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Land Health Evaluation
Gold Gulch Lease No. 5265
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U.S. Department of the Interior
Bureau of Land Management
Gila District
Tucson Field Office
3201 East Universal Way
Tucson, AZ 85756
Phone: (520) 258-7200
FAX: (520) 258-7238



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1 INTRODUCTION

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

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

This evaluation seeks to ascertain:

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

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

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

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

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

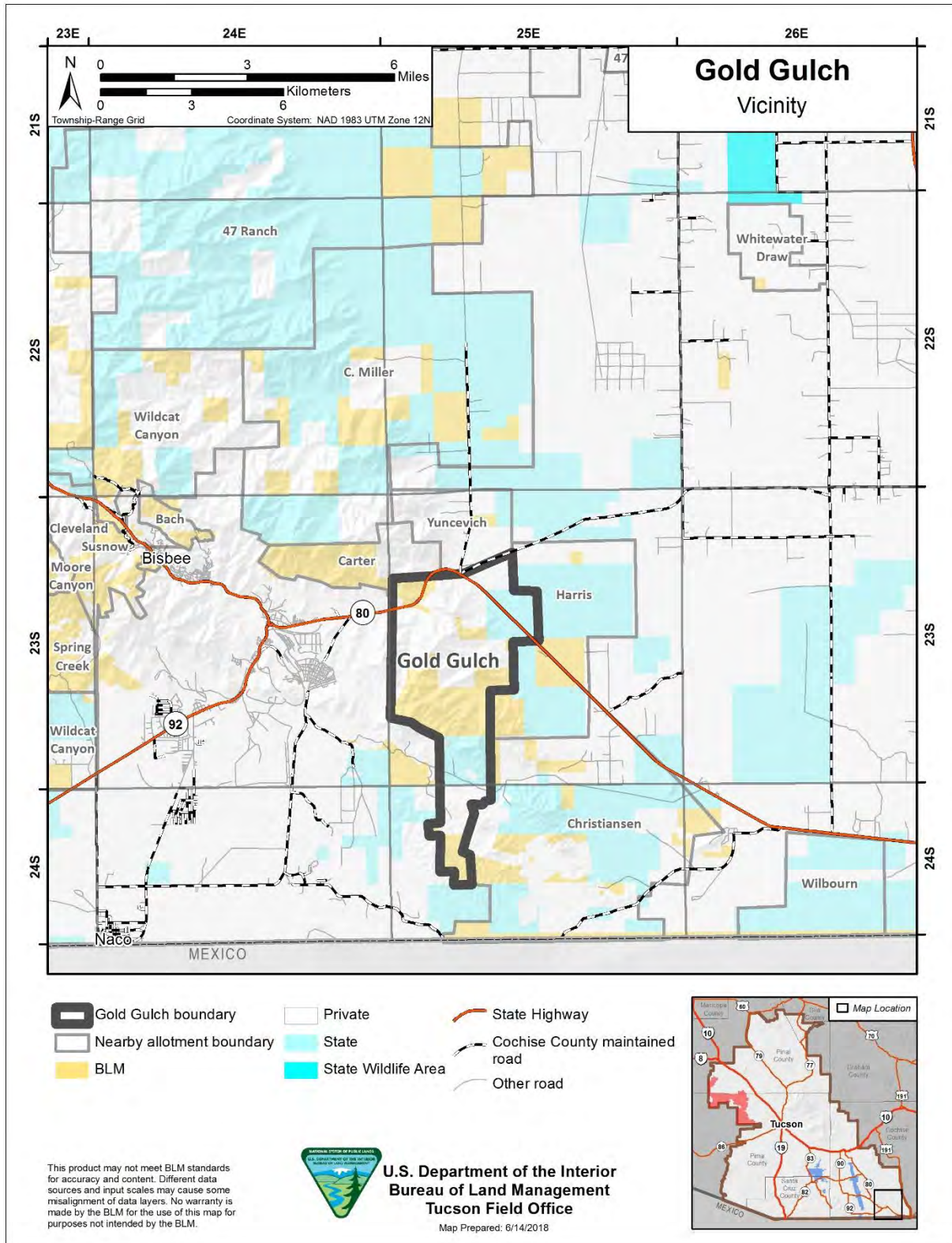
The Arizona Standards and Guidelines identify three standards regarding (1) upland sites, (2) riparian-wetland sites, and (3) desired resource conditions based on specific indicators, as discussed in *Section 6 Rangeland Inventory and Monitoring Methodology* of this document.

2 ALLOTMENT PROFILE AND GENERAL DESCRIPTION

2.1 Location

The BLM portion of the Gold Gulch allotment is located about 4 miles east of the town of Bisbee in Cochise County, Arizona. The BLM lands within the allotment are comprise approximately 34 percent of the total livestock operation. The ranch borders Christensen to the south and east, the Yuncevich and Carter allotments to the north, and the Harris allotment to the east. Figure 1 below shows the Gold Gulch allotment location.

Figure 1. Vicinity Map of the Gold Gulch Allotment



2.2 Physical Description

This section describes physical characteristics within the Gold Gulch Allotment.

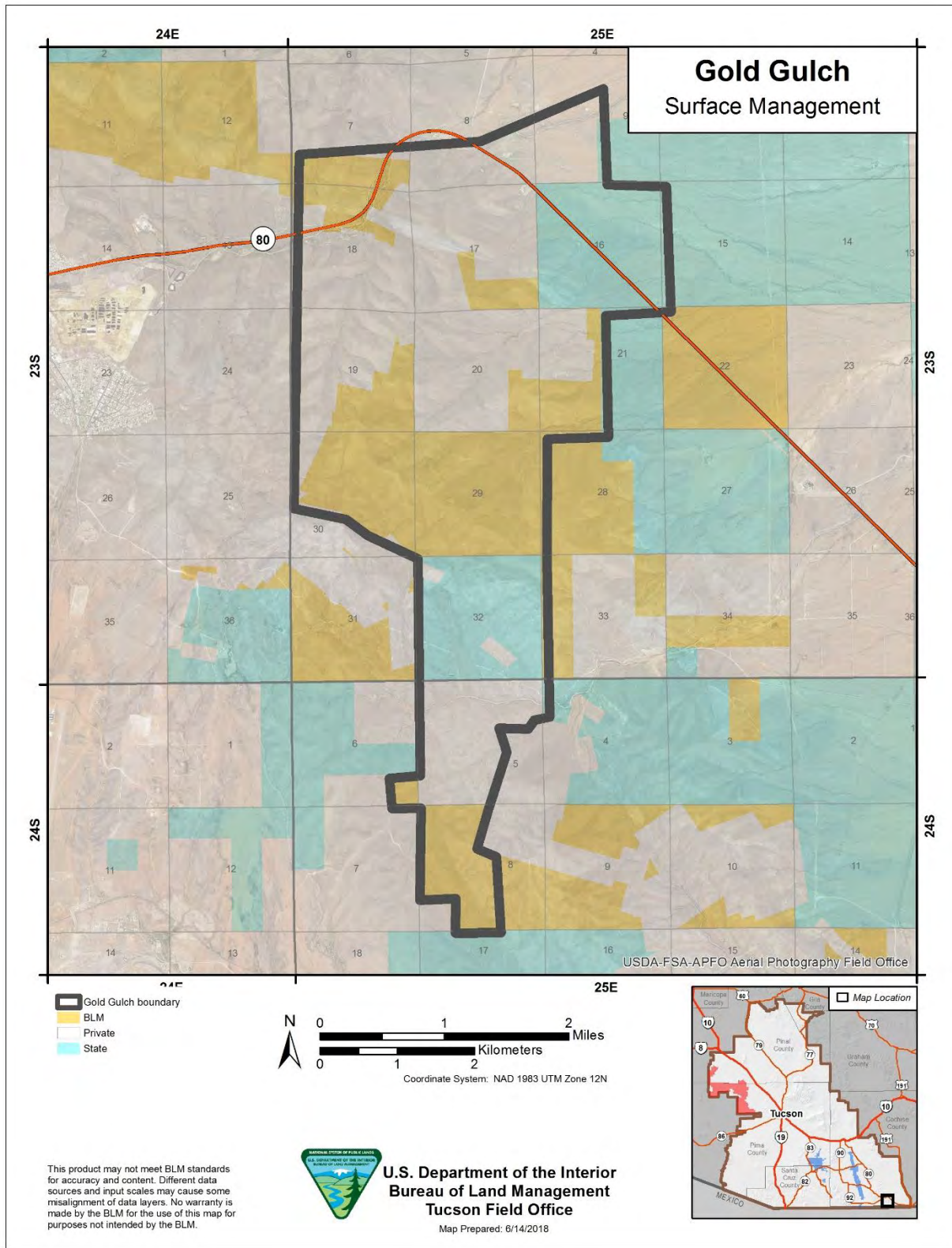
2.2.1 Surface Land Ownership

The acreage of the Gold Gulch allotment is detailed below (Table 1). The BLM lands within the allotment are all located on the western portion. The allotment is ran as a single pasture with rock cliffs as a natural barrier and the highway fencing as another barrier. Fence lines do not separate between land ownership. Lands within the allotment are predominately private lands, with lesser amounts of public and state lands. Public lands constitute about 34 percent of the allotment. Spatial distributions of land ownership are displayed in Figure 2.

Table 1. Acreage of Landownership

Land Classification	Gold Gulch Allotment
Public Acres	2,314.70
State Acres	1,350.89
Private Land Acres	3,177.58
Total Acres	6,843.16

Figure 2. Land Ownership of the Gold Gulch Allotment



2.2.2 Precipitation and Temperature

Climate data comes from the Loamy 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 4300-5800, and 13-17 inches in the western part where elevations are 3300-4500 feet. Winter-Summer rainfall ratios are 40-60% in the west and 30-70% in the east. Summer rains fall July-September, originate in the Gulf of Mexico and are convective, usually brief, intense thunderstorms. Cool season moisture tends to be frontal, originates in the Pacific and Gulf of California, and falls in widespread storms with long duration and low intensity. Snow rarely lasts more than one day. May and June are the driest months of the year. Humidity is generally very low. Temperatures are mild. Freezing temperatures are common at night from December-April; however temperatures during the day are frequently above 50 F. Occasionally in December-February, brief 0 F temperatures may be experienced some nights. During June, July and August, some days may exceed 100 F. Climate stations for the average precipitation and temperature tables below are: 020309, Apache Powder Co. Period of record 1923-1990, 022659 Douglas Period of Record 1948-2004, 023120 Fort Huachuca Period of Record 1900-1981, 027530 San Manuel Period of Record 1954-2004, 028619 Tombstone Period of Record 1893-2004.

