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Land Health Evaluation
Albert Thomas Lease No. 5284
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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 Albert Thomas 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).

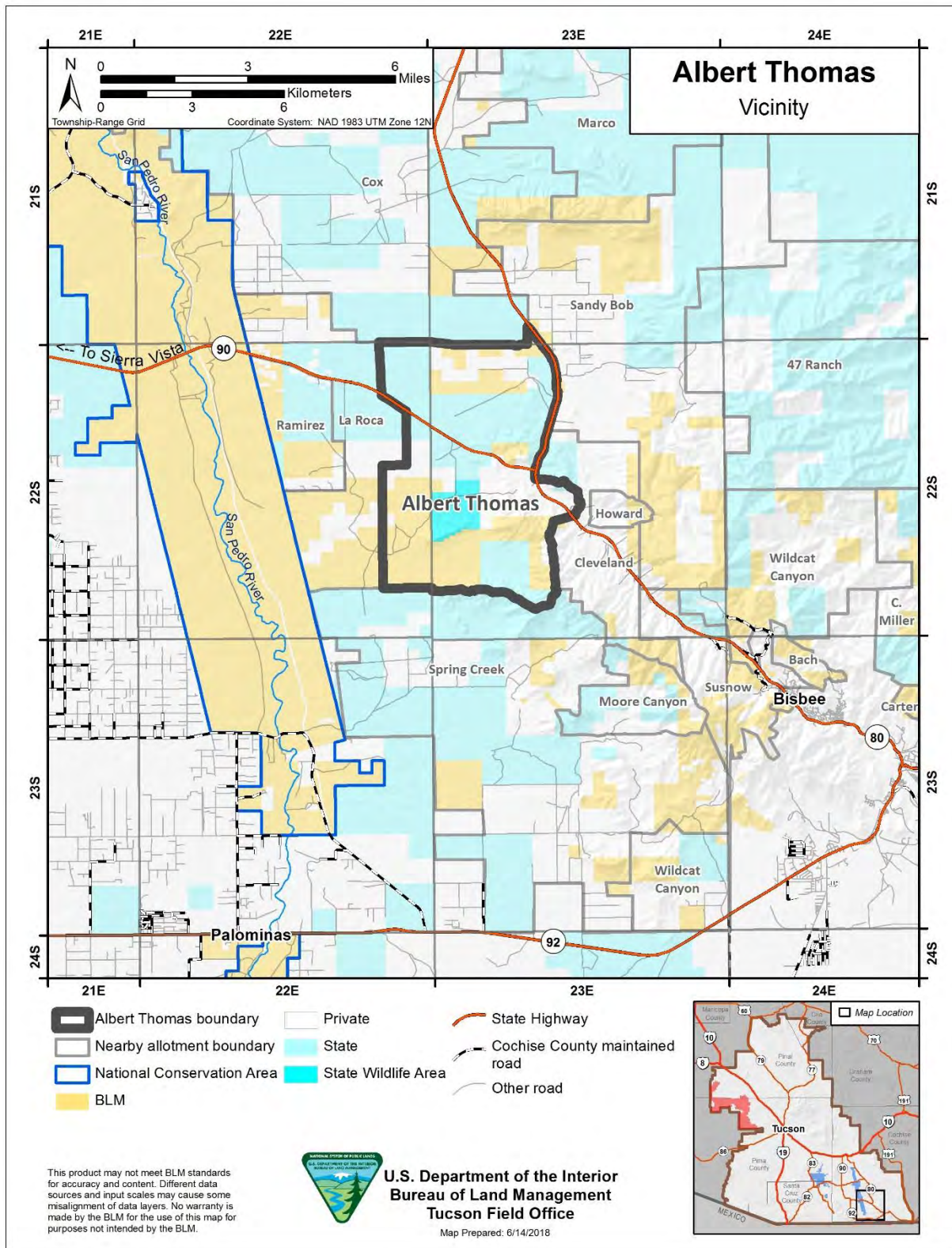
The Arizona Standards and Guidelines identify three standards regarding (1) upland sites, (2) riparian-wetland sites, and (3) desired resource conditions based on specific indicators, as discussed in *Section 6 Rangeland Inventory and Monitoring Methodology* of this document.

2 ALLOTMENT PROFILE AND GENERAL DESCRIPTION

2.1 Location

The BLM portion of the Albert Thomas allotment is located about 10 miles east of the town of Sierra Vista in Cochise County, Arizona. The BLM lands within the allotment are comprise approximately 34 percent of the total livestock operation. The ranch borders the La Roca allotment to the west, the Powers allotment to the south, the Cox allotment the north. Figure 1 below shows the Albert Thomas allotment location.

Figure 1. Vicinity Map of the Albert Thomas Allotment



2.2 Physical Description

This section describes physical characteristics within the Albert Thomas Allotment.

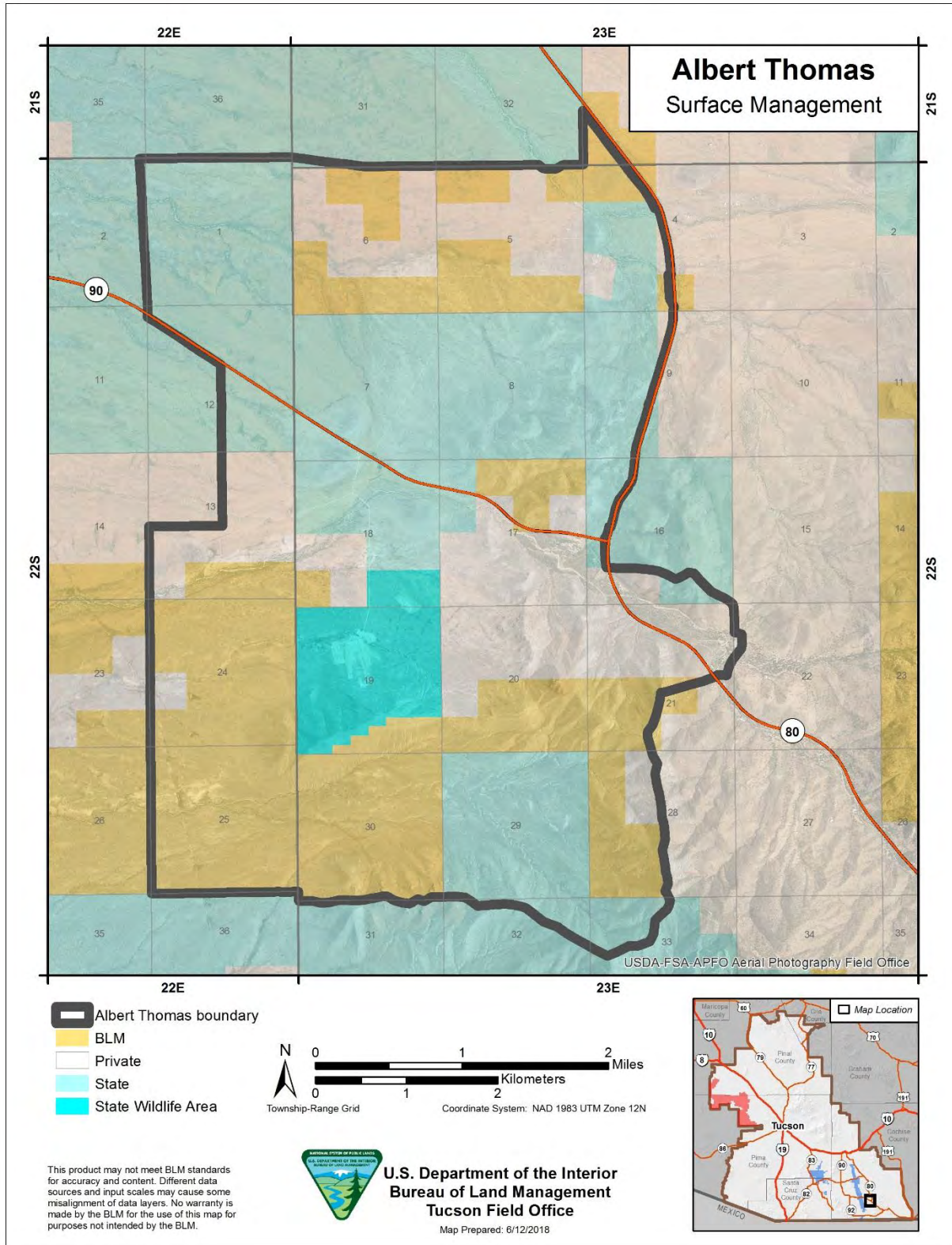
2.2.1 Surface Land Ownership

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

Table 1. Acreage of Landownership

Land Classification	Albert Thomas Allotment
Public Acres	3,734
State Acres	4,257
Private Land Acres	2,427
State Wildlife Area (Sierra Vista Shooting Range)	624
Total Acres	11,043

Figure 2. Land Ownership of the Albert Thomas Allotment



2.2.2 Precipitation and Temperature

Climate data comes from the Limy Upland 12-16" precipitation zone (p.z.) Ecological Site Description (ESD). Precipitation in this common resource area ranges from 12-16 inches yearly in the eastern part with elevations from 3600-5000 feet, and 13-17 inches in the western part where elevations are 3300-4500 feet. Winter-Summer rainfall ratios are 40-60% in the west and 30-70% in the east. Summer rains fall July-September, originate in the Gulf of Mexico and are convective, usually brief, intense thunderstorms. Cool season moisture tends to be frontal, originates in the Pacific and Gulf of California, and falls in widespread storms with long duration and low intensity. Snow rarely lasts more than one day. May and June are the driest months of the year. Humidity is generally very low. Temperatures are mild. Freezing temperatures are common at night from December-April; however temperatures during the day are frequently above 50 F. Occasionally in December-February, brief 0 F temperatures may be experienced some nights. During June, July and August, some days may exceed 100 F. Climate stations for the average precipitation and temperature tables below (Table 2) are: 020309, Apache Powder Co.. Period of record 1923-1990, 022659 Douglas Period of Record 1948-2004, 023120 Fort Huachuca Period of Record 1900-1981, 027530 San Manuel Period of Record 1954-2004, 028619 Tombstone Period of Record 1893-2004.

