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APPENDIX A
Rangeland Health Evaluation

Upper Centennial Complex
CARCO Allotment #03014
Forepaugh Allotment #05012
Cross Mountain Allotment #03021
Auza Allotment #05032

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Abstract

This draft Rangeland health evaluation seeks to ascertain if the Arizona Standards for Rangeland Health are met on the Upper Centennial Complex of allotments. Standard One, "*Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate and landform (ecological site)",* is met for uplands on this Complex with the exception of the Cross Mountain allotment. Standard Two is not applicable on the Complex. Standard Three, "*Productive and diverse upland and riparian-wetland communities of native species exist and are maintained"* is met on this complex.

1.0 Introduction

The purpose of this draft land health evaluation is to gauge whether the Arizona Standard of Rangeland Health (Standards) are being achieved on the Central Arizona Ranch Company (CARCO), Forepaugh, Cross Mountain, and Auza grazing allotments (hereafter the "Upper Centennial Complex" or "Complex") and to determine if livestock are the causal factor for either not achieving or not making significant progress towards achieving land health standards in the case of non-achievement of Standards. An evaluation is not a decision document, but a standalone report that clearly records the analysis and interpretation of the available inventory and monitoring data. As part of the land health assessment process Desired Plant Community (DPC) objectives were established for the Biological Resources (biological objects within the boundaries of the allotments). The DPC objectives will assure that soil condition and ecosystem function described in Standards 1 and 2 are met.

The Secretary of the Interior approved Arizona's Standards for Rangeland Health and Guidelines for Grazing Administration (Guidelines) in April 1997. The Decision Record, signed by the BLM State Director (April 1997) provides for full implementation of the Standards and Guides in Arizona BLM Land Use Plans. See Appendix B for Arizona's Standards for Rangeland Health.

Land Health Standards are measurable and attainable goals for the desired condition of the biological resources and physical components/characteristics of the desert ecosystems found within the boundaries of these grazing allotments.

This evaluation seeks to ascertain: 1) if standards are being achieved, not achieved, and, in cases of not achieved, if significant progress is being made towards achievement of land health. 2) Where it is ascertained that land health standards are not being achieved, determine whether livestock grazing is a significant causal factor for non-achievement.

2.0 Complex Profile

2.1 Complex Location

The Upper Centennial Complex is located west of the town of Wickenburg, Arizona. Highway 60 runs along the south boundary of most of the complex, with the exception of an isolated parcel on the Cross Mountain allotment. Highway 71 bisects the complex, through the Forepaugh allotment. Acreages for the allotments within the complex are given in Section 2.2.1, below. A map of the Complex allotments is available in Appendix A.

2.2 Physical Description

2.2.1 Allotment Acreages

The acreages of the allotments within the Upper Centennial Complex are given below.

Land Classification	CARCO Allotment	Forepaugh Allotment	Cross Mountain	Auza
Public Acres	37,000	9,431	862	1,247
State Acres	1,704	50,248	24,949	27,102
Private Land Acres	2,790	3,444	1,570	486
Total Acres	41,494	63,123	27,381	28,835

2.2.2 Climate Data

Climate data for this allotment are taken from the Western Regional Climate Center data available at www.wrcc.dri.edu. The data are based on the National Oceanic and Atmospheric Administration (NOAA) site located in Wickenburg, AZ south of the complex. Average mean air temperature at this site is 65.7°F, with an average of 150.4 days per year at a daily maximum temperature above 90°F and 61.2 days a year with a daily minimum below 32°F. This is consistent with the Natural Resource Conservation Service (NRCS) Agricultural Handbook 296, which describes the climate of the area as:

> *"The average annual air temperature is 58 to 74 degrees F (15 to 23 degrees C). The freeze-free period averages 285 days and ranges from 205 to 365 days, decreasing in length with increasing elevation."* (USDA 2006)

2.2.3 Precipitation

Precipitation data for the Upper Centennial Complex is taken from the Maricopa County Flood Control District (MCFCD). MCFCD maintains a network of rain, streamflow, and weather stations within the watershed in and surrounding Maricopa County, with publicly available historic station data. The stations below were used in the calculation of precipitation on the Complex:

Station Name	Station Number	Lat	Long	Years of Record	Mean Annual Rainfall
Centennial Wash	5180	33.94323	-113.0005	34	7.98
Joshua Tree	7150	34.16327	-113.01537	14	9.98
Smith Peak	5190	34.06711	-113.35106	35	8.56
Outlaw Hill	5165	33.91425	-112.93914	13	9.65
Sols Tank	7030	34.06156	-112.91489	20	9.85
Sols Wash @ SR71	5275	34.11853	-112.96272	34	10.79
Sols Wash Tributary @US 93	7025	34.05187	-112.85030	20	9.26

Based on the above rainfall information, the complex falls within the 7-10" precipitation zone for the NRCS ecological site guides.

2.2.4 Soils Data

Soils data for the Complex are taken from the NRCS soil survey of the Yavapai County, Western Part (1976). The soils data is limited to public lands within the allotments, and does not include soils present

on State trust or privately held lands. Soil descriptions are taken from the NRCS/USDA soils website. NRCS classifies the soils in Yavapai county as falling within the 10-13" precipitation zone, however, rainfall data shows that use of the 7-10" precipitation zone is more appropriate for the soils within the complex.

2.2.4.1 The CARCO Allotment

Soils on the CARCO allotment are typical of desert floor and mountainous soils. Many soils within the allotment are soil complexes and associations, totaling nineteen soil types. The majority of these soil complexes and associations are present on less than 5% of the public land individually, and will not be discussed in depth. Individual soils within these minor complexes may be present in the major complexes discussed. There are seven soil types that account for approximately 78% of the allotment soils, discussed below:

The most dominant soil within the allotment is the Anthony gravelly sandy loam, 0-8% slopes, comprising 17.6% of the allotment. The Anthony soils are deep, well drained soils on fans. The soil is derived from mixed alluvium, with slopes from 0-8% and elevations from 2,000 to 4,000 feet. The ecological site associated with the soil is the Limy Upland 7-10"Precipitation Zone (pz), Deep. Runoff is medium on this soil and the erosion hazard is slight.

The second most dominant soil within the allotment is the Cave-Continental gravelly sandy loams, 2 to 30% slopes, comprising 16.1% of the allotment. The Cave soils are shallow and very shallow well-drained soils on alluvial fans and plains. The soil is derived from mixed alluvium, with slopes from 2-30% and elevations from 2,000 to 4,000 feet. The ecological site associated with the Cave soil is the Limy Upland 7-10"pz. The Continental soils are deep, well-drained soils on sloping to moderately steep fans and valley slopes. The soil is derived from mixed alluvium, with slopes from 2-30% and elevations from 2,000 to 4,000 feet. The ecological site associated with the Continental soil is the Loamy Upland 7-10"pz ecological site. Runoff on both soils is medium and erosion hazard is moderate.

The third most dominant soil within the allotment is Cellar soils, 20-60% slopes, comprising 11.3% of the allotment. These soils are shallow to very shallow and well drained on gently sloping to steep granite hills and mountains. The soil is derived from fractured and decomposing granite, with 20-60% slopes and elevations from 2,000 to 4,500 feet. The ecological site associated with the Cellar soil is the Granitic Hills, 7-10"pz. Runoff on this soil is medium and the erosion hazard is moderate to high.

The fourth most dominant soil within the allotment is the Anthony-Mohave sandy loams, 1-3% slopes, comprising 11.2% of the allotment. The Anthony soils are deep, well drained soils on level to gently sloping flood plains and fans. The soil is derived from coarse, recent alluvium, with slopes from 0-15% and elevations from 2,000 to 4,000 feet. The ecological site associated with the Anthony soil is the Limy Upland 7-10"pz Deep ecological site. The Mohave soils are deep, well drained soils with a distinct zone of lime accumulation on alluvial fans. The soils are derived from mixed alluvium and are nearly level, with elevations from 2,000 to 4,000 feet. The ecological site associated with the Mohave soil is the Sandy Loam Upland 7-10"pz Fine ecological site. Runoff on both soils is slow and the erosion hazard is slight.

The fifth most dominant soil within the allotment is the Whitlock-Anthony gravelly sandy loams, 0-15% slopes, comprising 8.4% of the allotment. The Whitlock soils are deep, well drained soils on fans. The soil is derived from alluvium with slopes from 0-15% and elevations from 2,000 to 4,000 feet. The ecological

site associated with the Whitlock soil is the Limy Upland 7-10”pz Deep ecological site. The Anthony soil is described above, and associated with the Limy Upland 7-10””pz Deep ecological site. Runoff on this soil association is medium and the erosion hazard is moderate.

The sixth most dominant soil within the allotment is the Mohave sandy loam, comprising 8% of the allotment. These soils are described above.

The seventh most dominant soil within the allotment is the Continental gravelly sandy loam, 2-15% slopes, comprising 5.6% of the allotment. The continental soils are described above.

2.2.4.2 The Forepaugh Allotment

Soils on the Forepaugh allotment are typical of hill and mountain soils in the Sonoran desert. Sixteen soil types are present on the allotment, most are single-soil units. There are six soil types that account for approximately 74% of the allotment soils, discussed below:

The most dominant soil unit within the allotment is Rock Land, accounting for 15.9% of the allotment soils. The Rock Land soil unit is comprised of 50-90% rock outcrops, interspaced with shallow and very shallow soils. There is no ecological site associated with this soil unit.

The second most dominant soil map unit within the allotment is the Vekol-Mohave complex, comprising 15.8% of the allotment. The Vekol soils are deep, well drained soils on alluvial fans and plains. The soils are derived from weathered alluvium, with nearly level slopes and elevations from 2,000 to 3,000 feet. The ecological site associated with the Vekol soil is the Loamy Upland 7-10”pz ecological site. The Mohave soil is described above. Runoff on this soil complex is slow and the erosion hazard is slight.

The third most dominant soil map unit within the allotment is the Anthony-Mohave sandy loams, 1-3% slopes. This soil is described above.

The fourth most dominant soil map unit within the allotment is the Continental-Loamy alluvial land association, sloping, comprising 10.4% of the allotment. The association occurs on alluvial fans, with loamy soils along shallow drainageways. The Continental soil is described above. The ecological site associated with this soil association is the Loamy upland 7-10”pz. Runoff on these soils is slow, and the erosion hazard is slight.

The fifth most dominant soil map unit within the allotment is Cellar soils, 20-60% slopes, comprising 8.4% of the allotment. These soils are described above.

The sixth most dominant soil map unit within the allotment is the Anthony gravelly sandy loam, 0-8% slopes, comprising 7.8% of the allotment. These soils are described above.