Table 2. Precipitation and Temperature Averages for Loamy 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):													
	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	
<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):													
	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Dec</u>
<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)

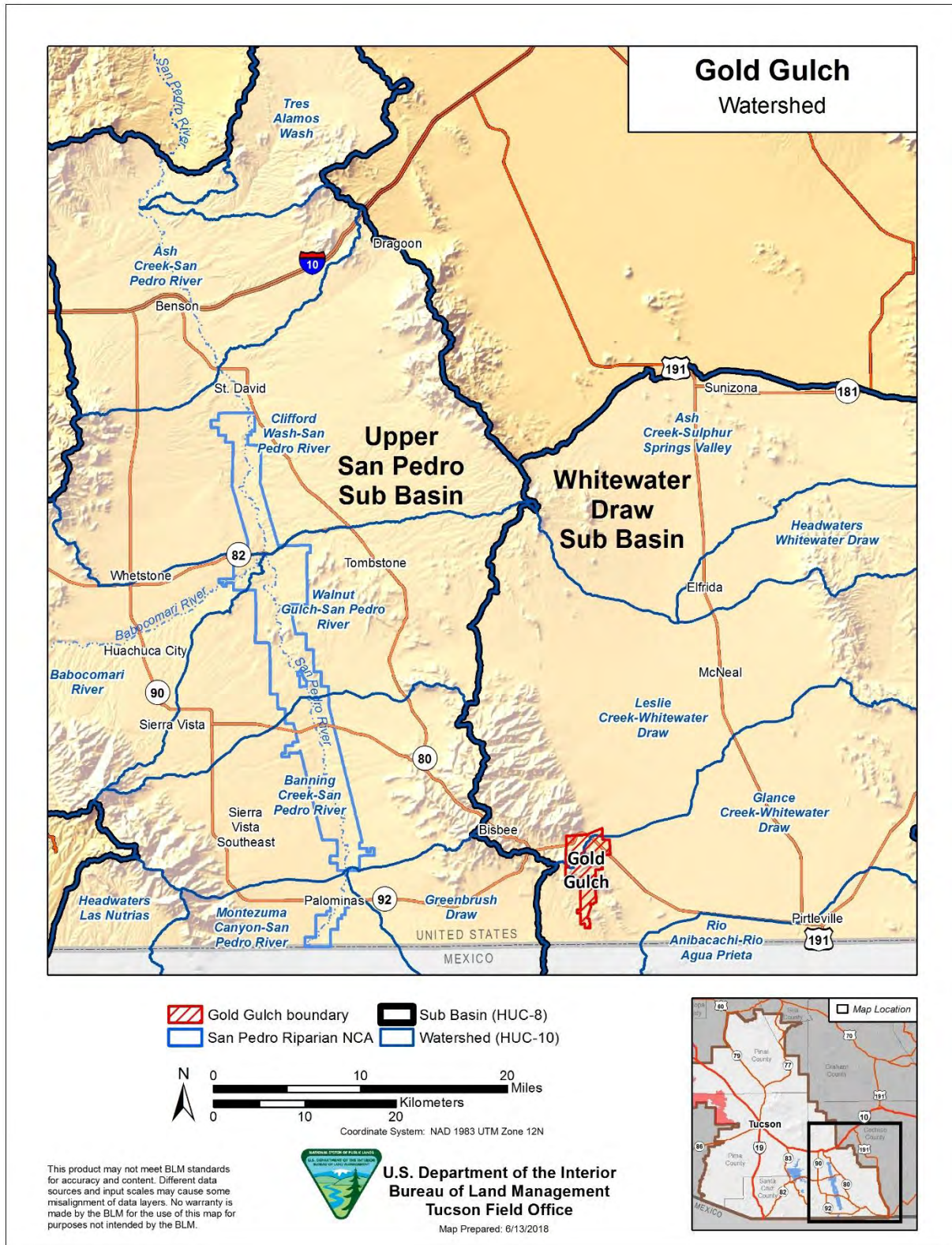
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	56.7	60.2	66.7	74.0	81.6	89.5	87.4	84.6	82.3	74.7	64.0	56.1	73.2
Average Min. Temperature (F)	30.6	33.0	36.8	43.0	49.8	58.4	61.8	59.9	55.1	46.0	36.7	30.6	45.2
Average Total Precipitation (in.)	1.13	1.19	0.88	0.57	0.21	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 Watersheds and Water Resources

The Gold Gulch 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 Glance Creek - Whitewater Draw (HUC-10). In this semi-arid basin, most of the stream courses are ephemeral. Whitewater draw is the largest of these drainages with the U.S. portion draining from its headwaters in the southern end of the Chiricauhuas to Mexico near Douglas, AZ

No natural perennial or intermittent water features exist in the allotment. The ephemeral stream channels in the allotment are head water tributaries near watershed divides.

Figure 3. Map of watersheds associated with Gold Gulch



2.2.4 Soils

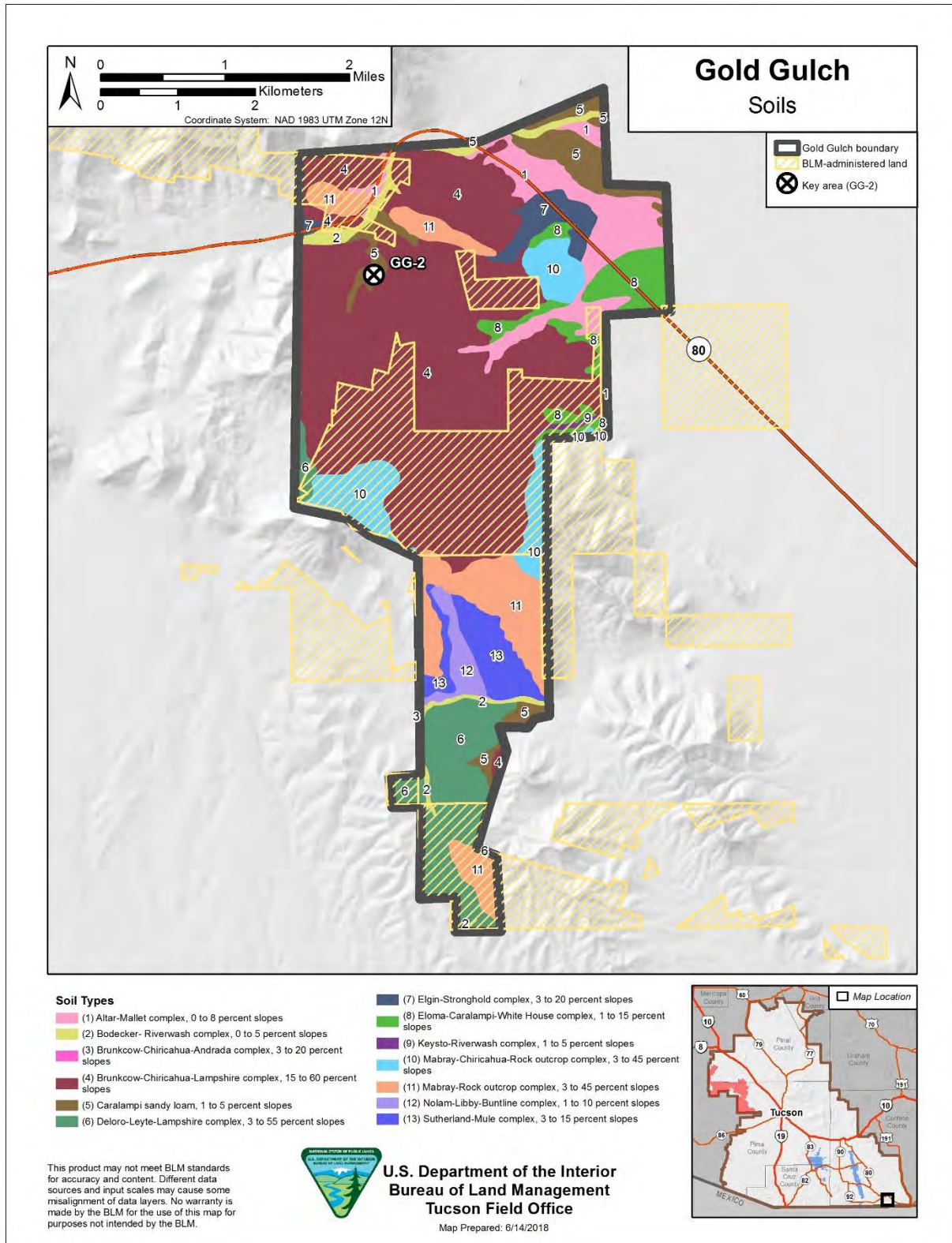
The dominant soil orders in this Major Land Resource Area (MLRA) (see section 3.3.1) are Aridisols and Entisols. The soils in the area have a dominantly thermic or hyperthermic (warm) soil temperature regime, an aridic (dry) soil moisture regime, mixed mineralogy, and are formed in alluvium. They vary from very shallow to very deep and vary from well drained to somewhat excessively drained. Haplocambids (Denure and Hayhook series), Haplocalcids (Gunsight and Stagecoach series), Calciargids (Mohall and Pinaleno series), and Natrargids (Casa Grande series) soils are formed on fan terraces and relict basin floors. Torrifluvents (Antho and Comoro series) soils are formed on alluvial fans and flood plains, while shallow or very shallow Torriorthents (Cellar and Quilotosa series) soils are formed on hills and mountains.

The specific soils on the Gold Gulch allotment are shown in the table below. The dominant soils are Brunkcow-Chiricahua-Lampshire complex, 15 to 60 percent slopes and Mabray-Rock outcrop complex, 3 to 45 percent slopes. The acreages may not be accurate due to difficulty defining the area of interest in the web soil survey system.

Table 3. Soils on the Gold Gulch Allotment

Map Unit Name		Acres in Allotment	Percent of Allotment Acres
Altar-Mallet complex, 0 to 8 percent slopes		501.02	7.32
Bodecker- Riverwash complex, 0 to 5 percent slopes		157.74	2.31
Brunkcow-Chiricahua-Andrada complex, 3 to 20 percent slopes mlra 41		0.00	0.00
Brunkcow-Chiricahua-Lampshire complex, 15 to 60 percent slopes		3,295.44	48.16
Caralampi sandy loam, 1 to 5 percent slopes		354.18	5.18
Deloro-Leyte-Lampshire complex, 3 to 55 percent slopes		619.34	9.05
Elgin-Stronghold complex, 3 to 20 percent slopes		163.12	2.38
Eloma-Caralampi-White House complex, 1 to 15 percent slopes MLRA 41		334.78	4.89
Keysto-Riverwash complex, 1 to 5 percent slopes		14.75	0.22
Mabray-Chiricahua-Rock outcrop complex, 3 to 45 percent slopes		441.95	6.46
Mabray-Rock outcrop complex, 3 to 45 percent slopes		626.49	9.16
Nolam-Libby-Buntline complex, 1 to 10 percent slopes		100.52	1.47
Sutherland-Mule complex, 3 to 15 percent slopes		233.82	3.42
Totals for Allotment		6,843.16	100.0%

