

United States Department of the Interior
Bureau of Land Management

Land Health Evaluation
Ramirez Lease No. 5268
September 2019

U.S. Department of the Interior
Bureau of Land Management
Gila District
Tucson Field Office
3201 East Universal Way
Tucson, AZ 85756
Phone: (520) 258-7200
FAX: (520) 258-7238



This page left intentionally blank

Contents

1	Introduction	1
1.1	Definitions of Arizona Standards for Rangeland Health and Guidelines for Grazing Administration	1
2	Allotment profile and general description	2
2.1	Location.....	2
2.2	Physical Description	4
2.2.1	Acreage	4
2.2.2	Precipitation and Temperature.....	6
2.2.3	Watershed and Water Resources	6
2.2.4	Soils.....	8
2.2.5	Range Improvements.....	10
2.3	Biological Resources.....	12
2.3.1	Major Land Resource Areas	12
2.3.2	Ecological Sites including Soils and Vegetation Communities	12
2.3.3	Wildlife Resources.....	18
2.4	Special Management Areas	18
2.5	Recreation Resources.....	18
2.6	Cultural Resources.....	19
2.6.1	Native American Concerns	21
3	Grazing Management	22
3.1	Grazing History.....	22
3.2	Mandatory Terms and Conditions for Permitted Use.....	22
4	Objectives	23
4.1	Land Use Plan Management Objectives.....	23
4.2	Allotment Specific Objectives.....	24
4.2.1	Land Health Standards	24
5	Rangeland Inventory and Monitoring methodology	26
5.1	Monitoring Protocols	26
5.1.1	Indicators of Rangeland Health.....	27
6	Management Evaluation and Summary of Studies data	28
6.1	Actual Use	28
6.2	Rangeland Health Assessments.....	28
7	Determination of Land Health Standards	33
7.1.1	Standard 1: Upland Sites	33
7.1.2	Standard 2: Riparian-Wetland Sites.....	34

7.1.3	Standard 3: Desired Resource Condition	34
8	Recommended Management Actions	35
8.1	Terms and Conditions:	35
9	List of Preparers.....	37
10	Authorized Officer Concurrence.....	38
11	references	39
12	APPENDIX A: SPECIES LISTS	41
13	APPENDIX B: MONITORING PROTOCOLS	42
13.1	Monitoring Protocols	42
13.1.1	Indicators of Rangeland Health.....	42
	Monitoring Protocols.....	43
14.2.1	Line Point Intercept (species composition and ground cover)	44
14.2.2	Pace Frequency	44
14.2.3	Fetch	44
14.2.4	Dry Weight Rank	45
14.2.5	Utilization	45
15	Appendix C: Monitoring Data	46
15.1	Key Area Data	46
14	Appendix C: Monitoring Data	50
14.1.1	Utilization	50

This page left intentionally blank

1 INTRODUCTION

The purpose of this draft Land Health Evaluation (LHE) report for the Ramirez allotment is to evaluate whether the Arizona Standards for Rangeland Health (Standards) are being achieved on the allotment. In the case of non-achievement of Standards, the LHE would also seek to determine if livestock are the causal factor for either not achieving or not making significant progress towards achieving the Standards. An evaluation is not a decision document, but a stand-alone report that clearly records the analysis and interpretation of the available inventory and monitoring data. As part of the land health evaluation process, Desired Plant Community (DPC) objectives (also referred to as key area objectives in this document) were established for the biological resources within the allotment.

The Secretary of the Interior approved Bureau of Land Management (BLM) Arizona Standards for Rangeland Health and Guidelines for Grazing Administration (Standards and Guidelines) in April 1997. The Decision Record, signed by the Arizona BLM State Director (April 1997) provides for full implementation of the Standards and Guidelines in Arizona land use plans. Standards and guidelines are implemented by the BLM through terms and conditions of grazing permits, leases, and other authorizations, grazing related portions of activity plans, and through range improvement-related activities. Land health standards are measurable and attainable goals for the desired condition of the biological resources and physical components/characteristics of desert ecosystems found within the allotment.

This evaluation seeks to ascertain:

1. If Standards are being achieved or not achieved, and, if not, if significant progress is being made towards achievement of land health on the allotment.
2. If it is ascertained that Standards are not being achieved, to determine whether livestock grazing is a significant factor causing that non-achievement.

1.1 Definitions of Arizona Standards for Rangeland Health and Guidelines for Grazing Administration

The Arizona standards for rangeland health are expressions of levels of physical and biological condition or degree of function required for healthy, sustainable rangelands and defines minimum resource conditions that must be achieved and maintained. Determination of rangeland health is based upon conformance with these standards.

Guidelines for grazing administration consider the type and level of grazing use. Guidelines for grazing management are types of methods and practices determined to be appropriate to ensure the standards can be met, or that significant progress can be made toward meeting the standard. Guidelines are tools that help managers and lessees achieve standards.

Although the process of developing standards and guidelines applies to grazing administration, present rangeland health is the result of the interaction of many factors in addition to grazing livestock. Other contributing factors may include, but are not limited to: past land uses, land use restrictions, recreation, wildlife, rights-of-way, wild horses and burros, mining, fire, weather, and insects and disease (Arizona Standards and Guidelines, 1997).

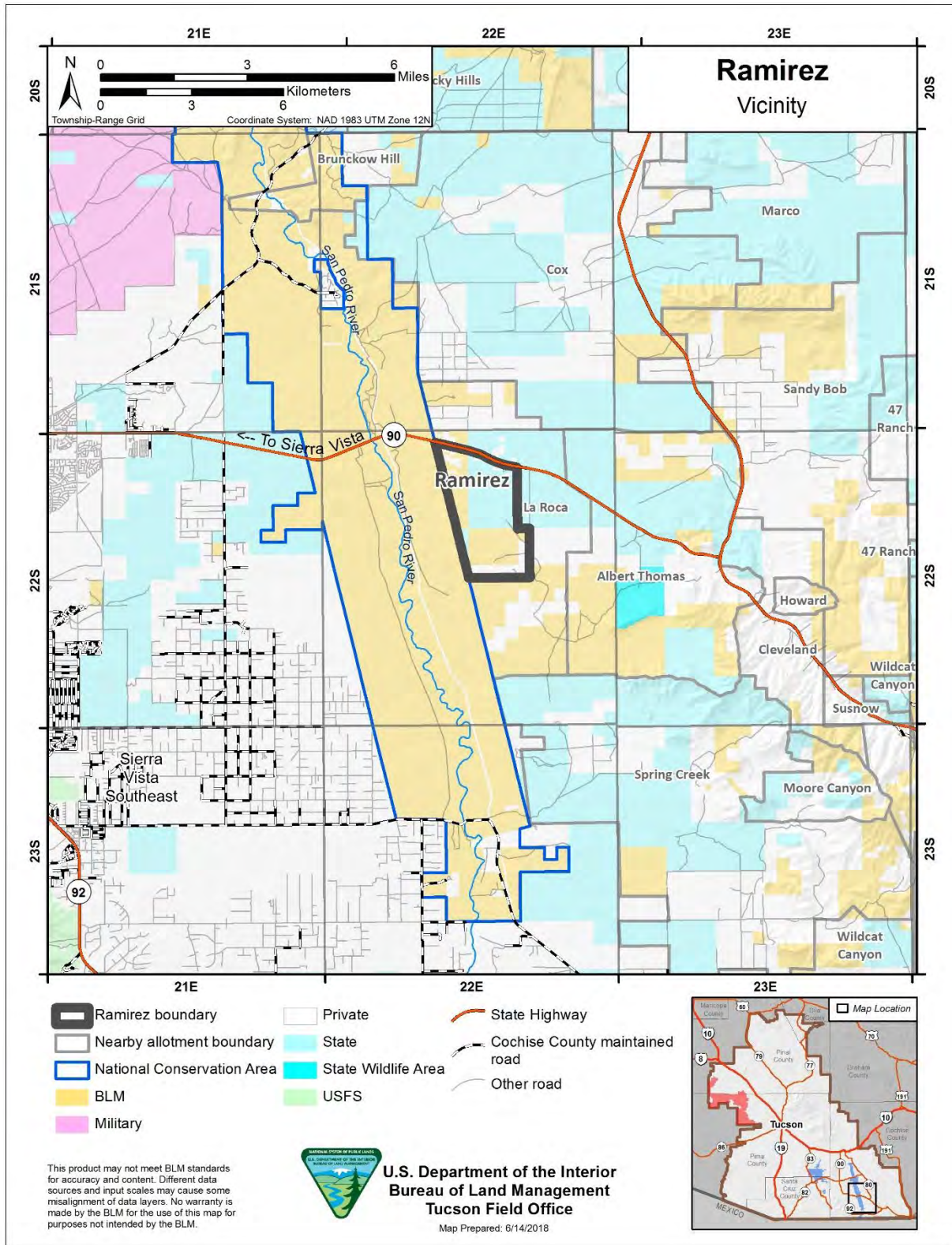
The Arizona Standards and Guidelines identify three standards regarding (1) upland sites, (2) riparian-wetland sites, and (3) desired resource conditions based on specific indicators, as discussed in *Section 6 Rangeland Inventory and Monitoring Methodology* of this document.

2 ALLOTMENT PROFILE AND GENERAL DESCRIPTION

2.1 Location

The BLM portion of the Ramirez allotment is located about 8 miles east of the town of Sierra Vista in Cochise County, Arizona. The BLM lands within the allotment are comprise approximately 40 percent of the total livestock operation. The ranch borders the La Roca allotment to the east, and the San Pedro Riparian National Conservation Area to the west. Figure 1 below shows the Ramirez allotment location.

Figure 1. Vicinity Map of the Ramirez Allotment



2.2 Physical Description

This section describes physical characteristics within the Ramirez Allotment.

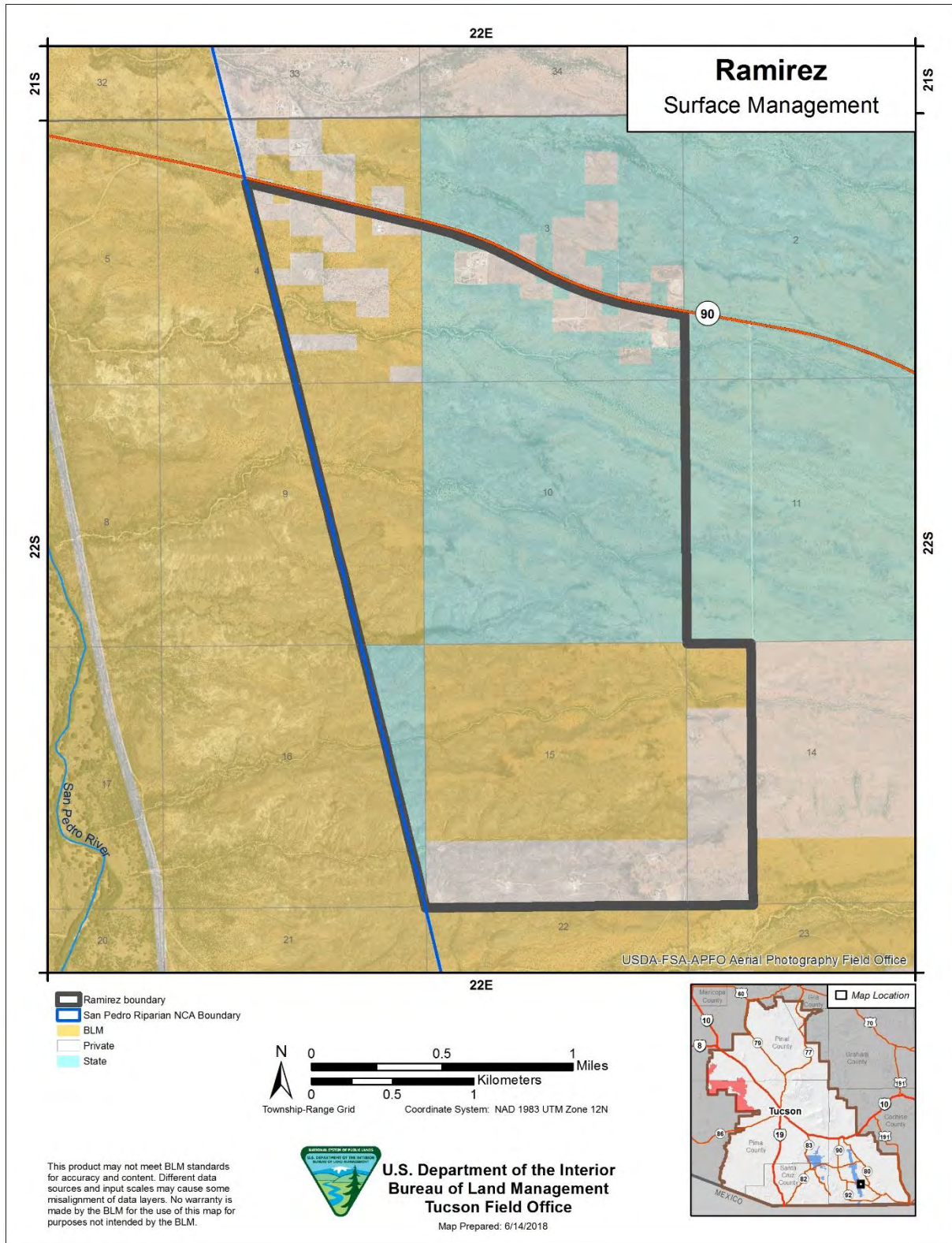
2.2.1 Acreage

The acreage of the Ramirez allotment is detailed below (Table 1). The BLM lands within the allotment are all located on the throughout. Fence lines do not separate between land ownership. Lands within the allotment are predominately public and state lands, with lesser amounts of private lands. Public lands constitute about 34 percent of the allotment. Spatial distributions of land ownership are displayed in Figure 2.

Table 1. Acreage of Landownership

Land Classification	Ramirez Allotment
Public Acres	903
State Acres	914
Private Land Acres	442
Total Acres	2,260

Figure 2. Land Ownership of the Ramirez Allotment



2.2.2 Precipitation and Temperature

Climate data comes from the Sandy Loam Upland 12-16" precipitation zone (p.z.) Ecological Site Description (ESD). Precipitation in this common resource area ranges from 12-16 inches yearly in the eastern part with elevations from 3600-5000 feet, and 13-17 inches in the western part where elevations are 3300-4500 feet. Winter-Summer rainfall ratios are 40-60% in the west and 30-70% in the east. Summer rains fall July-September, originate in the Gulf of Mexico and are convective, usually brief, intense thunderstorms. Cool season moisture tends to be frontal, originates in the Pacific and Gulf of California, and falls in widespread storms with long duration and low intensity. Snow rarely lasts more than one day. May and June are the driest months of the year. Humidity is generally very low. Temperatures are mild. Freezing temperatures are common at night from December-April; however temperatures during the day are frequently above 50 F. Occasionally in December-February, brief 0 F temperatures may be experienced some nights. During June, July and August, some days may exceed 100 F. Cool season plants start growth in early spring and mature in early summer. Warm season plants take advantage of summer rains and are growing and nutritious July-September. Warm season grasses may remain green throughout the year. Climate stations for the average precipitation and temperature tables below are: 020309, Apache Powder Co. Period of record 1923-1990, 022659 Douglas Period of Record 1948-2004, 023120 Fort Huachuca Period of Record 1900-1981, 027530 San Manuel Period of Record 1954-2004, 028619 Tombstone Period of Record 1893-2004. For more detail on local precipitation data please refer to section 7.2 below.