2.2.4.3 The Cross Mountain Allotment

Soils on the Cross Mountain allotment are typical of desert floor and mountainous soils. Most soils within the allotment are soil complexes and associations, totaling nine soil types. There are four soil types that account for approximately 86% of the allotment soils, discussed below:

The most dominant soil on the allotment is the Mohave-Guest complex, comprising 42.3% of the allotment. The Mohave soils are described above. Guest soils are deep, well drained soils on flood plains. The soil is derived from alluvium with slopes from 0-1% and elevations from 2,200 to 4,000 feet. The ecological site associated with the Guest soil is the Clayey Swale 7-10"pz (R040XB203AZ). Runoff on these soils is slow, and the erosion hazard is slight.
The second most dominant soil on the allotment is the Continental-Mohave complex, 1-4% slopes, comprising 16.5% of the allotment. The Continental and Mohave soils are described above.

The third most dominant soil type within the allotment is the Gran-Wickenburg-Rock outcrop complex, low precipitation, 1-10% slopes, comprising 14.5% of the allotment. Gran soils are shallow, well-drained soils on hillslopes and summits. The soils are derived from bedrock, with slopes from 1-10% and elevations from 1,800 to 4,000 feet. The ecological site associated with the Gran soil is the Granitic Upland 7-10"pz (R040XB220AZ). Wickenburg soils are shallow, well drained soils on hillslopes and pediments. The soils are derived from bedrock, with slopes from 1-10% and elevations from 1,800 to 4,000 feet. The ecological site associated with the Wickenburg soil is the Granitic Upland 7-10"pz. Rock outcrop occurs throughout the soil complex, and has no associated ecological site. Runoff on these soils is moderate to rapid, and the erosion hazard is moderate.

The fourth most dominant soil type within the allotment is the Tres Hermanos gravelly sandy loams, comprising 12.4% of the allotment. These are deep, well-drained soils on fan terraces. The soils are derived from alluvium, with slopes from 0-3% and elevations from 1,800 to 2,500 feet. The ecological site associated with these soils is the Loamy Upland 7-10"pz (R040XB213AZ). Runoff on these soils is slow, and the erosion hazard is slight.

2.2.4.4 The Auza Allotment

Soils on the Auza allotment are typical of desert floor and mountainous soils. There are four soil types within the allotment. All soils on the allotment have been described above. The dominant soil is Cellar soils, 20-60% slopes, comprising 52% percent of the allotment. The second most dominant soil is the Anthony-Mohave sand loams, 1-3% slopes, comprising 32% of the allotment. The Continental gravelly sandy loam, 2-15% slopes and Cave-Continental gravelly sandy loams 2-30% slopes account for the remaining 11 and 6% of the allotment, respectively.

2.3 Biological Resources

2.3.1 Major Land Resource Areas

The Upper Centennial Complex lies within Major Land Resource Area (MLRA) 40, Sonoran Basin and Range. MLRAs are described in USDA NRCS Agriculture Handbook 296: "Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin" (2006). MRLAs describe, on a large-landscape scale, the physiography, geology, climate, water, soils, biological resources and general land use. Ecological Site Descriptions produced by the NRCS are organized by MLRA for reference purposes.

2.3.2 Ecological Sites

An ecological site is a unique landscape with specific physical characteristics that differs from others in its ability to produce distinct types and quantities 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. Each is influenced by the other and influences the development of the others. (TR 1734-07, Ecological Site Inventory)

Ecological sites are named and classified based on soil parent material or soil texture and precipitation. There are several ecological sites that occur within the Upper Centennial Complex. The dominant ecological sites on Public lands within the complex are described below. Reference Map 3, Appendix A, for ecological sites occurring on the complex.

NRCS provides Ecological Site Descriptions online at https://esis.sc.egov.usda.gov/.

Granitic Hills 10-13"pz R040XA131AZ
This site occurs on hill-slopes and ridges. Slopes range from 15 to 80% and elevations are from 2000 to 4000 feet. Soils are shallow to moderately deep, non-calcareous and well drained, formed in residuum and colluvium. Soils are well covered by gravels, cobbles, and/or stones, with rock outcrops comprising up to 25% of the area. The potential plant community is a mixture of grasses, forbs and shrubs. Annual vegetative production is expected to be between 528 and 643lbs air-dry weight per acre.

Limy Upland 7-10"pz Deep R040XB208AZ
This site occurs on fan terraces, old stream terraces and ridge-tops. Slopes are from 1 to 15%. Elevations range from 1000 to 2100 feet. Soils are deep, formed in very gravelly alluvium. Soils are calcareous, and loamy textured. Surface rock fragments are common. Plant-soil moisture relationships are poor. The potential plant community on this site is dominated by creosotebush with limited other shrub and cacti species. Annual vegetative production is expected to be between 218 and 276 lbs air-dry weight per acre.

Loamy Upland 7-10"pz R040XB213AZ
This site occurs on fan terraces and stream terraces. Slopes range from 1-15% and elevations from 1000' to 2200'. Soils are deep, formed in loamy alluvium of mixed origin. Soils have argillic horizons near the surface, with very gravelly sandy loam to loam textures. Plant-soil moisture relationships are fair. The potential plant community is a diverse mixture of desert shrubs, trees and cacti with limited perennial grass. Annual vegetative production is expected to be between 300 and 500lbs air-dry weight per acre.

Clayey Swale 7-10"pz R040XB203AZ
This site occurs on floodplains and alluvial fans. Slopes range from 0-2% and elevations from 1100' to 2200'. Soils are deep, formed in clayey alluvium of mixed origin, dark colored and have high shrink-well potential. Plant-soil moisture relationships are very good. The potential plant community is dominated by tobosagrass, with annual forbs and grasses common, and woody species are uncommon. Annual vegetative production is expected to be between 712 and 880 air-dry weight per acre.

2.3.3 General Wildlife Resources

Wildlife species that occur within the Upper Centennial Complex are typical and representative of the vegetative communities and topography present in the area. Species present include, but are not limited to, mule deer, coyote, javelina, mountain lion, bobcat, gray fox, desert cottontail, black-tailed jackrabbits, Gambel's quail, great horned owls, and various reptiles, small mammals, bats, and migratory

birds. Desert bighorn sheep may use steep, rugged habitat in the Harcuvar Mountains on the CARCO and Forepaugh allotments.

2.3.4 Special Status Species, T&E

Sonoran desert tortoise (*Gopherus morafkai*) is a BLM sensitive species, that occupies upland areas in Sonoran desert scrub vegetation in the Complex. Desert tortoise distribution is not uniform within its range. Tortoises tend to occupy hillsides and ridges with outcrops of large boulders as well as areas with incised washes and caliche caves, but may be found in lower densities throughout the area. Tortoises generally use natural and excavated cover sites between or under boulders and in caliche caves along washes wherever they occur. Their diet consists of annual forbs (30.1%), perennial forbs (18.3%), grasses (27.4%), woody plants (23.2%) and prickly pear fruit (1.1%) (Van Devender,et al. 2002).

The Upper Centennial Complex contains category I and category III desert tortoise habitat. Category I habitat is defined as: 1) Habitat that may be essential to the maintenance of viable populations; 2) Habitat where most conflicts are resolvable; and 3) Habitat that contains medium to high densities of tortoises or low densities contiguous with medium or high densities. Category III habitat is defined as: 1) Habitat that is not considered essential to the maintenance of viable populations; 2) Habitat where most conflicts are not resolvable; and 3) Habitat that contains low to medium densities of tortoises not contiguous with medium or high densities. The table below shows the approximate acreages of desert tortoise habitat within the complex.

Allotment	Category 1 Acres	Category 3 Acres
CARCO	15,709	13,623
Forepaugh	5,740	2,410
Cross Mountain	0	150
Auza	0	1,087

2.4 Special Management Areas

There are no special management areas, such as designated wilderness or areas of critical environmental concern, within the complex.

2.5 Recreational Resources

Public access generally coincides with routes permitted for use by the grazing permittees. Minor maintenance of the existing routes is generally welcomed by the public. Major upgrades to the existing routes are less welcome due to the recreationists' expectation for rough, minimally maintained roads. Improving roads to a higher standard is generally perceived by the public, and the BLM, to invite vandals and new uses which may leave trash or displace authorized use. Improving access can have the effect of increasing use of an area which was previously lightly used, leading to increased litter and increasing impacts to vegetation and water quality.

3.0 Grazing Management

3.1 Grazing History

The current permit and lease holder for the CARCO and Forepaugh allotments within the complex is the Forepaugh cattle company. Livestock are rotated through the two allotments based on water and

forage availability. Generally, livestock rotate for spring and summer into the northern pastures of the CARCO allotment and are rotated to the Forepaugh allotment for the fall and winter.

The Cross Mountain allotment is held by the Echeverria family, and the Auza allotment is held by the Auza family. Both of these allotments are primarily comprised of state lands.

BLM billing records show continuous use on these grazing allotments since the 1960s. Livestock have likely been present in this area since the mid-1800s.

3.2 Mandatory Terms and Conditions for Permitted Use

The allotments within the complex are perennial allotments and maintain a year-long base herd. The Mandatory Terms and Conditions of the permits and leases are listed below:

Allotment Name	Allotment Number	Livestock Number	Livestock Kind	%PL	Type Use	AUMs
CARCO	03014	211	Cattle	92	Active	2329
Forepaugh	05012	74	Cattle	100	Active	888
Cross Mountain	03021	1	Cattle	100	Active	12
Auza	05032	7	Cattle	100	Active	84

4.0 Objectives

4.1 Relevant Planning and Environmental Documents

The Taylor Grazing Act of 1934 provides for two types of authorized use: (1) A *grazing permit*, which is a document authorizing use of the public lands within an established grazing district, and are administered in accordance with Section 3 of the Taylor Grazing Act; and (2) a *grazing lease*, which is a document authorizing use of the public lands outside an established grazing district, and are administered in accordance with Section 15 of the Taylor Grazing Act. The CARCO and Cross Mountain allotments are Section 3 grazing permits, and the Forepaugh and Auza allotments are Section 15 grazing leases.

The BLM is responsible for establishing the appropriate levels and management strategies for livestock grazing in these allotments. Grazing permits issued must be in compliance with the multiple use and sustained yield concepts of FLPMA and the Fundamentals of Rangeland Health (43 CFR 4180), and be in accordance with the Guidelines for Grazing Administration while continuing to achieve Arizona Standards for Rangeland Health.

Land Health Standards:
On April 28, 1997, the Secretary of Interior approved the implementation of the *Arizona Standards for Rangeland Health and Guidelines for Grazing Administration* for all Land Use Plans in Arizona. The purpose of the Standards and Guidelines (S&Gs) is to maintain or improve the health of the public rangelands. Standards and guidelines are intended to help the Bureau, rangeland users and others focus on a common understanding of acceptable resource conditions and work together to achieve that

vision. Standards and Guidelines were incorporated into Phoenix District land use plans in 1997 and into the *Bradshaw-Harquahala RMP* in 2010.

As defined by the Arizona Resource Advisory Council, "Standards" are goals for the desired condition of the biological and physical components and characteristics of rangelands. "Guidelines" are management approaches, methods, and practices that are intended to achieve a standard. Guidelines are developed and applied consistent with the desired condition and within the site's capability and specific public land uses, and may be adjusted over time. Arizona S&Gs are defined as the following:

Standard 1 - Upland Sites
Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate and landform (ecological site).

