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Land Health Evaluation  
C. Miller Lease No. 5260  
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# 1 INTRODUCTION

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The purpose of this draft Land Health Evaluation (LHE) report for the C. Miller 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.

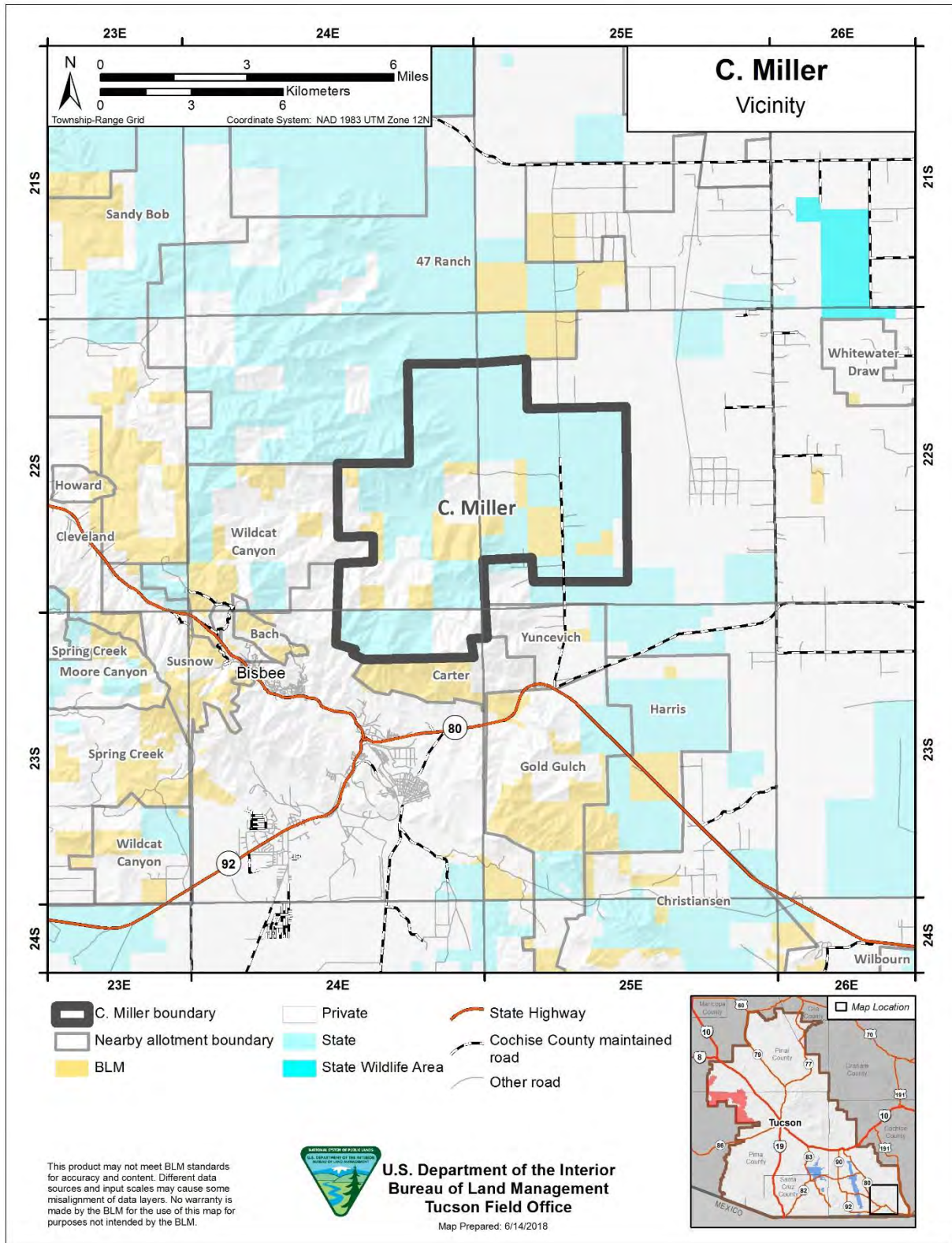
## **2 ALLOTMENT PROFILE AND GENERAL DESCRIPTION**

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### **2.1 Location**

The BLM portion of the C. Miller allotment is located about 5 miles east of the town of Bisbee in Cochise County, Arizona. The BLM lands within the allotment are comprise approximately 14 percent of the total livestock operation. The ranch borders the Wildcat Canyon allotment to the west, the Carter and Yuncevich allotment to the south, the 47 Ranch allotment the north. Figure 1 below shows the C. Miller allotment location.

Figure 1. Vicinity Map of the C. Miller Allotment





## 2.2 Physical Description

This section describes physical characteristics within the C. Miller Allotment.

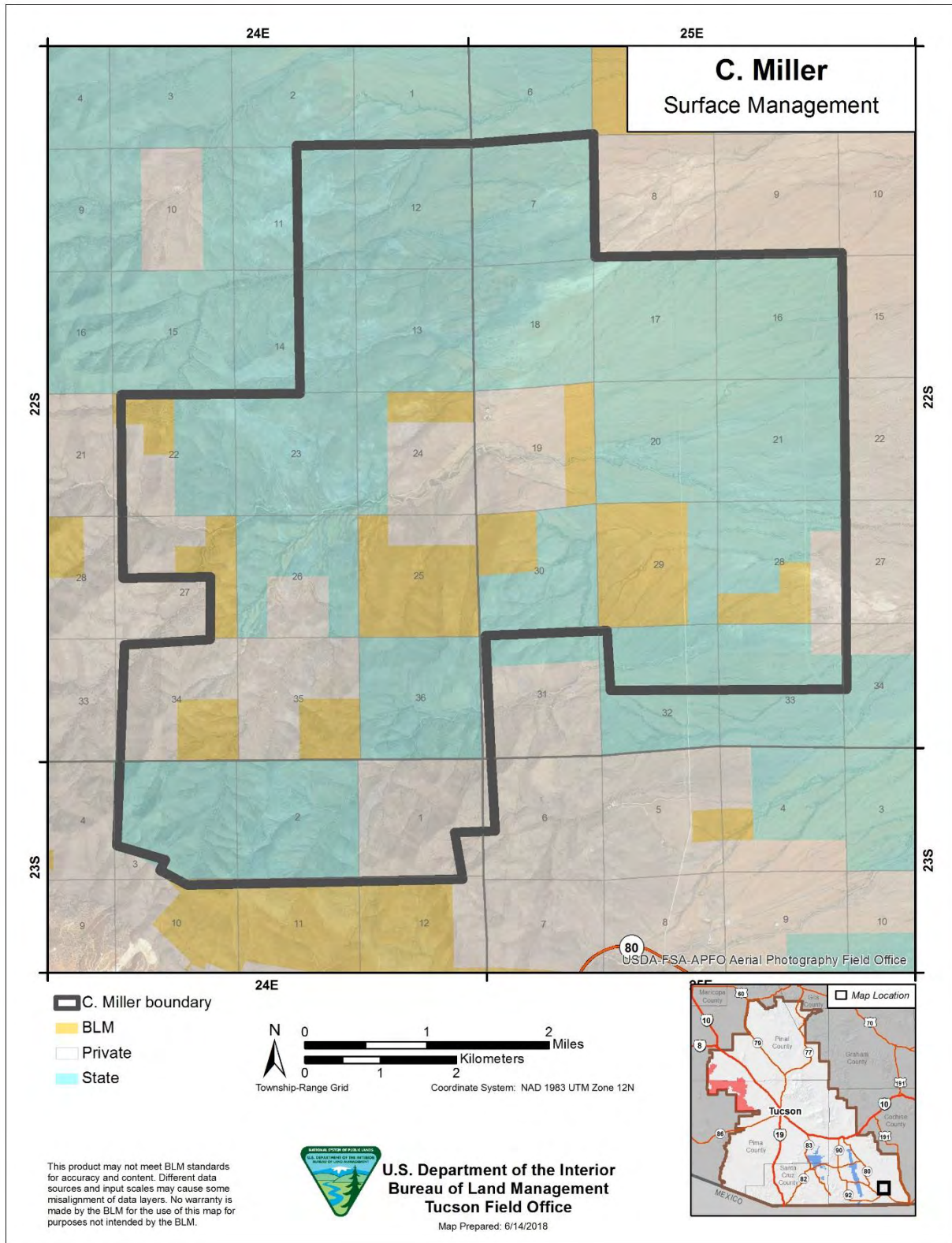
### 2.2.1 *Surface Land Ownership*

The acreage of the C. Miller 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 lands, with lesser amounts of state and private lands. Public lands constitute about 14 percent of the allotment. Spatial distributions of land ownership are displayed in Figure 2.

**Table 1. Acreage of Landownership**

<b>Land Classification</b>	<b>C. Miller Allotment</b>
Public Acres	2,247
State Acres	10,724
Private Land Acres	3,257
<b>Total Acres</b>	<b>16,228</b>

Figure 2. Land Ownership of the C. Miller Allotment



### 2.2.2 Precipitation and Temperature

Climate data comes from the Clay 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, originate 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 (Table 2) 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.

**Table 2. Precipitation and Temperature Averages for Clay Loam 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	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	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	47.1

**Table 3. Western Regional Climate Center data from BISBEE, ARIZONA (020775).**

Period of Record Monthly Climate Summary. Period of Record: 03/01/1985 to 06/09/2016  
 (https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?az0775)

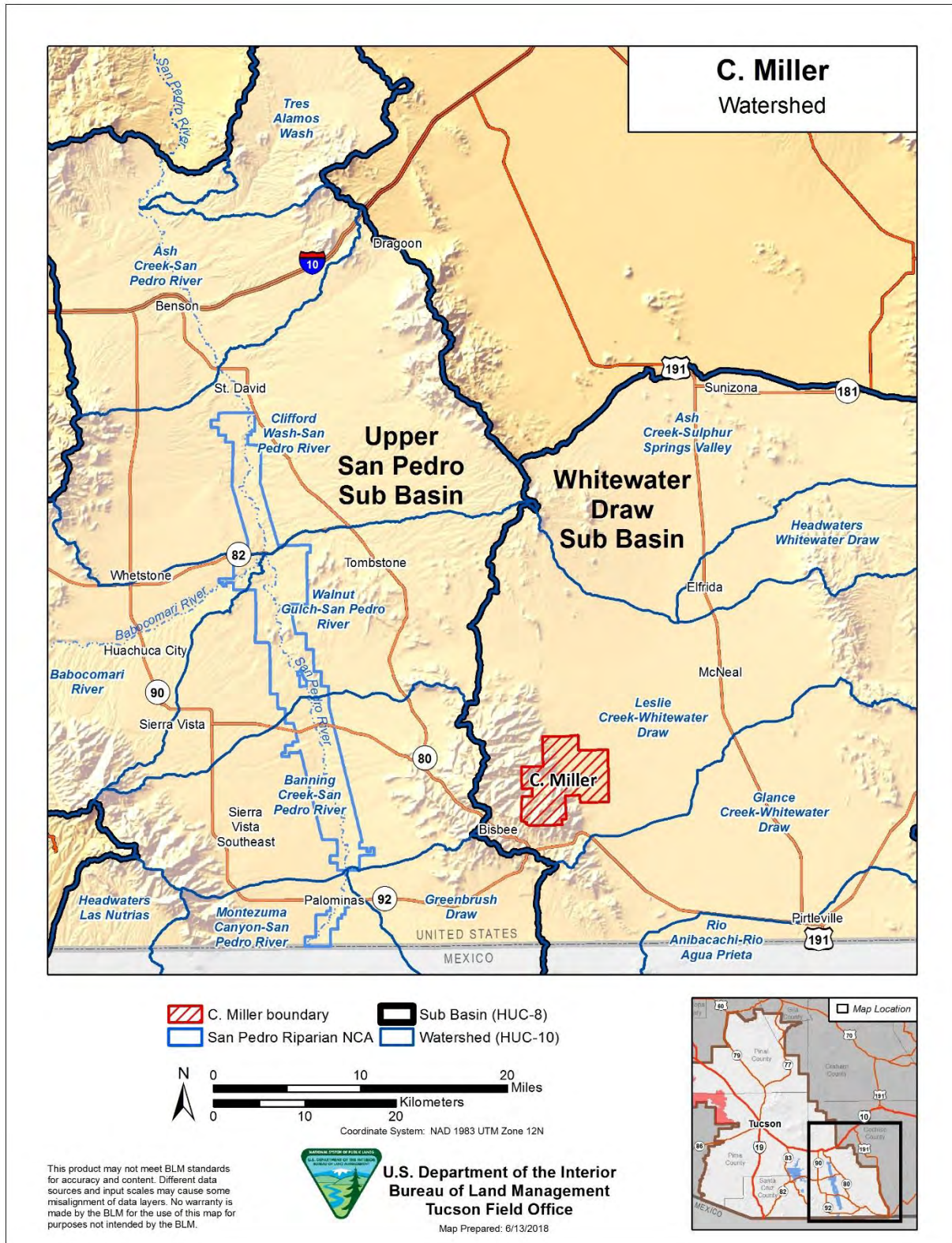
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	56.7	60.2	66.7	74.0	81.6	89.5	87.4	84.6	82.3	74.7	64.0	56.1	73.2
Average Min. Temperature (F)	30.6	33.0	36.8	43.0	49.8	58.4	61.8	59.9	55.1	46.0	36.7	30.6	45.2
Average Total Precipitation (in.)	1.13	1.19	0.88	0.57	0.21	0.64	4.13	4.20	1.90	1.26	0.90	1.36	18.38
Average Total SnowFall (in.)	2.4	1.6	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.4	6.1
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

### 2.2.3 Watershed and Water Resources

The C. Miller allotment is located on the other side of the basin divide from San Pedro River and lies within the Whitewater Draw HUC-8 Sub Basin (Figure 3) in the Douglas Basin of the Sulfur Springs Valley. Within this sub basin, the allotment is included in the smaller Leslie Creek- Whitewater Draw (HUC-10). In this semi-arid basin, most of the streams are ephemeral, Whitewater draw being the largest, the U.S. portion of which drains from its headwaters in the southern end of the Chiricahua's to Mexico near Douglas, AZ.