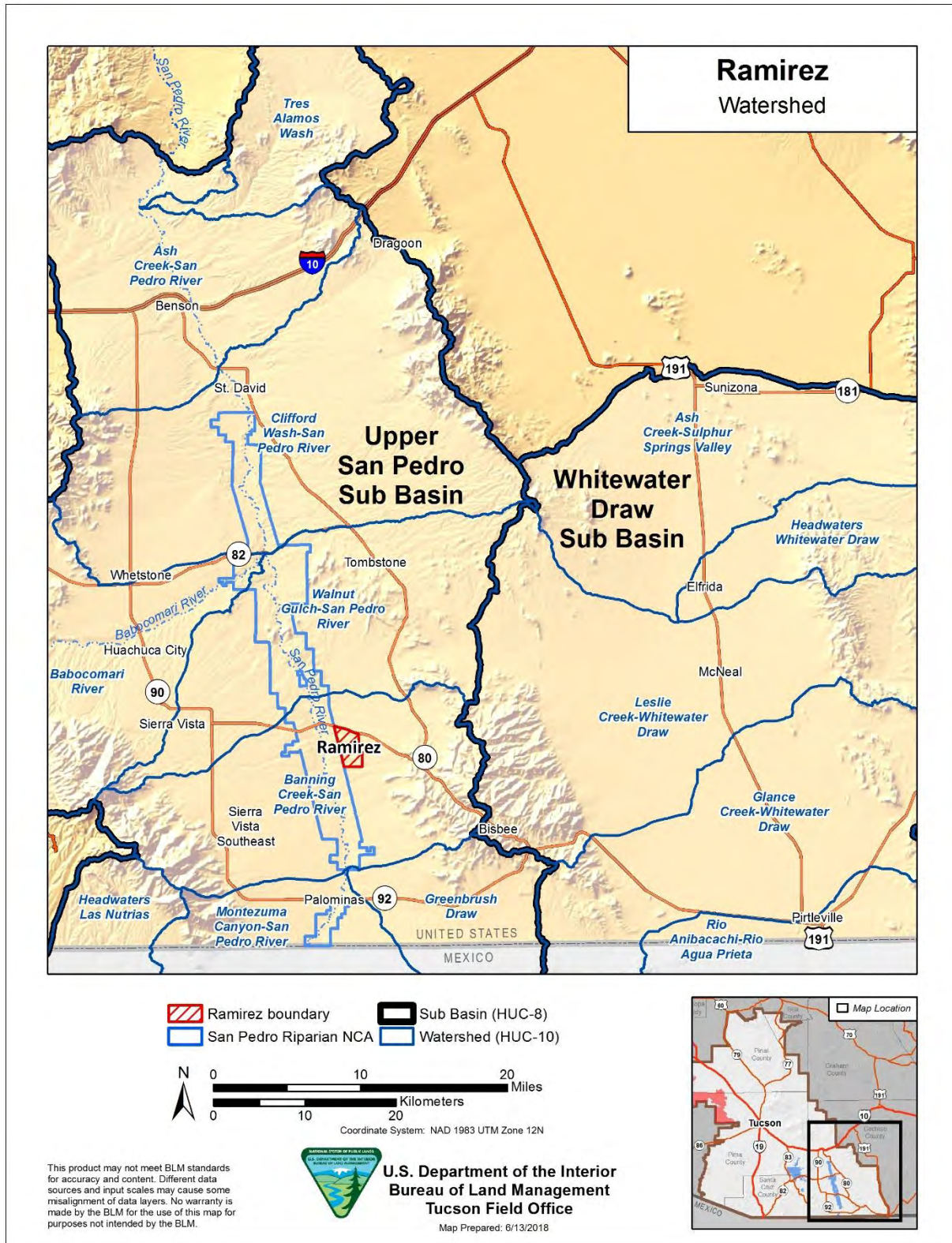
Table 2. Precipitation and Temperature Averages for Limy Upland Site

Averaged Temperature and Precipitation (1894-2005)												
Frost-free period (days): 195												
Freeze-free period (days): 0												
Mean annual precipitation (inches): 16												
Monthly Precipitation (Inches):												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>High</i>	1.10	0.97	0.50	0.30	0.24	0.52	3.86	3.46	1.72	0.88	0.74	1.08
<i>Low</i>	0.76	0.67	0.50	0.29	0.17	0.50	2.44	2.61	1.63	0.90	0.53	0.87
Monthly Temperature (°F):												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>High</i>	46.8	49.7	54.6	61.7	68.1	77.1	80.7	78.6	73.9	65.1	54.1	48.3
<i>Low</i>	46.3	48.8	54.0	60.0	67.5	76.8	77.3	75.2	72.1	64.1	53.5	47.1

2.2.3 Watershed and Water Resources

The Ramirez allotment is located just east of the San Pedro River and lies within the Upper San Pedro HUC-8 Sub Basin (Figure 3). Within this sub basin, the allotment is included in the smaller Banning Creek-San Pedro River (HUC-10). There are no perennial or intermittent streams in the allotment, but several ephemeral drainages exist, which flow only in response to rain events.

Figure 3. Map of watersheds associated with Ramirez



2.2.4 Soils

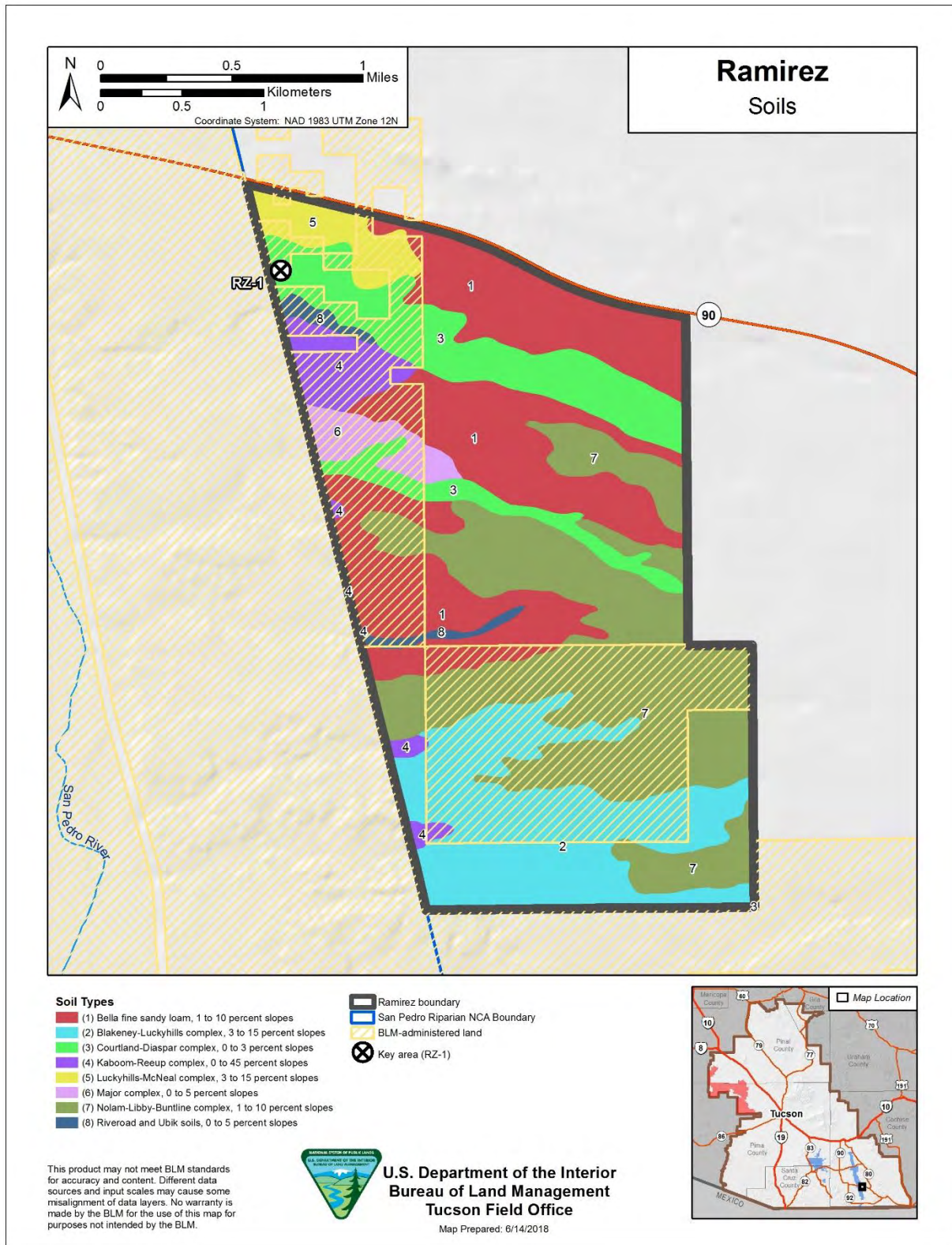
The dominant soil orders in this MLRA are Aridisols, Entisols, Alfisols, and Mollisols. The soils in the area dominantly have a thermic (warm) soil temperature regime, an aridic or ustic (dry) soil moisture regime, and mixed mineralogy and formed in alluvium. They vary from very shallow to very deep and are well drained to somewhat excessively drained. There are Ustic Torrifluvents (Ubik and Keysto series) that are formed on flood plains, Calcids (Blakeney series) that are formed on terrace deposits and Argids (Eloma and Forrest series) and Aridic Haplustalfs (Gardencan and Crowbar series) that are formed on fan terraces. Shallow and very shallow Haplustolls (Far and Yarbam series) exist on the allotment and are formed on hills and mountains.

The specific soils on the Ramirez allotment are shown in the table below. The dominant soils are Nolam-Libby-Buntline complex, 1 to 10 percent slopes and Bella fine sandy loam, 1 to 10 percent slopes. The acreages may not be accurate due to difficulty defining the area of interest in the web soil survey system.

Table 3. Soils on the Ramirez Allotment

Map Unit Name		Acres in Allotment	Percent of Allotment Acres
Bella fine sandy loam, 1 to 10 percent slopes		640.64	28.34
Blakeney-Luckyhills complex, 3 to 15 percent slopes		408.47	18.07
Courtland-Diaspar complex, 0 to 3 percent slopes		286.44	12.67
Kaboom-Reeup complex, 0 to 45 percent slopes		88.00	3.89
Luckyhills-McNeal complex, 3 to 15 percent slopes		74.01	3.27
Major complex, 0 to 5 percent slopes		54.30	2.40
Nolam-Libby-Buntline complex, 1 to 10 percent slopes		681.36	30.14
Riverroad and Ubik soils, 0 to 5 percent slopes		27.47	1.22
Totals for Allotment		2,260.70	100.0%

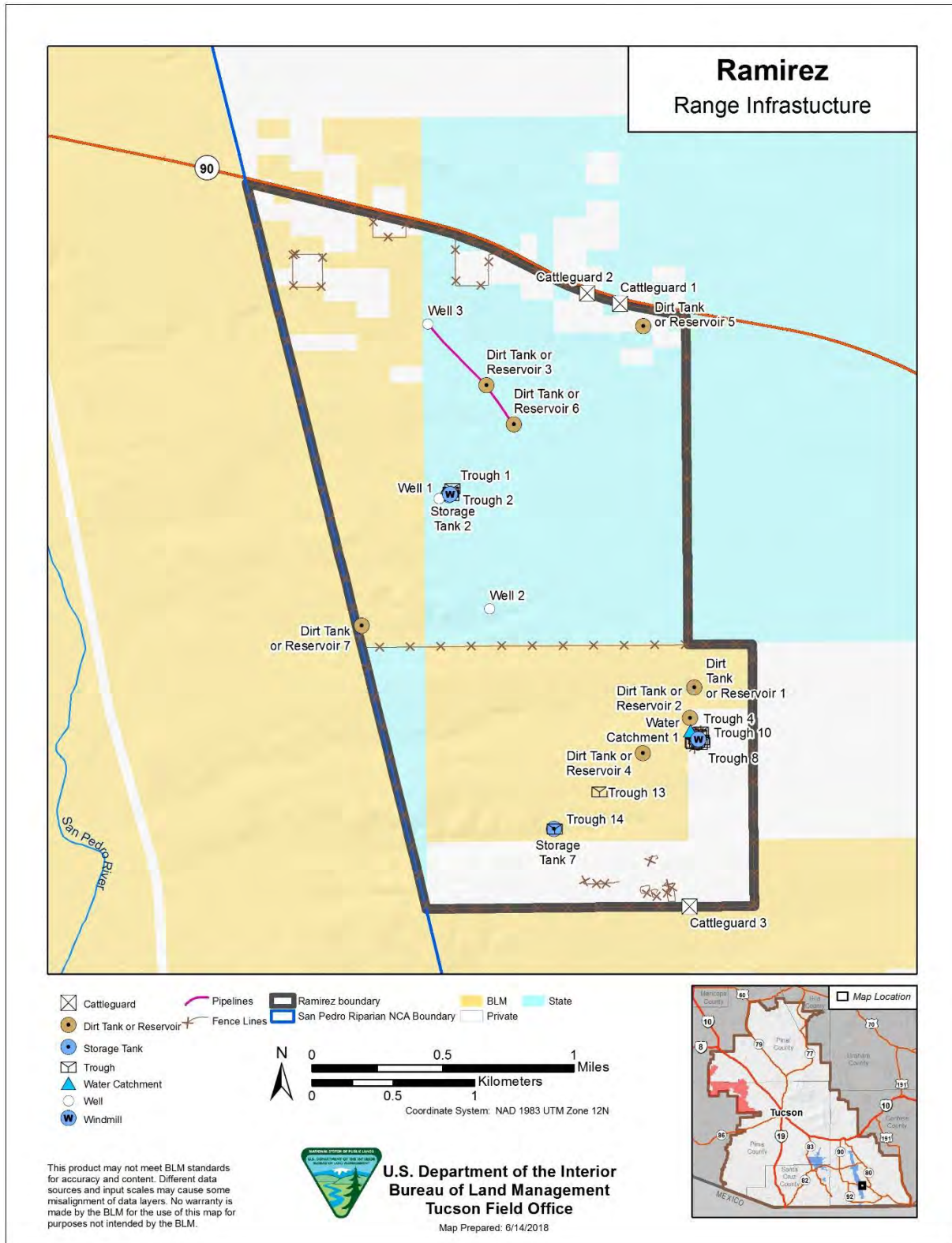
Figure 4. Map of Soil Types within the Ramirez Allotment



2.2.5 Range Improvements

After a review of the range improvement record for this allotment there are multiple watering locations with storage tanks as well as fencing within the allotment. Figure 5 is a map of the existing range improvements throughout the entire allotment. This mapping exercise was completed using areal imagery as well as verification from the lease holder.

Figure 5. Existing Range Improvements on the Ramirez Allotment



2.3 Biological Resources

2.3.1 Major Land Resource Areas

Major Land Resource Areas are geographically associated land resource units, usually encompassing several thousand acres. Natural Resource Conservation Service (NRCS) soil scientists in appropriate states wrote the descriptions of new MLRAs and MLRAs with changed boundaries. The National Soil Survey Center staff wrote the descriptions of MLRAs with no boundary changes since 1981. The information in the United States Department of Agriculture Handbook 296, issued 2006, is current as of October 2005. A unit may be one continuous area or several separate nearby areas. Major Land Resource Areas are characterized by particular patterns of soils, geology, climate, water resources, and land use. The Ramirez allotment is located in MLRA 41—Southeastern Arizona Basin and Range. It makes up about 15,730 square miles.

Most of this area is in the Mexican Highland Section of the Basin and Range Province of the Intermontane Plateaus. The eastern one-fifth of the area is in the Sonoran Desert Section of that same province and division. This MLRA has mountain ranges that trend southeast to northwest and has relatively smooth valleys between the mountains. Examples of the many mountain ranges are the Chiricahua, Dagoon, Swisshelm, and Pedregosa Mountains. In the vicinity of Willcox, there is a distinct closed basin called the Willcox Playa. The southeast boundary of the part of this MLRA in New Mexico is the Continental Divide. Elevation ranges from 2,620 to 4,590 feet in most areas. It generally ranges from 4,920 to 5,900 feet in the mountains. On some peaks, however, it can reach almost 8,900 feet. On Mt. Graham, in Arizona, it reaches 10,717 feet.

Most of this area is in the Sonoran Desert Section of the Basin and Range Province of the Intermontane Plateaus. Many short, fault-block mountain ranges trending southeast to northwest rise abruptly from the smooth or gently sloping desert valley floors. These include the Painted Rock, Gila Bend, Big Horn, Copper, Granite, and Santa Rosa Mountains. Elevation ranges from 980 to 3,600 feet (300 to 1,100 meters) in most of this area. The Gila River then flows west across the southern part of the MLRA to the Colorado River.

Major Land Resource Areas are broken down further into ecological sites, which are associated units of soil and vegetation with quantifiable characteristics.

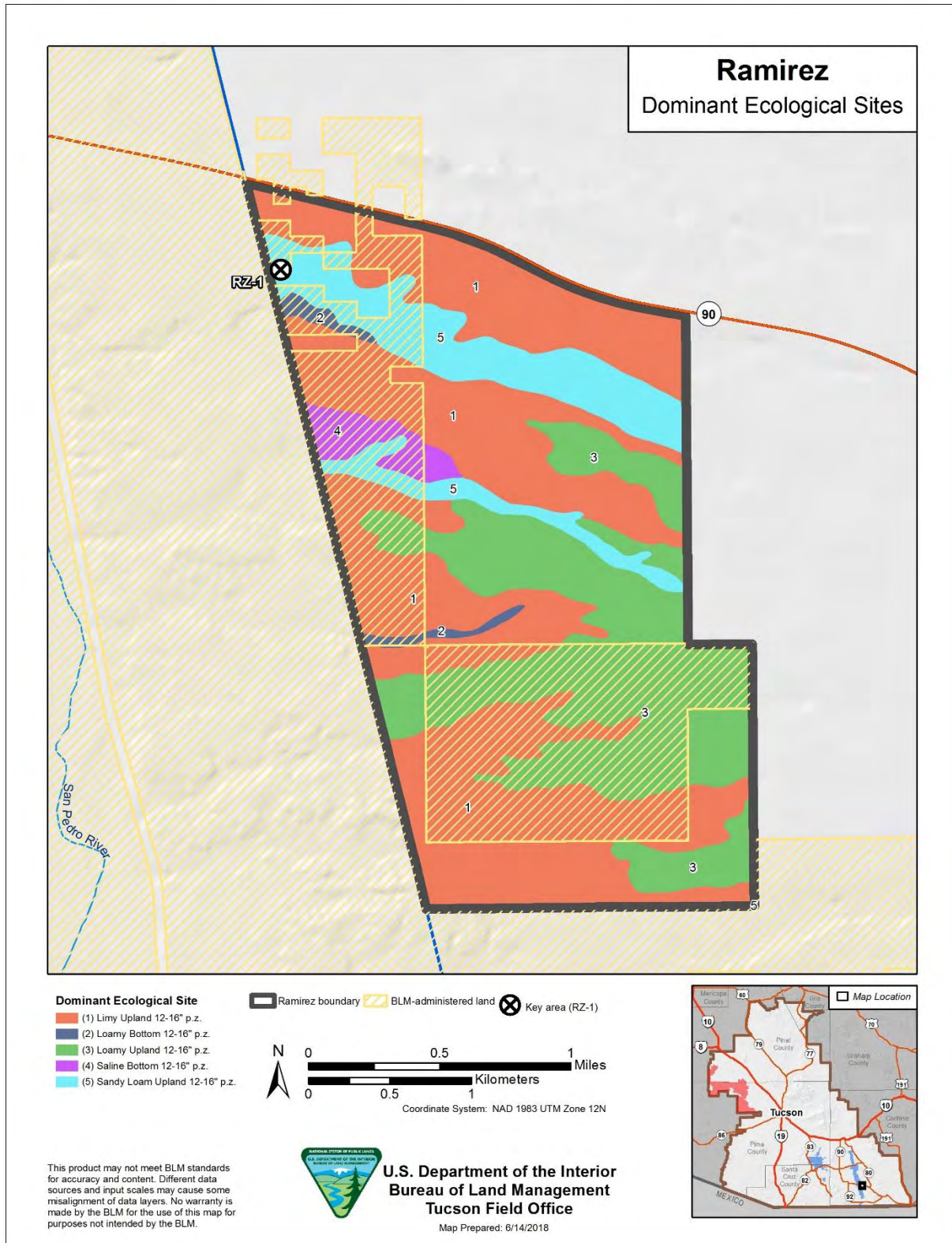
2.3.2 Ecological Sites including Soils and Vegetation Communities

An ecological site is a distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation. It is the product of all the environmental factors responsible for its development, and it has a set of key characteristics (soils, hydrology, and vegetation) that are included in the Ecological Site Description. Development of the soils, hydrology, and vegetation are all interrelated (TR 1734-07, Ecological Site Inventory). Ecological sites are named and classified based on soil parent material or soil texture and precipitation. Ecological sites provide a consistent framework for classifying and describing rangeland soils and vegetation thereby delineating land units that share similar capabilities to respond to management activities or disturbance. NRCS provides Ecological Site Descriptions online at <https://esis.sc.egov.usda.gov/>.