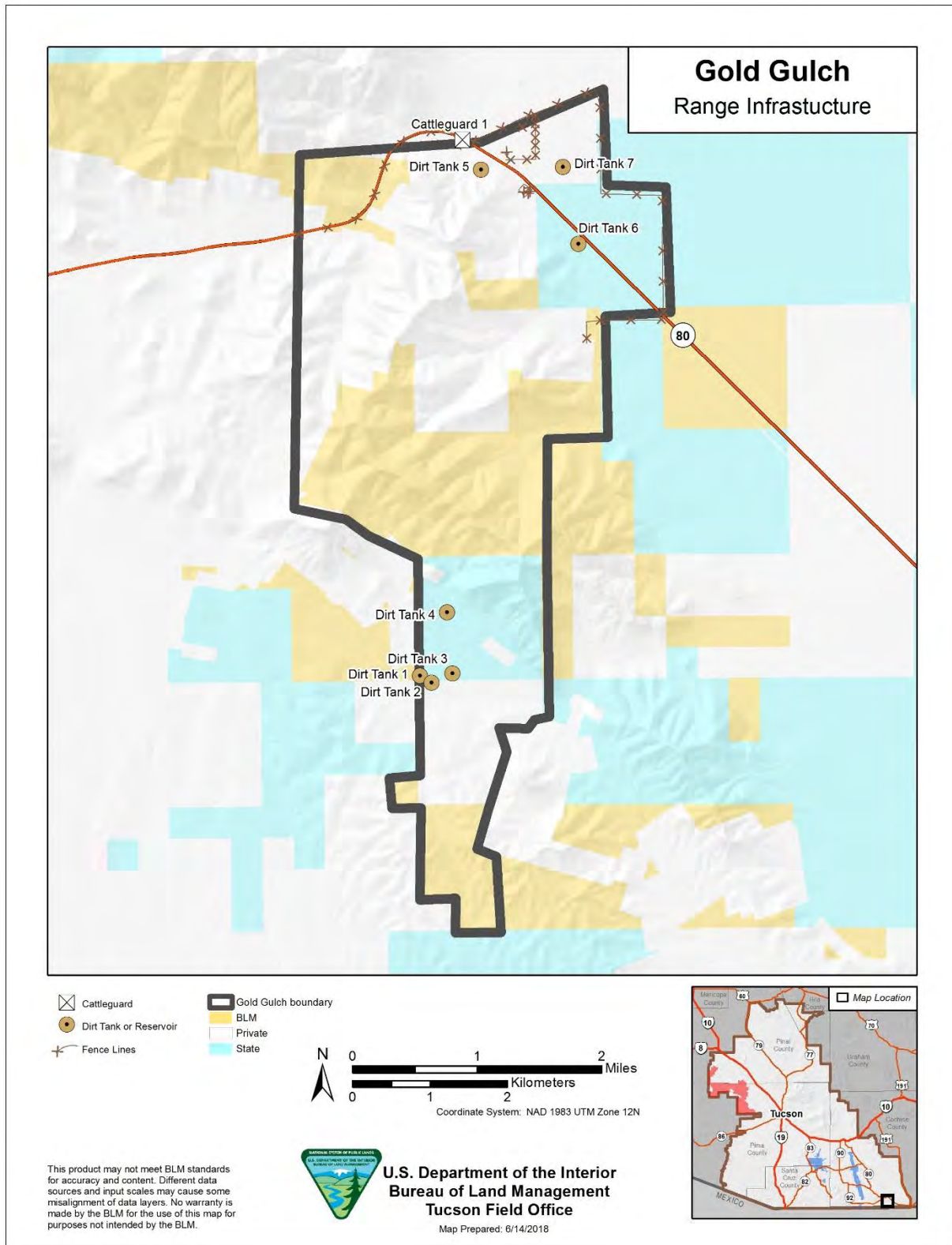
Figure 4. Map of Soil Types within the Gold Gulch Allotment



2.2.5 *Range Improvements*

Gold Gulch Allotment has fencing and a dirt tanks which are not on BLM. Figure 5 shows the existing range improvements throughout the entire allotment. There is an additional stock tank called Geller Reservoir in T23S R25E Sec 21. This mapping exercise was completed using areal imagery as well as verification from the lease holder.

Figure 5. Existing Range Improvements on the Gold Gulch 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 Gold Gulch 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.

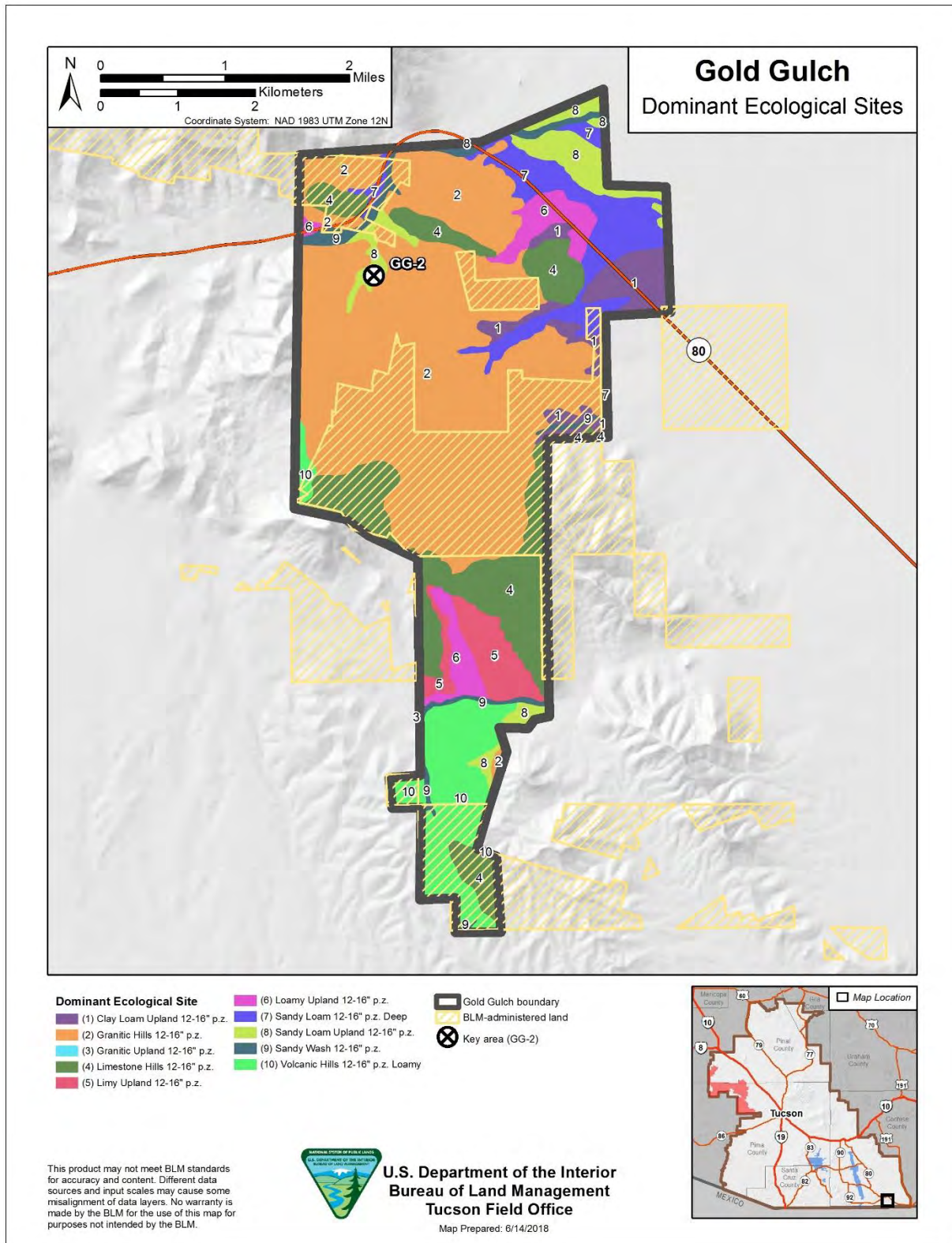
2.3.2 Ecological Sites

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 10 ecological sites exist within the entire Gold Gulch allotment. Two key areas, GG-4 and GG-5, have been established on BLM public lands. Key area GG-4 is within Loamy Upland 12-16" precipitation zone (p.z) ecological site and GG-5 is within Limy Upland 12-16" ecological site (Figure 6). Key Area GG-1 and GG-1 was established by the BLM and University of Arizona Extension, and pace frequency data is collected to be able to track any changes in long-term trend of vegetation and ground

cover from 2009, 2013 and 2016. GG-4 and GG-5 is the location where the U.S. Forest Service Strike Team, referred to as TEAMS documented the 2014 LHE and collected line-point intercept data.

Figure 6. Ecological Sites within Gold Gulch Allotment



2.3.3 Plant Resources

The ecological site for key areas GG-4 is Loamy Upland 12-16" precipitation zone (R041XC313AZ). Key vegetative species for this site include: false mesquite (*calliandra eriophylla*) - range ratany (*krameria erecta*) / sideoats grama (*bouteloua curtipendula*) and sprucetop grama (*bouteloua chondrosioides*).

The potential plant communities found on an ecological site are naturally variable. Composition and production will vary with yearly conditions, location, aspect, and the natural variability of the soils. The Historical Climax Plant Community represents the natural potential 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 ecological site for GG-5 is Limy Upland 12-16" (R041XC309AZ). Key vegetative species for this site include: creosote bush (*larrea tridentata*), whitethorn acacia (*acacia constricta*), bush muhly (*muhlenbergia porter*) and threeawn (*aristida*).

The plant communities found on an ecological site are naturally variable. Composition and production will vary with yearly conditions, location, aspect, and the natural variability of the soils. The Historical Climax Plant Community represents the natural potential 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 Limestone Hills ecological site support desert shrub vegetation. Table 4 below lists the vegetation communities within the Gold Gulch allotment. There are three vegetation types that make up almost 70 percent of the total acreage. Those majority communities are;

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. The Apacherian-Chihuahuan Mesquite Upland Scrub ecosystem ranges from the lower limit of the study area at 3700 feet near the mouth of Kielberg Canyon on the west slope, to just over 5000 feet in numerous places. Most of this ecosystem is situated along the west slope between Kielberg and Schoenholzer Canyons, and on the northeast boundary, from Rattlesnake to Four Mile Canyon - among the lowest elevations in the entire study site. This ecosystem takes in those lands with less than 10% cover of oak and conifers, but hold at least 15% cover of small trees and shrubs, most typically mesquite, fairyduster (*Calliandra eriophylla*), catclaw and whitethorn acacia, and wait-a-minute (*Mimosa aculeaticarpa* = *M. biuncifera*). Grasses were also a feature of the ecosystem, but with an inverse relationship to the abundance of trees and shrubs. For instance, slopes holding only 20% tree/shrub cover could hold 25-40% grass cover, mostly typically sideoats, curly mesquite, and cane beardgrass. Exotic love grass (*Eragrostis lehmanii*) was uncommon. On the east side of the Galiuros, this ecosystem transitions upslope to juniper savanna or woodland of single-needle pinyon and scrub oak, while on the west side the transition is usually to an oak encinal. The majority of this ecosystem – 76% - was on steep slopes in excess of 10 degrees (>19%), in sharp contrast to the Apacherian-Chihuahuan Semi-Desert Grassland and Steppe, of which only 11% was on steep slopes. In the Chiricahuas, Dragoon, and Dos Cabezas, this ecosystem occupied flats, fan, and steeper slopes, the latter often with much ocotillo, beargrass and rosette monocots (*Agave*, *Yucca*, *Dasyliirion wheeleri*). In contrast, in the Galiuros there was no similar 'rosette' grassland, but instead oak encinal and/or juniper chaparral with large patches of bunchgrasses (see descriptions of these ecosystems). These were not mapped as part of this 'mesquite upland shrub.' (<https://www.azfirescape.org>)