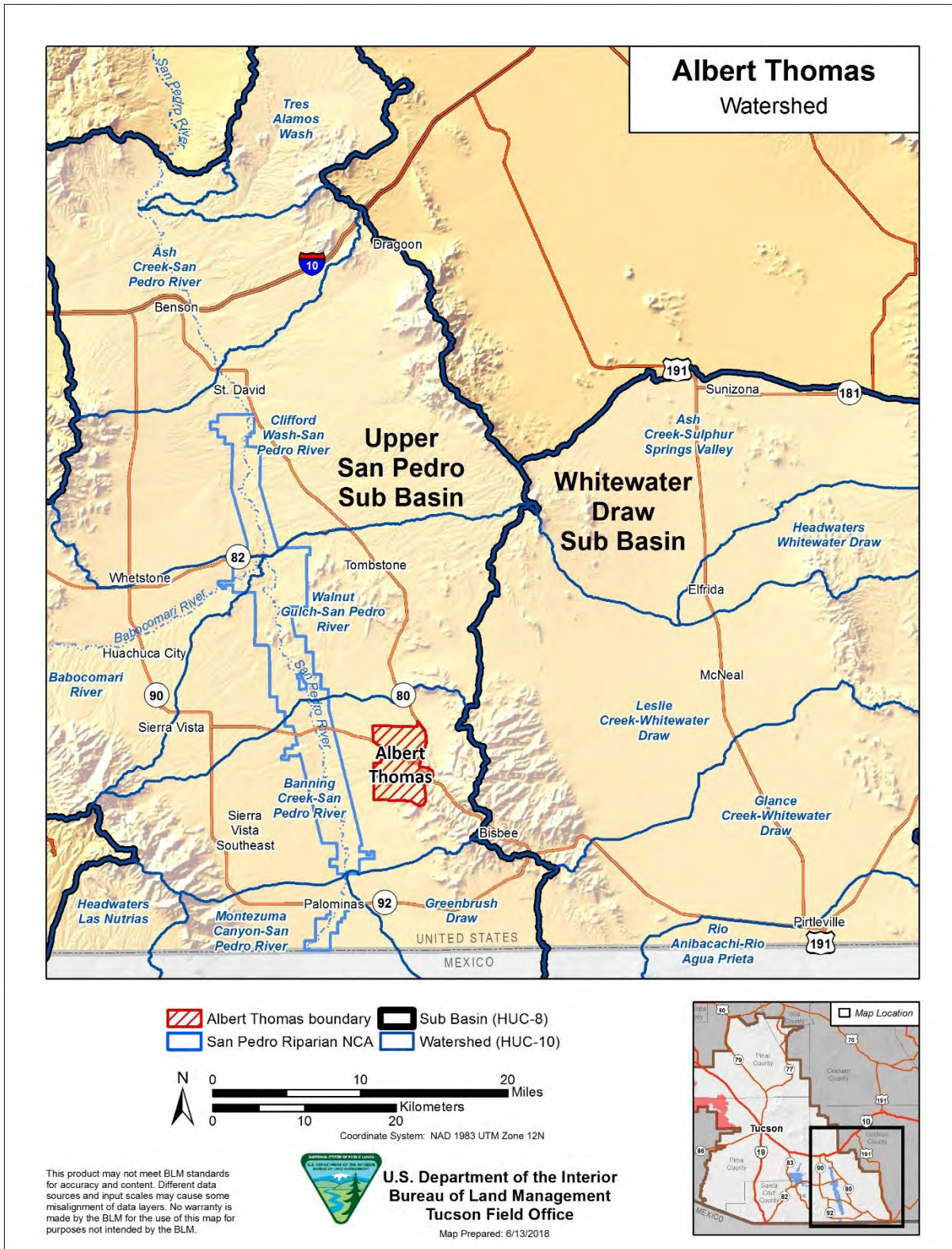
Table 2. Precipitation and Temperature Averages for Limy Upland Site

Averaged Temperature and Precipitation (1894-2005)												
Frost-free period (days): 195												
Freeze-free period (days): 0												
Mean annual precipitation (inches): 16												
Monthly Precipitation (Inches):												
	<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>
<i>High</i>	46.8	49.7	54.6	61.7	68.1	77.1	80.7	78.6	73.9	65.1	54.1	48.3
<i>Low</i>	46.3	48.8	54.0	60.0	67.5	76.8	77.3	75.2	72.1	64.1	53.5	47.1

2.2.3 Watershed and Water Resources

The Albert Thomas allotment is located just east of the San Pedro River and lies within the Upper San Pedro HUC-8 Sub Basin (Figure 3). Within this sub basin, the allotment is included in the smaller Banning Creek-San Pedro River (HUC-10). There are no perennial or intermittent streams in the allotment, but several ephemeral drainages exist, which flow only in response to rain events. The largest ephemeral drainage inside the allotment boundary is Banning Creek, which starts in the Mule Mountains near Bisbee and reaches its terminus at the confluence with the San Pedro River. In the allotment, it flows for a reach of less than 5 miles from east to west. A USGS Streamgage is located on Banning Creek just upstream of the allotment boundary. It has a period of record from 2001 to 2019 constituting 18 years. The highest flow was recorded in 2006 at 2,500 cfs, while the lowest annual peak flood was 0 cfs in 2003 (USGS 2019). The 2, 5, 10, and 25-year recurrence intervals are estimated from the systematic record to be 171.8, 1347, 2830, 5060 cfs, respectively.

Figure 3. Map of watersheds associated with Albert Thomas



2.2.4 Soils

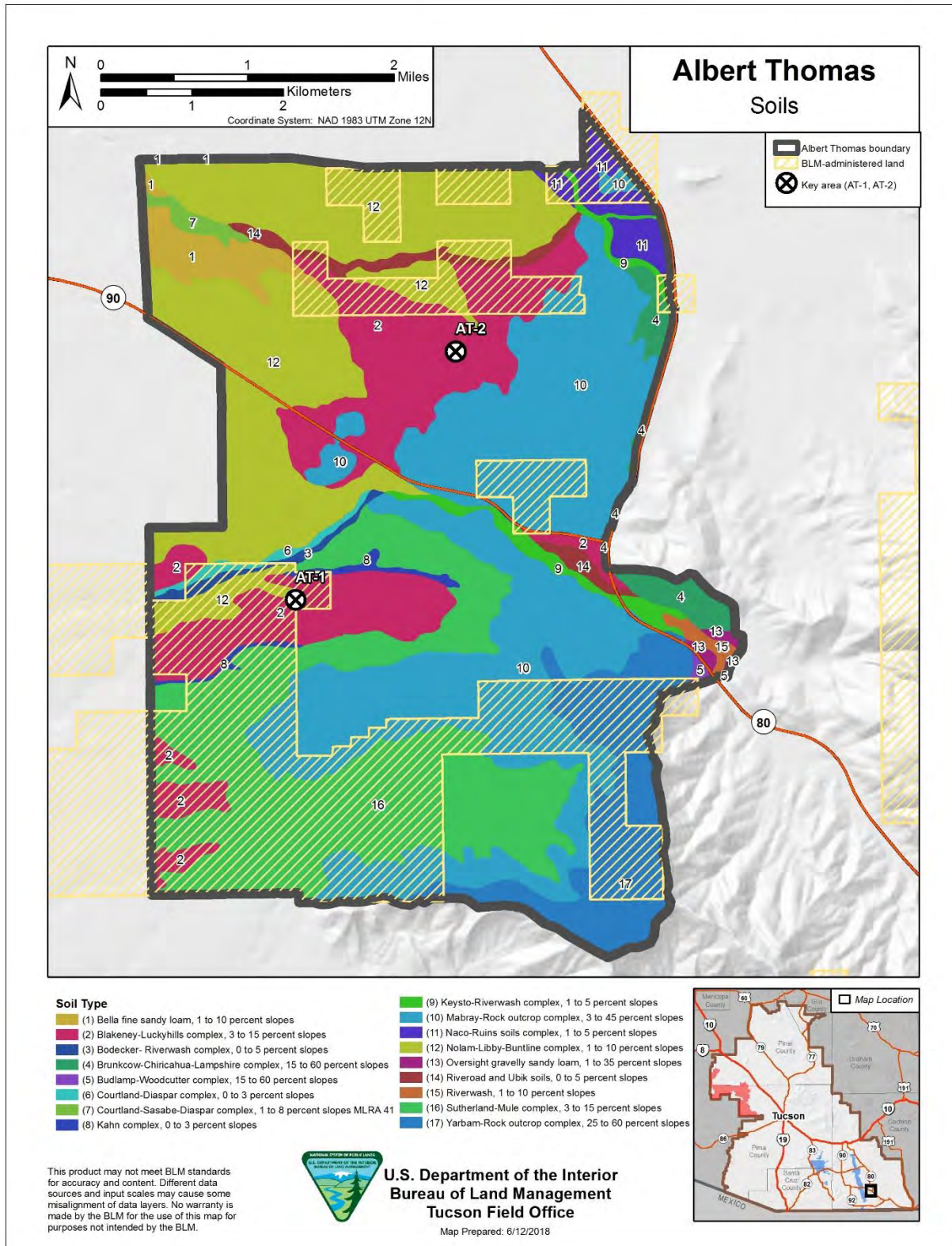
The soil composition on the Albert Thomas allotment is varied as presented in Table 3 and Figure 4. The dominant soil orders in this MLRA are Aridisols, Entisols, Alfisols, and Mollisols. The soils in the area dominantly have a thermic soil temperature regime, an aridic or ustic soil moisture regime, and mixed mineralogy and formed in alluvium. They vary from very shallow to very deep and are well drained to somewhat excessively drained. There are Ustic Torrifuvents (Ubik and Keysto series) that are formed on flood plains, Calcids (Blakeney series) that are formed on terrace deposits and Argids (Eloma and Forrest series) and Aridic Haplustalfs (Gardencan and Crowbar series) that are formed on fan terraces. Shallow and very shallow Haplustolls (Far and Yarbam series) exist on the allotment and are formed on hills and mountains.

The specific soils on the Albert Thomas allotment are shown in the table below. The dominant soils are Mabray-Rock outcrop complex, 3 to 45 percent slopes and Nolam-Libby-Buntline complex, 1 to 10 percent slopes. The acreages may not be accurate due to difficulty defining the area of interest in the web soil survey system.