The largest drainage in the C. Miller allotment is Dixie Canyon. This ephemeral drainage has an estimated contributing area of 18.6 sq. miles from the outlet at the eastern boundary of the allotment. The elevation relief (highest elevation minus lowest elevation) of this drainage 2,878 ft. The 2, 5, 10, & 25 year peak floods are estimated from the regional statistics to be 481, 1240, 2010, and 3350 cubic feet per second, respectively (USGS 2016).

Figure 3. Map of watersheds associated with C. Miller



## 2.2.4 Soils

The soil composition on the C. Miller allotment is varied as presented in Table 4 and Figure 4. The dominant soil orders in this Major Land Resource Area (MLRA) are Aridisols, Entisols, Alfisols, and Mollisols. The soils in the area dominantly have a thermic soil temperature regime, an aridic or ustic 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 Torrfluvents (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 C. Miller allotment are shown in the table below. The dominant soils are Lutzcan-Yarbam complex, 25 to 50 percent slopes and Eloma-Caralampi-White House complex, 1 to 15 percent slopes MLRA. The acreages may not be accurate due to difficulty defining the area of interest in the web soil survey system.

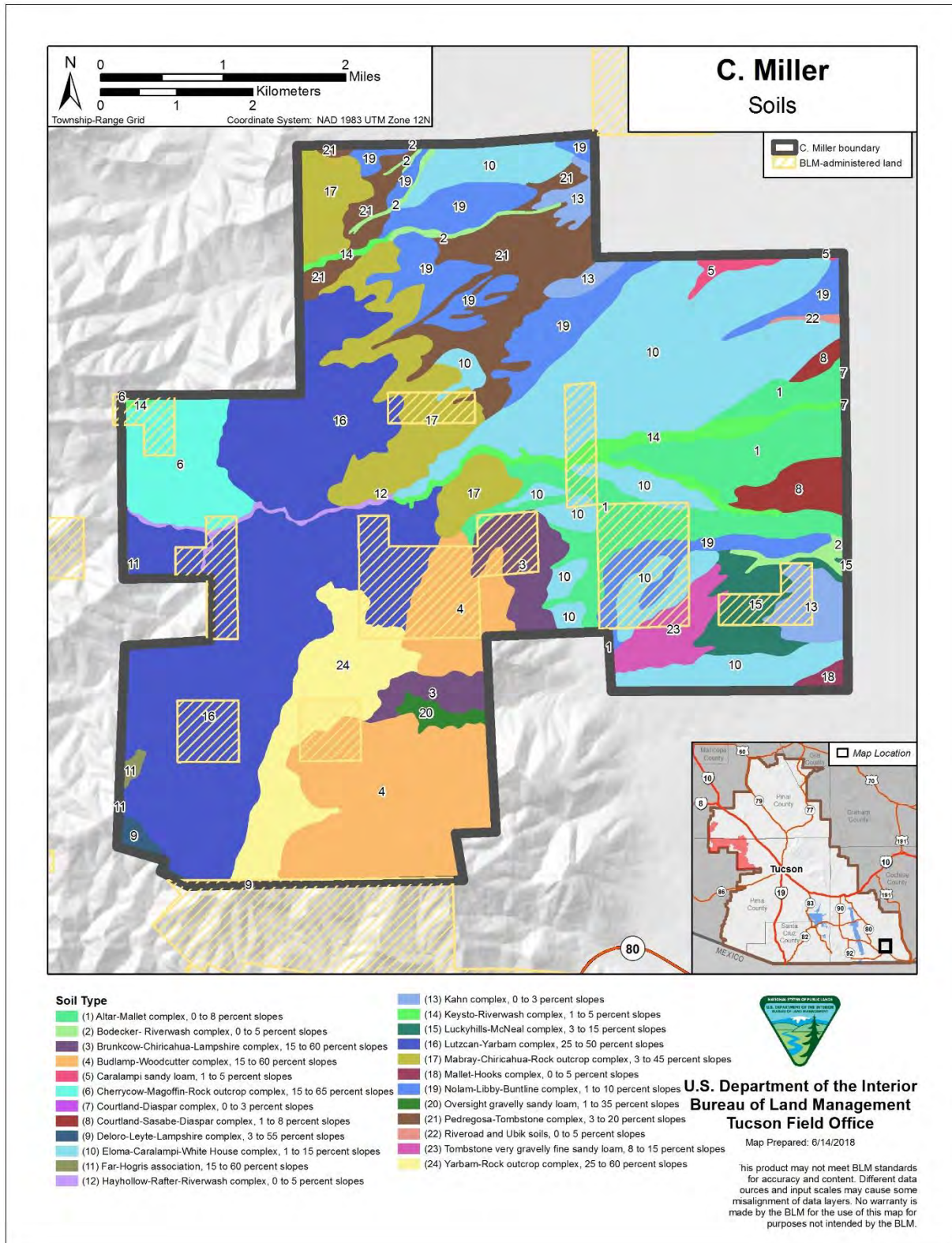
**Table 4. Soils on the C. Miller Allotment**

Map Unit Name	Acres in Allotment	Percent of Allotment Acres
Altar-Mallet complex, 0 to 8 percent slopes	1,161.76	7.16
Bodecker- Riverwash complex, 0 to 5 percent slopes	125.39	0.77
Brunkcow-Chiricahua-Lampshire complex, 15 to 60 percent slopes	449.64	2.77
Budlamp-Woodcutter complex, 15 to 60 percent slopes	1,724.68	10.63
Caralampi sandy loam, 1 to 5 percent slopes	68.52	0.42
Cherrycow-Magoffin-Rock outcrop complex, 15 to 65 percent slopes	584.86	3.60
Courtland-Diaspar complex, 0 to 3 percent slopes	1.84	0.01
Courtland-Sasabe-Diaspar complex, 1 to 8 percent slopes MLRA 41	236.16	1.46
Deloro-Leyte-Lampshire complex, 3 to 55 percent slopes	60.63	0.37
Eloma-Caralampi-White House complex, 1 to 15 percent slopes MLRA 41	2,801.11	17.26
Far-Hogris association, 15 to 60 percent slopes	31.72	0.20
Hayhollow-Rafter-Riverwash complex, 0 to 5 percent slopes	55.29	0.34
Kahn complex, 0 to 3 percent slopes	348.71	2.15
Keysto-Riverwash complex, 1 to 5 percent slopes	311.52	1.92
Luckyhills-McNeal complex, 3 to 15 percent slopes	310.51	1.91
Lutzcan-Yarbam complex, 25 to 50 percent slopes	3,585.99	22.10
Mabray-Chiricahua-Rock outcrop complex, 3 to 45 percent slopes	1,113.68	6.86
Mallet-Hooks complex, 0 to 5 percent slopes	46.97	0.29
Nolam-Libby-Buntline complex, 1 to 10 percent slopes	1,215.07	7.49
Oversight gravelly sandy loam, 1 to 35 percent slopes	71.64	0.44
Pedregosa-Tombstone complex, 3 to 20 percent slopes	883.81	5.45
Riveroad and Ubik soils, 0 to 5 percent slopes	17.23	0.11

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Tombstone very gravelly fine sandy loam, 8 to 15 percent slopes		243.84	1.50
Yarbam-Rock outcrop complex, 25 to 60 percent slopes		777.95	4.79
Totals for Allotment		16,228.5	100.0%

Figure 4. Map of Soil Types within the C. Miller Allotment

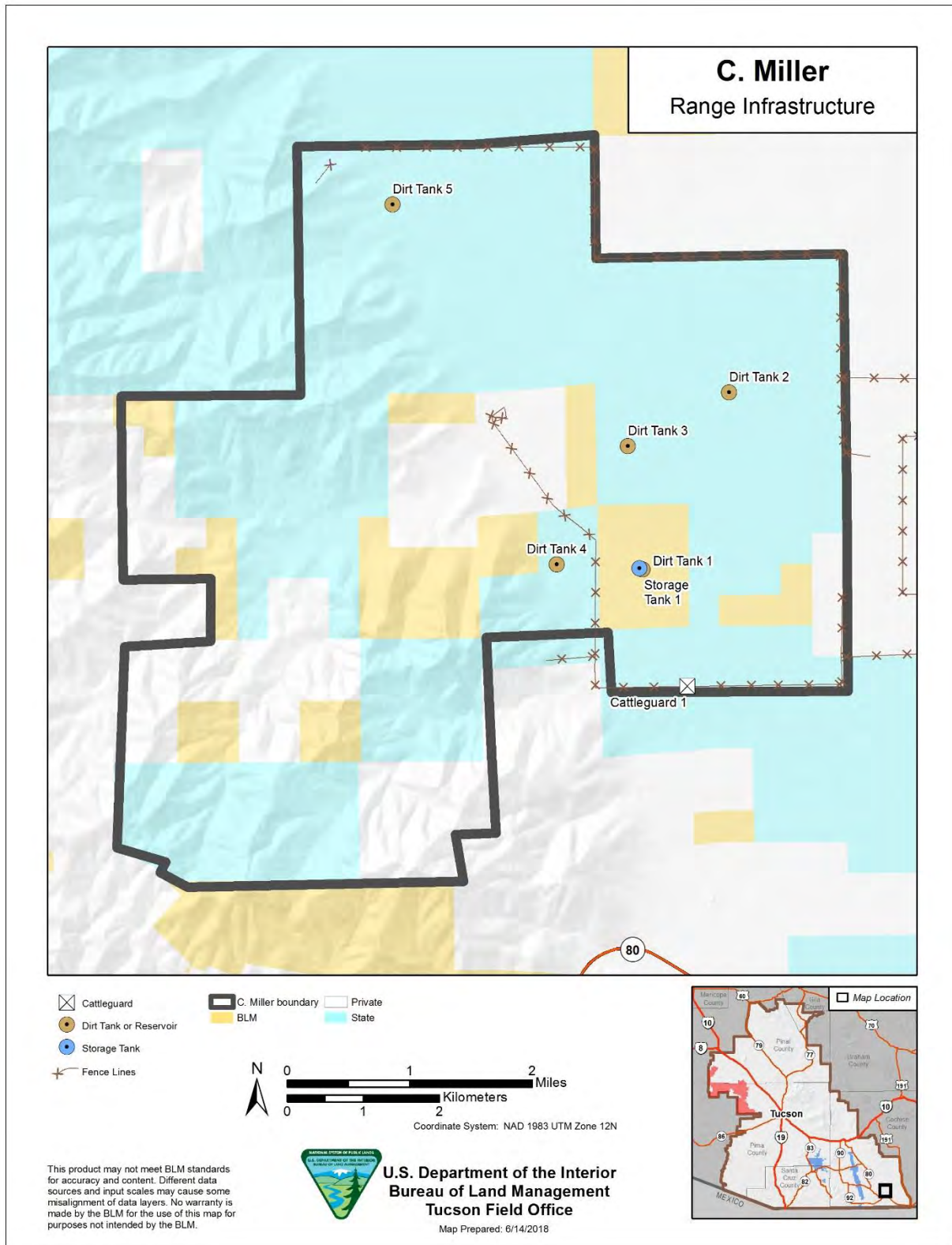




### **2.2.5 Range Improvements**

After a review of the range improvement record for this allotment there are two improvements on public lands, two dirt tanks, and a water storage with trough. Most were digitized using imagery but old files also included Mural Hill Reservoir that is in T22 R24 Sec 34 SE SE. The tank is seasonal like most dirt tanks. Multiple fence lines create pastures that allows for rest rotation grazing system. 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 C. Miller 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 C. Miller 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