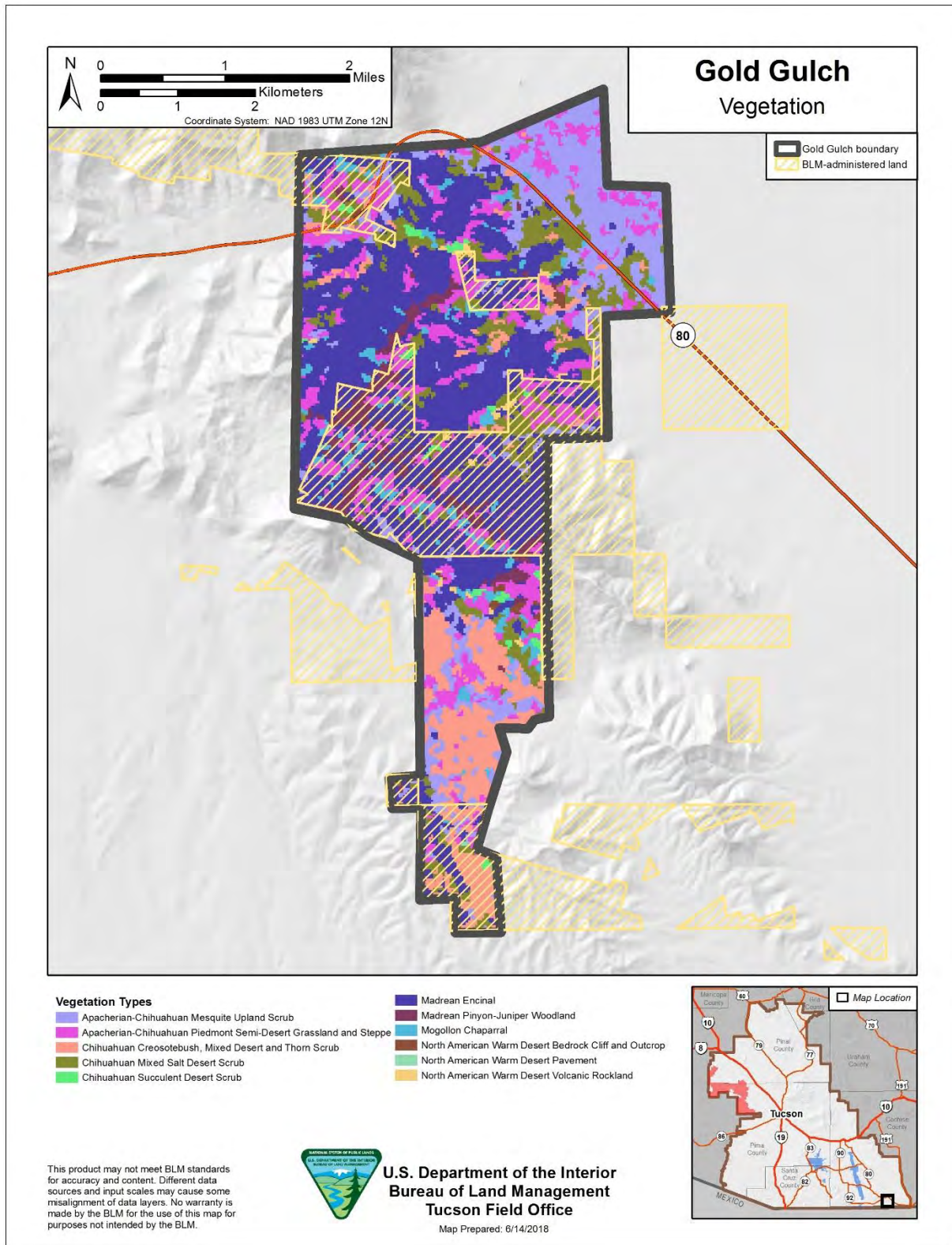
Table 4. Vegetation Communities Found Within the Gold Gulch Allotment

Vegetation Type	Acres on Allotment	Percent of Acres
Apacherian-Chihuahuan Mesquite Upland Scrub	1,124.23	16.43
Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	1,051.52	15.37
Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	717.39	10.48
Chihuahuan Mixed Salt Desert Scrub	739.65	10.81
Chihuahuan Succulent Desert Scrub	61.24	0.89
Madrean Encinal	2,599.14	37.98
Madrean Pinyon-Juniper Woodland	255.29	3.73
Mogollon Chaparral	228.59	3.34
North American Warm Desert Bedrock Cliff and Outcrop	29.18	0.43
North American Warm Desert Pavement	1.56	0.02
North American Warm Desert Volcanic Rockland	35.37	0.52

Gold Gulch Allotment Land Health Evaluation

Total	6,843.16	-
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Figure 7. Vegetation Communities within Gold Gulch Allotment



2.3.4 Wildlife Resources

General Wildlife

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

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

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

Special Status Species

An Arizona Game and Fish Department Heritage Data Management System (HDMS) and Project Evaluation Program (PEP) analysis was conducted for the allotment area (Project ID: HGIS- 09551). Through that analysis, it was determined that 30 species with special status (Appendix A, includes effects determinations and rationale) could occur within a 5 mile radius of the allotment. Of those species, 8 could potentially be impacted by the proposed action, however, forage and cover availability, for these species within the allotment is sufficient based on LHE standards being met, so impacts to plants and animal species are considered discountable.

2.4 Special Management Areas

There are no special management areas within the Gold Gulch 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 BLM's assessment efforts regarding applicable heritage resources management and compliance criteria.

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

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

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

The results varied by study plot location with the greatest impacts recorded near water sources, where higher concentrations of livestock use occurred. Osborn and Hartley (1991) concluded that “the degree of effect is a direct reflection of grazing intensity and dependence on limited water sources in this cold desert environment.” This conclusion is also reflected in a study that examined lithic artifact breakage in areas of variable livestock use along the Central Arizona Project aqueduct in the western Arizona desert (Brown and Stone 1982) where collections of lithic artifacts from six archaeological sites were found to

exhibit breakage rates between 13 and 17 percent. In comparison, 52 percent of the artifacts from a seventh site located near a cattle-accessed reservoir were found broken. In sum, these studies have demonstrated that grazing impacts to cultural resources are primarily of concern in areas of concentrated livestock use such as around water sources and corrals.

Direct impacts to historic properties where livestock concentrate may include trampling, chiseling, and churning of site soils, cultural features and artifacts, artifact breakage, and impacts from standing, leaning, or rubbing against historic structures and other above-ground cultural features such as rock art (Broadhead 2001; Osborn et al. 1987). Indirect impacts from livestock concentrations may include accelerated soil erosion and 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 Gold Gulch grazing allotment on August 12, 2019. Data reviewed were obtained from BLM cultural program project files, site reports, and atlases, in addition to BLM-maintained General Land Office (GLO) plats and patent records. Electronic files also were reviewed using online cultural resource databases including *AZSite* (2019), Arizona's statewide cultural resource inventory system, and the *National Register of Historic Places Focus Database & NPGallery Digital Asset Search* (2019). Archival information was compared with livestock grazing and range improvement data to determine the potential for resource conflicts, particularly in livestock concentration areas such as around water sources, at chutes/corrals, and near supplemental feeding locations.

Background research identified two prior cultural resources investigations that inventoried linear corridors covering approximately 35 acres of BLM-managed land (c.f., Barz 1997 and Jones 2004), and resulting in the documentation of two cultural resource sites (both of which are historic-age segments of State Route 80). Historic GLO plat maps also were reviewed that depict the "Road to Bisbee," ranches, and mining claims (various plats dated from 1886 to 1940).

Statement of Effect Determination

There are no range improvements or potential livestock concentration areas on the BLM-administered portion of the allotment. 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 Gold Gulch allotment is appropriate under a finding of *no historic properties affected* with the following, standard Conditions of Approval (COAs). Newly proposed range improvements would be subject to individual project review and assessment for Section 106 compliance in accordance with the Statewide Protocol. If, as a result of any new assessment or monitoring, historic properties are identified and found to exhibit potential for or actively occurring grazing impacts, mitigation measures would be developed in coordination with the SHPO and any other applicable consulting parties.

Cultural Resources Stipulations / Standard Conditions of Approval (COAs)

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

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

2.6.1 Native American Concerns

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

The BLM initiated government-to-government consultation with nine Native American tribes who claim cultural affiliation to and/or traditional use of the area—as determined through the online *Arizona Government-to-Government Consultation Toolkit* (accessed August 12, 2019)—by sending letters summarizing the results of the Class 1 cultural resources assessment and rangeland monitoring data for the Gold Gulch allotment. Tribes consulted include the Fort McDowell Yavapai Nation, Fort Sill Apache Tribe, Hopi Tribe, Mescalero Apache Tribe, Pascua Yaqui Tribe, Pueblo of Zuni, San Carlos Apache Tribe, Tohono O’odham Nation, and White Mountain Apache Tribe. Identified plant species in the subject allotment with potential cultural significance include velvet mesquite (*Prosopis velutina*; USDA-NRCS 2019).

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

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

3 GRAZING MANAGEMENT

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

3.1 Grazing History

Historic and recent grazing use has been by cattle on the Gold Gulch allotment. The BLM lands within the allotment comprise approximately 34 percent of the total livestock operation. There are 32 head of cattle authorized on the BLM portion of the Gold Gulch allotment. Between the public land and the other leased and private lands, a yearlong grazing system is utilized. The 384 Animal Unit Months (AUMs) under the BLM section 15 grazing lease are included in the total head of cattle in addition to the private land and State lease, and are managed together on the entire allotment.

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

The allotment is 6,843.16 total acres, of which 2,314.70 acres is administered by the BLM. There is currently one lease issued for 384 Animal Unit Months (AUMs) on the BLM public lands for the Gold Gulch allotment. 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 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 Gold Gulch allotment leases are in Table 5.

Table 5. Gold Gulch Lease and AUMs

Ownership	Animal Unit Months (AUMs)	Animal Units (AU)
BLM – Gold Gulch #5265	384 AUMs	32 AU Yearlong

3.2 Mandatory Terms and Conditions for Permitted Use

Grazing use on the Gold Gulch Allotment is in accordance with the terms and conditions of the current lease issued for 384 AUMs on public lands. The Mandatory Terms and Conditions of the lease are listed below.

Table 6. 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
32	Cattle	3/1 to 2/28	100	Active	384

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

Existing Other Terms and Conditions

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

4 OBJECTIVES

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

Eastern Arizona Grazing Environmental Impact Statement (1987)
 Safford District Resource Management Plan (1991)
 Gila District Livestock Grazing Program Biological Opinion (2012)

4.1 Land Use Plan Management Objectives

- BLM’s authority for management of upland vegetation (vegetation outside riparian zones) comes from the Endangered Species Act (1973), Taylor Grazing Act (1934), Public Rangelands Improvement Act (1978) and The Federal Land Policy and Management Act (1976). These laws require BLM to manage vegetation for its use while maintaining sufficient ground cover to maintain and enhance watershed condition and reduce non-point source pollution from rangeland management and use activities. Best management practices would be selected from available

grazing management systems, livestock management practices and BLM standards for range improvements to ensure ground cover and reduce non-point pollution (to Arizona's waters sediment production and fecal contamination) resulting from grazing activities. Safford RMP page 24

- Livestock grazing is managed through allotment management plans, most of which were developed from decisions resulting from the Upper Gila-San Simon Grazing Environmental Impact Statement (BLM 1978) and the Eastern Arizona Grazing Environmental Impact Statement (BLM 1986). These plans were written for a specific unit of rangeland (allotment) based on multiple-use resource management objectives established through existing land use plans and activity level plans by resource specialists and 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 Gold Gulch 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 Gold Gulch 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 NRCS’s Ecological Site Descriptions were used to provide guidance to develop DPC’s for the sites.

