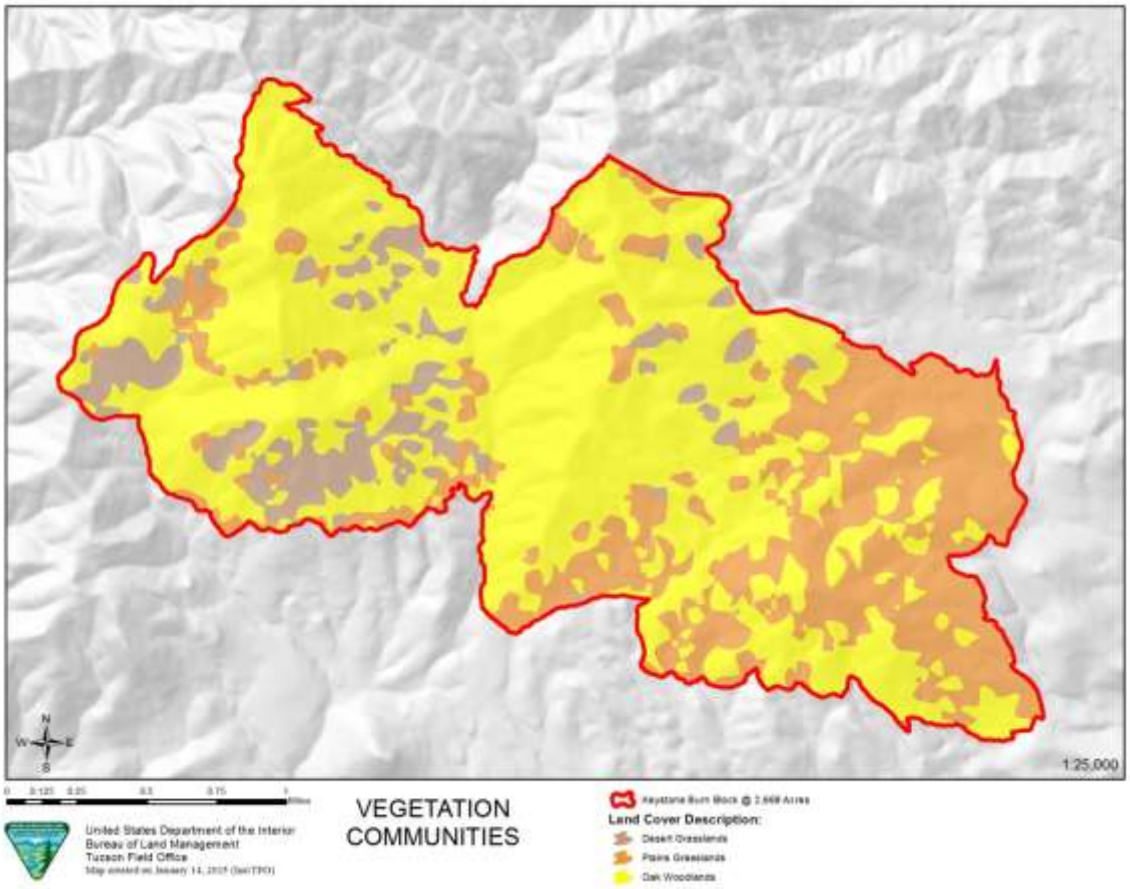

Figure 3-5. Project Area Vegetation Communities.

These assessments have not been done for this allotment but are a requirement especially during the 10 year lease renewal process.

3.4.5.1 Desert Grassland

Elevations range from 3,800 to 4,600 feet in the desert grassland communities, although the community will go higher on steep southern exposures. Annual precipitation averages from 12 to 16 inches. In the desert grassland region, the soil temperature regime is thermic and the soil moisture regime is ustic aridic. In the desert grassland communities, the predominant species are native grasses. There is moderate to dense vegetation cover that includes desert grasses and forbs, succulent species, sub-shrubs, and some herbaceous cover of annuals. Fires are common with mean fire return intervals estimated at between 10 and 25 years. Ground cover consists primarily of gravel, cobble, and rock. Plant basal area ranges from 5 to 15 percent of the soil surface. Plant litter occupies 5 percent to 45 percent of the soil surface. Litter and plant cover values represent the range from after disturbance (e.g. fire, drought) until site equilibrium is reached. There are no signs of compaction or accelerated erosion. The ability of soil to maintain resource values and sustain outputs is high. High quality habitat exists for desert mule deer, Coues whitetail deer, javelina, mourning dove, scaled and Gambel's quail. Traditional food and material plants thrive here, including pigweed, coyote melon, canaigre, agave species, sotol, ocotillo, soaptree and banana yucca, cane cholla, prickly pear, oneseed juniper and mesquite.

3.4.5.2 Plains Grassland and Savanna

Elevations range from 4,600 to 5,500 feet in the plains grassland and savanna communities, although the community may go higher on steep southern exposures. Annual precipitation averages from 16 to 20 inches. In the plains grassland region the soil temperature regime is thermic and the soil moisture regime is aridic ustic. In the plains grassland and savanna communities, the predominant species are native perennial grasses. There is moderate to dense vegetation cover that includes mid and short grasses and forbs, succulent species, sub-shrubs, taller shrubs and some trees. Fires are common with mean fire return intervals estimated at between 5 and 20 years. Ground cover consists primarily of gravel, cobble and rock. Plant basal area ranges from 10 to 20 percent of the soil surface. Plant litter occupies 20 percent to 70 percent of the soil surface. Litter and plant cover values represent the range from after disturbance (fire, drought) until site equilibrium is reached. There are no signs of compaction or accelerated erosion. The ability of soil to maintain resource values and sustain outputs is high. High quality habitat exists for Coues whitetail deer, desert mule deer, javelina, mountain lion, winter sparrow species, and Mearn's quail. Traditional food and material plants thrive here, including skunkbush, yerba de pasmo, herbaceous sage, sotol, agave, yucca, beargrass, oak, walnut, mesquite and juniper.

3.4.5.3 Woodland

A small area of woodland (tree canopy greater than 15 percent) occurs around Keystone Peak on top of the Sierrita Mountains. Elevations range from 5,200 feet to over 6,000 feet. Annual precipitation is about 20 inches. Soil temperature regimes are thermic. The soil moisture regime is ustic aridic. The predominant species are native trees. There is moderate to dense vegetation cover that includes mid and short perennial grasses and forbs, sub-shrubs, shrubs and trees. Fires are common with mean fire return intervals estimated for some communities at between 5 and 15 years. Ground cover consists of organic layers (duff) of oak leaves and twigs under tree canopies with gravel, cobble and rock cover of 20 to 40 percent. Bedrock outcrop ranges from 1 to 10 percent of the surface. Plant basal area ranges from 4 to 10 percent of the soil surface. Plant litter occupies 20 percent to 90 percent of the soil surface. Litter and plant cover values represent the range from after disturbance (e.g. fire, drought) until site equilibrium is reached. There are no signs of compaction or accelerated erosion. The ability of soil to maintain resource values and sustain outputs is high. High quality habitat exists for Coues whitetail deer, black bear, javelina, coatimundi, mountain lion, band-tailed pigeon, and Mearn's quail. Traditional food and material plants thrive here, including oak, pinyon, juniper, manzanita, skunkbush, agave, yucca, beargrass, terragon, and herbaceous sage.

3.4.6 Soils

There are a variety of soil types in the project area (Figure 3-6). Table 3-5 lists the soil types and their potential for erodibility. Of the soil types listed above, 3.3 percent of the soils in the project area have a slight erosion hazard potential, 63.6 percent have a moderate erosion hazard potential and 33.2 percent have a high erosion hazard potential. A rating of "slight" indicates that erosion is unlikely under ordinary climatic conditions. "Moderate" indicates that some erosion is likely and the erosion-control measures may be needed. "Severe" indicates that erosion is very likely and that erosion control measures, including revegetation of bare areas, are advised.

Table 3-5. Soil Types in Project Area.

Map Unit Symbol	Map Unit Name	Erosion Hazard Potential	Rating Reasons (Numeric / Value)	Acres in Project Area	Percent in Project Area
9	Caralampi very gravelly sandy loam, 5 to 15% slopes.	Slight	N/A	4	0.2%
20	Cortaro-Rock outcrop-Faraway complex, 15 to 45% slopes.	Moderate	Slope/erodibility (0.50)	481.7	18%
24	Deloro-Rock outcrop complex, 15 to 60% slopes.	Moderate	Slope/erodibility (0.50)	1043.7	39.1%
31	Graham-Pantak complex, 2 to 15% slopes.	Slight	N/A	0.2	0.0%
52	Oracle-Romero-Rock outcrop complex, 5 to 35% slopes.	Slight	N/A	83.2	3.1%
56	Pantek-Deloro complex, 8 to 35% slopes.	Moderate	Slope/erodibility (0.50)	172.7	6.5%
57	Pantak-Rock outcrop complex, 25 to 50% slopes.	Severe	Slope/erodibility (0.75)	426.2	16%
70	Romero-Oracle complex, 25 to 60% slopes.	Severe	Slope/erodibility (0.75)	459.3	17.2%
Total				**2671.1**	**100%**

Source: NRCS 2014.

3.4.7 Special Status Species

3.4.7.1 Threatened and Endangered Species

There are many federally listed species that occur within Pima County (Appendix B). There are five federally listed threatened and endangered species present or that have the potential to occur within the project area. They include the jaguar (*Panthera onca*), ocelot (*Leopardus pardalis*), lesser long-nosed bat (*Leptonycteris yerbabuenae*), Chiricahua leopard frog (*Lithobates [=Rana] chiricahuensis*) and Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*). In addition, critical habitat for the Chiricahua leopard frog is located in proximity to the project area. These species are discussed below.

Chiricahua Leopard Frog

The Chiricahua leopard frog was listed as threatened on June 13, 2002 (67 FR 40789). The range of the Chiricahua leopard frog extends through the southeastern montane sector of Arizona and adjacent Sonora, Mexico, at elevations ranging from 1,219-4,023 feet (Pima, Santa Cruz and Cochise Counties, AZ), and from montane central Arizona east and south along the Mogollon Rim to montane parts of west-southwestern New Mexico, at elevations ranging from 3,500-8,040 feet (Apache, Coconino, Gila, Graham, Greenlee, Navajo, and Yavapai Counties, Arizona). Threats to this species include introduced bullfrogs, crayfish, and predatory fish, a chytrid fungus (*Batrachochytridium dendrobatidis*), habitat fragmentation, major wetland manipulations, water pollution, and over-grazing.

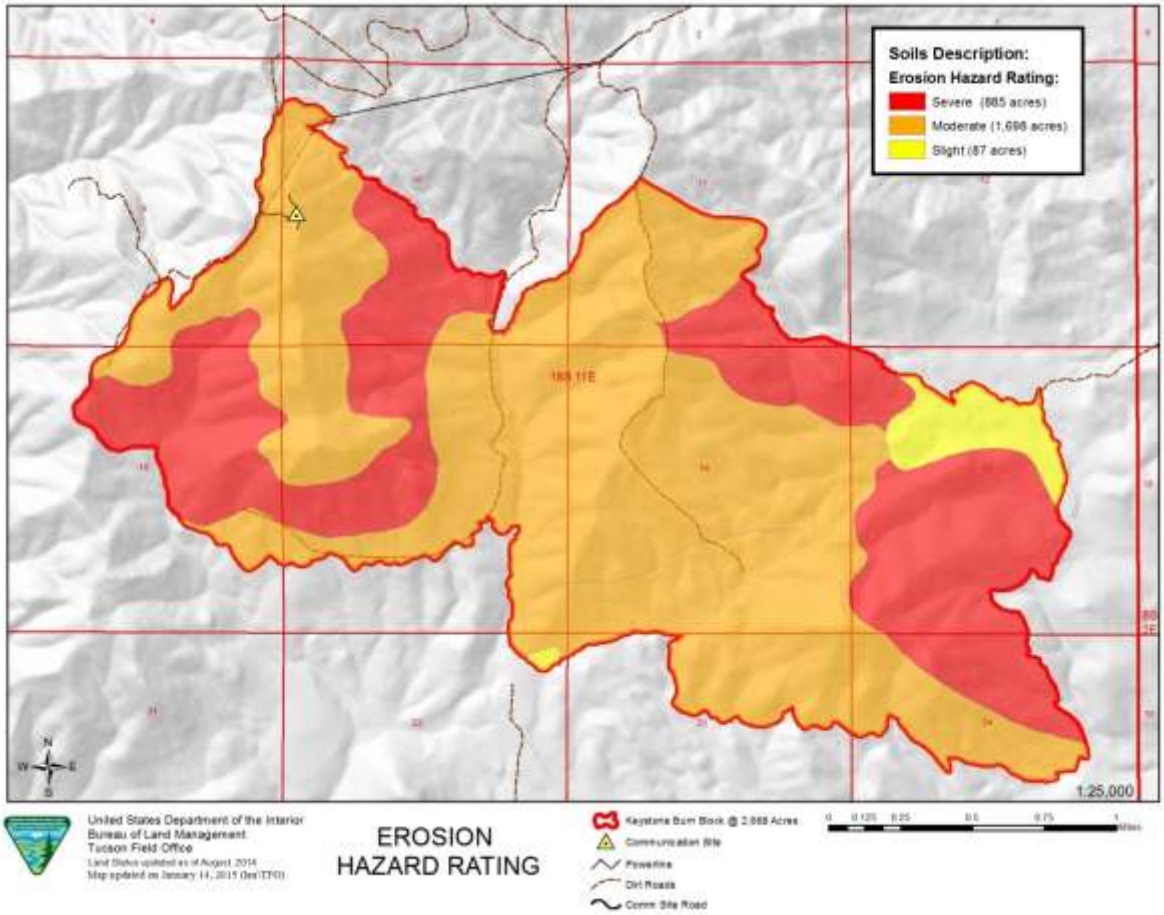

Figure 3-6. Soil Types.

Because of a taxonomic revision of the Chiricahua leopard frog, USFWS reassessed the status of and threats to the currently described species (*Lithobates chiricahuensis*), and listed the currently described species as threatened rangewide (77 FR 16324-16424). Critical habitat was designated at the same time. Twin Tanks and Ox Frame Tank are located near the project area (Figure 3-7), and are designated critical habitat (see 77 FR 16348, with excerpt below). Twin Tanks are on lands owned by ASLD, and Ox Frame Tank is on private land. The primary habitat type for the Chiricahua leopard frog includes oak, mixed oak, and pine woodlands, although its habitat ranges into areas of chaparral, grassland, and desert, particularly for the southern populations. This species requires permanent water sources, including streams, rivers, backwaters, ponds, and stock tanks that are mostly free from introduced fish, crayfish, and bullfrogs. Natural aquatic systems include rocky streams with deep rock-bound pools, river overflow pools, oxbows, permanent springs, permanent pools in intermittent streams, and beaver dams. Human-influenced aquatic systems include earthen stock tanks, livestock drinkers, irrigation sloughs, mine adits, abandoned swimming pools, and ornamental backyard pools (AZGFD 2003).

The Primary Constituent Elements (PCEs) for Chiricahua leopard frog are found at 77 FR 16373. PCEs include aquatic breeding habitat and adjacent uplands exhibiting standing bodies of water with salinities less than five parts per thousand, pH greater than or equal to 5.6 and pollutants absent or minimally present. Other elements include appropriate emergent and submerged vegetation or other substrates, absence of non-native predators, absence of chytridiomycosis, upland habitats that provide opportunities for foraging and basking, and dispersal and nonbreeding habitat that provides movement corridors.

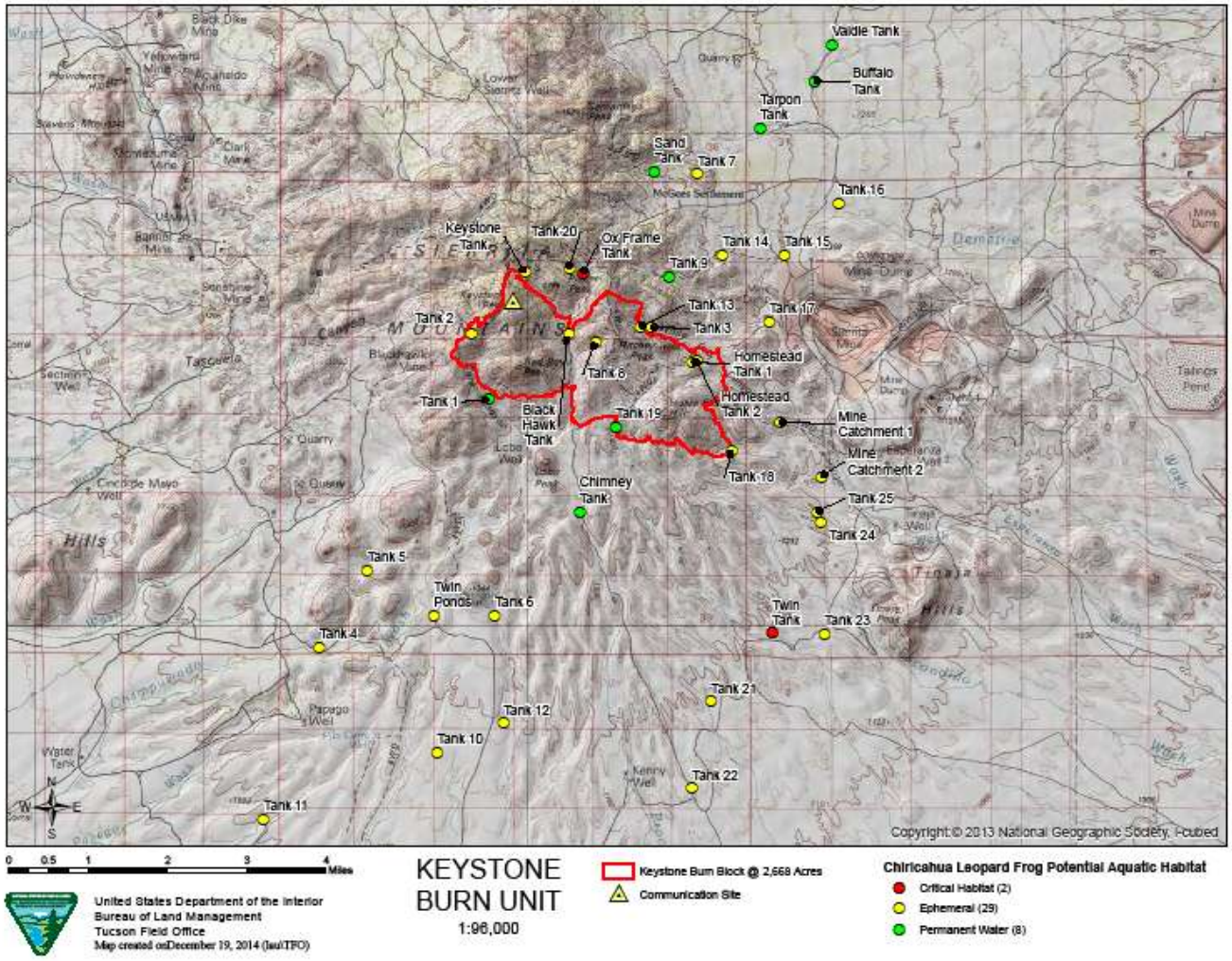

Figure 3-7. Project Area Tank Locations (Chiricahua Leopard Frog Habitat).

Ox Frame Tank (private property owned by Sierrita Mining and Ranching Company) is outside and approximately 0.8 miles upstream of the Keystone Peak project area. The closest point of the project area to Ox Frame Tank is approximately 0.4 mile; the area to be burned drains away from Ox Frame Canyon in this location. A recent survey conducted in June 2013 (Caldwell and Kahrs 2013) documented occupancy by Chiricahua leopard frogs at three livestock tanks within the Sierrita Allotment (Black Hawk, Tank 08, and Ox Frame Tank). Because of occupied habitat and potential unsurveyed habitat for Chiricahua leopard frogs within and near the prescribed fire boundary, the conservation measures from the BLM Statewide LUP Amendment for Fire, Fuels, and Air Quality are mandatory for the Keystone fire.

Jaguar

The jaguar, a large member of the cat family (*Felidae*), is an endangered species that currently occurs from southern Arizona and New Mexico to southern South America. Endangered status was extended to the jaguar

in the U.S. in 1997 (62 FR 39147). Designation of critical habitat was determined to be prudent in January 2010. Critical habitat was proposed for the jaguar in August of 2012 (77 FR 50214), with a revised proposal published in July of 2013 (78 FR 39237). A final critical habitat rule was issued March 5, 2014. The project area does not fall within any proposed critical habitat for jaguar; however, it does contain potential habitat and may provide connectivity between the Baboquivari, Atascosa, Santa Rita jaguar critical habitat units (Figure 3-8). Ox Frame Canyon is a major xero-riparian movement corridor that could be used by jaguar within the Sierrita Mountains (Figure 3-9).

Sightings in the U.S in the late 20th century to the present have occurred mainly along the U.S./Mexico international border. Jaguars in the U.S. are thought to be part of a population, or populations, that occur largely in Mexico. A number of threats contributed to, or continue to affect, the status of jaguars range-wide, including habitat loss, persecution, poaching of prey and fragmentation of populations across portions of the range (Caso et al. 2008). Increased illegal and consequent law enforcement actions along the Mexico-U.S. international border may be limiting jaguar movement across the border.

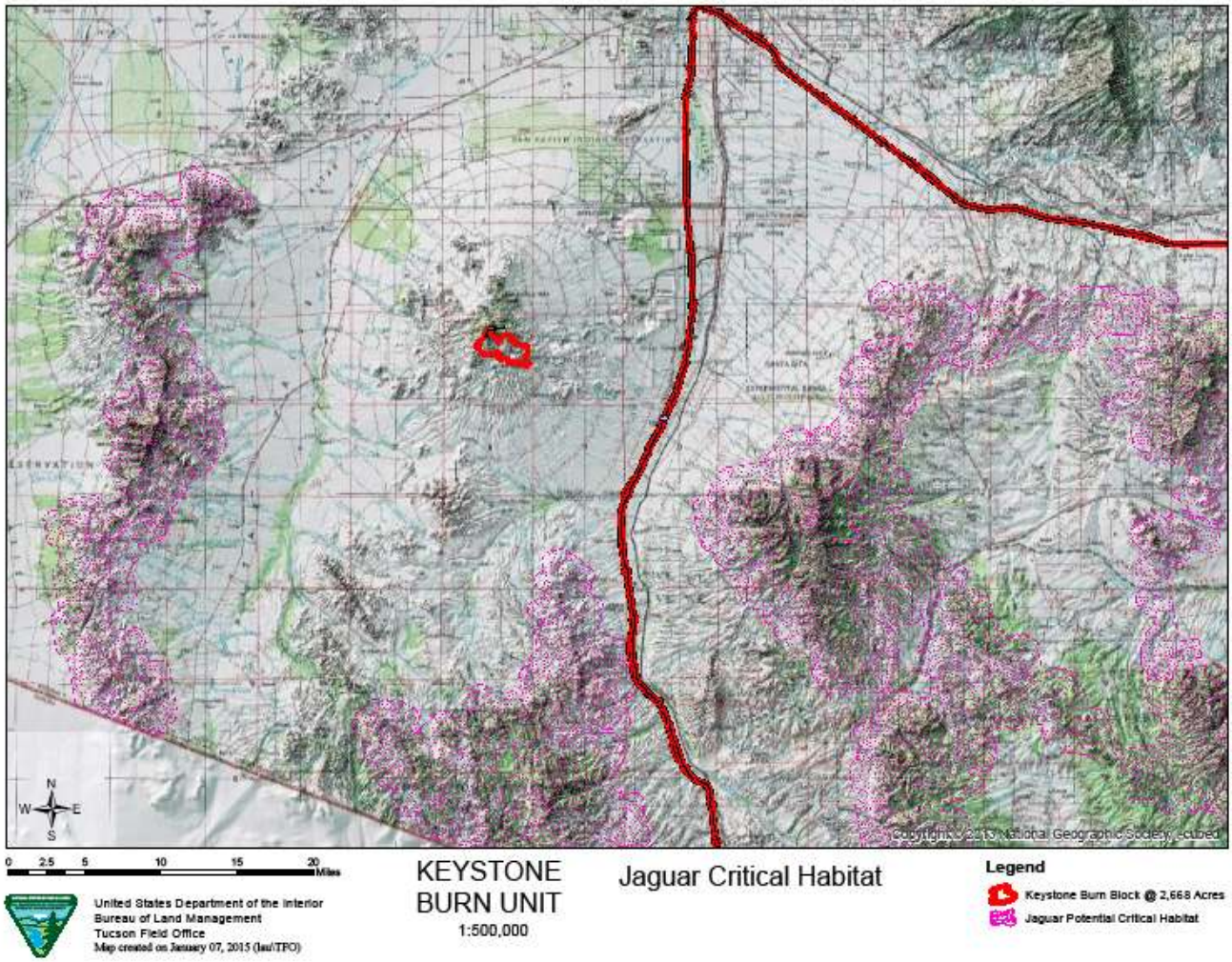

Figure 3-8. Jaguar Critical Habitat.