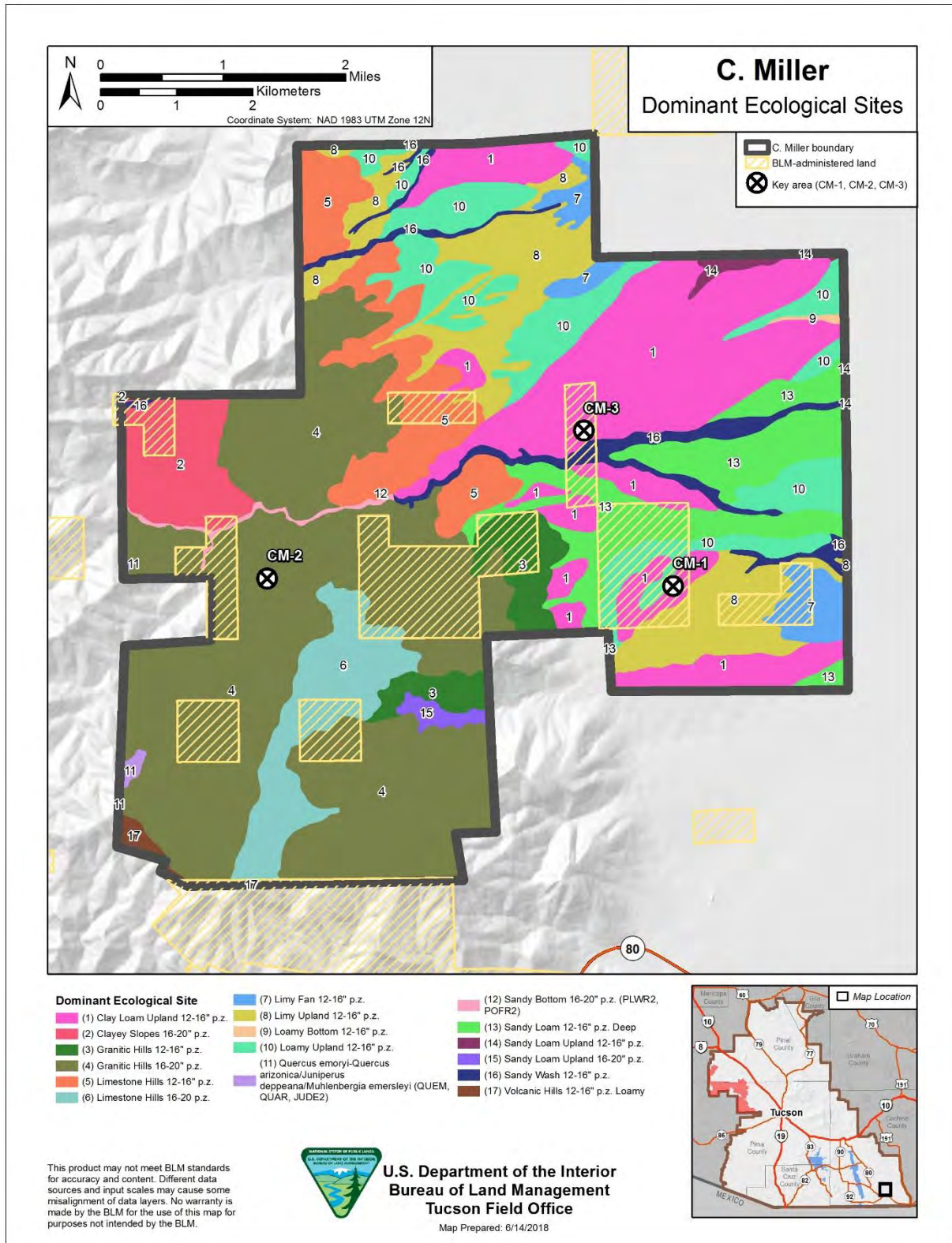
An ecological site is a distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation. It is the product of all the environmental factors responsible for its development, and it has a set of 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 17 ecological sites exist within the entire C. Miller allotment. Three key areas, CM-1, CM-2 and CM-3, have been established on BLM public lands. Key area CM-1 and CM-3 are within Clay Loam Upland 12-16" precipitation zone (p.z) and CM-2 is within the Granitic Hills 16-20" p.z. ecological site, which are the primary ecological sites within the BLM lands in the allotment (Figure 6). Key Area CM-1, CM-2 and CM-3 were established by the BLM and University of Arizona Extension, and pace frequency

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data is collected to be able to track any changes in long-term trend of vegetation and ground cover. CM-1 and CM-3 is also the location where the U.S. Forest Service Strike Team, referred to as TEAMS documented 2014 LHE and collected line-point intercept data.

Figure 6. Ecological Sites within C. Miller Allotment



The ecological site for key areas CM-1 and CM-3 is a Clay Loam Upland 12-16" p.z (R041XC305AZ). Key vegetative species for this site include: false mesquite (*calliandra eriophylla*), Tobosagrass (*pleuraphis mutica*) 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 old fan terraces and old stream terraces. It is always in an upland position.

### **2.3.3 Wildlife Resources**

#### **2.3.3.1 General Wildlife**

The C. Miller allotment, which includes public, private, and state lands offers diverse habitats for migratory birds, providing valuable food, water, and cover. 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. 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.

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.

#### **2.3.3.2 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- 09551). Through that analysis, it was determined that 41 species with special status (Appendix A, includes effects determinations and rational) could occur within a 5 mile radius of the allotment. Of those species, 14 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.

## **Plant Resources**

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 the site is dominated by warm season perennial grasses. Most of the major perennial grass species on the site are well dispersed throughout their plant community. However, tobosa, vine mesquite, and curly mesquite tend to occur in patches on this site. These patches appear to be well dispersed and are variable in size. Perennial forbs are well represented on the site, as well as a few species of low shrubs. The aspect is open grassland.

This area supports forest, savanna, and desert shrub vegetation. Pine-oak woodlands are at the higher elevations, where ponderosa pine, Douglas-fir, live oak, New Mexico locust, Mexican pinyon, buckbrush, and manzanita grow along with an understory of muhlys, bluegrasses, sedges, pine dropseed, and squirreltail. Evergreen woodland savannas are at intermediate elevations, where Mexican blue oak, Emory oak, and turbinella oak are the dominant species and cone beardgrass, sideoats grama, blue grama, Texas bluestem, plains lovegrass, sprucetop grama, threeawns, and needlegrass characterize the understory. Whitethorn, soap tree yucca, fourwing saltbush, mesquite, and ocotillo grow on the drier soils at the lower elevations. The understory on these sites consists of Rothrock grama, black grama, alkali sacaton, curly mesquite, plains bristlegrass, bush muhly, and lemongrass.

Table 5 below lists the vegetation communities within the C. Miller allotment. There are three vegetation types that make up 75 percent of the total acreage. Those majority communities are (Figure 7);

1. Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe. "This ecological system is a broadly defined desert grassland, mixed shrub-succulent or xeromorphic tree savanna that is typical of the Borderlands of Arizona, New Mexico and northern Mexico [Apacherian region], but extends to the Sonoran Desert and throughout much of the Chihuahuan Desert. It is found on gently sloping bajadas that supported frequent fire throughout the Sky Islands and on mesas and steeper piedmont and foothill slopes in the Chihuahuan Desert. Common grass species include *Bouteloua eriopoda*, *Bouteloua hirsuta*, *Eragrostis intermedia*, *Muhlenbergia porteri*, *Muhlenbergia setifolia*, *Pleuraphis jamesii*, *Pleuraphis mutica*, and *Sporobolus airoides*, succulent species of *Agave*, *Dasyliirion*, and *Yucca*, and tall shrub/short tree species of *Prosopis* and various oaks (e.g., *Quercus grisea*, *Quercus emoryi*, *Quercus arizonica*). Many of the historical desert grassland and savanna areas have been converted, some to Chihuahuan Mesquite Upland Scrub (*Prosopis* spp.-dominated), through intensive grazing and other land uses. (<http://swregap.nmsu.edu>)
2. Madrean Encinal occurs in foothills, canyons, alluvial fan piedmonts (bajadas) and plateaus in the Sierra Madre Occidentale and Sierra Madre Orientale in Mexico, extending north into Trans-Pecos Texas, southern New Mexico and sub-Mogollon Arizona. Stands occur down to 900 m elevation in southern Sonora, but generally range from around 1200-1350 m intermixed with semi-desert grasslands, and extend up to 1650-2200 m as pure oak patches within Madrean montane forests and woodlands (Brown 1982a). Soils are variable but generally thin and rocky. Where encinal occurs within grasslands, it generally occupies the rockier substrates or is restricted to drainages (Brown 1982a). *Soil/substrate/hydrology*: Soils are variable but generally thin and rocky. Where encinal occurs within grasslands, it generally occupies the rockier substrates or is restricted to drainages (Brown 1982a). (<https://www1.usgs.gov/csas/nvcs/nvcsGetUnitDetails?elementGlobalId=833206>)

3. 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 5. Vegetation Communities Found Within the C. Miller Allotment**

Vegetation Type	Acres on Allotment	Percent of Acres
Apacherian-Chihuahuan Mesquite Upland Scrub	3,620.79	22.31
Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	4,412.32	27.19
Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	625.40	3.85
Chihuahuan Mixed Salt Desert Scrub	935.88	5.77
Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub	23.00	0.14
Chihuahuan Succulent Desert Scrub	87.78	0.54
Madrean Encinal	4,178.54	25.75
Madrean Juniper Savanna	1.11	0.01
Madrean Pine-Oak Forest and Woodland	80.89	0.50
Madrean Pinyon-Juniper Woodland	1,852.21	11.41
Mogollon Chaparral	297.09	1.83
North American Warm Desert Bedrock Cliff and Outcrop	23.77	0.15
North American Warm Desert Pavement	0.89	0.01
North American Warm Desert Riparian Mesquite Bosque	4.00	0.02

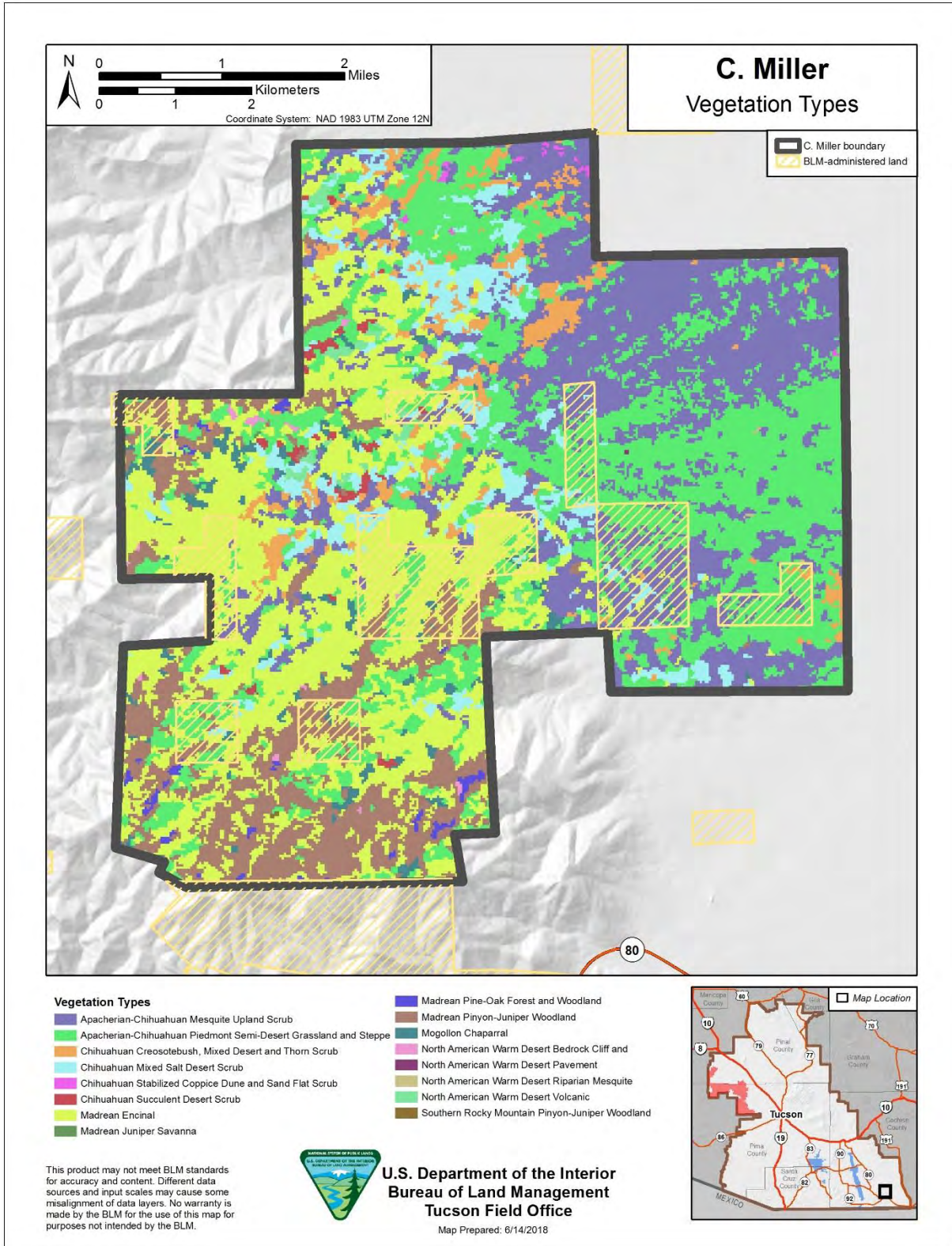


C. Miller Allotment Land Health Evaluation

North American Warm Desert Volcanic Rockland	83.06	0.51
Southern Rocky Mountain Pinyon-Juniper Woodland	1.78	0.01
Total	16,228.5	-

**Figure 7. Vegetation Communities within C. Miller Allotment**

C. Miller Allotment Land Health Evaluation



## 2.4 Special Management Areas

There are no special management areas within the C. Miller 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 BLMTFO'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 gulying, 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 C. Miller grazing allotment between June 6 and 12, 2019. Data reviewed were obtained from BLMTFO 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 & NP Gallery 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 four prior cultural resources investigations (Table 6) that, collectively, have resulted in the inventory of approximately 50 acres of BLM-managed surface and documentation of six cultural resource sites. Known site types include a prehistoric processing and agricultural complex, a historic-age ranching site, and historic-age roads. Historic-age GLO plat maps also were reviewed that depict ranches, mines, dwellings, and associated infrastructure (plat nos. 2505 and 2506, dated 1920 and 1886, respectively); however none of the depicted features correspond with the BLM-administered portion of the allotment. Such features evidence the long-term grazing and mining history of the area, some of which predates the early 1900s.