Perennial grass components of the DPCs provide important forage resources for Sonoran desert tortoise by providing protein for nutrition and to help tortoises excrete excess potassium. Shrub components provide forage for grazing wildlife such as mule deer, as well as foliar cover for smaller animals such as rabbits, quail and tortoise.

4.2.2 Key Area Objectives

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

Key area GG-4 is within Loamy Upland 12-16” precipitation zone (p.z) ecological site. GG-5 is within the Limy Upland 12-16” site. GG-4 and GG-5 is also the location where the U.S. Forest Service Strike Team, referred to as TEAMS documented the 2014 LHE and collected line-point intercept data.

Key Area GG-1 and GG-2 were established by the BLM and University of Arizona Extension, and pace frequency data is collected to be able to track any changes in long-term trend of vegetation and ground cover.

Refer to Table 7 and Figure 6 for the location of the key area on the Gold Gulch Allotment. Addressed in this LHE report are the results from the key area monitored by the U.S. Forest Service (USFS) TEAMS in 2013 (Appendix B).

Table 7. Location of the Gold Gulch Allotment Key Areas

Key Area	Ecological Site	Ecological Site ID	GPS Coordinates (NAD83 CONUS)
GG-1	Volcanic Hills 12-16” loamy	R041XC323AZ	12 R 0610047 UTM 3470177

Key Area	Ecological Site	Ecological Site ID	GPS Coordinates (NAD83 CONUS)
GG-2	Sandy Loam Upland 12-16"	R041XC313AZ	12 R 0610267 UTM 3477521
GG-4	Loamy Upland 12-16"	R041XC313AZ	12 R 0610233 UTM 3478330
GG-5	Limy Upland 12-16"	R041XC309AZ	12 R 0609359 UTM 3473494

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

Key Area GG-4 and GG-5 Desired Plant Community Objectives for Loamy Upland 12-16" and Limy Upland 12-16" precipitation zone ecological sites

- Maintain Grasses/Grasslike plants composition of ≥10%
- Maintain a palatable shrub composition of ≥10%
- Maintain vegetative foliar cover at ≥40%

Rationale: Maintaining a perennial grass composition of 10 percent on this site is in between the native midgrass drought /fire interaction in the HCPC for Loamy Upland state and transition model. Palatable shrub composition of 10% or greater is appropriate for the site based on its aspect and elevation and complies with the expected ranges of shrub production in the Ecological Site Guide. Foliar cover is expected to be between 30% and 40% as per the reference sheet. A vegetative foliar cover of 40% or greater should serve to prevent accelerated erosion beyond what is expected in the reference state.

5 RANGELAND INVENTORY AND MONITORING METHODOLOGY

The Arizona standards for rangeland health were assessed for the Gold Gulch 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 35 (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 and monitoring methodology can be found on Appendix C. 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.

Monitoring Protocols

Monitoring occurred on the Gold Gulch Allotment at key areas GG-4 and GG-5. 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 Limy and Loamy 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.

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 OF STUDIES DATA

6.1 Actual Use

Actual use information will be submitted within 15 days of the end of the grazing year in accordance with 43 CFR 4130.3-2(d). Actual use reports will identify the amount of livestock use and period of use for each water source/pasture. According to billed use the lease has paid full use since 1992. Livestock grazing for the Gold Gulch 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

A RHA of the three rangeland attributes was completed at key area GG-4 and GG-5. 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 GG-4 and GG-5 on the Gold Gulch Allotment is presented in Table 8 below.

Table 2. Summary of Range Health Assessment Ratings

Key Area	Ecological Site	Range Health Attributes – Degree of Departure		
		Soil	Hydrology	Biotic Integrity
GG-4	Loamy Upland 12-16” p.z.	None to Slight	None to Slight	None to Slight
GG-5	Limy Upland 12-16” p.z.	None to Slight	None to Slight	None to Slight

GG-4- The potential plant community on this site is a diverse mixture of desert shrubs, half shrubs and perennial grasses and forbs. Most of the major perennial grasses on the site are well dispersed throughout the plant community. Black grama occurs in patches which are small in size and appear to be well dispersed over large areas of the site. The aspect is shrub-land. Cryptogam cover (moss, lichen) can be considerable in the plant community, but diminishes as the surface cover of gravel increases.

With continuous heavy grazing, the palatable perennial grasses and forbs are replaced by increases in the large woody perennials (creosote bush, white thorn, and tar bush). Natural fire may have been important in maintaining a balance between herbaceous and woody species on the site, but fire free intervals were much greater than those of more productive sites, due to the length of time needed for

fuels to accumulate. Also, fuel continuity is poor in areas of this site due to slope and aspect. In addition, the major perennial grasses; bush muhly and black grama, have shrub-like characteristics (perennial culms and branching), and accumulate much old dead material and may take several years to recover to pre-fire conditions.

North aspects have more perennial grass than south aspects. Shrubs will resume dominance within ten years after fire.

GG-5- The potential plant community on this site is a diverse mixture of desert shrubs, half shrubs and perennial grasses and forbs. Most of the major perennial grasses on the site are well dispersed throughout the plant community. Black grama occurs in patches which are small in size and appear to be well dispersed over large areas of the site. The aspect is shrub-land. Cryptogam cover (moss, lichen) can be considerable in the plant community, but diminishes as the surface cover of gravel increases.

With continuous heavy grazing, the palatable perennial grasses and forbs are replaced by increases in the large woody perennials (creosote bush, white thorn, and tar bush). Natural fire may have been important in maintaining a balance between herbaceous and woody species on the site, but fire free intervals were much greater than those of more productive sites, due to the length of time needed for fuels to accumulate. Also, fuel continuity is poor in areas of this site due to slope and aspect. In addition, the major perennial grasses; bush muhly and black grama, have shrub-like characteristics (perennial culms and branching), and accumulate much old dead material and may take several years to recover to pre-fire conditions.

North aspects have more perennial grass than south aspects. Shrubs will resume dominance within ten years after fire.

Rangeland Health Attribute 1: Soil and Site Stability

GG-4- 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 four 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 due to the area being naturally armored by the heavy gravel and rock component. Rock and gravel fragments covered 87 percent of the soil surface. Plants were able to grow through these fragments and provided a canopy cover measured at 53 percent and 7 percent basal cover at GG-4(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. Stable soils on the site and heavy with rocks.

GG-5- 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 due to the area being naturally armored by the heavy gravel and rock component. Rock and gravel fragments covered 84 percent of the soil surface. Plants were able to grow through these fragments and provided a canopy cover measured at 91 percent and 15 percent basal cover at GG-5(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. Soils are stable with good vegetative and rock cover.

Rangeland Health Attribute 2: Hydrologic Function

GG-4- 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 five 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 87 percent of the soil surface. Canopy cover was measured at 53 percent and 7 percent basal cover at GG-4 (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 30 percent. It was rated None to Slight.

Plant community composition and distribution relative to infiltration was rated None to Slight. The vegetation composition is effective at soil stability due to the basal area cover and root systems that are not restricted by a compaction layer. This type of plant community is moderately to highly effective at capturing and storing precipitation.

The overall rating for Hydrologic Function was None to Slight. All 10 indicators for hydrologic function were rated as None to Slight. No above ground flows but natural drainages are present.

GG-5- 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 five 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 84 percent of the soil surface. Canopy cover was measured at 91 percent and 15 percent basal cover at GG-5 (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 vegetation composition is effective at soil stability due to the basal area cover and root systems that are not restricted by a compaction layer. This type of plant community is moderately to highly effective at capturing and storing precipitation.

The overall rating for Hydrologic Function was None to Slight. All 10 indicators for hydrologic function were rated as None to Slight. The site is stable with minimal above ground flows on slopes.

Rangeland Health Attribute 3: Biotic Integrity

GG-4- 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 87 percent of the soil surface. Canopy cover was measured at 53 percent and 7 percent basal cover at GG-4 (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 None to Slight. Plant mortality/decadence was rated None to Slight; all age classes were evenly represented. Litter amounts were measured at 30 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. Lehmann's occurred on site and occurs on the majority of sites in the southwest. Reproductive capability of perennial plants was rated None to Slight, as the native plants are adapted to the climate and are capable of producing seeds, stolons, and rhizomes except during the most severe droughts.

The overall rating for Biotic Function was None to Slight. All Nine indicators for biotic function were rated as None to Slight. The sites biotic community is within the ESD parameters.

GG-5- 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 93 percent of the soil surface. Canopy cover was measured at 91 percent and 15 percent basal cover at GG-5 (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 None to Slight. Plant mortality/decadence was rated None to Slight; all age classes were evenly represented. 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. Lehmann's occurred on site and occurs on the majority of sites in the southwest. Reproductive capability of perennial plants was rated None to Slight, as the native plants are adapted to the climate and are capable of producing seeds, stolons, and rhizomes except during the most severe droughts.

The overall rating for Biotic Function was None to Slight. All Nine indicators for biotic function were rated as None to Slight. The sites vegetative composition is within the ESD parameters.

Key Area Conclusions:

Upland range health was evaluated at two key areas (Referred to GG-4 and GG-5). The key areas were 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 this assessment, it was determined whether or not applicable resource standards were being met within the Allotment.

Key Area GG-4

- Maintain Grasses/Grasslike plants composition of $\geq 15\%$ ACHIEVED
- Maintain a palatable shrub composition of $\geq 10\%$ ACHIEVED
- Maintain vegetative foliar cover at $\geq 40\%$ ACHIEVED

Rationale: The grass composition objective is being met at GG-4. The most current long-term monitoring data shows a grass composition of 18 percent. Palatable shrub composition on the site, expected >10 percent, consist of 15 percent of the plant community. The vegetative foliar cover objective is being met

at this site, with foliar cover of 53 percent. No sign or utilization (0 percent) by livestock was observed at the site.

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

Vegetative cover collected at GG-4 is adequate to ensure soil stabilization, and appropriate permeability rates within the ecological system. There were no rills/gullies present at the site, pedestals and/or terracettes were slight to moderate within the innerspaces. Wind-scouring and litter movement were none to slight. The ground is naturally armored by rock/gravel.

Key Area GG-5

- | | |
|--|----------|
| • Maintain Grasses/Grasslike plants composition of $\geq 15\%$ | ACHIEVED |
| • Maintain a palatable shrub composition of $\geq 10\%$ | ACHIEVED |
| • Maintain vegetative foliar cover at $\geq 40\%$ | ACHIEVED |

Rationale: The grass composition objective is being met at GG-5. The most current long-term monitoring data shows a grass composition of 38 percent. Palatable shrub composition on the site, expected >10 percent, consist of 23 percent of the plant community. The vegetative foliar cover objective is being met at this site, with foliar cover of 91 percent. Utilization (5 percent) by livestock was observed at the site specifically on aristida.

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

Vegetative cover collected at GG-5 is adequate to ensure soil stabilization, and appropriate permeability rates within the ecological system. There were no rills/gullies present at the site, pedestals and/or terracettes were slight to moderate within the innerspaces. Wind-scouring and litter movement were none to slight. The ground is naturally armored by rock/gravel.

7 DETERMINATION OF 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).

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, 2005). These variations occur due to site aspect, soils, and other natural conditions. The ESD for both GG-4 and 5 describes the state and transition model of the vegetative community as HCPC sites: The key areas reflect the descriptions within the ESDs for sites at or approaching climax communities. Both sites have natural variations as described above and within the ESD’s. 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 Gold Gulch 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: In general the composition, structure and distributions of plant communities are present as described within the ESDs throughout a majority of the allotment. The current vegetative composition of both perennial and annual native species within the allotment is appropriate for the range site and is

conducive to meet the requirements of the Taylor Grazing Act, Federal Land Policy and Management Act, Endangered Species Act, Clean Water Act, and other applicable laws, regulations, and policies.