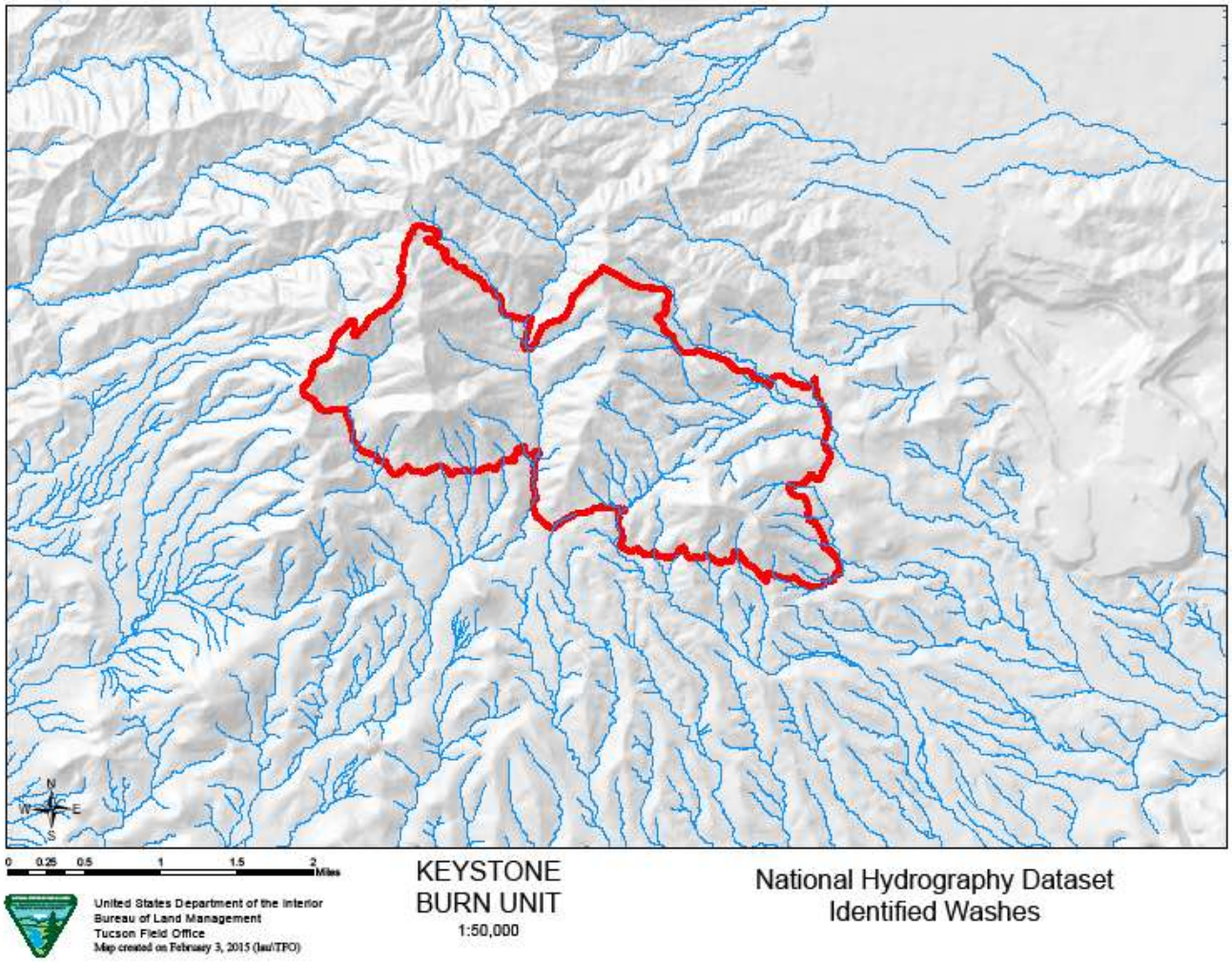

Figure 3-9. Washes in Project Area.

In Arizona, jaguars have been sighted in a variety of ecological communities, from Sonoran desert scrub through subalpine conifer forest (1,600->9,800 feet) (AZGFD 2003). Jaguars have shown an affinity towards areas with dense plant cover, an abundance of prey, and the presence of water (USFS 2001). Most records are from Madrean evergreen-woodland, shrub-invaded semi-desert grassland, and along rivers, which are likely used as travel corridors (USFS 2001, AZGFD 2003). The jaguar prefers warm tropical climate associated with water, and is only rarely found in extensive arid regions (AZGFD 2003).

Jaguars are considered opportunistic feeders, especially in rainforests, and their diet varies according to prey density and ease of prey capture (sources as cited in Seymour 1989, p. 4). Jaguars equally use medium- and large-size prey, with a trend toward use of larger prey as distance increases from the equator (Lo´pez Gonza´lez and Miller 2002, p. 218). Javelina and white-tailed deer are thought to be the mainstays in the diet of jaguars in the United States and Mexico borderlands (Brown and Lo´pez Gonza´lez 2001, p. 51).

Sightings in the U.S in the late 20th century to the present have occurred mainly along the U.S./Mexico international border. Jaguars in the U.S. are thought to be part of a population, or populations, that occur largely in Mexico. A number of threats contributed to, or continue to affect, the status of jaguars rangewide, including habitat loss, persecution, poaching of prey, and fragmentation of populations across portions of the range (Caso et al. 2009).

Increased illegal and consequent law enforcement actions along the Mexico-U.S. international border may be limiting jaguar movement across the border.

The following current information is taken from the designation of critical habitat for jaguar, proposed rule (77 FR 50227): Recently (1996 through 2011), five, possibly six, transient male jaguars have been documented in the United States. Two of these six male jaguars were photographed in 1996 in the United States; one on March 7, 1996, in the Peloncillo Mountains, located along the Arizona-New Mexico border (Glenn 1996, entire; Brown and Lo´pez Gonza´lez 2001, p. 6), and another on August 31, 1996, in the Baboquivari Mountains in southern Arizona (Brown and Lo´pez Gonza´lez 2001, p. 6; McCain and Childs 2008, p. 2). In February 2006, a jaguar was observed and photographed on the northern end of San Luis Mountains of southwestern New Mexico, very close to the U.S.-Mexico border (McCain and Childs 2008, p. 2; Arizona Game and Fish Department 2011a, p. 2). Using remote cameras, jaguars were photographed in the Pajarito, Atascosa, Tumacacori, Baboquivari, and Coyote Mountains near the Arizona-Mexico border from 2001 through 2009 (McCain and Childs 2008, entire; Arizona Game and Fish Department 2011a, pp. 1–3). On November 19, 2011, a jaguar was observed and photographed in the Whetstone Mountains in southern Arizona (Arizona Game and Fish Department 2011b, p. 1; and unpublished data). This same jaguar was later documented in 2012 in the Santa Rita Mountains (79 FR 12575), which are the next mountains to the east of the Sierrita Mountains.

Lesser Long-nosed Bat

The lesser long-nosed bat was listed as endangered on September 30 1988 (53 FR 38456), and a recovery plan finalized in 1997 (USFWS 1997). This species is migratory, present in southern Arizona (Cochise, Gila, Graham, Pima, Pinal, Maricopa, and Santa Cruz Counties) usually from April to September. In April, pregnant females congregate at traditional maternity roost sites in the western desert area of Arizona; some males and perhaps non pregnant females arrive in July. By late September or October, the bats migrate south to Mexico for the winter. The closest known maternity colonies or other roost sites for this species are located in Organ Pipe Cactus National Monument, Cabeza Prieta National Wildlife Refuge, and the Catalina, Rincon, Santa Rita, and Patagonia mountains.

Population declines are thought to be associated with reduced numbers and size of maternity colonies in Arizona and Sonora due to exclusion and disturbance. In the extreme northern edge of its distribution, possible over-harvesting of native agaves in northern Mexico, or other actions reducing forage availability in the U.S. and Mexico, may cause population declines.

Lesser long-nosed bats inhabit desert or semidesert grassland and desert shrub (paloverde/saguaro) up to oak woodland transition habitats (1,200-7,300 feet elevation) (AZGFD 2003, USFWS 2003). They forage mainly on agave and columnar cacti blooms in paloverde-mixed cacti vegetation, including areas of saguaro, ocotillo, paloverde, prickly pear, and organ pipe cactus. Foraging habitat preferences are seasonal, generally foraging among agaves later in the summer. The bats typically day-roost in caves, abandoned mine tunnels, and occasionally, old buildings. Both roosting and foraging habitat for lesser long-nosed bat does occur within the project area. Abandoned mine shafts occur around the Keystone Peak communication site, and agave and shin-dagger are present for nectivorous bats. Other bat species known to roost in the same cave or mine with lesser long-nosed bat, including pale Townsend's big-eared bat (*Corynorhinus townsendii pallescens*) and cave myotis (*Myotis velifer*), are known to roost nearby.

Ocelot

Endangered status was extended to the U.S. portion of the ocelot's range with a final rule published July 21 1982 (47 FR 31670) (USFWS 1982a). Critical habitat is not designated for this species.

Threats to this species include habitat destruction and loss of connectivity, road mortality among dispersing ocelots, increased illegal and law enforcement actions along the international border, human disturbance, and illegal trapping and shooting.

The following habitat description for ocelot is from the Gila District Grazing Biological Opinion (USFWS 2012): The ocelot uses a wide range of habitats throughout its range in the Western Hemisphere (Tewes and Schmidly 1987). Despite this, the species does not appear to be a habitat generalist. Ocelot spatial patterns are strongly linked to dense cover or vegetation, suggesting it uses a fairly narrow range of microhabitats (Emmons 1988, Horne 1998). Ocelot populations appear to be rebounding in parts of its range, perhaps due to a decrease of hunting since the end of the 1980s. In the absence of hunting, the ocelot seems tolerant of human settlement and activities if large forests and sufficient prey are available. The Arizona/Sonora ocelot subspecies (*L. p. sonoriensis*) occurs in southern Arizona and northwestern Mexico (Sonora and northern Sinaloa) (López-Gonzalez et al. 2003; Murray and Gardner 1997). Breeding populations occur in the States of Sonora and northern Sinaloa. Ocelots occur at elevations less than 8,000 feet, typically inhabiting dense chaparral thickets, humid tropical and subtropical forests, mangrove forests, swampy savannas, semi-arid thorn scrub, brush land, and desert scrub habitats with riparian corridors for dispersal. A primary habitat component is the presence of dense cover (USFWS 2003). The ocelot adapts well to disturbed areas around human activity (USFWS 2003), and may persist in partly cleared forests, second-growth woodland, and abandoned cultivation reverted to brush. Dens occur in caves, hollow trees, thickets, or the spaces between the closed buttress roots of large trees.

In November 2009, the first live ocelot was documented in Arizona (in Cochise County) with the use of camera traps. Additionally, in April 2010, an ocelot was found dead on a road near Globe, Arizona. Additional more recent sightings have been documented in southeastern Arizona (https://www.flickr.com/photos/usfws_southwest/sets/72157632294203147/).

Potential habitat for ocelot exists within the Sierrita Mountains, where the project area is located, especially in light of the ocelot documentation near Globe. Ox Frame Canyon is a major xero-riparian movement corridor that could be used by ocelot within the Sierrita Mountains.

Pima Pineapple Cactus

The Pima pineapple cactus occupies ridges in semi desert grassland and alluvial fans in Sonoran Desert scrub biotic communities. These plant communities are dominated by the following species: *Acacia constricta* (white-thorn acacia), *Prosopis velutina* (velvet mesquite), *Gutierrezia microcephala* (thread snakeweed), *Ambrosia deltoidea* (triangle-leaf bursage), and various other cacti and grasses. The Desert Botanical Garden reports that "Plants are found on alluvial hillsides in rocky, sandy soils.... habitat type is primarily desert grassland...." The elevational range of this species is approximately 2,300 - 5,000 feet. It lies on flat ridgetops with little slope, and known substrates for the Pima pineapple cactus are mostly rocky loams, although alluvial hillsides in rocky, sandy soils are reported to contain the cactus. Supposedly, no soil analysis has been done to determine the soil requirements for the Pima pineapple cactus.

The population trend for this species is downward due to loss and degradation of habitat. Management factors include the limited range and sparse distribution, loss of habitat due to urban development, capital improvement projects, off-road vehicle use, road construction, agriculture, mining, habitat degradation due to livestock grazing, alteration of habitat due to aggressive alien grasses (buffelgrass and Lehmann lovegrass), illegal collecting, and range management practices that cause surface disturbances such as ripping and imprinting.

On March 28, 2013, BLM coordinated a survey for Pima pineapple cactus within the proposed Keystone Peak prescribed fire boundary, with a total of 13 participants. Participants were from BLM (three participants), Sierrita Mining and Ranching Company (nine participants), and AVCA (one participant). Detailed maps of potential habitat were provided by BLM and contained polygons of areas with appropriate elevation (less than 4,700 feet) and slope (less than 15 percent) for Pima pineapple cactus occurrence. Training on identification of Pima pineapple cactus was provided by BLM in the form of discussion and photo handouts prior to conducting the surveys. Surveys followed the standard survey protocol (Roller 1996). The larger polygons of potential habitat north and east of Homestead Tank were surveyed earliest in the day and received two sweeps of survey because these areas contained the most likely habitat for Pima pineapple cactus. The disturbed area of Lehmann lovegrass north of Homestead Tank was not surveyed because it was unlikely any Pima pineapple cactus had established in this location in the short time since soil disturbance. Areas approximately 0.5 mile northwest of Homestead Tank received one survey sweep. Polygons further west of Homestead Tank did not receive surveys because rocky soils and elevation precluded habitat potential. The polygons west of Horse Pasture Hill were looked at in the field, but habitat appeared even less suitable for Pima pineapple cactus, so these polygons were not surveyed. No Pima pineapple cactus were found on any of the areas surveyed and very little (less than 1 percent) of the areas surveyed appeared to be potential habitat, based on very rocky soils present throughout the area. The higher elevations (even those areas under 4,700 feet) contained unlikely plant associations and also appeared to be unsuitable habitat, probably due to microclimates of colder temperatures and rocky substrate.

3.4.7.2 BLM Sensitive Species

A total of ten BLM Sensitive Species occur or have the potential to occur in the project area are discussed below and in Table 3-7.

Table 3-7. BLM Sensitive Species With Habitat in the Project Area.

Common Name	Scientific Name	Habitat
Pima Indian mallow	*Abutilon parishii*	Lower Sonoran desert scrub, transition zone of Upper Sonoran grassland communities, and Sonoran deciduous riparian forest to Arizona upland desert scrub. Mesic situations in full sun within higher elevation Sonoran desert scrub. Higher bajadas or low in washes. Bouldery, rocky shallow soils. Found on rhyolite, granite, gneiss and Pleistocene alluvium. On rocky hillsides, cliff bases, canyon bottoms, lower side slopes and ledges of canyons among rocks and boulders. Likes rocky substrate. Slopes can exceed 45 degrees, with fifty percent of sites on slopes of 45percent or more. Occurs at 1,720 to 4,900 feet (525-1495 m). Usually in canyons with southern or western exposure; plants prefer a southern exposure even when in east- or west-facing canyons.
Sonoran desert tortoise	*Gopherus morafkai*	Rocky slopes and bajadas of Sonoran desertscrub most often with paloverde-mixed cacti plant associations. Shelter sites are found in caliche caves in cut banks at elevations ranging from 510 to 5300 ft (155-1615 m).
Great Plains narrow-mouthed toad	*Gastrophryne olivacea*	Mesquite semi-desert grassland to oak woodland, in the vicinity of streams, springs and rain pools. They are more terrestrial than aquatic in habits. They can be found in deep, moist crevices or burrows, often with various rodents, and under large flat rocks, dead wood, and other debris near water in drainages, springs, cattle tanks, and ponds. In Arizona, elevation ranges from 1,400 – 4,700 feet within Madrean evergreen woodland, semi-desert grassland, and Sonoran Desert scrub.
Arizona Botteri's sparrow	*Peucaea botterii*	Savanna-type grassland habitats, especially those with scattered shrubs or trees. In Arizona, they favor giant sacaton or other tall grass with mesquite,

	arizonae	graythorn or catclaw.
Arizona grasshopper sparrow	*Ammodramus savannarum ammolegus*	Semiarid grasslands with a low, woody shrub component such as scattered young mesquite and mimosa. Desert grassland and Sonoran desert scrub -- Open to dense vegetation of shrubs, low trees, and succulents, dominated by paloverde, prickly pear, and saguaro. The preferred habitat in Arizona is open grasslands between 3,800 and 5,300 feet.
American peregrine falcon	*Falco pereginus anatum*	Areas with rocky, steep cliffs, primarily near water, where prey (primarily shorebirds, songbirds, and waterfowl) concentrations are high.
golden eagle	*Aquila chrysaetos*	Usually found in open wooded country and barren areas, especially in hilly or mountainous regions. They nest on rock ledges, cliffs or in large trees.
cave myotis	*Myotis velifer*	Predominantly desert scrub of creosote, brittlebush, palo verde and cacti, but sometimes up to pine-oak communities. Roost in caves, tunnels, mineshafts, under bridges, and sometimes in buildings. Mostly between 300 and 5,000 feet.
greater western mastiff bat	*Eumops perotis californicus*	Lower and upper Sonoran desert scrub near cliffs, preferring rugged rocky canyons with abundant crevices. They prefer crowding into tight crevices a foot or more deep and two inches or more wide. Colonies prefer crevices even deeper, to ten or more feet. Considered a year-round resident in Arizona. Whether or not this bat hibernates during winter is unclear. Many roost sites do not seem to be occupied year-round, although they are likely to be occupied periodically. Elevation ranges from 240 – 8,475 feet.
Townsend's big-eared bat	*Corynorhinus townsendii*	Desert scrub, oak woodland, oak/pine, pinyon/juniper, and coniferous forests. In Arizona, summer day roosts are found in caves and mines from desert scrub up to woodlands and coniferous forests. Night roosts may often be in abandoned buildings. Elevation ranges between 550 and 8,437 feet (168 - 5272 m). Most records range above 3,000 feet (915 m).

Sonoran Desert Tortoise

Sonoran desert tortoise (*Gopherus morafkai*) is a candidate for listing under the ESA (ESA of 1973, as amended [16 USC 1531 et seq.)), and listing is currently being reviewed by USFWS (FR 50 CFR Part 17 [Docket Number USFWS–R9–ES–2012–0050; MO– 4500030113]. Listing appears imminent. In 1988, the BLM developed a range-wide plan for improving the status of desert tortoise. Part of that plan included the categorization of habitat to provide for the future protection and management of the categorized areas and their associated desert tortoise populations (BLM 1988). Desert wildfires cause direct mortality to Sonoran desert tortoise and can indirectly reduce biotic and structural diversity of Sonoran desert tortoise habitats (Van Devender et al. 2002). The western-most portion of the project area lies 1.1 miles east of Category 3 Sonoran desert tortoise habitat (BLM 1988). The elevation of the project area ranges from 4,700-5,000 feet; this is slightly above the known elevation range of Sonoran desert tortoise which is 4,500 feet and below. Slopes in the area range from 0-43 percent (Figure 3-10). In April 2014, BLM conducted a systematic belt transect survey of a BLM parcel lying 1.1 miles west of the project area, and within Category 3 Sonoran desert tortoise habitat by walking in tandem with approximately 20-foot spacing between the surveyors. Surveyors looked for tortoise, tortoise sign and habitat features such as burrows, incised washes and pack rat shelters. No Sonoran desert tortoises or sign was discovered; however, 25 plant species (Table 3-6) known to be Sonoran desert tortoise forage plants were discovered in the survey area which is, from topographic and terrain perspective, functionally suitable for SDT.

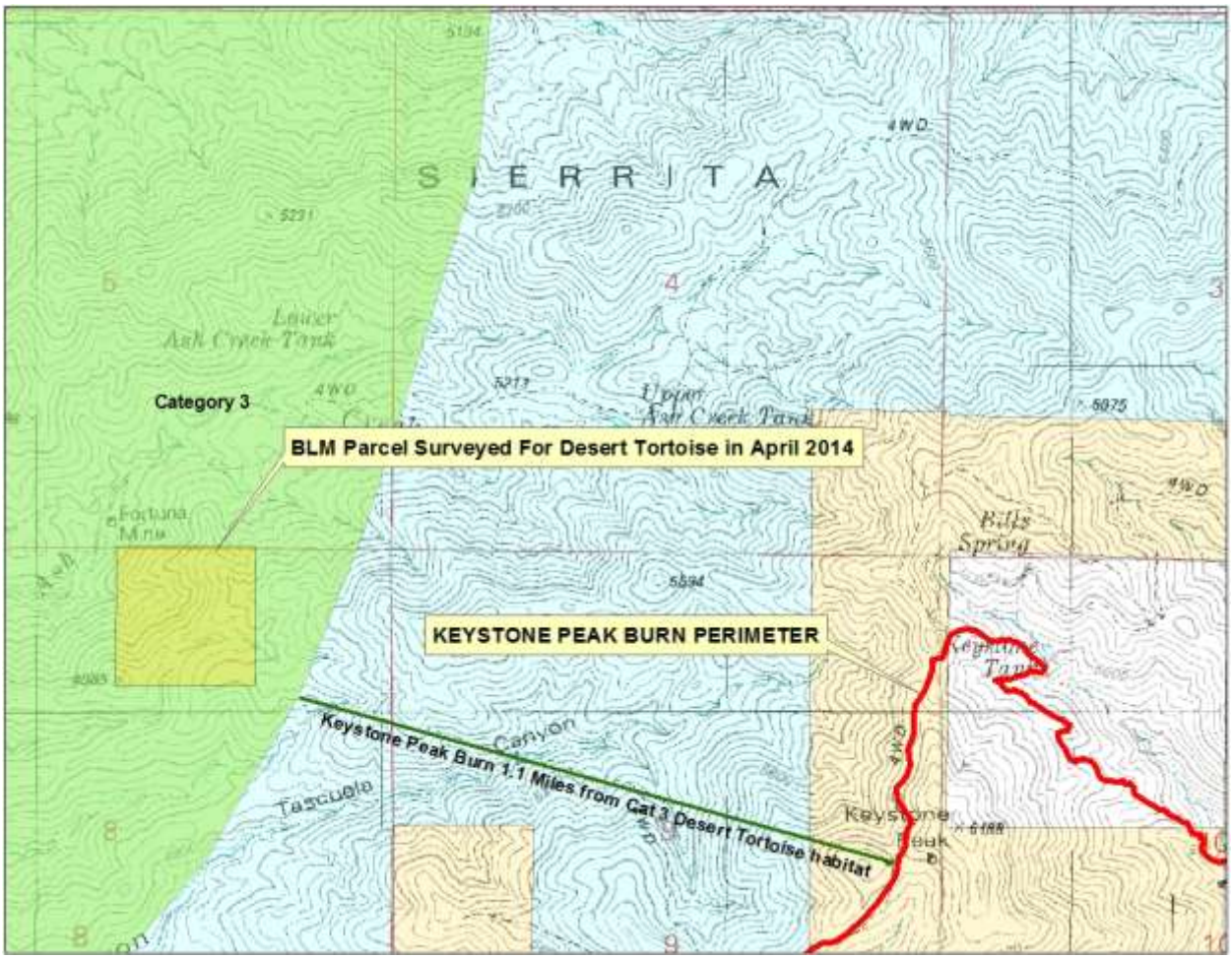

Figure 3-10. Proximity of Sonoran Desert Tortoise Category 3 Habitat to Western Perimeter of Project Area.