**Table 6. Prior Cultural Resources Investigations within the C. Miller Allotment**

No	Project No.	Project Name	Reference(s)
	2.196.SHPO	4.25 acres east of Lonesome Road	AZSite 2019
	215.BLM	BLM Survey	AZSite 2019
	1978-32.ASM	ADOT Materials Pit	Hammack 1978
	1998-557.ASM	EPNG Willcox to Mexico Survey	Chenault 2000

### Statement of Effect Determination

No documented cultural sites coincide with the existing range improvement and potential livestock concentration area on the BLM-administered portion of the allotment; however, this location has not been subject to field assessment or inspection. 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 C. Miller allotment is appropriate under a finding of *no adverse effect*, provided that the one un-surveyed range improvement location is subject to field inspection prior to lease issuance. Additionally, the following Conditions of Approval (COAs) are applicable lease stipulations. 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 10 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 C. Miller 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, White Mountain Apache Tribe, and Yavapai-Apache Nation. Identified plant species with potential cultural significance include broom snakeweed (*Gutierrezia sarothrae*) 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**

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

#### **3.1 Grazing History**

Historic and recent grazing use has been by cattle on the C. Miller allotment. The BLM lands within the allotment comprise approximately 14 percent of the total livestock operation. There are 8 head of cattle run on the BLM lease. Between it and the other leased and private lands, there is a yearlong grazing system. The 96 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. This lease calculated its AUMs using 8 cows at 100% public lands to total 96 AUMs

The management category given to the C. Miller allotment is custodial (C). Custodial grazing management is applied to areas having acceptable range condition and a stable or improving trend. Under custodial management the BLM management actions are limited to licensing livestock use based on the AUMs available on the public lands. The individual ranch operator determines the grazing system (if any) to be used. The BLM checks these grazing units to ensure that the utilization on public lands is not excessive, that range condition and trend are being maintained, and that applicable regulations are being followed. The BLM will work with the operator to adjust livestock numbers on the total grazing unit if utilization is found to be excessive or the range trend to be downward. Grazing units managed custodial include areas where the effects of livestock use on the public land resources are anticipated to be minimal. Selection of public land areas for custodial management is based on the following criteria:

1. Present range condition is not a factor.
2. Allotments have low resource production potential and are producing near their potential.
3. Limited resource-use conflict/controversy may exist.
4. Opportunities for positive economic return on public investment do not exist or are constrained by technological or economic factors.
5. Present management appears satisfactory or is the only logical practice under existing resource conditions.

The allotment is 16,228 total acres, of which 2,247 acres is administered by the BLM. There is currently one lease issued for 96 Animal Unit Months (AUMs) on the BLM public lands for the C. Miller allotment. Public land percentage is 14 percent. 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 20 pounds of forage per day. AUMs totals for the C. Miller allotment leases are in Table 7.

**Table 7. C. Miller Lease and AUMs**

Ownership	Animal Unit Months (AUMs)	Animal Units (AU)	Percent Public Land
BLM – C. Miller #5260	96 AUMs	8 AU Yearlong	100

### 3.2 Mandatory Terms and Conditions for Permitted Use

Grazing use on the C. Miller Allotment is in accordance with the terms and conditions of the current lease issued for 96 AUMs on public lands. The Mandatory Terms and Conditions of the lease are listed below:

**Table 8. 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
8	Cattle	3/1 to 2/28	100	Active	96

\* 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

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This section provides an overview of the Tucson Field Office management objectives that are associated with the C. Miller 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 resource management objectives established through existing land use plans and activity level plans by resource specialists and permittees. 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 C. Miller 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 C. Miller 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, providing forage and habitat for both livestock and wildlife.

The potential plant community on this site is dominated by warm season perennial grasses. All the major perennial grass species on the site are well dispersed throughout the plant community. Perennial forbs and a few species of low shrubs are well represented on the site. The aspect is open grassland.

With continuous heavy grazing, palatable perennial grasses like blue, hairy, sprucetop and sideoats grammas and plains lovegrass decrease. Increases under such circumstances include curly mesquite, threeawns and, in places, false mesquite. With severe deterioration, shrubby species increase to dominate. Loss of porous surface soil causes a reduction in the site's ability to effectively use intense summer rainfall. Natural fire was important in the development of the potential plant community. Stable areas of the 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 grass is about the same as the present production of half-shrubs once they are removed from the plant community by fire or brush management.

**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 areas CM-1 and CM-3 are within Clay 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 CM-1 and CM-3 were established by the BLM and University of Arizona Extension. Pace frequency data was collected to track any changes in long-term trend of vegetation and ground cover in 2010, 2013 and 2017. These key areas were used by TEAMS and documented the 2014 LHE and collected line-point intercept data.

Refer to Table 9 and Figure 6 for the location of the key area on the C. Miller 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 9. Location of the C. Miller Allotment Key Area**

Key Area	Ecological Site	Ecological Site ID	GPS Coordinates (NAD83 CONUS)
CM-1	Clay Loam Upland 12-16"	R041XC305AZ	12 R 0611645 UTM 3484130
CM-3	Clay Loam Upland 12-16"	R041XC305AZ	12 R 0610470 UTM 3486176

The key area objective for the C. Miller 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 Areas CM-1 and CM-3 Desired Plant Community Objectives for Clay Loam Upland 12-16" precipitation zone ecological site**

- Maintain Grasses/Grasslike plants composition of ≥15%
- Maintain a palatable shrub composition of ≥10%
- Maintain bare ground to under 20%

**Rationale:** Maintaining a perennial grass canopy cover of more than 15 percent on this site moves the state to native mid-grassland. Also under the native mid-grassland state mesquite are to be reduced to less than 15% canopy cover to transition toward the native mid-grassland state. Bare ground has been recorded in the 6-13% range in years past.

## **5 RANGELAND INVENTORY AND MONITORING METHODOLOGY**

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The Arizona standards for rangeland health were assessed for the C. Miller Allotment by a U.S. Forest Service Interdisciplinary (ID) team on January 11, 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 C. Miller Allotment at key areas CM-1 and CM-2. 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 Clay Loam Upland 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 land health evaluation (LHE) 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**

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### **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 1992. Livestock grazing for the C. Miller 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 two key areas (CM-1 and CM-3) and is located in the Clay Loam Upland 12-16" p.z (R041XC305AZ). 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 CM-1, CM-2 and CM-3 key areas, in 2010, 2013 and 2017. Upland range health and vegetation monitoring was evaluated on CM-1 and CM-3 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 CM-1 and CM-3 on the C. Miller Allotment is presented in Table 10 below.

**Table 10. Summary of Range Health Assessment Ratings**

Key Area	Ecological Site	Range Health Attributes – Degree of Departure		
		Soil	Hydrology	Biotic Integrity
CM-1	Clay Loam Uplands 12-16" p.z.	None to Slight	None to Slight	Moderate
CM-3	Clay Loam Uplands 12-16" p.z.	None to Slight	None to Slight	Moderate

**Rangeland Health Attribute 1: Soil and Site Stability**

CM-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 None to Slight because there were none observed on the site. Bare ground was measured at zero 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. 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 because soils were stable and remained in place. Rock and gravel fragments covered 46.5 percent of the soil surface. Plants were able to grow through these fragments and provided a canopy cover measured at 84 percent and 7 percent basal cover at CM-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. All 10 indicators for soil site stability were rated as None to Slight. Site was stable with good perennial grass cover.

CM-3- 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 None to Slight because there were none observed on the site. Bare ground was measured at 11 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. 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 because soils were stable and remained in place. Rock and gravel fragments covered 9 percent of the soil surface. Plants were able to grow through these fragments and provided a canopy cover measured at 66 percent and 8 percent basal cover at CM-3 (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. All 10 indicators for soil site stability were rated as None to Slight. Site was stable with good perennial grass cover.

**Rangeland Health Attribute 2: Hydrologic Function**

CM-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 None to Slight because there were none observed on the site. Bare ground was measured at zero

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 46.6 percent of the soil surface. Canopy cover was measured at 84 percent and 7 percent basal cover at CM-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 56 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. All 10 indicators for hydrologic function were rated as None to Slight. The site had no above ground flows and had good vegetative cover and distribution.

CM-3- 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 None to Slight because there were none observed on the site. Bare ground was measured at 11 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 9 percent of the soil surface. Canopy cover was measured at 66 percent and 8 percent basal cover at CM-3 (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 66 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. All 10 indicators for hydrologic function were rated as None to Slight. The site had no above ground flows and had good perennial grass cover.

### ***Rangeland Health Attribute 3: Biotic Integrity***

CM-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 46.6 percent of the soil surface. Canopy cover was measured at 84 percent and 7 percent basal cover at CM-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 Moderate due to Lehman invaded site. Plant mortality/decadence was rated Slight to moderate; Mesquite showed decadence within population. The ESD describes the current functional groups as being adapted to survival in all years, except during the most severe droughts. Litter amounts were measured at 56 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 Moderate. 7 indicators for biotic function were rated as none to slight. One indicator was slight to moderate and one was moderate. The site is moderately deviated from the HCPC community due to Lehman's dominating the site.

CM-3- 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 9 percent of the soil surface. Canopy cover

was measured at 66 percent and 8 percent basal cover at CM-3 (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 Moderate due to Lehman dominated site. Plant mortality/decadence was rated Slight to moderate; Mesquite showed decadence within population. The ESD describes the current functional groups as being adapted to survival in all years, except during the most severe droughts. Litter amounts were measured at 56 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 Moderate. 7 indicators for biotic function were rated as none to slight. One indicator was slight to moderate and one was moderate. The site is moderately deviated from the HCPC community due to Lehman's dominating the site.

### Key Area Conclusions:

Upland range health was evaluated at two key areas (Referred to CM-1 and CM-3). The key areas were selected for 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 Areas CM-1 and CM-3

- |  |          |
|--|----------|
| • Maintain Grasses/Grasslike plants composition of $\geq 15\%$ | ACHIEVED |
| • Maintain a palatable shrub composition of $\geq 10\%$        | ACHIEVED |
| • Maintain bare ground to under 20%                            | ACHIEVED |

**Rationale:** Grass composition based on the most recent 2017 data has been met. CM-1 was over 60 percent. CM-3 was 95%. Palatable shrub composition on CM-1 was almost 20 percent while CM-3 only about 3 percent. CM-3 is a much different site with more grasses present. Maintaining bare ground to under 20 percent was also achieved on CM-1 at 10 percent. CM-3 was actually 32 percent in 2010, 26 percent in 2013, 11 percent in 2014 and 30 percent in 2017. CM-3 has a composition of Lehman's love grass of 90 percent and 48 percent litter cover. This site has 66 percent foliar cover but shows signs of Lehman's dominated sites.

### Conclusions:

The data at both trend plots shows that cover and litter is adequate to ensure soil stabilization and appropriate permeability rates within the ecological site. The ESDs describe the Ecological Dynamics of the Sites on the allotment as plant communities that are "*naturally variable*" (NRCS 2013). These variations occur due to site aspect, soils, and other natural conditions. The ESD for both CM-1 and 3 describes the state and transition model of the vegetative community as a Lehmann invaded state: "*Mesquite has increased in the absence of fire for long periods of time to canopy levels of 10%. Lehmann and / or Boer lovegrass have invaded from seeded areas and dominate the under-story...*" The key area does not have a high frequency of Mesquite within the community but it is present as observed within transect CM-1. 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 not



observed. Wind-scouring and litter movement were none to slight. The allotment is within the variability of the state and transition models as delineated in the ecological site descriptions. (Appendix B Figure 14).

#### **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 CM-1 and 3 is Clay Loam Upland 12-16" p.z (R041XC305AZ). Vegetative cover collected at both sites 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 none to slight. Wind-scouring and litter movement were none to slight (Figure 1 and 2).

The approximate potential ground cover (surface, basal, and foliar) is described in Tables 2, 3 and 4 below. Table 2 specifically provides a comparison between the desired conditions as described by the ESD (NRCS 2013) and the current conditions of CM-1 and 3 in January 2014. Tables 3 and 4 address the kind and amount (by cover) of vegetation at the both sites. Litter should be in the range of 10 to 60 percent, with 5 to 45 percent surface fragments. A tolerable range of bare ground would be between 15 and 25 percent. Foliar cover collected at CM-1 was 84 percent with 7 percent basal cover of perennial grasses and shrubs. Total litter at CM-1 was measured at 56 percent, with bare ground measuring 0 percent. Rock and rock fragments covered 57 percent of the soil surface. Utilization measured at CM-1 at the time of the study was 0 percent.

Foliar cover collected at CM-3 was 66 percent with 8 percent basal cover of perennial grasses and shrubs. Total litter at CM-3 was measured at 66 percent, with bare ground measuring 11 percent. Rock and rock fragments covered 10 percent of the soil surface. Utilization measured at CM-3 at the time of the study was 0 percent.

#### **6.2.1.2 Standard 2: Riparian-Wetland Sites**

Not Applicable to C. Miller 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 distributions of plant communities are present as described within the ESDs for a state and transition of "Lehmann Invaded s State" throughout a majority of the allotment. The current vegetative composition of both perennial and annual native and non-native species within the allotment is acceptable 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. The standard and guideline has an exception for this standard which states that "Ecological sites or stream reaches on which a change in existing vegetation is physically, biologically, or economically impractical." This exception applies to this site.

The BLM sensitive species that have suitable habitat present and are known or have the potential to exist within this allotment are the American peregrine falcon, bald eagle, golden eagle, California leaf-nosed bat, cave myotis, greater western mastiff bat, spotted bat, Townsend's big-eared bat and desert ornate box turtle (possibly). The bird species utilize the grassland, open shrub, cliff habitat, and riparian areas for hunting prey. The bat species may occur on the allotment if roosting habitat is available in caves or

mines. Generally the composition, structure, and distribution of habitat for these sensitive species is intact and would be suitable for use if the species is present.