A total of 5 ecological sites exist within the entire Ramirez allotment. One key area, RZ-1, has been established on BLM public lands. Key areas RZ-1 is Sandy Loam Upland 12-16" precipitation zone ecological site, which is one of the primary ecological sites within the BLM lands in the allotment (Figure 6). The key area was chosen to be able to track perennial grass cover. Key Area RZ-1 was established by the BLM and University of Arizona Extension, and pace frequency data is collected in 2011, 2012 and

2016 to be able to track any changes in long-term trend of vegetation and ground cover. RZ-1 is also the location where the U.S. Forest Service Strike Team, referred to as TEAMS documented the 2014 LHE and collected line-point intercept data.

Figure 6. Ecological Sites within Ramirez Allotment



The ecological site for key area RZ-1 is Sandy Loam Upland 12-16" precipitation zone (R041XC1319AZ). Key vegetative species for this site include: bastardsgae (*erigonum wrightii*), fairyduster (*calliandra eriophylla*), black grama (*bouteloua eriopoda*) and sideoats grama (*bouteloua curtipendula*).

This site occurs in the middle elevations of the Madrean Basin and Range province in southeastern Arizona. It occurs on fan terraces and old stream terraces. It is always in an upland position.

The Historical Climax Plant Community represents the natural potential for plant communities found on relict or relatively undisturbed sites. Other plant communities described here represent plant communities that are known to occur when the site is disturbed by factors such as fire, grazing, or drought.

The potential plant community on this site is dominated by warm season perennial grasses. All the major perennial grass species on the site tend to be well dispersed throughout the plant community. Perennial forbs and shrubs are minor on the site. The aspect is open grassland.

With continuous heavy grazing, palatable perennial grasses are removed from the plant community and species like Rothrock grama and threeawns will increase. With severe deterioration, shrubby species will increase or invade and dominate the plant community. This is the most productive upland site in the CRA. Natural fire was important in the development of the potential plant community. Stable areas of this site can produce effective herbaceous covers with up to 10% canopy cover of mesquite. In areas where half-shrubs dominate the under-story, the potential production of perennial grasses is equal to present production of half-shrubs once they are removed by fire or another type of brush management.

Table 4 below lists the vegetation communities within the Ramirez allotment. There are two vegetation types that make up 85 percent of the total acreage. Those majority communities are;

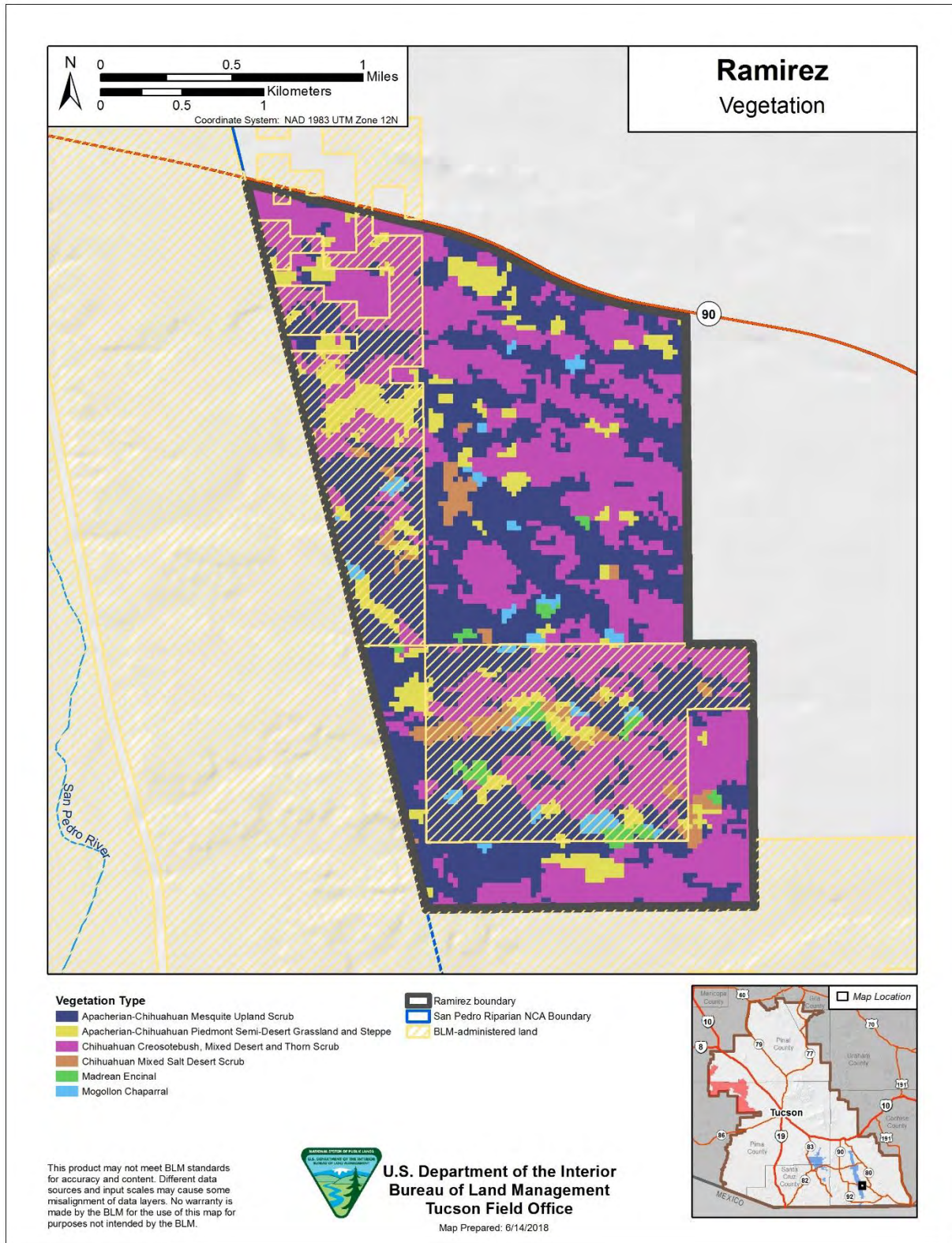
1. This widespread Chihuahuan Desert land cover type is composed of two ecological systems the Chihuahuan Creosotebush Xeric Basin Desert Scrub (CES302.731) and the Chihuahuan Mixed Desert and Thorn Scrub (CES302.734). This cover type includes xeric creosotebush basins and plains and the mixed desert scrub in the foothill transition zone above, sometimes extending up to the lower montane woodlands. Vegetation is characterized by *Larrea tridentata* alone or mixed with thornscrub and other desert scrub such as *Agave lechuguilla*, *Aloysia wrightii*, *Fouquieria splendens*, *Dasyliion leiophyllum*, *Flourensia cernua*, *Leucophyllum minus*, *Mimosa aculeaticarpa* var. *biuncifera*, *Mortonia scabrella* (= *Mortonia sempervirens* ssp. *scabrella*), *Opuntia engelmannii*, *Parthenium incanum*, *Prosopis glandulosa*, and *Tiquilia greggii*. Stands of *Acacia constricta* *Acacia neovernicosa* or *Acacia greggii* dominated thornscrub are included in this system, and limestone substrates appear important for at least these species. Grasses such as *Dasyochloa pulchella*, *Bouteloua curtipendula*, *Bouteloua eriopoda*, *Bouteloua ramosa*, *Muhlenbergia porteri* and *Pleuraphis mutica* may be common, but generally have lower cover than shrubs. (<http://swregap.nmsu.edu>)
2. APACHERIAN-CHIHUAHUAN MESQUITE UPLAND SCRUB – This ecological system is located from foothills and piedmont in the Chihuahuan Desert, extending into the Sky Island region (southeastern Arizona and southwestern New Mexico) to the west, and the Edwards Plateau to the east. It occurs as upland shrublands concentrated in the extensive grassland shrubland transition in foothills and piedmont in the Chihuahuan Desert. It extends into the Sky Island region to the west, and the Edwards Plateau to the east. Substrates are typically derived from alluvium without a well-developed argillic or calcic soil horizon that would limit infiltration and storage of winter precipitation in deeper soil layers. *Prosopis* spp. and other deep-rooted shrubs exploit this deep soil moisture that is unavailable to grasses and cacti. Vegetation is typically dominated by *Prosopis glandulosa* or *Prosopis velutina* and succulents. Other desert scrub that may

codominate or dominate includes *Acacia neovernicosa*, *Acacia constricta*, *Juniperus monosperma*, or *Juniperus coahuilensis*. Grass cover is typically low. During the last century, the area occupied by this system has increased through conversion of desert grasslands as a result of drought, overgrazing by livestock, and/or decreases in fire frequency. It is similar to Chihuahuan Mixed Desert and Thorn Scrub, but is generally found at higher elevations where *Larrea tridentata* is not codominant. It is also similar to Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub, but does not occur on eolian-deposited substrates. (<http://swregap.nmsu.edu>)

Table 4. Vegetation Communities Found Within the Ramirez Allotment

Vegetation Type	Acres on Allotment	Percent of Acres
Apacherian-Chihuahuan Mesquite Upland Scrub	984.13	43.53
Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	190.46	8.42
Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	958.00	42.38
Chihuahuan Mixed Salt Desert Scrub	59.89	2.65
Madrean Encinal	28.73	1.27
Mogollon Chaparral	39.48	1.75
TOTAL	2,260.70	

Figure 7. Vegetation Communities within Ramirez Allotment



2.3.3 Wildlife Resources

General Wildlife

Wildlife species composition expected to occur on this allotment is characteristic of the Madrean Basin and Range province in Southeastern Arizona. Common species would include: mule deer, white-tailed deer, mountain lion, coyote, bobcat, raccoon, skunk, white-throated woodrat, white-footed mouse, gopher snake, king snake, western diamondback rattlesnake, prairie rattlesnake, coachwhip, patch-nosed snake, western whiptail lizard, side-blotched lizard, tree lizard, canyon tree frog, red-tailed hawk, Cooper's hawk, golden eagle, prairie falcon, raven, turkey vulture, meadowlark, ladder-back woodpecker, ash-throated flycatcher, canyon wren, and rough-winged swallow.

Livestock impact wildlife in a variety of ways, by their presence, through behavioral disturbance, and through competition for forage. Behavioral impacts resulting from inter-specific encounters (including human and livestock) are difficult to quantify, as they vary by species and by type of interaction. Wildlife currently present on the allotments have, to varying degrees, acclimated to the presence of livestock and associated human disturbances. Impacts to wildlife and habitat components include, but are not limited to: cover and forage removal, soil disturbance and erosion, reduction of fine fuels available to carry fire (altered fire regime), addition of artificial water and mineral sources; habitat fragmentation, changes in overland and channel flow regimes, and long-term vegetative community conversion.

The Ramirez allotment, which includes public, private, and state lands offers diverse habitats for migratory birds, providing valuable food, water, and cover. Migratory species that utilize the area include but are not limited to: Red-tailed hawk, Cooper's hawk, bald eagle, golden eagle, American peregrine falcon, raven, turkey vulture, meadowlark, ladder-back woodpecker, ash-throated flycatcher, canyon wren, and rough-winged swallow. No surveys have been conducted specifically within this allotment for this project to determine presence but these species have the potential of occurring within the vegetation communities located on this allotment (Figure 7). Current livestock presence and management dictates habitat condition relative to the stable state vegetative community that has developed on each site as a result of the long term grazing impacts. Overall, this Allotment provides adequate habitat for wildlife species.

Special Status Species

An Arizona Game and Fish Department Heritage Data Management System (HDMS) and Project Evaluation Program (PEP) analysis was conducted for the allotment area (Project ID: HGIS- 9552). Through that analysis, it was determined that 55 species with special status (Appendix A, includes effects determinations and rational) could occur within a 5 mile radius of the allotment. Of those species, 8 could potentially be impacted by the proposed action, however, forage and cover availability, for these species within the allotment is sufficient based on LHE standards being met, so impacts to plants and animal species are considered discountable.

2.4 Special Management Areas

There are no special management areas within the Ramirez Allotment.

2.5 Recreation Resources

There are no developed recreation sites within the allotment. Dispersed recreation primarily involves small and big game hunting, target shooting, hiking, and off-highway vehicle operation.

2.6 Cultural Resources

The BLM's evaluation of rangeland health standards includes considerations for the protection of cultural resources—such as prehistoric and historic-age sites, buildings, and structures—and plants that may be of traditional cultural significance to Native Americans. Should the BLM identify impacts to sites or traditional-use plants, revised lease terms and conditions may be warranted and/or rangeland management directives could be modified to achieve desired resource conditions. The following sections describe the BLM's assessment efforts regarding applicable heritage resources management and compliance criteria.

The BLM's authorization of grazing leases is considered an undertaking subject to compliance with Section 106 of the National Historic Preservation Act (NHPA; 54 U.S.C. 306108 et seq.) and its implementing regulations found at 36 C.F.R. 800, wherein the BLM has the legal responsibility to consider the effects of its actions on *historic properties*. BLM Manual 8100 Series and the Arizona BLM Protocol (the Statewide Protocol) provide applicable Section 106 compliance procedures to meet appropriate cultural resources management standards. Additionally, cultural resources evaluations for proposed grazing permits and leases generally follow the procedures and guidance provided in BLM Instructional Memoranda.

Section 106 of the NHPA requires federal agencies to 1) identify historic properties within Areas of Potential Effects (APEs) for a federal undertaking; 2) evaluate the significance of cultural resources by determining National Register of Historic Places (NRHP) eligibility; and 3) consult with applicable federal, state, and tribal entities regarding assessment results, NRHP eligibility determinations, and proposed methods to avoid or mitigate potential impacts to historic properties. In Arizona, the BLM's NHPA responsibilities are carried out in accordance with the Statewide Protocol—a Programmatic Agreement among the BLM and the Arizona State Historic Preservation Officer (SHPO; agreement executed December 14, 2014). Should the BLM determine that a routine undertaking would result in *no historic properties affected* or *no adverse effect*, as advised by a qualified cultural resources specialist, the undertaking may proceed under the terms and conditions of the Statewide Protocol. If the undertaking is determined to have an *adverse effect*, or otherwise meets stipulated consultation thresholds, project-specific consultation is then initiated with the SHPO.

A small number of controlled studies that examine potential grazing impacts on historic properties have been performed (e.g., Osborn and Hartley 1991, Osborn et al. 1987, Roney 1977, and Van Vuren 1982). For example, Alan Osborn and his colleagues (c.f., Osborn et al. 1987; Osborn and Hartley 1991) examined the effects of domestic livestock grazing on the archaeological resources of Capitol Reef National Park in southern Utah. The study included reconnaissance and observations at recorded sites, and the creation of experimental and control plots containing several types of newly manufactured lithic and ceramic artifacts that were measured, weighed, placed, and mapped. Several study plots were located close to water sources. The study plots and artifacts were reexamined after 6 months of grazing use. Osborn found that 93 percent of the artifacts remained intact, and 84 percent remained visible. Pottery fragments were more prone to breakage. Mapping revealed that 23 percent of artifacts were displaced, but that 75 percent of the displaced artifacts had moved fewer than 15 centimeters. (Osborn et al. 1987)

The results varied by study plot location with the greatest impacts recorded near water sources, where higher concentrations of livestock use occurred. Osborn and Hartley (1991) concluded that “the degree of effect is a direct reflection of grazing intensity and dependence on limited water sources in this cold desert environment.” This conclusion is also reflected in a study that examined lithic artifact breakage in areas of variable livestock use along the Central Arizona Project aqueduct in the western Arizona desert (Brown and Stone 1982) where collections of lithic artifacts from six archaeological sites were found to exhibit breakage rates between 13 and 17 percent. In comparison, 52 percent of the artifacts from a seventh site located near a cattle-accessed reservoir were found broken. In sum, these studies have demonstrated that grazing impacts to cultural resources are primarily of concern in areas of concentrated livestock use such as around water sources and corrals.

Direct impacts to historic properties where livestock concentrate may include trampling, chiseling, and churning of site soils, cultural features and artifacts, artifact breakage, and impacts from standing, leaning, or rubbing against historic structures and other above-ground cultural features such as rock art (Broadhead 2001; Osborn et al. 1987). Indirect impacts from livestock concentrations may include accelerated soil erosion and gullying, in addition to increased potential for unlawful artifact collection and/or vandalism of cultural resources. Other indirect impacts may include degradation of the historic setting, thereby detracting from the view-shed and historic feeling of nearby cultural resource sites. However, cultural resources are constantly subject to site formation processes or events after creation (Binford 1981; Schiffer 1987). These processes can be both cultural and natural, and may occur instantly or over thousands of years. Cultural formation processes include activities directly or indirectly caused by humans. Natural processes include chemical, physical, and biological processes of the natural environment that impinge upon and/or modify cultural materials. Determining the cause of impacts to historic properties may be difficult, in some cases, because activities such as camping and off-highway vehicle use may also result in the same kinds of effects as described above.