Table 3. Soils on the Albert Thomas Allotment

Map Unit Name	Acres in Allotment	Percent of Allotment Acres
Bella fine sandy loam, 1 to 10 percent slopes	217.88	1.97
Blakeney-Luckyhills complex, 3 to 15 percent slopes	1,604.36	14.53
Bodecker- Riverwash complex, 0 to 5 percent slopes	56.65	0.51
Brunkcow-Chiricahua-Lampshire complex, 15 to 60 percent slopes	195.56	1.77
Budlamp-Woodcutter complex, 15 to 60 percent slopes	13.01	0.12
Courtland-Diaspar complex, 0 to 3 percent slopes	48.90	0.44
Courtland-Sasabe-Diaspar complex, 1 to 8 percent slopes MLRA 41	52.36	0.47
Kahn complex, 0 to 3 percent slopes	59.45	0.54
Keysto-Riverwash complex, 1 to 5 percent slopes	156.61	1.42
Mabray-Rock outcrop complex, 3 to 45 percent slopes	3,047.89	27.60
Naco-Ruins soils complex, 1 to 5 percent slopes	205.31	1.86
Nolam-Libby-Buntline complex, 1 to 10 percent slopes	2,259.60	20.46
Oversight gravelly sandy loam, 1 to 35 percent slopes	30.11	0.27
Riverroad and Ubik soils, 0 to 5 percent slopes	154.43	1.40
Riverwash, 1 to 10 percent slopes	36.10	0.33
Sutherland-Mule complex, 3 to 15 percent slopes	2,067.18	18.72
Yarbam-Rock outcrop complex, 25 to 60 percent slopes	837.78	7.59
Totals for Allotment	11,043.19	100.0%

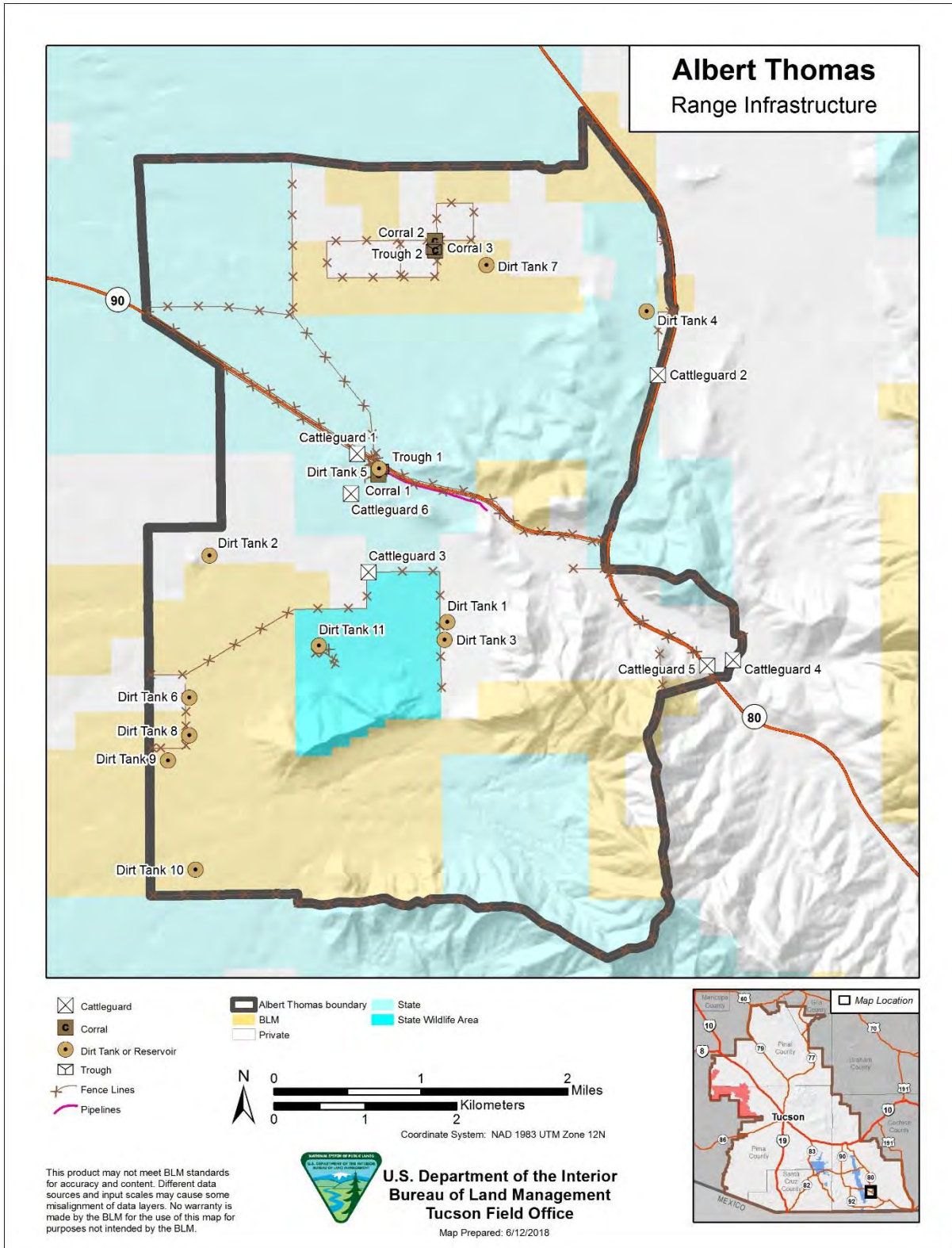
Figure 4. Map of Soil Types within the Albert Thomas Allotment



2.2.5 Range Improvements

After a review of the range improvement record for this allotment there are three corrals on state and private lands. In addition, there are three water troughs and eleven dirt tanks where livestock might congregate. There is one dirt tank in section 20 and one in section 30 that were found in files. The one in section 20 is now within the shooting range and no longer functional for livestock. The one in section 30 was within a large wash and not maintained. Figure 5 is a map of the existing range improvements throughout the entire allotment. This mapping exercise was completed using areal imagery as well as verification from the lease holder.

Figure 5. Existing Range Improvements on the Albert Thomas 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 Albert Thomas 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, Dragoon, Swisshelm, and Pedregosa Mountains. In the vicinity of Willcox, there is a distinct closed basin called the Willcox Playa. The southeast boundary of the part of this MLRA in New Mexico is the Continental Divide. Elevation ranges from 2,620 to 4,590 feet in most areas. It generally ranges from 4,920 to 5,900 feet in the mountains. On some peaks, however, it can reach almost 8,900 feet. On Mt. Graham, in Arizona, it reaches 10,717 feet.

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

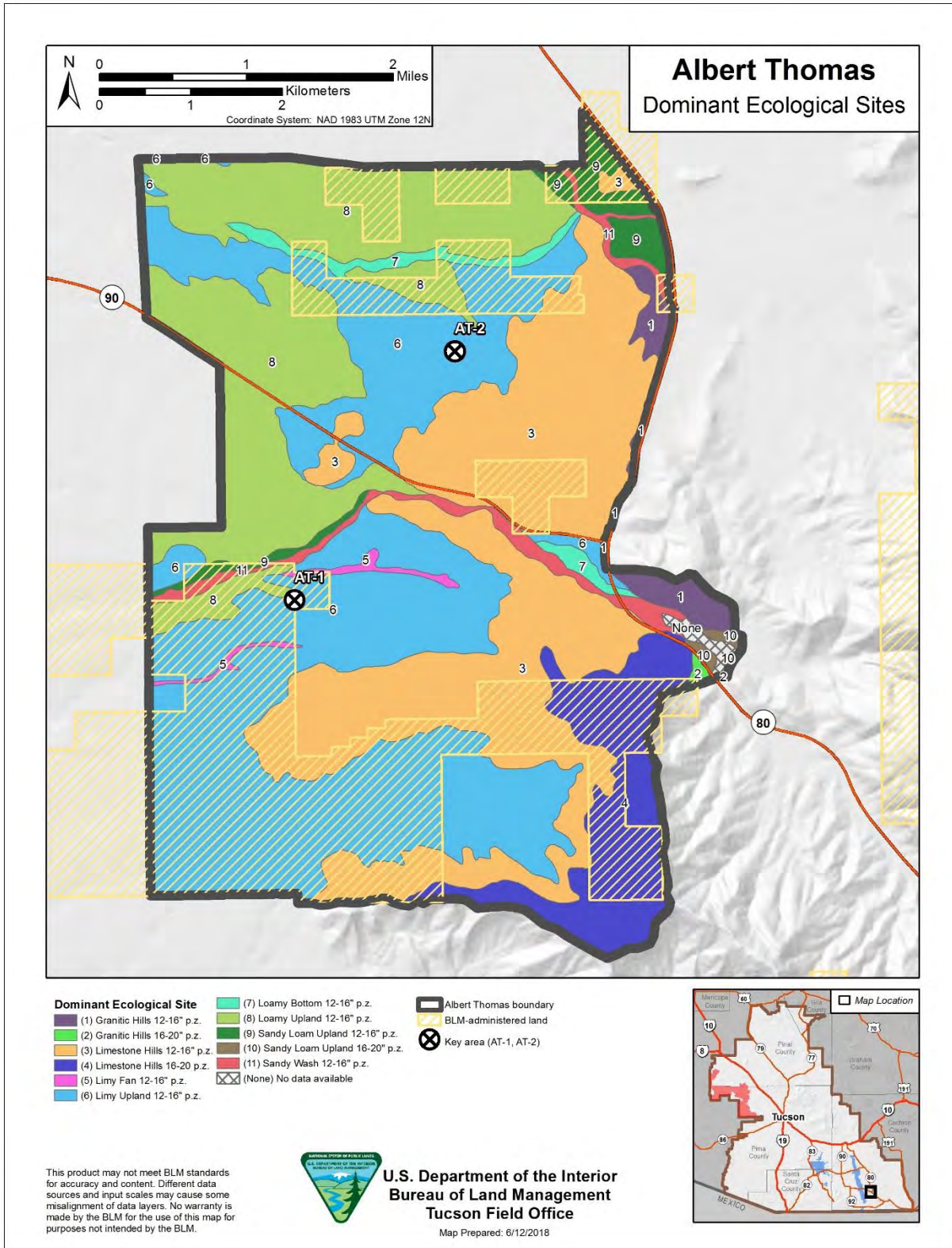
Major Land Resource Areas are broken down further into ecological sites, which are associated units of soil and vegetation with quantifiable characteristics.

2.3.2 Ecological Sites including Soils and Vegetation Communities

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

A total of 11 ecological sites exist within the entire Albert Thomas allotment. Two key areas, AT-1 and AT-2, have been established on BLM public lands. Key areas AT-1 and AT-2 are within Limy Upland 12-16" precipitation zone ecological site, which are the primary ecological sites within the BLM lands in the allotment (Figure 6). Key Area AT-1 and AT-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. AT-1 and AT-2 is also the location where the U.S. Forest Service Strike Team, referred to as TEAMS documented the 2014 LHE and collected line-point intercept data.

Figure 6. Ecological Sites within Albert Thomas Allotment



The ecological site for key area AT-1 is Limy Upland 12-16" precipitation zone (R041XC1309AZ). Key vegetative species for this site include: creosote bush (*larrea tridentata*), whitethorn acacia (*acacia constricta*), bush muhly (*muhlenbergia porter*) and threeawn (*aristida*).

This site occurs in the middle elevations of the Madrean Basin and Range province in southeastern Arizona. It occurs on pediments, fan terraces and hill-slopes. Slope aspect is not site differentiating.

2.3.3 Wildlife Resources

2.3.3.1 General Wildlife

Wildlife species composition expected to occur on the allotment is characteristic of the Madrean Basin and Range province in Southeastern Arizona. Common species would include: mule deer, white-tailed deer, mountain lion, coyote, bobcat, raccoon, skunk, white-throated woodrat, white-footed mouse, gopher snake, king snake, western diamondback rattlesnake, prairie rattlesnake, coachwhip, patch-nosed snake, western whiptail lizard, side-blotched lizard, tree lizard, canyon tree frog, red-tailed hawk, Cooper's hawk, golden eagle, prairie falcon, raven, turkey vulture, meadowlark, ladder-back woodpecker, ash-throated flycatcher, canyon wren, and rough-winged swallow. Migratory species that utilize the area include but are not limited to: Red-tailed hawk, Cooper's hawk, bald eagle, golden eagle, American peregrine falcon, raven, turkey vulture, meadowlark, ladder-back woodpecker, ash-throated flycatcher, canyon wren, and rough-winged swallow. No surveys have been conducted specifically within this allotment for this project to determine presence but these species have the potential of occurring within the vegetation communities located on this allotment (Figure 7).