### **Key Area CM-1 and CM-3**

The vegetative community at CM-1 and 3 represents the composition, structure, and distribution of the state called “Mesquite, Natives”. The ESD describes this transition model as “Mesquite increases in the absence of fire for long periods of time. Native perennial grasses maintain dominance with good grazing management, and with mesquite canopy levels from 2 to 10%. Tobosa, curly mesquite and blue grama are dominant and the site remains stable as long as basal cover does not drop below 7 or 8%. Snakeweed and burroweed cycle with climate but never gain dominance. Lehmann lovegrass can invade the site in this state, but is not well adapted to the heavy soil textures and will not dominate the under-story. It will seldom exceed 5 to 15% canopy levels and will die during severe drought on this site. Some soil compaction has occurred due to livestock traffic, but hydrologic processes are not impaired.....” The data collected at the site reflects what is described within the community of the ESD. Appendix C specifically list the species that occurred within the transect. Also in appendix C is an ocular inventory of both study areas with professional estimations of plant dominance within the population. The data indicates that the allotment has a moderate deviation from a HCPC community but is within the ESD framework of maintaining a functional, viable ecosystem for multiple users.

## **7 DETERMINATION OF LAND HEALTH STANDARDS**

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### **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 both trend plots shows that cover and litter is adequate to ensure soil stabilization and appropriate permeability rates within the ecological site. The ESDs describe the Ecological Dynamics of the Sites on the allotment as plant communities that are “naturally variable” (NRCS 2013). These variations occur due to site aspect, soils, and other natural conditions. The ESD for both CM-1 and 3 describes the state and transition model of the vegetative community as a Mesquite, Native grass state: “Mesquite increases in the absence of fire for long periods of time. Native perennial grasses maintain dominance with good grazing management, and with mesquite canopy levels from 2 to 10%. Tobosa, curly mesquite and blue grama are dominant and the site remains stable as long as basal cover does not drop below 7 or 8%. Snakeweed and burroweed cycle with climate but never gain dominance. Lehmann lovegrass can invade the site in this state, but is not well adapted to the heavy soil textures and will not dominate the under-story. It will seldom exceed 5 to 15% canopy levels and will die during severe drought on this site. Some soil compaction has occurred due to livestock traffic, but hydrologic processes

are not impaired....” The key area does not have a high frequency of Mesquite within the community but it is present as observed within transect CM-1. 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 not observed. Wind-scouring and litter movement were none to slight. The allotment is within the variability of the state and transition models as delineated in the ecological site descriptions.

## **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 C. Miller allotment.

## **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 species within the allotment is invaded by Lehmann lovegrass. This state within the allotment falls under the exemption granted under the standard and guideline which reads “Ecological sites or stream reaches on which a change in existing vegetation is physically, biologically, or economically impractical” This describes the current condition for which this allotment falls under. However, even though the allotment is being dominated by an invasive perennial grass it is still 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 that support a productive and a diverse biotic community. The frequency of desirable native primary grammanoids is less than what is recommended in the ESD for a HCPC state. The desired native species occur within the allotment and occurred within the transect though at a reduce frequency. Generally the composition, structure, and distribution of habitat for the threatened, endangered, and sensitive species is intact and is suitable for use if the species is present.

## 8 RECOMMENDED MANAGEMENT ACTIONS

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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
C. Miller	8 Cattle	3/1 to 2/28	100	96	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

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### List of Preparers

Name	Organization	Title
Eric Baker	Tucson Field Office USDI Bureau of Land Management	Rangeland Management Specialist
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Name	Organization	Title
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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

## 10 AUTHORIZED OFFICER CONCURRENCE

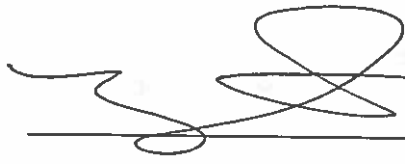
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I have reviewed the determinations presented in Section 8 Determinations of Land Health Standards and the grazing and other management actions identified in Section 9 Recommended Management Actions.

I concur with the determinations and recommendations as written.

I do not concur.

I concur, but with the following modifications:

  
\_\_\_\_\_ Acting for

Jayme Lopez

Field Office Manager

BLM Tucson Field Office

Date

9/10/2019

## 11 REFERENCES

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# 12 APPENDIX A: SPECIES LISTS

**Table 1--Effects Determinations with Rationals 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-09569.**

Scientific Name	Common Name	FWS	BLM	Effects Determination	Rational
<i>Aquila chrysaetos</i>	Golden Eagle	BGA	S	NE	E
<i>Asplenium dalhousiae</i>	Dalhouse Spleenwort		S	MA	B
<i>Carex ultra</i>	Cochise Sedge		S	MA	B
<i>Gentianella wislizeni</i>	Wislizeni Gentian	SC		MA	B
<i>Graptopetalum bartramii</i>	Bartram Stonecrop	SC	S	MA	B
<i>Hexalectris warnockii</i>	Texas Purple Spike	SC	S	MA	B
<i>Leptonycteris yerbabuenae</i>	Lesser Long-nosed Bat	SC		NE	F
<i>Lithobates blairi</i>	Plains Leopard Frog		S	NE	A
<i>Lithobates chiricahuensis</i>	Chiricahua Leopard Frog	LT		NE	A
<i>Metastelma mexicanum</i>	Wiggins Milkweed Vine	SC		MA	B
<i>Sceloporus slevini</i>	Slevin's Bunchgrass Lizard		S	MA	B
<i>Terrapene ornata luteola</i>	Desert Box Turtle		S	MA	B
<i>Accipiter gentilis</i>	Northern Goshawk	SC	S	NE	A
<i>Ammodramus savannarum ammolagus</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	E
<i>Athene cucularia hypugaea</i>	Western Burrowing Owl	SC	S	NE	F
<i>Buteo regalis</i>	Ferruginous Hawk	SC	S	NE	E
<i>Charadrius montanus</i>	Mountain Plover	SC		MA	B
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo (Western DPS)	LT		NE	A
<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	C
<i>Dipodomys spectabilis</i>	Banner-tailed Kangaroo Rat		S	NE	F
<i>Empidonax fulvifrons pygmaeus</i>	Northern Buff-breasted Flycatcher	SC		NE	A
<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>Haliaeetus leucocephalus</i>	Bald Eagle	SC, BGA	S	NE	E
<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	E
<i>Lithobates blairi</i>	Plains Leopard Frog		S	NE	A
<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>Pyrgulopsis thompsoni</i>	Huachuca Springsnail	CCA		MA	B
<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; LT= Listed Threatened

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 and 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 Clay Loam Upland 12-16” precipitation zone (p.z.) ecological site located on the public lands within the C. Miller allotment. These plant species provide key forage and cover for wildlife species and livestock.

Table 11 presents a list of plant species from the Clay Loam Upland 12-16” p.z. ecological site description located on the C. Miller allotment.

**Table 11. Key Plant Species from the Clay Loam Upland 12-16” p.z. ecological site description**

<b>Common name</b>	<b>Scientific name</b>
cane beardgrass	<i>Bothriochloa barbinodis</i>
sideoats grama	<i>Bouteloua curtipendula</i>
plains lovegrass	<i>Eragrostis intermedia</i>
tobosa	<i>Pleuraphis mutica</i>
sprucetop grama	<i>Bouteloua chondrosioides</i>
black grama	<i>Bouteloua eriopoda</i>
blue grama	<i>Bouteloua gracilis</i>
curly mesquite	<i>Hilaria belangeri</i>
poverty threeawn	<i>Aristida divaricata</i>
false mesquite	<i>Calliandra eriophylla</i>
Palmer agave	<i>Agave palmeri</i>
soaptree yucca	<i>Yucca elata</i>
whitethorn acacia	<i>Acacia constricta</i>
broom snakeweed	<i>Gutierrezia sarothrae</i>
burroweed	<i>Isocoma tenuisecta</i>

During the January 2017 data collection these species in table 12 were found on key areas CM-1.

**Table 12. Species List from C. Miller CM-1 Key Area in December 2017.**

<b>Species</b>	
<b>Woody Species</b>	
whitethorn acacia-Canopy	ACCO2
whitethorn acacia	ACCO2
false mesquite	CAER
tarbush	FLCE
ocotillo-Canopy	FOSP2
ocotillo	FOSP2
rock hibiscus	HIDE
range ratany	KRER
mariola	PAIN2
mariola-Canopy	PAIN2
<b>Grasses - Perennial</b>	
threeawn	ARIST
sprucetop grama	BOCH
sideoats grama	BOCU
Lehmann lovegrass	ERLE
tobosa	HIMU2
bush muhly	MUPO2
vine mesquite	PAOB
fluffgrass	TRPU10
<b>Unclassified</b>	
ragweed	AMBRO
croton	CROTO

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four o'clock	MIRAB
mesquite	PROSO
mesquite-Canopy	PROSO
ragwort-senecio	SENEC
sida	SIAB
Texas zinnia	ZIGR

**TABLE 12. SPECIES LIST FROM C. MILLER CM-3 KEY AREA IN DECEMBER 2017.**

<b>Species</b>	
<b>Woody Species</b>	
yerba de pasmo-canopy	BAPT
yerba de pasmo	BAPT
false mesquite	CAER
turpentine bush-Canopy	ERLA12
turpentine bush	ERLA12
broom snakeweed-Canopy	GUSA2
broom snakeweed	GUSA2
catclaw mimosa	MIBI12
mariola-CANOPY	PAIN2
mariola	PAIN2
<b>Grasses - Perennial</b>	
threeawn	ARIST
cane beardgrass	BOBA3
weeping lovegrass	ERCU2
Lehmann lovegrass	ERLE
<b>Forbs - Perennial/Biennial</b>	
Perennial forb(s)	PPFF
<b>Unclassified</b>	
burroweed-Canopy	HATE
burroweed	HATE
mesquite	PROSO
mesquite-Canopy	PROSO

ragwort	SENEC
desert zinnia	ZIAC

## 13 APPENDIX B: MONITORING PROTOCOLS

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### 13.1 Monitoring Protocols

#### 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

Tables 13 below show the results from the land health evaluation completed in January 2014 on the C. Miller allotment. Summary results are shown from the Rangeland Health Evaluation at key area CM-1 and CM-3. All attributes ranked none to slight from departure of the Clay Loam Upland 12-16" p.z. reference sheet.

**Table 13. January 11, 2014 Summary Results from Rangeland Health Evaluation at Key Area CM-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	1	1	7

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

17 Indicators Reference Sheet	Rational from January 2014
1. <b>Number and extent of rills:</b> None, these sites generally occur on low slopes not prone to rill formation	None to slight. None observed.
2. <b>Presence of water flow patterns:</b> They cover about 15% of the area, are discontinuous, sinuous, uniformly distributed and range in length from 2 to 20 feet and width is generally < 1ft	None to slight. None observed.
3. <b>Number and height of erosional pedestals or terracettes:</b> Very slight pedastalling on longer-lived plants. Terracettes are infrequent, 5 to 20 feet apart and with elevation differences of 1 - 2 in.	None to slight. None observed.
4. <b>Bare ground from Ecological Site Description or other studies (rock, litter, standing dead, lichen, moss, plant canopy are not bare ground):</b> 20-25% bare ground, (20-30% gravel on some soil series), bare patch size averages 1-3 ft, connectivity is very low	None to slight. 0%. Within ESD parameters.
5. <b>Number of gullies and erosion associated with gullies:</b> None, these sites generally occur on low slopes not prone to gully formation	None to slight. None observed.



17 Indicators Reference Sheet	Rational from January 2014
<p>6. <b>Extent of wind scoured, blowouts and/or depositional areas:</b> None present</p>	<p>None to slight. None observed.</p>
<p>7. <b>Amount of litter movement (describe size and distance expected to travel):</b> Litter is all fine, herbaceous and litter movement in steeper areas is from 1 to 2 feet. Litter is not moving in flatter areas. No loss of litter from the site</p>	<p>None to slight. Litter in place at plant bases.</p>
<p>8. <b>Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):</b> Soil surface is 3 to 4 inches of dark colored gravelly sandyloam over clayloam and clay. Soil surface resistance to erosion is good across the site with little variability, aggregate stability test averages &gt; 5</p>	<p>None to slight. Veg cover near 100% of perennial plants.</p>
<p>9. <b>Soil surface structure and SOM content (include type and strength of structure, and A-horizon color and thickness):</b> Soil surface has moderate to strong fine granular structure, with common to many fine roots. Surface horizon is 3 to 4 inches thick and dark colored and OM present throughout site</p>	<p>None to slight. Soils stable and in place.</p>
<p>10. <b>Effect on plant community composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:</b> Perennial mid-grasses have a canopy of 30%, half-shrubs a canopy of 5%, short grasses a canopy of 5%, and large shrubs and succulents a canopy of 2%. All species are uniformly dispersed with no reduction in basal area affecting infiltration and runoff (basal area: &gt;12-15%)</p>	<p>None to slight. Complete perennial cover.</p>
<p>11. <b>Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):</b> No surface soil compaction. Soil surface is loose as you walk across it in some areas. An abrupt textural change at 3 to 4 inches from sandyloam to heavy clayloam or clay has the feel of being compacted but is not.</p>	<p>None to slight. None.</p>

17 Indicators Reference Sheet	Rational from January 2014
<p>12. <b>Functional/Structural Groups (list in order of descending dominance by above-ground weight using symbols: &gt;&gt;, &gt;, = to indicate much greater than, greater than, and equal to) with dominants and sub-dominants and "others" on separate lines:</b>                      Dominant: Warm season perennial mid-grasses &gt;&gt; half-shrubs &gt; warm season perennial short grasses = annual forbs &gt; perennial forbs = succulents &gt; large shrubs and trees</p>	<p>Moderate. Lehmann Lovegrass invaded state.</p>
<p>13. <b>Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):</b> Good age class distribution of dominant perennial grasses. Some mortality and loss of live basal meristem during severe drought conditions. Litter and senescent vegetation comprise a large amount of the total biomass</p>	<p>Slight to moderate. Mesquite is showing decadence within population.</p>
<p>14. <b>Average percent litter cover (20-25%) and depth (1/8-1inches):</b> Litter is roughly 20-25% of ground cover (predominantly from mid-grasses) and is uniformly distributed throughout site, depth (1/8 to 1 in)</p>	<p>None to slight. Within ESD parameters.</p>
<p>15. <b>Expected annual production (this is TOTAL above-ground production, not just forage production):</b> Production in lbs/acre based on annual rainfall: High- &gt;1150 lbs/ac, Norm- &gt;1040 lbs/ac, Low- &gt;930 lbs/ac</p>	<p>None to slight. Within ESD parameters.</p>
<p>16. <b>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</b></p>	<p>None to slight. None observed.</p>

17 Indicators Reference Sheet	Rational from January 2014
<p><b>describing what is NOT expected in the reference state for the ecological site:</b> Mesquite, whitethorn, burroweed, prickly pear, Lehmann lovegrass</p>	
<p>17. <b>Perennial plant reproductive capability:</b> Not impaired in any way; good age class distribution of perennial grasses, recruitment is evident throughout site</p>	None to slight. Within ESD parameters.