Standard 2 - Riparian - Wetland Site
Riparian-wetland areas are in proper functioning condition.

Standard 3 - Desired Resource Conditions
Productive and diverse upland and riparian-wetland communities of native species exist and are maintained.

The Bradshaw-Harquahala Resource Management Plan (2010) contains additional desired future condition objectives for wildlife special status species. For the Upper Centennial Complex, the desired future condition objectives for Sonoran desert tortoise are applicable. These objectives are given below:

> *"TE-3. In Category I and II areas, vegetation will consist of at least 5 percent native perennial grasses, at least 10 percent native perennial forbs or subshrubs, at least 30 percent native trees and cacti, by dry weight, as limited by the potential of the ecological site as described by the Natural Resource Conservation Service (NRCS) ecological site guides."*

4.2 Key Area Objectives

Specific Key Area objectives step down from the Desired Future Condition objectives found in the Bradshaw-Harquahala RMP (2010). These Key Area specific objectives are designed to assess Public Land conformance to the Arizona Standards for Rangeland Health on the Upper Centennial Complex.

There are 7 active Key Areas on the Upper Centennial Complex. The CARCO allotment contains 4 Key Areas. The Forepaugh, Cross Mountain, and Auza each contain 1 Key Area. The table below shows the active key areas on the complex:

Allotment	Key Area	Ecological Site
CARCO	KA1 KA2 KA3	Loamy Upland 7-10" Sandy Loam Upland 7-10", Fine Granitic Hills 10-12"

	KA4	Volcanic Hills 7-10”
Forepaugh	KA1	Limy Upland 7-10”
Cross Mountain	KA1	Limy Fan 7-10”
Auza	KA1	Limy Upland 7-10” Deep

Desired Plant Community (DPC) Objectives were developed for each Key Area within the Complex by an interdisciplinary team of BLM resource specialists and biologists. These objectives are designed to maintain or improve the biotic integrity of the Public Lands, provide for wildlife habitat, and provide for usable forage as limited by the potential of the ecological site. These objectives, and the rationale for each objective, are given below.

4.2.1 Standard 1- Upland Sites, applies to all key areas.

Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site). (Bradshaw-Harquhala RMP decision LH-1)

Soil erosion on the key area is appropriate to the ecological site on which it is located. Factors indicating conformance to Standard 1 include ground cover, litter, vegetative foliar cover, flow patterns, rills, and plant pedestalling in accordance to developed NRCS Ecological Site Guides and/or Reference Sheets. Deviations that are “slight” or “slight to moderate” from the appropriate site guide or reference are considered meeting the Standard. Departures of Moderate or greater will not meet the Standard except in cases where the departure is documented as showing an improvement of land health over what is expected on a reference site.

4.2.2 Standard 2 – Proper Functioning Condition

Standard Two does not apply to this complex. No riparian areas are present within the complex.

4.2.3 Standard 3- Desired Resource Condition Objectives

Upland Sites

Objective: Productive, diverse upland and riparian-wetland plant communities exist and are maintained.

DPC objectives 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. Because DPC objectives are site-specific, Key Areas located on similar stratum may have difference DPC objectives. This is due to differences in slope, elevation, aspect and rainfall factors, as well as other site potential limiting factors such as prior disturbance, rock outcroppings, or heavy gravel cover. The recommended palatable shrub and grass compositions will provide for adequate wildlife forage on the site for species such as Sonoran desert tortoise, mule deer, quail, and other non-game wildlife species. The foliar cover and bare ground cover class objectives will provide thermal and hiding cover for wildlife species and will prevent accelerated erosion on the sites.

Sonoran desert tortoise habitat requirements are listed in the Bradshaw-Harquahala RMP. The DPC objectives for each key area within desert tortoise habitat are consistent with the Sonoran desert tortoise habitat requirements based on the potential for the site. The following key areas fall within Category 1 desert tortoise habitat: CARCO Key Areas 3,4; Forepaugh Key Area 1.

CARCO Allotment

Key Area 1
Loamy Upland 7-10"pz

- Maintain a perennial grass composition of ≥10%
- Maintain palatable browse species composition of ≥15%
- Maintain a vegetative foliar cover of ≥20%
- Maintain a bare ground cover class of ≤40%

Rationale:

Rationale for the DPC objectives is taken from the NRCS Loamy Upland 7-10"pz ecological site description and reference sheet. Perennial grass composition ranges from 6-15% in the ecological site description. Maintaining a grass composition of 10% or greater will maintain important forage and is appropriate for this ecological site. Shrub composition is expected to be between 46-79% per the ecological site description. Maintaining a palatable browse composition of 15% or greater will provide adequate forage on the site and is appropriate to the ecological site, as not all species present are palatable and 30-50% of the shrub group is expected to be creosotebush. (See Appendix A, Section 3). In the reference state, canopy cover is estimated between 15-25%. Maintaining a foliar cover of 20% is expected to maintain the integrity of the site, as foliar cover underestimates in comparison to canopy cover measurements, and will prevent accelerated erosion of the site. In the reference state, bare ground is expected to be between 10-60%, with lower expected values in low rainfall years. Maintaining a bare ground cover class of 40% or less is appropriate to this ecological site in this area and will help prevent accelerated erosion of the site.

Key Area 2
Sandy Loam Upland 7-10"pz Fine

- Maintain a perennial grass composition of ≥20%
- Maintain palatable browse species composition of ≥10%
- Maintain a vegetative foliar cover of ≥15%
- Maintain a bare ground cover class of ≤45%

Rationale:
NRCS has not developed a Sandy Loam Upland -Fine ecological site description for any rainfall regime in MLRA 40. Based on the soil type at this key area, Mohave sandy loams, the most appropriate ecological site description is the Sandy Loam Upland 7-10"pz (R040XB212AZ). The soil series typic of this ecological site, the Mohall and Tremant soils, are similar to the Mohave soil, with the Mohave soil having more pronounced argillic properties and reduced calcareous properties in the upper soil horizons. This is expected to increase soil productivity slightly over what is expected on the ecological site description used. The ecological site guide shows an expected grass composition between 11-21%. A perennial grass composition of 20% or greater will maintain forage for wildlife species and is appropriate to the site given the potential for higher production than the site description. The ecological site description shows an expected shrub composition between 68-74%. Shrub composition on a less calcareous site such as this is expected to be significantly lower, considering the lack of Atriplex and Ambrosia species which tend to prefer more alkaline soils. Maintaining a palatable browse composition of 10% or greater will provide adequate forage on the site. Shrub canopy cover is estimated at 30% in the reference state. Foliar cover measurements tend to underestimate cover in comparison to canopy cover measurements, and with the reduced potential for shrub growth due to the soil type, an objective of 15% or greater foliar cover was found to be adequate for the site. In the reference state, bare ground is expected to be

60-65%. Due to the similarity of the soil surfaces between the ecological site soils and the key area soils, and the lack of substantial rock or gravel cover, an objective for a bare ground cover class of equal to or less than 45% was found to be adequate for the site.

Key Area 3
Granitic Hills 10-13"pz

- Maintain a perennial grass composition of ≥20%
- Maintain palatable browse species composition of ≥15%
- Maintain a vegetative foliar cover of ≥15%
- Maintain a bare ground cover class of ≤10%

Rationale:
This key area is mapped in the 10-13" precipitation zone, however, the rainfall data for the complex shows an average precipitation complex-wide of approximately 9" annually. Due to the elevation and aspect of this key area, it was more appropriate to use the low-end values of the higher rainfall regime site description as opposed to the high-end values of the lower rainfall regime site description. Rationale for DPC objectives is taken from the NRCS Granitic Hills 10-13" p.z. ecological site description and reference sheet. The ecological site guide shows a grass composition from 43-76%, and the reference sheet indicates perennial grass cover of 20-30% of the canopy cover. The perennial grass objective of 20% or greater is appropriate to the site due to the reduced rainfall recieved and will maintain important forage for wildlife and desert tortoise. The ecological site guide shows shrub production from 28-42% on the site. Maintaining a palatable browse composition of 15% or greater will provide adequate forage on the site and is appropriate to the potential for the site, as not all shrub species are palatable. The ecological site description shows an expected canopy cover of 15-25%, of which 20-30% is grasses. Maintaining a vegetative foliar cover of 15% or greater is appropriate to the site due to its aspect and slope, and will prevent accelerated erosion of the site. Bare ground cover class is expected to be between 15-20% in the reference state. Maintaining a bare ground cover class of 10% or less is appropriate to this site due to its slope and gravel cover, and will prevent accelerated erosion of the site.

Key Area 4
Volcanic Hills 7-10"pz

- Maintain palatable browse species composition at ≥15%
- Maintain vegetative foliar cover of ≥15%
- Maintain a Bare Ground cover class of ≤10%

Rationale:
Rationale for DPC objectives is taken from the NRCS Volcanic Hills 7-10" p.z. ecological site description and Reference Sheet (R040XB222AZ). Perennial grass composition in the ecological site description is between 1-5%, while the reference sheet shows limited potential for perennial grass production. While the site is located in Category 1 desert tortoise habitat, the ecological site is incapable of meeting the grass requirements for tortoise habitat, and a grass composition objective was not set. Shrub and forb composition on the site is expected to be between 52-88% in the ecological site description. Maintaining a palatable browse composition of 15% or greater will provide adequate forage on the site and meet habitat requirements for Sonoran desert tortoise. The reference sheet shows an expected canopy cover of 10-20%, of which 90-95% is trees, 3-7% shrubs and halfshrubs, and 1-2% succulents. Maintaining a

vegetative foliar cover of 15% or greater is appropriate to the site due to its slope, and will prevent accelerated erosion of the site. Bare ground cover class is expected to be between 1-5% in the reference state due to gravel cover. Maintaining a bare ground cover class of 10% or less is appropriate to this site due to gravel and rock cover, and will prevent accelerated erosion.

The Forepaugh Allotment

Key Area 1
Limy Upland 7-10"pz

- Maintain a perennial grass composition of ≥5%
- Maintain a palatable browse species composition of ≥10%
- Maintain a vegetative foliar cover of ≥15%
- Maintain a Bare Ground cover class of ≤40%

Rationale:
Rationale for DPC objectives is taken from the NRCS Limy Upland 7-10" p.z. Ecological Site Description and Reference Sheet (R038XB210AZ). The reference sheet shows a perennial grass cover of 0-1%, and the ecological site guide shows a perennial grass composition between 1-5%. The perennial grass objective exceeds the reference state, and lies within the expected range of the ecological site description. Shrub composition is expected to be between 53-86% per the ecological site description. Maintaining a palatable browse composition of 10% or greater will provide adequate forage on the site and is appropriate to the ecological site, as not all species present are palatable. (See Appendix A, Section 3).The reference sheet shows an expected canopy cover of 20-25%. Maintaining a vegetative foliar cover of 15% or greater is appropriate to the site due to its aspect and slope, as foliar cover tends to underestimate canopy cover, and will prevent accelerated erosion of the site. Bare ground cover class is expected to be between 10-60% in the reference state. Maintaining a bare ground cover class of 40% or less is appropriate to this site due to slope and aspect, and will prevent accelerated erosion of the site above what is expected in the reference state.