A BLM cultural resources specialist completed a comprehensive Class 1 (existing information) assessment of the Ramirez grazing allotment on August 12, 2019. Data reviewed were obtained from BLM cultural program project files, site reports, and atlases, in addition to BLM-maintained General Land Office (GLO) plats and patent records. Electronic files also were reviewed using online cultural resource databases including *AZSite* (2019), Arizona's statewide cultural resource inventory system, and the *National Register of Historic Places Focus Database & NPGallery Digital Asset Search* (2019). Archival information was compared with livestock grazing and range improvement data to determine the potential for resource conflicts, particularly in livestock concentration areas such as around water sources, at chutes/corrals, and near supplemental feeding locations. The results of archival research are summarized as follows; data provided are applicable to BLM-administered lands within the subject allotment (i.e., the jurisdictional APE) and based on currently available information from the aforementioned sources.

Background research identified three prior cultural resources investigations that, collectively, have inventoried approximately 380 acres of BLM-managed land (c.f., Kayser n.d. and Harmon 1996), and documented one cultural resource site: the historic Arizona and Southern Railroad, Bisbee to Fairbank Spur (AZ EE:3:73[ASM]). Historic-age GLO plat maps also were reviewed that depict a network of unnamed roads, an abandoned railroad grade, and supplemental resurveys of the State Route 90 corridor (plat nos. 2501, 2500-B, and 2500-C; dated 1920, 1962, and 1963, respectively).

Statement of Effect Determination

None off the six livestock concentration areas on the BLM-administered portion of the allotment have been subject to cultural resources inventory. However, as a routine undertaking with no currently identified impacts to historic properties within the BLM-administered portion of the allotment, lease issuance for continued livestock use of the Ramirez allotment is appropriate under a finding of *no adverse effect* provided that the six identified concentrations areas are subject to inspection prior to lease issuance. The following, standard Conditions of Approval (COAs) also would apply. Any subsequent cultural resources inventory should focus on identified areas of livestock concentration within the BLM-administered portion of the allotment, as appropriate. Newly proposed range improvements would be subject to individual project review and assessment for Section 106 compliance in accordance with the Statewide Protocol. If, as a result of any new assessment or monitoring, historic properties are identified and found to exhibit potential for or actively occurring grazing impacts, mitigation measures would be developed in coordination with the SHPO and any other applicable consulting parties.

Cultural Resources Stipulations / Standard Conditions of Approval (COAs)

The operator is responsible for informing all persons who are associated with the allotment operations that they will be subject to prosecution for knowingly disturbing historic or archaeological sites, or for collecting artifacts. Any cultural (historic/prehistoric site or object) or paleontological resource (fossil remains of plants or animals) discovered

during operations shall be immediately reported to the Authorized Officer (AO) or his/her designee. All operations in the immediate area of the discovery shall be suspended until written authorization to proceed is issued. An evaluation of the discovery shall be made by a qualified archaeologist or paleontologist to determine appropriate actions to prevent the loss of significant cultural or scientifically important values.

If in connection with this work any human remains, funerary objects, sacred objects or objects of cultural patrimony as defined in the Native American Graves Protection and Repatriation Act (P.L. 101-601; 104 Stat. 3048; 25 U.S.C. 3001) are discovered, operations in the immediate area of the discovery shall cease, the remains and objects shall be protected, and the operator shall immediately notify the BLM Tucson Field Manager. The immediate area of the discovery shall be protected until notified by the BLM Tucson Field Manager that operations may resume.

2.6.1 Native American Concerns

Native American religious concerns are legislatively considered under several acts and Executive Orders including the American Indian Religious Freedom Act (AIRFA; 42 U.S.C. 1996), the Native American Graves Protection and Repatriation Act (NAGPRA; 25 U.S.C. 3001), and Executive Order 13007 (Indian Sacred Sites). In sum, and in concert with other provisions such as those found in the NHPA and Archaeological Resources Protection Act (ARPA; 16 U.S.C. 470aa-470mm), these acts and orders require the federal government to carefully and proactively consider the traditional and religious values of Native American culture and lifeways to ensure, to the greatest degree possible, that access to sacred sites, treatment of human remains, the possession of sacred items, conduct of traditional religious practices, and the preservation of important cultural properties are not unduly infringed upon. In some cases, these concerns are directly related to *historic properties* and/or archaeological resources, such as those considered under Section 106 of the NHPA. Likewise, elements of the landscape without archaeological or human material remains also may be involved.

The BLM initiated government-to-government consultation with nine Native American tribes who claim cultural affiliation to and/or traditional use of the area—as determined through the online *Arizona Government-to-Government Consultation Toolkit*—by sending letters summarizing the results of the Class 1 cultural resources assessment and rangeland monitoring data for the Ramirez allotment. Tribes consulted include the Fort McDowell Yavapai Nation, Fort Sill Apache Tribe, Hopi Tribe, Mescalero Apache Tribe, Pascua Yaqui Tribe, Pueblo of Zuni, Tohono O’odham Nation, San Carlos Apache Tribe, and White Mountain Apache Tribe. Identified plant species with potential cultural significance include Alkali Sacaton (*Sporobolus airoides*) and Velvet mesquite (*Prosopis velutina*; USDA-NRCS 2019).

Currently, there are no known adverse impacts to any culturally significant plants, items, sites, or landscapes. Additionally, because lease issuance does not include authorization for new construction, ground disturbance, or the direct sale/exchange of federally managed lands, the undertaking will not prevent access to any known sacred sites, prevent the possession of sacred objects, or otherwise interfere with the performance of traditional ceremonies and/or rituals.

If new information is provided by consulting tribes, additional or edited terms and conditions of land-use and/or mitigation may be required to protect or restore resource values. Future assessment and/or consultations would occur during the BLM’s review of any additional proposed actions within the subject allotment such as range improvement projects. Should the BLM identify adverse impacts, additional consultations regarding potentially significant sites and possible protection or mitigation strategies would be warranted.

3 GRAZING MANAGEMENT

This section discusses the grazing history, permitted use, and terms and conditions on the current lease for the Ramirez allotment.

3.1 Grazing History

Historic and recent grazing use has been by cattle on the Ramirez allotment. The BLM lands within the allotment comprise approximately 34 percent of the total livestock operation. There are 3 head of cattle run on the BLM lease. Between it and the other leased and private lands, there is a yearlong grazing system. The 36 Animal Unit Months (AUMs) under the BLM grazing lease are included in the total head of cattle on the private land and State lease, and are managed together on the entire allotment.

The management category given to the Ramirez allotment is maintain (M). The management category given to the allotment is maintain (M). By definition, M category allotments have no serious resource conflicts and range condition and present management is satisfactory. Under this management BLM management actions are limited to licensing livestock use based on the AUMs available on the public lands, and the individual ranch operator determines the grazing system (if any) to be used. BLM checks these grazing units to insure that the utilization on public lands is not excessive, that range condition and trend are being maintained, and that applicable regulations are being followed. If utilization is found to be excessive or the range trend to be down, BLM will work with the operator to adjust livestock numbers on the total grazing unit.

The allotment is 2,260 total acres, of which 903 acres is administered by the BLM. There is currently one lease issued for 36 Animal Unit Months (AUMs) on the BLM public lands for the Ramirez allotment. Public land percentage is 40%. An AUM is the amount of forage required by one animal unit for a period of 30 days or one month. Within the allotment, yearlong grazing from March 1 to February 28 is allowed under the terms and conditions of the lease. The BLM lands associated with this allotment are used in conjunction with the private and state in a rotational grazing system. The BLM land, however, is not fenced off completely. An Animal Unit (AU) is considered to be one mature cow of about 1,000 pounds either with or without a calf up to six months of age or one bull, consuming about 30 pounds of forage per day. AUMs totals for the Ramirez allotment leases are in Table 6.

Table 6. Ramirez Lease and AUMs

Ownership	Animal Unit Months (AUMs)	Animal Units (AU)	Percent Public Land
BLM – Ramirez #5268	36 AUMs	3 AU Yearlong	100

3.2 Mandatory Terms and Conditions for Permitted Use

Grazing use on the Ramirez Allotment is in accordance with the terms and conditions of the current lease issued for 36 AUMs on public lands. The Mandatory Terms and Conditions of the lease are listed below:

Table 7. Mandatory Terms and Conditions of the Lease

Total Livestock on the BLM acres of the Allotment	Livestock Kind	Grazing Period of Use	Percent Public Land*	Type Use	AUMs on Public Land
3	Cattle	3/1 to 2/28	100	Active	36

* Percent Public Land is used for calculating AUMs on the BLM acreage. This is not stating the percent of public land within the total allotment.

Existing Other Terms and Conditions

1. In order to improve livestock distribution on the public lands, all salt blocks and /or mineral supplements will not be placed within a ¼ mile of any riparian area, wetland meadow, or watering facility (either permanent or temporary) unless stipulated through a written agreement or decision in accordance with 43 CFR 4130.3-2(c).
2. If in connection with operations under this authorization, any human remains, funerary objects, sacred objects of cultural patrimony as defined in the Native American Graves Protection and Repatriation Act (P/L/ 101-601; 104 Stat. 3048; 25 U.S.C. 3001) are discovered, the permittee/lessee shall stop operations in the immediate area of the discovery, protect the remains and objects, and immediately notify the Authorized Officer of the discovery. The permittee/lessee shall continue to protect the immediate area of the discovery until notified by the Program Manager that operations may resume.
3. In accordance with 43 CFR 4130.8-1(F): Failure to pay grazing bills within 15 days of the due date specified in the bill shall result in a late fee assessment of \$25.00 or 10 percent of the grazing bill, whichever is greater, but not to exceed \$250.00. Payment made later than 15 days after the due date, shall include the appropriate late fee assessment. Failure to make payment within 30 days may be a violation of 43 CFR Secs. 4150.1 and 4160.1-2.

4 OBJECTIVES

This section provides an overview of the Tucson Field Office management objectives that are associated with the Ramirez Allotment per the Safford Resource Management Plan (RMP) (BLM, 1991), as amended by the decision record for Arizona Standards and Guidelines and incorporates the Gila District Livestock Grazing Program Biological Opinion, 2012. The Safford RMP incorporates by reference the decisions from the Eastern Arizona Grazing Final Environmental Impact Statement (FEIS) Record of Decision (1987).

Eastern Arizona Grazing Environmental Impact Statement (1987)

Safford District Resource Management Plan (1991)

Gila District Livestock Grazing Program Biological Opinion (2012)

4.1 Land Use Plan Management Objectives

- BLM's authority for management of upland vegetation (vegetation outside riparian zones) comes from the Endangered Species Act (1973), Taylor Grazing Act (1934), Public Rangelands Improvement Act (1978) and The Federal Land Policy and Management Act /1976). These laws require BLM to manage vegetation for its use while maintaining sufficient ground cover to maintain and enhance watershed condition and reduce non-point source pollution from rangeland management and use activities. Best management practices would be selected from available grazing management systems, livestock management practices and BLM standards for range improvements to ensure ground cover and reduce non-point pollution (to Arizona's waters sediment production and fecal contamination) resulting from grazing activities. Safford RMP page 24
- Livestock grazing is managed through allotment management plans, most of which were developed from decisions resulting from the Upper Gila-San Simon Grazing Environmental Impact Statement (BLM 1978) and the Eastern Arizona Grazing Environmental Impact Statement (BLM 1986). These plans were written for a specific unit of rangeland (allotment) based on multiple-use resource management objectives established through existing land use plans and activity level plans by resource specialists and permit-tees. An Allotment Management Plan

establishes objectives, seasons of use, grazing system, numbers of livestock permitted on the range, range improvements, monitoring plans and evaluation procedures for the allotment.
Safford RMP page 137

4.2 Allotment Specific Objectives

The Ramirez Allotment is subject to the following objectives as established in the Arizona Standards for Rangeland Health.

4.2.1 Land Health Standards

Standard 1: Upland Sites

“Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate and landform (ecological site).”

Criteria for meeting Standard 1:

Soil conditions support proper functioning of hydrologic, energy, and nutrient cycles. Many factors interact to maintain stable soils and healthy soil conditions including appropriate amounts of vegetative cover, litter, soil porosity, and organic matter. Under proper functioning conditions, rates of soil loss and infiltration are consistent with the potential of the site.

Ground cover in the form of plants, litter or rock is present in pattern, kind, and amount sufficient to prevent accelerated erosion for the ecological site; or ground cover is increasing as determined by monitoring over an established period of time.

Signs of accelerated erosion are minimal or diminishing for the ecological site as determined by monitoring over an established period of time.

Standard 2: Riparian-Wetland Sites

“Riparian-wetland areas are in proper functioning condition.”

Standard 2 is **not applicable** because no riparian-wetland sites exist within the Ramirez allotment.

Standard 3: Desired Resource Conditions

“Productive and diverse upland and riparian-wetland plant communities of native species exist and are maintained.”

Criteria for meeting Standard 3:

Upland and riparian-wetland plant communities meet desired plant community objectives. Plant community objectives are determined with consideration for all multiple uses. Objectives also address native species, and the requirements of the Taylor Grazing Act, Federal Land Policy and Management Act, Endangered Species Act, Clean Water Act, and appropriate laws, regulations, and policies.

Desired plant community objectives will be developed to assure that soil conditions and ecosystem function described in Standards 1 and 2 are met. They detail a site-specific plant community, which when obtained, will assure rangeland health, State water quality standards, and habitat for endangered, threatened, and sensitive species. Thus, desired plant community objectives will be used as an indicator of ecosystem function and rangeland health.

Desired Plant Community Objective

As part of the land health evaluation process, Desired Plant Community (DPC) objectives were established for important biological resources. DPC objectives address the desired resource conditions based on vegetation attributes, such as composition, structure, and cover that are desired within the Allotment. These include establishing vegetative characteristics necessary for soil protection, and providing forage and habitat for both livestock and wildlife. The NRCS’s Ecological Site Descriptions were used to help develop DPC’s for the sites.

Desired Plant Community Objective

As part of the land health evaluation process, Desired Plant Community (DPC) objectives were established for important biological resources. DPC objectives address the desired resource conditions based on vegetation attributes, such as composition, structure, and cover that are desired within the Allotment. These include establishing vegetative characteristics necessary for soil protection, and providing forage and habitat for both livestock and wildlife. The NRCS’s Ecological Site Descriptions were used to help develop DPC’s for the sites.

4.2.2 Key Area Objectives

In grazing administration, a key area is defined as a relatively small portion of a range selected because of its location, use, or grazing value as a monitoring point for grazing use. Key areas are indicator areas that are able to reflect what is happening on a larger area as a result of on-the-ground management actions. A key area should be a representative sample of a large stratum, such as a pasture, grazing allotment, wildlife habitat area, herd management area, watershed area, etc. Objectives should be developed so that they are specific to the key area. Monitoring studies can then be designed to determine if these objectives are being met (USDI, 1996).

Key area RZ-1 is within Sandy Loam Upland 12-16” precipitation zone (p.z) ecological site, which is the primary ecological site within the BLM lands in the allotment (Figure 6 above). Key Area RZ-1 was established by TEAMS and documented the 2014 LHE and collected line-point intercept data. The BLM and University of Arizona Extension collected pace frequency data to collect and to track any changes in long-term trend of vegetation and ground cover in 2011, 2013 and 2017.

Refer to Table 8 and Figure 6 for the location of the key area on the Ramirez Allotment. Addressed in this LHE report are the results from the key area monitored by the U.S. Forest Service (USFS) TEAMS in 2014 (Appendix B).

Table 8. Location of the Albert Thomas Allotment Key Area

Key Area	Ecological Site	Ecological Site ID	GPS Coordinates (NAD83 CONUS)
RZ-1	Sandy Loam Upland 12-16	R041XC1319AZ	12 R 0584059 UTM 3490490

The key area objective for the Ramirez Allotment is to meet the land health standards as established in the Arizona Standards for Rangeland Health. Specific objectives are defined below to guide the determination of whether the land health standards are being met.

Key Area RZ-1 Desired Plant Community Objectives for Sandy Loam 12-16” precipitation zone ecological site

- Maintain native perennial grass canopy of $\geq 10\%$
- Mesquite canopy $< 15\%$

Rationale: Maintaining a perennial grass canopy cover of more than 10 percent on this site moves the state to native mid-grassland drought interaction HCPC. Also under the mesquite, annuals state mesquite are to be reduced to 10-15% canopy cover. Both are within the Sandy Loam Upland 12-16" state and transition model.

5 RANGELAND INVENTORY AND MONITORING METHODOLOGY

The Arizona standards for rangeland health were assessed for the Ramirez Allotment by a U.S. Forest Service Interdisciplinary (ID) team on January 12, 2014. The ID team consisted of a rangeland management specialist and a wildlife biologist. Documents and publications used in the assessment process include the Web Soil Survey of Arizona (NRCS, 2015), Ecological Site Descriptions for Major Land Resource 40 (NRCS, 2007), Interpreting Indicators of Rangeland Health Technical Reference 1734-6 (USDI-BLM et al., 2005), Sampling Vegetation Attributes Technical Reference 1734-4 (USDI-BLM et al., 1996), and the National Range and Allotment Handbook (USDA-NRCS, 2003). A complete list of references is included at the end of this document. All are available for public review in the BLM Tucson Field Office. The ID team used rangeland monitoring data and professional observations to assess conformance with the Arizona standards for rangeland health.