**Table 13. January 11, 2014 Summary Results from Rangeland Health Evaluation at Key Area CM-3.**

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	1	1	7

**Table 14. Summary of 17 Indicators for Clay Loam Upland 12-16" p.z. Ecological Site on Key Area CM-3.**

17 Indicators Reference Sheet	Rational from January 2014
<p>1. <b>Number and extent of rills:</b> None, these sites generally occur on low slopes not prone to rill formation</p>	None to slight. None observed.
<p>2. <b>Presence of water flow patterns:</b> They cover about 15% of the area, are discontinuous, sinuous, uniformly distributed and range in length from 2 to 20 feet and width is generally &lt; 1ft</p>	None to slight. None observed.
<p>3. <b>Number and height of erosional pedestals or terracettes:</b> Very slight pedestalling on longer-lived plants. Terracettes are infrequent, 5 to 20 feet apart and with elevation differences of 1 - 2 in.</p>	None to slight. None observed.
<p>4. <b>Bare ground from Ecological Site Description or other studies (rock, litter, standing dead, lichen, moss, plant canopy are not bare ground):</b> 20-25% bare ground, (20-30% gravel on some soil series), bare patch size averages 1-3 ft, connectivity is very low</p>	None to slight. 11%. Within ESD parameters.
<p>5. <b>Number of gullies and erosion associated with gullies:</b> None, these</p>	None to slight. None observed.

17 Indicators Reference Sheet	Rational from January 2014
sites generally occur on low slopes not prone to gully formation	
6. <b>Extent of wind scoured, blowouts and/or depositional areas:</b> None present	None to slight. None observed/ heavy perennial cover.
7. <b>Amount of litter movement (describe size and distance expected to travel):</b> Litter is all fine, herbaceous and litter movement in steeper areas is from 1 to 2 feet. Litter is not moving in flatter areas. No loss of litter from the site	None to slight. Litter at plant bases.
8. <b>Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):</b> Soil surface is 3 to 4 inches of dark colored gravelly sandyloam over clayloam and clay. Soil surface resistance to erosion is good across the site with little variability, aggregate stability test averages > 5	None to slight. Near 100% perennial cover.
9. <b>Soil surface structure and SOM content (include type and strength of structure, and A-horizon color and thickness):</b> Soil surface has moderate to strong fine granular structure, with common to many fine roots. Surface horizon is 3 to 4 inches thick and dark colored and OM present throughout site	None to slight. None observed.
10. <b>Effect on plant community composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:</b> Perennial mid-grasses have a canopy of 30%, half-shrubs a canopy of 5%, short grasses a canopy of 5%, and large shrubs and succulents a canopy of 2%. All species are uniformly dispersed with no reduction in basal area affecting infiltration and runoff (basal area: >12-15%)	None to slight. Grass dominated system.
11. <b>Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):</b> No surface soil compaction. Soil surface is loose as you walk across it in some areas. An abrupt textural change at 3 to 4 inches	None to slight. None.

17 Indicators Reference Sheet	Rational from January 2014
<p>from sandyloam to heavy clayloam or clay has the feel of being compacted but is not.</p>	
<p>12. <b>Functional/Structural Groups (list in order of descending dominance by above-ground weight using symbols: &gt;&gt;, &gt;, = to indicate much greater than, greater than, and equal to) with dominants and sub-dominants and "others" on separate lines:</b>                      Dominant: Warm season perennial mid-grasses &gt;&gt; half-shrubs &gt; warm season perennial short grasses = annual forbs &gt; perennial forbs = succulents &gt; large shrubs and trees</p>	<p>Moderate. Lehmann Lovegrass dominated site.</p>
<p>13. <b>Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):</b> Good age class distribution of dominant perennial grasses. Some mortality and loss of live basal meristem during severe drought conditions. Litter and senescent vegetation comprise a large amount of the total biomass</p>	<p>Slight to moderate. Mesquite is showing decadence.</p>
<p>14. <b>Average percent litter cover (20-25%) and depth (1/8-1inches):</b> Litter is roughly 20-25% of ground cover (predominantly from mid-grasses) and is uniformly distributed throughout site, depth (1/8 to 1 in)</p>	<p>None to slight. Within ESD parameters.</p>
<p>15. <b>Expected annual production (this is TOTAL above-ground production, not just forage production):</b> Production in lbs/acre based on annual rainfall: High- &gt;1150 lbs/ac, Norm- &gt;1040 lbs/ac, Low- &gt;930 lbs/ac</p>	<p>None to slight. Within ESD parameters.</p>
<p>16. <b>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</b></p>	<p>None to slight. None observed.</p>

17 Indicators Reference Sheet	Rational from January 2014
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: Mesquite, whitethorn, burroweed, prickly pear, Lehmann lovegrass	
17. <b>Perennial plant reproductive capability:</b> Not impaired in any way; good age class distribution of perennial grasses, recruitment is evident throughout site	None to slight. Within ESD parameters.

## 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 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 USDOl, 1996). Utilization measured at CM-1 and CM-3 at the time of the study in 2014 was 0%.

**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.
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.

## 14.2 Monitoring Protocols

The standards were assessed for the C. Miller 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 C. Miller 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 areas CM-1 and CM-3 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 C. Miller. 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 m<sup>2</sup>) 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 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 USDOI, 1996). Utilization measured at CM-1 at the time of the study in 2014 was 0%.

Utilization Method

**Table 2. 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 3. 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.
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.

**Key Areas CM-1 and CM-3 Clay Loam Upland 12-16" precipitation zone**

**Table 17. A comparison between conditions described in the ESD (R041XC305AZ – NRCS 2006) and current conditions of key area CM-1. Soil cover components include: plants (including basal cover), biological crusts, litter, and surface fragment.**

	<u>Basal Cover</u>				<u>Biologi</u> <u>cal</u> <u>Crust</u>	<u>Litte</u> <u>r</u>	<u>Surface</u> <u>Fragme</u> <u>nts &gt; ¼"</u> <u>&amp; &lt;= 3"</u>	<u>Surface</u> <u>Fragme</u> <u>nts &gt; 3"</u>	<u>Bedro</u> <u>ck</u>	<u>Bare</u> <u>Grou</u> <u>nd</u>
	<u>Gras</u> <u>s/</u> <u>Gras</u> <u>s like</u>	<u>For</u> <u>b</u>	<u>Shru</u> <u>b/</u> <u>Vine</u>	<u>Tre</u> <u>e</u>						
ESD R041XC305 AZ	6- 25%	0- 1%	1-2%	0- 0%	1-10%	10- 60%	5-45%	0-5%	0%	15- 25%
CM-1	6%	0%	1%	0%	0%	56.4 %	46.5%	0%	0%	0%

C. Miller Allotment Land Health Evaluation

CM-3	7%	0%	1%	0%	0%	66.3	8.9	0%	0%	10.9%
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**Table 18. Foliar cover of species recorded in the LPI plot for key areas CM-1.**

Key area information		Species	Line point intercept canopy cover at CM-1 Foliar Cover	Line point intercept canopy cover at CM-1 Basal Cover
<b>Trend Plot 1 C. Miller Allotment</b>		Annual forbs	13%	
Range site: R041XC305AZ		Needle Grama ( <i>Bouteloua Aristidoides</i> )	10%	
		Threeawn ( <i>Aristida</i> )	2%	
		Rothrock Grama ( <i>Bouteloua Rothrockii</i> )	1%	
		Cane Bluestem ( <i>Bothriochloa Barbinodis</i> )	1%	1%
		Lehmann Lovegrass ( <i>Eragrostis Lehmanniana</i> )	39%	5%
		Stinkgrass ( <i>Eragrostis Cilianensis</i> )	2%	
		Mariola ( <i>Parthenium Incanum</i> )	31%	
		Tobosagrass ( <i>Pleuraphis Mutica</i> )	1%	
		Velvet Mesquite ( <i>Prosopis Velutina</i> )	6%	1%
<b>Cover/Litter/Bare Ground</b>				
Foliar Cover	84%			
Basal Cover	7%			
Bare Ground	0%			

**Table 4. Foliar cover of species recorded in the LPI plot for key area CM-3 in January 2014.**

Key area information		Species	Line point intercept canopy cover at CM-3 Foliar Cover	Line point intercept canopy cover at CM-3 Basal Cover
<b>Trend Plot 2 C. Miller Allotment</b>		Annual forbs	29%	
Range site: R041XC305AZ		Lehmann Lovegrass ( <i>Erogrostis Lehmanniana</i> )	49%	6%
		Threeawn ( <i>Aristida</i> )	2%	1%
		Gutierrezia sarothrae	3%	1%
<b>Cover/Litter/Bare Ground</b>				
Foliar Cover	66%			
Basal Cover	8%			
Bare Ground	11%			

Table 19 and 20 shows the data summary from 5-24-2011 on key area CM-1. Figure 11 is the percent cover data collected by U of A, using line intercept, on the C. Miller allotment. Figure 12 and 13 are photos of transect CM-1 from 5/24/2011.

**Figure 12. CM-1 Key Area on 7/10/10**



**Table 20. 2010, 2013 and 2017 U of A data summary on CM-1.**

**Southeast Arizona Monitoring Program**

**Site Class:** BLM || Gila || Tucson || C Miller (5260) || C Miller

**Date:** 07/07/2010

**Examiner(s):** AB, E. Baker

**Site ID:** CM-1

Ground Cover						Fetch				
Cover Category	# Hits					% Cover	Count	100	Max	30
	Transect				Total		Average	8.9	Min	0
	1	2	3	4	Total			Asymmetry		
Bare Ground	8	7	6	4	25	13				
Gravel	17	19	18	23	77	39				
Litter	11	11	12	11	45	23				
Rock	10	12	10	6	38	19				
Live Basal Veg.	4	1	4	6	15	8				

Species Frequency - 40x40 cm Quadrat						Dry-Weight Composition						
Species	Symbol	# Hits					% Frequency	# Hits				% Composition
		Transect				Total		Rank 1	Rank 2	Rank 3	Wtd. Total	
		1	2	3	4	Total						
<b>Woody Species</b>												
Acacia constricta	ACCO2		2			2	1	5	4	4	47	5
Acacia constricta-canopy	ACCO2	3	2			5	3					
Aloysia wrightii	ALWR	1	8	2		11	6	10	4	3	81	8
Aloysia wrightii-canopy	ALWR		3	1		4	2					
Atriplex hymenelytra	ATHY		1			1	T			1	1	1
Calliandra eriophylla	CAER	6	6	13	1	26	13	10	8	7	93	9
Calliandra eriophylla-canopy	CAER	1				1	T					
Gutierrezia sarothrae	GUSA2		1	4	7	12	6	1	1	1	10	1
Opuntia	OPUNT	1				1	T		2		4	1
Parthenium incanum	PAIN2	13	5	8	9	35	18	11	12	21	122	12
Parthenium incanum-canopy	PAIN2	4	6	9	6	25	13					
Yucca elata-canopy	YUEL		1			1	T					
Yucca elata	YUEL									1	1	1
<b>Grasses - Perennial</b>												
Aristida	ARIST		1	1		2	1			1	1	1
Bouteloua curtipendula	BOCU	2	2	3	1	8	4	2	4	3	25	2
Bouteloua eriopoda	BOER4	1	1		5	7	4	1	2	1	12	1
Eragrostis lehmanniana	ERLE	19	20	26	24	89	45	32	29	21	303	30
Pleuraphis mutica	PLMU3			1	4	5	3	1			7	1
Tridens pulchellus	TRPU10	5	1		1	7	4		3	6	12	1
<b>Annuals</b>												
Annual forb(s)	AAFF	4	7	11	5	27	14					
<b>Unclassified</b>												
Ephedra	EPHED			1		1	T	1			7	1
Ephedra-canopy	EPHED		1			1	T					
Fouquieria-canopy	FOUQU				1	1	T					
Krameria	KRAME	3	1	1	1	6	3	3	2	1	26	3
Prosopis	PROSO	3		2	5	10	5	20	24	25	213	21
Prosopis-canopy	PROSO	18	16	18	14	66	33					