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

2.3.3.2 Special Status Species

An Arizona Game and Fish Department Heritage Data Management System (HDMS) and Project Evaluation Program (PEP) analysis was conducted for the allotment area (Project ID: HGIS- 09570). Through that analysis, it was determined that 57 species with special status (Appendix A, includes effects determinations and rational) could occur within a 5 mile radius of the allotment. Of those species, 14 could potentially be impacted by the proposed action, however, forage and cover availability, for these species within the allotment is sufficient based on LHE standards being met, so impacts to plants and animal species are considered discountable.

2.3.4 Plant Resources

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

The potential plant community on 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.

Cool season plants start growth in early spring and mature in early summer. Warm season plants take advantage of summer rains and are growing and nutritious July-September. Warm season grasses may remain green throughout the year.

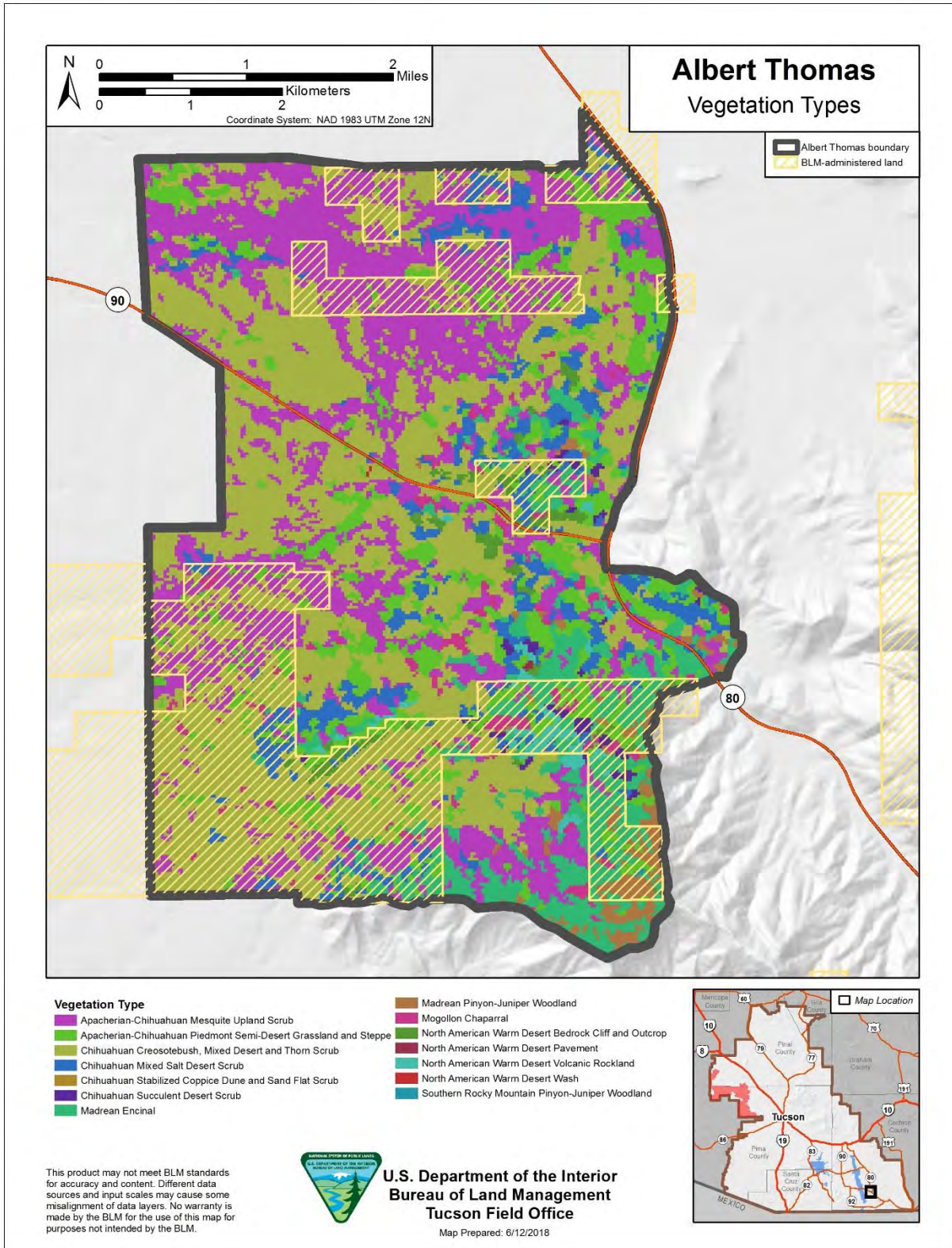
Table 4 below lists the vegetation communities within the Albert Thomas allotment. There are two vegetation types that make up 60 percent of the total acreage. Those majority communities are (Figure 7);

1. This widespread Chihuahuan Desert land cover type is composed of two ecological systems the Chihuahuan Creosotebush Xeric Basin Desert Scrub (CES302.731) and the Chihuahuan Mixed Desert and Thorn Scrub (CES302.734). This cover type includes xeric creosotebush basins and plains and the mixed desert scrub in the foothill transition zone above, sometimes extending up to the lower montane woodlands. Vegetation is characterized by *Larrea tridentata* alone or mixed with thornscrub and other desert scrub such as *Agave lechuguilla*, *Aloysia wrightii*, *Fouquieria splendens*, *Dasyliirion leiophyllum*, *Flourensia cernua*, *Leucophyllum minus*, *Mimosa aculeaticarpa* var. *biuncifera*, *Mortonia scabrella* (= *Mortonia sempervirens* ssp. *scabrella*), *Opuntia engelmannii*, *Parthenium incanum*, *Prosopis glandulosa*, and *Tiquilia greggii*. Stands of *Acacia constricta* *Acacia neovernicosa* or *Acacia greggii* dominated thornscrub are included in this system, and limestone substrates appear important for at least these species. Grasses such as *Dasyochloa pulchella*, *Bouteloua curtipendula*, *Bouteloua eriopoda*, *Bouteloua ramosa*, *Muhlenbergia porteri* and *Pleuraphis mutica* may be common, but generally have lower cover than shrubs. (<http://swregap.nmsu.edu>)
2. APACHERIAN-CHIHUAHUAN MESQUITE UPLAND SCRUB – This ecological system is located from foothills and piedmont in the Chihuahuan Desert, extending into the Sky Island region (southeastern Arizona and southwestern New Mexico) to the west, and the Edwards Plateau to the east. It occurs as upland shrublands concentrated in the extensive grassland shrubland transition in foothills and piedmont in the Chihuahuan Desert. It extends into the Sky Island region to the west, and the Edwards Plateau to the east. Substrates are typically derived from alluvium without a well-developed argillic or calcic soil horizon that would limit infiltration and storage of winter precipitation in deeper soil layers. *Prosopis* spp. and other deep-rooted shrubs exploit this deep soil moisture that is unavailable to grasses and cacti. Vegetation is typically dominated by *Prosopis glandulosa* or *Prosopis velutina* and succulents. Other desert scrub that may codominate or dominate includes *Acacia neovernicosa*, *Acacia constricta*, *Juniperus monosperma*, or *Juniperus coahuilensis*. Grass cover is typically low. During the last century, the area occupied by this system has increased through conversion of desert grasslands as a result of drought, overgrazing by livestock, and/or decreases in fire frequency. It is similar to Chihuahuan Mixed Desert and Thorn Scrub, but is generally found at higher elevations where *Larrea tridentata* is not codominant. It is also similar to Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub, but does not occur on eolian-deposited substrates. (<http://swregap.nmsu.edu>).

Table 4. Vegetation Communities Found Within the Albert Thomas Allotment

Vegetation Type	Acres on Allotment	Percent of Acres
Apacherian-Chihuahuan Mesquite Upland Scrub	3,113.60	28.19
Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	1,343.64	12.17
Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	4,196.54	38.00
Chihuahuan Mixed Salt Desert Scrub	726.73	6.58
Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub	3.87	0.04
Chihuahuan Succulent Desert Scrub	70.66	0.64
Madrean Encinal	944.97	8.56
Madrean Pinyon-Juniper Woodland	231.19	2.09
Mogollon Chaparral	181.36	1.64
North American Warm Desert Bedrock Cliff and Outcrop	132.96	1.20
North American Warm Desert Pavement	2.22	0.02
North American Warm Desert Volcanic Rockland	92.74	0.84
North American Warm Desert Wash	0.89	0.01
Southern Rocky Mountain Pinyon-Juniper Woodland	1.82	0.02
TOTAL	11,043.19	

Figure 7. Vegetation Communities within Albert Thomas Allotment



2.4 Special Management Areas

There are no special management areas within the Albert Thomas Allotment.

2.5 Recreation Resources

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

2.6 Cultural Resources

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

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

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

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

The results varied by study plot location with the greatest impacts recorded near water sources, where higher concentrations of livestock use occurred. Osborn and Hartley (1991) concluded that “the degree of effect is a direct reflection of grazing intensity and dependence on limited water sources in this cold desert environment.” This conclusion is also reflected in a study that examined lithic artifact breakage in areas of variable livestock use along the Central Arizona Project aqueduct in the western Arizona desert (Brown and Stone 1982) where collections of lithic artifacts from six archaeological sites were found to exhibit breakage rates between 13 and 17

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

Direct impacts to historic properties where livestock concentrate may include trampling, chiseling, and churning of site soils, cultural features and artifacts, artifact breakage, and impacts from standing, leaning, or rubbing against historic structures and other above-ground cultural features such as rock art (Broadhead 2001; Osborn et al. 1987). Indirect impacts from livestock concentrations may include accelerated soil erosion and gully, 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 Albert Thomas grazing allotment between June 6 and 12, 2019. Data reviewed were obtained from BLMTFO cultural program project files, site reports, and atlases, in addition to BLM-maintained General Land Office (GLO) plats and patent records. Electronic files also were reviewed using online cultural resource databases including *AZSite* (2019), Arizona’s statewide cultural resource inventory system, and the *National Register of Historic Places Focus Database & NPGallery Digital Asset Search* (2019). Archival information was compared with livestock grazing and range improvement data to determine the potential for resource conflicts, particularly in livestock concentration areas such as around water sources, at chutes/corrals, and near supplemental feeding locations. The results of archival research are summarized as follows; data provided are applicable to BLM-administered lands within the subject allotment (i.e., the jurisdictional APE) and based on currently available information from the aforementioned sources.