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.

The vegetative community at GG-4 represents the composition, structure, and distribution of the state called "Native Mid-Grassland Community". The ESD describes this transition model as "*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.*" Professional observations and data collected at the site support what is reflected in the ESD for a HCPC site. The data indicates that the allotment has no to perhaps a slight deviation from a HCPC community.

The vegetative community at GG-5 represents the composition, structure, and distribution of the state called "Native shrub, grass, forb community". The ESD describes this transition model as "*....Most of the major perennial grasses on the site are well dispersed throughout the plant community. Black grama occurs in patches which are small in size and appear to be well dispersed over large areas of the site. The aspect is shrub-land.*" Black grama did not occur within the transect nor was it observed within the study area but was observed within the allotment. Other primary species that are mentioned within the ESD that do occur within the transect and occur within the study area are bush muhly (*Muhlenbergia porteri*) and low woollygrass (*Dasyochloa pulchella*). The data indicates that the allotment has none to perhaps a slight deviation from a HCPC community.

8 RECOMMENDED MANAGEMENT ACTIONS

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

8.1 Terms and Conditions:

Terms:

Allotment	Livestock # and Kind	Grazing Period of Use	Percent Public Land	AUMs	Type Use
Gold Gulch	32 Cattle	3/1 to 2/28	100	384	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 BLM TFO. The immediate area of the discovery shall be protected until notified by the BLMTFO Manager that operations may resume.

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

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

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

after the due date, shall include the appropriate late fee assessment. Failure to make payment within 30 days may be a violation of 43 CFR Secs. 4150.1 and 4160.1-2.

9 LIST OF PREPARERS

List of Preparers

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

List of Reviewers

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

11 AUTHORIZED OFFICER CONCURRENCE

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

I concur with the determinations and recommendations as written.

I do not concur.

I concur, but with the following modifications:

 Acting for 9/10/2019
Date

Jayme Lopez

Date

Field Office Manager

BLM Tucson Field Office

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13 APPENDIX A: SPECIES LISTS

Table 1--Effects Determinations with Raionals for BLM and USFWS Special Status Species and Special Areas Documented within 2 Miles of Project Vicinity, as determoned by Arizona Game and Fish Department's Heritage Data Management System (HDMS) and Project Evaluation Program (PEP) Project ID: HGIS-09551.

Scientific Name	Common Name	FWS	BLM	Effects Determination	Rational
<i>Aquila chrysaetos</i>	Golden Eagle	BGA	S	NE	A
<i>Gentianella wislizeni</i>	Wislizeni Gentian	SC		MA	B
<i>Leptonycteris yerbabuenae</i>	Lesser Long-nosed Bat	SC		NE	E
<i>Lithobates chiricahuensis</i>	Chiricahua Leopard Frog	LT		NE	A
<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 ammoregus</i>	Arizona grasshopper sparrow		S	MA	B
<i>Anthus spragueii</i>	Sprague's Pipit	SC		MA	B
<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>Corynorhinus townsendii pallescens</i>	Pale Townsend's Big-eared Bat	SC	S	NE	E
<i>Cynomys ludovicianus</i>	Black-tailed Prairie Dog	CCA	S	NE	A
<i>Dipodomys spectabilis</i>	Banner-tailed Kangaroo Rat		S	NE	F
<i>Empidonax traillii extimus</i>	Southwestern Willow Flycatcher	LE		NE	A
<i>Euderma maculatum</i>	Spotted Bat	SC	S	NE	E
<i>Eumops perotis californicus</i>	Greater Western Bonneted Bat	SC	S	NE	E
<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	E
<i>Lithobates blairi</i>	Plains Leopard Frog		S	NE	A
<i>Myotis occultus</i>	Arizona Myotis	SC	S	NE	E
<i>Myotis velifer</i>	Cave Myotis	SC	S	NE	E
<i>Myotis yumanensis</i>	Yuma Myotis	SC		NE	E
<i>Panthera onca</i>	Jaguar	LE		NE	E
<i>Peucaea botterii arizonae</i>	Arizona Botteri's Sparrow		S	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

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 habttat or harm individuals; C= species does not occur in or near proect 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 Loamy Upland 12-16" precipitation zone (p.z.) ecological site located on the public lands within the Gold Gulch allotment. These plant species provide key forage and cover for wildlife species and livestock.

Table 11. Key Plant Species from the Loamy Upland 12-16" p.z. ecological site description from GG-4

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

Species collected January 2014 GG-4.

Annual forbs
 Acacia constricta
 Acacia greggii
 Aristida sp.
 Bothriochloa barbinodis
 Bouteloua chondrosioides
 Bouteloua curtipendula
 Eragrostis lehmanniana
 Mimosa dysocarpa
 Muhlenbergia porteri
 Muhlenbergia torreyi
 Prosopis velutina
 Salix

Species collected January 2014 GG-5.

Annual forbs
 Acacia constricta
 Aristida sp.
 Dasyochloa pulchella
 Diplacus
 Eragrostis lehmanniana
 Fouquieria splendens
 Larrea tridentata
 Mimosa dysocarpa
 Muhlenbergia porterii
 Parthenium incanum
 Urochloa arizonica

14 APPENDIX B: MONITORING PROTOCOLS

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

14.1 Indicators of Rangeland Health

A rangeland health evaluation 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 evaluation 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 evaluation 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 (Technical Reference 1734-6).

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

14.2 Monitoring Protocols

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

14.2.1 *Line Point Intercept (species composition and ground cover)*

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

14.2.2 *Pace Frequency*

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

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

1. Species present within the bounds of the sample quadrat are recorded with a single tally.
2. If no species are present, no frequency data are recorded.
3. Perennial or annual grasses and forbs must be rooted within the quadrat to be counted.
4. A grass or forb plant base present under the quadrat frame is considered "in."
5. Annual plants, grasses and forbs, are counted whether green or dried.
6. Tree/shrub canopy and basal hits are recorded separately. Over time, these parameters can indicate changes in tree/shrub size (canopy) or plant numbers (basal).

7. A canopy hit is any part of the tree or shrub that overhangs the quadrat (enters an imaginary vertical projection of the plot frame).
8. Quadrat placements are placed at one-pace intervals (2-steps), patterned in transects (straight lines) and are run parallel to each other, generally contouring slope, within the area of one ecological site (vegetation and soil type).

14.2.3 Fetch

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

14.2.4 Dry Weight Rank

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

14.2.5 Utilization

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

Table 13. Herbaceous (grasses and forbs) utilization classes

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

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

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

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

Rating	Description
0-5%	The key browse plants show no evidence of grazing use or only negligible use.
6-20%	The key browse plants have the appearance of very light use. The available leaders are little disturbed.
21-40%	There is obvious evidence of leader use. The available leaders appear cropped or browsed in patches and 60 to 80% of the available leader growth remains intact.
41-60%	Key browse plants appear rather uniformly utilized and 40 to 60% of the available leader growth remains intact.
61-80%	The key browse plants are hedged and some plant clumps may be slightly broken. Nearly all available leaders are used and few terminal buds remain. Between 20 and 40% of the available leader growth remains intact.
81-94%	There are indications the key browse species have been utilized repeatedly. There is no evidence of terminal buds and usually less than 20% of available leader growth remains intact. Some, and often much, of the second and third years' growth has been utilized. Hedging (the appearance of browse plants that have been browsed so as to appear artificially clipped or consistent browsing of terminal buds of browse species that results in excessive lateral branching and a reduction in upward and outward growth) is readily apparent. Key browse plants frequently have broken branches.
95-100%	Less than 5% of the available leader growth on the key browse plants remain intact. Most of the second and third years' growth have been utilized. All key browse plants have major portions broken.

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

15 Appendix C: Monitoring Data

15.1 Key Area Data

Upland range health was evaluated at two key areas (GG-4 and GG-5). The key areas were selected for their 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.

Upland range health was evaluated on GG-4 and GG-5 in 2014 by TEAMS.

These key areas were selected for consistency with average livestock use within the allotment. A quantitative and qualitative evaluation of rangeland health indicators was conducted in order to determine if any gaps existed between existing condition and the ecological reference condition. Using these evaluations, it was determined whether applicable resource standards were being met within the allotment and whether adequate perennial grass resources were available relative to Sonoran desert tortoise forage needs.

15.2 Utilization

Utilization measured at GG-4 at the time of the study in 2014 was 0 percent. GG-5 measured 5 percent utilization on aristida.

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

Tables 13 below shows the results from the land health evaluation completed in January 2014 on the Gold Gulch allotment. Summary results are shown from the Rangeland Health Evaluation at key area GG-4. All attributes ranked none to slight from departure of the Loamy Upland 12-16" p.z. reference sheet.

Table 13. January 2014 Summary Results from Rangeland Health Evaluation at Key Area GG-4.

Rangeland Health Attribute	Departure From Ecological Site Description				
	Extreme	Moderate to Extreme	Moderate	Slight to Moderate	None to Slight
Soil/Site Stability	0	0	0	0	10
Hydrologic Function	0	0	0	0	10
Biotic Integrity	0	0	0	0	9

Table 14. Summary of 17 Indicators for Loamy Upland 12-16" p.z. Ecological Site on Key Area GG-4.

17 Indicators Reference Sheet	Rational from January 2014
1. Number and extent of rills: None, these sites generally occur on low slopes not prone to rill formation	None to slight. None observed.
2. Presence of water flow patterns: 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. Number and height of erosional pedestals or terracettes: Very slight pedestalling 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. Bare ground from Ecological Site Description or other studies (rock, litter, standing dead, lichen, moss, plant canopy are not bare ground): 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. Within parameters of ESD.
5. Number of gullies and erosion associated with gullies: None, these	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. Extent of wind scoured, blowouts and/or depositional areas: None present	None to slight. None observed. Area naturally armored.
7. Amount of litter movement (describe size and distance expected to travel): 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. None observed. Fine litter at plant bases.
8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values): 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. Area is naturally armored.
9. Soil surface structure and SOM content (include type and strength of structure, and A-horizon color and thickness): 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. Effect on plant community composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff: 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. Veg composition is patchy as described in ESD.
11. Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site): 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. No compaction of soils at site.

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. Functional/Structural Groups (list in order of descending dominance by above-ground weight using symbols: >>, >, = to indicate much greater than, greater than, and equal to) with dominants and sub-dominants and "others" on separate lines: Dominant: Warm season perennial mid-grasses >> half-shrubs > warm season perennial short grasses = annual forbs > perennial forbs = succulents > large shrubs and trees</p>	<p>None to slight. Plant community is variable but within parameters.</p>
<p>13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence): 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>None to slight. Good age class distribution.</p>
<p>14. Average percent litter cover (20-25%) and depth (1/8-1inches): 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. Per ESD.</p>
<p>15. Expected annual production (this is TOTAL above-ground production, not just forage production): Production in lbs/acre based on annual rainfall: High- >1150 lbs/ac, Norm- >1040 lbs/ac, Low- >930 lbs/ac</p>	<p>None to slight. Per ESD.</p>
<p>16. Potential invasive (including noxious) species (native and non-native). List Species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or</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. Perennial plant reproductive capability: Not impaired in any way; good age class distribution of perennial grasses, recruitment is evident throughout site	None to slight. Within parameters of ESD.