Table 3-6. Plant Species Encountered During Sonoran Desert Tortoise Surveys April 2014.

Scientific Name	**Common Name**
Perennial Grasses	
**Aristida spp.*	Perennial three awn
Bou*teloua chondrosioides*	Sprucetop grama
**Bouteloua curtipendula*	Sideoats grama
**Bouteloua gracilis*	Blue grama
**Bouteloua hirsuta*	Hairy grama
Bothriochloa barbinodis	Cane beardgrass
Eragrostis lehmanniana	Lehmann lovegrass
**Erioneuron pulchellum*	Fluff grass
Leptochloa dubia	Green sprangletop
Lycurus setosus	Wolftail

**Muhlenbergia porteri*	Bush muhly
**Panicum obtusum*	Vine mesquite
**Setaria macrostachya*	Plains bristlegrass
Annual Forbs	
**Phacelia crenulata*	Scorpionweed
Various small annual forbs	Annual forbs-too small to identify
Perennial Forbs	
**Allionia incarnata*	Trailing windmills
Argemone arizonica	Arizona pricklypoppy
Bahia angustifolia	Silverleaf bahia
**Chamaesyce albomarginata*	White margin sandmat
**Cirsium spp.*	Thistle
**Lotus wrightii*	Red & yellow pea; Wright's deer vetch
Verbena spp.	Verbena
Trees and Shrubs	
Agave schottii	Shindagger
***Astrolepis spp.*	Cloak fern
Baccharis sarothroides	Desert broom
**Calliandra eriophylla*	Calliandra (False mesquite) (Fairy duster)
Celtis pallida	Desert Hackberry
**Cylindropuntia spp.*	Cholla
**Dalea formosa*	Featherplume
***Dasylirion wheeleri*	Sotol
**Echinocereus rigidissimus*	Arizona rainbow cactus
Ericameria laricifolia	Turpentine bush
***Ferocactus spp.*	Barrel cactus
Gutierrezia sarothrae	Broom snakeweed
Isocoma tenuisecta	Burroweed
**Krameria spp.*	Range ratany
**Mammillaria spp.*	Pincushion cactus
Mimosa dysocarpa	Velvet pod mimosa
**Lycium spp.*	Wolfberry
Nolina microcarpa	Bear grass
**Opuntia spp.*	Prickly pear
***Prosopis spp.*	Mesquite
*Denotes plant species observed to be eaten by Sonoran desert tortoise, **Denotes plants found in fecal analysis but not observed to be eaten by Sonoran desert tortoise.	
Van Devender et al. 2002.	

Pima Indian Mallow

Pima Indian mallow has not been documented in the Sierrita Mountains; however, the Sierrita Mountains are within the range of the species. Pima Indian mallow has been documented in all mountain ranges

surrounding the Sierrita Mountains; it does occur in the Santa Catalina and Tortalito Mountains to the north, Rincon Mountains to the northeast, Silverbell Mountains to the northwest, Santa Rita Mountains to the east and Tumacacori Mountains to the south. The project area contains rocky, granitic soils within the elevational limits of Pima Indian mallow. Therefore, potential habitat for Pima Indian mallow does exist within the project area.

Great Plains Narrow-Mouthed Toad
Potential habitat for Great Plains narrow-mouthed toad does occur within the project area. This terrestrial toad uses habitat with moist ground or leaf litter and under rocks or fallen log and breed throughout the spring and summer in pools of water left by rainfall with appropriate substrate temperature. Their primary diet is ants.

Botteri's Sparrow
While Botteri's sparrows most frequently nest in preferred giant sacaton grassland, this species also nests in upland grasslands interspersed with scattered, low shrubs such as mesquite, acacia, ocotillo, and cacti (Corman and Wise-Gervais 2005). Most Botteri's sparrows arrive in Arizona in mid-May, with most singing activity from late-June and early July just before and during the summer rainy season. This species is susceptible to loss of grassland habitats, and had been extirpated west of Sonoita. During the Arizona Breeding Bird Atlas, Botteri's sparrow were again found to occupy the upper Altar Valley, and the northern edge of their current distribution is the foothills south of Vail (Corman and Wise-Gervais 2005). This species can tolerate prescribed burning and moderate cattle grazing (Webb and Bock 1996). Potential habitat for this species does exist within the lower slopes of the Keystone prescribed fire area.

Arizona Grasshopper Sparrow
Disjunct breeding populations of Arizona grasshopper sparrow occur in southeastern Arizona, with breeding populations documented in the Altar Valley near the project site (AZGFD 2007). The preferred habitat for Arizona grasshopper sparrow is open grasslands between 3,800-5,300 feet, and includes some low, woody shrub component such as scattered young mesquite and mimosa. In southeastern Arizona, habitat has a majority of ungrazed grass cover, and about 5 percent shrub canopy cover. The species usually produces two broods in late May and again in early July. The peak of male singing occurs after the onset of summer rains in roughly early July. Domed nests are placed on the ground at the base of a grass clump, forb, or shrub. However, the Altar Valley supports only low numbers of this species, which are restricted here to local areas of marginal to favorable habitat (AZGFD 2007). Management needs for this species include reduction of cattle grazing in native grasslands to maintain and enhance native grasses and reduction in shrub invasion by maintaining natural fire regimes (AZGFD 2007). In southwestern Arizona, this species avoids recently burned sites for up to two years post-burn.

American Peregrine Falcon
Peregrine falcons return to breeding areas from mid-February to mid-March in Arizona. There are no cliff faces of adequate size or height in the project area to support nesting by this species, but the area does provide suitable hunting habitat for their prey of primarily birds.

Golden Eagle
Habitat for golden eagle occurs within and adjacent to the Keystone prescribed fire boundary, and an individual golden eagle was observed at one tank near the fire boundary in 2013. Golden eagles are very sensitive to disturbance during nesting. However, there are no cliff faces of adequate size or height in the project area to support nesting by this species, but the area does provide suitable hunting habitat. Prey present in the project area includes cottontail, jackrabbit, snakes, birds, and carrion.

Bats
Roosting habitat for cave myotis, greater western mastiff bat, and Townsend's big-eared bat does occur within the project area, and these species have been documented within abandoned mines or other roosts. All three of these bat species use maternity roosts, where primarily females and young are found. Townsend's big-eared bat prefers to hang from open ceilings at roost sites and don't use cracks or crevices as do greater western mastiff bat., while cave myotis prefer to roost near the entrances of caves or mines. All

three species feed on insects such as moths, crickets, grasshoppers, true bugs, beetles, flys, and hymenopterans. Cave myotis are usually the earliest bats leaving roosts, and can be observed during twilight hours soon after sunset; this species usually flies to water and drinks shortly after exiting the roost. Greater western mastiff bats usually leave the roost later than cave myotis (roughly an hour after sunset), and are limited by the availability of drinking water as they are unable to drink from water sources less than 30 m long. Pale Townsend's big-eared bat may leave the roost to forage at variable times depending upon insect activity and developmental stage of young.

The greatest threats to bats include human disturbance and vandalism at maternity and hibernating sites. If maternity colonies are disturbed, young may be left behind and die. It is not clear whether greater western mastiff bats hibernate, but pale Townsend's big-eared bat and cave myotis have winter hibernating roosts in Arizona. Disturbance to hibernating bats may cause the bats to move and expend energy reserves so that they are not capable of surviving the winter due to loss of fat.

3.4.8 Wildlife

3.4.8.1 Migratory Birds

The Keystone prescribed fire area contains land within the Sonoran and Mojave Deserts Bird Conservation Region (BCR) 33. Table 3-8 lists those migratory bird species of conservation concern from BCR 33.

Table 3-8. Migratory bird Species of Conservation Concern..

Sonoran and Mojave Deserts (BCR33)	elf owl
least bittern	burrowing owl
bald eagle (b)	Costa's hummingbird (Mar-June)
peregrine falcon (b)	Gila woodpecker
prairie falcon	gilded flicker
black rail	Bell's vireo (c)(Apr-June)
snowy plover (c)	gray vireo
mountain plover (nb)	Bendire's thrasher
whimbrel (nb)	LeConte's thrasher
long-billed curlew (nb)	Lucy's warbler(Apr-June)
marbled godwit (nb)	yellow warbler (*sonorana* ssp.)
red knot (*roselaari* ssp.) (nb)	rufous-winged sparrow(Apr-July)
gull-billed tern	black-chinned sparrow (May to June)
black skimmer	Lawrence's goldfinch
yellow-billed cuckoo (w. US DPS)	

, (b) ESA delisted, (c) non-listed subspecies or population of Threatened or Endangered species, (nb) non-breeding in this BCR

Riparian areas in the watershed are important migration corridors through Arizona's deserts for birds moving between tropical wintering areas and breeding areas farther north. The value of riparian habitat extends beyond district, state, or national boundaries. Ox Frame Canyon and the nearby Santa Cruz River are important migration corridors for neotropical migrants or for altitudinal dispersers that migrate up and down in elevation.

Birds of conservation concern within BCR 33 that could occur within the habitat of the project area include hunting or migrating peregrine and prairie falcon, but appropriate nesting substrate is absent. While very narrow corridors of xero-riparian vegetation with a few scattered cottonwoods does occur within the project area (Figure 3-, appropriate species composition of large cottonwood/willow and adjacent mesquite does not occur. Therefore, habitat is not large enough in extent for yellow-billed cuckoo. Other Birds of Conservation Concern that do not have appropriate habitat within the project area will not be discussed.

Costa's hummingbird may nest locally on lower mountain slopes and along open canyon drainages of the Sierrita Mountains. Nesting activity for Costa's hummingbird peaks from mid-March to mid-April at lower elevations, but may continue on into May and June at higher elevations. Potential habitat for Bell's vireo may occur in small mesquite woodlands and heavily wooded desert washes with dense stands of mesquite and hackberry. Peak in nesting activity for Bell's vireo occurs from mid-April through the beginning of June. Lucy's warbler may occur in foothill drainages containing mesquite, ash, or oaks, with peak nesting activity from the beginning of April through early June. Rufous-winged sparrows may occur on the edges of washes and small groves of mesquite, with grasses being the essential ground cover component. Nesting for rufous-winged sparrow typically occurs during the late summer monsoon period after rains begin (early July); although spring nesting also occurs from early April through early June with normal winter and early spring precipitation. Black-chinned sparrow may occur in rocky, arid foothill slopes with patches of grasses and scattered oaks. Peak nesting activity for black-chinned sparrow is generally from late May to late June.

Peak nesting activity occurs from roughly March through late June for Birds of Conservation Concern which occur within the Keystone prescribed fire.

3.4.8.2 Wildlife

The diversity of habitat within the project area results in many animal taxa, including invertebrates, amphibians and reptiles, small and large mammals, and many bird species. The elevation and substrate with corresponding vegetation largely determines what species may be present, although some species are habitat generalists and may be found throughout the project area.

Pima County's Sonoran Desert Conservation Plan (SDCP), Pima County Multi-Species Conservation Plan, and the Pima County Wildlife Connectivity Assessment identify areas of conservation value within the county and the project area. The project area is within the Santa Rita-Sierrita linkage design wildlife corridor. As such, it provides genetic connectivity between the Santa Rita and Sierrita Mountains for species such as Coues whitetail deer, javelina, mountain lion, and black bear. Pima County identified wildlife movement corridors, including landscape movement corridor 29 encompassing washes in the Avra Valley connecting the Tohono O'odham Nation and the Sierrita Mountains to Brawley Wash (mule deer, javelina, small mammals, and herpetofauna), landscape movement area 16 with linkage between the Baboquivari Mountains through Fresno and Cierro Prieto Washes to the Sierrita Mountains (mountain lion, bobcat, coyote, and javelina), and landscape movement area 17 connecting the Baboquivari Mountains through Brown Canyon to the Sierrita Mountains (mountain lion, bobcat, coyote, javelina). The lower slopes of the Sierrita Mountains are considered a biological core area (i.e. has potential to support habitat for five or more priority vulnerable species) and Ox Frame Canyon is considered an important riparian area (i.e. valued for their higher water availability, vegetation density, biological productivity, and landscape connectivity) in the SDCP (Figure 3-11).

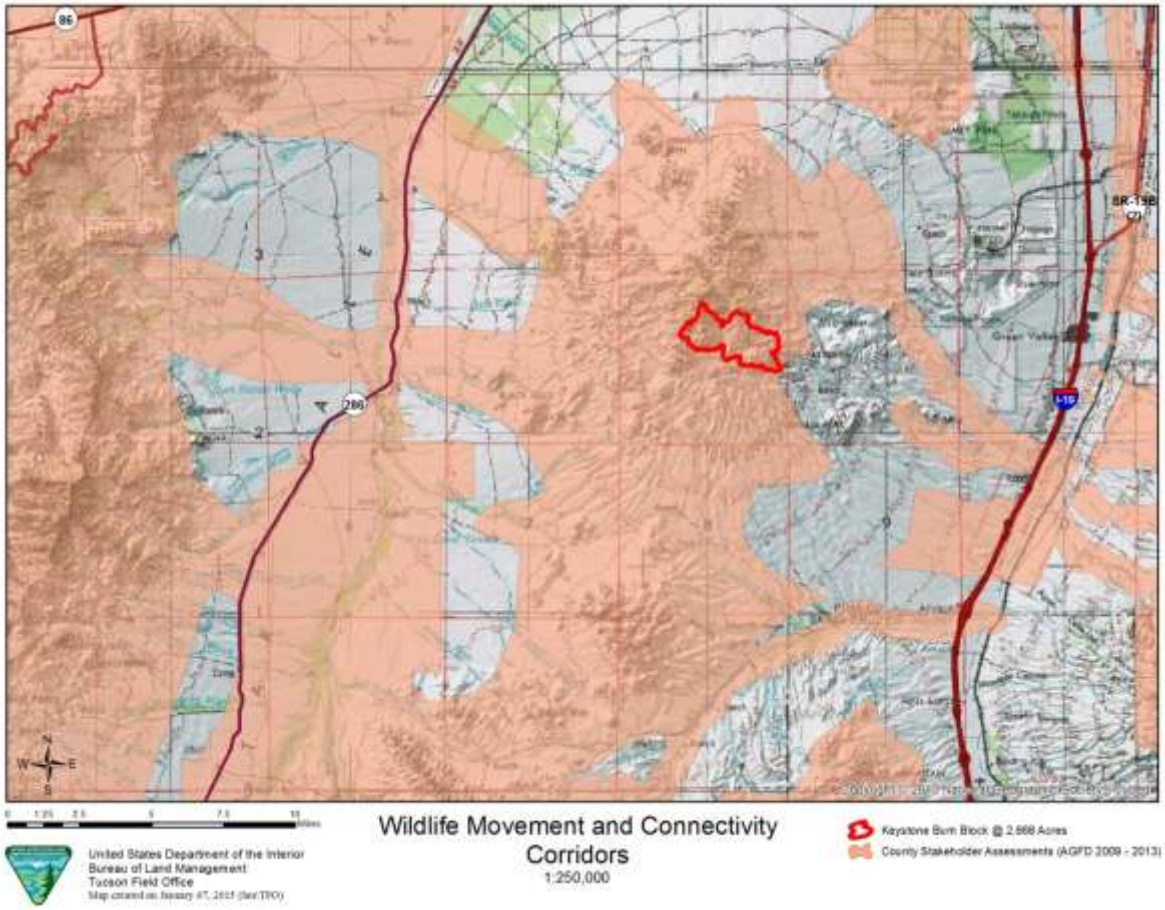

Figure 3-11. Wildlife Corridors

The AZGFD State Wildlife Action Plan (SWAP) identifies Species of Greatest Conservation Need (SGCN) based on vulnerability of populations, of which there are eight criteria (see AZGFD 2012). Species that rated high on the vulnerability category were designated to have the highest priority for directed conservation management. Vulnerable species require conservation actions aimed at improving conditions for those species through intervention at the population or habitat level. Vulnerable species were further separated into three priority tiers of 1a, 1b, and 1c, which are listed as A, B, or C. Species in Tier A and B are in most immediate need of conservation. Tier A are federally listed species, candidate species, species with a signed conservation agreement, a species that require monitoring following delisting, or a closed season species. Tier B species do not match the criteria for A, but are vulnerable in at least one of the eight vulnerability categories (AZGFD 2012). Tier C species have insufficient information available to fully assess their status, but the species needs to be watched. Common name used are those used in the 2012 SWAP, and the SWAP also lists scientific names. See the Special Status Species section for federally listed and proposed (Tier A), candidate, and BLM sensitive species. See the Migratory Bird section for all migratory birds, including migratory game birds (e.g. doves).

Invertebrates

It is unknown what species of invertebrates occur within the project area. There are probably species of insects, protozoans, flatworks, segmented worms, snails, arachnids (e.g. spiders, scorpions), crustaceans (e.g. fairy shrimp, amphipods, isopods), centipedes, and millipedes that occur that have not been inventoried or had their ecological role described. However, invertebrates provide essential ecological roles in ecosystem stabilization, energy and nutrient transfer, maintenance of trophic structures, plant pollination, plant

protection, and the provision of major habitats for other organisms, among other processes (Kellert 1993). Insects provide a rich food source for other invertebrates, fish, amphibians, reptiles, birds, and mammals. It is unknown whether crayfish or other non-native invertebrates may occur in the project area.

Amphibians and Reptiles

Amphibians that may be present within appropriate habitat in the project area include Couch's and Mexican spadefoot toads, red-spotted toad, Sonoran desert toad, Great Plains narrow-mouthed toad, and lowland leopard frog. Sonoran desert toad, Great Plains narrow-mouthed toad, and lowland leopard frog are BLM sensitive species and are discussed in the special status species section. The threatened Chiricahua leopard frog has been documented in the project area and is discussed under Threatened and Endangered Species. Reptiles present in the project area may include Sonoran desert tortoise (discussed under special status species), eared lizard, ornate tree lizard, side-blotched lizard, spiny lizard, regal horned lizard, desert grassland whiptail, Gila monster, western threadsnake, Sonoran coralsnake, Smith's black-headed snake, ring-necked snake, nightsnake, western lyresnake, gopher snake, glossy snake, western patch-nosed snake, Sonoran whipsnake, coachwhip, common kingsnake, black-necked gartersnake, terrestrial gartersnake, western diamond-backed rattlesnake, and black-tailed rattlesnake.

Mammals

Due to the wide elevational differences in habitat, the Sierrita Mountains are home to many mammals including a wide variety of small rodent species that provide a food source for birds of prey and carnivores at higher trophic levels. Carnivores such as coyote, bobcat, and skunk have habitat within the project area.

Arizona Game and Fish Department Game Species

The Sierrita Mountains are found in the middle of AZGFD's hunt unit 36A. Big game species within this hunt unit include javelina, desert mule deer, Coues' whitetail deer, and mountain lion. Small game present include cottontail rabbit, black-tailed and antelope jack rabbit, mourning dove, band-tailed pigeon, and scaled, Gambel's, and Mearn's quail.

There is no public vehicular access to the top of the mountain, but foot access by the public is allowed. Public access is available from the east from McGee Ranch Road, and from the northeast from Ocotillo Ranch Road (AZGFD 2015). The main roads on the east and west sides are legally locked on private property.

There are several scattered livestock waters present within the project area (Figure 3-7), and provide important water sources for many wildlife species. Many of the livestock waters are in earthen tanks, providing easy access to wildlife as well. Some livestock waters are in troughs and Sierrita Ranch has made a concerted effort to assure that wildlife escape ramps are installed on all livestock troughs.

Mule deer are found in GMU 36A mainly in foothills and deeper canyons of the unit. This species utilize xero-riparian washes as movement corridors, and are usually found near permanent water. Preferred habitat allow mule deer adequate visibility. Browse species in the project area include buckwheat, acacia, fairyduster, hackberry, and mesquite.

Coues' whitetail deer are typically found at higher elevations than mule deer, and habitat may contain oaks or pines, but habitat for mule and Coues' deer may overlap. Whitetail deer are considered an edge species (Williamson and Hirth 1985), using areas between major habitat types with the availability of cover, food, and water in close proximity (Suring and Vohs 1979). Whitetail deer are expanding their range and in many areas are encroaching into what at one time was mule deer habitat (Baker 1984). Habitat changes favoring whitetail deer are likely the cause of this expansion, and this expansion is of concern in areas where mule deer are limited in number (Ockenfels et. al. 1991). For whitetail deer, of concern is the level of human disturbance caused by roads during critical periods of the year, and is particularly important during drought conditions and fawning season (Ockenfels et al. 1991). Also of concern may be direct competition between whitetail deer and cattle for browse and forbs during periods of drought (Knipe 1977, Ockenfels et al. 1991). Whitetail deer may avoid sites with high cattle utilization (Brown 1984), and reproductive success may be lower in areas with high cattle stocking rates (Smith 1984).

Javelina are present near permanent water sources mainly in the foothills and washes of the project area. Javelina are thought to be of tropical origin, having only recently arrived in the desert southwest, because their bones are not found in archeological sites and settlers did not record observations of javelina. Javelina may have extended their range northward from Mexico as desert grassland became invaded by scrub and cactus. Preferred habitat for javelina includes semi desert grassland with cactus and other succulents as their favored food source.

Because of their abundant prey base (e.g. javelina and Coues' whitetail deer), mountain lion are found throughout the project area. Mountain lions are important predators, helping to control their ungulate prey populations (AZGFD 2007), which might otherwise become overabundant and impact habitat and other wildlife species (Cote et al. 2004). Stream courses are frequently used as travel corridors and hunting routes for mountain lions, and riparian vegetation provides cover for movement (AZGFD 2007). Large tracts of roadless habitat are necessary to maintain individual populations, and the corridors that connect these tracts are required for dispersal of lions between populations (AZGFD 2007).