Background research identified six prior cultural resources investigations (Table 5) that, collectively, have resulted in the inventory of approximately 640 acres of BLM-managed surface and documentation of eight cultural resource sites. Known site types include prehistoric resource procurement and/or processing locales, a historic-age mining/prospecting site, and two roadways that are part of the Historic State Highway System.

Table 5. Prior Cultural Resources Investigations within the Albert Thomas Allotment

No	Project No.	Project Name	Reference(s)
1	1980-98.ASM	Albert Thomas Survey	Madsen 1980
2	1996-307.ASM	SR 90: Sierra Vista-Bisbee	Harmon 1996
3	1997-392.ASM	SR80 Tombstone	Stone and Palus 1997
4	BLM-060-690C	BLM Survey	AZSite 2019
5	BLM-060-690D	BLM Survey	AZSite 2019
6	BLM-060-690E	BLM Survey	AZSite 2019

Historic-age GLO plat maps also were reviewed that depict an “abandoned railroad grade,” multiple telephone lines, and a network of unnamed roads (plat nos. 2501 and 2503, dated 1920 and 1915, respectively). Although none of these features correspond with range improvements or livestock concentration areas on BLM-managed surface, historic land-use features—in particular, ranching and mining features—may exist throughout the subject allotment; such features serve as evidence of the long-term history of grazing and mining activities within the allotment and surrounding vicinity, some of which predates the early 1900s.

Statement of Effect Determination

Although no documented cultural sites coincide with any of the existing range improvements or potential livestock concentration areas, three of the seven BLM-administered range improvement locations have been subject to

field assessment or inspection. As a routine undertaking with no currently identified impacts to historic properties within the BLM-administered portion of the allotment, lease issuance for continued livestock use of the Albert Thomas allotment is appropriate under a finding of *no adverse effect*, provided that an assessment strategy is devised for the four un-surveyed range improvement locations prior to lease issuance. Additionally, the following Conditions of Approval (COAs) are applicable lease stipulations. Any subsequent cultural resources inventory should focus on identified areas of livestock concentration within the BLM-administered portion of the allotment, as appropriate. Newly proposed range improvements would be subject to individual project review and assessment for Section 106 compliance in accordance with the Statewide Protocol. If, as a result of any new assessment or monitoring, historic properties are identified and found to exhibit potential for or actively occurring grazing impacts, mitigation measures would be developed in coordination with the SHPO and any other applicable consulting parties.

Cultural Resources Stipulations / Standard Conditions of Approval (COAs)

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

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

2.6.1 Native American Concerns

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

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

Currently, there are no known adverse impacts to any culturally significant plants, items, sites, or landscapes. Additionally, because lease issuance does not include authorization for new construction, ground disturbance, or

the direct sale/exchange of federally managed lands, the undertaking will not prevent access to any known sacred sites, prevent the possession of sacred objects, or otherwise interfere with the performance of traditional ceremonies and/or rituals.

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

3 GRAZING MANAGEMENT

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

3.1 Grazing History

Historic and recent grazing use has been by cattle on the Albert Thomas allotment. The BLM lands within the allotment comprise approximately 34 percent of the total livestock operation. There are 60 head of cattle run on the BLM lease. Between it and the other leased and private lands, there is a yearlong grazing system. The 338 Animal Unit Months (AUMs) under the BLM grazing lease are included in the total head of cattle on the private land and State lease, and are managed together on the entire allotment. This lease calculated its AUMs using 60 cows at 47% public lands to total 338 AUMs

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

The allotment is 11,043 total acres, of which 3,734 acres is administered by the BLM. There is currently one lease issued for 338 Animal Unit Months (AUMs) on the BLM public lands for the Albert Thomas allotment. Public land percentage is 34%. For the purposes of calculating AUMs for billing 47% is used to provide the total AUM allowed. An AUM is the amount of forage required by one animal unit for a period of 30 days or one month. Within the allotment, yearlong grazing from March 1 to February 28 is allowed under the terms and conditions of the lease. The BLM lands associated with this allotment are used in conjunction with the private and state in a rotational grazing system. The BLM land, however, is not fenced off completely. An Animal Unit (AU) is considered to be one mature cow of about 1,000 pounds either with or without a calf up to six months of age or one bull, consuming about 30 pounds of forage per day. AUMs totals for the Albert Thomas allotment leases are in Table 6.

Table 6. Albert Thomas Lease and AUMs

Ownership	Animal Unit Months (AUMs)	Animal Units (AU)	Percent Public Land
BLM – Albert Thomas #5284	338 AUMs	60 AU Yearlong	47

3.2 Mandatory Terms and Conditions for Permitted Use

Grazing use on the Albert Thomas Allotment is in accordance with the terms and conditions of the current lease issued for 338 AUMs on public lands. The Mandatory Terms and Conditions of the lease are listed below:

Table 7. Mandatory Terms and Conditions of the Lease

Total Livestock on the BLM acres of the Allotment	Livestock Kind	Grazing Period of Use	Percent Public Land*	Type Use	AUMs on Public Land
60	Cattle	3/1 to 2/28	47	Active	338

* 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 Albert Thomas 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 Albert Thomas 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 Albert Thomas allotment.

Standard 3: Desired Resource Conditions

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

Criteria for meeting Standard 3:

Upland and riparian-wetland plant communities meet desired plant community objectives. Plant community objectives are determined with consideration for all multiple uses. Objectives also address native species, and

the requirements of the Taylor Grazing Act, Federal Land Policy and Management Act, Endangered Species Act, Clean Water Act, and appropriate laws, regulations, and policies.

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

Desired Plant Community Objective

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

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

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

Table 8. Location of the Albert Thomas Allotment Key Area

Key Area	Ecological Site	Ecological	GPS Coordinates
		Site ID	(NAD83 CONUS)
AT-1	Limy Upland 12-16	R041XC1309AZ	12 R 0589793 UTM 34866123549006 m N

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

Key Areas AT-1 Desired Plant Community Objectives for Limy Upland 12-16” precipitation zone ecological site

- Maintain native perennial grass canopy of ≥10%
- Creosote, whitethorn shrub canopy <30%

Rationale: Maintaining a perennial grass canopy cover of more than 10 percent on this site moves the state to native grass. Also under the native grass state creosote and whitethorn are to be reduced to <30% canopy cover. Both are within the Limy Upland 12-16" state and transition model.

5 RANGELAND INVENTORY AND MONITORING METHODOLOGY

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

5.1 Monitoring Protocols

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

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

Line Point Intercept

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

5.1.1 Indicators of Rangeland Health

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

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

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

Step 3. Collect Supplementary Information

Step 4. Rate the 17 Indicators on the Evaluation Sheet

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

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

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

1. Rills: S, H
2. Water Flow Patterns: S, H
3. Pedestals and/or Terracettes: S, H
4. Bare Ground: S, H
5. Gullies: S, H
6. Wind-Scoured, Blowout, and/or Depositional Areas: S
7. Litter Movement: S
8. Soil Surface Resistance to Erosion: S, H, B
9. Soil Surface Loss or Degradation: S, H, B
10. Plant Community Composition and Distribution Relative to Infiltration and Run off: H
11. Compaction Layer: S, H, B
12. Functional/Structural Groups: B

13. Plant Mortality/Decadence: B

14. Litter Amount: H, B

15. Annual Production: B

16. Invasive Plants: B

17. Reproductive Capability of Perennial Plants: B

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

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

6 MANAGEMENT EVALUATION AND SUMMARY

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 Albert Thomas Allotment is permitted as a Section 15 grazing lease. Allowable AUMs are calculated on BLM-administered land only. Lease holders are billed for their maximum use available on public lands unless non-use is requested and approved. Non-use by the lessee was not requested during the evaluation period.

6.2 Rangeland Health Assessments

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

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 AT-1 on the Albert Thomas Allotment is presented in Table 9 below.

Table 9. Summary of Range Health Assessment Ratings

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

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.

The ecological site for AT-1 is Limy Uplands 12-16”. Litter should be in the range of 10 to 20 percent, with 5 to 45 percent surface fragments. A tolerable range of bare ground would be between 15 and 55 percent. Foliar cover collected at AT-1 was 46 percent with 4 percent basal cover of native shrubs. Total litter at AT-1 was measured at 40 percent, with bare ground measuring 25 percent. Rock and rock fragments covered 36 percent of the soil surface. Utilization, measured at the key area, was 5 percent.

Rangeland Health Attribute 1: Soil and Site Stability

AT-1- There were no rills or gullies observed, these indicators were rated None to Slight. Water flow patterns were not observed and were rated None to Slight. Pedestals and/or Terracettes were rated as Slight to Moderate because there was some pedestalling of grasses in open interspaces. Bare ground was measured at 25 percent, indicating the site has moderate to high plant cover and was rated None to Slight. There was no evidence of wind-scouring observed due to a heavy gravel and rock component and was rated None to Slight. All litter size classes remained at the base of plants with little to no movement and was rated None to Slight. Soil surface resistance to erosion was rated as None to Slight due to the area being cobble cover. Rock and gravel fragments covered 36 percent of the soil surface. Plants were able to grow through these fragments and provided a canopy cover measured at 46 percent and 4 percent basal cover at AT-1 (Appendix C). Soil surface loss and degradation were None to Slight as soils are stable and in place. Compaction layers were not present and not restricting water infiltration or root penetration and was rated None to Slight.

The overall rating for Soil and Site Stability was None to Slight. Nine indicators for soil site stability were rated as None to Slight and one was slight to moderate. Site was stable and any showed signs if pedestalling in inner spaces.

Rangeland Health Attribute 2: Hydrologic Function

AT-1- There were no rills or gullies observed. These indicators were rated None to Slight. Water flow patterns were not observed and were rated None to Slight. Pedestals and/or Terracettes were rated as Slight to Moderate

because there was pedestalling in open interspaces. Bare ground was measured at 25 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 36 percent of the soil surface. Canopy cover was measured at 46 percent and 4 percent basal cover at AT-1 (Appendix C). Soil surface loss and degradation were None to Slight as soils are stable and in place. Compaction layers were not present and not restricting water infiltration or root penetration and was rated None to Slight. Litter amounts were measured at 40 percent. It was rated None to Slight. Plant community composition and distribution relative to infiltration was rated None to Slight.

The overall rating for Hydrologic Function was None to Slight. Nine indicators for hydrologic function were rated as None to Slight and one was slight to moderate. The site had very slight above ground flow patterns.

Rangeland Health Attribute 3: Biotic Integrity

AT-1- Soil surface resistance to erosion was rated as None to Slight. Soil surface is naturally armored by rock and canopy cover. Rock and gravel fragments covered 36 percent of the soil surface. Canopy cover was measured at 46 percent and 4 percent basal cover at AT-1 (Appendix C). Soil surface loss and degradation were None to Slight as soils are stable and in place. Compaction layers were not present and not restricting water infiltration or root penetration and was rated None to Slight. Functional/structural groups was rated None to Slight. Plant mortality/decadence was rated None to Slight; all age classes were evenly represented. Litter amounts were measured at 40 percent, and were therefore rated None to Slight. Annual production was rated as None to Slight and is appropriate for the site. Invasive plants was rated None to Slight as there were none noted on the site. Reproductive capability of perennial plants was rated None to Slight, as the native plants are adapted to the climate and are capable of producing seeds, stolons, and rhizomes except during the most severe droughts.