Table 15. January 2014 Summary Results from Rangeland Health Evaluation at Key Area GG-5.

Rangeland Health Attribute	Departure From Ecological Site Description				
	Extreme	Moderate to Extreme	Moderate	Slight to Moderate	None to Slight
Soil/Site Stability	0	0	0	0	10
Hydrologic Function	0	0	0	0	10
Biotic Integrity	0	0	0	0	9

Table 16. Summary of 17 Indicators for Limy Upland 12-16" p.z. Ecological Site on Key Area GG-5.

17 Indicators Reference Sheet	Rational from January 2014
1. Number and extent of rills: None	None to slight. None observed.
2. Presence of water flow patterns: Flow paths common at least 10% of the area; 30-40 feet long, discontinuous.	None to slight. None observed.
3. Number and height of erosional pedestals or terracettes: Pedestals common on all shrubs. Terracettes uncommon	None to slight. None observed.
4. Bare ground from Ecological Site Description or other studies (rock, litter, standing dead, lichen, moss, plant canopy are not bare ground): 10-50%	None to slight. Within parameters of ESD.
5. Number of gullies and erosion associated with gullies: None	None to slight. None observed.
6. Extent of wind scoured, blowouts and/or depositional areas: None	None to slight. None observed. Area naturally rock armored.
7. Amount of litter movement (describe size and distance expected to travel): Herbaceous litter in vicinity of flow paths moves in flow paths.	None to slight. None observed. Fine litter at plant bases.
8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of	None to slight. Good appropriate vegetation and rock cover.

17 Indicators Reference Sheet	Rational from January 2014
values): Expect balues 1-3 in bare areas and 4-6 in grass and shrub canopies.	
9. Soil surface structure and SOM content (include type and strength of structure, and A-horizon color and thickness): Weak granular; color is 7.5YR4/4 dry, 7.5YR3/3 moist; thickness to 11 inches.	None to slight. None observed.
10. Effect on plant community composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff: Canopy 15-25%, basal 5-10%, litter 5-20%,; 50-60% of canopy cover is shrubs, 10-20% is subshrubs, 10-20% is perennial grasses. Cover is well dispersed throughout the site.	None to slight. Plant community is per ESD.
11. Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site): None	None to slight. No compaction of soils at site.
12. Functional/Structural Groups (list in order of descending dominance by above-ground weight using symbols: >>, >, = to indicate much greater than, greater than, and equal to) with dominants and sub-dominants and "others" on separate lines: Dominant: large shrubs > perennial grasses > subshrubs > perennial forbs > annually grasses & forbs > succulents	None to slight. Good veg diversity per ESD.
13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence): 75-80% mortality of desert zinnia.	None to slight. Even age class distribution.
14. Average percent litter cover (5-20%%) and depth (0.25-0.5inches):	None to slight. Per ESD.
15. Expected annual production (this is TOTAL above-ground production, not just forage production): 350 lbs/ac unfavorable precipitation; 600 lbs/ac normal precipitation; 900 lbs/ac favorable precipitation	None to slight. Per ESD.
16. Potential invasive (including noxious) species (native and non-native). List Species which BOTH characterize	None to slight. None observed.

17 Indicators Reference Sheet	Rational from January 2014
<p>degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicator, we are describing what is NOT expected in the reference state for the ecological site: Lehmann lovegrass, creosote, whitethorn, mesquite, prickly pear, burroweed, wait-a-bit.</p>	
<p>17. Perennial plant reproductive capability: Not affected due to regional prolonged drought.</p>	<p>None to slight. Within parameters of ESD.</p>



Figure 1. Key area GG-4 looking East in January 2014.



Figure 2. GG-5 looking North in January 2014.

Table 2. A comparison between conditions described in the ESD (R041XC313AZ – NRCS 2013) and current conditions of key management areas GG-4. Soil cover components include: plants (including basal cover), biological crusts, litter, surface fragments, rock, and bare ground.

	<u>Basal Cover</u>				<u>Non-Vascular Plants</u>	<u>Biological Crust</u>	<u>Litter</u>	<u>Surface Fragments</u>	<u>Surface Fragments</u>	<u>Bedrock</u>	<u>Water</u>	<u>Bare Ground</u>
	<u>Grass/Grasslike</u>	<u>Forb</u>	<u>Shrub/Vine</u>	<u>Tree</u>				<u>> 1/4" & <= 3"</u>	<u>> 3"</u>			
ESD	6 to 25	0 to 1	1 to 5	0 to 1	0 to 1	1 to 10	10 to 60	5 to 40	0 to 15	0 to 0	0 to 0	15 to 25
GG-4	6	0	1	0	0	0	29.7	51.5	36	0	0 to 0	4

Table 3 A comparison between conditions described in the ESD (R041XC309AZ – NRCS 2005) and current conditions of key management areas GG-5. Soil cover components include: plants (including basal cover), biological crusts, litter, surface fragments, rock, and bare ground.

	<u>Basal Cover</u>				<u>Non-Vascular Plants</u>	<u>Biological Crust</u>	<u>Litter</u>	<u>Surface Fragments</u>	<u>Surface Fragments</u>	<u>Bedrock</u>	<u>Water</u>	<u>Bare Ground</u>
	<u>Grass/</u>	<u>Forb</u>	<u>Shrub/</u>	<u>Tree</u>				<u>> 1/4" & <= 3"</u>	<u>> 3"</u>			

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	<u>Grasslike</u>		<u>Vine</u>									
ESD	1 to 3	0 to 1	2 to 3	0 to 0	0 to 0	1 to 25	10 to 20	5 to 45	0 to 8	0 to 1	0 to 0	15 to 55
GG-5	7	0	3	0	0	0	56.4	36.6	48.5	0	0 to 0	0

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

Key area information	Species	Line point intercept cover at GG-4	
		Foliar Cover	Basal Cover
Trend Plot 1 Gold Gulch Allotment	<i>Annual forbs</i>	11%	
Range site: R041XC313AZ	<i>Acacia constricta</i>	2%	1%
	<i>Acacia greggii</i>	1%	
	<i>Aristida sp.</i>	16%	
	<i>Bothriochloa barbinodis</i>	5%	2%
	<i>Bouteloua chondrosioides</i>	2%	1%
	<i>Bouteloua curtipendula</i>	5%	1%
	<i>Eragrostis lehmanniana</i>	10%	
	<i>Mimosa dysocarpa</i>	7%	
	<i>Muhlenbergia porteri</i>	6%	1%
	<i>Muhlenbergia torreyi</i>	3%	1%
	<i>Prosopis velutina</i>	3%	
	<i>Salix</i>	4%	
Cover/Litter/Bare Ground			
Foliar Cover	53%		
Basal Cover	7%		
Bare Ground	4%		

Foliar cover of species recorded in the LPI plot for key area GG-5 in January 2014.

Key area information	Species	Line point intercept cover at GG-5	
		Foliar Cover	Basal Cover
Trend Plot 2 Gold Gulch Allotment	<i>Annual forbs</i>	16%	
Range site: R041XC309AZ	<i>Acacia constricta</i>	9%	1%
	<i>Aristida sp.</i>	9%	1%
	<i>Dasyochloa pulchella</i>	1%	1%
	<i>Diplacus</i>	22%	4%
	<i>Eragrostis lehmanniana</i>	5%	
	<i>Fouquieria splendens</i>	4%	1%
	<i>Larrea tridentata</i>	23%	1%
	<i>Mimosa dysocarpa</i>	9%	
	<i>Muhlenbergia porteri</i>	9%	2%
	<i>Parthenium incanum</i>	1%	1%
	<i>Urochloa arizonica</i>	33%	3%

Cover/Litter/Bare Ground	
Foliar Cover	91%
Basal Cover	15%
Bare Ground	0%

comparison between the state and transition model in the ESD and the LPI data collected in January 2014 at GG-4.

<i>State in Transition of HCPC Site as described by the ESD</i>	LPI Data GG-4 Canopy Cover
Mid grasses - 10 to 20% Canopy Cover	BOBA3 – 5% Canopy Cover BOCU – 5% MUPO2 – 6%
Short grasses- 15 to 35% Canopy Cover	BOCH – 2%
half-shrubs- 5 to 10%	CAER – Present but not within transect
Annual forbs and grasses fluctuate with climate (Drought/El Nino)	Annual forbs – 11%

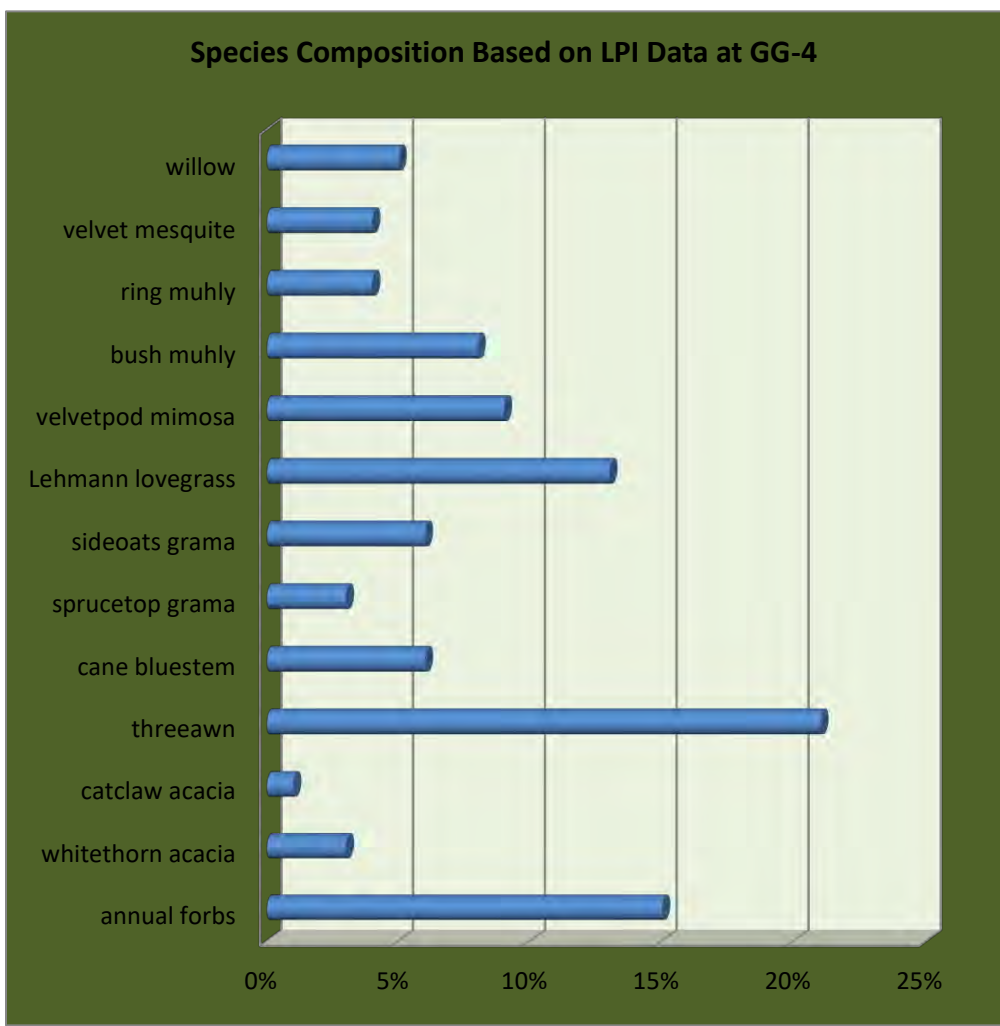


Figure 4. Species Composition at GG-4

Table 7. Functional/structural plant groups at GG-4.