5.1 Monitoring Protocols

Monitoring occurred on the Ramirez Allotment at key area RZ-1. Quantitative measurements for cover and species composition were collected along each transect and were analyzed in conjunction with qualitative indicators of soil quality, hydrologic function, and biological health. This was completed to assess the existing conditions within the ecological site Sandy Loam Uplands 12-16" p.z. The existing conditions were compared to site specific reference conditions established by the NRCS, which are considered to be representative of relatively undisturbed states within a given soil-plant community type. This comparison between existing and reference conditions determines the level of departure from the potential natural community.

The key area was recorded using a global positioning system (GPS) using a projection of North American Datum (NAD) 83. Inventory and monitoring data are provided in Appendix B.

Line Point Intercept

The method used to obtain transect data pertaining to species composition and soil cover is line point intercept (LPI). This method consists of a horizontal, linear measurement of plant intercepts along the course of a line (tape) 100 feet in length. LPI is a rapid and accurate method for measuring occurrence of grass or grass-like plants, forbs, shrubs, and trees in which vegetation composition is extrapolated. It also quantifies soil cover, including vegetation, litter, rocks, and biotic crusts. These measurements are indicators of wind and water erosion, water infiltration, and the ability of the site to resist and recover from degradation.

5.1.1 Indicators of Rangeland Health

The five steps for a rangeland health assessment (RHA) are protocols for evaluating the three rangeland health attributes (soil and site stability, hydrologic function, and biotic integrity), as outlined in Technical Reference 1734-6. They are:

Step 1. Identify the Key Area; Determine the Soil and Ecological Site

Step 2. Obtain or Develop the Reference Sheet and the Corresponding Evaluation Matrix

Step 3. Collect Supplementary Information

Step 4. Rate the 17 Indicators on the Evaluation Sheet

Step 5. Determine the Functional Status of the Three Rangeland Health Attributes:

1. Soil and site stability (S) – The capacity of an area to limit redistribution and loss of soil resources (including nutrients and organic matter) by wind and water.
2. Hydrologic function (H) – The capacity of an area to capture, store, and safely release water from rainfall, run-on and snowmelt (when relevant), to resist a reduction in this capacity, and to recover this capacity when a reduction does occur.
3. Biotic integrity (B) – The capacity of the biotic community to support ecological processes within the normal range of variability expected for the site, to resist a loss in the capacity to support these processes, and to recover this capacity when losses do occur. The biotic community include plants, animals, and microorganisms occurring both above and below ground.

The RHA provides information on the functioning of ecological processes (water cycle, energy flow, and nutrient cycle) relative to the reference state for the ecological site or other functionally similar unit for that land area. This assessment provides information that is not available with other methods of evaluation. It gives an indication of the status of the three rangeland attributes chosen to represent the health of the “key area” (i.e., the area where the evaluation of the rangeland health attributes occurs). The following are the 17 indicators that are evaluated during a RHA assessment and the attribute(s) they measure:

1. Rills: S, H
2. Water Flow Patterns: S, H
3. Pedestals and/or Terracettes: S, H
4. Bare Ground: S, H
5. Gullies: S, H
6. Wind-Scoured, Blowout, and/or Depositional Areas: S
7. Litter Movement: S
8. Soil Surface Resistance to Erosion: S, H, B
9. Soil Surface Loss or Degradation: S, H, B

10. Plant Community Composition and Distribution Relative to Infiltration and Run off: H
11. Compaction Layer: S, H, B
12. Functional/Structural Groups: B
13. Plant Mortality/Decadence: B
14. Litter Amount: H, B
15. Annual Production: B
16. Invasive Plants: B
17. Reproductive Capability of Perennial Plants: B

Attribute ratings reflect the degree of departure from expected levels for each indicator per the reference sheet. The degree of departure may be categorized (rated) as:

- None to Slight
- Slight to Moderate
- Moderate
- Moderate to Extreme
- Extreme to Total

6 MANAGEMENT EVALUATION AND SUMMARY OF STUDIES DATA

6.1 Actual Use

Actual use information will be submitted within 15 days of the end of the grazing year in accordance with 43 CFR 4130.3-2(d). Actual use reports will identify the amount of livestock use and period of use for each water source/pasture. According to billed use the lease has paid full use since 1994. Livestock grazing for the Ramirez Allotment is permitted as a Section 15 grazing lease. Allowable AUMs are calculated on BLM-administered land only. Lease holders are billed for their maximum use available on public lands unless non-use is requested and approved. Non-use by the lessee was not requested during the evaluation period.

6.2 Rangeland Health Assessments

Upland range health was evaluated at one key area (RZ-1) and is located in the Sandy Loam Uplands 12-16" p.z. The key area was selected for its consistency with average livestock use within the allotment. A quantitative and qualitative assessment of rangeland health indicators was conducted in order to determine if any gaps existed between existing condition and ecological reference condition. Using these assessments, it was determined whether or not applicable resource standards were being met within the allotment.

Vegetation monitoring was conducted by the University of Arizona Extension and the BLM range specialists at the RZ-1 key area, in 2011, 2013 and 2016. Upland range health and vegetation monitoring was evaluated on RZ-1 in 2014 by TEAMs.

Ratings of Moderate or more are considered to indicate resource concerns for soil erosion, water quantity, and plant productivity. It is important to remember that these ratings are made relative to the potential for the site. For example, a site with highly erodible soils and low potential for stabilizing vegetation may be rated as having a Slight departure from reference conditions even though the actual amount of soil movement is significant, while a site with a high potential for stability rated “Moderate” may have relatively little soil movement. Monitoring data recorded for the RHA is provided in Appendix C. A summary of the assessment conducted at key area RZ-1 on the Ramirez Allotment is presented in Table 9 below.

Table 9. Summary of Range Health Assessment Ratings

Key Area	Ecological Site	Range Health Attributes – Degree of Departure		
		Soil	Hydrology	Biotic Integrity
RZ-1	Sandy Loam Uplands 12-16” p.z.	None to Slight	None to Slight	Slight to moderate

The potential plant community on this site is dominated by warm season perennial grasses. All the major perennial grass species on the site tend to be well dispersed throughout the plant community. Perennial forbs and shrubs are minor on the site. The aspect is open grassland. (NRCS 2005).

Because range capacity can vary over time due to issues such as the season, climatic variation, site potential, and previous and current disturbance, adaptive management during and across years must be applied in order to prescribe the most appropriate grazing plan and prevent resource degradation.

The ecological site for RZ-1 is Sandy Loam Uplands 12-16”. Litter should be in the range of 20 to 75 percent, with 5 to 40 percent surface fragments. A tolerable range of bare ground would be between 10 and 20 percent. Foliar cover collected at RZ-1 was 92 percent with 19 percent basal cover of native shrubs. Total litter at RZ-1 was measured at 84 percent, with bare ground measuring 1 percent. Rock and rock fragments covered 56 percent of the soil surface. Utilization, measured at the key area, was zero percent.

Rangeland Health Attribute 1: Soil and Site Stability

RZ-1- There were no rills or gullies observed, these indicators were rated None to Slight. Water flow patterns were not observed and were rated None to Slight. Pedestals and/or Terracettes were rated as Slight to Moderate because there was some pedestalling of grasses in open interspaces. Bare ground was measured at one percent, indicating the site has moderate to high plant cover and was rated None to Slight. There was no evidence of wind-scouring observed due to a heavy gravel and rock component and was rated None to Slight. All litter size classes remained at the base of plants with little to no movement and was rated None to Slight. Soil surface resistance to erosion was rated as None to Slight due to the area being cobble cover. Rock and gravel fragments covered 56 percent of the soil surface. Plants were able to grow through these fragments and provided a canopy cover measured at 92 percent and 19 percent basal cover at RZ-1 (Appendix C). Soil surface loss and degradation were None to Slight as soils

are stable and in place. Compaction layers were not present and not restricting water infiltration or root penetration and was rated None to Slight.

The overall rating for Soil and Site Stability was None to Slight. Nine indicators for soil site stability were rated as None to Slight and one was slight to moderate. Site was stable with appropriate vegetative cover.

Rangeland Health Attribute 2: Hydrologic Function

RZ-1- There were no rills or gullies observed. These indicators were rated None to Slight. Water flow patterns were not observed and were rated None to Slight. Pedestals and/or Terracettes were rated as Slight to Moderate because there was pedestalling in open interspaces. Bare ground was measured at one percent, indicating the site has moderate to high plant cover, and that the soils were well armored by rock fragments and was rated None to Slight. Soil surface resistance to erosion was rated as None to Slight due to the area being naturally armored by rock and canopy cover. Rock and gravel fragments covered 56 percent of the soil surface. Canopy cover was measured at 92 percent and 19 percent basal cover at RZ-1 (Appendix C). Soil surface loss and degradation were None to Slight as soils are stable and in place. Compaction layers were not present and not restricting water infiltration or root penetration and was rated None to Slight. Litter amounts were measured at 84 percent. It was rated None to Slight. Plant community composition and distribution relative to infiltration was rated None to Slight.

The overall rating for Hydrologic Function was None to Slight. Nine indicators for hydrologic function were rated as None to Slight and one was slight to moderate. No above ground flows with good veg and rock cover per the ESD.

Rangeland Health Attribute 3: Biotic Integrity

RZ-1- Soil surface resistance to erosion was rated as None to Slight. Soil surface is naturally armored by rock and canopy cover. Rock and gravel fragments covered 56 percent of the soil surface. Canopy cover was measured at 92 percent and 19 percent basal cover at RZ-1 (Appendix C). Soil surface loss and degradation were None to Slight as soils are stable and in place. Compaction layers were not present and not restricting water infiltration or root penetration and was rated None to Slight. Functional/structural groups was rated Slight to Moderate. Plant mortality/decadence was rated None to Slight; all age classes were evenly represented. Litter amounts were measured at 84 percent, and were therefore rated None to Slight. Annual production was rated as None to Slight and is appropriate for the site. Invasive plants was rated None to Slight as there were none noted on the site. Reproductive capability of perennial plants was rated None to Slight, as the native plants are adapted to the climate and are capable of producing seeds, stolons, and rhizomes except during the most severe droughts.

The overall rating for Biotic Function was None to Slight. Eight indicators for biotic function were rated as None to Slight. Functional structural groups was rated slight to moderate due to the lack of appropriate perennial grasses per the ESD. Adequate veg cover though mostly annual and native grasses.

Key Area Conclusions:

Upland range health was evaluated at one key area (Referred to RZ-1). The key area was selected for its consistency with average livestock use within the Allotment. A quantitative and qualitative assessment of rangeland health indicators was conducted in order to determine if any gaps existed between existing condition and ecological reference condition. Using these assessments, it was determined whether or not applicable resource standards were being met within the Allotment.

Key Area RZ-1 Desired Plant Community Objectives for Sandy Loam 12-16" precipitation zone ecological site

- Maintain native perennial grass canopy of $\geq 10\%$ ACHIEVED
- Mesquite canopy $< 15\%$ NOT ACHIEVED

Rationale: Overall, the soil on the allotment is stable. The allotment exhibits biotic integrity, and it is in a productive and sustainable condition. Currently, soil loss or degradation is not occurring. Perennial, native grasses and shrubs are very effective at holding soil cover due to their basal area and their fine fibrous root systems. These grasses and shrubs contribute organic matter directly into the soil and help build stable soil aggregates. In addition the plant and litter cover provide protection against wind erosion, and it increases infiltration and decreases runoff.

Vegetative cover collected at RZ-1 is adequate to ensure soil stabilization, and appropriate permeability rates within the ecological system. There were no rills/gullies present at the site, pedestals and/or terracettes were slight to moderate within the innerspaces. Wind-scouring and litter movement were none to slight. The ground is naturally armored by rock/gravel.

The ecological site for the R-1 key area is R041XC319AZ – Sandy Loam Upland 12-16" p.z. erigonum wrightii - calliandra eriophylla / bouteloua eriopoda - bouteloua curtipendula (bastardsage - fairyduster / black grama - sideoats grama) ecological site . Vegetative cover collected at R-1 was adequate to ensure soil stabilization, and appropriate permeability rates within the ecological system. There were no rills/gullies present at the site, pedestals and/or terracettes were slight to non-existent. Wind-scouring and litter movement were none to slight.

Grass canopy cover just from aristia was 80 percent which met the > 10 percent objective. The measure mesquite canopy in 2014 was actually 16 percent canopy cover which is just outside the 15 percent objective.

Conclusions:

The data at the trend plot showed that foliar cover, litter, and rock cover are adequate to ensure soil stabilization and appropriate permeability rates within the ecological sites. In addition we observed very little to no signs of erosion at the site. The ESD describe the plant communities as "*naturally variable*" where "*composition and production will vary based on yearly conditions, location, aspect, soils,*" and previous disturbances (NRCS 2005). The ESD for R-1 only briefly describes the Historical Climax Plant Community (HCPC) as "*The potential plant community on this site is dominated by warm season perennial grasses. All the major perennial grass species on the site tend to be well dispersed throughout the plant community. Perennial forbs and shrubs are minor on the site. The aspect is open grassland.*" The site reflects conditions that are slight to moderately departed from a HCPC community. Though there is a departure the soil conditions on the allotment, at the key areas and as a whole, are productive and stable providing for functional hydrologic, energy, and nutrient cycles.

Key Area RZ-1 Sandy Loam Upland 12-16" precipitation zone

6.2.1.1 Standard 1: Upland Sites

Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate and landform (ecological site).

The ecological site for key area RZ-1 is Sandy Loam Upland 12-16" precipitation zone ecological site. Vegetative cover collected at RZ-1 is adequate to ensure soil stabilization, and appropriate permeability rates within the ecological system. There were no rills/gullies present at the site, pedestals and/or terracettes were slight to non-existent. Wind-scouring and litter movement were none to slight (Figure 10).

The approximate potential ground cover (surface, basal, and foliar) is described in Tables 17 and 18 below. Table 17 specifically provides a comparison between the desired conditions as described by the ESD reference sheet for Sandy Loam Upland 12-16", and the current conditions of RZ-1 in January 2014. Table 18 address the kind and amount (by cover) of vegetation at the sites.

The ecological site for RZ-1 is Sandy Loam Upland 12-16". Litter should be in the range of 20 to 75 percent, with 0 to 5 percent surface fragments. A tolerable range of bare ground would be between 10 and 20 percent. Foliar cover collected at RZ-1 was 92 percent with 19 percent basal cover of native shrubs. Total litter at RZ-1 was measured at 84 percent, with bare ground measuring 1 percent. Rock and rock fragments covered 56 percent of the soil surface. Utilization, measured at the key area, was 0 percent and we observed no sign of livestock.

6.2.1.2 Standard 2: Riparian-Wetland Sites

Not Applicable to Ramirez allotment

6.2.1.3 Standard 3 Desired Resource Conditions

"Productive and diverse upland and riparian-wetland plant communities of native species exist and are maintained."

Evaluation: In general the composition, structure and distribution are present, However, line point intercept (LPI) cover data collected at the key area indicates that perennial and native Mid-grasses such as sideoats gramma (*Bouteloua curtipendula*), Arizona cottontop (*Digitaria californica*) are significantly reduced within the site, as well as suffrutescent grasses such as black gramma (*Bouteloua eripoda*) are significantly reduced. The warm season grammanoid species are desirable and preferred by livestock and wildlife and are decreasers within a range site as a result of herbivory. These species were observed within the allotment, just not in the LPI transect. Fire, historical heavy grazing, and drought have likely caused a significant decrease of primary species within these ecological sites resulting in the annual native and non-native species to become dominant. The current vegetative composition of both perennial and annual native species within the allotment, even though shifted from a Climax Community is appropriate for the range site and is conducive to meet the requirements of the Taylor Grazing Act, Federal Land Policy and Management Act, Endangered Species Act, Clean Water Act, and other applicable laws, regulations, and policies. There is one Threatened or Endangered Species or critical habitat known to occur on the Ramirez allotment: lesser long-nosed bat (*Leptonycteris curasoae yerb*). The Ramirez allotment is within the identified foraging range of a known roost. The Lesser Long-nosed bat requires caves and mines for roost sites and access to health stands of saguaro cactus and paniculate agaves for foraging. This species migrates to Mexico during September/October returning in the spring to bear young.

Key Area RZ-1

The vegetative community at RZ-1 represents the composition, structure, and distribution of a state and transition community that is described (Table 4) in the ESD as: "Mesquite, annuals". Mesquite and other large shrubs are dominant with 10 to 15% canopy. Native and non-native annual forbs and grasses, both cool and warm season, dominate the under-story." The functional/structure group was found to have

slight to moderate deviation from the reference community as described within the ESD (Table 5). This departure is due to the large amount of annual grasses observed at the site. Although slight to moderate deviations from the reference community exist, the composition (Figure 2) and structure of the vegetation (Figure 1) still provides well distributed habitat for wildlife (general wildlife and sensitive species) and other multiple uses.

Conclusions:

The current vegetative composition of native species within the allotment is appropriate for the state and transition model of a Mesquite, annuals rangeland site. This is a slight to moderate departure from the HCPC site as described within the ESD. The explanation for the departure is described within the ESD as *“With continuous heavy grazing, palatable perennial grasses are removed from the plant community and species like Rothrock grama and threeawns will increase.”* The site is currently dominated by threeawn species (*Aristida sp.*) with a minor component of native perennial grasses present. Though the site is departed from the reference condition the range site is continuing to meet the requirements of the Taylor Grazing Act, Federal Land Policy and Management Act, Endangered Species Act, Clean Water Act, and other applicable laws, regulations, and policies that support a productive and a diverse native biotic community. Perennial grasses and suffrutescent forbs are present within the allotment, which is an indicator that the overall ecological condition is meeting standard as described in the ESD though slight to moderately deviate. We observed no utilization on any plants at RZ-1 and no sign of livestock.