The overall rating for Biotic Function was None to Slight. All Nine indicators for biotic function were rated as None to Slight.

Key Area Conclusions:

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

Key Area AT-1

- Maintain native perennial grass canopy of $\geq 10\%$ ACHIEVED
- Creosote, whitethorn shrub canopy $< 30\%$ ACHIEVED

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

The ecological site for AT-1 is R041XC309AZ Limy Upland 12-16" p.z. / *larrea tridentata* - *acacia constricta* / *muhlenbergia porteri* – *Aristida* (creosote bush - whitethorn acacia / bush muhly - threeawn) ecological site. . Vegetative cover collected at AT-1 is adequate to ensure soil stabilization, and appropriate permeability rates

within the ecological system. There were no rills/gullies present at the site, pedestals and/or terracettes were slight to moderate within the innerspaces. Wind-scouring and litter movement were none to slight. The ground is naturally armored by rock/gravel.

The approximate potential ground cover (surface, basal, and foliar) is described in Tables 2 and 3 below. Table 2 specifically provides a comparison between the desired conditions as described by the ESD (NRCS 2005) and the current conditions of AT-1 in December 2013. Table 3 address the kind and amount (by cover) of vegetation at the sites. Litter should be in the range of 10 to 20%, with 5 to 45% surface fragments. A tolerable range of bare ground would be between 15 and 55%. Foliar cover collected at AT-1 was 46% with 2% basal cover of perennial native grasses and shrubs. Total litter at AT-1 was measured at 40%, with bare ground measuring 25%. Rock and rock fragments covered 36% of the soil surface. Utilization measured at AT-1 at the time of the study was 5% on aristida species (*Aristida sp.*).

Conclusions:

The data at the trend plot 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 2005). These variations occur due to site aspect, soils, and other natural conditions. The ESD for AT-1 describes the Historical Climax Plant Community (HCPC) as: “*The potential plant community on this site is a diverse mixture of desert shrubs, half shrubs and perennial grasses and forbs... The aspect is shrub-land.*” The key area reflects this description of the ecological site. 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 slight to moderate due primarily to wind. Wind-scouring and litter movement were none to slight. Finally, almost the entire allotment is naturally armored by rocks/gravel. The allotment is within the variability of the state and transition models as delineated in the ecological site descriptions. (Appendix B Figure 14).

Key Area AT-1 Limy Upland 12-16” precipitation zone

6.2.1.1 Standard 1: Upland Sites

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

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

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

The ecological site for AT-1 is Limy Upland 12-16”. Litter should be in the range of 10 to 20 percent, with 0 to 8 percent surface fragments. A tolerable range of bare ground would be between 15 and 55 percent. Foliar cover collected at AT-1 was 46 percent with 2 percent basal cover of native shrubs. Total litter at AT-1 was measured at 40 percent, with bare ground measuring 25 percent. Rock and rock fragments covered 0 percent of the soil surface. Utilization, measured at the key area, was 5 percent on *Aristida* species.

6.2.1.2 Standard 2: Riparian-Wetland Sites

Not Applicable to Albert Thomas allotment

6.2.1.3 Standard 3 Desired Resource Conditions

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

Evaluation: In general the composition, structure and distributions of plant communities are present as described within the ESDs 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.

Key Area AT-1

The vegetative community at AT-1 represents the composition, structure, and distribution of the HCPC community with slight departures, as described in the ESD (Table 19) as: “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.” The data collected at the site reflects what is described within the HCPC community of the ESD. Figure 1 specifically list the species that occurred within the transect. Table 5 is an ocular inventory of the study area with professional estimations of plant dominance within the population. The data indicates that the allotment has none to perhaps a slight deviation from a HCPC community.

Conclusions:

The current vegetative composition of native species within the allotment is appropriate for the key area and the ecological 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 that support a productive and a diverse native biotic community. The frequency of desirable native primary grammanoids is what is recommended in the ESDs. Some of the species occurred within the allotment (but not consistently within the transect) is an indicator that the overall ecological condition within the community is functioning within the parameters of the ESDs.

Generally the composition, structure, and distribution of habitat for the threatened, endangered, and sensitive species is intact and is suitable for use if the species is present.

The data at the trend plots show that cover and litter is adequate to ensure soil stabilization and appropriate permeability rates within the ecological site. The ESDs describe the plant communities as “naturally variable” where “composition and production will vary based on yearly conditions, location, aspect, soils,” and previous disturbances (NRCS 2006). The ESD for AT-1 describes the Historical Climax Plant Community (HCPC) as “The potential plant community on this site is a diverse mixture of desert shrubs, half shrubs and perennial grasses and forbs. The aspect is shrub-land.”

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 slight to moderate due primarily to

wind. Wind-scouring and litter movement were none to slight. Finally, almost the entire allotment is naturally armored by rocks/gravel. The allotment is within the variability of the state and transition models as delineated in the ecological site descriptions. (Appendix B Figure 14).

7 DETERMINATION OF LAND HEALTH STANDARDS

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 are adequate to ensure soil stabilization and appropriate permeability rates within the ecological sites. The ESDs describe the ecological dynamics of the sites on the allotment as plant communities that are “naturally variable” (NRCS 2006). These variations occur due to site aspect, soils, and other natural conditions.

The ESD for AT-1 describes the Historical Climax Plant Community (HCPC) as: “The potential plant community on this site is a diverse mixture of desert shrubs, half shrubs and perennial grasses and forbs. The aspect is shrub-land.” The key area reflects this description of the ecological site. 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 slight to moderate due primarily to wind. Wind-scouring and litter movement were none to slight. Finally, almost the entire allotment is naturally armored by rocks/gravel. The allotment is within the variability of the state and transition models as delineated in the ecological site descriptions.

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 Albert Thomas allotment.

Standard 3: Desired Resource Condition

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

Determination:

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

Conclusion: (Standard Achieved)

Rationale: The current vegetative composition of native species within the allotment is appropriate for the key area and the ecological 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 that support a productive and a diverse native biotic community. The frequency of desirable native primary grammanoids is what is recommended in the ESDs. Some of the species occurred within the allotment (but not consistently within the transect) is an indicator that the overall ecological condition within the community is functioning within the parameters of the ESDs.

Generally the composition, structure, and distribution of habitat for the threatened, endangered, and sensitive species is intact and is suitable for use if the species is present.

8 RECOMMENDED MANAGEMENT ACTIONS

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

8.1 Terms and Conditions:

Terms:

Allotment	Livestock # and Kind	Grazing Period of Use	Percent Public Land	AUMs	Type Use
Albert Thomas	60 Cattle	3/1 to 2/28	47	338	Active

Conditions:

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

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

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

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

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

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

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

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

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

9 LIST OF PREPARERS

List of Preparers

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

List of Reviewers

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


10 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

Jayme Lopez

Date

Field Office Manager

BLM Tucson Field Office

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12 APPENDIX A: SPECIES LISTS

Table 1--Effects Determinations with Rationals for BLM and USFWS Special Status Species and Special Areas Documented within 2 Miles of Project Vicinity, as determined by Arizona Game and Fish Department's Heritage Data Management System (HDMS) and Project Evaluation Program (PEP) Project ID: HGIS-09570.

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

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

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

Plant Species collected in 2017 on AT-1

Woody Species	
whitethorn acacia	ACCO2
whitethorn acacia-canopy	ACCO2
Warnock's snakewood-canopy	COWA
tarbush	FLCE
tarbush-canopy	FLCE
creosote bush	LATR2
creosote bush-canopy	LATR2
mariola	PAIN2
mariola-canopy	PAIN2
littleleaf sumac-canopy	RHMI3
Grasses - Perennial	
black grama	BOER4
nineawn pappusgrass	ENDE
bush muhly	MUPO2
burrograss	SCBR2
fluffgrass	TRPU10
Forbs - Perennial/Biennial	
desert holly	ACNA2
Annuals	
Annual forb(s)	AAFF
Annual grass(es)	AAGG
Unclassified	

windmills	ALLIO
twinleaf senna	SEBA3
plains bristlegrass	SEMA5
nightshade	SOLAN
desert zinnia	ZIAC

13 APPENDIX B: MONITORING PROTOCOLS

Vegetation monitoring was conducted by the University of Arizona Extension and the BLM range specialists at the AT-1 key area, in 2011, 2013 and 2017. Upland range health and vegetation monitoring was evaluated on AT-1 in 2014 by TEAMS.

13.1.1 Indicators of Rangeland Health

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

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

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

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

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

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

- Extreme to Total
- Moderate to Extreme
- Moderate
- Slight to Moderate

- None to Slight

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

The interdisciplinary team used rangeland monitoring data, professional observations, and photographs to assess achievement of the Standards and conformance with the Guidelines. All study sites were recorded with a GPS using a 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 Albert Thomas 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 AT-1 was the 17 indicators of rangeland health (NRCS 2005) and utilization. Utilization is the proportion or degree of the current year’s forage production that is consumed or destroyed by animals (including insects). Utilization may refer either to a single plant species, a group of species, or the vegetation as a whole. Utilization is a comparison of the amount of vegetation left compared with the amount of vegetation produced during the year (USDA, NRCS, and USDO, 1996).

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

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

Rangeland Health Attribute	Departure From Ecological Site Description				
	Extreme	Moderate to Extreme	Moderate	Slight to Moderate	None to Slight
Soil/Site Stability	0	0	0	1	9
Hydrologic Function	0	0	0	1	9
Biotic Integrity	0	0	0	0	9

Table 14. Summary of 17 Indicators for Limy Upland 12-16” p.z. Ecological Site on Key Area AT-1.

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: Discontinuous, 10-15 feet in length. Will see shorter flow paths with high surface coarse fragments.	None to slight. None observed.
3. Number and height of erosional pedestals or terracettes: Pedestals common on all shrubs. Terracettes uncommon	Slight to moderate. Some pedstalling of grasses in open innerspaces.