The Cross Mountain Allotment

Key Area 1
Limy Fan 7-10"pz

- Maintain a palatable browse species composition of ≥20%
- Maintain a vegetative foliar cover of ≥10%
- Maintain a Bare Ground cover class of ≤60%

Rationale:
Rationale for DPC objectives is taken from the NRCS Limy Fan7-10" p.z. Ecological Site Description and Reference Sheet (R038XB207AZ). This site shows significant prior disturbance due to Echeverria Field being located adjacent. Grass is present in small areas adjacent to the site, but the site shows limited potential for grass recruitment, and a perennial grass objective was not set. Shrub and forb composition is expected to be between 50-100% per the ecological site description, up to 66% of which may be creosotebush. Maintaining a palatable browse composition of 20% or greater will provide adequate forage on the site and is appropriate to the ecological site, as not all species present are palatable. (See Appendix A, Section 3).The reference sheet shows an expected canopy cover of 50-70%, of which 90-

95% is shrubs, and 0-1% perennial grass. The ecological site description shows an expected canopy cover from 10-15%. Maintaining a vegetative foliar cover of 10% or greater is appropriate to the site due to its aspect and slope, as foliar cover tends to underestimate canopy cover, and will prevent accelerated erosion of the site. Bare ground cover class is expected to be between 10-60% in the reference state. Maintaining a bare ground cover class of 60% or less is appropriate to this site due to slope, disturbance, and lack of gravel cover, and will prevent accelerated erosion of the site above what is expected in the reference state.

The Auza Allotment

Key Area 1
Limy Upland 7-10"pz Deep

- Maintain a palatable browse species composition of ≥40%
- Maintain a vegetative foliar cover of ≥15%
- Maintain a Bare Ground cover class of ≤20%

Rationale:

Rationale for DPC objectives is taken from the NRCS Limy Upland 7-10" p.z. Deep Ecological Site Description and Reference Sheet (R038XB208AZ). The reference sheet shows a perennial grass cover of 0-1%, and the ecological site guide shows a perennial grass composition between 1-5%. Limited perennial grass is present on the site, and recruitment opportunities are limited. Due to this, a perennial grass objective was not set. Shrub and forb composition is expected to be between 80-100% per the ecological site description. Maintaining a palatable browse composition of 40% or greater will provide adequate forage on the site and is appropriate to the ecological site, as not all species present are palatable. (See Appendix A, Section 3).The reference sheet shows an expected canopy cover of 20-25%. Maintaining a vegetative foliar cover of 15% or greater is appropriate to the site due to its aspect and slope, as foliar cover tends to underestimate canopy cover, and will prevent accelerated erosion of the site. Bare ground cover class is expected to be between 10-60% in the reference state. Maintaining a bare ground cover class of 20% or less is appropriate to the site due to gravel cover present on the site, and will prevent accelerated erosion of the site above what is expected in the reference state.

5.0 Inventory and Monitoring Data

5.1 Rangeland Survey Data

Rangeland Inventory was completed on the Upper Centennial Complex in 1981. This inventory was completed using the Modified Soil Vegetation Inventory Methodology based on BLM Handbook H-4410-1, "National Range Handbook" and Technical Reference 1734-7, "Ecological Site Inventory". The inventory was used to determine range condition and apparent trend as described in the 1982 Lower Gila North Draft Grazing Environmental Impact Statement.

5.2 Upland Monitoring Protocols

Monitoring protocols used at the Key Areas on the allotments include a variety of study methods. Compliance with Standard One is completed using the Interpreting Indicators of Rangeland Health study method, as described in BLM Technical Reference 1734-6 Version 4 (2005). This study method is supplemented with quantitative data collected in the methods described below.

Compliance with Standard Three is completed using a variety of upland study methods. All Key Areas were conducted using Pace Frequency, Dry Weight Rank, and Point Cover for the 2011-2015 data sets. Earlier data sets consisted of Pace Frequency and Point Cover only. These study methods were conducted using a 40x40cm frame with a centrally located point. These methods are described in detail in BLM Technical Reference 1734-4, "Sampling Vegetation Attributes".

Point cover methods have varied since some of the Key Areas within the complex were established, and historic data is generally not comparable to current data for the Bare Ground, Gravel, and Rock cover classes due to different methods of collection. Pace frequency methods are equivalent across all years.

Utilization data was collected at each Key Area using the Key Species method from 2011-2015. Prior studies on these sites were completed using either the Key Species or Grazed Class method. These methods are described in BLM Technical Reference 1734-3, "Utilization Studies and Residual Measurements".

6.0 Management Evaluation and Summary of Studies Data

6.1 Actual Use

Actual Use reporting is not required on the allotments in the Upper Centennial Complex. Livestock numbers provided in the tables below are based on ranch records provided by the permittees or billed use. Actual numbers on the Forepaugh, Cross Mountain, and Auza allotments are expected to greater than what is listed in the tables below, as the BLM permits do not account for the state lease stocking rates.

6.1.1 CARCO Allotment

Number of Active Livestock	Kind	Grazing Begin	Grazing End	%PL	AUM"s
211	Cattle	3/1/15	2/28/16	92	2329
211	Cattle	3/1/14	2/28/15	92	2329
211	Cattle	3/1/13	2/28/14	92	2329
211	Cattle	3/1/12	2/28/13	92	2329
211	Cattle	3/1/11	2/28/12	92	2329
211	Cattle	3/1/10	2/28/11	92	2329
211	Cattle	3/1/09	2/28/10	92	2329
211	Cattle	3/1/08	2/28/09	92	2329
211	Cattle	3/1/07	2/28/08	92	2329
211	Cattle	3/1/06	2/28/07	92	2329

6.1.2 Forepaugh Allotment

Number of Active Livestock	Kind	Grazing Begin	Grazing End	%PL	AUM"s
74	Cattle	3/1/15	2/28/16	100	888
74	Cattle	3/1/14	2/28/15	100	888

74	Cattle	3/1/13	2/28/14	100	888
74	Cattle	3/1/12	2/28/13	100	888
74	Cattle	3/1/11	2/28/12	100	888
74	Cattle	3/1/10	2/28/11	100	888
74	Cattle	3/1/09	2/28/10	100	888
74	Cattle	3/1/08	2/28/09	100	888
74	Cattle	3/1/07	2/28/08	100	888
74	Cattle	3/1/06	2/28/07	100	888

6.1.3 Cross Mountain Allotment

Number of Active Livestock	Kind	Grazing Begin	Grazing End	%PL	AUM"s
1	Cattle	3/1/15	2/28/16	100	12
1	Cattle	3/1/14	2/28/15	100	12
1	Cattle	3/1/13	2/28/14	100	12
1	Cattle	3/1/12	2/28/13	100	12
1	Cattle	3/1/11	2/28/12	100	12
1	Cattle	3/1/10	2/28/11	100	12
1	Cattle	3/1/09	2/28/10	100	12
1	Cattle	3/1/08	2/28/09	100	12
1	Cattle	3/1/07	2/28/08	100	12
1	Cattle	3/1/06	2/28/07	100	12

6.1.4 Auza Allotment

Number of Active Livestock	Kind	Grazing Begin	Grazing End	%PL	AUM"s
7	Cattle	3/1/15	2/28/16	100	84
7	Cattle	3/1/14	2/28/15	100	84
7	Cattle	3/1/13	2/28/14	100	84
7	Cattle	3/1/12	2/28/13	100	84
7	Cattle	3/1/11	2/28/12	100	84
7	Cattle	3/1/10	2/28/11	100	84
7	Cattle	3/1/09	2/28/10	100	84
7	Cattle	3/1/08	2/28/09	100	84
7	Cattle	3/1/07	2/28/08	100	84
7	Cattle	3/1/06	2/28/07	100	84

7.0 Conclusions

7.1 Upland Health Conclusions

Upland Health Conclusions are based on the analysis of the current monitoring data for each key area. Standard Three analysis is based on Dry Weight Rank, Belt Density, Line Intercept and/or Point Cover study methods. Grass composition results are based on the sum composition percent for all grass species occurring on the study area. Palatable shrub composition results are based on the sum composition percent for all palatable browse species as listed, by animal species, in Appendix A, Section 3, "Upper Centennial Complex Plant List". Vegetative foliar cover and bare ground cover class results are based on point cover data.

Summary of Standard Achievement or Non-achievement for all Key Areas:

Allotment	Key Area	Standard One	Standard Three
CARCO	1	Achieved	Achieved
	2	Achieved	Achieved
	3	Achieved	Achieved
	4	Achieved	Achieved
Forepaugh	1	Achieved	Not Achieved
Cross Mountain	1	Not Achieved	Achieved
Auza	1	Achieved	Achieved

Utilization data is used to determine if livestock are a potential causal factor for non-achievement of Standards. Based on Holechek (1988), livestock utilization levels on perennial grass species in this precipitation zone should be between 30-40% for moderate use without producing deleterious effects to the ecological site. Based on Heffelfinger (2006), browse utilization in this precipitation zone should be limited to 35% to prevent deleterious effects to deer habitat.

7.1.1 CARCO allotment

Key Area 1

Standard One: Upland Site Achieves Standard

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

Signs of accelerated erosion are minimal and are consistent with the site reference state. Soil and Site Stability and Hydrologic Function ratings are both categorized as a "None to Slight Departure" from the reference state. Reference Section 2.1.1 of Appendix A.

Standard Three: Standard is achieved on this site.

- Maintain a perennial grass composition of ≥10% NOT ACHIEVED
- Maintain palatable browse species composition of ≥15% ACHIEVED
- Maintain a vegetative foliar cover of ≥20% ACHIEVED
- Maintain a bare ground cover class of ≤40% ACHIEVED

Rationale:

This key area does not meet objectives for perennial grasses, with a grass composition of slightly less than 8%. Palatable browse composition objectives are met for desert tortoise, at slightly less than 73% of composition, slightly more than 28% discounting the limited browse value of creosotebush. Browse composition objectives are met for mule deer, at slightly more than 91% of composition, slightly less than 47% when discounting the limited browse value of creosotebush. Vegetative foliar cover objectives are met, with a vegetative foliar cover of slightly more than 26%. Bare ground cover class objectives are met, with a bare ground percentage of slightly less than 11%.

Trend:
Perennial grass frequency has substantially decreased on this site. Pleuraphis species decreased since the 1980s from 69% frequency to 7% frequency currently. Most woody species have maintained similar frequencies since the 1980s, with significant reductions in cholla species and increases in Acacia species. Utilization on this site has generally been in the slight to light category since the site was established, indicating livestock are unlikely to be a causal factor for the reduction of grasses on the site. Prolonged drought, particularly related to monsoonal moisture, is the most likely reason for the lack of recruitment on warm-season grasses on this ecological site.