Overall throughout the allotment the soils are productive, stable and in a sustainable condition. There were no rills/gullies present at the ecological site, pedestals and/or terracettes were none to slight. Wind-scouring and litter movement were none to slight. Finally, almost the entire allotment is naturally armored by rocks/gravel. The allotment is within the variability of the state and transition models as delineated in the ecological site descriptions. (Appendix B Figure 14).

7 DETERMINATION OF LAND HEALTH STANDARDS

7.1.1 Standard 1: Upland Sites

Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate and landform (ecological site).

Determination:

- Meeting the Standard
- Not Meeting the Standard, but making significant progress towards standard
- Not Meeting the Standard, not making significant progress toward standard

Conclusion: (Standard Achieved)

Rationale: The data at the trend plot showed that foliar cover, litter, and rock cover are adequate to ensure soil stabilization and appropriate permeability rates within the ecological sites. In addition we observed very little to no signs of erosion at the site. The ESD describe the plant communities as *“naturally variable”* where *“composition and production will vary based on yearly conditions, location, aspect, soils,”* and previous disturbances (NRCS 2005). The ESD for R-1 only briefly describes the Historical Climax Plant Community (HCPC) as *“The potential plant community on this site is dominated by warm season perennial grasses. All the major perennial grass species on the site tend to be well*

dispersed throughout the plant community. Perennial forbs and shrubs are minor on the site. The aspect is open grassland.” The site reflects conditions that are slight to moderately departed from a HCPC community. Though there is a departure the soil conditions on the allotment, at the key areas and as a whole, are productive and stable providing for functional hydrologic, energy, and nutrient cycles. Energy flow and nutrient cycling is occurring on the allotment as plant vigor, diversity, and cover is high. Other shrubs and succulents exist in minor amounts. Annual forbs and grasses (both native and non-native) are very important in their respective seasons. Overall throughout the allotment the soils are productive, stable and in a sustainable condition within the capability of the ecological sites.

7.1.2 Standard 2: Riparian-Wetland Sites

Objective: Riparian-wetland areas are in proper functioning condition.

Determination:

- Meeting the Standard
- Not Meeting the Standard; Making Significant Progress Toward Standard
- Not Meeting the Standard; Not Making Significant Progress Toward Standard
- Standard Does Not Apply

Rationale: There are no wetland-riparian sites within the Ramirez allotment.

7.1.3 Standard 3: Desired Resource Condition

Productive and diverse upland and riparian-wetland plant communities of native species exist and are maintained.

Determination:

- Meeting the Standard
- Not Meeting the Standard, but making significant progress towards standard
- Not Meeting the Standard, not making significant progress toward standard

Conclusion: (Standard Achieved)

Rationale: The current vegetative composition of native species within the allotment is appropriate for the state and transition model of a Mesquite, annuals rangeland site. This is a slight to moderate departure from the HCPC site as described within the ESD. The explanation for the departure is described within the ESD as “*With continuous heavy grazing, palatable perennial grasses are removed from the plant community and species like Rothrock grama and threeawns will increase.*” The site is currently dominated by threeawn species (*Aristida sp.*) with a minor component of native perennial grasses present. Though the site is departed from the reference condition the range site is continuing to meet the requirements of the Taylor Grazing Act, Federal Land Policy and Management Act, Endangered Species Act, Clean Water Act, and other applicable laws, regulations, and policies that support a productive and a diverse native biotic community. Perennial grasses and suffrutescent forbs are present within the allotment, which is an indicator that the overall ecological condition is meeting standard as described in the ESD though slight to moderately deviate. We observed no utilization on any plants at RZ-1 and no sign of livestock.

8 RECOMMENDED MANAGEMENT ACTIONS

Based on the determinations in Section 7 above, there are no resource concerns related to current livestock use that should be considered before lease issuance. Therefore, the 10-year grazing lease may be renewed with the following existing terms and conditions:

8.1 Terms and Conditions:

Terms:

Allotment	Livestock # and Kind	Grazing Period of Use	Percent Public Land	AUMs	Type Use
Ramirez	3 Cattle	3/1 to 2/28	100	36	Active

Conditions:

1. Grazing permit or lease terms and conditions and the fees charged for grazing use are established in accordance with the provisions of the grazing regulations now or hereafter approved by the Secretary of the Interior.
2. They are subject to cancellation, in whole or in part, at any time because of:
 - a. Noncompliance by the permittee/lessee with rules and regulations.
 - b. Loss of control by the permittee/lessee of all or a part of the property upon which it is based.
 - c. A transfer of grazing preference by the permittee/lessee to another party.
 - d. A decrease in the lands administered by the Bureau of Land Management within the allotment(s) described.
 - e. Repeated willful unauthorized grazing use.
 - f. Loss of qualifications to hold a permit or lease.
3. They are subject to the terms and conditions of allotment management plans if such plans have been prepared. Allotment management plans **MUST** be incorporated in permits or leases when completed.
4. Those holding permits or leases **MUST** own or control and be responsible for the management of livestock authorized to graze.
5. The authorized officer may require counting and/or additional or special marking or tagging of the livestock authorized to graze.
6. The permittee's/lessees grazing case file is available for public inspection as required by the Freedom of Information Act.
7. Grazing permits or leases are subject to the nondiscrimination clauses set forth in Executive Order 11246 of September 24, 1964, as amended. A copy of this order may be obtained from the authorized officer.
8. Livestock grazing use that is different from that authorized by a permit or lease **MUST** be applied for prior to the grazing period and **MUST** be filed with and approved by the authorized officer before grazing use can be made.

9. Billing notices are issued which specify fees due. Billing notices, when paid, become a part of the grazing permit or lease. Grazing use cannot be authorized during any period of delinquency in the payment of amounts due, including settlement for unauthorized use.

10. Grazing fee payments are due on the date specified on the billing notice and MUST be paid in full within 15 days of the due date, except as otherwise provided in the grazing permit or lease. If payment is not made within that time frame, a late fee (the greater of \$25 or 10 percent of the amount owed but not more than \$250) will be assessed.

11. No Member of, or Delegate to, Congress or Resident Commissioner, after his/her election of appointment, or either before or after he/she has qualified, and during his/her continuance in office, and no officer, agent, or employee of the Department of the Interior, other than members of Advisory committees appointed in accordance with the Federal Advisory Committee Act (5 U.S.C. App.1) and Sections 309 of the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701 et seq.) shall be admitted to any share or part in a permit or lease, or derive any benefit to arise there from; and the provision of Section 3741 Revised Statute (41 U.S.C. 22), 18 U.S.C. Sections 431-433, and 43 CFR Part 7, enter into and form a part of a grazing permit or lease, so far as the same may be applicable.

12. The operator is responsible for informing all persons who are associated with the allotment operations that they will be subject to prosecution for knowingly disturbing historic or archaeological sites, or for collecting artifacts. Any cultural (historic/prehistoric site or object) or paleontological resource (fossil remains of plants or animals) discovered during operations shall be immediately reported to the Authorized Officer (AO) or his/her designee. All operations in the immediate area of the discovery shall be suspended until written authorization to proceed is issued. An evaluation of the discovery shall be made by a qualified archaeologist or paleontologist to determine appropriate actions to prevent the loss of significant cultural or scientifically important values.

13. If in connection with this work any human remains, funerary objects, sacred objects or objects of cultural patrimony as defined in the Native American Graves Protection and Repatriation Act (P.L. 101-601; 104 Stat. 3048; 25 U.S.C. 3001) are discovered, operations in the immediate area of the discovery shall cease, the remains and objects shall be protected, and the operator shall immediately notify the BLMTFO. The immediate area of the discovery shall be protected until notified by the BLMTFO Manager that operations may resume.

14. In order to improve livestock distribution on the public lands, all salt blocks and/or mineral supplements shall not be placed within a ¼ mile of any riparian area, wet meadow or watering facility (either permanent or temporary) unless stipulated through a written agreement or decision in accordance with 43 CFR 4130.3-2(C).

The following Other Terms and Conditions should be added to the BLM lease:

- The lessee shall submit, upon request, a report of the actual grazing use made on this allotment for the previous grazing period, March 1 to February 28. Failure to submit such a report by March 15 of the current year may result in suspension or cancellation of the grazing lease.
- In accordance with 43 CFR 4130.8-1(F): Failure to pay grazing bills within 15 days of the due date specified in the bill shall result in a late fee assessment of \$25.00 or 10 percent of the grazing bill, whichever is greater, but not to exceed \$250.00. Payment made later than 15 days after the due date, shall include the appropriate late fee assessment. Failure to make payment within 30 days may be a violation of 43 CFR Secs. 4150.1 and 4160.1-2.

9 LIST OF PREPARERS

List of Preparers

Name	Organization	Title
Eric Baker	Tucson Field Office USDI Bureau of Land Management	Rangeland Management Specialist
Troy Grooms	Forest Service TEAMS USDA Forest Service	Rangeland Management Specialist
Rick Baxter	Forest Service TEAMS USDA Forest Service	Wildlife Biologist
Doug Middlebrook	Forest Service TEAMS USDA Forest Service	Wildlife Biologist
Evan Darrah	Safford Field Office USDI Bureau of Land Management	Geographic Information Specialist

List of Reviewers

Name	Organization	Title
Kristen Duarte	Tucson Field Office USDI Bureau of Land Management	Rangeland Management Specialist
Keith Hughes	Tucson Field Office USDI Bureau of Land Management	Natural Resource Specialist
Dave Murray	Tucson Field Office USDI Bureau of Land Management	Hydrologist
Amy McGowan	Gila District Office USDI Bureau of Land Management	Planning & Environmental Specialist
Kim Ryan	Tucson Field Office USDI Bureau of Land Management	Cultural Resources Specialist
Darrell Tersey	Tucson Field Office USDI Bureau of Land Management	Natural Resource Specialist

11 AUTHORIZED OFFICER CONCURRENCE

I have reviewed the determinations presented in Section 8 Determinations of Land Health Standards and the grazing and other management actions identified in Section 9 Recommended Management Actions.

I concur with the determinations and recommendations as written.

I do not concur.

I concur, but with the following modifications:

 Acting for 9/10/2019
Date

Jayme Lopez

Date

Field Office Manager

BLM Tucson Field Office

11 REFERENCES

- Arizona Government-to-Government Consultation Toolkit. 2019. Available online at <https://sites.google.com/view/az-consultation-toolkit/home> (accessed August 12, 2019).
- AZSite. 2019. Arizona's Cultural Resource Inventory, maintained by the Arizona State Museum. Available online at <http://azsite3.asurite.ad.asu.edu/azsite/> (accessed August 12, 2019).
- Binford, Lewis R. 1981. Behavioral Archaeology and the "Pompeii Premise". *Journal of Anthropological Research*, 37(3):195-208.
- Broadhead, Wade. 2001. *Brief Synopsis of Experiments Concerning Effects of Grazing on Archaeological Sites*. Bureau of Land Management, Gunnison Field Office, Gunnison, Colorado.
- Brown, Patricia E. and Connie L. Stone. 1982. *Granite Reef: A Study in Desert Archaeology*. Anthropological Research Papers No. 28, Arizona State University, Tempe.
- Harmon, Elizabeth. 1996. *Cultural Resources Survey of 7.6 Miles of State Route 90 Between Sierra Vista and Bisbee, Southwestern Cochise County, Arizona*. Accession No. 1996-307.ASM. Archaeological Research Services, Inc., Tempe.
- Kayser, D.W. n.d. *Archaeological Survey of the Proposed Charleston Dam and Reservoir, Southwest Arizona*. Accession No. 1968-1.ASM. University of Arizona, Arizona State Museum, Tucson.
- National Register of Historic Places Database & NPGallery Digital Asset Search. 2019. Maintained by the National Park Service. Available online at <https://www.nps.gov/subjects/nationalregister/database-research.htm> (accessed August 12, 2019).
- Osborn, Alan J. and Ralph J. Hartley. 1991. Adverse Effects of Domestic Livestock Grazing on the Archaeological Resources of Capitol Reef National Park, Utah, p.136-153. In *Proceedings of the First Biennial Conference of Research in Colorado Plateau National Parks*. U.S. Geological Survey, Washington, D.C.
- Osborn, Alan J., Susan Vetter, Ralph J. Hartley, Laurie Walsh, and Jesslyn Brown. 1987. Impacts of Domestic Livestock Grazing on Archaeological Resources of Capitol Reef National Park, Utah. *Occasional Studies in Anthropology*, No. 20. U.S. Dept. of the Interior, National Park Service, Midwest Archaeological Center, Lincoln, Nebraska.
- Roney, John. 1977. Livestock and Lithics: The Effects of Trampling. Unpublished Manuscript. U.S. Department of the Interior, Bureau of Land Management, Winnemucca District Office, Winnemucca, Nevada.
- Schiffer, Michael B. 1987. *Formation Processes of the Archaeological Record*. University of New Mexico Press, Albuquerque.
- USDA. 1997. National Range and Allotment Handbook
- USDA. 2009. Ecological Site Description System. NRCS. Online. http://esis.sc.egov.usda.gov/esis_report/fsReport.aspx?approved=yes&id=R041XC306AZ
- USDA. 2009. MLRA Explorer. NRCS. Online. <http://ceiwin3.cei.psu.edu/MLRA/pdf/rep633991599496468900.pdf>

- USDA. 2009. Soil Survey of Arizona. Natural Resource Conservation Service.
- USDA-NRCS. 2019. Culturally Sensitive Plants Database. Available online at <https://plants.usda.gov/java/factSheet?cultural=yes> (accessed August 12, 2019).
- USDI. 1996. Sampling Vegetation Attributes. Bureau of Land Management.
- USDI. 2005. Interpreting Indicators of Rangeland Health. Interagency Protocol (BLM, ARS, NRCS).
- USDI. 2016. Information for Planning and Conservation (IPaC). U.S. Fish and Wildlife Service. Accessed online at: <https://ecos.fws.gov/ipac/>
- U.S. Geological Survey, 2019, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation), accessed [June 26, 2019], at URL https://nwis.waterdata.usgs.gov/az/nwis/inventory/?site_no=09470700&agency_cd=USGS
- Van Vuren, Dirk H. 1982. Effects of Feral Sheep on the Spatial Distribution of Artifacts on Santa Cruz Island. *Bulletin of the Southern California Academy of Science*, 81(3):148-151.

12 APPENDIX A: SPECIES LISTS

Table 1--Effects Determinations with Raionals for BLM and USFWS Special Status Species and Special Areas Documented within 2 Miles of Project Vicinity, as determined by Arizona Game and Fish Department's Heritage Data Management System (HDMS) and Project Evaluation Program (PEP) Project ID: HGIS-09552.

Scientific Name	Common Name	FWS	BLM	Effects Determination	Rational
<i>Agosia chrysoaster chrysoaster</i>	Gila Longfin Dace	SC	S	NE	A
<i>Anthus spragueii</i>	Sprague's Pipit	SC		MA	B
<i>Buteo plagiatus</i>	Gray Hawk	SC		NE	A
CH for <i>Lilaeopsis schaffneriana ssp. recurva</i>	Huachuca Water Umbel Designated Critical Habitat			NE	A
<i>Catostomus clarkii</i>	Desert Sucker	SC	S	NE	A
<i>Centronyx bairdii</i>	Baird's Sparrow	SC		MA	B
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo (Western DPS)	LT		NE	A
<i>Cyprinodon macularius</i>	Desert Pupfish	LE		NE	A
<i>Eryngium sparganophyllum</i>	Arizona Eryngo		S	NE	A
<i>Falco peregrinus anatum</i>	American Peregrine Falcon	SC	S	NE	A
<i>Kinosternon sonoriense sonoriense</i>	Desert Mud Turtle		S	NE	A
<i>Lilaeopsis schaffneriana ssp. recurva</i>	Huachuca Water-umbel	LE		NE	A
<i>Lithobates chiricahuensis</i>	Chiricahua Leopard Frog	LT		NE	A
<i>Lithobates yavapaiensis</i>	Lowland Leopard Frog	SC	S	NE	A
<i>Metastelma mexicanum</i>	Wiggins Milkweed Vine	SC		NE	E
<i>Myotis velifer</i>	Cave Myotis	SC	S	NE	E
PCH for <i>Coccyzus americanus</i>	Yellow-billed Cuckoo Proposed Critical Habitat			NE	A
PCH for <i>Thamnophis eques megalops</i>	Northern Mexican Gartersnake Proposed Critical Habitat			NE	A
<i>Phrynosoma cornutum</i>	Texas Horned Lizard	SC		MA	B
<i>Poeciliopsis occidentalis occidentalis</i>	Gila Topminnow	LE		NE	A
<i>Terrapene ornata luteola</i>	Desert Box Turtle		S	MA	B
<i>Thamnophis eques megalops</i>	Northern Mexican Gartersnake	LT		NE	
<i>Accipiter gentilis</i>	Northern Goshawk	SC	S	NE	A
<i>Agosia chrysoaster</i>	Longfin Dace	SC	S	NE	A
<i>Ammodramus savannarum ammodramus</i>	Arizona grasshopper sparrow		S	MA	B
<i>Anthus spragueii</i>	Sprague's Pipit	SC		MA	B
<i>Aquila chrysaetos</i>	Golden Eagle	BGA	S	NE	F
<i>Athene cucularia hypugaea</i>	Western Burrowing Owl	SC	S	NE	F
<i>Buteo regalis</i>	Ferruginous Hawk	SC	S	NE	F
<i>Catostomus clarkii</i>	Desert Sucker	SC	S	NE	A
<i>Catostomus insignis</i>	Sonora Sucker	SC	S	NE	A
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo (Western DPS)	LT		NE	A
<i>Colaptes chrysoides</i>	Gilded Flicker		S	NE	E
<i>Corynorhinus townsendii pallascens</i>	Pale Townsend's Big-eared Bat	SC	S	NE	F
<i>Cynomys ludovicianus</i>	Black-tailed Prairie Dog	CCA	S	NE	F
<i>Dipodomys spectabilis</i>	Banner-tailed Kangaroo Rat		S	NE	F
<i>Empidonax fulvifrons pygmaeus</i>	Northern Buff-breasted Flycatcher	SC		NE	E
<i>Empidonax traillii extimus</i>	Southwestern Willow Flycatcher	LE		NE	A
<i>Euderma maculatum</i>	Spotted Bat	SC	S	NE	F
<i>Eumops perotis californicus</i>	Greater Western Bonneted Bat	SC	S	NE	F
<i>Falco peregrinus anatum</i>	American Peregrine Falcon	SC	S	NE	A
<i>Gila robusta</i>	Roundtail Chub	CCA	S	NE	A
<i>Haliaeetus leucocephalus</i>	Bald Eagle	SC, BGA	S	NE	F
<i>Kinosternon sonoriense sonoriense</i>	Desert Mud Turtle		S	NE	A
<i>Leopardus pardalis</i>	Ocelot	LE		NE	F
<i>Leptonycteris yerbabuenae</i>	Lesser Long-nosed Bat	SC		NE	F
<i>Macrotus californicus</i>	California Leaf-nosed Bat	SC	S	NE	F
<i>Myotis occultus</i>	Arizona Myotis	SC	S	NE	F
<i>Myotis velifer</i>	Cave Myotis	SC	S	NE	F
<i>Myotis yumanensis</i>	Yuma Myotis	SC		NE	F
<i>Panthera onca</i>	Jaguar	LE		NE	F
<i>Peucaea botterii arizonae</i>	Arizona Botteri's Sparrow		S	MA	B
<i>Rhinichthys osculus</i>	Speckled Dace	SC	S	NE	A
<i>Sorex arizonae</i>	Arizona Shrew	SC		MA	B
<i>Strix occidentalis lucida</i>	Mexican Spotted Owl	LT		NE	A