C. Miller Allotment Land Health Evaluation

Site Class: BLM || Gila || Tucson || C Miller (5260) || C Miller

Date: 07/07/2010

Site ID: CM-1

Setaria macrostachya	SEMA5	5	1	1	3	10	5	3	4	29	3
Sida	SIDA	3	2	3	2	10	5	1	4	6	1

Study Attributes: Number of Transects = 4  
 Samples Per Transect = 50  
 Dry-Weight-Rank Ranking Mode =  
 Dry-Weight-Rank Sample Size =

Figure 13. CM-1 Key Area on 9/11/13



C. Miller Allotment Land Health Evaluation

### Data Summary

Site Class: BLM || Tucson || C Miller (5260) || C Miller || C-1 to C-3

Date: 9/11/2013

Site ID: CM-1

Examiner(s): JE, MW

% Ground Cover						
Species	Transect (#Hits)					% Cover*
	1	2	3	4	Total	
Bare Ground	10	11	6	10	37	6.17
Gravel (1/4" - 3")	67	47	55	38	207	34.50
Litter	55	75	67	82	279	46.50
Rock > 3"	14	15	19	16	64	10.67
Live Basal Veg.	4	2	3	4	13	2.17

Fetch			
n	199	Minimum	0
Maximum	31	Median**	7.00
Mean	7.72	SE	1.65
Asymmetry	4.52		

% Frequency							40x40 cm					DWR Wt. Composition		Sample Size = 193
Species		Transect (#Hits)					% Freq*	Rank (#Hits)			Wtd. Sum	% Comp.*		
		1	2	3	4	Total		1	2	3				
Acacia constricta	ACCO2		1	1	1	3	1.50	3	2	1	26	1.35		
Acacia constricta-Canopy	ACCO2		2	1		3	1.50							
Acacia greggii	ACGR	1				1	0.50	3		1	22	1.14		
Acacia greggii-canopy	ACGR	3				3	1.50							
Allionia	ALLIO	1	3			4	2.00	1		3	10	0.52		
Annual forb(s)	AAFF	32	32	39	46	149	74.50							
Annual grass(es)	AAGG	34	35	45	33	147	73.50							
Aristida	ARIST	1	1	2		4	2.00	2	2	3	21	1.09		
Boerhavia	BOERH2	6	6	13	9	34	17.00	2	7	14	42	2.18		
Bouteloua gracilis	BOGR2		1			1	0.50			1	1	0.05		
Bouteloua rothrockii	BORO2		2			2	1.00	1	1		9	0.47		
Calliandra eriophylla	CAER	7	6	11	10	34	17.00	26	18	20	238	12.33		
Calliandra eriophylla-Canopy	CAER	2		4	5	11	5.50							
Chamaesyce	CHAMA15	2			4	6	3.00	1	2	4	15	0.78		
Croton-canopy	CROTO			3		3	1.50							
Croton-croton	CROTO		1	1	1	3	1.50	2	1	3	19	0.98		
Ephedra	EPHED		1			1	0.50	1	1	1	10	0.52		
Ephedra-canopy	EPHED				2	2	1.00							
Eragrostis intermedia	ERIN	2				2	1.00	2			14	0.73		
Eragrostis lehmanniana	ERLE	17	17	34	44	112	56.00	44	57	47	469	24.3		
Gutierrezia sarothrae	GUSA2	1				1	0.50	1			7	0.36		
Hibiscus denudatus-Rock hibiscus	HIDE			2	1	3	1.50	1	1		9	0.47		



C. Miller Allotment Land Health Evaluation

Site Class: BLM || Tucson || C Miller (5260) || C Miller || C-1 to C-3

Date: 9/11/2013

Site ID: CM-1

Krameria	KRAME	2		2	3	7	3.50	3	3	2	29	1.5
Krameria-canopy	KRAME			1		1	0.50					
Muhlenbergia porteri	MUPO2	1	1	3	2	7	3.50	1	5	2	19	0.98
Panicum obtusum	PAOB			1	1	2	1.00	1	1	1	10	0.52
Parthenium incanum	PAIN2	3	8	3	10	24	12.00	45	44	29	432	22.38
Parthenium incanum-Canopy	PAIN2	16	16	14	16	62	31.00					
Pleuraphis mutica	PLMU3			2	9	11	5.50	7	5	2	61	3.16
Porophyllum gracile- yerba de venado	POGR5		1			1	0.50			1	1	0.05
Prosopis	PROSO	5	3	5	4	17	8.50	39	37	38	385	19.95
Prosopis-Canopy	PROSO	14	22	15	7	58	29.00					
Senecio-senecio	SENEC				1	1	0.50			1	1	0.05
Setaria macrostachya	SEMA5	1				1	0.50			1	1	0.05
Sida	SIDA	4	6	7	6	23	11.50	5	3	16	57	2.95
Sphaeralcea	SPHAE			1		1	0.50					
Talinum	TALIN2	1	1	1		3	1.50			1	1	0.05
Tridens pulchellus	TRPU10		4		1	5	2.50	2	3	1	21	1.09

\* Number of decimal places does not imply level of precision

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



### Data Summary

Site Class: BLM || Tucson || C Miller (5260) || C Miller || C-1 to C-3

Date: 1/10/2017

Site ID: CM-1

Examiner(s): Mike McIntire, Rikki Gurule

% Ground Cover						
Species	Transect (#Hits)					% Cover*
	1	2	3	4	Total	
Bare Ground	6	10	9	7	32	10.67
Gravel (1/4" - 3")	50	29	22	30	131	43.67
Litter	10	22	34	23	89	29.67
Rock > 3"	8	12	10	12	42	14.00
Live Basal Veg.	1	2		3	6	2.00

Fetch			
n	100	Minimum	0
Maximum	20	Median**	5.75
Mean	6.65	SE	0.53
Asymmetry	2.58		

% Frequency						40x40 cm		DWR Wt. Composition			Sample Size = 97	
Species		Transect (#Hits)					% Freq*	Rank (#Hits)			Wtd. Sum	% Comp.*
		1	2	3	4	Total		1	2	3		
<b>Woody Species</b>												
whitethorn acacia-Canopy	ACCO2	1	2			3	3.00					
whitethorn acacia	ACCO2							2	1	1	17	1.75
false mesquite	CAER	2	1	1	1	5	5.00	2	3	3	23	2.37
tarbush	FLCE			1		1	1.00	1	1	1	10	1.03
ocotillo-Canopy	FOSP2			2		2	2.00					
ocotillo	FOSP2									2	2	0.21
rock hibiscus	HIDE				1	1	1.00			1	1	0.10
range ratany	KRER		1	1		2	2.00	1	1		9	0.93
mariola	PAIN2		4	3	4	11	11.00	15	18	20	161	16.60
mariola-Canopy	PAIN2	5	4	10	5	24	24.00					
<b>Grasses - Perennial</b>												
threeawn	ARIST	3		2	2	7	7.00	3	6	3	36	3.71
sprucetop grama	BOCH				1	1	1.00	1			7	0.72
sideoats grama	BOCU	1				1	1.00	1			7	0.72
Lehmann lovegrass	ERLE	12	10	12	20	54	54.00	51	45	39	486	50.10
tobosa	HIMU2			3	4	7	7.00	6	3		48	4.95
bush muhly	MUPO2								1	1	3	0.31
vine mesquite	PAOB			2		2	2.00	2	1	1	17	1.75
fluffgrass	TRPU10	6	2	1		9	9.00	3	4	6	35	3.61
<b>Unclassified</b>												
ragweed	AMBRO				2	2	2.00		1	2	4	0.41
croton	CROTO	1	1			2	2.00	1		1	8	0.82

C. Miller Allotment Land Health Evaluation

Site Class: BLM || Tucson || C Miller (5260) || C Miller || C-1 to C-3

Date: 1/10/2017

Site ID: CM-1

four o'clock	MIRAB								1		2	0.21
mesquite	PROSO		2	1		3	3.00	6	7	15	71	7.32
mesquite-Canopy	PROSO	5	4	2	3	14	14.00					
ragwort-senecio	SENEC		2			2	2.00	1	1		9	0.93
sida	SIAB	2				2	2.00		2	1	5	0.52
Texas zinnia	ZIGR			1		1	1.00	1	1		9	0.93

\* Number of decimal places does not imply level of precision

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

**Table 21. 2010, 2013 and 2017 U of A data summary on CM-3.**

**Southeast Arizona Monitoring Program**

**Site Class:** BLM || Gila || Tucson || C Miller (5260) || C Miller

**Date:** 07/07/2010

**Examiner(s):** AB, E. Baker

**Site ID:** CM-3

Ground Cover							Fetch			
Cover Category	# Hits					% Cover	Count	100	Max	30
	Transect				Total		Average	5.5	Min	0
	1	2	3	4			Median	Asymmetry		
Bare Ground	5	12	7	8	32	32				
Gravel	2		1	1	4	4				
Litter	15	10	12	12	49	49				
Rock	2	1	1		4	4				
Live Basal Veg.	1	2	4	4	11	11				

Species Frequency - 40x40 cm Quadrat							Dry-Weight Composition				
Species	Symbol	# Hits					% Frequency	# Hits			% Composition
		Transect				Total		Rank	Wtd. Total		
		1	2	3	4		1	2	3		
<b>Woody Species</b>											
Acacia constricta	ACCO2				1	1	1		2	1	
Baccharis sarothroides	BASA2		1			1	1	1	1	1	
Calliandra eriophylla	CAER			1		1	1	1	1	1	
Ericameria laricifolia	ERLA12		1			1	1	1	2	1	
Ericameria laricifolia-canopy	ERLA12				1	1					
Gutierrezia sarothrae	GUSA2	1				1	1	1	4	1	
Gutierrezia sarothrae-canopy	GUSA2	2	1		2	5					
Mimosa biuncifera	MIBI3							1	2	1	
Mimosopsis biuncifera-canopy	MIBI12	3				3					
Opuntia	OPUNT	1				1					
Opuntia-canopy	OPUNT	1				1					
<b>Grasses - Perennial</b>											
Aristida	ARIST	3	2	4	2	11	6	6	4	6	
Bothriochloa barbinodis	BOBA3	1		1		2	1	1	1	1	
Digitaria californica	DICA8	2			1	3	4	1	1	3	
Eragrostis curvula	ERCU2		1			1	1			1	
Eragrostis lehmanniana	ERLE	17	19	21	20	77	69	67	64	72	
<b>Unclassified</b>											
Haplopappus tenuisectus	HATE	2	1			3	4	5	8	5	
Haplopappus tenuisectus-canopy	HATE	1	2	1	2	6					
Prosopis	PROSO	1				1	4	7	7	5	
Prosopis-canopy	PROSO	6	3		2	11					
Sida	SIDA				1	1	1	1	1	1	
Zinnia acerosa	ZIAC				1	1	1	1		1	

**Study Attributes:** Number of Transects = 4  
 Samples Per Transect = 25  
 Dry-Weight-Rank Ranking Mode =  
 Dry-Weight-Rank Sample Size =

### Data Summary

Site Class: BLM || Tucson || C Miller (5260) || C Miller || C-1 to C-3

Date: 9/4/2013

Site ID: CM-3

Examiner(s): JE MW

% Ground Cover						
Species	Transect (#Hits)					% Cover*
	1	2	3	4	Total	
Bare Ground	13	23	29	15	80	26.67
Gravel (1/4" - 3")	6	4	10	39	59	19.67
Litter	49	46	26	19	140	46.67
Rock > 3"	6		5		11	3.67
Live Basal Veg.	1	2	5	2	10	3.33

Fetch			
n	100	Minimum	0
Maximum	37	Median**	3.75
Mean	5.09	SE	0.6
Asymmetry	7.33		

% 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				
Annual forb(s)	AAFF	23	24	22	23	92	92.00							
Annual grass(es)	AAGG	7	7	9	2	25	25.00							
Aristida	ARIST	3	2	2	5	12	12.00	4	5	3	41	4.51		
Calliandra eriophylla-CANOPY	CAER		1			1	1.00							
Calliandra eriophylla	CAER							1	1	1	10	1.1		
Cylindropuntia acanthocarpa	CYAC8	1				1	1.00			1	1	0.11		
Eragrostis lehmanniana	ERLE	22	21	23	22	88	88.00	77	65	54	723	79.45		
Fouquieria-CANOPY	FOUQU				2	2	2.00		1	1	3	0.33		
Haplopappus tenuisectus	HATE	1	1			2	2.00	1	1	1	10	1.1		
Haplopappus tenuisect.-Canopy	HATE			1		1	1.00							
Mimosopsis biuncifera	MIBI12			1		1	1.00		1		2	0.22		
Parthenium incanum	PAIN2			1		1	1.00	1		1	8	0.88		
Parthenium incanum-CANOPY	PAIN2			1		1	1.00							
Prosopis	PROSO			1		1	1.00	3	5	9	40	4.4		
Prosopis-Canopy	PROSO	3	8	1	2	14	14.00							
Senecio	SENEC			1		1	1.00	1	1		9	0.99		
Sida	SIDA	13	8	8	2	31	31.00	3	11	19	62	6.81		
Unknown 1	UNKN1			1		1	1.00			1	1	0.11		