Small Game Species

Desert cottontail are found in various brushy habitats desert scrub, semi desert grassland, sandy washes, and xero-riparian areas. Black-tailed jackrabbit prefer more open areas in semi desert grassland, while antelope jackrabbits may be found in the lower elevation desert.

Gambel's quail are found in desert washes and other xero-riparian habitats within the project area. Scaled quail are found in semi desert grassland and mixed mesquite habitats. Scaled and Gambel's quail may be found in the same habitat where grasslands merge with mesquite and xero-riparian habitat. Number of scaled and Gambel's quail may vary considerably annually due to rainfall patterns, winter severity, and other factors, but scaled quail are more sensitive of livestock grazing pressure than Gambel's quail. Mearn's quail are found in the project area at higher elevations than Gambel's and scaled quail, and Mearn's habitat generally does not overlap with Gambel's and scaled quail. Mearn's quail rely heavily on oak-grassland savannah in the project area, and rarely occur in other habitat types except in years of peak abundance. Mearn's quail may be occasionally associated with other tree species including catclaw and mesquite, but high grass diversity and cover height associated with an oak overstory are the best habitat for this species (Zornes 2008). Sierra Ranching and Mining has expressed concern over oak mortality during the prescribed fire. Most individual oaks will resprout, but it may take years for them to again form an overstory suitable for good habitat for Mearn's quail and band-tailed pigeon.

Key trends for wildlife habitat within the project and surrounding area include:

- Long-term drought with impacts to vegetation and habitat, effects to availability of surface water for wildlife, and unknown effects of climate change;
- Groundwater depletion caused by pumping with potential future loss of surface water used by wildlife for drinking;
- Potential impacts to all wetland vegetation types and food web ecology due to decreased groundwater levels;
- Potential impacts to surface water availability in the watershed and impacts to xeroriparian habitat due changes in surface water availability and drought;
- Water quality issues and unknown impacts from emerging contaminants, heavy metals, and *E. coli;*
- Increased use for border activities, including smuggling and Border Patrol, with corresponding disturbance to wildlife, for which some species are especially vulnerable (e.g. mule deer, nesting raptors);
- Increased recreational activity by hikers, equestrian users, mountain bikers, and OHV users with corresponding disturbance to wildlife, soils, and habitat;
- Associated increase in habitat fragmentation and human disturbance with "wildcat" trails and roads;
- Loss, modification, and fragmentation of habitats on adjacent private and state land due to mining, urbanization, border activities, and recreational use;

- Impacts from authorized livestock use with associated disturbance and impacts to vegetation, soils, and subsequently composition and structure of vegetation;
- Continuing impacts to soils and vegetation from historic uses;
- Impacts from introduced species (e.g. Lehmann lovegrass, bullfrog, crayfish, non-native fishes) to native wildlife; and
- Impacts to migration corridors important for genetic connectivity.

4 Environmental Consequences

This section includes a discussion of the environmental consequences, including a description of direct and indirect impacts. Impacts are defined as modifications to the existing condition of the environment and/or probable future condition that would be brought about by implementation of one of the alternatives.

Impacts can be direct or indirect. Direct impacts are those effects that are caused by the action or alternative and occur at the same time and place, while indirect effects are those effects that are caused by or would result from an alternative and are later in time, but that are still reasonably certain to occur.

4.1 Environmental Consequences of the Proposed Action

4.1.1 Air Quality

Prescribed fires may contribute to changes in air quality. Air quality of a regional scale is affected only when many acres are burned on the same day. Local problems are more frequent and occasionally acute due to the large quantities of smoke that can be produced in a given area during short period of time.

Smoke consists of small particles (particulate) of ash, partly consumed fuel, and liquid droplets. Other combustion products include invisible gases such as CO, CO2, hydrocarbons, and small quantities of NOx. NOx are usually produced at temperatures only reached in piled or windrowed slash or in very intense wildfires. In general, prescribed fires produce inconsequential amounts of these gases. Except for organic soils (which are not generally consumed prescribed burns), forests fuels contain very little sulfur, so SOx are not a problem either.

Particulates, however, are of special concern to the prescribed burner because they reduce visibility. The amount of particulate put into the air depends on amount and type of fuel consumed, fuel moisture content, and rate of fire spread as determined by timing and type of firing technique used. Rate of smoke dispersal depends mainly on atmospheric stability and wind speed.

Effects of smoke can be managed by burning on days when smoke will blow away from smoke-sensitive-areas. Precautions must be taken when burning near populated areas, highways, airports, and other smoke-sensitive areas. Weather and smoke management forecasts are available as a guide for wind speed and direction. Any smoke impact downwind must be considered before lighting the fire. The burner may be liable if accidents occur as a result of the smoke. All burning should be done in accordance with applicable smoke management guidelines and regulations. During a regional alert when high pollution potential exists, all prescribed burning should be postponed.

Nighttime burning should be done with additional care because a temperature inversion may trap the smoke near the ground. This smoke can create a serious visibility hazard, especially in the presence of high humidity (which occur on most nights). In particular, smoke mixing with existing fog will drastically reduce visibility. Cool air drainage at night will carry smoke downslope, causing visibility problems in lowlands and valleys.

There would be direct and indirect, short term impacts to air quality during implementation of the Proposed Action. Direct and indirect short term impacts may include the following:

- Direct
  - Temporary reduced visibility on the roads in the immediate vicinity of the project area. This impact would be generally confined to areas near the flame front or areas of heavy fuel loading (longer duration burning) due to wind speeds and directions influencing smoke drift before the column has time to rise into the atmosphere and disperse with the prevailing transport (upper level) winds.
  - Temporary reduction in air quality due to smoke and particulate matter generated during the combustion process. The impacts from smoke generated by light fuels, 1 hour and 10 hour fuels are short lived due to the small size and rapid consumption.
- Indirect
  - Diurnal settling of smoke in nearby drainages and valleys
  - Smoke column causing concern in the local community due to perceived threat of wildfire.
  - Visual impairment of airspace surrounding project area, or smoke column. May cause concern for military training routes, local public airport traffic, and local commercial airline traffic.

The BLM would implement BMPs AQ-1 through AQ-7 described in Chapter 2. Burn permits will be obtained from ADEQ prior to burn implementation. During annual registration of proposed treatment, smoke modeling predictions, including PM10 and PM2.5 emissions, showing predicted impacts to all receptors within a 15 mile radius would be supplied to ADEQ. Maps depicting anticipated smoke dispersal for both daytime and nighttime would be submitted to the ADEQ. Permits for conducting prescribed burns are requested the day prior to ignition and are issued by the ADEQ four a 24 hour period. Due to the short nature of the prescribed burn (less than three days) there would be no long term direct or indirect impacts. Since the ADEQ would be granting a permit for this project the project would not result in an exceedance of the air quality standard.

4.1.2 Cultural Resources

According to guidelines provided under Section 106 of the NHPA which requires all ground disturbing areas to be surveyed prior to project implementation. All areas where ground disturbances occur such as fire handline construction or dozerline construction will require Class III survey prior to project implementation.

If cultural sites are located they will be protected through avoidance. All areas including fire handline construction areas, equipment staging areas and temporary new road construction areas will be identified and surveyed at Class III levels prior to project implementation. If cultural resource sites are located on the surveys all sites would be protected

If there are additional areas identified after the initial survey is conducted project operations will be put on hold until the new survey areas are cleared. Thus, there would be no impacts to cultural resources.

4.1.3 Grazing Management

The project area is entirely within the Sierrita Allotment and would require grazing deferment for the Proposed Action to be implemented. The Sierrita allotment would have to defer livestock grazing for 1-2 years prior to ignition to build up fine fuels to carry the fire and post ignition to allow grasses to reestablish and develop adequate root systems. This would result in an adverse short term, direct impact to the grazing program since cattle would not be allowed to graze. However, the Proposed Action would result in a more diverse native grassland community within the allotment which would be a beneficial, long term indirect impact to the grazing program.

4.1.4 Land Health

Implementation of the Proposed Action would result in the introduction of wildfire back into this ecosystem. Some studies have shown that approximately 3.5 million acres of the shrub-invaded native grasslands have the potential for restoration back to native grass dominated ecosystems (Gori and Enquist 2003) utilizing integrated vegetation management techniques. Fire has played an important role in the Altar Valley's ecology prior to Euro-American settlement. Those fire regimes likely played a crucial role in maintaining the area's grasslands by suppressing woody species and encouraging new growth (Sayre 2000, 2002, AVCA 2008). As one component of fire management, prescribed fire is used to alter, maintain, or restore vegetative communities; achieve desired resource conditions; and to protect life, property, and values that would be degraded and/or destroyed by wildfire, (USDI/USDA 2006 AVCA 2008).

Implementation of the Proposed Action would result in an increase in perennial grasses and provide more forage and cover for the allotment. Thus it would be a positive long term benefit for rangeland health.

4.1.5 Native American Religious Concerns

Under the NHPA Section 101 (d) (6) consultation with Tribes whose tradition or history may contribute to the National Register eligibility of a potentially affected property when carrying out section 106 responsibilities is required. An official project description letter was sent out to the Tribes informing them about the Keystone Peak Prescribed Burn project and asking them for their input. No response was received. The project was presented at the Four Southern Tribes meeting and no concerns were raised during or after that meeting.

4.1.6 Soils

As described in Section 3.4.6, over 96 percent of the project area has soils that are of moderate or severe erosion hazard. Soils with a "Moderate" rating have the potential for erosion and may need erosion control measures implemented. Soils with a "Severe" rating are very likely to experience erosion.

The following erosion control measures would be implemented as part of the Proposed Action.

RR-02 Seed from regionally native or sterile non-native species of grasses and herbaceous vegetation will be used in areas where reseeding is necessary following ground disturbance to stabilize soils and prevent erosion by both wind and water.

RR-03 Sediment traps or other erosion control methods will be used to reduce or eliminate influx of ash and sediment into aquatic systems.

Sediment traps and other erosion control methods would minimize erosion in soils with a "Moderate" rating. Sediment traps and other erosion control methods as well as reseeding bare areas would minimize soil erosion in soils with a "Severe" rating.

4.1.7 Special Status Species

4.1.7.1 Threatened and Endangered Species

BLM completed consultation with the USFWS to ensure compliance with the Endangered Species Act in August 2013. BLM consulted with USFWS on the jaguar, ocelot, lesser long-nosed bat, Chiricahua leopard frog (and associated critical habitat which is in proximity to the project area), and Pima pineapple cactus. USFWS concurred with BLM's may affect, not likely to adversely affect determinations on all of these species (Appendix C). Specific analysis on each species is discussed below as well as species specific conservation measures that will be implemented as a result of consultation. These impacts are based on the proposed action implementing agreed upon conservation measures during the August 2013 consultation in addition to

the measures from the LUPA that are applicable to this project. Table 4-1 depicts each listed species or critical habitat, the BLM effect determination and rationale, and the USFWS rationale for concurrence with the BLM determination.

Table 4-1. Listed Species or Critical Habitat.

Species or Critical Habitat	BLM Effect Determination	BLM Rationale	USFWS Concurrence Rationale (from 2013 BO)
Chiricahua leopard frog	May affect, not likely to adversely affect	Project activities could result in adverse direct and indirect effects to leopard frog eggs, tadpoles, and invertebrates or their habitats, potentially causing a change in the numbers and reproduction in any potentially occupied habitat. An improvement in watershed conditions post-fire could improve habitat conditions.	A recent survey completed in June 2013 indicated that Chiricahua leopard frogs do occupy at least two tank/springs within the boundaries of the proposed prescribe fire. An un-named occupied tank was rapidly drying, and the occupancy status of the tank at the time of the proposed action will be dependent on the amount and timing of precipitation prior to the implementation of the proposed action. BLM committed in its August 6, 2013 correspondence to apply all the appropriate conservation measures from the BLM Statewide LUP Amendment for Fire, Fuels, and Air Quality and Biological Opinion related to Chiricahua leopard frogs.
Chiricahua leopard frog critical habitat	May affect, not likely to adversely affect	The conservation measures (e.g. placement of sediment traps, exclusion of using water from occupied habitat) would apply to Ox Frame Canyon and other major xero-riparian corridors. Long-term positive effects to the species would occur from the reduced risk of catastrophic wildfires within Chiricahua leopard frog recovery unit 1, which may help stabilize populations, protect occupied habitat, and increase the resiliency of local populations to other	Ox Frame Tank and North and South Twin Tanks are the only tanks designated as Chiricahua leopard frog critical habitat within the vicinity of the proposed action. These tanks are outside of the boundary of the proposed prescribed fire. Additionally, the designated tanks are upstream or an adequate distance from the proposed prescribed fire that off-site and indirect effects from the proposed action are discountable. Conservation measures will

		types of disturbance. Chiricahua leopard frog critical habitat at Twin Tanks may be impacted through improvement of watershed conditions and infiltration.	be implemented to avoid or reduce the potential effects to designated critical habitat that occurs outside of the boundaries of the proposed action (see measures RA-1 through RA-13 in Section 2.2.24), thus effects will be insignificant.
Jaguar	May affect, not likely to adversely affect	Due to the jaguar's ability to disperse long distances, its ability to opportunistically forage on a variety of prey species, and the small likelihood that the jaguar would occur on or near BLM-administered lands in Arizona, direct and indirect effects to the species the proposed prescribed fire actions would be so small as to be insignificant or so unlikely as to be discountable. Improvements in vegetation condition would maintain habitat heterogeneity, and would reduce the risk of catastrophic wildfires. Reproduction, numbers, and distribution of jaguars would not be changed by the proposed fire management activities.	Jaguars are rare in Arizona and no jaguars have been documented in the action area. The proposed action will result in a short-term increase in human activity and effects to the vegetation communities providing some jaguar habitat elements. However, because of the extremely rare nature of the jaguar in the project area, effects from human disturbance are discountable. Effects to jaguar habitat elements are expected to be short-term and will likely improve jaguar habitat conditions overall, and for jaguar prey specifically. The area would retain a long-term mosaic of suitable habitat structures for dispersing and foraging jaguars. Although habitat in some foraging areas may be modified, the travel corridors would retain patches of dense riparian habitat, allowing for dispersal into the United States from Mexico. In addition, implementation of prescribed fire to reduce fuel loads and restore riparian and upland habitats over the long-term would reduce the risk of catastrophic wildfires, and the large-scale loss of suitable jaguar habitat. These effects are expected to be beneficial or to only have insignificant short- or long-term effects to the

			jaguar and jaguar habitat.
Ocelot	May affect, not likely to adversely affect	Due to the ocelot's ability to disperse long distances, its ability to opportunistically forage on a variety of prey species and persist in previously disturbed sites, and the small likelihood that an ocelot would occur in the proposed action area, effects to the species would be so minor as to be insignificant or so unlikely as to be discountable. Reproduction of ocelots would not be changed by the proposed prescribed fire activities. Long-term habitat improvements resulting from the proposed prescribed fire could benefit future recovery efforts for ocelots.	Ocelots are rare, secretive, and have not been detected in the Sierrita Mountains. The proposed action will result in a short-term increase in human activity and effects to the vegetation communities providing some ocelot habitat elements. However, because of the extremely rare nature of the ocelot in the project area, effects from human disturbance are discountable. Effects to ocelot habitat elements are expected to be short-term and will likely improve habitat conditions overall, and for ocelot prey specifically. The area would retain a long-term mosaic of suitable habitat structures for dispersing and foraging ocelots. Although habitat in some foraging areas may be modified, the travel corridors would retain patches of dense riparian habitat, allowing for dispersal into the United States from Mexico. In addition, implementation of prescribed fire to reduce fuel loads and restore riparian and upland habitats over the long-term would reduce the risk of catastrophic wildfires, and the large-scale loss of suitable ocelot habitat. These effects are expected to be beneficial or to only have insignificant short- or long-term effects to the ocelot and ocelot habitat.
Lesser long-nosed bat	May affect, not likely to adversely affect	The potential for negative effects to lesser long-nosed bats from the proposed Keystone Peak prescribed fire would only occur if food sources are damaged or destroyed.	There are no known lesser long-nosed bat roosts in the action area for the proposed Keystone Peak prescribed fire. Effects to roosting bats will be discountable.

		Implementation of the Conservation Measures (Appendix 12.2) would minimize these effects to the extent that any residual effects would be minor. In addition, bats would benefit from an overall reduction in the threat of catastrophic wildfires within foraging habitats. The proposed prescribed fire actions would not affect the reproduction, distribution, or numbers of bats within their range.	The proposed Keystone Peak prescribed fire would be used to restore and maintain grassland habitat, to reduce accumulated hazardous fuels, and to reduce the chance of catastrophic fire on BLM-administered, state, and private land. While there may be short-term impacts to lesser long-nosed bat foraging habitat, with the implementation of the proposed conservation measures, the proposed action will provide long-term benefits to lesser long-nosed bat forage resources.
Pima pineapple cactus	May affect, not likely to adversely affect	Conservation measures FS-1 through FS-7 and PL-1 through PL-4 would help protect this species during prescribed fire. No Pima pineapple cactus were found during survey of potential habitat. Potential habitat could be improved through the use of prescribed fire, although substrate and microclimates may be unsuitable.	Surveys for the Pima pineapple cactus were conducted and none were found. While it is possible that the survey missed individual Pima pineapple cacti, it is unlikely that a meaningful population of the Pima pineapple cactus was missed, and, thus, effects to Pima pineapple cacti from the proposed action are discountable. Habitat appeared largely unsuitable due to rocky substrate throughout the area of the proposed prescribed fire, with areas of colder microclimate. Therefore, it is unlikely that any direct mortality to Pima pineapple cactus would occur from the Keystone prescribed fire. Positive effects to future potential habitat for Pima pineapple cactus may occur through the control of woody invasives, such as mesquite and snakeweed, and subsequent restoration of grassland habitat.

If at any point the project area expands outside of the planned burn area in a way that may affect listed species or for some reason one or more of the conservation measure cannot be met BLM would enter into emergency consultation with the USFWS.

The following effects excerpts for each species are compiled, analyzed for the project, and modified, if necessary, from the BLM Statewide LUP Amendment for Fire, Fuels, and Air Quality Management Biological Evaluation (Dynamac Corp. 2003).

Chiricahua Leopard Frog

Direct and Indirect Effects

Both North and South Twin Tanks are outside of the prescribed boundary and are on ASLD property. A large drainage from within the prescribed fire boundary drains to the west of Twin Tanks. Other drainages from the southeast side of the prescribed fire drain to the north and east of Twin Tanks. No drainages from within the prescribed fire boundary drain into Twin Tanks, therefore, it is unlikely that the Keystone Peak prescribed fire will have any direct effect on Twin Tanks and Chiricahua leopard frog eggs, larvae, or adults in the tanks. Ox Frame Tank is outside of the (revised) prescribed fire boundary, and is approximately 0.8 mile upstream of the northern fire boundary. No drainages within the prescribed fire boundary drain into the upper portion of Ox Frame Canyon where the tank is located, therefore, it is unlikely that the Keystone Peak prescribed fire will have any indirect effect on Ox Frame Tank.

Other aquatic habitats within the fire boundary include many springs and tanks including but not limited to Homestead, Kidoo, Black Hawk, Keystone, and an un-named tank and spring on the southwest side of the fire boundary. It is unknown whether Chiricahua leopard frogs occur at any of these sites. Direct effects to Chiricahua leopard frog could occur if this species is present at any of these locations. Thus, the conservation measures including erosion control at all springs and tanks (potential habitat that has not been surveyed) shall be implemented for the proposed prescribed fire, per the Statewide LUP Amendment.

Some negative effects to the Chiricahua leopard frog from prescribed fire management actions may be indirect, resulting from soil or ash inflow into occupied waters from project activities that occur upslope or upstream from occupied sites. An inflow of ash and sediment into a water body is capable of smothering eggs and tadpoles . Sediment and ash flow can also inhibit respiration in macroinvertebrates resulting in a change in composition and density, which are the primary food source for the frogs. A reduction in prey can affect Chiricahua leopard frog numbers and subsequent reproduction. Indirect effects that have may affect numbers and reproduction of frogs may result ina change in the frog's distribution, if isolated populations are extirpated, and recolonization from adjacent sites can not occur. .

Increases in stream flow discharges following a fire can result in little to substantial effects on the physical, chemical, and biological quality of the water in streams, rivers, and lakes. The magnitude of these effects is largely dependent on the size, intensity, and severity of the fire, and on the condition of the watershed at the time of burning (Neary et al. 2005). Therefore, sediment trap installation within canyons, as a required conservation measure, will be designed by the BLM hydrologist and fishery biologist. The sediment traps will be implemented after the prescribed fire, but before the end of June (the beginning of monsoon season). In addition, the upper portions of Ox Frame canyon will be burned with backing fire since the ignition operations will start on the uphill side of the project area. Blacklining operations will occur during early evening and into nighttime hours to take advantage of lower temperatures and higher humidities. Utilizing these methods should allow for a mosaic burn pattern in the upper portions of the canyon. Patches of unburned vegetation should allow for decreased amounts of water and sediment runoff.

Over time, implementing the proposed prescribed would reduce the risk of catastrophic fires in upland habitats that would result in large-scale losses of vegetation. Because small, disjunct populations, such as the Chiricahua leopard frog, are at higher risk of local extirpation from catastrophic events, this long-term improvement may assist in protecting their aquatic habitats and potentially stabilize this frog population, thereby providing a positive effect to the species. Removal of woody invasive species and grassland

restoration may improve watershed conditions by increasing water infiltration, resulting in more available surface water for use by frogs in the watershed.

Jaguar

Direct and Indirect Effects

Since no reproducing jaguars likely exist in the United States, the proposed fire management treatments would likely have no direct effects to reproducing adults. Should a transient jaguar be present, implementing prescribed fire in upland habitat to restore these habitats may disturb the individual, but would not result in direct mortality. In addition, Conservation Measures, such as night time burning, and backing fire would also require identifying sites for retaining dense riparian habitats to facilitate jaguar movement and to minimize direct effects to transient individuals from these activities. Implementing Conservation Measures, coupled with the low probability of a transient jaguar being present where prescribed fire activities are occurring, would make the potential for any residual direct effects to the jaguar from prescribed fire so unlikely as to be discountable.

Ox Frame Canyon, within the prescribed fire boundary, is a major xero-riparian corridor within the Sierrita Mountains. Burnout of boundary lines will take place in the evening just before sunset and continuing into the night (evening) or into the morning when rising humidity and lowering temperatures will moderate burning conditions. The upper portions of the canyon will most likely be burned with backing fire since the ignition operations will start on the uphill side of the burn unit. Utilizing these methods described should allow for a mosaic burn pattern in the upper portions of the canyon, and still allow for a movement corridor for jaguar.

Because resident reproducing jaguars are not considered to occur in the United States, and because there is a low potential for a transient jaguar to occur in the action area, prescribed fire activity would not indirectly result in a change in the number of jaguars in the United States or in the reproductive status of the species. The main indirect effects to the jaguar would stem from modification of habitat and the habitat of its prey species.