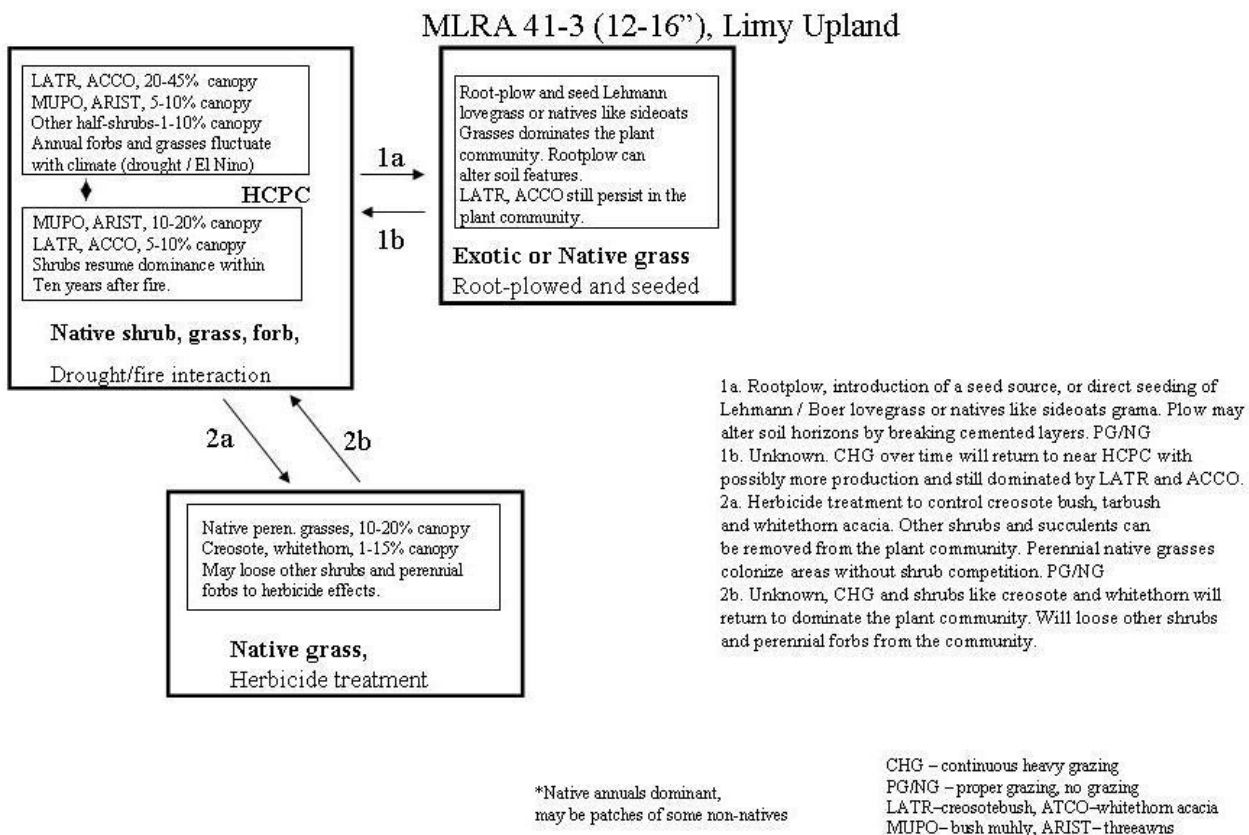
17 Indicators Reference Sheet	Rational from January 2014
<p>4. Bare ground from Ecological Site Description or other studies (rock, litter, standing dead, lichen, moss, plant canopy are not bare ground): 10-50%</p>	<p>None to slight. 25%</p>
<p>5. Number of gullies and erosion associated with gullies: None</p>	<p>None to slight. None observed.</p>
<p>6. Extent of wind scoured, blowouts and/or depositional areas: None</p>	<p>None to slight. None observed.</p>
<p>7. Amount of litter movement (describe size and distance expected to travel): Herbaceous litter in vicinity of flow paths moves in flow paths.</p>	<p>None to slight. Litter scattered/ within ESD parameters.</p>
<p>8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values): Expect values 1-3 in bare areas and 4-6 in grass and shrub canopies</p>	<p>None to slight. Within ESD parameter/ cobbly cover.</p>
<p>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.</p>	<p>None to slight. Soils appear stable. None observed.</p>
<p>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.</p>	<p>None to slight. Veg comp within ESD parameters.</p>
<p>11. Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site): None</p>	<p>None to slight. No compaction of soils at site.</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: large shrubs > perennial grasses > subshrubs > perennial forbs > annually grasses & forbs > succulents</p>	<p>None to slight. Effects of drought/ within ESD parameters for HCPC comp.</p>

17 Indicators Reference Sheet	Rational from January 2014
<p>13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence): 75-80% mortality of desert zinnia.</p>	<p>None to slight. Even age class distribution.</p>
<p>14. Average percent litter cover (5-20%) and depth (0.25-0.50inches):</p>	<p>None to slight. Dead litter component within ESD parameters.</p>
<p>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</p>	<p>None to slight. Good production/ within ESD parameters.</p>
<p>16. Potential invasive (including noxious) species (native and non-native). List Species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicator, we are describing what is NOT expected in the reference state for the ecological site: Lehmann lovegrass, creosote, whitethorn, mesquite, prickly pear, burroweed, wait-a-bit.</p>	<p>None to slight. None observed.</p>
<p>17. Perennial plant reproductive capability: Not affected due to regional prolonged drought.</p>	<p>None to slight. Within ESD parameters.</p>

Table 17. A comparison between conditions described in the ESD (R041XC309AZ – NRCS 2006) and current conditions of key area AT-1. Soil cover components include: plants (including basal cover), biological crusts, litter, and surface fragment.

	<u>Basal Cover</u>				<u>Biological Crust</u>	<u>Litter</u>	<u>Surface Fragments > 1/4" & <= 3"</u>	<u>Surface Fragments > 3"</u>	<u>Bedrock</u>	<u>Bare Ground</u>
	<u>Grass/ Grass like</u>	<u>Forb</u>	<u>Shrub / Vine</u>	<u>Tree</u>						
ESD R041XC309AZ	1-3%	0-1%	2-3%	0%	1-25%	10-20%	5-45%	0-8%	0-1%	15-55%
AT-1	1%	0%	1%	0%	2%	40%	36%	0%	0%	25%

Figure 14. State and transition model for Limy Upland



14 APPENDIX C: MONITORING DATA

14.1 Monitoring Protocols

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

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

Line Point Intercept

The method used to obtain transect data pertaining to species composition and soil cover is line point intercept (LPI). This method consists of a horizontal, linear measurement of plant intercepts along the course of a line (tape) 100 feet in length. LPI is a rapid and accurate method for measuring occurrence of grass or grass-like plants, forbs, shrubs, and trees in which vegetation composition is extrapolated. It also quantifies soil cover, including

vegetation, litter, rocks, and biotic crusts. These measurements are indicators of wind and water erosion, water infiltration, and the ability of the site to resist and recover from degradation.

14.1.1 Indicators of Rangeland Health

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

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

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

Step 3. Collect Supplementary Information

Step 4. Rate the 17 Indicators on the Evaluation Sheet

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

4. 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.
5. 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.
6. 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:

18. Rills: S, H

19. Water Flow Patterns: S, H

20. Pedestals and/or Terracettes: S, H

21. Bare Ground: S, H

22. Gullies: S, H

23. Wind-Scoured, Blowout, and/or Depositional Areas: S

24. Litter Movement: S

- 25. Soil Surface Resistance to Erosion: S, H, B
- 26. Soil Surface Loss or Degradation: S, H, B
- 27. Plant Community Composition and Distribution Relative to Infiltration and Run off: H
- 28. Compaction Layer: S, H, B
- 29. Functional/Structural Groups: B
- 30. Plant Mortality/Decadence: B
- 31. Litter Amount: H, B
- 32. Annual Production: B
- 33. Invasive Plants: B
- 34. 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

14.1.2 Utilization

Utilization is the proportion or degree of the current year’s forage production that is consumed or destroyed by animals (including insects). Utilization may refer either to a single plant species, a group of species, or the vegetation as a whole. Utilization is a comparison of the amount of vegetation left compared with the amount of vegetation produced during the year (USDA, NRCS, and USDO, 1996). Utilization measured at AT-1 at the time of the study in 2014 was 5% on *Aristida*.

Utilization Method

Table 2. Herbaceous (grasses and forbs) utilization classes

Rating	Description
0-5%	The rangeland shows no evidence of grazing use or negligible use.
6-20%	The key species has the appearance of very light grazing. Plants may be topped or slightly used. Current seedstalks and young plants are little disturbed.
21-40%	The key species may be topped, skimmed, or grazed in patches. Between 60 and 80 percent of current seedstalks remain intact. Most young plants are undamaged.
41-60%	Half of the available forage (by weight) on key species appears to have been utilized. Fifteen to 25 percent of current seedstalks remain intact.

61-80%	More than half of the available forage on key species appears to have been utilized. Less than 10 percent of the current seedstalks remain. Shoots of rhizomatous grasses are missing.
81-94%	The key species appears to have been heavily utilized and there are indications of repeated use. There is no evidence of reproduction or current seedstalks.
95-100%	The key species appears to have been completely utilized. The remaining stubble is utilized to the soil surface.

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

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

Table 3. Browse (shrubs, half shrubs, woody vines, and trees) utilization classes

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

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

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

Key area information	Species	Line point intercept canopy cover at AT-1
Trend Plot 1 Albert Thomas Allotment	Annual forbs	25%
Range site: R041XC309AZ	Creosote Bush (<i>Larrea Tridentate</i>)	21%
	Threeawn (<i>Aristida</i>)	4%
	Black Grama (<i>Bouteloua Eriopoda</i>)	1%

Key area information		Species	Line point intercept canopy cover at AT-1
		Feather Fingergrass (<i>Chloris Virgate</i>)	2%
		Bush Monkey Flower (<i>Diplacus</i>)	2%
		Lehmann Lovegrass (<i>Erogrostis Lehmanniana</i>)	5%
		Tarbush (<i>Flourensia Cernua</i>)	6%
		Alkali Sacaton (<i>Sporobolus Airoides</i>)	1%
Cover/Litter/Bare Ground			
Foliar Cover	46%		
Basal Cover	2%		
Bare Ground	25%		

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

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

Southeast Arizona Rangeland Monitoring Program

Site Class: BLM || Gila || Tucson || Albert Thomas (5284) || Albert Thomas

Date: 05/24/2011

Examiner(s): AB, E. Baker, A. Thomas

Site ID: AT-1

Ground Cover							Fetch			
Category/Species	Symbol	# Hits				% Cover	Count	100	Average	11.6
		1	2	3	4					
Ground Cover							Min	0	Max	45
Bare Ground		10	13	13	13	49	Median	10.0	Asymmetry	3.2
Gravel (1/4" - 3")		24	18	21	27	90				
Litter		16	16	10	6	48				
Rock > 3"			1	2	2	5				
Live Basal Veg.			2	4	2	8				