\* Number of decimal places does not imply level of precision

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

### Data Summary

Site Class: BLM || Tucson || C Miller (5260) || C Miller || C-1 to C-3

Date: 1/10/2017

Site ID: CM-3

Examiner(s): Mike McIntire Rikki Gurule

% Ground Cover						
Species	Transect (#Hits)					% Cover*
	1	2	3	4	Total	
Bare Ground	18	21	23	28	90	30.00
Gravel (1/4" - 3")	4	8	9	18	39	13.00
Litter	44	39	34	26	143	47.67
Rock > 3"	5	2	5	1	13	4.33
Live Basal Veg.	4	5	4	2	15	5.00

Fetch			
n	100	Minimum	0
Maximum	42	Median**	4.25
Mean	6.51	SE	1.9
Asymmetry	4.65		

% Frequency						40x40 cm					DWR Wt. Composition			Sample Size = 88	
Species		Transect (#Hits)					% Freq*	Rank (#Hits)			Wtd. Sum	% Comp.*			
		1	2	3	4	Total		1	2	3					
<b>Woody Species</b>															
yerba de pasmo-canopy	BAPT		2			2	2.00								
yerba de pasmo	BAPT							1		1		8	0.91		
false mesquite	CAER	1				1	1.00		1	1		3	0.34		
turpentine bush-Canopy	ERLA12	1				1	1.00								
turpentine bush	ERLA12							1				7	0.80		
broom snakeweed-Canopy	GUSA2	1				1	1.00								
broom snakeweed	GUSA2								1	1		3	0.34		
catclaw mimosa	MIBI12				1	1	1.00		1	1		3	0.34		
mariola-CANOPY	PAIN2			2		2	2.00								
mariola	PAIN2								1	2		4	0.45		
<b>Grasses - Perennial</b>															
threeawn	ARIST	2	1	1	1	5	5.00	2	3	5		25	2.84		
cane beardgrass	BOBA3	1				1	1.00			1		1	0.11		
weeping lovegrass	ERCU2	2	1			3	3.00	2	2			18	2.05		
Lehmann lovegrass	ERLE	20	24	23	15	82	82.00	82	77	67		795	90.34		
<b>Forbs - Perennial/Biennial</b>															
Perennial forb(s)	PPFF	1				1	1.00								
<b>Unclassified</b>															
burweed-Canopy	HATE	1	2			3	3.00								
burweed	HATE								1	2		4	0.45		
mesquite	PROSO	1				1	1.00			5		5	0.57		
mesquite-Canopy	PROSO	3	2			5	5.00								

C. Miller Allotment Land Health Evaluation

Site Class: BLM || Tucson || C Miller (5260) || C Miller || C-1 to C-3

Date: 1/10/2017

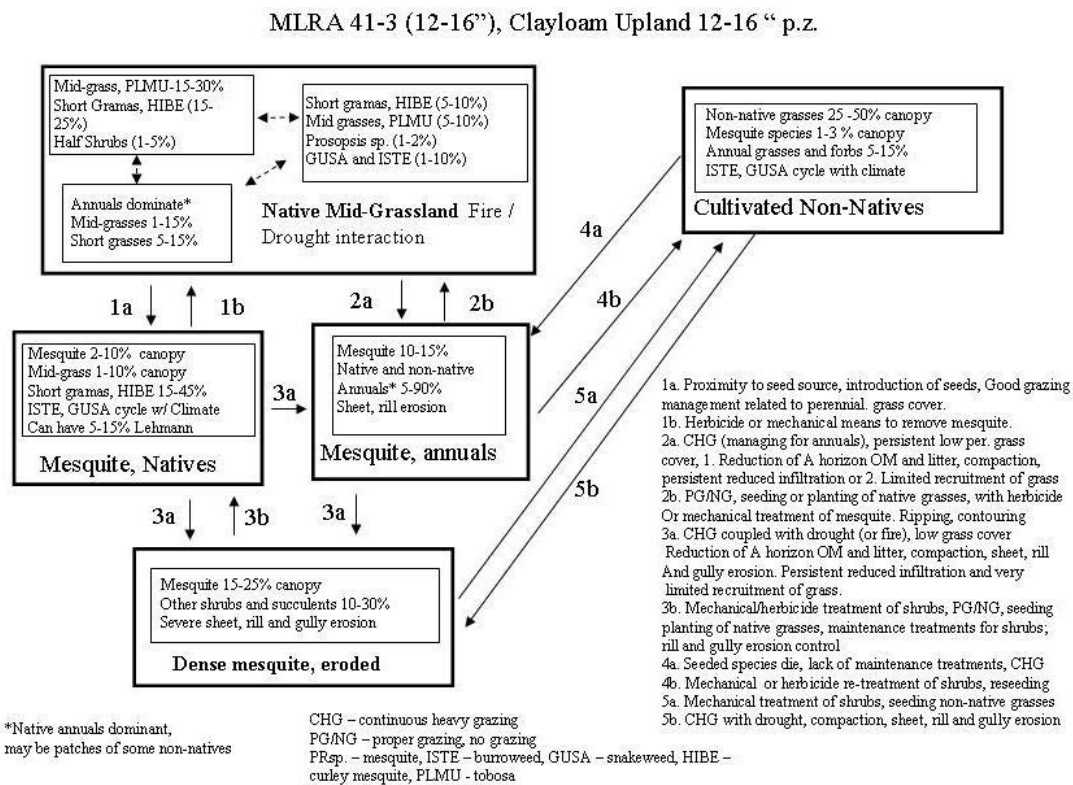
Site ID: CM-3

ragwort	SENEC	1			1	1.00		1	1	0.11
desert zinnia	ZIAC		1		1	1.00		1	3	0.34

\* Number of decimal places does not imply level of precision

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

Figure 14. State and transition model

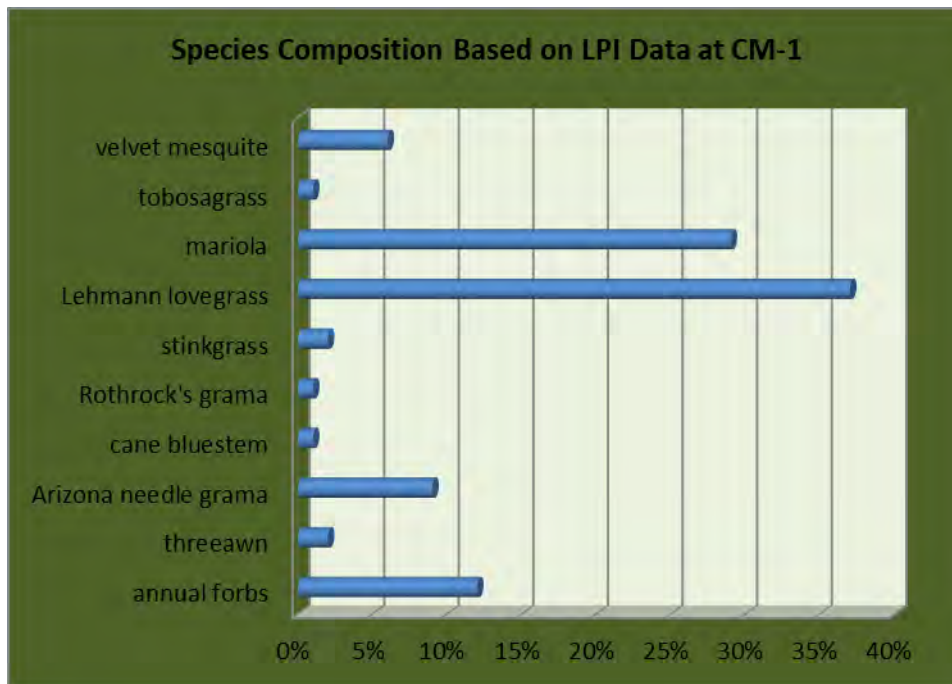




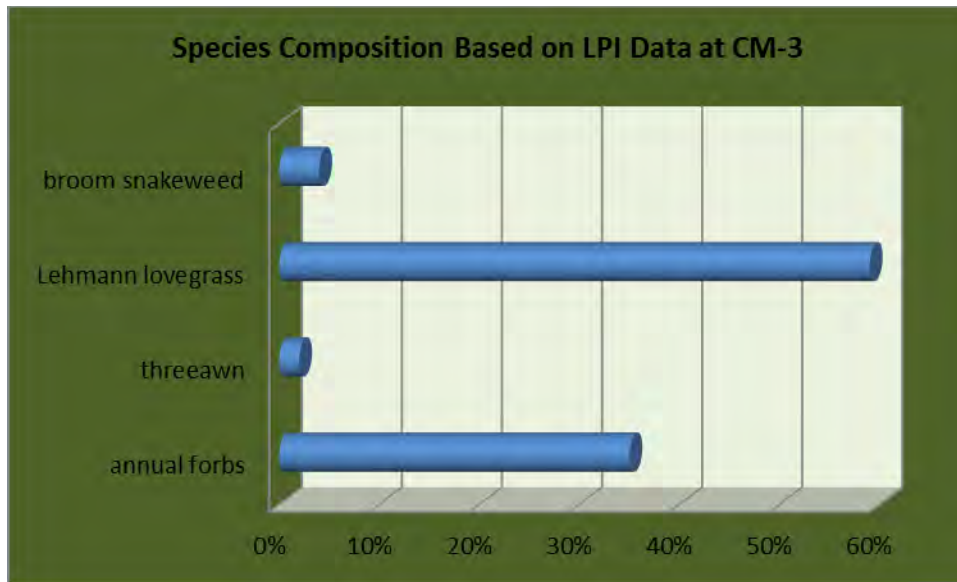
**Table 19. A comparison between the state and transition model in the ESD and the LPI data collected in January 2014 at CM-1 and CM-3.**

State in Transition of mesquite, native Site as described by the ESD	LPI Data	
	Canopy Cover	
	CM-1	CM-3
Mesquite 2-10% Canopy Cover	PRVE – 6%	Present but not within transect
Lehmann 5-15% Canopy Cover	ERLE – 39%	ERLE – 49%
Remnant natives	BOBA3 – 1% BORO2 – 1% PLMU3 – 1% ARIST – 2%	ARIST – 2%

**Figure 19. Species Composition at Key Area CM-1**



**Figure 19. Species Composition at Key Area CM-3**



**Table 20. Functional/structural plant groups at CM-1**

Ranking	Species List for Functional/Structural Groups at CM-1
D	Lehmann lovegrass ( <i>Eragrostis lehmanniana</i> )
S	Whitethorn Acacia ( <i>Acacia Constricta</i> )
M	Low Woollygrass ( <i>Dasyochloa Pulchella</i> )
M	Threeawn ( <i>Aristida</i> )
M	Tobosagrass ( <i>Pleuraphis mutica</i> )
M	Fairyduster ( <i>Calliandra eriophylla</i> )
M	cane bluestem ( <i>Bothriochloa barbinodis</i> )
M	plains lovegrass ( <i>Eragrostis intermedia</i> )
M	velvet mesquite ( <i>Prosopis velutina</i> )
M	Cholla ( <i>Cylindropuntia</i> )
M	broom snakeweed ( <i>Gutierrezia sarothrae</i> )
M	Annual Forbs
M	Rothrock's grama ( <i>Bouteloua rothrockii</i> )
M	Arizona needle grama ( <i>Bouteloua aristidoides</i> )
T	Arizona passionflower ( <i>Passiflora arizonica</i> )

Ranking	Species List for Functional/Structural Groups at CM-1
T	Yucca
T	sideoats grama ( <i>Bouteloua curtipendula</i> )
T	Stinkgrass ( <i>Eragrostis cilianensis</i> )
T	Arizona cottontop ( <i>Digitaria californica</i> )
	<b>Dominant (D) roughly 40-100% composition, Sub-dominant (S) roughly 10-40% composition, Minor Composition (M) roughly 2-5% composition, or Trace (T) roughly &lt;2% composition.</b>

**Table 20. Functional/structural plant groups at CM-3**

Ranking	Species List for Functional/Structural Groups at CM-3
D	Lehmann lovegrass ( <i>Eragrostis lehmanniana</i> )
M	broom snakeweed ( <i>Gutierrezia sarothrae</i> )
M	Ocotillo ( <i>Fouquieria splendens</i> )
M	Whitethorn Acacia ( <i>Acacia Constricta</i> )
M	velvet mesquite ( <i>Prosopis velutina</i> )
T	Burrowed ( <i>Isocoma tenuisecta</i> )
T	plains pricklypear ( <i>Opuntia polyacantha</i> )
T	flower of stone ( <i>Selaginella lepidophylla</i> )
M	Threeawn ( <i>Aristida</i> )
	<b>Dominant (D) roughly 40-100% composition, Sub-dominant (S) roughly 10-40% composition, Minor Composition (M) roughly 2-5% composition, or Trace (T) roughly &lt;2% composition.</b>

**Conclusions:**

The current vegetative composition of species within the allotment is in a mesquite, native state and transition. This state within the allotment falls under the exemption granted under the standard and guideline which reads “Ecological sites or stream reaches on which a change in existing vegetation is physically, biologically, or economically impractical” This describes the current condition for which this allotment falls under. However, even though the allotment is being dominated by an invasive perennial grass it is still 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 that support a productive and a diverse biotic community. The frequency of desirable native

### C. Miller Allotment Land Health Evaluation

primary graminoids is less than what is recommended in the ESD for a HCPC state. The desired native species occur within the allotment and occurred within the transect though at a reduced frequency. Generally the composition, structure, and distribution of habitat for the threatened, endangered, and sensitive species is intact and is suitable for use if the species is present.