Use of prescribed fire to reduce hazardous fuels in areas of dense vegetation (shrub-invaded grasslands) would potentially reduce habitat suitability for foraging jaguars. Jaguar prey species such as white-tailed deer and javelina would likely benefit from proposed treatments. Because of the jaguar's ability to forage on a variety of prey species and its ability to travel long distances, these effects to prey species and foraging habitat may be insignificant to the jaguar.

Because the use of prescribed fire would be relatively small in size compared to the overall available habitat for jaguars, this proposed treatment, including the implementation of conservation measures, would retain a long-term mosaic of suitable habitat structures for dispersing and foraging jaguars. Although habitat in some foraging areas may be modified, the travel corridors would retain patches of dense riparian habitat, allowing for dispersal into the United States from Mexico. In addition, implementation of prescribed fire to reduce fuel loads and restore riparian and upland habitats over the long-term would reduce the risk of catastrophic wildfires, and the large-scale loss of suitable jaguar habitat. These indirect effects, combined with the transient nature of the species, would not result in a change in the jaguar's distribution.

Lesser Long-nosed bat

Direct and Indirect Effects

The proposed Keystone Peak prescribed fire would be used to restore and maintain grassland habitat, to reduce accumulated hazardous fuels, and to reduce the chance of catastrophic fire on BLM-administered, state, and private land. It is anticipated that the Keystone Peak prescribed fire would not affect known reproducing or roosting long-nosed bats, since the closest known maternity colonies and roost sites for this species are not located in the Sierrita Mts. Since bats forage at night, prescribed fire could cause direct disturbance to foraging bats for those activities such as black-lining or night burning. Foraging bats may be

disturbed by prescribed fire if these activities damage agaves or shindagger, as these are an important source of nectar upon which the bats feed. To minimize or eliminate the direct effects of prescribed fire on the lesser long-nosed bat and its food sources, several Conservation Measures shall be implemented, requiring the protection of key foraging areas and plants.

The primary indirect effects to the lesser long-nosed bat from the proposed prescribed fire would be from long-term loss of agave and shindagger, key food resources. Implementing the Conservation Measures would further minimize or eliminate any long-term loss of food resources, thereby minimizing the indirect threat of affecting the bat species' numbers, reproduction, and distribution. Using prescribed fire to restore range conditions, may, in the long-term, reduce the threat of catastrophic wildfires that could cause large-scale losses of foraging habitat for these bats.

Ocelot

Direct and Indirect Effects

Since no reproducing ocelots likely exist in the United States, the proposed fire management treatment would have no direct effects to reproducing adults. Should a transient ocelot be present, implementing prescribed fire in dense habitats used by ocelots to restore these habitats may disturb the individual from noise or other human activity, but would not likely result in direct mortality. Due to the mobility of the species, and its ability to persist in previously disturbed sites, any ocelot within the area would likely avoid areas of human activity associated with prescribed fire. Because of the low probability of an ocelot being present where prescribed fire activities are occurring, the potential for any residual, negative direct effects to the species from this activity would be so unlikely as to be discountable.

Ox Frame Canyon, within the prescribed fire boundary, is a major xero-riparian corridor within the Sierrita Mountains. Burnout of boundary lines will take place in the evening just before sunset and continuing into the night or morning when rising humidity and lowering temperatures will moderate burning conditions. The upper portions of canyons will most likely be burned with backing fire since the ignition operations will start on the uphill side of the burn unit. Utilizing these methods described should allow for a mosaic burn pattern in the upper portions of the canyon, and still allow for a movement corridor for ocelot.

Because resident reproducing ocelots are not considered to occur in the United States, and because there is a low potential for a transient ocelot to occur in the action area, the proposed prescribed fire activities would not indirectly result in a change in the number or distribution of ocelots in the United States or in the reproductive status of the species.

Use of prescribed fire to reduce hazardous fuels in areas of dense vegetation (shrub-invaded grasslands) would potentially affect the habitat of prey species. Ocelots prey on a variety of species, some of which prefer open habitat and others prefer dense habitat. Thus, habitat alterations from prescribed fire would benefit some prey species while negatively affecting others. Because the project area is relatively small in size compared to the overall available habitat for ocelots and their prey, this proposed treatment would retain a long-term mosaic of suitable habitat structures for transient and hunting ocelots and their prey. Thus, any effects on ocelot prey species from prescribed fire, combined with the mobility of ocelots, and their ability to persist and opportunistically forage in previously disturbed sites, would not significantly affect ocelot reproduction, distribution, or numbers. In addition, implementation of prescribed fire to reduce fuel loads and desired vegetation conditions over the long-term would reduce the risk of catastrophic wildfires, and the large-scale loss of suitable ocelot habitat.

Pima Pineapple Cactus

Direct and Indirect Effects
Despite the fact that grassland portions of Pima pineapple cactus habitat are generally regarded as fire-adapted, the species itself is not, so prescribed fire utilized in the grassland portion of Pima pineapple cactus habitat may cause direct mortality to individual plants. Potential habitat in the Keystone Peak prescribed fire boundary was surveyed for Pima pineapple cactus and none were found. Habitat appeared largely unsuitable due to rocky substrate throughout and areas of colder microclimate. Therefore, it is unlikely that any direct mortality to Pima pineapple cactus would occur from the Keystone prescribed fire.

Indirect effects to this species and its habitat may include the following effects: 1) soil erosion following prescribed fire, 2) alteration of vegetative structure and/or composition from prescribed fire activities, 3) an increase in invasive species in the habitat which may outcompete Pima pineapple cactus (which could occur when native vegetation is removed by fire), 4) increased recreational or incidental traffic through this species habitat as an indirect result of temporary trails for prescribed fire activities, and 5) decrease or loss of bee pollinators due to prescribed fire actions outside the specific habitat of Pima pineapple cactus. Positive effects to future potential habitat for Pima pineapple cactus may occur through the control of woody invasives, such as mesquite and snakeweed, and subsequent restoration of grassland habitat. This is unlikely, however, due to unsuitable substrate and/or microclimate throughout the potential habitat areas with appropriate elevation and slope.

4.1.7.2 BLM Sensitive Species

Sonoran Desert Tortoise
Direct and Indirect Effects
Due to the elevation and topography of the project area, there is minimal likelihood that a Sonoran desert tortoise would be present. Implementation of the Proposed Action would not affect the CAT 3 desert tortoise habitat due to the management controls that would be in place to keep the fire under control. Thus, there would be no impact to desert tortoise.

Pima Indian Mallow
Direct and Indirect Effects
Pima Indian mallow has a weak spring flowering (with spring rain) followed by a longer late summer-fall bloom, and plants flower spring through fall in response to rain. Pima Indian mallow is not hurt by light fires (AZGFD 2000). Direct effects to this plant could be that individual plants are burned; however, the plant is a perennial and will resprout after fire. Indirect effects could include an increase in bare ground after the prescribed fire, with a corresponding increase in soil erosion.

Great Plains Narrow-Mouthed Toad
Direct and Indirect Effects
This toad is usually active after summer rains begin. Therefore, any direct effects from prescribed fire that occurs prior to monsoon season to individual toads are unlikely to occur. However, habitat for this toad may be affected by the fire through removal of litter or woody substrate used for cover. The abundance and assemblage of the toad's invertebrate food source may not be directly impacted by prescribed fire because this toad feeds primarily on ants and termites. Ants may be affected through impacts from fire to seed sources.

Arizona Botteri's Sparrow
Direct and Indirect Effects
This species can tolerate prescribed burning and moderate cattle grazing (Webb and Bock 1996). Because the majority of nesting with this species occurs after monsoon rains begin, the prescribed fire will likely cause little or no direct mortality. Vegetative cover used for nesting may be removed by the prescribed fire, and

may not reach appropriate levels for nesting cover for at least one growing season. While this species does utilize some smaller and lower density mesquite in grassland habitat, overall the prescribed fire is anticipated to improve the extent and quality of nesting habitat for Botteri's sparrow.

Arizona Grasshopper Sparrow

Direct and Indirect Effects

Because the majority of nesting with this species occurs after monsoon rains begin, the prescribed fire will likely cause little or no direct mortality. Management needs for this species include reduction of cattle grazing in native grasslands to maintain and enhance native grasses and reduction in shrub invasion by maintaining natural fire regimes (AGFD 2007). In southwestern Arizona, this species avoids recently burned sites for up to two years post-burn. After two years, the extent and quality of nesting habitat for grasshopper sparrow may be improved by the prescribed fire.

American Peregrine Falcon

Direct and Indirect Effects

Due to the highly mobile nature of this species, it is unlikely that direct mortality would occur from the prescribed fire. Vegetative cover may be reduced after the fire until the next growing season, possibly allowing better visibility of the peregrine's bird prey. Change in vegetation composition and structure after at least one growing season may alter the bird species' composition of this falcon's diet.

Golden Eagle

Direct and Indirect Effects

Due to the mobile soaring behavior of this species, it is unlikely that direct mortality would occur from prescribed fire. Removal of vegetative cover from the fire may allow golden eagle's to better see their prey species, at least until the next growing season. If mortality to wildlife occurs from fire, golden eagles may be opportunistic feeders of the carrion left behind. Long-term change in vegetation composition and structure may alter the golden eagle's composition of prey species.

Bats

Direct and Indirect Effects

Due to the behavior of bats to roost in deeper crevices or mines and their highly mobile nature, it is unlikely that any direct mortality would occur from prescribed fire. Removal of vegetation and litter may immediately change the abundance and composition of some bat species' invertebrate food source. Long-term changes in vegetation composition and structure may change bat's composition of invertebrate prey. Fire staging or other activities shall not occur near mine features or outcroppings, minimizing impacts to bats at their roosts.

4.1.8 Wildlife

4.1.8.1 Migratory Birds

Because of the range in nesting dates (March to June) for migratory birds that occur in the project area, direct impacts to migratory birds will likely occur through removal of nests by fire, and mortality of eggs, nestlings, and fledglings. Short term, direct effects from smoke and ash may occur for individuals that are not mobile enough to leave the immediate area. Vegetative cover would be removed by the fire, and birds may be more susceptible to predation or weather effects. Suitable nesting substrate may be changed, depending upon species, by changes in plant structure and composition. Removal of seeds through prescribed fire may reduce the amount of food available for seed eating species. Changes in plant structure and composition may affect the species richness and abundance of invertebrate food sources. The amount of bare ground left by prescribed fire would influence the avian species present, with more habitat available for those species which prefer open areas. Those species which prefer dense cover or brushy areas may experience local decline. The

amount of loose bark, snags, and tree cavities may be affected through prescribed fire, altering the available habitat for bird species which use these substrates for nesting, concealment, or thermoregulation.

Longer-term effects may include a change in vegetation composition and structure, impacting the species of birds that utilize the habitat. If grassland conditions are restored, then long term, positive impacts may occur. Grassland specialists may increase in extent and abundance. Changes in watershed condition may allow increased locations or duration of surface water for drinking and bathing.

4.1.8.2 Wildlife

Wildlife would experience direct impacts during the prescribed fire and activities, and also indirect impacts from changes in vegetation composition and structure after the fire. However, the major effects on wildlife from the Proposed Action would be beneficial, long term, and indirect and pertain to changes in food and cover. Prescribed fires can increase the edge effect and amount of browse material, thereby improving conditions for deer and other wildlife. Birds favor food species and semi-open or open conditions that can be created and maintained by burning. The adverse, direct effects of prescribed fire on wildlife would include destruction of hiding cover and possible mortality of birds, reptiles, or mammals trapped in the fire. Since the Proposed Action would take place outside of the avian nesting season there would be no impacts to nesting birds. The deliberate nature of the Proposed Action would allow for pre-fire surveys to ensure there are no species nesting in the project area and should allow them an opportunity to escape when the fire begins. Thus, there should be no adverse, direct, long term impacts to wildlife.

Direct effects to wildlife may include direct mortality to young, infirm, or other individuals who are not able to escape or conceal from approaching fire or suffer effects from smoke and ash. Prescribed fire may result in a reduction of cover used for escape, concealment, and forage or browse. Some wildlife species, such as rabbits and rodents, may be more obvious to predators because vegetative cover is reduced. The removal of seeds through prescribed fire may reduce the amount of this food source for seed-eating wildlife, such as rodents, which may affect the food source for higher trophic levels. The abundance and composition of invertebrates may change with changes in vegetative structure or cover, also affecting the food source for higher trophic levels. The amount of litter, woody debris, bark, and tree cavities may be affected through prescribed fire, altering the invertebrates, small mammals, amphibians, and reptiles that use this resource for cover or concealment. Edges between habitat may be changed in extent, location, or design, impacting wildlife that utilize edges (e.g. Coues whitetail deer). Longer-term impacts include a change in vegetation composition and structure, impacting those species dependent upon grassland habitat. If the watershed is improved, then locations and amount of surface water may increase for use by wildlife.

Burnout of all xeroriparian areas will take place in the evening just before sunset and continuing into the night or morning when rising humidity and lowering temperatures will moderate burning conditions. The upper and lower portions of OxFrame and other major canyons shall be burned with backing fire since the ignition operations will start on the uphill side of the burn unit. Utilizing these methods described should allow for a mosaic burn pattern in the upper portions of the canyon, and still allow for a movement corridor for wildlife. Riparian values to be protected include live vegetation, density, cover, and species richness of vegetation, woody debris, snags, cavities, and loose bark.

4.2 Environmental Consequences of the No Action Alternative

4.2.1 Air Quality

Under the No Action Alternative, the Proposed Action would not take place and there would not be a prescribed burn in this area. All unplanned wildland fires occurring in the vicinity of the project area would be fully suppressed and not managed in any way. Air quality could result in an exceedance of an air quality standard through implementation of the No Action Alternative. However, since it would likely be put out sooner the direct and indirect impacts would occur for a shorter period of time and air quality should return to pre-fire status soon after a wildland fire is completely suppressed. Thus, there would be no significant impacts from implementation of the No Action Alternative.

4.2.2 Cultural Resources

Under the No Action Alternative conditions would remain the same; there would be no change. Cultural resources would not be affected.

4.2.3 Grazing Management

Under the No Action Alternative, any wildland fire starts would be fully suppressed. Thus, the adverse, short term direct impacts that would occur under the Proposed Action would not occur under the No Action Alternative because the forage would not be lost and grazing would be allowed after the fire. However, the beneficial, long term indirect effects would occur under the Proposed Action would not occur under the No Action Alternative since there would not be an opportunity for native grasses to recolonize the area.

4.2.4 Rangeland Health

Under the No Action Alternative, the BLM would practice full suppression on any wildland fires at Keystone Peak. The wildland fire would not be allowed to burn and would not have a chance to remove the current woody vegetation cover to make room for desert grasslands to return. This would have long term, negative effects to rangeland health.

4.2.5 Native American Religious Concerns

Under the No Action Alternative conditions would remain the same; there would be no change. Native American religious concerns would not be affected.

4.2.6 Soils

Under the no action alternative, the proposed action would not take place and any potential short term impacts from soil erosion would not occur. However, since the prescribed burn would not take place there would not be an opportunity for native grasslands to return to this area. Native grasslands function as a better soil holder then that current vegetation so the soil erosion that is taking place on the project area now would continue and would not be lessened by the return of native grasses.

4.2.7 Special Status Species

4.2.7.1 Threatened and Endangered Species

Under the no action alternative, BLM would continue to suppress wildfire in accordance with the BLM Statewide Land Use Plan Amendment for Fire, Fuels, and Air Quality (2004), including Conservation Measures. Fire suppression activities on BLM-administered land on or near listed species or critical habitat would continue to require emergency consultation or conference with FWS.

Chiricahua Leopard Frog
The vegetation community would not be changed under the No Action Alternative and as a result improvements in groundwater recharge would not be achieved. Spring flow would not benefit from improved aquifer recharge conditions related to vegetation type conversion.

Jaguar

Under the no action alternative, prescribed fire would not occur on Keystone Peak. Habitat would continue natural processes of invasion of woody species into grasslands, and increase in fuels from fire suppression. In the case of wildfire, planned activities such as burnout of boundary lines, night burning, or backing fires, would likely not occur in xeroriparian movement corridors. Wildfire may be more extreme and result in loss of a mosaic habitat or loss in dense habitat in canyons used for concealment or hunting. Prey species may potentially have more direct impacts from wildfire, and indirect effects could be more intense from wildfire activity affecting soils and vegetation.

Lesser Long-nosed Bat
Under the no action alternative, prescribed fire would not occur on Keystone Peak. There would be no direct effects to foraging bats from prescribed fire activities such as night burning or staging areas, and no indirect effects from long-term loss of agave and shindagger as foraging plants. Without prescribed fire, continuing suppression and wildfire may result in higher fuel loading, increasing the risk and severity of wildland fires. Wildfires may cause immediate and significant long-term changes in lesser long-nosed bat foraging habitat, because the agave that provide critical food sources may take many years to recover from fire. In addition, wildfires may burn hotter and farther in semi-desert grassland or desertscrub habitats, reducing the natural mosaic pattern that would retain patches of suitable foraging habitat.

Ocelot
See discussion for jaguar.

Pima Pineapple Cactus
Under the no action alternative, prescribed fire would not occur on Keystone Peak. There would be no direct effects to Pima pineapple cactus from prescribed fire or activities such as staging areas. Without prescribed fire, continuing suppression and wildfire may result in higher fuel loading, increasing the risk and severity of wildland fires. In addition, wildfires may burn hotter and farther in semi-desert grassland or desertscrub habitats.

4.2.7.2 BLM Sensitive Species

Sonoran Desert Tortoise
Under the No Action Alternative the proposed action would not take place. The BLM would practice full suppression on any wildland fires at Keystone Peak. Wildland fires would not be allowed to burn and would not have a chance to remove the current woody vegetation cover to make room for desert grasslands to return.

Pima Indian mallow
While Pima Indian mallow has not been documented in the Sierrita Mountains, potential habitat does occur. Under the no action alternative, prescribed fire would not occur in potential habitat. Wildfires would continue to be suppressed, likely resulting in continuing build-up of fuels and subsequently more intense wildfire events. Although Pima Indian mallow is fire-adapted, wildfire may result in increased soil erosion than prescribed fire, which could impact potential habitat for this species.

Great Plains narrow-mouthed toad
Lack of prescribed fire and wildfire suppression may result in more intense wildfire and the inability to predict the location of fire, both on a regional and local basis. Without design features used to minimize negative impacts, wildfire may be more intense in canyon bottoms or near tanks, drainages, and springs where this toad breeds during the summer. More intense wildfire events may result in impacts to habitat from erosion and ash.

Botteri's and Arizona grasshopper sparrow
Lack of prescribed fire and wildland fire suppression have combined to impact habitat for these species through invasion of woody species into their grassland habitat. Lack of prescribed fire may result in more intense, larger, and longer-lasting impacts from wildfire. Depending upon the severity and frequency of wildfire, these impacts could be negative or positive for the species depending upon the amount of soil erosion, amount of bare ground, subsequent long-term impacts to native perennial grass species richness and density, and above-ground removal or mortality of woody invasive species. Livestock utilization of wildfire burned areas and the ability for native grasses to grow, seed, and produce adequate root systems may also impact these grassland sparrows.

America peregrine falcon and golden eagle
Under the no action alternative, prescribed fire would not occur. It is unlikely that direct mortality would occur to these species with wildfires due to their ability to fly. Wildfire may remove vegetative cover used by these species' prey animals and could cause direct mortality to some prey species. Depending upon the severity and frequency of wildfire, these direct impacts could be negative or positive for these species depending upon the subsequent habitat components for prey species. Long-term change in vegetation composition and structure from wildfire may alter abundance and composition of prey species.

Bats
Fire suppression without prescribed fire may result in fuel loading and consequently more intense or more widespread wildfire. It is unlikely that any direct mortality would occur from wildfire due to the placement of roosts and the bats' ability to fly. Removal of vegetation and litter through wildfire may be more intense than prescribed fire, and may change the abundance and composition of some bat species' invertebrate food source. Fire suppression activities during emergency situations may occur around roosts, and could cause disturbance to roosting bats.

4.2.8 Wildlife

4.2.8.1 Migratory Birds
Under the no action alternative, direct impacts to migatory birds such as mortality or forced movement of adults would not occur without a prescribed fire. There would be no immediate destruction of nests or mortality of eggs, nestlings, or fledglings. Succession of woody invasive species into grassland habitat may continue without prescribed fire. Impacts to migratory birds without prescribed fire may preclude the restoration of grassland habitat, and therefore impact species richness and abundance of grassland specialists versus avian species that utilize more brushy habitats. Catastrophic fire may occur without prescribed fire, and could impact soil resources which, in turn, could impact vegetation used by migratory birds as habitat. Wildfire may also occur at any time of the year, possibly impacting nesting bird species of conservation concern to a larger degree.

4.2.8.2 Wildlife
Under the no action alternative direct impacts to wildlife, such as mortality or forced displacement from prescribed fire, would not occur. Ground litter, woody debris, and rough bark would not be immediately

removed and instead left in place for small mammals, reptiles, amphibians, and invertebrates. Vegetation communities may undergo subsequent wildfire events that may be more catastrophic to habitat from soil erosion or subsequent mortality to native perennial grasses. Depending upon amount of wildfire suppression, vegetation communities may continue to become invaded by woody species. Grassland components of habitat may be lost without wild or prescribed fire, and those species that are more adapted to grassland habitat may suffer local decline.

5 Cumulative Impacts

According to Council on Environmental Quality regulations, the analysis of cumulative impacts in an EA should consider the potential environmental impacts resulting from "the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 CFR 1508.7).

Cumulative impacts may occur when there is a relationship between a proposed action and other actions expected to occur in a similar location or during a similar time period. Actions overlapping, or in proximity to, a proposed action can have more potential for cumulative impacts on "shared resources" than actions that may be geographically separated. Similarly, actions that coincide temporally would tend to offer a higher potential for cumulative impacts. To the extent that details regarding such actions exist and the actions have a potential to interact with the Proposed Action outlined in this EA, these actions are included in the cumulative analysis.

5.1 Geographic Boundaries for Cumulative Impacts Analysis

Geographic boundaries for analysis of cumulative impacts in this EA vary for different environmental resources. For example, for air quality, the potentially affected air basin is the appropriate boundary, whereas the project area is the appropriate boundary for other resources. For wide-ranging or migratory wildlife, project impacts could combine with impacts from other sources within the range of the population. For terrestrial biological resources, the burn area is the appropriate geographical area for assessing cumulative impacts. The cumulative impacts analysis focuses on projects that directly overlap with the proposed alternatives (i.e., occur in similar locations and potentially impact similar resources).

The geographic scope for each resource issue is given in Table 5-1.

Table 5-1. Resource Issue and Geographic Area for Analysis

Resource Issue	Geographic Area for Analysis
Air Quality	Pima County Air Quality Control District
Cultural Resources	Project Area
Grazing Management	Sierrita Grazing Allotment
Land Health	Sierrita Grazing Allotment
Native American Religious Concerns	Project Area
Soils	Sierrita Grazing Allotment
Special Status Species	Range of special status species in U.S.
Migratory Birds	Sierrita Mountains nesting birds and migration corridors
Wildlife	Sierrita Mountains and movement corridors

Timeframe of the Cumulative Effects Analysis

The proposed action of prescribed fire on Keystone Peak would last for the length of the natural fire interval, although there are theoretically some indirect effects of prescribed fire that could last longer, Historically, natural fires were frequent and of low intensity. Light surface fires burned at intervals averaging about ten years in grasslands, or less at higher elevations. The short fire-interval was caused by warm, dry weather common to the Southwest in early summer, the continuity of fuel, and the high incidence of lightning. A major historic fire season occurred just before the monsoon season in midsummer. Therefore, the temporal scope for analysis of this issue is ten years for short-term effects. Long-term effects are defined as those impacts that last longer than ten years, because these impacts could last longer than can be modified under a single prescribed fire or natural fire interval.