Species Frequency - 40x40 cm Quadrat							Dry-Weight Composition						
Species	Symbol	# Hits				% Frequency	# Hits			Wtd. Total	% Comp.		
		1	2	3	4		Total	1	Rank 2			3	
Woody Species													
Acacia constricta	ACCO2	3	5	1	1	10	5	15	14	13	146	15	
Acacia constricta-canopy	ACCO2	1	13	5	10	29	15						
Atriplex hymenelytra	ATHY	12	9	9	14	44	22	2	3	19	39	4	
Flourensia cernua	FLCE	2	1	1	1	5	3	11	11	7	108	11	
Flourensia cernua-canopy	FLCE	9	5	2	4	20	10						
Larrea tridentata	LATR2	4	4	5	4	17	9	29	36	35	310	31	
Larrea tridentata-canopy	LATR2	22	19	22	20	83	42						
Lycium pallidum-canopy	LYPAC		1		2	3	2				3	1	
Lycium pallidum	LYPAC								1	1			
Parthenium incanum	PAIN2	13	10	15	14	52	26	16	11	11	145	14	
Parthenium incanum-canopy	PAIN2	5				5	3						
Yucca baccata	YUBA		1			1	T	1	1		9	1	
Grasses - Perennial													
Aristida	ARIST		1	1		2	1	1			7	1	
Bouteloua eriopoda	BOER4	1		1		2	1	1	2	1	12	1	
Muhlenbergia porteri	MUPO2	7	6	8	4	25	13	6	4	5	56	6	
Scleropogon brevifolius	SCBR2	4	1	1		6	3	3	2	2	27	3	
Sporobolus airoides	SPAI	1		1	1	3	2		1		2	1	
Tridens pulchellus	TRPU10	1			1	2	1	1			7	1	
Annuals													
Annual grass(es)	AAGG	3	4	1	4	12	6						
Unclassified													
Setaria macrostachya	SEMA5	3	1	2	1	7	4	1	2		11	1	
Zinnia acerosa	ZIAC	6	12	10	7	35	18	13	12	6	121	12	

study Attributes: Number of Transects = 4
 Samples Per Transect = 50
 Dry-Weight-Rank Ranking Mode = MULTIPLE
 Dry-Weight-Rank Sample Size = 100

Figure 12. AT-1 Key Area on 5/24/11



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

Data Summary

Site Class: BLM || Tucson || Albert Thomas

Date: 8/2/2013

Site ID: A-1

Examiner(s): MW

% Ground Cover						Fetch				
Species	Transect (#Hits)					% Cover*	n	Minimum	Median**	SE
	1	2	3	4	Total					
Bare Ground	54	37	27	27	145	24.17	200	0		
Gravel (1/4" - 3")	47	49	74	74	244	40.67	65	16.12		
Litter	48	56	47	48	199	33.17	18.52		2.74	
Rock > 3"			1	1	2	0.33	2.25			
Live Basal Veg.	1	8	1		10	1.67				

% Frequency							40x40 cm					DWR Wt. Composition			Sample Size = 138
Species	Transect (#Hits)					% Freq*	Rank (#Hits)			Wtd. Sum	% Comp.*				
	1	2	3	4	Total		1	2	3						
Acacia constricta ACCO2		3	3	1	7	3.50	7	8	6	71	5.14				
Acacia constricta-canopy ACCO2	2	4	4	2	12	8.00									
Allionia ALLIO	2		1		3	1.50	2	2	3	21	1.52				
Annual forb(s) AAFF	39	49	48	45	181	90.50									
Annual grass(es) AAGD	10	12	7	5	34	17.00									
Atriplex hymenelytra ATHY	1	8	1	3	13	6.50	3	4	9	38	2.75				
Flourensia cernua FLCE	2	1	1	2	6	3.00	17	16	19	170	12.32				
Flourensia cernua-canopy FLCE	5	8	4	6	23	11.50		1		2	0.14				
Larrea tridentata LATR2	3	3	1	1	8	4.00	59	58	57	586	42.46				
Larrea tridentata-canopy LATR2	20	24	12	18	74	37.00	1			7	0.51				
Muhlenbergia porteri MUPO2	4	8	1	3	16	8.00	4	10	5	53	3.84				
Parthenium incanum PAIN2	5	5	5	3	18	9.00	34	28	26	320	23.19				
Parthenium incanum-canopy PAIN2	9	8	6	8	31	15.50									
Scleropogon brevifolius SCBR2		5			5	2.50	3	4	3	32	2.32				
Solanum SOLAN			1	1	2	1.00	2	1	2	18	1.3				
Talinum TALIN2		1			1	0.50			1	1	0.07				
Tridens pulchellus TRPLU10	4				4	2.00	3	3	4	31	2.25				
Unknown 1 UNKN1				1	1	0.50	1	1	1	10	0.72				
Zinnia acerosa ZIAC			1	1	2	1.00	2	2	2	20	1.45				

* Number of decimal places does not imply level of precision
 ** Plot median = average transect median, not the median of all plot data

Notes: 4 x 50 at 4 paces apart; t post or survey perpendicular to road

Figure 13. AT-1 Key Area on 8/2/13



Table 21. 2017 U of A data summary on AT-1.

Data Summary

Site Class: BLM || Tucson || Albert Thomas

Date: 1/11/2017

Site ID: A-1

Examiner(s): Mike McIntire Rikki Gurule

% Ground Cover						
Species	Transect (#Hits)					% Cover*
	1	2	3	4	Total	
Bare Ground	48	54	47	53	202	33.87
Gravel (1/4" - 3")	45	27	41	33	146	24.33
Litter	54	67	62	61	244	40.67
Rock > 3"				2	2	0.33
Live Basal Veg.	3	2		1	6	1.00

Fetch			
n	100	Minimum	0
Maximum	28	Median**	10.5
Mean	10.97	SE	0.57
Asymmetry	1.56		

% Frequency							40x40 cm		DWR Wt. Composition			Sample Size = 100	
Species	Transect (#Hits)					% Freq*	Rank (#Hits)			Wtd. Sum	% Comp.*		
	1	2	3	4	Total		1	2	3				
Woody Species													
whitethorn acacia	ADCC2		3	1		4	2.00	6	11	15	79	7.90	
whitethorn acacia-canopy	ADCC2	4	10	11	5	30	15.00						
Warnock's snakewood-canopy	CCWA	1				1	0.50	1			7	0.70	
tarbush	FLCE	1		1	4	6	3.00	11	12	8	109	10.90	
tarbush-canopy	FLCE	7	10	10	3	30	15.00						
creosote bush	LATR2	5	2	3	3	13	6.50	33	28	30	317	31.70	
creosote bush-canopy	LATR2	20	18	17	18	74	37.00			1	1	0.10	
mariola	PAIN2	4	4	4	4	16	8.00	27	25	19	258	25.80	
mariola-canopy	PAIN2	15	15	14	12	56	28.00						
littleleaf sumac-canopy	RHM3				2	2	1.00						
Grasses - Perennial													
black grama	BOER4			1		1	0.50						
nineawn pappusgrass	ENDE	12	3	3	1	19	9.50	6	9	8	68	6.80	
bush muhly	MUPO2	2	2	2	2	8	4.00	2	2	2	20	2.00	
burrograss	SCBR2	4	2		1	7	3.50	6	2	1	47	4.70	
fluffgrass	TRPU10	4		2	1	7	3.50	3	1	3	26	2.60	
Forbs - Perennial/Biennial													
desert holly	ACNA2	6	6	7	9	28	14.00		3	9	15	1.50	
Annuals													
Annual forb(s)	AAPP	27	32	38	39	136	68.00						
Annual grass(es)	AAGG	26	23	31	19	99	49.50						
Unclassified													

Figure 13. AT-1 Key Area on 1/11/16



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

Cover data described by the ESD	LPI Data AT-1 Canopy Cover
LATR, ACCO - 20 to 45% Canopy Cover	LATR – 21% Canopy Cover ACCO – Present but not within transect
MUPO, ARISTIDA- 5 to 10% Canopy Cover	Aristida – 4% MUPO2- Present but not within transect BOER4 – 1%
Other shrubs and succulents- 1-10%	FLCE- 6%
Annuals fluctuate with climate	Annual forbs – 25% CHVI4 – 2%

Figure 19. Species Composition at Key Area AT-1

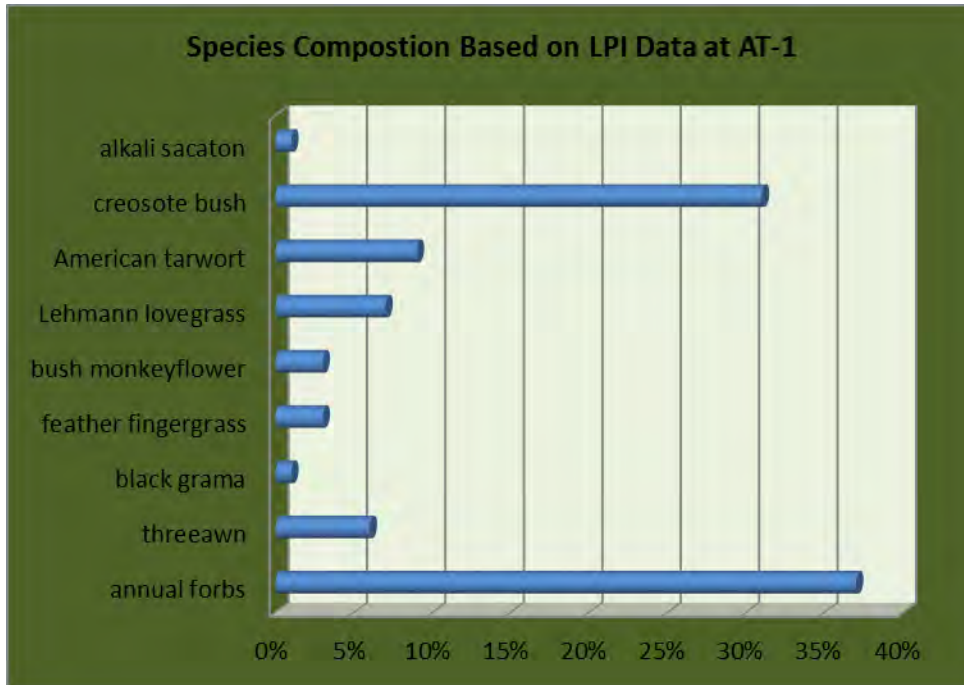


Table 20. Functional/structural plant groups at AT-1

Ranking	Species List for Functional/Structural Groups at AT-1
D	Creosote Bush (<i>Larrea Tridentate</i>)
S	Whitethorn Acacia (<i>Acacia Constricta</i>)
S	American Tarwort (<i>Flourensia Cernua</i>)
S	Bush Monkeyflower (<i>Diplacus</i>)
S	Threeawn (<i>Aristida</i>)
S	Mariola (<i>Parthenium Incanum</i>)
M	Burrograss (<i>Scleropogon Brevifolius</i>)
M	Black Grama (<i>Bouteloua Eriopoda</i>)
M	Alkali Sacaton (<i>Sporobolus Airoides</i>)
M	Feather Fingergrass (<i>Chloris Virgate</i>)
S	Bush Muhly (<i>Muhlenbergia Porteri</i>)
T	Nightshade (<i>Solanum</i>)
T	Fameflower (<i>Talinum</i>)
T	Low Woollygrass (<i>Dasyochloa Pulchella</i>)
T	Desert Zinnia (<i>Zinnia Acerosa</i>)
	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.