S= BLM Sensitive Species; SC= FWS Species of Concern; BGA= Bald and Golden Eagle Protection Act; CCA= Candidate Conservation Agreement; LE= Listed Endangered

NE= No Effect, MA= May Affect; A= habitat for species does not occur in or near project footprint; B= habitat for species occurs in or near project footprint and activity proposed could remove habitat or harm individuals; C= species does not occur in or near project footprint; D= Habitat for species occurs in or near project footprint, but species is not present during proposed action; E= habitat for species occurs in or near project footprint, but proposed action will not negatively impact species due to mobility or large range; F= Habitat for species occurs in project area, but project activities do not impact primary constituent elements of habitat for the species

This section includes the list of plant species present or potentially present within the Sandy Loam Upland 12-16” precipitation zone (p.z.) ecological site located on the public lands within the Ramirez allotment. These plant species provide key forage and cover for wildlife species and livestock.

Table 11. Key Plant Species from the Sandy Loam Upland 12-16” p.z. ecological site description from RZ-1

Common name	Scientific name
cane beardgrass	<i>Bothriochloa barbinodis</i>
sideoats grama	<i>Bouteloua curtipendula</i>
plains lovegrass	<i>Eragrostis intermedia</i>
sprucetop grama	<i>Bouteloua chondrosioides</i>
black grama	<i>Bouteloua eriopoda</i>
blue grama	<i>Bouteloua gracilis</i>
desert-holly	<i>Acourtia nana</i>
slimleaf bursage	<i>Ambrosia confertiflora</i>
carelessweed	<i>Amaranthus palmeri</i>
false mesquite	<i>Calliandra eriophylla</i>
shrubby buckwheat	<i>Eriogonum wrightii</i>
range ratany	<i>Krameria erecta</i>
whitethorn acacia	<i>Acacia constricta</i>
fourwing saltbush	<i>Atriplex canescens</i>

Species recorded in 2014 at RZ-1

<i>Aristida</i>
<i>Chloris virgata</i>
<i>Eragrostis lehmanniana</i>
<i>Prosopis velutina</i>
<i>Selaginella lepidophylla</i>
<i>Sporobolus airoides</i>

13 APPENDIX B: MONITORING PROTOCOLS

The following sections describe the inventory and monitoring protocols that were used on the Ramirez allotment in 2014.

13.1 Monitoring Protocols

13.1.1 Indicators of Rangeland Health

A rangeland health assessment provides information on the function of ecological processes (water cycle, energy flow, and nutrient cycle) relative to the reference state for the ecological site or other functionally similar unit for that land area. This assessment provides information that is not available with other methods of evaluation. It gives an indication of the status of the three attributes chosen to represent the health of the “evaluation area” (i.e., the area where the evaluation of the rangeland health attributes occurs). The three attributes are:

1. Soil/Site Stability (S)
2. Hydrologic (H)
3. Biotic Integrity (B)

The following are the 17 indicators of rangeland health that are evaluated during an assessment and the attribute(s) they measure:

1. Rills: S, H
2. Water Flow Patterns: S, H
3. Pedestals and/or Terracettes: S, H
4. Bare Ground: S, H
5. Gullies: S, H
6. Wind-scoured, Blowout, and/or Depositional Areas: S
7. Litter Movement: S
8. Soil Surface Resistance to Erosion: S, H, B
9. Soil Surface Loss or Degradation: S, H, B
10. Plant Community Composition and Distribution Relative to Infiltration and Runoff: H
11. Compaction Layer: S, H, B
12. Functional/Structural Groups: B
13. Plant Mortality/Decadence: B
14. Litter Amount: H, B
15. Annual Production: B
16. Invasive Plants: B
17. Reproductive Capability of Perennial Plants: B

The three attributes of rangeland health (soil/site stability, hydrologic function, and biotic integrity) are evaluated and assigned rating categories for each of the 17 attributes ((Interpreting Indicators of Rangeland Health Technical Reference 1734-6, Version 4 – 2005.)

Attribute ratings reflect the degree of departure from expected levels for each indicator per the Reference Sheet. The degree of departure may be categorized as:

- Extreme to Total
- Moderate to Extreme
- Moderate
- Slight to Moderate
- None to Slight

Monitoring Protocols

The standards were assessed for the Ramirez allotment by a contracted U.S. Forest Service interdisciplinary team consisting of rangeland management specialists and wildlife biologists (both with additional resource backgrounds in soils and botany). TEAMS (Talent, Expertise, Agility, Mobility and Simplicity) Enterprise mission is to provide convenient and cost effective environmental planning, field services, and policy development through an exemplary workforce of dedicated, creative, and experienced natural resource specialists. Additional information is on their website: <https://www.fs.fed.us/teams/>.

The interdisciplinary team used rangeland monitoring data, professional observations, and photographs to assess achievement of the Standards and conformance with the Guidelines. All study sites were recorded with a GPS using projection of NAD 83.

Quantitative cover, and species composition, collected along each transect (Line Point Intercept [LPI]) was used in conjunction with qualitative indicators of soil quality, hydrologic function, and biological health (Indicators of Rangeland Health) in order to assess existing condition of ecological sites at the key area

within the Ramirez allotment. Existing condition was compared to site-specific reference conditions (thought to represent relatively undisturbed states within a given soil--plant community type) in order to determine the level of departure from the potential natural community. Other data collected at key area RZ-1 was the 17 indicators of rangeland health (NRCS 2005) and utilization.

14.2.1 Line Point Intercept (species composition and ground cover)

The method used to obtain transect data pertaining to species composition, and soil cover is the LPI. This method consists of a horizontal, linear measurement of plant intercepts along the course of a line (tape) 100 foot in Ramirez allotment. It is designed for measuring grass or grass-like plants, forbs, shrubs, and trees. This method is a rapid, accurate method for quantifying soil cover, including vegetation, litter, rocks and biotic crusts. These measurements are related to wind and water erosion, water infiltration and the ability of the site to resist and recover from degradation. The LPI method measures vegetation cover along a given distance and from that, composition is extrapolated.

14.2.2 Pace Frequency

Pace frequency is the number of times a plant species is present within a given number of uniformly sized sample quadrats (plot frames placed repeatedly across a stand of vegetation). Plant frequency is expressed as percent presence for each species encountered within total number of quadrat placements, therefore, frequency reflects the probability of encountering a particular plant species within a specifically sized area (quadrat size) at any location within the key area. The total number of frequency hits among all species will not equal the total number of quadrat placements and frequency is insensitive to the size or number of individual plants. Frequency is a very useful monitoring method but does not express species composition, only species presence. Frequency is an index that integrates species' density and spatial patterns.

A 40 x 40 cm. (0.16 m²) quadrat is used for pace frequency applied as follows:

1. Species present within the bounds of the sample quadrat are recorded with a single tally.
2. If no species are present, no frequency data are recorded.
3. Perennial or annual grasses and forbs must be rooted within the quadrat to be counted.
4. A grass or forb plant base present under the quadrat frame is considered "in."
5. Annual plants, grasses and forbs, are counted whether green or dried.
6. Tree/shrub canopy and basal hits are recorded separately. Over time, these parameters can indicate changes in tree/shrub size (canopy) or plant numbers (basal).
7. A canopy hit is any part of the tree or shrub that overhangs the quadrat (enters an imaginary vertical projection of the plot frame).
8. Quadrat placements are placed at one-pace intervals (2-steps), patterned in transects (straight lines) and are run parallel to each other, generally contouring slope, within the area of one ecological site (vegetation and soil type).

14.2.3 Fetch

Fetch is the distance from the nearest perennial plant base within 360 degrees of the quadrat's ground cover point. Fetch, reported with descriptive statistics, relates to plant distribution and watershed characteristics. Perennial plant cover can reduce soil erosion by creating an obstruction, slowing the rate of overland flow. A shorter distance between perennial plant bases lessens the opportunity for flowing water to acquire the necessary energy to remove soil and litter from a site. Overtime, fetch data can be used to assess changes in the spatial distribution and connectivity of vegetation patches plus document trends in the fragmentation of plant cover for rangeland health evaluation. One-hundred distances were measured in conjunction with pace frequency as baseline data for future monitoring.

14.2.4 Dry Weight Rank

Dry weight rank estimates plant composition on a dry weight production basis. This data collection was made using a 40cm x 40cm plot frame and 100 placements. The three perennial species within a vertical projection of quadrats placed repeatedly (100 times) comprising the most annual biomass production on a dry weight basis are ranked (1st, 2nd, and 3rd most biomass). Multiple ranks are given when less than 3 species are present. For example, if species A and species B are the two species present, ranks of 1 and 3, 1 and 2, or 2 and 3 are given to species A; if only species B is present, it receives a tally for each rank. No tally was recorded at quadrat placements void of perennial species.

14.2.5 Utilization

Utilization is the proportion or degree of the current year’s forage production that is consumed or destroyed by animals (including insects). Utilization may refer to either a single plant species, a group of species, or the vegetation as a whole. Utilization is a comparison of the amount of vegetation left compared with the amount of vegetation produced during the year (USDA, NRCS, and USDO, 1996).

Table 13. Herbaceous (grasses and forbs) utilization classes

Rating	Description
0-5%	The rangeland shows no evidence of grazing use or negligible use.
6-20%	The key species has the appearance of very light grazing. Plants may be topped or slightly used. Current seedstalks and young plants are little disturbed.
21-40%	The key species may be topped, skimmed, or grazed in patches. Between 60 and 80 percent of current seedstalks remain intact. Most young plants are undamaged.
41-60%	Half of the available forage (by weight) on key species appears to have been utilized. Fifteen to 25 percent of current seedstalks remain intact.
61-80%	More than half of the available forage on key species appears to have been utilized. Less than 10 percent of the current seedstalks remain. Shoots of rhizomatous grasses are missing.
81-94%	The key species appears to have been heavily utilized and there are indications of repeated use. There is no evidence of reproduction or current seedstalks.
95-100%	The key species appears to have been completely utilized. The remaining stubble is utilized to the soil surface.

Source: Interagency Technical Reference, *Utilization Studies and Residual Measurements*, 1996.

Seven utilization classes show relative degrees of use of available current year’s growth (leaders) of key browse plants (shrubs, half shrubs, woody vines, and trees). Each class represents a numerical range of percent utilization. Utilization classes are as follows:

Table 14. Browse (shrubs, half shrubs, woody vines, and trees) utilization classes

Rating	Description
0-5%	The key browse plants show no evidence of grazing use or only negligible use.
6-20%	The key browse plants have the appearance of very light use. The available leaders are little disturbed.
21-40%	There is obvious evidence of leader use. The available leaders appear cropped or browsed in patches and 60 to 80% of the available leader growth remains intact.
41-60%	Key browse plants appear rather uniformly utilized and 40 to 60% of the available leader growth remains intact.

Rating	Description
61-80%	The key browse plants are hedged and some plant clumps may be slightly broken. Nearly all available leaders are used and few terminal buds remain. Between 20 and 40% of the available leader growth remains intact.
81-94%	There are indications the key browse species have been utilized repeatedly. There is no evidence of terminal buds and usually less than 20% of available leader growth remains intact. Some, and often much, of the second and third years' growth has been utilized. Hedging (the appearance of browse plants that have been browsed so as to appear artificially clipped or consistent browsing of terminal buds of browse species that results in excessive lateral branching and a reduction in upward and outward growth) is readily apparent. Key browse plants frequently have broken branches.
95-100%	Less than 5% of the available leader growth on the key browse plants remain intact. Most of the second and third years' growth have been utilized. All key browse plants have major portions broken.

Source: Interagency Technical Reference, *Utilization Studies and Residual Measurements*, 1996.

15 Appendix C: Monitoring Data

15.1 Key Area Data

The standards were assessed for the Ramirez allotment by a contracted U.S. Forest Service interdisciplinary team consisting of rangeland management specialists and wildlife biologists (both with additional resource backgrounds in soils and botany). Documents and publications used in the assessment process include the Soil Survey of Arizona (NRCS 2009), Ecological Site Descriptions for Major Land Resource 40 (NRCS 2009) Interpreting Indicators of Rangeland Health (USDI-BLM et al. 2000), Sampling Vegetation Attributes (USDI-BLM et al. 1996), and the National Range and Allotment Handbook (USDA-NRCS 1997).

The interdisciplinary team used rangeland monitoring data, professional observations, and photographs to assess achievement of the Standards and conformance with the Guidelines. All study sites were recorded with a GPS using projection of NAD 83.

Quantitative cover, and species composition, collected along each transect (Line Point Intercept [LPI]) was used in conjunction with qualitative indicators of soil quality, hydrologic function, and biological health (Indicators of Rangeland Health) in order to assess existing condition of ecological sites at the key area within the Ramirez allotment. Existing condition was compared to site-specific reference conditions (thought to represent relatively undisturbed states within a given soil-plant community type) in order to determine the level of departure from the potential natural community. Other data collected at key area RZ-1 was the 17 indicators of rangeland health (NRCS 2005) and utilization. Utilization is the proportion or degree of the current year's forage production that is consumed or destroyed by animals (including insects). Utilization may refer either to a single plant species, a group of species, or the vegetation as a whole. Utilization is a comparison of the amount of vegetation left compared with the amount of vegetation produced during the year (USDA, NRCS, and USDO, 1996).

15.2 Utilization

Utilization measured at RZ-1 at the time of the study in 2014 was 0 percent.

15.3 Rangeland Health Evaluations and Frequency/Cover, Composition, and Structure Data

Tables 13 below show the results from the land health evaluation completed in January 2014 on the Ramirez allotment. Summary results are shown from the Rangeland Health Evaluation at key area RZ-1. All attributes ranked none to slight from departure of the Sandy Loam Upland 12-16" p.z. reference sheet.

Table 13. January 12, 2014 Summary Results from Rangeland Health Evaluation at Key Area RZ-1.

Rangeland Health Attribute	Departure From Ecological Site Description				
	Extreme	Moderate to Extreme	Moderate	Slight to Moderate	None to Slight
Soil/Site Stability	0	0	0	0	10
Hydrologic Function	0	0	0	0	10
Biotic Integrity	0	0	0	1	8

Table 14. Summary of 17 Indicators for Sandy Loam Upland 12-16" p.z. Ecological Site on Key Area RZ-1.

17 Indicators Reference Sheet	Rational from January 2014
1. Number and extent of rills: None present.	None to slight. None observed.
2. Presence of water flow patterns: Water flow paths occupy 10-15% of area; short (3-5 feet) in length and discontinuous and sinuous.	None to slight. None observed.
3. Number and height of erosional pedestals or terracettes: Pedestals are infrequent on long lived perennial grasses; Approximately 10% of perennial grass plants have pedestals no more than 1 inch above surrounding soil surface; Black grama dominated areas have formed terracettes 2-5 feet apart with a 1 inch elevation difference from above to below the terracette; Bunchgrass dominated areas have formed terracettes 10-15 feet apart with a 1 inch elevation difference from above to below the terracette.	None to slight. None observed.
4. Bare ground from Ecological Site Description or other studies (rock, litter, standing dead, lichen, moss, plant canopy are not bare ground): Bare soil 15-25%, gravel and rock 10%, litter 20-30%, vegetation canopy/basal 45-50%; bare patches 1-3ft in diameter	None to slight. 17% within parameters of ESD.
5. Number of gullies and erosion associated with gullies: None	None to slight. None observed.
6. Extent of wind scoured, blowouts and/or depositional areas: None	None to slight. None observed.