Key Area 2
Standard One: Upland Site Achieves Standard
Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).

Signs of accelerated erosion are present on this site, however, these appear to be revegetating and are likely due to flooding evening in the late 1990s. Soil and Site Stability and Hydrologic Function ratings are both categorized as a "None to Slight Departure" from the reference state. Reference Section 2.1.2 of Appendix A.

Standard Three: Standard is achieved on this site.

- Maintain a perennial grass composition of ≥20% ACHIEVED
- Maintain palatable browse species composition of ≥10% ACHIEVED
- Maintain a vegetative foliar cover of ≥15% NOT ACHIEVED
- Maintain a bare ground cover class of ≤45% ACHIEVED

Rationale:
This key area meets objectives for perennial grass species, with a perennial grass composition of slightly more than 24%. Palatable browse composition objectives are met for desert tortoise, with slightly more than 59% of the plant community, slightly less than 23% when discounting the limited palatability of creosotebush. Browse composition objectives are met for mule deer, at slightly more than 70% of the plant community, slightly less than 34% when discounting the limited palatability of creosotebush. Vegetative foliar objectives are not met, with a foliar cover of 13%. Bare ground cover class objectives are met, with a bare ground cover class of 39%.

Trend:
Perennial grass frequency decreased on this site for Pleuraphis species. Woody species have generally maintained similar frequencies with the exception of cholla. Utilization levels since site establishment have been light to moderate with a few years of increased use in the late 1980s and early 1990s. Based on the historic use patterns, it is unlikely that livestock grazing is a major causal factor for the reduction

in grasses on the site. Long-term drought is expected to increase grass mortality and affect grass recruitment on this ecological site.The site could benefit from several grazing seasons of reduced livestock use during and immediately following the monsoon season. In the late 1990s, this site experienced a flooding event due to heavy rainfall and its location adjacent to a drainage. It's probable that this removed shallower rooted species and impeded vegetation recruitment on this site due to increased channelization of the sheet flow typical of this ecological site.

Key Area 3

Standard One: Upland Site Achieves Standard

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

Signs of accelerated erosion are minimal and are consistent with the site reference state. Soil and Site Stability and Hydrologic Function ratings are both categorized as a "None to Slight Departure" from the reference state. Reference Section 2.1.3 of Appendix A.

Standard Three: Standard is achieved on this site.

- Maintain a perennial grass composition of ≥20% ACHIEVED
- Maintain palatable browse species composition of ≥15% ACHIEVED
- Maintain a vegetative foliar cover of ≥15% ACHIEVED
- Maintain a bare ground cover class of ≤10% ACHIEVED

Rationale:

This key area meets objectives for perennial grasses, with a grass composition of slightly less than 30%. Palatable browse composition objectives are met for desert tortoise, at 39% of composition. Browse composition objectives are met for mule deer, at slightly more than 48% of composition. Vegetative foliar cover objectives are met, with a vegetative foliar cover of 15%. Bare ground cover class objectives are met, with a bare ground percentage of 0%, primarily due to the high gravel and rock cover on the site of 70%.

Trend:

Perennial grass frequency has oscillated on this site. Pleuraphis species have decreased in frequency, while Muhlenbergia and Dasyochloa species have increased, and Tridens muticus has established on the site. Overall, grass frequency for all species was 31.5% in 1982, and 40.5% in 2013. The decrease of warm-season grasses suggests a reduction in monsoonal moisture on the site. Woody upland species have generally maintained consistent frequencies across the site, with the exceptions of Acamptopappus and Ambrosia species removal and colonization, respectively. Utilization on this site has generally been slight to light, with heavy utilization only noted in one year. Based on the utilization observed, livestock are unlikely to be a causal factor in the vegetation changes on the site.

Key Area 4

Standard One: Upland Site Achieves Standard

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

Signs of accelerated erosion are minimal and are consistent with the site reference state. Soil and Site Stability and Hydrologic Function ratings are both categorized as a "None to Slight Departure" from the reference state. Reference Section 2.1.4 of Appendix A.

Standard Three: Standard is achieved on this site.

- Maintain palatable browse species composition at ≥15% ACHEIVED
- Maintain vegetative foliar cover of ≥15% ACHIEVED
- Maintain a Bare Ground cover class of ≤10% ACHEIVED

Rationale:
Palatable browse objectives for desert tortoise are met on this site, at slightly more than 97% of composition, and slightly more than 74% when discounting creosotebush. Browse objectives for mule deer are met on this site, at slightly more than 59% of composition, and slightly less than 37% when discounting creosotebush. Vegetative foliar cover objectives are met on this site, with a foliar cover of 27.5%. Bare ground cover class objectives are met on this site, with a bare ground cover class of 4%.

7.1.2 Forepaugh Allotment

Key Area 1:
Standard One: Upland Site Achieves Standard
Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).

Signs of accelerated erosion are minimal and are consistent with the site reference state. Soil and Site Stability and Hydrologic Function ratings are both categorized as a "None to Slight Departure" from the reference state. Reference Section 2.2.1 of Appendix A.

Standard Three: Standard is not achieved on this site.

- Maintain a perennial grass composition of ≥5% ACHIEVED
- Maintain a palatable browse species composition of ≥10% NOT ACHIEVED
- Maintain a vegetative foliar cover of ≥15% NOT ACHIEVED
- Maintain a Bare Ground cover class of ≤40% ACHIEVED

Rationale:
The perennial grass composition objective is met on this site, with a perennial grass composition of slightly more than 6%. Palatable browse composition objectives are met for both desert tortoise and mule deer, however, nearly 90% of the site is composed of creosotebush, which is of limited forage value, and does not meet the intent of the objective. Vegetative foliar cover objectives are not met on this site, with a foliar cover of 12.5%. Bare ground cover class objectives are met on this site, with a bare ground cover class of 36.5%.

Utilization on this site has been slight to moderate since its establishment. It is unlikely that livestock use in this area has lead to the non-achievement of DPC objectives. Prolonged drought in this area is a likely causal factor for low foliar cover values and lack of palatable browse recruitment.

7.1.3 The Cross Mountain Allotment

Key Area 1:
Standard One: Upland Site Does Not Achieve Standard

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

The site does not meet the Standard due to extensive, heavy modification of the public lands within the allotment. Prior use as an air field has led to soil compaction on much of the area, as well as increased erosion adjacent to the airfield due to the increased runoff.

Standard Three: Standard is achieved on this site.

- Maintain a palatable browse species composition of ≥20% ACHIEVED
- Maintain a vegetative foliar cover of ≥10% ACHIEVED
- Maintain a Bare Ground cover class of ≤60% ACHIEVED

Rationale:
Palatable browse composition objectives are met for desert tortoise, at slightly less than 74% of composition without including creosotebush. The site does not lie within desert tortoise habitat. Browse objectives are met for mule deer, at slightly less than 39% composition without including creosotebush. Vegetative foliar cover objectives are met on this site, with a foliar cover of 12%. Bare ground cover class objectives are met on this site, with a bare ground cover class of 60%.

Utilization on this site is slight. Grass is present in clusters across the landscape on soils with a higher clay content. Utilization studies were located on one of these clusters adjacent to the monitoring site. Due to the historic disturbance of the site, it is unlikely that livestock are a causal factor for the non-achievement of Standard 1.

7.1.4 The Auza Allotment

Key Area 1:
Standard One: Upland Site Achieves Standard
Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).

Signs of accelerated erosion are minimal and are consistent with the site reference state. Soil and Site Stability and Hydrologic Function ratings are both categorized as a “None to Slight Departure” from the reference state. Reference Section 2.2.3 of Appendix A.

Standard Three: Standard is achieved on this site.

- Maintain a palatable browse species composition of ≥40% ACHIEVED
- Maintain a vegetative foliar cover of ≥15% ACHIEVED
- Maintain a Bare Ground cover class of ≤20% ACHIEVED

Rationale:
Palatable browse composition objectives are met for desert tortoise, at slightly less than 80% of composition. This key area does not lie within desert tortoise habitat. Browse objectives are met for mule deer, at slightly less than 82%. Vegetative foliar cover objectives are met on this site, with a foliar cover of 19%. Bare ground cover class objectives are met on this site, with a bare ground cover class of 8%.

8.0 Recommended Management Actions

8.1 Recommended Management Actions for all Allotments

To facilitate orderly management of the range, Actual Use reporting should be added to the terms and conditions of the permit and lease. The permittees have voluntarily submitted Actual Use for several years, however, adding the reporting requirement will ensure appropriate use levels have been maintained during drought years, and will facilitate desired stocking rate calculations in years that Utilization data is collected.

In order to reduce grazing pressure near livestock water sources within the complex, any salt or supplement blocks placed on the public lands should be located at least one-quarter of a mile from available water sources, and should be located at least one-eighth of a mile above major drainages. On the CARCO allotment, waters located along the flood plain of Bullard Wash would not have this restriction because forage on this floodplain is limited and moving salt off the waters is unlikely to have any effect on grazing distribution.

The south pasture of the CARCO allotment should continue to be managed as a primarily ephemeral pasture for spring use in years with adequate winter moisture. The northern pastures of the allotment, where feasible, should employ a rest-rotation system allowing for at least one out of five monsoonal periods in each pasture to remain ungrazed. This is expected to facilitate recruitment of warm-season perennial grasses which appear to be declining due to drought. Redevelopment of the water sources located in Rudy Pass will allow for improved livestock distribution in the higher elevations of the northern pastures and further reducing grazing pressure on the drought-affected lowlands.

Active livestock management on the Cross Mountain and Auza allotments is infeasible due to the large percentage of state lease lands intermingled with small tracts of public lands. Utilization levels are currently appropriate, and the allotments should continue to be managed under their current respective grazing systems, with the addition of the actual use reporting and salt placement.