5.2 Past, Ongoing, and Reasonably Foreseeable Actions

Past, present, and reasonably foreseeable actions relevant to the alternatives are described below.

Past Actions

During the late part of the 19th century and early part of the 20th century, heavy grazing occurred over a large part of private, state, and federal land (Humphrey 1987). Livestock grazing has occurred in Southern Arizona since the Spanish land grants. The "fire deficit" caused by fire suppression (Climate Change 2012), and change in vegetation resulted in increased severity of fire in some locations. With emphasis on grazing management, the slow process of improving land health began. Grazing management has helped to maintain or improve resource conditions in some areas compared to historic use.

However, livestock grazing on federal lands is not the only factor that affects vegetation. Wood products were extensively harvested for the mining industry, and this practice removed trees and reduced fuel loads within these vegetation communities. Beginning in the 1930s, the federal government actively managed public land with fire suppression. Because of fire suppression, livestock grazing, decrease in harvest of wood products, precipitation, and other factors, woody vegetation has reestablished on sites and expanded into adjacent vegetation communities. Other impacts from human caused climate change altered vegetation cover and composition. Increases in carbon dioxide levels from burning of fossil fuels have favored the growth of woody species through carbon sequestration (Throop and Archer 2008).

As a consequence of alterations in land use practices and climate change, vegetation cover and composition changed. Shrub and tree densities and subsequent canopy cover increased (Brown 1950). Livestock grazing, fire, invasion by woody plants, increase in Lehmann lovegrass, and precipitation appear to have influenced native perennial grass dynamics (McClaran 2003). Increase in woody species resulted in higher fuel loads which created larger, hotter fires. Vegetation communities became less diverse and more even-aged.

In the past, prescribed and wildfire has occurred on other federal, state, and private land. For the most part, prescribed fire has been used in order to control woody species, such as mesquite and juniper, increase herbaceous vegetation, or for maintenance of grassland communities.

Population growth has changed the setting from rural to suburban and urban uses in some areas. Increased human activity has occurred with border crossing violations and subsequent Border Patrol activity. Local mining activities have caused impacts to vegetation, soils, groundwater, and surface water hydrology. Groundwater pumping has occurred for residential, agriculture, commercial, mining, recreational, and livestock grazing purposes. Introduction of non-native or invasive species, pests, or diseases have impacted native flora and fauna. The construction of roads, trails and utility corridors has resulted in soil erosion in some cases and habitat fragmentation overall. Recreational impacts, such as hunting plant collection, and

OHV use, have occurred in the past. Border activities from smuggling and law enforcement have resulted in impacts to soil, vegetation, and water quality. Other past issues include long-term drought, and unknown impacts from climate change.

Present Actions

The trend toward larger, hotter wildfires continues presently in Southeastern Arizona (Climate Change 2012). Continued fire suppression perpetuates fuel loading. Goals of current land management practices by federal agencies include improvement of vegetation communities. Authorized livestock use must meet land health standards. Inventory, monitoring, and control of noxious and invasive weeds are occurring. Border crossings continue as does Border Patrol activity. Recreational use of public land in the area occurs and is probably increasing with continuing increased nearby urbanization. Groundwater depletion is still occurring although the Central Arizona Project may offset some of this loss. Mining in the area will likely continue in some locations. Pima County activities include such things as maintenance of ROWs, road and bridge construction and maintenance, sewage conveyance and treatment, mosquito and weed control, recreation activities, and ranching operations. Other present issues include long-term drought, and unknown impacts from climate change.

Reasonably Foreseeable Future Actions

The following list identifies the land use planning and environmental documents consulted in determining the pertinent existing and reasonably foreseeable future actions:

- Eastern Arizona Grazing EIS,
- Rosemont Copper Project EIS
- Pima County Multi-Species Conservation Plan
- Pima County Comprehensive Plan
- Other BLM grazing leases.
- BLM Statewide Land Use Plan Amendment for Fire, Fuels, and Air Quality Management
- Phoenix Resource Management Plan and Environmental Impact Statement
- Gila District Grazing Program
- Altar Valley Fire Management Plan

The past, present, and reasonably foreseeable projections are made only for the purpose of analyzing possible future cumulative impacts, and are not linked to the Proposed Action. Inclusion of these documents in this scenario does not constitute a decision or a commitment of resources. If a future action requires NEPA compliance, inclusion in this cumulative impact analysis would not satisfy any NEPA requirement.

The future of soils, vegetation, hydrology and other biotic factors cannot be predicted by considering changes in fire interval alone. Population growth and demographic changes are likely to occur in the local area. Land-use changes, such as increased recreation use and subdivision of privately owned ranch lands, are likely to have future impacts to resources. The number of natural fire ignitions is likely to be similar to previous years, with some experts anticipating the continued occurrence of larger, hotter fires. Previous research reveals that climatic changes, including increasing temperatures and the earlier onset of spring snowmelt, have been linked to increasing levels of atmospheric greenhouse gases and might be influencing these damaging fire trends. As average global temperatures rise, researchers project that the risk of wildfires in America's West is projected to accelerate (Climate Central 2012). Prescribed fire will continue to be used in some locations, and it is likely that wildland urban interface will continue to be a concern in the management of fires. Livestock

grazing will continue to be managed to meet land health standards. Pima County will continue maintenance of ROWs, road and bridge construction and maintenance, sewage conveyance and treatment, mosquito and weed control, recreation activities, and ranching operations. It is likely that increased efforts will be required to detect and control noxious and invasive weeds and other exotic species or diseases. Other foreseeable future issues include possible continuation of long-term drought, and unknown impacts from climate change.

5.2.1 Air Quality

Implementing the proposed action would result in short-term air quality impacts. However, since the impacts would only last a few days it would not result in an adverse cumulative impact to air quality.

5.2.2 Cultural Resources

Implementing the proposed action could have a small effect on cultural resources due to the changes in ground vegetation that could occur once the prescribed fire goes through the project area. Bare ground levels would increase and the possibility of exposing archaeological sites/artifacts may result. Usually when this happens the trend is towards increased looting and theft

5.2.3 Grazing and Range

Implementing the proposed action would result in long-term (at least 20 years) changes in vegetation on the site. Shrubby species would be decreased in the short term and long term. Herbaceous species would increase resulting in greater diversity of vegetation. In the long term the site could be invaded by Lehman's lovegrass (Eragrostis lehmanniana). This is an undesirable introduced perennial grass. It provides forage for livestock but tends to become a monoculture reducing plant diversity. It greens up earlier in the spring, a desirable characteristic for livestock forage, but becomes unpalatable to livestock later in the season. Its tendency to become a monoculture and extremely small seeds makes it undesirable in terms of wildlife habitat when compared to native perennial grasses.

If this outcome becomes reality, this project would be a long-term adverse cumulative impact.

5.2.4 Native American Religious Concerns

As discussed in Section 4.1.5, an official project description letter was be sent out to the Tribes informing them about the Keystone Peak Prescribed Burn project and asking them for their input. To date no input has been received and no Native American Religious Concerns have been identified, thus there would not be a cumulative impact from this project.

5.2.5 Soils

Implementing the proposed action would result in long-term changes in vegetation that would see the return of native grasses which are better suited to soil retention. This change would minimize the impact to soils resources.

5.2.6 Special Status Species

5.2.6.1 Threatened and Endangered Species

The following cumulative effects excerpts for each listed species are compiled, analyzed for the project, and modified, if necessary, from the BLM Statewide LUP Amendment for Fire, Fuels, and Air Quality Management Biological Evaluation (Dynamac Corp. 2003).

Chiricahua leopard frog

The Chiricahua leopard frog's southern range has a checker-boarded land ownership pattern involving Federal, state, and private landholders, and the species has been affected by activities on other State and private lands that have cumulatively contributed to its decline. Many of these activities, such as grazing,

surface and groundwater modifications, human population expansion and associated infrastructure development, mining, and recreation (including off-highway vehicle use), are expected to continue on State and private lands within the range of the species. These activities could continue to introduce alien species, such as bullfrogs, crayfish, and fish that would prey on or compete with the Chiricahua leopard frog, and the chytrid fungus that could harm the species. These activities could also continue fragmentation, degradation, and pollution of the frog's wetland habitats. Drought and climate change may further stress habitat and the species.

The cumulative impact of the no action alternative may vary depending upon the future intensity, location, and size of wildfires and corresponding amounts of fire suppression activities. Low or moderate wildfire in the Sierrita Mountains may improve habitat conditions for this species, creating a metapopulation of individuals that improve overall viability of the species. Intense wildfire may degrade watershed values and downslope aquatic habitat, decreasing overall viability of the metapopulation. Because small, disjunct populations of Chiricahua leopard frog are at higher risk of local extirpation from catastrophic events, this long-term improvement using all Conservation Measures may assist in protecting their aquatic habitats and potentially stabilize this frog population, thereby providing a positive effect to the species.

Jaguar and Ocelot

Increasing human population expansion and associated urbanization, recreation (e.g., hiking, camping, or off-road vehicles), grazing, groundwater and surface water use and diversion, and mining on state or private lands within riparian corridors in southeastern Arizona may contribute to cumulative effects to jaguar and ocelot. Effects may be direct disturbance to individuals or loss or modification of riparian habitats used for dispersal and hunting. Drought and climate change may also impact habitat and water sources for these species. The cumulative impact of the no action alternative may vary depending upon the future intensity, location, and size of wildfires and corresponding amounts of fire suppression activities. Low or moderate wildfire in the Sierrita Mountains may improve habitat conditions for this species and for their prey. Intense wildfire may degrade watershed values and remove large areas of low, dense vegetation used for movement and concealment. The action alternative using prescribed fire with all Conservation Measures may assist in protecting habitat and potentially protect movement and concealment areas, thereby providing a positive effect to the species.

Lesser long-nosed bat

Land ownership within the range of the lesser long-nosed bat in Arizona is a checkerboard of Federal, state, and private lands. Activities on State and private lands within the action area that may contribute to cumulative effects to the species may include disturbance or destruction of roosts from unregulated recreation (e.g., cave or mine exploration) or closing or gating of mines for human safety, as well as disturbance or destruction of key foraging plants from recreation activities (e.g., off-highway vehicles) or agricultural clearing or grazing, collection of cactus and agaves for landscaping, mining, and human expansion and associated infrastructure development. Drought and climate change may also impact the lesser long-nosed bat's habitat. The cumulative impact of the no action alternative may vary depending upon the future intensity, location, and size of wildfires and corresponding amounts of fire suppression activities. Low or moderate wildfire in the Sierrita Mountains may improve habitat conditions for this species and for their food sources. Intense wildfire may degrade watershed values and remove large areas of forage plants, with a long period of time necessary to recover from the fire. The action alternative using prescribed fire with all Conservation Measures may assist in protecting habitat and potentially protect foraging plants, thereby providing a positive effect to the species.

Pima pineapple cactus

Cumulative effects to this species under this proposed action may include the following broad types of impacts: 1) changes in land use pattern, such as shifts in grazing, mining activity, and recreational activity that negatively affect this species habitat or potential habitat, 2) encroachment of human development into this species' habitat or potential habitat leading to a potential reduction in gene flow, habitat fragmentation, and accidental or purposeful loss of plants due to use of machinery or foot travel through the habitat, 3) fire management actions (prescribed fire or suppression) by tribal, state, county, or municipal governments on lands adjoining or near BLM-administered lands, and 4) introduction and expansion of noxious weeds that may affect fire severity or use of herbicides in Pima pineapple cactus habitat. Drought and climate change may further impact the habitat for Pima pineapple cactus. . The cumulative impact of the no action alternative may vary depending upon the future intensity, location, and size of wildfires and corresponding amounts of fire suppression activities. Low or moderate wildfire in the Sierrita Mountains may improve potential habitat conditions for this species. Intense wildfire may degrade watershed values, cause soil erosion, and degrade any potential habitat. The action alternative using prescribed fire with all Conservation Measures may assist in protecting potential habitat.

5.2.6.2 BLM Sensitive Species

The existing condition of special status species is largely from human activity within the geographic scope, consisting of soil erosion, livestock grazing, changes in plant frequency, cover, and utilization, fires and fire suppression, recreation, wood cutting, mining, habitat fragmentation due to roads, ROWs, and fencelines, residential and commercial construction, border crossing violations and Border Patrol activity, border fencing, groundwater and surface water use and diversion, predator control, drought and climate change. The cumulative impact of the no action alternative may vary depending upon the future intensity, location, and size of wildfires and corresponding amounts of fire suppression activities. Low or moderate wildfire in the Sierrita Mountains may improve potential habitat conditions for BLM sensitive species. Intense wildfire may degrade watershed values, cause soil erosion, and degrade any potential habitat. The action alternative using prescribed fire with all design features may assist in protecting habitat.

Migratory Birds

The existing condition of migratory birds and their habitat is an effect of past human activity within the geographic scope, consisting of livestock grazing, fires and fire suppression, wood cutting, mining, changes in plant frequency, cover, and utilization, habitat fragmentation due to roads, ROWs, or fencelines, housing and commercial construction, predator control, groundwater and surface water use and diversion, border activities, introduction of non-native species (e.g. domestic cat, Lehmann lovegrass, tamarisk), drought and climate change.

The cumulative effects analysis area for biological resources could include the overall range of any population of birds that may be affected by the prescribed fire. For some migratory bird species that utilize the area around the Sierrita Mountains and the Santa Cruz River, this could include much of North and South America. Cumulative effects may include effects on dispersal between populations, but is likely short-term.

The cumulative effect of the no action alternative, together with other present and reasonably foreseeable actions, may result in more extreme impacts to migratory birds from wildfire. Without design features, increased mortality of birds of conservation concern may occur to nests, eggs, nestlings, and fledglings from intense wildfire and suppression activities, and from birds unable to escape from water troughs that are not equipped with escape ramps. The cumulative effect of the proposed action for prescribed fire, together with other present and reasonably foreseeable actions, may result in less direct mortality of birds due to timing avoidance dates, the inability to escape from water troughs with escape ramps, and the moderation of fire in xeroriparian areas through backing or night time fire. Compared to the no action alternative. prescribed fire

may result in short and long-term improvement of vegetation conditions in both xeroriparian and grassland areas. Improved vegetation cover in xeroriparian and grasslands may result in improved concealment, movement, nesting, foraging, or hunting habitat for migratory birds, and may have effects on food sources. Combined with regional loss of grassland habitat, effects to grassland species at the population level may become important. Effects from both the no action and action alternative would require documentation through monitoring and land health evaluations.

5.2.7 Wildlife

The existing condition of wildlife distribution is an effect of past human activity within the geographic scope, consisting of livestock grazing, changes in plant frequency, composition, and utilization, competition with livestock for water, food, or shelter, fires and fire suppression, recreation (including hunting), wood cutting, mining, habitat fragmentation due to roads, ROWs, or fencelines, residential and commercial construction, groundwater and surface water use and diversion, border activity, border fencing, predator control, introduction of non-native species (e.g. Lehmann lovegrass, crayfish, sport fish, domestic cats and dogs), drought and climate change.

The cumulative effect from the no action alternative, together with other present and reasonably foreseeable actions, may result in larger and more intense wildfire events and possibly more extreme suppression efforts. The cumulative effect of the proposed action, together with other present and reasonably foreseeable actions, may result in a decrease in woody invasive vegetation and increased native perennial grass cover on Keystone Peak. This may result in an increase in available forage for livestock utilization and possibly a long-term change in plant frequency, cover, or composition, which may impact cover, food sources, and water availability for wildlife. Combined with regional loss of grassland habitat, effects to grassland species at the population level may become important. Documentation through monitoring and land health evaluations should be completed for both the no action and action alternative.

6 Consultation and Coordination

6.1 Persons and Agencies Consulted

- Larry Humphrey, BLM Gila District Fuels Specialist (retired)
- Dan Robinett, Robinett Rangeland Resources, LLC
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- Dan Moore, BLM TFO Geologist
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Appendix A- Glossary of Terms

The following definitions were obtained from the National Wildland Fire Coordinating Group (NWCG) publication *PMS-205 Glossary of Wildland fire Terminology 2012*.

Air Quality
The composition of air with respect to quantities of pollution therein; used most frequently in connection with "standards" of maximum acceptable pollutant concentrations. Used instead of "air pollution" when referring to programs.

Available Fuel
That portion of the total fuel that would actually burn under various environmental conditions.

Backing Fire
1 Fire spreading, or ignited to spread, into (against) the wind or downslope. A fire spreading on level ground in the absence of wind is a backing fire.
2 That portion of the fire with slower rates of fire spread and lower intensity normally moving into the wind and/or down slope. Also called: heel fire.

Blackline
Preburning of fuels adjacent to a control line before igniting a prescribed burn. Blacklining is usually done in heavy fuels adjacent to a control line during periods of low fire danger to reduce heat on holding crews and lessen chances for spotting across control line. In fire suppression, a blackline denotes a condition where there is no unburned material between the fireline and the fire edge.

Broadcast Burning
Prescribed burning activity where fire is applied generally to most or all of an area within well-defined boundaries for reduction of fuel hazard, as a resource management treatment, or both.

Burn Boss
Person responsible for supervising a prescribed fire from ignition through mopup.

Contingency Actions
A back-up plan of action when actions described in the primary plan are no longer appropriate. Contingency actions are required to be taken when the result exceeds its intent. Actions are taken to return the project to its intended design.

Contingency Plan
The portion of a prescribed fire plan, incident action plan, or wildland fire use implementation plan that identifies possible but unlikely events and the contingency resources needed to mitigate those events.

Contingency Resources
Planned and identified fire suppression personnel and equipment that mitigate possible but unlikely events that exceed or are expected to exceed holding resource capabilities.

Control Line
An inclusive term for all constructed or natural barriers and treated fire edges used to control a fire.

Fire Behavior
The manner in which a fire reacts to the influences of fuel, weather, and topography.

Fire Behavior Prediction Model

A set of mathematical equations that can be used to predict certain aspects of fire behavior when provided with an assessment of fuel and environmental conditions.

Fire Dependent
Plants and vegetation communities which have evolved adaptations such as a reliance on fire as a disturbance agent, protection as a species against the effects of wildland fire, or even a strengthening or enhancement by it.

Fire Ecology
The study of the effects of fire on living organisms and their environment.

Fire Effects
The physical, biological, and ecological impacts of fire on the environment.

Fire Frequency
A general term referring to the recurrence of fire in a given area over time.

Fire Hazardous Areas
Those wildland areas where the combination of vegetation, topography, weather, and the threat of fire to life and property create difficult and dangerous problems.

Fire Interval
The number of years between two successive fire events for a given area; also referred to as fire-free interval or fire-return interval.

Fire Management Objective
Planned, measurable result desired from fire protection and use based on land management goals and objectives.

Fire Management Plan (FMP)
A plan which identifies and integrates all wildland fire management and related activities within the context of approved land/resource management plans. It defines a program to manage wildland fires (wildfire, prescribed fire, and wildland fire use). The plan is supplemented by operational plans, including but not limited to preparedness plans, preplanned dispatch plans, and prevention plans. Fire Management Plans assure that wildland fire management goals and components are coordinated.

Firebreak
A natural or constructed barrier used to stop or check fires that may occur, or to provide a control line from which to work.

FireFamily Plus
A software application that provides summaries of fire weather/danger climatology and occurrence for one or more weather stations extracted from NIFMID.

Firing Technique
Any method or pattern of igniting a wildland area to consume the fuel in a prescribed pattern. E.g., heading or backing fire, spot fire, strip-head fire, and ring fire.

Fuel Continuity
The degree or extent of continuous or uninterrupted distribution of fuel particles in a fuel bed thus affecting a fire's ability to sustain combustion and spread. This applies to aerial fuels as well as surface fuels.

Fuel Model

Simulated fuel complex for which all fuel descriptors required for the solution of a mathematical rate of spread model have been specified.

Handline
Fireline constructed with hand tools.

Hazard Fuel
A fuel complex defined by kind, arrangement, volume, condition, and location that presents a threat of ignition and resistance to control

Holding Resources
Resources assigned to do all required fire suppression work following fireline construction but generally not including extensive mop up.

Ignition Method
The means by which a fire is ignited, such as hand-held drip torch, helitorch, and backpack propane tanks.

Ignition Pattern
Manner in which a prescribed fire is ignited. The distance between ignition lines or points and the sequence of igniting them is determined by weather, fuel, topography, firing technique, and other factors which influence fire behavior and fire effects.

Incident Action Plan (IAP)
Contains objectives reflecting the overall incident strategy and specific tactical actions and supporting information for the next operational period. The plan may be oral or written. When written, the plan may have a number of attachments, including: incident objectives, organization assignment list, division assignment, incident radio communication plan, medical plan, traffic plan, safety plan, and incident map. Formerly called shift plan.

Ladder Fuels
Fuels which provide vertical continuity between strata, thereby allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease. They help initiate and assure the continuation of crowning.

Limbing
Removing branches from a felled or standing tree, or from brush.

Lopping
After felling, cutting branches, tops, and unwanted boles into lengths such that resultant logging debris will lie close to the ground.

Lopping and Scattering
Lopping logging debris and spreading it more or less evenly over the ground.

Minimum Impact Suppression Techniques (MIST)
The application of strategy and tactics that effectively meet suppression and resource objectives with the least environmental, cultural and social impacts.

Mop Up
Extinguishing or removing burning material near control lines, felling snags, and trenching logs to prevent rolling after an area has burned, to make a fire safe, or to reduce residual smoke.

Natural Barrier

Any area where lack of flammable material obstructs the spread of wildfires.

Objective
1 A description of a desired condition; quantified and measured, and where possible, with established time frames for achievement.
2 Specific, achievable, measurable, time-limited results to be achieved through land management practices, either through a description of a desired condition or the degree of desired change in an attribute.

Prescribed Burning
Application of prescribed fire.

Prescribed Fire
Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements (where applicable) must be met, prior to ignition.

Prescribed Fire Burn Plan
A plan required for each fire application ignited by management. Plans are documents prepared by qualified personnel, approved by the agency administrator, and include criteria for the conditions under which the fire will be conducted (a prescription). Plan content varies among the agencies.

Prescription
Measurable criteria that define conditions under which a prescribed fire may be ignited, guide selection of appropriate management responses, and indicate other required actions.

Risk Management (RM)
A continuous, five-step process that provides a systematic method for identifying and managing the risks associated with any operation.

Safety Briefing
A safety briefing emphasizes key safety concerns on the incident and is presented at each briefing session. The safety briefing should contain information to alert incident personnel of potential risk/hazard considered to be most critical.

Slopover
A fire edge that crosses a control line or natural barrier intended to confine the fire.

Spot Fire
Fire ignited outside the perimeter of the main fire by a firebrand.

Test Fire
A prescribed fire set to evaluate such things as fire behavior, fire effects, detection performance, or control measures.

Appendix B -Federally Listed Species in Pima County

Table B-1. Federally Listed Species in Pima County (obtained October 20, 2014 from USFWS IPAC).