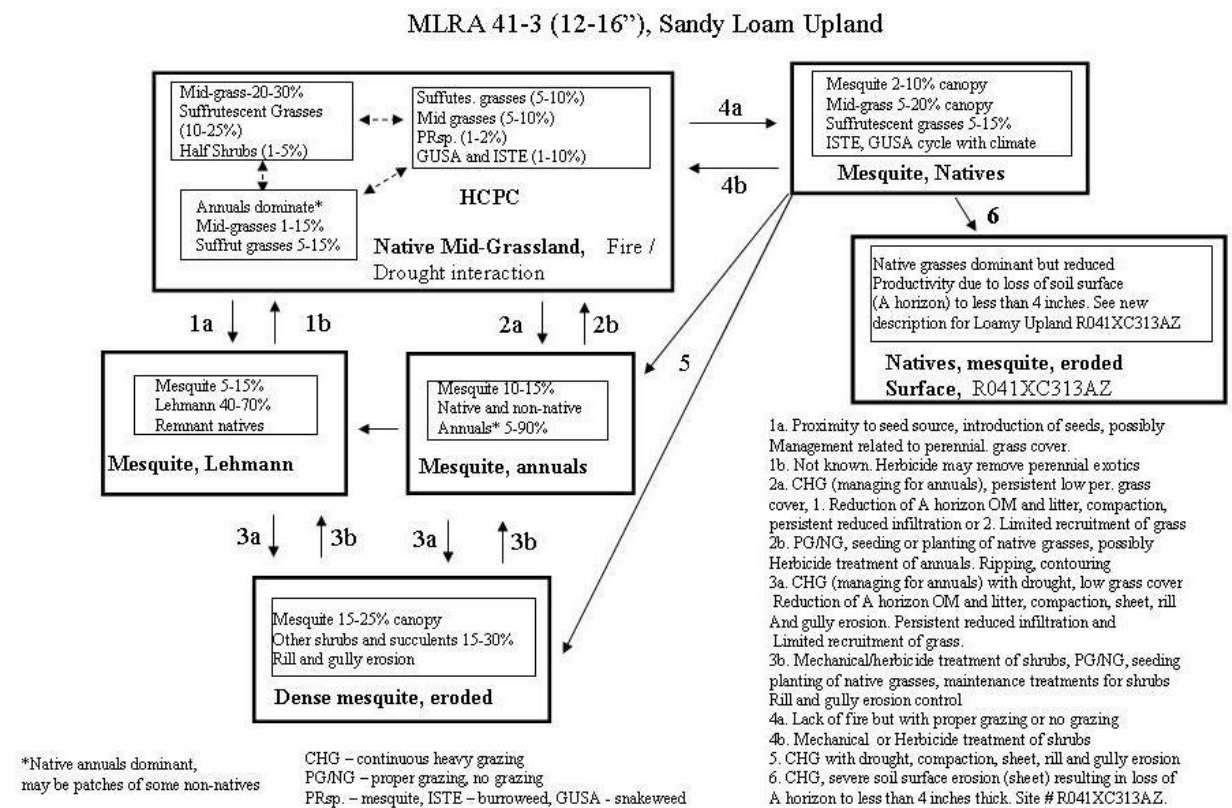
17 Indicators Reference Sheet	Rational from January 2014
<p>7. Amount of litter movement (describe size and distance expected to travel): All size classes remaining in place and masking water flow patterns, no loss of litter from the site.</p>	<p>None to slight. Good litter component/ located at plant bases.</p>
<p>8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values): Aggregate stability test average >5.</p>	<p>None to slight. Within vegetative parameters of ESD.</p>
<p>9. Soil surface structure and SOM content (include type and strength of structure, and A-horizon color and thickness): Soil surface ranges from fine sandyloam to loamy sand; slight physical crust in interspaces, weak granular structure, OM throughout (greater under perennial plants), A-horizon 4-8+ in</p>	<p>None to slight. None.</p>
<p>10. Effect on plant community composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff: Canopy 25-30%, Basal 5-10%, Litter 65-75%; 75-80% of canopy cover is perennial grasses and 5-10% is trees and shrubs. Cover is well dispersed throughout site</p>	<p>None to slight. Adequate plant community on site.</p>
<p>11. Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site): None, unrestricted root development throughout profile</p>	<p>None to slight. None observed.</p>
<p>12. Functional/Structural Groups (list in order of descending dominance by above-ground weight using symbols: >>, >, = to indicate much greater than, greater than, and equal to) with dominants and sub-dominants and "others" on separate lines: Dominant: Perennial mid-grasses > annual forbs & grasses > shrubs > succulents > short grasses Mesquite canopy >= 10% may inhibit grass cover/production</p>	<p>Slight to moderate. Dominated by annual aristida. Some perennials under mesquite.</p>
<p>13. Amount of plant mortality and decadence (include which functional</p>	<p>None to slight. Even age class distribution.</p>

17 Indicators Reference Sheet	Rational from January 2014
<p>groups are expected to show mortality or decadence): Some scattered mortality/decadence of low shrubs and smaller perennial grasses as may be expected for drought. May exhibit high degree of decadence due to lack of fire on the site.</p>	
<p>14. Average percent litter cover (65-75%) and depth (0.25-0.5inches): 20-30% litter cover in canopy interspaces (65-75% total litter cover) with depths of 0.25 – 0.5in. Cover much higher under vegetation, some litter persisting since last season, uniform distribution throughout site. Almost all litter is herbaceous</p>	<p>None to slight. Good litter component per ESD parameters.</p>
<p>15. Expected annual production (this is TOTAL above-ground production, not just forage production): annual production 2000 lbs/ac in favorable rainfall years, 1200 lbs/ac in normal years and 700 lbs/ac in poor years</p>	<p>None to slight. Within ESD parameters.</p>
<p>16. Potential invasive (including noxious) species (native and non-native). List Species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicator, we are describing what is NOT expected in the reference state for the ecological site: Lehmann's love grass can dominate site to the exclusion of other grasses, Mesquite can also dominate site and tend to inhibit grass cover/production after roughly 10% canopy cover, prickly pear also be invasive</p>	<p>None to slight. None observed.</p>
<p>17. Perennial plant reproductive capability: Not impaired in anyway, even in prolonged drought black gramma producing stolons</p>	<p>None to slight. Within ESD parameters.</p>

Table 17. A comparison between conditions described in the ESD (R041XC319AZ – NRCS 2006) and current conditions of key area RZ-1. Soil cover components include: plants (including basal cover), biological crusts, litter, and surface fragment.

	Basal Cover				Biological Crust	Litter	Surface Fragments > 1/4" & ≤ 3"	Surface Fragments > 3"	Bedrock	Bare Ground
	Grass/ Grass like	Forb	Shrub / Vine	Tree						
ESD R041XC319AZ	8-15%	0-1%	0-1%	0-1%	1-10%	20-75%	5-40%	0-5%	0%	10-20%
RZ-1	19%	0%	0%	0%	0%	84%	56%	0%	0%	1%

Figure 14. State and transition model for Sandy Loam Upland



14 APPENDIX C: MONITORING DATA

14.1.1 Utilization

Utilization is the proportion or degree of the current year’s forage production that is consumed or destroyed by animals (including insects). Utilization may refer either to a single plant species, a group of species, or the vegetation as a whole. Utilization is a comparison of the amount of vegetation left

compared with the amount of vegetation produced during the year (USDA, NRCS, and USDO, 1996). Utilization measured at RZ-1 at the time of the study in 2014 was 0%.

Table 18. Foliar cover of species recorded in the LPI plot for key areas RZ-1.

Key area information		Species	Line point intercept canopy cover at RZ-1
Trend Plot 1 Ramirez Allotment		Threeawn (<i>Aristida</i>)	80%
Range site: R041XC319AZ		Feather Fingergrass (<i>Chloris Virgate</i>)	1%
		Lehmann Lovegrass (<i>Eragrostis Lehmanniana</i>)	2%
		Mesquite (<i>Prosopis velutina</i>)	16%
		Resurrection plant (<i>Selaginella lepidophylla</i>)	1%
		Alkali Sacaton (<i>Sporobolus Airoides</i>)	5%
Cover/Litter/Bare Ground			
Foliar Cover	92%		
Basal Cover	19%		
Bare Ground	1%		

Table 19 and 20 shows the data summary from 2-28-2011 on key area RZ-1. Figure 11 is the percent cover data collected by U of A, using line intercept, on the Ramirez allotment. Figure 12 and 13 are photos of transect RZ-1.

Table 19. 2011 U of A data summary on RZ-1.

Southeast Arizona Rangeland Monitoring Program

Site Class: BLM || Gila || Tucson || Ramirez (5268) || Ramirez

Date: 02/28/2011

Examiner(s): AB, E Baker

Site ID: R-1

Ground Cover							Fetch			
Category/Species	Symbol	# Hits				% Cover	Count	100	Average	6.4
		Transect								
		1	2	3	4	Total	Min	0	Max	43
Ground Cover							Median	4.0	Asymmetry	5.2
Bare Ground		8	2	11	4	25				
Gravel (1/4" - 3")		1	1	1	2	5				
Litter		14	19	9	17	59				
Live Basal Veg.		2	3	4	2	11				

Species Frequency - 40x40 cm Quadrat							Dry-Weight Composition				
Species	Symbol	# Hits				% Frequency	# Hits			Wtd. Total	% Comp.
		Transect									
		1	2	3	4	Total	1	2	3		
Woody Species											
Opuntia fulgida-canopy	OPFU				1	1					
Opuntia fulgida	OPFU							1		1	1
Opuntia leptocaulis	OPLC		1			1	1			2	1
Grasses - Perennial											
Aristida	ARIS	1	1	2	3	7	3	5	3	34	4
Bouteloua rothrockii	BORO2	6	1	8	10	25	19	20	15	188	20
Digitaria californica	DICA8			1		1	1			7	1
Eragrostis lehmanniana	ERLE	23	19	8	12	62	60	56	44	576	61
Muhlenbergia porteri	MUPO2		3	1		4	2	2		18	2
Annuals											
Annual forb(s)	AAFF		1			1					
Annual grass(es)	AAGG	1	2	7	7	17					
Unclassified											
Haplopappus tenuisectus	HATE	3	2	1		6	1	4	10	25	3
Haplopappus tenuisect.-canopy	HATE	2	3	2	1	8					
Prosopis	PROSO			2		2	4	4	19	55	6
Prosopis-canopy	PROSO	2	8	6	6	22					
Setaria macrostachya	SEMA5		3	4		7	4	2	2	34	4

Figure 12. RZ-1 Key Area on 2/28/11



Table 20. 2013 U of A data summary on RZ-1.

Data Summary

Site Class: BLM || Tucson || Ramirez

Date: 8/23/2013

Site ID: R-1

Examiner(s): MW

% Ground Cover							Fetch			
Species	Transect (#Hits)					% Cover*	n	100	Minimum	0
	1	2	3	4	Total					
Bare Ground	12	15	7	7	41	13.67	Mean	19.2	SE	3.23
Gravel (1/4" - 3")	19	7	25	21	72	24.00	Asymmetry	3.41		
Litter	43	51	42	47	183	61.00				
Rock > 3"			1		1	0.33				
Live Basal Veg.	1	2			3	1.00				

% Frequency							40x40 cm		DWR Wt. Composition			Sample Size = 62	
Species		Transect (#Hits)					% Freq*	Rank (#Hits)			Wtd. Sum	% Comp.*	
		1	2	3	4	Total		1	2	3			
Allionia	ALLIO	1	1			2	2.00	1	1	2	11	1.77	
Allionia-canopy	ALLIO		2	1		3	3.00						
Annual forb(s)	AAFF	22	23	16	17	78	78.00						
Annual grass(es)	AAGG	22	13	21	23	79	79.00						
Aristida	ARIST	6	15	2	1	24	24.00	9	13	11	100	16.13	
Bothriochloa barbinodis	BOBA3			4		4	4.00	4	3	4	38	6.13	
Bouteloua rothrockii	BORO2	2				2	2.00	2	2	2	20	3.23	
Chamaesyce	CHAMA15		2	2	1	5	5.00	2	1	4	20	3.23	
Croton	CROTO	1	3		1	5	5.00	1	1	1	10	1.61	
Cucurbita-canopy	CUCUR		3			3	3.00						
Cucurbita	CUCUR								1	1	3	0.48	
Digitaria californica	DICAB	3	1	1	2	7	7.00	2	5	1	25	4.03	
Eragrostis lehmanniana	ERLE		8	1		9	9.00	5	5	4	49	7.9	
Evolvulus	EVOLV	1		1	1	3	3.00	2	2	2	20	3.23	
Haplopappus tenuisectus	HATE	1			2	3	3.00	3	3	2	29	4.68	
Haplopappus tenuisect.-canopy	HATE			1		1	1.00						
Kallstroemia-orange flower	KALLS	1		1		2	2.00						
Prosopis	PROSO	1				1	1.00	21	12	14	185	29.84	
Prosopis-canopy	PROSO	3	15	2	8	28	28.00						
Sida	SIDA	3	7	5	4	19	19.00	9	11	12	97	15.65	
Zinnia grandiflora	ZIGR		1		2	3	3.00	1	2	2	13	2.1	

* Number of decimal places does not imply level of precision

** Plot median = average transect median, not the median of all plot data

Figure 13. RZ-1 Key Area on 8/21/13



Table 21. 2016 U of A data summary on RZ-1.

Data Summary

Site Class: BLM || Tucson || Ramirez

Site ID: R-1

Date: 12/1/2016

Examiner(s): Mike McIntire Rikki Gurule

% Ground Cover						
Species	Transect (#Hits)					% Cover*
	1	2	3	4	Total	
Bare Ground	25	17	21	19	82	27.33
Gravel (1/4" - 3")	6	2	5	8	21	7.00
Litter	42	55	48	47	192	64.00
Live Basal Veg.	2	1	1	1	5	1.67

Fetch			
n	100	Minimum	0
Maximum	22	Median**	6.5
Mean	7.33	SE	0.39
Asymmetry	2.2		

% Frequency							40x40 cm					DWR Wt. Composition			Sample Size = 91	
Species		Transect (#Hits)					% Freq*	Rank (#Hits)			Wtd. Sum	% Comp.*				
		1	2	3	4	Total		1	2	3						
Woody Species																
Arizona pencil cholla	CYAR14		1			1	1.00	1			7	0.77				
Grasses - Perennial																
threeawn	ARIST	4	6	2	6	18	18.00	13	10	7	118	12.97				
Rothrock's grama	BORCO2	18	5	16	15	54	54.00	47	52	40	473	51.98				
Arizona cottontop	DICAB	1	1			2	2.00	1	3		13	1.43				
Lehmann lovegrass	ERLE	6	14	5	2	27	27.00	24	23	18	232	25.49				
Annuals																
Annual grass(es)	AAQG	23	13	24	24	84	84.00									
Unclassified																
burroweed	HATE			2	2	4	4.00	3	2	4	29	3.19				
burroweed-canopy	HATE			1	2	3	3.00									
mesquite-canopy	PROSO	8	10	2	8	28	28.00									
mesquite	PROSO							2		22	36	3.96				
plains bristlegrass	SEMA5	1				1	1.00		1		2	0.22				

* Number of decimal places does not imply level of precision

** Plot median = average transect median, not the median of all plot data

Figure 13. RZ-1 Key Area on 12/1/16



Table 19. A comparison between the state and transition model in the ESD and the LPI data collected in January 2014 at RZ-1.

State and Transition Mesquite, annuals	LPI Data RZ-1 Canopy Cover
Mesquite– 10-15% Canopy Cover	PRVE –16% Canopy cover
Native and non-native Annuals – 5-90%	ARISTIDA Sp - 80% Canopy cover
State and Transition Mesquite, annuals	LPI Data

Figure 19. Species Composition at Key Area RZ-1

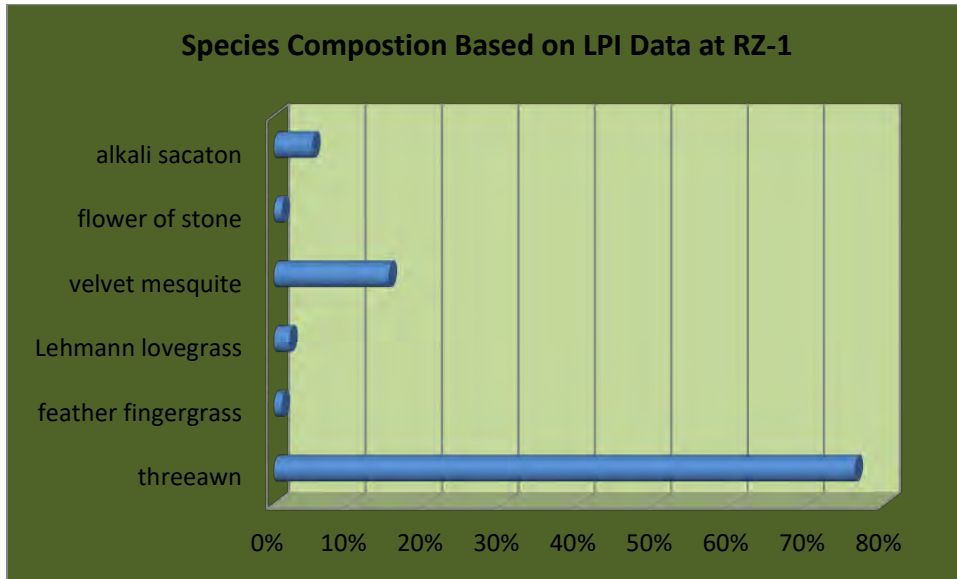


Table 20. Functional/structural plant groups at RZ-1

Ranking	Species List for Functional/Structural Groups at RZ-1
D	ARISTIDA SP
M	ERLE
S	PRVE
M	BOBA3
M	SELE2
M	CHV14
M	BORO2
	Dominant (D) roughly 40-100% composition, Sub-dominant (S) roughly 10-40% composition, Minor Composition (M) roughly 2-5% composition, or Trace (T) roughly <2% composition.