9.0 List of Preparers

Name	Title
James Holden	Rangeland Management Specialist
Codey Carter	Wildlife Biologist
Kelly Scarbrough	Recreation Specialist

10.0 References

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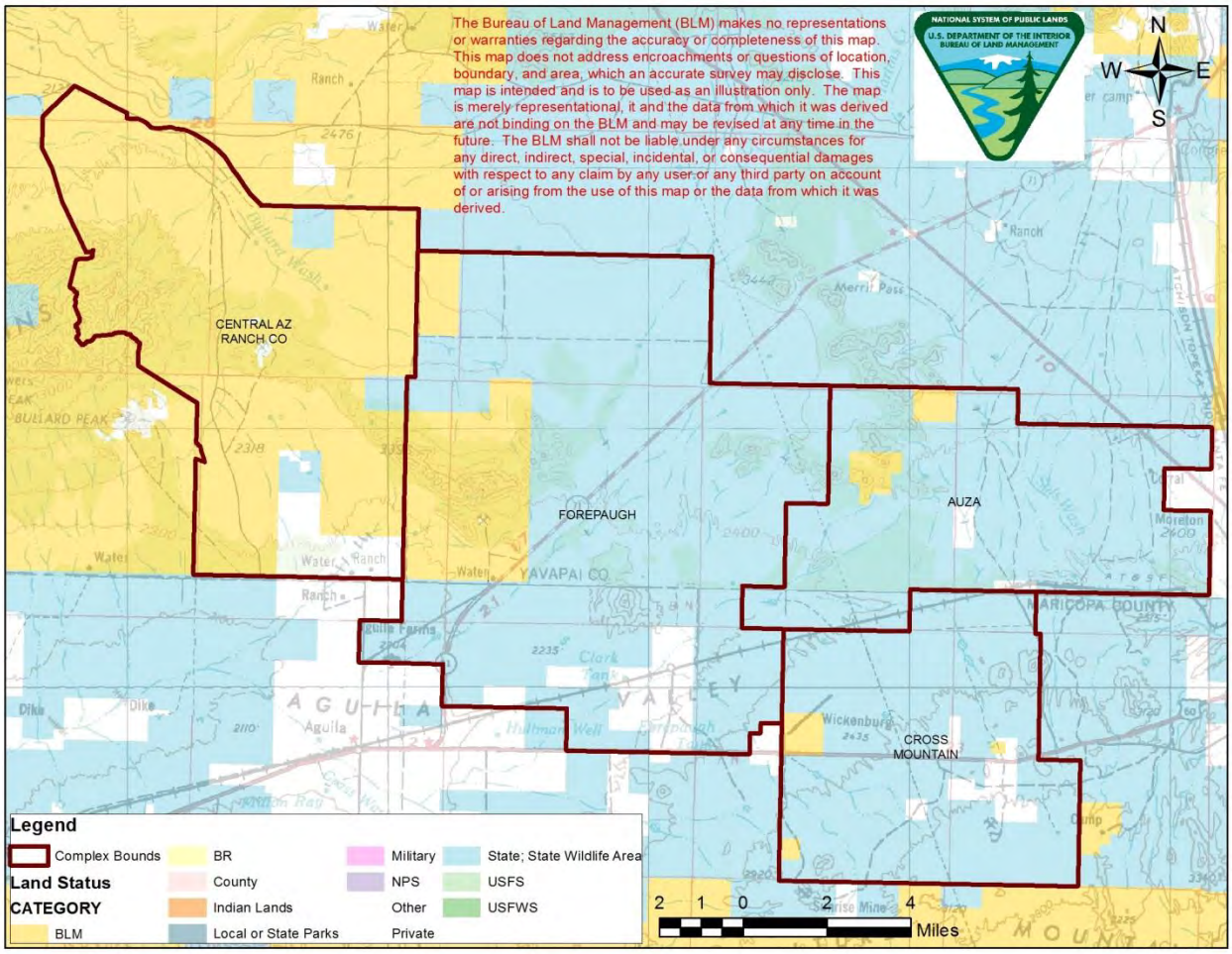
Upper Centennial Complex

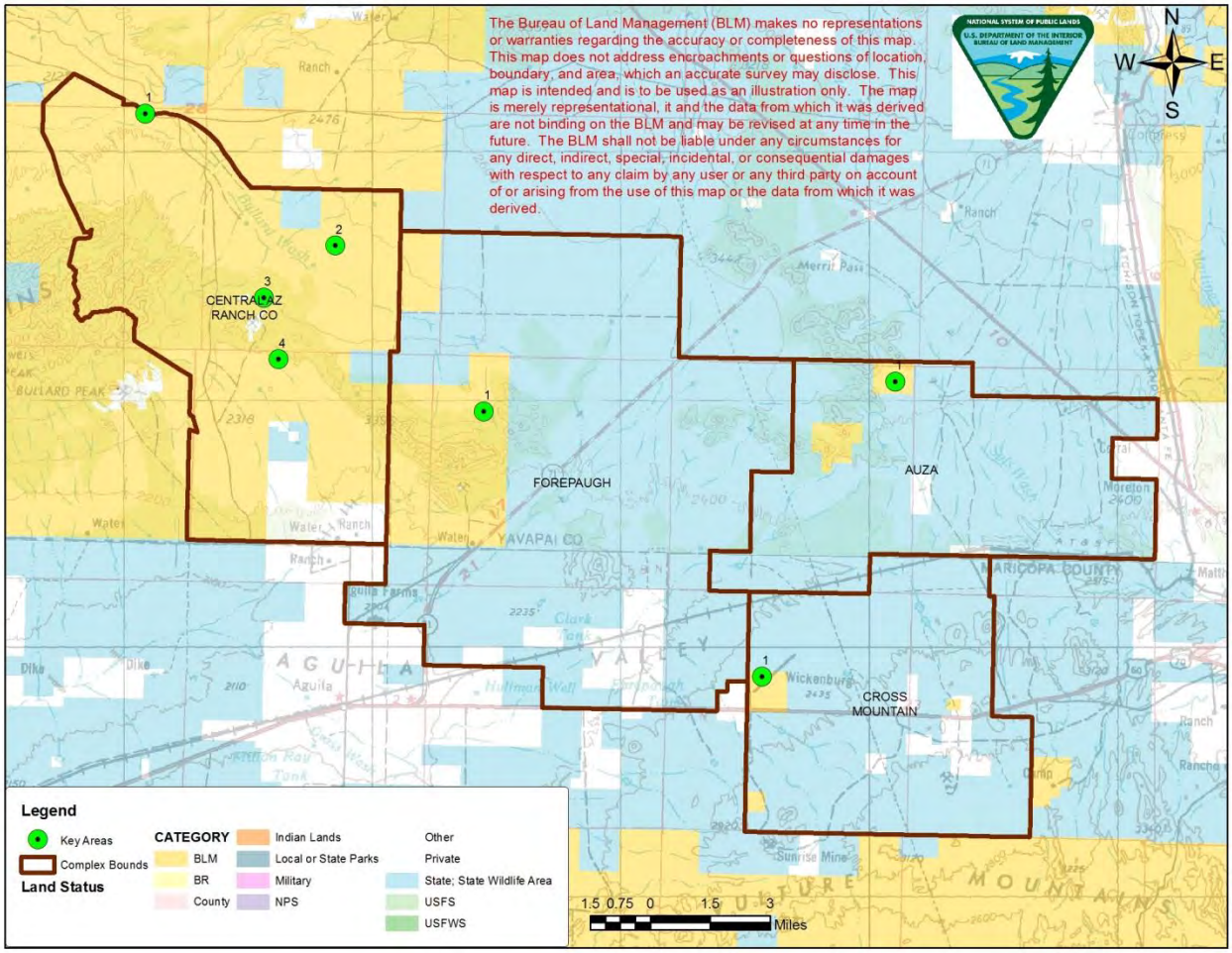
Data Appendices

1.0 Complex Maps

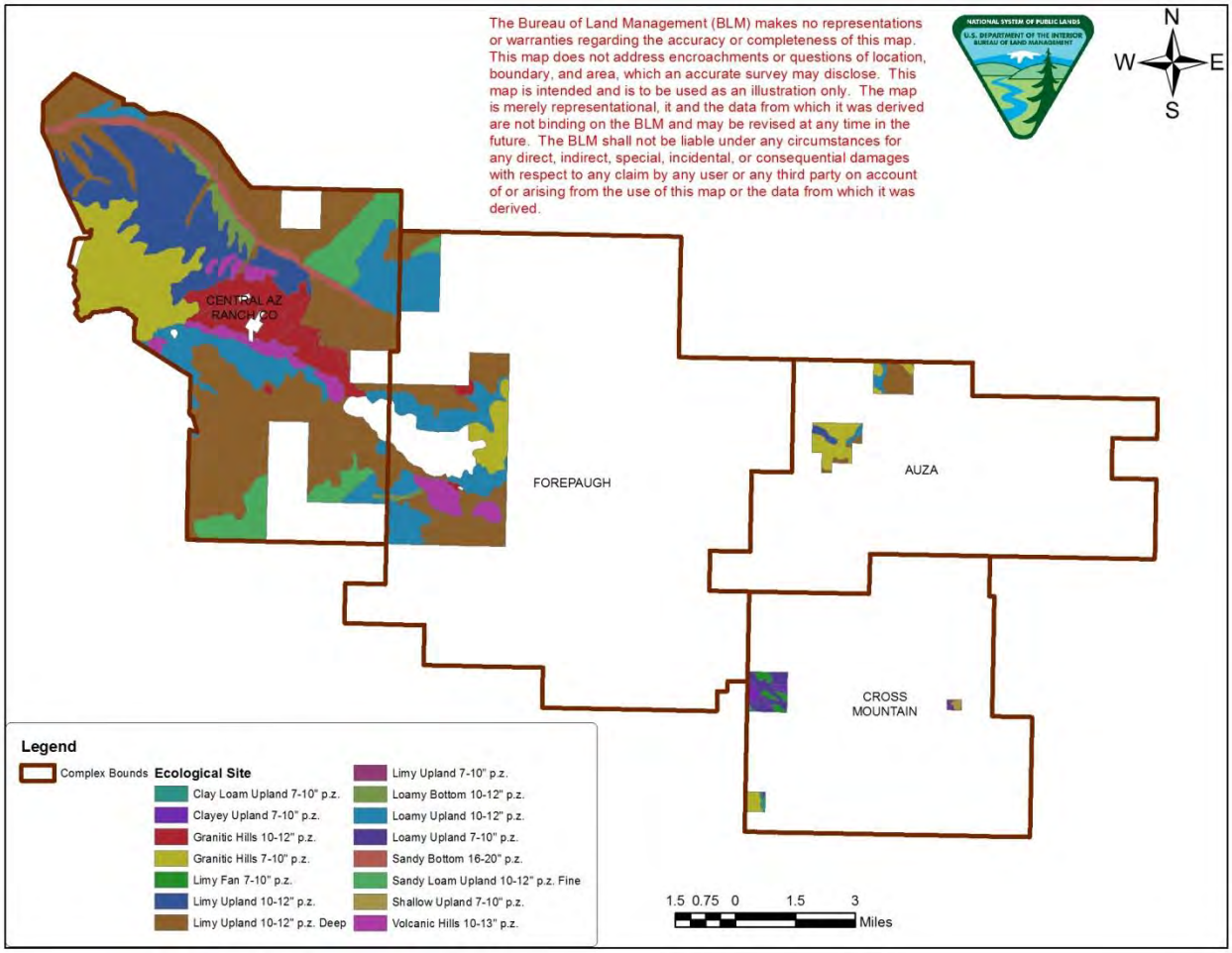
Map 1, Upper Centennial Complex Boundaries



Map 2, Upper Centennial Complex Key Areas



Map 3, Upper Centennial Complex Ecological Sites



2.0 Key Area Data

2.1 CARCO Allotment

2.1.1 Key Area 1

Interpreting Indicators of Rangeland Health:

Attribute Rating:	Rationale:
Soil and Site Stability (S):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with the expected conditions on the site.
Hydrologic Function (H):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with the expected conditions on the site.
Biotic Integrity (B):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with the expected conditions on the site.