Common Name	Scientific Name	Status	Habitat	Potential habitat in project area?	Affected by proposed action?
Kearney's blue star	*Amsonia kearneyana*	E	West-facing drainages in the Baboquivari Mts.	No	No
Huachuca water umbel	*Lilaeopsis schaffneriana ssp. recurva*	E	Cienegas, perennial low gradient streams, wetlands.	No	No
Nichol Turk's head cactus	*Echinocactus horizonthalonius var. nicholii*	E	Found in unshaded microsites in Sonoran desertscrub on dissected alluvial fans at the foot of limestone mountains and on inclined terraces and saddles on limestone mountain sides. Elevation approximately 2,500 ft.	No	No
Pima pineapple cactus	*Coryphantha scheeri var. robustispina*	E	Desert grassland and Chihuahuan Desert. Occurs in alluvial valleys or on hillsides in rocky to sandy or silty soils at 3,900 – 4,800 ft elevation.	Yes	Yes
Acuna cactus	*Echinomastus erectocentrus var. acunensis*	E	Well drained knolls and gravel ridges in Sonoran desertscrub, in elevation ranging from 1,000 to 4,500 ft.	No	No
Canelo Hills ladies'-tresses	*Spiranthes delitescens*	E	This orchid is known only from southern Arizona within four cienegas in Cochise and Santa Cruz County. Habitat is marshy wetlands from 4,585-4,970 ft in finely grained, highly organic, saturated soils.	No	No
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	E	Pools, cienegas, backwaters, seeps, and springs.	No	No
Gila chub	*Gila intermedia*	E	Deep pools with overhanging banks/cover.	No	No
desert pupfish	*Cyprinodon macularius*	E	Small, shallow pools, cienegas, backwaters,	No	No

			seeps, and springs.		
Sonora chub	*Gila ditaenia*	T	Occurs west of Nogales in Santa Cruz County in largest, deepest, and most permanent pools with bedrock-sand substrate. Elevation 1,000-4,000 ft.	No	No
Chiricahua leopard frog	*Lithobates chiricahuensis*	T	Streams, rivers, backwaters, ponds, and stock tanks that are mostly free from introduced fish, crayfish, and bullfrogs.	Yes	Yes
Sonoyta mud turtle	*Kinosternon sonoriense longifemorale*	C	Ponds and streams. Found only in Quitobaquito Springs in Organ Pipe Cactus National Monument.	No	No
northern Mexican gartersnake	*Thamnophis eques megalops*	T	Cienegas, stock tanks, large-river riparian woodlands and forests, streamside gallery forests.	No	No
Sonoran desert tortoise	*Gopherus morafkai*	C	Primarily rocky (often steep) hillsides and bajadas of Mohave and Sonoran desertscub. May encroach into desert grassland, juniper woodland, interior chaparral habitats, and even pine communities. Washes and valley bottoms may be used in dispersal.	Yes	Yes
California least tern	*Sterna antillarum browni*	E	Open, bare or sparsely vegetated sand, sandbars, gravel pits, or exposed flats along shorelines of inland rivers, lakes, reservoirs, or drainage systems.	No	No
masked bobwhite	*Colinus virginianus ridgwayi*	E	Desert grasslands with diversity of dense native grasses, forbs, and brush between approximately 500 – 3,900 ft. (150 – 1,200 m) in elevation. Species is closely associated with prairie acacia (*Acacia angustissima*).	No.	No

Mexican spotted owl	*Strix occidentalis lucida*	T	Nests in canyons and dense forests with multilayered foliage structure. Generally nest in older forests of mixed conifer or ponderosa pine/gambel oak, in canyons, and use variety of habitats for foraging.	No	No
southwestern willow flycatcher	*Empidonax traillii extimus*	E	Cottonwood/willow and tamarisk vegetation communities along rivers and streams.	No	No
yellow-billed cuckoo	*Coccyzus americanus*	T	Large blocks of riparian woodlands (cottonwood, willow, or tamarisk galleries).	No	No
lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E	Desert scrub habitat with agave and columnar cacti present as nectar plants.	Yes, present April-Sept	Yes
jaguar	*Panthera onca*	E	May use dense vegetation in river bottoms for hunting and travel corridors.	Yes	Yes
ocelot	*Leopardus pardalis*	E	Desert scrub in Arizona; associated with areas of dense cover.	Yes	Yes
Sonoran pronghorn	*Antilocapra americana sonoriensis*	E	Broad intermountain alluvial valleys with creosote-bursage and palo verde-mixed cacti associations.	No	No

Appendix C-US Fish and Wildlife Concurrence

AESO/SE
02EAAZ00-2013-I-0238

August 16, 2013

Memorandum:

To: Field Manager, Bureau of Land Management, Tucson Office, Tucson, Arizona

From: Field Supervisor, U.S. Fish and Wildlife Service, Arizona Ecological Services Office, Phoenix, Arizona

Subject: Informal Consultation Pursuant to Section 7 of the Endangered Species Act and 50 CFR 402.13 for the Keystone Peak Prescribed Fire

Thank you for your agency's correspondence of June 5, 2013, requesting informal consultation on the proposed Keystone Peak Prescribed Fire. This letter documents our review of your Biological Assessment (BA) and the Keystone Peak Prescribed Fire Burn Plan associated with this proposed action in compliance with section 7 of the Endangered Species Act of 1973 as amended (16 U.S.C. 1531 *et seq*) (ESA). Your correspondence concluded that the proposed Keystone Peak Prescribed Fire may affect, but is not likely to adversely affect the jaguar (*Panthera onca*), ocelot (*Leopardus pardalis*), lesser long-nosed bat (*Leptonycteris yerbabuenae*), Chiricahua leopard frog (*Lithobates [=Rana] chiricahuensis*) and critical habitat, and Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*). We concur with your determinations with our rationales provided below.

Previous applicable section 7 consultations in the project area include:

- BLM Statewide Land Use Plan Amendment for Fire, Fuels, and Air Quality Management (02-21-03-F-0210)
- Phoenix Resource Management Plan and Environmental Impact Statement (2-21-88-F-167)
- Phoenix District Portion of the Eastern Arizona Grazing Environmental Impact Statement (2-21-96-F-422)
- Gila District Grazing Program (22410-2006-F-0414)
- Altar Valley Fire Management Plan (22410-2005-F-0002)

The Keystone Peak prescribed fire is being conducted under the program-level BLM Statewide Land Use Plan Amendment for Fire, Fuels, and Air Quality Management consultation (02-21-03-F-0210) and is consistent with this program. Your request for project-specific section 7 consultation for the Keystone Peak prescribed fire is consistent with the existing Biological Opinion (BO) for that consultation.

Project-specific consultation actions related to the Keystone Peak prescribed fire include:

- September 28, 2010: BLM requested informal verification by email of the list of species with potential to occur within the prescribed fire area that may be affected by the project.
- July and August 2012: FWS provided BLM with additional information on listed species occurrence in the prescribed fire area.

The proposed action consists of a prescribed burn in the Sierrita Mountains (T18S, R11E, Sections 2, 3, 9, 10, 11, 13, 14, and 15). The prescribed burn treatment unit is located approximately 25 miles SSW of Tucson and 10 miles west of Green Valley, in Pima County, Arizona (see Map 11.1 of the BA). The prescribed fire boundary is characterized by high mountains dissected by deep canyons within the drainages of Oak Frame, Tank, and White Iron Canyons in the Sierrita Mountains (see Map 11.2 of the BA). Topography is extremely rough, with the high point of Keystone Peak at 6,120 feet above mean sea level, and the lowest part of the fire at 4,202 feet at the southeast boundary of the fire near South Tank. A complete description of the proposed action is found in your BA and the Keystone Peak Prescribed Fire Burn Plan and both documents are incorporated herein by reference.

The proposed prescribed fire will occur within three vegetation communities: desert grassland, plains grassland and savanna, and woodland.

Desert Grassland Communities

Elevations range from 3,800 to 4,600 feet in the desert grassland communities, although the community will go higher on steep southern exposures. Annual precipitation averages from 12 to 16 inches. In the desert grassland region, the soil temperature regime is thermic and the soil moisture regime is ustic aridic. In the desert grassland communities, the predominant species are native grasses. There is moderate to dense vegetation cover that includes desert grasses and forbs, succulent species, sub-shrubs, and some herbaceous cover of annuals. Fires are common with mean fire return intervals estimated at between 10 and 25 years. Ground cover consists primarily of gravel, cobble, and rock. Plant basal area ranges from 5 to 15 percent of the soil surface. Plant litter occupies 5 percent to 45 percent of the soil surface. Litter and plant cover values represent the range from after disturbance (e.g. fire, drought) until site equilibrium is reached. There are no signs of compaction or accelerated erosion. The ability of soil to maintain resource values and sustain outputs is high. High quality habitat exists for desert mule deer, Coues whitetail deer, javelina, mourning dove, scaled and Gambel's quail. Traditional food and material plants thrive here, including pigweed, coyote melon, canaigre, agave species, sotol, ocotillo, soaptree and banana yucca, cane cholla, prickly pear, one seed juniper and mesquite.

Plains Grassland and Savanna Communities

Elevations range from 4,600 to 5,500 feet in the plains grassland and savanna communities, although the community may go higher on steep southern exposures. Annual precipitation averages from 16 to 20 inches. In the plains grassland region the soil temperature regime is thermic and the soil moisture regime is aridic ustic. In the plains grassland and savanna communities, the predominant species are native perennial grasses. There is moderate to dense vegetation cover that includes mid and short grasses and forbs, succulent species, sub-shrubs, taller shrubs and some trees. Fires are common with mean fire return intervals estimated at between 5 and 20 years. Ground cover consists primarily of gravel, cobble and rock. Plant basal area ranges from 10 to 20 percent of the soil surface. Plant litter occupies 20 percent to 70 percent of the soil surface. Litter and plant cover values represent the range from after disturbance (fire, drought) until site equilibrium is reached. There are no signs of compaction or accelerated erosion. The ability of soil to maintain resource values and sustain outputs is high. High quality habitat exists for Coues whitetail deer, desert mule deer, javelina, mountain lion, winter sparrow species, and Mearn's quail. Traditional food and material plants thrive here, including skunkbush, yerba de pasmo, herbaceous sage, sotol, agave, yucca, beargrass, oak, walnut, mesquite and juniper.

Woodland Communities

A small area of woodland (tree canopy greater than 15percent) occurs around Keystone Peak on top of the Sierrita Mountains. Elevations range from 5,200 feet to over 6,000 feet. Annual precipitation is about 20 inches. Soil temperature regimes are thermic. The soil moisture regime is ustic aridic. The predominant species are native trees. There is moderate to dense vegetation cover that includes mid and short perennial grasses and forbs, sub-shrubs, shrubs and trees. Fires are common with mean fire return intervals estimated for some communities at between 5 and 15 years. Ground cover consists of organic layers (duff) of oak leaves and twigs under tree canopies with gravel, cobble and rock cover of 20 to 40 percent. Bedrock outcrop ranges from 1 to 10 percent of the surface. Plant basal area ranges from 4 to 10 percent of the soil surface. Plant litter occupies 20 percent to 90 percent of the soil surface. Litter and plant cover values represent the range from after disturbance (e.g. fire, drought) until site equilibrium is reached. There are no signs of compaction or accelerated erosion. The ability of soil to maintain resource values and sustain outputs is high. High quality habitat exists for Coues whitetail deer, black bear, javelina, coatimundi, mountain lion, band-tailed pigeon, and Mearn's quail. Traditional food and material plants thrive here, including oak, pinyon, juniper, manzanita, skunkbush, agave, yucca, beargrass, , and herbaceous sage.

The BLM, in coordination with the Altar Valley Conservation Alliance, proposes the implementation of the Keystone Peak prescribed fire treatment. The Keystone Peak prescribed burn encompasses 2,669 acres of mixed land ownership in the Sierrita Mountains, located approximately 25 miles south southwest of Tucson (see Maps 11.1 and 11.2 of the BA). Of the total acres, 877, 941, and 851 acres are under BLM, private, and state ownership, respectively. For the prescribed fire perimeter, handline is 11,386' (2.2 miles), road length is 10.84 miles, and the total boundary is 13.04 miles (see Map 11.3 of the BA). The prescribed fire treatment will be implemented to reduce the fuel loading adjacent to the Keystone Peak Communication Site, reduce shrub canopy cover, reduce cover of shin dagger (*Agave schottii*), increase cover and composition of native perennial grasses, and reintroduce

fire back into the ecosystem." The Keystone Peak Burn Plan lists in detail the various steps that will be taken for the prescribed fire; some of the key steps are summarized below.

Fuels Narrative

Fuels are predominately perennial and annual grasses with shin-dagger, catclaw and velvet-pod mimosas, mesquite, sotol, prickly pear, ocotillo, snakeweed, mesquite, whitethorn, and oak overstory. The main carrier of fire will be the short grasses and shin-dagger (fuel model GS2). Fuel Model GS2 was selected as the predominate fuel type even though this site has fuel loading closer to the GS1 fuel model. The fuels are continuous with isolated areas of sparse fuels. Problems with fire spread due to continuity and slope are not expected, and areas of sparse fuel will aid in achieving a mosaic burn pattern. Fuels outside of the project area are similar to the fuels within the project area.

Ignition Time Frames/Season(s)

The best time to ignite this prescribed fire is during the months of late April, May or early June, with the month of May preferred. The Keystone Peak prescribed fire will be scheduled for 2014 but, in the event that weather prescription, other fires, staffing, or funding becomes an issue, then this prescribed fire may occur in a subsequent year. Burnout of boundary lines will take place in the evening just before sunset and continuing into the night when rising humidity and lowering temperatures will moderate burning conditions. The upper portions of the canyon will most likely be burned with backing fire since the ignition operations will start on the uphill side of the project area. Utilizing these methods described should allow for a mosaic burn pattern in the upper portions of the canyon. After lines have been burned out, the interior will be allowed to burn during the higher end of the prescription to produce a hot fire to kill the most brush and target species. Burning during this season will mimic historic natural ignitions. There are adequate holding features to burn out the communication sites and along the power line before burning the lines on the downwind portions of the perimeter. The topography is broken by deep canyons which will allow time to black-line for two shifts.

Projected Duration

This is projected to take two days of preparation work, clearing around the power line and communication sites, and building the hand-line on the southwest side of the fire. Burning will take two days and monitoring and mop-up will take one day.

Techniques

Ground firing methods (e.g. drip torch, fusee, hand flare or pistol) will be utilized to implement the ignition phase of the burn. No aerial ignitions will be utilized. After a successful test burn is completed, ignition will start around the communication site. After the communication site is secured, burning will begin from the road where the power line crosses in the northeast corner of the burn and work toward the communication sites. No ignition will take place until the representative of TRICO Electric Cooperative confirms the line is de-energized. Strip and backing fires will be the preferred ignition method to achieve an adequate buffer along unit boundaries (i.e. black-line). Strip head fires (short/moderate runs and duration), may be used to help promote fire in areas of sparse fuel and/or to promote a mosaic burn pattern. The ignition phase of the burns should not last longer than 10-14 hours each day of ignition. Two firing teams of 1-4 lighters will be used to complete the ignition phase of the burn, and additional lighters will be obtained from holding forces as needed to complete ignition operations. Drip torches will be the primary ignition devices used to ignite the fuels. Alternative ignition devices (e.g. flare gun, hand toss flares, fusees) may be utilized as needed. The use of these ignition devices will be determined by the Burn Boss and Ignition Specialist(s) after careful consideration of fuels, weather, and fire behavior.

Counter Measures for Slopover

In the event of a slopover, all ignitions will stop, unless further ignitions are needed to prevent more slopover. The holding forces will flank the slopover until forward rates of spread have been stopped. The Holding Boss will coordinate the slopover containment efforts. In the event that the slopover escapes initial attack or if it appears the slopover cannot be contained by forces on hand, the burn will be declared a wildfire. After slopover is contained, the Burn Boss will make the determination whether or not to proceed with the burn. A Maximum Manageable Area (MMA) has not been delineated for this burn. With the broken topography and differing land ownerships, no opportunity exists for development of a logical MMA. Projected fire line is almost all on roads with good access. Any slopovers should be able to be easily contained with personnel and equipment on hand. There are no secondary roads or good control features outside of the burn area to base a MMA on.

The Contingency Plan is implemented when project objectives and containing burn within established control lines are no longer being met. If the Contingency Plan is successful at bringing the project back within the scope of the burn plan, the Burn Boss may decide to continue implementation. If contingency objectives (rapid containment and control of any slopover) are not met, the prescribed fire is converted to a wildfire and an extended attack suppression action is taken.

The objectives of the proposed action are:

Resource Management Objectives

- Implement an integrated vegetation management treatment to the rangelands and wildland urban interface, while applying appropriate management principles, techniques, methods, applications, and practices to achieve resource management goals and objectives, ensuring that firefighter and public safety is the first priority objective for all operations.
- Within shrub-invaded native grasslands, kill 30 percent to 70 percent of the half shrubs, and maintain native-grass dominance with mesquite densities at less than 10 percent.
- Within shrub-invaded non-native grasslands, top kill 30 percent to 70 percent of mesquites less than 4 inches in diameter, stimulate native grass production, and maintain mesquite densities at less than 10 percent.
- Within mesquite woodlands, top kill 20 percent to 50 percent of mesquites less than 6 inches diameter, and maintain total shrub and mesquite canopy cover at 10-25 percent.
- Within oak, junipers, and/or piñon-oak canyons, reduce the 1-hour fuels by 30 to 80 percent, the 10-hour fuels by 10 to 40 percent, the 100-hour fuels by 1 to 10 percent, and 1,000-hour fuels by 1 to 20 percent.
- Reduce shin dagger cover by 30percent, but limit reduction of shin dagger cover to less than 50percent.

Prescribed Fire Treatment Objectives

- Reduce fuel around communication site.
- Apply fire to 70percent of the project area.
- Consume 70percent of the grass cover.
- Scorch canopy of 60percent of shrub and tree species.
- Consume or scorch 30percent of the shin dagger.

Acceptable Range of Departure from Treatment Objectives

- Apply fire to less than 70percent, but more than 50percent of the project area.
- Consume less than 70percent of the grass cover, but more than 50percent.
- Scorch less than 60percent of shrub and tree canopy, but more than 20percent
- Consume or scorch more than 30percent of the shin dagger cover but less than 50percent to meet conservation measures in the BLM Statewide LUP Amendment for Fire, Fuels, and Air Quality Management for lesser long-nosed bat.

Vegetation monitoring will be done at three locations on the proposed Keystone Peak prescribed fire. The monitoring protocol was developed by Dr. Ron Tiller for use on the Las Cienegas National Conservation Area, and was designed to sample the effects of land treatments like prescribed fire and mechanical mesquite removal upon target shrub species and herbaceous plant communities. The three transect locations were established and monitored pre-prescribed burn during 2010.

CONSERVATION MEASURES

The following excerpt is from the BLM Statewide LUP Amendment for Fire, Fuels, and Air Quality Management FONSI and EA, pages 2-3 through 2-6 (BLM 2004): For all fire management activities (wildfire suppression, wildland fire use, prescribed fire, and mechanical, chemical, and biological vegetation treatments), the following Conservation Measures will be implemented as part of the proposed action. These Conservation Measures are intended to provide Statewide consistency in reducing the effects of fire management actions on Federally threatened, endangered, proposed, and candidate ("Federally protected") species.

Appendix 12.2 of the BA contains excerpts for all applicable conservation measures for actions and species from the BLM Statewide Land Use Plan Amendment for Fire, Fuels and Air Quality Management (BLM 2004). The

Keystone Peak prescribed fire is being conducted under this program-level consultation and is consistent with the program. These conservation measures are mandatory for the Keystone Peak prescribed fire, and are incorporated by reference. Included are conservation measures for lesser long-nosed bat, Chiricahua leopard frog, Pima pineapple cactus, jaguar, and ocelot.

Our concurrences with the BLM's determinations that the proposed Keystone Peak Prescribed Fire is not likely to adversely affect these species are as follows:

Jaguar

The jaguar, a large member of the cat family (Felidae), is an endangered species that currently occurs from southern Arizona and New Mexico to southern South America. Endangered status was extended to the jaguar in the U.S. in 1997 (62 FR 39147). Designation of critical habitat was determined to be prudent in January 2010. Critical habitat was proposed for the jaguar in August of 2012 (77 FR 50214), with a revised proposal published in July of 2013 (78 FR 39237). A final critical habitat rule is expected in late 2013 or early 2014. The jaguar was addressed in *Listed Cats of Texas and Arizona Recovery Plan (with Emphasis on the Ocelot)* (U.S. Fish and Wildlife Service 1990), but only general information and recommendations to assess jaguar status in the U.S. and Mexico, and protect and manage occupied and potential habitat in the U.S. were presented. No specific recovery recommendations or objectives for the jaguar were presented. A draft recovery plan for the jaguar is currently in process, with plans to complete the draft in 2014. Sightings in the U.S in the late 20th century to the present have occurred mainly along the U.S./Mexico international border. Jaguars in the U.S. are thought to be part of a population, or populations, that occur largely in Mexico. A number of threats contributed to or continue to affect the status of jaguars' rangewide, including habitat loss, persecution, poaching of prey and fragmentation of populations across portions of the range (Caso et al. 2009). Increased illegal and consequent law enforcement actions along the Mexico-U.S. international border may be limiting jaguar movement across the border.

In Arizona, jaguars have been sighted in a variety of ecological communities, from Sonoran desertscrub through subalpine conifer forest (1600->9800 ft.) (AGFD 2003). Jaguars have shown an affinity towards areas with dense plant cover, an abundance of prey, and the presence of water (USFS 2001). Most records are from Madrean evergreen-woodland, shrub-invaded semi-desert grassland, and along rivers, which are likely used as travel corridors (USFS 2001, AGFD 2003). The jaguar prefers warm tropical climate associated with water, and is only rarely found in extensive arid regions (AGFD 2003).

Proposed critical habitat for the jaguar was published on August 20, 2012 (77 FR 50214-50242), with a revised proposal, economic analysis, and an environmental assessment published on July 1, 2013 (78 FR 39237). The Keystone Peak prescribed fire boundary does not fall within any proposed critical habitat for jaguar; however, the project area does contain potential habitat and may provide connectivity between proposed jaguar critical habitat units 1, 2, and 3. Ox Frame Canyon is a major xero-riparian movement corridor that could be used by jaguar within the Sierrita Mountains.

We concur with your determination that the proposed action is not likely to adversely affect the jaguar for the following reasons:

- The action area is within the range of the jaguar and contains habitat for the jaguar. However, jaguars are rare in Arizona and no jaguars have been documented in the action area for this proposed prescribed fire. The proposed action will result in a short-term increase in human activity and effects to the vegetation communities providing some jaguar habitat elements. However, because of the extremely rare nature of the jaguar in the project area, effects from human disturbance are discountable. Effects to jaguar habitat elements are expected to be short-term and will likely improve jaguar habitat conditions overall, and for jaguar prey specifically. The area would retain a long-term mosaic of suitable habitat structures for dispersing and foraging jaguars. Although habitat in some foraging areas may be modified, the travel corridors would retain patches of dense riparian habitat, allowing for dispersal into the United States from Mexico. In addition, implementation of prescribed fire to reduce fuel loads and restore riparian and upland habitats over the long-term would reduce the risk of catastrophic wildfires, and the large-scale loss of suitable jaguar habitat. These effects are expected to be beneficial or to only have insignificant short- or long-term effects to the jaguar and jaguar habitat.
- Jaguar-specific conservation measures from the BLM Statewide LUP Amendment for Fire, Fuels, and Air Quality will be implemented, including (see Appendix 12.2 of the BA for the entire list): 1) implement the

Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats to minimize adverse effects to jaguars that may occur in dense riparian habitats on BLM-administered lands, and 2) maintain dense, low vegetation in major riparian or xero-riparian corridors on BLM-administered lands in identified locations south of Interstate 10 and Highway 86.