Ranking	Species List for Functional/Structural Groups at GG-4
S	ARISTIDA SP
S	CYDA
S	ERLE
S	PRVE
M	BOCU
M	BOBA3
M	ACCO2
M	MUPO2
M	MIDY
T	GUSA2
T	CAER
T	SALIX
T	BOCH
T	YUCCA

Dominant (D) roughly 40-100% composition, Sub-dominant (S) roughly 10-40% composition, Minor Composition (M) roughly 2-5% composition, or Trace (T) roughly <2% composition.

Table 8. A comparison between the state and transition model in the ESD and the LPI data collected in January 2014 at GG-5.

<i>State in Transition of HCPC Site as described by the ESD</i>	LPI Data GG-5 Canopy Cover
LATR, ACCO - 20 to 45% Canopy Cover	LATR – 23% Canopy Cover ACCO – 9%
MUPO, ARISTIDA- 5 to 10% Canopy Cover	MUPO2- 9% ARISTIDA SP. – 9%
Other half-shrubs- 1 to 10%	PAIN2 – 1% MIDY – 9%
Annual forbs and grasses fluctuate with climate (Drought/El Nino)	Annual forbs – 16% URAR – 33%

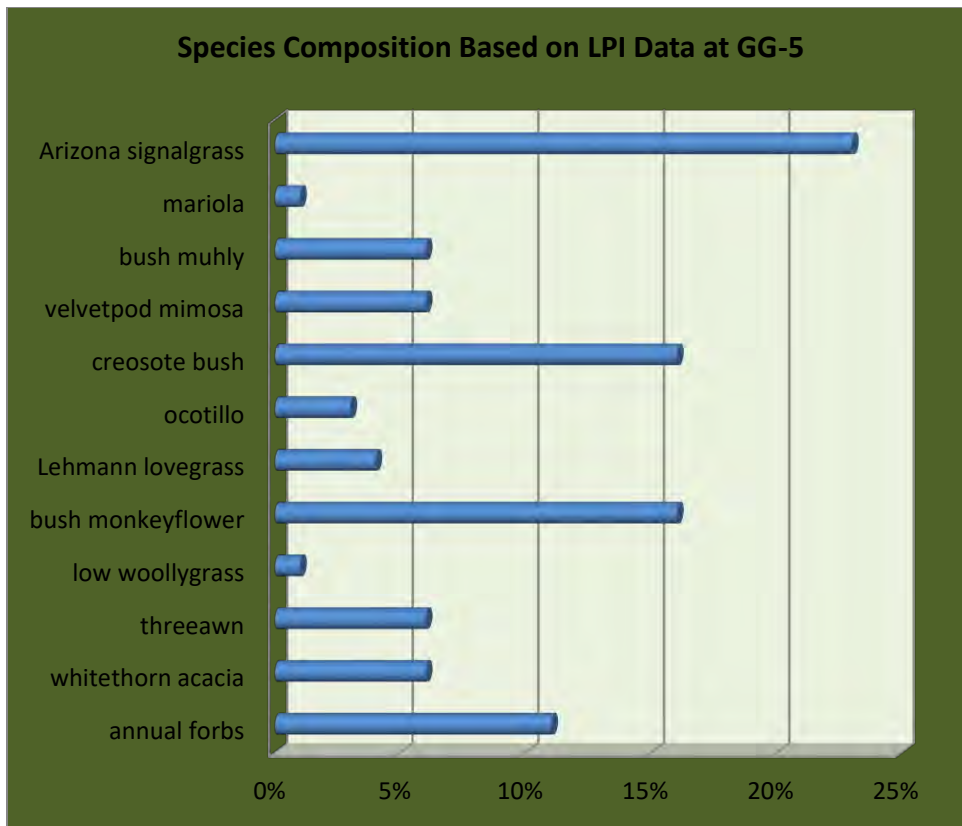


Figure 5. Species Composition at GG-5

Table 9. Functional/structural plant groups at GG-5

Ranking	Species List for Functional/Structural Groups at GG-5
D	LATR2
S	ERLE
M	ARISTIDA SP.
M	URAR
M	ANNUAL FORBS
S	FOSP2
S	ACCO2
T	PAIN2
T	DIPLA3

Dominant (D) roughly 40-100% composition, Sub-dominant (S) roughly 10-40% composition, Minor Composition (M) roughly 2-5% composition, or Trace (T) roughly <2% composition

Figure 14. State and transition model for Loamy Upland

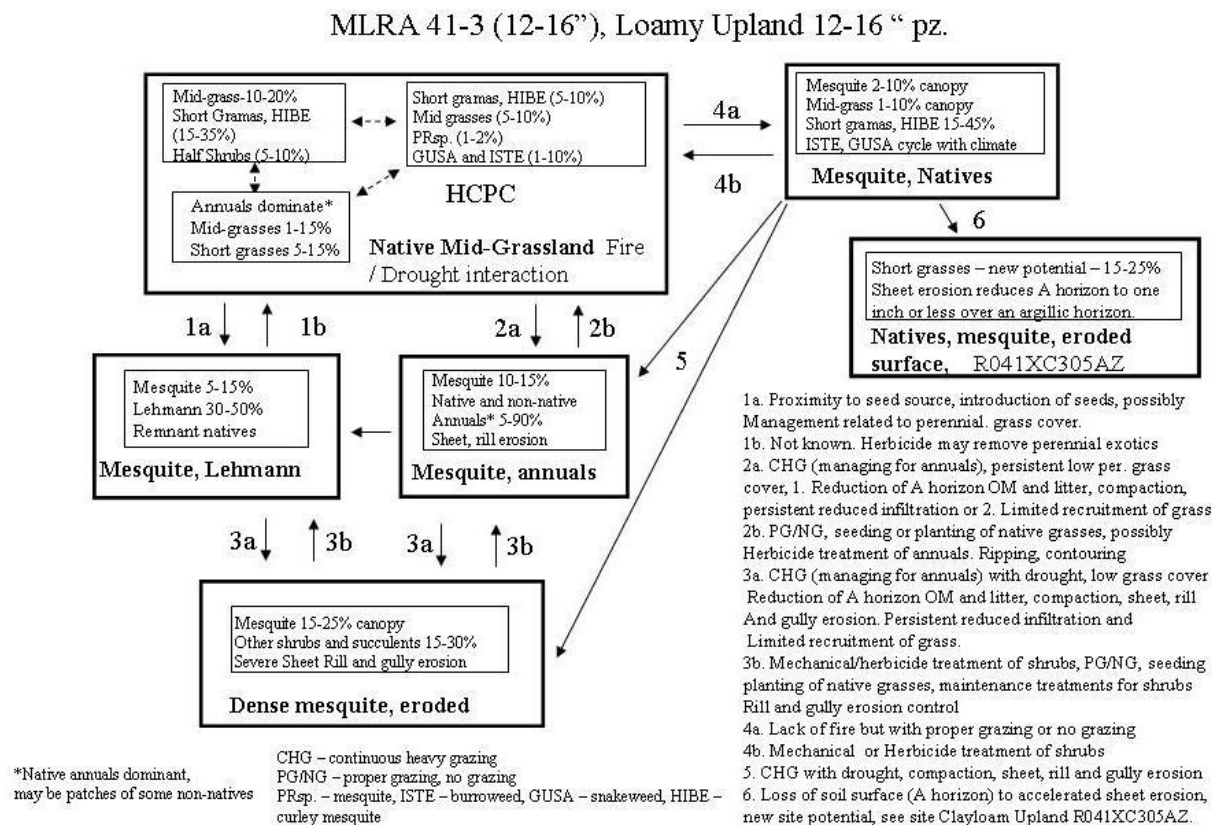
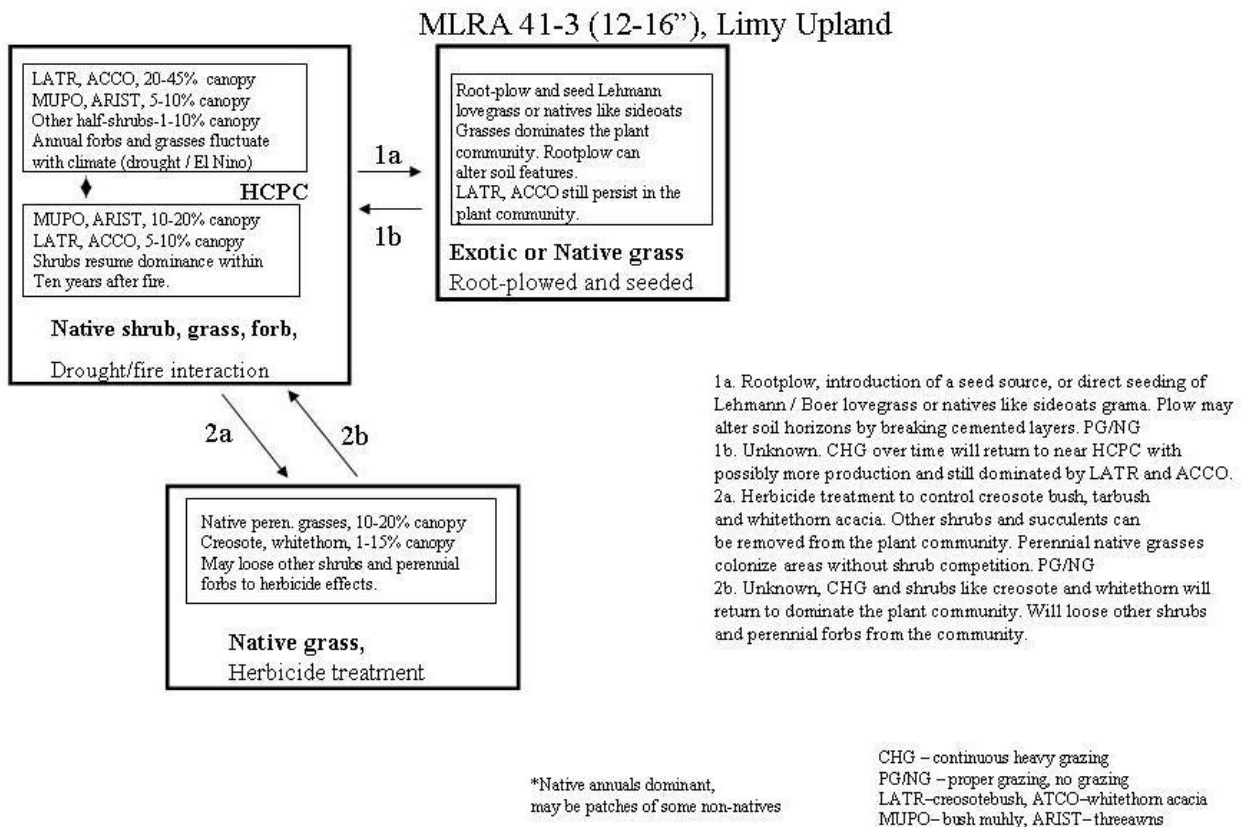


Figure 15. State and transition model for Limy Upland



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