Codes: N-S (None to Slight) S-M (Slight to Moderate) M (Moderate) M-E (Moderate to Extreme) E-T (Extreme to Total)

Point Cover Data:

Point Cover data were collected in conjunction with dry weight rank and frequency data in 2013. Bare ground cover measures should not be directly compared. In prior years, gravel cover (2mm-1/2" size class) was included in the "Bare Ground" cover measure. The percent cover by cover class is given below:

Year	Bare Ground	Foliar Cover	Basal Cover	Litter	Gravel (2mm-1/2")	Rock (>1/2")	Cryptogam
1982	64.7	N/A	N/A	34.2	N/A	1.1	N/A
1988	58.0	N/A	7.5	29.5	N/A	5.0	N/A
1992	45.0	N/A	5.0	46.0	N/A	4.0	N/A
2013	10.5	26.5	1.0	26.5	31.0	2.5	2.0

Frequency and Composition Data:

Composition data is based on Dry Weight Rank.

KA1 Plant Species	Symbol	Frequency (%)				Composition (%)
Tree and Shrub Species		**2013**	**1992**	**1988**	**1982**	**2013**
Acacia constricta	ACCO2	8.0	1.0	1.5	1.0	12.8
Acacia greggii	ACGR	2.0	2.0	1.5	-	2.7
Acamptopappus sphaerocephalus	ACSP	-	4.5	2.0	2.0	-
Ambrosia dumosa	AMDU2	4.5	-	-	-	7.6
Cylindropuntia acanthocarpa	CYACA2	5.0	8.5	11.0	28.0	6.9
Echinocereus engelmannii	ECEN	-	0.5	-	2.0	-
Ephedra trifurca	EPTR	2.0	2.5	2.5	1.0	3.6
Ferocactus acanthodes	FEAC	-	0.5	-	-	-
Hymenoclea salsola	HYSA	-	-	0.5	-	-
Krameria erecta	KRER	2.5	2.5	1.5	3.0	3.9
Larrea tridentata	LATR2	25.0	23.5	16.5	23.0	44.4
Lycium pallidum	LYPA	1.5	-	0.5	-	1.9

Opuntia basilaris	OPBA2	-	0.5	3.5	2.0	-
Parkinsonia microphyllum	PAMI5	-	-	1.0	-	-
Prosopis juliflora	PRJU	-	-	2.5	-	-
Salazaria mexicana	SAME	-	-	2.0	1.0	-
Stephanomeria pauciflora	STPA4	0.5	-	-	-	0.1
Yucca brevifolia	YUBR	4.0	1.5	3.0	5.0	5.6
Ziziphus obtusifolia	ZIOB	-	1.5	1.5	1.0	-
Grasses and Forbs						
Argythamnia claryana	ARCL2	-	1.0	-	-	-
Dasyochloa pulchella	DAPU7	-	4.0	7.5	-	-
Eriogonum inflatum	ERIN4	0.5	0.5	3.0	3.0	0.1
Muhlenbergia porteri	MUPO2	-	0.5	-	2.0	-
Phoradendron sp.	PHORA	0.5	-	-	-	0.1
Pleuraphis rigida	PLRI3	7.0	35.5	47.0	69.0	7.7
Sphaeralcea ambigua	SPAM2	1.0	1.0	2.0	1.0	1.6
Annuals						
Annual Forbs	AAFF	-	96.5	100	97	N/A
Annual Grasses	AAGG	-	96.5	100	89	N/A

Utilization data:

KA 1 Utilization				
Year	PLRI/ PLMU	KRER	EPHED	SAME
4/16	26.9	17.5	-	-
1/15	26.2	-	12.5	-
10/93	12.0	-	18.2	15.2
10/92	11.7	-	19.9	14.3
11/91	14.4	-	25.6	13.3
12/90	16.1	-	25.8	19.7
11/89	13.3	-	18.2	13.3
10/88	6.6	-	27.6	17.3
9/87	15.7	-	28.0	24.3
9/86	9.2	-	20.0	20.0
9/85	7.2	-	18.0	26.0
2/83	9	-	27.0	20.0
9/82	7	-	10.0	24.0

2.1.2 Key Area 2

Interpreting Indicators of Rangeland Health:

Attribute Rating:	Rationale:
Soil and Site Stability (S):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with the expected conditions on the site.
Hydrologic Function (H):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with the expected conditions on the site.
Biotic Integrity (B):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with the expected conditions on the site.

Codes: N-S (None to Slight) S-M (Slight to Moderate) M (Moderate) M-E (Moderate to Extreme) E-T (Extreme to Total)

Point Cover Data:

Point Cover data were collected in conjunction with dry weight rank and frequency data in 2013. Bare ground cover measures should not be directly compared. In prior years, gravel cover (2mm-1/2" size class) was included in the "Bare Ground" cover measure. The percent cover by cover class is given below:

Year	Bare Ground	Foliar Cover	Basal Cover	Litter	Gravel (2mm-2")	Rock (>1/2")	Rock (>2")	Cryptogam
1982	41.0	N/A	6.0	53.0	N/A	-	N/A	-
1988	69.0	N/A	3.5	27.5	N/A	-	N/A	-
1992	45.5	N/A	10.0	44.5	N/A	-	N/A	-
2013	39.0	13.0	3.5	40.0	3.5	N/A	-	1.0

Frequency and Composition Data:

Composition data is based on Dry Weight Rank.

Plant Species KA2	**Symbol**	**Frequency (%)**				**Composition (%)**
Tree and Shrub Species		**2013**	**1992**	**1988**	**1982**	**2013**
Acacia constricta	ACCO2	6.5	10.0	3.5	6.0	11.1
Acacia greggii	ACGR	0.5	0.5	3.5	-	1.0
Cylindropuntia acanthocarpa	CYACA2	7.5	22.0	20.5	13.0	11.2
Larrea tridentata	LATR2	19.0	12.5	10.0	17.5	36.3
Opuntia sp.	OPUNT	-	1.5	0.5	1.0	-
Prosopis juliflora	PRJU3	6.0	14.5	11.5	9.5	10.6
Grasses and Forbs						
Dichelostemma capitatum	DICAC5	4.5	-	-	-	5.6
Perezia nana	PENA5	-	-	-	4.5	-
Pleuraphis mutica	PLMU3	16.0	51.0	46.0	53.0	24.2
Sphaeralcea ambigua	SPAM2	-	3.0	6.0	0.5	-
Annuals						

Annual forbs	AAFF	-	99.5	100.0	100	N/A
Annual grasses	AAGG	-	90.5	100.0	97	N/A

Utilization data:

KA 2 Utilization		
Year	PLMU2/ HIMU2/ HIRI	PRJU
9/16	35.6	-
1/2015	15.4	-
3/13	20.3	-
10/93	15.9	23.6
10/92	27.9	23.5
11/91	27.0	16.0
12/90	41.0	16.7
11/89	49.7	25.5
10/88	16.2	17.6
9/87	49.8	19.8
9/86	44.8	14.0
9/85	38.2	12.0
2/83	46.0	10.0
9/82	25.0	>10%

2.1.3 Key Area 3

Interpreting Indicators of Rangeland Health:

Attribute Rating:	Rationale:
Soil and Site Stability (S):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with the expected conditions on the site.
Hydrologic Function (H):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with the expected conditions on the site.
Biotic Integrity (B):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with the expected conditions on the site.

Codes: N-S (None to Slight) S-M (Slight to Moderate) M (Moderate) M-E (Moderate to Extreme) E-T (Extreme to Total)

Point Cover Data:

Point Cover data were collected in conjunction with dry weight rank and frequency data in 2013. In prior years, gravel cover (2mm-1/2" size class) was included in the "Bare Ground" cover measure. The percent cover by cover class is given below:

Year	Bare Ground	Foliar Cover	Basal Cover	Litter	Gravel (2mm-2")	Rock (>1/2")	Rock (>2")
1982	44.0	N/A	5.5	21.5	N/A	29.0	N/A
1988	37.5	N/A	7.5	30.5	N/A	25.0	N/A
2013	0.0	15.0	0.5	14.5	56.5	N/A	13.5

Frequency and Composition Data:

Composition data is based on Dry Weight Rank.

Plant Species KA3	Symbol	Frequency (%)			Composition (%)
Tree and Shrub Species		2013	1988	1982	2013
Acacia constricta	ACCO2	2.0	2.0	1.5	1.6
Acacia greggii	ACGR	1.5	1.0	1.0	1.1
Acamptopappus sphaerocephalus	ACSP	-	16.0	10.0	-
Adenophyllum porophylloides	ADPO	-	-	3.0	-
Ambrosia dumosa	AMDU	12.5	-	-	9.6
Brickellia atractyloides	BRAT	0.5	1.0	-	0.5
Cylindropuntia acanthocarpa	CYACA2	1.5	2.5	1.0	1.0
Ephedra sp.	EPHED	2.5	2.5	2.5	1.2
Eriogonum fasciculatum	ERFA2	-	1.5	2.0	-
Fercactus acanthodes	FEAC	-	1.0	1.0	-
Fouquieria splendens	FOSP2	2.0	0.5	1.0	1.5
Janusia gracilis	JAGR	-	-	0.5	-
Krameria erecta	KRER	3.5	3.0	0.5	3.3
Larrea tridentata	LATR2	5.5	14.5	9.5	5.1
Lycium	LYCIU	0.5	2.5	2.0	0.4
Menodora scabra	MESC	7.0	-	1.5	5.3
Opuntia basilaris	OPBA2	-	0.5	0.5	-
Parkinsonia microphylla	PAMI5	13.0	11.0	10.5	12.4

Psilostrphe cooperi	PSCO2	2.0	5.5	1.5	0.8
Viguiera dentata	VIDE3	-	-	5.0	-
Yucca brevifolia	YUBR	-	0.5	0.5	-
Grasses and Forbs					
Baileya multiradiata	BAMU	-	1.0	-	-
Dasyochloa pulchella	DAPU7	14.0	14.0	6.5	10.5
Dichelostemma capitatum	DICAC5	45.5	-	2.0	17.4
Erodium sp.	ERODI	15.5	-	-	4.5
Eriogonum inflatum	ERIN4	5.0	4.5	4.0	2.6
Muhlenbergia porteri	MUPO2	11.5	3.0	3.0	8.0
Pleuraphis mutica	PLMU3	0.5	2.0	1.5	0.2
Pleuraphis rigida	PLRI3	11.5	34.5	20.5	10.0
Sphaeralcea ambigua	SPAM2	-	-	0.5	-
Tridens muticus	TRMU	3.0	0.5	-	1.2
Annuals					
Annual forbs	AAFF	-	100	100	N/A
Annual grasses	AAGG	-	100	99.5	N/A

Utilization data:

KA 3 Utliization	Utilization (%)		
Year	PLRI3/PLMU3	MUPO2	KRER
4/16	24.2	28.6	14.9
1/15	9.8	3.2	-
3/13	35.4	50.0	-
10/93	10.0	-	-
10/92	12.6	-	-
11/91	7.4	-	-
12/90	13.7	-	-
11/89	19.3	-	-
10/88	10.4	-	-
9/87	21.0	-	-
9/86	8.6	-	-
9/85	10.4	-	-
2/83	8.0	-	-
9/82	1.0	-	-

2.1.4 Key Area 4

Interpreting Indicators of Rangeland Health:

Attribute Rating:	Rationale:
Soil and Site Stability (S):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with the expected conditions on the site.
Hydrologic Function (H):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with the expected conditions on the site.