- The BLM Gila District Grazing Program Biological Opinion states that: "The BLM will implement the following conservation measures to reduce adverse effects to listed species and critical habitat from authorized livestock grazing actions on BLM lands within designated allotments. Those conservation measures that may apply to the Keystone Peak prescribed fire are the following measures for jaguar: 1) the BLM will maintain dense, low vegetation (mesquite, cottonwood, willow, etc.) in major riparian or xero-riparian corridors on BLM-administered lands within the jaguar range to the extent possible under the BLM's grazing program, and 2) the BLM will continue to implement grazing actions that improve conditions of riparian areas. Implementation of the above conservation measures will reduce potential impacts to the jaguar to an insignificant level.
- The effects of the proposed action are thus insignificant and discountable in terms of individual jaguars and the species' population as a whole.

Ocelot

Endangered status was extended to the U.S. portion of the ocelot's range with a final rule published July 21, 1982 (U.S. Fish and Wildlife Service 1982a). Critical habitat is not designated for this species. Recovery for the ocelot was originally addressed in Listed Cats of Texas and Arizona Recovery Plan (with Emphasis on the Ocelot) (U.S. Fish and Wildlife Service 1990). A revised draft recovery plan was made available for public comment on August 26, 2010. The ocelot is found in every mainland country south of the U.S. except Chile, and 11 subspecies have been described (Pocock 1941, Cabrera 1961, Hall 1981, Eizirik et al. 1998). Two of the 11 subspecies occur in the U.S.: the Texas ocelot (*L. pardalis albescens*) and the Sonora ocelot (L. *p. sonoriensis*) (Hall 1981).The ocelot was listed as endangered in the United States on July 21, 1982 (47 FR 31670). Threats to this species include habitat destruction, human disturbance, and illegal trapping and shooting.

The ocelot uses a wide range of habitats throughout its range in the Western Hemisphere (Tewes and Schmidly 1987). Despite this, the species does not appear to be a habitat generalist. Ocelot spatial patterns are strongly linked to dense cover or vegetation, suggesting it uses a fairly narrow range of microhabitats (Emmons 1988, Horne 1998). Ocelot populations appear to be rebounding in parts of its range, perhaps due to a decrease of hunting since the end of the 1980s. In the absence of hunting, the ocelot seems tolerant of human settlement and activities if large forests and sufficient prey are available. The Arizona/Sonora ocelot subspecies (*L. p. sonoriensis*) occurs in southern Arizona and northwestern Mexico (Sonora and northern Sinaloa) (López-Gonzalez et al. 2003; Murray and Gardner 1997). Breeding populations occur in the States of Sonora and northern Sinaloa. Ocelots occur at elevations <8000 ft., typically inhabiting dense chaparral thickets, humid tropical and subtropical forests, mangrove forests, swampy savannas, semi-arid thornscrub, brushland, and desertscrub habitats with riparian corridors for dispersal. A primary habitat component is the presence of dense cover (USFWS 2003). The ocelot adapts well to disturbed areas around human activity (USFWS 2003), and may persist in partly cleared forests, second-growth woodland, and abandoned cultivation reverted to brush. Dens occur in caves, hollow trees, thickets, or the spaces between the closed buttress roots of large trees.

In November 2009, the first live ocelot was documented in Arizona (in Cochise County) with the use of camera traps. Additionally, in April 2010, an ocelot was found dead on a road near Globe, Arizona, and a genetic analysis occurred to determine the origin of this specimen, although preliminary data indicate the young male ocelot was not of captive origin. Additional sightings have been documented in southeastern Arizona from 2011- 2013.

Potential habitat for ocelot exists within the Sierrita Mountains, where the Keystone Peak prescribed fire is proposed, especially in light of the ocelot documentation near Globe. Ox Frame Canyon is a major xero-riparian movement corridor that could be used by ocelot within the Sierrita Mountains.

We concur with your determination that the proposed action is not likely to adversely affect the ocelot for the following reasons:

- Ocelots are rare, secretive, and have not been detected in the Sierrita Mountains. The proposed action will result in a short-term increase in human activity and effects to the vegetation communities providing some ocelot habitat elements. However, because of the extremely rare nature of the ocelot in the project area,

effects from human disturbance are discountable. Effects to ocelot habitat elements are expected to be short-term and will likely improve habitat conditions overall, and for ocelot prey specifically. The area would retain a long-term mosaic of suitable habitat structures for dispersing and foraging ocelots. Although habitat in some foraging areas may be modified, the travel corridors would retain patches of dense riparian habitat, allowing for dispersal into the United States from Mexico. In addition, implementation of prescribed fire to reduce fuel loads and restore riparian and upland habitats over the long-term would reduce the risk of catastrophic wildfires, and the large-scale loss of suitable ocelot habitat. These effects are expected to be beneficial or to only have insignificant short- or long-term effects to the ocelot and ocelot habitat.

- There were no species-specific conservation measures developed for the BLM Statewide LUP Amendment for Fire, Fuels, and Air Quality (Appendix 12.2 of the BA). However, the BLM Gila District Grazing Program Biological Opinion states that: "The BLM will implement the following conservation measures to reduce adverse effects to listed species and critical habitat from authorized livestock grazing actions on BLM lands within designated allotments. Those conservation measures that may apply to the Keystone Peak prescribed fire are the following measures for ocelot: 1) the BLM will maintain dense, low vegetation (mesquite, cottonwood, willow, etc.) in major riparian or xero-riparian corridors on BLM-administered lands within the range of the ocelot to the extent possible under the BLM's grazing program, and 2) the BLM will continue to implement grazing actions that improve conditions of riparian areas.
- The effects of the proposed action are thus insignificant and discountable in terms of individual ocelots and the species' population as a whole.

Lesser long-nosed bat

The lesser long-nosed bat was listed as endangered on September 30, 1988 (53 FR 38456), and a recovery plan finalized in 1997 (FWS 1997). This species is migratory, present in southern Arizona (Cochise, Gila, Graham, Pima, Pinal, Maricopa, and Santa Cruz Counties) usually from April to September. In April, pregnant females congregate at traditional maternity roost sites in the western desert area of Arizona; some males and perhaps non-pregnant females arrive in July. By late September or October, the bats migrate south to Mexico for the winter. The closest known maternity colonies or other roost sites for this species are located in Organ Pipe Cactus National Monument, Cabeza Prieta National Wildlife Refuge, and the Catalina, Rincon, Santa Rita, and Patagonia mountains.

Population declines are thought to be associated with reduced numbers and size of maternity colonies in Arizona and Sonora due to exclusion and disturbance. In the extreme northern edge of its distribution, possible over-harvesting of native agaves in northern Mexico, or other actions reducing forage availability in the U.S. and Mexico, may cause population declines.

Lesser long-nosed bats inhabit desert or semidesert grassland and desert shrub (paloverde/saguaro) up to oak woodland transition habitats (1200-7300 ft. elevation) (AGFD 2003, USFWS 2003). They forage mainly on agave and columnar cacti blooms in paloverde-mixed cacti vegetation, including areas of saguaro, ocotillo, paloverde, prickly pear, and organ pipe cactus. Foraging habitat preferences are seasonal, generally foraging among agaves later in the summer. The bats typically day-roost in caves, abandoned mine tunnels, and occasionally, old buildings. Habitat for lesser long-nosed bat does occur within the Keystone Peak prescribed fire area.

We concur with your determination that the proposed action is not likely to adversely affect the lesser long-nosed bat for the following reasons:

- There are no known lesser long-nosed bat roosts in the action area for the proposed Keystone Peak prescribed fire. Effects to roosting bats will be discountable.
- Conservation measures will be implemented that will reduce effects to lesser long-nosed bat forage to an insignificant level. These include: 1) instructing all crew bosses in the identification of agave and columnar cacti and the importance of their protection, 2) prior to implementing any fuels treatment activities (prescribed fire, vegetation treatments), pre-project surveys will be conducted for paniculate agaves and saguaros that may be directly affected by fuels management activities, 3) protect long-nosed bat forage plants -- saguaros and high concentrations of agaves -- from wildfire and fire suppression activities, and from modification by fuels treatment activities (prescribed fire, vegetation treatments), to the greatest extent possible, and 4) BLM personnel would examine concentrations of agaves (including shindagger – *A. schottii*) within each proposed fuels treatment area, and blackline or otherwise protect from treatments any significant concentrations of agaves that appear to be amidst fuel loads that could result in mortality greater

than 20 percent (>50percent for *A. schottii).* BLM personnel would determine which significant agave stands are prone to mortality greater than 20 percent (>50percent for *A. schottii*).

- In addition, the BLM Gila District Grazing Program Biological Opinion states that: "The BLM will implement the following conservation measures to reduce adverse effects to listed species and critical habitat from authorized livestock grazing actions on BLM lands within designated allotments. The conservation measure that may apply to the Keystone Peak prescribed fire is the following measure for lesser long-nosed bat: 1) the BLM will ensure that grazing related actions do not directly or indirectly affect day roost sites on BLM land as they are identified. The BLM will ensure that grazing program actions such as road construction and maintenance do not facilitate public access to known lesser long-nosed bat roosts.
- The proposed Keystone Peak prescribed fire would be used to restore and maintain grassland habitat, to reduce accumulated hazardous fuels, and to reduce the chance of catastrophic fire on BLM-administered, state, and private land. While there may be short-term impacts to lesser long-nosed bat foraging habitat, with the implementation of the proposed conservation measures, the proposed action will provide long-term benefits to lesser long-nosed bat forage resources.
- The effects of the proposed action are thus insignificant and discountable in terms of individual lesser long-nosed bats and the species' population as a whole.

Chiricahua Leopard Frog and Critical Habitat

The Chiricahua leopard frog was listed as threatened on June 13, 2002 (67 FR 40789). The range of the Chiricahua leopard frog extends through the southeastern montane sector of Arizona and adjacent Sonora, Mexico, at elevations ranging from 1219-4023 ft. (Santa Cruz and Cochise Counties, AZ), and from montane central Arizona east and south along the Mogollon Rim to montane parts of west-southwestern New Mexico, at elevations ranging from 3500-8040 ft. (Apache, Coconino, Gila, Graham, Greenlee, Navajo, and Yavapai Counties, AZ). This species inhabits land owned by the U.S. Forest Service - Apache-Sitgreaves, Coconino, Coronado, and Tonto National Forests, Bureau of Indian Affairs - White Mountain Apache and San Carlos Apache Reservations, U.S. Fish and Wildlife Service - San Bernardino National Wildlife Refuge, Bureau of Land Management, and private citizens. Threats to this species include introduced bullfrogs, crayfish, and predatory fish, a chytrid fungus (*Batrachochytridium dendrobatidis*), habitat fragmentation, major wetland manipulations, water pollution, and over-grazing.

Because of a taxonomic revision of the Chiricahua leopard frog, FWS reassessed the status of and threats to the currently described species (*Lithobates chiricahuensis*), and listed the currently described species as threatened rangewide (77 FR 16324-16424). Critical habitat was designated at the same time. Twin Tanks and Ox Frame Tank occur near the Keystone Peak prescribed fire boundary, and are designated critical habitat (see 77 FR 16348, with excerpt below). Twin Tanks are on lands owned by Arizona State Land Department, and Ox Frame Tank is on private land. Both Twin Tanks and Ox Frame Tank are located outside of the (revised) burn boundary.

The primary habitat type for the chiricahua leopard frog includes oak, mixed oak, and pine woodlands, although its habitat ranges into areas of chaparral, grassland, and desert, particularly for the southern populations. This species requires permanent water sources, including streams, rivers, backwaters, ponds, and stock tanks that are mostly free from introduced fish, crayfish, and bullfrogs. Natural aquatic systems include rocky streams with deep rock-bound pools, river overflow pools, oxbows, permanent springs, permanent pools in intermittent streams, and beaver dams. Human-influenced aquatic systems include earthen stock tanks, livestock drinkers, irrigation sloughs, mine adits, abandoned swimming pools, and ornamental backyard pools (AGFD 2003).

Designated critical habitat, recovery unit 1, for the Chiricahua leopard frog exists near the Keystone Peak prescribed fire boundary (see map 11.4of the BA). The Primary Constituent Elements (PCEs) for Chiricahua leopard frog are found at 77 FR 16373. PCEs include aquatic breeding habitat and adjacent uplands exhibiting standing bodies of water with salinities less than 5 parts per thousand, pH greater than or equal to 5.6 and pollutants absent or minimally present. Other elements include appropriate emergent and submerged vegetation or other substrates, absence of non-native predators, absence of chytridiomycosis, upland habitats that provide opportunities for foraging and basking, and dispersal and nonbreeding habitat that provides movement corridors.

Ox Frame Tank (private property owned by Sierrita Mining and Ranching) is outside and approximately 0.8 miles upstream of the Keystone Peak prescribed fire boundary. The closest point of the prescribed fire boundary to Ox Frame Tank is approximately 0.4 mile; the area to be burned drains away from Ox Frame Canyon in this location. A

recent protocol survey conducted in June 2013 (Caldwell and Kahrs 2013) documented occupancy by Chiricahua leopard frogs at Ox Frame Tank. Other tanks within the fire boundary include Homestead, Kidoo, Black Hawk, Keystone, and an un-named tank and spring on the southwest side of the fire boundary. The June 2013 survey also confirmed occupancy by Chiricahua leopard frogs of the un-named tank. In correspondence we received from the BLM on August 6, 2013, BLM management indicated that all conservation measures from the BLM Statewide LUP Amendment for Fire, Fuels, and Air Quality and Biological Opinion related to Chiricahua leopard frogs will be mandatory and included as part of the proposed action.

We concur with your determination that the proposed action is not likely to adversely affect the Chiricahua leopard frog for the following reasons:

- Most currently known populations of the Chiricahua leopard frog are upstream or several miles away from the boundaries of the Keystone Peak prescribed fire. A recent survey completed in June 2013 indicated that Chiricahua leopard frogs do occupy one tank within the boundaries of the proposed prescribe fire. This un-named tank was rapidly drying, and the occupancy status of the tank at the time of the proposed action will be dependent on the amount and timing of precipitation prior to the implementation of the proposed action.

BLM committed in its August 6, 2013 correspondence to apply all the appropriate conservation measures from the BLM Statewide LUP Amendment for Fire, Fuels, and Air Quality and Biological Opinion related to Chiricahua leopard frogs. These conservation measures will reduce potential effects to an insignificant level and include:

1. Biologists will be involved in the development of prescribed burn plans and vegetation treatment plans to minimize effects to federally protected species and their habitats within, adjacent to and downstream from proposed project sites. Biologists will consider the protection of seasonal and spatial needs of federally-protected species (*e.g.*, avoiding or protecting important use areas or structures and maintaining adequate patches of key habitat components) during project planning and implementation;
2. Minimum Impact Suppression Tactics (M.I.S.T.) will be followed in all areas with known federally-protected species or habitats;
3. Pre-project protocol surveys and clearances (biological valuations/assessments) for federally-protected species will be required for each project site before implementation. All applicable Conservation Measures will be applied to areas with unsurveyed suitable habitat for federally-protected species, until a survey has been conducted by qualified personnel to clear the area for the treatment activity;
4. When using water from sources supporting federally-protected species, care must be taken to ensure adverse impacts to these species are minimized or prevented. Unused water from fire abatement activities will not be dumped in sites occupied by federally-protected aquatic species to avoid introducing non-native species, diseases, or parasites;
5. Install sediment traps, as determined by a Resource Advisor or qualified biologist approved by BLM, upstream of tanks and ponds occupied by Chiricahua leopard frogs in order to minimize the amount of ash and sediment entering the water. Consultation with a qualified biologist during the planning phase will aid in determining sediment trap installation requirements (see Conservation Measures FT-1 and FT-3 in Appendix 12.2 of the BA); and
6. Except as needed in emergency situations to abate the immediate fire threat or loss of life or property, no water will be drafted for fire suppression from bodies of water known to be occupied by the Chiricahua leopard frog. Additionally, the following conservation measures specific to the Chiricahua leopard frog will be implemented and will reduce effects to the Chiricahua leopard frog and designated critical habitat to an insignificant level:

   AM-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats.

   AM-2 For fire management sites with habitat for the Chiricahua leopard frog, unsurveyed sites will be considered occupied unless surveyed prior to project implementation.

   AM-3 Install sediment traps, as determined by a Resource Advisor or qualified biologist approved by BLM, upstream of tanks and ponds occupied by Chiricahua leopard frogs in order to minimize the amount of ash and sediment entering the water. Consultation with a qualified biologist during the planning phase will aid in determining sediment trap installation requirements.

   AM-4 All personnel performing fire management activities at any creek crossing will be informed of the potential presence of Chiricahua leopard frogs, their status, and the need to perform their duties to avoid impacts to the frog and its habitat.

AM-5 Except as needed in emergency situations to abate the immediate fire threat or loss of life or property, no water will be drafted for fire suppression from bodies of water known to be occupied by the Chiricahua leopard frog.

- The effects of the proposed action are thus insignificant and discountable in terms of individual Chiricahua leopard frogs and the species' population as a whole.

We also concur with your determination that the proposed action may affect, but is not likely to adversely affect designated critical habitat for the Chiricahua leopard frog for the following reasons:

- Ox Frame Tank and North and South Twin Tanks are the only tanks designated as Chiricahua leopard frog critical habitat within the vicinity of the proposed action. These tanks are outside of the boundary of the proposed prescribed fire. Additionally, the designated tanks are upstream or an adequate distance from the proposed prescribed fire that off-site and indirect effects from the proposed action are discountable.
- Conservation measures will be implemented to avoid or reduce the potential effects to designated critical habitat that occurs outside of the boundaries of the proposed action (see measures RA-1 through RA-13 in Appendix 1 of the BA), thus effects will be insignificant.

Pima Pineapple Cactus
The Pima pineapple cactus occupies ridges in semidesert grassland and alluvial fans in Sonoran Desertscrub biotic communities. These plant communities are dominated by the following species: *Acacia constricta* (white-thorn acacia), *Prosopis velutina* (velvet mesquite), *Gutierrezia microcephala* (thread snakeweed), *Ambrosia deltoidea* (triangle-leaf bursage), and various other cacti and grasses. The Desert Botanical Garden reports that "Plants are found on alluvial hillsides in rocky, sandy soils.... habitat type is primarily desert grassland...." The elevation range of this species is approximately 2,300 - 5,000 feet. It lies on flat ridge tops with little slope, and known substrates for the Pima pineapple cactus are mostly rocky loams, although alluvial hillsides in rocky, sandy soils are reported to contain the cactus. Supposedly, no soil analysis has been done to determine the soil requirements for the Pima pineapple cactus.

The total range of the Pima pineapple cactus includes south-central Arizona and north-central Sonora, Mexico. Within the state, its known range is bounded by Santa Cruz County, Santa Rita Mountains (east); Pima County, Baboquivari Mountains (west), Tucson (north), and the Arizona-Mexican border (south). The land management/ownership for Pima pineapple cactus includes the following entities: BIA - San Xavier Reservation and Tohono O'Odham Nation, BLM - Tucson Field Office, BOR - Phoenix Area, FWS - Buenos Aires National Wildlife Refuge, USFS – Coronado National Forest, State Land Department, City of Tucson, and private.

The population trend for this species is downward due to loss and degradation of habitat. Management factors include the limited range and sparse distribution, loss of habitat due to urban development, capital improvement projects, off-road vehicle use, road construction, agriculture, mining, habitat degradation due to livestock grazing, alteration of habitat due to aggressive alien grasses (buffelgrass and Lehmann lovegrass), illegal collecting, and range management practices that cause surface disturbances such as ripping and imprinting.

The proposed Keystone Peak prescribed fire is 2,669 acres in size; of this, 877 acres are BLM. A total of 530 acres in the prescribed fire boundary is lower than 4700' in elevation and, of this, 185 acres are under 15percent slope (see Map 11.5 of the BA). Therefore, approximately 185 acres within the prescribed fire boundary has potential for Pima pineapple cactus occurrence in those areas with appropriate soils. Of the 185 acres, 40 acres are BLM.

On March 28, 2013, BLM coordinated a survey for Pima pineapple cactus within the proposed Keystone Peak prescribed fire boundary, with a total of 13 participants. Participants were from BLM (three participants), Sierrita Mining and Ranching (nine participants), and Altar Valley Conservation Alliance (one participant). Detailed maps of potential habitat were provided by BLM and contained polygons of areas with appropriate elevation (less than 4,700') and slope (less than 15percent) for Pima pineapple cactus occurrence (see Map 11.5 of BA). Training on identification of PPC was provided by BLM in the form of discussion and photo handouts prior to conducting the surveys. Surveys followed the standard survey protocol (Patricia Roller 1996). The larger polygons of potential habitat north and east of Homestead Tank were surveyed earliest in the day and received two sweeps of survey because these areas contained the most likely habitat for PPC. The disturbed area of Lehmann lovegrass north of

Homestead Tank was not surveyed because it was unlikely any PPC had established in this location in the short time since soil disturbance. Areas approximately ½ miles northwest of Homestead Tank received one survey sweep. Polygons further west of Homestead Tank did not receive surveys because rocky soils and elevation precluded habitat potential. The polygons west of Horse Pasture Hill were looked at in the field, but habitat appeared even less suitable for PPC, so these polygons were not surveyed. No Pima pineapple cactus were found on any of the areas surveyed and very little (less than 1 percent) of the areas surveyed appeared to be potential habitat, based on very rocky soils present throughout the area. The higher elevations (even those areas under 4,700') contained unlikely plant associations and also appeared to be unsuitable habitat, probably due to microclimates of colder temperatures and rocky substrate.

We concur with your determination that the proposed action is not likely to adversely affect the Pima pineapple cactus for the following reasons:

- Surveys for the Pima pineapple cactus were conducted and none were found. While it is possible that the survey missed individual Pima pineapple cacti, it is unlikely that a meaningful population of the Pima pineapple cactus was missed, and, thus, effects to Pima pineapple cacti from the proposed action are discountable.
- Habitat appeared largely unsuitable due to rocky substrate throughout the area of the proposed prescribed fire, with areas of colder microclimate. Therefore, it is unlikely that any direct mortality to Pima pineapple cactus would occur from the Keystone prescribed fire.
- Positive effects to future potential habitat for Pima pineapple cactus may occur through the control of woody invasives, such as mesquite and snakeweed, and subsequent restoration of grassland habitat.
- The effects of the proposed action are thus insignificant and discountable in terms of individual Pima pineapple cactus and the species' population as a whole.

Thank you for your continued coordination concerning listed species. No further section 7 consultation is required for the proposed Keystone Peak prescribed fire at this time. Should project plans change, or if information on the distribution or abundance of listed species or critical habitat becomes available, this determination may need to be reconsidered. In all future correspondence on this project, please refer to the consultation number 02EAAZ00-2013-I-0238.
If you have any questions, please contact Scott Richardson at (520) 670-6150, ext. 242 or Jean Calhoun at (520) 670-6150, ext. 223.

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