Biotic Integrity (B):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with the expected conditions on the site.

Codes: N-S (None to Slight) S-M (Slight to Moderate) M (Moderate) M-E (Moderate to Extreme) E-T (Extreme to Total)

Point Cover Data:

Year	Bare Ground	Foliar Cover	Basal Cover	Litter	Gravel (2mm-2")	Rock (>2")	Cryptogam
2016	4.0	27.5	3.0	26.0	42.0	24.0	1.0

Frequency and Composition Data:

Composition data is based on Dry Weight Rank.

Plant Species KA4	Symbol	Frequency (%)	Composition (%)
Tree and Shrub Species		**2016**	**2016**
Ambrosia dumosa	AMDU2	8.5	13.1
Encelia farinosa	ENFA	32.5	39.0
Eriogonum wrightii	ERWR	0.5	0.8
Fouquieria splendens	FOSP2	1.5	2.0
Krameria erecta	KRER	2.0	3.6
Larrea tridentata	LATR2	16.5	22.7
Parkinsonia microphylla	PAMI5	10.5	15.9
Grasses and Forbs			
Dasyochloa pulchella	DAPU7	1.0	1.7
Eriogonum inflatum	ERIN	0.5	0.3
Euphorbia sp.	EUPHO	0.5	0.9
Annuals			
Annual forbs	AAFF	0	N/A
Annual grasses	AAGG	0	N/A

Utilization data:

KA 4 Utliization	
	Utilization %
Year	AMDU
2016	2.5

2.2 Forepaugh Allotment

2.2.1 Key Area 1

Interpreting Indicators of Rangeland Health:

Attribute Rating:	Rationale:
Soil and Site Stability (S):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with the expected conditions on the site.
Hydrologic Function (H):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with the expected conditions on the site.
Biotic Integrity (B):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with the expected conditions on the site.

Codes: N-S (None to Slight) S-M (Slight to Moderate)M (Moderate)M-E (Moderate to Extreme) E-T (Extreme to Total)

Ground Cover Data:

Year	Bare Ground	Foliar Cover	Basal Cover	Litter	Gravel (2mm-1/2")	Rock (>1/2")
2013	36.5	12.5	1.0	16.0	22.0	12.0

Composition Data:

Composition data is taken from dry weight rank.

KA1 Plant Species	Symbol	Frequency (%)	Composition (%)
Tree and Shrub Species		**2013**	**2013**
Acacia greggii	ACGR	1.0	4
Fouquieria splendens	FOSP2	0.5	2
Larrea tridentata	LATR2	22.5	87.8
Grasses and Forbs			
Pleuraphis mutica	PLMU3	2.0	6.2

Utilization Data:

KA 1 Utliization		
	Utilization %	
Year	PLMU3	KRER
9/16	25.8	14.6
1/15	5.9	-
5/13	38.8	37.1

2.3 Cross Mountain Allotment

2.3.1 Key Area 1

Interpreting Indicators of Rangeland Health:

The 17 indicators of rangeland health were not collected at this key area. Due to the highly modified nature of the site from the Echeverria Air Field and glider training school, no suitable reference area could be established.

Point Cover Data:

Point Cover data were collected in conjunction with belt density and line intercept data in 2016.

Year	Bare Ground	Foliar Cover	Litter	Gravel (2mm-2")
2016	60	12	25	3

Composition Data:

Composition data is based on Belt Density.

Plant Species KA1	Symbol	Composition (%) 2016
Tree and Shrub Species		
Gutierrezia sp.	GUTIE	3.5
Larrea tridentata	LATR2	22.8
Prosopis velutina	PRVE	5.3
Grasses and Forbs		
Acourtia nana	ACNA2	35.1
Sphaeralcea ambigua	SPAM2	33.3

Utilization data:

KA 1 Utilization	Utilization %
Year	PLRI
5/16	7.0

2.4 Auza Allotment

2.4.1 Key Area 1

Interpreting Indicators of Rangeland Health:

Attribute Rating:	Rationale:
Soil and Site Stability (S):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with the expected conditions on the site.
Hydrologic Function (H):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with the expected conditions on the site.
Biotic Integrity (B):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with the expected conditions on the site.

Codes: N-S (None to Slight) S-M (Slight to Moderate) M (Moderate) M-E (Moderate to Extreme) E-T (Extreme to Total)

Point Cover Data:

Point Cover data were collected in conjunction with dry weight rank and frequency data in 2011. Bare ground cover measures should not be directly compared. In prior years, gravel cover (2mm-1/2" size class) was included in the "Bare Ground" cover measure. The percent cover by cover class is given below:

Year	Bare Ground	Foliar Cover	Basal Cover	Litter	Gravel (2mm-1/2")	Rock (>1/2")	Cryptogam
2013	8.0	19.0	5.0	32.5	32.5	2.5	0.5

Frequency and Composition Data:

Composition data is based on Dry Weight Rank.

Plant Species KA1	Symbol	Frequency (%)	Composition (%)
		2013	2013
Tree and Shrub Species			
Ambrosia dumosa	AMDU2	31.0	51.7
Cylindropuntia acanthocarpa	CYACA2	3.0	2.5
Hymenoclea salsola	HYSA	11.0	17.85
Larrea tridentata	LATR2	1.5	1.1
Parkinsonia microphylla	PAMI5	4.5	3.8
Prosopis velutina	PRVE	14.5	22.2
Grasses and Forbs			
Argythamnia neomexicana	ARNE2	1.5	0.6
Perezia	PEREZ2	0.5	0.1

Utilization data:

KA 1 Utilization	Utilization %		
Year	AMDU2	BORO2	HYSA
1/15	14.0	25.8	-
5/13	16.0	-	14.0

3.0 Upper Centennial Complex Plant List

The following plant list comprises all the plant species identified on long-term monitoring transects. This list is not exhaustive nor all inclusive of the plants on the Complex. Plant species on the list are identified by common name, scientific name, and NRCS Plants Database symbol. Palatable plants are identified, by species, for Sonoran desert tortoise, mule deer, and domestic livestock (cattle). Palatability of plant species for Sonoran desert tortoise is taken from VanDevender, et al (2002) and Oftedal (2002). Palatability of plant species for mule deer is taken from the "Habitat Guidelines for Mule Deer: Southwest Deserts Ecoregion" (Heffelfinger 2006) and "Diets of Desert Mule Deer" (Krausmann et al, 1997). Livestock plant palatability is taken from the Complex-associated Ecological Site Descriptions.

Common Name	Scientific Name	Symbol	Sonoran Tortoise	Mule Deer	Livestock
Whitethorn Acacia	Acacia constricta	ACCO2		X	
Catclaw Acacia	Acacia greggii	ACGR	X	X	
Rayless goldenhead	Acamptopappus sphaerocephalus	ACSP		X	
Perezia	Acourtia nana	ACNA2	X		
San Felipe dogweed	Adenophyllum porophylloides	ADPO	X	X	
Triangle leaf bursage	Ambrosia deltoidea	AMDE4	X	X	
White Bursage	Ambrosia dumosa	AMDU2	X	X	X
N/A	Annual forbs	AAFF	X	X	X
N/A	Annual grasses	AAGG	X	X	X
Desert silverbush	Argythamnia claryana	ARCL2	X	X	X
New Mexico silverbush	Argythamnia neomexicana	ARNE2	X	X	X
Desert marigold	Baileya multiradiata	BAMU		X	
Spearleaf brickelbush	Brickellia atractyloides	BRAT		X	
Buckhorn cholla	Cylindropuntia acanthocarpa	CYACA2	X	X	X
Fluffgrass	Dasyochloa pulchella	DAPU7	X		X
Bluedicks	Dichelostemma capitatum	DICAC5			
Engelmann's hedgehog	Echinocereus engelmannii	ECEN			
Brittlebush	Encelia farinosa	ENFA	X		
Mormon tea	Ephedra	EPHED	X	X	X
Mormon tea	Ephedra trifurca	EPTR	X	X	X
Flat-top buckwheat	Eriogonum fasiculatum	ERFA2	X	X	X
Desert Trumpet	Eriogonum inflatum	ERIN4	X	X	X
Erodium	Erodium sp.	ERIOD		X	
Shrubby buckwheat	Eriogonum wrightii	ERWR	X	X	X
Spurge	Euphorbia sp.	EUPHO	X	X	

California barrel cactus	Ferocactus acanthodes	FEAC	X	X	
ocotillo	Fouquieria splendens	FOSP2	X	X	
snakeweed	Gutierrezia sp.	GUTIE			
burrobrush	Hymenoclea salsola	HYSA			X
Slender janusia	Janusia gracilis	JAGR	X	X	X
Range ratany	Krameria erecta	KRER	X	X	X
Creosote bush	Larrea tridentata	LATR2	X	X	
Wolfberry	Lycium	LYCIU	X	X	
Pale desert-thorn	Lycium pallidum	LYPA	X	X	X
Rough menodora	Menodora scabra	MESC		X	X
Bush muhly	Muhlenbergia porteri	MUPO2	X	X	X
Beavertail prickly pear	Opuntia basilaris	OPBA2	X		
Prickly pear	Opuntia	OPUNT	X	X	X
Little leaf palo verde	Parkinsonia microphylla	PAMI5	X	X	X
mistletoe	Phoradendron sp.	PHORA		X	
Tobosagrass	Pleuraphis mutica	PLMU3	X		X
Big galleta	Pleuraphis rigida	PLRI3	X		X
Mesquite	Prosopis juliflora	PRJU3	X	X	X
Velvet mesquite	Prosopis velutina	PRVE	X	X	X
Whitestem paperflower	Psilostrophe cooperi	PSCO2	X	X	
Mexican bladdersage	Salazaria mexicana	SAME		X	
Globemallow	Sphaeralcea ambigua	SPAM2	X	X	X
Brownplume wirelettuce	Stephanomeria pauciflora	STPA4		X	
Slim tridens	Tridens muticus	TRMU	X		X
Toothleaf goldeneye	Viguiera dentata	VIDE3	X	X	
Joshua tree	Yucca brevifolia	YUBR		X	
Graythorn	Ziziphus obtusifolia	ZIOB			